Serial No. T-97

REPORT

on

APPRENTICESHIP SYSTEM

of

THE KEARNEY & TRECKER CORPORATION

West Allis, Wisconsin

December 1941

Prepared and published by:

Federal Committee on Apprenticeship
Division of Labor Standards
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The Kearney & Trecker Corporation
West Allis, Wisconsin

FOREWORD

by

Wm. F. Patterson
Chief of Apprenticeship

This report constitutes a description of a method used in the training of apprentices in private plants. It is issued in the expectation that interested groups or individuals will find it useful as a basis for study and comparison with their own and other existing apprenticeship systems. Companies desiring to have a similar survey made of their apprenticeship systems are advised to communicate with the Apprenticeship Section of the Division of Labor Standards, U. S. Department of Labor, Washington, D. C.

For more than 40 years the Kearney & Trecker Corporation has maintained an apprenticeship system, which for almost 25 years has operated in accordance with standards of apprenticeship approved by the Wisconsin State Industrial Commission. Candidates for apprenticeship are subjected to rigorous selective tests which are given only if the applicant has attended vocational school for a minimum of 4 weeks after high-school graduation. The apprenticeship program, which includes as one of its more interesting technical features a special routing procedure by which the more advanced apprentices train those who are less advanced, is looked upon by the Company as the most significant of its personnel training programs.

The report was written by Oswald L. Harvey, Technical Analyst, Apprenticeship Section, Division of Labor Standards, U. S. Department of Labor. We are indebted to George Havlista, Director of Industrial Training at the Kearney & Trecker Corporation, for valuable assistance rendered in providing the information and data contained herein, and for his advice in reviewing and editing the text.

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KEARNEY & TRECKER CORPORATION

West Allis, Wisconsin

The apprenticeship system at the Kearney & Trecker plant just outside Milwaukee was originally established in 1901, and has been maintained continuously with only two major changes since that year. The first change occurred in 1927 when the program was reorganized and placed under the direction of the Employment Manager. The second change took place in 1940 when, because of the importance of the apprenticeship program, that official was assigned the job of training only, thus raising the status of apprenticeship to one of major importance in the Company's personnel training program. As will be shown later, these improvements have been of marked significance.

The plant is located in one of the great metal trades centers of the United States. It manufactures milling machines and necessary attachments. The apprenticeship program is approved and conducted in conformity with standards recommended by the Wisconsin State Industrial Commission, which in turn is approved by the Federal Committee on Apprenticeship.

The Company's purpose in training apprentices is to develop highly skilled craftsmen, keymen, and executives.

Administration and supervision

The apprenticeship system is under the control of the Director of Industrial Training, who is responsible directly to the President and General Works Manager. The Director has the authority, subject to approval by the State Industrial Commission, to decide how many apprentices shall be employed, and the terms and conditions of

their employment and training. He decides the qualifications which candidates shall meet for admittance to apprenticeship, where they shall be located in the plant after employment, and the manner in which they shall progress through the various processes prescribed in their indentures. He handles all disciplinary problems, sets up the training course, supervises weekly apprenticeship classes held at the plant, and maintains comprehensive records on the apprentices under his charge.

The personnel of the Training Department consists of the Director of Industrial Training, an Assistant Director of Industrial Training, a secretary, and an assistant secretary. Assistance is also given by foremen, assistant foremen, and utility apprentices.

Apprentices

As of November 1941 the Company employed 198 machinist apprentices, 1 patternmaker apprentice, 1 electrician apprentice, and 17 college engineering students on a corporation basis. These "cooperative" students are usually hired in pairs, so that one may attend school while the other works in the plant. Their program is alternated every 4 weeks to give them theoretical and practical experience. Drafting apprentices are chosen from the group of machinist apprentices who have completed 2½ to 3 years of the apprenticeship course and are students in the 5-year Evening Technical Course.

Admission requirements (See exhibits C and D)

Any young man between the ages of 18 and 22 can qualify for an apprenticeship, providing he is a high-school graduate and continues his studies, after graduation, by day or evening attendance at any college, university, university extension, correspondence school, or local trade or vocational school, and studies subjects related to the trade which he wishes to follow. When he has

completed 4 weeks of such school attendance he reports to the school office and obtains a written statement verifying his attendance and listing the subjects that he has taken. He brings this statement, together with his high-school diploma and birth certificate, to the Training Director, who assigns a date for the tests which will determine his qualifications.

These tests, prepared by the Training Director, are both oral and written, and cover items on scale-reading, micrometer-reading, mechanical drawing, and mathematics. The applicant is also required to submit a written composition on what he has done since grade-school graduation, and why he wants to become an apprentice at the Kearney & Trecker plant. The examination consists of two parts, one completed at the plant, and the other at home. Applicants from distant towns are canvassed and tested by the local school authorities in cooperation with the Company. Only if they satisfy all of the requirements are they called in to Milwaukee for personal interview. Both tests cover the same general fields of knowledge. Because of the confidential nature of the tests, they cannot be reproduced here. The material will, however, be sent upon request directly to any industrial plant, providing the request is signed by the president of that plant, and addressed to the Kearney & Trecker Corp.

At present about 10 percent of the applicants obtain sufficiently high grades. Only those with the highest ratings on the tests are employed by the Company. No other factor is given prior consideration.

Terms of apprenticeship

All apprentices are employed under written indentures according to the form prescribed by administrative regulation of the Wisconsin State Industrial Commission. The indenture provides for a term of 8,320 hours, a workweek of 40 hours, and at least 576 hours of related

school instruction to be included as part of the total hours of apprenticeship. The probationary period is 3 months, after which indentures may be cancelled only with the approval of the State Industrial Commission. On the completion of apprenticeship, each apprentice is presented with a cash bonus of $100 and a State Certificate of Completion of Apprenticeship, presented by the employer in cooperation with the State Industrial Commission. The apprentice-graduate is also provided with a pocket-card testifying to the fact that he has completed his apprenticeship.

Shop training and work schedules

All apprentices in the machinist trade receive the same course of instruction, as follows:

Work process	Months (approximate)
Drill press	1 to 3 months
Milling machines	6 to 12 months
Screw machines, lathes and boring mills	12 to 18 months
Grinding, planing, and slotting machines	12 to 18 months
Floor work and assembling	12 to 18 months

The period of time for each work process varies within broad limits to allow for individual differences in ability. Other variations are made for individuals: for example, the bigger apprentices are given the heavier tools to operate.

Training is given on the job, and all work done by apprentices is productive. Apprentices work for alternate periods of 4 weeks on the first and third shifts. With few exceptions they do not work on the second shift, as this work would prevent evening-school attendance.

The training on any given machine is not all given in a continuous period; it is deliberately broken up so that apprentices repeat their experience on various work processes at various times.

This practice of repetitive training, in the opinion of the Director of Industrial Training, yields more effective results in both accuracy and speed.

An unusual procedure is followed in routing apprentices so as to permit the maximum use of available equipment and to insure thorough training. Apprentices are shifted from one process to another, and job changes for all apprentices are posted every 4 weeks. In some cases the change is from one department to another, and in others it involves progression from one machine to another within the same department. In each department the apprentice progresses from a less advanced to a more advanced machine at 4-week intervals. This scheme is illustrated in exhibit E. The number of units varies from one department to another, but the same general scheme applies to all departments.

To eliminate idle machine-time while apprentices are attending their vocational day-school classes, there is in each group set-up one apprentice called the all-around man, whose duty it is to fill such vacancies. In a higher position than the all-around apprentice is the apprentice serving his last 4 weeks in a group set-up, who bears the title of utility apprentice. It is his responsibility to help break in the new apprentice, to look after the quality of work and the safety of the other apprentices in his group, to check the oiling of machines, the set-ups, and the time on production, to supervise first-piece inspection, and to maintain daily records of the work done. He also assists the foreman in his various duties and operates any machines which are idle because of the absence of regular employees. One apprentice on the third shift, the squad leader, is responsible for the supervision of the utility and all-around apprentices on that shift.

Each foreman is responsible for the supervision of training within his department. The utility apprentice assists him in this work. The Training Director and his assistant deal directly with the foreman when questions arise concerning methods of training.

Related instruction

All apprentices attend classes in related instruction at the local public vocational school one day a week on company time, for which they are paid at regular base rates. In addition, apprentices are required throughout their apprenticeship to attend school at least one night per week without pay.

Apprentices also attend, in three separate groups for one hour a week, lectures and discussions under the leadership of the Training Director, dealing with shop problems and, for senior apprentices, on foremanship. A movie projector, with films and sound attachments, constitutes a useful device in making these meetings instructive. A series of slides, including pictures taken throughout the plant, are also shown and discussed at these meetings.

Wages and incentives

The present basic wage scale for apprentices for each successive period of 1,040 hours is as follows:

Periods of 1,040 hours each	Cents per hour
1st	30
2d	32
3d	35
4th	38
5th	41
6th	45
7th	50
8th	55

The average apprentice rate for the 4 years is based on 50 percent of the journeyman rate.

No special wage rate is paid to exceptional apprentices, but all apprentices are placed on an incentive basis known as the "standard time incentive." According to this scheme the apprentice

can increase his earnings by completing his work in less than the specified time. In addition to the base rate and the incentive bonus, the apprentice, after 6 months of service, receives a profit-sharing dividend. Those apprentices who work on the second shift receive an additional 5 cents an hour, and those who work on the third shift receive an additional 10 cents an hour.

At the termination of his apprenticeship the apprentice is expected to find his own job. This fact is impressed on each apprentice from the day he begins his training course.

Records and reports

All apprentices are required to submit certain written reports to the Industrial Training Department, where they are checked and filed in individual folders. All the reports the apprentice has written during the 4 years of his apprenticeship are returned to him when he graduates. These apprentice reports include:

Daily all-around and utility report.—The all-around and utility apprentices report on the set-up and first-piece inspection of every job performed by each apprentices under their supervision.

Weekly report.—Every apprentice prepares a report together with free-hand sketches of the work he handles during the week.

Weekly scrap and progress report.—Every apprentice fills out a report on work scrapped. This is checked by the foreman who, at the same time, gives a qualitative rating on the apprentice's interest in his work, the quality and quantity of his work, and the apprentice's general qualifications (see exhibit F).

Day-school report.—The school provides the apprentice with a slip which must be signed after each class by the instructor in charge. This slip is submitted to the Industrial Training Department on the following day.

Monthly report.—On his monthly report the apprentice records the types of machine worked on, the department in which he worked, the kind of work he performed, the number of hours worked, and the time lost (see exhibit G).

Night-school report.—The night-school report shows the hours taken in each subject at the designated school. This report also must be verified by the teacher in charge of the class.

Efficiency report.—On this special chart the apprentice plots the time it actually took him to set up and produce each given job (see exhibit H).

Departmental compositions.—Two weeks prior to the date on which the apprentice is to leave a department he must submit a paper on his experiences within that department.

Tool and tool-box report.—At the time an apprentice is transferred from one department to another he must settle all tool charges with the Tool Crib, and have the contents of his tool box checked by his foreman.

Personality rating sheets.—Foremen rate apprentices in regard to specified qualifications before the apprentices leave their departments.

Personal-contact report.—The Director of Training personally contacts each apprentice, talks over training problems with him, and completes a report on the interview.

Disciplinary report.—This report is filled out and signed by the apprentice at the time he is interviewed on disciplinary problems.

Statistics

During the 40 years of its existence the Kearney & Trecker Corporation has hired 786 apprentices, of whom 258 have already graduated. (See exhibit A.) The turnover rate for this total period of time is 56 percent. Since the end of 1927, when the program was reorganized, however, it has been only 29 percent. Of all apprentices graduated since 1901, 75 percent were still employed by the Company in 1941. Available evidence shows a marked increase in the number of apprentices hired during the past two years.

The present distribution of apprentices by trade and by year of apprenticeship is given in exhibit B.

It is estimated that out of a total of 3,300 shop employees, the Company has 1,800 men engaged in skilled trades, of whom approximately 9 percent are apprentices.

Other training programs

Apart from the apprenticeship program, the Company has a 2-year specialized course for approximately 200 learners on single-machine operations. The present basic wage scale for these learners is as follows:

3 months... 45 cents
6 months... 50 cents
6 months... 55 cents
6 months... 60 cents
3 months... 65 cents

They are under the supervision of the foremen and the Training Director. This program, however, is entirely separate from the apprenticeship program, although learners may apply for admission to apprenticeship and are eligible if able to pass the required examination. If transferred to the apprenticeship program, they are given some credit for their previous experience with the Company.

A 3-year course is also offered to acquaint the college graduate with the organization and operation of the Kearney & Trecker Corporation. This period of training familiarizes the individual with general shop practices and processes. Similar to an apprenticeship, but not intended to train mechanics, this program educates college-trained men for jobs in maintenance, service, sales, or junior executive positions. It provides them with general experience, all practical in nature, enabling them to study the business of the Corporation. It serves to supplement their academic college work in that it combines practical application and knowledge with the theoretical work performed at school.

The course is divided into several parts, each having a definite purpose and sequence:

a. 6 months, general machine-shop practice.
b. 9 months, various milling machines.
c. 9 months, various assembling and erecting.
d. 3 months, various office departments.
e. 9 months, elective specialization.

a. Six months' general machine-shop practice.—This part gives experience dealing with the basic machine tools and processes. The tools and processes have been selected to provide a comprehensive knowledge of the manufacture of the Company's product. The length of time spent in each department is as follows:

2 weeks, radial drills
2 weeks, engine lathe
2 weeks, automatic screw machine
2 weeks, boring bars
2 weeks, planer
1 week, thread milling
1 week, thread grinding
1 week, external grinding
1 week, internal grinding
1 week, surface grinding
1 week, tool grinding
1 week, gears—hobbing
1 week, gears—shapers
1 week, gears—Gleason
1 week, gears—laboratory
2 weeks, cutter grinding
1 week, inspection crib
1 week, toolroom
1 week, heat treating
1 week, laboratory

b. Nine months' milling machine practice.—This part deals with production, emphasis on set-ups, types of cutters, speeds, feeds, chip load per tooth, and adaptability of various types and models of machines for certain classes of work. It includes work on various types of standard and special machines to familiarize the student with the Company's product. The types of machines and the time spent on each is as follows:

3 months, horizontal types
3 months, vertical types
1 month, simple and duplex types
1 month, bridge type
1 month, special boring machines
Table Department
Saddle Department
die miller

c. Nine months' assembling and erecting.—This part includes the various parts, units, and attachments, and the general assembly of complete machines, the work being divided as follows:

2 months, knee type assembly
2 months, bed type assembly
1 month, dividing head assembly
1 month, attachment assembly
2 months, Pre-Test Department
1 month, Final-Test Department

d. Three months' various office departments.—The purpose of this part is to acquaint the individual with general Company policies and problems.

e. Nine months of elective specialization.—This period is devoted to such classes of work as the management deems fit to strengthen the student's knowledge of the job he selects.

EXHIBITS

A. Apprentices hired, released, and graduated, 1901-41

B. Distribution of apprentices, October 1941

C. Application for employment

D. Entrance requirements

E. Illustration of routing procedure

F. Weekly scrap and progress report

G. Apprentices' monthly report

H. Apprentice efficiency report

EXHIBIT A

APPRENTICES HIRED, RELEASED, AND GRADUATED, 1901-41
AND GRADUATES EMPLOYED BY COMPANY IN 1941

Kearney & Trecker Co.
West Allis, Wisconsin

Year	Hired	Released	Graduated	On roll at end of year	Graduates employed by Company in 1941
1901	3	-	-	3	-
2	8	-	-	11	-
3	5	-	-	16	-
4	3	-	-	19	-
5	19	15	3	20	2
6	23	13	7	23	-
7	30	25	3	25	-
8	17	22	1	19	-
9	18	16	2	19	1
1910	12	10	0	21	-
1	11	9	3	20	2
2	20	16	2	22	1
3	17	14	3	22	1
4	6	5	2	21	2
5	17	11	3	24	1
6	18	9	5	28	1
7	18	14	5	27	-
8	12	13	1	25	-
9	20	16	7	22	3
1920	19	12	5	24	3
1	1	4	4	17	2
2	2	2	3	14	3
3	8	9	1	12	1
4	10	5	3	14	1
5	19	11	2	20	2
6	17	7	0	30	-
7	25	6	4	45	2
8	25	8	4	58	3
9	38	13	10	73	6
1930	18	4	13	74	10
1	4	11	15	52	13
2	0	2	5	45	3
3	0	1	4	40	3
4	0	2	10	28	9
5	32	-	18	42	17
6	35	2	9	66	8
7	45	9	3	99	3
8	1	1	12	87	12
9	41	3	20	105	19
1940	73	-	32	146	30
Nov. 10 1941	96	3	34	206	30
TOTAL	786	323	258		194

EXHIBIT B

DISTRIBUTION OF 200 APPRENTICES BY TRADE AND PERIOD
AS OF OCTOBER 31, 1941

(Each period represents 1,040 hours)

Trade	1st	2nd	3rd	4th	5th	6th	7th	8th
Machinist.....	44	54	32	25	23	13	3	4
Pattern-maker..	--	--	1	--	--	--	--	--
Electrician....	--	--	1	--	--	--	--	--

EXHIBIT C

KEARNEY & TRECKER CORP. APPLICATION FOR EMPLOYMENT

APR 12 1990880

DATE ..... 19.....

NAME IN FULL ..... WHERE BORN .....

ADDRESS ..... DATE OF BIRTH .....

TELEPHONE NO. ..... AGE IN YEARS .....

MARRIED ..... NUMBER OF DEPENDENTS .....

CITIZEN OF U. S. ..... IF NOT HAVE YOU FIRST PAPERS .....

HEALTH ..... HEIGHT .....

EDUCATION: State Rupture or other trouble WEIGHT .....

GRADE SCHOOL YRS. ..... HAVE YOU SERVED APPRENTICESHIP .....

HIGH SCHOOL YRS. ..... WHERE ..... HOW LONG .....

TRADE SCHOOL YRS. ..... WHAT IS YOUR TRADE .....

OTHER SCHOOLING .....

KIND OF EMPLOYMENT WANTED ..... WAGE EXPECTED .....

WERE YOU EVER EMPLOYED BY THIS COMPANY ..... WHEN .....

Last Employers	Position Held	Wages	Years Employed	Date of Leaving

ARE YOU NOW EMPLOYED ..... WHERE ..... WAGES .....

WHO SENT YOU HERE FOR EMPLOYMENT .....

NAME OTHERS EMPLOYED HERE .....

I HEREBY WARRANT ALL STATEMENTS TO BE TRUE AND ACCURATE.

Form 262 1500 2-40 SIGNED .....

EXHIBIT D

KEARNEY & TRECKER CORPORATION
APPRENTICESHIP TRAINING

By

GEORGE HAVLISTA
Director of Industrial Training

Entrance Requirements

Since you are interested in becoming an apprentice at the Kearney and Trecker Corporation, the following data should prove beneficial to you.

Any young man between the ages of 18 and 22 can qualify for an apprenticeship, providing he is a high school graduate and continues his high school work or studies after high school graduation at any college, university, university extension, or correspondence school, Boys' Technical Trade School, Milwaukee Vocational School, West Allis Vocational School, or any local trade or vocational school, day or evening attendance taking those subjects that are correlated to the trade the applicant wishes to follow.

When the apprentice prospect has completed 4 weeks of such school attendance, he is to report to the school office and obtain a written statement verifying his attendance and listing the subjects he has taken. He is to bring this statement along with his high school diploma, and birth certificate to the Main Office of the Kearney & Trecker Corporation any day at 8:15 a. m. or 1:00 p. m. except Saturdays. At that time, the applicant will be given or assigned a date to take the test that will determine said applicant's qualifications. Only those applicants who are best qualified will be placed on the preferred list as eligible applicants for an apprenticeship.

The tests, oral and written, are composed of scale reading, micrometer reading, mechanical drawing, and mathematics.

An applicant who has taken the test and has not been called to report for work within a period of 4 months will be given an opportunity to take a re-test providing he is still attending school and presents another school statement verifying his attendance. Applicants who have discontinued their school attendance after the test are disqualified.

When the applicant reports for his test, he is also to present a composition on what he has been doing since he was graduated from grade school to the present time, including high school starting date, how vacation time was spent, high school graduation date, dates of jobs, date of starting attendance at day or evening school after high school graduation. The essay should be completed with remarks on "Why I Want to Become an Apprentice at the Kearney and Trecker Corporation."

Drafting apprentices are chosen from the group of machinists who have completed two and one half to three years of the apprenticeship course providing they are students in the Five Year Evening Technical Course and promise to complete it.

EXHIBIT E

ILLUSTRATION OF ROUTING OF APPRENTICES THROUGH A GIVEN DEPARTMENT INVOLVING USE OF ALL-AROUND MAN AND UTILITY-SQUAD APPRENTICE

Kearney & Trecker Corporation
West Allis, Wisconsin

Assume that in the Lathe Department a battery of 4 lathes of different degrees of complexity has been set aside for the training of apprentices. At any given time 6 apprentices will be found assigned to these machines: 4 of them will be working at the machines; 1 will be serving as "all-around" or "fill-in" man during the successive periods these 4 boys are attending school; and 1 will be in charge of the group as "utility" man.

The composition of the group changes every 4 weeks: a new boy is brought into the group; each of the other boys has been shifted upward to a lathe demanding more complicated work; the boy who was formerly working on the most complicated lathe is now the "all-around" or "fill-in" man; and the former "utility" man has gone to a different department or section.

The scheme may be graphically represented as follows:

Assignment	4-week periods					
	1st	2nd	3rd	4th	5th	6th
Lathe No. 1.....	A	B	C	D	E	F
Lathe No. 2.....	Z	A	B	C	D	E
Lathe No. 3.....	Y	Z	A	B	C	D
Lathe No. 4.....	X	Y	Z	A	B	C
All-around or fill-in.....	W	X	Y	Z	A	B
Utility.....	V	W	X	Y	Z	A

Each apprentice is identified by a capital letter. Thus, when he first comes on the job, apprentice "A" is assigned to Lathe No. 1. He spends 4 weeks on each of the lathes (of increasing difficulty) until he becomes "all-around" man. During his last period, as the most experienced apprentice, he is in charge of the group. Note that, after 6 periods of 4 weeks each, the personnel of the group is entirely changed.

EXHIBIT F

KEARNEY & TRECKER CORPORATION
APPRENTICESHIP TRAINING

By

GEORGE HAVLISTA
Director of Industrial Training

WEEKLY SCRAP & PROGRESS REPORT

Clock No. 73-25

Week Ending November 10, 1939

Name John Berg

Date	Dept. No.	Waste No.	Order No.	Part No.	No. of Pcs.	Reason	Cost $	Foreman's Signature
11/6	27	33745	34	11878	1	Chuck not exctly in slot.	1.74	John H. Jones

A weekly scrap and progress report must be handed in at the end of every week by each apprentice and is to be signed by his foreman.

Remarks by Foreman None

JOB INTEREST		MENTAL QUALIFICATIONS		QUALITY OF WORK		QUANTITY OF WORK	
Steady Worker	X	Intelligent	X	Excellent Workmanship		Good Producer	
Average Worker		Good Judgment		Good Workmanship	X	Average Producer	X
Lacks Interest		Common Sense		Fair Workmanship		Fair Producer	
Loafs		Poor Judgment		Poor Workmanship		Always Behind	
Check One:		Check One:		Check One:		Check One:	

Length of time in department 9 weeks **Remarks** Generally speaking, workmanship is good

Signed by foreman John H. Jones

FORM 140 1M 5-40

EXHIBIT C

Apprentices Monthly Report

KEARNEY & TRECKER CORPORATION

Name John Berg Employment No. 78-25 November (MONTH) 19 39

Date	Type of Machine	Mach. No.	Hours Worked	Time Lost	Class of Work Performed
1	Dept. 62 Inspection		8		Final inspect small gears
2	Dept. 62 Inspection		8		Roll spur gears and check C. Dist.
3	Dept. 62 Inspection		8		Check spur gears for runout
4	Dept. 62 Inspection		8		Roll gears, checked small parts
5					
6	Dept. 12 Shaper		8		Cut spur gears on gear shaper
7	Dept. 12 Gears		8		Cut spur gears on shaper
8	Dept. 12 Gears		8		Cut spur cluster gears on shaper
9	Dept. 12 Gears	997	8		Cut straight bevel gears on Gleason
10	Gleason Generator	997	8		Cut bevel gears on Gleason Generator
11					
12					
13	Dept. 12 Gleason	997	8		Learned to set-up Gleason Generator
14	Dept. 12 Gleason	997	8		Set-Up Bevel Generator and cut gears
15	Dept. 12 Gleason	997	8		Cut bevel gears (straight) finished
16	Dept. 12 Gleason	997	8		Finish cut straight bevel gears
17	Dept. 12 Gleason	997	8		Finish cut straight bevel gears
18	Dept. 12 Gleason	997	8		Finish cut straight bevel gears
19					
20	Dept. 12 Gleason	997	8		Cut bevel gears
21	Dept. 12 Gleason	997	8		Cut bevel gears
22	Dept. 12 B. C. Hobs		8		Learned set-up on Barber-Colmans
23	Dept. 12 B. C. Hobs		8		Learned set-up and cut Spiral Gears
24	Dept. 12 B. C. Hobs		8		Cut spur gears (Pump and spiral)
25	Dept. 12 Gear Test		5		Rolled gears for run-out
26					
27	Dept. 12 Gleason		8		Re-cut bevel gears returned by Milw. Gear
28	Dept. 12 Gleason		8		Cut bevel gears and spur gears
29	Dept. 12 Gleason		8		Bevel gears cut; also cut spur gears
30	Holiday-Thanksgiving				
31					
			189	-	

REMARKS ON OTHER SIDE

EXHIBIT H

APPRENTICE EFFICIENCY REPORT

This form is spaced for 13 jobs and is filled out entirely by the apprentice before he starts each job. The apprentice calculates when the job should be completed.

Apprentices work on the same standard time per piece as mechanics, no special or extra time given to them. It is necessary for apprentices to attain accuracy and speed while learning the trade to enable them to compete with mechanics.

Date - When job was handled.
Part No. - Part number of workpiece.
Oper. No. - What is to be done on job.
Set-up - Time in hours allowed for setting up job.
Cycle - Time in hours allowed to complete one piece.
Pcs. - No. of pieces in lot.
Total hours - Time allowed to complete entire set-up and lot.
Actual hours - Actual time taken to complete set-up and lot.
Hours gained - Hours actually gained on allowed time.

Apprentice begins by placing a dot at "starting time." He draws a vertical line indicating "allowed set-up time." After adding "allowed set-up time" to "cycle time per piece" multiplied by the number of pieces, he has the "total allowed time" for the lot. He places another dot on the sheet to show this time. He now has a picture of actual time allowed for the lot including the set-up allowance and is ready to start the job with a mental picture of its time elements. The job is set-up and at the completion of the set-up, the apprentice places an "X", either before or after the vertical line, representing the allowed set-up. He thus can see if he has gained or lost time on the set-up. He now starts his lot pieces, for which he has an allowed or cycle time per piece in hours. He multiplies the cycle time by 60 to determine the number of minutes for allowed time. This results in a flat rate and pays no bonus. To make possible a bonus earning of 25 percent, the cycle hours are multiplied by 40; the result, in minutes, is the actual time required to make one piece equal to an increase of 25 percent of the employee's base rate.

The next step is to time the individual piece to determine whether or not the pieces can be made in the allotted time. If the pieces are being made in the allotted time, he is safe to go ahead, keeping his eye on that last dot on his chart.

If he does not complete the pieces in the allotted time, the "utility" apprentice of that department is called and the difficulty must be analyzed and solved.

At the completion of his job, the apprentice draws a horizontal line from the first dot to the time completed.

If he has gained on the job, there will be a space from the end of the line and the second dot. If he has lost time on the job, the line will be drawn beyond the second dot.

EXHIBIT E

APPRENTICE EFFICIENCY REPORT

KEARNEY & TRECKER CORPORATION

NAME John Berg

CLOCK NO. 78-25 DEPT. 27

1938

DATE	PART NO.	OPER. NO.	SET UP	CYCLE	PCS.	TOTAL HRS.	ACTUAL HRS.	HRS. GAINED	HRS. LOST
8/8	1034	70	0	.26	3	.78	.78	0	0
8/7	2164	20	.84	.14	32	5.32	3.5	1.82	0
8/7	2137	38	1.07	.083	15	2.31	1	1.31	0
8/7	9792	45	.61	.047	4	.798	.798	0	0
8/7	2173	35	.40	.087	25	2.57	2.60	0	.03
8/5	9831	40	1.05	.16	5	1.85	1.40	.45	0
8/5	1334	40	.63	.084	20	1.31	1.80	0	.49
8/5	9710	110	0	.135 .118	8	2.02	1.75	.27	0
8/4	1239	30	.74	.015	20	1.09	1.00	.09	0
8/4	1239	75	.88	.066	75	5.83	2.7	3.13	0
8/4	9938	70	.88	.066	75	5.83	4.3	1.53	0
8/3	11504	9	1.007	.05	100	6.007	3.	3.007	0
8/3				Apprentice Meeting					

TOTAL 35.76 24.62 11.600 .52