

The
Training
Within
Industry
Report

1940 -1945

The
Training Within Industry
Report

1940 — 1945

*

A Record of the Development
of Management Techniques for
Improvement of Supervision—
Their Use and the Results

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621.7938

U. S. C.

WAR MANPOWER COMMISSION
BUREAU OF TRAINING
TRAINING WITHIN INDUSTRY SERVICE
Washington, D. C.: September 1945

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LETTERS OF TRANSMITTAL

SEPTEMBER, 1945

TO: MR. PHILIP S. VAN WYCK,
*Director, Bureau of Training,
War Manpower Commission.*

This report is made up of two parts—a narrative account of the organization, how it worked, the mistakes it made, and the results accomplished; and a technical section describing the development of the TWI programs and techniques.

Some of this material may appear to be critical, but it is not so intended. We have only tried to be factual and to set down just what happened and what we have learned in order that others may profit thereby. We fervently hope that there will not ever again be a need for another World War industrial training group, but for three of the TWI directors this has been a recurring assignment. Accordingly we feel responsible for setting down as much detail as possible.

We have learned so much about the techniques of training that what we knew before is as nothing. This learning has been at the expense of the taxpayers and therefore should be preserved and used in peacetime. These techniques are as applicable to peace as to war production.

TWI has worked under two agency heads—Mr. Sidney Hillman, of the Advisory Commission to the Council of National Defense who became Associate Director General of the Office of Production Management and also Director of its Labor Division and continued as Director of the Labor Division when it was transferred to the War Production Board; and then under Mr. Paul V. McNutt, Chairman of the War Manpower Commission. It has been part of the labor supply organization headed by Brigadier General Frank J. McSherry, and then one of the services of the Bureau of Training, first under Dr. W. W. Charters and then under Mr. Philip S. Van Wyck.

To all of these people and to the entire TWI staff we are grateful for continued and specific cooperation.

C. R. DOOLEY, *Director,
Training Within Industry.*

SEPTEMBER, 1945

To: Mr. EDWARD L. KEENAN,
Executive Director.

All those who are concerned with the development and administration of training will find the "Report" of the Training Within Industry Service of great value. It details fully the recognition of the urgent need in the early days of the war for immediate training of our rapidly expanding production supervisory force, and the practical and efficient "J" programs that were developed to meet this need.

These programs have functioned throughout the war years under the able leadership and direction of an outstanding group of industrial personnel and training people, with the cooperation and assistance of industry, labor, and government. The rank and file of TWI people have enabled and assisted management and labor through the use of these tools to shoulder those training responsibilities that they alone can discharge.

The war job is finished, but the "J" programs will continue in use by those who have been trained to use them.

PHILIP S. VAN WYCK, *Director,*
Bureau of Training.

SEPTEMBER, 1945

To: Mr. ROBERT C. GOODWIN,
Deputy Director.

The Training Within Industry Service has compiled its final report. This frankly written, highly instructive report covers the development and operation of the TWI program throughout its life, as well as detailing some interesting background preceding the war.

Mr. Dooley, Mr. Dietz, Mr. Kane, Mr. Conover, and their associates have done an outstanding training job. You and I had first-hand acquaintanceship with the splendid results attained in our heavily industrialized Fifth Region (Michigan, Ohio, and Kentucky) through TWI, as well as recognizing its nation-wide achievements.

The "Four Horsemen" feel that their war job is accomplished. The program has been terminated as far as Federal assistance is concerned. Industry and labor are carrying on from here. The "Report" will be a valuable tool in their hands.

EDWARD L. KEENAN,
Executive Director.

SEPTEMBER, 1945

To: Mr. PAUL V. McNUTT, *Chairman,*
War Manpower Commission.

It gives me much pleasure to present the "Training Within Industry Report." You are well acquainted with the great job TWI has done through the war years as their part of the gigantic total program of war training sponsored by, and coordinated by, the War Manpower Commission, in connection with the greatest recruitment and placement program of all time.

The TWI program is an exemplification of your long-time philosophy of "getting the job done" in a manner comporting with the best tenets of democracy. Industry was shown the need of doing, and aided in doing, its own training job.

ROBERT C. GOODWIN,
Deputy Director.

FOREWORD

In reading this Training Within Industry report, it is important to remember that TWI maintained the same fundamental pattern of organization and functioned under the same leadership throughout its existence, through all the reorganizations of the groups to which it has been assigned at one time or another. It originated in the Council of National Defense in August 1940 and its closing in the fall of 1945 came at the same time as the War Manpower Commission ceased to function.

It is not possible to try to understand this World War II agency called the "Training Within Industry Service" without looking at the backgrounds of the four men who developed and directed it: C. R. Dooley, Director; Walter Dietz, Associate Director; M. J. Kane and William Conover, Assistant Directors. They had known each other for years and shared the same philosophy of training for production, although each brought with him to TWI his own special experience and talent. Each joined TWI in 1940 on loan from his employer without government compensation.

Mr. Dooley has had three industrial connections—with Westinghouse Electric and Manufacturing Company which he joined in 1902, with the Standard Oil Company of New Jersey, and with the Socony-Vacuum Oil Company whose industrial relations manager he was when he came to Washington in 1940. In all of these companies the planning and direction of training was part of his responsibilities.

Mr. Dietz joined the Western Electric Company in 1902 and has been continuously associated with that company except when he has been on loan to the government for war-time assignments. He held the position of personnel relations manager of the Manufacturing Department when he came to Washington in 1940. Both Mr. Dooley and Mr. Dietz remained with TWI throughout its five years of operation.

Mr. Kane had been with the General Electric Company as a personnel manager before the first World War, and after that war went to the American Telephone and Telegraph Company where he was staff engineer on training of supervisors, instructors, and conference leaders when he came to TWI in 1940. After spending almost four and a half years with TWI, Mr. Kane left on January 1, 1945 to become director of industrial relations for the National Association of Manufacturers.

Mr. Conover came to TWI in 1940 from the United States Steel Corporation where he was assistant director of industrial relations.

His previous industrial connections were with the Philadelphia Gas Company, the Western Electric Company, and Lycoming Manufacturing Company. He left TWI in December 1944 to join the General Cable Corporation where he is director of manufacturing.

Mr. Dooley, Mr. Dietz, and Mr. Kane had been borrowed by the government in the first World War. In coming back to head a group facing even more difficult problems, they brought with them not only their own previous war training experience but also a knowledge of what had been happening in industrial training since World War I. They also brought the knowledge that the valuable experiences of the first war had not taken root in very many industrial establishments and therefore they had some idea of the difficulties of convincing management of its responsibilities in making use of training techniques to increase production. This time, the work had to go deeper into the consciousness of management.

All four of these men were originally borrowed from their companies for short terms of a few weeks, six months at the most. Socony-Vacuum, Western Electric, American Telephone and Telegraph, and U. S. Steel often asked how much longer their men were going to be needed in Washington, but it was always possible to arrange for just a little more time. A great debt is owed these companies for their cooperation and generosity.

Mr. Dooley, Mr. Dietz, Mr. Kane, and Mr. Conover continued to feel all the time that the day of their return was just around the corner, that soon contracting companies would accept responsibility and no longer need help from Washington except as they learned of new techniques through the TWI district offices acting as a clearing-house. Their field organization consisted of 22 district offices, each of which likewise started around a nucleus of staff borrowed from industry, but gradually a beginning was made toward the building of a paid staff, both in the districts and at TWI headquarters, until in 1944 it reached a peak of a little over 400.

This report gives a public accounting of the work done by this staff of industrial men and women, both those loaned by their companies and those who were recruited for TWI employment, and by the more than 600 advisers and consultants on the headquarters and district panels and by the 23,000 industrial men and women who were prepared as TWI trainers and who did the actual training in supervisory skills which resulted in almost 2,000,000 certifications for supervisors in over 16,000 war production plants and essential services.

PAUL V. McNUTT, *Chairman,*
War Manpower Commission.

P R E F A C E

Training Within Industry was an emergency service to the nation's war contractors and essential services. Its staff was drawn from industry to give assistance to industry, and its history covers the time from the Fall of France to the end of World War II—from the summer of 1940 to the fall of 1945. TWI's objectives were to help contractors to get out better war production, faster, so that the war might be shortened, and to help industry to lower the cost of war materials.

Training Within Industry is known for the results of its programs—Job Instruction, Job Methods, Job Relations, and Program Development—which have, we believe, permanently become part of American industrial operations as accepted tools of management.

There is nothing new about TWI programs—they are built on accepted principles. The only new thing is that something was done about getting them used. If there is any single thing that could be stated as “what TWI has learned,” it would be that “the establishment of principles, and even getting acceptance by managers, alone have practically no value in increasing production.” “*What to do*” is not enough. It is only when people are drilled in “*how to do it*” that action results.

During a period of national emergency it was right to set up and operate a federal group such as TWI at public expense. In peacetime the development of techniques for in-plant training and their use to get production results is so profitable that it is properly something which private enterprise should operate and pay for. The long-term use of these programs in American industry is just now beginning. TWI is like a new ship which has completed its trial run with a crew drawn from the builder's staff—the ship is now turned over to the owners, American industrial plants and service organizations, to man and operate.

TWI work was undertaken to meet the specific objective of immediately increasing production for defense, then for war. No long-range objective was set, but there are many implications for the development of the individual and for the improvement of the country's educational system. In this respect, TWI headquarters was fortunate to have on its staff for a time, as a special consultant, Dr. Charles Riborg Mann, who had served as Chairman of the War Department's Committee on Education and Special Training during World War I. Dr. Mann, with his wide perspective, wrote the following just before his death in 1942:

The Common Goal

We all want to meet the demands of war—maximum production through best use of our facilities and talents. But we can also build for the future in meeting the present challenge. The training we give the worker to do a good job *now* for war production can be more than an expedient means of getting the job done. It can be suitable to the individual and in line with his native talent and aspiration. Then it becomes education because the worker placed in the line of work he desires, and trained in accordance with his talent and aspiration, is a growing individual—mentally, morally, and spiritually, as well as technically. Training done from this point of view promotes production now and builds better citizens for a greater national stability afterwards.

National strength may be increased without limit by education that builds men. A nation of strong men may multiply its strength many fold by organization of its manpower into an effective team driving to achieve a common goal. Education and organization are thus the tools with which America must shape her destiny.

The development of the TWI programs has been a superb team job involving many people. Particular credit should be given to four members of this team, first to Glenn Gardiner (TWI's New Jersey District Director) who, as chairman of a group of industrial people in New Jersey, was responsible for the original plans for TWI's first program, Job Instruction, and also for the Job Methods program.

Walter Dietz (TWI's Associate Director from its beginning in 1940 and the head of its development group) was specifically responsible for the conception and working-out of Job Relations and Program Development. The technical histories of each of these programs and the contributions of the many people who conducted, controlled, and revised the successive experimental versions are given in Part II of this report.

Throughout the many stages of the development of these programs, Mike Kane and Bill Conover assisted, particularly in checking results in plants. They were first to center attention on the necessity of management support to get full use. They supervised the launching of the programs nation-wide and directed the rigid quality control throughout the nation whereby a high degree of uniformity of performance was maintained.

In a report of this length it just is not possible to give a complete story—when one TWI district's experience is mentioned or one company's results described, it is as an example of what happened many times in many places. The preparation of this report has been a team job—district records have been used, many staff members have contributed, and we have drawn upon what has already been said and written about TWI in magazines and newspapers. It has been compiled by Frances Kirkpatrick of the Headquarters staff under the direction of Walter Dietz. Its appearance at this date is due to the

faithful service of TWI Headquarters secretaries and stenographers who have stayed with their jobs throughout difficult liquidation days.

Individuals may later write of their own experiences in TWI, and probably there will be various interpretations and evaluations, but this report is the official account by the TWI organization for the record.

C. R. DOOLEY,
Director of Training Within Industry.

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Part I

TWI Work with War Industry

Chapter 1

GETTING THE TRAINING WITHIN INDUSTRY IDEA INTO ACTION

The summer of 1940 was a stock-taking period. Managers and Army planners were saying: "Just what does the country now have, in machines and the tools to make them, in plants and in good locations for plants, in manpower trained or untrained? What can be done to turn out more tools, to build more plants, to make more people productively useful?" For eighteen months further the United States tried to hold the war at a good arm's length, both by increasing aid to the countries which were already at war with the Axis powers and by strengthening our own defensive powers.

No all-out defense effort existed, but many emergency governmental groups were set up, and much planning was done for production increases. Training Within Industry was one of the first emergency services to be organized after the Fall of France on June 22, 1940.

According to the Bureau of the Census, there were still eight million unemployed people in the summer of 1940, including the more than three million whose employment was on the government projects of WPA, CCC, and NYA. Most of those people had never worked in a factory or a shipyard. Many had never been associated with any productive enterprise. The nation's vocational education system could be geared to give them some schooling before they went to work, but not even the best school could bring them up to the level of productive proficiency that would be required by the demands being placed on the aircraft and automotive plants and the shipyards even in the defense days. Much would remain for industry itself to do. In peacetime it is good business practice for any plant to do all in its power to increase the ability and skill of its workers so that they will produce maximum quantities of quality work without loss of time and materials. In a time of National danger, it became of prime importance for the Federal government to do all in its power to help industry to help itself to get out more materials than had ever been thought possible, and at a constantly accelerating speed. The Arsenal of Democracy was being built.

NATIONAL DEFENSE

A defense phase before a World War was not an entirely new experience. In 1916 the United States had looked at spreading conflict and had taken steps to increase its productive resources. A Council of National Defense had been established "for the coordination of industries and resources for the national security and welfare." An Advisory Commission had been appointed, made up of persons selected because they had "special knowledge of some industry, public utility, or the development of some natural resource, or [would] be otherwise specially qualified." Among its responsibilities the Council was charged with the "increase of domestic production of articles and materials essential to the support of armies and of the people during the interruption of foreign commerce" (Act of August 29, 1916, 39 Stat., 649-50).

The Advisory Commission

In 1940 this World War I legislation was used to again set up another emergency group. Congress had specified that the Advisory Commission to the Council of National Defense should include in its seven members an Advisor on Industrial Production and an Advisor on Employment (Federal Register Doc. 40-2213; filed June 3, 1940). Later in the month, the Council (made up as required by the 1916 legislation of the Secretary of War, the Secretary of the Navy, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, and the Secretary of Labor), named the new Advisory Commission and appointed William S. Knudsen as Commissioner of Industrial Production and Sidney Hillman as Commissioner of Employment. The Council also specifically provided for the employment of "such experts as may be necessary . . . or to the organization of subordinate bodies for its assistance." (Federal Register Doc. 40-2584, filed June 24, 1940).

Owen D. Young, Chairman of the Board of the General Electric Company, was one of the assistants chosen by Mr. Hillman and, on July 24, 1940, Mr. Young recommended that industry be given some help in getting manpower ready for greatly increased production of new war materials.

ESTABLISHMENT OF TRAINING WITHIN INDUSTRY

The plan was simple—there would be a volunteer staff of industrial men, on loan for full or part time, to provide consulting, advisory, and clearing-house service. In August Mr. Hillman asked the Socony-Vacuum Company to lend the services of C. R. Dooley, and requested from the Western Electric Company the assistance of

Walter Dietz. They came to Washington in August 1940 for six weeks, and stayed until Training Within Industry closed its operations in the fall of 1945.

The TWI organization was planned in 1940 as a country-wide network of industrial training men each of whom would (1) establish a local industrial panel of volunteer consultants, and (2) serve as a link in a national chain in order to circulate useful techniques among the various industrial areas of the country.

TWI Policy

On September 24, 1940, TWI issued its first bulletin. It stated:

The underlying purpose of this activity is to assist defense industries to meet their manpower needs by training within industry each worker to make the fullest use of his best skill up to the maximum of his individual ability. . . . It is the intention of this organization to render specific advisory assistance to defense industries in inaugurating programs which they will carry on within their own plants at their own expense. The availability of this service will be made known, but will not be compulsory. There will be no authority to go into a plant on any basis other than at their request.

The problem of increasing all kinds of skills was regarded as involving three parts: (1) taking an inventory of present skills in order to discover the skills among the unemployed and among those who were working below their greatest usefulness; (2) training outside of industry; and (3) training within industry. It was felt that Training Within Industry as an advisory group should take into account job progression (or upgrading), trade apprenticeship, and supervisory development.

THE JOB AHEAD

No one in 1940 could vision the largeness of the job ahead. What was projected seemed tremendous, but only a sample was even dreamed of. If anyone had pictured an armed force of 14,000,000, and the national war production force needed to supply it, the job would have seemed impossible. Nevertheless American industry did meet the challenge; as the pressures mounted, plans enlarged. Mr. Hillman said in October 1941 in a speech in Seattle: "As we love freedom, we cannot fail to hurl the last ounce of our productive powers against freedom's greatest enemy. We must build two planes for Hitler's one, two tanks for his one, two ships for his one, two guns for his one."

The credit for this industrial job belongs to industry. TWI, as an organization, and TWI people, are proud to have had a part in this war work. Although "advisory assistance" gave way to the

provision of specific programs for the increase of supervisory skills, and the volunteer, part-time organization was augmented by a small full-time, paid staff, TWI policy did not change—the real job had to be done *by* industry, *within* industry. Industry's own men collected, standardized, streamlined, and developed techniques for industry itself to use, on a volunteer basis. The four TWI programs, Job Instruction, Job Methods, Job Relations, and Program Development, are methods of group instruction whereby plant people learn through practice on their own current problems to use these specific 4-step methods, so simple that each is printed on a pocket card. These methods have resulted in 1,750,650 certifications of supervisors in 16,511 plants and unions.

MANAGEMENT AND TRAINING

Growing pressure was put on management to accept its responsibility for training as an everyday operating tool, but there was never any authority to launch a TWI program in a plant except the authority of the plant's own management. Gradually, as demands for TWI service grew and, since TWI could not possibly serve all the war plants and essential services which requested assistance, TWI confined its work to those plants where managers not only asked for help but took active, personal part in the operation of the TWI programs in order to get full benefit from them.

Managements had to learn to operate their training programs during working hours, at plant expense—that in war time it is too slow to leave increase of skill to the ambition of individuals. Training men, too, had much to learn, and this included TWI staff members. This TWI approach was not a matter of schools or classes or lessons—it was individual and group work on production problems of output, quality, scrap, lost-time, re-work and maintenance, and working relations.

This action of Training Within Industry has gone on across the country in a variety of plants. The wide spread of TWI activities has meant that TWI people have shared in a rich and varied experience—from building parts of ships in Denver to food-canning done by prisoners of war, from the movement of troops to the making of the Atomic Bomb, from increasing skills in many establishments to meeting the needs in hospitals. TWI programs have been spread to foreign subsidiaries of American companies and have been officially adopted by others of the United Nations.

All of this has been done because of the “multiplier principle,” which is: “Develop a standard method, then train the people who will train other people who will train repeated groups of people to use the method.”

HOW TWI WAS SET UP

From the beginning, TWI has operated as a decentralized service. In September 1940, TWI divided the country into 22 geographical districts according to the main industrial areas. In each, an informal group was to be headed by a prominent local production executive or industrial personnel man who would continue on his company's payroll while he gave TWI part-time service as a "dollar-a-year" man.

The TWI Districts

These districts were planned as centering around established industrial areas which often meant crossing state lines. They were laid out as follows: Northern New England with an office in Boston; Southern New England with an office in Hartford (later New Haven); Upper New York State with an office in Buffalo; Metropolitan New York with an office in New York City; New Jersey with an office in Newark; Eastern Pennsylvania and Delaware with an office in Philadelphia; Maryland and Virginia with an office in Baltimore; North and South Carolina with an office in Raleigh.

The Southeastern States with an office in Atlanta; the Ohio Valley (that is, Southern Ohio, Southern West Virginia, and Kentucky) with an office in Cincinnati; Western Pennsylvania and Northern West Virginia with an office in Pittsburgh; Northern Ohio with an office in Cleveland; Michigan with an office in Detroit; Indiana with an office in Indianapolis; Illinois and Wisconsin with an office in Chicago; the North Central States with an office in Minneapolis; the Middle States with an office in St. Louis; the Western Gulf and Rio Grande country with an office in Houston (later Dallas); the Rocky Mountain States with an office in Denver; Southern California with an office in Los Angeles; Northern California with an office in San Francisco; and the Pacific Northwest with an office in Seattle.

New York State was actually operated as one district with headquarters in New York City.

Numerous minor territorial changes were later made, chiefly as to counties along district boundary lines. For a short time TWI maintained a separate office in Washington, D. C., to provide service to the Army and to government establishments. Later a separate district was added for Oregon with an office in Portland. In January 1944 a district for the Territory of Hawaii was established with an office in Honolulu. The Raleigh and Baltimore offices were eventually combined and West Virginia, which had passed from the Cincinnati district to the Pittsburgh district, was added to this new combination. The district headquarters was moved to Washington, D. C.

Some time after the War Manpower Commission was organized, TWI, in order to eliminate some administrative difficulties, changed a few of its district boundaries so that while one WMC region might contain several TWI districts, no TWI district was divided between two WMC regions. In some cases the administrative necessity of conforming to state lines (such as serving East Chicago, Indiana from Indianapolis instead of from Chicago) caused a cut through an industrial area and had the effect of either reducing service or increasing costs.

District Directors and District Representatives

When the TWI organization was planned in 1940, it was decided that each district would be headed by an industrial man on a dollar-a-year basis. As soon as it was recognized that the head of the district could not give full time to the growing load of the job, he was given one full-time paid assistant and a stenographer. But the plans were for the bulk of the work to be done by the panel of consultants—the group, ranging in size from 10 to 60 members in each district, who would serve when their help was requested. The head of the district was to be called the District Representative. His full-time paid assistant was called the Assistant District Representative.

By February 1943 the field organization had over 225 paid staff members, and the early titles were no longer appropriate. Accordingly, the dollar-a-year district head was given the title of District Director, the head of the full-time staff was called District Representative, and those of his assistants who headed programs were called Assistant District Representatives. In order to properly identify the position and responsibility, these later titles have been used throughout this report so that “Director” always indicates the head of the staff who served without compensation, and “Representative” means the head of the paid staff.

Building the Field Staff

As TWI's paid staff grew, selections were made of men with industrial or commercial experience. There were many business men and salesmen displaced from their regular work because of the war. There were executives and staff men from non-essential industries; there were a few men from other government agencies and from vocational schools, most of whom had previous business background. During TWI's five years there was a constant flow of men returning to business and new men taking their places. In the later years few people were employed for the TWI technical staff unless they had been previously trained by TWI in the handling of a TWI program and had demonstrated their ability in one or more of the TWI programs.

National Advisers and Consultants

When TWI was organized a National Advisory Committee was appointed:

Walter Reuther, United Automobile Workers of America
E. C. Davison, International Association of Machinists
Clinton S. Golden, Steel Workers Organizing Committee (later,
United Steelworkers of America)
Marion H. Hedges, International Brotherhood of Electrical
Workers
John Green, Industrial Union of Marine and Shipbuilding
Workers of America
John E. Rooney, Operative Plasterers' and Cement Finishers'
International Association
R. Randall Irwin, Lockheed Aircraft Corporation
W. G. Marshall, Westinghouse Electric & Manufacturing Com-
pany
M. F. Burke, United Aircraft Corporation
E. J. Robeson, Newport News Shipbuilding & Dry Dock Com-
pany
C. S. Ching, U. S. Rubber Company
K. F. Ode, Falk Corporation

This Advisory Committee reviewed and approved the statement of OPM Policy on training which was released by TWI in June, 1941. This policy statement stressed:

1. Unemployed workers to be absorbed before additional workers were trained.
2. Increased emphasis to be put on the development of craftsmen through apprenticeship.
3. Production specialists to be used and upgrading followed, requiring that management help foremen and experienced workers to assist new workers in acquiring skill and that management provide opportunity for advancement.
4. Continuous consultation on training between management and education.

The statement concluded with this prediction:

Such philosophy, such practices and such consultation should result in well-balanced training programs, and bring about an orderly and an effective approach to creating and maintaining a supply of competent workers available to meet the rapidly increasing needs of defense industry.

The "Policy Bulletin" carried the facsimile signatures of the advisers, and this endorsement was immediately effective in establishing an understanding of the way this new TWI group looked at its work.

TWI Headquarters has always had on its paid staff at least one full-time labor consultant. These labor staff members carried on all kinds of TWI assignments for which they were specially equipped because of individual background.

District Advisers

Each district had advisers from management and from labor, usually two from industry, one from an A.F. of L. union, and one from a C.I.O. union.

None of the TWI advisers acted as an elected representative of a group. None was chosen to represent a specific interest. Each adviser was a member of the TWI district organization who, because of intimate experience and personal background and successful use of TWI service in his plant or interest in it through his union, was able to give TWI specific counsel and specific service. He was sworn in to further government interest in the prosecution of the war. The TWI advisers had to be acceptable in the community, to each other, to TWI, and WMC. The districts also had to avoid getting people solely because their prominent names would be window-dressing. Advisers had to be able to really give some time to TWI problems.

Technical Consultants

At both headquarters and in the districts, TWI had technical consultants from industry and from education. The headquarters consultants were:

Allen B. Gates, Eastman Kodak Company
Major Albert Sobey, General Motors Institute
G. G. Via, Newport News Shipbuilding & Dry Dock Company
Morris S. Viteles, Philadelphia Electric Company and University of Pennsylvania
Bartley Whiteside, at that time connected with the Wright Aeronautical Company
Louise Moore, U. S. Office of Education
F. J. Roethlisberger, Harvard University Graduate School of Business Administration
Arthur L. Mann, Chief of the Bureau of Industrial Service of the University of the State of New York

Each district had a panel of training consultants which varied in size, and in the amount of work its members did for TWI. Some served virtually as staff members, others only attended an occasional meeting.

FUNCTIONS AT TWI HEADQUARTERS

TWI Headquarters in Washington was a small group which reached a peak of 45 in 1943, with 10 additional technical men who were on the headquarters payroll but who were stationed in the field to give assistance to several districts.

The National Director of TWI was responsible for matters of policy and relationships; the Associate Director was in charge of development work, statistical information, operating reports, and TWI publications; the Assistant Directors headed the field operations. All four directors worked closely together in planning TWI operations and setting national standards.

The headquarters and district organization are shown in Exhibit 1.

DISTRICT ORGANIZATION

As TWI districts took on new functions, new positions were set up. The standard staffing pattern was:

District Director—an industrial man available part-time (the dollar-a-year token payments were dropped and these men served without compensation)

District Representative—the full-time, paid, operating head of the district

Program Heads (and assistants as needed) for:

Job Instruction

Job Methods

Job Relations

Program Development

Management Contacts Head—the “sales manager”

Office Supervisor (and stenographic help as needed)

Resident Representatives for important industrial areas outside the district office city

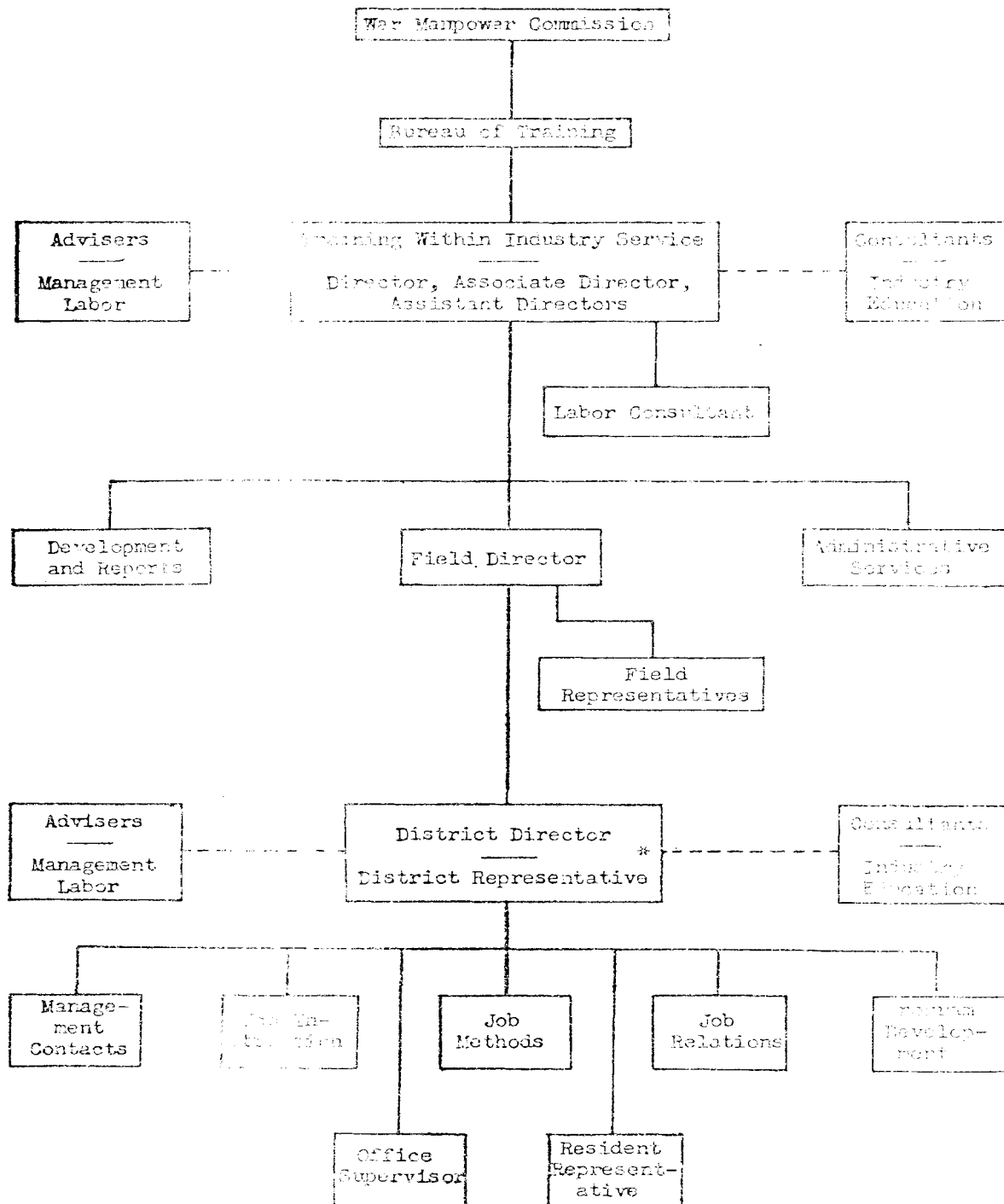
In every TWI district office the same functions existed whether the staff was large or small. In some cases one person filled several functions. In others, several persons were needed for one function. Some District Directors served full-time, but most of them were available only part-time.

Early Area Coverage

Many TWI districts decentralized their work. For example, at the first meeting of the Boston advisers and panel members, the four states of the district were divided into 12 areas and a member appointed as resident consultant in each. In 1941 the New York district

Exhibit 1

BASIC TRAINING WITHIN INDUSTRY ORGANIZATION



* Typical Organization for 22 TWI District Offices

mapped its areas in the upper part of the state, and selected panel members to head TWI operations in five upstate cities.

Early in 1942 it was decided to place a man in charge of TWI in the upstate areas of Buffalo, Rochester, Syracuse, Utica, Albany, and Binghamton. At that time the New York Metropolitan area was also divided into Manhattan, Brooklyn and Staten Island, and Westchester and Long Island areas with a staff man responsible for TWI activities in each area.

These representatives were trained in the application of the Job Instruction, Job Methods, and Job Relations programs and in procedures for contacts with management. Their duties and responsibilities in their respective areas might be said to be the same as the District Representative's for the entire district. They were held responsible for the type of job done in their areas under the direction and guidance of the District Representative. Management contacts were planned in advance with the District Representative, on a timetable basis, and a schedule of operations approved in advance.

In the early days each representative also conducted Institutes in Job Instruction but with the increased load and the specialization of program heads and specialists this was discontinued. This resident man was still held responsible for the total activity in the area. When working in an area, a Program Head from the district office acted in a staff capacity with the representative as the line operator. This plan worked smoothly as there were definite written procedures and each man knew where he fitted into the whole picture.

Resident Representatives

In 1944 the position of "resident representative" was established officially in all districts. When paid staff members were appointed as resident representatives, they became responsible for making the preliminary plans for the operation of TWI programs in their territories, performing all management contact functions, and in many cases for coaching trainers. They were considered as members of the WMC area staff and handled priority referrals. They called on the district headquarters for the necessary technical work of conducting Institutes. In more than fifty industrial areas, in addition to those where district offices were located, TWI maintained resident representatives.

Volunteer Area Coverage

District staffs were limited in size, and some District Representatives faced such heavy demands in the headquarters city that they

allotted almost all their funds for technical men rather than providing paid contact men in outlying areas.

For example, in the summer of 1944 with only one resident representative in outstate Michigan, the District Representative solicited the cooperation of leading industrialists in the various cities throughout the state. From then on no contacts were made in their cities until they had been notified beforehand. The volunteer representatives called on various companies accompanied by a TWI staff man from district headquarters. They arranged meetings with Chambers of Commerce and meetings of top management in companies in various cities.

Growth of TWI Staff

While TWI started out in 1940 as a dollar-a-year organization, paid staff members were added until the paid staff in 1944 reached a peak of over 400. Many of them, while on the government payroll, were actually on loan from their companies, which gave up their services for the duration of the war and plan to make full use of their new knowledge and skills on their return to their own plants.

The TWI staff grew in accordance with the addition of specific programs and growing pressure for war production. In July 1941 there were 53 paid staff members, in July 1942 there were 163, in July 1943 there were 341, and in July 1944 the staff reached 415 members.

During May and June of 1945 there was uncertainty whether TWI would be continued past the end of the fiscal year on June 30. The Bureau of the Budget had recommended a one-third cut from the original request, the House of Representatives had removed TWI completely from the WMC budget, and later the Senate restored two-thirds of the requested budget. During this period some staff members resigned and approximately one hundred and fifty others, on the basis of service, were notified that their jobs would be discontinued on June 30 in order to bring expenses within a reduced budget.

When a compromise appropriation was decided upon July 3, 1945, through joint action of the House and Senate, there were 31 persons at Headquarters and 200 in the field. All but six Headquarters staff members and all but 18 field staff members remained until TWI field operations closed on September 30, 1945.

Staff Training

Although TWI staff members all brought something to TWI, still they all had to be trained very specifically. At first, in order to get into production quickly, TWI did what it recommended to industry—developed specialists. Later, in order to have a flexible organization

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to meet imperative rush needs and to serve contractors in isolated locations, individual staff members were "rounded out." TWI accepted its own decision that training isn't all technical, that it involves a lot of influencing. Accordingly, TWI men were trained to sell **managements the idea of training as a production tool**, to prepare plant representatives to put on the basic programs, and to do a coaching job in their continuing contacts with plants.

In October 1944 TWI Headquarters issued an administrative manual in order to compile the best existing practices in the field.

COOPERATION WITH TWI

From the beginning, TWI has had the utmost cooperation from industry in making men available for full or part-time service while remaining on their companies' payrolls, releasing others to go on the paid staff, providing rent-free space, and furnishing materials.

Many TWI districts began in space which was rent-free. For some time the Portland office was housed by the Portland Chamber of Commerce. The St. Louis office arranged for space in the Syndicate Trust Building on a dollar-a-year basis. The Honolulu district staff for three months was housed rent-free in the air-conditioned pent-house of the Bishop Bank Building. Government also cooperated. The Boston district borrowed space from the Federal Security Agency for six months. Los Angeles was taken in by the U. S. Forestry Service. Chicago was housed by the Illinois State Employment Service. The Atlanta office was given free space by the Georgia School of Technology, and the Pittsburgh office by the Carnegie Institute of Technology. Both universities and trade schools were generous in their provision of space for early Institutes.

Materials Furnished by Companies

Beginning in 1941 the Western Electric Company furnished for free distribution copies of its book, *Job Instruction*, until the total mounted to 2,000 copies in April 1942. At that time Western Electric gave TWI permission to have the manual reprinted at the Government Printing Office where many thousand copies have been sold at 10 cents a copy.

The Bethlehem Steel Company gave TWI permission to have reprinted for sale through the Government Printing Office at a cost of 20 cents a copy its book, *An Introduction to Shipbuilding*. This is intended to aid new men in shipyards by making them more familiar with shipbuilding operations and terms.

The Caterpillar Tractor Company at Peoria, Illinois, made extensive use of the Job Instruction program, and incorporated many prin-

ciples into its own group instruction. A descriptive booklet, *Group Instructor Training*, was published by the company and some 20,000 copies made available for free distribution by TWI to other companies.

The Reader's Digest gave TWI 15,000 copies of each of the series of three articles about TWI programs written in 1943 by Stuart Chase. The article on Job Relations was reprinted immediately by the *Labor Messenger*, the newspaper of the Houston, Texas Labor and Trades Council and its affiliated A.F. of L. organizations.

The Ethyl Corporation provided TWI with thousands of copies of "Streamlined Job Training for War Plants," a reprint from *Ethyl News*. The Electric Storage Battery Company of Philadelphia provided TWI with reprints of its accounts of the TWI programs in *Exide News*.

A LOOK AT HOW TWI HAS WORKED

Training Within Industry has done three kinds of things:

1. Given advice and information.
2. Trained industrial people to handle their own problems.
3. Solved problems for plants.

Looking back on the past five years it is easy to say, "All of our work should have been in that second field—training plant men to do the job themselves." But TWI was made up of people, and people make mistakes.

TWI's first year was largely spent on the "advice and information" level. The organization was very small, and that was about all that could be done. And it was hoped that an "eye opening" job would be enough.

During that first year, TWI also did some plant problem-solving. TWI people went into plants, made surveys to spot training needs, and mapped training programs. The end of the survey stage did not entirely eliminate TWI's doing what was really the plant's own job. There were some critical situations where speed was so important that TWI was asked to move in and take over the job of training the plant's supervisors. And there were cases where TWI paid debts of industrial friendship by going in and doing what should have been the plant's training job.

But the bulk of TWI's work was in its assigned field of service—"training industrial people to handle their own production problems through training." Let us take a look at that word "training." TWI people themselves have done a lot to confuse an already muddy situation. Words mean different things to different people, and to some

people "training" and "education" mean the same thing. TWI has found it helpful to consider the following definitions:

Education is for the rounding-out of the individual and the good of society; it is general, provides background, increases understanding.

Training is for the good of plant production—it is a way to solve production problems through people; it is specific and helps people to acquire skill through use of what they have learned.

TWI has consistently advocated that management in each plant assign functional responsibility for the planning of training to a specific person who works in a staff capacity to help the line organization. The actual operation of the training is part of the everyday responsibility of the line managers and supervisors, who may actually do the training or may have trainers assigned to them as assistants. Where the training man fits in, what he is called, whether he works on training full-time or part-time, whether he has any assistants—all that is the plant's own business.

People have to *learn* to do jobs. They can learn by being trained or they can learn through mistakes, through gradual catching on. "Learning by doing" is good, planned training. "Learning by accident" or "by exposure" is only a hope and represents a serious charge against good management.

Training is a multiplying process—one person's "know-how" and "can-do" spread to many. No plant can afford to ignore this useful device. You can eat the seed corn, or plant it. You can tie your children's shoes, or you can help them to learn to tie their own shoes. In plants, you can repair machines, do work over, pay the accident costs, or you can train people to do work correctly. In wartime such wasteful practice was against national interest. In peacetime, competition takes care of poor business management.

Now—whom did TWI train? TWI trained:

1. *Management*—in what training is, what it can do for the plant.
2. *Line executives and supervisors*—in the use of three supervisory problem-solving methods.
3. *Staff men with functional responsibility for planning of training*—in the use of a method for solving production problems through training.

Chapter 2

A CLEARING-HOUSE FOR INDUSTRIAL EXPERIENCE

TWI's early assistance to plants was largely of advisory and consulting nature. This included surveys, either of an industry or of a particular plant, and the collecting and circulating of information about proven in-plant techniques. TWI, as one of the first emergency groups, was also frequently called on to collect information from contractors for the government and to influence war contractors to cooperate with other government agencies or accept other government policies. This latter stemmed out of the make-up of the TWI organization—local industrial people who had standing in the community.

THE "LENS-GRINDER" STUDY

During the very first week of TWI's existence and while it still was a two-man organization of Director and Associate Director, the first assignment was received. All through the summer of 1940 there had been much discussion of shortages in particular lines of skilled work. One of the most serious shortages was in lens-grinders and polishers for government arsenals and navy yards. This problem was presented to the TWI Directors and on August 28, 1940 they called to a conference on lens-grinding and precision instruments representatives of Sperry Gyroscope Corporation, Leeds & Northrop, Bausch and Lomb, General Electric Company, Eastman Kodak Company, and the American Telephone & Telegraph Company, who met with staff members of the National Defense Commission and representatives of Army and Navy Ordnance and Frankford Arsenal.

As a result of this conference, TWI arranged to borrow M. J. Kane from American Telephone and Telegraph to make plant visits and write the material in training form.

The original problem in the lens-grinding field was to assist government arsenals and navy yards to get 350 properly qualified lens grinders. It was considered that a qualified learner did well to master the art of lens-grinding in five years. Upon studying the

problem, it was found that 20 jobs are really included in lens-grinding. It had been assumed that a lens-grinder must be able to perform all 20 jobs. In the emergency, the specific solution recommended was to upgrade workers then employed on precision optical work to the most highly skilled jobs, and to break in new people on just one of the simplest jobs. This required production specifications and intensive training.

Key Points

Experimental work was done by E. A. Fricke of Frankford Arsenal and Mr. Kane, at the Frankford Arsenal, the Bausch & Lomb Optical Company, and the Eastman Kodak Company. One kind of work was found to include 14 operations. Each of these 14 operations was broken down by an experienced worker into segments and made full-time work since the volume of production warranted it. Each part of the job was studied to find the important features. Out of this experience grew the conception of "key points." This practical discovery was destined to lift job instruction to an entirely new level of usefulness.

Much of this supposedly difficult work was relatively simple and easy. A few critical points determined whether the whole operation was successful. Furthermore, it was possible to isolate these critical points. These points were the keys to good work and the keys to good lenses, and these were soon referred to as "key points." Thus was born a phrase and a conception that some months later was to form the cornerstone of a nation-wide production training effort.

The Instruction Process

Careful thought was also given to the process of instruction itself by which a lens-grinding operation, with its key points, could be put over to a learner. Based on the instruction steps developed by C. R. Allen in World War I, the following method was recommended by Mr. Kane:

1. Show him how to do it.
2. Explain key points.
3. Let him watch you do it again.
4. Let him do the simple parts of the job.
5. Help him do the whole job.
6. Let him do the whole job—but watch him.
7. Put him on his own.

In November 1940 these steps, along with the "key points" idea, were incorporated in a bulletin, "Helping the Experienced Worker to Break in a Man on a New Job."

In an account of this experiment, "A Study of Lens Grinding" (reproduced in the Appendix), it was stated:

The main purpose in having the worker identify these key points is to enable him to recall them when he is breaking in new people. His own familiarity with the work often causes a competent worker to overlook the difficulties he had during his early stages and thus without intention, he fails to mention these difficulties when breaking in a new man.

It was also found that the production sequence was not always the best learning order.

TWI thought that, by this demonstration, and by using the specific steps outlined in its instruction bulletin, a plant could break down its own skilled jobs. This stress on the value of key points and of taking small instruction steps one at a time, plus the outlining of a method of good instruction was expected to equip plants to go ahead on their own.

Completing the Cycle

As a result of this work, the training of people for the separate jobs involved in lens-grinding was reduced from approximately five years to a matter of months. Everyone—the arsenals and plants as well as TWI—was well satisfied. Experience was to prove however that these principles had not been milked dry. In the summer of 1945 a TWI field man reported that a TWI-trained man in a lens plant had been assigned the job of reducing the four to six months that it then took before a new man "made production."

The plant's training department had never been able to break in on this territory because it was considered sacred by those in charge—none of these new-fangled ideas for them! Management decided to set up a new department in a different building and use all new help—workers from another department (which had been terminated), who had never done any lens-grinding. A job instructor was trained, and three men were assigned to him on a test basis. By the end of the first day all three had ground satisfactory lenses—without any scrap whatever! It was estimated that in 6 weeks' time over 100 persons would be working in this department and all of them would be "making production."

THE TWI CLEARING-HOUSE

In the meantime, TWI was working on a few other bulletins to get the clearing-house function into operation before the Directors would return to their companies. In order to speed the job, they felt more help was needed. Accordingly, William Conover was borrowed from U. S. Steel and James Mitchell was borrowed from General

Brehon Somervell who at that time headed the Work Projects Administration in New York City.

During the fall of 1940 the TWI Headquarters staff was in touch with a number of defense contractors. They were told of occurrences like these:

Some of the new workers do not know which end of the drill to chuck up.

A new worker opened her tool box, pulled out a screwdriver and, holding it by the shank and waving the handle part of it in front of her, said, "What do I do with this?"

A worker complained to a lead man: "This little wheel doesn't come out of the hole." (The little wheel was the drill, and the hole was the drill guide.)

A file has been screwed to a block of wood to make it easier for the worker to use that tool. A woman worker was found using the wooden side of the block.

In some way, a hole had gotten into the skin of the wing. A worker had put a "dummy" rivet into the hole. The lead-man was interested in ascertaining the character of the hole, and its size. He told a new worker to drill out the rivet. The worker proceeded to drill a circle of holes around the rivet and then knocked out the piece of skin.

In an Induction talk a Safety Engineer asked a group of 20 new people: "How many of you know the difference between a drill press and a sewing machine?" Four of them had never in their lives seen a sewing machine.

Out of such happenings came growing conviction that after jobs were engineered or broken-down into specialized operations the men who already knew those operations (supervisors, skilled mechanics, and lead-men) were going to have to break-in new men and women on these jobs. Accordingly, increasing dependence was put on the lens-grinding study as a pattern for what any contractor could do when faced by a shortage of skilled workers. For example, in Chicago, a contractor was faced with a large order for precision optical light bulbs which are no larger than a grain of wheat. The customary training time for this work was three years. Engineering the job and the making of job breakdowns cut training time to six weeks.

In addition to its bulletins which set down principles and techniques, TWI also began to publish "examples" of how a specific plant had handled its problems.

PLANT SURVEYS

The plant surveys which were made by TWI were of four kinds: (1) quick appraisal, (2) overall survey (which required perhaps a week's time), (3) critical occupation or specific problem survey, and (4) follow-up or re-survey. In some districts panel members spent a great deal of time going into important plants and really digging into their problems and planning the kind of training which would assist them. Occasionally a member of the TWI Headquarters group

assisted as in the St. Louis district's survey of the Curtiss-Wright Corporation's plant which outlined the training needs of 22 departments. The organizing of a training department, with one individual given full responsibility and authority for its functions, was among the recommendations. The management accepted the suggestions included in the report and put them into use throughout the plant.

The Iron Fireman Manufacturing Company of Portland, Oregon began to plan defense contracts in 1938, and by 1939 had sub-contract orders from the Boeing Aircraft Company. The handling of these orders resulted in a request to double their capacity to handle machined parts. Thus their work began in the days when orders were accompanied by drawings that had not been detailed or even properly dimensioned. Routing them through the company's engineering department for preparation of specifications solved this problem. The Portland district's survey was made in April, 1941 before the TWI Job Instruction program was available, but it recommended the use of other available assistance in the field of the "art of teaching." TWI commended the company for its upgrading system, and suggested broadening the activities in supplementary instruction through the establishment of an employee-management educational committee.

District panel members were depended on to make most of the surveys. They were directed to:

1. make an inventory of present skills in the plant
2. find out what training was available outside the plant
3. urge in-plant training according to need

Survey Difficulties

As requests for service increased, the districts began to experience difficulty. In order to make adequate surveys of training needs, careful investigation, an intelligent recommendation, and much time were required. Most of the panel consultants were unable to free themselves from their primary duties sufficiently to prepare sound surveys. They were glad to be of assistance by making informal suggestions of possible methods but could not give the time to do a good job and hesitated to put themselves in the position of making specific recommendations on the basis of sketchy information. In some parts of the country, however, manufacturers showed little interest in surveys.

War plants were eventually built in the states that made up the Minneapolis district but in 1940, and until well after the war started, the sites of these future plants were still open fields. Slowly plants were constructed—shipyards in Duluth and Superior; munitions plants in New Britain, Minnesota, and Des Moines, Iowa; shell and bomb-loading plants at Burlington, Iowa, and Hastings, Nebraska—

but when TWI was first set up in Minneapolis, training needs caused by the future war seemed much farther away than the depression.

In Northern New England, there had been surplus labor for so long that manufacturers were giving all of their attention at this time to mechanical and material supply problems. They could not believe that trained manpower would be a serious production problem. Only a few establishments asked for help. One of the first was the Boott Mills of Lowell, Massachusetts, which had received a large order for olive drab cotton duck. The number of employees had increased from 950 to 1900. A comprehensive survey was made, job descriptions and breakdowns were prepared, and a planned system of upgrading and supervisory training recommended. When the Job Instruction program became available, the mill used the program. In June, 1942, Boott Mills wrote to TWI: "You have been of tremendous help. In 1941 we more than doubled production on war work, and we are now tackling the job of again doubling our production in response to instructions from the War Production Board. Without J.I.T. our progress would not have been as great." TWI assistance was further recognized when the company received the Army-Navy "E" in September, 1942.

CONSULTING SERVICE

The TWI Headquarters staff helped representatives of the New York and Indianapolis districts to serve the Carl L. Norden Company of New York on their problem of building a new plant in Indianapolis for the Navy. The new company, to be known as the Lukas-Harold Company, was to manufacture bomb-sights. The plant was to be ready for occupancy by March, 1942 and the employment of 6,000 workers was projected. It was decided that at least 1,000 trained workers should be available by March 1, and that it would be necessary to establish a company school which would house at least 50 machine tools, these tools to be furnished by the Lukas-Harold Company. Space was later provided by the Indiana State Defense Training Division which also paid the instructors for the training of 50 people on each of three six-hour shifts. The instructors were chosen from supervisory personnel or prospective foremen. All of these instructors came to New York to work in the parent plant for a time.

The Indianapolis vocational schools agreed to give two weeks of pre-employment training to anyone who had not had previous machine experience. The parent company had over 150 skilled mechanics and from this group were drawn most of the senior supervisors for the Indianapolis plant. The TWI consultants helped the company to schedule its complete training program, and one of the New

York TWI men later joined the Lukas-Harold organization as director of training.

COOPERATION FOR DEFENSE

In its first year Training Within Industry was often the only defense agency listed in the phone book. Accordingly, there were calls for all kinds of assistance. The San Francisco office helped in handling labor disputes, safety problems, and housing needs. All the TWI dollar-a-year men were asked to use personal influence to combat labor pirating, to get big plants to let sub-contracts, to introduce representatives of the Federal Committee on Apprenticeship and of the Engineering, Science, Management Defense Training program.

Labor Supply

TWI people reminded plants of the labor supply overlooked when minority groups were ignored, and they supplied information to Washington on current labor supply. They also worked on such local problems as what to do with the New Jersey silk-workers who were losing their jobs. There was at that time as much interest in conversion of people as in conversion of plants. There was no real labor shortage overall, but labor supply early became short in some districts. Accordingly, TWI urged the use of the blind and the deaf and later, when the supervisory programs were available, often put on special demonstrations to show that the same methods of training would work for handicapped people as with the usual worker.

In St. Louis there was ample manpower but a shortage of skilled workers. Accordingly, there was much pirating of labor, and several meetings were held in the TWI district office in order to work out agreements between managements for the elimination of this practice.

Defense Training

In Southern California there was quite a bit of training offered at a fee, with the tuition paid by the person who was seeking to learn something or preparing for a new job. The business ethics in some cases were not too good and, in many cases, TWI was approached by the Chamber of Commerce, Better Business Bureau, or the victims of some of these training institutions in an attempt to get this kind of activity stopped. Later the shortage of materials used for instructional purposes, such as welding rod, aluminum sheets, or rivets, affected or curbed the activities of these so-called pre-trade schools. TWI was also, of course, called on to assist the well-run schools to get needed material; even city departments of education had trouble getting these materials for use in instruction.

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In shipbuilding, the need for certified welders was most acute. It was alleged that despite the great numbers of trainees completing courses in ship-welding, too few were eligible for certification to meet the need for welders. Others believed that the instruction was faulty, that equipment and materials used in the training period did not prepare the potential worker for the machines and materials with which he would operate as a shipyard worker on the job. Mr. Hillman was present at several discussions held at the TWI Los Angeles office and at Los Angeles shipyards in connection with this program. He pointed out that the yards were held accountable for delivering ships, that they could not be delivered without welders, that public funds had been made available to schools to develop competent welders, and that, if the schools could not deliver in adequate quantities, other measures would have to be developed and relied upon. Some yards introduced their own welding training activities—either retraining the men they received from the schools or undertaking the training of the raw recruits.

Apprenticeship

In TWI's earliest days William Patterson, Chief of the Federal Committee on Apprenticeship in the Department of Labor, was considered a member of the TWI Headquarters group. His field representatives were informally associated with the district TWI offices. TWI districts recommended apprenticeship, and apprenticeship field men took active part in promoting TWI service.

Detroit Contractor Meetings

In the early days the Detroit staff and panel held meetings for contractors to provide an opportunity of exchanging ideas on how to meet the many new problems arising with the shift to defense production. Such problems as sources of new employees, induction of new workers, trade apprenticeship, supervisory development, and company training programs were discussed. Attention was given to government aids of all types available to defense industries. The first series of conferences was so successful they were continued until over six hundred industry representatives had attended. Both large and small companies were represented.

THE SPRING 1941 PICTURE

J. C. Furnas in an article, "Battle for Skills," which appeared in the May 10, 1941 issue of the *Saturday Evening Post*, gives a good survey of the situation:

Washington's idea is to make the Employment Service and its state affiliates both a nationwide dragnet for skills and a machine for putting them where worst needed. . . . The hitch may be that the employer, trained all his life in getting men at the gate or by advertising, will learn too slowly that he gets farther without disrupting anything by going to a state agency to begin with. . . .

A famous West Coast aircraft plant recently advertised for labor, got 40,000 replies, and turned them all over to the state and national employment offices for sifting and picking. Occasionally the Employment Service finds itself figuring out for a manufacturer tackling a new field for defense purposes just how many of what kinds of workmen he needs, and then combing their names for him out of the files.

Still, a nationwide skill clearing-house, however well handled, can only exploit existing skills. That 1,500,000 who may register is nowhere near enough—how far from being enough is revised upward every two weeks. The other end of the job is to get skills into the hands of as many people as possible. Not necessarily all-round, top-notch skills—that is a good idea, too, but it takes too long to prove much in an emergency. There are hundreds of thousands of men who could learn more than they now know, and hundreds of thousands of youngsters with latent mechanical aptitudes who can quickly be taught enough to be uncommonly useful in this short-of-breath year of 1941.

The NYA has something to do with this idea, and so has the WPA. The U. S. Employment Service acts as mid-wife, through its state affiliates, to test applicants for training and distribute them. The nation's vocational schools, co-operating intimately with local defense industries, are the machinery used, and the U. S. Office of Education superintends the job professionally. But the key to it all is the training-within-industry division of the OPM, which—and this is no accident—is headed by two men, Channing R. Dooley, of Socony-Vacuum, and J. W. Dietz, of Western Electric, who went through the battle-for-skills rough-and-tumble in the last war and know precisely what brand of chaos they are trying to prevent.

The passwords are "upgrading" and "single skills." The all-round master mechanic—as scarce these days as a hotel room in defense-boom Washington—went through years of apprenticeship and years more in a shop to become virtuoso on a turret lathe, a milling machine, a boring mill and twenty other gigantic gadgets. He knows what makes them tick and, in a pinch, could both repair and build them. He is indispensable, and any nation with an ample supply of him owns a military asset equal to Napoleon and Alexander the Great rolled into one. In the present emergency, however, it is wasteful to keep him on machine jobs in any plant that will adapt itself to upgrading as most plants will. His spot is supervising the machine work of men not quite so good as he is.

So he is firmly escorted upstairs—"upgraded," in fact. The places left vacant by the upgrading of the Grade-B mechanics who take over from him are filled by a crowd of single-skill youngsters—boys who look like likely candidates for eight to twelve weeks of intensive training in handling one kind of machine. When the objective is not all-round training but single-skill competence, it is surprising to see how rapidly those weeks enable a green but apt youngster to turn out respectable work with a riveter or a welding torch or a grinding gadget. It is unorthodox in many industries. But it is the only way to boom a plant from 300 men to 3000 inside a year. And it seems to be working in most places.

LABOR SUPPLY COMMITTEES

Early in the defense program the Labor Division of the Office of Production Management was delegated the responsibility of getting the necessary workers into the plants of defense industries. In 1941 an organization of Regional Labor Supply Committees was established, composed of representatives of the various training and labor supply agencies. The Labor Supply Division was not an operating unit but a coordinating agency which assigned duties and responsibilities to the appropriate agencies and insured that the duties were carried out.

The District heads of Training Within Industry served on these committees throughout the country. On occasion, the TWI office in a district actually performed the task of a branch labor supply, labor relations, or public relations office, until the appropriate agency was able to take over. After the establishment and strengthening of local offices of the other agencies to handle manpower problems not directly related to training, TWI continued to cooperate actively and constantly. In this relationship, TWI staff members frequently made or assisted in making special plant or area surveys on problems of manpower and training. This continued until April 1942 when the War Manpower Commission was formed.

"DILUTION"

In defense days there was much use of the word "dilution," in the sense that skills would be "diluted." Statements of this sort caused confusion and misunderstanding. The tolerances required for a job were not decreased. The degree of skill was just as great, whether the job was performed by a worker who had the ability to do other operations or whether he did just this one segment.

The journeyman mechanic differs from the skilled operator only in that the journeyman has acquired the many skills related to a trade. The skilled operator has just as much skill as the journeyman in one or a very few operations. He has skill but not the versatility of the journeyman. Using a man with wide skills on a production job which requires only one or two skills is a waste of skills. Often the single-skill operator can perform more quickly and more accurately his one operation than can the all-round craftsman. Skill therefore is not diluted, and misunderstandings are saved when people talk about "engineering a job" and developing specialists rather than about "dilution."

BRITISH EXPERIENCE

It was felt that much could be gained from British experience. It had been anticipated that the United States too would reach the

bottom of the labor market barrel. As it turned out, of course, it was never necessary to widen the labor market here to the extent necessary in England. In the Ministry of Labour in England there existed a group which was interested in both the training which the government could provide for plants and in furthering in-plant training. Their experience on upgrading, the use of women workers, and the use of part-time workers was several years ahead of this country.

Such information appeared in the *British Engineering Bulletin* which, because of paper shortage, could not be supplied in enough quantities to reach many people in this country. At first TWI Headquarters circulated the British information by letter, then from June 1941 to May 1943, issued quarterly abstracts of the articles appearing in the *Engineering Bulletin*. As the demand for the abstracts became heavier, arrangements were made for their distribution to libraries through the United States Information Service, which was sending out a regular packet of war training material. The Library of Congress provided photostat service for persons who wished to have the entire article.

THE FIRST YEAR OF DEFENSE PRODUCTION

In June 1941 the Office for Emergency Management issued an account of the first year's experience in defense production since the Fall of France. In June 1940 few American plants were turning out any military planes or ships or tanks or guns. In the year from June 1940 to June 1941 attention was given first to what was looked at as the major battlefield—in the air. One thousand planes a month had been forecast for January 1941 but this had to be scaled down 30 percent. (This has to be looked at in the light of total military plane production of 1800 during all of 1938, and 2100 during all of 1939.)

By March 1941, new machine tools were restricted to defense contractors. In this June 1941 report it was figured that the output of airplanes had been trebled during the last year, tanks had increased 600 percent, powder 1000 percent, small arms ammunition 1200 percent, Garand rifles 360 percent, 30-caliber machine guns trebled, 50-caliber machine guns quadrupled. In the six months ahead contractors were asked to make even more increases, some only doubled but some increased five-fold. Aid to Britain was mounting. America was trying to equip her own armed forces, and construct far-flung bases.

A Review and a Prediction

When Archibald MacLeish in the Office of Facts and Figures, *Report to the Nation*, issued January 14, 1942, looked back to the period following the Fall of France, he said:

For some skills, 3 to 4 years are required to train workers. The emergency demands short-cuts. They have been found in such devices as "upgrading," by which workers are moved up through the higher skills within a plant and new workers are hired to fill their places. One aircraft factory was able to expand its labor force from 1200 to 7500 in a few months. Employees who had done nothing more complicated than handle a wheelbarrow were "upgraded" to semitechnical operations on the assembly line. . . .

Determined to end raiding, O.P.M.'s Labor Division has been arranging industry-wide agreements between workers and employers stabilizing rates of pay in plants doing similar work. Agreements already have been worked out in the shipbuilding, aviation, and construction industries. Without such agreements, shipyards, aircraft plants, and construction projects would compete in paying higher wages, the Government would have to pay more for munitions, and production schedules would be disrupted by needless migrations of workers.

A Committee on Fair Employment Practice in O.P.M. has been working to eliminate color, creed, and nationality prejudices in the hiring of workers. Efforts are being made to level the barriers against older workers. In the railroad industry the age limit for hiring skilled labor has been raised from 45 to 51; for unskilled workers, from 45 to 60.

Beginnings, too, have been made in the recruiting of women for war work. During the last war, nearly one-fourth of all the employees in aircraft plants were women. Before this war ends, one-third of our aircraft workers may be women. . . . Women already are doing light sheet-metal work, riveting, welding, spray painting, pasting, and gluing. Women have been found particularly adaptable to small-arms ammunition work, and in the Frankford Arsenal in Philadelphia nearly 40 percent of the employees are women. Other women are making gas masks and working as bench hands, solderers, and inspectors in arms and munitions factories. It is estimated more than 500,000 women now are employed in war work. But today only 4 women in every 1,000 are working in war industries, while in 1918 there were 21 such workers in every 1,000.

In shipyards, hours of work have been lengthened to 48 a week, while in some of the critical war industries, such as machine tools, overtime has extended the working day to 9 and 10 hours. . . . As a further source of labor, several million workers are expected to be freed for war jobs as less essential industries are curtailed. Workers will turn from making automobiles to making tanks, from compacts to ammunition, from sewing machines to rifle parts, from fountain pens to fuses, from rat traps to camp cots, from pipe fittings to hand grenades, from lawn mowers to shrapnel, from women's lingerie to mosquito nets (pp. 39, 40, 41).

THE "FINDING THE WAY" PERIOD

TWI's first year was one where experience was tested and consolidated. It was a period of "finding-out-how-best-to-do-the-job." During the fall and winter of 1940 and 1941 much time was given to setting up the TWI districts and to getting started on the program. TWI staff members who made the surveys, as well as plant executives, used the TWI series of bulletins as a source of things to "look for" and as a source containing "many of the answers." Several hundred

surveys in war plants were made during the first six months of 1941, and consultation given to hundreds more—in all some assistance was given to 892 plants, employing over a million and a half people.

Experience with Surveys

In May 1941, the industrial men who were heading the TWI districts were brought into Washington where they reported their experience in making surveys and in getting adoption of the principles of TWI's bulletin on instruction. TWI had attracted favorable industrial attention but TWI people knew that the service was not good enough. After New Jersey had made about 25 surveys, the panel members looked at the results of their work and found that only one action had been taken—a plant had set up a personnel department.

The panel members decided that their time had been wasted. Every place they went they saw that foremen were going to have to be doing a lot of instruction. They were going to need some help. Outside facilities would not do more than 5 percent of the job of breaking-in new workers; therefore the rest would have to be done on the job. Therefore, there should be a plan for systematic ways of training on the job, and such a plan had actually been developed by the New Jersey staff and panel and was described at this national meeting.

THE "PACKAGE" IDEA

The idea of 10 hours of instruction for a group of 10 men, or what has been called the Training Within Industry "package" idea, is the contribution of Glenn L. Gardiner, vice-president of Forstmann Woolen Company and the Director of TWI's New Jersey activities. Of course, for many years, various companies and many state departments of education had been instructing people in groups in "how to instruct," using the same basic steps as now appeared in the New Jersey Job Instruction program, but the sizes of groups varied, the lengths of the programs varied, and the content usually was determined by the instructor's opinions of the particular group.

Standardization was now brought to this field. This contribution can be compared to the introduction of power-cutting machines in the garment industry, for as long as every garment had to be hand-cut, the volume was small. Power-cutting machines and sewing machines have meant more clothes for everybody at lower price, and higher wages for operators. A standardized package of Job Instruction meant that an untold number of supervisors would get assistance which never before could have been available to them.

It was proposed therefore that TWI as a national organization offer a specific plan of help in *one* field and that that field be job instruction for supervisors.

This plan went back to the late C. R. Allen's 4 steps of instruction (which Mr. Kane had enlarged to 7 steps, anticipating greater training difficulties than were ever encountered) in a program that could be quickly understood and used widely. Instead of requiring six weeks to train a foreman in how to break-in people, ten hours was proposed. Instead of much discussion of learning difficulties, choice of methods and such, there was a simple straightforward formula that will work practically every time. In short, Job Instruction emerged from a seemingly complicated subject to a clear, easily mastered, and most of all, practical instrument of production.

Chapter 3

EMPHASIS ON SKILLS OF SUPERVISION

In August 1941 when the TWI district heads met in Washington, experiences were exchanged, and it was decided to make a major shift in TWI's whole approach to its task—to adopt the proposal for a national Job Instruction program. It was decided that TWI could be more effective if some of the sideline activities were eliminated. The original plan of giving contractors a consulting service on a broad range of in-plant training problems was abandoned. Instead, TWI would concentrate on the needs of supervisors. The serious shortages of supervisors and lead-men had led plants to appoint many men who had no experience or particular qualification for directing the work of others.

It was decided that upgrading and apprenticeship would still be advocated but that TWI would focus its specific work in the field of supervisory improvement. Later (1942) TWI and the Apprentice-Training Service agreed on a specific division of work, and TWI withdrew from the field of techniques for training individual workers, limiting its activities entirely to the skill needs of supervisors and the skill needs of the plant men who had functional responsibility for training.

TWI decided to point out just one thing plants needed to do, and to stay with them long enough to show them exactly what to do and how to do it. The following four essentials for a training program for defense industry were stressed:

1. The training program should be one of utter simplicity.
2. It must be prepared for presentation by intensive and carefully "blue-printed" procedure, utilizing a minimum of time.
3. It must be built on the principle of demonstration and practice of "learning by doing," rather than on theory.
4. The program should provide for "multipliers" to spread the training by coaching selected men as trainers who, after being qualified in an Institute, go into industry and in a uniform manner pass the program on to supervisors and their assistants who would use it in training men and women workers.

The program to be offered, of course, was that of Job Instruction, for "breaking-in" hundreds of thousands of new workers appeared to be the most vital single problem that contractors faced. TWI committed itself to conducting the Institutes in which future trainers would be prepared to put on the Job Instruction program.

ADOPTION OF THE JOB INSTRUCTION PROGRAM

TWI Headquarters had the job of combining the best features of Mr. Kane's 7-step method and Mr. Gardiner's work. The New Jersey group had their 4-step plan organized into a 10-hour program, and they had already tested the program in seventy plants. Hence, it could be put to work immediately. However it was decided to make Mr. Kane's job breakdown composed of "steps" and "key points" part of the 4-step plan. Thus it was that the first official Job Instruction program of TWI represented the basic work of Mr. Gardiner and Mr. Kane.

The program gives, to groups of 10 men in 10 hours, instruction in time-tabling their own training problems, making job breakdowns, and giving instruction according to a proven 4-step method.

The Job Instruction Card

The outline of the Job Instruction program, as it appears on a pocket card, is made up of "How to Get Ready to Instruct":

HAVE A TIME TABLE—

how much skill you expect him to have, by what date.

BREAK DOWN THE JOB—

list important steps.

pick out the key points. (Safety is always a key point.)

HAVE EVERYTHING READY—

the right equipment, materials, and supplies.

HAVE THE WORKPLACE PROPERLY ARRANGED—

just as the worker will be expected to keep it.

and the 4-steps of "How to Instruct":

Step 1—PREPARE THE WORKER.

Put him at ease.

State the job and find out what he already knows about it.

Get him interested in learning job.

Place in correct position.

Step 2—PRESENT THE OPERATION.

Tell, show, and illustrate one IMPORTANT STEP at a time.

Stress each KEY POINT.

Instruct clearly, completely, and patiently, but no more than he can master.

Step 3—TRY OUT PERFORMANCE.

Have him do the job—correct errors.

Have him explain each KEY POINT to you as he does the job again.

Make sure he understands.

Continue until YOU know HE knows.

Step 4—FOLLOW UP.

Put him on his own. Designate to whom he goes for help.

Check frequently. Encourage questions.

Taper off extra coaching and close follow-up.

If Worker Hasn't Learned, the Instructor Hasn't Taught.

Scheduling of Job Instruction

Job Instruction sessions are scheduled as five, two-hour meetings. In the first meeting both poor and good instruction are demonstrated to get conviction of the value of doing a good instructing job. In the other four meetings, the group members get individual practice and drill on making training timetables, making job breakdowns, and instruction itself, in connection with their own problems of scrap, accidents, and low production.

TWI, in this first program, set a pattern followed in all its later programs: TWI programs were not available to individuals but were only available to plant management, for the people whom it designated as needing this assistance.

New Jersey's method of getting Job Instruction launched in plants provided for:

1. The making of contacts by panel men.
2. The preparation of the trainer's schedule by the State Vocational Education department.
3. Compensation for trainers from vocational education funds.
4. Quality checks by the panel members.

TWI Headquarters at once began to work with L. S. Hawkins, Director of Vocational Training for Defense Workers of the Office of Education, in order that financing arrangements like those made in New Jersey could be set up in every state.

In October 1941 a Job Instruction Institute was held at Washington Headquarters and by November the new program was in actual operation on a national basis.

PLANNING FOR OTHER TWI PROGRAMS

On November 11 and 12, 1941, the district heads of TWI again assembled in Washington and reviewed the progress in Job Instruction. At this time, it was agreed that there should be two other intensive streamlined supervisory programs, one to be in the field of

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Human Relations and one in the field of Production Supervision. A possible program for training directors was also discussed at this time. Thus, the broad outline of the four TWI programs was projected in 1941.

EARLY JOB INSTRUCTION EXPERIENCE

Many plants started using the Job Instruction program not so much because they felt they needed it, but because they knew and liked TWI people. The general attitude in September 1941 was well stated by C. R. Hook, Jr., of Rustless Iron & Steel who was Baltimore's dollar-a-year man for TWI. "We do not expect the problem to be great. A substantial majority of defense contracts have been awarded to large companies, who are handling their training problems in a most excellent and successful fashion. However, we want to be prepared to render assistance when need arises."

In general, the plants where Job Instruction was started on a "Sure, go right ahead and do anything you want" basis, failed to get the values they should have received. It was a long time before TWI learned that it was important to start programs only when managements demanded them, not merely accepted them, and operated them, themselves.

Spread of the Program

The opinion of plant managers did of course mean that a quick start was made. The Job Instruction program was promoted at first in all districts by panel members. In no other way except with volunteer help could such a program have been so quickly launched. But gradually the districts realized that men with jobs of their own could not possibly fill the needs. As suitable men could be located (largely on release from non-war industry) and as the demand for the Job Instruction program increased, the district staffs grew.

By January 1, 1942, the number certified in Job Instruction (sometimes called Job Instructor Training or referred to as J.I.T. or J.I.) had reached a figure permitting regular tabulation. The later growth of the program is shown by the following quarterly certification figures:

January 1, 1942	15,767	January 1, 1944	767,892
April 1, 1942	48,641	April 1, 1944	832,784
July 1, 1942	125,006	July 1, 1944	885,349
October 1, 1942	218,736	October 1, 1944	917,753
January 1, 1943	365,764	January 1, 1945	945,367
April 1, 1943	472,877	April 1, 1945	971,140
July 1, 1943	592,860	July 1, 1945	992,118
October 1, 1943	685,327	October 1, 1945	1,005,870

In 1942, approximately 6,000 new workers were reporting for work every day as night shifts and extra day shifts became necessary. Four hundred workers who had had no experience in directing the work of other people were being appointed as supervisors every day. Some were experienced operators, but some of those who were going to direct the work of these new workers had neither knowledge of the job nor of how to break-in new people. This undoubtedly contributed to the speed with which TWI's program was accepted.

By August, 1942, when TWI was two years old and when the Job Instruction program had been in operation on a nation-wide basis for one year, TWI stated:

The greatest single accomplishment of TWI has been to create a tremendous acceptance in industry of the importance of training. This far-reaching acceptance by industry will undoubtedly leave a lasting impression of the tremendous success of J.I.T. and the voluntary demands for additional programs are evidence of eager industrial participation. . . . In connection with the continuance of J.I.T., our main problem is quality control and follow-through. This will require the development of additional men to specialize in this phase of the work. The problem is the extent to which J.I.T. should be made available to anyone who requests it on the basis that everything will be in the interest of the war effort in the future.

Just as engineering changes are necessitated when an article goes into mass production, so technical improvements in Job Instruction were made by Mr. Kane, Mr. Conover, Mr. Gardiner, and others as national experience grew. These are described in Chapter 13 (Part II).

Acceptance of the Job Instruction Program

The Job Instruction program serves a dual purpose—it meets a new or, recurring, production problem and it provides immense human satisfaction. The action and treatment received by a worker from his supervisor when new work is being started makes or breaks production. It lies at the heart of all productive effort. It determines to a large measure the worker's attitude toward his work in the weeks and months ahead, for the problem is only half-met when the worker has learned what to do. The other half is his interest in the work and his will to go ahead and do it with energy and dispatch.

THE NEED FOR SKILL IN IMPROVEMENTS

In the fall of 1941 the TWI district heads had decided that something was needed in "production supervision." From this statement stemmed the Job Methods Program, again growing out of work by Mr. Gardiner in New Jersey, assisted by C. H. Cox. Established principles of work simplification were cleared of engineering terms,

and techniques were clarified so that they could be applied by average supervisors rather than by engineers. This program was presented to the TWI district heads and approved by them in May, 1942 and national use began in September, 1942. The new program was featured at an A.M.A. conference in New York in December, 1942. (A detailed account appears in Part II as Chapter 15.) It also followed the "package" principle—10 hours, 10 men, a 4-step method, demonstration, and individual practice.

In order to avoid misunderstanding about TWI sponsorship of a program designed to increase individual production, TWI objectives and the Job Methods program specifically were presented to the War Manpower Commission's Labor-Management Committee on July 10, 1942. A TWI sub-committee was appointed, made up of R. E. Gillmor, president of Sperry Gyroscope Company; R. Randall Irwin, director of industrial relations for Lockheed Aircraft Corporation; James Matles, director of organization for the United Electrical Radio Workers (C.I.O.); and Frank P. Fenton, director of organization for the American Federation of Labor. On August 21 this sub-committee announced its approval of all TWI programs.

The Objective of Job Methods

The program at this time was designed to develop in supervisors a constructively critical attitude toward their work. Although this has now grown into drill in a specific method of making improvements, there has been no change in the objective: to help the supervisor produce greater quantities of quality products in less time, by making best use of manpower, machines, and materials now available.

The Job Methods Card

The four steps of Job Methods are:

Step I—BREAK DOWN the job.

1. List *all* details of the job *exactly* as done by the *Present Method*.
2. Be sure details include all:
 - Material Handling.
 - Machine Work.
 - Hand Work.

Step II—QUESTION every detail.

1. Use these types of questions:
 - WHY is it necessary?
 - WHAT is its purpose?
 - WHERE should it be done?
 - WHEN should it be done?
 - WHO is best qualified to do it?
 - HOW is the 'best way' to do it?

2. Also question the:

Materials, Machines, Equipment, Tools, Product Design,
Layout, Work-place, Safety, Housekeeping.

Step III--DEVELOP the new method.

1. ELIMINATE *unnecessary* details.
2. COMBINE details when practical.
3. REARRANGE for better sequence.
4. SIMPLIFY all *necessary* details:
 - Make the work *easier* and *safer*.
 - *Pre-position* materials, tools and equipment at the best places in the *proper work area*.
 - Use *gravity-feed* hoppers and *drop-delivery* chutes.
 - Let *both hands* do *useful* work.
 - Use *jigs* and *fixtures* instead of hands, for holding work.
5. *Work out* your idea *with* others.
6. Write up your proposed new method.

Step IV--APPLY the new method.

1. *Sell* your proposal to the *boss*.
2. *Sell* the new method to the *operators*.
3. Get final approval of all concerned on *Safety, Quality, Quantity, Cost*.
4. Put the new method to work. Use it until a *better* way is developed.
5. Give *credit* where *credit* is due.

Launching Procedures

In both the Job Instruction program, which had been underway for a year when Job Methods was launched, and in Job Relations, which was used on a trial basis in many plants in 1942, experience through national use or try-outs had shown that an individual supervisor could use these new skills if he wished to do so. A different problem was faced in Job Methods. Improvements are changes, and most changes extend outside the supervisor's immediate department or authority. Also, labor relations were involved in changed work procedures.

Accordingly, very specific launching procedures were worked out, and arrangements made for informing both management and labor of the specific details of the program before it was launched in a plant. It also had been feared that proposals would get "lost"--accordingly TWI recommended to plants a specific way to keep proposals moving through the approval machinery, including the appointment of a line executive to clear and expedite proposals.

It was soon realized that it was important to stress two points:

1. Management must be shown that Job Methods was not an attempt to make professional engineers out of their supervisors. Job Methods will help supervisors to make many small improvements on the jobs they are closest to. (TWI needed to stress this point to management, and trainers needed to steer supervisors toward the improvements that were closest

to them, those which could be made without wholesale re-design of machines or tools or departmental layouts.

2. Management was going to have to show supervisors that the plant was interested in the making of improvements. This would have to be done by, first, encouraging supervisors to make improvements, and then improving the handling of proposals.

TWI made these changes in its approach to management, and also stressed the by-products of Job Methods—the development of thinking among supervisors, the identification of supervisors who were thinking, and the increased attention given to safety as a result of the development of better methods.

J.M. and Suggestion Awards

In August 1943, the National War Labor Board was asked to rule on the giving of cash awards for Job Methods suggestions. TWI policy was to tell management that improving the job is a normal part of every supervisor's job. On the other hand if an individual company wishes to give extra financial awards for adopted suggestions, that is a matter for the company's own decision. Some companies were fearful of making such cash awards because they thought the National War Labor Board might construe these awards as unauthorized increases in salary.

The War Labor Board stated:

Cash awards for employee suggestions designed to increase production do not require board approval, provided, that the awards are not a subterfuge for increasing wages, but represent a genuine award for additional effort on the part of the employee outside of his normal work, and are in an amount which would be regarded by normal industry tests as not in excess of the value of the contribution by the employee. An employee who has discovered short-cuts in manufacturing, perfected an invention, or otherwise accomplished some work in addition to his regular duties, may receive a bonus or other form of compensation commensurate with the value of that service which was not required by the regular choice of duty. You understand, of course, that the awards must not be a disguised wage increase and that they must not exceed the value of the service.

ANOTHER NEED—SKILL OF WORKING WITH PEOPLE

In January, 1941 Sidney Hillman had asked the National Academy of Sciences for its guidance on the most useful service TWI might perform. The reply was that new supervisors were going to need a great deal of help "in the human relations problems of handling men." This assignment was turned over to Walter Dietz, and the resulting program, Job Relations, was developed under his leadership (the technical details of the development of this program are given in the history of the Job Relations Program which is included as Chapter 14 in Part II).

Through the spring and summer of 1941 industrial suggestions and help were solicited, both from management and from supervisors. All the suggestions were in the vein of the traditional conference on accepted principles—none proposed a method, considered a skill, or involved any practice. Accordingly the development group began to search for something specific, but broad and fundamental. Trial sessions extended over more than a year before Job Relations was officially launched at an A.M.A. meeting in Chicago in February, 1943.

The Job Relations Card

Some of the general rules to which personnel directors clung so tenaciously were valuable, and a few were truly foundations of good relations. While those rules would not solve problems, they would often prevent many problems. Four had such universal value that they became part of the Job Relations program and were named the "Foundations for Good Relations":

- Let each worker know how he is getting along.
- Give credit when due.
- Tell people in advance about changes that will affect them.
- Make best use of each person's ability.

In a slightly different vein the following general warning was adopted: *People Must Be Treated As Individuals.*

The 4-step Job Relations method of handling a human relations problem is not new—it has long existed as "the scientific method" or "the engineering method." It is followed in legal and military practice, but its application to the personnel field was unique. The steps seem so reasonable and its intuitive use by successful leaders so evident that it is hard to understand why it had never been formulated in the personnel field before this time.

The Job Relations steps are:

DETERMINE OBJECTIVE

1. GET THE FACTS.

- Review the record.
- Find out what rules and plant customs apply.
- Talk with individuals concerned.
- Get opinions and feelings.

Be sure you have the whole story.

2. WEIGH AND DECIDE.

- Fit the facts together.
- Consider their bearing on each other.
- What possible actions are there?
- Check practices and policies.
- Consider objective and effect on individual, group, and production.

Don't jump at conclusions.

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3. TAKE ACTION.

Are you going to handle this yourself?
Do you need help in handling?
Should you refer this to your supervisor?
Watch the timing of your action.

Don't pass the buck.

4. CHECK RESULTS.

How soon will you follow up?
How often will you need to check?
Watch for changes in output, attitudes, and relationships.

Did your action help production?

The Job Relations Pattern

Experience with the Job Instruction program was very valuable to the Job Relations development group. For example, the "pattern" of five, 2-hour sessions for 10 supervisors, led by a trainer who had been prepared by TWI in an Institute, was followed. A demonstration of the results of poor handling of a problem is used to convince the supervisors of the necessity of developing skill in working with people. The 4-step method is then presented to the group.

In the remaining sessions each supervisor handles a problem of his own, using the Job Relations 4-step method. They bring in such problems as a man with home worries, a technical man who feels he is in a rut, a girl who won't accept transfer from an hourly rate to a salary basis, an oldtimer who is peeved, a crew that can't agree on hours, a man who works someplace else part of the time, or a girl who won't rotate shifts. The trainer gives emphasis to special points by presenting three more problems.

The development of the Job Relations program was a long, slow job. There were no precedents, and there were many prejudices based on current personnel practice. Personnel experts had rules to use in situations—they were not accustomed to using a skill method of solving a problem. Exploration of the problem began in January, 1941; the first draft of a program was completed on December 6, 1941; the first trial group was run in January, 1942; the program was not released nationally until February, 1943.

In many plants, shop stewards were included with supervisors in J.R. sessions; by 1944 TWI suggested certain adaptations where there were stewards in a group; in 1945 a special Union Job Relations manual was prepared. This represented no basic change in the program but used union terminology and situations. (*See Chapter 6.*)

OPENING SESSIONS IN THE SUPERVISORY PROGRAMS

In any of the TWI supervisory programs the first session is very important. If the content of the 10-hour program is analyzed, the

first session in Job Instruction or Job Methods or Job Relations would be called a demonstration of need, good and bad procedure, or simply "selling." The other four sessions are the real "training" sessions, where the supervisors learn by doing. This first session in any one of the programs is designed to get conviction that (1) their own habits are just about like everybody else's, (2) they are not particularly effective, and (3) there is a method which will get better results.

In order to get conviction on these three points, a standard device is used. The trainer illustrates what a supervisor does. This demonstration has to be something which makes supervisor after supervisor say or think, "I've done the same thing myself." But the demonstration has to end in poor results, so obvious that supervisor after supervisor will say, "That's not very smart." The stage is then ready for the trainer to demonstrate a method that will get improved results.

The trainer thus has spent the first session getting the supervisors interested in learning the method before he tries to actually get that method across. These opening sessions are TWI's "famous firsts" and have been used repeatedly in presentations of the program at business and professional meetings. Naturally, the particular demonstration used in each program had to be carefully chosen. It is interesting that, in spite of the technical improvements made in the programs as the result of widespread use, there has been no change in the Job Instruction, Job Methods, or Job Relations first-session demonstrations.

Tying the Knot

The Job Instruction trainer uses the tying of the "fire underwriters' knot." This knot, so named because of its specification in insurance policies, is found in electrical connections where the breaking of one strand of two-stranded wire could cause a short circuit, and is in nearly every electrical ceiling fixture as well as inside many electrical plugs and appliances.

Despite its common use, few people know how to tie it. It thus has been 99 percent safe for the trainer to "tell" a member of the group how to tie the knot. Few people even tried. There is no trickery—the trainer gives an exact, complete description. Less than a dozen people in Job Instruction's million have been able to tie the knot from hearing how to tie it. (In that case, if the trainer were quick-witted, he tossed his piece of twisted electrical cord to another member and said, "Now you tie it." That never failed.)

After the group admitted—often volunteered—that "telling" alone was not good instruction, the trainer demonstrated "showing how to do it." The trainer stood facing his next victim—and he tied the

knot in plain sight, but he gave no explanation. People usually tried to tie the knot after seeing it tied, but the successes were about as rare as after "telling" alone. For one thing, the operation had been viewed backwards.

By that time the supervisors are on the trainer's side--ready to say they've often "told" people how to do some work, or "shown" them, then wondered why they didn't get it right. The trainer then selects another member, and, using the Job Instruction 4-step method, gets him to tie a neat, taut knot the first time. This was called the "sure fire" demonstration.

The Radio Shield

In Job Methods, the trainer first shows the way the operators in Bill Brown's department are riveting a radio shield which is made up of a brass sheet and a copper sheet. The worker goes to a tote box, near but not beside his bench, and picks up a handful of copper sheets. Inspecting them, he lays out 12. He tosses scrap in a nearby scrapbin, and returns any that are left. He repeats for the brass sheets, putting a brass sheet on top of each copper sheet.

Then the worker stacks the 12 sets and begins to rivet each set at the four corners. He has to line them up for close tolerance. Each one has to have the word "Top" rubber-stamped in a corner. Finished sets are put in a case and eventually he carries the filled case to a scale where it is weighed and marked. The job is obviously one involving a lot of going back-and-forth, and yet it rings true as everyday practice.

Next the trainer shows the improved method developed by the supervisor, Bill Brown. The supply of brass and copper sheets is kept at the bench, and piles are put in fixtures which slope the pile to make the removal of one sheet easy. A brass sheet is picked up with one hand while a copper sheet is picked up with the other. Scrap is dropped through slots in the bench. Two riveting machines are placed in a fixture which lines up the two sheets and also acts as a counting gauge. The "top" stamp is eliminated as it was found to have been unneeded for some months. The weighing at the scale was eliminated since it was also being done later.

The trainer explains that the 300 percent improvement in production per operator and elimination of many tiring details and much heavy work was accomplished through use of the Job Methods 4 steps, which he then sets forth.

Joe Smith

More than a half-million supervisors have heard a Job Relations trainer say "Joe Smith was a good worker and his earnings were high." They've heard it in American and in Oxford English, in

Spanish, in French, and in "pidgin." The story concerns an irresponsible bachelor who could afford to lay off one day a week; after he was married he came to work every day for a long time. The day after a wage increase was announced, Joe wasn't at work. The supervisor, who needed Joe desperately, decided to teach Joe a lesson so greeted him on his return with the news that he was being laid off for a week.

Since Joe stayed away because his father had been hurt in an accident, and since he thought his message had reached his supervisor, feeling against Joe's supervisor ran high.

Members of Job Relations groups were quick to say they'd often jumped to conclusions, or that they could remember when supervisors had done such a thing to them. The answer to "Well, what could he have done?" was "Find out why Joe wasn't there," sometimes it was the very wording of the Job Relations Step 1—"Get the Facts." Thus, in Job Relations, by looking at what Joe's supervisor did *not* do, the members of the group are led to tell the trainer what this particular 4-step method is.

HELPING INDUSTRY TO HELP ITSELF

Although by the beginning of 1942 TWI had already provided industry with one tool, the Job Instruction program, and work had been started on Job Relations, and a third field of supervisory training (improvement of methods) had been discussed, there had been no lessening of the conviction that industry should help itself, that it must accept its responsibility for the use of training as an everyday operating tool. But it was evident that some additional steps would have to be taken before industry could accept this responsibility.

General Motors Cooperation

The Detroit TWI district had successfully been holding discussions for war contractors during the winter of 1940-41 at which various training needs and solutions were considered. These meetings had been instigated and organized by Major Albert Sobey of the General Motors Institute, a member of the Detroit district panel.

In February, 1942, TWI and G.M.I. jointly put on a one-week session for 15 industrial men at the General Motors Institute in Flint, Michigan. In addition to the consideration of training needs and solutions, each training director who attended was required to develop a training plan for his own plant. Martin Firth, of G.M.I. assisted Walter Dietz in conducting this meeting.

For the next year, meetings which ranged from those more nearly like the original Detroit groups to work sessions like the Flint experience, were held across the country and much interest generated. By

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early 1943 it was felt that there was a skill need in this field of designing training plans and programs to meet specific plant needs. A 4-step method was applied, and the name "Program Development" adopted in April, 1943.

In 1944, the need for further improvement was found, and revisions were made to give the members more practice in use of the method. At this time the emphasis was placed very strongly on "How to Meet a *Production Problem through Training.*"

The Program Development Card

The four steps were established as:

1. SPOT A *PRODUCTION* PROBLEM.

Get supervisors and workers to tell about their current problems.

Uncover problems by reviewing records—performance, cost, turnover, rejects, accidents.

Anticipate problems resulting from changes—organization, production, or policies.

Analyze this evidence.

Identify training needed.

Tackle One Specific Need at a Time.

2. DEVELOP A *SPECIFIC* PLAN.

Who will be trained?

What content? Who can help determine?

How can it be done best?

Who should do the training?

When should it be done—how long will it take?

Where should it be done?

Watch for Relation of This Plan to Other Current Training Plans and Programs.

3. GET PLAN INTO *ACTION*.

Stress to management evidence of need—use facts and figures.

Present the expected results.

Discuss plan—content and methods.

Submit timetable for plan.

Train those who do the training.

Secure understanding and acceptance by those affected.

Fix responsibility for continuing use.

Be Sure Management Participates.

4. CHECK *RESULTS*.

How can results be checked? Against what evidence?

What results will be looked for?

Is management being informed—how?

Is the plan being followed?

How is it being kept in use?

Are any changes necessary?

Is the Plan Helping Production?

The P.D. card concludes with a statement on responsibility for training results:

The LINE organization has the responsibility for making continuing use of the knowledge and skills acquired through training as a regular part of the operating job.

The STAFF provides plans and technical "know how," and does some things FOR but usually works THROUGH the line organization.

It will be noted that these four steps are simply a re-statement of the "engineering" method—this time in training terms as contrasted to the personnel emphasis of Job Relations. P.D. training follows the "J" pattern—demonstration of a 4-step method followed by individual practice of the 4-step method on the member's own problem. (The specific details of the technical evolution are outlined in the history of Program Development which is included as Chapter 16 in Part II.)

Introducing Program Development

In the majority of Program Development Institutes, most members were already familiar with the techniques used to introduce the three supervisory programs. They expected that TWI would have a 4-step method, and that they would be shown its application before being asked to use it on one of their own problems. The P.D. Institute Conductor followed standard TWI practice and described a production problem, then demonstrated how a training director solved it through use of a 4-step method.

The production problem, which was one that had been brought into an early Program Development Institute, concerns serious cost errors. The superintendent had long been suspicious of the amazing cost reports which showed that every job came out exactly as estimated, never over, never under. After some Sunday work at double time, the superintendent demanded explanations, and an amazing but believable mass of evidence was discovered.

In the first place, time-cards were needlessly complicated, and the time-clocks were inconveniently located. Supervisors did not encourage punching of time-cards because they made up their cost reports from estimates not from records. And they did this because they had no appreciation of the importance of cost records, and accordingly avoided the added work of getting authorization to run over an estimate. They covered up their excess costs through savings on jobs which had actually been performed below the estimate.

This problem illustrates the importance of using the thorough first step of Program Development, and on this foundation the Institute Conductor builds the remainder of the method.

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TWI PROGRAMS IN OPERATION

TWI work was at all times interesting and colorful. Figures on plants reached, supervisors certified, and even on production increased and manpower saved, fail to give a picture of the action involved. Consider an area up in New York which was weather-bound under a 32.6-inch snowfall. That meant slogging around on snowshoes or hitch-hiking on a snowplow even to get started toward getting a TWI job done. Or take the tale of the Denver staff man required to make a quick 200-mile trip to a small but highly important copper mine with a critical manpower problem. He started out by plane, only to be yanked off for a passenger outranking him in priority, made a short jump by passenger train and a longer one in the caboose of a freight, hopped a bus or two, thumbed a few leagues with truck drivers and kindly motorists, and finished his journey on foot.

A TWI man on the Pacific Coast made a service call and met a woman shipyard supervisor who had completed all three "J" programs—the first woman in the shipbuilding industry to gain that distinction.

In all, more than 1,000 war plants received service visits from TWI in an average week in the winter of 1945 (from that point on, TWI staff was decreasing and the volume of service also decreased.) No two of those calls were alike, save in objectives. They all differed in scene, characters, and action, and there was a high potentiality of the unusual and interesting in every one of them.

A total of more than 700 TWI training groups were conducted in an average week for an aggregate of more than 6200 supervisors who in turn made the benefits of on-the-job training affect the production of some 65,000 workers whom they supervised. Some of those workers helped to fabricate the last shells and the last bombs that sank enemy battleships or submarines.

TWI in a Plant

The state of New Jersey had many small pre-war plants which mushroomed in size. Typical is Pollak Manufacturing Company of Arlington which had 600 people in 1938. In August, 1945 their seven 100 percent war plants employed more than 5,000.

Twenty years ago Pollak made prefabricated parts for "Jenny" planes. In World War II Pollak made bomb fuse mechanisms and caps, bomb racks, shackles, and powder cans for the Navy. Job Instruction was started in September, 1941; Job Methods in September, 1942; and Job Relations in March, 1943. These early groups were conducted by outside trainers but later a training department was set up, company trainers prepared, and continuing use stressed.

Four men have attended a Program Development Institute and they have, with the assistance of the Newark staff, spread understanding of the P.D. method through management. There have been 514 J.I. certifications, 450 in J.M., and 215 in J.R. There has been a 20 percent reduction in break-in time for new employees, a 5 percent reduction in re-work, and other reductions in absenteeism and turnover.

THE FIVE NEEDS CONCEPT

While Program Development was being tried out, TWI discovered a way of talking about supervisory needs that proved very useful in outlining what TWI was prepared to do, and making clear the fields in which the plant would have to develop its own programs. It proved effective in discussing the special needs of a plant, and made "our business is different" concepts clear in relation to basic needs of all supervisors. The statement, which has become a standard part of TWI thinking and publications, is:

EVERY SUPERVISOR HAS FIVE NEEDS

1. *Knowledge of the Work*—materials, tools, processes, operations, products and how they are made and used.
2. *Knowledge of Responsibilities*—policies, agreements, rules, regulations, schedules, interdepartmental relationships.

These two knowledge needs must be met currently and locally by each plant or company.

Such knowledge must be provided if each supervisor is to know his job and is to have a clear understanding of his authority and responsibilities as a part of management.

3. *Skill in Instructing*—increasing production by helping supervisors to develop a well trained work force which will get into production quicker; have less scrap, rework and rejects, fewer accidents, and less tool and equipment damage.
4. *Skill in Improving Methods*—utilizing materials, machines, and manpower more effectively by having supervisors study each operation in order to eliminate, combine, rearrange, and simplify details of the job.
5. *Skill in Leading*—increasing production by helping supervisors to improve their understanding of individuals, their ability to size up situations, and their ways of working with people.

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These three skills must be acquired individually. Practice and experience in using them enable both new and experienced supervisors to recognize and solve daily problems promptly.

Training Within Industry Service assists companies in giving their supervisors a start in acquiring these skills through three 10-hour programs: Job Instruction, Job Methods, and Job Relations.

These skills, acquired through this training, must become a part of day-to-day operations. In no other way can production be so quickly influenced and manpower conserved.

Confidence and resourcefulness in how to proceed, not standardized solutions and rules, are developed. These enable supervisors to get good teamwork, to give better service, and to get out more production.

Chapter 4

EARLY PROMOTIONAL ACTIVITIES

From the very beginning TWI has been selling ideas to management. TWI was in existence eighteen months before Pearl Harbor. During the first part of that period many plant managers either were under no pressure and hence felt no need to do anything about training, or else the pressure was so great that they said they had no time. At first TWI used three main devices to get management to accept its responsibility for training and see the values of training--speeches, surveys, and bulletins.

MEETINGS

TWI people in the various districts were accustomed to meetings, to trying to get a point of view across to a group. This type of promotion was used in a number of districts late in 1940 and early 1941 before TWI's program took definite shape. District Directors accepted or sought speaking engagements under auspices of industrial, educational, and social organizations, used the radio, and literally beseeched the industrialist to look at his bottlenecks. They prophesied that he would lose skilled workers whom he would be unable to replace, how he might have to consider entirely new sources of labor, that unless he started doing his own training of skilled and unskilled supervisors and workers alike he would "lose his shirt" and Uncle Sam would not have that Arsenal of Democracy to protect us and keep us out of war. The only follow-up on these meetings was publicizing of TWI's assistance through bulletins on how to get an in-plant training job done, and some calls on management to see if the bulletins were helpful.

PLANT SURVEYS

Throughout 1941 TWI Headquarters continued to press the districts to make surveys, and 27 were made during the last week of December 1941, some three months after the specific Job Instruction program had become available nationally.

The training consultants, executives borrowed part-time from industries that were doing a good job of training, spread the gospel of training through assigned calls on the managers or training directors of plants. They offered to make surveys of training needs as a basis for individually advising how to spread training through the use of job breakdowns and "good instruction," as well as how to apply the many other suggestions of the bulletins. The part that these men played in promoting good in-plant training cannot be overlooked; too often it was the thankless job of "door bell ringing" at plants that did not know they needed to be helped, and which at that time often had no intention of doing training on any other basis than trial and error. A year or more later many of these plants were enthusiastic users of TWI services.

In February 1943 TWI wrote to the districts as follows: "We will start out with an admission of guilt: Once we encouraged you to make surveys—later we cut the emphasis. As part of our relation to the total training picture in WMC we would like to take another look at the value of surveys." The districts were requested to summarize their experience with surveys. The record of production effects was not good. Just pointing out the needs for training was definitely not enough. The result was that the making of surveys was officially dropped.

BULLETINS FOR EMPLOYERS

A look through TWI district files indicates who received these bulletins that were supposed to get plant action in expediting production. Almost half of them apparently were asked for by other than the industrial plants for whom they were intended. Vocational education groups, other government agencies, university schools of business, research bureaus, university and college executives and professors, management and trade associations, youth organizations, engineering societies, public and university libraries were recipients of much of the early printed material. Consequently much of it misfired as a direct aid to war plant training, although the extent to which it served to educate and arouse people into an alertness for the post-Pearl Harbor days may have been important in the more populous industrial centers.

In March 1942 TWI issued its last bulletins, *Increasing War Production through Employment of Women* and *Safety on the Job for the New Employee*. Some time after TWI had issued its bulletin on women, Mr. Dooley was quoted in *Fortune* (February 1943) as follows:

We have so many requests from nervous employers for special material on the training of women that I've asked my secretary to go out and buy a

rubber stamp to use on every printed piece we send out, reading "This includes women, Negroes, handicapped, Chinamen, and Spaniards." The only difference between . . . men and women in industry is in the toilet facilities.

The article goes on to say :

But women need to get the feel for machines, and Mr. Dietz recommends warm-up courses, especially for women who have never worked before. . . . If we expect to bring into factories women who have never worked before, it would seem the best part of wisdom to give them some sort of pre-planned training, if only to strengthen their confidence. But the final policy must, of course, come through training in the plant, and for this the Dooley-Dietz Method is to teach teachers. Foremen, leadmen, supervisors, and anyone else responsible for showing how things ought to be done are drilled in the most effective ways to go about it.

The early bulletins were distributed individually by TWI panel members in many cases and in others they were left with exhibits at defense contractors' shows. TWI preferred the individual distribution, but many panel members who were willing to work said that the bulletins did not help them to get a conversation started once they got into a manager's office.

With the Job Instruction program as a specific thing which plants might do, TWI perhaps unfortunately began to talk too much in terms of what its program and its techniques were. Of course, the original idea of going into a plant and making a survey had been too comprehensive for as small a group as TWI to handle, but the *fundamental* of that survey approach was not wrong. It implied finding out what was needed in the plant before the consideration of any training. When Job Methods and Job Relations became available they also, for quite a time unfortunately, were presented to management almost entirely by means of describing the details of techniques of the program.

PLANT ACCEPTANCE

The background of TWI people in one way put up a handicap which was not recognized for a long time—it was too easy to get into plants and get a "yes." Managements did not take the trouble to find out the details of what TWI would do for production and accepted the word of their old industrial friends that "this is good stuff" and did not demand production results. When results are not demanded, they dwindle after the first enthusiasm generated in basic training cools.

TWI people presented the programs according to many different methods, based on their own backgrounds, but all tended to make their approach on the basis of what a program was, not what it would accomplish. Often they approached the wrong people in the plant.

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The first specific TWI program, Job Instruction, was eagerly accepted by plants—it was a usable remedy for a generally acknowledged problem—getting inexperienced people to do skilled operations quickly. Obviously thousands of individuals who found their places in the defense and war effort were novices in industry and were of little productive value until trained. The same may be said of great numbers of those raised to supervisory levels. Another reason for the rapid acceptance of Job Instruction was that the program was interesting for both those who took part and those who dropped in to watch.

MASS PROMOTION

TWI tried to “kill a lot of birds with one stone.” In 1941 a New Jersey panel member assembled 49 representatives of contractors to hear about Job Instruction. This started a pattern which attracted many customers in New Jersey and was used by many other districts. The usual arrangement was to have a dinner meeting for business executives sponsored by such a group as the Chamber of Commerce.

Many of the districts followed this lead, particularly Chicago, Pittsburgh, Detroit, and New Haven. By the end of 1941 or early 1942 panel members were too busy in their own plants to spend much time on calling on other plants. Some panel members whom the District Directors counted on to “sell” this new program to their own companies suddenly became lukewarm; often they became positively cold to this threat to their personal prestige as training directors who had always devised their own training programs. Ways had to be found to capitalize on the favorable attention that had already been created by TWI.

Sponsored Meetings

Chambers of Commerce, Employers' Associations, Manufacturers' Associations, Trade Associations, engineering societies, hospital councils, and even semi-public groups such as the Service Clubs and the American Legion were utilized to publicize the availability of Job Instruction. Large national group meetings were also utilized; the conventions of the American Railway Association, the American Management Association, the American Society of Mechanical Engineers, the American Foundrymen's Association, and the American Transit Association were typical of national groups at whose meetings TWI Headquarters and District staff speakers explained and urged use of the TWI programs. Job Instruction was presented as a program that would speed up the assimilation of the new unskilled workers who by this time had become numerous and a definite headache to most managements.

While the patterns differed, the dinner meeting was usually sponsored by an organization desirous of helping its membership and chairmanned by one of its officers. At the speaker's table were top executives of industries that had already had some results with the program, though in the early days their confidence was often based only on "everybody in our company liked the program and the trainer."

Usually the chairman, having given the meeting his blessing and TWI his endorsement, turned the meeting over to the TWI Director or his promotional assistant. An explanation of objectives was given, the underwriters' knot was tied by members from the audience selected for the telling, showing, and "sure fire" demonstrations, and high dramatics were indulged in to impress industry that men could learn easily if trained properly, as a solution to their new production headaches.

Much dependence was placed on "testimony." Members of managements expressed their approval by saying, "Here is a government agency whose men will come into your plant only when invited, help you, get out, and when they are gone, you still own your plant"; "This is a government war agency that helps instead of hinders"; "If anyone had told me that I would be hiring theatre ushers, musicians, and manicurists to operate lathes and milling machines in my plant, and that I would not only like it but get standard production from them, I would have called him a liar; today I do it gladly, get results, and only TWI has made this possible." A Brigadier General, recently a manufacturer, would say "The place to start this program is in the President's office; I took it and none of you big shots is too big to learn it too." The Navy would urge its contractors to push their production through this J.I. program.

Some districts stationed a panel consultant or staff member at each of the small tables. He carried on a group discussion which usually resulted in individual discussions on how to solve individual problems, prolonged long after adjournment. Districts would often get signatures on the dotted line at the dinner, committing the company to begin training for a designated number of supervisors by a given date; Newark would announce the number of certificates contracted for before the end of the meeting.

The TWI staff or panel members would then remain in the city for immediate follow-up with plant executives and make arrangements for scheduling the basic training.

Results of Mass Promotion

A difficulty encountered in the early use of this method was getting top managements of plants to attend; too often they sent "representatives" or their training directors, and often foremen. Yet, in the

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long run, the wide coverage that these meetings provided in favorable word-of-mouth reports served the purpose well. Eventually managements came out themselves because of the favorable reports heard on every side. Meetings varied in size from 25 to 800 in attendance.

Some districts secured the definite endorsement of the programs by their State Manufacturers' Associations, as in Connecticut, Illinois, and Wisconsin. Army Ordnance, Navy Procurement, the Air Force, the Maritime Commission, and other agencies interested in production including the War Production Board, with which TWI was identified until the middle of 1942, were heavy promotional factors in direct persuasion of plant managements to use TWI services. State and city vocational school authorities, in states where TWI had insufficient staff coverage, arranged or held promotional meetings for TWI.

Staff members vied with one another in numbers of management agreements to have a given number of supervisors trained. Staff members in some districts were given sales quotas. As the other programs developed, the J.I. program men were put on the defensive by the J.M. and J.R. men. District Representatives had to harness the competitive enthusiasm of these men while convincing them that the programs were tools for different purposes—that a carpenter does not contrast the quality of his hammer, his saw, and his chisel—all are tools for particular purposes in accomplishing one end. Competition was the order of the day in the most active districts.

Publicity

The place of radio as supplementary to the meetings must not be overlooked. From the time of TWI's first nation-wide broadcast in March, 1941 when the National Director of TWI spoke from New York as a start for the cross-country stops which ended at the Lockheed plant in California, TWI was frequently on radio programs. Several times the Director was put on national hook-ups to discuss this new type of training, and local District Directors followed with short local spot announcements. Columbia Broadcasting System, particularly through its Chicago outlet WBBM, presented several elaborate scripts using as many as twenty participants from TWI and industry (usually the panel members); organized labor offered its Chicago station WCFL for 15-minute evening programs in the same city. Luncheon club speakers were also put on the air in various cities.

Newspaper accounts of meetings were extensively distributed; addresses made at meetings were mailed by organizations to their memberships; direct mail announcements and solicitation for interviews were used; even the telephone was used promotionally. An increasing number of house organs and business publications pre-

other companies. By 1943, TWI insisted that company men be used if at all possible as further evidence of management's acceptance of responsibility for training within their own organizations.

Long before funds for state payment of trainers were cut in 1943, the use of state-paid trainers was restricted to small companies for whom TWI could not afford to prepare a trainer, or in small, scattered and remote plants such as are found in the lumbering, mining, and canning industries.

Trainer Specialization

For a time there was an unfortunate impression among some plants that the J.I. trainer must "stick to his last," or if he went over to J.M. he would have to drop J.I. This probably grew from observations of TWI assignments—in order to get the "J" programs launched speedily, specialists were used.

The only requirement that TWI made was that each trainer be competent to handle the program he put on. This meant satisfactory completion of an Institute and satisfactory handling of groups as determined by repeated quality control visits. Since the first-line supervisor is expected to acquire the skill of instruction, skill of improving methods, and skill of leadership, and to use them every day on his job, why should it seem strange for his boss to have this same rounded ability?

In order to speed production of any kind, specialization is common. In getting training programs launched in a plant it often is speedier to develop Job Instruction trainers and work them up to their full limit; do the same with Job Methods and Job Relations. This, however, was an emergency measure and disappeared with time. The trainer who can handle all three packages does a better job in each one of them.

TWI and Company Certificates

As companies began to use their own trainers rather than itinerant trainers paid from state funds it no longer was appropriate to use the supervisory certificate with the printed signatures of Mr. Dooley and L. S. Hawkins of the U. S. Office of Education. Accordingly a new certificate was designed with Mr. Dooley's signature printed on it and space left for the signature of the executive and the name of the company. This was used with in-plant trainers. Many companies also printed their own certificates as well as other supplies. The wording of the certificates was brief; for example, the Job Relations certificate reads: "This certifies that _____ has satisfactorily completed the Training Within Industry Job Relations Training and has pledged to apply the principles of good job relations in his daily work."

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SPECIALTY SELLING METHODS

During the early promotional aspects of selling TWI to industry in certain districts, a few former industrial sales managers on TWI staffs realized that a promotional cycle must be accompanied or followed by good salesmanship, that the TWI "product" should be sold to management on an individual basis comparable to the sale of insurance, management consultant services, or other intangibles. Some district staff members developed adaptations of their previous experience in industrial sales and in the sale of so-called educational programs by private companies.

Several factors favored development of such specialty selling techniques. It had been demonstrated that more had to be sold than the 10-hour programs, that this sale required considerable individual effort with one or more members of management, and that managements did not buy without thorough appreciation that they were giving the green light to the operation of a management tool in their business.

In May 1942, TWI Headquarters asked each District Representative to see that manufacturers, who had used the Job Instruction program, required supervisors to apply what they had learned, to see that coverage in each plant was average, and that managements were kept up to date with refinements in the program.

INCREASING THE TWI SALES LINE

The first impact of expanding production for defense had been in the field of breaking-in the millions of new men and women who had to learn new work, or who had never been in manufacturing at all--and many who had never worked at all. But early recognition had also been given to other important supervisory problems and, as soon as the Job Instruction Program was launched, TWI gave attention to other ways to improve supervisory ability. The Job Methods and Job Relations Programs (for supervisors) and Program Development (for plant men with functional responsibility for training) were developed and launched.

These additions necessitated the growth of the field staff and the addition of more men to the headquarters staff in order to have specialized supervision of the programs. Although the new programs filled the gaps in the picture of the universal supervisory needs, the end result of this stage of TWI effort was the conviction that no lasting results would occur unless plants themselves took more responsibility.

Chapter 5

WORKING WITH MANAGEMENT

Job Methods reaches outside the supervisor's own authority, it is apt to be misunderstood unless carefully introduced. Thus, TWI was literally forced into going to top management in order to get this particular program started. This was, of course, the right course anyway.

THE MANAGEMENT CONTACT APPROACH

In 1943 one of TWI's friends, C. Luckey Bowman, became a without-compensation consultant and helped TWI to begin to develop a real sales approach. Mr. Bowman advocated the development of a specific means of selling and the training of TWI's staff members to do this kind of selling. TWI staff members developed, under the leadership of A. G. Blake, what is called the TWI Management Contact approach which was used in all TWI districts after January, 1944. This approach went back to the original idea of surveying the plant's problems, only in this case, instead of sizing-up their training program, top management of the plant was asked what its most urgent problems were.

This did not mean that TWI began to offer a wider number of programs. By this time there was so much evidence that all supervisors did need skill in instruction, in improving methods, and in working with people that very few plant problems were found not to involve at least one of the TWI supervisory programs. The fourth TWI program is the one for the plant man to whom has been given the functional responsibility for designing the plant's own individual training programs. Because of this spread, it became virtually impossible for any manager to name a problem involving people on which TWI could not give assistance.

This new technique did not eliminate any of the formerly used promotional efforts, but harnessed them and coupled them to a well-tested form of presentation of the programs to top and middle management.

Selling Results Instead of Techniques

Reports of Job Methods improvements were logically presented in terms of hours or money saved. This led to more concrete measurement of the results of Job Instruction and Job Relations. Thus, the promise and expectation of getting measurable results became a very concrete part of the approach to management.

Since early 1944, TWI work has proceeded on this more realistic basis. The far-reaching results of this new approach show that this is one of the most important steps TWI has taken. It was learned the hard way. No TWI service is given unless top management really understands what is involved, realizes what it must do to make the program produce dividends for the investment the plant will make, and accepts the program on the basis of making it pay in the solution of individually identified production problems such as scrap losses, broken tools, and turnover.

The new Management Contact heads in the districts had to be trained in how to get complete management support and in helping a company plan for the operation of the TWI program.

TWI Headquarters had in August 1942 sent this word to its districts. "We found that trying to get 'complete programs started' is not the best way to help the war contractors; meeting a plant's specific needs one at a time rounds out programs." However this point of view was not pressed. TWI itself had again followed the practices for which it criticized plants—"known the right thing"—but taken no action.

Middle Management Meetings

In 1943 TWI established the policy of starting a program in a plant only after the executives between the top executive group and the supervisory organization had been thoroughly informed about TWI programs. This executive group, also, had to be thoroughly aware of its responsibility for making these programs work. It can readily be appreciated that a busy president can approve a program enthusiastically, but the plant superintendent, if ignorant of it or unsold as to its possibilities, can be a real barrier. Accordingly, TWI made mandatory as a part of its standard procedure in the field that, before the program started, every intermediate executive understood that making the program work was part of his job. TWI insisted that a chief executive make this point clear to his entire executive and supervisory organization.

While TWI no longer based its sales approach on how the program was operated but rather on what it could do for a plant, it still was necessary for the program to be launched in a plant by a man who both knew the program and how it was to be described to the line

organization. Accordingly, TWI staff men held "middle management meetings" for the executives who reported to the manager. Their understanding and support for any training program is vital for on them falls the weight of getting supervisors to use what they have learned, and giving them additional help.

These meetings in time developed a pattern. The top executive who had agreed to sponsor the program opened the meeting and introduced the TWI representative, and the importance of executive endorsement cannot be over-estimated. The TWI representative then told the purpose of the meeting—to get understanding—and established an atmosphere of informal discussion with questions welcomed at any time. TWI background was briefly described—a service for industry developed by industrial men, using the successful experience of thousands of war plants. A brief picture of the positions TWI's directors occupied and the growth and extent of TWI service followed.

It was then time to outline three points about the particular TWI program:

1. What it would do for the company.
2. What the program was.
3. What management must do to get results.

Next the TWI representative pointed out the key position of the supervisor and outlined the supervisor's five needs (*see Chapter 3*). These were developed by leading questions, and in such order as to lead into the particular "J" program which top management had decided to launch in the plant. Special emphasis was given to the various responsibilities centering in each of the skill needs. Since supervisors are responsible for these various functions, improved results do help the plant.

A striking result from either the local or national collection of results was described as a lead-in to "Would it help if this happened here?" TWI made no promises that the results would occur and warned that the degree varied—but a smaller result might still be worthwhile. It was emphasized that the overall results were not accomplished by individuals, getting them was a team job involving the whole organization.

A rough organization chart was developed to show the various levels of supervision in that plant. It was then appropriate to tell how the TWI programs were developed to be useful to supervision at all these levels. The program was described as having two parts—ten hours of *basic training*, then *continuing use* so that management would get maximum returns. It was pointed out that, like any production tool, a supervisory skill is used over and over, day in and day out.

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Only after this discussion was the operation of the five, 2-hour sessions for a group of 10 supervisors described. The group was told that the method would be established in the first session, and they were told what the method was. The remaining eight hours would be spent in "doing," with each man bringing from his own department one of his own jobs or problems to demonstrate his use of the method. Thus, each man would learn by doing, not by listening.

Discussion of the principles, of results, and of examples of successful use normally started at this point. When someone asked, "Who should have the basic training?", the TWI representative explained that, since success is a team job, it means that interest in results goes clear up the line organization, that every boss and supervisor can profit by it, and that the interest and backing demonstrated by this middle management group would be reflected throughout the organization.

It was necessary to point out that, while the basic training did develop skill, this skill would be quickly lost unless used. It is easy to find non-controversial parallels from sports—the pitcher who stops practicing or the awkwardness of a good football player at the beginning of the season. It is therefore necessary to plan action to keep skill alive and growing so that management will get maximum results.

The meeting would be concluded by reminding the group that, just as returns on a money investment are in proportion to the amount put into the proposition, so are results in proportion to the effort invested. It is necessary for a plant to: (1) assign responsibility, (2) give the basic training to all supervisors, (3) coach supervisors and sell them on use of the program, (4) report results, (5) give credit for results. These are not responsibilities which, once filled, are ended. They continue, if results are to continue.

TWI News Letter

In 1941 TWI Headquarters began to issue a weekly News Letter in order to tie together its small, scattered staff. Gradually the character changed, and editing a weekly promotional summary of TWI results became a full-time job. Special issues were prepared in editions as large as 2500 copies. All were distributed on a selective basis to the managements which would be interested in the contents of a specific issue.

WHAT THIS TWI APPROACH HAS MEANT

TWI always called back on plants which had started using the program. By 1943 it was recognized that calls for technical assistance alone were not enough. The Management Contact approach meant that much more time was spent with management before a pro-

gram was started. TWI representatives worked first with the president or chief operating executive to make sure that he understood his own personal responsibility for seeing that his plant got increased results through TWI programs. Working directly with top management required from one to half a dozen visits and sometimes involved the aid and persuasive assistance of one of TWI's Management Advisers, a fellow-executive, or a personal associate. TWI determined not to expend the time and effort of its limited staff in a war plant until the management did accept its responsibility for getting continuing results.

When a man like D. W. Creeden, president of Libby, McNeill and Libby, pulled from his pocket one of the TWI 4-step cards and discussed its application with a department head, top management support was evident and middle management realized it.

The Long-Bell Lumber Company of Oregon is an outstanding example of an establishment where all three "J" programs are known and used by management. When an accident occurs, it is discussed with the foreman and often with the person who was hurt, to see whether he really knew how to do the job. Then the method of doing the job is reviewed. Relations between the supervisor and the employee are considered to determine their possible effect.

Coaching

At least one person in the plant had to be given special help so that he could, under the management's direction, give the supervisors the additional help on how to apply a TWI program which can come only from an "inside man." TWI assisted management in selecting the proper person to coordinate TWI programs in the plant and in informing the executive and supervisory force as to this person's duties; TWI also trained him to perform these duties. This procedure for making TWI programs effective changed them from being a "shot in the arm," enthusiastically accepted and quickly forgotten, to taking a permanent part in the plant's operation.

COMPANY VIEWPOINT

The Iron and Steel Division of the Kaiser Company at Fontana, California trained 600 supervisors in Job Instruction and 431 in Job Relations. Dale Archerd, the training director, at all times worked closely with the Los Angeles TWI office. In July, 1944, Frank A. Backman expressed the Kaiser management's attitude toward supervisory training in the following message to all their foremen:

Training is a process not confined to a class or conference room. Any time your boss calls a meeting, and out of that meeting comes an idea to further production, to improve the work, or to iron out many of the head-

aches so well known in supervision, that is training. When a superintendent straightens out a weakness in some particular function of a general foreman's duties, thereby making him a better foreman, that is training. If a lead-man shows a new worker an easier way to do a job, that is training. In industry training is a continual process, we must continue to improve our ideas, and pass them on. We either progress or go backward.

The supervisor's job is more difficult and complicated than it has been in the past. Management, realizing this complexity, and desiring to give every aid to the supervisors of Kaiser Company, adopted Training Within Industry's three programs which are designed to aid the supervisor in his daily work. By the use of the principles set forth in the first of these programs, Job Instruction, a supervisor has a tool with which to work toward obtaining a skilled work force, a skilled work force which reduces materially the things for which management holds a supervisor responsible. It is a tool with which the supervisor may get reductions in production delays, lost-time accidents, tool and equipment damage, break-in-time, etc. The reduction of these things add up to one all important factor, a reduction in *Costs*.

We may have done a job a certain way for a period of years, then suddenly we discover a better or easier way of doing the same job. Are we going to let our new worker learn the better way through experience or are we going to give him the benefit of our experience that he may do a better job for us? Perhaps there is a hazardous part of this operation that others have been injured on. Are we going to allow the new worker to learn this by experience, or are we going to convincingly stress this particular hazard to him thereby saving valuable man-hours for our production?

The supervisor whose work force is so well trained that it functions smoothly even in his absence, is truly using good supervisory techniques.

Some supervisors have the mistaken idea that their own boss will be impressed if they seem to be indispensable in their work. If you are ill or absent from your department tomorrow, will production suffer? What plans have you made for such an emergency? The supervisor who wishes to get ahead should remember that his own possibility of promotion is based on two things—first, that he should have the training and ability to fill the higher position, secondly, that he has proven his ability as a "maker of men," by developing the ability of one or more of his subordinates to the point where some one of them can take his place; by developing his work force to the point that they are skilled workmen. This may seem suicidal, to train someone for your own job, but it is the quickest way to promotion. If there is a promotion open to you tomorrow, are you prepared? If a skilled or well-trained work force can achieve for a supervisor all these things, and bearing in mind that it is practically impossible to hire skill, is it to the supervisor's advantage to apply this supervisory skill of proper instruction?

The well informed supervisor recognizes that he must have the loyalty and cooperation of the people whose work he supervises, in order to get his own job done. Since results come through people, our daily relationship with these people is important. Good relationships give you good results and poor relationships give you poor results. As an aid to help get results, Management has introduced to our plant the Job Relations program. This program advocates such homely truths as: being sure you have the whole story, do not jump at conclusions; do not pass the buck; and people must

be treated as individuals. These things apply not only to our employee-employer relationships, but to our inter-departmental relationships as well.

Concern for human relationships is good supervision, because it translates itself into a "plus" factor which becomes increasingly important as production demands grow, a factor which develops into loyalty for the supervisor, thereby loyalty to the company.

Does your boss think it an asset for you to both do the job well and still get along with people? How would it help you personally to have such a reputation?

These two programs are but a portion of the things your Management is doing to help you acquire skill in good supervisory techniques. In the near future we plan to present the third of the Training Within Industry's programs entitled "Job Methods."

To those of you who have completed the ten hours in Job Instruction and Job Relations I wish to leave this thought—A skill is not acquired at a conference table, only the pattern, or the track on which to run may be pointed out. Supervisors can only become skilled through consistent use and application. These are necessary supervisory skills and have always been a part of the supervisor's job. The more skill we acquire in them the easier and better we will do our job. These are skills which are forever yours once they have become part of your everyday work.

In April, 1945, J. H. Tait of the Plate Mill made a report to management on the operation and results of J.I. and J.R. He credited Job Instruction with an overall efficiency increase of approximately 50 percent and stated that Job Relations had both cut down grievances and been a contributing factor to the success of Job Instruction.

In the Plate Mill, production losses due to controllable causes had dropped from 2.8 percent in August 1944 to 1.2 percent in November. Then, as it happened in many companies, after the first enthusiasm generated in basic training sessions had worn off, results decreased. By January 1945 the loss percentage was climbing again and had reached 2 percent. Management began a drive for *use* of Job Instruction, and loss figures reversed their upward trend, dropping to .4 percent by April and to zero in June. Carloading errors decreased from 17 percent almost to zero between September 1944 and June 1945.

EVALUATING TWI INSTITUTES

Both the 10-hour sessions and the Institutes were misused to the extent that people were admitted to them (thereby replacing or preventing others from attending) who could have been as well or better served by some other means. The objective of the Institutes was instruction, and it was a waste of time to include others in a training session which was put on by the most highly skilled technical man in the organization.

Many sessions and Institutes were mistakenly used to give information, to promote programs, as trials, to get conviction, to aid in the

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individual development of a person, to avoid embarrassing situations, and in gratitude for previous favors.

In the fall of 1943, the results of Job Methods Institutes in the middle west were analyzed and it was found that too few trainers put on sessions for supervisors, and that too few supervisors used this skill after its first application in the 10-hour groups. Few companies were checking results or saw the importance of it. Managements did not understand the Job Methods objectives and they were not informed as to how they could contribute to the program so that supervisors would use their skill and get production results.

These problems were located by taking a close look at Job Methods. It was found that they existed in the other programs, too.

OPERATING PLANS

Job Instruction and Job Relations could operate between lower levels of supervision without top management's support, or even knowledge of the use of the program. This was impossible in the Job Methods program, as the continuing use of Job Methods resulted in a steady flow of proposals for job improvements being passed up the line of supervision for acceptance or rejection.

The failure of Job Methods in certain plants demonstrated to TWI the necessity for operating on a definite company plan. It was then found that use of the other two programs also improved if there were a plan which provided for the assigning of responsibility, the obtaining of "adequate" coverage, provisions for the coaching of supervisors, the reporting of results to management, and the giving of credit. In Job Methods, provision also had to be made for proposal clearance.

Beginning in 1944 TWI adopted the "Operating Plan" idea in providing that no program would be launched in any organization without a definite plan which was aimed at the continuing use of the principles presented in the basic training phase.

These plans have been criticized both inside and outside TWI, and in many cases there were faults; when the emphasis was put only on "plan" rather than on "operating," the mechanism became too complex. The best plans were those which an executive could consider as a memo from himself to himself—a notation on points that must not be forgotten, such as "what do we expect to get out of this? How are we going to get it? How are we going to keep this moving?"

More time spent with top executives, more work with "middle management," and more attention to keeping the programs in action took approximately twice as much TWI effort per plant. However, this new approach more than doubled the net results obtained.

EXPERIENCE OF COMPANIES

Willamette Iron and Steel

TWI's Portland staff has always pointed to the Willamette Iron and Steel Corporation for prime proof of the value of top management participation. During World War I, Willamette built ships and after that war manufactured heavy iron and steel machinery. During the depression the company's payroll was down to 320 men, at its peak in World War II, there were 16,500 employees. Early in 1941, when contracts for cruiser-type mine-layers were received, the District Representative gave the president of Willamette information about the Puget Sound Navy Yard and assisted in arranging for a group of 28 (which included A. F. Flegel, the president, and the top supervisors) to have two weeks of intensive training there.

As soon as the TWI programs were available in Oregon they were adopted by Willamette and each time Mr. Flegel was among those receiving basic instruction. Then Mr. Flegel decided he needed a coordinator of training and appointed J. L. Wood, who now is assistant general manager of the corporation and retains active control of training. Willamette has issued its own certificates to supervisors who have taken part in all three of the "J" programs. Top executives actively promote continuing use of the TWI methods. By programs, 1,119 supervisors were certified in Job Instruction; 562 in Job Methods; and 814 in Job Relations.

The accounting and engineering departments evaluated the results of 387 Job Methods improvements and reported to management man-hour savings totalling \$76,000 annually.

Electric Storage Battery

Few companies have worked with TWI more closely than has the Electric Storage Battery Company of Philadelphia. L. B. F. Raycroft, public and industrial relations director, was a management adviser for the Philadelphia district. Joseph Gould, training director, was at TWI Headquarters for six weeks in 1942 helping to give the Job Instruction program to the Services of Supply. L. W. Moseley, personnel director, served on the Philadelphia panel.

Job Instruction began in this company in the fall of 1941 and was revived in 1943. The basic training has been given quite far up the line. There are 225 supervisory positions in this company and over the four years 642 supervisors have been certified in Job Instruction, 221 in Job Methods, and 384 in Job Relations. Also, 75 percent of the stewards in the union which has an agreement with the plant have been certified in Job Relations through attendance at joint groups. All training is conducted on company time, either during regular hours or after hours at overtime rates. Three TWI-prepared

men assigned as J.I. coaches are available to help supervisors at all times. A good Job Methods proposal clearance plan is in operation.

The management is requiring that all grievances be handled as Job Relations problems and that they be written up according to the 4 steps. During the past two and a half years, there have been only eight weeks when no TWI basic training group was in session at Exide.

The real significance of this report of TWI programs at Exide is, of course, in the results that the company obtained. Actual records which are kept on every worker on a new job show that "training time" has been reduced on an average of 50 percent throughout the plant. Management has also stated that there is less scrap, breakage, machine down-time, grievances, turnover, and absenteeism, and that in two years' time the savings have amounted to six figures.

An Example of Success After Getting Management Support

In November, 1943, two Northern Ohio plants of a national company started Job Instruction. After a short interval, the Job Relations program was installed in the plant. Coverage of both programs was approximately 50 percent, cooperation of top management was rather indifferent, and results very spotty. Management claimed that it was too busy and supervision was spread too thin to use Training Within Industry services further.

During the last half of 1944 Job Methods was installed at another of the company's plants on a firm basis. During the first 10-hour sessions, savings in the amount of 20,000 man hours were developed. With this ammunition TWI was able to arrange a meeting for the very top management of four of the company's Ohio plants and presented continuing use and the immediate and practical benefits that were possible by top management's really participating in Training Within Industry programs.

Assistant superintendents were selected as trainer candidates. Detailed operating plans were developed, stressing particularly in-plant coaching. Tangible results in manpower, materials, and machine savings began piling up. During a critical period the dry-cell battery department was moved from one city to another. The engineering department estimated that it would take four months to meet the production schedule. However, by sending several supervisors to another plant and by having them make Job Instruction breakdowns of all the new jobs, the new department was able to meet production schedules within six weeks.

At one plant the first 45 Job Methods proposals submitted were accepted and put into use with a saving of over 100,000 man hours. Top management has stated that Job Relations has been a tremendous factor in improving worker-management relations.

The Perfect Circle Company

The Indianapolis district has been proud of the Perfect Circle Company as a perfect user of TWI programs. H. M. Dirks, the personnel director, was one of the first panel members of the district and took the lead in providing an exchange of training information in the eleven counties around Hagerstown, Indiana. Mr. Dirks heard of the forthcoming Job Instruction program when he attended the all-district meeting held in Washington in May, 1941, and went back so enthused that he "sold" enough companies to provide requests for a demonstration of the program for management and an Institute.

Lothair Teetor, Perfect Circle president, invited 55 industrialists to hear about Job Instruction. Mr. Dirks's interest not only got TWI started in his company but in numerous other plants. At Perfect Circle, 10-hour sessions began at the top, and middle management meetings launched all the programs (Job Instruction, January 1942; Job Relations, March 1943; Job Methods, May 1943; Program Development, August 1944.)

Perfect Circle always "lined up an Institute." That is, they did the promotional work with other plants, then provided Institute space at one of their plants (Hagerstown, Richmond, New Castle, and Tipton, Indiana). Perfect Circle procedure included the appointment of coordinators, basic instruction for all supervisors, coaching, and insistence on use and results. Some of the reported results were:

The new plant at Richmond met its production schedule every month with one exception. Management gives lion's share of the credit to J.I. principles which were used to break-in approximately 1500 new workers. Management of the Hagerstown plant feels that the use of J.I. and J.R. principles is largely responsible for reducing turnover from 6.2 percent to 3.9 percent per month over a three-year period. This was the best turnover record of any plant in this area, the average ranging from 8.5 to 10 percent per month over this same time. Both these plants report that use of J.R. principles reduced the number of complaints 90 percent.

Training time was reduced to one-tenth of the previous time required to get new workers up to production in one department, by using J.I. principles. Another department doubled the production per worker--by using J.I., J.M., and J.R. principles. In the four plants there were 2095 certified in Job Instruction, 215 in Job Methods, 685 in Job Relations (including 26 stewards), and 4 in Program Development.

Textile Plant

In a large textile plant in Eastern Pennsylvania TWI services were first introduced in 1942 with Job Instruction being conducted

by "outside trainers." This company operates plants in four localities in Eastern Pennsylvania with a total employment of about 5,000. In those early days TWI activity was being handled by the personnel director, who followed the usual lines of foremanship training. As such, TWI programs were being presented as "education." In 1943, the need for conducting the Job Methods program by "in-plant trainers" was strongly emphasized, and the company management sent several men to a J.M. Institute.

In getting Job Methods started, the company realized that this was a production tool, and getting the desired results would require the full-time services of a man to look after these activities. With some advice from TWI, he was not given a title of "Training man" but "Assistant to the General Manager." Most of this man's efforts are devoted to making the three "J" programs work. He has been able to get the majority of all levels of supervision through the 10 hours of each program, and definitely intends to continue with this policy until everyone in the organization, who is in a supervisory capacity, has gone through the 10 hours. This includes people from not only the manufacturing division, but also such staff divisions as the laboratory, engineering, and office.

While the primary purpose of giving the training to supervisors in the staff division is for use in their particular work, there have been by-products that have helped the man in charge of the TWI activities. For example, the chief time and motion study man gave considerable thought to an application of J.I. to certain situations that his department noticed in its work. They had known for some time that good operators who make incentive rates have some small variations in the way they do the same job. A special study was made of several groups of experienced operators and in the report it was pointed out where operators were outstanding on certain elements or weak.

This focused the attention on experienced operators whose performances were satisfactory according to "standard," whereas many of the foremen who had J.I. were looking only at new or inexperienced workers. In attacking this situation with the use of J.I. breakdowns, much progress was made in bringing out key points of jobs with experienced operators, and this enabled them to increase their productivity. One result involved the changing-over of experienced operators from one type of loom to another. In this particular plant an operator, after he has demonstrated his ability and reached the status of an experienced operator, according to the union contract receives a guaranteed minimum. When transferred to another type of loom, he carries along with him the status of an experienced operator and a guaranteed minimum.

However, it has been recognized that such an experienced operator, when transferred to a type of loom which might differ as to size or

speed, would require a period of learning or becoming acquainted with the new type loom, and the company had an item in direct labor costs of "make-up pay." This took care of the transferred operator during those weeks and sometimes months when the production did not meet "standard" but the company had to pay the minimum.

With use of J.I. on this problem, including good breakdowns, the operators were given preliminary training on the new type loom before the transfer was effected. This procedure was finally developed over a period of several months to the point where the operators were able to step into the new job and make "standard" the first or second day.

The "make-up pay" had been running 3.65 percent of the productive payroll. At the end of seven months, this "make-up pay" had been reduced 51 percent. It is believed that this item of "make-up pay" can eventually be eliminated.

On Job Instruction as well as the other programs, the company reaches very high for trainers in the various mills. This is in order to have a good man to train the supervisors and also to get someone with authority to get continuing use. Job Methods improvements are tested; their effectiveness on one loom alone may be very small, but, if successful, they are adapted to about 1,700 looms. Many applications of Job Methods have increased the life of machinery and equipment. Much of the success of these programs in this particular plant is due to the man who is operating them. He is encountering the usual amount of resistance from individuals in the middle management group, and he faces these problems every day. It is necessary for him to be a top flight salesman, and an exceedingly tactful operator.

THE PROBLEM APPROACH

During May and June of 1945 demands for TWI service were unusually heavy. Since the continuance of TWI after June 30 was doubtful, some tardy industrialists were anxious to get in before the gate might close. Very small plants had always been served by itinerant, state-paid trainers. When the U. S. Office of Education announced that all programs were to be concluded on May 31, many small plants arranged to pay the trainers but it became necessary for TWI staff members to conduct 10-hour sessions in some other cases where plants were performing critical work. All of this meant that TWI had to become increasingly selective about where it gave service. It was not possible to handle all WMC referrals—a choice had to be made. It was not possible to offer all TWI programs to a plant.

Accordingly, the "problem approach" was adopted. This meant that TWI provided assistance to supervisors in specific departments

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just on the particular skill or skills they needed most. This stems from or is closely related to, coaching—the giving of the needed amount of assistance to the specific supervisors who require it. Thus, in its closing days, TWI was forced by conditions to follow its own prescription; that is, provide only that training which is actually *needed* to solve production problems.

WHAT TWI LEARNED ABOUT SELLING TRAINING TO MANAGEMENT

TWI, by experience in selling managements on using the TWI programs, found that there are two major reasons why proposals for new training programs are turned down:

1. If a plant training man has a past record of having promoted generalized programs which are unconnected with plant problems—that is, if he has kept training going whether or not there is any real need but just because “there ought to be some training”—he finds it hard to get anyone to even listen to him when times are busy, or profits are lean. Unfortunately many a training man has let his management get the idea that training is “good for our employees” and thereby let them miss the fact that training is really a management tool.
2. If the training man only talks techniques and how he will operate his program, a well-designed plan may never be connected by management with any actual current plant problem, or with results which may be expected.

If executives are concerned about products that fail to pass inspection, about goods that customers are rejecting (that they won't buy, or that they return as faulty), a plan to improve quality interests them.

If the boss is worried about meeting a contract on time or setting a record good enough so that he'll get another, volume of production is something he does not ignore. When plant management is concerned about its local standing—about whether the plant is considered “a good place to work”—proposals put up in that language get attention.

How to Get Top Management Interest and Support

Top executives are interested in results, not means; in accomplishments, not techniques. Management is management because it has to get out production in spite of turnover, scrap, waste, rejects, poor use of machines, time, high costs. Therefore, management is interested in those problems. Relatively few managers are interested in whether real machines, models, cutaways, or motion pictures are the best means of familiarizing a supervisor or a worker with a new opera-

tion—but many training men stake their plans on discussing such techniques.

The person who has something to sell has to talk in terms of what people will buy. If top management is interested in costs, a way to reduce costs gets attention.

Interest is not enough, acceptance is not enough. Management has to participate if a training program is going to be effectively operated. A genuinely good training program means, of course, that line operating people have identified problems, have helped to plan the specific content of the training programs which will overcome the underlying causes of problems, and are ready to assist in the actual training. But passive acceptance at the top of management, indifference at the middle levels—both of these can nullify thoroughly good planning of training.

It is necessary for the training man to do such good work that he is ready to really promise results in tangible terms—money, quality, time, manpower—that he gets not merely support but a management demand that the plan be used and the expected results produced.

TWIS FUTURE IN MANAGEMENT

Arthur Gorman, financial writer for the *New York World Telegram*, wrote on Saturday, September 29, 1945 of the close of TWI's field service the day before, under the heading "Training Within Industry Group Is Disbanded, but Ideas Go On":

A government agency disbanded yesterday and industry, for once was grieved. The outfit that shut up shop was an arm of the War Manpower Commission known as Training Within Industry.

Thousands of management men throughout the country in factories, mines and shipyards know the strategic role TWI played in the nation's miracle of war production. Since the dark days of 1940 when the Nazis were thrusting toward Paris, TWI trained 1,750,000 supervisory employees in the art of getting along with workers to the end that production figures might move steadily upward. And the job was done with a total TWI staff of 400.

The four guiding spirits of TWI were C. R. Dooley, former industrial relations manager of Socony-Vacuum Oil Co.; Walter Dietz, former associate director of personnel relations for Western Electric Co.; M. J. Kane, staff engineer on training problems for American Telephone & Telegraph Co., and William Conover, assistant director of industrial relations for U. S. Steel Corp.

The way TWI set about making up for a shortage of skilled labor by training the available labor supply is illustrated by an experience of Rome Collin, who was in charge of TWI's field activities in upstate New York in 1942.

Mr. Collin in one town had the unenviable duty of approaching a corporation president noted for his directness. When he entered the executive's office, the greeting he received was a sharp, "Well, what do you want?"

"I don't want anything," Mr. Collin answered. "But if I had a dozen tool makers I bet you'd give me a warmer reception. I don't have the tool makers, but I have something that will help you get along without them."

That's what TWI did. It taught supervisors how to get along without. Glenn L. Gardiner, director of the New Jersey TWI district, and personnel manager of Forstmann Woolen Co., worked out a course for training supervisory personnel in the "know how" of job instruction which reduced to ten hours teaching procedures which formerly required from 60 to 100 hours.

At first, business executives were skeptical. They said there wasn't time to start new training programs. Today TWI procedures are in use in 18,000 factories, railroads, airlines, hospitals, and mines.

TWI men credit the success of the program to the cooperation given by business management. So perhaps it isn't accurate to say that TWI has disbanded. Rather, it has closed its doors as a government emergency war agency, but it lives on in American industry as a philosophy of management.

Chapter 6

WORKING WITH ORGANIZED LABOR

TWI has worked with representatives of organized labor from the beginning. There has at all times been on the paid Headquarters staff at least one man chosen because of his background in organized labor. TWI has always had labor advisers as well as management advisers and technical consultants, both at Headquarters and in the districts.

In September 1940, when TWI was barely a month old, *Business Week* (September 21, 1940, page 55) gave an account of the "labor section of the Defense Commission." It predicted that the pattern developed for Frankford Arsenal would be followed in many other industries and crafts and that intensive job specialization would replace "hectic competition for craftsmen." This item also talked of TWI's upgrading policy as a "fair shake" for unions.

As an early start toward clarifying TWI objectives with labor groups, Dr. F. H. Harbison of the University of Chicago's Industrial Relations Division invited twenty A.F. of L. and C.I.O. representatives to a dinner conference. When these men heard about the TWI approach from Dr. Harbison and the Chicago District Director, they approved TWI's program of expediting war production through supervisory training.

When a Job Instruction or Job Methods program was started in a plant, the union which had a contract in the plant was informed in order to avoid any misunderstanding. Before the Job Methods program was released for national use, it was discussed and previewed by national union leaders in order to prevent any feeling that it was "efficiency engineering" or a "speed-up" (see Chapter 3).

TRAINEE PROGRAMS IN WEST COAST SHIPYARDS

The San Francisco Shipyard trainee program began in September 1941. Through TWI efforts there was a meeting of the Pacific Drydock Association for representatives of all of the Bay Area shipyards and the heads of the Metal Trades Council, which represents all the Unions in the area, to work out a definite procedure for training and

upgrading new shipyard workers. The program, which had the personal support of John Fry of the A.F. of L. Metal Trades Department, provided for definite wage increases in line with advancing progress of the workers. In return it was mandatory that the worker be given a certain amount of on-the-job instruction and also supplemental training. Through this program it was hoped that journeymen specialists would be developed in nearly all fields in a period of 120 days.

The program was designed for the International Brotherhood of Boilermakers, Iron Ship Builders and Helpers of America. In November 1942, this trainee program was turned over to the Apprentice Training Service. At that date there were 33,000 men carrying trainee cards, and since the beginning of the program almost 17,000 men had reached journeyman status.

A similar program was also sponsored by TWI in Seattle.

LABOR APPROVAL OF TWI OBJECTIVES AND PROGRAMS

Leonard Gappa, of the International Brotherhood of Electrical Workers (A.F. of L.), who joined TWI Headquarters in 1941 wrote the following report in April 1943:

Viewing Job Methods Training for the first time I felt that this unit of instruction would require special handling in so far as the labor groups were concerned. After consultation with our labor advisers we agreed that the most sensible approach would be to hold meetings at the local level with the organized labor groups of any area where we were about to launch J.M.T., these meetings to have an appreciation session so that labor could have a full understanding of the program. Without an understanding of J.M.T., many distorted stories probably would have been started.

Through the splendid cooperation of our district staff people, twenty-five such meetings have been held since October. The results have been most gratifying. Many questions were asked by the organized labor representatives pertaining to launching of J.M.T., also how could they participate and help. In some cases at these meetings organized labor for the first time became acquainted with our people and TWI principles and objectives. These meetings also gave our staff people an opportunity to practice what we preach; that is, learn by doing. They also found that these organized labor representatives, like themselves, were just people and like to be treated as such. Below are some of the high lights of these meetings:

At the J.M.T. Appreciation Session in New York, both labor groups gave full approval to this important program in spite of the fact that there were approximately 300,000 unemployed people in that city at the time of the presentation.

In Philadelphia, one representative of a union with 12,000 members employed in 50 or more plants, endorsed the program wholeheartedly and said if we had any trouble getting it started in any plant where he had contacts we should call on him for help.

At Harvard University Graduate Business School, where I presented all three packages of TWI—J.L.T., J.M.T., and J.R.T.—to the Union Fellows group conducted by Professor Sumner Slichter, the acceptance was gratifying. We had about three hours discussion following the presentation. Sev-

eral of the labor group wished to know if they could become participants in an Institute at a later date, upon completion of their studies at Harvard. These men are picked by their International Unions as having potential leadership ability and are sent to Harvard for further development. They are a keen alert group, and their acceptance is a tribute to the soundness of our program.

At Indianapolis, the attendance was rather small, but the labor representatives requested that an appreciation session be given at the Central Labor Union where about 100 different unions were represented.

In Chicago, one labor leader said that this may be a means by which labor and management can get together on the many problems they have. He further stated that a closer relationship, if built up in confidence and respect, would be the result of such cooperation. He followed up by saying: "I suppose I have a lot of nerve to say we can get together and not be fighting one another when we can't even get along with ourselves. We have a split in the labor movement right now that we should bring our efforts to try to 'heal'!" A C.I.O. representative came back and said: "Well if we had more meetings like this I am sure we could get together. Why can't we have more meetings of this nature? If it isn't asking too much of Mr. Gappa, I would like to have him come back soon, as I believe meetings of this nature will do more to heal the breach that is now existing in organized labor than anything I can think of. I think the program is swell, and again I can't help but urge that to repeat meetings such as this can go a long way toward healing the breach that exists."

In Cincinnati, after the presentation of J.M.T. at a meeting composed of mixed groups of A.F. of L. and C.I.O., they gave their enthusiastic support to the program and said this was the first time they really understood what TWI was trying to do. After a brief explanation of the other phases of our program they asked that two more meetings be scheduled for J.I.T. and J.R.T. When these are finished I am certain that a better understanding of TWI's objectives by labor will be had in that area.

After the St. Louis meeting, which was a straight C.I.O. group, I received requests for additional information and copies of our bulletins. Our labor adviser in that district said that this is the first time he has really understood what they were trying to do in St. Louis.

The U.A.W.-C.I.O. meeting in Detroit for their top International Officers was very successful. They still remembered the J.I.T. session, which was not followed up, but they gave the J.M.T. program their endorsement, and as a result of this meeting they have agreed to make a man available for cooperative work with us.

In Pittsburgh considerable interest was shown by both groups. Steel Workers had thirty-eight men present for an appreciation session that was conducted in their offices. The A.F. of L. groups accepted the program in the same spirit. The Machinists' representative said, "Good Heavens yes, this is what management needs. If we can help you, let us know."

Recently I have been giving some little time to presenting the newer Job Relations Training program to Labor, and more time will be devoted to that in the immediate future. Results so far have been highly satisfactory. The Job Instruction Training program was given numerous work-overs during my first eighteen months with TWI, and I believe I can say that worthwhile results were accomplished. J.I.T. is now so universally accepted that it no longer needs special attention with respect to Labor's attitude.

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While I would not suggest that we have not had some barriers to break down, and some misconceptions to correct, in order to gain labor approval for the TWI principles and objectives, I do say that my experience has shown that Labor representatives on the whole have not been hostile or prejudiced. All they have needed is a clear explanation of what we are trying to do, and how we go about it. They have been quick to see that on-the-job training is absolutely essential to the war effort, and that it is intended solely to speed up war production, and not to speed up war workers, or to make demands upon them that are not in line with sound industrial relations.

HOW JOB RELATIONS GOT STARTED IN UNIONS

The use of Training Within Industry's Job Relations program by union stewards, and later the development of a special version called Union Job Relations has been a natural development in the growth of the fields to which the TWI programs have been applied. Before the national launching of Job Relations in early 1943, TWI's labor men were considering the applicability of Job Relation principles to problems facing shop stewards and other union officers.

Michigan Experience

In the spring of 1943 union stewards were included in a number of Job Relations sessions in Michigan. This did not come to the attention of the TWI office for some time since no questions were raised as to the sessions outline or the materials but eventually a point was raised as to whether itinerant trainers paid from state vocational funds could be compensated for putting on a supervisory program for stewards.

The Eaton Manufacturing Company in Battle Creek, after having training in Job Relations for its supervisors, requested the same program for stewards. The officers of the union were called in and an agreement was reached with them. As a result 125 stewards in this company received the standard supervisory Job Relations program.

Reo Motors in Lansing also asked for the same kind of arrangements. In both cases, the company took care of the cost of the stewards' time while they were receiving the basic 10 hours of instruction. A short time afterward a Regional Director of the C.I.O. asked the Detroit TWI staff what was going on, and why TWI was so interested in his people. As a result a demonstration of the Job Relations program was put on in Flint, Michigan, for their international representatives for Michigan. As a result an Institute in the standard supervisory Job Relations program was arranged in Flint for union representatives.

A short time afterward the International Representative of the U.A.W.-A.F. of L. raised questions about the Job Methods program at the Norge Company in Muskegon. The union was informed that it too could receive some help from TWI. As a result of that meeting

the U.A.W.-A.F. of L. under the sponsorship of George Kiebler, International Representative, gave national endorsement to the Union Job Relations program. Three Institutes have been conducted in Michigan, in Lansing, Jackson and Detroit.

Other successes with the Job Relations program in Michigan unions have been with the Independent Federation of Telephone Workers. An appreciation meeting was given to their officers and two 10-hour sessions were run for them, with the result that three people were trained as trainers and extensive use is being made of Union Job Relations.

Eligibility of Stewards

Mr. Gappa had been anxious from the beginning to make the Job Relations program available to stewards, and on January 19, 1944 stewards and other union members were made specifically eligible in so far as use of federal war training funds was concerned. From then on, the Job Relations program was available to the union in any plant where TWI worked with supervisors and also to unions in critical industries whether TWI was working with plant management or not. Stewards had already been included with supervisors in many plant groups, such as at the Follansbee Steel Company, but the specific arrangement for eligibility made it possible to provide a state-paid trainer for union groups.

Union Adaptation

Two of TWI's labor advisers (Clinton S. Golden, United Steelworkers of America, who was one of TWI's original advisers, and Frank P. Fenton, Director of Organization for the A.F. of L., who became a TWI adviser in 1942) took particular interest in the extension of training in the skill of leadership to union officers and stewards. Both Mr. Fenton and Mr. Golden endorsed the program, and gave TWI Headquarters specific help in adapting the program for use in unions. (See Chapter 14.)

Some unions, which wished to carry on the program as part of their own operations, felt that acceptance would be improved if all references to supervision and management were removed. Erling Larsen, C.I.O. consultant on the TWI Headquarters staff, advocated this view. Accordingly, T.W.I.'s development group, aided by additional labor consultants, began trials of an all-union version. Through arrangements made by Mr. Golden, field try-outs of early experimental union versions were held in cooperation with the Steelworkers headquarters in Pittsburgh, the TWI office there, and TWI Headquarters. These early try-outs were followed by the holding of additional trial sessions in A.F. of L. unions and also in other C.I.O. unions.

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The Union Job Relations program was made available in early 1945. Union Job Relations, like the supervisory program from which it grew, is a 10-hour program for groups of ten stewards. It is exactly the same as the standard Job Relations program in its structure and principles.

The U.J.R. Card

During the first 2-hour session the attention of the steward is focused on the importance of people in every union responsibility that he has, and the foundations for good relations and the four steps in handling a problem are presented:

FOUNDATIONS FOR GOOD RELATIONS

- Let each member know his rights and responsibilities.
 - Tell him what the union can do for him.
 - Tell him what the union expects from him.
- Give credit when due.
 - Look for extra or unusual performance.
 - Tell him while "it's hot."
- Tell people in advance about changes that will affect them.
 - Tell them WHY if possible.
 - Get them to accept the change.
- Make best use of each member's ability.
 - Look for ability not now being used.
 - Never stand in a man's way.

People Must Be Treated as Individuals.

HOW TO HANDLE A PROBLEM

DETERMINE OBJECTIVE

1. GET THE FACTS.
 - Review the record.
 - Find out what union and plant rules and customs apply.
 - Talk with individuals concerned.
 - Get opinions and feelings.
 - Be sure you have the whole story.*
2. WEIGH AND DECIDE.
 - Fit the facts together.
 - Consider their bearing on each other.
 - What possible actions are there?
 - Check union and management practices and policies.
 - Consider objective and effect on the individual, group, union, and production.
 - Don't jump at conclusions.*
3. TAKE ACTION.
 - Are you going to handle this yourself?
 - Do you need help in handling?
 - Should you refer this?
 - Watch the timing of your action.
 - Don't pass the buck.*

4. CHECK RESULTS.

How soon will you follow up?

How often will you need to check?

Watch for changes in attitudes and relationships within the union and toward management.

Did your action strengthen union job relations?

In the remaining four sessions, the use of the method is practiced by the stewards on their own problems.

Extent of the Program

Eight thousand stewards have gone through ten hours of instruction in Union Job Relations and many more have been certified in the standard Job Relations program in mixed groups for stewards and supervisors. Unions have set up operating plans looking toward continuing use of the program. Union officers have been trained to put on the programs for their own stewards in order that they can carry on now that TWI service has ended.

Top union officers have been quick to say to TWI that they want stewards to be able to discriminate between real grievances and those where the worker does not truly have a case, that they expect stewards and local officers to handle problems themselves, that something needs to be done to reduce the expense of arbitration. Use of Job Relations has brought about these results for a number of unions.

Each year at Monteagle, Tennessee, the Congress of Industrial Organizations holds a "C.I.O. Regional Directors' School." For the past two years, the Job Relations program head from Atlanta has presented the TWI program and conducted full 10-hour sessions at these meetings. From this conference came numerous requests for U.J.R. not just in the Atlanta district but all over the country.

Special Problems

There are certain differences in working with unions which must be recognized. Union meetings are usually held after hours, and union officers cannot make the same commitment for time as can a plant. Unions do not ordinarily have the funds to pay trainers or to compensate the men during the time they spend in attending training sessions.

Some unions, of course, were suspicious of the motives of TWI's industrial men—were they trying to influence union thinking? After this was cleared up, enthusiasm was usual but then a number of problems would arise:

Who should be sent to Institutes—union officers change more frequently than do plant supervisors.

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How to pay the costs of the program—unions do not have funds to compensate their members for their time during Institutes or during sessions.

How to set up schedules—union officers are busy and they handle emergency situations which mean constant changes in where they will be at a particular time.

How to get stewards to attend the 10-hour sessions—in a union, authority flows upward instead of down as in a plant.

In one union, two weeks after the completion of the 10-hour sessions, only one member of the ten still held office. Less than half the members scheduled for later groups attended enough sessions to be certified.

In general, it does take longer to get a program started in a union—and unions did not become eligible for TWI service until 1944 and there was no special union program until 1945. There are perhaps a half-dozen unions which are adequately prepared on a national basis to handle the program, and many more locals. There are a number of U.J.R. Institute Conductors, trained and certified by TWI, who are qualified to carry on the program. Further spread of the program and its use will depend on the intent and support of the unions, and backing of union officers.

PROGRESS WITH UNIONS

In some unions, real progress was made. The Steelworkers have maintained their original interest and there has been good coverage particularly in Pennsylvania and Indiana. Lester Washburn, president of the United Auto Workers (A. F. of L.), has given complete endorsement to the program and his union has definitely put the Union Job Relations program into action.

Many locals of the International Brotherhood of Electrical Workers (A. F. of L.) are using the program.

The C.I.O. United Auto Workers were among the earliest users of Job Relations, beginning before there was a union version and while state-paid trainers were available. Over seven hundred stewards received basic instruction.

Shipbuilders

A demonstration of the supervisory Job Relations program was given the Industrial Union of Marine and Ship Workers of America (C.I.O.) executive committee during their convention in Atlantic City in September 1944. As a result of the demonstration, they decided to send their educational director, Elwood Peoples, to an Institute. Mr. Peoples completed an Institute held in Philadelphia in

October. As a result of his experience in handling groups, Mr. Peoples decided such training would be of valuable assistance to the stewards of their union. Accordingly, he sent two men to the next Institute held in November.

The enthusiastic response of those attending the groups led him to organize Job Relations on a national basis. Since that time, I.U.M.S.W.A. trainers have attended Institutes in Philadelphia, New York, Richmond, Pittsburgh, and Newark.

Over six hundred I.U.M.S.W.A. officers and stewards have been certified. Some of the locals have provided in their by-laws that, in order to be elected as a steward, a person must have Union Job Relations Training. In setting up his program, Mr. Peoples decided originally that the best persons to act as trainers would be the organizers. He found this policy to be unsound. Although the men in this classification had the ability to present the program, they were handicapped by sudden transfers from one district to another and emergency situations arose that caused interruptions of planned groups. Very often, just about the time groups were planned for the locals of a certain district, the national office would transfer the trainers to another district.

The present plan of operation is to employ additional men for this particular purpose. Mr. Peoples has been prepared as an Institute Conductor and will therefore train the men personally and quality control their work. Seven men who have attended Institutes have been transferred to his direct control. It is estimated that about three more will be required. These men will be sent to the various districts for the particular purpose of working with the officers and stewards in Union Job Relations and will be under his direct control. The West Coast, Great Lakes, and Gulf sections of the country are still to be covered.

Experience has shown that an ideal situation in getting groups together is when agreement is reached to have the men attend on company time. At Sun Shipbuilding, the company agreed to charge one hour to "grievance time" and one hour to "unproductive time." As a result of this agreement all stewards of Local No. 2 were covered. The result of this effort has shown that, while prior to Union Job Relations from 10 to 20 cases reached the third step of the grievance procedure per week, now only two get that far.

The I.U.M.S.W.A. has adopted a "Request for Adjustment of Grievance" form in some locals. Whenever a steward feels that he has a supportable grievance he is required to write out on this form a complete statement of the grievance which he signs and dates. The form is made out in quadruplicate with distribution as follows: Copy

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1 to the foreman, 2 to the local union office, 3 to the personnel department as a tickler, 4 to national headquarters of the union.

There is space on the form for the foreman to explain his disposition of the grievance before passing it on to his superintendent. Another space provides for a similar statement of disposition by the superintendent before passing the form on to the personnel department.

In practice, the form has tended to decrease the number of grievances presented. Stewards seem to feel that it is advisable to be sure they have *all* the facts and that the grievance is one which will stand up before they are willing to put it in writing. According to the I.U.M.S.W.A., use of the form has accomplished many advantages for both sides:

1. Fewer grievances presented.
2. More complaints settled privately between foremen and employees (or their stewards) before they are allowed to become grievances.
3. Better relations and improved cooperation between foremen and stewards.
4. Increased prestige for foremen.
5. Better presentation of those grievances which are presented.
6. Elimination of minor "beefs" and "gripes."
7. Economy for both the union and management.

Machinists

In the International Association of Machinists (A.F. of L.) various locals have taken part in the Union Job Relations program and various officers have expressed their interest. J. D. Smith, President of the Machinists' Aeronautical Industrial District Lodge 776, at Fort Worth, Texas, says that the program led to improved relations between union committeemen and supervisors at Consolidated-Vultee.

Edgar O. Schill of Moline, Illinois, reported after he had conducted three Job Relations groups of stewards, "The boys, as stewards, now realize how much easier it will be to carry out their responsibilities as stewards by using the organized plan of procedure taught and practiced in the basic training sessions in Job Relations as compared to the old hit-or-miss procedures learned only by years of experience."

The Machinists in New Jersey have certified U.J.R. trainers who are planning to carry on the program. At the Iowa State Conference of Machinists held in April, 1945, the program was recommended for all local and district lodges in Iowa.

In the case of the Aeronautical District Lodge of the Machinists, in Seattle, the Union Job Relations program has become a definite part of the process of breaking-in new shop stewards. Union officials say the withdrawal of vocational funds and the ending of the war

will have no effect on the continuance of the program as they have named a man to take charge of training within the union. They are planning to continue on the principles of U.J.R. from now on, making it a "must" as far as union procedure is concerned. They have certified 269 stewards and shop committeemen. The officials of the union report a marked difference in the attitude of the shop stewards, committeemen and various committee heads in how a problem should be handled.

Connecticut Experience

Most of TWI's experience with unions in Connecticut was in the Waterbury area, particularly with C.I.O. unions in the brass industry. In Local 251 of the International Union of Mine, Mill and Smelter Workers (C.I.O.) which is the largest (comprising between 8,000 and 10,000 members), a member was prepared as a trainer and he in turn has trained close to 100 stewards and is scheduled to give the 10-hour U.J.R. program to the remaining stewards. In this particular union, a continuing use program was established with the Executive Committee.

John Driscoll, the State C.I.O. Secretary, has recommended the procedure in many other locals in that area. Stewards have been trained for other C.I.O. locals working in Scovill Manufacturing Company, American Brass, and several smaller locals in the Waterbury and Torrington area.

A formal presentation was made to the State A.F. of L. Convention in Rhode Island in the Spring of 1945. At that time many requests for service were received. This was followed by presentations to Executive Committees of ten of the textile unions in the Providence area, and A.F. of L. shipbuilders at Walsh-Kaiser Shipyards. This program was getting well underway and the district was planning on an Institute to cover A.F. of L. activities in Rhode Island which would have also included the Industrial Trade Union (an independent union of 15,000 members at Woonsocket) when the end of TWI services cancelled these plans.

An Institute was held for the United Automobile Workers, A.F. of L., in Meriden, the membership consisting of stewards from New Departure, Connecticut Telephone and Electric, Cuno Engineering (all of Meriden); Peck, Stow and Wilcox of Southington; and the Auburn Spark Plug Company of Auburn, New York. This Institute was arranged through U.A.W. of America, A.F. of L., International Headquarters at Milwaukee.

In one other union, where its headquarters had made a national plan, the trainer stopped conducting sessions after state payment ended. The withdrawal of state funds for payment of trainers affected

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the operation of the program with certain locals, but with others who are sold on the value of the program, no detrimental effect has been evident. In the Waterbury area, the C.I.O. Unions are continuing, and are paying the trainer from their own funds. This is likewise true of the United Rubber Workers, C.I.O., at the U. S. Rubber plant in Naugatuck, Connecticut, who have engaged the services of the trainer from the brassworkers in Waterbury.

The U.A.W.-C.I.O. at Chance Vought, brassworkers in Waterbury, and the Machinists (A.F. of L.) in Stamford have stated that they were able to reduce by over 50 percent the number of grievances which had to be sent to the second level of the grievance procedure. In other words, the steward became capable enough to handle them on the first level. This eventually reduced, of course, the number of grievances going into arbitration and saved the union considerable money in that respect.

Los Angeles Experience

Los Angeles experience is typical of what happened in perhaps three-fourths of the districts—interest, proportionally small use, but fine results where used.

In four organizations, there were innumerable promises. Top officials and business agents, as well as some chief stewards, appeared sincere in their belief that Union Job Relations would be of great help and should be presented to their shop stewards, but no programs ever got started. One prevalent reason was lack of suitable union conference quarters in which to hold the 10-hour sessions. Another reason offered was lack of after-hours transportation, which is understandable when the huge area covered by the city of Los Angeles, necessitating driving from 20 to 40 miles to work, is considered. Another prevalent reason was that elections were planned in the near future and therefore, if Union Job Relations was presented, the job would have to be done all over as soon as new shop stewards took office.

On the brighter side of the picture are eight other unions. A number of Job Relations sessions were held for shop stewards and representatives of the United Brotherhood of Carpenters and Joiners of America; Building and Construction Trade Council; Brotherhood of Painters, Decorators, and Paperhangers; International Brotherhood of Electrical Workers; Construction, Production, and Maintenance Laborers; and the Journeymen, Plumbers and Steam Fitters (A.F. of L.), particularly in and around San Bernardino and Riverside, California. Results seemed to be good, and enthusiasm was high; however, the unions claimed that it was impossible to follow through with the development of coaches to assist in getting continuing use of the program.

In the United Auto Workers—C.I.O., at Timm Aircraft, the results were excellent. Shop stewards report that grievances decreased to a negligible number. They stated that after Job Relations had been presented to both supervisors and stewards, all problems were handled properly and with dispatch.

In the case of the United Steelworkers of America, C.I.O., at the Kaiser Company, Union Job Relations was most effective. There was complete support and participation from international representatives and officers, as well as from all shop stewards. This group adopted the 4-step method as standard procedure for handling all grievances. After U.J.R., few grievances ever reached the front office. This, of course, meant considerable money saving to the union. The chief steward in this plant stated that much time had previously been spent on grievances, so their decrease resulted in an increase in production and establishment of greatly improved reputation for the union in this organization. The union stewards and company supervisors alike give full credit for this great improvement to Job Relations. When elections were held, and new shop stewards took office, company management furnished a conference room, trainer, and full pay for the stewards while participating in Union Job Relations.

WORKING WITH LABOR AND MANAGEMENT

The Job Instruction program was presented in 1942 at the New England Shipbuilding Company (peak employment 35,000) at a joint conference of management and representatives of both the A.F. of L. and C.I.O. unions which had bargaining agreements with the plant. A Job Instruction Institute in November, 1942 was conducted by Mr. Gappa of the TWI Headquarters staff. It included one representative of the A.F. of L. and one of C.I.O. along with plant representatives. The C.I.O. member, Erling Larsen, later became a labor consultant on the TWI Headquarters staff. A company member, who conducted both the first J.I. 10-hour group and the one hundred and seventeenth, later joined the Boston staff.

The line organization took real responsibility and helped with the application of time-tables and breakdowns and the use of the 4 steps. After a company representative had attended a Program Development Institute in 1944, Job Instruction coverage was extended so that eventually 1250 supervisors were certified. Use of Job Relations for supervisors was begun in March 1944 and for union stewards in December 1944, but it was not possible to start Job Methods before TWI closed. The yard is now down to 5000 people on maintenance work, but Job Instruction is firmly entrenched in the organization.

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Chapter 7

MEASURING THE RESULTS OF TWI PROGRAMS

The Job Instruction program was well received—supervisors said they liked it, top executives praised it. Often, however, their statements were in praise of the trainer rather than the program, and few indicated any factual basis. Nevertheless, TWI Headquarters, for a year and a half after Job Instruction's national launching, was satisfied with getting the voluntary approval of managers, especially of those who were known to weigh compliments and give none of them lightly. TWI made little effort to get from plants any specific information on production results. For one thing, TWI did not want to seem to pry into company affairs.

PRESSURE FOR RESULTS

In 1943, two factors entered the results picture—the new Job Methods program was producing reports of concrete savings in manpower and in money, and the House Appropriations Committee suddenly asked for figures to back up TWI's budget statements about reduction in break-in time and increases of production. Thus the measurement of results of TWI programs started.

Job Methods results are not a matter of impression—they are very concrete. Either supervisors make improvements or they don't. If they make improvements, results are obtainable and apparent.

This difference was a major factor in a drive for known use and results of Job Instruction and Job Relations in order that results from these programs could move from the impression or intangible stage to what could be concretely measured. Congressional requests led TWI to get reports of those results. This has been a good thing because, without outside stimulation, some plants just never would have demanded production results.

Management Views

This does not mean that executive opinion is not important—it is truly vital to real use of the programs since management support

makes or breaks their use. When in April 1942, I. K. Foster, general superintendent of Minneapolis Honeywell Regulator Company, said: "As a result of our experience with this training we are not at all frightened by the prospect of having to man a large part of our precision machine shop with green men," it left no questions about the standing of TWI in that company. The personal statements of managers have continued to be highly valued, but they no longer stand alone as the sole indicator of TWI success. Many of them also state tangible results.

O. P. Robinson, vice president and general manager of the Electric Boat Company, Groton, Connecticut, wrote to TWI in August 1943:

It has been made clear to us . . . that the submarine is doing a job so successfully that the present strategy calls for a much more rapid rate of production. . . . Manpower . . . is our number one problem for our present building program—to say nothing of what it becomes on the proposed speed-up program. . . . We are employing women in trades previously unheard of, and are employing young boys, doctors, lawyers, butchers, and so forth, and we are advertising by all means we know of, and the various manpower agencies are attempting all vainly to obtain additional employees. The bright spot we see in this picture that is tangible and we can place our hands on is the Training Program that you have inaugurated, for . . . we cannot help but realize 7 to 10% increased efficiency and that is, of course, better than the equivalent of adding 7 to 10% of green employees to our roster.

Clifford Mutchler, manager of the Intercontinental Division, Transcontinental and Western Air, Incorporated, Washington, D. C., in June 1943 said:

When you consider that only one out of every twelve Intercontinental Division employees was from the T.W.A. domestic service the value of TWI is apparent, and has proved to be the practical answer to our training and morale problem. The program has been received enthusiastically by executives and employees alike. The evaluation and up-grading of available manpower through methods as taught in TWI has made it possible to double the supervisory staff. Much valuable time has been saved as a result of this evaluating of new employees.

Schedules are increasing in frequency—"turn-around" times have been cut in half. It is estimated that the efficiency of our operation can be further increased through the continued application of J.I.T., J.M.T., and J.R.T. methods. For an organization that started from scratch approximately one year ago, we feel that TWI can claim its rightful share in the success of our accomplishment for the Air Transport Command and its worldwide operation.

I. A. Rose of General Electric Appliance Company of Chicago, wrote in June 1945:

The fact that our ordnance plant has been rated as the lowest cost producer of cores in the industry is, in my opinion, due to a large degree to the TWI training programs.

Some results reports, in addition to material that could be tabulated, gave a picture of conditions. In September 1945, H. L. Austin, vice president of the Food Machinery Corporation at Lakeland, Florida, wrote:

In our production of amphibious tanks we have had to rely on local labor. Even our supervisory forces, in the main, came from pea pickers, citrus grove workers, etc. Because of poor morale, our labor turnover was terrific; complaints and grievances were multitudinous; production schedules lagged. We sent our top production superintendent and our director of training to a Job Relations Institute. They came back and presented the program to all our supervisors. Within a fortnight, complaints and grievances ceased; labor turnover stopped, and production went ahead of schedule. I don't know what we would have done without Job Relations Training, because it verily saved the day for us.

SUMMARIES OF RESULTS

In May, 1943, the House Appropriations Committee asked TWI to state its net results in overall increases in production, reduction of scrap, and other savings. It was not possible then (or now) to get total figures, but some figures on results in individual plants were available in district reports and executives' letters. More than six hundred voluntary plant statements were used to make up the first summary. In each, the percentage of change (whether an increase in production or a reduction of scrap) was calculated, and these percentages were tabulated in four groups—those under 25 percent, between 25 and 49 percent, between 50 percent and 74 percent, and those of 75 percent and over. The first tabulation showed:

Kind of result	Percentage of plants reporting results			
	Under 25%	25-49%	50-74%	75% and over
Production increased	63	16	1	20
Training time reduced . . .	52	25	7	16
Manpower saved	89	9	1	1
Scrap loss reduced	89	5	5	1

These tabulations were continued because they were found useful in three ways: (1) to back up requests for TWI budgets, (2) to get management interested in launching a TWI program, (3) to spur management on to demanding use of the TWI programs so that similar results might be obtained.

Trends in Results

In all, seven tabulations were made. At first, most reports reported results of less than 25 percent whether in saving of manpower

or reduction of scrap, or increase in production, or reduction in grievances, but the trend was upward:

	Percentage of Plants Reporting Results of 25 Percent and Over						
	May 1943	Sept. 1943	Feb. 1944	Nov. 1944	April 1945	July 1945	Sept. 1945
Production increased...	37	30	62	76	64	63	86
Training time reduced	48	69	79	92	96	95	100
Manpower saved	11	39	47	73	84	74	88
Scrap loss reduced....	11	11	53	20	61	66	55
Grievances reduced ..	(Not reported)		55	65	96	100	100

This, of course, does not give any picture of the individual results from which the summary was made, of the occasional production increases which ran over 500 percent, of training time reduced by 90 percent, or the virtual elimination of grievances. It does show what percentage of the results were in what TWI felt is a "more-than-your money's worth" classification. Money savings and time savings could not be tabulated, but they have perhaps been of even greater importance to plants, the government, and to taxpayers.

The summary of results in these unidentified tables permitted TWI to use some reports which otherwise would not have been available. One company president said:

Under no circumstances do I want you to make public my name or that of my company. While I want you to know what this program has done for us, still I must not have it known to some of my stockholders, who would immediately ask "What have you, Mr. President, been doing all these years to overlook such a possible reduction in expenses which would have meant increased dividends to us?"

Texas Experience

Many of the districts made their own tabulations of trends in results. The Texas district summarized its experience as follows:

Since we started maintaining records of tangible results which management reported in percentage figures, managements of 65 companies have made 21 reports of increased production, 20 reduction in training time, 16 reduction in scrap and re-work, 32 in man hours saved, 13 in reduction of turnover, and 17 in reduction in grievances. Obviously many results have not been reported. However, the report of only one of the above items shows a total of 2,693,790 man hours saved. At an average cost of 70 cents this amounts to \$1,885,653. Since the total expenditures in this district from the beginning, including payment of trainers from vocational funds, amounts to approximately \$235,000 it seems evident that the people made a good investment in Training Within Industry in the states of Texas, Louisiana, and New Mexico as well as throughout the remainder of the nation.

RESULTS REPORTING

In order to improve the quality of reporting of tangible results, TWI developed a form for the statement of results in facts and figures, in "before and after" terms. Each district was required to submit a minimum of one a week in addition to the numerous narrative statements of results that appeared in the reports for the various programs. Exhibits 2 and 3 show typical district results reports.

Exhibit 2

TYPICAL RESULT FORM (DENVER)

TWI OUTSTANDING "RESULT OF THE WEEK" IN DENVER DISTRICT	
Result was noted and reported to us on (Date) <u>April 16, 1945</u>	
Result of:	J.I. ☒ J.M. ☒ J.R. ☒ P.D. ☐
1. Kind of establishment (name of product or service)	<u>Rubber products</u>
2. *Name and location of plant	<u>Gates Rubber Company, Denver, Colorado</u>
*May we use company name? Yes ☒ No ☐	
3. Number of employees in plant	<u>5,000</u>
4. Number of employees affected	<u>40</u>
5. Just what happened in "before and after" terms: (State evidence in facts, figures, man hours, etc.)	
Before "J" Programs:	
In one clerical department, where 46 were employed, 375,000 units were produced in one year.	
After "J" Programs:	
By applying the three "J" methods conscientiously and continuously, 450,000 units were produced by 40 workers.	
This is an increase of 20%, or 75,000 units, in output by a work force reduced by 13%, or 6 workers.	
The quality of the work was also greatly improved.	
Note: Most credit is given to J.I. and J.R., as the work force has always been method-improvement minded.	

Getting these results reports in form for calculation of percentages and tabulation was not altogether easy. Headquarters had to remind districts, and districts had to remind plants, that hours in the "before" statement and dollars in the "after" results could not be tabulated. TWI people also had to urge plants to search for overall effects.

Exhibit 3

TYPICAL RESULT FORM (DALLAS)

TWI OUTSTANDING "RESULT OF THE WEEK" IN DALLAS DISTRICT

Result was noted and reported to us on (Date) May 3, 1945

Result of: J.I. ☒ J.M. ☒ J.R. ☒ P.D. ☐

1. Kind of establishment (name of product or service) Shipbuilding
2. *Name and location of plant Consolidated Steel Corp., Orange, Tex.
 *May we use company name? Yes ☒ No ☐
3. Number of employees in plant 18,749
4. Number of employees affected 15,000
5. Just what happened in "before and after" terms:
 (State evidence in facts, figures, man hours, etc.)

During the past 4 years four different types of vessels have been built. When the yard opened only 2% of the workers had previous shipbuilding experience.. About 50% had no previous experience in any related industry.

The average employment during this 4 years has been 18,000.
 The number of certificates issued in the three TWI "J" programs are:

J.I. - 2850
 J.M. - 800
 J.R. - 540

Mr. Newell Hogan, Training Director, and Mr. James D. McClellan, Production Manager, reported the following beneficial results from TWI programs:

Increase in production	- 45%
Reduction in training time	- 78%
Reduction in scrap	- 69%
Reduction in tool breakage	- 75%
Saving of manpower	- 45%
Reduction of accidents	- 70%

These results were arrived at by comparison of production department records, based on the construction of the first 50 destroyer escorts as compared with the last 50. The credit for these beneficial results is largely attributed to the successful continuous use of TWI programs.

All levels of supervision in both the yard and the office have been processed in one or more of the "J" programs. This accounts for the large number of employees affected.

It was often discovered that while a change seemed to affect only one person, it actually had a cumulative influence. In one plant of 2,000 a Job Methods result was reported as affecting two people. These two people were inspectors. It was discovered that they were doing identical work, several production stations apart. One inspector was removed and put on different work. This made just one more man available for other work but the important effect was that the production of this line was increased 5 percent. Everyone on the line was having small bits of delay which hadn't been perceived and which could not be utilized. By the elimination of this one inspection, 5 percent more work was made available to them and operators absorbed it with no apparent increase in speed.

OVERALL RESULTS

Across the country during war years, there was a tremendous increase in individual and in-plant production. J. A. Krug's report, "Production Wartime Achievements and the Reconversion Outlook" (WPB Document No. 334), published in October 1945, states:

The tremendous increase in gross national product at a time when manpower was being steadily drawn into the armed forces would not have been possible if we had not called on the housewives of the nation, the youth of school age, the oldsters who had earned retirement, and the physically handicapped to supplement—and in part to replace—those who would normally have staffed our industries, trade, and services. The labor force increased in five years from 54,000,000 to 64,000,000—up almost 20%. Out of these 10,000,000 new workers, plus all but a few hundred thousand of the 9,000,000 unemployed of 1939, came the manpower and womanpower to replace the 10,000,000 added to the military services and to add 7,500,000 to civilian employment. Most of this addition went into manufacturing plants. Agriculture and, later, construction actually lost workers.

Even 7,500,000 more workers would not have been enough for the job actually done had they not been willing to work longer and harder. Between 1939 and 1944, the average work week increased from 37.7 to 45.2 hours—20%—in manufacturing, from 32.4 to 39.5 hours in construction, and from 32.3 to 43.9 hours in mining. At the same time, productivity—output per man-hour—climbed sharply, as volume increased, manufacturing methods improved, and workers responded to appeals to move the munitions to the fighting fronts faster and faster (p. 2).

The Toledo plant of Doehler Jarvis credits TWI with that plant's rise from 118 percent efficiency to 161 percent. Work at that plant led to the adoption of the TWI programs at the company's other four plants in various parts of the country. At Toledo, the first trainer was the foreman of the tool and die shop—now he is their headquarters director of industrial relations and training; another trainer has become a plant superintendent and another an assistant superintendent. These are typical of the many men "discovered" through their work on TWI programs in their plants.

Improving Plant Output

In the Long Island City plant of the General Cable Corporation where 800 people were employed on the making of 7-strand field wire, production was many thousands of miles of wire below Army requirements. Fifty-two stranding machines were available and the plant was operating on three shifts (24 hours a day—6 days per week). The plant had been in operation for 5 months and production was only 50 percent of known normal production for this number of machines.

The TWI District Representative and the Job Instruction program head spent three days in this plant to find out what prevented it from putting out maximum production, and found the following:

Production per day, early January	Scrap (Percentage)	Turnover (Percentage)	Absenteeism (Percentage)
4,600,000 ft.	15.00	25.00	16.00

Job Instruction was given to the 67 supervisors. Improvement was apparent immediately.

The following results show what happened:

Average production per day	Scrap (Percentage)	Turnover (Percentage)	Absenteeism (Percentage)
Jan. 4,765,000 ft.	2.00	23.00	13.00
Feb. 7,567,500 ft.	1.25	25.00	11.00
Mar. 9,046,700 ft.	1.00	12.50	9.50
April 10,000,000 ft.	1.00	7.00	8.00

This plant jumped from fifth place to third place in production among this corporation's plants within four months. Later this plant reached first place.

Easy Washing Machine Summary

H. B. Laird, one of the first Job Instruction trainers and director of training for the Easy Washing Machine Corporation in New York since 1912, has written TWI:

In the overall analysis, the following figures indicate types of improvement as a result of training:

10% to 50% increased production.

Absentees reduced from 15% before to 2% after.

Rejects reduced to 1% from 5% and 10%.

Scrap reduced to less than 1% from 5%.

Learning time reduced as much as 50% on certain jobs—one job normally requiring 3 weeks to train on grinding operation, reduced to 3 days.

In general, we have been complimented by the Ordnance Department for work in many instances, better quality than required.

Expansion from approximately 1100 employees to 4100 with a minimum of training that produced maximum results.

While specific figures in dollar savings are not available for publication, much saving resulted from J.M.T., and the fact that no labor differences were experienced, during the war, speaks very highly for J.R.T. All in all, only satisfaction and approval has ever been expressed in reference to TWI training by executives as well as workers.

Job Instruction was launched in this plant in April, 1942; Job Methods in April, 1943; and Job Relations in August, 1943.

Caterpillar Ordnance Plant

At the Victory Ordnance plant of the Caterpillar Military Engine Company, 90 percent of the employees had no previous industrial experience. Nevertheless during 1944 production efficiency was raised 49 percent and tool breakage cut 12 percent, part of the credit for which was given to Job Instruction. Since the start of the Job Relations program there have been no major grievances, and turnover was below the national average. These results, plus others like reduction of "down time," are credited largely to the supervisors, 278 of whom had Job Instruction, 221 Job Relations, and 90 Job Methods.

A LOOK AT ONE INDUSTRY

TWI time was always focused on war production "hot spots." This has meant consistent service to shipbuilders, and results have been marked.

From a monthly report of the Moore Dry Dock Company, Oakland, California, came this statement:

Job Methods improvement proposals actually in effect are saving, according to craft superintendents' own estimates, 8,332 man hours per month. This amounts to 99,984 man hours per year, and at a commonly accepted value of \$1.50 per man hour, represents a saving of almost \$150,000 each year. This figure is constantly being raised by a flow of new Job Methods improvements coming in from the several hundred foremen, quartermen, and leadermen, trained in J.M. during the past six months.

The effect of TWI programs on turnover was measured in the Wainwright Yard of the Jones Construction Company at Panama City, Florida. Seventy-five percent of the men who had had one or two of the TWI programs stayed with their jobs and 80 percent of the men who had had all three TWI programs, against a yard average of slightly less than 40 percent.

TWI was given part of the credit for the fact that the Tacoma Division of Todd Pacific Shipyards got more and better production (aircraft carriers) with 21,000 employees than they formerly got with 29,000.

Overall results were the product of repeated individual improvements such as this instance from the Oregon Shipbuilding Corporation, where the superintendent reported that, before Job Instruction, department output was 800 rivets per man, per day, per shift. After Job Instruction the superintendent reported enthusiastically that the output had increased to 3200 rivets per man, per day, per shift; that the workers were doing the work easier and were happier.

Captain R. B. Daggett, U. S. Navy, Supervisor of Shipbuilding at Tampa Shipbuilding Company, Incorporated, wrote TWI:

In making a study of construction done at Tampa Shipbuilding, it is noted that in comparing one Ammunition Carrier type ship with another ship of the same class, constructed at an earlier date, 400,000 man hours were saved. This represents a saving of approximately \$784,800 on cost of production. Comparison of two vessels of the LSV class shows a saving of 78,121 man hours or approximately \$133,753. It is also noted, with interest, that the saving of man hours began about the same time as J.R. began to be effective.

While I do not think that this saving in man hours can be wholly attributed to J.R., I do feel that better relations on the job, brought about through use of J.R., have been a real contributing factor.

RESULTS IN UNIONS

Although the Job Relations program in unions has been available a proportionately short time and has reached a comparatively small number of stewards, there have been results that can be tangibly expressed. The business agent for five New York locals of the International Brotherhood of Electrical Workers (A.F.L.) reported that, since Union Job Relations was given to the stewards in one local, not a single grievance had come to him to handle (three months). In the past at least two cases a week were referred for attention and handling. The stewards are highly pleased because their work has been simplified and they feel they are more effective in their relationships with union members.

One local of the Industrial Union of Marine and Shipbuilding Workers (C.I.O.) at Sun Shipbuilding & Drydock Company, before using the Union Job Relations program, had ten to twenty cases a week that went to the third step of the grievance procedure. This was cut to a weekly average of two. (*See also Chapter 6.*)

TYPICAL RESULTS

The specific company situation makes individual plants seek different kinds of results and give different values to them. Thus the reports reaching TWI covered a wide variety of experience.

Safety

William F. O'Connor, Director of Fires and Safety of Koppers United Corporation, Pittsburgh, reports a 52 percent reduction in accident frequency for the first five months of 1945 compared with the first five months of 1944 and gives the credit to Program Development.

Money Savings

In November, 1944 the ASF Fourth Service Command reported on Job Methods use for one year in 40 installations that included camps, forts, and hospitals. The total saving was \$1,718,023—about the same amount as TWI's appropriation for that period.

Foreign Language Problems

In the past the normal break-in time for Mexican track-hands on the New York, New Haven & Hartford Railroad Company, due to language difficulties, has been about three weeks. The track foreman had picked up a smattering of the language in handling other groups of Mexicans. By using the J.I. pattern he was able to get his next group up to skill in one week.

Office Delays and Errors

Office methods are susceptible to improvement just as plant operations are. In the Civil Service Commission, Honolulu, a certain address list was customarily routed for hand correction. The corrections by hand resulted in errors, and the routing meant follow-up and searching. Two other kinds of information were combined with the address list and a card file set up—corrections were checked with individuals, not routed to everyone. Three of twelve clerks were released for another department's use.

Hawaiian Manpower

In Hawaii, more workers could not be moved in. Maximum use of available people was of paramount importance. Much of the TWI staff's time was given to the Army but the pineapple and sugar plantations had a share. In a sugar company on Kauai, 12 men spent one day a week scrubbing evaporator tubes with brushes which had to be replaced each week. Spraying the tubes with molasses to remove the scale meant equivalent cost in materials (molasses vs. brushes) but only three men were needed and the job was better done.

At another Hawaiian plantation, new methods saved 7,460 man-days a year—the equivalent of adding 25 men to the payroll. Installing the improvements cost \$11,000; the yearly savings were \$40,000.

Production Increases

TWI Headquarters continued to feel that production increases were after all the true values. There just could be no question of the worth of such results as were obtained at Radio Specialty Company, in Oregon, where a good operator in a day could grind 500 quartz crystals—but 80 percent would require touching-up. The beveling machine was re-designed—daily production went up to 2,000, touching-up went down to zero. The old 5 percent breakage was eliminated. To the operators there was one other improvement. The old method required placing a crystal under a revolving cylinder and holding it. Girls were used on this job, as men's fingers were too large. The girls frequently ground their fingers as well as the crystals. The new method eliminated the finger work and finger-bleeding.

In a Detroit aircraft plant the stamping of the part number required removal and reversal of the part. A J.M.-trained supervisor devised a holder that made it possible to stamp both sides at the same time. Daily production of 700 parts increased to 1,400 parts.

A foreman at a small machine shop in St. Louis made 76 breakdowns of jobs in his department. On January 1, 1945 (before being trained in J.M.) his department of 65 people was two and a half months behind schedule. By April, the department was operating with 28 people, and it was meeting a production schedule which had been increased 20 percent.

Scrap

At the Curtiss-Wright Corporation in Louisville (aircraft assembly of C-46 planes) the plant made a special study of the relation of scrap to Job Instruction. They found that where J.I. certification was low, the trend in the scrap curve was upward. Where J.I. certification was high, the scrap curve was downward. In Department A where all supervisors were certified in J.I. (against a plant average of 54 percent), the per capita scrap cost was 15 cents (against a plant average of 61 cents). In Department B, J.I. coverage was 83 percent and per capita scrap cost was 27 cents. In Department C, the 25 percent J.I. coverage was below the plant average and the per capita scrap cost was 65 cents.

"Small" Results

Not all results were spectacular, but the individual, outstanding results might well have to take second place if all the small ones could be added—individually small results like making a man in an Iowa soap plant available for other work half-time by putting sacks directly on a truck instead of on a conveyor and then on a truck, or the

annual savings of \$275 in pork trimmings at a South Dakota packers where chutes were installed at trimming tables, or Nebraska experience in the elimination of the heavy work of lifting loaded baskets of steel chips over a 6-foot wall through the simple device of tearing down the wall, or the monthly saving of seventeen and a half hours of a busy man's time when grievances reaching the superintendent of an Iowa factory dropped to a number averaging only two and a half hours of his time, or a saving of $\frac{1}{3}$ of a minute each in retying loose knots on 180,000 hog bellies at an Iowa packing plant.

INTANGIBLE RESULTS

The TWI programs have had other values than those ordinarily thought of.

Recruiting Workers

The Albany Castings Company of Voorheesville, New York ran a "Learn to Mould" advertisement in Albany newspapers, holding out these inducements: "You will have a good job now, help win the war, be trained under certified War Production Job Instructors, can expect rapid advancement." The company found that this advertisement drew more applicants than any it had ever run. Some of the men were older men who had not worked in the foundry trade for a long time and who were reluctant to go back on the job because they felt they were stale. The manager said that the thing that brought these men in was training "under certified War Production Job Instructors."

Supervisory Opinion

At the St. Johns River Shipbuilding Company in Jacksonville, Florida, the foreman of chippers and caulkers (an old-line shipbuilder), was skeptical about the Job Instruction program for the first four hours of the sessions. However, at the end of the first eight hours, he said:

I have worked in 14 shipyards during the last 30 years. During that time I have always been the goat management selected for any sort of training conference or committee work. When notified to report for this J.I., I groaned and thought, "Again!" However, this is the first program in all my experience which really gives me something to hang my hat on and go to work with.

The New Worker's Side

In Washington the head of a government agency had recently taken part in a Job Instruction group. He had decided that every

supervisor in his agency needed to acquire the skill of instruction and he was enthusiastically pressing the scheduling of basic instruction. At his desk one day he found a routine notice that a new stenographer was reporting in some section the next day. He sent for one of his assistants and said, "Now when that new girl comes, I want you to bring her to me first. Then I want you to see that she is assigned to Miss So-and-So, who has already taken part in the Job Instruction program."

The new girl arrived and talked with the top man who then introduced her to the supervisor who was to train her in her new work. Early the next morning the executive received a phone call from the girl's mother. This is how it ran:

I just want to tell you how much I appreciate what you did for my daughter yesterday. I am sure you do not know it, but her father was killed in action a very short time ago, and our life in Washington was so intimately tied up with him and with his government work that we just didn't know whether we were going to be able to stand staying in Washington, and my daughter felt it would be very hard to go to work for the government. My daughter needs the job and decided she would try it. She went to work yesterday dreading the experience. She came home last night, a different girl. She told me how you talked with her, that she felt that her work was going to be very important, and that she was going to have a real war job. She said the job seemed to be one that she could handle and that she felt she would be really on to it in a short time. It has made a lot of difference to both of us.

Relations on the Job

In Massachusetts a constant absentee had been visited several times by the personnel and medical department and on every occasion they found him to be actually ill. Medical reports showed no definite chronic condition. The foreman, having had Job Relations, suggested that he be allowed a chance. He found that the fellow-employees, knowing how the man worried, used to tell him how bad he looked; after three or four days of this, the employee would break down and feel sick enough to remain at home for a day or two. The foreman talked to the employees in the department, explaining what had caused the man's illness, and the foreman suggested that people tell the man how well he looked. The man has been on the job ever since.

AWARDS

TWI as an organization, and its leaders as individuals, have received many awards for achievement.

Industry's Star Award

The State Chamber of Commerce, in New Jersey, the birthplace of the Job Instruction program, took the initiative in arranging a public

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celebration to mark the granting of the millionth TWI certificate. This was not the millionth Job Instruction certificate but J.I. had accounted for over seven hundred thousand out of the million. The National Association of State Chambers of Commerce chose this occasion to create and present a new kind of recognition which was called "Industry's Star Award."

It had become quite usual for the Government to decorate industry with an "E" for doing a good job. This was apparently the first instance of a government agency's being decorated by private industry. In making the award, Thomas Roy Jones, President of the New Jersey State Chamber of Commerce, said that TWI, in the eyes of industry, has measured up to the following standards:

1. It is a service measurable in practical results.
2. The service being rendered is timely and shorn of non-essentials.
3. The service is economical in proportion to results obtained.
4. The personnel of the agency consists of people who intimately understand the practical problems of industry, and recognize the value of the established system of free enterprise.
5. It is a service which does not undertake to do for industry the things industry can do for itself.
6. It renders a service devoid of all other purposes except that for which it is constituted.

In a number of cities, local award ceremonies were held. In both Chattanooga and Kingsport, Tennessee, the Industry Star Award lapel button was presented to trainers. In the South, particularly, this award actually helped dispel suspicion of TWI as an "interfering" government agency.

100,000 for Los Angeles

In June 1944 the California State and Los Angeles Chambers of Commerce combined to mark the award of the one hundred thousandth certificate issued by the Los Angeles district. Five hundred local organizations were represented at the occasion.

10,000 for Honolulu

When the Honolulu district had been in operation six months, its certification figures reached 10,000. A hatch-tender employed by Castle & Cooke at the Honolulu waterfront, who had previously completed basic instruction in Job Relations, was given his Job Instruction certificate at a meeting of the WMC Labor-Management Committee.

The Picatinny Story

Now that military restrictions have been released, the Picatinny Arsenal, Dover, N. J., has issued a report entitled, *Picatinny Played*

Big War Role, Helped Blast Axis. One division of the report is devoted to the "Great Training Programs":

The Arsenal functioned as a great school. The enormous demand for ammunition in a global war necessitated the construction of many new munitions plants. These plants were operated by cereal, soft drink, soap, and other types of industrial enterprises. They had to be trained in ammunition, and Picatinny did the training. More than 5,000 of the key personnel of these new plants—inspectors, foremen, operators—came to the Arsenal to attend school and to gain experience on operating lines.

New Jersey district records show that TWI played a major part in these Arsenal Training programs: Job Instruction Training, 854 certified; Job Methods, 940; Job Relations, 522.

Since Picatinny is the "mother arsenal," its improved methods are reproduced in other government arsenals. In 1943 when Picatinny savings amounted to a little over \$1,000,000 it was estimated that the savings in the other ammunition establishments would amount to \$30,000,000. In July, 1943 Picatinny Arsenal announced to all employees that, since the "vast majority" of suggestions received during the past year had come from supervisors who had had Job Methods Training, J.M. would now be extended to all Arsenal employees whose efficiency rating was "good" or better.

General Somervell, commenting on Picatinny J.M. improvements, spoke first of savings in man hours, and then said: "As every one of us on the production front knows, man hours saved in the factory are quickly translated into man-lives saved on the battlefield."

Benefits from Job Methods at Picatinny Arsenal continued to add up and, on July 1, 1944, the Arsenal held an impressive ceremony to celebrate their achievements and invited Mr. Dooley to give an address. In the period from Pearl Harbor to the time of the celebration, over 1,300 employee-proposed improvements had been put into effect and many of them used at other Ordnance plants. The Arsenal had realized a saving of \$5,000,000. Credit was given to Job Methods for approximately 90 percent of the results. By June 1945 the dollars and cents savings actually accomplished through TWI services at Picatinny Arsenal had amounted to \$6,800,000.

Honors to the Directors

Purdue University honored Mr. Dooley and Mr. Dietz by giving to these two of its alumni honorary degrees of Doctor of Engineering in Human Relations in 1944 in recognition of their establishment and direction of Training Within Industry.

The TWI Director and Associate Director jointly shared the first award in Human Relations given in 1945 by the Society for the Advancement of Management. When the award was announced in June, the S.A.M. National President, R. R. Zimmerman, said:

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The Society for the Advancement of Management established three standards for making its award for Human Relations.

The first deals with contributions to the science of human relations. For many years engineers and technicians have made improvements dealing with machines and materials. However, the human element of production has been given little attention. Dooley's and Dietz's TWI efforts in this field have been focused on the specific improvement of supervisors in American industry.

A second requirement for this award was that accomplishments be scientifically conceived and executed and that they be factually stated. Results of the TWI program, established by the two recipients, have been measured in terms of production increases, reduction of waste, decreases in training time and reduction of grievances. Two-thirds of the plants reporting production increases state that these increases have been greater than 25 per cent. Approximately the same proportion report similar large decreases in scrap. More than 90 per cent of the plants reporting on the reductions of grievances and training time have found their results fall in the 25 per cent or greater class.

The third requirement for the award was that it be in the human relations area. Dooley's specific accomplishment has been the setting up of the industrial network which has accomplished excellent results. Dietz is receiving the award for developing the Job Relations program, which is the first such program to give standard assistance to supervisors at all levels in the field of leadership.

By-Products

Marked results of TWI work have been the increased interest and improved understanding of training as a production tool, and the way people in the training field have set about increasing their own knowledge and skill. Training Associations in Boston, New York, New Jersey, Cleveland, Indianapolis, Seattle, and other cities have stemmed out of TWI activities and programs.

Chapter 8

TWI AS A GOVERNMENT AGENCY

The Training Within Industry Service has been different from most government groups, and perhaps took too much pride in its peculiarities. But these characteristics must be recognized because they determined the course of the organization.

TWI's leaders and its staff members were not career government employees—they came largely from private, competitive business. TWI staff members as a rule felt “temporary” and planned to get back to their usual business, which most of them have now done. They were not accustomed to government regulations and found it hard and tedious to conform. The TWI staff was held together by personal loyalty to its leaders whom many of them have long known and respected for their industrial work, as well as by belief in the TWI programs and a desire to have a part in the war effort.

TWI was set up under NDAC, transferred to OPM, then to WPB, then to FSA, then to WMC, and with the setting-up of the Bureau of Training in WMC, made a member of that group. (*See* Office of Production Management, Regulation No. 5, “Establishing a Labor Division in the Office of Production Management and Prescribing Its Duties and Functions,” March 17, 1941; War Production Board, General Administrative Order No. 2, “Organization of the War Production Board,” January 26, 1942; War Manpower Commission, Executive Order No. 9139, “Establishing the War Manpower Commission in the Executive Office of the President and Transferring and Coordinating Certain Functions to Facilitate the Mobilization and Utilization of Manpower,” April 18, 1942; War Manpower Commission, Executive Order No. 9247, “Transferring Certain Employment Service and Training Functions to the War Manpower Commission,” September 17, 1942; War Manpower Commission General Order No. 1, “Functions of the Bureau of Training,” December 10, 1942.)

Through all these changes TWI maintained its entity, although during the popularity of extreme decentralization in 1943, it took a large proportion of the time of the Headquarters staff to defend

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the position that quality requires standards, and national quality demands national quality control of standards. During the stage when TWI was adding new programs and new staff members, there were differences in the programs in different localities. These had to be brought under control through exacting national standards. Decentralized technical work was never permitted—when it happened, it was treated as a deviation and the work brought in line with national standards as established in manuals for Institute Conductors and trainers.

Line and Staff Activities

When the position of training chief was established in WMC regions, states, and areas, there was much misunderstanding as to the scope of his activity. Eventually it was determined that “when” and “where” training service should be given were proper parts of overall manpower planning, but that the “how” is technical and therefore properly a matter for TWI control. The arguments over receiving direction from WMC were largely theoretical. In 1945, a year after priority referrals began, the “when” and “where” directions were important but the volume was relatively not large. It had increased in importance because of urgency of specific war products. Such referrals were given priority, but in general, if TWI was not already serving the plant, it kept on planning its own work in accordance with production urgency.

ELIGIBILITY

One of the first activities of the USES Educational and Training Relations Unit (which later became the Training Needs Section of the Bureau of Training) had been the determination of the need for various types of vocational training, based on labor supply and demand in those defense occupations in which training should be provided. Accordingly, a list of occupations and industries was prepared in cooperation with the various federal training and labor supply groups. In July 1940, the Advisory Commission to the Council of National Defense approved this list. The inclusion of an occupation meant that:

... such an occupation is important in the defense program and may be considered an appropriate field for training if the local conditions of demand and supply warrant pre-employment training. Training in any case should be initiated only when the supply of workers in an occupation appears insufficient to meet the current and anticipated demands.

Experience indicated that occupations rather than industries were the appropriate unit for the planning and administration of defense training, and that the industry list would therefore be more useful if

it were translated into more specific occupational terms. Accordingly, in June 1941, the Federal Security Agency issued a list of the occupations approved by OPM for training courses for defense workers.

Director of Defense Training

On March 27, 1941, the Federal Security Administrator had created the Office of the Director of Defense Training, charged with the responsibility for the direction and supervision, with as full authority as the laws permitted, of all national defense training programs, including defense projects under the jurisdiction of that agency, namely National Defense Training Programs in the U. S. Office of Education and the defense projects of the NYA and CCC. Colonel (now Brigadier General) Frank J. McSherry was appointed to this position. This office also acted in a liaison capacity in connection with the national defense training matters affecting the FSA or any of its subordinate agencies, with proper authorities of the OPM, and with other government establishments dealing with labor supply and training within defense industries.

Expansion of Eligibility Lists

Lists were revised as needs changed. A volume, *War Production Occupations for Vocational Training*, issued by the Federal Security Agency in 1942, became the basic list of occupations for which pre-employment training or supplementary vocational training for war production workers might be given when need for training was established. Additional occupations were added in supplements. These occupations and the industries in which they occurred were determined by the War Manpower Commission on the basis of labor market data and occupational information. The list provided a broad national framework within which local courses might be approved when need was established for such training.

Supervisory training was approved for all industries listed in the FSA book and its supplements, and in WMC's *List and Index of Essential Activities* and supplements, with the exception of agriculture and commercial fishing, educational services, government services, and technical, scientific and management services. These four classifications were not eligible for service from TWI. The approved lists for training were supplemented from time to time when additional industries or occupations were declared essential to the war effort. In addition, national lists of *Industries Approved for Supervisory Training* were issued by the Bureau of Training of WMC.

Approvals for Exceptions

Originally, courses not on these nationally approved lists were submitted to Washington for specific approval. In order to expedite

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action, the Bureau delegated this approval authority to Regional Manpower Directors.

The arrangements were sufficiently flexible to permit service to groups involved in the war effort who could be aided by use of the TWI programs. For example, hospitals and power laundries became eligible for TWI service on a national basis in February, 1943, but before then many, which had been classed as locally essential, were given service. In specific areas, government agencies were served by TWI; for example, the New York City Housing Authority.

RELATIONS WITH VOCATIONAL EDUCATION

The relations between TWI and the various State Departments of Vocational Education stem out of the original cooperation in New Jersey. The Rutgers University Extension Division was also actively associated with the promotion and scheduling of TWI work.

On October 6, 1941, TWI established a number of provisions about the operation of Job Instruction. It was required that districts make arrangements with the State Vocational Education Department as to financing the payment to trainers and arrange to have a schedule supervisor designated, but it was to be emphasized that State Directors of Vocational Education must understand that the program was to be presented exactly as offered by TWI.

Assignment of Functions

The first directive from the Office of Education on the handling of J.I. sessions was issued October 9, 1941. This first release specified that TWI would make contacts with defense industries, that TWI would conduct the Institutes, and that sessions held either in his own plant or at another to which he was assigned by the scheduler, on time not covered by the trainer's regular salary, could be compensated for through defense funds available in the state.

On February 24, 1942, TWI sent to its Field Representatives the first official instructions, jointly approved by the United States Office of Education and TWI, for the Administration of the J.I.T. program. This first statement, commonly called the Dooley-Hawkins agreement, gave as the objectives:

1. The 10 hours of training for every first-line supervisor in war industry.
2. Extension of training to higher executives as far as possible.
3. Bringing industry and vocational education together on a long-time working basis.

It was stressed that this TWI program did not replace any vocational education, foremanship, or other form of in-plant training.

Certification of trainers was made a joint function of TWI and the State Board of Vocational Education. Institute Conductors were to be drawn from TWI. Quality control was to be exercised by TWI or by the State. Rates of pay for the trainers were determined by the respective States and varied widely, ranging from \$2.00 to \$6.00 per hour.

A supplement was issued in June 1942, and a further revision made January 18, 1943. It was specified that TWI would conduct the Institutes, make initial sales contacts and arrange for the schedule supervisors to make plant calls in order to do additional selling, arrange for groups, and assign trainers. TWI would arrange for quality control by competent men. A representative of the State Board for Vocational Education could either attend sessions or delegate to TWI responsibility for seeing whether the quality of sessions merited compensation.

When the Job Instruction program was started it was thus tied in very closely with the Vocational School set-up. The first Chicago Institute was held at the Milwaukee Vocational School. However, all of the men who were in the Institute were from industrial companies. They were to be used to conduct 10-hour programs in various Milwaukee war plants. These trainers were paid by State Vocational funds.

As Job Methods and Job Relations came along, similar arrangements were made.

The actual working arrangements varied with the various States. For example, in Ohio the state functions in connection with the TWI program were handled through universities, such as the University of Akron, University of Toledo, and the University of Cincinnati.

Unusually fine working relationships existed in New York between TWI and the State Vocational Department. For over three years Dr. E. H. T. Foster was the state-paid representative on the TWI staff. The state provided a total of thirteen schedule supervisors, six quality control trainers, and nine stenographers. In addition, many TWI staff members were carried on the state payroll for the one or two months that were necessary to get Civil Service approval of appointment.

Restrictions on Eligibility

The tie-up with Vocational Education was influential in determining eligibility for the programs. Actual payment of trainers was from federal funds disbursed by the states. Definite restrictions were necessary. These restrictions were, however, interpreted differently by the various states. Some of the states decided that supervisors in only some of the plant's departments could be trained at state expense. For example, in California, it was at first ruled that machine shop

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foremen and water transportation foremen in the Golden State Creamery were the only ones who were eligible. The actual supervisors of the dairy, which held prime contracts with both Army and Navy, could not get Job Instruction.

Proportion of State-Paid Sessions

When the "J" programs were first launched, most sessions were conducted by state-paid trainers. As TWI laid increased emphasis on management responsibility, the proportion of state-paid sessions dropped. Half-way along in Job Instruction's four year history (by June 30, 1943) the percentage of sessions conducted at state expense had dropped to 43 percent. By the end of March 1945, this was reduced to 19 percent.

On May 5, 1945, the U. S. Office of Education began to close its war training programs, providing for their termination by June 30. Most of the sessions which had been scheduled by itinerant trainers for May were held, but only in a few cases was it possible to arrange state payment for sessions in June.

The withdrawal of state funds had practically no effect on the progress of basic training in the TWI programs. It was found that companies too small to have their own trainers were glad to pay the trainers. However, few unions were able to carry the expense of Union Job Relations. During the three months ending June 30, 1945 the percentage of state-paid sessions dropped to 15 percent and during TWI's last three months of operation (July through September, 1945) there were of course no state-paid sessions.

Results of TWI—Office of Education Cooperation

It is probably too soon to evaluate the net results of the joint work of TWI and Vocational Education. The financing arrangements undoubtedly contributed largely to the quick start of the program. Being able to say "It's free—we send a man to run it" got ready acceptance. On the other hand, experience proved that this acceptance got the program off to a poor start. Management felt no responsibility, did not realize that the program was far from free when the cost of the supervisor's own payroll time was reckoned, and often went along on the basis of "We'll try it because it can't hurt us and it doesn't cost anything."

There were some strained relations—state vocational people sometimes felt that TWI was stepping into their traditional preserve. Others felt that the contacts improved their relations with plants and would help them in their long-time job through increasing their familiarity with what plant needs really were.

TWI has been in the position of biting the hand that fed it through its sometimes critical remarks about education in general and specific

vocational education groups. Out of it all, TWI did learn that its original insistence that "this is a job industry itself must do" was right. If industry had paid its own trainers' costs from the start, serious interest would have begun at an earlier date and results would have been obtained sooner.

"WHERE" TO WORK

Eligibility regulations established a broad field in which TWI could work. Not until 1943 did TWI admit that it was not going to be able to cover all plants. TWI did work for a long time on the "as many as possible" basis, but eventually, in closing days of drastically reduced staff, worked only "where needs are greatest." First intentions were to do something for as many as possible, then practice veered to doing a complete job for a reduced number, and eventually to doing only the specific thing which would be most useful toward solving a problem on a critical operation or in a bottleneck department of a plant.

Early Directions

In defense days, lists of contractors were available and these were sent to districts freely. Shortly after Pearl Harbor such lists became confidential information. However, in March 1942, at the request of Donald Nelson, then head of WPB, TWI sent to all of its field men a list of the machine-tool builders throughout the country, and forwarded Mr. Nelson's request that TWI help these companies see the importance of machine tools to the overall effort to increase production. The districts were asked to offer Job Instruction to those companies immediately.

In April 1942 TWI Headquarters sent out a list of the 100 companies then estimated as holding approximately 80 percent of war contracts. By the late fall of 1943 critical needs began to become apparent and, through the Industrial Allocations Division of USES, TWI received WPB's lists of products that were behind schedule.

By this time WMC had decentralized, and directions on where help was needed were supposed to come through the regional set-up. WMC "critical" lists were made up from a labor shortage point of view. Once the new workers arrived and needs for help in breaking them in arose, the plant was no longer reported as "critical," but this would be the time of greatest need for training. TWI received from WMC, as referrals, names chosen from TWI's reports of plants where TWI programs were in operation. TWI Headquarters maintained that, until WMC field personnel became more accurately informed on training needs, TWI would continue to be guided by its own industrial contacts.

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Beginning of WMC Controls

After WMC was established, areas were classified on a labor shortage basis. Late in 1942, Dayton became a "critical" labor area. Lack of workers and lack of housing, according to WMC reports, had combined to mark that city as a place for no more contracts. Managements of Dayton plants combined in a drive to get Dayton removed from this No. 1 classification. Fred Barr, vice-president of the National Cash Register Company, had always sponsored TWI in Dayton (had made their training director, Robert Kline, available to conduct Institutes for other plants), and N.C.R. arranged at their plant a management meeting to outline TWI services, to recommend them, and to show the results N.C.R. was getting. TWI service in Dayton expanded and, when the city got rid of its "critical" listing, the credit was shared with TWI.

The "West Coast Plan"

The serious impact of war production allocated by the procurement agencies to the West Coast became evident by the summer of 1943. The War Manpower Commission and training agencies operating on the West Coast had up to this point in the war effort operated a manpower program primarily through recruitment, training, and placement activities, with each agency acting somewhat independently without relation to the activities of the other. Procurement agencies placed contracts in the same fashion, so that by the summer of 1943 it was obvious that some systematic program for scheduling and allocating war production on the West Coast must be devised.

On August 13, 1943, provision was made for the orderly allocation of production by the procurement agencies, and extensive sub-contracting outside of the West Coast by prime contractors. The so-called West Coast Manpower program established production urgencies, manpower priorities, employment ceilings, and an organized plan for securing better use of labor through utilization surveys, improving personnel policies and practices, improving supervision, and eliminating in-plant causes of turnover, absenteeism, and labor hoarding. It was the forerunner of all WMC controls.

In October 1943, TWI Headquarters appointed one of its California staff members as Regional Representative of TWI, to render such aid as was necessary to bring about close cooperation between Training Within Industry and the War Manpower Commission, whose regional head was William Hopkins, TWI's ex-District Director for Los Angeles. Various records of the War Manpower Commission, War Production Board, and the Office of Defense Transportation indicated that there was considerable information available as to contracts awarded, labor shortages in specific plants, specific plant

problems, specific plant manpower problems, specific skill shortages in plants, and other information indicating training needs and pointing directly to plants and industries where training activities should be concentrated.

The Regional Manpower Director, through the Regional Chief of Training and his staff, directed that this vital information be assembled in the offices of the State Chiefs of Training for use by the heads of the various training agencies, the purpose being to acquaint these agency heads with the types of problems creating production bottlenecks in critical plants so that they could properly and intelligently direct the approach and activities of members of their staffs. Later, this program was revised, requiring the State Chiefs of Training to assemble training information and make specific training assignments to the various constituent training agencies, who were charged with the responsibility of meeting with plant production supervisors, providing training assistance, and reporting on the status of training within the plant.

During the final year of operation, the TWI districts on the West Coast concentrated their time and energy on plants referred by WMC, with excellent results. A splendid working relationship was developed between the Bureau of Training of WMC and the cooperating agencies in implementing the training phases of the West Coast Manpower program.

WMC—TWI RELATIONSHIPS

During 1943, the absorption of the established TWI group into the new War Manpower Commission caused some friction between WMC and TWI, but early in 1944 a serious effort began to iron out the differences.

TWI Policy Letter No. 1

On February 4, 1944, an instruction was sent out as WMC Field Instruction 228 and as TWI Policy Letter No. 1. It said, in part:

Training Within Industry's objective may be summed up as follows: To get top executives to accept training as a major management function; to get them to use skilled supervision as a part of production, and to train within their own plants at their own expense to the end that every supervisor be equipped to make the maximum use of the abilities of every worker in war production and essential service. . . .

The District Director's operating staff comprises a varying number of paid full-time staff members. The caliber of the staff is the most important single factor in meeting TWI objectives, and it is therefore the duty and responsibility of the TWI District Director and the TWI District Representative to see that persons are chosen who are both qualified and acceptable, and to provide for their thorough training.

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TWI Policy Letter No. 2

A second TWI Policy Letter (WMC Field Instruction No. 273) was issued March 10, 1944 under the subject "Training Within Industry Service as an Integral Part of the War Manpower Commission." It read:

These instructions are being issued for the purpose of clarifying organizational relationships within the War Manpower Commission, concerning the Training Within Industry Service, based upon the WMC Organizational Manual dated July, 1943, which reads in part as follows:

"The Regional Manpower Director is the Executive Director in the field and is responsible for all War Manpower Commission personnel and activities in his territory. . . .

"The State organization then does the manpower job for the whole State including direction and supervision over the local offices of the USES, the representatives of the training agencies and the manpower utilization consultants assigned to the State.

"In this case the local USES offices, the representatives of the training agencies, and the utilization consultants operate under the supervision of the Area."

The Training Within Industry Service is one of the training agencies referred to above. At the national level where policies and procedures are established, it is a staff service located organizationally in the Bureau of Training. In the field at each level the TWI is located organizationally in the Division of Training. The TWI representatives serve on the staff of the appropriate WMC Chief of Training (or the WMC Director where no Chief of Training has been appointed) at each level to carry out the TWI part of the over-all manpower training program.

All TWI administrative action shall flow through the appropriate WMC area, State or regional office, whereas technical advice and information will flow from the TWI Director in Washington to the TWI District Directors.

The regular policies and procedures established in the WMC in regard to personnel and fiscal matters will be adhered to, and personnel and funds of the Training Within Industry Service will not be commingled or used for other than TWI services without the concurrence of the agency.

To summarize, this means it is the function of the Regional, State and Area Chiefs of Training to determine *when* and *where* training shall be given according to the priority of need, and it is the function of the appropriate Training Within Industry Service officials to determine *how* the training program of their Service shall be given and carried out. . . .

Revision of TWI Policy Letter No. 2

This letter was not understood. An occasional WMC area chief of training looked on a local TWI resident representative as "his man." On August 14, 1944, a supplement was issued (WMC Field Instruction 273, Supplement 1, also TWI Policy No. 2). It contained the following clarification of TWI functions:

Because of the practical limitations of the TWI staff and the specialization necessary within the TWI group in order for it to do its segment of the WMC job, the basic operating unit must be the district staff. Each

TWI district group operates as a team. This staff embraces a District Representative and five technical specialists, plus assistants as necessary. District offices were originally located in the largest and most strategic war production centers so that the least amount of travel was required. The appointment of a resident representative in an area does not mean that an additional operating unit of TWI has been placed in that territory; he is merely stationed at a point to economize on travel costs. To establish a TWI unit in each area that could do the TWI job in its entirety would require an additional group in every state and many areas. The resident representative cannot perform the entire TWI job and must have help from members of the TWI district team to get the job done; likewise, he may have to contribute to performing the TWI job in other areas. Therefore, all members of each district staff, including resident representatives, will be responsible directly to the District Representative.

The District Representative of TWI will operate as a member of the Regional Director's staff.

In Regions having more than one TWI district, one person is designated as the TWI representative on the Regional Director's staff.

Area and State Directors are responsible for the total manpower program in their territories and have the responsibility for telling TWI what plants should have priority of attention (when and where). Therefore, since TWI's service can only be effectively rendered through the coordinated availability of each specialist, contacts should be made through channels with the District Representative and not with individual staff persons. The District Representative will plan staff itineraries and plant visits giving first attention to those where WMC Directors indicate priority of need. However, where the practical factor of distance requires it, the Area Director and the TWI District Representative may arrange for requests to be made directly to the nearest TWI staff member, subject to such procedure as they mutually agree upon.

Each Resident Representative will, however, keep in close contact with the Area Director where he is stationed, will attend Training Council meetings, will use the same office location wherever convenient and will conform to the customs and rules of the Area WMC office.

In order to maintain the maximum effectiveness of the TWI staff members operating as a team, the Resident Representatives who are located in the TWI district office city should occupy space in the TWI district office.

Where distance warrants having Resident Representatives, each District Representative shall discuss the strategic placing of such TWI personnel with the Regional and State Director concerned.

There had been previous statements that the "how" of training is technical, and therefore a matter for TWI's determination. This point was further explained:

The question of amount of time to be devoted to any one plant or to any one project is to be determined by the District Representative, based upon his evaluation of production results to be obtained. Many factors make it desirable to continue service or withdraw all contacts with individual plants according to the experience in each case. Before withdrawing from any plant, TWI will discuss the matter with the WMC Director.

Area and State Directors have the responsibility for getting results in their respective territories and must be satisfied with the work done by

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TWI representatives. Accordingly, Area or State Directors may register with the Regional Director, for action by the District Representative, their dissatisfaction or approval of the performance of any TWI person at any time.

GETTING UNDERSTANDING OF RELATIONSHIPS

Both WMC and TWI were anxious that the time-consuming disagreements about relationships should end. Accordingly, this August 14, 1944 instruction was not just mailed to the WMC and TWI field staffs but was hand-delivered and discussed. Teams made up of one representative of WMC Headquarters (usually a member of the Bureau of Training) and one from TWI Headquarters visited all twelve WMC regions. These meetings were held in the late summer and early autumn. At each conference, the WMC Regional Director, Regional Chief of Training, all State WMC Directors, all State Chiefs of Training, all TWI District Directors, and all TWI District Representatives attended.

TWI Policy Letter No. 3

During the period when these meetings were held, TWI issued its third policy letter, "Current Basis for TWI Service" (WMC Field Instruction 245):

In order to maintain TWI's high standard of quality and at the same time better serve the war effort, the following is to govern current use of district staff members from now on:

ONE—Serve NO "NEW ACCOUNTS" except those specifically referred by WMC as being specific plant situations of highest urgency in war production.

TWO—Put remaining time, energy, and effort on improving service and coverage in "OLD ACCOUNTS," in order of priority of war need, recognizing that attention to such plants will contribute most to the war effort.

THREE—Admit no representative from any company to a "J Program Institute" who does not guarantee to put on *at least five 10-hour groups in his own company.*

Admit no itinerant candidates, either free-lance or from a non-eligible company, to a "J Program Institute" unless there is enough volume of need to warrant putting on *at least ten 10-hour groups* in priority companies, including both new and old accounts.

Use itinerant trainers only when it is uneconomical or impossible for TWI to prepare plant representatives or union representatives in the case of Job Relations program for union stewards.

It will be necessary to deny service to eligible plants and even to ignore recognized need for service unless such a plant is a War Manpower Commission priority referral or a priority plant in which TWI programs are already under way.

The big idea is that from now on TWI is to devote its entire effort to rendering full and complete service to those plants which it serves,

rather than reaching out for a larger number of plants and giving them only limited service. No further commitments are to be made on any other basis.

This decision has been made in the light of current district reports and nation-wide WMC emphasis. It is impossible to give *complete* service with the funds available, even to all *eligible* war plants and services. We can't do everything we would like to do, so let's meet the neediest needs and do what we do do, excellently.

Headquarters Representatives are working on this basis in order to cooperate with you in making this application of our remaining time.

These meetings, and the directions, did not solve all problems but understanding and cooperation did improve. Since the greater part of WMC was concerned with manpower shortages (which resulted in production shortages), there had to be continuing efforts to keep TWI work exactly on the beam. TWI stated this as follows:

What Does "Production Urgency" Mean to TWI?

TWI has been saying for some time that the efforts of its field staff are focused on giving service according to "production urgency"—that it receives directions from WMC on "when and where, according to production urgency." Just what does "production urgency" mean?

In general, we can say that service according to "production urgency" means that staff time and effort and materials and money go first to the place where assistance will do the most for the total war effort.

Specifically, it means that TWI works in the following groups, and in this order:

A. Critical Plants and Services *Behind* Schedule—

The hot spots where increased production right now will mean the most in terms of the whole country's war effort.

B. Critical Plants and Services on Schedule—

Those plants, currently and locally of such immediate importance as to require special handling to insure continuing results.

C. Essential Production and Services—

Essential war production industries and services whose importance across the country is recognized by their inclusion on the permanent eligibility list.

D. Other Civilian Activities—

Those which are judged to be of local importance.

For Job Relations only, union stewards in war plants or services are eligible in the same order of priority (A, B, C,) as are the supervisors in those industries and services.

As the WMC field organization expands and as war needs become more sharply defined, there will be increasing, specific directions from WMC to TWI on the hot spot critical plants—in Group A, above. In some districts at some times, *all* TWI effort might be concentrated on Group A contractors.

Beyond the requirements of Group A, TWI serves Group B. In these *demand* cases, TWI installs its program in the usual way—presentation of the *complete* program to *top* management.

When these needs are met—and only when they are met adequately—TWI goes out to "look for business" in Group C.

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TWI CHANGES

TWI did some conforming. Where TWI district lines crossed WMC regional boundaries, the district lines were changed so that, while one region might contain several districts, no district was divided between two regions (*see* Chapter 1). In each region one TWI person was appointed TWI Regional Representative so that the WMC Regional Chief of Training could always work through one person even if two districts were involved.

By the spring of 1943, considerable TWI time was being spent in the preparation of manning tables. Therefore, since the manning tables dealt with the actual training time needed for the work of specific jobs more than they dealt with problems of supervision, it was pointed out to the districts that the Apprenticeship organization was better equipped to do this work.

Area Coverage

In August 1943, TWI began to attempt to cover WMC principal industrial areas with the designation of a specific panel member or the appointing of a new panel member or the assignment of a paid man from nearby. The main function of the TWI Representative as far as WMC was concerned was to represent TWI at local area meetings, to inform WMC of TWI programs, and to refer requests for service to the district headquarters. There have been as many as 270 WMC areas but in only 99 was there a WMC training council. TWI had resident men in 73 of these cities (22 district headquarters and 51 resident representatives) and covered the other 26 by specific assignment.

ATS-TWI Functions

In September 1942, the Apprentice-Training Service and TWI had clarified their own relationships by a joint statement. The agreement announced that either agency would give advisory assistance, that TWI would provide its four programs, and that the Apprentice-Training Service would specifically assist with the training of apprentices, the training of advancing workers, with labor relations which affect training, with supplementary labor agreements, and with problems connected with occupational deferment and employment requirements of Federal and State laws.

FINAL STATEMENTS OF POLICY

In order to leave a clear record, the three Policy Letters were reissued on August 10, 1945. No content change was made in Policy Letter No. 1. Policy Letter No. 2 combined the previous letter and

its supplement, recognized the reduced numbers of staff members by removal of references to exact numbers of program heads, and gave the new titles of Field Directors and Field Representatives in accordance with a re-shaping of the functions of the former position of Headquarters Representatives.

Revision of TWI Policy Letter No. 3

The August 10, 1945 issue of the third Policy Letter was a revision necessitated by the staff reductions that became effective July 1. These directions continued until the districts closed on September 30. They read;

In order to get best results, in terms of current war production, from a limited staff, TWI will operate with plants and unions as follows:

1. Serve WMC referrals in order of urgency and accept no other new accounts. (*No change*)
2. If there is any remaining time, put it on work with old accounts on the basis of order of urgency. (*No change*)
3. Work with *new and old accounts* on a *problem basis*—

That is, give service through a *specific* TWI program or programs to meet the *specific* needs of the people concerned.

This means, in terms of short-term expediency, that we are *abandoning* the "complete coverage" approach. We are no longer in a position to promote *all* programs for *all* supervisors even in urgency plants.

Where the plant problem is one of relations, Job Relations service is to be offered simultaneously for supervisors and stewards. Where the plant problem concerns instruction or methods, effort must be concentrated on supervision.

Because of the late start with unions, it is only fair to continue the kind and amount of TWI service which will count most for war production.

4. All work must be of high quality—service for even a few people on any program will involve management support and coaching, in order for the plant to solve its production problems.
5. Relations with itinerant trainers:
 - a. When sessions are to be conducted by an itinerant trainer, the District Representative is responsible for recommending qualified trainers.
 - b. The financial arrangement is a matter resting entirely between the employer and the trainer. The District Representative may acquaint the employer with the customary rates paid in the vicinity.

6. Relations with vocational school people:

The letter issued on May 5, 1945 by the Office of Education stopped use of Federal funds for payment of TWI trainers. This, in effect, stops all working relationships between TWI and the State Vocational people as provided for by the Dooley-Hawkins Agreement dated January, 1943. In view of the extremely limited budget, TWI cannot furnish supplies to any vocational organizations.

7. Vacancies:

All vacancies are to be reported immediately to TWI Headquarters. As soon as you know definitely that they will occur, wire a brief report.

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Confirm by mail when the change becomes effective. In no case are vacancies to be filled without TWI Headquarters approval.

8. Institutes:

- a. Run no Institutes where there will be no opportunity to follow with coaching to get trainers well grooved.
- b. Due to the limited time during which TWI can continue to render service and to the reduction in staff, it is the policy from here on out to place our emphasis on assistance to plants through in-plant coaching and management emphasis on continuing use of already established or new programs inaugurated to solve specific problems. Inasmuch as Institutes do not produce full benefits for several weeks, Institutes will be conducted only in such situations where the urgency and the volume indicate that there is sufficient time to do a completely effective job with the representatives of the plant or plants enrolled in an Institute.
- c. If such Institutes are held promptly after needs are established, this probably will result in having Institutes of less than 10 people, and the procedures should be adapted to meet that specific situation.

Revision of Eligibility Restrictions

Revisions of restrictions on eligibility were also announced on August 18, 1945, after the end of regulations established because of the use of federal war training funds. They read:

Only war contractors and essential services are eligible for TWI assistance, and staff limitations mean that service is actually available to only the most urgent establishments (these decisions as to eligibility and importance are made locally by WMC).

The training of government employees is the province of Civil Service with the exception of employees in Army, Navy, etc., establishments where the particular branch of the service is responsible. Exceptional cases may be handled with the concurrence of the WMC Regional Director and TWI Headquarters.

In approved establishments, the following specific program restrictions are established:

Job Instruction—supervisors and experienced employees

Job Methods—any designated employee

Job Relations—supervisors, union stewards, and union officers

Program Development—individual with assigned functional responsibility for identifying production problems and planning training to meet those needs.

PRODUCTION URGENCY

In the fall of 1944 a national Production Executives Committee was set up. It established lists of urgent plants and gave as reasons for their failure to meet schedules such factors as inadequate supervision and expanded contracts. This list was sent to WMC Regional Directors and later, in the spring of 1945, copies were made available to TWI Headquarters.

TWI's field organization was flexible, and when an industry or a plant was declared "critical," TWI was able to give concentrated service. At the end of 1943 and the beginning of 1944, there were problems so urgent that the WMC Executive Director, Lawrence Appley, asked Mr. Dooley, direct, to put all possible TWI effort on landing-craft and ball-bearings. The directions were long-distanced to the District Representatives (and also sent through channels, by letter). Within a day telegraphed information was available and within a week there were reports of new service already under way.

This direct action was reported by the WMC Regional Directors as causing misunderstandings among their state and area people, and accordingly WMC headquarters promised its field staff it would return to the "action-through-channels" method. In the meantime, direct action had gotten service started, and results mounted. When planes were all ready to be flown *if* they had bearings, formalities could be cut, and acknowledgment of error made later.

At the same time, TWI gave concentrated service to supporting industries, such as manufacturers of abrasives and of steel balls for bearings, and forges and foundries producing equipment for landing craft.

As the war needs picture changed, TWI gave concentrated service to textiles (principally Army duck and tire cord), to high-octane gasoline plants, heavy duty tires, canning and food processing, coal mining, and railroads.

TWI AND FINANCES

The bulk of the cost of TWI has rightly been borne by industry. American industry has invested millions in TWI in the time its trainers have spent conducting sessions in the TWI programs, the time its supervisors have spent attending these sessions, the time of top executives in launching the programs, and of operating executives who follow-up and coach. Then too, industry has paid the salaries or expenses of many men who have been available to TWI, full-time or part-time for five years. Industry says it has had its money's worth—and it probably has or the investment would not have been continued.

What has TWI cost in terms of public money, drawn from the taxpayers? The amount spent by TWI is slightly more than \$5,000,000.

No appropriations were made especially for TWI until the fiscal year of 1942-1943. Before then, for its small staff, the groups to which TWI belonged paid its bills. The amount is estimated as considerably below \$500,000. The following table shows appropriations and "obligations" (it is not possible to get actual expenditures for government groups for some years).

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<i>Fiscal years</i>	<i>Appropriated</i>	<i>Obligated by Headquarters</i>	<i>Obligated by Districts</i>	<i>Total Obligations</i>
1942-43	Reg. \$1,145,000 Def. 25,000	\$107,000	\$1,054,000	\$1,161,000
1943-44	Reg. 1,686,000 Def. 461,500 Def. 60,000	183,000	1,453,559	1,636,559
1944-45	Reg. 2,000,000	147,272	1,444,872	1,592,144
1945-46	Reg. 600,000	68,140	439,820	507,960
Total	\$5,977,500	\$505,412	\$4,392,251	\$4,897,663

If to the total of Headquarters and District obligations for the years when there were actual appropriations (\$4,897,663) is added \$500,000 for pre-appropriation days, the grand total is \$5,397,663. During this period the U. S. Office of Education spent \$4,435,490 in paying trainers for TWI sessions. The total of the two is less than \$10,000,000, so the cost to taxpayers has been less than \$6.00 for each certified supervisor.

It will be noticed that TWI never "spent all its money." Requests for supplemental appropriations were projected on the basis of getting them "fairly soon." If they were received in full, but later than expected, TWI could not use the money because it would have meant building the staff beyond the requested limits—and that might be construed as putting pressure on Congress for future expansion.

In the spring of 1945 the TWI budget hung fire for months (see Chapter 1). From day to day no one knew whether TWI might, in accordance with the House action, close entirely on June 30. TWI people had grown a lot in individual ability through their TWI work and the organizations from which they came wanted them back. They were constantly tempted by financially better offers. The staff had been held through a combination of personal loyalty to TWI and individual patriotic feelings, but general conditions in the spring of 1945 made a few feel free to leave.

The \$600,000 appropriation which was finally voted looked at first like six months of operation (July 1—December 31) for two-thirds of the staff on a rigidly economical basis (in order to maintain quality control of its programs TWI travel costs may have seemed high—items like that would be cut). But it was soon learned that a going agency does not have to plan to include in its regular current budget such items as overtime pay and lump-sum payment for accrued leave for people whose jobs end, whereas a liquidating agency does have to include these items. It was immediately evident that the money would last only little more than 3 months.

Closing of TWI Districts

TWI had never planned to stay in existence after the war, but the idea of not staying on the job until the war was over had not entered into consideration either. In July, 1945—before the Atomic Bombings and before the entry of Russia into the Japanese war and before the United States knew very much about the crippling action of the Air Force and the Navy—there were no reliable predictions as to when V-J day might come. Nevertheless, TWI's \$600,000 was largely earmarked for its commitments, and accordingly, on July 28, 1945, the TWI district offices were notified that they were to cease operations on September 30 and that if necessary the District Representatives would remain through October 31 to finish work under way and liquidate the district.

When V-J day came, TWI felt its release was complete. Although the staff had been reduced more than a third, it had still been possible to serve most important plants. Service had been maintained for critical operations—now everyone could leave honorably. Accordingly the districts were notified on August 23, 1945, that *all* field operations including field liquidation would be concluded by September 30.

TWI AND CONGRESS

Throughout, TWI's Congressional relations were interesting. From 1940 to 1943 TWI had in a way depended on its reputation. Congress had appropriated money without particular questions the first time it was asked (1942-43) and had even added both a supplemental and a deficiency appropriation.

But the House of Representatives hearings in the spring of 1943 were different. Members of the Appropriations Committee began to ask hard questions, they wanted to know just how much training time had been saved overall, the value of the total scrap reduction, and other questions which truly could not then or ever be answered on a national basis. But these searching and demanding questions led TWI to develop accurate reports and occasioned a study of factual results which was maintained throughout the remainder of TWI's existence (*see* Chapter 7).

Congress in 1943 was mightily interested in small business. TWI was asked for figures on the sizes of the plants it served. Because of TWI's nature (administrative decentralization dated from 1940—there was never any technical decentralization), this information just did not exist in Washington—it had to be sent for, hastily. This and many other questions led to the establishment of the quarterly operating report (*see* sample report in Appendix) which in turn

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attracted favorable attention from the Bureau of the Budget as being a unique cost-and-coverage report.

Congressional exchanges may be illustrated by the following from the House Appropriations hearings in the spring of 1944. The TWI Director said, "We hope that by the time the war is over we will have worked ourselves out of a job." Congressman Butler Hare, chairman of the sub-committee said, "Do you think I would be justified in saying as I go back to the House that in my 20 years of experience I have finally found one government agency that predicts that it will complete its job in 12 months?" The TWI Director's reply was, "By the end of the war. It depends on what the Japs and Germans do."

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Chapter 9

USE OF TWI PROGRAMS WITHIN INDUSTRY

When TWI operating service ended September 30, 1945, the following certification totals appeared:

Job Instruction	1,005,170
Job Methods	244,773
Job Relations	490,022
Union Job Relations	8,856
Program Development	1,829
Total	1,750,650

These people have been trained in 16,511 plants and unions, in every kind and size of war industry and essential service as shown in Exhibit 4.

This gives no picture of the results, but it does mean that in order to earn this certification these people have, in groups of 10, sat down around a table for five, 2-hour sessions and given concentrated attention to learning a method and have practiced that method on one of their own problems or jobs. The TWI certificates have acquired a recognized national value and have been highly prized.

In Program Development, 2,347 men from 1,927 companies attended the 321 P.D. Institutes conducted by TWI. Certification standards set by TWI were high, and only 1,829 of this number were certified on the basis of getting a 4-step plan launched and operating in their plants.

Much of TWI work, particularly in the last two years, was on hot-spot situations. This work was sometimes concentrated geographically but sometimes spread across the country. The sessions were held in large plants and in small ones (57 percent of the plants being those employing less than 500), some being so small that there were not enough supervisors for even one group of 10. For example, in Northern Ohio a procedure was worked out for the solicitation of the small plants and the scheduling of their representatives for joint

groups. In many cases it was the owner of the business who attended the session. In all, 134 of these very small Northern Ohio companies were served. From them 312 supervisors were certified. The total number of employees in these companies was 3,153.

WHERE THE TWI PROGRAMS WERE USED

Various considerations entered into the placement of war contracts. The October, 1945 WPB report, "Production Wartime Achievements and the Reconversion Outlook," gives the following summary of geographic location of war plants:

Considerations of manpower availability, housing, proximity of materials and components, and integration with existing plants compelled a very large part of the facilities to be placed in regions already heavily industrialized. The East North-Central region, which had 31.5% of the 1939 plants, has 29.7% of today's expanded total. The share of the Middle Atlantic states dropped only from 29.8% to 24.3%. Expansions in the least industrialized areas were large only in relation to the existing manufacturing capacity in those regions.

There has, of course, been some tendency toward the dispersion of industrial capacity, though the largest expansions in dollar terms have been in the heavily industrialized states and the top nine states of 1939 are the top nine today. (page 38)

Leading States in TWI Volume

Likewise, there were variables in the geographical distribution of TWI's work. Many established companies were "training minded" and eagerly accepted TWI's offers of assistance—others felt they needed no outside help. Some new, rapidly growing plants wanted help desperately—a few were so located that TWI's limited staff could not give much assistance. TWI gave service in every industrial area, but the pattern was quite close to the listing of the top nine states reported by WPB as leading in 1939 and again in 1945:

<i>States having top industrial production according to WPB</i>	<i>States having top number plants served by TWI (a)</i>	<i>States having top number TWI certificates (b)</i>
1. New York	1. Pennsylvania	1. California (c)
2. Pennsylvania	2. Ohio	2. Ohio
3. Illinois	3. New York	3. Pennsylvania
4. Ohio	4. New Jersey	4. New York
5. Michigan	5. Michigan	5. Illinois
6. New Jersey	6. Illinois	6. Michigan
7. Massachusetts (d)	7. California	7. New Jersey
8. California	8. Washington	8. Indiana
9. Indiana (e)	9. Massachusetts	9. Washington

(a) 59 percent of plants served by TWI in these nine states.

(b) 59 percent of TWI certificates in these nine states.

(c) 11 percent of all TWI certificates in California.

(d) thirteenth place in number of TWI certificates.

(e) tenth place in number of plants served by TWI.

Exhibit 4
PLANTS, UNIONS, AND GOVERNMENT AGENCIES SERVED BY TRAINING WITHIN INDUSTRY*

Groups Served	Units Served					Certifications						
	Under 100 Emp.	100-499 Emp.	500-999 Emp.	1,000 Emp. & over	Total No. Plants	Total Employees in plants	Job Instruction	Job Methods	Job Relations	Program Development	Union Job Relations	Total
Industrial Groups												
Agriculture	2	19	21	12	54	49,191	3,252	760	2,904	8	..	6,924
Mining	26	103	112	61	302	238,915	9,034	1,748	5,286	10	..	16,078
Contract Construction	8	17	15	9	49	88,401	5,182	424	1,123	3	..	6,732
Ordnance and Accessories	54	291	171	240	756	1,063,225	83,079	16,933	36,641	169	..	136,822
Food	293	562	333	160	1,348	689,141	33,931	10,183	15,269	71	..	59,454
Textile Mill Products	16	262	247	113	668	540,021	29,921	8,556	13,442	83	..	52,002
Apparel, Fabric Products	56	250	131	49	486	240,736	12,628	2,915	3,657	33	..	19,233
Lumber, Lumber Products	66	240	81	20	407	139,899	6,667	1,698	2,162	17	..	10,544
Paper and Printing	51	240	127	66	484	250,646	16,517	4,654	6,425	67	..	27,663
Chemicals, Allied Prod.	62	217	150	82	511	344,787	23,898	7,108	15,945	72	..	47,023
Petroleum, Coal	37	103	113	65	318	310,046	16,639	2,590	9,452	36	..	28,707
Rubber, Leather, Glass	94	318	182	106	700	503,097	31,193	9,192	15,906	60	..	36,356
Iron, Steel, Metal Prod.	404	1,015	509	355	2,283	1,712,980	94,118	26,346	49,701	225	..	170,390
Aircraft and Parts	54	228	140	206	628	1,640,348	156,739	50,615	78,668	149	..	296,171
Ships, Ship Repair	30	133	72	125	360	1,222,101	84,306	17,865	43,686	41	..	145,898
Autos, Auto Equipment	58	43	62	41	204	213,724	12,111	3,947	5,504	25	..	21,587
Other Transp. Equipment	24	57	33	31	145	109,898	4,796	2,030	2,001	11	..	8,818
Elec., Mech. Machinery	252	682	305	238	1,477	1,088,175	70,617	22,702	28,860	167	..	122,346
Transp., Comm., Util.	227	377	492	234	1,330	1,505,266	53,037	16,230	38,344	118	..	107,729
Service Industries	205	348	275	23	851	271,507	16,791	1,775	4,671	16	..	23,353
Miscellaneous	957	497	339	75	1,868	465,425	152,581	17,741	57,703	312	..	228,337
Trade and Finance	47	40	100	32	219	189,728	9,418	1,461	4,102	18	..	14,999
Govt. Establishments	106	186	448	137	877	808,549	78,653	17,290	48,244	76	..	144,233
Unions	4	13	141	28	186	263,040	57	20	356	42	8,856	9,371
All Groups	3,133	6,241	4,599	2,538	16,511	13,948,842	1,005,170	244,773	490,022	1,829	8,856	1,750,650

*Punch-card tabulation made for TWI by National Roster of Scientific and Specialized Personnel

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Industrial Classifications

In the tabulation of where the TWI programs were used, 24 classifications were used (*see* Exhibit 4). The "Miscellaneous" group is largely made up of sub-contractors which handled such a variety of production as to make industrial coding impossible. The "Union" group would likewise cut across the classifications according to kinds of contracts in the plants where the various union members were employed. The "Government" group represents the work done by TWI for the Army Service Forces (*see* Chapter 10) and assistance to other government agencies which it was not practical for the Civil Service Commission to serve. The "Trade and Finance" group was made up of groups locally approved for service.

Excluding these four special groups, the 20 groups of war contractors and essential civilian services (such as transportation, communications, utilities, hospitals, laundries) have been arranged in order from high to low, as follows:

<i>No. establishments served</i>	<i>No. employees</i>	<i>No. supervisory certificates</i>
1. Metal Products	1. Metal Products	1. Aircraft and Parts
2. Elec., Mech. Machinery	2. Aircraft and Parts	2. Metal Products
3. Food	3. Transp., Comm., Util.	3. Ships, Ship Repairs
4. Transp., Comm., Util.	4. Ships, Ship Repairs	4. Ordnance
5. Service Industries	5. Elec., Mech. Machinery	5. Elec., Mech. Machinery
6. Ordnance	6. Ordnance	6. Transp., Comm., Util.
7. Rubber, Leather, Glass	7. Food	7. Food
8. Textile Mill Products	8. Textile Mill Products	8. Rubber, Leather, Glass
9. Aircraft and Parts	9. Rubber, Leather, Glass	9. Textile Mill Products
10. Chemical Products	10. Chemical Products	10. Chemical Products
11. Apparel, Fabric Products	11. Petroleum, Coal	11. Petroleum, Coal
12. Paper and Printing	12. Service Industries	12. Paper and Printing
13. Lumber, Lumber Products	13. Paper and Printing	13. Service Industries
14. Ships, Ship Repairs	14. Apparel, Fabric Products	14. Autos, Auto Equipment
15. Petroleum, Coal	15. Mining	15. Apparel, Fabric Products
16. Mining	16. Autos, Auto Equipment	16. Mining
17. Autos, Auto Equipment	17. Lumber, Lumber Products	17. Lumber, Lumber Products
18. Other Transp. Equipment	18. Other Transp. Equipment	18. Other Transp. Equipment
19. Agriculture	19. Contract Construction	19. Agriculture
20. Contract Construction	20. Agriculture	20. Contract Construction

This order is, in general, consistent with three exceptions: (1) the Service Industries (mainly hospitals and laundries) are fifth in the number of establishments served but, because the average size was small, drop to twelfth place in number of employees and to thirteenth in number of supervisory certifications: (2) Aircraft is ninth in number of establishments but second in number of employees and first in number of certifications: (3) Ships and Ship Repair is fourteenth in number of establishments but fourth in number of employees and third in number of certifications.

Aircraft and Ships, together, account for only 6 percent of the total 16,511 units served by TWI, but for 20 percent of the employees and

25 percent of the certifications. The Metal Products group, in addition to being first in number of establishments and in number of employees, accounts for almost 10 percent of the total number of TWI certificates.

Geographical Concentrations

Five industrial groupings—Aircraft, Metal Products, Ships and Ship Repairs, Ordnance, and Electrical and Mechanical Machinery—account for half the TWI certificates. In these five industries the greatest volume came in concentrated areas. Although TWI worked with Aircraft plants in 34 states, over half the total Aircraft certificates of 286,171 were in five states:

California (largely southern California)	67,383
Ohio	28,024
Michigan	21,930
New York	20,325
Kansas	16,707
Total	154,369

In Metal Products, which appeared in 46 geographical tabulations, over half the 170,390 certifications came from the following states:

Ohio	36,947
Pennsylvania	31,851
Connecticut	13,467
Illinois	13,023
Total	95,288

Ship and Ship Repairs' 145,898 certificates were scattered through 33 states all along the coasts, lakes, and rivers, but half came from three states:

California (largely northern California)	39,789
Washington	20,287
Texas	13,646
Total	73,722

While Ordnance plants dotted the country (38 states), the volume as far as TWI work was concerned was concentrated. More than half the 136,822 certificates came from these states:

New York	14,958
Ohio	14,954
Michigan	14,419
Illinois	14,385
Indiana	9,817
Total	68,533

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The Electrical and Mechanical Machinery Industry, the fifth largest TWI group with 122,346 certifications, was served by TWI in 36 states but concentrated in the following:

New Jersey	15,819
Pennsylvania	13,906
Illinois	13,866
Ohio	12,765
Massachusetts	11,504
Total	67,860

Every industrial classification appeared in California, Ohio, and Pennsylvania.

Geographical Spread

The TWI geographical classification was for the 48 states and the District of Columbia and the Territory of Hawaii. None of the 20 industrial groups appears in all 50 of these geographical tabulations. The following show the highest spread of distribution:

Transportation, Communications, Utilities	49
Metal Products	46
Service Industries	46
Food	45
Rubber, Leather, Glass	43

The "textile belt" turned out to be a swathe as far as TWI was concerned—35 states—but North and South Carolina, Pennsylvania, Georgia and Virginia account for more than half the certificates.

Agriculture appeared in only 11 tabulations and generally excluded the mid-west farm states.

Size of Plants Served by TWI

Many generalizations have been made about the East as the home of the small plant, and much attention has been given to the tremendous size of some California plants.

TWI work did not follow this generally accepted pattern. In New Jersey TWI records show that 62 percent of the plants served employed less than 500 people, and that is actually 2 percent less than California. However, in California, when a plant was big it was *very* big indeed—the average number of employees in plants served by TWI in California is 1,227, against a TWI plant average of 736 employees in New Jersey.

Connecticut is another state frequently associated with small plants—in that state only 53 percent of the plants served by TWI were in the under 500 group. In Colorado, 80 percent of the plants served employed less than 500, in Oregon 79 percent, in Minnesota 77 percent, and in Washington 75 percent. Ohio was the only highly in-

dustrialized state where the percentage (65 percent) of plants employing less than 500 was higher than in California.

The Lumber group shows 75 percent in the under 500 group; Service Industries—65 percent; Food—63 percent; Apparel and Fabric Products—63 percent; Metal Products—62 percent.

In the group of plants of less than 100 employees there are some extremely high percentages in states where the total number of plants served is very small, such as 84 percent of South Dakota's 12 plant accounts. However, 48 percent of the Oregon plants served by TWI were in the less than 100 group, and more than 30 percent of the TWI accounts in Colorado, Hawaii, Minnesota, and Washington were in this smallest size group. Only 19 percent of Connecticut plants served by TWI were in this group although 26 percent of the New Jersey accounts were in this group. In California, 19 percent of the plants served by TWI employed less than 100. South Carolina served substantial numbers of plants, but none employing less than 100.

The highest percentage of establishments with less than 100 employees is found in Food Processing plants—22 percent; Service Industries (in this group the small size of such establishments as laundries counteracts such larger establishments as hospitals)—24 percent; and Autos and Auto Equipment (which largely means repair shops)—29 percent.

Three industrial groups stand out in the 1000 employees and over classification: Ships and Ship Repair—35 percent; Aircraft—33 percent; and Ordnance—32 percent. Two highly industrialized states have high percentages in the plants with 1000 and more employees—Rhode Island—26 percent; and Maryland—25 percent.

Distribution of TWI Certificates

From September 1941 until September 1942 almost all of TWI staff time was spent on the Job Instruction program. An attempt was being made to reach every supervisor in every war plant and essential service. Shortly after the Job Methods and Job Relations programs were introduced, TWI began to improve its basis of working with plants. As quality standards became higher, the number of plants served and the number of supervisors certified began to drop. Eventually, TWI service had to be virtually rationed. Job Methods reached one-fourth as many supervisors as received basic instruction in J.I., and Job Relations certification volume was one-half the J.I. figure.

*Changes in the War Production Picture**

TWI's approach virtually paralleled the general attitude toward war production. The October, 1945 War Production Board report states:

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After mid-1943, when military needs for some classes of goods were being fully satisfied, the period of production for quantity's sake came to an end. For the remainder of the war period, the major problems were in special items or materials—in what we later came to call the critical programs. These critical programs were constantly shifting; at one time or another they included a long list of common components (engines, turbines, electric motors and controls, friction and anti-friction bearings, valves and pipe fittings, heat exchangers, compressors, etc.), and such items as aircraft carriers, destroyer escorts, landing craft, synthetic rubber, aviation gasoline, many types of aircraft, tires, trucks, various classes of ammunition, attack transports and cargo vessels, and of course, the atomic bomb.

The peak of the munitions program was reached in the last two months of 1943. . . . Thereafter, the "capital goods" of war, such as guns and tanks, were in sufficient supply to permit cuts in total production while continuing and increasing output of the more desirable weapons. Ship production was still on the increase; output of the heavier, longer-range types of planes continued to rise; and expendable items, such as bombs and ammunition, were called for in increasing quantities (page 10).

This sharper focusing of TWI work has meant that, while more than 16,000 plants were served by TWI, 60 percent of them have used only one program, 22 percent have used two programs, 14 percent have used three programs, and 4 percent (slightly over 600 plants) have used all four of the TWI programs.

Trainers for the TWI Programs

Institute Conductors from the TWI districts trained 12,137 Job Instruction trainers, 4,726 Job Methods trainers, and 6,504 Job Relations trainers, or 23,367 in all. Of these trainers, 67 percent were industrial men who conducted sessions of the TWI supervisory programs only in their own plants; 17 percent were plant men who, in addition to serving as trainers for their own companies, also conducted sessions in other plants; 7 percent were members of government agencies who conducted sessions in their own agencies; 4 percent were vocational school people and employees of government agencies who conducted sessions in plants, and 5 percent of the trainers made the conducting of sessions at state compensation their full-time work.

INDUSTRIAL COVERAGE

TWI worked with plants which had to constantly expand to meet multiplied demands for explosives, guns, ammunition, aircraft, and ships—with industries which had to be built from scratch in order to supply synthetic rubber and high octane gasoline—with established plants which converted from automobiles to tanks, from carpets to tents, from mechanical pencils to time-fuses.

Work with each plant was different although approaches to management were standard and the programs all followed the manuals.

This was because the companies were different. Potlatch Forests, Inc. is engaged in lumbering, logging, and saw-mill work. For the supervisors of the 2100 employees at establishments at Coeur d' Alene, Lewiston, and Potlatch, Idaho, standard groups of 10 members are feasible—but the TWI programs are also being extended “to the woods.” John Shepherd, the training coordinator of Potlatch, is a qualified trainer in all the “J” programs and also is certified in Program Development. He was given special assistance by TWI for his problem of training logging supervisors on an individual basis.

Some sessions for the Kirby Lumber Company, the largest logging and milling company in the South, which operates over many hundreds of square miles in East Texas and Louisiana, were held right in the pine forest, with the blackboard nailed on a tree, the men seated on logs, and the trainer's equipment resting on a stump. In other companies, sessions were held in railroad cars and even in tents. Sessions were held on night shifts, on Sundays. Once, to meet an emergency, the entire 10-hour Job Instruction program was put on during one day for the technicians who were being flown the next day to the European theater to set up the first V-mail Service.

It is not possible to give a complete account either of extent of work in industries or of plants in an industry, but a few will be described as typical.

ATOMIC BOMB PLANTS

The development and actual manufacture of the Atomic Bomb was an example of scientific cooperation which crossed usual barriers, and also of just plain faith—faith that made people keep on working in the dark, when they didn't know and couldn't be told what they were doing, where they went along with someone who said, “This is important, but you'll just have to take my word for it.” It was not only the employees in the Clinton and Hanford Engineer Works who were mystified about just what was going on. Every service given them was on the known basis of “This is the top priority urgency”—but why, only a few people knew.

Clinton

TWI's Atlanta district was responsible for getting all four TWI programs in use in Clinton, and under conditions which just were not in line with standard TWI procedure. Prospective trainers in Job Instruction and Job Methods got their practice on phony jobs—they couldn't demonstrate their real work, so they assembled flashlights and hack saws.

There was no TWI quality control of trainers—outsiders were not admitted no matter how well accredited they were. TWI did not like

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this and TWI's national director protested that maintaining quality and coaching trainers were an essential part of TWI service, but after consultation with top officials of the operating companies decided to accept their statements that the programs were being followed and results checked. Some groups of trainers were, however, brought into Knoxville for quality meetings.

Program Development brought a welcome change of pace—the plant man said that, while his most important use of the P.D. method would be on secret production problems, he could work in the Institute on a real problem by taking one in the service area, where cafeterias and garbage disposal presented real problems. The whole job was elusive—TWI never knew whether it had done a good job in preparing trainers, whether trainers were really helping supervisors to acquire skill in breaking in new workers, in improving methods, and in working with people.

All of the five operating units at Clinton took part in TWI programs, and TWI records show these certification figures: 2,019 for Job Instruction, 217 in Job Methods, and 4,140 in Job Relations. These figures are the only figures that TWI has—results are official secrets—but project heads have said they do not know how they would have got along on their jobs without TWI. After the announcement of the Atomic Bomb, an in-plant, inside the wall, Job Relations Institute was held for the Union Carbide & Carbon project in September 1945.

Hanford

In early 1943 Seattle newspapers reported government purchase of 500,000 acres of land near Pasco, and later the construction of a gigantic war plant was reported. After four calls at the projected Hanford Engineer Works, arrangements were completed for a Job Instruction preview for 25 executives. This resulted in the hiring by this du Pont subsidiary of several people to be included along with assistant superintendents in a Job Instruction Institute. In all, seven Job Instruction Institutes were held (resulting in 2,720 supervisory certifications), four Job Relations Institutes (887 certifications), and two Job Methods Institutes (308 certifications). Four company men later were trained in Program Development.

At one time Hanford had more than 51,000 employees, and most of the production supervisors came from the construction staff where the TWI work first began. At the same time TWI worked with the Olympic Commissary which took care of all meals and housing for Hanford. Olympic certifications were: J.I., 434; J.M., 256; J.R., 290; P.D., 2.

During the construction period TWI was given reports of decreases in break-in time, but after Hanford went to work on the Atomic

Bomb, reports understandably stopped but executives continued to tell TWI that results kept on coming.

As in Tennessee, the usual intimate in-plant contacts and actual TWI knowledge of results just did not exist. But top du Pont management at Hanford assured TWI that "production has been going along extremely well and that training is an everyday responsibility of the various superintendents of the isolated production plants," and also stated that Job Relations "constituted a frontal assault on some of the most perplexing problems of manpower utilization."

Allied Projects

TWI worked with many of the other contractors who were tied into the development of the Atomic Bomb as part of the "Manhattan District."

For some time the U. S. Vanadium Corporation, a subsidiary of Union Carbide, has mined and processed vanadium ores from mines in the area of Rifle and Uravan, Colorado. The ores contain uranium, an important element necessary in the development of the Atomic Bomb. Three processing plants were erected at Grand Junction, Uravan, and Durango, Colorado, operated by the U. S. Vanadium Corporation as contract accounts. Total employment in all operations reached approximately 1,000 employees. Urgency for the product became more and more vital. Time was all-important and it became necessary to make the best use of all personnel and facilities.

Some basic training in J.I. was given in 1943, before the government became vitally interested. Follow-up on the program was neglected, resulting in only nominal benefits. In August 1944, this company was given a double A priority as a part of the Manhattan District program. The WMC Regional Director and Regional Training Chief referred this account to TWI for complete service.

During the period from August 1944 to May 1945, in-plant trainers were developed in the "J" programs so that complete coverage on basic training could be given quickly in spite of the scattered installations. Thirty-day summaries and evaluations of the "J" programs were made by the company executives for the purpose of obtaining overall results. Such a summary of Job Methods results for the month of April revealed total benefits to the extent of \$11,165 as verified by company records. Coverage on basic training is: J.I., 117; J.R., 94; J.M., 96. Three men were certified in Program Development.

AIRCRAFT

The rapid expansion of aircraft plants was perhaps the most amazingly satisfactory occurrence in all the history of war production. TWI districts served nearly all the aircraft plants and many revisions

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of TWI "J" programs were tried out in the aircraft plants since they were the real examples of "new, rapidly expanding plants."

Northrop

Before 1941, Northrop Aircraft, Inc. of Hawthorne, California, was little known in aircraft production, being engaged primarily in engineering and developmental work. It became, however, one of the major contributors to the war effort producing the P-61 "Black Widow" night fighter and building the "Flying Wing" Army bomber. At peak production it employed 10,000 people.

Job Instruction Training, beginning in the fall of 1942, was given to 1,241 supervisors of all levels. By February 1944, as a result of consistent coaching, Northrop was experiencing such plant-wide results as: production increased, 17 percent; break-in time reduced, 22 percent; rejections reduced, 12 percent; scrap reduced, 27 percent; injuries reduced, 45 percent. The reduction in injuries enabled this company to receive the Department of Labor Safety Award. The Safety Engineer gives Job Instruction the major credit for this accomplishment.

Job Relations was given to 906 supervisory personnel at all levels. Results were not as good as expected. Northrop was never satisfied with the acceptance of its follow-through plan. However, the management feels something was accomplished: grievances reduced, 2 percent; and absenteeism reduced, 17 percent. Job Relations cannot be given full credit for the reduction in absenteeism as Northrop had the lowest rate of absenteeism of the airframe manufacturers on the West Coast from April 1942 to June 1945.

Job Methods was the last of the "J" programs introduced to the personnel of this company, being started in May 1945. The experience gained with the other TWI programs was used to good advantage in establishing a procedure for handling Job Methods proposals. Due to cutbacks in production schedules, the savings from many of the improved methods will not now be fully realized as they were based on six months' operations, but the value of improving Job Methods has been proven to management even in the short period of time this systematic method of improving jobs was used.

The results reported were attained through the insistence of management as represented by President John K. Northrop. This active management support was generated and sustained by reports of production and cost factors. An interesting feature of this company's operation of TWI programs was that these reports were filled out by each lead-man and reviewed, commented upon, and forwarded by his supervisor. Such reports from the "front line" of production enabled management to give recognition and take corrective action where need was indicated.

Bell Aircraft

The Bell Aircraft plant near Marietta, Georgia, is the Southern Division of the Bell Aircraft Corporation of Buffalo. The product is the B-29 super bomber and the plant is known as the largest aircraft plant under one roof in the world. The entire plane structure is fabricated and assembled in the one plant. Rickenbacker Field, with complete airport and hangar facilities located near the plant, is operated as an auxiliary service. Finished planes are flight-tested and, during the war, were flown directly to combat areas or modification points. The production quota was raised several times but in every instance was met with a fair margin. An average employment of approximately 25,000 workers was maintained.

The first service extended to the plant was Job Instruction. A total of thirteen trainers were certified in order to provide Job Instruction to 2,286 supervisors. Representatives of top management have definitely stated that this program has materially assisted in maintaining production schedules.

Job Relations was inaugurated in November 1943. Nineteen trainers were certified and 2,027 supervisors received the basic training. Top management has often stated that the Job Relations program has not only solved a great many problems, but has also prevented many of them from coming up.

Early in October 1944, the Job Methods program was put into operation. Nine trainers were certified, and 544 supervisors were certified. The results of the Job Methods program have been outstanding in that several specific departments have been brought up to scheduled production in a limited period of time.

The plant training department was reorganized with the definite objective of directing all training services toward specific production problems and representatives from the production and training departments participated in a Program Development Institute.

SHIPBUILDING

Many shipyard managements have said that the Job Methods, Job Instruction, and Job Relations programs were material factors in the country-wide spectacular reductions of work days from laying the hull to commissioning the ship. (See reports of shipyard results in Chapter 7.)

The savings made in shipyards as a result of a single Job Methods improvement frequently ran into sizable sums, but perhaps more important are the small improvements in one yard which were adopted by other yards, thus multiplying the small saving many times.

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Shipbuilding Publications

In 1941 and early 1942 while shipyards were expanding, TWI prepared and distributed illustrated booklets to show shipyard management how training of new workers could be done in the specific crafts of electrical work and welding. In 1941 TWI called a national conference of shipyard training heads to appraise shipyard job training needs and to crystallize an orderly approach to help the yards set up the training facilities they needed. The result was the issuance in 1942 of a national code entitled *Basic Principles in Establishing Production Training in Shipyards* which was endorsed and promoted by the Maritime Commission.

Missouri Valley Bridge & Iron

The Missouri Valley Bridge & Iron Company, at Evansville, Indiana, was given a contract to build LST ships at a point fifteen hundred miles from the sea in a locality where 98 percent of the employees had no idea about this kind of work. All eight hundred supervisors were given training in all three of the TWI supervisory programs. Every supervisor, after having been trained in Job Methods, was required to make a systematic analysis of each operation in his charge. When every job in the entire process of building a ship of a given type had been studied for possible improvements, the improvements were incorporated in new job directions, and production then proceeded according to that pattern. This was repeated for each type of ship.

In all of the honors heaped upon this shipyard, they generously divided the credit with TWI, saying that it had contributed greatly to whatever success they had achieved. One of the company officials said that in a single contract for the construction of 60 LST's, TWI was responsible for a saving of \$1,500,000.

Marinship

Marinship Corporation at Sausalito, California was one of TWI's long-time big users. Their employment at its peak was 17,000. They used all 4 programs having certified 2,054 in J.I., 1,436 in J.M., 1,699 in J.R., and 1 in P.D.

Coverage

The Training Within Industry programs were used by shipyards on all three coasts as well as by inland yards—from Richmond Shipyards on the West Coast to Bethlehem yards on the East Coast, and

homes to get into production in a fraction of the time that would otherwise have been necessary. An outstanding record of reduction in grievances and turnover and of promoting cooperative effort generally has been attributed to the use of Job Relations.

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from Tampa Shipbuilding Company on the Gulf of Mexico to the Dravo Corporation on the Ohio River near Pittsburgh and Manitowoc yard on Lake Michigan.

SERVICE TO RAILROADS

TWI districts from Chicago westward concentrated staff resources on the western railroads as their contribution to the concerted drive that began July 7, 1945. At that time Selective Service, the War Department, the Production Executives' Committee, and the War Manpower Commission joined in a special manpower program for western railroads. Primary emphasis was given to the recruiting and placement of experienced railroad workers, including men furloughed from the armed services and those allocated through special deferment measures. TWI work paralleled this intensive drive by swinging a large part of its organization to the giving of intensive assistance to the railroads.

During this railroad drive, R. E. Woodruff, President of the Erie Railroad, personally urged the use of TWI programs in many of the railroad companies. His conviction of the worth of these programs was based on his own long experience with them. Since 1942 the Erie Railroad had made extensive use of TWI with a coverage extending from one end of the system to the other. Over 4,000 certificates have been awarded to supervisors completing TWI programs.

While decision to adopt TWI programs was usually made at the railroad headquarters, the service cut through states across the country. For example, work with the Missouri Pacific System stemmed out of St. Louis with activity in Kansas City, Little Rock, and Houston. Santa Fe use of TWI programs began in the Amarillo, Texas division point but became system-wide. The Pullman Company's nation-wide use of the TWI programs, of course, affected the western railroads.

Long before the Western Railroad drive, the Chicago office had been working with railroads and had found that certain selling points were of particular interest to railroads—safety, relations with Brotherhoods, transferring workers among departments, and improved public relations ranked along with decreased break-in time in getting management attention.

In the east, there was also much service to railroads, such as work with the New York, New Haven & Hartford stemming out of TWI's New Haven office; work with the Delaware, Lackawanna, and Western, stemming out of New York; and the Cleveland district responsible for inaugurating the system-wide program of the Erie Railroad.

Chicago & Northwestern

In January 1944, TWI approached the accounting department of the Chicago & Northwestern Railway. C. L. Dennis of the Brotherhood of Railway Clerks was present when the Job Instruction program was presented to management and added his endorsement, later saying that adoption of the TWI programs was the most constructive action taken by the company in twenty years, and that after supervisors had had Job Relations grievances virtually disappeared. By February, Institute training was provided, sessions were started, and on-the-job coaching under way.

In March, TWI discussed Job Instruction with the President, R. L. Williams and, following this, C. A. Ruckmick (the J.I. coordinator) was named Supervisor of Training. Following middle management meetings in May, the program was spread to other divisions. Two Institutes were held for this railroad, and those trainers have certified 387 in Job Instruction. Job Relations was launched in September 1944, and, again, two Institutes were held, resulting in the training of 222. Job Methods began just before the end of TWI service in September 1945.

Pullman

At the request of the President, David A. Crawford, all TWI program activity within the Pullman Company was administered and handled by the company's headquarters at Chicago, with Harry Guilbert, Director of Safety and Personnel, in direct charge. Arrangements, schedules, and other activities having to do with the Pullman program operations in any TWI district were initiated at Chicago, and cleared with the Chicago TWI district office.

The Pullman Company has 75 in-plant trainers, developed in Chicago Institutes, for the three "J" programs. These trainers were sent to Pullman branches, but in a few remote or small Pullman installations TWI districts were asked to supply trainers. Over 5,000 certificates in the 10 hours of basic instruction were given to Pullman supervisors.

New York, New Haven, and Hartford

TWI programs have been used in the New York, New Haven, and Hartford Railroad since November 1943, starting with Job Instruction (1330 certifications); Job Methods in October 1944 (313 certifications); and Job Relations which was undertaken shortly before TWI field operations ended. In May 1945, the railroad estimated that it had then invested 11,770 supervisory hours in attendance at training sessions (and TWI had given 800 hours to serving them), and that 28,710 more hours would be put in.

Louisville & Nashville

Cincinnati's work with the Louisville & Nashville Railroad began in November 1943 with a call on J. B. Hill, President, who at once remarked that TWI looked like a way to avoid having supervisors reach limits beyond which they could not be upgraded. The Job Instruction program was started in the Louisville locomotive and car repair shop where 4,000 of the system's 35,000 employees work. Duane Gorman, who was then apprentice instructor, became a certified J.I. trainer. For 334 supervisors he has held groups in Louisville, DeCoursey, Corbin, and Ravenna, Kentucky; and in Nashville, Birmingham, and Mobile. These are the major shops in servicing equipment for 5,000 miles of road.

Railway officials and the safety director credited TWI with a five and one-half months' no-accident record in Louisville. Before J.I. there had never been a month without one accident at least. Mr. Gorman became a J.R. trainer in August 1944. Following the same schedule, 330 supervisors were trained. Mr. Gorman began Job Methods in June 1945 and by August had reported 216 certifications.

CONVERSION OF THE AUTOMOBILE INDUSTRY

In 1941 and 1942 the conversion of the automobile industry, the pros and cons of airplane contracts for motor car manufacturers, and the use of automobile engines in tanks were subjects about which everyone had an opinion. The magnificent record made by the automobile industry in adapting their mass production, assembly-line techniques and that of its suppliers is now a matter of record.

Detroit Experience

The Ford Motor Company was the Detroit district's first big account. Today the company has qualified Institute Conductors on all four TWI programs. Some of the finest results of the district have come from this Company, where certifications have been as follows: J.I., 5267; J.M., 2873; J.R., 1907; and P.D., 1.

TWI programs did not get started in the Packard Motor Car Company until March 1945. All three "J" programs now are in operation at Packard and top managers have had basic instruction in all three. Other training programs have been discontinued but the TWI supervisory programs, directed by the Program Development problem approach, are firmly entrenched. TWI was able to train for Packard, men from their own staff as Institute Conductors so that the programs can continue to reach new people. When the Detroit district closed, Packard certification figures had reached 300 in J.I., 280 in J.M., and 150 in J.R.

Chrysler also has its own Institute Conductors in all four programs in order to continue their extensive work which already has the following coverage: J.I., 2,119; J.M., 846; J.R., 1,666. Chrysler also has a P.D.-trained man.

ORDNANCE

Among the numerous ordnance plants served by TWI was the New River Ordnance plant of Hercules Powder Company where the safety director and one of the superintendents became J.I. trainers in the fall of 1944 and gave the 10-hour program to most of the supervisors. In January 1945, there was a bottleneck on the flash-reducing lines and at the request of WMC, TWI returned to the plant to help the new training director to get supervisors to really use J.I. The "charges" were so essential they were being flown to European battlefields.

A new unit or "house" employing twenty-five people was being opened, and it was decided to check the effect of training on production. Six similar houses had been in operation for periods of from one to five months. These houses were turning out an average of 300 charges per shift. At the end of the first week, house No. 7 produced 300 charges, whereas it had taken the other six houses several months to reach that level.

The company prepared all of its own materials for J.I. and truly made it a company program. Break-in time was cut in half, production went up, and rejects were reduced. The New River plant had gone down to 300 people in the summer of 1944; by January 1945, it was over 4,500, and eventually reached a peak of 5,500 employees. It was closed immediately after V-J Day. There were 270 certifications in J.I., 88 in Job Relations which was launched in June 1945, and 13 in Job Methods which was started in July. The programs were constantly publicized in the plant paper, and top management kept supervisors alert by requiring a monthly report in terms of scrap, break-in time, absenteeism, safety, and production.

TEXTILES

When tire cord and cotton duck were placed in the "must" category, the Bureau of Training of the War Manpower Commission organized an intensive drive to provide specialized training services to these plants wherever needed. In view of the emergency nature of the program, special efforts were made to apply training techniques which would produce quick results. Among the training programs which proved to be effective in immediately meeting the current situation were extensive application of Job Instruction, Job Relations, and Job Methods.

productive worker a way which will both turn out more work and, in the plants where this particular technique was developed, increase the individual worker's earnings.

Cannery managements and TWI field men on the West Coast jumped the gun in 1945, getting started before the season started. A bigger and better job of training for the high priority seasonal food processing industry was done in 1945 than was accomplished in 1944. It also reflected a change of management attitude in that management was more receptive toward (in most instances anxious to get) TWI services and became interested in sound procedures of planning to obtain maximum operating results from the use of those services.

This pre-season activity was due to two developments in the use of TWI services in 1944. First, correct instruction of workers through TWI trained foremen and forewomen brought the workers to full earning power quickly and greatly reduced turnover among new workers during their first week or ten days on the job. Second, most cannery operations were found to be readily simplified or improved through the Job Methods technique. Management realized that in order to get the best results from the J.I. and J.M. programs, all supervisory personnel should be retrained or trained prior to the opening of the 1945 season.

Canners' Association

During February and March of 1945 the New York State Canners' Association sent out letters to practically all the canning industry in Northern New York where one or more of the TWI "J" programs had been used, recommending early activity and offering to act as intermediary in TWI contacts. In Pennsylvania, canners speeded up the launching of J.M., which lagged somewhat there in 1944.

Tangible Results at Bozeman

The production superintendent of Bozeman Canning Company (40 percent of their total pack at four plants went to the armed forces) has reported that in the 1944 season, hours equivalent to 6,850 man days were saved through Job Methods (over 10 percent); production increases ranged from 5 to 10 percent; one plant saved 1,000 gallons of fuel oil.

Value That Cannot Be Measured

The Minnesota Valley Canning Company at Le Sueur, Minnesota, operates seven food processing and canning plants in southern Minnesota, with over 6,000 employees. All plant superintendents and supervisors, numbering 192, were put through Job Instruction, Job Methods, and Job Relations Training. Soon after the 10-hour ses-

sions were completed a thorough follow-through plan was put into effect under the supervision of the production manager. The coordinator and plant superintendent received individual coaching. The result was a remarkable overall improvement in production, but the Company values even more the experiences of which the following is typical:

A supervisor in one of the plants had been quite concerned with the disorganized manner of operations during the off-season periods. Upon going through the "J" programs he acquired not only the ability to do something about it but the courage to go ahead with his proposed outline of various employees' duties, responsibilities, etc. He submitted his plan to the superintendent, who in turn consulted executive management. With very few changes, the outline was accepted and is now in use. This particular plant is now rated as the one most efficiently operated, and the company plans to put into effect similar plans in all of its plants.

Swift & Company's National TWI Program

Some companies with many branches decided to operate the programs from their headquarters. This occasionally meant that a district was swamped by demands for service. Three Job Relations Institutes were held simultaneously for Swift & Company in Chicago. In cases like this, other districts and Headquarters Representatives helped. In all, 20 TWI districts worked with 138 Swift establishments, resulting in basic instruction for 3200 supervisors in Job Instruction, 1978 in Job Methods, and 2338 in Job Relations.

Prisoners of War

There are many instances where the Job Instruction program has been used in difficult situations such as the training of German prisoners of war. In upper New York state, job breakdowns according to TWI were made and then translated into German in order for them to be used in the training of the P.O.W.

In an Indiana packing plant which had to increase production of boned meat, a night shift of eleven German prisoners was added. Through the use of Job Instruction and an interpreter, the skill of boning was passed on to these prisoners. As a result of this training, within three weeks' time the eleven prisoners were boning 105 cattle per night, against the record of the sixteen day-shift oldtimers who boned 200 animals per day.

OIL IN TEXAS

TWI served many petroleum companies. No picture of Texas operations, of course, is complete without considering oil, the "black gold" of the Southwest, and the story of the Texas Company's use of the TWI programs is outstanding. Following a preview meeting of

the Job Instruction program attended by top and middle management of the Texas Company Refinery (100-octane gasoline), Port Arthur, in October 1943 this program was started with an Institute. The company's trainer brought this program to 1,511 supervisors in this large refinery which has an average employment of 4,800. Long before this job was completed Frank Wallace, Works Manager of all Texas Company plants in South Texas, and Douglas P. Bailey, General Superintendent of Port Arthur Works, insisted that an operating plan for continuing use be developed.

Operation of their plan has resulted in every one of the almost 5,000 employees being listed on departmental timetables. A recap of timetable information indicates the progress of each employee, the number who can perform each operation in the department, and the number who are prepared for jobs in the next department to which they would normally advance. Over ten thousand job breakdowns have been made with sufficient copies so that they are readily available to all levels of supervision. Supervisors are constantly being coached in preparation and checking of timetables, job breakdowns, and use of the 4-step method. Basic instruction has been completed in all Texas Company refineries in Texas and operating plans for continuing use are in operation.

The tangible results from one department of the Port Arthur Works is indicative of results already obtained in other departments and plants. Before Job Instruction was given to supervisors in the manufacturing department, plant management says that instruction was given in a haphazard manner. There was no definite method used in breaking-in new employees. Since Job Instruction was put on a continuing use basis early in 1944, the following results have been obtained:

	Percent
Manufacturing costs reduced	20
Accidents resulting in lost time reduced	75
Minor accidents reduced	20
Break-in time reduced	40
Scrap and rework reduced	20

Texas Company Approach

A preview of the Job Relations program was presented to Messrs. Wallace, Bailey, Moser, Hechendorf and the Superintendents of the Refinery Division on one of the Company house boats on Sabine Bay in September 1944. This program was adopted by management and basic instruction started in accordance with a plan probably unique in American industrial life. Supervisors of the Port Arthur Works and other South Texas plants were invited in groups of thirty to attend a week's conference at the elaborate Galvez Hotel, on the beach of the Gulf of Mexico at Galveston.

The first three days of the week were devoted to a conference on supervisory responsibilities led by B. H. Anglin of New York, national Industrial Relations Director for the Texas Company Refinery Department. The final three days of the week were devoted to the standard J.R. program conducted by outstanding J.R. trainers from all parts of Texas. In some cases the Texas State Department of Vocational Education paid these men. In other cases managements of other companies loaned their trainers to the Texas Company. This program was scheduled for successive groups for nine weeks but its success was such that management extended it an additional seven weeks. During this latter period an Institute was conducted for eight Texas Company trainers. An operating plan is in effect, including the use of a form based on the 4 steps which must be used with all problems referred to higher levels of supervision. Recommended action is included on this form.

Program Development got under way in the Refinery in August 1945.

Under the sponsorship of R. B. McLaughlin, Vice President and Manager of the Texas Pipe Line Company, the Job Instruction program was started in this company in May, 1943 when ten company trainers successfully completed an Institute. These men and trainers from other Institutes brought the program to 987 supervisors scattered over a tremendous territory in eight states. A Job Relations Institute was held for the Pipe Line Company in August 1945.

TWI SERVICE TO PUBLIC UTILITIES

Crowded war centers caused heavy, growing loads on public utilities. The Detroit Edison Company, with a peak employment of 5,322, was given extensive service by TWI which certified 1,064 supervisors in J.I., 445 in J.M. and 1,168 in J.R. Georgia Power Company has used TWI in 25 installations and has had 707 supervisors certified in J.I., 141 in J.M., and 177 in J.R.

Michigan Bell Telephone Company of Detroit has 140 supervisors certified in J.I., 111 in J.M., 813 in J.R. In addition, in operations outside Detroit, 757 supervisors have been certified in J.R. In Union Job Relations, 300 stewards have been certified. The Chesapeake & Potomac Telephone Company has used the "J" programs extensively in the three states in which it operates—Maryland, Virginia, and West Virginia. There have been 1,423 certifications in J.I., 551 in J.M. and 740 in J.R.

COAL

Pittsburgh Coal is the largest producer in Pennsylvania; it has some 8,500 employees, 10 major mines, and some 12,000,000 tons of

production annually. Because it was the largest coal operator in the state, the Pittsburgh District Office early sought to install the "J" programs. In 1941 and 1942, 249 of the Company's supervisors were given basic training in Job Instruction. The Job Relations program became available early in 1943 and the Company's officials adopted the program promptly; 336 supervisors at 9 different operating properties were given the basic training. According to reports from Company officials, these programs aided materially in getting new workers up to production in minimum time and effected a major decrease in management-labor friction evidenced by a reduction in grievances.

Applying Job Methods Underground

At the close of the Job Relations program, TWI representatives attempted to sell the Job Methods program to the Company, but the invariable answer was that "Job Methods may work in a steel plant but it would not apply to coal mining operations underground." However, the staff persisted and got a courteous hearing on each call because of the results produced by the J.I. and J.R. programs.

The industrial relations manager agreed to check data with other mining outfits. He became sold on J.M. possibilities and agreed to arrange, with the approval of the production manager, for a preview of the program in February, 1945. Some twenty top production officials attended this preview—three days later management adopted the program. Under the company's plan, the overall program was to be headed up by the production manager with the superintendent of each mine directly responsible in his own operation. Four men were sent to an Institute and subsequently gave the basic training to 306 supervisors.

Because of official sponsorship and a fine set-up for the clearance of proposals, the program produced many important improvements in the mines. An improvement approved at any one mine is immediately cleared through a coordinator so that all of the other mines immediately get the benefit of the improvement. Results like the following are typical: 60 percent labor saving in construction of a road; freed 2 men out of 4 in rock-dust unloading; 63 percent of time required for handling war bonds saved; handling 20 percent more coal per day through new method of spotting cars.

Because of good results, the program was installed in the home office of the company in Pittsburgh, and 62 supervisors were trained.

Safety and Coal Mines

An eastern Pennsylvania coal company had used Job Relations but just would not accept Job Instruction—what they wanted was a safety program. The officials changed their minds, after a time table

showed the jobs on which miners were not qualified, and a breakdown was made of a dangerous job into steps and "hazards" (rather than just plain key points). Other coal companies became interested when they saw the application to safety, and in all over 1,100 supervisors have been certified in the Philadelphia & Reading Coal & Iron Company, the Pennsylvania Coal Company, and the Susquehanna Coal Company.

NAVY SECRET PROJECT

When in the summer of 1944 McQuay Norris began operation of a St. Louis plant making secret Navy communications equipment, TWI offered its services. The Job Instruction program got under way in January, 1945 with 10-hour sessions for top and middle management. The company's own trainers gave basic instruction to 330 supervisors, and the plant has kept the importance of J.I. constantly to the front. When the program started there were 1,500 employees in the manufacturing department. In four months it had grown to 2,700. Because no transfer between departments was permitted, whenever there was a vacancy on a production line the line was held up until someone could be trained. Lead-girls now use job breakdowns and instruct by the 4-step method, with the result of cutting training time to 30 minutes from the previous 4 to 6 hours needed to get into full swing.

Job Relations was started in April, and 217 supervisors received training. Since the nature of the work has meant absolute departmental separation, three men received P.D. training in order to have this method used on all work.

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Chapter 10

USE OF TWI PROGRAMS OUTSIDE AMERICAN INDUSTRY

In addition to the almost two million certificates given by TWI to supervisors in American war plants and services, TWI trained Institute Conductors who are responsible for over a half million certificates issued by other groups:

	<i>J.I.</i>	<i>J.M.</i>	<i>J.R.</i>
Army Service Forces	150,000	75,000	100,000
Civil Service Commission	67,000	26,000	20,000
U. S. Department of Agriculture	11,000	10,000	4,000
Social Security Board	1,800	7,200	800
Department of Labour, Canada	55,000	14,000	12,000
Ministry of Labour, England	15,600	240	2,000
Total	300,400	132,440	138,800

TWI PROGRAMS IN THE ARMY

Early in 1942 Brig. General Frank McSherry was anxious to get help for the Watertown, Watervliet, and Rock Island Arsenals which had many problems due to the rapid expansion which was taking place in these organizations. At that time there was considerable discussion in Army circles as to the advisability of setting up a training center for these arsenals. The Job Instruction program was introduced at Picatinny Arsenal in March 1942 and the reaction was so favorable that in April the Office of the Chief of Ordnance in Washington began the introduction of J.I. into other Services of Supply establishments.

In May, 1942 the Quartermaster Corps had assembled 93 officers and officer candidates for intensive training at the New Cumberland Supply Depot in Pennsylvania. The problem concerned shipping of badly needed medical, food, and clothing supplies. The schedule was already "filled," but the Quartermaster Corps wanted Job Instruction. Accordingly, over Memorial Day weekend, a Philadelphia TWI staff member and nine trainers loaned by Philadelphia, Harrisburg, York,

and Lancaster industries put on simultaneous 10-hour Job Instruction sessions, fitted into evenings and Sundays of the "holiday" weekend.

In June, James P. Mitchell, (who had been a member of the original TWI Headquarters staff) Director of Civilian Personnel of the Army Service Forces (at that time the Services of Supply), consulted TWI for concrete aid in the arsenal problems as well as overall needs.

Subsequently, General Brehon Somervell issued Administrative Memorandum No. 24, dated August 18, 1942, which stated:

The responsibilities of supervisors have been studied with respect to the basic skills of *how to instruct, how to lead, and how to manage the technical aspects of their jobs*, and fundamental training programs of ten hours each have been developed under the names of "Job Instructor Training," "Job Relations Training" and "Job Methods Training" by the Training Within Industry agency of the War Manpower Commission.

The above mentioned agency, composed of the foremost training specialists in the country, has built up a nation-wide organization of more than 3,000 competent, experienced trainers, who have given the 10-hour program of Job Instruction to over 160,000 supervisors and key men. Arrangements have been made to utilize the experience and knowledge of this organization in supervisory training programs for all Services of Supply executives and supervisors within the United States.

In addition, General Somervell issued Circular Letter No. 45, dated August 19, 1942, in which he set up the working agreement between Training Within Industry and the Army Service Forces.

When the program was thus planned it was thought that there would be sixty thousand supervisors to train and that the Job Instruction program could be completed by December 1942. At one time, it was discussed as to whether the Army Service Forces would furnish their own trainers to be trained by TWI or whether TWI would furnish the trainers. It was finally decided that TWI would put on the 10-hour sessions. The rapid growth of the ASF and turnover in supervisors has meant that basic training in this program is still continuing, although the program is now handled by Army trainers who were prepared by TWI.

TWI's Largest Assignment

In September 1942, TWI sent to all of its field staff some descriptive material about the Army Service Forces, to give them an idea of the size of the job and to show them how TWI Headquarters was handling its part of the job. In Washington appreciation meetings were held for the top ranking officers for each service. These are the Office of the Quartermaster General, the Office of Chief of Ordnance, the Office of the Chief of Chemical Warfare Services, the Office of the Chief of Engineers, the Office of the Chief Signal Officer, the Office of the Surgeon General, and the Transportation Service.

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Each of these service divisions operates in the field. Therefore each district was responsible for working with these seven separate agencies. The service command was divided into 9 areas.

The Army Service Forces is the Army's supply and administrative arm. It is necessary to picture the world's largest manufacturer, merchant, supplier, transportation service, contractor, and storage company all unified under one control in order to get a picture of the ASF during wartime. This is the service which feeds, clothes, houses, and equips the Army. It devises and produces the weapons of war, it transports the Army and its supplies, and operates its communications. It builds the roads, and bases and repairs them. It makes the gases that are used in chemical warfare. It handles payrolls for the Army, attends to its medical needs, supervises religious observances, carries the Army mail, does all of the paper work, provides recreation for the troops, sells the soldiers cigarettes at low prices at post exchanges, and maintains the military police.

ASF also had an important role in the procurement and handling of military supplies for the British, Russians, and Chinese under Lend Lease arrangement. ASF services and repairs tanks, guns, and combat vehicles in action. ASF includes everything in the Army except the Ground Force command and the Air Force.

ASF in Washington

In Washington, D. C. where, at that time, there were some 8,000 civilian supervisors in the ASF, it was planned to put on several Institutes with personnel selected from various government agencies who would be loaned to the War Department to conduct the sessions, since there were no trainers available in Washington. Due to considerable difficulty in lining up suitable personnel for the job and to the fact that General Somervell's directive stated that the supervisors in the ASF should receive the basic ten hours of Job Instruction by December 30, 1942, it was found necessary to bring in from industry and TWI districts sufficient trainers to conduct the 10-hour sessions.

Industrial Assistance

TWI Headquarters brought in 117 trainers for 10-hour sessions held in Washington from 59 companies, 13 government departments, 12 TWI districts, and 4 state education or college groups. The company people were borrowed directly by TWI Headquarters from the presidents of their organizations and served anywhere from one to eight weeks, putting on either two or three groups a week in Washington.

Too much cannot be said in praise of industry in general and the personal work of the trainers loaned by industry to carry out this assignment. It was a unique experience for the individual, and it

performed a very valuable service to the government in time of a great need for that service. At the end of December, 1942 these trainers had conducted 684 sessions for various branches of the ASF and had certified 7,125 supervisors.

The District Job

At the same time, in the districts many military establishments were following General Somervell's directive and having sessions conducted by TWI in the local areas.

The southeastern section of the country had an unusually large proportion of Army installations. Therefore, the Atlanta staff had to be greatly increased. Half of TWI's staff time in the Atlanta district had to be given to this Army service but through it the story of TWI filtered back into industry.

ASF Responsibility

The Job Relations and Job Methods programs were later made available to ASF. In the beginning of 1943 Training Within Industry felt that it was time to help the Army Service Forces to carry on its own training in line with the philosophy emphasized for industry. Plans were made whereby Training Within Industry Headquarters staff members conducted Institutes to develop trainers for the ASF. This was done periodically as needed throughout the first eight months of 1943.

It was agreed that until ASF was able to carry the load TWI would continue with quality control. By June 30, 1943, 82,820 were certified in Job Instruction, 1,272 in Job Methods, and 26,933 in Job Relations. By the end of August when ASF took over the handling of the programs, another 5,000 had been added to the total.

ASF Reaction

General Somervell stated before the House Civil Service Investigating Committee on June 15, 1943, the following with regard to supervision and personnel in the ASF:

The War Department, in the production plants under the ASF, was faced with the same emergencies in plant and personnel expansion as those which bothered private industry. It was apparent at once that poor or inadequate supervision meant inefficient workmanship and unsatisfactory production schedules. Borrowing the invaluable aid of the Training Within Industry Division of the War Manpower Commission, we inaugurated a program of Job Instructor training courses for ASF supervisors, both men and women. Let me say a word of appreciation, at this point, of the constructive services rendered in this task by the TWI. Like 10,000 or so operators in private industry, we were happy to take advantage of it. . . .

Up to the present time, the ASF has given the Job Instructor course to approximately 75,000 supervisors, as a result of which the breaking-in time

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for new employees has been appreciably reduced. The other courses are now being applied. Equally good results are to be expected. . . .

These courses are by no means restricted to civilians, although most of them are taught by civilians. At the Seattle Port of Embarkation recently, the Commanding General and eleven Colonels enrolled in the Job Relations training course and are "going to school" regularly with Second Lieutenants and civilian supervisors and foremen. I say with utmost sincerity, democracy is working in this Army. Moreover, none of us is too old or too important to learn.

Office Versions

TWI consulted with the Civil Service Commission in making an adaptation of Job Methods for office work. This was used with the ASF supervisors in Washington, as well as with Civil Service organizations.

ASF Films

When the Army Service Forces prepared to run the TWI program on their own, they developed sound slides which they have used in the actual group training meetings. These films have been available to TWI and considerable use has been made of them for promotion or as an interest-getter in review sessions. TWI served as consultant in the making of these films, but does not approve of the use ASF has made of them in the actual 10-hour sessions where they take up some of the time allotted for supervisory participation and practice. An individual acquires skill only through practice.

Program Development for the Army

In early 1945, the Ordnance Department of the Army held a series of conferences across the United States for all of its training directors. TWI loaned the head of Program Development in the Indianapolis district to handle the training in the P.D. method.

Honolulu Service

In Honolulu, the Army was the district's largest customer. Hawaiian Air Depot, Hickam Field, Hawaii, had 5,552 employees with 943 supervisors doing maintenance and repair of all aircraft for the Army Air Forces, Hawaiian Department. The staff for TWI programs grew from one Job Relations trainer to eighteen trainers.

Job Relations started in January 1944 and 1,108 supervisors were certified. The results can be briefly summarized by the statement made by the General Superintendent, "Our problems were many with the great influx of mainland employees, but with the pattern set in Job Relations supervisory training we managed to work more with the individual to overcome a great many of their problems, thereby increasing the efficiency of the Depot."

Job Instruction started in May 1944 and TWI certified 1,885 supervisors and journeymen. This program led directly to an on-the-job training program covering the entire depot using the method set forth by Job Instruction. In one unit the average time for a complete maintenance job was thirty-five to forty hours. After training for one-third of the personnel, maintenance time was cut to an average time of twelve to fourteen hours.

Job Methods was started in August 1944 and 536 supervisors were certified. The results of this can be measured somewhat by the awards made by the Suggestion Committee. For five months there were 92 suggestions which saved 6,853 man-hours per month. There was also considerable increase in production, materials were saved, and many hazards were eliminated.

Nine trainers were certified in all three "J" programs, and three men were trained in Program Development. Program Development had been requested for 10 army personnel officers from Western Pacific Supply bases but TWI's closing made it impossible.

TWI AND THE NAVY

The Navy itself did not make any widespread use of TWI services, but in 1944 a special staff was recruited from TWI to promote navy contractor's use of TWI programs. In 1942, Ralph A. Bard, Assistant Secretary of the Navy, had said:

Navy contractors who do not have organized training programs in their plants, who are now faced with the necessity of training large numbers of new employees, should be greatly interested in the practical help which is available to them through the utilization of the Job Instructor Training program. May I express the hope that, in view of the urgent need for increased production, management will take full advantage of the valuable service provided by your organization.

The Navy was extremely helpful in a number of districts in promoting use of TWI and J.I. in particular in plants of naval contractors. The Chicago district, for example, could always count on contact assistance from Commander R. J. Twyman.

In 1942 the Great Lakes Naval Training Station used J.I. with all the instructors who train in mechanical skills necessary to maintenance of vessels. Lieutenant Commander Waters reported greater training coverage was possible in 16 weeks than in his entire naval experience of many years as a training executive.

THE SPREAD OF THE PROGRAM TO THE FEDERAL GOVERNMENT

By September 1942, the Job Instruction program was in use in the Civil Service Commission, the Civil Aeronautics Administration,

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Federal Housing Authority, Federal Security Agency, General Accounting Office, National Youth Administration, the Government Printing Office, and the Bureau of the Census.

Other government agencies which later began the use of Job Instruction include the Tennessee Valley Authority, Rural War Production Training, U. S. Forestry Service, Federal Committee on Apprenticeship, Unemployment Compensation Commission, the Bonneville Power Administration, the Guayule Rubber Project of the U. S. Department of Agriculture, and the Office of Censorship (both in Washington and in the Panama Canal Zone).

The Minneapolis district did extensive work with the agricultural colleges of Iowa, Minnesota, North Dakota, South Dakota, and Nebraska. Institutes were conducted in order that college staff members could give the TWI program to county agents and to soil conservation departments.

The Office of Defense Transportation regularly advocated the use of the TWI programs by railroads and bus lines.

Although it was never the intent that TWI should, beyond getting the programs started, serve either government agencies or the armed services, in various localities all over the country needs for service have been more important than just conforming to rules previously made. Accordingly, by agreement, much of such service has been given. For example, Philadelphia has worked extensively in Signal Corps establishments; and the Baltimore district has done much work with the Naval Supply Depot at Norfolk, and at Edgewood Arsenal, Aberdeen Proving Grounds, and Holabird Ordnance Depot.

USE OF THE PROGRAMS IN FOREIGN COUNTRIES

The Job Instruction program was introduced to Canada through Noel R. Arthur of Defense Industries, Limited, who came to the New Jersey district in January 1942 to attend an Institute. New Jersey representatives, at his invitation, conducted an Institute in Canada in May 1942. Canada has reproduced the Job Instruction manual in both English and French. Later both Job Methods and Job Relations were also adopted by the Department of Labour under the direction of R. F. Thompson.

In February 1944 the British Ministry of Labour sent a representative, F. H. Perkins, to TWI Headquarters for six months to learn the TWI programs. He became an Institute Conductor in all four TWI programs. During the first year after his return to England he launched Job Instruction, Job Methods and Job Relations in some of England's most important industries. Four Job Instruction Institute Conductors have been trained, 32 Institutes held, and 300 trainers prepared. One Job Methods Institute Conductor has been

trained, two Institutes held, and there are 20 trainers. For Job Relations there are two Institute Conductors, and the six Institutes have resulted in the preparation of 56 trainers.

The J.I. program has been started in Saudi Arabia through work of the San Francisco TWI district with the Arabian-American Oil Company, and with the Bechtel, McCone & Parsons project. In addition to this Arabic version, Standard Oil has also been responsible for the introduction of Job Instruction in Spanish in South America, through the New Jersey district. Spanish versions have also been put on in Mexico, being made available by the Los Angeles district to the Cananea Copper Company at the request of James Knapp who had previously used the programs at California Shipbuilding.

A Job Instruction manual in Spanish was requested by an International Labour Office delegate from Chile. Accordingly, work was begun with the districts on putting together various experiences of American companies with subsidiaries in Spanish-speaking countries but no official Spanish manual was completed.

Job Instruction materials have also been transmitted to representatives of Australia, Holland, New Zealand, Poland, Norway, Sweden, the Union of South Africa, and Venezuela. Training bulletins were made available to Brazil, Cuba, India, Mexico, Russia, and Puerto Rico.

TWI Headquarters arranged for the New York district to give Program Development Training to Major T. H. Wang and Captain Y. C. Liu of the Chinese Air Force.

The Indianapolis office reported a long distance use of the Job Methods and Job Instruction programs as told by the Lukas-Harold Corporation. Before Job Methods and Job Instruction were applied to the field assembly of units of fire control instruments, the sub-assemblies were sent to the field with 22 pages of single-spaced, typed, assembly instructions. It was extremely difficult for inexperienced people to assemble these very delicate instruments. As a result of J.M., the Lukas-Harold coordinator conceived the idea of photographing the various parts of the sub-assembly showing how they should be put together. The information sent to the field was reduced to twelve photographs and two pages of instructions. Each photograph and each page of instruction is laminated. Previously the instructions would become covered with grease and oil, frequently rain-soaked and muddy, and this made it more difficult to make the assembly.

Pan American Airways brought to Miami by clipper the supervisors from their Latin American installations in order to give them basic instruction in Job Relations. In all, there were 364 certifications in Job Instruction, 18 in Job Methods, 372 in Job Relations, and the training director took part in a Program Development Institute.

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ADAPTATIONS OF THE TWI PROGRAMS

The TWI programs have been used in a wide variety of situations. Sometimes this has meant an adaptation of the program, sometimes only the materials used by group members needed change, and often it was found that the standard program really was appropriate.

At first TWI complied with requests for adaptations and developed detailed variations for offices, hospitals, housing projects, and agriculture. As requests from additional fields came in, TWI took another look at the idea and made a number of field inquiries with the result that there are now two adaptations for Job Instruction only—offices and hospitals. These are simple reminders to the trainer that, instead of saying “bench,” it is more reasonable to say “desk” in an office group and “table” in a hospital group. Examples are given of breakdowns and timetables in office and hospital situations. It is found that this natural transposition is all that is necessary.

The hospital adaptation of Job Instruction, stemming from the personal interest of the District Director, E. L. Olrich, president of the Munsingwear Corporation in Minneapolis, has resulted in the extension of all the TWI programs to many hospitals. Early endorsement by the Mayo Clinic was very helpful. At the request of the University of Minnesota, assistance was given to those who were carrying on the training in the Kenney treatment of infantile paralysis. The National Red Cross was given special assistance in streamlining their Home Nursing program by use of breakdowns and individual practice.

Many TWI staff members have on their own time made TWI techniques available to important groups which were not eligible for war training. Great interest in Job Methods was generated in libraries as a result of an Institute conducted by New Jersey's Office Supervisor. The New Jersey Library Association, because of increased demands for service in congested war areas, allotted funds to pay a trainer.

Job Instruction has been used at the Maryland Workshop for the Blind, and the card has been reproduced in Braille. Job Instruction has also been used for deaf mutes.

The United States Department of Agriculture, through its extension service, has promoted the use of the TWI programs. Job Instruction, Job Methods, and Job Relations have been made available through the State Extension Services also. Many young people have been reached through 4-H Club Camps. This latter work was primarily designed to introduce the Westinghouse Better Farm and Home Methods contest. The Westinghouse material was designed to get farm boys and girls to look at the methods of doing their “chores.”

Westinghouse issued excellent cartoon material explaining just how methods could be improved.

County agricultural and county home demonstration agents have been active. There are no overall figures available as to the numbers who have been reached in this way, but in April, May, and June of 1945 the Federal Extension staff gave Institute training to over one hundred people and over 1,000 people had 10 hours of instruction in one of the "J" programs.

The use by housewives of the Job Methods program in particular has received quite a bit of newspaper publicity in the New York and New Jersey areas.

The U. S. Office of Education through its business education service has provided a Job Instruction adaptation called "How to Teach an Employee," and a program called "Human Relations Training" which was adapted from the TWI Job Relations program. These Office of Education programs are in the retail merchandising field.

TWI AND RETURNING VETERANS

TWI was often asked what it was going to do for returning veterans. The answer was—"The same thing." TWI's specialization was in the field of supervision. Its whole approach has been on the basis of recognizing individual differences—what the man already knows about the work, the physical ability he has to do the job, the personal characteristics that make him a different person from his neighbor. Therefore, neither the supervision of veterans nor supervising by veterans presents new problems, except as veterans' rights are concerned.

It is the supervisor who actually assists and is responsible for the veteran's successful integration into industry with the effect that that has on his whole life. If the supervisor has been prepared for his job, taking into account the five needs of the supervisor as outlined by TWI—knowledge of work, knowledge of responsibilities, skill of instruction, skill of improving methods, and skill in leadership—he will have little trouble in making the veteran feel that he belongs to the work group.

If the veteran is to become a supervisor he will have these same 5 needs, and it should be the responsibility of management to see that he has the opportunity to acquire the needed knowledges and skills.

The finest thing that can happen to the veteran is a realization that he is doing something worthwhile and that his abilities are being used to the maximum. The supervisor will need to be alert to the skills and knowledge gained by the veteran in the armed services. The cream of the crop went to the Army, and they are coming back better and stronger.

Industry—Army—TWI

A particularly interesting account of work with veterans came from Los Angeles. James McKinley, Training Director at Northrop Aircraft, was sent on a special assignment to the Birmingham Hospital, a military unit in the San Fernando Valley. The wife of the Vice President and General Manager of Northrop, through her work with a volunteer group, had become interested in the avocational pursuits and classes for physically handicapped and shock cases. It occurred to her that something more purposeful than rug and basket weaving might aid in quicker adjustment of these boys, both emotionally and manipulatively.

Mr. McKinley set up a regular small parts and sub-assembly production unit at the hospital to make parts for the P-61 Northrop Black Widow night fighter. Job Instruction went into action and regular production schedules were set up. The boys not only made rapid physical and emotional recoveries, but were paid for production which passed inspection. During the war those men who wished to stay in the area were employed in the Inglewood plant on release from the hospital.

Chapter 11

INCREASING THE EFFECTIVENESS OF TWI PROGRAMS

In 1941-42 and part of 1943 the primary emphasis of TWI was on training as many supervisors as possible, and most of these supervisors were trained in Job Instruction. TWI felt that managers of plants would see to "quality," so the chief interest of TWI was in "reaching as many supervisors as possible, as speedily as possible."

Quality was "talked" but there were no specific plans for action. In May 1942, at the District Representatives' meeting, much emphasis was put on the necessity of following the Job Instruction manual. The importance of giving a good demonstration of showing, telling, and correct instruction was stressed. Some attention was given to quality of breakdowns, and the need for better criticism of demonstrations was pointed out.

Certain standards of technical instructions prevailed for all of the TWI programs. Institutes were conducted only by TWI staff members or plant representatives who had been certified by a representative of TWI Headquarters. Ten-hour sessions were conducted only by trainers who had been certified by TWI as a result of satisfactory performance following their preparation either in an Institute or through individual coaching. It was specified that active trainer status could be maintained by only those people who put on at least one 10-hour session in each 90-day period.

Beginning in September 1942, when Job Instruction had been in national use for a year, J.I. trainers were borrowed from all over the east and middle west to conduct sessions for the ASF. Observers from TWI Headquarters were unpleasantly surprised to find that J.I. was not really a standard program—its variations were almost as numerous as the number of people. This led to large-scale, quality control.

In January 1943 TWI Headquarters wrote to all trainers as follows:

Your responsibility is not just a matter of production. You bear and carry Training Within Industry's good name. When you go into a plant

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you represent a group organized solely to serve industry in the war effort. Our program comes from industry, and our work is for industry, and within industry. Whether we reach every contractor who needs what we have to offer depends wholly upon your efforts. This means that you are responsible for the best use of your time, of our materials, and of the government's funds spent through you. Most of all you have carried the load on quality points. The TWI tradition is in your hands.

PROGRAM FLEXIBILITY

During the earlier days of the TWI programs, and particularly when each program was new, there was a great deal of flexibility. In the early days TWI Headquarters did not realize the importance of absolute following of manuals because there had been no experience in having TWI trainers serve separate plants of nation-wide organizations. When different trainers went into large plants (or into such a large establishment as ASF) their work at times was compared unfavorably. Transfer of TWI-trained supervisors within a company or within the Army pointed up differences. Gradually it was brought home that everyone must positively "Follow the Manual." This proved to be a strong selling point as TWI work has been recommended by one employer to another or one part of a company to another part.

Nobody pretends that the TWI programs can be handled in only one way, but it is known that the programs as outlined in the manuals can be handled safely with good results by an average trainer. A deviation may be one that one specific trainer can handle. If another trainer sees him and tries to follow his example, he may fail. Also, the second trainer might think of deviations of his own and not be able to handle them.

Ideas about technique do not occur just once. In fact, they occur over and over again. The thing that one trainer may experiment with may have been tried already and found not up to the standard of usability by all trainers. Efforts may be wasted on something which has already been thought of, tried out, and rejected for cause. It is for this reason that TWI is including detailed accounts of the development of the programs in this report (*see Part II*).

Program Revisions

TWI has not tried to squelch originality or thinking but, as members of a national team, this procedure was followed: If a field man had an idea, he talked it over with or sent it to his Headquarters Field Representative. If that man felt, from his broader view of the programs, that it had merit, and that it was new, he sent it to the Associate Director and leader of the Headquarters development group for a controlled try-out of anything which promised improvement over

what had already been done. Many improvements were made possible through this process. Try-outs were arranged through work with W. S. Cooper of the Headquarters Field staff who also served as a member of the development group.

10-Hour Content

TWI was often criticized as being arbitrary, but when the problem was explained the emphasis was accepted as necessary. All three 10-hour programs were designed to give to supervisors the opportunity to acquire skill through practice. All of the demonstrations, (that is, the sample jobs used in Job Instruction and Job Methods and the human relations problems in the Job Relations program) were chosen after long experimenting.

Plants engaged in heavy industry or in chemical processing sometimes could not see the adaptability of the fire underwriters' knot. Other plants did not like the Job Relations problem where the union got more facts than the plant supervisor did. Other plants said that nothing so badly planned as the Job Methods radio shield demonstration could ever happen. "The answer is the same for all three programs. All illustrations were designed, chosen, and developed solely to accomplish one very definite and specific purpose—getting steps of and practice in the use of a simple common practical method," said TWI Headquarters.

However, there were certain common-sense changes or adaptations which had to be made by each trainer according to the particular group with which he was working. For example, in the opening of the first session of Job Instruction quite a bit of emphasis is put on the number of new employees, never previously employed, and on the number of displaced employees, shifting from non-essential industry, who are coming into the plant. The picture changed after this manual was printed. Even in 1944 in very few places was it appropriate to use this emphasis. The factor which should be stressed is the present and continuing importance of getting jobs done right and quickly with the work force now available.

In the Job Methods manual there is in the first session an outline for a discussion of "This is the critical year of the war." Any year in wartime was critical, but better points of emphasis evolved. In the Job Relations manual the fifth session ends with a strong patriotic appeal which may not be the present most effective conclusion.

Many informal and individual substitutions have been going on at these spots, and no trainer should be criticized for removing material which is no longer appropriate. However, entirely too many of these substitutions have been in the vein of "You must use this method." Pressure to use the method is not the trainer's job. That is management's responsibility. The trainer has just three objectives: (1) to

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interest people in learning the method, (2) to help them to learn the method, and (3) to get them to *want* to use the method.

Everyone has to use some good common sense in Institutes, in quality control visits, and in coaching. It is not departing from the standard quality program when trainers are permitted, encouraged, and even helped to make their introductory and concluding remarks in a vein suitable for the particular group in the particular company at the time. Of course, many questions have been raised and changes suggested in anticipation of situations which just do not occur. In these cases TWI was able to say "Just try it once our way and see what happens."

QUALITY OF BASIC INSTRUCTION

TWI had done a lot of talking about quality; then it began to take definite steps to get top management support, line organization participation, and reporting of results. For a time there was little reference to the quality of basic instruction. That was a mistake.

Top management backing, management support, having a competent coordinator, providing good Institutes for trainers, scheduling for complete coverage, coaching members of line supervision in how to get continuing results—these alone are not enough. If basic training is not of high quality, the very best management contact procedures are completely useless, and the continuing use coaching is expected to serve a purpose for which it is not designed.

Management acceptance is not an end in itself. It exists to get basic training and continuing use off to a good start. Proper setting-up of a program is not a substitute for careful quality control of the 10-hour sessions. Management's acceptance of responsibility for basic training and continuing use does not guarantee results. When TWI quality controlled a trainer, TWI was not checking the plant—it was checking its own performance, seeing whether the trainer had really been equipped to handle the program, whether he understood the importance of exactly following the procedures which had been developed through experience.

Often TWI confused its industrial customers just by the way staff members talked. In Job Instruction and in Job Relations, TWI people were prone to say, in connection with the supervisors' participation in the 10 hours, "This is only practice and is not important. All we are interested in is the method." In Job Methods there was sometimes too much attention given to the improvement that was made by each supervisor during the 10-hour sessions. Sometimes this made people lose sight of use of the method.

There is a middle ground. Good work during the 10-hour sessions is necessary because the method is being learned. This method is the

one which will be used from then on because what is done in the 10 hours alone is not enough. The right start has to be made there. Then, this new knowledge must be used so that skill will be acquired.

KEEPING TWI PROGRAMS ALIVE

Just as industry had often let people learn the hard way—by making mistakes—so TWI had to learn by experience that training was only the beginning. Proven training techniques had been supplied by TWI, trainers had been carefully prepared so that they put on effective training sessions, they were quality controlled in order to maintain standards—it still was not enough. They needed a stimulus, even pressure, from their own bosses so that they would use what they had learned and really develop the skills of supervision.

With Job Instruction and Job Relations it had largely been assumed that use was being made, but in Job Methods, it was very easy to tell whether a program was or was not being used. From stating that management must accept its responsibility for training, TWI moved to insistence that service be given only to those plants where management agreed to use training as an everyday operating tool and demand results from it. This required the training of the TWI staff in a new way of working with plant management, as well as the development of specific techniques for management contact work and for line organization coaching to continue the results of supervisory improvement.

J.I. "Follow-Through"

In 1942, it was realized that the 10 hours of instruction alone was not enough, and work on "Follow-Through" began. The first work in this field was set up in the pattern of an Institute. Four industrial men, each one accompanied by a supervisor from his plant, came to a TWI district office for a one-day session called a Follow-Through Institute. They practiced on their own supervisors in drill on the fundamentals of Job Instruction.

A number of districts reported that this kind of drill was more effective in the plant, that its scheduling as a formal Institute made it seem like an additional program, and that they were having success doing the same type of thing with trainers and supervisors, right in the trainer's own plant.

J.M. "Follow-Through"

In July 1943, a "Follow-Through" plan for Job Methods was issued. Its use was made a part of the initial sale. It was required that one plant man serve as the "spark plug" to work with and through the operating executive to keep the program constantly alive and active. He was also to carry the burden of the necessary control

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records and reports, to collect and assemble scattered information necessary for decision on proposals, and to give supervisors the extra coaching that they needed to help their own subordinates.

TWI proposed that the chief executive send a letter to all supervisors stressing that improvement of methods was company practice and that the making of improvements was a regular part of each supervisor's job. Numbered blank breakdown sheets and proposal sheets were to be continuously fed to second-line supervisors who were to hand them to their first-line supervisors. The time for their return was to be set. Second-line supervisors were to help first-line supervisors to pick the jobs they wanted to study and also help them to work out the breakdowns and the improvement. It was suggested that the second-line supervisor approve suggestions which were within his own authority and send on those which he could not accept finally. This Job Methods coordinator or expeditor was to keep track of all proposals. The expeditor was to prepare periodical reports, to hold meetings of supervisors, and to get the top operating executive to discuss the program at supervisory and staff meetings.

Through the winter and spring of 1944 there was extensive experimentation with not only Follow-Through of Job Instruction, but of all the "J" programs. In brief, the result was that TWI abandoned the Follow-Through Institute and determined that no rigid procedure was necessary but that each plant must, at the time it made the original commitment, agree to embody these procedures:

- Assignment of responsibility for results
- Adequate coverage
- Provision for coaching
- Reporting of results
- Credit for results

Following these procedures virtually assured management that there would be continuing use of the programs and, therefore, results.

MANAGEMENT AND CONTINUING USE

The importance of top management attention has never decreased. When the superintendent of a coke plant at Colorado Fuel & Iron writes to all his foremen as follows, it shows he means business:

Our operation of the Coke Plant is not being carried on as easily and efficiently as it has in the past. The reasons for this are, in some cases, beyond our control, while others can be corrected to the mutual advantage of yourselves and the Corporation. One such point is the incomplete instruction of workers in their duties and in safety hazards of the job. . . . A man performing the same job for two foremen may be required to do certain phases of his work differently when he changes from one foreman to the other. Both of these contribute to poor operation, errors, uncertainty

on the part of the worker as to just what he is supposed to do, and require constant supervision by the foreman if the job is to be done at all. . . .

The primary requisite of better instruction is that the work required on each job in the plant be accurately and completely outlined, that all short-cuts known to any foreman be made available to all, that all hazards be spotted and steps to avoid them clearly stated, and that one best method of doing the job be developed and used by every supervisor concerned. When this is done, instruction of all workers, new or experienced, can be completed much more rapidly and efficiently than at present. As the first step in this program, every job in the plant must be analyzed and broken down into individual operations. The Job Instructor Training plan offers a method of doing this with which you are all familiar, and will be used for this work.

At Dayton Rubber Manufacturing Company, the plant prepared its own supplies of materials to be used in connection with the TWI programs. They wished to give special emphasis to safety, and added to the J.I. breakdown sheet a third column for safety specifications. Breakdowns (prepared on a schedule maintained through management insistence) were checked by the safety department and the training department, and up-to-date copies of all kept by the superintendent and the individual foreman.

In some plants, managements assign their J.I. trainers to break down jobs on which scrap, rejects, or costs are out of line. Executives often assign jobs for improvement instead of waiting for supervisors to think of them. Many companies require written grievance reports that cover all foundations and steps of Job Relations. In all three "J" programs, the adoption of records for results of the programs has been a powerful stimulant.

Lack of Management Support

Results should guarantee continuing use, but only top management support will provide the real stimulus. During the period (winter of 1943-44) when bearings had top urgency ratings, in the TWI districts where there were bearing plants all other work was, if necessary, dropped. Headquarters staff members moved in and specialists were borrowed from other districts to put on a blitz. Results were good.

Some plants were virtually ordered by the Army and WPB to use the TWI programs. They did, at the time, and they got results. At one plant they included:

Fifty improvements resulting in savings of 1,868 man-hours per week.

Another improvement cutting in half the need for 258 women workers.

Another eliminating over 2,000 crane-lifts per month.

Saving 8 tons of steel scrap (a lot for bearings).

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By the spring of 1944 the pressure on this particular plant was removed—management had acknowledged there were benefits from J.I. and J.M., but J.R. was never started. The J.M. improvements did not average one per supervisor trained, and there is no evidence that the plant will make any further use, on its own, of the techniques they were forced by their customers (the government) to use. In this instance, relations between TWI and management were not particularly good.

Need for Management Participation

Programs could and did fail of their real purpose even when management openly praised TWI and thought the programs good. The manager of a branch plant of a large radio manufacturing company employing 1,200 was completely sold on the value of the three "J" skills. All three programs were installed over a period of two years and a member of the engineering department attended a P.D. Institute. The J.I. program was "completed" in April 1942, J.M. in September 1943, J.R. in November 1943, P.D. in September 1944. During the period these programs were in operation, the plant manager was continually telling TWI of the fine reports he was receiving from his people regarding the results and value of this activity—but no tangible results could be reported on a "before and after" basis.

In December 1944 one of the TWI staff decided that this would be a good place to check on continuing use of the J.I. program. Approaching management on the basis of what additional service might be given to help with current problems, he was informed that the fuse department was having too many rejects and too much machine down-time. Through a meeting scheduled with the chief engineer, the industrial relations department, the general manager and superintendent of the plant, it was agreed that the lack of use of the J.I. program was a major contributing factor. Because of turnover, more than 33⅓ percent of their key men and supervisors had not had the basic training. There was no evidence of use of J.I. anywhere in the plant after two years.

A company man attended an Institute for a refresher, the TWI man helped draw up a plan, and worked in the plant himself on continuing use. By April, the efficiency rating was averaging 72 percent as compared to 53 percent in January. Production was 117,000 units per week as compared to 104,000 per week, and their inspection had changed from Class #5 to Class #2½. This plant manager now understands what TWI meant by "Continuing Use and Results."

Company Practices

At Patterson Field (Dayton, Ohio) where TWI provided Job Instruction for the Air Technical Service Command, a foreman went

to this superintendent and said the personnel department must hire three skilled workmen in order to complete a rush job. The superintendent asked what the departmental timetable showed, but the foreman said he didn't have one. The superintendent then demanded up-to-date timetables from every department—result, six skilled men discovered and the rush job completed on time. The superintendent posted departmental timetables in his office—result, foremen kept them up to date and individual workmen became enthusiastic about acquiring additional skills.

Philco Radio has twice revised in 14 months its operating plan for Job Methods in order to keep it in tune with actual experience. Each supervisor prepared a job survey chart, listing all jobs where J.M. would apply. This timetable has to be kept current as work changes. The industrial engineering department prepares for the department superintendents a weekly summary of J.M. activities in the 13 departments. Each superintendent designated one man to follow up on the report. Supervisors are required to submit present method breakdowns on all jobs they study for improvement, not just say that no improvement is possible.

In an Iowa plant there was great disappointment because a simplified method had failed to result in any increase of production by the eight operators. After a month of no results, the foreman figured the individual production expected, and talked with each operator. He found a number of small troubles that were easily corrected. The results of using the Job Relations foundation point of "Let each worker know how he is getting along" were that, within one day, the operators neared the set goal and one worker increased his production 60 percent. This good experience led him to discuss work with operators whose jobs had not been changed—result, individual increases of 10 to 20 percent.

In a Southern Ohio mill, line supervisors were given Job Instruction, and there were also J.I.-trained instructors in the departments. New workers were assigned to the instructors and records kept in order to compare with previous experience. First-day production increased 73 percent, first-month production increased 36 percent, absenteeism during the first month was 53 percent below the previous record, and the number of workers earning incentive bonus increased 350 percent. New workers remained with the job instructor approximately two and a half weeks, then were turned over to a regular supervisor. Production had climbed under the instructor, but fell back under the supervisor. This led the company to say to its foremen (who had been given basic instruction in J.I.), "Naturally this condition can be avoided by a continuation of the use of the principles of Job Instruction Training. . . . Can we, at a time like this, afford to

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neglect preparing the worker, presenting the operation, trying out his performance, and following up?"

Coaching by TWI

Much plant coaching has actually been done for plants by TWI staff members. Largely it was a step in helping a plant man to become thoroughly familiar with the TWI programs so that they would produce maximum results. In other cases, however, TWI men have moved into an urgent situation and done the job which should have been done by the plant.

Canning plants have only a few supervisors during shutdowns. During the canning season they don't feel they can put supervisors in training sessions. Therefore, it is unusually difficult to give basic instruction to their supervisors. In one plant, with capacity for 2,400 employees, Job Methods was started in January 1945, with sessions run by an outside trainer. A second group was run later in the month, but between the two groups the TWI representatives had started on-the-job coaching.

Results were evident early, such as a 37 percent increase in box repairs. The TWI man kept in frequent touch with management—the season would start in April. Results like boosting a previous daily maximum of 1,800 cases of cans given protective coating, to 5,000, kept interest alive. As the asparagus season approached, coaching was applied to bottleneck situations and supervisors were helped to give good instruction to foreladies—result, 15 percent more asparagus packed, and output of labelling machines doubled, because of getting under way faster.

By that time (June 1945) a company representative was sent to a P.D. Institute. The end of TWI service was approaching, so the P.D. man was given special coaching. That company had had 33 service calls from TWI in seven months. The TWI work undoubtedly helped solve this plant's 1945 problems, and if the plant men learned the coaching process from witnessing what the TWI men did, it will have a start on solving its own problems in 1946 when no outside assistance will be available.

COACHING AND CONTINUING USE

Coaching is the key point of continuing use. In the TWI coaching procedure, again there was nothing new except putting action into "accepted" principles. In athletics, in music, in industrial sales training, coaching is normal. And, in industry, managers usually follow up and assist on many of their other operating procedures. Training is too rarely included.

Coaching Guides

In order to assist plants with the coaching, TWI prepared a guide for each of the "J" programs (issued in July 1944). The same five points of how to coach a supervisor appear in each one of these guides:

1. Give reasons and advantages.
2. Get understanding of the principles.
3. Select a problem and work on it together.
4. Ask him to work another problem alone.
5. Give credit for good results and good effort.

Experience has shown that technical coaching is of little value unless the supervisor feels that the program has the support of his boss—the influencing and encouraging-to-use is necessary to continuing use of what has been learned in basic instruction sessions. Coaching must be tailor-made to suit the individual supervisor's needs—some may need a great deal of help but others will really have learned the principles and need only to be reminded and stimulated to use what they know.

How to Coach

In all the TWI programs the objective of the 10-hour sessions has been to get a certain amount of basic instruction across to all members of the group. Naturally people in the group will differ. Some really would need less than 10 hours and some do not get a good picture by the end of the 10 hours. Accordingly, TWI has stressed with management, when a program is first undertaken, the importance of providing on-the-job coaching. It is not possible to specify exactly what and how much will be done for any one supervisor since that will be determined by his own individual needs and interests. Coaching starts at a different point for each supervisor.

TWI has learned that the coaching method is always the same although the degree varies widely. The first step is to find out whether the supervisor is using the method in which he has been instructed. This is found out by asking him to demonstrate its use on a problem. Questions are then invited. He is given help where he needs it and where he wants it. This individualized approach to coaching on the job evolved after TWI had experimented with many complicated group procedures.

Coaching is designed to increase skills. How do you get these skills? By solving one problem then another, or by practicing. The objective of a TWI program, and the objective of coaching, is not to solve a problem, but to develop ability to solve any problems when they come up. Coaching is something which is done, frequently, for an indefinite time, in the plant, in the line, on the job.

Coaching

Coaching is he's trying to do something.

It is impossible to do a good job. He emphasizes that you can't work on the job criticize, thing again supervisor.

A lot of how a supervisor whack will go too far into a tree rolling, getting the other. doesn't need.

Coaching give some let him along the little help "that's fine never end.

Who Should

This kind of attention, not be done on the spot how much.

This also might be is directing the way to of coaching coached. The job was already h

Coaching in the Line

Coaching only means helping someone to do a better job of what he's trying to do. It is necessary to know what kind of a job the man is doing now—otherwise time is wasted on things he doesn't need, or something which still is not clear to him is overlooked.

It is important to find out whether he's interested, whether he wants to do a good job. The personal values of good performance have to be emphasized. All of this means a personal working relationship—you can't coach on the phone, or in a letter, or by a lecture. You have to work with a man. His boss is the best one to work with him, out on the job. He can show him how to do a better job—not just criticize, explain why his good work succeeded so he'll do the same thing again, and watch him work until the boss really knows that the supervisor knows.

A lot of good pointers for coaching can be picked out by considering how a small boy rolls a hoop. Some boys try to give the hoop one whack with a big stick. That does not work very well. The hoop goes too fast and any bump it goes over turns it aside, and it crashes into a tree part way along. It takes a lot of attention to keep a hoop rolling, giving it a tap on one side to straighten it, then a little tap on the other. It becomes a matter of pride not to touch the hoop when it doesn't need it.

Coaching is like that. It means constant attention. The boss can't give someone a big dose of technical assistance and selling and then let him alone for a long time. He has to let the worker know right along that he is interested. There has to be a little help here and a little help there. When things are going all right the boss just says "that's fine" and goes on. The boss has more than one hoop, but he never entirely removes his attention from any of them.

Who Should Coach?

This knowing when to help, and giving just the right amount of attention, is fundamental to coaching. That means that coaching cannot be done well by an outsider. It has to be done by the man who is on the spot, in the plant, on the job, who can tell when it is needed and how much.

This also gives the answer to "how long does coaching take?" It might be said that coaching by a supervisor continues as long as he is directing the work of someone whom he wants to have perform in the way that produces most results for the department. How much of coaching is technical? That will vary according to the man being coached. Some people will need practically no technical assistance. The job with them will be to influence them to use the knowledge they already have so that they will develop skill.

Does this sound as if coaching can be done in meetings or in refresher sessions? No. In groups, interest can be aroused and some technical assistance can be given, but giving technical assistance to someone who does not need it may kill his interest. Coaching does not require a formal contact—it may be something as simple as conversation in a plant cafeteria, or while walking down a factory aisle. Coaching must be individual, and it must be timely, and it must be appropriate.

Dev

Part II

Development of the TWI Programs

Chapter 12

THE BACKGROUND FOR TWI DEVELOPMENT

The wide use of the TWI programs has been possible only because of the way in which they were developed. No TWI program was braintrusted or just "written." All grew from demands for assistance on definite common needs; all went through many try-outs with groups of supervisors in plants. These programs *for* industry came *from* industry—the experience of many people in many plants was pooled, individual approaches were merged. The nation's war plants both provided the materials and the proving ground. No one person was individually responsible—it was group work, on a large scale.

FUNDAMENTALS OF THE TWI APPROACH

A common thread runs through all the TWI programs. Many points were determined in advance, others "happened" once and proved so successful that they were made "must's."

1. It is necessary to have a specific method or pattern which the plant man can follow in solving his own problems. The method must be simple, and it must be briefly stated. Each of the four TWI programs has a 4-step method.
2. The method is to be applied as a production tool. Therefore, it should be stated in shop terms, not in academic language.
3. Technical perfection alone is not enough. There must be something in the program which gets acceptance and use. Advertising men talk about believe-ability. Training designers have to watch for believe-ability, acceptability, and usability.
4. In order that members of training groups can "learn by doing," groups must be kept small enough to permit time for guided, individual practice of the method on their own everyday problems. There is no substitute for practice.
5. There must be a definite outline of exactly *what* will be covered, how much time will be given to each point, and *how* it will be done in order that there will be a recognized universal standard for the training sessions.
6. Ten hours of content is best put across in five 2-hour meetings. A 2-hour session does not need to be interrupted by an intermission. Time spent in opening and closing the meeting is no greater for a 2-hour session than for a 1-hour meeting.

The needs for the various TWI programs were expressed by scattered individuals and by groups. A common thread had to be selected from the variously-phrased statements, and likewise the kind of people who would receive the training had to be defined in terms of their needs and backgrounds.

Actual development of a program has to be undertaken by a relatively small group which must be made up of people whose work will be accepted. They must be competent in the specific field, and both experience and willingness to accept new ideas are essential. This group works under such limiting factors as the amount of time to be spent on the development of the program, the time that can be used in preparing the trainer, the time schedule for the training program itself, expense, equipment, and facilities.

Developing Training Content and Techniques

The development group explores the full problem in order to consider possible solutions. Since a choice must be made, the committee must have a chairman who will either choose one of the alternates or agree to selection by the majority. The next step is to select specific content and techniques, and determine the training method—that is, collect the raw materials for the training program. These then have to be turned over to one person to draft the program, using the chosen content, techniques, and method. This preliminary draft is then presented to the group and frequently any or all members suggest revisions in it.

TWI learned that while much can be planned and drafted in advance, the first sessions in a new program have to be left rather largely to the ability and inspiration of the person conducting the trial group. He tries something, and it either works or it doesn't work. If it works, what he did is set down and other people try it too. If it doesn't work, and it still seems like a good idea, an attempt is made to find out why the particular work failed.

Program Try-outs

The chairman of the development group supervises try-outs of the program. It is not satisfactory, for these trial groups, to just use trainers with so much experience and ability that they can handle any program and make people like it and get results. A national program has to be clear enough and easy enough that it can be handled by average trainers. These try-outs should be put on by several people in order to avoid the making of judgments on the basis of what one person did rather than on what was in the program.

It is important to vary the situations under which try-outs are held. A program may be very effective with new inexperienced

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supervisors but just may not go over or even be needed by more experienced people. TWI programs were at first thought of as meeting the needs of new, first-line supervisors but experience showed that best results came when they were extended through the entire line of management and supervision. Since the idea of a national standard program means that it will be used for both new and old supervisors, for first-line supervisors and their own bosses, for men and women, for mixed groups, it is necessary to have try-outs under all these circumstances.

Try-outs had to be held in all sorts of plants and under all sorts of conditions. Some versions of TWI programs were found useful in a plant which was so new and confused that anything clear was a help, but they really did not accomplish much in a well-run plant. Therefore, try-outs had to be so distributed that the effect of size, organization, working conditions, and product could be learned.

It was also found advisable to set up specific hurdles. It was necessary to find out whether the program in itself was good enough that a group of mature experienced supervisors would participate in it and like it even when the trainer was younger than the group members or when a woman trainer was used. All these hurdles had to be set by the development group so that it was not necessary to wait for unfortunate experience or failure in an operating program.

Evaluating Try-outs

Evaluations have to be on the basis of considering the suitability of content, effectiveness of techniques and methods, and checking the results against the problem which was identified or the objective which was to be met. All TWI programs had their try-outs in plants, and most trial groups had an observer from that plant's staff as well as a member of the development group.

The observer was usually able to tell more about supervisors' reactions than the person who conducted the training session. In early try-outs, trainers reported on their own experience, but other members of the development group were not able to get an exact picture. Accordingly, an observer was sent along to report just what happened in terms of the trainer's effectiveness in getting the method across to the group. The observer, of course, had to be competent to comment and usually was someone who likewise put on experimental groups under observation. It was necessary for this observer to refrain from participating in the group discussions. Anything that he said or did interfered with the normal situation which was sought. Therefore, even if he saw a mistake being made, he had to stay in the role of observer throughout the session.

Revisions

Revisions followed try-outs. This meant that again one person had to handle the outlining of the program, submit it to the group for approval, and then again one person supervised the trials. These steps of revision, try-outs, and evaluation were repeated until the group accepted the training session outlines exactly as used. It was not satisfactory to accept them on the basis of "with this small change." Even a small change may affect the strategy of the program and cause some unplanned result.

After each of the TWI programs was launched on a wide scale and there had been increased experience, it was evaluated in the light of the original need it was designed to meet. Experience with the program often indicated that it was necessary to return to the development procedure of draft, try-out, and revise, in order to improve the program and overcome any difficulties encountered in widespread use.

OUTLINES OF THE TRAINING SESSIONS

TWI has been strict to the point of rigidity about following the sessions outlines or manuals. The reason is that the members of the development group had opportunities not ordinarily available to an individual training man in his own plant. Therefore, results of such development work are very probably better than what any one individual might develop on his own. Also, in the development of the programs, many ideas were tried out and many rude shocks experienced. Many cherished ideas and old beliefs fell down under the rigorous trials that TWI found it possible to make. Accordingly, since every program went through demanding tests before it was released, TWI insisted that its resulting manuals be followed exactly.

The TWI manuals, and the TWI series of brief bulletins on training, have been collected in a bound volume. No public distribution of this volume was made but one copy has been placed in each of the major city and college libraries of the country.

"Following the Manual"

A railway engineer on the "City of San Francisco" does not ever consider the possibility that, just because he has made the run on a particular passenger division between Chicago and San Francisco hundreds of times, he might now leave the track. But trainers, as their experience increases, are often tempted to introduce innovations.

Incidents like the following selection from a district report show why following the outlines is important:

In a Job Methods session a foreman was demonstrating a present method breakdown which was only fair. The job was a slitting operation in heavy

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sheet metal, performed by a girl operator on a homemade slitting machine. She went as far as she could on the machine, and finished the slit by hand with a hack-saw to a tolerance of 1/64 inch. The foreman's improvement was to put an adjustable stop on the machine-table, so the work could all be done on the machine, to a tolerance of .003 inches.

The day shift superintendent was "kibitzing" the group. One detail of the breakdown was "Start the machine." The trainer asked, "How do you start the machine?" Before the foreman could answer, the superintendent cut in: "What difference can that possibly make? The man has already made his improvement."

"I don't know what difference it might make, because I don't know anything about this machine," said the trainer. "But I do know this program, and we are following the program. To follow the program, we have to have every detail, and we do not have the details of starting the machine." He turned to the foreman and asked him how the girl started the machine.

The foreman, who had been through J.I., told and showed and explained: "She takes two steps to the right, like this, and then she jumps into the air like this, and swats the starting lever." The trainer got all that down on the blackboard as the man did it, for three or four additional details. Then he checked the "Stop machine" detail. The foreman told him the girl took the same two steps, jumped, and hit the lever again, except that she knocked it the other way. The trainer put all that on the board.

Then he turned to the superintendent and said: "Does this operator have to start and stop this machine for every piece?" "Sure." "And how many pieces a day will this operator slit for you?" "Forty an hour, 320 a day," said the superintendent. "So this girl has to jump and hit that lever twice for each of 320 pieces, making 640 jumps a day," said the trainer. "Now, Mr. Superintendent, will you please go over there in the corner and jump as high as you can 640 times, and swing your arm as far as you can on every jump, and then let us know if it fatigues you at all?"

The result was that, in addition to the initial improvement, 640 jumps per day were eliminated by extending the lever so the girl could reach it easily. The superintendent ordered method breakdowns made on every job over which he had jurisdiction.

Manual Form

As a result of TWI's insistence on "follow the manual," pressure arose to put the manuals in a form which really could be followed. Anyone familiar with the TWI programs will realize that quite often the trainer is on his feet talking, and he will often be at the blackboard. Even under those circumstances, he was required to follow his manual. Accordingly, in the manuals which were reprinted within the last year and a half, TWI evolved a typographical style which permits a trainer to *work* from the manual but not just read it.

It was decided that a manual should be readable from a distance of from four to five feet, and that a glance should be enough to show the exact kind of thing that the trainer should be doing—what he must put on the board and the few parts which were to be stated verbatim. The typographical scheme employed was for printing

in large (14 point) clear type, widely spaced (4 point leaded), according to the following typographical code:

CAPITALS Section heads
 Horizontal line across page Encloses section for timing
 Plain type Trainer says in own words
 * Star in front of line Trainer says verbatim

 Material between lines Board work

 [Bracket] Instructions to trainer

These details have proven effective in getting new trainers to do quality work speedily, and to continue with good results.

TRAINING THE TRAINERS

In launching each of the TWI programs one person demonstrated the program, in order to set the pattern, and then initiated the training of those who were to handle the program. The first Job Instruction Institutes (the meetings in which prospective trainers are prepared to conduct 10-hour sessions) represented little more than demonstrating for the members the program that they would put on. There was some explanation and a little practice in how to put the members of the group at ease and get them talking. During the four years after the first program was launched, TWI learned a lot about the training that must be given in these Institutes. It was necessary to drill the trainers in putting on the sessions, to tell the trainers not just what to do but also why—that is the strategy back of the content. It was also important to let the trainer know what results he could expect to get.

The outline for the Institute Conductor was developed in as much detail and with as much thought to cover his one week's group work with trainers as the training outlines were developed to cover the trainer's ten hours of work with supervisors.

WHAT TWI HAS LEARNED

Because TWI programs had to be standard and because the circumstances under which they were used varied so widely, it was necessary to eliminate practically all gadgets and aids. It was found that a blackboard was essential. A number of points have to be illustrated, and a blackboard is the most effective standard device which is readily available. Likewise the range of people included in the groups made paper work generally unsuitable. This also is in line with TWI philosophy of training supervisors in a pattern which is a thinking and operating process, and which can be used on small

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everyday problems before they become the big ones which might require paper work.

TWI is convinced that, in any of these intensive training sessions of the type which it has made available and which it has assisted other groups to develop, the members must get practice or they will not retain what they have learned in such concentrated form. Accordingly, all of the TWI programs have increasingly given more session time to the member's own practice on his own problems.

And finally, TWI has learned that development of a good program is not enough, standardized presentation alone gives no guarantee of results, and not even the acquiring of some skill is enough. Only when top management understands, sponsors, participates and demands production results, can full usefulness of the program be obtained.

THE BACKGROUND FOR THE TWI JOB INSTRUCTION PROGRAM

It is common practice, when someone says "Where did the Job Instruction program come from?" to answer that there were four stages. The principles were crystallized by Charles R. Allen (who adopted the Herbartian steps of "Show, Tell, Do, and Check") and his group in the Emergency Fleet Corporation during the first World War. M. J. Kane (who had been a member of that group) developed these into a form for specific action in his lens-grinding work during the first few months of TWI history in 1940 (*see* Chapter 2). Glenn Gardiner then produced a specific, simplified program which was first used in New Jersey in June 1941. TWI Headquarters adopted this program in August 1941 and spread it nationally.

The need for better industrial instruction in industry had been apparent to many managers, educators, and consultants for years. Organized thought began to be directed to the problem in about 1910. Charles R. Allen, at that time a vocational instructor under the Massachusetts State Board of Education, presented his views at meetings of vocational teachers whenever there was an opportunity. However but few people at the time gave any particular heed to his plea for better instruction in industry.

In 1913 a group of industrial people (including Mr. Dooley and Mr. Dietz) organized the National Association of Corporation Schools (later this became the American Management Association) to promote better training in industry and business.

Emergency Fleet Corporation Work

On September 12, 1917, the Emergency Fleet Corporation of the United States Shipping Board set up an Educational and Training

Section. (See U. S. Shipping Board, Emergency Fleet Corporation, *The Training of Shipyard Workers*. Washington, D. C., 1919.) There were at that time 37 steel shipyards and 24 wood shipyards with 50,000 workers. There was urgent need to secure ten times this number but no experienced workers were available. The only answer was to train them. Mr. Allen headed the group which set up the program and Mr. Kane was a member.

This section did its work on these principles: (1) all training to be done by the shipbuilders, (2) instructors (with previous supervisory experience) to be selected by the shipbuilders, (3) instructors to be especially trained, in a six-week intensive course, in the best method of giving instruction, (4) special instructor training to be conducted by the Emergency Fleet Corporation, and (5) the Emergency Fleet Corporation to maintain a staff of training experts to help the shipyards in their training activities.

The actual instruction followed four steps:

1. Preparation.
2. Presentation.
3. Application.
4. Inspection (or test).

All training was done on ship material, in the shop or on the ways. When the learners were segregated on a "school ship" the training period increased from 26 days to 45, and the monthly number of learners trained by each instructor was reduced from 8 to 6. The size of the groups under one instructor varied from 7 to 17. The two yards that produced the men with highest capabilities averaged 11 and 9 men per group respectively.

It was found that men who had gone through the training department were more stable than men who were just hired "at the gate." This was

. . . due to the work of the instructor, who . . . endeavored to make the work interesting, emphasized the war emergency needs for ships, showed personal interest in the men while in training, as well as following them up afterward, and developed the idea of loyalty toward the yard. The instructor had closer contact with the learner than any other man in the yard, and had considerable influence over him (p. 29).

It was concluded that the instructor himself was an important factor. He must be skilled as an instructor as well as skilled in his trade. It was also decided that training should be on actual jobs and not on practice work that would be discarded, and that learners should be trained under actual working conditions rather than in special instruction quarters or schools.

A learner must become accustomed to the environment in which he is to work and must learn to meet the varying conditions coming up on the actual job . . . (p. 49). The order in which jobs are given to a learner should conform to a regular progression commencing with the job that is the easiest to learn and proceeding up to the most difficult one . . . (p. 50).

The director of a training department is an important factor in effecting the success of training in a shipyard. . . . He should be a man big enough to head up to the general manager and work on a par with the various superintendents and head foremen . . . (p. 52).

Some instructors, on their return from the instructor training centers, were placed by the shipbuilders in the construction departments as production foremen. The shipbuilders found that certain portions of the instructor training course fitted in very well with the work of the men as foremen. . . . The features of the course which made for an increase of efficiency were those which dealt with trade analysis, the proper giving of instructions so that they would be most easily and effectively absorbed by the worker, the retaining of the attention of the worker while giving him instructions, the giving of jobs in a progressive order and to the most suitable men, the creation of a sympathetic and sincere viewpoint toward the worker, particularly in connection with the handling of men who are new to the yard, and the planning of operations, so that equipment could be used to fullest capacity and the movement of material take place with minimum friction and loss of time (p. 73).

WAR DEPARTMENT TRAINING

Although this instructor training was designed for shipyards and operated as a program only in shipyards, its principles attracted wide attention, and many industrial men from then on advocated these principles. In the first World War as in the second, there were in Washington many men on loan from their own companies. Among them were C. R. Dooley and Walter Dietz, on assignments for the War Department, both of whom knew "Skipper" Allen and "Mike" Kane, and who helped to spread the story of the new developments in training of industrial instructors.

The War Department Committee on Education and Special Training (of which Mr. Dooley was vocational director and Mr. Dietz secretary) developed instructional material for use by colleges in training men in almost one hundred trades needed in the Army. In every one of its manuals this statement was repeated:

There are two fundamentals that the Committee wishes to impress upon instructors:

1. An efficient instructor must be accurately informed as to what jobs a carpenter, or a blacksmith, for instance, may be called upon to do in the Army.
2. Methods of instruction must be used which in the time available will best train men to do these jobs.

Learning to do by doing (that is, solving problems on the job under the guidance of a trained instructor) proved to be not only an ex-

cellent means of instruction in both skill and trade knowledge, but resulted in production and not merely exercises. The assignment of jobs, asking of questions, and presentation of problems in advance of detailed technical instruction did much to develop originality, initiative, and resourcefulness.

TRAINING PRINCIPLES DEVELOPED IN WORLD WAR I

The Emergency Fleet Corporation experience and that of the Army can be summarized as establishing these principles:

1. Training must be done *within* industry.
2. Instructors should be plant men, preferably supervisors.
3. These supervisors would need help in the method of instruction.
4. Break-in time is cut by training on the job.
5. The most effective size of group for training by one instructor is from 9 to 11.
6. Spelling-out the importance of work and giving of personal attention develops worker loyalty.
7. Training is an investment—its costs are paid by eventual increased production.
8. Ability to instruct is an important supervisory qualification.
9. The four steps in good instruction are: 1. Preparation; 2. Presentation; 3. Application; 4. Inspection (or test).
10. Job analysis or the making of job breakdowns is an important preliminary step before instruction.

Many industrial people "accepted" those principles verbally, but there were few indications of their use.

THE WORK OF CHARLES R. ALLEN

When the war ended, Allen was recognized as an authority on industrial instruction. In 1919 he summarized his long experience in vocational education work in Massachusetts and the advances made in the Emergency Fleet Corporation in a book, *The Instructor, the Man, and the Job*. In it he spent considerable time stressing the difference between "teaching" and "telling." Then he set up the difference between "instructing" and "showing." Those who are familiar with TWI materials will find a familiar vein in the following quotation from Allen:

The foreman of a shop is responsible for the training that is given there. . . . Whether he carries on the training work himself, or whether he puts the actual work of instruction into the hands of instructors, he should know what constitutes good instruction. . . . If he gives the training himself, he must know how to do a good instructing job. If he has instructors, he must know whether they are or are not giving good instruction. . . .

Many foremen have had considerable experience in training. . . . Many such men, while they know that they have succeeded in putting over

the training, are conscious that something has not been just right—they have known that while they knew the jobs to be taught (or their instructors knew them), many new men failed to “catch on” readily, seemed to progress very slowly, were “dumb,” and often never seemed to get so that they could do a first-class job. Sometimes, a good many of the men in training would quit before they were trained, giving all sorts of reasons, and so increasing the turnover.

The trouble, of course, lies in the fact that, whether whoever gave the instruction was or was not a first class man on his job, he did not know “how to put it over.” He may have known his own game but he did not know the instructing game (p. 361).

It is interesting to note that Allen practically sensed the need for the three TWI supervisory programs when he said:

. . . we would have the best conditions if: (1) each man were trained so that he could do his job in the best possible way; (2) each man were trained to do his job in the least time compatible with thorough training; (3) the experiences of each man during the training period had been such that he stayed through the training period and did not quit when only partly trained (p. 5).

This certainly hints a supervisory training program of (1) Job Methods, (2) Job Instruction, and (3) Job Relations!

PRINCIPLES OF INDUSTRIAL INSTRUCTION BETWEEN THE WARS

The work of the Emergency Fleet Corporation and the Allen books influenced much of what was written about instruction. There was almost universal acceptance of the fundamental rightness of the steps he advocated, but, except in vocational schools, there is practically no evidence of any uniform use of the principles as a definite method to follow when people were to be trained on new jobs. Massachusetts continued to use the Allen principles and many other departments of vocational education advocated their use. Some states conducted courses based on these principles for plant supervisors and foremen.

In 1919 the United States Department of Labor's Training Service issued Training Bulletin No. 12, *How Training Departments Have Bettered Production*. There was an excellent discussion of the four instruction steps and of just how the instructor should work with the new man in the section, “A General Plan for Organizing Training in a Community,” written by Owen D. Evans of the Boston Continuation School.

Use of the Allen 4 steps, in printed card form, began at the Dunwoody Institute in the twenties, where C. R. Allen was a staff member. Charles Prosser, the head of Dunwoody, likewise had associated with him Philip S. Van Wyck, now the Director of the WMC

Bureau of Training. The Allen 4 steps were used in basic instructor courses at Colorado State College beginning in 1929.

Following Allen's statement of the four steps, a number of other people in the training field began to discuss the steps and to occasionally present them in different form. In the *Handbook of Business Administration* (edited by W. J. Donald, McGraw-Hill, 1931) there are numerous references to instruction steps. H. G. Kenagy, in a section titled, "The Technique of Training on the Job," mentions 4 steps—demonstration, trial, correction, and follow-up. Guy Via's 1927-28 series of "Foremen's Lectures" are quoted showing the use, at Newport News Shipbuilding and Dry Dock, of the 4 steps of preparation, presentation, application, and testing. W. W. Charters, in his chapter on "Building a Sales Training Program," recommended five steps, (1) job analysis, (2) demonstration, (3) try-out, (4) correction, (5) follow-up, and coaching on-the-job after principles had been learned in group instruction.

Outstanding discussions of the proper approach to industrial instruction are found in *Plant Training Practices*, published by the American Telephone and Telegraph Company in 1930; in *How to Instruct* by Glenn Gardiner, published by the Elliott Service Company in 1936, and in *Job Instruction* which was issued by the Western Electric Company in 1940.

The "Standstill" Years, 1919 to 1940

The work of the Emergency Fleet Corporation group, the resulting Allen books, and the others following his point of view, influenced much of what was written about instruction. There was some activity in instructor training but actually these activities were but a spark that served to keep the work from being completely forgotten. Mr. Kane, in the American Telephone & Telegraph Company, continued to work on improved techniques in industrial instruction. Another member of the Allen group, Russell N. Keppel, joined Mr. Dooley at the Standard Oil Company of New Jersey and operated in-plant programs for instructor training.

Throughout depression years there was little pressure until the summer of 1940, when defense preparation first became really serious, for improvement in getting people broken-in on new work quickly. The years from 1919 to 1940 may rightfully be called the standstill years as far as any widespread use of good job instruction principles was concerned.

TWI PROMOTION OF STEP-BY-STEP INSTRUCTION

Training Within Industry's first work was the Lens Grinding survey (see Chapter 2), and the first technical material published by

TWI was the bulletin, "Helping the Experienced Worker to Break in a Man on a New Job." All the TWI districts expressed interest in the bulletin. Some district panel members made actual use of it in plant calls. In early 1941, Los Angeles panel members developed a check sheet for use in "Instructor Training":

1. Do you "break down" the job you are showing into simple, easy steps, and show the easiest things first?
2. Do you give a general picture of the whole job, before starting off on some small part of it?
3. Do you tell them what they should know clearly and simply?
4. If the man you are training repeats the same mistakes, are you sure it is not your fault because you did not explain how to do it so he understands it?
5. Do you make sure he understands the words you use in explaining certain jobs—especially the "terms of the trade" that are new?
6. Do you know, and tell him, exactly how many different operations there are to the job?
7. Do you impress on him the need for accuracy first, speed later?
8. What do you do to keep your helper interested in learning more about the work?
9. Do you encourage him if he is progressing satisfactorily, or rapidly?
10. Do you ever get mad at him, or think he is "dumb" because he does not know as much about it as you do?
11. Are you sure he feels perfectly free to ask you any and all questions that come to his mind?
12. Do you point out the harmful results of his mistakes, and *why* they happened?
13. What do you do about these problems that the one who is learning runs into?
 - a. Getting the one or two tricky points, or "knacks" of the job.
 - b. Trying to get the "feel" of the whole operation.
 - c. Understanding *why* certain things must be done in certain ways, or done "just so."
 - d. Breaking old work habits, or wrong work habits.
 - e. Catching on to a new, or extra tough problem.
 - f. Getting speed with ease.
14. Do you think carrying out the best answers to these questions would help you do a better and faster job of training?
15. Do you think a few hours of training along these lines—that is, in learning how to put ideas over more easily—would help in doing a better job of it?

This list was distributed to the other TWI districts.

This early TWI Headquarters and District attention to the need to assist supervisors in their problem of breaking-in people on new work laid the basis for the development of all the TWI programs, and for its overall part in the production phase of World War II.

Chapter 13

THE DEVELOPMENT OF THE JOB INSTRUCTION PROGRAM

At a meeting of the New Jersey panel in the spring of 1941, Glenn Gardiner announced his belief that, using the original four steps of Charles R. Allen, a standard 12-hour program in "How to Instruct" could be outlined. After some discussion of trials in plants it was agreed that five, 2-hour sessions would provide the best schedule. The contents were roughly outlined and, after consideration of many demonstration jobs, it was decided that the tying of the fire underwriters' knot (which had successfully been used as a demonstration by the New Jersey Vocational Education Staff for many years) was both the most dramatic and the most practical. The group felt that the first two sessions would be needed for the presentation of the proper method of instruction. The remaining three sessions were to be spent on practice.

GETTING THE PROGRAM STARTED IN NEW JERSEY

The projected plan was based on using forty instructors from vocational schools who would be free for full-time work in July and August. This was regarded as a service to be rendered and financed by the federal government. It was figured that they could reach approximately 8,000 men before the schools reopened. Both the State Department of Vocational Education and the Extension Department of Rutgers had been offering courses in instructor training. It was decided that these would be integrated with the new TWI program so that all three Job Instructor programs would be the same.

The First Job Instruction Group

Accordingly, without benefit of any written outline, the first Job Instruction program was put on at the American Steel Castings Company in Newark. The first trial group followed a pattern which now has been used for over a million supervisors who, in groups of 10, have been given 10 hours of basic instruction in how to break-in workers on new jobs, under the leadership of a trainer who was pre-

pared by TWI for this work. The worthlessness of "telling" alone, or "showing" alone, set the stage for a demonstration of good instruction which used the Allen steps. Each member of the group then demonstrated use of the method. (*See Chapter 3.*)

The trainer of this first group found that the method lent itself to presentation in the first session, instead of requiring two meetings. This meant that four sessions, or eight hours, were available for practice by the supervisors. American Steel Castings was pleased with this first group and made an immediate request for the program for all supervisors.

There had been considerable discussion as to whether incorrect or correct instruction should be demonstrated first. Experience in the first group established not only the selling value of using poor instruction first, but that the material could be put over in 10 hours with demonstrations by all members. This first plan included the use of job breakdowns but divided them into "Do" and "Know" columns rather than into "Steps" and "Key Points."

The First Job Instruction Outlines

When this first group was completed, an outline was written for the five sessions, and reference material prepared. On June 19, 1941 the New Jersey district staff and the panel assembled to consider the material, and approved it. A slogan, "If the learner hasn't learned, the teacher hasn't taught," was adopted. This put a new light on the foreman's responsibility for getting new, green, sometimes none-too-promising, people into production quickly.

The First J.I. Institutes

A group of 25 prospective O.P.M. trainers was gathered for the first Institute. It was decided that this number was too large, so the group was split and two Institutes conducted. Each Institute was scheduled for 18 hours, as three 6-hour days.

By the fourth Institute a definite plan had been worked out. During the first 10 hours of the Institute, the five 2-hour sessions were put on. The next two hours were spent in questions about the duties of the trainers. The next five hours were spent in giving each member of the group practice in opening the first session. The last hour was spent on a discussion of how to handle a group of this character.

Promotion of the Program

During the month of June the New Jersey panel was considerably enlarged as it was planned that panel members would do all the promotional work. Each was to approach one new company each week, and was also made responsible for follow-up with that company.

On June 27, 1941, Glenn Gardiner testified at hearings held at Trenton, New Jersey by the Congressional Committee investigating national defense migration:

By far the most important service which this organization is prepared to give to defense industries is a new program whereby a staff of O.P.M. Trainers has been developed and made available to go into defense companies and actually train in their places of business those members of the companies' organization—including foremen, assistant foremen and supervisors—who have responsibility for teaching jobs to new workers and new jobs to old workers. . . .

O.P.M. Trainers who are to do the actual training work in the defense industries are either men borrowed on part-time basis from companies of the state or instructors employed in the State Vocational Education organization. At the present we have available 64 men for this work and the number can be expanded quickly to 200 or 300 if necessary.

We are convinced that this practical program, directed specifically as it is to the very "cutting edge of the tool" will do more to accelerate the assimilation and training of the thousands of new workers in defense industries and the upgrading of other thousands to more skilled occupations, than anything else that might be done.

In all of our work with defense industries we have had the utmost of cooperation. We have had occasion to call upon more than 50 companies to seek approval for the part-time use of some executive of the company in the carrying out of our program and in no instance have we had a rejection to our appeal.

By June 28 promotional material was ready, a colored cover for Mr. Kane's bulletin, "Helping the Experienced Worker to Break in a Man on a New Job."

Industrial Acceptance

Within a month of the start of the program, New Jersey industries were beginning to ask to have their own men prepared as trainers—this need for helping supervisors to break-in green people wasn't going to end with the end of the summer of 1941. What had been originally started as something that would be done during a period when vocational instructors had free time, just could not stop when they went back to the schools. Job Instruction became a permanent, year-round activity, which was later to be broadened by the other programs.

The First J.I. Card

One panel member had been using a pocket card outlining 20 principles of motion economy. He suggested that the same sort of thing be done for Job Instruction. The first card, which was issued near the end of July, read:

HOW TO INSTRUCT

Practical methods to guide you in instructing a new man on a job, or a present worker on a new job or a new skill.

FIRST, here's what *you must* do to *get ready* to teach a job:

1. Decide what the learner must be taught in order to do the job efficiently, safely, economically and intelligently.
2. Have the right tools, equipment, supplies and material ready.
3. Have the work place properly arranged, just as the worker will be expected to keep it.

THEN, you should *instruct* the learner by the following *four basic steps*:

STEP I—PREPARATION (of the learner)

1. Put the learner *at ease*.
2. Find out what he already knows about the job.
3. Get him interested and desirous of learning the job.

STEP II—PRESENTATION (of the operations and knowledge)

1. *Tell, Show, Illustrate, and Question* in order to put over the new knowledge and operations.
2. Instruct slowly, clearly, completely and patiently, one point at a time.
3. Check, question and repeat.
4. Make sure the learner really learns.

STEP III—PERFORMANCE TRY-OUT

1. Test learner by having him perform the job.
2. Ask questions beginning with *why, how, who, when, or where*.
3. Observe performance, correct errors, and repeat instructions if necessary.
4. Continue until you *know he knows*.

STEP IV—FOLLOW-UP

1. Put him "on his own."
2. Check frequently to be sure he follows instructions.
3. Taper off extra supervision and close follow-up until he is qualified to work with normal supervision.

REMEMBER—If the learner hasn't learned, the teacher hasn't taught.

ROUNDING OUT THE JOB INSTRUCTION PROGRAM

In August, 1941 Mr. Gardiner presented the New Jersey plan at a meeting of the TWI District Directors, and it was adopted for national use (*see Chapter 3*). The fall of 1941 was a busy time

during which TWI Headquarters had to both integrate the New Jersey and Headquarters work into one program and at the same time start to promote its use throughout the country.

The New Jersey group's brief outline was adequate for experienced training people, but the ready acceptance of the program meant that there had to be prepared guides and helps from which thousands of inexperienced trainers could present a creditable and effective story that would get lasting results. Thus it was that "working on the manual" was a major undertaking that consumed much time throughout the fall and winter.

Job Breakdowns

The first problem was putting job breakdowns into the program. New Jersey had called attention to the value of breakdowns, and trusted to plants and to supervisors to go ahead. While the New Jersey plan had been realistically based on the view that no one was going to do anything about good instruction until there was something specific to do, this viewpoint had not been carried to the "Get Ready" points. Further needs arose as time went on. It was important that a step and a key point be properly described and defined, that samples of job breakdowns be prepared. Some of the lens-grinding breakdowns were used at first.

Wide use of any training program provides experience and points to needs for improvement which cannot be spotted in any other way. When the Job Instruction program was used on a national basis, in tremendously large plants, in very new companies where the total of supervisory experience was small, in remote areas, experience showed that further refinements and safeguards were needed.

When the program was started, one of the "Get Ready" points was "Decide what the learner must be taught in order to do the job efficiently, safely, economically and intelligently." When, in 1942, this was changed to read, "Get ready to teach the job by—breaking down the job—decide what the learner must be taught in order to do the job efficiently, safely, economically, and intelligently—finding the key points," it meant that job breakdowns were specifically included in the 10-hour program. The proper defining of a step and key point did not come for some time after that. (A sample breakdown is shown in Exhibit 5.)

Other Problems

It was decided that supervisors needed to get an idea of just how good job instruction would solve problems for them. A sheet listing problems was the result. Another difficulty was the lack of industrial or even mechanical experience on the part of many trainers. Conse-

quently many of them found it difficult to cite concise examples of many aspects of a supervisor's problems. Many trainers were asked questions that they could not answer, at least with confidence. Consequently several concrete examples of how to meet the problem of the long operation, the noisy operation, and how to teach "feel" were placed in the reference section of the manual.

Exhibit 5

SAMPLE JOB INSTRUCTION BREAKDOWN

JOB BREAK-DOWN SHEET FOR TRAINING MAN ON NEW JOB In-feed grind on centerless grinder PART <u>Shaft</u> OPERATION <u>grinder</u>	
IMPORTANT STEPS IN THE OPERATION Step: A logical segment of the operation when something happens to ADVANCE the work	KEY POINTS Key point: Anything in a step that might Make or break the job Injure the worker Make the work easier to do, i. e., "knack," "trick," special timing, bit of special information
1. Place piece on plate against regulating wheel	"Knack" - don't catch on wheel
2. Lower lever-feed	Hold at end of stroke (count 1-2-3-4) Slow feed - where might taper Watch - no oval grinding
3. Raise lever-release	
4. Gauge pieces periodically	More often as approach tolerance
5. Readjust regulating wheel as required	Watch - no back lash
6. Repeat above until finished	
7. Check	

THE BEGINNING OF QUALITY CONTROL

In December 1941, the New Jersey District brought its trainers together to answer their common questions and get uniformity of procedure. This was probably the first "quality control" session. New Jersey had reached almost three hundred plants and the staff

was able to give answers to a number of questions and suggestions which had been made. Some suggested that a new worker be brought into the J.I. sessions to serve as the learner, but this was rejected as taking too much time and not being necessary. At this time New Jersey specified that, in order to be certified, a supervisor must attend the first session and three out of the other four, and that he must put on a demonstration. (Later, attendance at all five sessions was made a requirement.)

The necessity of following the manual was stressed. The desirability of holding sessions during working hours was pointed out. Trainers were told they must not permit the group to go out in the shop for an instruction demonstration. By this time, a check sheet for a demonstration had been worked up and trainers were told to follow it strictly. Trainers were warned against having executives just "sit in" on sessions. Full participation of executives was encouraged, but too many did not bother to put on a demonstration—just contented themselves with giving advice.

National Quality Control

TWI Headquarters felt there was need for a national quality control meeting, and summoned one man from each district to Washington in January, 1942. At this meeting, the importance of quality control was discussed and the standard method of handling the first two sessions was demonstrated. The group then discussed the purpose of each of the four steps and the three special instruction problems. The TWI Assistant Directors were helped in coaching the district men by Charles Smith of the Standard Oil Company of New Jersey and A. T. Garrett of the Western Electric Company.

Following this meeting, instructions were sent out to all trainers.

Experience in the field indicates the need for more emphasis on the first item under the heading "What You Must Do to Get Ready to Teach a Job." On the "How to Instruct Card" this item reads: "Decide what the learner must be taught in order to do the job efficiently, safely, economically and intelligently." In order to do this it is required that the first two volunteer demonstrations and the criticism thereof be confined to the first hour of the second session. The entire second hour of the second session should be devoted to detailed instruction on how to break down a job for instruction purposes.

It was specified that the first job breakdown should be that of the fire underwriters' knot. At the end of Session II members were to be asked to bring in breakdowns for their own demonstrations.

FURTHER REFINEMENTS

It was discovered that often workers just copied motions and that they sometimes didn't understand what they were doing. Thereafter

in the Job Instruction program it was not enough that the learner merely *do* the job in Step 3; he was required to tell the instructor *what* he was doing and *why*. The wording of Steps 2 and 3 was changed to embrace this very practical change.

The J.I. Timetable

"Time is Short" posters were in every war plant but nowhere in the Job Instruction program was there any mention of time, nor were supervisors urged to get results by any plan or by any particular date. The phrase, "Have a plan—something to shoot at," was suggested with the idea that each supervisor would be specific about each of his workers and set a date by which each should be capable of meeting a prescribed performance. This first attempt was to have the supervisor work out a schedule by using the following as a guide:

_____ *(worker's name)* _____ should be
able to do _____ *(what job)* _____ and do it _____ *(how*
well) _____ by _____ *(what date)* _____

Shortly this was called a "timetable" and the card was changed to read "Have a timetable—how much skill do you expect him to have, and how soon." These directions were given: "List the workers down the side of the page; list the jobs across the top; check jobs the workers can already do; set dates for completion of training to fill the gaps." This idea had been inherent in the program from the beginning, but, again, too much had been assumed about what the supervisor would "just naturally do."

In spite of the purpose the timetable was expected to serve, it was not really used until intensive coaching of trainers began in the fall of 1942 in connection with the ASF assignment. From this experience grew a new section of the Job Instruction manual. In Step 1, the supervisor was directed to "Find out what he already knows about the job." This is part of the timetable concept, but not every supervisor realized that. Along with the timetable "Get Ready" point, this part of Step 1 was made more specific so that it now reads "State the job and find out what he already knows about it." (A sample timetable appears as Exhibit 6.)

J.I. Breakdown Drill

Another major need that soon became apparent was for better understanding and use of job breakdowns. It was found that the usual "blackboard" presentation gave neither the trainer nor the foremen the training which would enable them to make breakdowns

The 4-Step Method

As part of the sharpening-up process the card wording was revised to the final wording (*see* Chapter 3). It was also felt that something should be done to get better use of the 4 steps. Actually, according to the instruction card, the instructor was supposed to put over the steps and key points in Step 2, and the worker was supposed to give them back in Step 3. It was reasoned that the worker should give back the key points at least. Accordingly a procedure was prepared by which trainers would check this very thing in each instructing demonstration.

Although this concept of the relationship of Steps 2 and 3 was recognized late in 1941, it was not until the fall of 1942 that an exact procedure was adopted for the trainer to use in checking a demonstration, and this insistence on correct instruction in Step 2, including reasons, and getting the reasons from the worker in Step 3 did not appear in the J.I. manual until January, 1943.

This served to further "tighten up" the instructing process and to bring home to Institute Conductors, trainers, and supervisors alike that job instruction really is an exacting process if it is done well and if it is to give outstanding results. The practice of making the learner "give it back just the way he received it" spread rapidly and was willingly received by all those inside TWI and out who wanted to get closer to perfection in the technique of instruction. Knowing how to do a job gives no guarantee of ability to instruct someone else to do it. In ordinary times, people learn through making mistakes. In wartime this could not be tolerated—a worker can do the job right the first time if he is properly instructed.

THE "LAST" REVISION

In early 1944 improvements were incorporated in a new edition. The change which has taken place in Job Instruction procedure can be illustrated by considering the breakdown of the demonstration job, the tying of the fire underwriters' knot. In the original manual the first step is "Untwist about six inches and straighten the free ends of the two wires. Hold wire in a vertical position with the thumb and first finger of the left hand at point 'C' ('C' is the point where the untwisting stops)." In the current manual the step is "Untwist and straighten ends. Hold in left hand at point 'C'." The key point is "About six inches."

The second step in the original outlines is "Using the right-hand wire 'B' make a loop from left to right. Hold junction of loop at 'C' with thumb and first finger of left hand. Extending part of wire 'B' should cross in front of wire 'A'." In the present outline this

step is given as "Make right-hand loop in right-hand wire (wire 'B'). Hold wire at junction of loop and main strand." The key point is "Cross in front of main strand."

The present manual also indicates some changes in the conducting of the sessions. The number in the group was reduced from 12 to 10. It was recognized that supervisors who put on demonstrations of instruction in Session II, before they knew much about the 4-step method, were serving a very useful purpose as "guinea pigs" but were not, themselves, getting practice in use of the method. Accordingly it is now specified that these volunteer instructors in Session II will put on later demonstrations according to the correct method. The work on the timetable was moved to Session III in order to provide more opportunity to get practice, and to leave in Session II more time for the breakdown drill. There is also a complete procedure for commenting on the demonstrations of instruction.

THE JOB INSTRUCTION INSTITUTE

Members of early Job Instruction 18-hour Institutes were largely people with previous experience in instructing or conference leading, and this experience was depended upon heavily.

The Job Instruction Institute was lengthened to four days in November 1942. At that time, with the Job Methods Program just started and the Job Relations Program ready to be launched, TWI Headquarters reminded its district staffs that this emphasis on better trainers for Job Instruction was not too late. "As we see it, Job Instructor Training is the basic 'bread and butter' program, which will be used continuously for the duration. Many companies have lost so many men and have had so many changes since they originally had J.I.T. that they are now ripe to start J.I.T. all over again."

Gradual changes in the Institute took place until the summer of 1944 when, in keeping with the specific technical changes in the program, a radically different form was adopted. The Institute now requires 40 hours and has two parts. When the Institute is set up properly, all members have attended a 10-hour group and have been certified before coming to the Institute.

In the first part, which takes a day and a half, the Institute Conductor drills the members on the three fundamentals of Job Instruction—the timetable, the job breakdown, and instruction according to the four steps. By the end of this first part of the Institute, the Institute Conductor knows whether each man has mastered the fundamentals of Job Instruction well enough to be considered good trainer material. Some men may be dropped at this stage. The second part of the Institute, or three and one-half days, is made up of drill in putting on the actual 10-hour program.

COOPERATION IN THE DEVELOPMENT OF THE JOB INSTRUCTION PROGRAM

In a sense, everyone involved in a program particularly in its early days is a contributor to its development—trainers who discovered effective techniques and supervisors who asked searching questions. Thus it becomes impossible to give recognition to all who assisted in the evolution of the program. The following people, who were in strategic places to make suggestions and improve techniques, were major contributors to the development of the Job Instruction program:

New Jersey Committee

Glenn Gardiner, TWI District Director, Chairman
A. T. Garrett, Western Electric Company
D. M. Heider, E. I. du Pont de Nemours & Company
Arthur H. Myer, TWI District Representative
W. R. Mullee, American Hard Rubber Company
R. C. Oberdahn, Calco Chemical Division, American Cyanamid Company
Howard Pardee, Wallace & Tiernan, Inc.
J. H. Vertrees, Rutgers University Extension Division
Bartley Whiteside, Wright Aeronautical Corporation
Arthur Wrigley, New Jersey State Department of Vocational Education

Later Development

Ellen Aird, TWI Minneapolis District.
John Calhoon, TWI Headquarters Representative
William Conover, TWI Assistant Director
Walter Dietz, TWI Associate Director
C. R. Dooley, TWI Director
M. J. Kane, TWI Assistant Director
John Mollers, TWI Headquarters Representative
V. K. Rowland, TWI Headquarters Staff

Chapter 14

THE DEVELOPMENT OF THE JOB RELATIONS PROGRAM

Job Relations was developed by TWI over a two-year period of research and experiment. In January 1941, Sidney Hillman, Commissioner of the Division of Labor in the Advisory Commission to the Council of National Defense, made this request to the National Academy of Sciences: "What can be done to increase knowledge and improve understanding of supervision at the work level?"

The Academy handed the request on to the National Research Council's Committee on Work in Industry, of which Dr. Lawrence J. Henderson, Director of the Fatigue Laboratory at Harvard University, was made chairman. This committee made an extensive report which called attention to three problems: (1) selection of supervisors, (2) training and development of supervisors, and (3) intensified problems of supervision arising from the emergency situation. In connection with supervisory development, the committee recommended that training be directed toward "improving and accelerating the training of supervisors in handling the human situations under their charge so as to secure maximum cooperation."

When this report was received by Mr. Hillman, he asked Training Within Industry to formulate such a training plan.

TWO YEARS OF JOB RELATIONS DEVELOPMENT

TWI Headquarters obtained the services of F. J. Roethlisberger and John B. Fox of Harvard University and L. J. O'Rourke of the Civil Service Commission, to work with Walter Dietz, Associate Director of TWI, and other Headquarters staff members in determining a method of attack and making preliminary plans for experimental work.

Determining Supervisory Needs

In August 1941 TWI sent out a questionnaire on supervisory needs to several hundred supervisors and their own bosses. When replies to the supervisory questionnaire were received it was found that

both the new supervisors and their own chiefs agreed that one of the most apparent weaknesses was in handling relationships with other people. A number of plants in New England were visited in order to find a pattern for the kinds of problems which were prevalent in plants holding war contracts. Their findings confirmed in the main the needs which were stressed in the replies to the questionnaire.

Suggestions for Supervisory Training

In October 1941 TWI Headquarters asked a group of 25 men from companies with outstanding training programs for their recommendations as to the training method which might be used in this emergency supervisory problem. The suggestions which were received covered content of training but contributed very little toward the training method which might be used. The methods which were suggested were largely lectures or the conventional conference type.

Many of these suggestions centered around the training of the supervisor as a representative of management. Knowledge of duties and responsibilities is a fundamental part of the supervisor's ability. However, responsibilities differ from one plant to another, and early in the study it was agreed that it was impossible for an outside group to set up a standard training program which will prepare a supervisor in one specific plant to handle his own responsibilities in that plant. It therefore seemed inadvisable to sponsor any training in this field through a government agency. TWI constantly recommended that plants themselves undertake this kind of training. Knowledge of responsibilities is a preface to exercising the skill of leadership, and it is the combination of these two which will enable the supervisor to increase his ability in working with people.

Job Instruction experience had already shown that supervisors can be materially benefited through short intensive training programs if these units include drill and practice. It was accordingly decided that TWI would set up a 10-hour unit, to be called Job Relations Training, which would provide practice in "handling the human situations." "Job Relations" was chosen rather than "Human Relations" to emphasize the specific area in which it had been decided to work.

Job Relations Trial Versions

During the fall of 1941 the first 10-hour program was developed. It was tried out in the Simplex Manufacturing Company (near Boston, Massachusetts) in January 1942. Successive versions, each revision being made on the basis of field trials, were used during the year. There were developed, in all, ten versions of Job Relations

before it was felt that the program was ready for national launching. Only minor revisions have been made since that time.

National Launching

In February 1943, public announcement of the availability of Job Relations was made by Mr. Dietz at the Chicago meeting of the Personnel Division of the American Management Association. A demonstration of the program was put on by Mr. Kane. The ready acceptance gave further evidence of a widespread need.

PROBLEMS IN JOB RELATIONS DEVELOPMENT

There was no precedent for Job Relations Training. Of course, many people have studied the extensive literature of psychology of human relations, and other people have worked out "stock solutions" and "useful rules" for "common problems." Most of the successful leaders have just grown by experience to be what they are, and the means they used were highly individual. Their successes depended largely on their own abilities and personalities. Some, unknowingly, often used the essentials of Job Relations, but there was no standard *method*.

Now any person who is successful in handling human situations feels that his own method is right. Consequently, differences of opinion when *one* method is considered are quite understandable. TWI had to have something which could be passed on and something which would work whether the user was a quick or slow thinker, had a friendly or less acceptable personality.

There was much early discussion of Job Relations Training by "experts"—men who are acknowledged leaders in industrial relations work. Their personal methods differed widely. Few of them had tried to formalize what they did into a method. Some had given courses in "human engineering." But they recognized the J.R. pattern as being different—therefore, it was subject to criticism.

A number of the people who attended Job Relations development conferences had no part in actually trying out this training program. Accordingly, there was quite a bit of theorizing mixed in with the reports of actual experience. Eventually it was found that what proved to be really helpful to the first-line supervisor had to be given the most weight.

WHAT JOB RELATIONS TRAINING IS

The Job Relations program represents an evolution. Some principles and devices were used in all versions, but most were drawn from experience with field trials in the cooperating plants.

Supervisory Responsibility

The first session of Job Relations opens with the blackboard development of a chart covering supervisory responsibility. The members of the group are asked "what their bosses hold them responsible for." Usual answers are production, quality, safety, training. No matter what answers the supervisors give, it is shown that people are involved. Therefore, the supervisor gets production through people, gets quality through people; in other words, "the supervisor gets results through people." The relationships between the supervisor and those people are "Job Relations."

Foundations for Good Relations

Next the trainer points out that, just as there are people in every departmental situation, so there are things which are important to all people. Anybody likes to know how he is getting along, he expects credit when it is due him, he wants to know about it if you make changes which affect him, and he wants to feel that he is making best use of his ability. If supervisors really use these fundamentals they prevent many problems from arising.

Treating People as Individuals

These points are important for all people—they lay the foundation for good supervision—but they are not enough. All these people are individuals—they are different. The background, the homes they come from, their personal interests outside of work, their health, their very jobs in the plants combine to make each individual different from any other. (See Exhibit 7 for chart of blackboard work.)

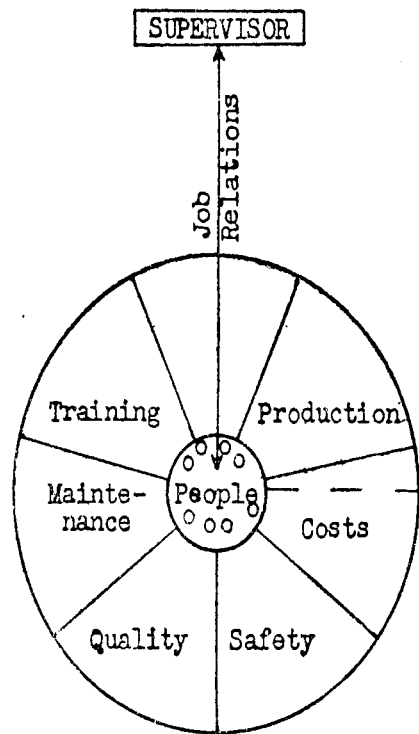
Even in the best-run departments it is necessary to remember that there must be a foundation for good supervision, and that the supervisor must take into account the particular individual who is concerned. It is important to know the kind of person who has a problem—rather than what kind of problem that person has.

The TWI 4-Step Method

TWI advocates a method for handling these problems. In order to show the need for a method, the trainer tells about a man who is laid off for apparent unexcused absenteeism. The supervisor has made no attempt to find out why the employee did not come to work—and the members of the group are quick to point out that it is rather short-sighted to lay off a man whom you need at work—and this supervisor didn't even have the facts of the case. These comments set up the discussion opener, "Just what does the supervisor want to accomplish?" and also make it very easy to draw out the 4-step pattern. (See Chapter 3.)

Exhibit 7
**HOW A SUPERVISOR MEETS HIS RESPONSIBILITIES
 THROUGH PEOPLE**

A Supervisor Gets
Results Through People



Foundations for Good Relations

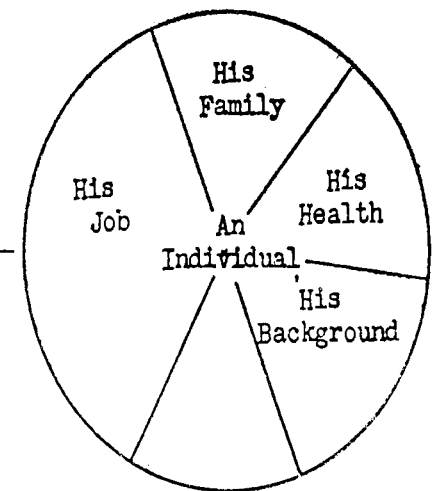
Let each worker know how he is getting along.

Give credit when due.

Tell people in advance about changes that
will affect them.

Make best use of each person's ability.

People Must Be Treated
As Individuals



Trainer's and Supervisors' Problems in Sessions II, III, IV, and V

In the second session the trainer presents a problem in conversational form which both illustrates Step 1, "Get the facts," and gives some interviewing hints on how the supervisor patiently and skillfully got at the personal facts which were having a bearing on the problem. The rest of the session is spent on the discussion of two supervisors' own problems.

The man presenting the problem is asked to tell the story only up to the point where some problem-solving action was taken—that is, to present the facts on which he made or will make a decision. The problem is then considered against the 4-step pattern. Did he have all the facts? Which ones are significant and must be taken into account in making a decision? The members of the group consider a number of possible decisions. The supervisor may then tell what he actually did, if he cares to, but some who have had poor results keep the conclusions of their problems to themselves.

In the third session, the trainer's problem illustrates the reaching of a poor decision with poor results, although all the facts were available. This emphasizes Step 2, "Weigh and decide." More supervisors' problems conclude this session.

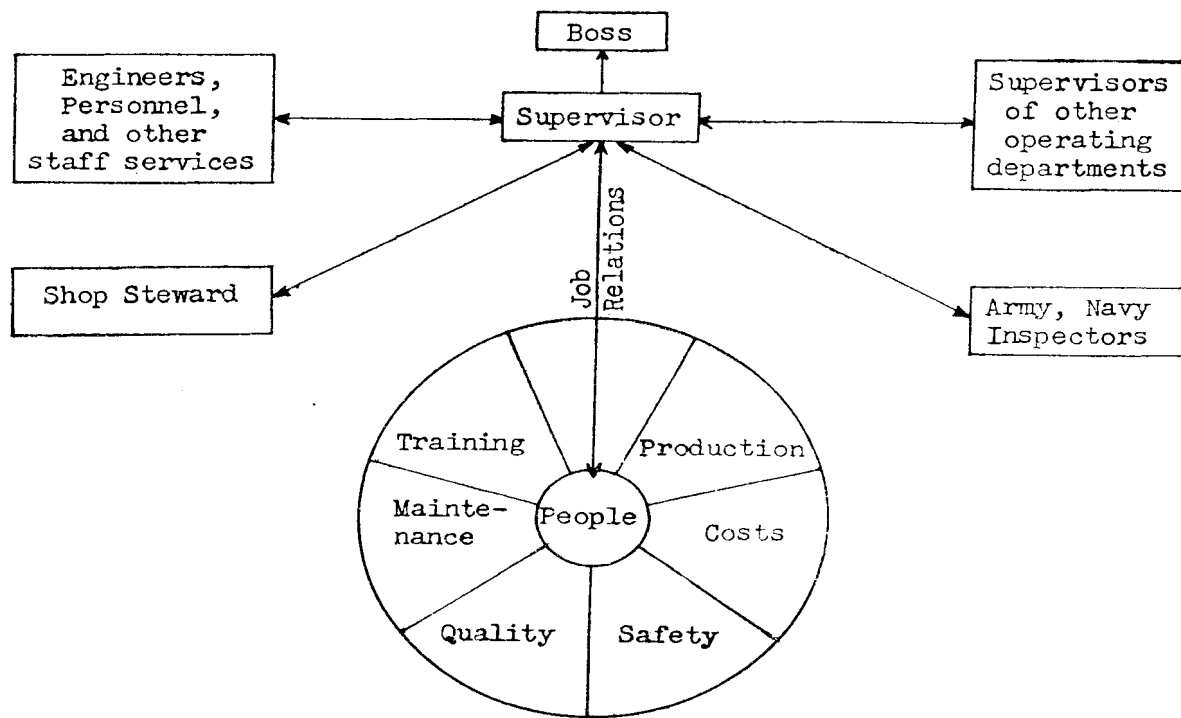
The trainer's problem in the fourth session illustrates Step 3, "Take action," and Step 4, "Check results," in a situation concerned with the effect of change. Supervisors' problems are concluded in this and in the fifth session. In the last session the 4 steps are quickly reviewed to emphasize the necessity of using a method.

Other Supervisory Relationships

In closing the fifth session the trainer returns to the chart on supervisory responsibility and amplifies it to show that the supervisor has relationships not only with the people whose work he directs but with his boss, other supervisors, chemists and engineers, union representatives, inspectors, etc. In any of these relationships it will also be important to keep the Job Relations pattern in mind. (See Exhibit 8.)

DEVELOPMENT OF THE VERSIONS BEFORE LAUNCHING OF THE PROGRAM

The only section of content which was used in every version without change was the first-session chart which shows that in each area of supervisory responsibility people are involved. This chart serves to establish the importance of people in every situation and also to show the meaning given to "Job Relations." It proved especially useful in getting prompt group participation in the first session.

*Exhibit 8***A SUPERVISOR'S OTHER RELATIONSHIPS***Version I*

Three points were selected as the guide for the outline of the first version:

1. Employees are human beings.
2. They are all individuals.
3. It is important to find out how they feel.

A number of case histories of actual job relations problems in plants were selected for presentation to the groups of supervisors. At first, the use of slide film was planned, but it was given up before the first session was held because of introducing mechanical aids which could not be made readily available for wide use. In order to make the points, paired cases were used, well handled and poorly handled. From one case "tips for listening to why people feel the way they do" were drawn out.

Case histories were handed out to members of the group to follow as the trainer read aloud. Later in this version, shorter cases on topics which appeared to be of interest to the individual members of the group were presented for discussion. The fifth session of Version I provided for a discussion of the foreman's situation in regard to other relationships and the use of the chart on supervisory relationships.

Version II

The second version contained no problems of any length. Short accounts of a number of situations were handed out to members of the group who took them home and prepared their comments before the next session. By February 1942, a number of industrial training men had been drawn into the picture. Late in February, representatives of seven plants which had used Versions I and II met in Washington to discuss with TWI staff members the results of their experiments. Version III was the result of this conference.

Version III

In this version, emphasis was placed on sizing-up of situations. Six steps were suggested:

1. Look over the situation.
2. Listen for the personal slants.
3. Line up the factors in the situation.
4. Weigh the factors.
5. Take action.
6. Follow up.

These points were presented on a small reminder card, the first one to be used for Job Relations. The slogan on this card was "Size up before you act."

For the first time provision was made for supervisors to bring in their own problems. This was the direct outgrowth of one experience with Version I where six sessions had to be held instead of five because the supervisors said that working on other people's problems was all very well but they had some of their own that they would like to talk over. There were, however, a number of restrictions as to the kinds of problems which might be brought in—no current grievances, none concerned with unions, none on which plant feeling ran high.

In this third version, when official provision was made for supervisors to bring in their problems, TWI made the attempt to hang them on to the "listening" angle, and asked a supervisor to pretend that he was the employee involved. Another supervisor would handle the case, posing as the supervisor concerned and pretend to interview the person who had brought in the case. Plant try-outs continued and, in April 1942, men who had been putting on the trial sessions met with TWI representatives in Chicago. As a result, Version IV was drawn up.

Version IV

The pretense of posing as the employee involved was abandoned. The experiment had not provided any practice in "interviewing" and

made the supervisors uncomfortable. For the handling of one of the trainer's cases, an interviewing case, a new device was tried. Each remark was put on a separate slip of paper with all the slips fastened together in a bundle. It was thought that better attention could be given to each separate remark if it appeared alone. Two supervisors were asked to read the "parts." However, it was found that they stumbled over the unfamiliar material and the effect of the case was lost, so that device was discarded when a new version was drawn up.

A new card was used. It had on it five points:

1. Be sure that each person knows what his job is.
2. Be sure that each person understands the basis for his pay.
3. Be sure that each person understands the conditions under which he is working.
4. Make each person feel that he is sharing in the war production effort.
5. Watch for significant changes in each person's output, attitude, or relationships.

These were looked upon as sound personnel practices for any company and were used because many people felt that knowing how to handle a problem when it arose was not enough—there had to be some everyday suggestions.

The steps for handling a job relations situation did not appear on the card but on a separate work sheet. They were:

1. Get and consider the facts.
2. Get the employee's viewpoint.
3. Make a decision and take action.
4. Follow up.

This work sheet was abandoned after this one trial as it tended to make handling a job relations situation seem like paper work.

Version V

This version presented few changes except in the card, which was, for the first time, split into "foundation points" and "action points." A short problem was used to illustrate each individual foundation point, and the pattern of the action steps was drawn from longer problems. The "foundations" were:

- Be sure that each person understands what his job is.
- Be sure that each person understands the working conditions.
- Be sure that each person understands what affects his earnings.
- Be sure that the people on the team work together.

The steps were:

1. Find out what is important to the individual and why.
2. Consider the whole background.
3. Make a decision and take action.
4. Follow up and watch for changes.

In April 1942, several members of the TWI Headquarters staff who had not had previous experience with Job Relations put on trial sessions in Baltimore. There were a great many individual ideas tried out in these sessions. At the end of that month a trial Job Relations Institute was held in Chicago. In May 1942, another trial Institute was held in Baltimore.

Five Months' Experience with Try-outs

During these first five months of experiment with Job Relations, sessions were put on for supervisors in twenty plants scattered across the United States. Conditions were constantly varied in order to develop material which could be used under differing circumstances. The plants themselves ranged from established units of recognized organizations which were continuing to do the same kind of work as in peacetime, to plants with rapidly expanding staffs being put into production by new companies which had been set up to handle production of materials and equipment developed for current war needs. In the plants the groups themselves were variously made up of "green" supervisors, experienced supervisors, supervisors of the same organization level, supervisors of different levels (including those who reported to each other), groups of men, groups of women, groups of men and women, groups containing union representatives, and groups made up of representatives of more than one company. Version VI was prepared to summarize the five months' experience.

Version VI

This version represented few content changes from Version V except as were involved in the detail of the material placed on the card. The card contained these foundation points:

- Be sure that each person understands what his job is.
- Be sure that each person understands the working conditions.
- Be sure that each person understands what affects his earnings.

The steps were:

1. Get the facts about the person.
2. Size up the whole situation.
3. Decide and take action.
4. Follow up.

Conference Consideration of Job Relations

In May 1942, Job Relations Training was presented to a conference of TWI District Directors. The group, in general, wanted the program to contain standardized rules rather than a method. There were marked differences of opinion, and it was agreed not to release Job Relations until it had the complete endorsement of TWI Headquarters and until the opinions of some plant managers had been solicited.

Accordingly, in June 1942, selected members of the Headquarters staff and a few industrial representatives from cities near Washington gathered for a review of experience to date and a thorough consideration of this training before launching it in the field.

Version VII

As a result of this conference certain changes were made in the "fundamentals," the importance of which had been given considerable emphasis in the May meeting. From then on they became an important and active part of the Job Relations program.

The number of problems presented by the trainer was reduced to three (one for each of the first three sessions). The broadened chart of supervisory relationships which had been used in Version I was again brought in to close the fifth session to point out the broad usefulness of Job Relations principles. The outlines for the sessions were set up in "steps" and "key points," two-column style. The new card for Version VII presented the following foundation points:

Remember—Everyone Wants

Recognition as an individual

To know how he is doing

Some "say" about things which affect him

Credit when due

To make best use of his ability

- Recognition as an individual

The steps for handling a job relations situation were:

1. Get the facts.
2. Evaluate.
3. Make a decision.
4. Take action.
5. Check results.

This version was tried out in Chicago in August 1942 and in Indianapolis in September 1942. The content and method were well

received by plant groups, but changes in emphasis and timing were found advisable.

Version VIII

As a result of these trials, in the next version, the previous Steps 2 and 3 were combined into a new Step 2, "Weigh and decide," thus reducing the steps to four. In practice, it had been found impossible to determine the end of "weighing" and the beginning of "decision." A fourth trainer's problem was added to provide specifically for discussion of the effects of change. This also provided problems for specific focus on each of the four steps. An important technique of handling supervisors' problems was also developed at this time—the requirement that the supervisor state what he hopes to accomplish before any discussion of the case begins. This "lifts the sights" for many supervisors who have been thinking in terms of "How can I discipline him?" instead of "How can I keep him on the job?"

Version VIII used the following fundamentals of good supervision:

- Everyday recognition of people as individuals.
- Letting people know how they are getting along.
- Giving people a chance to talk over in advance the things that affect them.
- Giving credit when due.
- Making best use of people's ability.

The four steps were:

1. Get the facts.
2. Weigh and decide.
3. Take action.
4. Check results.

Version VIII was tried out in Baltimore and that version convinced the TWI staff members that a working model had been achieved.

Training the TWI Staff

Beginning October 26, 1942, the first Headquarters Master Institute was conducted in Washington for the purpose of training selected members of the TWI field staffs to handle the launching and quality controlling of the Job Relations program. The next week was spent by all of the Institute members in Philadelphia where each man put on two sessions per day in a wide variety of local plants. These sessions were quality controlled by members of the Headquarters staff. Trainers and observers compared notes as to the effectiveness of the methods. Special attention was given to the technique of

handling the problems brought in by supervisors for practice of the method.

Version IX

This version, which was prepared after the Philadelphia experience, did not represent a material change except that the two-column form of sessions outlines was abandoned, and charts for blackboard work were added to the outlines. Its card was almost identical with that used in Version VIII.

Version X

The final version resulted from the sessions held in various districts in December 1942. This is the version which was released nationally in 1943. It was decided that the "fundamentals" would have force only if action points were given. Accordingly, two action points were added under each fundamental. The charts in Session I were expanded to include attention to the differing make-ups of individual persons. This had been talked about but the chart helped to emphasize it in a vivid way.

Some changes were made in the mechanics of handling problems brought in by the supervisors. In order to give emphasis to Step 2, "Weigh and decide," the supervisor was asked to withhold the telling of the action he took, and only tell the facts which were available at the time he made the decision. This results in discussion free from criticism of the action a supervisor has already taken.

Supervisors' Problems

TWI's early stipulation barring problems concerning union matters which might be considered controversial and any that were subject to current attention was withdrawn since it had been found that the overall restriction "Is it up to the supervisor to handle?" was enough. The program now permits bringing in any problem on which the supervisor has to take action.

The first versions spent most of the time on analysis of problems which were brought in by the trainer. It had been felt that management would object to any discussion of internal affairs, some of which might well represent current grievances. Also it had been believed that supervisors themselves might not wish to bring in situations in which they might appear in an unfavorable light. Both of these suppositions were without foundation. Plant supervisors did not want to spend the time on "canned cases." They were living close to their own problems and wanted and needed help on them. And there has as yet (1945) been no management objection to consideration of affairs that are current within the plant.

TWI for a long time had felt that certain problems would require more ingenuity and resourcefulness than many trainers would have. The later versions showed that there were safeguards which would permit supervisors to bring in any problems which were really within their own province—"something which they could or had to do something about."

Changing Emphasis

Job Relations has, in all its versions, given its main emphasis to making the supervisor realize that he is a manager, not a direct producer; that he gets results only through the people he supervises. In the first versions, the entire ten hours was spent in the field of getting to know people—seeing their differences, learning to find out what they meant by what they said. The supervisor was then in a better position to attack his problems. As the program evolved, this necessary part was condensed in order to leave room for the introduction and practice of a method of problem-solving. Thus, what had once been the whole unit became the first step ("Get the facts") of the four-step method.

Problems Presented by the Trainer

In the early versions, ten or more problems were presented by the trainer. In the first two versions no problems were brought in by supervisors, but from Version III on, each member of the group brought one of his own problems. In early versions all the trainer's problems were in conversational form as particular emphasis was placed on getting at the *meaning* of what people said. This, of course, brought in individual differences as well as latent content. And, when supervisors were first permitted to bring in their own problems, those too were tied to the interviewing angle.

Gradually the number and length of the trainer's problems were reduced. As the 4-step method of problem-solving evolved, and the attention to the personal facts became confined to one step of the four, all of the original problems except one were replaced. In the tenth and final version, only one is in conversational style, but in that instance the same focusing on the importance of how people *feel* was continued along with the simple aids to interviewing called "tips for listening." The problems now used are designed to illustrate and enforce the 4-step method.

In early versions paired problems were used to show good and poor handling of the same situation. When the number of problems and the amount of time given to problems presented by the trainer were reduced, this duplication was no longer possible. It had been found that discussion of the poorly handled problems was often more valu-

able than giving attention to those which had good results. Accordingly, the 4-step method is set up in the first session through the use of an instance where the supervisor's mistakes are obvious to practically any member of the group.

In the next session, the use of a skillful conversational case not only shows the importance of the first step "Get the facts" but gives some practical hints on how a supervisor goes at this step. This problem is no longer presented "slow motion," one remark at a time, but there are frequent halts for discussion of "Just why did he say that?" and "What was he getting at?" The pattern for handling discussion of the supervisors' own problems is also emphasized.

In the third session, a problem involving a poor decision shows the importance of the step, "Weigh and decide." In the fourth session a well-handled problem emphasizes the third and fourth steps, "Take action" and "Check results."

The Job Relations Method

The points which were set up as fundamentals to good supervision once included statements of characteristics of a well-run plant. TWI soon saw this mistake and put everything on the basis of what the supervisor alone could do. And the 4-step method was designed to help the supervisor to find what he can best do, in the circumstances as they exist—the very conditions under which a problem was generated.

No rules or standard answers are suggested, and neither the trainer nor any member of the group gives a supervisor the answer to his problem or makes decisions for him. Instead, the ten hours are spent on learning and using a method by which answers to his problems involving people can be found by the supervisor concerned. He develops confidence in his own skill and resourcefulness in using it.

Job Relations Strategy

It had been TWI's experience in J.R. try-outs that trainers do a better job of following the manual if they know "the reason why." Accordingly the Job Relations manual opens with a section called "The Strategy of Job Relations" which explains the purpose of each specific section of content.

DEVELOPMENTS SINCE NATIONAL LAUNCHING

Although Job Relations had been developed by experiments on a scale which probably has never been equalled, it was recognized that the need for further refinements might develop. The ready acceptance given the program meant that soon after the launching of the program in early 1943 the weekly rate of supervisors receiving basic instruction

in Job Relations equalled the total number of supervisors trained in the preceding year of experimental sessions.

The "Problem of the Negro Mechanic"

When the Job Relations program was launched, a problem involving the introduction in a plant of the first Negro mechanic was used in Session IV to emphasize Steps 3 and 4 and to give special consideration to the effect of change. After some months of use, the problem was changed to one involving the appointment of the first woman supervisor in a plant. Before the national launching of Job Relations this particular problem concerning a Negro worker had been used experimentally in many plants including some where race relations were delicately balanced.

TWI work had shown that this problem did not cause trouble, but rather that it did serve a useful purpose illustrating how the Job Relations method works in a potentially dangerous situation. However, since it could not be guaranteed that all trainers would be able to handle this particular session well and since much time was being spent explaining why TWI persisted in using this problem, it was felt best to make the change.

The 1944 Version

By February 1944 when the program had had national use for a full year and 250,000 supervisors had received basic instruction in Job Relations it was felt that a permanent revision of the program could be made and a final manual printed. The revised sessions were tried out during the late winter and spring of 1944 and a new manual issued in June 1944.

No fundamental change was made in the method. The card was changed to incorporate in print what had always been practiced in handling a problem. That is, before the four steps were applied, the supervisor who had the problem had always been required to state his objective or "just what he was trying to accomplish." This was now put on the card. The order of the various items under Step 2 was also shifted slightly. No change at all was made in the foundations for good relations.

Applying the Method

A much more important change, and one that indicated a real difference, was in making a very rigid application of Step 1. This, of course, was not a change in the program but in the way it was handled. If a supervisor felt that he did not have all the facts he was not allowed to go ahead to Step 2 where he would be deciding on possible actions. This occurred because in many groups "get more

facts" or "talk with individual" were recurring frequently as possible actions.

Group Participation in Supervisors' Problems

There had been a growing tendency to "take the problem away from the supervisor." The man presenting the problem told it. Then the trainer asked him to quickly give him the facts and these were noted on the board. The trainer then drew a dotted line below the facts and turned to the group and said: "Now what else do you remember?" They supplied facts which the supervisor had told in his narrative but did not repeat in his listing, and they asked questions which resulted in the supervisor's supplying more facts. All the facts, of course, had to come from the supervisor, but the handling often resulted in an unfortunate appearance of "Look how many more facts *we* got out of this." This was cleared up by outlawing the dotted-line technique and requiring that the problem be handled in the vein of "getting the supervisor to tell us more of these facts which he knows."

JOB RELATIONS FOR UNION STEWARDS

In the spring of 1944 it was felt that just as the trainer who puts on Job Instruction groups for a hospital is given a few tips as to illustrations and vocabulary which will be suitable in a hospital situation, so a trainer used only to management and supervisory thinking should be given a few hints about unions if he were going to put on Job Relations sessions for union stewards. A printed leaflet outlining these changes was prepared at this time.

The major change was the addition of the steward to the Session I chart on responsibilities. The problems were not changed and the supervisor's five needs were presented. However, since approximately seven hours out of the total of ten was spent on the discussion of the members' own problems, the groups made up of union stewards truly worked on union relations.

By the fall of 1944 a number of TWI field staff members said that the volume of union groups was growing to the extent that many of them would prefer a mimeographed manual including the mark-ups to using a printed copy of the manual with pencil changes. Accordingly, the adaptation suggestions of the printed leaflet were incorporated in a mimeographed manual titled "Job Relations for Joint Groups of Plant Supervisors and Union Stewards," which was issued in November 1944.

This manual was used not only for joint groups but also for groups made up entirely of stewards.

Union Job Relations

This handling of the program was satisfactory to most people but in some cases was not considered by unions to be good strategy. (See Chapter 6.)

In February 1945 a Union Job Relations manual was released. This manual discusses the steward's five needs which are expressed as the same as the supervisor's five needs. (TWI did not offer to unions any assistance except in the development of skill in leading.) Only the steward is considered in the chart work in Session I which follows the pattern developed for supervisors. A new card stating the foundations in terms which fit union relations and which include union policies and application of the method was developed (see Chapter 6), and also a union problem sheet. The four problems presented by the trainer are union problems. The supervisor comes into the picture only in Session V where he appears as one of the persons with whom the steward has relations.

BANKING VERSION OF JOB RELATIONS

As with all TWI programs a number of groups and industries not eligible to receive the program from TWI have been able to arrange to get the program going in their own organizations through some such device as making one of their men available as an itinerant trainer and then using him for their own sessions at, of course, their own expense. They have prepared their own materials and quite often have made adaptations. One of the most interesting is that prepared by the American Institute of Banking. The spirit of the Job Relations program has been followed faithfully and the only changes are such perfectly realistic ones as transposing Tom, the industrial worker who sticks his hand into a machine, to Tom, the bank messenger who is careless in driving a pick-up car.

COOPERATION IN THE DEVELOPMENT OF JOB RELATIONS

Many of the following persons put on trial groups of the various versions and others took part in conference consideration of the techniques.

Early Development

Walter Dietz, TWI Associate Director, Chairman
M. E. Carlson, TWI Chicago District
L. E. Castle, Western Electric Company
R. W. Collins, North American Aviation Company
William Conover, TWI Assistant Director

John Convery, TWI Headquarters Representative
W. S. Cooper, TWI Headquarters Representative
R. R. Fisher, Boeing Airplane Company
John B. Fox, Harvard University
L. A. Gappa, TWI Headquarters Labor Consultant
W. I. Gooch, Boeing Airplane Company
E. E. Howard, Armstrong Cork Company
M. J. Kane, TWI Assistant Director
H. J. Kessel, TWI Headquarters Representative
Frances Kirkpatrick, TWI Headquarters
A. E. Lawrence, TWI Denver District
Harry Musgrave, Southern California Gas Company
Arthur Myer, TWI Newark District
Leonard Nelson, Acme Steel Company
L. J. O'Rourke, U. S. Civil Service Commission
M. E. Parker, Eli Lilly Company
F. J. Roethlisberger, Harvard University
J. N. Thompson, North American Aviation Company

Union Adaptation

When the Union Job Relations program was developed, a number of the persons who had worked on the development of Job Relations assisted with the try-outs of a union adaptation. They were assisted by additional labor consultants and TWI district staff members:

Emery F. Bacon, United Steelworkers of America
Thomas Cannon, TWI Pittsburgh District
Frank P. Fenton, American Federation of Labor
Ernest Johnson, TWI Detroit District
Erling Larsen, TWI Headquarters Labor Consultant
William Parrish, TWI Pittsburgh District

Chapter 15

THE DEVELOPMENT OF THE JOB METHODS PROGRAM

The New Jersey staff felt that the Job Instruction program, in addition to giving supervisors help in breaking-in new people, had also done quite a bit to improve personnel relations. Therefore, in August 1941 when the staff met with representatives of Rutgers and of Newark College of Engineering, it was decided that a logical next step would be to develop a program in the field of conserving manpower, machine capacity, equipment, and material.

In the original planning for this unit Glenn Gardiner set the following requisites:

1. A way to comb a plant quickly in order to discover all jobs with possibilities for methods improvements.
2. A method that could be put over to supervisors and which would have practical everyday use.
3. A streamlined program for a group of 10 supervisors in 10 hours.
4. Based on sound methods engineering principles but in simplified form.
5. In accordance with the Job Instruction pattern.

METHODS ENGINEERING PRECEDENT

Work in the field of scientific management had been going on since the turn of the century. The measurement of work and improvement of methods was frequently keyed in with efficiency engineering and with incentive payments. In many cases, the detailed study of the job led to the development of better methods (by the industrial engineer who worked as an expert throughout the plant) and, after operators had been taught these better methods, they then were able to produce more and therefore earn more. All of this work, however, was done by professionals. With the exception of suggestion schemes, there had been no attempt to stimulate individual workers or their immediate supervisors or in fact any persons except trained engineers

in the improvement of methods until the Job Methods program was started.

In the fall of 1941, Clifton Cox, who was professionally trained as an industrial engineer and who had been working on a 10-hour methods program for employees of Johnson & Johnson and was also currently introducing a 30-hour methods engineering course at Rutgers Extension University, joined the New Jersey staff and was given the assignment of developing the new program. There was frequent consultation with industrial engineers. It was of course necessary to constantly stress the fact that Job Methods was not meant to be at a "professional" level and that all technicalities must be kept out.

STRUCTURE OF THE PROGRAM

It had been decided that this program would follow the Job Instruction pattern in that it would be conducted by a specially prepared trainer who would put on five 2-hour sessions for groups of 10 supervisors. In the first session the method of making an improvement would be demonstrated, and a 4-step pocket card giving the principles of the program would be distributed. The remaining sessions would be devoted to the members' demonstrations of improvements they proposed to make by using the 4-step method.

The Radio Shield Demonstration

A number of jobs were considered before selection of the Session I demonstration which was to be used to establish the principles of improving a method. Equipment had to be simple and movable. A motion picture was considered, even tried out, but lack of equipment in many plants and the cost and awkwardness of bringing in projectors ruled this out.

The assembly of a radio shield was selected (*see* Chapter 3). It was not possible, of course, to use actual materials or equipment in the demonstration but it was a job which could be demonstrated very well through the use of replicas. Colored cardboards were used for the brass and copper sheets, and stapling machines were used instead of riveters. This material could be purchased cheaply and transported easily. The old method of doing the job is illustrated in the "Present Method Breakdown" (Exhibit 9) and the improvement by the "Proposed Method Breakdown" (Exhibit 10).

The improvement demonstrated by the J.M. trainer resulted in better use of machine time, increased production, and decreased scrap. This improvement was not accomplished through a speed-up, but through elimination of unnecessary details. Both breakdowns and the proposal were made up on large charts which the trainer displayed before the group.

Exhibit 9

ORIGINAL "PRESENT METHOD" BREAKDOWN

PRODUCT <u>Radio Shields</u>		DATE <u>March 4</u>	194 <u>2</u>
OPERATION <u>Inspect, Assemble, Rivet, Stamp and Pack</u>		DEPT. <u>Riveting & packing</u>	
OPERATOR'S NAME <u>Jim Jones</u>		YOUR NAME <u>Bill Brown</u>	
LIST OF ALL DETAILS FOR ~~EXISTING~~ PRESENT METHOD	NOTES		
1. Walk to box of copper sheets	Placed 6 feet from bench by Handler		
2. Pick up 15 to 20 copper sheets			
3. Walk to bench			
4. Inspect and layout 12 sheets	Scratches and dents. Scrap in bins		
5. Walk to box and replace extra sheets			
6. Walk to box of brass sheets	Placed 3 ft. from copper box by Handler		
7. Pick up 15 to 20 brass sheets			
8. Walk to bench			
9. Inspect and layout 12 brass sheets	1 on top of each copper sheet		
10. Walk to box and replace extra sheets			
11. Walk to bench			
12. Stack 12 sets near riveter			
13. Pick up one set with right hand			
14. Line up sheets and position in riveter	Line-up tolerance .005"		
15. Rivet top left corner			
16. Move sheets and rivet top right corner			
17. Remove, reverse and position in riveter			
18. Rivet bottom right corner			
19. Move sheets and rivet bottom left corner			
20. Remove, reverse, place shield on table			
21. Stamp identification and pile on table	"TOP" on brass - lower right corner		
Repeat #13 to #21 - 11 times			
22. Carry 12 shields to tote box and place in box			
23. Carry full tote box to scale and weigh	50 feet from bench to scale		
24. Make weight ticket and place in box	Approximately 75 lbs. gross		
25. Carry tote box to Packing Dept.	By Handler - 100 feet		
26. Take shields out of tote box	By Packer		
27. Pack shields in shipping case. 200/case	Check inspection. Wood cases supplied by Handler		
28. Close, weigh and stencil case			
29. Mark weight on delivery slip			
30. Set case aside for shipment	Empty tote boxes returned by Handler		

Exhibit 10

ORIGINAL "PROPOSED METHOD" BREAKDOWN

PRODUCT <u>Radio Shields</u>		DATE <u>March 4</u> , 194 <u>2</u>
OPERATION <u>Inspect, Assemble, Rivet, Pack</u>		DEPT. <u>Riveting and Packing</u>
OPERATOR'S NAME <u>William Smith</u>		YOUR NAME <u>Bill Brown</u>
LIST OF ALL DETAILS FOR ~~PROPOSED~~ METHOD		NOTES
1. Put pile of copper sheets in right jig.		Boxes placed on table by Handler
2. Put pile of brass sheets in left jig		
3. Pick up 1 copper sheet in right hand		
and 1 brass sheet in left hand		
4. Inspect both sheets		Scratches and dents. Drop scrap through slots
5. Assemble sheets and place in fixture		Fixture lines up sheets and locates rivet holes. Brass sheet on top
6. Rivet 2 bottom corners		
7. Remove, reverse and place sheets		
8. Rivet 2 top corners		
9. Place shield in front of fixture		
Repeat #3 to #9 - 19 times		
10. Put 20 shields in shipping case. 200-case		Cases placed by Handler
11. Carry full cases to Packing Dept.		By Handler with hand truck
12. Close, weigh and stencil cases		Check inspection by Packer
13. Mark weight on delivery slip		
14. Set cases aside for shipments		

It was emphasized that breakdowns must be made on the job in order to get the small details. While the Job Instruction breakdown is designed to get the important steps and key points, the Job Methods breakdown must show up the smallest details. Unfortunately, in the early stages both the Job Instruction and Job Methods blank breakdown sheets appeared in 2-column form closely resembling each other. The confusion has now been eliminated to some extent by making up the Job Methods breakdown as a 3-column form with one column for details, one for notes, and one for ideas (Exhibits 11 and 12).

The Job Methods Card

The first printed version of the Job Methods 4 steps was as follows:

HOW TO IMPROVE WAR PRODUCTION METHODS

A practical plan to help you deliver GREATER QUANTITIES of QUALITY products in LESS TIME, by making the best use of Manpower, Machines and Materials.

STEP I—BREAK DOWN the job.

1. List *all* the details of operations, moves, inspections and delays, while operators are:
 - a. Moving Materials
 - b. Working with Machines
 - c. Working with Hands and Tools

STEP II—QUESTION every detail.

1. Use these types of questions:
 - WHY is it necessary?
 - WHAT is its purpose?
 - WHERE should it be done?
 - WHEN should it be done?
 - WHO is best qualified to do it?
 - HOW is 'the best way' to do it?
2. Question product design, material, material handling, layout, set-ups, tools and equipment, machines, operator qualifications, work-places and operations.

STEP III—DEVELOP the new method.

1. ELIMINATE unnecessary details.
2. COMBINE details when practical.
3. REARRANGE to get better sequences.
4. SIMPLIFY all necessary details.
 - a. Make the work *easier* and *safer*.
 - b. *Preposition* materials, tools and equipment at the best places in the *proper work-area*.
 - c. *Gravity-feed* and *Drop-delivery*.
 - d. Let *both hands* do *useful* work.
 - e. *Jigs* and *Fixtures* for holding.
5. Discuss your idea with others.
6. Write up your suggestion.

STEP IV—APPLY the new method.

1. Sell your suggestion to the boss.—Get his approval for a trial.
2. Sell the new method to operators.—Give it a fair test.
3. *Safety? Quality? Quantity? Cost?*
4. Get final approval from all.
5. Put it into effect. Use it until a *better* way is developed.
6. Give credit where credit is due.

In all of the J.M. versions, the order of the questions in Step 2 has been stressed. Asking "How" before "Why" would waste time. In order to differentiate "What is its purpose" from "Why is it necessary," the "What" question was made to apply almost exclusively to quality. In the first version of Job Methods the importance of selling the new methods to operators so they would have a fair test was stressed. This original version, however (and the first 4-step cards), talked about suggestions rather than about improved methods.

Exhibit 11

REVISED "PRESENT METHOD" BREAKDOWN

Operation <u>Inspect, Assemble, Rivet, Stamp and Pack</u>		Product <u>Radio Shields</u>	Department <u>Riveting & Packing</u>
Your Name <u>Bill Brown</u>		Operator's Name <u>Jim Jones</u>	Date <u>June 14, 1944</u>
List of All Details for { Present } Method	Notes	IDEAS	
Every single thing that is done—Every inspection—Every delay	Reminders—Tolerances—Distance—Time used—Etc.	Write them down—Don't trust your memory	
1. Walk to box of copper sheets	Placed 6 feet from bench by handler		
2. Pick up 15 to 20 copper sheets			
3. Walk to bench			
4. Inspect and lay out 12 sheets	Scratches and dents. Scrap in bins		
5. Walk to box and replace extra sheets			
6. Walk to box of brass sheets	Placed 3 feet from copper box by handler		
7. Pick up 15 to 20 brass sheets			
8. Walk to bench			
9. Inspect and lay out 12 brass sheets	One on top of each copper sheet		
10. Walk to box and replace extra sheets			
11. Walk to bench			
12. Stack 12 sets near riveter			
13. Pick up one set with right hand			
14. Line up sheets and position in riveter	Line-up tolerance .005"		
15. Rivet top left corner			
16. Move sheets and rivet top right corner			
17. Remove, reverse, and position in riveter			
18. Rivet bottom right corner			
19. Move sheets and rivet bottom left corner			
20. Remove, reverse, and place shield on table			
21. Stamp identification and pile on table	"TOP" on brass - lower right corner		
	Repeat #13 to #21 - 11 times		
22. Carry 12 shields to tote box and place in box			
23. Carry full tote box to scale and weigh	50 feet from bench to scale		
24. Make weight ticket and place in box	Approximately 75 pounds - gross		
25. Carry tote box to packing department	By handler - 100 feet		
26. Take shields out of tote box	By packer		
27. Pack shields in shipping case. 200/case	Check inspection. Wood cases supplied by handler		
28. Close, weigh, and stencil case			
29. Mark weight on delivery slip			
30. Set case aside for shipment	Empty tote boxes returned by handler		

*Exhibit 12***REVISED "PROPOSED METHOD" BREAKDOWN**

Operation Inspect, Assemble, Rivet, Pack Product Radio Shields Department Riveting & Packing
 Your Name Bill Brown Operator's Name _____ Date June 14, 1944

List of All Details for { Proposed Method Every single thing that is done—Every inspection—Every delay	NOTES Reminders—Tolerances—Distance—Time used—Etc.	IDEAS Write them down—Don't trust your memory
1. Put pile of copper sheets in right jig	Boxes placed on table by handler	
2. Put pile of brass sheets in left jig		
3. Pick up 1 copper sheet in right hand and 1 brass sheet in left hand		
4. Inspect both sheets	Scratches and dents. Drop scrap through slots	
5. Assemble sheets and place in fixture	Fixture lines up sheets and locates rivet holes. Brass sheet on top	
6. Rivet the 2 bottom corners		
7. Remove, reverse, and place sheets		
8. Rivet the 2 top corners		
9. Place shield in front of fixture		
	Repeat #3 to #9 - 19 times	
10. Put 20 shields in shipping case. 200/case	Cases placed by handler	
11. Carry full cases to packing department	By handler with hand truck	
12. Close, weigh, and stencil cases	Check inspection by packer	
13. Write weight on delivery slip		
14. Set cases aside for shipment		

One very definite aim of the program from its very beginning was to prevent people from presenting incomplete ideas. An idea may sound good, but when it is presented to the boss he often finds flaws in it. Following the 4-step procedure means that the supervisor himself looks for flaws and does not present the idea to management until he has a complete and workable procedure to describe. Anyone who has had ideas refused or criticized as being incomplete or impossible realizes that this experience often keeps the supervisor from making a later, better suggestion.

First Plans for Operation of the Program

The program was named Job Methods at a meeting held in January, 1942. The first 4-step card was labelled "How to Improve War Production Methods," but that was shortly changed to "How to Improve Job Methods.")

It was specified in the first manual that the trainer should get to the plant before Session III and discuss follow-up with the plant contact man. A review of Job Instruction in Session V appeared in this first version and still is a basic feature of J.M. The trainer's check sheet appearing in this first manual is the beginning of what

has turned into a standard procedure for handling a Job Methods demonstration.

First Job Methods Try-outs

Experimental sessions began in the winter of 1942. The first group was made up of the same supervisors at the American Steel Castings Company who had taken part in the first sessions of Job Instruction.

In the first trials, process and flow charts such as industrial engineers customarily used were employed. Their use was standard in methods engineering work but they were shortly ruled out of Job Methods as being too professional for first-line supervisors.

It was found out that more drill was needed on the learning of the 4 steps and on "selling" the improvement. Also, more group participation was felt necessary. There had to be more care given to getting supervisors to make complete breakdowns and set them down on paper. At this time it was noticed that the question "How is the 'best way' to do it?" in Step 2 was causing supervisors to try to develop their improvement right in that step which properly is only an information-gathering step.

 The program at this time was designed to develop in supervisors a constructively critical attitude toward their work. Although this has now grown into drill in a specific method of making improvements, there has been no change in the objective of helping the supervisors to produce greater quantities of quality products in less time, by making the best use of the manpower, machines, and materials now available.

LAUNCHING JOB METHODS

The Job Methods program was presented to a conference of TWI District Directors in Washington in May 1942. Following that there was extensive explanation of the objectives of the program to labor groups in particular (*see* Chapter 3). Specific launching procedures were worked out:

1. A Headquarters Representative and the District Representative discussed Job Methods fully with the management and labor advisers in each district where an Institute was to be held.
2. A demonstration, requiring 1½ to 2 hours, was held for the panel. Both management advisers and labor advisers were invited, along with a few selected union officials whom the labor advisers wished to bring.
3. A similar demonstration was held especially for union leaders selected by the district labor advisers if they felt such a meeting would be helpful.

In addition, executives of unionized plants were asked whether it would be helpful to discuss the program with union leaders, and TWI staff members offered to assist.

It had been feared that proposals would get "lost"—accordingly TWI recommended to plants a specific way to keep proposals moving through the approval machinery.

Questions about Job Methods

Three questions arose so frequently that standard answers were provided.

1. What should be done if employees are eliminated as a result of a methods change?

This problem is solely one for the company to handle. A general reply which meets all situations is obviously not possible. However, since such an occurrence might be the outgrowth of the Job Methods program, Training Within Industry is interested in it. In considering this question, the following points are suggested: (a) Occasional changes in and elimination of jobs has been going on for years. Therefore, the problem is not new, nor *especially* related to Job Methods Training. Where such a problem arises, it should be handled according to established practice in the company. Factors of far greater importance than this training program affect the tenure of employees' jobs. (b) In dealing with a specific instance during this war period, it is recommended: that no one ever be laid off as a result of a methods change but that an employee thus affected be transferred. . . .

2. What happens to an employee's earnings in case of a methods change?

This whole question is one that is solely a problem of local management. Usually, if earnings are increased, there is little or no difficulty. However, Training Within Industry is interested in the problem because sometimes a methods change may raise the question of earnings. For company consideration, it is suggested that, from the standpoint of the individual worker, a sound and fair policy seems to be to never reduce the employee's net "take-home" as the result of a methods change.

3. Suppose this "methods improvement" idea becomes nation-wide—what effect will this have on the possibility for unemployment in the post-war period?

Again, this whole question is beyond the province of a training program, but the following points of view are suggested: (a) No one knows what will happen in the post-war economy, or post-war period. In fact, the only thing that *is* definitely known about the post-war period is that certain catastrophe will be the result if the United States loses the war. (b) It might be that the improvements developed during the war period would help American industry in post-war competition for world markets. It should be remembered that the industries of each country will be searching desperately for means to continue their economic existence. In the competition for the world's markets, those having the best production methods may be in the most favorable situation. (c) Again, the only sure thing that *is* known is that the United States must win the war. No one can guess what will happen after the war.

The Job Methods Manual

In August 1942, in preparation for national launching, the Job Methods Manual was revised and put in 2-column "steps and key points" typographical style. The previous manual supplements on safety and housekeeping were eliminated.

Training TWI Staff Members

In September 1942 a Master Institute was held at TWI Headquarters in Washington. It was emphasized that the basic philosophy was to get at obvious improvements, and that the approach should be practical rather than technical. Following one week in Washington the Institute members spent two weeks in New Jersey putting on Job Methods sessions under observation.

PROGRAM CHANGES THROUGH NATIONAL USE

In the first manuals the present and proposed methods breakdowns appeared in almost exactly the same form as in the present manual, and the 4 steps were established in a form from which few changes have been necessary. Participation of the operator became part of the procedure for the making of an improvement and, accordingly, the breakdown and proposal forms were changed to include mention of the operator.

The December 1942 Edition

The first manual produced in Washington for nation-wide distribution appeared in December 1942. This actually is the third edition of the Job Methods manual. In this manual the phrase "proposed new method" was substituted for "suggestion." This edition contained additional material on the importance of getting the boss to give credit to the operator who helped the supervisor with his improvement. It also focused attention on the supervisor as the man in the strategic position for the making of improvements.

The phrase "now available" was added to the heading of the card in line with the original intent that supervisors were to be encouraged to find better ways of doing jobs under present conditions, not to stir them up to look for ways out by the use of new machinery and other items which they would not be able to get under war conditions.

This version conceded that not all jobs could be improved, and specified that if a supervisor broke down two jobs without finding an improvement he could be certified. The use of the large wall charts was eliminated and, instead, trainers put breakdowns on the board and handed out copies of the various forms related to the demonstration job. The "final" form of the card was developed at this time (*see Chapter 3*).

Version IV

Early in 1943 the first two sessions only were revised. In this version the two-column form of steps and key points was abandoned and a continuous outline resembling Job Instruction substituted. The opening of the session was also handled in the manner established by Job Instruction. Much material was moved from the reference section to the actual outlines. At this time new material was added to urge that the supervisor explain to the worker what he was doing and to encourage working out his improvement with the operator.

Trainers were directed to put on the board the breakdowns of the jobs which the members demonstrated. A warning about the inadequacy of flash ideas was inserted. Many supervisors were just writing up ideas that they had had for some time, they were not really using the J.M. 4 steps. It was also specified at this time that any person who should receive credit should be mentioned on the written proposal. It was suggested that, near the end of Session I, in order to demonstrate that Job Methods was not a speed-up system, the trainer should act out a speed-up of the present method in order to show that many mistakes would be made through merely hurrying.

Version V

In April 1943 the next version was prepared. This is the first manual which gave detailed descriptions on the exact set-up for the demonstration job, such as using waste baskets for tote boxes. This manual was also the first one to give answers to the Step 2 questions in terms of the demonstration job. In this manual the idea that two breakdowns of present methods could be substituted for an improvement was deleted.

Jim Jones, the operator on the job, was also introduced at this time and the proposal sheet was revised to include a space for listing of the person who helped to develop the proposal.

Version VI

This edition, prepared in May 1943, represented little change from the preceding one. The idea of having the trainer arrange for follow-up in a call on management preceding Session III was dropped. Special emphasis was given to developing the new method with others, with three points made—that the supervisor find out from his boss whether the job was worth trying to improve, that he consult his fellow-supervisors for their experience, and that, of course, he work with the operator.

Version VII

The first printed Job Methods manual appeared in December 1943. The major changes were the moving of more material from the

reference section into the outlines, and the spelling-out of the outlines into very complete directions for the conducting of the whole session. This same manual is still in use but it is supplemented by a "Trainer's Guide" and standard procedures for handling the improvements presented by supervisors in the 10-hour sessions.

WHAT HAS BEEN LEARNED ABOUT QUESTIONING A METHOD

The first Job Methods sessions were frankly designed to develop a questioning attitude among supervisors with the result of getting from them ideas which already were close to the surface. The detailed questioning of the breakdown has meant that it is possible to go far below the surface and really evolve ideas which never could have appeared on the basis of suggestions.

In making a Job Methods breakdown, it has been learned that, in order to really analyze the details, it is very helpful to look first at the verb (which normally is the first word in the detail). For example, take an assembling job breakdown which has these two details: "Reach down to box on floor" and "Pick up bolt." The first step in the questioning process is to ask "Why is it necessary?" If you ask "Why is it necessary to reach down to box?" the answer probably would be "in order to pick up the bolt." If you confine yourself to the verb, and say "Why is it necessary to reach down?" you are immediately led into considering the possibility that the box of bolts should have been up on the work bench.

THE JOB METHODS INSTITUTE

As a result of J.I. experience, J.M. Institutes were from the beginning conducted in a manner that would get across to the trainer simultaneously both the conference technique necessary to handle the group and the concept of the program itself. The Institute procedure remained unchanged until 1945, when it was changed to the Job Instruction Institute pattern. The early part of the Institute shows how Job Methods can be applied to any type of job, and dwells on this point until all members grasp the use of the plan. The latter part of the Institute is then devoted to conference technique and to skill and practice in presenting the program to the group of supervisors.

COOPERATION IN THE DEVELOPMENT OF THE JOB METHODS PROGRAM

As in Job Instruction, early work was done in New Jersey, and Headquarters people assisted in later changes.

New Jersey Committee

Glenn Gardiner and Clifton Cox, New Jersey TWI District,
Chairmen

L. E. Cole, United States Metals Refining Company

A. T. Garrett, Western Electric Company

A. B. Hall, Johns Manville Corporation

D. M. Heider, E. I. du Pont de Nemours & Company

Walter Hoffman, R. C. A. Victor Division

Elmer Kagemann, Bakelite Corporation

P. J. Lathrop, Bristol Myers Company

E. H. MacNiece, Johnson & Johnson Company

W. R. Mullee, American Hard Rubber Company

Frank Nickau, Apprenticeship Field Representative

R. E. O'Donovan, Congoleum-Nairn, Inc.

Howard Pardee, Wallace and Tiernan, Inc.

Later Development

A. G. Blake, TWI Headquarters Representative

William Conover, TWI Assistant Director

Leonard Gappa, TWI Headquarters Labor Consultant

M. J. Kane, TWI Assistant Director

Glenn McNeilly, TWI Headquarters Representative

Chapter 16

THE EVOLUTION OF PROGRAM DEVELOPMENT

There have always been three fundamentals in the Training Within Industry approach to its assignment of helping defense and war contractors to increase production. They are:

1. Getting management to accept responsibility for training as an everyday operating tool
2. Helping industry to help itself
3. Serving as a clearing-house of information on what industry is doing to meet production problems through training

TWI provided three specific supervisory training programs for management to use in improving supervisory skills. The fourth skill for which TWI provided training was called Program Development, a means by which plant representatives who have the functional responsibility of planning the training to meet their own organization's production problems are given specific instruction and practice in the use of a 4-step method.

A plant's production problems *are individual to the plant*. A plant man must prepare to meet them. TWI, through its nation-wide contacts and its experience in preparing people to use its 4-step methods, developed steps for the identification of individual plant training needs, planning of specific, in-plant training, assisting the line organization with the operation of training, and checking of results.

THE BEGINNING OF PROGRAM DEVELOPMENT

In the spring of 1941 the newly organized Detroit district of Training Within Industry began, with the help of the General Motors Institute of Flint, Michigan, to put on conferences for defense contractors. The first conference was held in April 1941. The pattern which was established in the Detroit District was a series of three meetings for groups of 20 to 30 representatives of contracting firms.

The General Motors people were largely responsible for the materials and the leadership. The discussions provided information

about: TWI organization and assistance, general analysis of training problems in national defense industries, consideration of the contractor's own training problems, induction of new workers, training of trainers, developing supervision, and trade apprenticeship.

By the fall of 1941 this program had been extended to Michigan areas outside of Detroit. The ninth and last of this series of meetings was held in January 1942.

In November 1941, Training Within Industry Headquarters, as a result of district requests, decided to attempt to provide some assistance of this type in all parts of the country. Major Albert Sobey of General Motors Institute at Flint, Michigan was asked to help. He offered the services of the G.M.I. staff and the facilities of the Institute for an experimental one-week program. In lining up this conference at Flint, it was decided that the policy and administrative matters involving cooperation between G.M.I. and TWI would be handled between Major Sobey and Mr. Dietz, and that the General Motors development work would be coordinated by Martin Firth.

It was specified that "there would not be room at this small conference for any except those who have, or are slated to have, major responsibility in the training field." It was stressed that "this is not a convention, but a group of men to *work* together, not just listen or discuss." Plant managers were promised that the training directors sent to the conference would be given proven aids to help them attack the problems involved in the specific responsibilities assigned to them. "The method used in the conference grows out of the basic assumption that each member of the group knows his plant problems better than anyone else involved and that it is *his* job to develop a plan to meet his plant needs."

This point of view has remained constant. TWI did not approach plant men and invite them as individuals. Even in cases where TWI knew the person who had the title of training director and where his responsibilities were known to TWI, he was not invited as an individual. The approach was always to top management which was asked to send a representative. TWI helped management to select this person. TWI has always attempted to get management commitment in advance that the representative it sends really is the man whom the plant will count on to design its coordinated training.

THE FLINT CONFERENCE

The first "Training Within Industry Conference for Training Coordinators" was held February 17-22, 1942 at General Motors Institute in Flint, Michigan. The conference coordinators were Walter Dietz for Training Within Industry and Martin Firth for the General Motors Institute. The program covered the following topics:

The Training Job in a Rapidly Expanding Organization
Identifying Training Needs
Methods of Induction
Job Instruction Training or Training the Trainer
Job Relations Training
Organization of a Training Program
Plant Trip to Observe Training Methods
Apprenticeship
Group Training Methods
Training Supervisors
Training Conference Leaders
Increasing the Effectiveness of Training

The members spent one day on preparation of individual training plans and then on the last day each one presented the plan he had made.

The form of the outlines as supplied by General Motors included for each subject a summary of the objective, the time schedule, where the leader's outline came from, charts to guide the discussion, forms needed, text material, name of the leader, description of equipment, description of space requirements.

Each subject treated in the conference was handled in three steps: (1) the conference leader analyzed for the group training problems in that subject and gave illustrations of solutions that have proved effective; (2) each plant representative, working alone, applied the suggestions to his plant problems; (3) each member reported his findings to the group for suggestion and comment.

One of the most effective devices was introduced by Mr. Firth early in the development work. He suggested a conference on the subject of "Looking at What is Happening in Order to Increase the Effectiveness of a Training Program." This approach was used:

1. Question the need—is it essential to effective production that the need we spotted be answered now?
2. Question the program objective—have we defined our training objective accurately so that our trained man answers the need?
3. Question the program content—are we covering the ground necessary to reach the objective?
4. Question the methods of instruction—are we using the right methods to get the content across?
5. Question the instructor—is the instructor handling the instructional methods effectively so he is covering the content and reaching the objective?
6. Question the learner—are we making the best choice possible in selecting these men for training?

THE FIRST TWI CONFERENCES

Following the conference held at Flint it was decided that, instead of taking training directors away from their plants for a full week,

it would be possible to present the material in a series of evening sessions. The idea was that this material could be offered on a cafeteria basis. Various topical conferences would be announced in advance and a man could select those he wished to attend.

TWI said "It was obviously the job of Training Within Industry to give as much help as possible. It was obviously impossible to go into the whole subject with each individual. So it was decided to set up a series of conference outlines that the district organizations can use in getting the answers across to groups of people. In order to make the district program as flexible as possible, meeting the various needs, a number of training units have been set up. Each unit is independent of the others and may be used alone, or all can be used to present an overall program."

The outlines for the Flint conference, except those concerning the TWI approach to specific supervisory training, were drawn from General Motors material. Immediately after the conference TWI prepared its own materials, the greatest change being the decision not to use charts.

General Motors gave to TWI permission to reproduce a number of its leaflets on supervisory subjects. Permission to reprint these was also given to plants provided the General Motors credit was maintained.

Tackling a Problem

Although there was at this time no specific method for tackling the planning of training, three steps were stressed :

1. Spotting training needs
2. Making a plan
3. Selling it so that it is used

This first manual provided specific conferences on :

The Training Job in a Rapidly Expanding Organization
Identifying Training Needs
Supervisory Training
Methods of Induction
Apprenticeship
Training Conference Leaders
Job Instruction Training
Job Methods Training
Job Relations Training
Organization of a Training Program
Increasing the Effectiveness of Training

Following a conference on a specific topic, the members were to be directed to draw up plans for their own plants. TWI Headquarters issued the following instructions to the TWI Districts :

After each group has worked together on the specific areas of training in which they wish to develop programs, the members still will be faced by the problem of effective organization of their training problems. In all probability each member of the group will have absorbed a good many new ideas and will have partially thought out an approach to his problem. If the members of the group make suggestions to their plants at this point, the suggestions may not be in a form that will make them easy for management to accept. The ideas will lack definiteness. There will be a need to get the suggested program into final and complete form. This can be accomplished by pulling the whole group back together again and covering the points outlined in "The Organization of a Training Program." It might be said that the specific objective of the conference is to have each man who attends develop a specific plan through which the training needs of the plant will be met.

At this time the TWI district staffs were still very small in numbers and, accordingly, it was proposed to include all TWI technical personnel in the new program.

The manual issued at this time closely resembled the outlines followed at the Flint conference. Two sections used at Flint were omitted. The plant trip was not included since one experience with getting a number of outsiders into a plant with war contracts had shown that identification problems were quite time-consuming. The other section omitted was the conference display of training methods.

Conducting the Conferences

This program of ten subjects was on the basis that an Institute Conductor would put on the meetings concerned with the TWI "J" programs (all of this was, of course, before the Job Relations or Job Methods programs were ready but their completion was expected shortly and accordingly places were saved for them in the contents), that the Apprenticeship section would be put on by one of the Apprenticeship representatives who served on the TWI panel, and that the material on conference leading would be presented by a representative of Vocational Education. These men were to be asked to furnish printed materials from their own agencies. TWI planned to furnish its own bulletins, of course, plus supervisory materials from General Motors reprinted by TWI with General Motors permission.

The District Representative in each district was to put on the introductory section and those on identification of training needs, organization of a training program, and increasing the effectiveness of training. Panel members were to be coached to present methods of induction and the section on training of supervisors.

It was planned that a district would invite industrial executives and training men to an introductory gathering at which the whole program would be outlined and a schedule of conferences on the specific topics requested by the group would be set up.

As a transition from the use of the General Motors charts, some alternates were suggested. From the abbreviated chart copy which was supplied in the outlines, each leader could make up small easel charts, or he could use the chart material as reminders for himself, or he could put the points on the blackboard in order to give them stress.

Training the TWI Staff

In the summer of 1942 four area conferences in New Jersey, Indiana, Missouri, and California were held to acquaint the members of the TWI district staffs with the new training director material.

District Experience

A number of the districts held meetings following the pattern outlined in the specifications permitting a cafeteria basis. Baltimore held half-day sessions. Chicago held full-day sessions one week apart. New York held a series of evening meetings, as did Philadelphia. In Philadelphia the groups were limited in size to twenty members. Occasionally there were four different groups meeting in one week.

In Cleveland there was no restriction on size, and occasionally there would be an attendance of close to two hundred. Cleveland interest in the common problems of plant training directors resulted in the formation of a group which met at regular intervals. At these meetings various companies presented their own training problems; specialists discussed such topics as upgrading; school people gave announcements of evening courses available. Indianapolis did not attempt to set up Training Director conferences but sponsored a training luncheon club and TWI staff members occasionally drew on the material for program use.

The Pittsburgh Personnel Association cooperated in a series of industrial training conferences which reached 142 persons. Five conferences were held in all. The usual pattern was to have a group meet one day a week for five successive weeks.

During the period that these conferences were being put on, on an assorted basis, a number of districts decided to change to full-day conferences rather than scattered evening sessions. Accordingly, as in New York, for example, four full days of work were scheduled. Following the discussion of each topic, time was allowed for the members to draw up brief training plans for that subject.

EXPERIENCE WITH THE PROGRAM

Difficulties connected with the conference technique were soon found. When people were asked to give their ways of meeting training problems or give suggestions, it was sometimes difficult to keep

the group from accepting ideas which just were not in agreement with TWI experience. TWI began to look at its clearing-house function as concerned with making available its broad experience with thousands of war plants rather than just opening up the discussion for the members of any one small group. Accordingly, the viewpoint began to move from that of information to actual instruction.

Renaming the Program

By January 1943 the program was known as "Training for Training Directors" but there was dissatisfaction with the name. Later it was changed to "Training Directors' Institute." "Training Director Conferences" was used next. Many production people were attending these conferences so the elimination of the words "training director" was desirable. Since the "J" programs had set the pattern for giving a two-word name to a kind of training, the name "Program Development Training" was finally selected in April, 1943 after the consideration of some thirty suggestions.

Supervisory Selection

The National Research Council's Committee on Work in Industry had recommended in 1941 that something be done to help plants to select new supervisors. During the winter of 1943 there were many requests from plants which said their supervisory training was not succeeding because of the poor calibre of the supervisors who were being trained. TWI borrowed, from the Procter & Gamble Company, R. S. Uhrbrock, the head of their Industrial Relations Research Department. Based on the experiences of many industrial companies, he set down a simple, standard plan for supervisory selection (*see* Appendix). This was incorporated in the Program Development manual.

While the Supervisory Selection plan was in draft stage, it was submitted to all of the TWI labor and management advisers, both those associated with the Headquarters staff and the district staffs. Advisers approved the plan as simple and specific, but recommended broadening of the field from which nominations were drawn by letting supervisors nominate others than the men in their own departments; that workers, either as individuals or through unions, might make nominations; that people might nominate themselves.

The response from labor advisers was particularly favorable. They said they could ask for nothing better than to think that nominations would be open, that all people would be judged in the same manner, and that a group could make the judgment.

The plan provided that: (1) nominations for supervisory candidates be drawn from the whole plant; (2) that consideration be given

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by a group not by just one person; and (3) that, in addition to the evaluation of all other records, all candidates were to be measured with one uniform objective device such as a simple test. It was recommended that supervisors not be considered on the basis of locating just one person for one opening, but rather as a pool of supervisory possibilities which could be developed in order that good men, wherever they were located in the plant, would get consideration wherever the vacancies occurred.

The selection program was not something which TWI went into a plant and did, rather it was a procedure which a plant uses for itself.

MAKING PROGRAM DEVELOPMENT MORE SPECIFIC

In the winter of 1943 it appeared very clear that there was much interest in the field of development of in-plant programs and practically any approach used had much value. However, the conclusion was reached that no pattern had been established and that the program was rapidly increasing in its differences from district to district. Accordingly, the TWI Headquarters development group began working with representatives of a number of TWI districts.

First P.D. Method

In February 1943 the first 4-step method was used. It was not, however, put on a card until some time later. The method was:

1. SPOT SPECIFIC NEEDS.

Analyze records—individual performance, cost, turnover, breakage, rejects, accidents, etc.

Get supervisors and workers to tell about their current shop and office problems.

Anticipate problems caused by future organization, production, or other changes.

2. DEVELOP A PLAN.

What content?

Who should do the training?

When should it be done?

How can it be done best?

Where should it be carried out?

Consider relation to overall training program.

3. OBTAIN MANAGEMENT SUPPORT.

Stress needs.

Discuss training, purpose, and methods.

Estimate advantages and results.

Plan notification through line organization.

4. LAUNCH PLAN AND FOLLOW THROUGH.

Secure understanding and acceptance by those affected.

Go ahead and TRAIN.

Check results and report to management.
Increase effectiveness.

The first work sheet was used at this time. It started out with the spotting of a training problem for which specific evidence of need was required. (Of course, experience showed that looking for a *training* problem was the wrong approach and this was changed to a *production* problem.) The problem sheet was also introduced at this time. It has had practically no changes in later versions.

The fundamental idea of this Institute was to give thorough discussion of various areas of training, including the three TWI supervisory programs, in order to give the man three days' intensive work on background in the training field. After one week's work in his own plant he then returned to present his plan.

THE SPRING 1943 VERSION

In April 1943 the development group reached these conclusions:

1. That Program Development Training would be handled on an Institute basis.
2. That the Institute would be scheduled for four full days, preferably three of them consecutive, and then a week later another full day. Various alternates were provided—four days a week apart, five consecutive half-days and one full day.
3. This Institute was not to be confused with group meetings for trainers.
4. Each district should attempt to hold one Institute for twelve men every three to four weeks.
5. Promotion, scheduling, conducting the Institute, and all follow-up was to be the responsibility of a specific staff member who, preferably, would also be a qualified trainer in all three "J" programs.

TWI Headquarters decided that the program had the objective of training "those persons in the plant who had the responsibility in the training field of originating (identifying) needs, organizing, selling, and administering in-plant training programs."

As industrial familiarity with the "J" programs increased, the demonstrations of these programs became a rather dull feature of the P.D. Institute. To avoid this, in April 1943 it was proposed that Follow-Through of Job Instruction be used instead of the Job Instruction demonstration, and that a problem be handled in Job Relations rather than giving just the standard demonstration. It was proposed that the Job Methods demonstration be shortened considerably.

The District Institute Conductors were trained individually. A number of districts did extensive work, but some did not use the program at all. Again, wide differences grew up between districts.

PROGRAM DEVELOPMENT FOR ARMY SERVICE FORCES

In March 1944 TWI was asked to put on a Program Development Institute for the Army Service Forces in Washington.

For some time the way P.D. was handled had been criticized on two grounds: (1) the conference method was not specific and led to unsound generalizations, (2) there was neither adequate training in the method nor time for presentation of a real plan, and consequently the Institute Conductor was tempted to do a superficial remodeling of the plan in the Institute.

Accordingly, it was decided that the only way to get out of this trouble was to get the people working on plans much sooner. This could be done if they could work on sample problems. For the A.S.F. Institute held in March 1944, a new approach was tried. A set of material was made up with references in three general fields: training of supervisors, training of non-supervisors, and the overall plant training program.

Each man was given a reference book and a specific individual problem assignment in the form of a narrative account of a plant situation which indicated a need for training. The man was to use the reference material and draw up a training plan following the four steps, using the specified work sheets. The problems themselves were not particularly clear. The assignment was like an academic exercise and the result was not what TWI had hoped for.

REVISION IN THE SUMMER OF 1944

In June 1944 two P.D. Institutes were put on following a revised pattern—two consecutive days of work, a week's interim, and then two more full days. For these Institutes a new card was developed:

1. SPOT A SPECIFIC NEED

Anticipate problems which result from changes in organization, production, or policies.

Review records—individual performance, cost, turnover, breakage, rejects, accidents, any other evidence.

Get supervisors and workers to tell about their current shop and office problems.

Look for opportunities for improvement.

Analyze for basic causes.

Consider possible solutions.

Tackle One Thing at a Time.

2. DEVELOP A SPECIFIC PLAN

Who will be trained?

What content?

How can it be done best?

Who should do the training?
 When should it be done—how long will it take?
 Where should it be done?

Watch for Relation of Plan to Overall Training Program.

3. GET PLAN INTO ACTION

Present to management the expected results.
 Stress evidence of need—use facts and figures.
 Discuss plan—content and methods.
 Submit timetable for plan.
 Train those who will do the training.
 Secure understanding and acceptance by those affected.
 Fix responsibility for continuing use.

Be Sure to Get Management Backing and Participation.

4. CHECK RESULTS

Is the plan being followed?
 How is it being kept in use?
 Are the expected results being realized?
 Are any changes necessary?
 Is management being informed?

Did the Plan Help Production?

RESPONSIBILITY FOR RESULTS THROUGH TRAINING

The LINE organization has the responsibility for making continuing use of the knowledge and skills acquired through training as a regular part of the operating job.

A STAFF group—(or often one staff person)—provides plans and technical “know how”; does some things FOR but usually works THROUGH the line organization.

Defining the Field

For some time the 4-step card had been headed “How to Meet a Production Problem through Training.” However, the discussion in P.D. Institutes had quite frequently been concerned with training problems which were not related to specific production problems. Accordingly, by June 1944, it was decided to present quite early in the Institute the following definitions:

What is Production?—End result—product or service—of an organization, plant, department, or unit.

What is a Production Problem?—Anything which interferes with production. (We uncover some production problems and try to correct or improve them; others can be *anticipated* and may be prevented.)

What is Training?—A way to solve production problems. (There are many ways to deal with the material side; training deals with the personnel side.)

What is a Training Plan?—An organized method of solving a specific part of a production problem.

What is a Training Program?—A combination of training plans coordinated to meet the training needs caused by a specific production problem.

What is a Training Director?—A person who has the responsibility for developing and coordinating training plans and programs in order to help management solve its production problems through people.

What is Management?—Those persons responsible for accomplishing the end results in terms of product or service.

This device was found very successful. It helped staff men to see a new and better approach to getting management support for their plans by giving them the tip to present their plans in terms of the factors which were worrying the boss. At this same time it was found helpful to put a simple chart on the blackboard showing the relationship of line and staff people and indicating that the staff man assists the line organization but has no operating responsibility.

Handling Plant Training Plans

As a result of successful experience in the Job Relations program a standard procedure for handling an individual demonstration had been adopted in Job Instruction. Accordingly, Program Development now followed the example of J.R. and J.I. and developed a standard procedure for handling an Institute member's plan. The fundamental purpose of the standard procedure is to insure that only the member presenting the plan is asked about plant facts and about solutions which are possible in his plant. Other members of the group are permitted to ask questions about the existence of related conditions and to make suggestions as to suitable methods and aids.

The June 1944 manual still depended on sample problems but did not count on their being used as overnight assignments. Instead each was introduced by a short discussion of the area of training in which the particular problem was located. Then the problem was read aloud and the group, or in some cases one individual, worked on it. This was found to be theoretical and confusing to the members of the group. It tended to cause arguments as to whether the problem was real and lost sight of the method.

Coaching Institute Members

At this same time it was decided that better work could be done on the real purpose of the Institute—acquiring some skill in the planning of training—by giving the members individual coaching in the interim between the two sections of the Institute.

The card was slightly revised again, and put in its present form (see Chapter 3).

Experience with Sample Problems

When the development group met in August 1944, it was decided that there must be a basic change in the problem technique. It was

decided to restrict the use of sample problems to the giving of experience with the mechanics of the P.D. method. In those fields where TWI had material which it believed would be of value to the group it was decided to handle it on an instruction basis, not through problems. It was also concluded at this time that the general looseness of the manual was directly responsible for misinterpretation, and that the outline needed to be much more specific than had originally been believed necessary. The philosophy of "we will have only experienced men putting on this program—therefore, it is safe to leave a lot up to them" was definitely abandoned. The Institute as now outlined presents specific informational material in the following fields:

- Induction
- Selection of Supervisors
- Conducting Meetings
- Methods and Aids for Training
- Getting a Plan into Action
- Checking Results
- Line and Staff Responsibility for Training
- Organization of Training Plans into an Overall Training Program

Since the major purpose of the first section of the Institute is to insure that the members really will know how to use the 4-step method when they go back to their plants for the interim between the two sections of the Institute, it was specified in the September, 1944 version that an overnight assignment be given at the end of the first day of the Institute. This assignment required each man to consider in terms of his own organization what would happen if his plant were suddenly given a release, new contract, or increased employment ceiling permitting the plant to put 200 people on a new kind of work—possibly peacetime production—within four weeks. This permitted consideration of a plant which might have to convert or expand or reconvert.

All of these plans were to be gone over in the group in the morning of the second day of the Institute. In this way the Institute Conductor was to find out whether he had put the method across to each individual member. Because of the sketchiness of the problem, it was very easy to point out that training plans cannot be made away from the plant. Also at this time the period between the two sections of the Institute was increased to 10 days in order to give members more time to work on their own plans.

In September and October, using the new Program Development manual, four Master Institutes were put on across the country in order to prepare all districts simultaneously to present a standard program.

1945 REVISION

During the winter of 1944-45 a number of changes were introduced in experimental Institutes with the result of issuing a new 5-day Institute manual made nationally available in June, 1945.

Drill on Method

When the P.D. Institute was made available nation-wide in the fall of 1944, a number of drill problems, commonly referred to as "quickies," were included in the afternoon of the first day. The variety of drill problems was found to be both unnecessary and confusing. Many people thought that these short problems were giving answers to what to do in similar situations. There was some complaint about the lack of evidence in the problems since it was being regarded as problem-solving, not as drill. This point was clarified in the spring of 1945 when the number of drill problems was reduced and specific emphasis was put on the fact that these problems were used only so that members might gain familiarity with the P.D. work sheets (which are simple tools that help with the application of the P.D. 4-step method).

The result of this change in handling the work sheet problems was that work on the overnight assignment was done with clearer understanding than had existed before. In the fall of 1944 it had been planned that one-half day would be allowed for the presentation of this assigned problem, but it was found that, when the assignment was undertaken on the basis of better understanding, the work which was brought in had progressed so much further that it could not be dismissed in a half-day. Accordingly, a full day was added to the first section of the Institute and approximately a day and a half is now included so that consideration of each member's solution of the standardized problem can be given.

Handling the Problems and Plans

This kind of practice resulted in the members' being in much better position to work on their own plans in the interim between the two sections of the Institute, and improved the quality of the work brought back to the second section of the Institute.

All of this headed toward the need for a better standard procedure for handling the 4-step plans of the members. There are certain points where only the man presenting the problem can supply information (such as what the evidence really is, who actually will do the training, etc.). In other cases the members of the group can participate and can broaden the discussion thereby. The use of the other members of the Institute in a questioning role reduces the possibility that the Institute Conductor will "expert" the

problem. Accordingly, in the June, 1945, manual a very specific standard procedure which spells out who does what, and when is included.

P.D. Attention to Induction

In all Program Development Institutes attention has been given to the field of "induction." TWI uses this term as meaning "introduction of the worker to the place and to the work." It is looked at as a training job, not as mere information. Instruction in how

Exhibit 13

PROGRAM DEVELOPMENT STEP 1 OF INDUCTION PROBLEM

What is the Production Problem? Production down to 80%			
EVIDENCE	TRAINING ACTION NEEDED		OTHER ACTION NEEDED
	Training for Whom?	Training in What?	
1,000 jobs in plant			
Never more than 950 filled			
Never more than 900 at work any one day	Every absentee	Importance of work	Investigation too long?
Turnover 5% a month plant-wide			
Turnover 20% a month, less than 3 mo. service			
Turnover 30% a mo., third shift, under 3 mos.			
Absenteeism 5% a month plant-wide	Every absentee	Importance of work	
Absenteeism 15% a month, under 3 months' service, approximately same all shifts	All new people and present short service	Importance of work	
Averages 10 months to get up to guarantee on piece rate	All new people and present short service	Work they are to do	
90% of rejects from less than 6 months' service	All new people and present short service	Work they are to do	
<u>Quits</u>			
Provoked discharges			
Transportation, third shift			See bus company
Didn't like jobs	All new people and present short service	Importance of work	
Didn't like supervisors	Supervisors	How to work with people	Better superv. selection?
Thought work dangerous	All new people and present short service	Safe practices	Check safety equipment?
Didn't like pay	All new people and present short service	Work they are to do How to figure pay	
<u>Absenteeism</u>			
Didn't think work important	All new people and present short service	Importance of work	Hall displays of completed product, news pictures
Looking for better job	All new people and present short service	Work they are to do Importance of work	Investigate provoked discharges?
Tired	All new people and present short service	Work they are to do	Any better methods?

"TACKLE ONE SPECIFIC NEED AT A TIME"

Exhibit 14

PROGRAM DEVELOPMENT STEP 2 OF INDUCTION PROBLEM

What is the Specific Plan? InductionTraining for Whom? All new employeesTraining for How Many? 50 a month

What Content?	How Can It Be Done Best?	Who Will Train or Help?	When? How Long?	Where?
Company production - mobile mounts for rocket guns one of newest weapons decreases Infantry casualties	Show completed product Point out what employee will do	Supervisor	First half-hour. Individually as soon as new em- ployee is brought to department	Supervisor's desk
Size of company orders - not up to full production	Sketch on paper how daily lag piles up		If necessary to keep waiting, provide some em- ployee magazines	
How people learn jobs safety - first quality - second quantity - third, but very important - Army and <u>your pay</u>	Description of job training			
How pay is figured guaranteed minimum piece rate deductions	Figure with him at his own rate; stress advantages of beating guarantee Summarize deductions		30 minutes to 1 hour depending on employee	
Company policies interests of employees "good place to work"	Mention company standing and attitude; tell him he will like plant			
Company rules , badges no smoking	Explain 2 rules, give rule book to take home and study; invite questions	Supervisor		
Company facilities lockers - showers lunch package passes driving clubs	Take him to locker Arrange worker take to lunch Does he need one now? Find out how he gets to work			
Detail on pay minimum piece rate pay period - lag deductions withholding tax Social Security war bonds union dues	Use his daily time cards Figure with him what his pay envelope will contain Answer questions Show him how he can increase his pay - on job every day increased production		Individually, day payroll is turned in - 30 minutes	Supervisor's desk
Detail on rules	Go through booklet - answer questions	Supervisor	Individually End of first week - 15 min.	Supervisor's desk
official company welcome	Speech and rocket news reel	Plant Supt.	End of month, all new employees, approximately 50 in group	Auditorium
Detail on facilities recreation, sports employee store employee magazine	Explanation	Personnel Director		
Detail on vacations and pensions eligibility dates provisions	Explanation Distribute printed plans	Personnel Director	1 1/2 hours	

What is the Relation of this Plan to Other Current Training Plans and Programs? This can and should be undertaken for all new employees as soon as they come to work; we should catch up on all short service employees as soon as possible. Other plans can't start until people are trained to handle. Supervisors can do this now.

to perform work is ruled out. Induction is applied largely to supervisory responsibility and thus is separated from larger orientation programs and from anything which is done before the person actually reports for work. TWI has stressed the importance of following good induction procedures when an employee is transferred or when a work situation so changes as to make it virtually new.

The manual issued in the fall of 1944 provided for the development of a composite induction problem from various items of evidence supplied by members of the group. An attempt was then made to develop a composite plan out of this evidence. There were a number of difficulties. For one thing, the evidence did not fit together. The P.D. Institute Conductor had to force the evidence into a pattern which was pre-determined as headed toward induction. Accordingly, the manual issued in 1945 substituted at this point the presentation of a problem by the Institute Conductor and the demonstration of a Step 2 on induction developed from this evidence. (See Exhibits 13 and 14.)

Practice on Method vs. Practice on Problem-Solving

At this same time it was pointed out that the assignment of a more or less standardized problem which could, however, be looked at in terms of each member's own plant, gave practice in use of the method. It is not until a member returns to his own plant and really spots a problem that he gets practice in actually solving a production problem through training.

THE PROGRAM DEVELOPMENT WORK SHEETS

Beginning in the winter of 1943 various work sheets were developed. By the spring of 1944 there were various editions of the work sheets for the different steps. One factor remained constant. The first item in Step 1 was always to get a statement of the production problem. Following this, however, there was considerable variation. The intent through all of these stages was to get details and causes of the production problem in order that solutions might be considered.

The members were encouraged to do their Step 1 work in the following order:

1. Identify the production problem.
2. Spot a specific need. (A great deal of detailed work on an analysis sheet was involved at this stage.)
 - a. How did the need arise?
 - b. What is the specific evidence of the need in terms of facts, figures, percentages?

- c. Just what will the solving of this production problem accomplish?
- d. What are the specific conditions or basic causes creating this production problem?

For each cause under "d" there was to be a possible solution suggested. The specific evidence was then transferred to the Step 1 work sheet and—

- 3. A specific plan developed—presumably one of the solutions from the analysis sheet.

To avoid the confusion caused by this approach and concentrate on what was really wanted in this step the analysis sheet was discarded and the Step 1 work sheet amplified to include:

- 1. What is the production problem?
- 2. List your facts.
- 3. For each fact, the cause.
- 4. For each fact, a training need if any.

The attempts to break this material down into the "facts" and the "causes" resulted in confusion. The purpose was not to train people in how to distinguish between cause and effect, but just to make sure that, before a training plan is made, the designer has a true knowledge of just what is going on in the plant in order that he can remedy specific situations which produce the problem. At this time it also became apparent that the indication of training needs alone was not enough. Too often a thorough exploration of a production problem showed that some other kind of action than training was necessary. Sometimes this other action must precede training action. Accordingly, the work sheet was adapted to include space for notes on such other action as checking on bus schedules or getting a policy stated.

Following very brief use of this approach it was decided that it could be made more clear by using "evidence" in place of "facts," using "underlying conditions and causes" in place of "causes," and considering for each item of evidence the action that was needed whether it was training action or some other kind. The next stage in work sheet development was:

- 1. The production problem (how is it spotted?)
- 2. A combined listing of evidence and underlying causes and conditions.
- 3. Any training action needed and for whom (supervisors or non-supervisors)
- 4. Any training needed in what (knowledge or skill)
- 5. Any other action needed.

The work sheet that was eventually adopted for Step 1 includes:

- 1. What is the production problem?
- 2. Evidence.
- 3. Training for whom?
- 4. Training in what?
- 5. Other action.

Production Problems

Many people have special difficulty in stating the production problem. Many of them instead give the training director's objective. When this preliminary statement is in terms of an objective, it often rules out alternate actions and heads everything toward something that is predetermined. Making this statement in terms of a production problem leads to a general exploration of the evidence, gives specific points to overcome in planning the training, provides reasons why the training should be undertaken, and gives bench-marks to check against in looking at the results.

Methods and Aids

The work sheet for Step 2 has had practically no change since it was first drawn up. It has always followed the card very closely and includes the content, the method, the persons who will train, the length and timing of the training, and the place where the training is to occur. In order to improve work on Step 2, a brief outline on Methods and Aids was developed.

However, the existence of elaborate aids will not guarantee the success of a training plan. The methods are more important, and the methods must be those suited to the individual situation. That is, if someone is to learn to do something he must practice it under observation so that he can be given instruction until he really knows how.

Steps 3 and 4

There have been various work sheets for Steps 3 and 4. In general these work sheets merely restated the steps on the card, usually putting them in question form. By August 1944, it was determined that, if Step 1 has been carefully done—that is, if the production problem has really been broken down into its elements—and if Step 2 has been prepared to meet a specific need as shown in Step 1, Step 3 then becomes a check list on how to use the Step 1 and Step 2 work sheets in presenting the plan to management. The work sheets for Steps 1 and 2 also serve as reminders of necessary management participation at this stage. Step 4, of course, represents a follow-up of Steps 1 and 2. Therefore, it was decided that for Steps 3 and 4 there could be no prescribed form, that the training directors should be urged to use the card as a basis for making their own notes about the way they were planning to carry out "Get plan into action" and "Check results."

Use of the Work Sheets

Since the work sheets represent a quick and yet thorough way of using all the material in Steps 1 and 2, it was found necessary to spend

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time on specific instruction in the use of the work sheets. In the present Institute, the afternoon of the first day is spent in drill on the use of the work sheets for Steps 1 and 2 and the kind of notes needed for Steps 3 and 4. This is handled by presenting two (or if needed, more) very brief narratives of production problems from which all members of the group work out Step 1 work sheets; then Step 2 work sheets, and so on.

WHAT HAS BEEN LEARNED ABOUT STEP 1

In some companies it has been discovered that one of the best ways of uncovering evidence of production problems is through supervisory conferences. In some companies training directors automatically review all records. When a training director has not previously worked closely with the line organization, it is recognized that he is going to have to show why he wants such intimate and detailed production information. It is good strategy to do a good job in a small field before attempting to tackle a very extensive problem requiring that he dig very deeply into production matters with which he had not been formerly concerned. There is, of course, no substitute for top management support of the training director which can be given through openly sponsoring his work and making information, records, and even people available to him.

It has been necessary to warn training directors against jumping to conclusions about evidence. Cost figures in themselves may not be important. The sum may seem large unless relative cost is considered. When it is not possible to get a trend of company experience or when there has been no previous situation to check results against, it often has been found possible to get industry averages.

It is very important to get evidence stated in terms of people as otherwise the training action may not be pointed toward the exact persons who need more knowledge or skill.

There is no reason for a training director to advocate setting up formidable new records. Normal company operating records give information about costs, production, scrap, turnover, etc. A training director can and should use these. Sometimes an additional item can be added to an existing record. When results are checked against existing records there is much more conviction than when a new device is set up.

In some cases people have tended to look at Step 1 as providing alternate courses of action. If a production problem was spotted through evidence provided by supervisors and workers, occasionally some one would overlook the other ways of getting evidence and just go ahead and analyze what he had and identify training needed. It is now stressed that the training director must go on through the

other ways of finding evidence—that is, reviewing records and anticipating effects of changes—before he is ready to make any plans for training to overcome the problem.

HANDLING THE INSTITUTE MEMBERS' PLANS

The directions concerning the handling of the members' own plans (that they have made during the interim between the two sections of the Institute) have also been subject to change. At first the members merely spoke from their notes or did blackboard work if they chose. It was found that this often slowed up discussion since a number of the Institute members were not experienced in presenting their material, doing blackboard work, and holding the attention of a group all in a short time.

As a result it was suggested in the outlines used in the spring of 1943 that members put their plans on large sheets of paper which could be hung up on the wall. One result of this was immediately apparent. If a man happened to start with the training problem instead of a production problem, the work sheet was off to the wrong start. If this were allowed to stand in front of the group, the wrong approach was stressed. If it were corrected by either the Institute Conductor or the member presenting the plan, the effect was not too good.

Therefore, it was specified that the Institute Conductor would question the member presenting a plan and if necessary keep on working with him until a suitable reply was given. Thus the Institute Conductor would draw out from the member the information to put on the board as a Step 1 work sheet. If the member had brought copies of his Step 2 work sheet, they were distributed but otherwise the Institute Conductor also put Step 2 on the board. In all cases the second, third, and fourth steps of the method were covered completely.

The official attitude as to whether it is wise for the Institute members to take away at the conclusion of the Institute copies of other members' plans has varied greatly. For a time the official instructions said very specifically that members were to be discouraged from bringing in copies of their plans to hand out and that it was the Institute Conductor's responsibility to see that any such copies were retrieved. The Institute Conductors themselves were almost unanimously against this regulation and it was not observed. Accordingly, the final instructions were that bringing in duplicate copies of plans was not to be urged, and that the Institute Conductor must in those occasions where duplicates were provided warn the members that the plan from one plant never can be exactly transposed to another.

Program Development Institutes offer a particularly tempting field for loose generalizations on the subject of plant standards, manage-

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ment organization, and supervisory responsibility. It was necessary to give Institute Conductors specific warning against permitting discussion of this sort and getting over the point of view that each training director must make up his own plan in the light of the exact situation within his own plant.

PROGRAM DEVELOPMENT AND THE "J" PROGRAMS

The fundamental principle of Program Development is that training should be individually designed to meet the specific evidence of a particular production problem in the plant. Some confusion has existed where people have felt that the existence of the TWI "J" programs was a direct contradiction to this philosophy. This occurs when people look simply at the 10-hour training sessions of one of the "J" programs.

If the evidence of a problem indicates that the needed training action is helping the supervisors to become better instructors, the man who is using the P.D. method still has work to do in the remaining three steps of P.D. in developing his specific plan, getting it into action, and checking the results. He does have available for his use tested instructional techniques which make up part of his Step 2. He still has to plan the selection of people to receive this training; the introduction of the plan to the people who are going to be trained; the preparation of the people who do the training; the arrangements for time and place. Most important of all, he must plan for the coaching which comes after the 10 hours of group instruction. The training director also must consider the relation of this plan to other training plans and programs.

In the spring of 1945 a sample P.D. Step 2 plan for Job Instruction was prepared for members of the P.D. staff in order to establish a minimum basis for illustration of how the Program Development method is used in connection with the other TWI programs (*see Exhibit 15*).

USING THE "J" PROGRAMS IN PROGRAM DEVELOPMENT INSTITUTES

The techniques of the TWI supervisory programs were used to quite an extent in Program Development. When content is planned it is helpful to consider what is known of good instruction; that is, training is planned to include something which gets the person interested, which shows clearly what he is to do, which gives him a chance to practice, and includes the checking of results. The Job Relations and Job Methods programs are likewise useful in various stages of P.D. work.

Exhibit 15
PROGRAM DEVELOPMENT STEP 2 FOR JOB INSTRUCTION

What is the Specific Plan? _____ How to Instruct (TWI Job Instruction Program)

Training for Whom? _____ All Supervisors

Training for How Many? _____ 200

What Content?	How Can It Be Done Best?	Who Will Train or Help?	When? How Long?	Where?
Introduction				
Need for skill of instruction	Announcement of changes	Plant manager	4/5/45 - 11-12am	Auditorium
changed product	Blow-up charts of new specifications		100 suprs. on first shift	
changed raw materials		Plant manager	4/5/45 - 9-10 pm	Auditorium
veterans returning			70 suprs. on second shift	
Value of TWI Job Inst. program	Examples	Night supt.	4/6/45 - 5-6 am	Conference room
results in other plants	"		30 suprs. on third shift	
problems of this plant	Blow-up of plant-wide time table for 10 hrs. of J.I.			
scrap - breakage	(NOTE 1)			
Scheduling of all supervisors for J.I.	Explanation	Plant manager	4/9/45 - 10-12am	Conference room
Session I			(NOTE 2)	
Personal value of skill of instruction.			10 in group.	
Management expects results	Explanation	Plant manager	10 minutes	
Intro. of trmr. - reason chosen	Name cards	Trainer		
Self-introductions requested	Description			
Supervisor's 5 needs	Problem sheet			
Imp. of ability to train	Demonstration		1 hr. 50 minutes	
Weaknesses of trng. methods	2-strand electric wire			
Telling - showing	Demonstration - electric wire			
TWI 4-step method	Blackboard			
"1. Prepare the worker	Job Instruction cards			
"2. Present the operation				
"3. Try out performance				
"4. Follow up."				
Session II				
Instruction by 4 steps alone	Demonstration by 2 members	Trainer	4/10/45 - 2 hrs.	Conference room
Necessity of making job bknds.	Group discussion			
How to "break down the job" -	Demonstration - knot -			
steps and key points	blackboard			
"Have everything ready"	Practice on demonstrated			
"Have the wplce. properly arr."	jobs - breakdowns disc.			
Session III				
"Have a Time Table"	Demonstration	Trainer	4/11/45 2 hrs.	Conference room
How to make timetable				
How to instruct, using	Practice by 3 members			
breakdown and 4 steps	Comments by trainer			
	Group discussion - blkbd.			
Session IV				
Timetables				
How to Instruct	Discussion of members time-tables	Trainer	4/12/45 2 hrs.	Conference room
	Practice by 4 members			
	Comments - discussion -			
	blackboard			
Special instruction problems -	Explanation - group discus-			
long operation, noise,	sion			
"feel"				
Session V				
How to Instruct	Practice by 3 members	Trainer	4/13/45 2 hrs.	Conference room
	Comments - discussion -			
	blackboard			
How skill of instruction can	Statement and appeal	Plant manager	10 minutes	
be acquired - company				
policy to "use J.I."				
Coaching				
What supervisor got out of it	Questioning	Supervisor's own boss	First time,	On the job
Understanding of method	Explanation		within 3 days of	
Advantages of use	Examples		fifth session -	
Application today - current	Discussion		one supvr. at a	
problems			time, repeat when	
			and to degree	
			needed	

What is the Relation of this Plan to Other Current Training Plans and Programs? "Trainers" can be

ready by April 9. This will permit scheduling all supervisors before vacation time; no other super-

visory training going on at present. No more than 10 supervisors will be off duty at any one time.

NOTE 1: Trainers will have been prepared by TWI, will have instruction outline to follow, and materials.

NOTE 2: Two groups daily for first shift; two groups daily for second shift; 1 group daily for third shift; all completed in five weeks - May 11.

IN-PLANT P.D. INSTITUTES

Some companies requested the holding of P.D. Institutes for the representatives of that company alone. Several of these in-plant Institutes were run on a mistaken basis. In some cases members were line executives who were not going to have any staff responsibility for planning to meet production problems through training. Their interest was solely in P.D. Step 1; that is, in the statement of the problem, the gathering of evidence that a problem existed, and the consideration of various actions. In other cases the members attending these in-plant Institutes were going to use the second step of Program Development or, in some cases, only a part of that step. In other words, they were instructors, not training directors.

TWI was forced to set very specific requirements for these in-plant Institutes. It was required that the members have functional responsibility for spotting and analyzing problems, planning and recommending training action, taking appropriate steps for getting the training into operation, and checking results. In order to conserve TWI staff time, it was made mandatory for the plant which wished an in-plant Institute to first send its training head to a standard P.D. Institute. Following his participation and certification, TWI gave him special coaching so that he could select the right members for the in-plant Institute and give them coaching between the two sections of the Institute. The P.D. Institute Conductor from the TWI staff, of course, conducted the actual five days of the Institute.

COOPERATION IN THE DESIGN OF PROGRAM DEVELOPMENT

In the introduction of trials of various revisions, development of content and preparation of problem material, the following people assisted:

Walter Dietz, TWI Associate Director, Chairman
Lee S. Adams, TWI Chicago District
C. C. Atwood, TWI Indianapolis District
H. H. Blomeier, TWI Headquarters Staff
William Conover, TWI Assistant Director
G. S. Cooper, TWI Philadelphia District
W. S. Cooper, TWI Headquarters Representative
C. V. Davison, TWI Cincinnati District
R. S. Driver, TWI Philadelphia District
Martin Firth, General Motors Institute
J. D. Haygood, TWI Headquarters Representative

Walter Hildebrand, TWI Cincinnati District
Frances Kirkpatrick, TWI Headquarters Staff
J. H. Kohlerman, TWI New York District
F. H. Perkins, British Ministry of Labour
V. K. Rowland, TWI Headquarters Staff
H. T. Smutz, TWI St. Louis District
Major Albert Sobey, General Motors Institute
R. S. Uhrbrock, The Procter & Gamble Company

Chapter 17

DEVELOPMENT WORK AHEAD

In looking at the simplicity of TWI programs it would seem that, since they only represent common sense, their development should have been possible without too much trouble. But it must be remembered that a lot of non-essentials had to be eliminated. One real job was streamlining and intensification. Another problem was standardization—it was felt that each of the TWI tools must have uniform application. Therefore they had to be tried out in a variety of situations—in plants new and old, well-run and poorly-run; with supervisors who were old-hands and those who were green; by trainers who were already experts and those who were scarcely competent to handle a group.

The TWI programs have been developed under opportunities never before available—the nation's war plants have been the laboratory, the experimental shop, and the proving ground. Development work would have continued as long as TWI existed—no program is ever perfect, and no program is any good unless it meets needs. Since needs change, any program must be kept growing.

UNFINISHED WORK

All of the TWI programs were given extensive try-outs before national launching, but use on a very large scale did point out some additional places where improvements were needed. The Job Instruction and Job Relations programs were revised on the basis of field experience as late as 1944 and Program Development in 1945. These versions have held up well and no further change had yet been suggested or considered necessary. However, in Job Methods and Union Job Relations TWI is leaving some unfinished work.

Union Job Relations

The Union Job Relations program, which is drawn from Job Relations for supervisors, was first made available in the winter of 1945 and revision was planned after more experience had been

obtained. The Union manual follows the supervisors' manual very closely and represents almost a case of word changes alone. The few places where changes were necessary were in the four problems presented by the trainer, one of which is presented in each of the first four sessions. These problems were selected as being the best of those available at the time the Union Job Relations program was launched, but the intent was to watch for stronger problems which well might develop from groups of stewards just as the problems in the eventual Job Relations manual were a result of problems brought in by supervisors in some of the early trial sessions.

No better substitutes for the Union problems had yet been uncovered when TWI work ended, but, if TWI development work had continued, a definite search would have been made for problems which would be both more common and more useful. The trainer's problems are used to illustrate the method. When the nature of the problem itself is discussed, there is loss of attention to the method. The "perfect" problem would be one which any group member would feel had been drawn from his own experience.

A Joint Approach to the Skill of Leadership

Some of the finest Job Relations results have stemmed out of joint sessions of supervisors and stewards. When a supervisor and a steward discuss a problem in which both have responsibilities, and each pulls from his pocket "the little blue card," there is a common basis to start with. The standard Job Relations program, while successfully used by stewards, does leave out the steward's responsibility for problems. The so-called "joint" manual did not go far enough in bringing unions in. The Union Job Relations manual ignores supervisors.

It would have been possible to develop one program which considered both stewards and supervisors. This development work did not get done by TWI—it is left for someone else to do.

Job Methods

The Job Methods program has been subject to some misunderstandings, and it had been hoped that these could be cleared up. Some people felt that this program was at an industrial engineering level. TWI would have attempted to make it clear that the objective was to give to supervisors skill in improving the methods of jobs which are done in their own departments every day and which are within their province to improve. Some people felt that TWI, by "discouraging flash ideas," was losing a lot of value. The intent was to get across the idea that a supervisor should grasp hold of every idea that does flash through his mind but not just let it go at that. He should break down the job and really work on develop-

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ing a truly improved method including those growing out of flash ideas.

Other features of Job Methods which were being considered for improvement were really mere manual arrangement, such as the moving of some reference material into the training outlines. Many trainers said that it was their experience, in the first session, that the 10 supervisors in the group would get off to a faster start in acquiring understanding of the J.M. 4-step method if the trainer would show exactly what the supervisor did in the natural chronological order. That is, the demonstration should be scheduled in this order, (1) demonstrate the present method; (2) use Job Methods on this job in order to develop an improvement; and (3) present the proposed method. An attempt would probably have been made to show just how each of the questions in Step 2 could be applied to every detail. None of these changes could have been made without try-outs.

There has been long confusion over the Job Methods breakdown made up of details, and the Job Instruction breakdown made up of steps. Something would have had to be done to clarify this. The Job Methods Step 1 might be "List the Details" or "Analyze the Job."

A few people got the idea that J.M. advocated making improvements just for the sake of making improvements, and TWI would have liked to give some help on how to pick bottlenecks or to locate the most important jobs as the places where improvement should begin.

There are some things about Job Methods which are not said in the manual but which have crept into the program. In the radio shield demonstration some trainers grunted while they lifted pseudo-heavy cases, purposely fell flat where they acted out a speed-up, and poured on the patriotic appeals. Others did not follow these practices, but the suggestion that they should gave them poor opinions of the program. How to maintain interest through dramatizing some of the situations needed to be experimented with.

Evaluation of Results

As time went on perhaps the most frequent demand for assistance within plants came from those functionally responsible for training who were trying to get away from the old bromide, "Training you know is intangible, and the results are so far-reaching that they just can't be measured!" Such experimenting as has been done looked promising when it was held to the specific objective of measuring the results of training in terms of effects on production. In other words, if training was set up to reduce accidents, what was the accident rate at the time the training was started, what was the

effect on the accident rate at intervals after the training had been in effect long enough to be fairly judged? Some efforts in this regard broke down because of the insistence that, only after methods and operations were so systematized that definite standards of performance could be set up, was it possible to do a reliable evaluating job.

Another difficulty was encountered when efforts were made to evaluate end-results of comprehensive and long drawn-out training efforts. Definite experimentation in this area looks promising and should prove effective if, as a start, those phases of production and operating which can most easily be segregated and measured are tackled first. By experimentation, current situations could be tackled and some controlled experiments set up which should prove convincing in progressively establishing some better measurement methods.

Two types of research are definitely indicated. First, that which has for its purpose the evaluation of results in terms of its effect upon the end-results as looked upon by the operating and production people, and, second, the training specialists' evaluation of the results of training as affected by his choice of training methods. These are two definite and distinct problems and they must be approached separately through different methods of attack although eventually the findings in each area will be closely related. Progress in this area will probably be made only if step-by-step efforts are made to evaluate the results which are the most easily get-at-able, rather than attempting to do too thorough and too comprehensive a job for a beginning.

Requests for Help in Meeting Current Needs

There were recent demands for special services—the application of the Job Relations technique to problems connected with returning veterans, and use of Job Instruction on safety problems for example. TWI has said what it has said to industry so many times before—“you have the tools, go ahead and use them.” Plants can and should make this application themselves.

As soon as TWI began to call attention to supervisory needs in knowledge of work and knowledge of responsibilities, plants asked for help in these fields. These needs are truly different in each plant, and, through Program Development, TWI attempted to prepare plant men to design their own specific plans to meet them.

While it is true that knowledge of a company's specific products, machines, methods and materials are controlling factors in each company's own business, it does not follow that research would not uncover some useful ways in getting across the knowledge required

by individual workers and supervisors which comes within this area. This should prove to be a promising field in which to discover a plant's own opportunities for using those facilities and methods on the job or at least within the plant, which are not available in preparatory or supplementary educational work under public auspices. For instance, the use of actual operating equipment, apparatus or products, models, plant visits, experience in use and operation of finished products, all may have special significance when carried on under a plant's own auspices. Determining which is essential operating knowledge and which, while related, would also be useful could very profitably be explored, and might well throw light on dividing lines between plant and public responsibility.

The P.D. method encourages line and staff cooperation in the identification of training needs; the planning of training; the selling, launching, and operating of training; and the checking of results. Production men thus learned of the P.D. method and looked at it as a way to solve other problems than those involving training. TWI was asked why it did not provide assistance in this field. The answer lies in the use of the P.D. method by the P.D.-trained man.

MANAGEMENT ATTITUDE TOWARD TRAINING

Much TWI time was spent on "missionary work"—getting managements to see that training is an everyday operating tool—perhaps as much time as on the actual conducting of its training programs. While procedures for getting training programs in use are not strictly development work, there was still much to be done about the most effective ways of getting this concept accepted by management.

As long as executives say "We're too busy to train," or "We're cutting back," or "We have experienced people" as excuses for not improving the ability of their people to reduce costs, rework, and accidents, and to improve quality and production—there is work to be done.

When a manager says "Our first-line supervisors don't make decisions," he forgets that ignoring a complaint or passing it on is a decision, and it can be an important one.

The managers who say, "We expect people to show some ambition to improve themselves" and leaves it to them, are forgetting their own interests.

If what has been learned about training in the last five years is regarded just as a fine emergency device, then Training Within Industry has failed to attain its overall goal.

Application of Skills

TWI by sheer necessity had to hold to a few fundamentals and repeat them thousands of times for thousands of supervisors. The practical application comes through use of the TWI methods on the great variety of local situations which faced individual supervisors.

TWI was frequently asked, "Are you not going to develop something more specific on quality control, costs, women workers?" The answer invariably was that the skilled supervisor is resourceful and can apply his skills to these problems as he faces them.

There seems to be a need, however, to help the practical-minded supervisor to learn how to sense just where and how his skills can be applied. A supervisor concerned about a current increase in accidents among his men is interested in searching for hazards as a first step in planning a way to keep people from getting hurt. While it is true that the final solution may rest in the technique of sound instruction, it may be easier to get supervisors to acquire the habits of better instruction if they start through the solving of current problems. For many supervisors this will be more acceptable than acquiring what they look upon as a more generalized skill for use whenever the need arises.

Management Problems and Skills

Analysis of TWI experience in the "skill approach" to improving supervision offers equal promise for its application to improving skill in solving all kinds of current problems at the upper management level.

The application of a standard technique first to just one type of problem may be a method of attack which has possibilities of reaching into the common responsibilities of supervision and management. Up to now the emphasis on these responsibilities and their importance has been very largely made through lectures and conferences without practice on how to meet them.

Much could be done toward establishing the ways of clearly defining a problem or of determining the specific objectives to be sought as a preliminary to the actual work of solving the problem. Something definite to check against is always useful in determining the direction in which progress should be sought, and also whether or not progress is actually being made.

The four definite skills that are used within the "J" programs and Program Development are covered up by different words which make them appropriate for application to the needs of people in specific positions. They could, by trial, be clothed in top management language in such a way that they would ring true and gain the

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willingness of managers to practice them on their own current problems. Such a pattern or method of attack might evolve into the following four steps:

Analyze—Diagnosing, being sure of the facts, evidence, underlying causes, determining that a problem is get-at-able—this looks like a basic first step.

Plan—Organizing, thinking-through, weighing and deciding what to do, seems a logical next step.

Execute—Getting things done, taking action—this is where the line executive gets busy.

Evaluate—Checking-up, being sure that the hoped and planned for results are being gotten—this too takes special skill and emphasis.

Whether these steps could be evolved into a widely applicable and acceptable plan or method of attack can only be determined by trial, by observing, by testing, by adapting, and by improving. This is an area which TWI was tempted many times to enter. It has been theorized about for years. A method of getting acceptance for such a plan of top management problem-solving might be evolved by cooperative research in many plants, under a wide variety of conditions, working with experienced managers with varying backgrounds in business and industry.

THE WORKPLACE AS THE LABORATORY

Much technical advance has been made as the result of research in the laboratory. There, scientific problems are isolated and tackled, and solutions are sought. New knowledge and new methods evolve.

In the field of human relations, the workplace is the laboratory. When people work together, the inter-relationships of job and supervisor and worker introduce many variables. The environment and atmosphere of the working conditions cannot be transplanted for experimental purposes. Change one condition and a whole situation is affected. This means then that future progress will depend upon the willingness of industry to carry on development work under its own auspices, and also to share the results with other plants. The experimenting must be done right where the work is done.

There must be, within industry, people interested in and competent to carry on such development work to meet new needs of workers, of management, and of industry. These people inevitably can do much to increase the effectiveness of industry in making its maximum contribution as a vital social institution in our Democracy.

Appendix

Advisory Commission to the Council of National Defense

Labor Division

"Training within Industry"

Practice Report #1

A STUDY OF LENS GRINDING

The Problem

Early in the Fall of 1940 a shortage of properly qualified lens grinders made itself evident. An immediate call for 350 qualified lens grinders for work in government arsenals and navy yards placed on the Employment Service and Civil Service failed to locate skilled men.

The additional 350 lens grinders were needed because an expanded defense production program called for precision optical instruments greatly in excess of anything like normal production quantities.

After the unsuccessful search for properly qualified lens grinders, some alternative had to be worked out because these instruments had to be delivered. It was found that the term Lens Grinder means very little because within this classification of work there is a wide range of skills covering a number of different precision optical operations. The fully competent lens grinder, like the first-class machinist, is supposed to be able to do successfully any job which falls within the classification. The following list covers the work done by the fully competent lens grinder:

1. Cut Optical Glass	11. Etching (Special)
2. Grind Lenses	12. Etching (General)
3. Grind Prisms	13. Polishing (Prism Blocks)
4. Grind Reticles	14. Polishing Small Lenses
5. Grind Windows or Covers	15. Polishing Large Lenses
6. Correct Prisms for Polish	16. Polishing Repairs
7. Blocking Prisms	17. Centering
8. Blocking Reticles	18. Cementing (Lens)
9. Silvering (Ordinary)	19. Cementing (Ocular Prisms)
10. Silvering (Oculars & Cutting)	20. Roof Prisms (Correction)

The most commonsense alternative was to explore the possibility of "upgrading" workers now employed on precision optical work to more skilled jobs and "breaking in" workers who had relatively low skill or no skill at all on the simple parts of the work with the idea of quickly perfecting their production ability on one part. Thus, by specializing the work and giving thought to intensive training of present workers as well as new men on parts of the produc-

tion of lenses, it seemed possible to get out volume production without developing all workers to all-round skill.

What Was Done

A group of competent supervisors and workmen employed at the Frankford Arsenal in Philadelphia, the Bausch and Lomb Optical Company at Rochester, and the Eastman Kodak Company at Rochester, selected for study one type of precision optical instrument which would embrace nearly all the skills required of a fully competent lens grinder. For this purpose, the production of the M-1 Circle Aiming instrument was chosen and it embraces the following operations:

1. Cut Glass	9. Block Lenses for Finish Grinding
2. Block Lenses for Grinding	10. Block Polishing (Prisms and Reticles)
3. Grind Lenses	11. Etching Reticles
4. Edge-grind Reticles	12. Lens Polishing
5. Grind Poro Prisms	13. Lens Centering
6. Grind Compass Covers	14. Cementing Lenses
7. Block Prisms for Polishing	
8. Block Reticles for Polishing	

The Analysis of Operations

These operations in turn were broken down by experienced workers into job assignments which, while only part of the completed operation, could provide full-time employment for a new worker if the volume of production warranted it. After setting up these job assignments or specialized parts of the production, each was studied with the thought of determining the one or two important features or "Key Points" which when mastered help the new worker to learn how to do the work.

Looking over the list of key points included in this study it will be noticed that they are not always susceptible of written explanation. Experience proves that they can be *definitely identified* by the experienced worker. In this study it was not thought necessary in every case to provide a written description of the knack, special movements, or particular information identified as key points. The main purpose in having the worker identify these key points is to enable him to recall them when he is breaking in new people. His own familiarity with the work often causes the competent worker to overlook the difficulties he had during his early stages and thus without intention he fails to mention these difficulties and how to overcome them when breaking in a new man.

It was also found that the order or sequence with which work must be done for production is not always the best sequence for

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growth in skill. These separate skills, forming the total skill of a fully competent man, are best acquired in a series of progressive steps. If a new man can be given these successive assignments and masters the key points, he will eventually become fully competent as a lens grinder. Three production units are used as an illustration and these are set up first in the order or sequence in which they must be done and paralleling this the sequence in which it is best to assign new people for quick learning. Following these lists are the detailed breakdowns of some of the job assignments. The production units are Poro Prisms, Lenses and Recticles as required for the M-1 Circle Aiming instrument.

CHART #1—PORO PRISMS

Sequence in Which Work Must be Done

1. Grind one side (individually by hand).
2. Block on plano tool preparatory to grinding for thickness.
3. Grind to thickness.
4. Remove and clean.
5. Block prisms for grinding 90° angles.
6. Grind two 90° angles.
7. Block for hypotenuse grinding.
8. Grind hypotenuse.
9. Grind top bevel.
10. Grind ends to size.
11. Rough radius (lathe).
12. Fit by hand to gauge.
13. Bevel.
14. Hand correction.

Sequence for Upgrading

1. Grind one side (individually by hand).
2. Remove from block and clean.
3. Block on plano tool.
4. Block for hypotenuse grinding.
5. Block prisms for 90° angles.
6. Bevel edges.
7. Grind to thickness.
8. Grind hypotenuse.
9. Grind top bevel.
10. Grind ends to size.
11. Grind two 90° angles.
12. Grind radius (lathe).
13. Fit to gauge by hand.
14. 45° Angle.
15. Hand correction.

As an illustration of the details which make up the various jobs, the following breakdown of the work is shown. This breakdown makes no pretense of being complete, nor to represent an exact example of all key points involved in manufacturing processes.

DETAILED OPERATIONS FOR GRINDING PORO PRISMS

1. GRIND ONE SIDE

- a. Hand grind on wheel individually.

Not a working face. This establishes the base for all subsequent working of the prism.

2. BLOCK PREPARATORY TO GRINDING FOR THICKNESS

Steps

- a. Heat block—put wax on block.
- b. Group prisms on block—eye approximation.
- c. Seating prism (watch for air bubbles).
- d. Cool block (water tank). Water must not touch the glass.
- e. Clean the wax off bottom of markers.

Key Points

1. Use of mental pattern to follow. Proper pattern saves production time.
2. Avoid overheating or too sudden changes of the temperature of the prism.
3. How to determine the maximum number it is **safe to put on the** block to get the most production.

a. S
b. U
i
c. I
a
d. U
a
e. S
l
f. C
f

3. GRIND TO THICKNESS

Steps

- a. Pick up block.
- b. Place on wheel (face down).
- c. Pressure and draw rub.

Key Points

1. Count the number of rubs.
2. Pressure to apply.
3. Length of draw.
4. The routines to use in saving time, particularly in reducing the number of times measuring for thickness is required.

a. I
l
b. I
1
b. I
c.

4. REMOVE AND CLEAN

Steps

- a. Heat block.
- b. Remove glass.
- c. Clean plate while warm.
- d. Reblock before beginning cleaning of glass which was removed.
- e. Cool.

Key Points

1. Realization of need for care depending on piece being removed.
2. Routine to use in order to save time and insure quality.

d.
e.

CLEANING

- a. Put all pieces from a block into gasoline bath.
- b. Brush off wax while immersed—brushing $\frac{1}{2}$ of total number.
- c. Place brushed pieces ($\frac{1}{2}$ plate) on absorbent paper. While these dry—brush remaining pieces.
- d. Wipe first group already dried with cloth while second half are drying.
- e. Put in box.
- f. Repeat a and b for second half.

1. Hold by edge—do not handle faces—while not particularly important here, the habit formed is most important in later operations.

f.
g.

5. GRIND TWO 90° SURFACES

Steps

- a. Select wax for the job.
- b. Using wax group several prisms into a block about 3" in length.
- c. Identify and clean one side to use as a base in squaring.
- d. Use square (rough) on two lengths and index.
- e. Select and mark error on two lengths and index.
- f. Grind on wheel to an accurate surface.

Key Points

1. Be sure seating is good (air bubbles).
2. To save production time, work on all errors in rotation, reducing each gradually.
3. Even distribution of pressure to insure that the four corners are bearing.
4. Pulling and wheel direction.
5. Count — turn — count — turn, etc., until ready to square.

6. BLOCK PRISMS FOR GRINDING 90° ∠

Steps

- a. Select table to hold prisms while being heated, bunsen burner, black wax or beeswax, V block and a few old prisms.
- b. Brush dust or foreign matter from the poro prisms and place on metal table.
- c. After the table has been filled with prisms, heat with burner until the prisms are warm enough to melt the wax used.
- d. Apply wax and adhere the prisms one to another, until a group approximately 3" long is obtained.
- e. While the assembled group is still hot, place them in the V block which is near by.
- f. With two old larger prisms, one on each side of the group, squeeze the two prisms together and at the same time push the rough hypotenuse to the bottom of the V block with a pencil.
- g. Allow the group to cool, and repeat the operation using another lane of the V block until the last lane is used. By this time the first group should be cool enough to move.

Key Points

1. Be sure the group is free from bubbles between the sides that have been adhered together.
2. Under normal temperature conditions beeswax is used.
3. If the temperature is very warm, use black wax which has a higher kindling point.

Steps

- a. Heat the V block to be used.
- b. Apply beeswax on the heated block.
- c. Insert individual groups and press down to be sure good contact is made.
- d. When the block is full, cool in water.

Key Points

1. The V block should be so constructed that the glass can be measured through the block. This distance should not vary more than .002" on the four sides of the block.

NOTE: An illustration of finer subdivisions of operations, with its own key points, is the following:

7-A. SQUARING (GRIND ALL 90° $\angle$)*Steps*

- a. Select a rough square and an accurate square.
- b. With the rough square approximate the error on the three sides of the group and mark with a red pencil.
- c. Grind the error on the 150 mill with a forward pull, applying equal pressure to each dimension.
- d. Clean and check to see if the error is removed.
- e. If the error is still present, repeat the operation until the three angles are approximately 90° and all defects of the surface are eliminated.
- f. Repeat the operation on 220 emery to remove pits of 150. Use the rough square.
- g. Use a small plate (10" diameter) with the center slightly high on a slower speed spindle.
- h. Repeat the operation using FF emery and the accurate square.
- i. Repeat the operation on the same plate with FFF emery.
- j. Final check for all angles. Be sure flat of surface is either flat or slightly low. It should never be higher.

Key Points

1. The flatness of the surface is regulated by the surface of the flat plate.
2. This plate should be checked to determine if it is high. A high plate gives a low surface and vice-versa. The accuracy of the angle is determined from experience according to the deviation tolerance on the blue-print.

8. GRINDING HYPOTHENUSE

Steps

- a. The bottom of the block is cleaned of any wax in order to insure accurate calibration.
- b. The emery 70, 150, 220, FF and FFF are used on the large mills. Procedure is the same as grinding a flat block to thickness.
- c. Remove and clean.

Key Points

1. The measurement on the four corners should be within .001" as on this operation depends the total angle of deviation of light.
2. The tolerance given should not be taken advantage of at this operation because it can later be used for any necessary corrections.

9. GRIND TOP BEVEL

Steps

- a. Heat a 10" flat round block.
- b. Adhere the individual groups with beeswax with the hypotenuse side down.
- c. Extend the group out on four points of the block. (The micrometer readings are to be taken here.)
- d. Cool the block.
- e. Grind to blue-print size on the large FF mill.
- f. Remove and clean.

Key Points

How much is removed when pressure is applied at one quadrant. Judge the permissible variation in thickness.

10. GRIND SIDES TO SIZE

Steps

- a. Cement two groups together with stickum so that the hypotenuse sides are together and the new group forms a rectangle.
- b. Place the new groups back into the V block so that the stickum line is toward the base of the V block. Fill the block.
- c. Grind to blue-print size on the FF large mill.
- d. Remove and clean.
- e. Place groups back into the V block and grind other side with the same procedure.
- f. Remove and clean.
- g. Break down the groups into individual prisms and clean.

Key Points

1. (Same as previous grinding operations.)

11. ROUGH RADIUS (LATHE)

Steps

- a. A 3" diameter bar stock of brass is made into a radius tool to be used on the lathe.
- b. A steady rest is placed before the tool. A piece of flat glass is cemented to the rest to keep the prism in position while it is being ground.
- c. Knock the four corners from the hypotenuse face of the prism on the large 150 mill.
- d. Place the prism on the steady rest and apply 220 emery. As the prism is approached to the tool with your hand, it will assume the radius of the tool.
- e. Check radius of the prism occasionally with a radius gauge.
- f. If the radius of the tool changes too much it can be dressed with a file and carborundum stone.

Key Points

Care should be taken not to take full advantage of tolerances on the radius operation. Some tolerance is required for later work. Watch the work for indications of need to change tool. Position of the radius on the prism is controlled by tapping the steady rest.

12. FIT PRISM TO GAUGE

Steps

- a. This operation is done on a small slow speed wheel with FF emery.
- b. The motion is a circular movement that requires coordination of eye and hand.
- c. The prism should fit so that the length of the hypotenuse is within the drawing tolerance but allows a slight amount of play in the gauge.
- d. A bevel is put all around the hypotenuse with FF to help the gauge fit.

Key Points

Must build up judgment to determine how much to grind on the radius.

13. BEVEL

Steps

- a. All the corners of the prisms are bevelled on the slow FFF wheel with FFF emery. The size according to drawing.
- b. The wheel should be kept flat to insure the best results.

14. HAND CORRECTION

(This is done only if one of the surfaces has become marred.)

NOTE: When the base of the accurate square is placed upon the side of the prism, and the round bar of the square on any other surface, the reading is not always a true 90° . This error is compensated for in the volume of glass. If a side with such an error is to be correct, the error should be in the same position after the correction. Any changing of this error will interfere in the total deviation of light.

15. 45° ANGLE

- a. On some prisms the 45° angle should be accurate, but on the poro prisms *only* one angle can be plus 45° and the other angle can be minus 45° . The path of light is neutralized in this system, hence the 45° angle need not be corrected.

CHART #2—EYE LENSES

<i>Sequence in Which Work Must be Done</i>	<i>Sequence for Upgrading</i>
1. Cut on saw if necessary.	1. Grind one side flat.
2. Block for grinding.	2. Grind bevel.
3. Grind one side flat.	3. Place sealing wax buttons on polished side.
4. Block for grinding to thickness.	4. Remove and clean.
5. Grind to thickness.	5. Inspect before polishing.
6. Grind to rough diameter.	6. Inspect.
7. Grind first radius.	7. Block lens on blocking tool.
8. Grind second radius.	8. Cut on saw if necessary.
9. Grind bevel.	9. Grind to thickness.
10. Grind—inspect before polishing.	10. Grind to rough diameter.
11. Place sealing wax buttons on first side.	11. Grind 1st radius. Grind 2d radius.
12. Block lenses on blocking tools.	12. Center and edge to diameter (finished).
13. Fine grind.	13. Cement crown and flint elements together.
14. Polish.	14. Fine grind.
15. Remove and clean.	15. Polish.
16. Place sealing wax buttons on polished side.	
17. Block lenses on blocking tool.	
18. Fine grind.	
19. Polish.	
20. Remove and clean.	
21. Inspect.	
22. Center and edge to diameter (finished).	
23. Cement crown and flint elements together.	

DETAILED OPERATIONS FOR LENSES

Steps

1. CUT ON SAW

- a. Flat grind bottom surface of slab (on a mill using coarse emery).
- b. Layout work from blueprint.
- c. Fasten work to plate on saw (using clamps to hold in place).
- d. Start saw and cut.
- e. Stop saw and remove pieces.

2. AND 3.

(Same general procedure as for prisms.)

4. BLOCK FOR GRINDING TO THICKNESS

Steps

- a. Select markers.
- b. Frost and grind markers.
- c. Heat and wax block.
- d. Set markers on block.
- e. Set lenses on block.
- f. Cool block.

Key Points

Make sure markers are proper thickness.
Average lenses to get maximum number on block.

5. GRIND TO THICKNESS

Steps

- a. Pick up block.
- b. Place on wheel (face down).
- c. Press and draw rub.
- d. Measure for thickness.

Key Points

Feel or "pull" of emery on wheel.
The sense of timing by "count."
Amount of glass removed before measuring.
Let the tool rotate while holding.

6. GRIND TO ROUGH DIAMETER

Steps

- a. Lay up stick (about 4").
- b. Grind off corners of stick on wheel.
- c. Grind rough round.
- d. Mark true circumference (each end).
- e. Finish rounding on wheel.
- f. Separate lenses and clean.

Key Points

(Same as for other grinding.)
How to hold stick to avoid emery burns on fingers.

7. GRIND CONCAVE RADIUS

Steps

- a. Read blueprint for radius.
- b. Select grinding sphere.
- c. Select radius gauge.
- d. Set sphere in spindle grinding machine.
- e. Start machine—smear grinding tool with wet emery.
- f. Put lens blank against sphere (thumb and two fingers of both hands).
- g. Apply pressure and rotate blank.
 - (1) Place lens in spinner.
 - (2) Adjust pin in bar to spinner.
 - (3) Apply pressure to arm.
- h. Measure radius and thickness.
- i. Continue f, g and h until completed.

Key Points

Necessity for forming good routines in working.
 Work curved surfaces from outside to center.
 Concave lenses become "flatter" and convex lenses "sharper" in grinding and polishing.

8. GRIND CONVEX RADIUS

(Same general procedure as for concave.)

9. TO 21.

(These are not included, being covered elsewhere in study.)

Examples of breakdown for Lens Centering:

22. CENTER AND EDGE TO DIAMETER (FINISHED)

Steps

- a. *Prepare brass chuck*
 - (1) Select chuck blank.
 - (2) Drill hole (#51 drill) through wall at back end of chuck.
 - (3) Set up in turning lathe.
 - (4) True edge of chuck.
 - (5) True inside rim and make V edge.
 - (6) Test trueness with plano piece of polished glass. (chuck images)
- b. *Grind edge to optical center*
 - (1) Heat chuck and sealing wax.
 - (2) Heat lens and apply wax.
 - (3) Place lens on chuck.
 - (4) Start machine and center lens.
 - (5) Set wax and lens with wet sponge.
 - (6) Trim off wax on back of lens.

Key Points

Setting T rest at angle.
 Work from inside in making V.
 Outside diameter must be same size as finished lens.

Handling bunsen flame—watch for change in color on chuck.
 Handling stick on rest to center lens—(scratches).
 Direction and amount of pressure to bring images into center (avoid ring cuts).

(7) Put lens against grindstone and grind. (Stops prevent further grinding.)		S
c. <i>Bevel outside edge</i>		
(1) Put fine emery and water on curved tool.	Swing motion of tool.	1
	Trimming to get proper bevel.	2
(2) Put tool against lens while machine is in motion.		3
		4
(3) Move tool in swinging motion to form slight bevel.		5
		6
(4) Dry lens with clean cheese cloth.		7
		8
(5) Remove lens (using bunsen burner to heat).		9
		10
d. <i>Clean lens</i>		
(1) Place in pan of clean alcohol.	Handle only edge of lens.	11
(2) Remove and place on clean paper to absorb wax.	Stroking with brush.	12
(3) Brush with camel hair brush.	Using cloth—folding and turning lens.	
(4) Dry with clean soft cheese cloth.		
e. <i>Inspect after grinding edge</i>		
(1) Use magnifier for scratches.	The proper background for seeing scratches.	w
—Look for those made by stick having slipped.		
—Ring cut on inside of lens.	Importance of finding any rough edge and removing it to help in cementing.	a.
—Chips due to careless use of micrometer.		
—Rough stone used in grinding.		b.
(2) Bevel flint lenses.		c.
(a) Put fine emery on frosted glass plate.		d.
(b) Place lens (inside edge) on emery.		e.
(c) Rotate lens—thumb and finger.		R
(3) Wrap finished lenses in soft paper.		pl
		a:
		w
		S
		cc
		ti
		f.

CHART #3—RETICLES

*Sequence in Which Work Must
be Done*

1. Grind to thickness.
2. Grind to diameter (finished).
3. Grind bevel.
4. Inspect before polishing.
5. Block.
6. Fine grind.
7. Polish.
8. Remove and clean.
9. Inspect.
10. Etch.
11. Fill in etched lines.
12. Inspect.

Sequence for Upgrading

1. Grind to thickness.
2. Inspect before polishing.
3. Grind bevel.
4. Block up.
5. Grind to thickness.
6. Remove and clean.
7. Inspect.
8. Grind to diameter (Finished).
9. Polish.
10. Fine grind.
11. Fill in etched lines.
12. Etch.

DETAILED OPERATIONS FOR RETICLES

No attempt is made to cover all the operations in detail. Only those which are different from operations previously covered are listed.

1. BLOCKING AND GRINDING TO THICKNESS

Steps

- a. Select four markers of the same measurement as the lenses being blocked.
- b. Frost markers on one side and grind corners off one side.
- c. Arrange lenses in circular pattern on block.
- d. Fill in one row on outside edge to next marker on outside row.
- e. Rotate plate $\frac{1}{4}$ turn.
Repeat c-d-e until one row is completed at edge of plate. Continue as above for each successive row, working toward center of the plate. Starting on outside insures more complete coverage of plate (production)—saves time.
- f. Cool plate in water.

Key Points

Gather markers and lenses of same thickness. Seat reticle correctly on plano plate with about $\frac{1}{8}$ of an inch between each lens so the grinder may be able to wash all of the emery from the plate after he is finished grinding.

Man Requirements

Must develop working habits which keep the work clean.
Learn to handle reticles and lenses without touching finished surfaces.
Have a routine for working which puts everything in its place, thus avoiding chance of picking up emery on tools or materials without being aware of doing so.

5. BLOCKING FOR FINE GRINDING AND POLISHING

*Steps**Keys Points and Man
Requirements*

- a. Heat plate and wax up with wax #2 or transferring wax.

(Same as for other blocking operations.)

Formula—4½ lbs. roofing pitch

1½ lbs. rosin

2 oz. beeswax

Heat wax separately and add slowly.

- b. After plate is waxed, using only enough to cover the plate, put a piece of newspaper on and press or rub out smoothly. Then cover paper with another coating of wax.
- c. Put first plate of reticles face down on block #2 with the least amount of moving or sliding in centralizing the plates.
- d. Press down top on #1 block to set firmly in wax. Allow to cool. See that tripod is level and blocks do not shift off center. Let reticles cool on blocks.
- e. After blocks are cool reverse plates and heat plate #1 evenly, sliding block #2 off as soon as possible.
- f. Clean off surfaces and proceed with block #1.
- g. After block #2 is polished, heat and remove reticles by taking hold of newspaper and pulling the whole lot off the plate on to a cool surface.
- h. After cooling, the reticles may be picked off individually or placed collectively in cleaning solution.

a.
b.
c.
d.
e.
f.
g.

a.
b.
c.
d.

e.

6. FINE GRINDING

- a. Set lap on spindle.
- b. Adjust block on oscillating arm.
- c. Operate grinding machine (using extra fine emery).
- d. Check surfaces for traces of emery pits from previous operations.
- e. Continue grinding until surfaces are perfectly flat.
- f. Remove block from arm.

7. POLISHING

- a. Set block on spindle.
- b. Adjust polisher (on top of block).
- c. Operate polishing machine (using proper polishing compound).
- d. Inspect and color test.
- e. Adjust machine for correction indicated by test.
- f. Continue c-d-e until surfaces are properly polished.
- g. Remove block from spindle.

10. ETCHING

*Steps**Key Points*

- a. Inspect.
- b. Mounting on blanks.
- c. Dipping.
- d. Setting up blanks in machine.
 - (1) Insert and adjust needle.
 - (2) Line up individual needles with the exact center of the templet.
 - (3) Place blank in holder table and adjust until each needle is centered on the guide hold. (A strong hand magnifier used to check on this from various angles.)
 - (4) Check the right angle position of the needle to the reticle surface.
- e. Operating machine to cut wax pattern.
 - (1) Set the stylus at the beginning of one templet groove. (Either figures or lines are run off together in order that none will be missed. It is usually impossible to go back and match missed lines.)
 - (2) Slide stylus along templet grooves (smoothly and not too fast. Avoid having stylus ride out of grooves).
 - (3) Remove back lash in margin before entering groove.
 - (4) Press foot-pedal slowly and smoothly so that needle points come down on reticle gently. (If this is not done the entire 10 needle points may be injured and the reticles ruined.)

Intersecting lines must be crossed slowly and accurately as the stylus must be held steadily to avoid the tendency to stick or slide into the wrong groove.

The point of contact made by the needles must be watched by keeping track of the motion of the rear ends of the rods holding the needles.

Perfect coordination between eyes, hands and feet are needed during this process. Any lack of coordination spoils 10 reticles.

- (5) Keep foot-pedal down when cutting is taking place. Release slowly before setting stylus in another figure or line to be run.

f. Fuming with acid.

- (1) Clean waxed surface with camels hair brush.
- (2) Fasten dipping rod to reticle holder.
- (3) Hold reticle over 60% hydro-fluoric acid container. (1 to 6 seconds exposure.)
- (4) Wash reticle in cold water.
- (5) Remove brass rod and place holder on soft clean paper on electric grill.
- (6) When hot enough push reticle through the holder from the front.
- (7) Place reticle face up in a pan of slightly warm Xylol.
- (8) Wash reticle in alcohol.
- (9) Brass holders are heated and cleaned in gasoline to be ready for new reticle blanks.

g. Filling.

The exact exposure period is determined by count. Under exposure means faint lines. Over exposure means pits, thick lines and clogged intersections. Width of lines must be kept within .002" in tolerance.

Brush waxed surface after cutting, always in one direction.

Always handle reticle by holding the edge.

Conclusion

As a direct result of this study, a simple pattern for recording an analysis of production jobs was worked out. In addition, some short instructions for an experienced worker to follow in teaching "production jobs" were designed. Both of these were incorporated in a bulletin (#2-C) which is attached. [Not included here—contents described in Chapter 2.]

The pattern has been applied in two shops manufacturing precision optical products. It has been tried out in a small way by industries making other defense products. The evidence so far indicates that the pattern can be used successfully to "break in" new workers rapidly. Of course, the specific application of such a pattern must fit local requirements. In general there are two types of training situations to be met in the defense program:

- (1) Training in an organization which is now engaged in defense production and finds its defense contracts require an increase of workers greatly in excess of normal growth;
- (2) Training in an organization which is undertaking to make a product which is an entirely different one from its regular production activity.

In the first situation it is not necessary as a general rule, to develop new production routines or methods. It is necessary to prepare the

supervisors so that they can carry out the actual training required. A beginning can easily be made on this by starting with a few supervisors, who have indicated their interest in training and who will assist in preparing an outline of a sufficient number of their jobs to form a progressive series for upgrading. The supervisors selected to work out the training pattern do not necessarily have to cover the production jobs for which training is most essential. It is desirable to have a good example of the pattern worked out because the support of the supervisory force is best obtained through having them convince themselves that through the use of a pattern of this sort they will eliminate many of the production difficulties. It is well to start with the simpler jobs because when they have been prepared and the usefulness of the pattern in training has been demonstrated, it will be easier to convince the supervisor who has the real problem in breaking in new workers that this approach will aid him in meeting his responsibilities.

In such a procedure it is well to assign a staff employee as assistant to the supervisor in making the analysis of the job and in preparing the training outline. Such a staff employee should be familiar in a general way with the processes involved and should have an inquisitive, or exploratory, type of mind that will ferret out the "key points" involved in doing the work.

In the second situation where the organization is entering into the production of an entirely new product, the first step toward the development of such a pattern is made when the engineer breaks the product down into the operations involved for estimating purposes. The next step involves the development and setting up the first trial method for doing the work in each of the process steps. When the methods to be used are worked out they should be in enough detail so that it can be used for training purposes.

An effective method of building the necessary organization is to take from the existing organization, or from the outside, a nucleus of new employees who have had experience in such, or similar, work or who can be trained quickly. Then using the breakdown which the industrial engineers have prepared start this smaller group of employees out on the prescribed methods. While the method is being developed in this manner by the experienced employees under the guidance of the regular supervisor with the assistance of the industrial engineer, the key points that must be imparted to the new operator can be developed and added to the steps of the process laid down by the engineers. Thus when the skeleton organization, which is to serve as trainers of the new employees as they are brought in, has finished its training period and the initial layout of method has been revised as found necessary by trial, actual training of the new workers can begin.

The attached exhibits are intended to show the difference in sequence between the learning assignment of operations and the order in which they must be carried out for production.

Exhibits A, B, C, and D show the production order for the products selected. Exhibits A-1, B-1, C-1, and D-1 show the learning sequence or the order in which the operations should be assigned for progressive growth in skill or knowledge.

It will be noticed on Exhibits A-1, B-1, C-1, and D-1 that progression factors have been selected in order to properly place each operation in sequence so that each one makes a demand for an increased ability on one or more of the factors shown.

Of course, for a different product a different set of progression factors will have to be chosen, and these must be determined for the product and agreed on by the firm setting up the sequence.

M. J. KANE,
Training Consultant.

Washington, D. C.
March 15, 1941.

PRODUCTION ORDER OF JOBS
PORO PRISMS

Exhibit A

- Operation #1 - Grind one side. (individually by hand)
 Operation #2 - Block on plane tool preparatory to grinding
 for thickness
 Operation #3 - Grind to thickness.
 Operation #4 - Remove and clean.
 Operation #5 - Block prisms for grinding 90° angles.
 Operation #6 - Grind two 90° angles.
 Operation #7 - Block for hypotenuse grinding.
 Operation #8 - Grind hypotenuse.
 Operation #9 - Grind top bevel.
 Operation #10 - Grind ends to size.
 Operation #11 - Rough radius (lathe).
 Operation #12 - Fit by hand to gauge.
 Operation #13 - Bevel.
 Operation #14 - Hand correction.

* * * * *

SAMPLE TRAINING SEQUENCE OF JOBS
for
MAKING OPTICAL GLASS PORO PRISMS

Exhibit A-1

These separate jobs are arranged in the order best suited for training a man by successive assignments, on each of which he will develop more skill and knowledge on one or more of the progress factors as shown.

Operations are to be assigned in numerical order from #1	.0001" and fractions of minutes on angles	Color Test Perfect	Highest	\$15 per piece and up	Complex
Fully trained man					
15. Hand correction.					
14. 45° angle					
13. Fit to gauge by hand.					
<u>4th Level</u>					
12. Grind radius (lathe).					
11. Grind two 90° angles.					
10. Grind ends to size.					
9. Grind top bevel.					
<u>3rd Level</u>					
8. Grind hypotenuse.					
7. Grind to thickness.					
6. Bevel edges					
5. Block prisms for 90° angles.					
<u>2nd Level</u>					
4. Block for hypotenuse grinding.					
3. Block on plane tool.					
2. Remove from block and clean.					
1. Grind one side (hand).					
<u>1st Level</u>					

PRODUCTION ORDER OF JOBS
EYE LENS

Exhibit B

- Operation #1 - Cut on saw if necessary.
- Operation #2 - Block for grinding.
- Operation #3 - Grind one side flat.
- Operation #4 - Block for grinding to thickness.
- Operation #5 - Grind to thickness.
- Operation #6 - Grind to rough diameter.
- Operation #7 - Grind first radius.
- Operation #8 - Grind second radius.
- Operation #9 - Grind bevel.
- Operation #10 - Grind - inspect before polishing.
- Operation #11 - Place sealing wax buttons on first side.
- Operation #12 - Block lenses on blocking tools.
- Operation #13 - Fine grind.
- Operation #14 - Polish.
- Operation #15 - Remove and clean.
- Operation #16 - Place sealing wax buttons on polished side.
- Operation #17 - Block lenses on blocking tool.
- Operation #18 - Fine grind.
- Operation #19 - Polish.
- Operation #20 - Remove and clean.
- Operation #21 - Inspect.
- Operation #22 - Center and edge to diameter (finished).
- Operation #23 - Cement crown and flint elements together.

Note: Objective lens will follow same order with a more critical final inspection.

* * * * *

SAMPLE TRAINING SEQUENCE OF JOBS .
for
MAKING OPTICAL GLASS EYE LENS

Exhibit B-1

These separate jobs are arranged in the order best suited for training a man by successive assignments, on each of which he will develop more skill and knowledge on one or more of the progress factors as shown.

Operations are to be assigned in numerical order from #1	.0001" and fractions of minutes on angles	Color Test Perfect	Highest	\$15 per piece and up	Complex
Fully trained man					
15. Polish.					
14. Fine grind.					
13. Cement crown and flint elements together.					
12. Center and edge to diameter (finished)					
4th Level					
11. Grind 1st radius.					
Grind 2nd radius.					
10. Grind to rough diameter.					
9. Grind to thickness.					
8. Cut on saw if necessary.					
3rd Level					
7. Block lens on blocking tool.					
6. Inspect.					
5. Inspect before polishing.					
4. Remove and clean.					
2nd Level					
3. Place sealing wax buttons on polished side.					
2. Grind bevel.					
1. Grind one side flat.					
1st Level					
Green Man	.050"	Rough	Ordinary	Low	Simple

PRODUCTION ORDER OF JOBS
RETICLES

Exhibit C

Operation #1 - Grind to thickness.
 Operation #2 - Grind to diameter (finished).
 Operation #3 - Grind bevel.
 Operation #4 - Inspect before polishing.
 Operation #5 - Block.
 Operation #6 - Fine grind.
 Operation #7 - Polish.
 Operation #8 - Remove and clean.
 Operation #9 - Inspect.
 Operation #10 - Etch.
 Operation #11 - Fill in etched lines.
 Operation #12 - Inspect.

SAMPLE TRAINING SEQUENCE OF JOBS
for
MAKING OPTICAL GLASS RETICLES

Exhibit C-1

These separate jobs are arranged in the order best suited for training a man by successive assignments, on each of which he will develop more skill and knowledge on one or more of the progress factors as shown.

Operations are to be assigned in numerical order from #1	.0001" and fractions of minutes on angles	Color Test Perfect	Highest	\$15 per piece and up	Complex
Fully trained man					
12. Etch.					
11. Fill in etched lines.					
4th Level					
10. Fine grind.					
9. Polish.					
8. Grind to diameter (finished).					
3rd Level					
7. Inspect.					
6. Remove and clean.					
5. Grind to thickness.					
4. Block up.					
2nd Level					
3. Grind bevel.					
2. Inspect before polishing.					
1. Grind to thickness.					
1st Level					
Green Man	.050"	Rough	Ordinary	Low	Simple

PRODUCTION ORDER OF JOBS
COMPASS COVERS

Exhibit D

- Operation #1 - Cut with glass cutter.
 Operation #2 - Grind one side flat.
 Operation #3 - Grind to thickness.
 Operation #4 - Cement together.
 Operation #5 - Grind 60° on sides.
 Operation #6 - Drill hole.
 Operation #7 - Cut radius on each end (approximate).
 Operation #8 - Grind radius on each end to fit cell.
 Operation #9 - Bevel.
 Operation #10 - Inspect before polishing.
 Operation #11 - Block.
 Operation #12 - Fine grind.
 Operation #13 - Polish.
 Operation #14 - Remove and clean.
 Operation #15 - Inspect.

SAMPLE TRAINING SEQUENCE OF JOBS
for
MAKING OPTICAL GLASS COMPASS COVERS

Exhibit D-1

These separate jobs are arranged in the order best suited for training a man by successive assignments, on each of which he will develop more skill and knowledge on one or more of the progress factors as shown.

Operations are to be assigned in numerical order from #1	.0001" and fractions of minutes on angles	Color Test Perfect	Highest	\$15 per piece and up	Complex
Fully trained man					
15. Grind radius on each end to fit cell.					
14. Drill hole.					
13. Grind 60° on sides.					
4th Level					
12. Polish.					
11. Block up.					
10. Inspect before polishing.					
9. Bevel.					
3rd Level					
8. Grind radius on each end (approx.)					
7. Inspect.					
6. Grind to thickness.					
5. Grind 60° on sides.					
2nd Level					
4. Cut with glass cutter.					
3. Inspect before polishing.					
2. Remove and clean.					
1. Grind one side flat.					
1st Level					
Green Man	.050"	Rough	Ordinary	Low	Simple

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Training Within Industry Bulletin Series

*Bureau of Training
War Manpower Commission*

*Originally Issued June 1943
Revised November 1943*

HOW TO SELECT NEW SUPERVISORS— A 6-STEP PROGRAM

Every plant is always on the lookout for more supervisors. And, in rapidly expanding plants, the need for supervisors constantly becomes more acute. Good supervisors *are* hard to find. **YOU HAVE TO TRAIN THEM.**

Management is dependent on supervisors in order to reach the big group of workers in the plant, but not every worker wants to be a supervisor. Some actually refuse to take the responsibility. They do not want to give orders to their friends. Many are incapable of becoming good supervisors even though they would jump at the chance. They cannot plan, or follow through, or adjust their thinking to supervisory problems. Some people just can't quit "doing" and begin to direct *others* "to do." Poor judgment, slowness, indecisiveness, inflexibility, or annoying mannerisms prevent them from ever becoming effective supervisors.

Where, then, *do* we find men and women to train as supervisors? They must be *discovered* among the ambitious workers who are willing to pay the price of leadership, and who can work well with their associates. You spot them in the rank-and-file of *your own plant*.

Many plants give careful attention to the selection of top supervision, but "just appoint" quite casually the first-line supervisors, the ones who really are in closest touch with the workers who get out production. First-line supervisors are particularly important because they make up the group from which higher supervisors are most often selected. The greater a supervisor's responsibility, the more costly are the mistakes if the man is not really fitted for supervisory work.

Management delegates much of its responsibility to supervisors; hence, initial selection is of prime importance. Selection of men and women for supervisory positions is a definite responsibility of management, but assistance can be gained and the selection procedure improved if the recommendations of present supervisors and, sometimes, of both the union and individual workers are enlisted.

To find one leader you must get the facts about a number of possible candidates. You must choose carefully, because a mistake is costly. Personal prejudices and favoritism must be avoided. You must find a potential supervisor and train him. And don't fail to give him a feeling of PERSONAL SATISFACTION in his new job.

C. R. DOOLEY, *Director,*
Training Within Industry.

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PICKING THE WORKER TO BE TRAINED AS A SUPERVISOR

In slow-moving times, supervisors often were created overnight by someone who said, "Tomorrow you take over the department. Now you are a foreman." Many of them turned out to be excellent. In easy-going times, the boss *does* know his men. But when five, twenty, or a hundred new supervisors are needed over a relatively short period in a rapidly expanding organization, there is little time to get well enough acquainted with workers to pass judgment on their qualifications for supervisory jobs. Under present conditions superintendents, and other company executives, don't know individual workmen well enough to take such "shots in the dark."

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A more systematic method is needed. Selection is improved when the method includes participation by the present supervisors in the nomination of candidates; use of a uniform, objective measure of ability; and group judgment of candidates.

The selection program described in this bulletin has been outlined from industrial experience. It will help to spot the men and women who will be likely candidates for supervisory responsibility. The procedure is simple. And, it works.

EXPLAINING THE SELECTION PROGRAM TO MANAGEMENT

This selection program must be completely understood by top management and it must have management approval. Management must see that the approach is outlined to the operating heads. Responsibility for this selection program must be assigned to one operating or personnel man who will see that it is carried through all stages of operation.

Basically, there are six steps.

1. Present supervisors are asked to nominate candidates for additional supervisory jobs. It may also be feasible to ask for nominations from the workers and from union representatives.
2. Each supervisor's nominations are discussed with him.
3. A committee made up of an operating man, a personnel man, and another representative designated by management considers the records in order to prepare a list of candidates. Each candidate on this list is interviewed if he is not known to the members of the committee.

4. A standard objective measure, such as a test, is used to get information about the ability of each candidate.
5. The selection committee reviews all the qualifications of the candidates.
6. Those judged to be qualified for supervisory training are selected. This will provide, in addition to immediate needs, a reserve to meet future demands.

At the time that management decides to undertake this selection program and assigns the responsibility for operating it, a follow-up procedure to make sure it is carried out must be agreed upon. Follow-up responsibility must be assigned to a specific person.

1. STARTING THE SELECTION PROGRAM

The need must be explained to the present supervisors. They must be assured that their own jobs will not be unfavorably affected, and their cooperation must be won. To accomplish this it is necessary that an operating official who carries weight with the men call the supervisors together and inform them about the new method. He will need to:

- a. Explain the *need* of having new supervisors coming along.
- b. Raise question, "Do we have any workmen in the ranks who might become good supervisors, if properly trained?"
- c. Emphasize that there is no thought of displacing present supervisors. It is *part of their jobs* to be on lookout for new talent. We can't afford to overlook good material. "All of us need understudies. You cannot move up until there is someone to take your place."
- d. Make assignment: "Consider all the men in *your* departments. Don't talk to them about this topic, but think about them. Jot down names of all the men who you feel might have supervisory abilities. Do not suggest men from other departments—we want information about the men you really *know* something about from intimate working relationships. You know which men take the lead, and whether the others in the group accept this or resent it. You know, too, which ones learn new jobs most quickly."
- e. Discuss personal qualities which are required of supervisors. Think in terms of the whole plant and what is expected of a supervisor.
- f. Remind them that, while the supervisor has to know the work, the best operator is not necessarily the best supervisor, but he must have enough operating ability to merit respect from the workers he supervises.
- g. Set a specific time to have list of names handed in.

Sometimes supervisors consciously or unconsciously stand in a man's way—if he is a good operator the supervisor does not want to lose him. Requiring each supervisor to name "two or three" will shake good men loose.

If management wishes to get nominations from the union and from individual workmen, the same steps of explanation should be followed.

2. GETTING INFORMATION ABOUT SUPERVISORY CANDIDATES

Not all the men and women who are suggested will be good possibilities. It is necessary to get more facts about those nominated. The supervisors who suggest names will be able to furnish much unrecorded detail.

The person assigned to head the selection committee will need to discuss with each supervisor the persons whose names he has suggested. Ask him to tell you why he nominated the person, but don't put him on the spot. This is a confidential fact-finding process, not a debate. Consider the following:

- a. What is the man's work record, including accident record and absenteeism as well as quality and quantity of production turned out? Does he *know* the work?
- b. How does he get along with other workmen on the job?
- c. Has he demonstrated such supervisory traits as ability to break in new men or to get men to cooperate with him on jobs? Do men go to him for help?
- d. How does he conduct himself on the job?
- e. Does he take the lead outside the plant—does he organize community events or sports?
- f. Does he have ideas? Make constructive suggestions for improvements?
- g. Has he been included in any training programs? How did he get along?

Some names may be withdrawn by the supervisors at this stage, and these persons need not know that they have been considered and judged unsuitable.

3. ROUGH SCREENING

Get personnel records (including health and safety records) for all men still on list, in order to have them considered by the selection committee. This committee should be made up of an operating executive, a personnel man, and another representative designated by management. One of these will be the man responsible for running the selection program. (This selection committee will be most effective if it has occasional "new blood.")

- a. Search the records. Look for controlling factors, but do not give weight to "stale boners" that should have been forgotten long ago.
- b. Retain the names of all those who look promising.
- c. Consider the supervisor who made the nomination—can you go along with his opinion?

When these records are scrutinized, some additional workers will be considered unsuitable for supervisory development. These need not know that they have been rejected unless such information is considered advisable for personal development.

The surviving candidates who are not known to the members of the selection committee will be interviewed briefly to find out if possible about recent instances in which they have taken the lead.

4. GETTING INFORMATION FROM SUPERVISORY CANDIDATES

Judgment so far has been largely based on opinion, and there may be little uniformity in the records that are available for consideration. Selection is improved if the method includes the use of a standard, objective measure such as a test.

Some plants will already have records resulting from a recent test which has been used for all employees. In other plants production reports by workers may give a measure of ability to handle figures and follow written instructions. In others it may be suitable to call the selected group of candidates together and give them a simple test in order to have a standard measure for all. There are many simple tests available commercially. Some companies prefer to draw up their own tests, using real problems from the plant. Twenty questions of the following type will make up a useful test:

If a rigger's hourly rate is 90 cents, what will it be if it is increased 10 per cent?

What is the cost of a square foot of copper if a piece $1\frac{1}{2}$ feet by $1\frac{1}{2}$ feet costs 45 cents?

A bin holds 200 cubic feet of lime. If the bin is 10 feet long and 5 feet wide, how deep is it?

Divide 144 hours equally among three shifts.

If time and a half is paid for all time over 8 hours, how much will a man get for working 11 hours if his hourly rate is 60 cents?

A warehouse is four stories high, and the interior measurements are 50 by 200 feet. How many square feet of floor space?

How much more interest do you get in a year on \$200 at 4 per cent than on \$200 at $3\frac{1}{2}$ per cent?

Divide: $45.3 \overline{)921.402}$

If a wire 20 inches long is to be cut so that one piece is two-thirds as long as the other piece, how many inches long will the shorter piece be?

How much cheaper per pound is sugar at 12 pounds for a dollar than at 9 cents a pound?

When a plant draws up its own test forms, it usually is desirable to change the figures in the test with successive groups of candidates. Most commercial tests have alternate forms for repeated use.

Whatever test form is used, it is important to remember that the score is only one of the pieces of recorded information on which a decision is based.

Do not set a minimum or "passing" score—tests are used only to indicate those in the group who have the most ability to do simple

figuring and to understand written directions. No time limit should be set—each person should be allowed to complete the form.

All candidates who are to be tested should be called together to hear about the selection program direct from management, rather than through rumors.

An operating executive, who has prestige with workers, explains the purpose:

- a. Company is looking to the future.
- b. More supervisors are needed.
- c. Somebody has thought that each man in the room might make a good supervisor.
- d. Supervisors have "headaches" but there are also rewards.
- e. Not every man in the room will be a supervisor.
- f. We need more facts. A practical test will be used to supplement the other records. It will help to indicate those who may become supervisors, but it is *not* going to be the *only* point on which the decision is made.
- g. Even if you aren't selected, this isn't going to hurt you. *Every man doesn't win every race he enters.*

There may be some who will indicate at this time that they are not interested in being considered for supervisory positions. If they wish, they should be allowed to leave before the test is given.

After the tests are scored they should be added to the records concerning the persons. Tests should *not* be returned. A score may be given to an individual if requested, but not until after the decision as to supervisory appointment has been made.

5. REVIEW OF ALL CANDIDATES' QUALIFICATIONS

The selection committee will now review each man's record separately:

- a. personal history data.
- b. test record or other uniform measure.
- c. other records that indicate the calibre of the man.

When the committee considers this final assembly of records, it will be important to consider particularly the man's work history. Has the man had the kind of experience needed on the new assignment, or can he get it quickly? Remember that a man may make a good supervisor on one kind of work but not another. Consider present and prospective supervisory openings.

The selection committee should look for these qualities and abilities and the knowledge considered essential in *your* organization. In general, the best prospects are the men who:

- a. Have appropriate experience.
- b. Are level-headed, intelligent, trainable, and willing to learn.

- c. Have the personal characteristics you want of supervisors in your plant.
- d. Have demonstrated their ability to get teamwork.
- e. Are acceptable to their associates and present supervisors.
- f. Are willing to take the responsibility of supervising.
- g. Handle their personal affairs intelligently.
- h. Can adapt themselves to change.

Men who fail in one or more of those qualifications are doubtful prospects.

6. SELECTING THE PEOPLE FOR TRAINING

The selection committee now has the facts on which to base its decisions.

- a. Accept or reject each man on list as a prospect for supervisory training. Decision should, if possible, be unanimous.
- b. If a sufficient number of likely prospects are "voted in" at this stage, the doubtful cases can be held for future consideration.
- c. If there is disagreement, so that no one gets unanimous endorsement, then further consideration should be given to nominees where there is majority approval of their qualifications.
- d. If possible, observe the man breaking-in a new worker on the job, before final choice.
- e. Let each candidate know where he stands.

This method of picking men indicates who will profit most from sound supervisory training. The next steps are to place him properly and see that he gets good training. Don't just allow him to pick up information as to the supervisor's job in a haphazard manner. Remember that you do *not* have a ready-made supervisor.

Some of the men may be appointed supervisors at once and get their training on the job. Others may be put in pre-supervisory training courses. Still others will be held as a reserve or pool. And there will be some who you know *never* will be appointed at all. All these candidates must be told *just where they stand*.

The "supervisory pool" must not be built up beyond the number needed within a reasonable time, such as three to six months. If there is not any turnover in the pool, the whole selection plan may be unpopular.

In order to follow the supervisory pool principle, it is necessary that:

- a. Management have some idea or estimate of the number of supervisors needed over some such period as three months.
- b. All promotions to supervisory positions come from the pool.

WILL THIS WORK IN YOUR PLANT?

If your plant has an extensive employment procedure, you may already have recent test records that give you an objective, uniform

measure—you may already have the information needed for Step 4.

If you do not have many supervisory positions to fill, it probably will be best not to set up a “pool” for if there are no appointments made from it in a reasonable length of time, the men will be more dissatisfied than if they had been told that someone else got the job and no more are open.

But, in *any* plant, it will pay to anticipate needs and go about supervisory selection in an organized manner rather than to look at it as “getting a man for the new shift tonight.” And for *any* opening, it will pay to look at the qualifications of more than one man.

GAINS THROUGH GOOD SELECTION

Planning and foresight will pay dividends. The whole purpose of this method of picking men to be trained as supervisors is to identify the steps that will inventory the abilities of workers, so that “hidden talent” is not overlooked. A man’s appearance and manner may not be impressive, yet he may have excellent supervisory ability.

No one person in the plant can possibly have all of the essential facts necessary to make “spot” decisions regarding the potential abilities of a man. Two or three men, familiar with the problem and acquainted with the men available for promotion, can do a better job of selecting than one can alone. The judgment of one supplements the others.

A review of the record and a discussion of the needs and facts *prevent* hasty decisions. Men with supervisory ability *can* be found among rank-and-file workers. That is the major source of supply. The men who will make good supervisors are there. This method gives you a simple way to *turn the searchlight* on the group and to find them.

SAMPLE QUARTERLY OPERATING REPORT

January—March 1945

DISTRICT OFFICE PAID STAFF AT END OF QUARTER

	Clerical and Administrative Employees (all clerical, stenographic and office operation)		Program Employees (all technical and promotional)		Total Paid Employees
	Number	Per cent	Number	Per cent	
Jan., Feb., Mar. 1945	168	48	182	52	350
Oct., Nov., Dec. 1944	168	48	184	52	352

PRODUCTION RATIOS

	No. Certificates per Staff Member	No. Plants Served per Staff Member	No. Certificates per Company
Jan., Feb., Mar. 1945	208	5	46
Oct., Nov., Dec. 1944	248	5	53

STATE VOCATIONAL EXPENSE DURING QUARTER

	Total Number of 10-hour Units Conducted	Total Number of 10-hour Units Paid for by State	Per cent of 10-hour Units Pd. for by St. (Item 2 div.by Item 1)
Jan., Feb., Mar. 1945	8,244	1,580	19
Oct., Nov., Dec. 1944	9,762	2,517	26

PROGRAM DEVELOPMENT TRAINING DURING QUARTER

	Number of Institutes Held	Number of Persons Completing	Number of Companies Represented	Number of Employees in Companies
Jan., Feb., Mar. 1945	38	206	242	660,488
Oct., Nov., Dec. 1944	47	293	283	1,191,151

VOLUME OF PRODUCTION DURING QUARTER

	Job Instruction		Job Methods		Job Relations		Total Number Certificates
	Number	Pct.	Number	Pct.	Number	Pct.	
Jan., Feb., Mar. 1945	25,434	35	14,437	20	32,929	45	72,800
Oct., Nov., Dec. 1944	27,002	31	20,759	24	39,164	45	86,925

COST OF CERTIFICATES ISSUED DURING QUARTER

	Unit Cost of Adm. Payroll (adm.payroll div.by no.of certificates)	Unit Cost of Prog.Payroll (prog.payroll div.by no.of certificates)	Unit Cost of Travel (total travel exp. div.by no.of certificates)	Unit Cost of All Oth. Exp. (total other exp.div.by no. certificates)	Unit Cost of a Certificate
Jan.,Feb.,Mar. 1945	\$1.86	\$3.03	\$.85	\$.42	\$6.16
Oct.,Nov.,Dec. 1944	1.56	2.51	.61	.33	5.01

TRAINING WITHIN INDUSTRY REPORT

COMPANIES SERVED DURING QUARTER

(Plants and Establishments using one or more TWI programs during the Quarter)

	NEW (served by TWI for first time during quarter)					OLD (previously served by TWI and still or again using TWI programs)					Total all Plants
	Less than 100 Emp.	100-499 Emp.	500-999 Emp.	1000 and over Emp.	Total New Plants	Less than 100 Emp.	100-499 Emp.	500-999 Emp.	1000 and over Emp.	Total Old Plants	
Jan., Feb., Mar. 1945											
Number	77	145	42	45	309	97	394	264	535	1,290	1,599
Per cent	25	47	14	14		7	31	20	42		
Oct., Nov., Dec. 1944											
Number	45	188	78	83	394	94	396	215	536	1,241	1,635
Per cent	11	48	20	21		8	32	17	43		

ACTIVE TRAINERS AT END OF QUARTER

(Only those trainers who have put on at least one 10-hour session in the past 90 days and who are currently qualified and authorized to put on sessions)

	Emp. in industry, train only in own plants		Emp. in industry available for trng. outside own plts.		Emp. in voc. eng. oth. sch. available for trng. in plts.		Emp. in govt. agency, conduct only in own ag.		Emp. in govt. agency, available in plts.		Full-time Trainer		Total Number
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	
JOB INSTRUCTION													
Jan., Feb., Mar. 1945	599	67	162	18	37	4	42	5	15	1	43	5	898
Oct., Nov., Dec. 1944	634	64	209	21	41	4	59	6	10	1	44	4	997
JOB METHODS													
Jan., Feb., Mar. 1945	370	68	106	20	13	2	17	3	6	1	33	6	545
Oct., Nov., Dec. 1944	485	68	115	16	20	3	47	6	4	1	41	6	712
JOB RELATIONS													
Jan., Feb., Mar. 1945	708	68	200	19	24	2	48	6	14	1	42	4	1,038
Oct., Nov., Dec. 1944	759	67	214	19	34	3	52	5	19	2	42	4	1,120
ALL THREE PROGRAMS													
Jan., Feb., Mar. 1945	1,677	68	468	19	74	3	107	4	37	1	118	5	2,481
Oct., Nov., Dec. 1944	1,878	66	538	19	95	3	158	6	33	1	127	5	2,829

OPERATIONS BY DISTRICTS

DISTRICT OFFICE PAID STAFF

District and State	Cl. & Admin.	Prog. (Tech. & Prom.)	Total	District and State	Cl. & Admin.	Prog. (Tech. & Prom.)	Total
1. Maine	1	0	1	15. Illinois	15	11	26
New Hampshire	1	0	1	Wisconsin	2	0	2
Vermont	1	0	1	TOTAL	17	11	28
Massachusetts	10	5	15	16. Minnesota	5	4	9
TOTAL	13	5	18	Iowa	2	0	2
2. Connecticut	11	5	16	Nebraska	1	0	1
Rhode Island	1	0	1	South Dakota	0	0	0
TOTAL	12	5	17	North Dakota	0	0	0
3-4. New York	12	8	20	TOTAL	8	4	12
5. New Jersey	7	11	18	17. Arkansas	1	0	1
6. Pennsylvania	6	11	17	Kansas	0	0	0
Delaware	0	0	0	Missouri	6	6	12
TOTAL	6	11	17	Oklahoma	0	0	0
7-8. Maryland	1	8	9	TOTAL	7	6	13
D. C.	4	0	4	18. Texas	5	11	16
Virginia	0	1	1	Louisiana	0	2	2
West Virginia	0	1	1	New Mexico	0	0	0
North Carolina	0	3	3	TOTAL	5	13	18
TOTAL	5	13	18	19. Colorado	4	3	7
9. Alabama	2	0	2	Utah	1	3	4
Florida	1	0	1	Wyoming	0	0	0
Georgia	7	6	13	Montana	0	0	0
Mississippi	0	0	0	Idaho	0	0	0
South Carolina	1	0	1	TOTAL	5	6	11
Tennessee	2	0	2	20. S. California	5	14	19
TOTAL	13	6	19	Arizona	1	0	1
10. S. Ohio	8	5	13	TOTAL	6	14	20
Kentucky	2	0	2	21. N. California	4	9	13
TOTAL	10	5	15	Nevada	0	0	0
11. Pennsylvania	7	10	17	TOTAL	4	9	13
12. N. Ohio	6	12	18	22. Washington	5	7	12
13. Michigan	8	10	18	23. Oregon	3	6	9
14. Indiana	7	9	16	24. Hawaii	2	1	3
				Total	168	182	350

PRODUCTION RATIOS

Dist.	No. Certs. per Staff Member	No. Plts. Svd. per Stf. Mem.	No. Certs. per Company	Dist.	No. Certs. per Staff Member	No. Plts. Svd. per Stf. Mem.	No. Certs. per Company
1	85	3	29	15	313	6	54
2	185	2	83	16	161	7	22
3-4	224	3	79	17	302	3	119
5	234	6	38	18	230	4	52
6	137	3	39	19	118	5	25
7-8	164	5	34	20	223	2	104
9	410	5	84	21	142	4	40
10	222	3	76	22	256	3	85
11	130	4	35	23	148	11	14
12	156	4	40	24	541	30	18
13	176	5	35				
14	147	7	23	Average	208	5	46

TRAINING WITHIN INDUSTRY REPORT

STATE VOCATIONAL EXPENSE

District and State	Total 10-hr. Units	Units Pd. by State	Pct. Pd. by State	District and State	Total 10-hr. Units	Units Pd. by State	Pct. Pd. by State
1. Maine	9	2	22	15. Illinois	690	104	15
New Hampshire	8	5	63	Wisconsin	305	55	18
Vermont	12	2	17	TOTAL	995	159	16
Massachusetts	127	40	31	16. Minnesota	79	31	39
TOTAL	156	49	31	Iowa	59	18	31
2. Connecticut	242	37	15	Nebraska	51	34	67
Rhode Island	57	49	86	North Dakota	23	23	100
TOTAL	299	86	29	South Dakota	0	0	0
3-4. New York	496	173	35	TOTAL	212	106	50
5. New Jersey	494	145	29	17. Arkansas	12	0	0
6. Pennsylvania	233	5	2	Kansas	184	26	14
Delaware	28	2	7	Missouri	168	43	26
TOTAL	261	7	3	Oklahoma	69	13	19
7-8. Maryland	98	12	13	TOTAL	433	82	19
D. C.	10	0	0	18. Texas	339	22	6
Virginia	113	6	5	Louisiana	87	1	1
West Virginia	53	14	26	New Mexico	15	0	0
North Carolina	93	14	15	TOTAL	441	23	5
TOTAL	365	46	13	19. Colorado	79	20	25
9. Alabama	228	61	27	Wyoming	7	0	0
Florida	168	2	1	Utah	34	7	21
Georgia	136	33	24	Idaho	8	3	38
Mississippi	23	0	0	Montana	15	6	40
South Carolina	42	21	50	TOTAL	143	36	25
Tennessee	300	28	9	20. S. California	548	69	13
TOTAL	897	145	16	Arizona	61	20	33
10. S. Ohio	331	9	3	TOTAL	609	89	15
Kentucky	97	12	12	21. N. California	198	28	14
TOTAL	428	21	5	Nevada	0	0	0
11. Pennsylvania	239	53	22	TOTAL	198	28	14
12. N. Ohio	330	66	20	22. Washington	323	40	12
13. Michigan	342	135	39	23. Oregon	153	32	21
14. Indiana	268	59	22	24. Hawaii	162	0	0
				Total or Average	8,244	1,580	19

PROGRAM DEVELOPMENT TRAINING

Dist.	Number Insti- tutes	Number Persons Comp.	Number Com- panies	Number Employees	Dist.	Number Insti- tutes	Number Persons Comp.	Number Com- panies	Number Employees
1	1	8	8	61,000	15	2	7	14	37,133
2	1	0	8	28,148	16	2	18	1	2,700
3-4	2	19	15	94,600	17	2	17	6	8,362
5	3	11	30	32,489	18	0	0	0	0
6	2	7	13	24,890	19	2	9	17	29,085
7-8	2	2	5	33,300	20	1	4	5	6,200
9	2	18	16	58,960	21	0	0	0	0
10	4	34	18	30,115	22	1	4	6	7,500
11	4	9	28	63,704	23	0	0	0	0
12	2	12	16	25,862	24	1	9	8	29,924
	3	18	18	50,495					
	1	0	10	36,021	Total	38	206	242	660,488

VOLUME OF PRODUCTION

District & State	J.I.	J.M.	J.R.	Total	District & State	J.I.	J.M.	J.R.	Total
1. Maine	37	0	47	84	15. Illinois	2,237	1,596	2,295	6,128
New Hamp.	41	10	53	104	Wisconsin	784	674	1,185	2,643
Vermont	39	18	61	118	TOTAL	3,021	2,270	3,480	8,771
Mass.	403	255	613	1,271	16. Minnesota	358	96	319	773
TOTAL	520	283	774	1,577	Iowa	223	89	165	477
2. Conn.	840	643	1,054	2,537	Nebraska	191	86	179	456
R. I.	154	180	285	619	S. Dakota	0	0	0	0
TOTAL	994	823	1,339	3,156	N. Dakota	127	37	62	226
3-4. New York	1,333	793	2,359	4,485	TOTAL	899	308	725	1,932
5. N. J.	779	1,243	2,195	4,217	17. Arkansas	14	13	58	85
6. Penna.	914	410	751	2,075	Kansas	218	229	1,205	1,652
Delaware	99	34	111	244	Missouri	674	229	640	1,543
TOTAL	1,013	444	862	2,319	Oklahoma	279	159	202	640
7-8. Maryland	203	198	234	635	TOTAL	1,185	630	2,105	3,920
D. C.	38	2	34	74	18. Texas	1,174	753	1,378	3,305
Virginia	442	234	332	1,008	La.	209	99	392	700
W. Va.	165	41	207	413	N. Mexico	82	0	54	136
N. Car.	528	29	272	829	TOTAL	1,465	852	1,824	4,141
TOTAL	1,376	504	1,079	2,959	19. Colorado	351	153	243	747
9. Alabama	707	125	1,144	1,976	Wyoming	41	0	27	68
Florida	189	153	1,006	1,348	Utah	77	27	169	273
Georgia	697	234	340	1,271	Montana	63	7	73	143
Miss.	145	31	13	189	Idaho	29	20	20	69
S. Car.	169	9	172	350	TOTAL	561	207	532	1,300
Tenn.	557	361	1,750	2,668	20. S. Calif.	1,314	707	1,920	3,941
TOTAL	2,464	913	4,425	7,802	Arizona	94	256	170	520
10. Ohio	726	437	1,347	2,510	TOTAL	1,408	963	2,090	4,461
Kentucky	502	93	221	816	21. N. Calif.	851	439	556	1,846
TOTAL	1,228	530	1,568	3,326	Nevada	0	0	0	0
11. Penna.	520	309	1,381	2,210	TOTAL	851	439	556	1,846
12. N. Ohio	945	895	976	2,816	22. Wash.	2,074	168	836	3,078
13. Michigan	723	1,228	1,226	3,177	23. Oregon	407	110	816	1,333
14. Indiana	587	326	1,439	2,352	24. Hawaii	1,081	199	342	1,622
					TOTAL	25,434	14,437	32,929	72,800

UNIT COSTS PER CERTIFICATE

Dist.	Admin.	Prog.	Travel	Other	Total	Dist.	Admin.	Prog.	Travel	Other	Total
1	\$8.01	\$4.08	\$2.09	\$.64	\$14.82	15	\$1.72	\$1.62	\$.50	\$.23	\$ 4.07
2	3.46	1.94	.75	.48	6.63	16	2.91	2.12	.94	.46	6.43
3-4	2.55	2.41	.71	.59	6.26	17	1.45	1.92	.71	.17	4.25
5	1.02	3.03	.26	.46	4.77	18	.82	3.62	1.02	.17	5.63
6	1.80	6.12	.98	.65	9.55	19	2.73	5.57	1.84	.87	11.01
7-8	1.03	4.78	1.94	.43	8.18	20	.98	3.70	.43	.93	6.04
9	1.54	.98	.90	.05	3.47	21	1.76	6.10	1.24	.79	9.89
10	2.06	1.35	.93	.35	4.69	22	1.42	2.78	.63	.42	5.25
11	1.86	5.19	1.26	.63	8.94	23	1.91	5.33	1.02	.43	8.69
12	1.38	5.31	1.07	.53	8.29	24	1.29	.83	.16	.14	2.42
13	2.39	4.28	.61	.58	7.86						
14	1.85	4.69	1.26	.58	8.38	Average	1.87	3.08	.87	.42	6.16

TRAINING WITHIN INDUSTRY REPORT

COMPANIES SERVED DURING QUARTER

District and State	NEW (served for first time)					OLD (served previously and again this quarter)					Total Companies Served
	Und. 100	100-499	500-999	Over 1000	Total	Und. 100	100-499	500-999	Over 1000	Total	
	Emp.	Emp.	Emp.	Emp.		Emp.	Emp.	Emp.	Emp.		
1. Massachusetts	0	5	1	0	6	0	11	14	11	36	42
Maine	0	0	0	0	0	0	0	1	2	3	3
New Hampshire	0	0	0	0	0	0	3	2	0	5	5
Vermont	0	2	1	0	3	0	1	0	1	2	5
TOTAL	0	7	2	0	9	0	15	17	14	46	55
2. Connecticut	0	1	2	1	4	2	10	7	7	26	30
Rhode Island	0	2	0	0	2	0	1	1	4	6	8
TOTAL	0	3	2	1	6	2	11	8	11	32	38
3-4. New York	1	9	4	4	18	2	12	11	14	39	57
5. New Jersey	4	12	4	2	22	7	40	11	30	88	110
6. Pennsylvania	0	3	3	4	10	0	5	8	29	42	52
Delaware	0	0	1	0	1	0	0	1	5	6	7
TOTAL	0	3	4	4	11	0	5	9	34	48	59
7-8. Maryland	0	2	0	1	3	0	3	4	13	20	23
D. C.	0	0	1	0	1	0	0	0	3	3	4
Virginia	0	3	3	2	8	0	3	3	12	18	26
West Virginia	0	0	1	0	1	0	0	1	8	9	10
N. Carolina	0	2	3	2	7	0	4	5	8	17	24
TOTAL	0	7	8	5	20	0	10	13	44	67	87
9. Alabama	0	1	0	2	3	0	6	7	9	22	25
Florida	0	0	0	0	0	0	1	1	7	9	9
Georgia	0	0	1	1	2	0	3	3	6	12	14
Mississippi	0	0	0	0	0	0	1	1	2	4	4
S. Carolina	0	0	0	0	0	0	2	2	3	7	7
Tennessee	0	0	0	0	0	2	5	5	22	34	34
TOTAL	0	1	1	3	5	2	18	19	49	88	93
10. S. Ohio	2	2	0	1	5	1	5	4	15	25	30
Kentucky	0	1	0	1	2	1	5	1	5	12	14
TOTAL	2	3	0	2	7	2	10	5	20	37	44
11. Pennsylvania	2	6	2	4	14	0	13	11	26	50	64
12. N. Ohio	0	7	0	0	7	5	17	10	32	64	71
13. Michigan	4	14	5	4	27	1	27	12	24	64	91
14. Indiana	9	4	2	2	17	7	29	18	33	87	104
15. Illinois	2	19	0	4	25	1	16	18	49	84	109
Wisconsin	2	4	1	1	8	3	14	13	16	46	54
TOTAL	4	23	1	5	33	4	30	31	65	130	163
16. Minnesota	4	4	0	1	9	4	12	2	3	21	30
Iowa	1	1	1	2	5	3	3	5	6	17	22
Nebraska	2	1	0	1	4	1	8	2	4	15	19
North Dakota	4	5	0	0	9	3	2	1	0	6	15
South Dakota	0	0	0	0	0	0	0	0	0	0	0
TOTAL	11	11	1	4	27	11	25	10	13	59	86
17. Arkansas	2	0	0	0	2	0	0	0	0	0	2
Kansas	0	1	0	0	1	0	0	0	6	6	7
Missouri	2	1	1	1	5	0	4	4	6	14	19
Oklahoma	2	0	0	0	2	0	0	0	3	3	5
TOTAL	6	2	1	1	10	0	4	4	15	23	33
18. Texas	8	6	0	1	15	6	16	7	11	40	55
Louisiana	3	4	0	0	7	1	3	1	6	11	18
New Mexico	0	3	1	0	4	0	0	3	0	3	7
TOTAL	11	13	1	1	26	7	19	11	17	54	80
19. Colorado	1	1	0	2	4	3	4	3	7	17	21
Wyoming	0	1	0	0	1	1	0	1	1	3	4
Utah	1	2	0	0	3	6	6	1	3	16	19
Idaho	0	0	0	0	0	0	2	1	1	4	4
Montana	0	1	0	0	1	0	2	1	1	4	5
TOTAL	2	5	0	2	9	10	14	7	13	44	53
20. S. California	4	6	0	0	10	0	12	3	10	25	35
Arizona	0	1	0	0	1	1	1	2	3	7	8
TOTAL	4	7	0	0	11	1	13	5	13	32	43
21. N. California	0	0	0	0	0	6	15	9	16	46	46
Nevada	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	6	15	9	16	46	46
22. Washington	2	2	2	0	6	3	8	7	12	30	36
23. Oregon	15	6	2	0	23	18	30	11	14	73	96
24. Hawaii	0	0	0	1	1	9	29	25	26	89	90
Total	77	145	42	45	309	97	394	264	535	1290	1,599

ACTIVE TRAINERS AT END OF QUARTER - JOB INSTRUCTION

District and State	Emp. in industry, train only in own plt.	Emp. in industry, avl. for tr. out-side plt.	Emp. in voc.eng. oth.sch. avl. tr. in plt.s.	Emp. in govt.agc. cond.only in own agency	Emp. in govt. agency, conduct in ind.	Full-time Trainer	Total
1. Massachusetts	11	0	2	0	0	4	17
Maine	0	1	0	0	0	0	1
New Hamp.	1	0	1	0	0	0	2
Vermont	0	0	0	0	0	0	0
TOTAL	12	1	3	0	0	4	20
2. Connecticut	21	3	0	0	0	0	24
Rhode Island	2	1	0	0	0	3	6
TOTAL	23	4	0	0	0	3	30
3-4. New York	33	12	0	0	0	0	45
5. New Jersey	17	2	3	2	0	8	32
6. Pennsylvania	27	5	1	0	5	0	38
Delaware	0	0	3	0	0	0	3
TOTAL	27	5	4	0	5	0	41
7-8. Maryland	9	1	0	0	0	0	10
D. C.	1	0	0	0	0	0	1
Virginia	12	2	0	0	0	0	14
W. Virginia	4	0	0	0	0	0	4
N. Carolina	14	3	0	0	0	0	17
TOTAL	40	6	0	0	0	0	46
9. Alabama	18	0	4	2	0	0	24
Florida	8	1	1	0	0	0	10
Georgia	27	3	0	1	0	0	31
Mississippi	2	0	0	0	0	0	2
S. Carolina	12	0	1	0	0	0	13
Tennessee	16	1	2	1	0	3	23
TOTAL	83	5	8	4	0	3	103
10. S. Ohio	18	6	0	0	0	0	24
Kentucky	9	5	0	0	0	0	14
TOTAL	27	11	0	0	0	0	38
11. Pennsylvania	17	5	1	0	0	0	23
12. N. Ohio	18	19	7	0	0	1	45
13. Michigan	8	0	0	4	0	9	21
14. Indiana	23	9	0	0	3	1	36
15. Illinois	75	12	1	3	0	0	91
Wisconsin	19	8	1	2	0	0	30
TOTAL	94	20	2	5	0	0	121
16. Minnesota	12	3	0	1	0	5	21
Iowa	11	2	0	0	0	1	14
Nebraska	10	7	0	0	3	0	20
North Dakota	2	0	0	0	0	1	3
South Dakota	1	0	0	0	0	0	1
TOTAL	36	12	0	1	3	7	59
17. Arkansas	0	0	1	0	1	0	2
Kansas	7	3	3	0	0	0	13
Missouri	19	3	0	0	0	0	22
Oklahoma	7	0	2	0	0	0	9
TOTAL	33	6	6	0	1	0	46
18. Texas	27	16	0	0	0	0	43
Louisiana	5	2	0	0	0	0	7
New Mexico	1	1	0	0	0	0	2
TOTAL	33	19	0	0	0	0	52
19. Colorado	4	4	1	2	0	0	11
Wyoming	0	1	1	0	0	0	2
Utah	1	1	0	0	0	0	2
Montana	0	1	1	0	0	0	2
Idaho	0	2	0	0	0	0	2
TOTAL	5	9	3	2	0	0	19
20. S. Calif.	29	3	0	0	0	7	39
Arizona	0	1	0	0	0	0	1
TOTAL	29	4	0	0	0	7	40
21. N. Calif.	15	4	0	3	1	0	23
Nevada	0	0	0	0	0	0	0
TOTAL	15	4	0	3	1	0	23
22. Washington	15	4	0	2	0	0	21
23. Oregon	8	5	0	0	0	0	13
24. Hawaii	3	0	0	19	2	0	24
Total	599	162	37	42	15	43	898

TRAINING WITHIN INDUSTRY REPORT

ACTIVE TRAINERS AT END OF QUARTER - JOB METHODS

District and State	Emp. in industry, train only in own plt.	Emp. in industry, avl. for tr. out-side plt.	Emp. in voc.eng. oth.sch. avl.tr. in plts.	Emp. in govt.agc. cond.only in own agency	Emp. in govt. agency, conduct in ind.	Full-time Trainer	Total
1. Massachusetts	5	1	1	0	0	3	10
Maine	0	0	0	0	0	0	0
New Hamp.	0	0	1	0	0	0	1
Vermont	0	0	0	0	0	0	0
TOTAL	5	1	2	0	0	3	11
2. Connecticut	10	7	0	0	0	0	17
Rhode Island	0	0	0	0	0	3	3
TOTAL	10	7	0	0	0	3	20
3-4. New York	28	5	0	0	0	0	33
5. New Jersey	23	5	1	2	0	4	35
6. Pennsylvania	19	2	0	0	2	0	23
Delaware	1	0	0	0	0	0	1
TOTAL	20	2	0	0	2	0	24
7-8. Maryland	5	1	0	0	0	0	6
D. C.	0	0	0	0	0	0	0
Virginia	9	1	0	0	0	0	10
W. Virginia	2	0	0	0	0	0	2
N. Carolina	0	0	0	0	0	0	0
TOTAL	16	2	0	0	0	0	18
9. Alabama	9	0	3	5	0	0	17
Florida	4	0	0	0	0	0	4
Georgia	4	7	0	0	0	0	11
Mississippi	1	0	0	0	0	0	1
S. Carolina	2	0	0	0	0	0	2
Tennessee	11	1	0	0	0	0	12
TOTAL	31	8	3	5	0	0	47
10. S. Ohio	12	2	0	0	0	0	14
Kentucky	4	1	0	0	0	0	5
TOTAL	16	3	0	0	0	0	19
11. Pennsylvania	14	2	2	0	0	0	18
12. N. Ohio	24	9	1	0	0	0	34
13. Michigan	35	2	0	0	0	8	45
14. Indiana	16	3	0	0	1	1	21
15. Illinois	56	4	0	0	0	3	63
Wisconsin	9	4	0	0	0	0	13
TOTAL	65	8	0	0	0	3	76
16. Minnesota	2	1	0	0	0	5	8
Iowa	2	5	0	0	0	2	9
Nebraska	0	1	0	0	0	0	1
N. Dakota	0	0	0	0	0	0	0
S. Dakota	0	0	0	0	0	0	0
TOTAL	4	7	0	0	0	7	18
17. Arkansas	0	0	0	0	1	0	1
Kansas	0	7	0	0	0	0	7
Missouri	2	5	0	0	0	0	7
Oklahoma	2	3	2	0	0	0	7
TOTAL	4	15	2	0	1	0	22
18. Texas	19	7	0	0	0	0	26
Louisiana	4	1	0	0	0	0	5
N. Mexico	0	0	0	0	0	0	0
TOTAL	23	8	0	0	0	0	31
19. Colorado	0	5	0	0	0	0	5
Utah	0	0	1	0	0	0	1
Wyoming	0	0	0	0	0	0	0
Idaho	2	1	0	0	0	0	3
Montana	1	0	0	0	0	0	1
TOTAL	3	6	1	0	0	0	10
20. S. Calif.	11	2	0	0	0	1	14
Arizona	1	1	0	0	0	1	3
TOTAL	12	3	0	0	0	2	17
21. N. Calif.	10	7	0	3	1	0	21
Nevada	0	0	0	0	0	0	0
TOTAL	10	7	0	3	1	0	21
22. Washington	3	0	1	2	0	2	8
23. Oregon	0	3	0	0	0	0	3
24. Hawaii	8	0	0	5	1	0	14
Total	370	106	13	17	6	33	545

ACTIVE TRAINERS AT END OF QUARTER - JOB RELATIONS

District and State	Emp. in industry, train only in own plt.	Emp. in industry, avl. for tr. out-side plt.	Emp. in voc.eng. oth.sch. avl. tr. in plts.	Emp. in govt.agc. cond.only in own agency	Emp. in govt. agency, conduct in ind.	Full-time Trainer	Total
1. Mass.	14	1	3	0	0	3	21
New Hamp.	3	0	0	0	0	0	3
Maine	1	1	0	0	0	0	2
Vermont	0	0	0	0	0	1	1
TOTAL	18	2	3	0	0	4	27
2. Connecticut	23	6	0	0	0	0	29
Rhode Island	4	1	0	0	0	3	8
TOTAL	27	7	0	0	0	3	37
3-4. New York	40	17	0	0	0	0	57
5. New Jersey	25	10	4	0	5	4	48
6. Pennsylvania	27	6	0	3	0	0	36
Delaware	9	1	0	0	0	0	10
TOTAL	36	7	0	3	0	0	46
7-8. Maryland	13	2	0	0	0	0	15
D. C.	1	0	0	0	0	0	1
Virginia	12	1	0	0	0	0	13
W. Virginia	7	1	0	0	0	0	8
N. Carolina	9	0	0	0	0	0	9
TOTAL	42	4	0	0	0	0	46
9. Alabama	17	0	2	1	0	0	20
Florida	24	1	1	3	0	0	29
Georgia	10	5	0	0	0	0	15
Mississippi	0	0	0	1	0	0	1
S. Carolina	8	0	0	0	0	0	8
Tennessee	23	2	1	2	0	0	28
TOTAL	82	8	4	7	0	0	101
10. S. Ohio	35	3	0	2	0	0	40
Kentucky	11	2	0	0	0	0	13
TOTAL	46	5	0	2	0	0	53
11. Pennsylvania	65	5	1	1	0	1	73
12. N. Ohio	16	25	5	0	0	3	49
13. Michigan	23	6	1	1	0	9	40
14. Indiana	38	7	0	1	1	1	48
15. Illinois	61	20	1	6	0	0	88
Wisconsin	22	12	0	10	0	0	44
TOTAL	83	32	1	16	0	0	132
16. Minnesota	2	2	0	0	1	5	10
Iowa	11	1	0	0	1	0	13
Nebraska	2	5	0	0	0	1	8
N. Dakota	0	0	0	0	0	0	0
S. Dakota	0	0	0	0	0	0	0
TOTAL	15	8	0	0	2	6	31
17. Arkansas	1	0	1	0	0	0	2
Kansas	21	6	1	0	0	0	28
Missouri	11	5	0	0	3	0	19
Oklahoma	7	1	0	0	0	0	8
TOTAL	40	12	2	0	3	0	57
18. Texas	20	9	0	0	0	0	29
Louisiana	11	2	0	0	0	0	13
New Mexico	4	3	0	0	0	0	7
TOTAL	35	14	0	0	0	0	49
19. Colorado	3	4	1	1	0	0	9
Wyoming	1	1	0	0	0	0	2
Utah	3	2	0	0	0	0	5
Montana	2	0	1	0	0	0	3
Idaho	1	1	0	1	0	0	3
TOTAL	10	8	2	2	0	0	22
20. S. Calif.	31	2	0	0	0	6	39
Arizona	0	2	0	0	0	1	3
TOTAL	31	4	0	0	0	7	42
21. N. Calif.	11	6	1	1	2	0	21
Nevada	0	0	0	0	0	0	0
TOTAL	11	6	1	1	2	0	21
22. Washington	12	4	0	0	1	4	21
23. Oregon	8	8	0	0	0	0	16
24. Hawaii	5	1	0	14	2	0	22
Total	708	200	24	48	16	42	1,038

TRAINING WITHIN INDUSTRY STAFF

This is a list of all persons employed by T.W.I. both on a "without compensation" basis and on the payroll. Every effort has been made to insure its accuracy and completeness but, because of the decentralized nature of the organization, there may be some errors or omissions.

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The dates given for the District Representatives do not represent their true length of T.W.I. service since each of these men had been a staff member long before his appointment to the position of District Representative.

All of the persons on this list were not active at any one time, the maximum total at one time being 410. The numbers in parentheses opposite the headings "District Staff" indicate the maximum size of staffs at any one time.

When the same name appears in more than one group or district it is because of promotion or transfer. The first appointment made in each district was the District Director who started operations and built up the paid staff. The single asterisk (*) indicates the first paid man on a district staff. He was the assistant to the District Director and in many cases became the first District Representative.

In addition to the four National Directors, the District Directors, and the Advisers, all of whom served without compensation, there were also a number of men loaned by their companies for actual staff work. These men, too, were on a "without compensation basis" and they are included in the district staff lists with their names indicated by the double asterisk (**).

When a district seems to have a large number of advisers, they served at different times or in different industrial centers.

T.W.I., in addition to those listed, had the assistance of some 500 panel members, who also served without compensation, on a part-time basis.

NATIONAL HEADQUARTERS—Washington, D. C.

Directors

C. R. Dooley, Director
 Walter Dietz, Associate Director
 William Conover, Assistant Director
 M. J. Kane, Assistant Director

Headquarters Field Staff (10 Members)

A. G. Blake
John B. Calhoon
John D. Clarke
John Convery
W. S. Cooper
Clifton H. Cox
H. E. Doner
J. D. Haygood

Herbert Kessel
Glenn D. McNeilly
Paul A. Mertz
John Mollers
Charles R. Mullan
A. E. Peterson
J. B. Roe
Howard deF. Trainor

Headquarters Staff (44 Members)

Ellen Aird
Marion Albemonte
Parnell E. Allen
Alice Anderson
Mildred Anderson
Mary E. Arthur
Betty Ann Beaty
Ellen M. Beckwith
Abner I. Bennett
Solomon Beren
Herbert H. Blomeier
Evelyn Bombardier
William T. Boyland
Mayre Branner
Faye C. Brockman
Violet L. Brown
Estelle J. Bunn
Wilbur J. Cain
Mary Ann Callahan
**Dick Carlson
M. E. Carlson
Hazel J. Chase
Wesley Clarke
Freddie O. Coleman
Bonita L. Combs
Clarence N. Cone
Thelma C. Conner
Ruth Conrad
Donald Craver
A. L. Criswell
Ruth L. Crocker
Charles Daus
June M. Dietz
Loreta Dingman
L. W. Emerson
John A. Fitzwater
Edward K. Follin
Dorothy France
Anne Fridgen
L. A. Gappa
Bernard L. Gardiner
Ann Garfink
Winnie Ann Garrett

Doris Gladden
Grayce L. Hayden
Rosemary A. Heagy
Mary H. Hipple
Claire Hughes
George Jaquet
Blanche Jones
Constance G. Jones
Herbert Juul
Shirley B. Keir
Frances Kirkpatrick
Gertrude Kleckley
Mary Lackatosh
Arthur Lang
Erling Larsen
Helen Linville
Jane L. Love
Isabel Lynn
C. R. Mann
Awilda Metcalfe
Anne Michener
J. P. Mitchell
Marguerite Morrison
Mary Nemes
Mary E. Newsome
John Nolan
Edward H. Ocker
William K. Opdyke
Katherine R. Parkman
Marion A. Purstell
Hilda Quimby
Donald Ringer
Roselyn Rosenberg
Virgil K. Rowland
John E. Saunders
David Schwartz
Ann E. Shanahan
Elnora Shelton
Mary S. Silber
Lillian Sklar
Ann R. Smith
Lulu Stoner
Louise Swindell

Sylvia Tatem
 Paul A. Taylor
 Norma TeSelle
 Sarah E. Thompson
 Catherine Tillie
 Frank A. Tully
 Claire Ulrich
 Louise G. Warman

Claude Watts
 Phyllis I. Wentworth
 Lucy Wester
 Kathryn Wilcox
 Marie Wolf
 Elizabeth Wurdeman
 Julia Yokum

NORTHERN NEW ENGLAND—Boston

District Director

Clarence G. McDavitt, New England Telephone & Telegraph Co., Nov. 1940-March 1943

Harry H. Kerr, Boston Gear Works, April 1943-Sept. 1945

District Representative

Harold K. Bragle, June 1943-July 1945

Management and Labor Advisers

J. J. Kelleher, CIO, United Steelworkers of America, Worcester Industrial Union Council

Clarence G. McDavitt, New England Telephone & Telegraph Co.

A. J. Moriarty, AFL, International Typographical Union

Everard Stubbs, Fellow Gear Shaper Co.

District Staff (18 Members)

Mary H. Barker
 Thomas J. Beedem
 George H. Bork
 Nathan T. Crocker
 John H. Frye
 Elizabeth M. Gannon
 Norman L. Gifford
 Helen Gilmartin
 Timothy F. Grady
 Marilyn Grosberg
 Maynard H. Hammond
 Helen M. Hennessey

Harold K. Hill
 James F. Hobbs
 Charles E. Hoffer
 **Wayne E. Keith
 Thalia Markante
 Helene C. Moran
 Catherine V. Oglivie
 Ward A. Robinson
 Robert S. Steinert
 *Gilbert H. Tapley
 Frederick A. Washburn
 James T. Wolohan

SOUTHERN NEW ENGLAND—New Haven

District Director

Ernest A. Stowell, Underwood Elliott Fisher Co., Nov. 1940-Feb. 1942

Joseph E. Moody, American Hat Corp., Feb. 1942-July 1942

Arthur DuBois, Associate Director, Sept. 1942-Sept. 1945

District Representative

*A. E. Whitehill, July 1941-July 1945

E. C. Brownell, July 1945-Sept. 1945

Management and Labor Advisers

J. H. DeCantillon, AFL, International Association of Machinists

Carl A. Gray, Grenby Manufacturing Co.

Thomas Kearny, AFL, International Brotherhood of Electrical Workers of America

R. Viall, Brown & Sharpe Manufacturing Co.

District Staff (17 Members)

A. Clinton Brooks	Charles W. LaBlanc
Adeline D. Canaleri	Adelaide Mastriani
John D. Clarke	Rose Doris Mastroddi
Elmer K. Eaton	Ralph C. McLeod
Lillian Geldman	John J. Moriarity
Viola P. Glaser	George W. Murdock
Harry C. Harris	Percy Redmund
Robert S. Hawthorne	A. Graham Shields
George L. Hero	Elsie B. Sutta
Selden G. Hill	Charles S. Todd
Agnes I. Kerr	M. Wilbur Townsend
Minnie C. Kline	

NEW YORK—New York City**District Director**

D. J. Hoose, The Texas Co., March 1941-June 1942
 Sterling W. Mudge, Socony-Vacuum Oil Co., July 1942-Sept. 1945

District Representative

R. E. Collin, Jan. 1943-Sept. 1945

Management and Labor Advisers

J. J. Brennan, AFL, Bricklayers, Masons and Plasterers, International Union of America, Building and Construction Trades Council
 Duncan B. Cox, Ranger Aircraft Engine Co.
 Harold J. Garno, CIO, United Automobile, Aircraft and Agricultural Implementation Workers of America, New York State Industrial Union Council
 R. E. Gilmore, Sperry Gyroscope Co., Inc.
 D. J. Hoose, The Texas Co.
 Thomas J. Lyons, AFL, International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America
 Howard McSpedon, AFL, International Brotherhood of Electrical Workers of America, Building and Construction Trades Council
 Gustave A. Strebel, CIO, New York State Industrial Union Council
 J. Carlson Ward, Jr., Fairchild Engine & Airplane Corp.

District Staff (23 Members)

Percy J. Boyce	Margaret B. Ludwig
Philip L. Burger	Samuel B. Magill
Gus W. Campbell	Mary L. Mathes
Ruth Cohen	E. J. Mendelsohn
Stanley D. Cutter	Harry M. Mitchell
August E. Farrenkopf	John Mollers
Doris Fine	Helen Mondschein
A. Winthrop Fish	John H. Moore
James H. Gilson	Samuel B. Morse
Ethel Graff	Raymond T. Murray
Willis D. Hall	Alice M. O'Keefe
George E. Hebner	Orville S. Osborne
L. R. Hills	Clair W. Rodgers
Verna A. Howell	Rosalie A. Sheldon
Beatrice Jacoby	Theodore R. Slatery
Francis M. Johnson	Hugh M. Smith
*Albert M. Jones	Edwin B. Stair
Harold W. Jordan	Arthur B. Woodward
James H. Kohlerman	

NEW JERSEY—Newark***District Director***

Glenn L. Gardiner, Forstmann Woolen Co., Jan. 1941-Sept. 1945

Arthur H. Myer, Associate Director, Feb. 1945-Sept. 1945

District Representative

*Arthur H. Myer, May 1943-Feb. 1945

Paul Lawall, Feb. 1945-Sept. 1945

Management and Labor Advisers

Peter J. Flynn, CIO, Industrial Union of Marine and Shipbuilding Workers of America

Carl Gylling, AFL, International Association of Machinists

Thomas R. Jones, American Type Founders, Inc.

Clifford Lindholm, Falstrom Co.

George Stringfellow, Thomas A. Edison, Inc.

District Staff (18 Members)

Edith Alter

Evelyn Anders

Carl Becker

Esther R. Becker

Francis B. Braillard

**George B. Clarke

William B. Corry

Clifton H. Cox

Lawrence J. Davis

Inglee B. Dewson

Howard J. Dreher

Wilma G. Dreher

Ruth Elsen

Ethel M. Florence

Anabel C. Fristoe

Edward B. Greene

Edith P. Hamburger

Roslyn Kohn

F. Ross Kelland

Edward W. McFeely

Howard A. Merrick

Rush Neer

Anita Olsan

Gertrude Pins

Orville N. Plouffe

Robert A. Portsmouth

Chester A. Pynn

Ruth Rosenbloom

Jean R. Rosse

Julius B. Walther

Walter C. Willard

**Robert Widdop

Theodore R. Wolf

Rose Wolfson

H. A. Zantow

EASTERN PENNSYLVANIA AND DELAWARE—Philadelphia***District Director***

H. W. Jones, Atlantic Refinery Co., April 1941-Sept. 1945

District Representative

John Convery, Oct. 1943-June 1945

Russell Conard, June 1945-Sept. 1945

Management and Labor Advisers

Carl Bersing, CIO, United Electrical, Radio and Machine Workers of America

Earl O. Bohr, AFL, International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America

Anthony Martinez, CIO, United Steelworkers of America

Dale Purves, John B. Stetson Co.

Louis B. F. Raycroft, Electric Storage and Battery Co.

Charles S. Sehl, AFL, International Association of Machinists

Earl Sparks, Metal Manufacturers' Association

David Williams, AFL, International Association of Machinists

District Staff (18 Members)

Clifford E. Alden
 Shirley S. Applegate
 Rose Becker
 Kathryn M. Bigelow
 Margaret R. Campbell
 *Clarence N. Cone
 Gilbert S. Cooper
 Harry P. Cramer
 Randolph S. Driver
 Alden D. Elbersson
 M. J. L. Frazier
 Howard W. Fry
 Gertrude E. Gould
 Elizabeth H. Greene
 Florence W. Grintz
 Margaret M. Hanley
 Rosewell G. Hawkins
 Lucretia B. Kammerman
 Marion F. Kelley

Margaret V. Kelly
 Clara G. Lafferty
 Dolores K. McCarthy
 Helen M. McMahon
 Sarah V. Meddlem
 Donald C. Moore
 Neil W. Mounts
 Julia L. Ostertag
 Janet Paton
 Cynthia G. Schwartz
 John A. Small
 John C. Steinman
 Clyde M. Tripple, Sr.
 Mary E. Wannop
 Lillian K. Weiss
 Margaret E. White
 Ineborg M. Wolfer
 Archie G. Woods

WESTERN PENNSYLVANIA—Pittsburgh**District Director**

Carl S. Coler, Westinghouse Electric & Manufacturing Co., Oct. 1940-Sept. 1945

District Representative

D. R. Demaree, Sept. 1944-Sept. 1945

Management and Labor Advisers

Clinton S. Golden, CIO, United Steelworkers of America
 Joseph A. Goney, CIO, United Steelworkers of America
 F. N. Hoffman, CIO, United Steelworkers of America
 W. G. Marshall, Westinghouse Electric & Manufacturing Co.
 Henry D. Scott, Wheeling Steel Corp.
 William S. Shord, AFL, International Brotherhood of Electrical Workers of America

District Staff (17 Members)

A. G. Blake
 Thomas L. Cannon
 Quincy P. Carvel
 Willard E. Colvin
 A. L. Criswell
 G. E. Dannels
 Catherine E. Davis
 Charles J. Farrell
 Philomene L. Fischione
 Grace H. Friel
 H. L. Grau
 Herbert C. Grove
 Helen T. Kampmeier
 Shirley B. Keir
 Winfield M. McAlister
 Gertrude S. McCoy
 Charles T. McNary

Andrew S. Malone
 Clay L. Meritser
 George Papin
 William M. Parrish
 J. Blair Peterman
 Carl E. Pyle
 Harland V. Pinkney
 Oscar L. Raup
 Deborah Ray
 Joseph Edmund Ricci
 Gottlieb M. Rohde, Jr.
 Harry D. Rojohn
 *Birl Schultz
 Frank K. Singer
 Robert C. Todd
 Ethel Weinberg

ATLANTIC CENTRAL—Raleigh, 1941—Baltimore, 1941

(Combined, with office at Baltimore, in January, 1944)

District Director

George Arthur, Champion Paper & Fibre Co., Jan. 1941-Dec. 1943—Raleigh
 Charles R. Hook, Jr., Rustless Iron & Steel Corp., July 1941-May 1942—
 Baltimore

James H. Kahlert, Bendix Radio, July 1942-Oct. 1943—Baltimore

Carl S. Coler, Westinghouse Electric & Manufacturing Co., Jan. 1944-Sept. 1945
 —combined districts

District Representative

Joseph A. Babeor, June 1943-Dec. 1943

George Papin, Jan. 1944-May 1945

Management and Labor Advisers

Frank Bender, CIO, United Automobile, Aircraft and Agricultural Implement Workers of America

Stewart Cort, Bethlehem Steel Co.

Alonzo Decker, Black & Decker Manufacturing Co.

C. A. Fink, AFL, International Brotherhood of Electrical Workers of America

Charles R. Hook, Jr., Rustless Iron & Steel Corp.

F. N. Kershaw, AFL, International Association of Machinists

Edward J. Robeson, Newport News Shipbuilding Co.

E. L. Sandefur, CIO, Textile Workers Union of America

Henry D. Scott, Wheeling Steel Corp.

F. W. Symmes, Union Buffalo Mills Co.

T. A. Wilson, AFL, International Typographical Union

District Staff (15 Members)

John T. Bagwell

Joseph Bartillis

Albert Behning, Jr.

William H. Blackmore

Mary Bartle

Ruth G. Cranor

Mildred Cunningham

James A. Dennis

*Henry T. Douglas—Baltimore

Ann Garfink Eff

Miriam D. Garrett

Alice E. Gregory

James A. Griffin

Dwight P. Jacobus

Minnie Mildred Keyser

Edna E. Kibbe

Ben L. Landis

Arthur Eugene Langston

C. Pell Lewis

Martin M. Markley

John A. Marshall

Frances Lois Michael

Charles T. McNary

Mary E. Newsome

Carl E. Pyle

Helen Radebaugh

J. B. Roe

Robert Louis Rogers

Leland O. Rowe

Frances R. Rumbley

Frederick J. Sendelbach

Sherman M. Shuck

Charles L. Smith

Charles S. Stabley

Eva Steuer

Francis E. Swartzlander

Clarence M. Thomas, Jr.

Sarah Thompson

*Grover S. Tome—Raleigh

Allen Warfield

Beverly Sandford Whitgreave

Sarah Frances Whitley

Geraldine R. Young

SOUTHEASTERN—Atlanta***District Director***

James E. McDaniel, Georgia School of Technology, Nov. 1940-Aug. 1942

A. S. Hotchkiss, Tennessee Coal, Iron and Railroad Co., Sept. 1942-Sept. 1945

District Representative

A. J. Speer, Nov. 1942-Sept. 1945

Management and Labor Advisers

Paul R. Christopher, CIO, Textile Workers Union of America, Tennessee State Industrial Council

Charles B. Gramling, AFL, International Union of Operating Engineers

Dewey Johnson, AFL, International Brotherhood of Electrical Workers of America

B. W. Sinclair, Georgia Power Co.

J. F. Vance, Tennessee Coal, Iron and Railroad Co.

District Staff (19 Members)

John S. Allen

Mary B. Bagley

Sylvia M. Bailey

Mildred T. Blank

Ethel I. Bradley

Sally N. Chubb

Paula D. Copeland

Margaret H. Donovan

Ellen L. Elrod

Henry D. Fulmer

Fred L. Gilman

Mary Green

Reuben E. Hagen

Thomas L. Harrell

James Lawrence Harrison

Lee Roy Head, Jr.

Thomas R. Hearn

Casper J. Johnson

Spencer V. Johnson

Margie McDonnell

Harry L. Morill

Ivey L. Murray

Gordon K. Norman

Lamar R. Partain

Birl Shultz

Alfred C. Smith

Charles S. Stabley

Burch E. Swann

Grant Swisher

*James Teat

Frank H. Thompson

Marion A. Truslow

Walter C. Willard

Alton C. Woodward

George W. Zimmerman

OHIO VALLEY—Cincinnati***District Director***

Paul Mooney, Kroger Grocery & Baking Co., Oct. 1940-Sept. 1945

District Representative

Aubrey Richmond, Oct. 1943-July 1945

Management and Labor Advisers

Lewis Crosley, Crosley Corp.

R. I. Davidson, CIO, Regional Director

Paul Fuller, CIO, Federation of Glass, Ceramic & Silica Sand Workers of America

Arthur Hartman, CIO, Amalgamated Clothing Workers of America

John J. Hurst, AFL, United Brotherhood of Carpenters and Joiners of America, Central Labor Council

George Seyler, Lunkenheimer Co.

District Staff (15 Members)

Irene Brown
 John W. Combs
 Kendall Guy Creager
 Charles V. Davison
 Cecilia C. Dennedy
 Thomas John Farrell
 Fred W. Gusweiler
 Richard E. Herbst
 Walter P. Hildebrand
 Joseph Mary Hildesheim
 Thomas J. Jones
 Myrl J. Kepner

Maurice J. Koch
 Frank A. McFerran
 *Burnett Reed
 Charles Darwin Riefkin
 Vivian Maxine Sams
 Harry Devers Semple
 Betty Gertrude Sutter
 Lloyd H. Taylor
 Marcia Joan Taylor
 Kathryn Thornton Thompson
 Mary Louise Thornton
 Herbert Robert Wegert

NORTHERN OHIO—Cleveland**District Director**

Oscar Grothe, White Sewing Machine Co., Nov. 1940-Sept. 1945

District Representative

*Lowell O. Mellen, June 1941-Sept. 1945

Management and Labor Advisers

Thomas H. Burke, CIO, Toledo Industrial Union Council
 Leo Casey, CIO, United Steelworkers of America
 Earl Caton, AFL, Amer. Fed. of State, County & Municipal Employees
 Elmer Cope, CIO, United Steelworkers of America
 Albert Dalton, AFL, International Association of Heat and Frost Insulators
 and Asbestos Workers
 Mathew DeMoore, AFL, International Association of Machinists
 R. S. Livingston, Thompson Products, Inc.
 T. N. Russell, CIO, United Automobile, Aircraft and Agricultural Implement
 Workers of America, Toledo Industrial Union Council
 Warner Seeley, Warner and Swasey Co.

District Staff (18 Members)

Helen B. Allen
 Gregory Taylor Armstrong
 Grover C. Bates
 Millie M. Beach
 Geraldine Anne Boguski
 Roy Dalton Bundy
 Dale Raleigh Cannon
 Dorothy J. Cronier
 Howard W. Divelbiss
 H. E. Doner
 Georgette Gleyzal
 John Harold Greenland
 Robert Charles Griswold
 Francis S. Hale
 Evan P. Hamilton
 Eileen E. Hancock
 Harvey B. Heiser
 Ray G. James
 Kay B. Jenkins
 Harold B. Jones

**Joseph S. Kopas
 John E. Kramer
 Franklin A. Lawrence
 Elliott F. Lewis
 Floyd W. Mathers
 Donald George McDaniels
 Jeanette Julia Nelson
 Alvina Rose Ocenek
 Ann Petrisin
 Gerald F. Propst
 Robert W. Sanborn
 Raymond B. Richardson
 Vernon E. Sanders
 Edward Everett Scott
 Celia A. Siodla
 Sophie S. Solarz
 Wilbur Arlie Tarbert
 **J. W. VandenBosch
 Jean Carolyn Westerhold
 David A. Williams, Sr.

MICHIGAN—Detroit***District Director***

M. M. Olander, Owens-Illinois Glass Co., Oct. 1940-April 1943
 Edward Latulip, Murray Corporation, Feb. 1945-Sept. 1945
 O. F. Carpenter, Associate Director, Dec. 1940-Feb. 1942

District Representative

Harry Jenkins, Oct. 1943-May 1944
 Edward Latulip, May 1944-Feb. 1945
 Ernest Johnson, March 1945-Sept. 1945

Management and Labor Advisers

Clark M. Adams, Bay Manufacturing Co.
 Harold Dyer, Wilcox-Rich Division, Eaton Manufacturing Co.
 A. N. Gustine, King-Seeley Corp.
 Willis H. Hall, Detroit Board of Commerce
 Harry Kelley, American Seating Co.
 William King, Clark Equipment Co.
 William Kratz, Anaconda Wire & Cable Co.
 William Krug, Frost Gear & Forge
 P. E. Parkins, Mueller Brass Co.
 Clair Reed, Reynolds Spring Co.
 John Reid, AFL, United Association of Plumbers and Steamfitters of the
 United States and Canada
 Walter P. Reuther, CIO, United Automobile, Aircraft and Agricultural Im-
 plement Workers of America
 Frank Rising, Automotive Parts & Equipment Manufacturers
 Herbert Russell, Wilcox-Rich Division, Eaton Manufacturing Co.
 Ernest Stinebower, Reo Motors, Inc.

District Staff (20 Members)

Secondris W. Arnold	Roger L. Johnson
Jeanette Barbarian	Beatrice Irene Kelly
William Frederick Behn	Douglas M. King
Frederick A. Brady	Bert Larson
W. S. Cooper	Edward Lehr
George A. Cox	Roy M. MacGregor
Arnold Daly	Nellie L. McFarlane
Elvin W. Day	Aliffe Melick
Doris M. Dennison	Russell A. Moore
Ralph Dystant	Irene Pashnick
Floyd W. Eaton	Parke Pearsall
Harry E. Frayer	Geraldine Schumper
Cynthia Gazvoda	L. D. Reynolds
John G. Gordon	G. Reginald Shiplette
Betty Gray	Robert Walder
Mildred Griffin	*Carl D. Wheaton
E. M. Hall	Harold White
Al Harmon	Graydon W. Willson
Fornia Harrington	Emilia Worose
Eva L. Jackson	

INDIANA—Indianapolis***District Director***

C. R. Evans, International Harvester Co., Oct. 1940-March 1941
 J. W. Coffman, Kingan & Co., March 1941-July 1941
 E. H. Adriance, Eli Lilly & Co., July 1941-March 1942
 A. Ewing Sinclair, P. R. Mallory & Co., March 1942-Sept. 1945

District Representative

*Herbert Kessel, July 1941-Jan. 1943
 William T. Murphy, Aug. 1943-Sept. 1945

Management and Labor Advisers

Henry C. Atkins, E. C. Atkins & Co.
 Roy Creasey, AFL, International Brotherhood of Electrical Workers of America
 Frank O'Neil, Link Belt Co.
 James Robb, CIO, United Steelworkers of America
 J. M. Smith, RCA Manufacturing Co.
 Lothair Teetor, Perfect Circle Co.
 C. C. Winegardner, Diamond Chain Mfg. Co.

District Staff (16 Members)

Paul H. Allen	Martha E. McGaughey
Charles C. Atwood	Louis J. Miles
Hal Richard Austin	Carl B. Moore
Julius W. Beyer	George Thomas O'Connor
Marjory E. Brizendine	Robert H. Orwin
Virginia J. Cook	Harry S. Partlowe
Kathleen A. Fleenor	Tom C. Polk
Mary Alice Galbraith	Nelson Reck
Philip B. Hawes	Ethel C. Rensberger
Kennedy G. Hereth	William Stokes
Elda N. Hiland	William N. Thompson
Lucille F. Himes	Helen Janet Trout
Paul A. Kuhn	Lawrence M. Vollrath
Margaret J. Lewellen	Carrie M. Wakeman
Juanita B. Masters	Thelma H. Westfall
John Thomas McCoy	

ILLINOIS—Chicago***District Director***

Paul A. Mertz, Sears Roebuck & Co., Nov. 1940-Jan. 1944
 John Ekern Ott, Acme Steel Co., Jan. 1944-Sept. 1945

District Representative

M. E. Carlson, Oct. 1943-June 1944
 Leonard P. Lynch, June 1944-Sept. 1945

Management and Labor Advisers

Joseph DeMuth, CIO, United Automobile, Aircraft and Agricultural Implement Workers of America
 Albert G. Fox, AFL, International Association of Sheet Metal Workers, Metal Trades Council
 O. A. Jirikowic, AFL, International Association of Machinists, Federated Trades Council

Terry Kandal, CIO, United Automobile Workers of America
 George Mischeau, CIO, United Steelworkers of America
 Harold F. North, Swift and Co.
 Lawrence J. Parrish, A. O. Smith Co.
 H. A. Schauer, Hasco Valve Co.
 Paul H. Steffes, CIO, United Automobile Workers of America
 Matthew Witzcak, AFL, International Molders & Foundry Workers of North America

District Staff (30 Members)

Kenneth B. Adams	Joseph A. Keller
Lee S. Adams	Rita Dolores Kinzie
Roland W. Barlow	Virginia A. Knoche
Harry S. Belman	*John Lamb
James Bacon Blanton	Winifred C. Leydecker
Clarence A. Bolton	Rebecca J. Lineberry
Beatrice Brandhandler	John C. Lhotka
Robert L. Burchell	Thomas H. Maginnis
Herbert T. Carey	William Francis McCarthy
Theodore E. Centner	Anne Mosio
John Wesley Coates	Mortimer L. Novitt
Lois Margaret Cook	Evelyn L. Nowicki
George C. Crabbe	Edwin Joseph Orr
Mary Eileen Dalton	Jane C. Pawlak
Rosemary Deeken	A. E. Peterson
Charles Ashley Deneen	John J. Shea
Edward O. Dieterle	Richard Thomas Shea
Annette DiGiacomo	Betty Silet
Jean Dunnivant	Jeanette Spiegel
Marguerite Ericksen	Gwendolyn Steel
Glenn T. Fiedler	Ann D. Stephenson
Arlene V. Flack	Glenn C. Sutton
Carl L. Graeber	Bessie Taruskin
Ralph Lester Hazlett	Lily Tatoulian
Vernon Kenneth Hazzard	Howard deF. Trainor
William J. Hebard	Charles D. Van Koten
Virginia L. Holmes	Lucille J. Venetucci
Louis E. Hooker	George A. Wall
Camille Ippolito	Roland E. Weldon
Jane J. Johnson	Betty Jane Wiser
Grace M. Joy	Dorothy Wood
Georgia Kachavos	Lorraine Zimmerman

NORTH CENTRAL—Minneapolis

District Director

Ernest L. Olrich, Munsingwear, Inc., Nov. 1940-Sept. 1945

District Representative

*J. H. Rothenberger, July 1941-Feb. 1945

Ralph L. Adkins, Feb. 1945-Sept. 1945

Management and Labor Advisers

Harry W. Clark, Hugo Manufacturing Co.

Fred Crosby, Am. Hoist & Derrick Co.

Sander Genis, CIO, Textile Workers Union of America

Jay Hormel, Hormel & Co.
 George Lawson, AFL, Boot and Shoe Workers Union
 C. L. Manderloft, Chippewa Falls Woolen Mill Co.
 Herbert J. Miller, Minnesota State Resources
 Gust Olson, Jr., Deere & Co.
 R. A. Olson, AFL, International Association of Machinists
 Dr. C. A. Prosser, Dir., Dunwoody Industrial Inst.
 Karl Vogel, Omaha Steel Works

District Staff (12 Members)

Ellen Aird	Josephine Hodges
A. B. Algren	Myrtle P. Lillegard
Norman C. Bronson	Olive Ornborg
John M. Bruer	Charles H. Peterson
Norman W. Bryant	Ralph L. Robertson
Phyllis Campbell	Gerhard T. Rugland
Eileen K. Carlson	Lois Skeate
Comyn C. Drake	Charles A. Thomas
Betty Draves	W. W. Thomas
John G. Eichhorn	Ruth Ticknor
Lydia Jean Ely	William H. Wagner
George K. Foster	Edna L. Wyman
Arthur M. Gray	

SOUTH CENTRAL—St. Louis

District Director

A. Earl Wyatt, Laclede Gas Light Co., Feb. 1941-Oct. 1942

District Representative

*C. T. Cardwell, Oct. 1942-Sept. 1945

Management and Labor Advisers

Joseph P. Clark, AFL, International Brotherhood of Firemen and Oilers,
 Central Trades and Labor Council
 Wilbur B. Jones, Attorney
 A. F. Kojetinsky, CIO, United Steelworkers of America
 Lloyd M. McBride, CIO, United Steelworkers of America
 Walter Siegerist, Medart Co.
 Joseph A. Waldron, AFL, Metal Polishers, Buffers, Platers & Helpers Inter-
 national Union

District Staff (14 Members)

Jeanette E. Ammann	John E. Jacobs
Dallas L. Belcher	J. Vern Koontz
Olga A. Cenkovich	Margrette Kortjohn
Carmen G. Denaski	Leo A. Maginn
Roberta H. Dore	Harry P. Materne
Grace C. Dwyer	William M. McCubbin
A. Harold Erickson	Ralph A. McKeehan
Lillian A. Graef	Harriett L. Nelson
Sade C. Granz	J. George Robinson
Ralph H. Grubb	Harold T. Smutz
Mildred E. Hackman	Leila Wallace
Jane B. Hutchins	Carl F. Walther

WEST GULF—Houston, 1941—Dallas, 1945***District Director***

Harold W. Fletcher, Hughes Tool Co., June 1941-Oct. 1942

District Representative

*Tracy T. Word, Aug. 1941-June 1944

Edward H. Durning, July 1944-Sept. 1945

Management and Labor Advisers

W. L. Childs, Reed Roller Bit Co.

David B. Harris, Humble Oil & Refining Co.

Simeon Hyde, CIO, Oil Workers International Union

Clyde Ingram, CIO, Oil Workers International Union

Ed Lorehn, Cameron Iron Works

A. S. McBride, AFL, Bricklayers, Masons & Plasterers International Union of America

District Staff (18 Members)

Jeanette Alm

Helen S. Bloum

Glen L. Bruner

Lois Cobb

Carrell D. Cole

Howard M. Darr

Ayline M. Deford

Mary Evelyn Dotson

Gloria I. Ennis

Valdemar T. Fearis

C. E. Ganby

Calvin B. Gentry

Solomon J. Gillard

R. F. Hammack

C. F. Hemphill

Robert B. Hill

Warren W. Hoag

James J. Huey

Doris Hunton

Hollie Irvin

Eric W. Jordan

F. M. Keith

Ruth I. Kubitscheck

Helen Q. Malone

Patsy M. Matlock

William H. Matthews

Dwight F. Maxwell

Jeanette McClellan

Marguerite Morrison

Stuart L. Reed

Isabel Reinhart

Harriet G. Roth

Murdelle W. Rucker

John H. Scully

Clifford G. Shawd

A. Ray Sims

Myrtle Tatum

Doris Toups

Harry E. Weaver

Joseph D. Winslow

MOUNTAIN—Denver***District Director***

George M. Kirk, Colorado Fuel & Iron Corp., Dec. 1940-Sept. 1945

District Representative

*A. E. Lawrence, May 1941-Sept. 1945

Management and Labor Advisers

Adam S. Bennion, Utah Power & Light Co.

Martin Cahill, AFL, International Union of Operating Engineers

Varro C. Jones, CIO, United Steelworkers of America

C. T. Keighley, Columbia Steel Co.

Fullmer H. Latter, AFL, International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America

Floyd F. Miles, AFL, International Association of Machinists

Harold F. Silver, Silver Engineering Works

C. T. Spivey, Columbia Steel Co.

Charles O. Voight, Stearns-Roger Manufacturing Co.

District Staff (11 Members)

Ferne F. Bishop	Pauline H. Mahoney
Betty Bristol	Harold R. Mays
James C. Brown	Marie C. Morris
Ken Browning	Floyd M. Rhed
Fred G. Cox	Ruth E. Schmutz
Samuel H. Hawkins	Herbert C. Shotwell
Arthur L. Kirby	Esther Vanderlass
Arlie J. Laue	Lucile S. Wardle
Wilma M. McDowell	Delphine E. Webb

PACIFIC SOUTHWEST—Los Angeles**District Director**

William K. Hopkins, Columbia Pictures, Nov. 1940-July 1942
 Garner A. Beckett, Riverside Cement Co., Sept. 1942-Jan. 1945

District Representative

Charles H. Fishburn, April 1941-Sept. 1945

Management and Labor Advisers

D. T. Babcock, Blyth & Co.
 John Despol, CIO, United Steelworkers of America
 C. J. Haggerty, AFL, International Union of Wood, Wire and Metal Lathers
 Preston Hotchkiss, Pacific Indemnity Co.
 Lloyd Mashburn, AFL, International Union of Wood, Wire and Metal Lathers
 L.A. Building and Construction Trades Council
 Morris Pendleton, Plomb Tool Co.
 George B. Roberts, CIO, United Rubber Workers of America
 James B. Thimmes, CIO, United Steelworkers of America
 A. H. Young, Calif. Institute of Technology

District Staff (20 Members)

Theodore C. Armstrong	Janice F. Freudenberg
Karl Becker	Otto D. Harmon, Jr.
Claude E. Bird	Victor J. Hydar
Hazel H. Bolton	Glen R. Mitchell
Betty E. Byrley	A. C. Parkinson
John B. Calhoon	Edwin T. Schenck, Jr.
*John M. Cowan	Georgette F. Shelton
Edwin J. Cutting	John R. Street
Bernice J. Daly	Paul Sturm
Paul M. Dorrance	Roscoe C. Thomas
Horace W. Dwinell	Louise Van Arnham
Carl B. Dwyer	A. Raymond Witham
William M. Elmendorf, Sr.	

PACIFIC CENTRAL—San Francisco**District Director**

A. R. Heron, Crown Zellerbach Corp., Nov. 1940-Aug. 1942
 Arthur W. Ford, California Packing Corp., June 1943-Sept. 1945

District Representative

Aylwin Probert, May 1941-Sept. 1945

Management and Labor Advisers

Julian F. Arntz, Bethlehem Steel Co.

Ken Hunter, CIO, United Steelworkers of America

J. Scott Milne, AFL, International Brotherhood of Electrical Workers of America

James R. Moore, Moore Dry Dock Co.

T. C. Petersen, Standard Oil Co.

Lee R. Smith, Brotherhood Railroad Signalmen

District Staff (13 Members)

*John G. Andrews

John Armstrong

P. A. Bjorkman

Percy V. Crain

Anne Louise Douglas

Margaret H. Dulik

Ernest F. Hartz

Morton P. Harvey

Arthur B. Jacobs

Thomas F. Joyce, Jr.

Paul J. Keever

John B. Keyes

M. J. Liljeblad

Margaret H. Meaney

Charles R. Mullan

Maurice A. Murphy

E. F. Robinson

Helen M. Sprague

Merle L. Stein

Randall Temby

Carl L. Voss

Henry C. Williams

OREGON—Portland**District Director**

Major General H. G. Winsor, Puget Sound Power & Light Co., Feb. 1941-Sept. 1942

Walter Williams, Continental, Inc., Oct. 1942-Sept. 1945

District Representative

*Laurin Hinman, Feb. 1941-Sept. 1945

Management and Labor Advisers

Albert S. Cummins, Calif. & Oregon Power Co.

William Dalrymple, United Mine Workers of America

Alfred Hartung, CIO, United Steelworkers of America

M. H. Jones, Jones Lumber Co.

James T. Marr, AFL, Municipal Employees Union

Ross McIntyre, International Sales & Produce Co.

D. E. Nickerson, AFL, United Brotherhood of Carpenters and Joiners of America

Archie C. Pierce, Pierce Auto Freight Lines

District Staff (9 Members)

Stuart W. Ball

Mae Bean

Gordon Beebe

Ada C. Bertch

Jack A. Bristol

Norman A. Davis

John G. Jones

Marieta A. Kellum

Louise R. McDonald

Gordon T. Olsen

Gordon D. Robinson

Wallace E. Shields

Barbara H. Vreeland

Robert H. Williams

Rollin W. Woodruff

Jean M. Ziegler

WASHINGTON—Seattle**District Director**

Major General H. G. Winsor, Puget Sound Power & Light Co., Feb. 1941-Sept. 1942

Walter Williams, Continental, Inc., Oct. 1942-Sept. 1945

District Representative

*Leighton Steele, Feb. 1941-Sept. 1945

Management and Labor Advisers

Donald C. Ahrens, AFL, International Hod Carriers, Building and Common Laborers' Union of America

Roy W. Atkinson, CIO, International Union of Mine, Mill and Smelter Workers

Richard Francis, United Mine Workers of America

E. R. Hinton, Olympic Steel Works

R. J. Lamont, Todd Pacific Shipyards, Inc.

H. W. McIlvaigh, AFL, International Association of Machinists

Walter Williams, Continental, Inc.

District Staff (12 Members)

Marie E. Arnold

Mae Bean

Helen M. Blessinger

Robert S. Boaz

Helen Bowdish

George W. Bowen

Harvey Cassill

Agnes Curry

N. Earl Davison

Ralph C. Dawson

Lillian K. Duggan

Dorothea M. Emme

Hilda Erz

Donald D. Fairbanks

Samuel H. Geijsbeek

Pearl L. Guthrie

Sylvia P. Haggard

Mildred H. Haugen

Earl E. Johnson

Theodore B. Kobbervig

Larry A. Lindstrom

Marguerite M. Lenzen

Ira C. McGee

Glenn D. McNeilly

H. J. Mitchell

Charles W. Paxson

Harriett H. Ralston

Ella N. Ritchie

Henrietta E. Shortridge

Myles P. Spencer

Hazel D. Stanton

Floyd M. Watson

Neva Marie Williamson

HAWAII—Honolulu***District Director***

Harold P. Dahlquist, Oahu Railway & Land Co., Jan. 1944-Sept. 1945

District Representative

*Elroy M. Fulmer, Jan. 1944-Sept. 1945

Management and Labor Advisers

Jack Hall, CIO, International Longshoremen's and Warehousemen's Union

Louis W. Jongeneel, Calif. Packing Co.

Jack Kawano, CIO, International Longshoremen's and Warehousemen's Union

John H. Midkiff, Waialua Agricultural Co.

John A. Owens, AFL, International Brotherhood of Boilermakers, Iron Shipbuilders & Helpers of America, Central Labor Council

Arthur A. Rutledge, AFL, Dairy Workers Union

J. C. Walker, Oahu Railroad & Land Co.

District Staff (3 Members)

Eva Fial Giambruno

Patricia W. Holt

Florence W. Lum

L. Rockwell Smith

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