



# LEARN BY DOING



THE STORY OF  
**T**RAINING **W**ITHIN **I**NDUSTRY

Walter Dietz with Betty W. Bevens

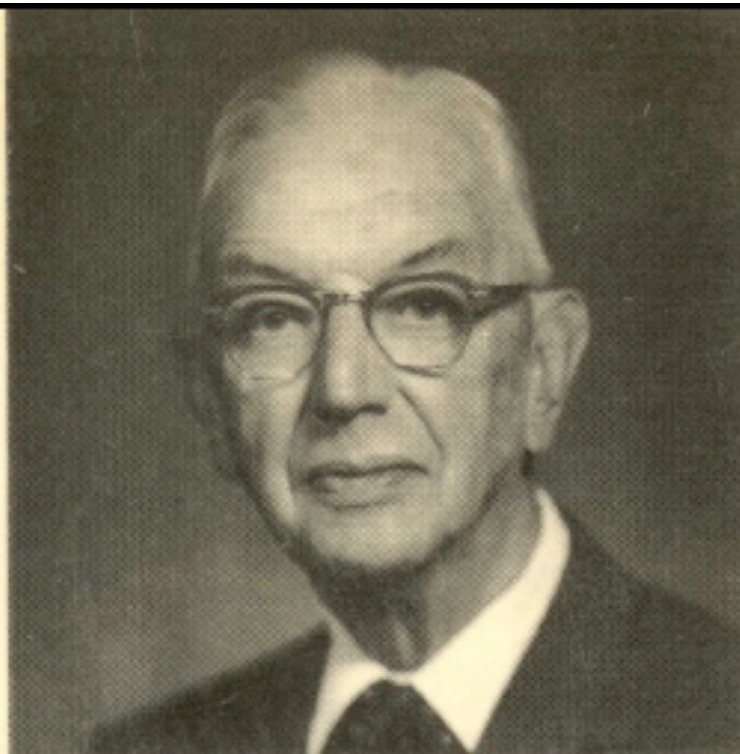


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*J.W.D./\$2.25*



Walter Dietz was born in Madison, Indiana, in 1880, over 90 years ago. He was graduated from Purdue in 1902 and earned his Master's in Electrical Engineering in 1907. His 43-year career with Western Electric Co. began in engineering and became centered in industrial relations and personnel administration.

With Western Electric Company's cooperation he shared in pioneering within national organizations and government agencies.

- 1911 - Started Educational Dept. - Western Electric Co., Hawthorne Works, Chicago.
- 1914 - Charter member - National Association for Corporation Training - President, 1917.
- 1923 - Founder and life member - American Management Association - Vice-President, Personnel Division, 1940.
- 1926 - Chairman, Research Committee U.S. Dept. of Labor. Started dictionary of 40,000 occupational titles.
- 1927-37 - Superintendent - Industrial Relations, Kearny Works - Western Electric Co.
- 1931 - Delegate to Vienna Meeting - National Adult Education Ass'n, Amsterdam - International Industrial Relations Conference.
- 1940-45 - Associate Director, Training Within Industry Service - War Manpower Commission, Washington, D.C.
- 1946 - Vice-President, Training Within Industries Foundation, Summit, N.J. - President, 1956.
- 1954-70 - Director, OWL Employment Service. Director, Research and Development, Summit Association for Gerontological Endeavor.

In Summit, N.J. since 1919, Mr. Dietz has had a part in many community civic activities - Adult Education, Public Library, Family Service, Unitarian Church, Boy Scouts, Red Cross, Urban League, Old Guard and SAGE. Each day he walks to his office at SAGE where, as head of its Research and Development Division, he helps to keep alive in other oldsters sparks of creativity, enthusiasm and lifelong learning which, he emphasizes, are the "Key Points" of useful living.

In 1944, in "recognition of his distinctive leadership in the establishment of better industrial relations through training, supervision and mutual understanding", Mr. Dietz was awarded an honorary degree of Doctor of Engineering by Purdue. He also received the Human Relations Award from the Society for the Advancement of Management (1945).

Of the many achievements of his busy career, Mr. Dietz has chosen to tell the story of Training Within Industry because it so well exemplifies his philosophy of satisfaction achieved through learning by doing.

# **Learn By Doing**

**THE STORY OF TRAINING WITHIN INDUSTRY**

# **Learn By Doing**

**The Story of**

## **Training Within Industry**

### **1940 - 1970**

by: Walter Dietz  
with  
Betty W. Bevens

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**MURIEL ALFORD DIETZ**

*Whose love and understanding were  
inspiration through many happy  
years.*

*Walter Dietz*

## THANK YOU!

*These good friends and others helped in many ways to get this book out of the "Impossible Dream" stage - -*

*Virgil K. Rowland, Herbert E. Demer, Carl S. Coler, Elizabeth and Robert Adams, Beryl P. (Mrs. Frank H.) Perkins, Richard A. Lobban, Jr.*

*But without the ability, skill and sheer perseverance of Betty Bevens, the TWI Story would not have been told.*



One must learn by doing  
the thing; for though you  
think you know it you have  
no certainty, until you try.

~ Sophocles, 445 B.C.

## FOREWARD

The experience of Training Within Industry has demonstrated that skills of supervision can be acquired and improved at the job level.

There is proof, too, that ability can be discovered and upgraded, thus giving individual men and women opportunity for usefulness and growth.

The conviction that programs developed under wartime pressure were sound is borne out by the fact that now, after thirty years, there is continuous, world wide, peace time use of these aids to management. The sheer simplicity, ease of adoption and measurable results account for this.

That there may be an up-to-now record of achievement is the purpose of this report. Then, too, those currently concerned in management, training and human relations may find renewed courage to carry on right at the work level where skilled human effort still gets results.

Walter Dietz

# Organizing For Defense

1940 - 1941

In the year 1940, the United States engaged in feverish activity--war with the Axis powers engulfed Europe and the freedom of the entire world lay in danger. In desperation, our allies looked to us for the weapons and material with which to fight on. In addition, our own defensive powers had to be strengthened because, if England fell, we would be the next victims of Axis aggression.

For private industry it was a time of chaos for, virtually overnight, it was necessary to convert from the leisure pace of peacetime production to the overwhelming demands created by the emergency. Machines, tools, and TRAINED manpower were needed in unlimited numbers. Of itself, private industry was not expected to organize this massive undertaking. In a time of national danger, the Federal government would have to help. Emergency governmental groups were set up and planning done for rapid production increases. TRAINING WITHIN INDUSTRY (TWI) was one of the first emergency services to be organized after the fall of France in 1940.

TWI was planned 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.

One of these useful techniques--the increasing of all kinds of industrial skills--was regarded as a three-part problem: (1) an inventory was needed in order to discover the skills among those unemployed; (there were over 8,000,000 unemployed in the United States at that time); the inventory would also uncover the number of those working below their greatest usefulness; (2) training outside of industry and, (3) training within industry.

## TWI ORGANIZATION

In order to grapple with this problem and others equally as complex, there gathered in Washington, D.C. a volunteer staff of industrial men on loan from private business. Appropriate legislation had been passed by Congress, authorizing TWI's organization and leaders in the fields of industrial and human relations were given the green light to proceed as they deemed best.

It was decided that TWI should operate as a decentralized service and the country was divided into 23 geographical districts spearheading the main industrial areas. In each area, an informal group was to be headed by a local production executive, or industrial personnel man, who could continue on his company's payroll while his service to TWI was on "a dollar-a-year basis." The bulk of the work was to be done by a panel of consultants, in groups ranging from 10 to 60 members in each district, under a District Representative. In every TWI district office the same functions existed whether the staff was large or small. In some cases one

person served several functions, while in others, several persons were needed for one function.

All staff members brought their specific knowledge and experience to the program but it was also necessary for them to receive special training. TWI did for itself what it recommended to industry. It developed "Specialists." Because time, or the lack of it, was of the greatest importance and because the demand for help grew more insistent daily, TWI had to learn to function quickly and effectively.

In the beginning it offered advisory assistance but it soon became evident that specific programs had to be devised which would take into account job upgrading, trade apprenticeship and supervisory development. A small, full-time, paid staff was hired to augment the executives from private industry and a policy for future operation was formulated. It was made clear from the beginning, however, that the real job had to be done by industry, within industry which must collect, standardize, streamline and develop techniques for its own use.

And industry was required to accept its own responsibility for training. No TWI assistance would be given except in answer to requests made by a plants own management.

As this policy was being formulated, TWI men were being trained to sell management the idea of training as a production tool, to prepare plant representatives to put on basic programs and to do a coaching job in their continuing contacts with management.

## THE "LENS-GRINDER" STUDY - A PILOT PROGRAM

Early in TWI's existence and while it was still a two-man organization consisting of Director and Associate Director, the first request was received. All through the summer of 1940 there had been much discussion of shortages in particular lines of skilled work and one of the most serious was in lens-grinders and polishers for government arsenals and navy yards. The problem was difficult because a qualified lens-grinder, under ordinary conditions, did well to master the art in five years. Upon studying the problem, it was ascertained that 20 jobs are included in lens-grinding and a master grinder must be able to perform all. In the war emergency it was decided to upgrade other workers on precision opticals to more highly skilled jobs and break in new people on the simpler operations. Each part of lens-grinding was carefully studied to find its important features and out of this study grew the concept of "Key Points", a practical discovery destined to lift job instruction to an entirely new level of usefulness.

### KEY POINTS

In essence, "Key Points" means simply this: much of the supposedly difficult work in any industrial operation is relatively simple. In the lens-grinding study, for example, a few critical points, if overlooked, might injure the worker or make the work more difficult to perform. "Key Points", properly determined and emphasized, can make or break a job. Therefore, searching for and recognizing these quickly and easily is perhaps the most vital part of any training effort.

# THE INSTRUCTION PROCESS

Careful thought was also given to the process of instruction itself by which, not only lens-grinding, but countless other technical and industrial operations could be more readily understood by a beginner. "Key Points" had been defined and it was now necessary to distinguish them from "Steps" which are also an integral part of the industrial learning process. A "Step" is a logical segment of operations to advance the performance of the work. After additional experimentation following the lens-grinding study, a standard "4-Step" job breakdown plan was initiated and, in time, proved to be basic to other TWI programs.

## A STUDY IN LENS-GRINDING

The concept of "Key Points" and "Steps" as applied to the lens-grinding operation can best be illustrated by the following example which is reproduced only in part.

### CHART NO. 1 - PORO PRISMS

Sequence in Which Work Must be Done

1. Grind one side (individually, by hand)
2. Block on piano tool preparatory to grinding for thickness
3. Grind to thickness

etc.

Sequence for Upgrading

1. Grind one side (individually, by hand)
2. Remove from block and clean
3. Block on piano tool.

etc.

# 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)

etc.

#### KEY POINTS

- 1. Use of patterns 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.

etc.

The lens-grinding study was an overwhelming success and it was found that by the use of the "Key Points" and "Steps" approach, the training of people for the separate jobs involved could be reduced from five years to a matter of months. Everyone--plants, arsenals and even TWI itself were convinced that a satisfactory method had been found. Demands for service began to grow.

## TWI CLEARING HOUSE

While the lens-grinding program was still in operation, work began on bulletins designed to get the "clearing-house" function underway. Reports from defense contractors throughout the country, begging advice on how to proceed, arrived at Washington headquarters daily. Report after report told of bottlenecks experienced in the hectic conversion to defense production and from this information, TWI became convinced that after jobs were engineered and broken down in to specialized operations, the men already skilled in these operations would have to become instructors of new workers. Citing as a pattern the lens-grinding study and listing the contractors who had successfully employed this technique, TWI solicited and began to publish bulletins. These bulletins contained examples of how growing numbers of contractors were successfully handling unique production problems. In addition, plant surveys were made and, in some districts, panel members spent a great deal of time at important plants, digging into their problems and planning training which would assist them.

In spite of all this, a "selling" job was still required and it was not easy. Many plant managers either were not as yet under any great pressure and felt no need to do anything about training, or else the pressure was so great they said they had no time. Through speaking engagements, surveys and bulletins, TWI literally beseeched industry to look to their bottlenecks and make haste before it was too late. Although it tried to convince them that TWI programs would help untangle these kinks in production, many executives were still not receptive, and continued to use the trial and error methods of the past.

## CONSULTING SERVICE

Yet, with unrelenting determination, TWI continued to offer new programming to fit specific needs. An interesting example was the help given by the Indianapolis district to the Carl L. Norden Company, manufacturers of the Norden bomb-sight which was one of the most essential of all war needs. One thousand workers were needed without delay and a full complement of 6000 workers projected. It was decided to establish a company school, housing at least 50 machine tools for training purposes. TWI consultants helped to schedule the training program which launched this important project towards a successful conclusion.

Defense plants continued to mushroom throughout the country and TWI's methods of making order out of chaos came more and more to the attention of harassed executives. Soon many began to clamor for assistance and as these requests increased, TWI districts began to experience difficulty. In order to make adequate surveys of training needs, careful investigation, intelligent recommendation and much time was required. Although happy to make informal recommendations, TWI hesitated to make specific proposals on the basis of sketchy information. Mechanical, material and man power problems cropped up as fast as plants were converted or built and manufacturers quickly approached TWI for suggestions. There were pleas for help in handling labor disputes, safety problems and housing needs, as well as the usual training and man power difficulties. The personal influence of TWI men was asked in combating labor pirating, in getting large plants to let sub-contracts and in introductions of representatives of the Federal Committee on Apprenticeship and in Engineering, Science, Managements Defense Training programs.

Plants were reminded of the labor supply overlooked when minority groups were ignored. At this time, too, women were recruited on a large

scale to perform many industrial tasks left vacant by men being drafted in to military service, or to help fill the tremendous need for workers created by the behemoth of production.

Also during this period, careful study was made of the methods being used in England to combat the man power shortage because it was anticipated that the United States, too, would reach the bottom of the labor barrel.

In spite of large scale problems undertaken and solved, TWI also gave attention to strictly local problems such as what to do with the New Jersey silk workers who were losing their jobs. Although there was no labor shortage overall, the supply became short in some areas and TWI urged the training of the blind and the deaf. Special demonstrations were held to show that the same methods of training the usual worker were also effective for the handicapped.

In St. Louis there was ample manpower but a shortage of skilled workers and also much pirating of labor. Meetings were held in the TWI district office and agreements worked out between managements for the elimination of this practice.

Some training was offered at a fee in Southern California with the tuition paid by the person seeking to learn. Often shortages of material for instructional purposes curbed the activities of these trade schools and TWI assisted those that were well-run, to obtain the needed material.

In the shipbuilding industry certified welders were acutely needed. Also, many executives believed that the instruction of potential welders was inadequate and materials and equipment used in teaching did not measure up to standards required on the job. At TWI headquarters in Los Angeles, discussions were held which stressed that shipyards were held accountable for delivering ships but these could not be delivered without

welders. Although public funds had been made available to schools to develop competent welders, if these schools could not deliver in adequate quantities, other measures would have to be undertaken. As a result, some yards introduced their own welding training activities, either re-training the men they received from the schools or training raw recruits, using TWI techniques.

In the early days, the Detroit staff held meetings for contractors to exchange ideas on how to meet the many problems arising with the shift to defense production. Attention was given to the government aids available to these industries. The first series of meetings was so successful they were continued until over six hundred industrial representatives had taken part in the discussions.

William Patterson, Chief of the Federal Committee on Apprenticeship in the Department of Labor, cooperated with TWI and his entire staff also worked with the district offices.

## A SUMMARY OF TWI'S DEFENSE YEARS

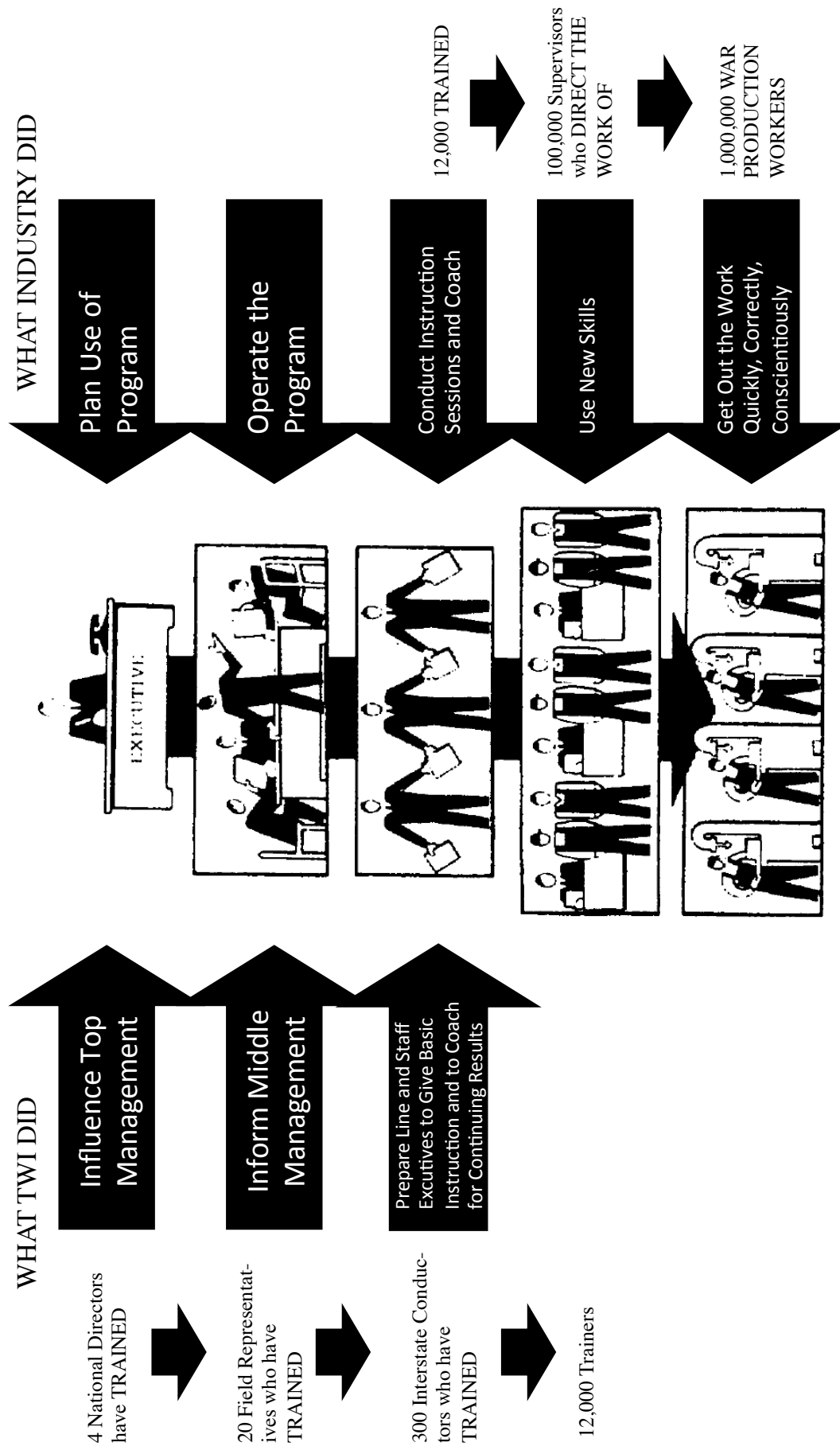
The first year was one of testing and consolidating, a period of "finding-out-how-best-to-do-the-job." There, were no over-night answers to the many perplexing problems. Also, TWI was different from most government groups and these characteristics had to be recognized because they determined the course of the organization. Its leaders were not career government employees but came from private, competitive business. When their work was finished, they planned to go back. Therefore, they sometimes found it difficult to conform to government regulations but were bound together by personal loyalty to those who were the leaders - men long respected for their industrial work. All believed in

TWI and its potential to become a leading contributor to the defense effort.

In June, 1941, the Office for Emergency Management issued an account of the first year's experience in defense production. Demands for aid to Britain were mounting and America was hard pressed trying to equip her own armed forces and construct far-flung defense bases. Attention had to be juggled from the needs of the battlefield to the needs of air defense. Almost insurmountable hurdles had to be dealt with swiftly and the account further stated that the output of airplanes trebled in one year. Tanks increased 600 percent, powder 1000 per cent, small arms ammunition 1200 per cent and so on down the line. It was obvious, too, that contractors would have to make even greater increases as the threat of all-out war came closer to reality.

In an article entitled "Battle for Skills" appearing in the Saturday Evening Post in 1941, J.C. Furnas, its author summarized the role which TWI had and would continue to play, "Its passwords," he observed, "were 'upgrading' and 'single skills' and these would open the way to providing a competent worker for every machine in every defense industry or essential service on a round-the-clock basis." Mr. Furnas further said, "The objective of TWI is not all-around training but single-skill competence. It is surprising to see how rapidly eight to twelve weeks intensive training in handling one kind of machine will enable a green but apt youngster to turn out acceptable work with a welding torch or a grinding gadget. It is unorthodox in many plants but it is the only way to boom a plant from 300 to 3000 workers inside a year. And it seems to be working in most places."

# OPERATION OF THE JOB INSTRUCTION PROGRAM IN A PLANT



# Developing Programs to Meet War Needs

## INTRODUCTION OF “J” PROGRAMS

Indeed TWI was working in most places, yet by August, 1941, its district heads were still not satisfied with results and were determined to eliminate any "bugs" still plaguing its smooth functioning. In the meantime, pressure from defense industries continued to mount--coming from all directions--as the pace of production accelerated. The time had come when clarification of TWI aims and approaches to the overall goals must be defined.

The district heads met in Washington where experiences were exchanged and ideas discussed. It was decided to make a major shift in the whole approach to the task and some of the original plans, such as giving contractors a consulting service on a broad range of in-plant training problems, were abandoned. Instead, the needs of supervisors were to be the area of concentration because the serious shortage of experienced men had forced numerous plants to appoint many who were not qualified to do the job.

Upgrading and apprenticeship would continue to be advocated but the main emphasis would be in one direction -- IMPROVING SUPERVISORS' SKILL INSTRUCTION.

This plan went back to the basic "4-Steps" and incorporated "Key Points," thus underwriting an easily understood program.

It was decided to point out one thing plants needed to do and then stay with them long enough to show them exactly what to do and how to do it. Utter simplicity was to be the keynote of a training program developed by intensive and carefully "blueprinted" procedure utilizing a minimum of time. Most important, this program would emphasize LEARNING BY DOING and would be based on one fundamental "Multiplier Principle," as follows:

Develop a standard method, then train people who will train other people who will train groups of people to use the method.

The successful businessmen on loan to TWI had built multi-million dollar enterprises on this same idea. Put to use under the frenzied pressures of defense planning it would once again prove its worth.

All programs were designed and developed to meet a specific need and Job Instruction (J.I.) was the first to be launched nationally. It was TWI's answer to the training problem which existed because of the influx of thousands of new workers into industry. Shortly after J.I. was underway, manager and supervisors were surveyed as to their respective problems and a need was found for programs emphasizing two other required skills for the smooth operation of production: (1) Job Methods (J.M.), the skills of making improvements in methods and (2) Job Relations (J.R.), the skills of working with people.

The use of the word "Job" in the names of programs was no accident. Before any programs were developed, it was determined that whatever was done would have to be fundamental and simple - - a part of everyday work for everyday supervisors. It must be on the job level; therefore, each program purposely carried the word "Job" in its name as a reminder to training people of this down-to-earth philosophy.

Also, in defense days, there was much use of the word "Dilution", in the sense that skills could be diluted. These statements caused confusion and misunderstanding. The degree of skill required was as great, whether the job was performed by a worker who had the ability to do other operations or whether he did just one segment. A journeyman mechanic has acquired many skills related to a trade, while a skilled operator has as much skill as the journeyman in one, or a few, operations. Using a man with wide skills on a production job which requires only one or two skills was then, as now, a waste of that skill. Often the single-skill operator can perform more quickly and accurately his one operation than can an all-around craftsman. Skill, therefore, is not diluted and misunderstandings are saved when people talk about "engineering a job" and "developing specialists", rather than about "dilution."

At this time, too, the "Package" idea was born. This was the idea of 10-hours of instruction for a group of 10 men. Although the concept of instructing people in groups of "How to Instruct" was not new, standardization was now brought into the field. A standardized package of Job Instruction meant that an untold number of supervisors would get assistance which heretofore had been unavailable.

## 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 ex-  
pected to keep it.

### *Job Instruction Training*

## TRAINING WITHIN INDUSTRY

Bureau of Training  
War Manpower Commission

**KEEP THIS CARD HANDY**

GPO 16 35140 1

## 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 IM-  
PORTANT STEP at a time.  
Stress each KEY POINT.  
Instruct clearly, completely, and pa-  
tiently, 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 ques-  
tions.  
Taper off extra coaching and close  
follow-up.

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**If Worker Hasn't Learned,  
The Instructor Hasn't Taught**

J I T “*The accomplishment of a job is both the end to  
be attained and the means for instruction.*”  
*Dooley*

## JOB INSTRUCTION

From then on, all ideas were formulated to proceed consistently with the standardized Job Instruction program. Utter simplicity of presentation was of foremost importance and the use of pocket-sized cards recommended. These cards, issued to supervisors upon completion of training, were to act as reminders in undertaking their training of others.

This “4-Step” concept of Job Instruction did not, however, slide into easy operation. There were many complications, not the least of which concerned the thousands of supervisors, (recently advanced from the midst of rank and file workers themselves), who needed guidance in giving instructions. As a result, the preparation of a manual became the major undertaking at headquarters and consumed much time in the fall and winter of 1941.

This manual included a sample job instruction breakdown a simple sheet listing the important steps in any industrial operation and incorporating the all-essential “Key Points.” Now delay in production because of inept instructors or workers would be substantially minimized.

But the need to convince industry of TWI's adaptability to almost any conceivable production problem continued to exist. Although the Job Instruction program was in readiness, a “selling” job still confronted those at headquarters.

On December 7, 1941, the picture suddenly and dramatically changed.

Even before Pearl Harbor, however, two additional TWI programs were under preliminary development at Washington headquarters. These were Job Methods (J.M.) and Job Relations (J.R.).

**HOW TO IMPROVE  
JOB METHODS**

A practical plan to help you produce GREATER QUANTITIES of QUALITY PRODUCTS in LESS TIME, by making the best use of the Manpower, Machines And Materials, now available.

**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.

JM-7 GPO 16-31488-2

- STEP III – DEVELOP** the new method
- 1. ELIMINATE unnecessary details.
  - 2. COMBINE details where 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 ideas 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.

**JOB METHODS TRAINING PROGRAM**  
**TRAINING WITHIN INDUSTRY SERVICE**  
**BUREAU OF TRAINING**  
**WAR MANPOWER COMMISSION**  
GPO 16-31488-2

J  
M “How is the best way to do it?”  
T

Gardiner

## JOB METHODS

The Job Method program evolved in the fall of 1941 when it became evident a need existed in "Production Supervision." Established principles of work simplification were cleared of engineering terms and techniques so they could be applied by average supervisors rather than only by engineers. Like Job Instruction, Job Methods followed the "Package" principle - - 10 hours, 10 men, a 4-Step method, demonstration and individual practice on problems. This program was designed to develop in supervisors a constructively critical attitude towards their everyday jobs. Job Methods' objective was to produce greater quantities of quality products in less time by making best use of manpower, machines and available materials.

## JOB RELATIONS

In January, 1941, the National Academy of Sciences was approached for guidance on the most useful additional service TWI might perform. The reply was that supervisors needed a great deal of help in human relations - the art of handling men.

Throughout the spring and summer, industrial suggestions and help were solicited from management and supervisors. Some of the general rules to which personnel directors clung so tenaciously were valuable a few were truly foundations of good relations. While these rules would not solve problems, they would often prevent them. Four had such universal value they became part of the Job Relations program and were named the FOUNDATIONS FOR GOOD RELATIONS:

## JOB RELATIONS

### A SUPERVISOR GETS RESULTS THROUGH PEOPLE

## FOUNDATIONS FOR GOOD RELATIONS

Figure out what you expect of him  
Point out ways to improve.

Look for extra or unusual performance  
Praise him while it's hot

Ask them WHY if possible.  
Get them to accept the change.

Look for ability not now being used  
Never stand in a man's way.

## PEOPLE MUST BE TREATED AS INDIVIDUALS

CONVENER-  
JAMES H. CONOVER  
NATIONAL INDUSTRIAL  
MANAGEMENT COMMISSION

## HOW TO HANDLE A PROBLEM

### 1 GET THE FACTS

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

### 2 WEIGH AND DECIDE

Put the facts together  
Consider their bearing on each other  
Check practices and policies  
What possible actions are there?  
Consider effect on individual group and production

### 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.

### 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?

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

Most important of all, however, was: PEOPLE MUST BE TREATED AS INDIVIDUALS. Although somewhat similar attempts had been made in scientific and military practice to incorporate these values, in the personnel field they were unique.

## LAUNCHING THE "J" PROGRAMS

The primary emphasis of TWI, then, was to reach and train as many supervisors as speedily as possible in Job Instruction. As a result, the TWI Institute plan came into being. Supervisors and lead men selected by their respective plants were sent to these Institutes for intensive instruction by specially prepared trainers. They, in turn, became trainers of others in their own plants who, likewise, trained still others. Thus, the "Multiplier Principle" continued.

Certain standards of technical instruction prevailed at all Institutes. They were conducted only by TWI staff members or plant representatives who had been certified by a headquarter's representative. The use of certificates had been decided upon when companies began using their own trainers. TWI's only requirement was that each trainer be competent to handle the program he put on and this meant satisfactory completion of an Institute and satisfactory handling of groups as determined by repeated quality control.



Ten hour sessions were conducted only by trainers previously certified, either in an Institute, or through individual coaching.

In TWI coaching there was nothing new except putting action into "accepted" principles. In industry, managers usually follow up and assist on many of their other operating procedures but, rarely, is training included. However, in order to assist plants with this coaching, TWI prepared a guide for each of the "J" programs. The same five points appear in each:

1. Give reasons and advantages.
2. Get understanding of the principles.
3. Select a problem and work on it together.
4. Ask supervisor to work another problem alone.
5. Give credit for good results and good effort.

This coaching procedure was a quality control technique to insure uniform results throughout the country.

In any of the supervisory programs, the first session is most important because it is a demonstration, or "selling." This first session is designed to convince supervisors that (1) their own habits are like the habits of everyone else, (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 and this demonstration must focus the supervisor's attention on the poor results obtained from his actions. Then the trainer demonstrates a method that will give improved results. He spends the first session getting the supervisors interested in learning the method before actually trying to put that method across.

These sessions are TWI'S "Famous Firsts." They are applicable in all circumstances regardless of technical improvements made in the program as a results of widespread use.



TRAINING WITHIN INDUSTRY  
FOUNDATION

*This is to certify that*

*John Doe*  
*XYZ COMPANY*

of

*has satisfactorily completed*

J O B I N S T R U C T I O N   T R A I N I N G

*and can apply effectively its principles in (his) (her) daily work.*

*W. Dooly*      *H. E. Doney*  
President                      Trainer

Training Within Industry Foundation      Date *7-4-46*

*These little cards were much prized  
by those who completed the training.*

## TYING THE KNOT

The tying of the "Fire Underwriter's Knot" is an interesting example of Job Instruction training. This knot, so named because of its specification in insurance policies, is found in all electrical fixtures where the breaking of one strand of two-strand wire could cause a short circuit. Despite its common use, few people know how to tie it.

In the Job Instruction training session, the trainer "tells" a member of the group how to tie it. Although he gives a complete description, less than a dozen people out of thousands can tie this knot by simply "hearing" how to do it. Thus, "telling" alone is not sufficient.

In the second step, the trainer chooses one of the group and demonstrates "by showing him how to do it" - in plain sight - without explanations. Once again, those who attempted to tie the knot failed and proved that "showing" is also ineffectual as a method of instruction.

By this time, supervisors readily agree that they have been relying on "telling" and "showing" when attempting to instruct new workers. The trainer then selects another member and using Job Instruction 4-Step method, gets him to tie a neat, taut knot quickly, the first time.

As for Job Methods, specific launching arrangements had to be worked out at its inception. Both management and labor had to be informed of specific details of any new program before it could be put into use. TWI recommended a definite way to keep proposals moving and it was also recommended that a line executive be appointed to expedite all matters concerned. Two points were stressed :

1. Management must be shown that Job Methods was not an attempt to make professional engineers out of supervisors. Its purpose is to help supervisors make small improvements on the

WAR MANPOWER COMMISSION

Bureau of Training

TRAINING WITHIN INDUSTRY SERVICE

PROGRAM DEVELOPMENT

How to Meet a Production Problem Through Training

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 to 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.

16-410934-1

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?

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.

16-41934-1 GPO

P “Who is going to do what, and how?”

D Conover

jobs they are closest to.

2. Management must show supervisors that the plant was interested in making improvements--by encouraging supervisors to think.

TWI also stressed the by-products of Job Methods: the development of THINKING supervisors, the identification of these supervisors, and the increased attention given to safety as a result of the development of better methods.

## PROGRAM DEVELOPMENT

In the spring of 1941, TWI began a series of conferences planned specifically for defense contractors. These conferences were held to emphasize the availability and scope of TWI services and only those slated to have major responsibility in the training field were invited to attend.

Trial conferences were held at the General Motors Technical Institute at Flint, Michigan, and selected representatives determined methods which would be useful in handling programs in their respective plants. As a result, the need became apparent for the development of a specific 4-Step approach prepared for those responsible for overall training programs - to meet their own unique requirements.

When this 4-Step approach proved initially successful, it was put into operation in institutes and in some of the districts and thus was created the fourth "J" program, known as Program Development (P.D.). As with the previous "J" programs, both the "4-Step" method and "Key Points" were incorporated in a standardized procedure which was flexible enough to meet specific needs.

The 4-Steps of Program Development are simply a restatement of the "engineering" method, this time in training terms as contrasted to the personnel emphasis of Job Relations.

When Program Development Institutes were initiated, most members were already familiar with the techniques used to introduce the other "J" programs. As anticipated, TWI, using standard practice, first described a production problem, then demonstrated to training directors its solution through use of the 4-Step method. In this "Famous First", a problem involving cost reduction was analyzed and used as an illustration. The remainder of the coaching method was built upon this problem.

## THE FIVE SUPERVISORY NEEDS

While Program Development was being tried out. TWI discovered a way of talking about supervisory needs which proved very useful in outlining what it was prepared to do, and making clear the fields in which a plant would have to develop its own programs. This new way proved effective in discussing the unique needs of any particular 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, inter-departmental 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 man power 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.

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

TWI 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 training, must become a part of day-to-day operations. In no other way can production be so quickly influenced and manpower used to best advantage.

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

## TWI AND LABOR UNIONS

From the beginning, TWI worked with representatives of organized labor along with headquarter's men whose chosen background was in this field.

When a Job Instruction or Job Methods program was started, the union which had a contract in a 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 union leaders in order to prevent any feeling that it was "efficiency engineering" or a "speed-up."

The use of Job Relations 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. Some unions, although they wished to carry on the Job Relations program as part of their own operations, felt that acceptance would be improved if all references to supervision and management were removed. Accordingly, TWI's development group, aided by additional labor consultants, began trials of an all-union version and the first experimental versions were held in cooperation with the Steelworkers in Pittsburgh, Pennsylvania. 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.

## DEVELOPMENT WORK AHEAD

In looking at the simplicity of TWI programs it would seem that, since they represent common sense, their development should have been possible without too much difficulty. It must be remembered, however, that many non-essentials had to be eliminated. One important job was streamlining and intensification. Another 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. So they were put into operation in plants old and new, in those well-run and in those poorly-run. They were tried with supervisors who were old hands and with those who were green; by trainers who were experts and also with those scarcely competent to handle a group.

All the programs were developed under opportunities never before available. The nations' war plants were the laboratory, experimental shop and proving ground. Development work will continue as long as TWI exists because no program is ever perfect and no program is any good if it fails to meet needs. Since needs change, any program must be kept growing.

Just as industry has 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 they could put on effective training sessions and they were quality controlled in order to meet standards. Still it was not enough. These people in industry needed a stimulus - even pressure - from their own bosses so that they would effectively use what they had learned and thus really develop the skills of supervision.

## JOB INSTRUCTION FOLLOW-THROUGH

By 1942, it was realized that 10 hours of instruction alone was not enough so work on "Follow-Through" began. The first work in this field was set up in the pattern of an Institute away from the plant. Four industrial men, each accompanied by a supervisor from his plant, came to a 1-day session called a Follow-Through Institute. The industrial men then practiced on their own supervisors, in drill, the fundamentals of Job Instruction. Later, however, it was found that this drill technique was more effective if held in each Institute member's own plant rather than in off-the-premises Institute surroundings.

## JOB METHODS FOLLOW-THROUGH

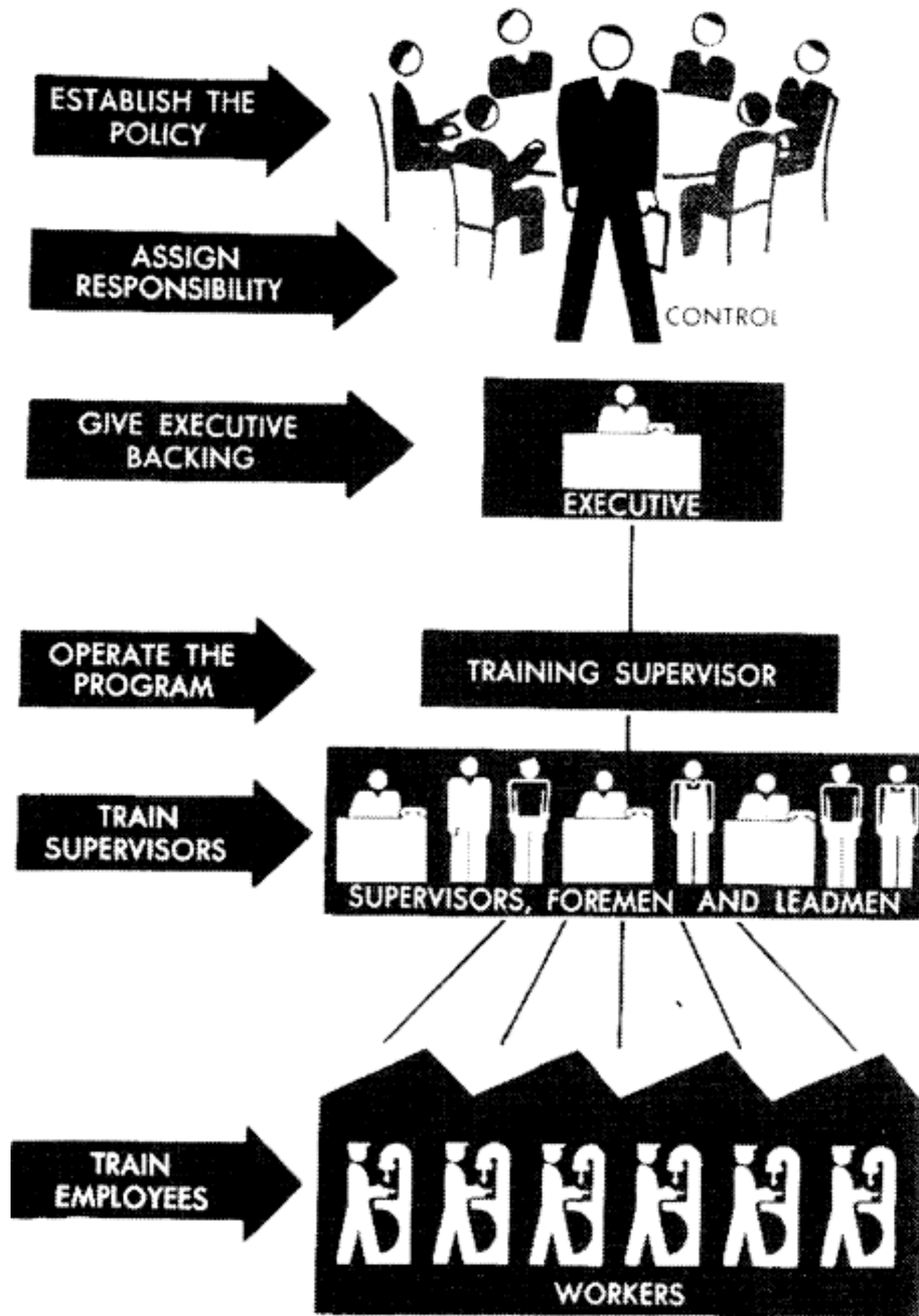
In July, 1943, a "Follow-Through" plan for Job Methods was issued and made a part of each plant's initial acceptance of the program. It was required that one man serve as the "spark plug" to work with and through the operating executive to keep the program constantly alive and active. He was also to carry the burden of the necessary control records and reports, to collect and assemble scattered information necessary for decision on proposals, and to give supervisors the extra coaching to help their own subordinates.

Through the winter and the following spring of 1944, there was extensive experimentation not only with Job Instruction and Job Methods "Follow-Up" but with all the "J" programs. As a result, TWI determined that each plant must, at the time of its original commitment, agree to embody these procedures:

- 1) Assignment of responsibility for results.
- 2) Adequate coverage.
- 3) Provision for coaching.
- 4) Reporting of results.
- 5) Credit for results.

Following these procedures virtually assured management that there would be continuing use of the programs and, therefore, desirable results.

# FIX THE RESPONSIBILITY!



## Getting Results

### OBTAINING PLANT ACCEPTANCE THROUGH UNDERSTANDING

The goal of all TWI's programming was, of course, the getting of quick and efficient results. How this was accomplished is the exciting story of TWI's war years.

In 1943, a specific sales approach was developed which included the training of a select staff for this purpose. This method, called Management Contact, was used in all districts after January, 1944. Its technique required top management of a plant to make known what its most urgent problems were.

The solutions of most supervisory problems could be reached through the three "J" programs. The fourth program - Program Development, or P.D. - gave training directors guidance in designing a complete training program to meet his own plant's particular needs. Thus it became virtually impossible for a plant manager to name any problem involving people where TWI could not lend assistance. This new technique, however, did not eliminate any of the formerly used promotional efforts. Instead it harnessed them to a well-tested form of presentation to top and middle management.

Job Methods improvements were logically presented in terms of hours or money saved and this led to more concrete measurement of the results of Job Instruction and Job Relations. The promise of getting measurable results became a definite part of the approach to management.

The results of this new approach soon showed it to be one of the most important projects TWI had undertaken. From 1944 on, it was learned that no effective service can ever be given unless top management really understands what is involved, realizes what it must do to make the program produce dividends for investments made and accepts the program on the basis of making it pay in terms of measurable results.

The executive group within a plant giving the go-ahead for the establishment of TWI service had also to be thoroughly aware of its responsibility for making the programs work. From the beginning, TWI made it mandatory as part of standard procedure that before a program started, all intermediate as well as top grade executives clearly understood their roles.

The approach was now based on what a program could do for a plant, rather than how it operated. Still, it was necessary for any program to be launched by a man who both knew the program and how to describe it to the line organization. TWI then held "Middle Management Meetings" for executives reporting to higher management and upon whom fell the weight of getting supervisory help to use what they had learned.

The meetings developed a pattern which incorporated the following three points:

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

TWI further pointed out the key position of the supervisor, outlining the aforementioned "Supervisors' Five Needs." Questions were encouraged and emphasis given to the various responsibilities in each of the skill needs. From a local or national collection of information about excellent results obtained by other plants, it was possible to lead into "Would it help if this happens here?" - a question needed in order that TWI might stress that good effects were bound to be obtained. However, middle management was reminded that it was team work which was required if these results were to be had.

It was pointed out that the TWI programs had two parts: basic training and then continuing use. After this discussion, the operation of the five 2-hour sessions for a group of 10 supervisors was described. The method was to be established in the first session and the remaining eight hours would be spent in "doing", with each man bringing a job or problem from his own department in order to demonstrate his use of the method.

Meetings concluded with the reminder that results would be in proportion to the effort invested. It was necessary for a plant to: (1) assign responsibility, (2) give basic training to all supervisors, (3) coach supervisors and sell them on the use of the program, (4) report results, (5) give credit for results. Most of all, if benefits were to continue, efforts must continue.

In the course of its wartime years, TWI found it necessary to spend more and more time with top management, making sure the chief operating executive understood his personal responsibility for results from the programs. Unless this was understood, there was little value in expending time and limited staff upon the effort.

However, it became increasingly apparent that top management was being successfully "sold." Libby, McNeill and Libby was an enthusiastic advocate of the 4-Step method. The Iron and Steel Division of the Kaiser Company, Fontana, California, trained 600 supervisors in Job Instruction and 431 in Job Relations. Other companies quickly followed suit. Willamette Iron and Steel, Portland, Oregon, was another example of TWI's common sense value. From a depression payroll of 320 men, the number of employees during the war increased to 16,500. At the Electric Storage Battery Company, Philadelphia, records showed training time had been reduced as much as fifty per cent along with savings in scrap, breakage, machine down-time, grievances, absenteeism and turnover. In two years time the savings had amounted to six figures.

With promotional ammunition such as this, TWI was able to arrange meetings with top management in plant after plant rendering essential services, as well as into all manner of industrial operations. It was especially useful to those companies making the change-over from the usual peacetime use of their equipment. The textile industry, for example, found the programs invaluable in instructing operators, both new and experienced, in the handling of various kinds of looms.

In this industry, as in all others, the primary purpose was the training of supervisors, but there were several by-products that helped the man in charge of TWI activities. For example, the chief time and motion study man gave considerable thought to an application of Job Instruction to certain situations that this department noticed in its work. They had observed that good operators, making incentive bonuses, had small variations in the way they did the same job. A special study was made of this group and it was pointed out where these operators were outstanding or weak on certain operations. By this means, attention was focused on experienced operators whose performances were satisfactory according to

"standard" whereas many foremen who had "J.I." were concentrating on new and inexperienced workers. By 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 further increase their productivity.

TWI also worked with plants which had constantly to expand to meet multiplied demands for explosives, guns, ammunition, aircraft and ships. It worked 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 differed although approaches to management were standard and all programs followed the manuals.

In a letter dated April 27, 1942, Sidney Hillman\* lauded the splendid efforts which TWI had made in behalf of increased production:

". . . in-plant training methods have been installed in more than 3,000 war contracting concerns employing well over 3,275,000 workers. War production training has been given or is being given to 3,450,000 persons in vocational and trade schools and in engineering colleges. Consequently, because you planned well, the supply of qualified manpower for war industry has been sufficient to meet the present demands of our war production program."

## ATOMIC BOMB PLANTS

Especially interesting is the story of the role of TWI in the development and manufacture of the atomic bomb which was, of course, the most closely-guarded secret of the war years. That every employee engaged in work on this project knew it to be "top priority urgency" is

\*See Chapter 7, TWI PEOPLE

common knowledge, but none knew exactly what this urgency actually encompassed. Therefore, it was faith alone which kept these people working.

TWI's Atlanta district was responsible for getting all four programs in use at the Clinton Atomic project under conditions which were not exactly in line with standard TWI procedure. Prospective trainers in Job Instruction and Job Methods got their practice on imitation jobs -- assembling flashlights or hacksaws, for example, instead of working on current problems.

There was no quality control of trainers as outsiders were not permitted under any circumstances and TWI headquarters simply had to accept the word of top officials that the programs were being followed and results checked. All work on Atomic projects and with other contractors who were in some way involved with the bomb was mystifying and elusive, but when the secret was finally made known -- when Hiroshima and Nagasaki had become part of history -- project heads acknowledged they did not know how they would have been able to get along without TWI.

## AIRCRAFT

The rapid expansion of aircraft plants was perhaps the most amazingly satisfactory occurrence in all the history of

war production. TWI served nearly all of the plants and many revisions of the "J" programs were tried out because they were true examples of the ability to adapt to new, rapidly expanding situations.

After adaptations, Job Instruction training was established at such plants as Northrop Aircraft, Inc., of Hawthorne, California, and Bell Aircraft, Marietta, Georgia. Job Methods and Job Relations followed in

quick succession and many problems inherent in the undertaking of mass production of desperately-needed aircraft were promptly overcome. For this, TWI was given a generous share of credit.

## SHIPBUILDING

Many shipyard managements felt that Job Methods and Job Relations were material factors in the country-wide spectacular reductions of work days from the laying of the hull to the commissioning of the ship. Savings in shipyards, as a result of a single Job Methods improvement, frequently ran into sizeable sums. More important was the ability of Job Instruction training to equip green workers to learn, in a very short time, an essential job in the production effort.

TWI programming covered shipyards on all three coasts as well as the inland yards and all the "J" programs effected the usual measurable results.

## OTHER INDUSTRIES

It was the same story in other industries: railroads, which required considerable help to keep the load moving day and night for ports of embarkation on both the Atlantic and Pacific oceans; automobiles, whose conversion into tanks was essential. The magnificent record made by this particular industry in adjusting their production assembly line techniques to accommodate war demands is now a matter of record. In their never-ending efforts Ford Motors, Packard and Chrysler all used the programs to best advantage.

At Hercules Powder Company, Job Instruction produced immediate results. In this and other ordnance industries, there was another consideration of prime importance in addition to training time, savings, scrap re-

duction, etc. It was the safety factor. Here, indirectly, TWI was undoubtedly responsible for the saving of many lives which might have been lost through inept handling of dangerous explosives.

Textiles, too, had top priority rating and Union Job Instruction, Methods and Relations programs were instituted as rapidly as possible with the cooperation of the National Textile Workers Union.

The food processing industry presented special problems because it is well known that fresh fruit must be processed rapidly. During the war it was difficult to find experienced workers. Those who were new could not handle the fruit quickly enough to prevent spoilage. Once again, TWI contributed to the solution of the problem. Breakdowns of work of the best performers were checked against the average of the poorest workers and from this, certain "Key Points" which increased production evolved.

Among the food processors seeking assistance was Swift & Co., Chicago, where three Job Relations Institutes were held simultaneously. As a matter of interest, 20 TWI districts worked nationwide with 138 Swift establishments, resulting in basic instruction of 3200 supervisors in Job Instruction, 1978 in Job Methods and 2338 in Job Relations.

At Wilson & Co., Job Relations was given not only to line supervisors but to presidents and vice-presidents who requested it as well. So enthusiastic was Thomas E. Wilson, Chairman, that a series of courses was scheduled evenings at his home. Joining in as trainees were his Production Vice President and General Counsel.

The general slogan of all these processing companies was "We will fill your orders without delay." Thanks, in large measure, went to TWI.

## RESULTS IN UNIONS

Although Job Relations in unions had been available only a short time prior to the end of the war, there were many tangible results. Noteworthy is the fact that the business agent for five New York locals of the International Brotherhood of Electrical Workers (A.F. of L.) reported that after Union Job Relations was given to stewards in one local, not a single grievance had come to him in three months. In the past there had been at least two cases a week. The stewards were especially pleased because their work was simplified and their relations with other union members increasingly cooperative. Similar reports came from the Industrial Union of Marine and Shipbuilding Workers (C.I.O.) where the weekly average of grievances in one local was cut from twenty to two cases.

## TEXAS OIL

No war can be won without petroleum and the story of TWI's programming with the Texas Company is outstanding. Job Instruction was attended by top and middle management in a 1943 Institute which trained 1511 supervisors. Long before the job was completed, top management insisted that an operating plan for continuing use be developed. Later, in a progress report covering 5000 employees, every one who had received "J " instruction was ready to advance to the next department. Plant management acknowledged that before Job Instruction, teaching was haphazard because there had been no definite method of breaking in new employees. Benefits were evident, however, in reports that costs had been reduced by twenty percent, lost time from accidents, seventy-five per cent and scrap and re-work reduced by twenty percent.

Public utility companies, telephone and power companies also used the programs to good advantage.

## COAL

In World War II, Pittsburgh Coal was the largest producer in Pennsylvania. It had some 8,500 employees, 10 major mines and some 12,000,000 tons of production annually. When the "J" programs commenced, these aided materially in getting new workers up to production in minimum time, and, in addition, they effected a major decrease in management-labor friction plus a considerable reduction in grievances.

In February, 1945, Job Methods was made available and produced many additional improvements. An improvement at one of the mines was immediately cleared through a coordinator so that all of the other mines could get its benefit without delay. The long-lasting effects of these improvements continue in use today with resulting costs and safer operating procedures. Safety is always the prime consideration in coal mines and the benefits obtained at Pittsburgh Coal were soon incorporated into the planning of other large companies.

## TWI IN THE ARMED FORCES

### Army

Early in 1942, the arsenals at Watertown, Watervliet and Rock Island asked for help and in March of that year, the Job Instruction program was introduced at the Picatinny Arsenal in New Jersey. At the New Cumberland Supply Depot in Pennsylvania the main problem concerned shipping of badly needed medical, food, and clothing supplies. With the help of Job Instruction this material was rapidly expedited. In June of 1942, TWI was asked for aid in overall needs by the Director of Services of Supply, Civilian Personnel.

Following this, General Brehon Somervell, Commanding General, Services of Supply, U.S. Army, issued a directive which called attention to the training programs and to the experience and knowledge of TWI itself. He requested its inclusion into a supervisory program for all Services of Supply executives and supervisors within the United States. A working agreement was formulated and TWI authorized to begin training sessions following the same format designed for private industry.

Work with the Army Service Forces, (or ASF) was TWI's largest assignment. ASF is the Army's supply and administrative arm and 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 its wartime role. It 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 used in chemical warfare. It handles payrolls for the Army, attends to its medical needs, supervises religious observances, carried the Army mail, does all the paper work, provides recreation for the troops, sells the soldiers cigarettes at post exchanges and maintains the military police. ASF includes everything in the Army except the Ground Force command and the Air Force. In order to launch this massive undertaking, it was necessary to bring in 117 trainers from 59 companies, 13 government departments, 12 TWI districts and 4 state education or college groups. The company people were borrowed directly by 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.

Enough cannot be said in praise of industry in general and the work of the trainers who carried out this vast assignment. It was a unique experience for the individual and it performed an invaluable service to the

government in a time of great need. At the end of December, 1942, trainers had conducted 684 sessions for various branches of the ASF and had certified 7,000 supervisors.

## Navy

The Navy did not make any widespread use of TWI but in 1944 a special staff was recruited to promote many contractors' use of the "J" programs. Among these was a St. Louis plant, operated by McQuay Norris, which made secret Navy communications equipment. Job Instruction got underway with sessions for top and middle management and the company's own trainers gave basic instruction to supervisors. The plant grew rapidly because of the urgency of its work and 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. However, by use of the 4-Step method, training time was cut to 30 minutes instead of the 4 to 6 hours previously taken.

## TWI AND THE FEDERAL GOVERNMENT

By September, 1942, Job Instruction was in use in the Civil Service Commission, the Civil Aeronautics Administration, Federal Housing Authority, Federal Security Agency, Tennessee Valley Authority, U.S. Forestry Service, Unemployment Compensation Commission, the Bonneville Power Administration and others.

Although it was never intended that TWI should, beyond getting the programs started, serve either government agencies or the armed services, needs took precedence over mere conformity to rules. It was, therefore, ready and willing to assist the government wherever and whenever necessary as rules, in time of war, must be broken as often as necessary.

## TWI IN FOREIGN COUNTRIES

In February, 1944, the British Ministry of Labour sent a representative to headquarters to learn about the programs. Upon his return to England, Job Instruction, Job Methods and Job Relations were put into immediate use in the most important industries in the British Empire.

TWI was introduced in far-flung places throughout the world. In Canada, the Job Instruction manual was printed in both English and French and later, Job Methods and Job Relations were adopted by the Department of Labour. An Arabic version was circulated in Saudi Arabia and one in Spanish for countries in South America and Mexico. Job Instruction materials were transmitted to 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 and Program Development (P.D.) given to members of the Chinese (then Nationalist Chins) Air Force.

## ADAPTATIONS OF THE PROGRAMS

TWI programs have been developed for use in a wide variety of situations. Sometimes this has meant an adaptation of the program sometimes only the material used by group members has needed change. Often the standard program was appropriate.

TWI complied with requests and developed detailed variations for offices, hospitals, housing projects and agriculture. Assistance was given to those who were carrying on training in the Sister Kenney treatment of poliomyelitis at the Mayo Clinic and the national Red Cross helped in streamlining their home nursing programs.

In libraries, great interest was generated in Job Methods 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 was used at the Maryland Workshop for the Blind with cards reproduced in Braille and the program was also adapted for deaf mutes.

The U.S. Department of Agriculture, through its extension service, promoted the use of all four "J" programs. Young people were reached through 4-H Club Camps, using material designed especially by Westinghouse. This material took the form of cartoons to appeal to youngsters. Agricultural and county home agents were active and the Federal Extension staff gave Institute training to many men and women in at least one "J" program.

Returning veterans, who had finished their tours of duty in the European and Pacific theaters, were helped by TWI to resume skills in civilian employment.

From their inception, the programs attracted favorable attention in the press. The simple formulas, which obtained amazing success in rapid increases in war production at lower cost, were publicized by Reader's Digest in a three-series article by Stuart Chase. Fortune magazine published a special article and TWI's success was covered by such organizations as the Houston, Texas, Labor and Trades Council and its affiliated A.F. of L. groups.

Thus, as the war drew to a close, there was ample proof of the cumulative successful effects of TWI's unique and sound method of getting results promptly. Figures and facts publicly acknowledged that the four "J" programs had served their country well. This augured well for the future

and the contribution TWI would continue making to industry in the years of peace which lay ahead.

## TWI Continues At Home

### THE TWI FOUNDATION

In August, 1945, the last gun lay silenced and World War II reached its grim end. From the dust and rubble which left cities in ashes and millions homeless, it would seem that, order could come no more. Yet no sooner had peace been restored than the world took inventory, resolving to salvage what could be salvaged, repair what could be repaired and, where necessary, build anew. Despite the horror, much had been learned. Paradoxically, the war had forced tremendous technological advances upon industry. In peace time, they must learn to keep pace. Although TWI, as a government agency, had ceased to exist, its record of accomplishments dictated a need for its continuing guidance in the traumatic industrial shift which accompanied demobilization. One of the first requests for help in converting to peacetime production came, interestingly enough, from the Hawaiian Islands where, only a few years before, the war with Japan had begun.

At the request of private management, the Training Within Industry Foundation was established and incorporated in New Jersey in 1946 to

keep available the supervisory training programs developed by TWI as a war agency and to adapt, improve and broaden these programs to meet the current needs of industry and commerce. Another aim was cooperative research in improved managerial techniques by which industry and commerce could help itself in assuring better management and supervision. The same men who headed TWI during the war were to guide the Foundation.\* Upon them fell the obligation of finding a way to successfully project TWI into the future.

The Foundation was established according to the same principle that had accounted for its smooth functioning during the war: "The technique which is best suited for a particular use can be made into a more trustworthy tool if it is developed, clarified and made easy to apply by the joint action of several qualified persons from different companies facing the same problem. To provide the stimulus, direction and continuity for such cooperative research, through joint action, the Foundation arranged with interested member companies, for the means of testing, trying out, and integrating their results. Thus a better solution could be reached than any single company could uncover working alone. The individual company must, of course, determine the use it will make of any technique which is available."

From its inception the Foundation incorporated the "Key Points" and the successful Job Instruction, Job Relations and Job Methods programs. Program Development was also continued. A careful evaluation of all the "J" programs was made, weighing any pertinent changes recommended in place of previously used war time production techniques. One of

\*See Chapter 7, TWI PEOPLE

## *How to Get Ready to Lead a Discussion Meeting*

1. DETERMINE PURPOSE OF MEETING:  
To develop support for required action.  
To consider unsolved problems.  
To settle disagreements and get group agreement.
2. EXPLORE THE SUBJECT:  
Get facts and information on the subject.  
Consider probable differences in viewpoints.  
Outline points that need discussion.  
Prepare presentation and materials.
3. OUTLINE THE DISCUSSION:  
Set the end objective.  
Set intermediate objectives.  
Make a timetable for the meeting.  
Plan opening, specifically.  
Plan close, specifically.

### 4. HAVE EVERYTHING READY:

Issue, and check, announcements in advance of meeting.  
Arrange for room, table, chairs, blackboard: check light, ventilation.  
Prepare charts, outline blackboard sketches, or any other needed aids.

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TRAINING WITHIN INDUSTRY FOUNDATION

1949

## DISCUSSION LEADING

### *How To Lead a Discussion Meeting*

1. OUTLINE SUBJECT CLEARLY  
Start meeting promptly.  
State problem or situation clearly.  
Introduce topic for discussion.
2. DIRECT THE DISCUSSION  
Draw out opinions, viewpoints, and experiences  
Make sure all participate.  
Keep discussion on the subject.  
Avoid personal conflicts and arguments.
3. CRYSTALLIZE THE DISCUSSION  
Present pints of agreement and disagreement.  
Determine degrees of feeling – watch for shifts in opinion.  
State intermediate conclusions as reached.  
Make sure of understanding and acceptance.
4. GET ACCEPTANCE FOR ACTION  
Summarize previous agreements and state conclusions clearly.  
Get agreement on action.  
Check to be sure all understand.  
Get group support based on conviction.

*Arrange [not legible in document]*

D “Check – Be Sure All Understand”  
L Kane

the first requirements was the updating of all manuals. Most of these needed little changes except in vocabulary. Instead of patriotic appeals, the emphasis was now on the importance of production to a company's own financial existence. "Win the War" was replaced by "Meet Competition", or "Make the Job Easier", or "Improve Quality", "Reduce Costs."

To these established programs TWI added Job Economics Training (JET), Discussion Leading (DL), and Management Problem Solving (MPS ). Original programs remained unchanged.

The purpose of Job Economics was to promote better understanding of the factors which advance or hinder the American economy. From this, a better basis was provided for consideration of current conditions and their bearing on a course of action. Discussion Leading was an intensive program for use by supervisors, designed to give skill in "talking out" matters of common interest and to promote better understanding in matters affecting all groups. Its aim was to encourage complete participation and full understanding in discussions and acceptance of action to be taken.

Management Problem Solving enabled top managers to develop ability to express their experience in simple, uniform terms which could be standardized and taught to their immediate staffs. Management Problem Solving embodied three vital principles:

1. Recognizing a problem where there is one.
2. Deciding what needs to be done to meet it.
3. Doing it.

With essential programming formulated, the six incorporators of the Foundation met in New York City on the 19th day of January, 1946. Their purpose was to take initial steps in contracting such business as

might come before a first meeting. By-laws were read, article by article, including Section 7 as follows:

"The President may appoint a program committee composed of five persons and it shall be the duty of this committee to recommend agenda for conferences of supporting members . . ."

Discussion was held on the planning of conference programs so that member companies would take away with them a clearer understanding of the purpose of the Foundation, knowledge of the functioning of TWI programs and an exchange discussion of the training problems encountered in the various member companies.

The conferences met with enthusiastic support and were attended by representatives from Monsanto Chemical Company, Socony Vacuum, Chicopee Manufacturing Corp., Otis Elevator and from other companies totaling over two hundred and representing the outstanding industrial and service organizations in the United States. Proceedings at conferences were similar; each highlighted the major objectives and goals for the year ahead. Administrative and supervisory problems most likely to be encountered were pin pointed and concrete suggestions made for a solution.

A weekly newsletter was sent to all member companies and bulletins issued frequently. These bulletins enabled the Foundation to share promptly its suggestions for increased production efficiency. Recommendations and suggestions were obtained from continuous research and from regular reports obtained from TWI representatives and findings submitted by member companies. Each issue of the bulletin also dealt in depth with such problems as cost reduction, executive decision-making, re-training experienced workers for different jobs, selection of new supervisors, accident prevention and other such problems as were common among the foundation members. Either a staff member or an executive

from a member company contributed his special knowledge to these in-depth articles.

In order to further improve service, specific field representatives were assigned to work with specific member companies. In addition, a fourth field representative was appointed for the United States. Territories were now divided as follows: East Coast, Ohio River Valley, Metropolitan Chicago and the West Coast.

So outstanding was the enthusiasm for the TWI Foundation that, in April, 1951, Fortune magazine paid special tribute in an article entitled "Training Manpower," excerpts from which said:

“TWI techniques have been kept alive by the TWI Foundation of Summit, New Jersey, which is headed by ex-TWI directors. The Foundation, a non-profit institution, is supported by membership fees from sixteen companies and by service charges received from companies (450 in 1950 ) that use its training staff. It offers three new post war courses, Discussion Leading, Management Problem Solving and Job Economics Training, and has twelve representatives teaching company trainers how to keep supervisors using TWI methods. A new TWI coaching technique has been developed for showing instructors how to guide a foreman in handling specific cases without directly telling him what the best solution might be.”

## TWI'S LASTING EFFECTS

The best testimonial to TWI's value in establishing fundamental training principles is to take a brief look at current information, gleaned from some of the outstanding industries in the United States. Although their numbers are legion, one area was chosen in illustration of TWI's adaptability to diverse training situations:

# MANAGEMENT PROBLEM SOLVING

## How To Solve a Management Problem

1. ISOLATE THE PROBLEM  
What is interfering with getting the end result?  
What will be accomplished when this problem is solved? State the specific goal.  
*Tackle one problem at a time.*
2. EXPLORE THE PROBLEM  
Review available records and reports.  
Get other available facts.  
What additional facts are needed? Get them.  
Determine feelings.  
What facts can be expressed in figures?  
What really causes this to be a problem?  
What policies and practices apply?  
*Get the whole story.*
3. DECIDE ON ACTION  
Consider action on underlying causes.  
What controlling factors influence the decision – cost, time, policy?  
Weight possible actions in the light of controlling factors.  
Decide what to do how – who when.  
*Take action.*
4. CHECK RESULTS  
Did you accomplish your specific goal?  
Have any new problems been created?  
*Was the problem solved?*

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Did you accomplish your specific goal?  
Have any new problems been created?  
*Was the problem solved?*

M

P “What is the problem and who has it?”

S

Doner

## THE CHICAGO AREA

### Commonwealth Edison Co.

The Commonwealth Edison has used Job Instruction and Job Relations programs for many years. They use a slightly modified version with a number of people with manuals to maintain uniformity. Their experience is “on-going” and it has helped many men move up in company ranks by being more effective supervisors. Top management has supported the programs. There are many specific majors of success, as evidenced by a cut-back in wages, costs and by an increase in efficiency. Additional benefits of better use of the people available has been an added by-product. Although there are varieties of TWI plans, all usually return to the original essentials. All in all, the various aspects of the programs have helped every level of operation from top management to beginning workers. By aiding individuals with basic organization, TWI has made all jobs clear and well-defined. The net effect is a well-integrated industry. Critical parts of all operations are reviewed periodically. In short, Commonwealth Edison has captured the essence of TWI programming by saying that “There is an art to being an effective worker.”

### Bastian-Blessing

The Personnel Department, responsible for all training programs, questioned why employees failed to perform according to expected capacities. It was discovered that increased production pressure in all facets of operations had resulted in a turning away from the fundamentals of proper instruction. Re-introduction of TWI's flexible JIT program first put in to operation in World War II soon brought about desired results. Scrap was reduced, morale problems alleviated, turnover slowed, employee advancement increased and the overall quality of work improved.

Plans are presently underway to conduct a second phase of TWI programming, namely: training key men and group leaders to break down, step by step, specific tasks on a given job. There are also plans for follow-up and emphasis on the harnessing together of several training programs in a flexible TWI package, tailored for the unique personnel requirements of the company.

### Armour & Company

JIT and JMT training programs were put into successful operation in 1951. Training manuals were revised and updated and each plant contacted to arrange for a demonstration of either program. No local plant manager was expected to take on either J.I.T. or J.M.T. until he was fully convinced of its value for his particular operations. This soft-sell basis resulted in 100% acceptance of TWI programming. Each plant manager then selected a well qualified man as local leader and, over the years, 213 such leaders have been trained in the various programs. METHODS IMPROVEMENT has been especially popular and some of the outstanding benefits reported from the successful use of all the programs includes savings in overtime cutbacks and more efficient use of materials. Conservative estimates indicate that savings of between five and ten million dollars have been realized since the introduction of the "J" programs. With modifications, the TWI programs as originally conceived are the basis for present day training procedures. The idea that "If the worker hasn't learned the instructor hasn't taught" helps maintain a fresh, critical perspective in all of the company's training operations.

### Swift & Company

After World War II, it was apparent that those who had been trained in TWI's three "J" programs were moving up most quickly in the com-

pany ranks. Here was another evidence of the benefit of TWI's ability to produce long and far-reaching results!

Men, trained as trainers, developed and expanded the conference method of instruction and formulated a series of leaders' guides to fit special training requirements of the meat packing industry. Specific adaptations at Swift were a "Safety Through Supervision" course, as well as incentive bonuses developed from Job Relations and Job Methods.

Through use of basic principles and with revisions contingent upon changing production requirements, TWI programs prove their value every day. Among these benefits are improved relations between union officials and supervisors and early recognition of grievances. The old example of the underwriter's knot still emphasizes fundamental ideas in teaching and training.

### Littlefuse Company

At the present time, all departments at Littlefuse use TWI training manuals and operations are maintained by a regular and systematic evaluation with job breakdown analyses. Those workers in need of more training can be easily identified. Key points of various operations are used as starting points and trainees shown their tasks in clear terminology. The by-products of this approach include general improvement in morale and efficiency. By having everyone do his share of work for which he is best suited, the whole plant operation has shown a higher degree of performance.

TWI has been at Littlefuse for five years and 1969 was the best in the history of the company. Interplant relationships are harmoniously maintained as people of all ethnic groups work together. Training in TWI Job Relations has enabled many foreman to better understand the importance

of proper job relations, with ensuing benefits for all. There is a fine spirit of loyalty among workers and supervisors and few grievances ever reach the Personnel Department.

## National Safety Council

The overall goal here is towards developing safety procedures which will cut accidents and, in turn, save money. Recently the J.I.T. approach of TWI has been united with Job Safety Analysis, developed by Mr. Len Smith of the Training Department, in programs that are both compatible and complementary. Four-step procedure is still apparent: Prepare the Worker, Present the Operation, Try Out Performance and give Follow-Up. In all situations with J.I.T., J.M.T., or J.R.T. the Job Safety analysis proceeds from a methodical step-by-step approach which encourages everyone to think critically and carefully about the flow of work with special emphasis on safety problems. In all Job Analyses of safety procedures, the job is broken down in Steps: What do do, How to do it, and the "Key Points" in various steps. Courses of one-week duration are held by the Safety Training Institute which embody these ideas and special manuals have been prepared to insure that the trainee will literally be able to carry these training methods back to his home firm.

## TWI IN EDUCATIONAL INSTITUTIONS

Many educational institutions have adopted TWI techniques into their curriculum. For a number of years the Rackham School of Graduate Studies of the University of Michigan has held a week-long seminar in which presentations of on-the-job Institute methods are given to representatives from industry and service organizations. The University of Utah and several other colleges had similar programs.

At the University of Chicago an evening program was included in their business administration department which concentrated on the application of TWI techniques and approach to a wide range of management problems. This course was conducted by Herbert Doner\*, the Foundation's mid-western representative.

At the request of the Chicago Chamber of Commerce a series of similar discussions were promoted and held at the Chamber of Commerce Building. In other cities across the country seminars were conducted for groups both large and small, carrying forward the principles of the Foundation.

Government Deposit Libraries across the country have been designated and still make available the "TWI 1940-1945 Report."

## FOREIGN CONSULTANTS

Simultaneous with the launching of the Foundation, many TWI representatives who had been most active during the war years set up their own private consulting services. These men trained others to use TWI techniques and thus further promoted the work of the Foundation.

While many of these representatives remained in the United States, some located in Europe and Eurasia or worked directly with representatives from these countries who had been sent to the United States for training. In some instances, such as in the training of ten representatives from Yugoslavia, it was necessary to call in interpreters. The work was exacting, but extremely interesting to all involved. All foreign countries requesting help, and especially those being aided by the Marshall Plan, were taken under the Foundation's guidance. By June of 1949, the number of foreign members totaled eighteen.

\*See Chapter 7, TWI PEOPLE

The manuals were translated into foreign languages and thus could be easily understood not only by those who spoke English, but also those whose native tongue was Dutch, French, Flemish or Swedish. They were also printed in Norwegian, Danish, German, Italian, Finnish, German Swiss and in Arabian. One need not be a linguist to understand the "J" programs.

On May 9, 1949, the first international Job Instruction Institute was held in Paris under the direction of M.E. Bechet and Marcel G. Mouget. Later, on April 12, 1950, a special luncheon was held by TWI at the Downtown Athletic Club, New York City, honoring M. Mouget and his accomplishments. Along with C.R. Dooley, M. Kane and W.K. Opdyke\* of the Foundation those attending were:

|                 |                                                       |
|-----------------|-------------------------------------------------------|
| J.S. Clarkson   | The Mutual Benefit Life Insurance Co.<br>Newark, N.J. |
| C.E. French     | National Association of Manufacturers                 |
| Richard Gleason | General Electric Company                              |
| L. P. Gratz     | Time Incorporated                                     |
| J.H. Herbert    | Socony-Vacuum Oil Company                             |
| P.B. Lewis      | E.I. duPont de Nemours and Company                    |
| C.G. Shaw       | Standard Oil Company (New Jersey)                     |
| T.G. Spates     | General Foods Corporation                             |
| J. Tanham       | The Texas Company                                     |
| H.H.R. Thompson | Asiatic Petroleum Corporation                         |

The work of the foreign consultants grew more exciting as it widened in scope. Included in Chapter 7 are reports from two of these men whose reports of industrial conditions in Nepal and Indonesia have considerable historical interest today.

\*See Chapter 7, TWI PEOPLE

## TWI Continues Abroad

COMMENT SE PREPARER A INSTRUIRE.  
COMO INSTRUIR.  
HVORDAN MAN BEHANDLER ET PROBLEM.  
IS USULLERIN.

Said in French, Spanish, Norwegian or Turkish, written in Japanese or in the script of Bengali, translated in Vietnamese or in the native tongue of other countries across the world, the message reads the same. To those familiar with TWI's pocket-sized instruction cards it is recognized at once as the Job Instruction card to which management and supervision refer when training others. Deliberately brief and to the point, these little reminders have changed little since their debut in World War II. As postwar TWI moved a round the world the instruction card became its calling card and wherever put to use, results proved its worth.

In North America, TWI moved with conspicuous success beyond the continental borders of the United States. The government of Mexico established a TWI operation in the Centro Industrial de Productividad in Mexico City, training approximately 1000 foremen and supervisors from 50 plants in the three programs during the period from August, 1956 until February, 1957. In Canada, the programs were also enthusiastically received and supported.

The "J" programs arrived in Italy in 1948, introduced by Esso, Shell and Socony-Vacuum in patterns closely following their parent American companies. In 1952, the Istituto per l'Addestramento nell' Industria was founded to promote further TWI and fellowships to advance the training of experts in programming were established by such firms as Montecatini, Pirelli, Falck, Edison and Necchi. The Istituto had the full support of the Italian Ministry of Labour and Social Service and outstanding results were obtained.

The first TWI International Institute, conducted by the International Labor Organization in Job Instruction was held in Paris, France, in 1949. It was well attended by representatives from the Benelux countries which reported outstanding benefits from the "J " programs later put into effect.

C. R. Dooley, Director of the TWI Foundation, accepted an invitation from the International Labour Organization in 1949 to act as a special manpower consultant on technical training in aiding countries receiving Marshall Plan aid. TWI was put into effect not only in France and Italy and the Benelux countries but in Denmark, Sweden, Norway, Finland and Holland as well.

The three "J" programs - were put in to operation in Turkey beginning in 1953 and by 1956 over 5000 foremen and supervisors had been

qualified. These were from approximately 100 companies, employing over 200,000 men and women.

In Nepal in 1958, TWI fitted nicely into an industrial program carried on jointly by government agencies and the U.N. Thirty men from government and industry were recruited as trainers in the "J" programs totaling 1226 employees. It was called upon for consultation in the Aswan High Dam project in Egypt and courses were developed for use in Korea. Unfortunately, however, the Korean War interfered with their progress at that time.

Recent comprehensive reports from Great Britain and New Zealand have been included at length because they so admirably illustrate the far-reaching influence of TWI programming in industries both large and small. Furthermore, they offer concrete suggestions for the initiation of the 'T' programs under the most diversified industrial and geographical conditions. TWI's adaptability makes it applicable in all areas of the world.

## REPORT FROM GREAT BRITAIN

The following is from a report dated August, 1966, prepared by the Ministry of Labour:

### "Training Within Industry" (TWI)

"An important contribution to the development of industrial efficiency is made by the TWI Service for the training of industrial supervisors. TWI offers courses in instructing techniques, leadership in industry, prevention of accidents and the improvement of methods. Each course can be conducted on the industrial premises and aims at the initial development of an essential supervisory skill. A fee is charged for these courses. TWI

is still the most widely used method of internal training for supervisors and forms the basis of many more advanced training programmes."

## Department of Employment and Productivity

In recent years, the Department of Employment & Productivity has provided TWI as a service for employers in response to increasing demand. A variety of courses, Job Instruction and Communication, Job Methods, Job Relations and Job Safety, Union Job Relations, Operator/Instructor Training Development Service (TDS) are offered, as well as special instruction for offices, retail distribution and hospital supervision. The aim is to provide effective training in the shortest possible time.

The fundamental principles of TWI are constantly being adapted to meet industrial and commercial demand and research is now underway to produce a clerical training course. The latest addition is the export office procedure course, launched in January, 1970, to assist firms engaged in exporting.

During the period 1966-1967, the Training Development Service (TDS) was born. TDS attempts to correlate (1) advisory briefing sessions for management and supervisory staff with (2) shop floor training of experienced operators selected to be operator/instructors. This is an in-plant course with an early visible effect following adoption in actual working conditions. Large firms report sizeable reductions in operator training time and labor turnover as well as better interplant relations.

In textiles, training is based on TWI Job Instruction supplemented by an advisory service to assist individual managements in organization of training, setting up of training facilities and selection of suitable operators as instructors. TWI "breakdown" has been expanded to include a

more complex analysis of skill and simulated time exercises have been introduced.

In specialized iron foundries, "fettling", or the process of cleaning up or dressing a casting after shot blasting annealing, requires stamina and good workmanship. Through methods grounded in TWI basic concepts, the estimated time to bring a newcomer up to experienced work standards has been reduced from nine months to approximately five weeks.

Similarly, in the paper conversion industry, engaged in assembling of corrugated fibre-board divisions for insertions into cases used by whiskey and gin distributors and food manufacturers, a systematic training course was introduced to help female operators increase their speed in order to, qualify for incentive bonuses. An operator/instructress, demonstrated initial basic exercises at a bench alongside the production benches, then supervised production until trainees had acquired the necessary skills. Ultimately, the trainee developed the needed speed and stamina and, on the average, attained the standard of an experienced worker in one-quarter to one-third the previous time required.

In the rubber industry, a program which has been well-established for a number of years now includes experienced operators as well as supervisors and functions effectively through utilization of TWI Job Instruction Departmental heads, managers and supervisory personnel

have previously attended a full-time eleven weeks course and are well acquainted with JI techniques. The senior foreman in each department is responsible for the training of new or transferred workers and selects qualified operator/instructors to train these new additions to the department. Arrangements are then made for training of these operator/instructors in courses arranged at intervals. This course, of 12 hours duration, embod-

ies job analyses and breakdown and development of instructional skill. All jobs in all departments have been analyzed by the TWI breakdown method, with some modifications.

## COURTALD WORKS

Sponsored by the then Ministry of Labour and National Services, TWI was introduced in decisive World War II year, 1944, when thousands of men and women, completely without industrial experience, were being recruited into the munitions, armaments or engineering industries. Key men - crafts men - quickly had to be made into supervisors. A good craftsman, however, is not necessarily a good instructor and therefore, training in instruction was vital. Industrial executives were called to help the Government devise a national scheme to instruct these supervisors and TWI Service, offered free, soon won overwhelming support.

The Job Instruction program was introduced to various levels of the supervisory staff. This was a novel development since the notion that management and supervisory teams might meet to discuss the skills of supervision had not as yet been seriously considered. From these meetings, however, the idea evolved to include the training of newcomers to industry, or transferees from other jobs. Although there were some early problems due to lack of understanding of TWI principles, inadequate push from management and inadequate follow-up, a new comer with an operator was replaced by the conviction that supervisors ought also to be good instructors.

As a result of J.I. at Courtaulds Works in various plants located throughout Great Britain, long-term effects were studied which resulted in (1) a greater realization of the need for training and (2) the development of a scheme for the selection and training of potential supervisors.

These features continue at Courtaulds today. Even more significant, however, was the development of a scheme of training covering the whole operating field of supervision and management as an outgrowth of fundamental TWI programs in J.R. and J.M.

In 1952, a residential training centre was established to provide courses in the major aspects of supervision. These courses were complementary to the training work done in each of the factories. With further company expansion these residential training courses were changed to training programs for higher management and these still successfully exist today. In fact, TWI sessions continue regularly at Courtaulds, modified only to meet changing individual requirements.

The Industrial Training Boards, introduced as a result of the Industrial Training Act of 1964, quickly recognized in TWI training a means whereby better work performance and job satisfaction could be encouraged. Selected experienced operators have been chosen for J.I. and others are chosen to present TWI programs to groups of supervisors. The use of operators as instructors is looked upon as one of the most significant training developments in recent years.

## KODAK

At the request of Ernest Bevin, and under the direction of the late F.H. Perkins\*, TWI was brought to Kodak in late summer, 1944. A 10-hour J.I. course was followed by the first J.I. Institute. Shortly afterwards, a 10-hour J.R. Institute was commenced. All these courses took place during wartime conditions with constant interruptions from air raid sirens signalling the approach of the Luftwaffe and its dreaded bombs.

\*See Chapter 7, TWI PEOPLE

In spite of these terrible difficulties, TWI made steady headway and in early 1945, the TWI Association was formed with Perkins as its founder-chairman. This movement spread to other regions in the country and continues until today to flourish as means of giving training to officers and instructors.

There commenced in 1948 the first "Operator Training School", conducted entirely by the line management and within Kodak's large production departments. Headed by a chief instructor and four full-time assistants, this school continues in operation today. All major production departments now have their own training departments, many with operator training schools.

By 1950, more than 400 personnel at Kodak had completed one or more of the TWI programs. J.I. and J.R. continue today as the basis of all training procedures. Although it is not always possible to adhere strictly to the TWI manual as in days gone by, until 1969 a 3-day full-time Instructors' course faithfully utilized the "Electrician's Knot" demonstration as a "must" for proper results.

When in 1959, the Industrial Training Boards required as a condition of training that all officers and instructors be qualified to instruct, a 5-day full-time course was designed containing TWI basics. At the present time, over 100 personnel have received certificates and are now registered as Qualified Instructors.

Without exception, all the training facilities operate on TWI-J.I. principles, complete with "timetables" and "breakdowns". In 1969 a new camera was put into production but not before complete training job breakdowns had been produced and used to train operators. This is sufficient evidence to support the statement that "Kodak is still very TWI-minded."

## JOSEPH LUCAS LIMITED

Of unusual interest is the Works Training Competition conducted yearly by Joseph Lucas Limited. Formerly called the TWI Assessment, the aim of this competition is to see how well training is being carried out on the shop floor, and to insure that all training is properly recorded in accordance with Engineering Industry Training Board (E.I.T.B.) procedure. Foremen are assessed and rated on such procedures as the hiring and training of operators, the manner of long presentation of information and the maintenance of training records. Trainers are scored on their ability to make use of breakdown sheets, understanding and use of principles of Job Instruction and demonstration of the 4-Steps, knowledge of Job Relations and finally understanding of performance appraisal. Operators ratings are based on knowledge of departmental procedure and information, interest in own progress and knowledge of important things to look for on the job.

An elaborate point system is placed in operation during the Works Training Competition and each employee is fairly scored. Another feature of the Competition is the Questionnaire for Foremen which covers all phases involved in successful performance by his or her particular department.

At the completion of the Competition a Works Training Trophy is awarded to the outstanding factory and a Highest Individual Rating Acknowledgement bestowed on the winning foreman.

Undoubtedly, TWI is the basis of formal training for supervisors in British industry. While there was no formal training before TWI, almost all programs today are founded on the original 4-Step principles.

Introduced to Lucas, as to other industries in the stressful days of World War II, TWI immediately became a great success. Semi-skilled people learned quickly and an outstanding example was the rapid learning of the lens-grinding operation required for the manufacture of the Air Force bombsight which, until TWI's existence, was considered only a skilled craftsman's job.

Modifications of original TWI programs continue in use today at Lucas where, as in other firms, tribute is paid to TWI and examples of its benefits regularly quoted. There can be little doubt that it pioneered formal supervisory training in Great Britain and, although today, a case is being made for supervisory training schemes to be tailored to the needs of the individual, it will be a long time before TWI is superseded as the major training scheme, particularly for smaller organizations.

## TWI

### Supervisors and Trainers Trained By the Department

|                   |        |
|-------------------|--------|
| 1962-63 . . . . . | 5,719  |
| 1963-64 . . . . . | 7,250  |
| 1964-65 . . . . . | 9,200  |
| 1965-66 . . . . . | 11,750 |
| 1966-67 . . . . . | 14,500 |
| 1967-68 . . . . . | 24,250 |
| 1968-69 . . . . . | 29,000 |

On the 6th of May, 1969, when opening the third Industrial Training Exhibition and Symposium at Belle Vue, Manchester, England. Mr. Roy

Hattersley, Joint Parliamentary Under Secretary of State, Department of Employment and Productivity, had this to say of TWI: in “Supervisor”:

"TWI is Britain 's most widely used supervisor training scheme and has been sponsored and developed by my Department for almost a quarter of a century. During that time more than one million supervisors have attended courses and many of the largest firms, in the country have based their own comprehensive training schemes on TWI's foundations. In addition, 15,000 trainees have attended my Department's courses and subsequently repeated the programmes for supervisors in their own firms. For both these services the demand continues to grow. The number of supervisors trained has almost quadrupled over the last five years. The demands on the D.E.P. training services have increased sixfold over the same period.

These are improvements which must be maintained if the country is to achieve lasting prosperity, for our industrial training programmes are an essential part of our more general plans for building a strong and productive economy. They are irrevocably linked with our proposals for improved productivity."

## **A Special Report From New Zealand**

### **NEW CHALLENGES ENCOUNTERED**

In New Zealand, as well as in other countries in the South Pacific, over 6,000 miles from the U.S.A., TWI has been a success and almost every year since its introduction to this area of the world, it has attained new records in practical results achieved.

TWI came to New Zealand in 1947, shortly after the cessation of World War II, with the help of the British TWI Service which had successfully employed Job Relations, Job Methods and Job Instruction methods under great stress in war time conditions. As many ideas and suggestions as were applicable were used as guide lines, but many had to be discarded because of the different geographical and industrial conditions of New Zealand.

New Zealand has four main centers - Auckland, Wellington, Christchurch and Dunedin so separated geographically that they involved problems of transport and travel. New Zealand firms are usually small. According to New Zealand Department of Labour statistics, only 364 factories employ more than 100 workers and of these only 58 employ more than 500. Most large firms have branches in the main centers and in other provincial centers, so that firms are split up into small branches, each with a staff usually less than 50. Such problems as these presented organizational difficulties in attaining smooth functioning in TWI programs.

In its earliest days, besides being dependent upon and grateful to the British TWI Service, much reliance was put on use of the 1940-45 Report of the U.S. TWI Service and other material from the United States. With the help of these two agencies and with practical knowledge gained while training in England, plus a thorough understanding of New Zealand's unique problems, the first TWI program, Job Instruction, was launched. This was followed by Job Relations, Job Methods and Program Development. All four programs have been adapted to fit individual needs of industry, commerce, the professions and the Public Services of New Zealand. Because of this flexibility and universal application, TWI in New Zealand has engaged in a great variety of work.

One Annual Report of the Department of Labour, New Zealand, refers to TWI working "in a number of projects during the year, ranging from helping earn American dollars with New Zealand package meat to improving the quality of concrete pipes, reducing costs in clothing manufacture, training staff in banks, and reducing prices in retail grocery stores."

## HOW TWI FUNCTIONS IN NEW ZEALAND

Perhaps the most important thing in achieving desired results in New Zealand is that TWI has developed a production technique rather than simply a training technique. It is a fully developed scheme whose objective is immediate results in terms of more work of better quality at lower cost and with better relationships on the job. It does this by making better use of available resources.

It was appreciated from the beginning that the TWI programs need to be followed up on the job to ensure successful results. The New Zealand TWI Service considers one of its most important achievements to be the way in which it has organized and developed follow-up on TWI and considers this one of the reasons for its success. New Zealand TWI Service found that "as long as it kept its eye on production results" everything else fell into place. Working along these lines over a number of years and experimenting with different methods led to the definition of "Four Tools of Follow-up."

### Four Tools of Follow-up:

1. Work through senior management by helping it formulate what are called Operating Plans - these plans make specific arrangements as to how the scheme is to be developed in the different departments of the firm how it is to be used, particularly the tangible objectives to be achieved: and provide the ways in which the senior management will give necessary help and facilities to the juniors so that they can make successful use of the scheme.

2. The personal coaching which is given to supervisors by TWI Trainers between sessions on each Program and afterwards on the job.
3. What are called TWI meetings - the coaching of supervisors in groups so as to economize time and effort.
4. The reporting of results and giving credit.

#### Follow-Up Assistants:

Tedious detail work in Job Instruction, Job Relations or Job Methods is performed by "Follow-Up Assistants" who are men or women supervisors or experienced workers with special aptitudes who are coached further by TWI. These are assigned to assist senior management and TWI trainers in following up all necessary operations.

#### Top Management Participation:

It has been found that the key factor in obtaining maximum results from TWI programming is the insight of top management into TWI. Since 1950 it has been insisted that top management itself come through the full 10-hour Program.

TWI has chosen to work only in those firms in which the top management executives are prepared to undertake this preparation. Extra units for top management were added to the Program relating mainly to organizing the scheme in the firm. Members of this group were helped to choose demonstrations of the use of Job Instruction, Relations and Methods of top management level. By taking this 10-hour Program, top management is equipped to set the pattern for the rest of the firm. In addition there were many discussions on what motivates top management. Out of this came the development of what was called the "Overall Scheme for

the Firm" and "Operating Plans." These were the basis for many of the future "projects" which TWI Service in New Zealand acknowledged with great pride.

In achieving the desired results from its TWI programming, top management of New Zealand firms employing TWI Service put to use the 5 principles originally set forth in the 1940-45 Report of the U.S. TWI Service. To these was added another principle from the Job Relations Program: Determine Objective.

One further method of facilitating TWI in-firm programming has been to organize a TWI Committee. This committee consists of members of top management who have been TWI trained and who act as a steering committee which studies results of TWI programs and guides their further development. Another objective of the TWI Committee is to decide the production programs where TWI can be used and authorize the help and facilities needed to use it.

The enthusiasm of organized top management in firms employing the TWI Service in New Zealand has proved most beneficial: in 1969, for example, the Service helped one firm's top management to codify its procedures at all levels in tendering for and carrying out overseas contracts involving many millions of dollars in overseas funds.

### Flexible Presentation:

After some experimentation with separate manuals for each of the many varied organizations utilizing TWI Service, it has been found most expedient to adapt the General Manual to fit the requirements of each particular group. The General Manual also provides a verbatim presentation which can be varied to appropriate conditions.

This "Flexible Presentation" has enabled TWI to enter successfully into every kind of activity and rapidly train TWI Trainers, not only in New Zealand, but in developing countries where English is spoken.

To further facilitate "Flexible Presentation" a number of Special Units have been worked out to present to groups where appropriate. Among these Special Units are the following: Developing Initiative, Writing Correspondence, Developing Judgment, Analysing a Physical Knack, Dealing With Workers Who Don't Know English, Putting Over Difficult "Key Points", Training in Interviewing, and Training a Salesman.

### Development of Post Institute Coaching

Over the years it has been found that the best way to perpetuate the use of TWI principles by those who represented their firms at the supervisory level at TWI Institutes was to help them become established in their particular firm. In order to do this additional help was needed after completion of Institute training. Each Trainer is given an extra week to practice Manual and Blackboard work While being coached by TWI Service Trainers. Following this, the TWI Service Trainer demonstrates with a group while the new Trainer observes and then the new Trainer takes his first group while the TWI Service Trainer observes and takes notes, giving suggestions for improvement.

### Quality Control

TWI in New Zealand maintains quality control of Trainers and this has been one of the main contributing factors to its success. Every Firm Trainer has quality control visits from Institute Leaders and Senior Trainers and no Firm Trainer is accredited unless he receives a certificate from

an Institute Leader showing he can conduct the TWI program to the Institute Leader's satisfaction. TWI Service Trainers must meet even more stringent requirements and are not given a certificate until they have reached even higher standards.

## TWI "PROJECTS"

From the development of Overall Schemes and Operating Plans came the idea of "projects" within the firm, e.g. the reduction of scrap by certain percentages. Later, these "projects" became industry-wide and then national, that is involving the Government in defining the objectives which can be better achieved with TWI help.

The success of this "project" idea can be illustrated best by quoting excerpts from reports of the New Zealand Department of Labour to the House of Representatives:

1955      "TWI has now been established in all the main centers. The practical results obtained on a country-wide scale in the Railways and the Post and Telegraph departments shows how TWI Service can be used as a coordinated team making a drive in the four main centres in any matter deemed of national importance. This machinery can also be used in the service of any private enterprise contributing on a national scale to production."

1960      "During the year the main feature was the further development of national projects giving selected industries the benefit of a concerted New Zealand-wide drive to help them in their contribution to the country's economy. These include the footwear industry, the woolen mills, groups of companies like The Federated Farmers Co-operative Wholesale

Federation which services primary industry, and the baking industry."

- 1965 "Following the recommendation of the Export Development Conference 1963 TWI has been helping to increase export earnings. In particular it has assisted in reducing costs and accidents and in improving efficiency and staff relations by:
- (a) the development of a national project in the Meat Freezing Industry
  - (b) the launching of another national project in the Transport Industry. This project is being developed in conjunction with the New Zealand Carriers Federation which, after exploring the various methods of training, selected TWI for its plan of training driver/trainers."
- 1966 In recent years TWI has organized several national projects - for example, in the Transport Industry where its driver/trainer courses have been described as very successful by the Carriers Federation and in the Meat Freezing Industry and the Woolen Mills. These projects in which leading organizations are participating are contributing materially to New Zealand's economy. Other national projects being organized range from farming to passenger transport, from electric power boards to assistance at the request of the Treasury, for the introduction of Decimal Coinage."
- 1968 Recent developments in TWI have increased its ability to assist in national development projects and it looks forward to playing its part in the further development arising out of the National Development Conference. It has organized na-

tional projects in industries like Meat Freezing, Transport, Woolen Mills, Electric Power Boards, Tourist Hotels; in Social Services like rehabilitation of the physically handicapped; in new industries like New Zealand Steel and in assistance to developing countries overseas."

## Stages of Development

In TWI Service in New Zealand 6 stages of development of the scheme within a firm have been identified. These are repeated with each TWI program.

- 1) The Appreciation Phase: The aim is to give insight to and to gain the interest of top management in TWI.
- 2) The Survey Phase: The aim is to help management survey the needs of the organization which TWI can meet and to tailor the overall scheme to fit the requirements of the concerned organization.
- 3) The Development Phase: In this phase the TWI Trainer develops the overall scheme and Operating Plans which have been submitted.
- 4) The Revision Phase: The overall scheme and Operating Plans are revised in the light of experience gained and the revised scheme is launched.
- 5) Integration: The revised and perfected scheme can now be integrated into the organization and real production results achieved.
- 6) Continuing Use: The aim is to insure the continuing beneficial use of TWI Service.

## Payment for Programs:

Unlike other New Zealand Government Services, TWI has largely covered costs by charging fees for its services. Although instituted as a free service, it now charges for Institutes and for the introduction of TWI into Trainer Firms. This charging of fees has proved acceptable to industry and has contributed greatly to the independence and success of TWI in New Zealand.

## TWI Newsletter:

A small magazine called "TWI Newsletter" has been developed. Its format is simple and it calls attention to some of the results achieved by TWI in industry and the Public Services in New Zealand. This little magazine travels all over the world.

## Some Examples of TWI results:

At the National Development Conference held in New Zealand in 1969 the following are some of the results cited:

N.Z. Glass Manufacturers Company used TWI to save \$16,000 on electric power.

E.S.&A. Robinson Ltd., Auckland, a flexible packaging and carton printing house, by developing the Job Instruction Program, saved \$22,000 per annum on one operation. This was accomplished when jobs were analyzed for instructional purposes and a fault heretofore unknown was uncovered.

In Wellington, Modern Plastics Ltd., Lower Hutt, during the period mid-February to mid-May lifted average weekly production from 18,000 yards of plastic-coated cloth to 26,000 yards (a peak of

40,000 yards was reached in one week) and scrap was reduced from 15.7% to 6.2%.

As a result of TWI Job Methods study in Canterbury, in Cyclone Industries (NZ) Ltd., a savings of 15% in the cost of manufacture was achieved in one of the firm's products of which the firm manufactures many thousands.

The TWI scheme is used extensively in New Zealand by both industry and the Public Services (or Civil Service). Officers of the Public Services were included in the first programs conducted and TWI has helped the Public Service Commission develop its Personnel Service into a Staff Training Branch. Working in the Public Service has meant that instead of dealing only with engineering and other manual work the TWI Service has also had to deal with clerical jobs.

One of the biggest Public Service projects has been in the Post Office with an employee complement of over 20,000. TWI Service was introduced with an Appreciation interview and subsequently Job Instruction and Job Relations programs were put into effect, training many thousands of clerical workers. In the entertainment industry TWI programming was introduced to the Totalisator Agency Board (the organization in New Zealand which handles off-course betting on horse racing). Because horse racing is very popular in New Zealand the Totalisator Agency Board usually has a branch in even the smallest township. Significantly, TWI was able to reach quickly every branch of the organization and the General Manager stated that, as a result of the Job Instruction and Job Relations Programs, a permanent annual savings of over \$40,000 was achieved.

In late 1969, TWI made a Cost Benefit Survey of firms in New Zealand which have used TWI, asking what benefits had been obtained from

the scheme and to what extent these were commensurate with costs. An analysis of the first 100 replies showed overwhelming support of the scheme. Some typical comments were:

Mr. E. Chapman, General Manager of C.W.F. Hamilton & Co., Ltd., Christchurch, an engineering firm, internationally known as the inventors and manufacturers of jet boats: "We have over the years (15) derived considerable tangible benefits from the Job Methods Program, the savings too voluminous to enumerate. However, the main benefit to us has been the intangible results in the form of better human relations resulting from the Job Relations Program and the increased efficiency from Job Instruction. . . We consider the value of these results has far outweighed any costs from the use of TWI programming . . . "

Mr. Byron C. Lumsden, Managing Director of Cunic Industries Ltd., Wellington, a member of the Cubitt Wells Group of Companies, a well-known building firm: "Our product calls for a new approach to building and the TWI system has given us the opportunity to introduce these techniques here in New Zealand as well as to carpenters in Australia, New Guinea, Hong Kong, Taiwan, Korea, Tokyo, Singapore, Indonesia and Fiji. In Tokyo we are partitioning the New Zealand Embassy and use Job Breakdown sheets printed in Japanese. The contractor on the site reports no problems in assembling the walls. I think the expansion of Cunic throughout Australia and the Greater Pacific Basin has been aided immeasurably by using the TWI scheme. The costs have been infinitesimal as compared with the tremendous benefit achieved and most certainly we have achieved results more economically with the aid of TWI..."



**JRT IN VIETNAM**

**HUẤN-LUYỆN NHÂN-  
VIÊN QUAN-TRỊ**



**HUẤN-LUYỆN VỀ  
GIAO-TẾ TẠI VIỆC**

**HUẤN-LUYỆN  
để  
TĂNG NĂNG-XUẤT**

The Managing Director of another firm, Licensed Motor Dealers in the South Island, quoted: "It is with considerable pleasure we advise you of the benefits accrued to this Company in the past year as a result of participation in the TWI scheme. Although final results are not yet available it is now evident that this Company has achieved a turnover increase of approximately \$370,000 over last year with the same staff. This increase in sales has been achieved within our budgeted variable overhead costs. The main factor in achieving these results of improved efficiency and profitability has been the application of TWI principles and training. The cost is insignificant compared with the immediate gains obtained, not only in cash, but also in staff relations and general efficiency. The greater gain is the continuing benefit of TWI in future years."

General Foods Corporation (New Zealand) Ltd., Auckland:  
"The computer equipment we have installed has introduced a new concept into Data Processing and is one which requires extensive training of the staff at all levels. We believe that this is the first time TWI has been used in training of this nature and the degree of understanding the overall acceptance and success has been most gratifying."

Results achieved by TWI have been widely publicized in New Zealand through the press, radio, television, films, and in magazines and management literature generally.

### Assistance to Overseas Countries

TWI in New Zealand has been able to assist developing overseas countries. In 1961-62, at the request of the Western Samoan Government, two specially selected Samoan nominees were trained and upon their return to Samoa were accompanied by New Zealand TWI Service Trainers who helped them launch the scheme in their own country.

For five years, Mr. George Thorn, of the New Zealand TWI Service, helped develop TWI successfully in Iraq and Uganda.

In 1967-68 a number of South Vietnamese students attending university courses in New Zealand were given instruction and experience in TWI and propose to develop its use in South Vietnam.

### The Future of TWI in New Zealand

In 1969, the Cabinet Committee of the New Zealand government approved an increase in the TWI service staff of 25%. Inasmuch as "staff ceilings" are imposed by the Government on Government departments, and any requests for increase are carefully investigated, this approval speaks well of TWI service in New Zealand. In the future the TWI service will concentrate on extending the scheme geographically and stepping up the volume of work. Its present Superintendent (Mr. Adams) and Institute Leader (Mrs. Adams), who founded and developed the Service in New Zealand, are retiring from the Public Service and will found their own firm as TWI consultants. They will develop TWI intensively and in-depth, researching TWI both in New Zealand and overseas and thus contribute to its further development. This represents the expansion of TWI into a new dimension.



1944

**"THE FOUR HORSEMEN"**

|        |       |         |      |
|--------|-------|---------|------|
| Dooley | Dietz | Conover | Kane |
|--------|-------|---------|------|

## TWI People

### WHO'S WHO

The preceding chapters have briefly highlighted a fascinating story of how one idea -- the TWI idea - successfully changed the basic concepts underlying training to improve skills of supervision. Rarely would one expect to find drama in the seemingly dull facts and figures supplied by the statisticians in industry and commerce, yet it is there. And deeply involved in this drama are men of vision - pioneers, really, who planned and helped win the battle of wartime production and then went on to explore new channels leading to increased peacetime production. This book would not be complete if it failed to give credit to these outstanding people who, unassumingly and unstintingly, contributed their time, energy and ability to the TWI idea.

Forseeing the tremendous training task which lay ahead in June, 1940, Owen D. Young, then Honorary Chairman, Board of Directors, General Electric Company, suggested the idea of creating a Training Within Industry Service. This Service was, at first, made part of the National Defense Advisory Commission, headed by Sidney Hillman who later became Associate Director General of the Office of Production

Management and Director of its Labor Division. When the Labor Division was transferred to the War Manpower Board under Paul V. McNutt, TWI came under his jurisdiction. Brigadier General Frank J. McSherry was the liaison contact with the labor supply organization with which TWI was associated.

There were discussions about "who could launch such a program" and Morse Cartwright, head of the National Adult Education Association suggested Dooley of Standard Oil and Dietz of Western Electric both of whom had the type of industrial experience and previous government service which would be helpful in this kind of program.

The Training Within Industry concept really dictated the importance of getting experienced men, on loan from their companies, to organize, introduce and operate this nationwide program. Organized labor, too, cooperated throughout and an Advisory Committee was appointed which served throughout the war. This Committee consisted of representatives from both labor and management.

ADVISORY COMMITTEE ON TRAINING  
of the Labor Division  
O.P.M.

M.F. Burke,  
United Aircraft Corp.

C.S. Ching,  
U.S. Rubber Co.

E.C. Davidson,  
International Assoc. of Machinists.

Clinton S. Golden,  
Steel Workers Organizing Committee.

John Greer,  
Industrial Union of Marine  
and Shipbuilding Workers of America.

M.H. Hodges,  
International Brotherhood of  
Electrical Workers

R. Randall Irwin,  
Lockheed Aircraft Corp.

W.G. Marshall,  
Westinghouse Electric and  
Manufacturing Co.

K.F. Ode,  
The Falk Corporation.

Walter P. Reuther,  
United Automobile Workers  
of America.

E.J. Robeson,  
Newport News Shipbuilding  
and Drydock Co.

John E. Rooney,  
Operative Plasterers'  
and Cement Finishers' International Assoc.

## TWI'S WARTIME STAFF

### HEADQUARTERS ORGANIZATION

C.R. Dooley, Director

M.J. Kane, Assistant Director

J. Walter Dietz, Associate  
Director

William Conover, Assistant  
Director

### LABOR CONSULTANTS

L.A. Gappa

E.A. Larsen

### FIELD REPRESENTATIVE

Paul A. Mertz

### HEADQUARTERS REPRESENTATIVES

A.G. Blake

Herbert Kessel

John Calhoon

Glen McNeilly

Winston Cooper

John Mollers

Clifton Cox

A.E. Peterson

Herbert Doner

Virgil Rowland

Many secretaries, typists, accountants.

## DISTRICT DIRECTORS AND DISTRICT REPRESENTATIVES

| District | District Organization                                                           | Address           |
|----------|---------------------------------------------------------------------------------|-------------------|
| 1        | Harry H. Kerr, District Director<br>H.K. Bragle, District<br>Representative     | Boston , Mass.    |
| 2        | A.E. Whitehill, District<br>Representative                                      | New Haven, Conn.  |
| 3 & 4    | Sterling Mudge, District Director<br>R.E.Collin, District<br>Representative     | New York, N.Y.    |
| 5        | Glenn Gardiner, District Director<br>Arthur H. Myer, District<br>Representative | Newark, N.J.      |
| 6        | H.W. Jones, District Director<br>John Convery, District<br>Representative       | Philadelphia, Pa. |
| 7        | James H. Kahlert, District Director<br>George Papin, District<br>Representative | Baltimore, Md.    |
| 8        | George G. Arthur, District Director<br>George Papin, District<br>Representative | Raleigh, N.C.     |
| 9        | A.S. Hotchkiss, District Director<br>A.J. Speer, District<br>Representative     | Atlanta, Ga.      |
| 10       | Paul Mooney, District<br>Director                                               | Cincinnati, Ohio  |
| 11       | C.S. Coler, District<br>Director                                                | Pittsburgh, Pa.   |

|    |                                                                                   |                       |
|----|-----------------------------------------------------------------------------------|-----------------------|
| 12 | Oscar Grothe, District Director<br>L.O. Mellen, District<br>Representative        | Cleveland, Ohio       |
| 13 | H.M. Jenkins, District<br>Representative                                          | Detroit, Mich.        |
| 14 | A.E. Sinclair, District Director<br>W.T. Murphy, District<br>Representative       | Indianapolis, Ind.    |
| 15 | M.E. Carlson, District<br>Representative                                          | Chicago, Ill.         |
| 16 | E.L. Olrich, District Director<br>J.H. Rothenberger, District<br>Representative   | Minneapolis, Minn.    |
| 17 | C.T. Cardwell, District<br>Representative                                         | St. Louis, Mo.        |
| 18 | Tracy T. Word, District<br>Representative                                         | Houston, Texas        |
| 19 | George M. Kirk, District Director<br>A.E. Lawrence, District<br>Representative    | Denver, Colo.         |
| 20 | Garner A. Beckett, District Director<br>C.H. Fishburn, District<br>Representative | Los Angeles, Calif.   |
| 21 | Arthur W. Ford, District Director<br>Aylwin Probert, District<br>Representative   | San Francisco, Calif. |
| 22 | Walter Williams, District Director<br>L.H. Steels, District<br>Representative     | Seattle, Wash.        |
| 23 | Walter Williams, District Director<br>L.E. Hinman, District<br>Representative     | Portland, Oregon      |

## HEADQUARTERS TECHNICAL CONSULTANTS

Allen B. Gates

Eastman Kodak Co.

Louis Moore

U.S. Office of Education

Albert Sobey

General Motors Corp.

Goerge G. Via

Newport News Shipbuilding & Drydock Co.

Morris S. Viteles

Philadelphia Electric Co.

Bartley Whiteside

Wright Aeronautical Co.

Dooley, Dietz, Kane and Conover came to be known as the "Four Horsemen." Thomas G. Spates, Former Personnel Vice-President, General Foods Corporation, told of some of these men in his book, "Human Values Where People Work." He listed them among a small pioneering group contributing much to the establishment of the industrial relation function in management.

"Two professionals are linked together both by the coincidence of their names, Dietz and Dooley, and by the parallelism of their careers . . ."

Channing Rice Dooley was Purdue '00 EE. After graduation he was instructor in electrical engineering there for a few years, joining Westinghouse Electric and Manufacturing Company in 1902. He later became associated with Standard Oil Company of New Jersey and with Socony Vacuum Oil Company whose industrial relations manager he was when he went to Washington in 1940. In all these companies the planning and direction of training was part of his responsibilities.

He was 62 years of age when called upon by the government for this enormous assignment aiding defense contractors meet the increasing demands of war production. Dooley was a pioneer in education within corporations. He had founded a technical night school for employees of Westinghouse Electric. He was a member of the National Advisory Commission on Apprenticeship. As a Charter Member in 1914, he helped organize the National Association of Corporation Schools which eventually became an integral part of the American Management Association.

In 1946, after the close of World War II, he became the organizer of the TWI Foundation and served as its President until his death in 1956.

J. Walter Dietz was also Purdue '02 EE. Upon graduation, he joined the Western Electric Company and was continuously associated with that company except when on loan to the government for war time assignments. Spates notes in his book that Dietz held varying positions in personnel administration with Western Electric, including that of secretary of the Central Personnel Committee. One of the early (1923) statements dealing with supervisors' relationships with employees was issued under his guidance. At the end of the war, he joined Dooley, Kane and Conover in forming the TWI Foundation and became its president upon Dooley's death. Dietz has never retired. He is now Director of Research and Development for S.A.G.E. (Summit Area Gerontological Endeavor) in Summit, N. J., a non-profit organization devoted to the concerns of older members of the community.

Like Dooley, Dietz was also a Charter Member of the National Association of Corporation Schools and in 1917 was president of that organization.

In 1944, Dietz and Dooley were each awarded by Purdue University an honorary degree of Doctor of Engineering in Human Relations in

recognition of their corporation leaderships in industrial relations. They also shared the first award in Human Relations given in 1945 by the Society for the Advancement of Management.

Mike Kane was with the General Electric Company as a personnel manager before the first World War and afterwards went to the American Telephone and Telegraph Company as staff engineer on the training of supervisors, instructors, and conference leaders. After spending four and one-half years with TWI, Kane left to become director of industrial relations for the National Association of Manufacturers.

In 1946, when the TWI Foundation was organized, Kane became a Trustee. In operating activities he was vice-president in charge of research. In later years he has been basking in the Florida sunshine.

Bill Conover, a graduate of the University of Iowa, 1922, came to TWI from the United States Steel Corporation where he was Assistant Director of Industrial Relations. His previous industrial connections were as Assistant to the President, Philadelphia Gas Company, Training Director of the Western Electric Company, and earlier as a production worker with Lycoming Manufacturing Company. He left TWI in 1944 to join the General Cable Corporation as Director of Manufacturing, and later was Superintendent of Production for Carrier Corp. At the time of his death in 1961 he was President of the Gray Manufacturing Co. of Hartford, Connecticut.

Glenn L. Gardiner, Vice-President of Forstmann Woolen Company, directed the New Jersey District. His initiative and enthusiasm assisted in getting the nationwide J.I.T. program off to a good start. Fieldwork in the New Jersey District led to the development of the countrywide Job Instruction training program which could be given to a group of ten foremen in ten hours. The related "Instructors' Manuals" and "Institute

Guides" for training trainers were also developed. Throughout the years Gardiner, was also author of many management books and bulletins dealing with foremanship and supervision.

Working through national headquarters, Gardiner introduced and coached district men throughout the district headquarters. Kane and Conover developed the "Follow-Through" methods for quality control of the instruction.

Clifton M. Cox, along with Gardiner sensed the need for improvement of work methods at the job level. Cox, professionally trained as an industrial engineer worked with Johnson & Johnson and Rutgers Extension University. He, with a group of representatives from N.J. Industry, did the development and field trial testing before launching the program nationally.

Job Methods was not meant to be applied at a professional level; all the technicalities had to be left out. Through intensive field trials a 10-hour, 10-man program, similar to J.I.T. was evolved. Cox also conducted Methods Institutes for many districts.

Frances Kirkpatrick, a graduate of Ohio State University, did publicity work for Proctor & Gamble in Cincinnati prior to her coming to Washington. Skilled in writing, she worked as a headquarters staff member throughout the five years. Through her ability to organize materials she was useful in expediting development work by recording discussions and group meetings. Miss Kirkpatrick was principal producer of the "1940-1945 T.W.I. Report." After serving during the entire war period, she became secretary of the T.W.I. Foundation in Summit, N.J.

Herbert Kessell, a Purdue EE, after active organizing work in the Indianapolis District came to Washington headquarters. As a member of the field staff, he specialized in J.R. Institute Work.

After the war he joined the Foundation staff of field representatives and conducted Institutes for the "J" programs.

Albert G. Blake, a Lehigh graduate engineer, came to the Pittsburgh District with a background of selling in the technical appliance field. When he joined Washington headquarters he advanced the sales approach to management acceptance of the "J" programs.

After the war he became a Trustee of the Foundation. He is President of Minerals & Chemicals Corporation of America.

Paul A. Mertz of Sears Roebuck Chicago had been active in the Industrial Relations Association there. He was the original Chicago District Director. As a member of the Washington staff he was the Headquarter's National Representative working with District Directors and Representatives on personnel and organization problems. After the war he was in charge of salesmen training for Oscar Mayer Co.

Virgil K. Rowland was borrowed from Detroit Edison Co. He was the first successful user of the J.I.T. program for office workers. He organized and conducted institutes to launch a nation-wide program for Gen. Somervell's organization. He successfully launched and carried on the entire TWI program in the Hawaiian Islands. J.R.T. development work and quality control were part of his responsibility at Washington.

His several books in the field of management improvement and development have been widely used. His alma mater, Central Western University, in 1963 awarded him an honorary Doctor of Law Degree.

As Assistant to the Chairman of the Board of Detroit Edison he serves as the Eastern Representative in New York City.

From the beginning of the TWI effort, organized labor was represented and cooperated.

L.A. Gappa of A.F. of L. and E.A. Larsen of C.I.O. were associated with Washington headquarters. Their counsel was helpful in avoiding misunderstanding as new programs and methods were introduced.

Frank H. Perkins, a representative of the British Department of Labour, spent over a year (1942-43) as a member of the Washington headquarters staff. He shared in development work and joined in field work using the "J" programs.

His basic knowledge and skill proved to be not only valuable to the Department of Labour, but in coaching foreign representatives in the extension of the TWI techniques throughout Europe. After the war he was with Imperial Chemical Industries Limited. After retirement he again became associated with the British Labor Department as a consultant.

Elizabeth Huntington, M.A. a graduate in psychology and education, went to England, in 1944 to study educational methods. Learning of TWI she became an enthusiastic leader upon her return to New Zealand.

Robert Adams, M.A. LLB. of New Zealand, trained in psychology, fell in love with TWI methods and with Elizabeth Huntington while coaching his first TWI Institute. They were married and became the leaders in developing TWI in that country, and throughout the South Pacific.

For more than 21 years they have been the inspiration in TWI's progress in this part of the world. Bob and Betty, as they are better known, call TWI "A first precision tool from which other tools will be made."

Upon retirement in 1970, the Adams established a far-reaching consulting service. (See Chapter 6.)

## THE FOUNDATION PEOPLE

Through the years, at various times, the following were active in Foundation Work:

### TRUSTEES OF THE TRAINING WITHIN INDUSTRY FOUNDATION

C.R. Dooley, President

Director, Training Within Industry, World War II

Walter Dietz, Vice President

Associate Director, Training Within Industry. World War II

M.J. Kane, Vice President -- Research

Assistant Director, Training Within Industry. World War II

A.G. Blake

President, Minerals & Chemicals Corp.

William Conover

President, Gray Mfg. Co.

John Moninger

Asst. to the President, American Meat Institute.

C.H. Murray

Vice President, Armco Steel Corporation

F.W. Pierce

Director, Standard Oil Co. (New Jersey)

Joe L. Jessup

George Washington University, Washington, D.C.

H.E. Doner -- Operations Manager

R.J. Sheridan, Executive Vice-President

W.K. Opdyke, Asst. to the President

W.J. Vogler, Asst. to the President

Lawrence J. MacGregor, Treasurer

Theodore Muchmore, Asst. Treasurer

Frances Kirkpatrick, Secretary

Leona M. Lovejoy, Secretary

Isabel Dietz, Secretary

Field Representatives:

C.C. Atwood - Indiana

Ken Browning - Utah

J.B. Calhoon - Oregon

H.B. Edson - Chicago and Florida

Howard W. Fry - Pennsylvania

S.V. Johnson - Tennessee

H.B. Jones - Ohio

Herbert Kessel - Mid-West

A.M. MacKinnon - Canada

G.D. McNeilly - California

A.B. Woodward - N.Y. State

The four heads, Dooley, Dietz, Kane and Conover, of the Government TWI Organization incorporated the Foundation in 1946. The Board of Directors was chosen from interested representatives of member companies. As the work grew, several full time people were required to carry on at the Summit, N. J. headquarters, and throughout the country.

Mike Kane was in charge of development work and launched the Job Economics, Discussion Leading and Management Problem 'Solving programs.

William Opdyke was Assistant to the President and did promotional work. Organization of the annual Conferences was under his supervision.

Frances Kirkpatrick continued with the Foundation in the development work as she had done in Washington. She served as Secretary of the Foundation.

Richard Sheridan was in charge of sales and promotion. He came to the Foundation with a varied educational and industrial background and experience. He served as Foundation Executive Vice-President until his death in 1961.

Leona M. Lovejoy was office manager at Summit headquarters.

Herbert E. Doner, who had been on the Washington headquarters staff, became field manager of the Foundation activities and later in the middle west. He was resident representative in Chicago.

Harry Williams, Vice-President of Wilson & Co., while not a member of the Foundation staff became most useful in the Chicago area. His enthusiasm was a factor in the Foundation's success in the mid-west.

Many of the experienced program specialists either served the Foundation directly or worked through their own consulting organizations.

Channing Rice Dooley served as President of the Foundation until his death in 1956. In paying tribute to his contribution, the Trustees of the Foundation issued a booklet summarizing his philosophy of the relationship of training and education:

"His sound philosophy of the relationship of training and education to modern industry was the outgrowth of the rich life and business experience of Channing Rice Dooley.

An engineer by training, Chan Dooley was a teacher at heart, a friend and philosopher. His leadership and his opportunities for service were varied and world wide.

We who have been associated with him intimately through the years bear witness to his wholesome influence through government, industrial education, business and industry, his community and his home."

Walter Dietz, who had been Vice-President, became President after Dooley's death and has carried on since.

The Foundation is no longer doing active promotion and field work. The archives are being preserved and occasional national and worldwide inquiries are answered. It is planned to transfer the archives to an interested university for use in industrial relations and educational work.

## CONSULTANTS AND MISSIONARIES

At home and abroad, immediately at the close of the war, there was demand for continuation of TWI programs. Private industry and business wished to follow through on programs started during the war. In addition, government departments were receiving requests from foreign gov-

ernments to inaugurate the services in their countries. Agencies, such as International Corporation Administration, encouraged such cooperation.

It was quite natural, therefore, for some of the men from headquarters and districts to set up as private consultants to meet this demand. These men were not directly related to the Foundation but, by and large, continued to follow TWI 's proven techniques.

Herbert Doner, of the Washington staff, serving as western representative of the Foundation carried on in the mid west with private industries. For the Industrial Relations Center of the University of Chicago he prepared a "Manual of Procedure for Supervisors." He also got results through the Illinois State Chamber of Commerce.

Lowell A. Mellon, of Cleveland, organized T.W.I., Inc., Business Service Division. In addition to many clients in the United States he notably conducted programs in Japan.

A.M. MacKinnon organized the Institute for Supervisory and Personnel Development with headquarters in Toronto, Ontario, Canada. A contractual relationship was maintained for several years. A very comprehensive service was rendered.

Carl S. Coler, formerly of Westinghouse and TWI District, Pittsburgh, and Headquarters staff was called upon for services in Mexico, Turkey and Nepal. His influence has been Worldwide and these assignments were under the direction of the International Cooperative Administration of the U.S. State Department.

Ellen Arid started with the Minneapolis District office. As a professional nurse her services proved outstanding with hospitals. TWI Washington headquarters cooperated with the American Red Cross, Miss Arid

was loaned for a two year assignment to launch the program through the Indian Red Cross.

Cyrus Falconer, a TWI consultant, went to Indonesia. Previously, Lowell O. Mellon had, at the request of the International Cooperative Administration, sent three trainers to introduce J.L.T. and J.R.T. programs. They worked in Java and Sumatra for over a year.

Marcel G. Mouget and Etienne Bechet headed the operation of the Centre d'Etudes and D'Organisation in Versailles, France. The agreement with C.E.O. licensed the use of the TWI programs for which the Foundation received a fee. In order to insure the quality of the service, the Foundation trained and certified the competency of their staff to train others in carrying on the programs. This contractual relationship continued over a ten year period.

The consulting management service CEO also covers Spain and Portugal.

Captain Harry Ward was secretary of the Industrial Management Research Association with headquarters in London. While Captain Ward was not directly associated with TWI activities in England or the United States, he was in a strategic position to keep TWI techniques before key management people in England. He was a very effective missionary.

C.R. Dooley, as president of the Foundation, was the missionary extraordinary. His travels kept him in touch with work in France and throughout Europe.

A program initiated by International Labor Office at Geneva gave impetus to the spread of TWI into Italy.

In cooperation with foreign representatives of the oil industry, instruction manuals were translated into French and German. A series of special Institutes were conducted for foreign oil subsidiaries.

Visits to Israel, Holland and Sweden resulted in Art E. Lawrence going to Israel and John Clarkson, on loan from the Mutual Benefit Life Insurance Co., to Holland.

Much of the drama associated with postwar TWI lies in its efforts to establish adequate industrial training programs in several of the underdeveloped countries. Also, while rich in natural resources, such countries as Indonesia and Nepal lacked any organized attempt to promote the economy through the proper use of manpower and material. Wherever TWI was put to use there was considerable progress but it encountered many obstacles while trying to convince those in charge of the various industrial and commercial enterprises that a massive overhauling needed to be undertaken.

In 1962, Cyrus Falconer reported to Foundation Headquarters: "Indonesia is a land with many problems. When they obtained their independence in 1949 there were but a handful of trained people. Few doctors, lawyers, engineers were there and almost no one with management skill or know-how. How could they have had? The opportunities in education were few indeed.

Added to this was the internal rebellion constantly present after their war of independence. While the TWI team was there (mostly 1958-59) there were still relatively few areas safe for foreigners to travel -- particularly after dark. Then the dispute over West Irian (New Guinea) diverted a large share of their greatly needed foreign exchange into military expenditures. This country of 90 million people has no heavy industry; no

coal, iron or copper. Railroads and highways designed for the era of ox-carts are totally inadequate for industrial growth.

This, then, was some of the background in 1958. The Indonesian government knew they needed help, and among other programs requested TWI programs. Our government, through I.C.A. provided scope change. Under the direction of L.O. Mellen of Cleveland, Ohio, three TWI trainers went over to see what they could do to explain TWI to supervisors in this underdeveloped land. J.I.T. and J.R.T. programs ran for a year and a half JMT just a little less. The Institutes were conducted in a suburb of the hot humid capital city of Djarkta. The trainees selected all spoke English, but in various degrees of fluency. The follow-up was conducted in the shop, or Nice, of the trainee and this meant trips all over Java and occasionally Sumtra. Not only was there a language barrier, but a greater handicap was in arriving at common understanding of industrial terms.

They never heard of "lay -off", "merit increase", "job evaluation", "job description", etc. But surprisingly, the basic problems confronting Ali, the supervisor, were almost the same that Joe, in Detroit, has to face. Their "ground rules" are different, but the human problems are the same.

The groups translated the manuals in to basic Indonesian. Then, in many cases, the trainee had to re-translate into one of the 200 tribal languages in presentation in his area.

The groups were mostly young men -- a few young women - eager and enthusiastic. Each Institute took 7 weeks instead of the 1 week we know here, but their interest held firm. Drill was conducted in a few weeks in English, then in Indonesian. With the help of an interpreter, and by watching the blackboard work it was found fairly easy to follow the presentation. The group itself assisted each other with comments.

Then the group would scatter to their own cities and the trainer would visit each and check on the first three sessions given. This gave an opportunity to meet with top-management and explain the purpose and importance of the programs.

After three Institutes in each TWI program a Master Institute was given the ten considered most likely to succeed in carrying the program back to the people. Then Master Institutes were designed to prepare the trainees to conduct Institutes themselves to prepare more trainers to train an ever-widening circle of supervisors . . . "

And, on July 19, 1958, Carl S. Coler had written from Jakarta.

"The Nepalese like the TWI program. The net results are hard to measure. In many ways the Nepalese are more elemental than the people that Moses took out of Egypt about 4,000 years ago. The first wheels many have seen are on aeroplanes . . . "

And so it all has come about... Men and women of experience and good will, ideas, faith, teamwork, hard work, money, leadership, all combined to prove that back in 445 B.C. Sophocles was right...

*"... though you think you know it you have no certainty, until you try."*