JOB EVALUATION

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PREFACE

The recent large increase in the number of industrial job-evaluation programs all over the world has created the need for a textbook to explain how such a plan functions under actual operating conditions. This book is written to satisfy that need. Our purpose is not to specify a ready-made job-evaluation plan, but to show how a typical plan works out in practice.

Time after time we have seen management and labor deadlocked over a job-evaluation problem which presented no real conflict merely because one or both parties misunderstood the simple basic principles involved. They did not understand the analytical nature of job evaluation; or failed to grasp the relationships between the evaluation system, the employees as individuals, and the company's organization structure; or they left out of account some necessary procedural step, either in the installation and current maintenance of the system or in arbitration methods. By describing the whole situation which develops from a typical job-evaluation plan, we have attempted to clarify the above points and many others which confront every industrial engineer, supervisor, and labor leader who deals with job evaluation.

In fairness to our present employer, the Boeing Aircraft Company, we wish it to be known that the contents of this book do not necessarily reflect the company's policy. The book is the result of our own analyses, and of our experience with many companies, of which Boeing is only one. However, if there had never been a desire for scientific management on the part of this company, very little of the detailed information that we have used would have been available to us.

Much constructive criticism by T. H. Clark and C. A. Stone, representatives of Aeronautical Industrial District Lodge No. 751 of the International Association of Machinists, has helped to assure us that the procedures we have finally presented are workable.

We wish to express our gratitude to Mr. J. H. Whitesel, industrial engineer, for his work on the appeal procedure; also to Mr. Paul Thorniley, labor coordinator at the Denver B29 Modification Center; Mr. Don Snelling, labor coordinator; Mr. Kenneth P. Ruggles, industrial engineer; Mr. Karl V. Sjoblom, industrial engineer; Mr. Robert V. Wright, critic; Howard Broten, artist; and B. F. Reno, Jr., for their invaluable assistance and comments. Special appreciation is extended to Helen Sather and Lois Delay, our secretaries, for their able and essential assistance.

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SEATTLE, WASHINGTON
March, 1946

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INTRODUCTION CHAPTER 1

"WHEN YOU CANNOT MEASURE, YOUR KNOWLEDGE IS MEAGER AND UNSATISFACTORY" . . . . . Lord Kelvin

EVERY human being wants recognition for his accomplishments. The industrial worker is no exception to this rule. He finds some recognition in the actual size of his pay check, but that is far from being the whole story. Even though his pay is high, he will not be happy if he feels that his ability is being wasted in an unsuitable job, or that the man next to him is being paid more for work that is no more important. If a company is small, or if its job set-up is simple and well established, the employer can adjust pay rates and fit people to the jobs from his own personal knowledge or through his personnel department; but in a big, complicated, rapidly changing industrial unit such as is fast becoming typical of our economic system these matters will get completely out of control unless a systematic procedure for job evaluation is adopted. The purpose of job evaluation is to find out exactly what each job is and to measure its true value in relation to all other jobs in the company. When this measure has been determined, the pay rates for all jobs can be established on the basis of equal pay for equal work, and employees can be fitted to jobs that match their individual abilities. When every employee knows that his individual qualities are thus being recognized, a large part of the company's labor-relations problem is solved.

It must be understood from the start, however, that job evaluation determines only *relative* pay rates, not the actual size of the pay check. A tool- and die-making job may be evaluated as having twice the value of a janitor's job, but the actual amount of pay is determined only when the basic wage, from which all pay rates are calculated, is settled. The basic wage is a separate matter and will not be discussed in this book.

Though job evaluation is designed primarily for the benefit of the worker, it also has specific value to management. Some of the ways in which it has definitely proved its value to the management of any large company are:

1. It provides definite, systematic, and factual data for working out wage and salary schedules.

2. It forms a scientific basis for discussing the relative worth of jobs in collective bargaining.

3. It helps to reduce excessive labor turnover by providing a logical basis for promotions and transfers.

4. It reveals duplicate and unnecessary activities.

5. It reduces troubles due to favoritism, either intentional or unintentional, by encouraging supervisors to think objectively about the jobs their people are doing.

Types of Job-Evaluation Plans

Because the use of job-evaluation methods is expanding so rapidly at present, job evaluation is often thought of as a brand new experiment. Actually many progressive companies have been using it for more than a quarter of a century, and certain definite procedures have become established. The systems that have proved the most practical are the job-ranking, the factor-comparison, and the point systems, all of which are briefly described in the following paragraphs.

Ranking System

This system is by far the simplest. All jobs are studied and written up. Then they are ranked in order of importance, as judged by the written descriptions. This method has been used by Talon, Inc., and many other companies.

Factor-Comparison System

This is a more complicated system. First, the elements ("factors") that make up the value of any job are carefully defined in writing. The factors usually chosen as being basic for all kinds of jobs are *skill required, responsibilities, effort demanded,* and *working conditions.* Next, twenty or thirty "key jobs" are selected. They represent all wage levels, and their wages are agreed by both management and labor to be fairly related to one another. Then the selected key jobs are written up, factor by factor. From these write-ups it is decided how much of the current wage for each job is being paid for each factor; for instance:

OVERHEAD CRANE OPERATOR

Skill	$0.51
Responsibilities	0.39
Effort demanded	0.19
Working conditions	0.26
Total present wage	$1.35

These factor breakdowns of the key jobs are used as a scale against which the money value of every factor of every other job in the company is measured. When the factor values thus assigned to a job are added, the sum represents the evaluated wage of that job under the existing basic-wage agreement.

The factor-comparison method has produced satisfactory results for the Atlantic Refining Company, Revere Copper and Brass, Inc., United States Steel, Shell Oil Company, Inc., and the California and Hawaiian Sugar Refining Corp.

Point System

The point system is based on the same job-measuring factors as the factor-comparison system, but the factor value of each job is arrived at in a different way. Instead of measuring the factor values directly against those of the key jobs, standardized point values are set for the different amounts ("degrees") of each factor that may be required by any job. The following example (though too much simplified for actual use) will serve to illustrate what is meant by "factor degrees":

SKILL FACTOR

First degree: Ability to read and write, plus up to 3 months' job experience	40 points

Second degree: Grammar-school education or equivalent, plus 3 to 6 months' job experience	80 points
(and so on, up to)	
Ninth degree: College education or equivalent, plus more than 10 years' job experience	360 points

(Note that in a point system, the point values for factor degrees do *not* represent dollars and cents.)

To evaluate any job by the point system, the point value of each factor (according to the degree required for that job) is set down. The point evaluation of the job is the total points for all factors. Example:

JANITOR

Skill, first degree	40 points
Responsibility, first degree	20 points
Effort demanded, fourth degree	60 points
Working conditions, second degree	30 points
Evaluated total	150 points

It will be noticed that the factors are weighted according to their general importance, each degree of skill, which is the most important, counting as 40 points, each degree of responsibility as 20 points, and each degree of the other two factors as 15 points. When the point values of all jobs are determined, the jobs can be fitted into a wage scale according to their total points. Many large companies have had successful experience with point-system job evaluation. Among these are General Foods, General Electric, American Telephone and Telegraph, Cheney Brothers, Wright Aeronautical Corporation, and Westinghouse Electric.

The system detailed in this book is a point system built partly around factor-comparison and job-ranking principles. The dollars-and-cents values of factors are established for key jobs as in the factor-comparison method. These values are then converted into corresponding degrees, measured in points, to which all jobs are fitted without immediate consideration of monetary values.

This system is based on the authors' combined experience with many companies. Its principal advantage is that, although it is anchored to current wage rates through the key jobs, its use of abstract points leaves the basic evaluations unaffected by future changes in wage rates. Experience has shown that this special advantage is obtained without sacrificing the virtues of the systems that are combined to gain it.

For maximum efficiency, a job-evaluation system must classify the jobs in such a manner that the employees can see a line of promotion ahead of them, or, if they are in jobs where promotion is not possible, lines of transfer to other jobs which do offer chances for promotion. Also, a system of merit raises within the established labor grades helps build morale and should be a part of the program. As the details of the system are described, it will be seen how conveniently it takes care of these requirements.

Comparison of Job-Evaluation Systems

Figure 1 shows the amounts of preliminary planning called for by three different job-evaluation systems: (1) a typical ranking system, (2) a typical factor-comparison system, and (3) the point system to be described in this book. For each, the point at which the plan is completed and the actual evaluation begins is indicated by the heavy black dividing line.

Note that the straight job-ranking system (1) needs no detailed plan. For this reason it is very efficient in an industry where the jobs are simple and different enough from one another so that the committee can keep them all clearly in mind at once.

The factor-comparison method (2) is shown to require a definite plan, but this plan does not include standard point ratings for each degree of each job factor. Therefore, to place the jobs in their proper labor grades the committee must balance the requirements of each job in the company against those of the key jobs. This individual handling of all jobs is very laborious and detailed work for a committee.

The point system (3) calls for a more complete plan than the other methods, but once the plan is established individual evaluators can go to work independently, each evaluating different departments, and all of them will arrive rapidly at fair and similar decisions by means of the standard point values. The chart should make it clear that this method will relieve the committee

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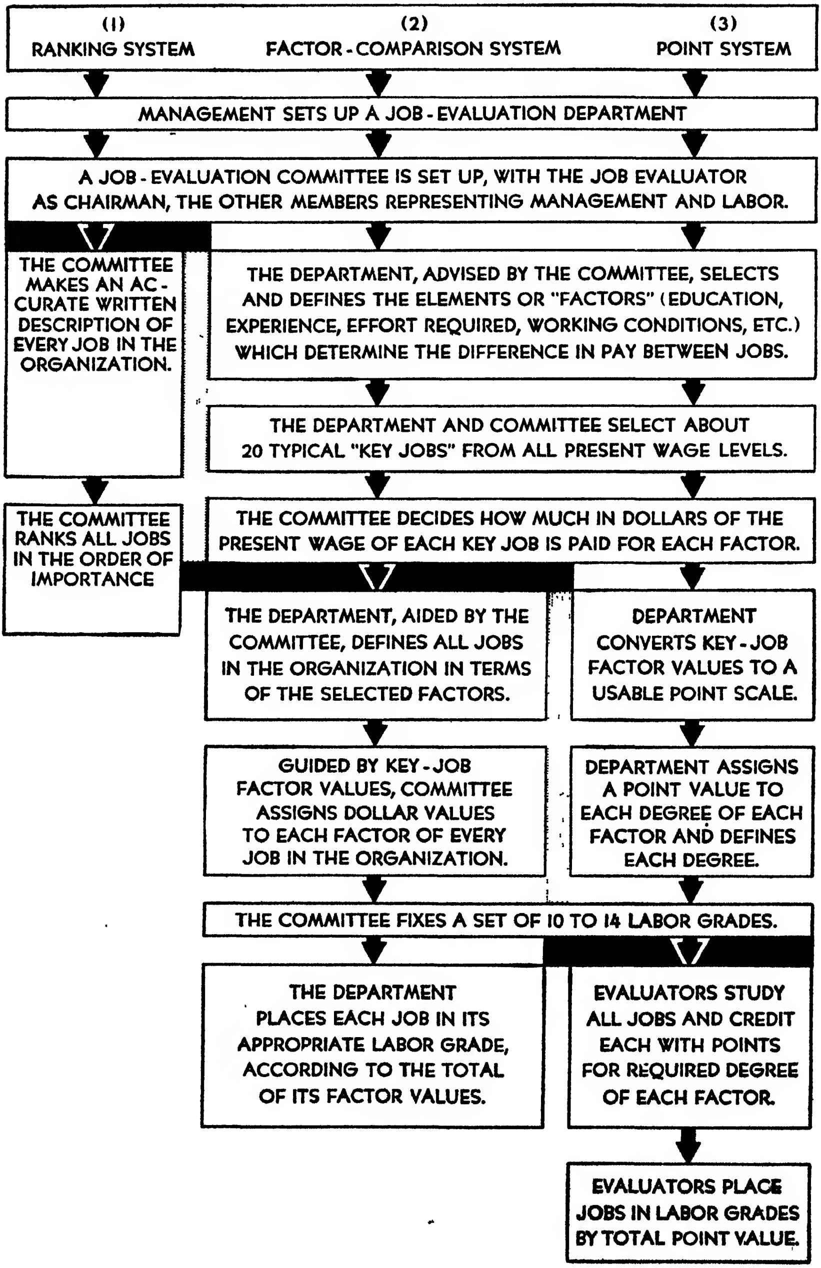


Fig. 1. Three job-evaluation methods.

of an enormous amount of detail when the company organization consists of a large and varied assortment of jobs.

Of the three systems shown in the chart, the last depends least on personal judgment to arrive at fair relationships. Even when this system is used, however, not only must the evaluators be keenly perceptive and experienced people, but also, as the detailed procedure will show, they must constantly check and recheck their decisions from every possible angle.

The first part of this book will follow the recommended procedures for establishing the plan, evaluating the jobs, and estimating the cost of the program in terms of increased payroll. Then methods for assigning workers to the jobs and maintaining the plan in efficient operation will be presented.

It will be noted that from this point on no mention is made of the other job-evaluation plans. It appears unnecessary to give detailed coverage of ranking, factor-comparison, and point-system job evaluation when all three are combined in the program described in this book. Close analysis of Fig. 1 will show how ranking and factor-comparison methods are combined with the point system to determine final factor points and labor grades.

CHAPTER 2

BUILDING A JOB EVALUATION PLAN

Organizing the Job-Evaluation Department

The job-evaluation department is the professional core around which the whole evaluation program will be formed. Since the department's evaluators will be dealing with matters of vital concern to every employee, their actions will affect the morale of the whole company during the changeover to the new system and its subsequent operation. To make certain that the effect on morale will be good and that production will not fall off, the evaluators must be chosen not only for their tact and ability to make unbiased judgments but also for their specialized education and experience in work closely related to job evaluation. They must understand industrial operations and organization. They must know the principles of objective analysis and the most efficient procedure for carrying out their decisions. In addition, they must have the perspicacity to foresee the practical results of their decisions. Carefully compiled data built around individual performance records reveal that all job evaluators must have the above qualifications; and even without statistical evidence the need for high-quality specialists is plain when one realizes that upon the work of these men rests the solution for the increasingly complex industrial-relations problems of modern business. Detailed write-ups of the requirements for industrial engineering jobs will be found in Chapter 7 ("Job-Evaluation Manual Write-Ups—Clerical and Technical"), as "Industrial Engineer A," "B," and "C."

By and large, these qualifications can be met best by graduate industrial engineers. But the department need not consist entirely of men with engineering training. Men with related backgrounds such as accounting, business administration, or economics may fit into the group. Also, a few men with long experience in the company are invaluable for their knowledge of its organization and policies, even though they have no specialized job-evaluation training. The nucleus of the department, however, should be composed of trained industrial engineers.

The industrial engineer is not, as is commonly supposed, merely a man who makes time studies. Although time study is one of the foundation blocks on which industrial engineering is built, the actual work of carrying it out is a semi-routine job, related to industrial engineering as drafting is related to civil or mechanical engineering. Taken as a whole, industrial engineering is the science of controlling large numbers of people in such a way that they can produce the greatest possible output in the least possible time with the least effort and the most satisfaction. In other words, it is the science underlying good business management.

In much the same manner as a mechanical engineer studies the behavior of gases to arrive at an efficient design for an internal-combustion engine, an industrial engineer studies human behavior to arrive at efficient methods for employing human energy. A job-evaluation program is one of these methods.

The department organization chart (Fig. 4) is typical for a large company. The same type of organization would be used by a smaller company, but the size of the department would be somewhat larger in proportion to the total number of employees, since the number of different jobs does not decrease in direct proportion to the number of people employed; the amount of evaluation work depends more on the number of different job titles than on the number of workers.

Note that the personnel of the department shown consists mostly of trained industrial engineers. The high percentage of men with special training partly explains why each evaluator can cover such large numbers of employees. Other explanations are the simplicity of the job set-up under this type of job evaluation and, perhaps even more important, the cooperation of supervisors and labor representatives in furnishing information. The last two explanations are well illustrated by the chart. The 2 men in Group 1 can cover 15,000 employees because the shops

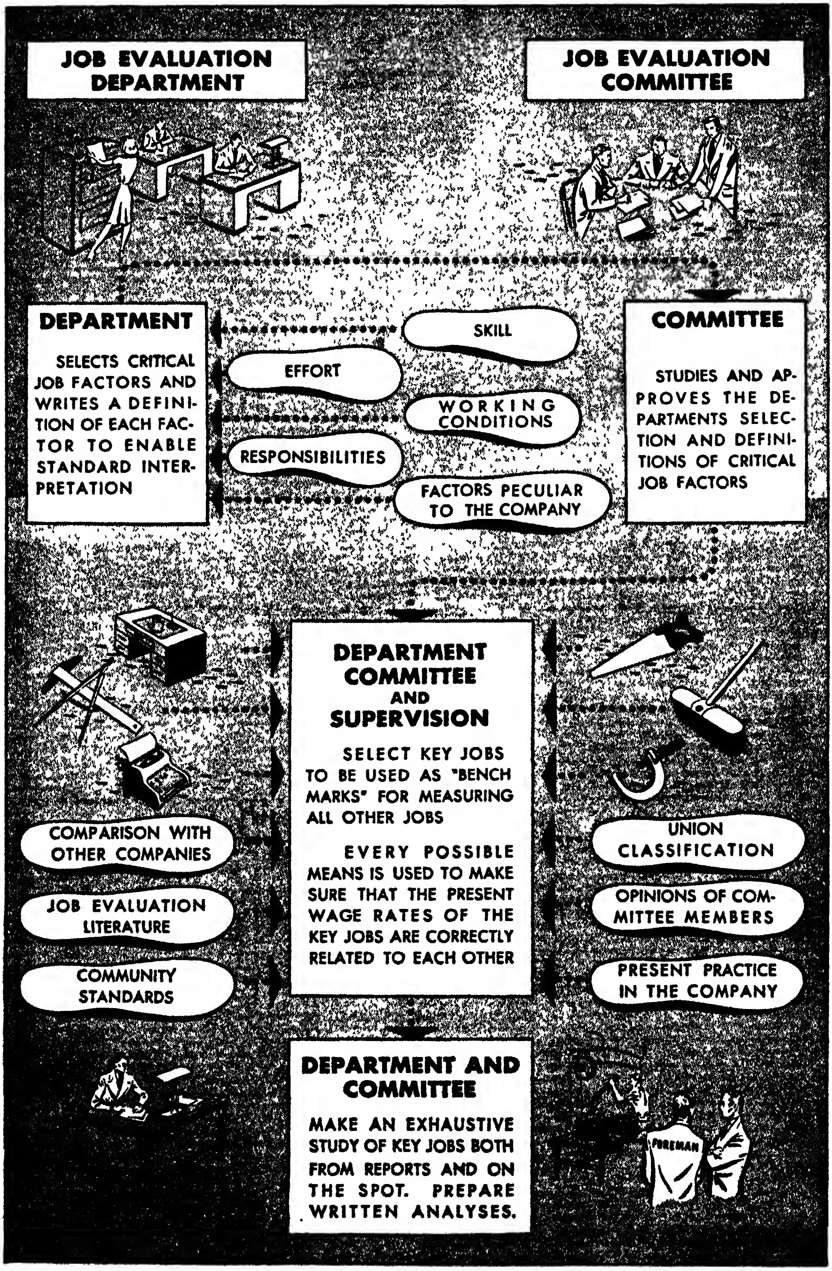


FIG. 2. Point-system job-evaluation procedure—factors and key jobs.

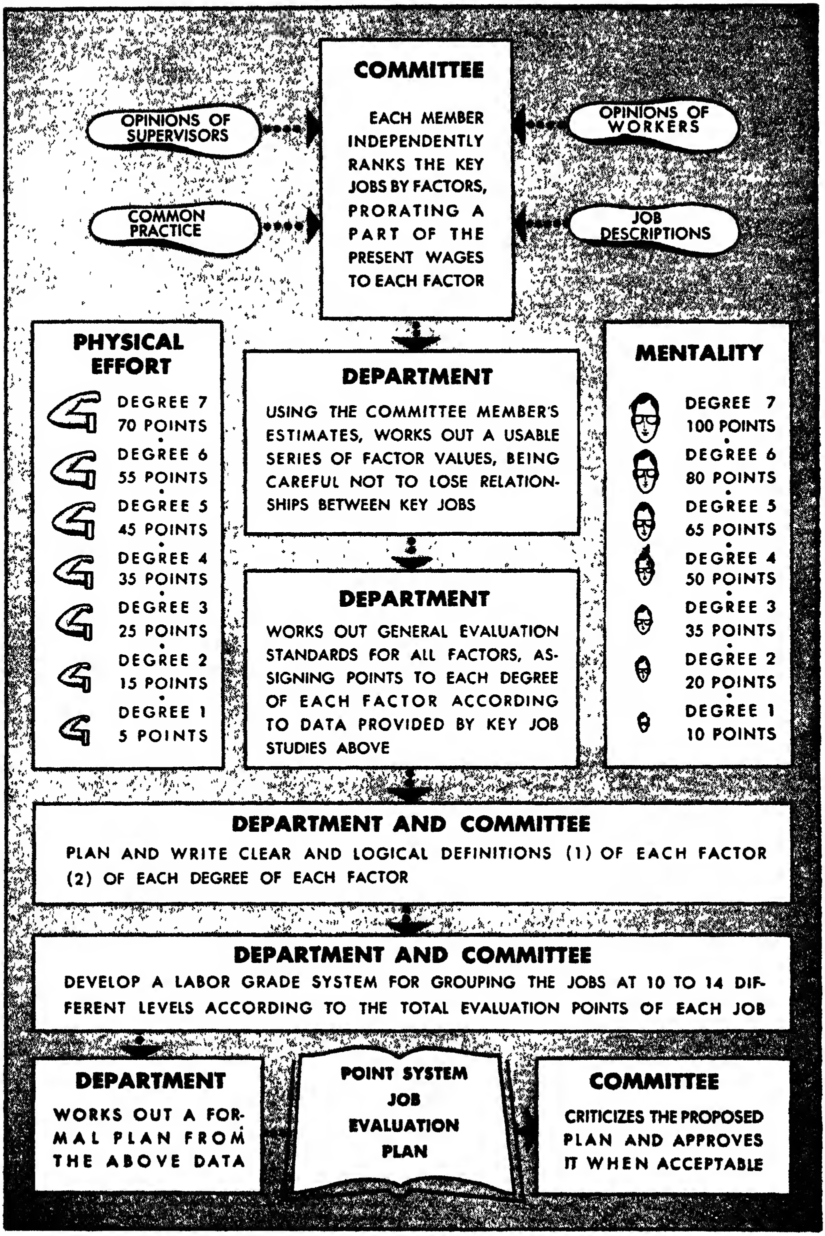


FIG. 3. Point-system job-evaluation procedure—assigning point values to complete the plan.

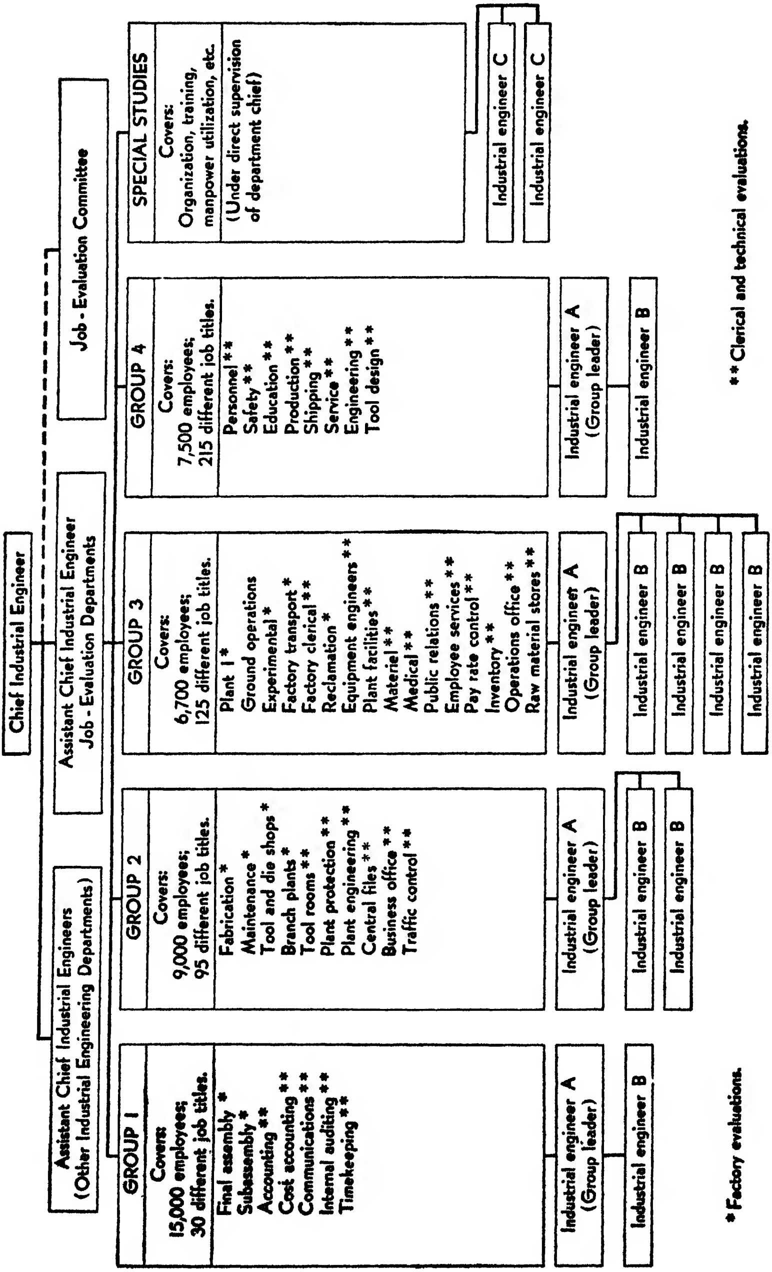


FIG. 4. Organization of a job-evaluation department.

concerned have a total of only 30 different job titles. Group 3 has to have more evaluators to cover a smaller number of people because of the more numerous job titles. Again, 2 men in Group 4 can cover more employees than the 5 Group 3 evaluators, in a still more complicated set-up, because Group 4 deals mostly with departments whose supervisors are used to administrative work and therefore able to cooperate efficiently.

The group organization of the department should not be as inflexible as it appears on the chart. There will be times, particularly while the jobs are being evaluated, when the whole department will be working together on jobs of one type or jobs in one large shop. The grouping is really planned less for actual job evaluation than for operating the system after it is in effect.

The department illustrated could develop a plan, evaluate the jobs, and assign the employees to them in a little more than 18 months; the time could be cut in half by increasing the department's man power. A department of the size shown, however, will suffice for supervising the operation of the plan once it is installed and in general will be more efficient if time is available for it to complete the preliminary work.

Organizing the Job-Evaluation Committee

As previously stated, the job-evaluation department must rely on management and labor for much of its basic information. In developing the evaluation plan, management and labor can cooperate best through a joint committee which is under an elected chairman, and which is advised by the chief industrial engineer. One half of the committee members should be selected by management and the other half by labor. Much of the responsibility for putting the plan into operation and making it succeed will rest on the department supervisors. For this reason the management members of the committee should be chosen for well-rounded representation of supervision throughout the plant. Top executives will not have enough time to spare; heads of small units will not represent wide enough sections of the company. Staff members of major departments, selected because their duties are closely allied to labor relations and because they have had long and varied experience with the company's operations, make the best committee members to represent management. The collective-bargaining agency or other organization which is to represent labor should choose its representatives with equal care. They should cover approximately the same groups of workers as the management representatives, so that full information from both points of view can be obtained in the event of controversial evaluations. Three to five members each, to represent labor and management, make a committee of workable size. All committee members should be chosen both for their sincere interest in the welfare of the employees and for their ability to think objectively in terms of the general good.

At the first meeting of the committee the chief industrial engineer, as adviser, will explain the principles of objective analysis and impress on the members that job evaluation is, as its name implies, unbiased analysis and comparison of the jobs themselves, not of the individuals or groups of people who hold the jobs; and that the requirements (factors) of each job must be analyzed without comparing that job to jobs in other departments. This is the only way to arrive at just, unbiased placement of all workers in the jobs that suit them best. He must make it clear that the committee is responsible for working out a system that will result in equal wages being paid for equal work. A committee that understands and works for these objectives will be making an important contribution toward good labor relations.

It is especially important for all committee members to realize that job evaluation is not (as supervisors tend to believe) a system for determining wages and hours, or (as labor representatives are apt to suspect) a means for justifying present pay rates by paper work.

The Plan

Since no single job-evaluation plan will fit all types of industry, the committee must select a plan and adapt it to the company. It is assumed here that the company is large and complicated enough to justify the choice of a point-system plan such as is recommended in this book. Such a plan may be available through a trade association or professional society. If so, it may be almost exactly what the company needs, requiring only minor adjustments to the particular customs and organizational features of the company, or to special conditions such as unusual hazards and special job relationships recognized by organized labor. On the other hand, there may be no plan in existence which even comes close to fitting the company. A plan will then have to be built up step by step, as described in the following pages. The plan described is built around factory jobs, which cover at least 90 per cent of the employees in most companies. Wherever the evaluation of clerical or technical jobs, which cover most of the remaining 10 per cent, differs from that for factory jobs, there are notes to explain the difference, and an example of a complete clerical-technical plan is presented after the typical factory plan. Neither plan includes information for evaluation of full-time supervisors or other high-ranking personnel.

Selecting Evaluation Factors

The first step in building a job-evaluation plan is to select the factors by which the value of all jobs will be measured. The factors selected must cover all aspects of all jobs, and they must be precisely defined. Otherwise the yardstick will be inaccurate and all further work will be wasted. Fortunately job factors have been so thoroughly studied and tested that there is a definite and solid body of information on which decisions can be based. Different companies and different plans tend more and more to adopt the same set of factors, as shown in Fig. 5 (farther along in this chapter), which illustrates the factors used in some of the more progressive evaluation plans. Differences are in precise lines of distinction or relative weighting rather than in choice of the basic factors. The four basic generally accepted factors (as shown on Fig. 5) are:

1. Skill.
2. Responsibility.
3. Job conditions.
4. Effort demanded.

The number of subdivisions into which these basic factors should be broken down is controlled by two practical limitations. First, if the number is too small, an error in estimating one subdivision will have an unduly large effect on the whole evaluation. Second, if the number of subdivisions is too large, they will overlap so that precise definitions cannot be written. In view of the first limitation, at least one basic factor must be subdivided. Usually "skill," which is the most important factor, is chosen, giving the minimum practically usable set of factors as:

1. Mentality (subdivision of skill).
2. Experience and training (subdivision of skill).
3. Responsibility.
4. Job conditions.
5. Effort demanded.

No successful plan has had more than 22 factors. From 8 to 11 has proved the most successful range for jobs with no supervisory responsibilities. From 11 to 13 factors may be necessary for jobs that do have supervisory duties definitely assigned to them. With more factors than this, it becomes necessary to distinguish between such similar qualities as initiative and judgment, which defy precise distinction.

Obviously, the general types of jobs in one company will vary from those in another. One kind of industrial operation may depend for its success on the presence of technically trained workers in most of the jobs; another operation may primarily require physical endurance of its people; and a third may involve particularly hazardous general working conditions. These differences should be reflected in the factors used for the company's job-evaluation plan, so that the evaluations will naturally tend to attract and encourage the type of workers the company needs. The following paragraphs indicate how, by different breakdowns of the basic factors, the special requirements of different companies can be emphasized. The breakdowns also show the wide difference in job requirements between factory and office work. The authors believe that separate evaluation plans for factory and office jobs are necessary for any company that employs a large number of clerical and technical workers.

Mentality

In most evaluation plans the mental side of skill is rated as a separate factor and is measured in terms of formal education or its equivalent. The requirement may range from ability to read and write to a Ph.D. degree. To distinguish it clearly from "experience and training" it may be considered the intellectual background the employee brings to the job as opposed to what he learns on the job. It includes knowledge of a craft, training in fields related to (but not directly in line with) the job under consideration, and study done in spare time or in evening classes as well as regular schooling.

Experience and Training

This factor, a second subdivision of "skill," includes all that the employee learns on the job, in a lower-paid job which leads directly up to it, or in a company training program. Experience and training is usually measured in terms of time. The requirement for a particular job is established by the number of weeks of practice that the average employee will need to develop the physical and mental habits required for doing the work and making decisions—in short, the time it takes to reach full production. The standard measurement must be based on actual learning time, not on emergency conditions such as rapid labor turnover, which may require the advancement of employees to new jobs before they have learned their old ones. Conversely, the time employees spend in their jobs after they have learned them, whether because turnover in the jobs ahead is slow or for any other reason, must not be added to the "experience and training" factor.

Complexity of Duties

This is a third possible subdivision of the "skill" factor. The complexity of the duties in a job is here assumed to measure the degree of creative ability or general intelligence that it requires. In some evaluation plans this factor has other names—initiative and ingenuity, aptitude, analytical requirement, etc. It is very intangible and difficult to define, yet also very real. It may be defined negatively as that kind of skill which people cannot consistently acquire through education or experience.

Supervision Received

In office work, and technical work such as engineering, it may be advisable to add a fourth subdivision of "skill," which rates the extent to which the job requires work to be done in the absence of direct supervision.

Responsibility

Every job requires the employee to accept some responsibility beyond merely getting his work done satisfactorily. It is this extra responsibility requirement that makes up the basic evaluation factor. Responsibility may be inherent in the job, or it may be assigned by management. An overhead craneman's responsibility for not dropping his load where it will endanger people or property is inherent in the job; the signalman who tells the crane operator what to do has this responsibility assigned to him. Because of the basic difference between these two types of responsibility, it is recommended that two subdivisions should be set up as separate factors in factory evaluations. These subdivisions are "responsibility for supervision" (assigned responsibility), and "responsibility for results" (inherent in the job).

In clerical and technical jobs, individual employees carry a heavier load of responsibility than people in factory jobs. To account for these extra responsibilities, the following breakdown is recommended:

RESPONSIBILITIES

(Clerical and Technical Jobs)

1. Errors.
2. Contacts with others.
3. Confidential data.
4. Character of supervision.*
5. Scope of supervision.*

* These factors apply only to employees who have definite supervisory duties.

Responsibility for Results

(Used as a single factor in factory evaluations only.) This factor is most conveniently measured by the possible cost in money of mistakes or neglect by the person who holds the job. These costs may consist of wasted material, spoiled products, damaged equipment or machinery, loss of time from production hold-ups, or injuries to the worker himself or to others. The possible loss may consist of many small items, like replacement of poorly driven rivets; or it may be in terms of large but infrequent occurrences like the scrapping of large assemblies because a jig is inaccurately built. Responsibility for results does not include responsibility for losses that cannot be controlled by the worker, or normal losses that cost more to avoid than to allow.

Responsibility for Errors

(Used as a separate factor for clerical and technical jobs only.) Obviously a bad mistake in engineering design or in a cost estimate can seriously affect any company. Since designs and estimates are built out of data furnished and transmitted by many employees, of all ranks, each employee has some share in this responsibility.

Responsibility for Contacts with Others

(Used as a separate factor for measuring clerical and technical jobs only.) This factor is used to appraise the extent to which the employee will represent his department to other departments, and particularly the extent to which he will represent the company to outsiders.

Responsibility for Confidential Data

(Used as a separate factor for clerical and technical evaluations only.) This factor is measured by the importance of any confidential data which will be handled by the person holding the job. It is used to appraise the integrity and discretion required of the employee in safeguarding such data.

Responsibility for Supervision

(Used as a single factor in factory evaluations only.) This factor weighs the degree to which the employee holding the job must train other workers and plan and direct their work for efficient use of man-hours, machine-hours, and material. Responsibility for supervision ranges from that of a journeyman over his helper to that of a department head who supervises hundreds of employees and has complete control of hiring, methods, and costs in his department. It is not recommended here, however, that full-time supervision jobs be included in the general job-evaluation plan. The requirements for supervision are so very different from those for janitor work, for instance, that any evaluation scale to cover both of them will be unworkably complicated. Both character of part-time supervision and number of people supervised are included in this factor.

There are three angles from which the factor value of responsibility for supervision may be measured. They are:

1. The natural gift for handling a group of people, required in varying degrees as the employee is in charge of more or less work. This supervisory qualification has been covered already under the "complexity of duties" factor, as ability to take independent action, exercise of judgment, and creative effort. To avoid overlapping, it should not be considered under "responsibility for supervision" in an evaluation plan which includes "complexity of duties."

2. The kind of supervision involved, which is generally indicated on the department organization chart. A part-time supervisor (the evaluation plans in this book do not cover full-time supervisors) may merely give simple directions to men who are working with him; or he may have to plan and lay out the work for them and take some responsibility for the efficiency of his group, making decisions on the number and type of men needed for a job. The type of supervision is thus a factor as important as the number of people supervised in measuring the requirements of jobs involving supervision.

3. The number of people supervised. For a given type of supervision this criterion measures the supervision factor.

Items 2 and 3 can be considered together in factory job evaluation; but for clerical and technical departments, where the type of supervision is more varied, it is good practice to establish them as separate factors: "type of supervision" and "scope of supervision."

Effort Demanded

This factor is often subdivided into "physical effort" and "mental and visual demand," as follows:

Physical Effort

(Unnecessary for evaluating clerical and technical jobs.) The physical-effort factor is used to measure the intensity of effort together with the percentage of time the individual is normally under load; it includes muscular exertion, difficult work positions, and continuity of effort and is based on normal requirements of the job.

Mental and Visual Demand

There is some opposition, in industrial-engineering circles, to the use of this factor. Industrial psychologists have proved, however (and some of us could guess without scientific proof), that nervous concentration and eyestrain are just as fatiguing as hard physical work. Since both kinds of effort are seldom required by the same job, a factor is necessary to balance the effort of a typical office worker against that of a typical laborer.

The "mental and visual demand" factor must not be confused with the "mentality" and "complexities" factors. A man doing fine machine work has to concentrate a lot harder than his boss, though his job is much simpler. A detail draftsman, or a key-punch operator punching out hundreds of Hollerith cards an hour, uses up a lot more nervous energy than either a lead engineer or a janitor. "Mental and visual demand" is a measure of required coordination between eye, mind, and hand; in other words, of nervous-energy output in the purely physical sense. This factor has no relation to quality of abstract thinking, which is evaluated by the mentality factors.

Job Conditions

In most evaluation plans general job conditions are treated as a single "working conditions" factor; but for factory evaluations the "job conditions" factor may more logically be subdivided into "working conditions" proper and "unusual hazards." The companies which use a single factor give various reasons: that hazards are the result of job conditions and therefore cannot be rated separately; that the higher base pay rates in dangerous industries account for the hazards factor; that there is no such thing as an accident; that when all possible safety precautions are taken and accidents are covered by insurance the workers are sufficiently protected. None of these reasons takes account of the basic fact that hazards do vary between jobs (and therefore workers will not willingly work on the more dangerous jobs without added pay).

Since clerical and technical jobs are seldom dangerous, no separate "hazards" factor is necessary for evaluating them.

Working Conditions

When working conditions are considered apart from hazards, they are measured in terms of disagreeable but not dangerous job features that cannot be controlled by the worker. These unpleasant features, though varied, are usually concrete enough to measure systematically. They include difficult working positions; noisy, dusty, hot, or cold conditions in the work area; and working with greasy or abrasive materials. Such items as personal expense, swing and graveyard shift assignments, or work in outlying districts are also part of the working conditions and should be evaluated as such unless full compensation is already being made in some other way.

Unusual Hazards

(This factor will not ordinarily be included in clerical or technical evaluations.) When used, this factor should include danger to health as well as danger of accidental injury. Thus, even though safety precautions are taken, exposure to dust that can cause an occupational disease is a health hazard besides being a disagreeable working condition. Health and accident records are useful in studying this factor, but spot studies must also be made; changes in production methods or safety devices may increase or decrease hazards as compared to the statistics.

Special Factors

The true value of each job in relation to all other jobs can be measured accurately by the factors that have already been considered—skill, responsibilities, effort demanded, and working conditions. In the present business world, however, true value is not a completely workable basis for pay rates. Human desires, fears, and traditions make it necessary to temper the ideal of equal pay for equal work with practical common sense. The law of supply and demand, for instance, cannot be ignored, even when it does not agree with true evaluations; nor can a tradition of unusually high pay or special bonuses for a particular craft; nor an existing seniority system. The question is not how to escape from these extraneous special factors; in our world they are inescapable. The real problem is how to acknowledge their existence without destroying the sound principles of job evaluation. There are three basic possibilities: (1) to distort the evaluation of the standard factors in such a way as to take care of special cases; (2) to add "special" factors to the jobs concerned, with sufficient point values to raise or lower the jobs into the required pay rate; (3) to evaluate all jobs justly, without special considerations, then add to or subtract from their pay rates in a separate operation, considering each case individually.

The last alternative is strongly recommended, since this method will always make it apparent when a job is "out of line"; both labor and management will then face a realistic, clean-cut issue, and there is a good possibility that the irregularity can be eliminated.

The following typical examples illustrate this problem. The welder A job, being on plant maintenance work where every job is different, requires more skill and diversity and evaluates higher than the welder B job, which consists of doing the same operation over and over on a standard product. There is,

FACTORY EVALUATIONS

Factor	Welder B (Shop) Degree	Welder B (Shop) Points	Welder A (Maintenance) Degree	Welder A (Maintenance) Points
Mentality	4	50	4	50
Experience and training	5	80	6	100
Complexity of duties	3	35	4	50
Responsibility for results	4	60	4	60
Responsibility for supervision	1	5	1	5
Physical effort	5	45	5	45
Mental and visual effort	4	40	4	40
Working conditions	4	35	4	35
Unusual hazards	4	35	4	35
Total point evaluations		385		420

however, a thoroughly established custom (developed because of a long-continued shortage of first-rate welders) of paying all welders at the same rate. It would be possible to solve this problem by adding extra experience and complexity points (which the job does not require) to the welder B evaluation or by adding a special factor, such as "recognition of trade standards, 20 points." The least confusing way, however, is to leave the evaluation alone, recording it on an off-standard pay-rate card as described in Chapter 10 (Fig. 50).

Another example:

CLERICAL AND TECHNICAL EVALUATION—FLIGHT TEST ENGINEER A

Factor	Degree	Points
Mentality	4	60
Experience and training	4	80
Complexity of duties	4	60
Supervision received	3	20
Responsibility for errors	3	20
Responsibility for contacts with others	3	20
Responsibility for confidential data	4	20
Mental and visual effort	4	20
Working conditions	4	20
Type of supervision	..	..
Scope of supervision	..	..
Total point evaluation		320

This job is extremely hazardous and for that reason would appear to merit a much higher point rating; but no account is taken of unusual hazards in clerical or technical evaluations such as this one. The addition here of a special factor would not confuse the issue from a moral standpoint; but from a practical angle it would. Not only would the extra factor be difficult to handle from the administrative standpoint; but it would probably duplicate the insurance and flying-time bonus which are customary for this type of job. Again the best answer is to let the evaluation stand and use the off-standard pay-rate card (Fig. 51) to take care of the necessary extra pay.

There will also be cases where the evaluation of a job seems too high. This will occur when the job has some unusual attraction like very pleasant working conditions or special opportunities for self-expression or for promotion. It may be found that if these jobs are paid according to their evaluations there is envy and dissatisfaction among other employees whose work is less pleasant or inspiring. It would be possible to bring down the pay by giving minus points for working conditions, or by adding a "chance for promotion" factor, also with a minus value; the practical course, however, is to evaluate the jobs like all others, then subtract from the final pay rate whatever amount is considered necessary. The fact that these jobs are underpaid according to their evaluation will then be perfectly clear, and corrective action can be taken if necessary.

To sum up, it is recognized that evaluations based on theoretically sound factors will sometimes conflict with established practice or with supply and demand; but such conditions should not affect the job evaluations; any necessary wage adjustments can be made later without changing the evaluations.

Selecting Key Jobs

When the job-evaluation department and the committee have decided what factors will be used for evaluating the company's jobs, their next step is to select a set of key jobs by which standards for each factor can be set. Data obtained from these key jobs will be used for rating every job in the company; they are the bench marks on which the accuracy of the whole plan will be based. All work done on the key jobs, from their original choice to the final point chart based on them, must be done with great care and unwavering intelligence.

Since most of the company's employees work in the factory, standards must be based primarily on factory jobs. Key jobs must be chosen to represent all major factory departments and all major types of factory work at every wage level. Usually from twenty to thirty jobs will provide a good cross section of the plant's operations. Each of the jobs chosen must be paid at a rate which everyone on the committee agrees is correctly related to the pay rates of all the others.

A universally accepted pay rate is most often found among jobs in highly standardized and long-established crafts such as tool and die making, carpentry, masonry, or steam fitting. In the lower-pay brackets there are also occupations of long standing which, though not sufficiently skilled to be rated as crafts, are equally standardized. They include such jobs as window washing, janitor work, and common labor. Any company making a specialized product will also have a large number of employees doing jobs too new to have a traditional place in the economic system. Comparisons throughout the particular industry and comparisons with similar but more standard crafts within the community will often enable the committee to agree on which of these specialized jobs are fairly paid in the present set-up.

Since the committeemen represent both management and labor in all branches of factory work, their agreement without reservation that the key jobs are fairly paid in relation to one another is a firm foundation for a successful job-evaluation system. A practical method of finding such key jobs is for the job-evaluation department to prepare a list of all jobs that appear to be fairly paid, the committee then narrowing down this list, by discussion and voting, to those jobs upon which they can agree most completely.

The following key-job list, used in a large aircraft plant, illustrates the kinds of jobs on whose relative pay a committee can most readily agree:

Tool and die maker	$1.59
Machinist, maintenance, rebuild	1.59
Airplane and engine maintenance mechanic	1.50
Heat treater, steel	1.50
Set-up man, turret lathes	1.41
Electrician, maintenance	1.41
Carpenter, maintenance	1.34
Overhead craneman	1.34
Assembler, structures	1.25
Drill grinder, hand	1.25
Truck driver, licensed equipment	1.16
Router operator	1.16
Riveter, aircraft	1.07
Tube bender	1.07
Fork truck operator	0.98
Cable splicer, hand	0.98
Saw operator, cut-off	0.89
Window washer	0.89
Janitor, regular	0.80
Helper, general	0.80

The committee must constantly bear in mind that the present question is *not* whether the pay scale, as shown in the list, is too high or too low. The question is only whether the pay rate of each job is fair in proportion to all the others. The committee members must not ask themselves "Is $1.34 enough money for an overhead craneman?" but "Is it right for an overhead craneman to be two pay brackets above a truck driver and one bracket below a maintenance electrician?"

Clerical and Technical Key Jobs

A separate committee usually evaluates clerical and technical jobs because of the very different background of the supervisors as compared to shop supervisors and shop committeemen. It is therefore recommended that the clerical-technical evaluation program be started after the key factory jobs are selected and written up. Clerical and technical labor grades can then be set up so that they are in line with factory standards, which determine the relative pay rates of the great majority of employees. Otherwise the selection of key clerical and technical jobs is based on the same principles as apply to key factory jobs. The following list illustrates a good practical selection for a company with a large engineering department.

CLERICAL AND TECHNICAL KEY JOBS

Assistant group engineer, design	$315
Lead engineer, design	300
Lead technician A, motion-picture laboratory	285
Senior auditor A, internal auditing	270
Major engineer, design	270
Methods engineer B	255
Major estimator A	255
Layout engineer, design	240
Major estimator B	240
Executive secretary	225
Placement man, personnel	225
Detail engineer, design	210
Tabulating-machine operator A	210
Junior engineer, design	195
Librarian A	195
Clerk C	180
Stenographer A	165
Typist A	150
Key-punch operator	135
Messenger	115

Studying Key Jobs

When the key jobs are selected the job-evaluation department and the committee are ready to undertake the next basic step—analyzing the key jobs. The department makes careful on-the-spot studies of each key job, relating this study to all available company records, data from other companies, and other job-evaluation plans. Each member of the committee familiarizes himself with every key job that he does not already know intimately from first-hand experience, studying especially the relative importance of the selected factors in each job. This analytical way of thinking may be new even to experienced department heads and labor representatives who are serving on the committee. Even within their own fields, such men can often recognize a good worker much more easily than they can figure out what special qualities are required by the same worker's job.

This study by the department and committee members will take several weeks. When the department has completed its written job analyses, the department chief will call a committee meeting (or meetings) to discuss them. The committee members will make suggestions and amend the write-ups until it is agreed that they are accurate and complete for their purpose.

Following are typical examples of key-job write-ups that have been amended and agreed to by the committee.

FACTORY KEY-JOB DESCRIPTIONS

Exceptionally Skilled Level—Tool and Die Maker

Lay out any type of tools or dies from prints or sketches. Complete any information lacking in print or sketch and, as required, make tool or die from part drawing. Plan and perform all necessary machine or bench operations to construct, alter, or repair sets of blanking, piercing, forming, and deep-draw dies. Accurate relationships, fitting, and interchangeability of parts require development of close tolerance fits. This job normally requires six to eight years of experience and the completion of an approved apprenticeship. Must be able to use advanced shop mathematics and to work from engineering or part drawings, sketches, or verbal instructions. Must have the necessary knowledge of shop practices and be familiar with all types of precision measuring instruments. Must also be familiar with elementary principles of mechanics, working qualities of metals, including operation of all types of machine tools, punch presses, forming presses, power brakes, etc. Individuals assigned to this classification are responsible for all set-ups; also for making sure that subsequent operations or layouts will not cause damage to tools and machines, and that tools and dies will function as called for on designer's drawing. Intense mental concentration is required when studying drawings, planning and laying out work, setting instruments, and performing a wide variety of operations which require very close attention and a high degree of skill and accuracy. The individual assigned to this job will occasionally handle heavy die tools or machine attachments; however, work is largely bench and machine operation. The job conditions are slightly dirty and subject to general factory noise. Accident hazards are not extreme; however, the employee is subject to severe cuts and possible eye injuries from flying particles.

Highly Skilled Level—Electrician, Maintenance

Lay out, install, and maintain a variety of electrical equipment such as controls (both activating and limit), motors, starters, lighting circuits, and plating equipment. Wire machine tools; hook up and cut off power to secondary side of transformers; wire and maintain paging systems. Diagnose and locate trouble to minimize power delays. Perform necessary electrical work on cranes and special equipment. Plan and perform general maintenance of spot-welding equipment as required. Adequate performance of this job normally requires four to five years of experience installing motors and lighting circuits, wiring machine tools, working on instrument and control panels. Must be able to use shop mathematics and work from wiring diagrams and schematic drawings. Must be familiar with the use of electric measuring instruments and have a knowledge of handbook and wattage formulas and fundamentals of electricity. Must know National Electric Code requirements for wiring and instruments. The adequate performance of this job requires judgment and ingenuity in diagnosing and remedying trouble to minimize power delays and in wiring complicated circuits with interrelated control and limiting switches. The individual assigned to this job has considerable responsibility for the installation of electrical equipment, and careless work may necessitate extensive repair or replacement. Close mental and visual application is required to variable operations such as tracing and wiring. Physical effort is required to push, pull, or lift heavy materials. Job conditions may be somewhat disagreeable because of fumes, noise, dirt, and working in high places and occasionally in cramped positions. Hazards are extreme, as high voltages may cause fatal accidents. Lower voltages may also be hazardous when working on ladders or scaffolds.

Skilled Level—Assembler, Structures

Lay out prefabricated airplane parts and subassemblies, and assemble them into major structural units. The operation consists of cutting, filing, fitting, drilling, reaming, clamping, forming (hand and machine), and aligning individual parts and pieces into their proper location with relationship to the whole, using fixtures and jigs where available. (At times it may be necessary to assemble without fixtures or jigs, or to make temporary jigs and fixtures to facilitate operation.) Work assemblies into proper sequence and make assembly layouts. Materials used consist of such previously fabricated articles as plates, channels, stiffeners, longerons, ribs, bulkheads, wing spars, corrugations, skin sections, stabilizers, and tail turret assemblies. Normally, one and one-half to three years of experience in aircraft final-assembly methods are necessary to acquire the skills essential to the performance of this job. This job further requires the ability to use shop arithmetic and standard aircraft shop tools. The employee on this job must be able to interpret and use assembly blueprints and must be familiar with the forming qualities of aircraft materials. Careless assembly or alignment of work may result in warping, twisting, or misfitting of parts, necessitating considerable rework. Moderate mental concentration is required to assemble, align, check, and perform a variety of operations, as may be required. Physical effort may at times be sustained when assembling parts and sections; also, occasional climbing may be necessary. Job conditions may be somewhat disagreeable because of crowded working conditions or the noise of adjacent riveting. Accident hazards include possible severe cuts and eye injuries and falls from ladders or assembly equipment.

Semi-Skilled Level—Tube Bender

Set up and operate tube-bending machines to bend tubing into various straight or compound angles, according to specifications. Select required radius blocks and bending aids. Hand-bend small tubing. Make forming boards or templates and formulate standard bend charts to facilitate bending operations, as required. Normally, six to twelve months of experience in tube bending are needed to learn this job. The employee must be able to use shop arithmetic and interpret simple assembly drawings. Careless bending may result in spoiled tubing or damage to radius blocks or mandrels. This job requires a normal amount of mental concentration, to obtain accurate bending. Considerable and sustained physical effort is required for doing this work on a production basis. Job conditions may at times be somewhat disagreeable because of factory noise and handling greasy tubes. The employee is exposed to such accident hazards as cuts and hernia.

Semi-Skilled Level—Fork-Truck Operator

Operate a fork truck to accomplish required intraplant trucking and parts distribution; load and unload box cars; move and transport all kinds of heavy and unwieldy objects; handle warehouse shuttling work, etc. About three months' experience is normally required for employee to learn details of operation and plant locations. Fork-truck operators must be able to read and write. The job involves considerable responsibility for materials, equipment, and the safety of other people. It requires the exercise of extreme care to prevent collision and property damage, since fork trucks are frequently operated in congested factory areas. Often a good deal of physical effort is needed for pushing, pulling, and lifting heavy materials. The job conditions are disagreeable because of truck vibration and exhaust fumes, factory noise, and intermittent exposure to outside weather. Collisions or careless handling of materials may result in broken bones or bruises. Heavy lifting may cause hernia.

Unskilled Level—Janitor, Regular

Perform janitorial duties such as sweeping and scrubbing floors, supplying lavatories with expendable materials, removing waste, and occasionally cleaning the inside of windows head high. Clean and polish furniture, operate vacuum equipment; clean and sweep factory areas in and about equipment, machines, and jigs. Less than one month of experience is normally required to learn duties of this job, cleaning agents, and plant locations. Must be able to follow verbal or written instructions. Careless operation of floor-polishing or vacuum equipment or improper use of cleaning compounds may result in minor damage. Physical effort is somewhat continuous as applied to scrubbing, sweeping, polishing brass, etc. At times, working conditions are very disagreeable because of exposure to moisture, dirt, and dust. Serious injuries are improbable; however, employee is subject to slips and falls.

CLERICAL AND TECHNICAL KEY-JOB DESCRIPTIONS

Assistant Group Engineer, Aircraft Design

1. As assigned by (or in the absence of) the group engineer, supervise and assist in the design of some aircraft component, such as body, wing, tail section, landing gear, power plant, controls, or equipment, electrical, hydraulic, etc. To carry out these responsibilities, the assistant group engineer must:

(*a*) Decide and consult, subject to final approval, on such matters as materials used, section used, type of processing to be employed.

(*b*) Assist in allocation of work to engineers in the group, and coordinate their work as necessary.

(*c*) Estimate release dates as required by group engineer.

2. Coordinate the lead men within the group to obtain complete designs of components; act as consultant on all matters relative to the design.

3. Assist in correlating designs with allied groups, as assigned.

4. Engage in early design of component parts as assigned.

5. As required, engage in actual work of layout, detailing, and checking to facilitate group functioning.

6. Coordinate with group engineer to maintain required group personnel relations, grade the employees, and maintain the necessary job evaluations and transfers within the group.

7. Perform special investigations as assigned by group engineer, and assist the maintenance of adequate cost, man-power, and progress records for the group.

Senior Auditor A, Internal Auditing

Act in the capacity of senior auditor in charge of any type of individual audit or investigation. Audit books and records and perform special audits as directed. Perform internal audits, and occasionally audit books and records of outside companies to determine or verify expenses of operation, financial condition, etc. Write comprehensive detailed reports; make cost comparisons and studies; make detailed analyses. Make complete or partial audits of any phase of accounting records, as assigned. Organize and supervise auditing programs, as assigned.

Major Estimator B

Make cost estimates as assigned by supervisor, usually in reply to requests for bid quotations. This responsibility requires the employee to:

1. Obtain all necessary blueprints.
2. Break down blueprints, itemizing parts to be manufactured and parts to be purchased.
3. Send itemized list of company manufactured parts to the engineering department for engineering check, and a duplicate list to the production office requesting delivery date.
4. If engineering changes are indicated, correct parts list accordingly.
5. Estimate labor cost and material cost for each part, using blueprints and other references.
6. Estimate crating charges on purchased items.
7. Collect all data and make out special cost estimates of total and unit costs, including overhead and profit figures.

Other functions are as follows:

1. Obtain from billing sheets the estimated cost of each item, for comparison between actual and estimated cost, using these comparisons for reference.
2. Break down cost of airplane completely into component part costs. This breakdown includes labor, material, and overhead.

Tabulating Machine Operator A

Set up and operate tabulating equipment such as accounting machine, summary punch, reproducers, collators, interpreters, and sorters. Make complicated new set-ups with occasional assistance from supervisors. Make simpler new set-ups which involve responsibility for accuracy and on which there may be no suitable check.

Junior Engineer, Aircraft Design

Do simple detail drafting; make routine engineering tests; perform routine engineering computations; prepare change orders and deviations; assist an engineer of a higher rate in engineering work. Work, in an engineering group or project, always under close supervision.

Librarian A

Set up and maintain a library, or library-type systems, for filing data. This responsibility requires the employee to:

1. Analyze, classify, index, cross index, route, charge out, and follow up various types of reports, clippings, books, manuals, photographs, publications, bulletins, etc.
2. Maintain all such data in up-to-date, convenient, and available form for use of own and other departments of the company.
3. Prepare bibliographies, and carry on necessary library research.
4. Perform specialized duties, such as operating address-o-graph system for mailing data to publications, etc., as assigned.
5. Attend to miscellaneous library routine such as filing, binding, typing, preparing folders, and maintaining material in files or on shelves.
6. Librarians in this grade perform duties of definite complexity, handling the difficult and technical work of the library, or supervise less-experienced library employees.

Stenographer A

Take dictation, and transcribe dictated material; type standard data from clean, clear copy; do simple stencil cutting from standard forms. Proofread own work. Take dictation at about 120 words a minute and transcribe from dictated notes at about 60 words a minute. Perform relevant clerical duties within scope of job.

TYPIST A

Type diversified data from rough or scratch copy. Do form typing of tabular, columnar, or statistical material; cut stencils of any degree of complexity. Must type copy at about 60 words a minute with complete accuracy. Arrange material for typing and proofread own work. Do clerical work such as sorting and filing.

KEY-PUNCH OPERATOR A

Operate alphabetical and numerical key punch or verifying machine; transcribe data onto tabulating cards. Work requires a considerable degree of accuracy.

MESSENGER

Maintain and perform messenger service on a specified route to pick up and deliver mail and other items as required. Run errands and perform very simple clerical duties as directed by supervision.

Proportioning Key-Job Wages to Evaluation Factors

By the time the key-job descriptions are completed the committee has become well acquainted with the key jobs and, with a little further study, can decide just how much of the wage of each job is paid for each evaluation factor. There are two types of questions that must now be answered. (1) Which *factors* are in general most important to the company and should therefore be credited with the largest proportion of the wages of all jobs? (2) Which *jobs* require the greatest amount of each factor?

The answer to the first question can be found partly in the personal opinions of the committee members; but it is important that the committeemen should know what other companies have found out about the subject by experience. Figure 5 shows the relative importance assigned to the different factors in five different successful evaluation plans. The most striking agreement shown on this chart is that the skill factors outweigh all the other factors combined. A careful study will reveal many other guiding principles, such as the facts that experience is more important than education and that complexity of duties (listed as initiative and ingenuity, aptitude, etc.), though somewhat loosely understood, rates about even with education.

From their careful study of the key jobs, the committee members will be able to answer the second question, "Which jobs require the greatest amount of each factor?"

This part of the procedure involves keeping very involved records, for which forms are prepared by the job-evaluation department. Figure 6 shows the first of these forms, which is used for recording each committee member's opinion as to how many cents an hour the mentality required for each key job is worth. The committee members will fill out forms of this type, for each evaluation factor, in such a way that the total cents for all factors equals the pay rate of each job. The "importance order" column represents the committeeman's opinion as to where, among the twenty, each key job should rank, judged only by the one factor under consideration.

When the committee members have filled out these forms they turn them in to the job-evaluation department, where they are combined into key ranking sheets exactly like Figs. 7 through 15, except that the "mean" and "final assignment" columns are not yet filled in. The A, B, C, D, and E columns on these sheets represent the rankings and point allocations made by the five committee members, including the chairman. A small (five-man) committee has been assumed, to simplify the tabulations.

Using the key ranking sheets as a starting point, the committee now discusses the relationships between the key jobs, factor by factor. For accurate final results, the members must talk over each factor independently of all the others. After full discussion, the "mean" or agreed ranking and point allocations are set down as the committee's decision. Note that the "mean" is not the average of the different individual opinions. The committee is dealing with job relationships, not with absolute pay standards, and its freedom to fix relationships in any way that

Basic Factors	National Metal Trades Association		General Electric Company		Westinghouse Electric Company		U. S. Steel Corp Subsidiaries		Southern California Aircraft Industries		Average Weight
	Factors Used	Wt.	Factors Used	Wt	Factors Used	Wt.	Factors Used	Wt	Factors Used	Wt.	
Skill	Education Experience Initiative and ingenuity	14 22 14	Mentality Skill	12.5 50	Basic education Experience requirement Aptitude	18.5 18.5 23	Skill, dexterity and accuracy Education or mental development Experience and training	23 10 12	Mentality Skill (Skill increases to maximum of 51% of total after 9 years)	23.5 17.25	
	% of total	50	% of total	62.5	% of total	60	% of total	45	% of total	41.25	51.75%
Effort	Physical demand Mental or visual demand	10 5	Mental application Physical application	6.25 6.25	Physical demand Mental demand Visual demand	7.4 7.4 7.4	Mental effort Physical effort	10 6	Mental application Physical application	11.75 11.75	
	% of total	15	% of total	12.5	% of total	22.2	% of total	16	% of total	23.5	17.84%
Responsibility	Equipment, process Material or product Safety of others Work of others	5 5 5 5	Responsibility	12.5	Equipment Product Safety of others	4.6 4.6 4.6	Responsibility	24	Material and equipment	23.5	
	% of total	20	% of total	12.5	% of total	13.8	% of total	24	% of total	23.5	18.76%
Job conditions	Working conditions Unavoidable hazards	10 5	Working conditions	12.5	Unusual features (Working conditions are considered supplementary after above factors are evaluated)	4	Working conditions Fatigue	10 5	Job conditions Unavoidable hazards	5.875 5.875	
	% of total	15	% of total	12.5	% of total	4	% of total	15	% of total	11.75	11.65%

FIG. 5. Point distribution in various evaluation plans.

MENTALITY			
Payroll Order	Present Rate	Importance Order (This Factor Only)	Cents Allocated to This Factor
Tool and die maker	$1.59		
Machinist, maintenance, rebuild	1.59		
Airplane and engine maintenance mechanic	1.50		
Heat treater, steel	1.50		
Set-up man, turret lathes	1.41		
Electrician, maintenance	1.41		
Carpenter, maintenance	1.34		
Overhead craneman	1.34		
Assembler, structures	1.25		
Drill grinder, hand	1.25		
Truck driver, licensed equipment	1.16		
Router operator	1.16		
Riveter, aircraft	1.07		
Tube bender	1.07		
Fork-truck operator	0.98		
Cable splicer, hand	0.98		
Saw operator, cut-off	0.89		
Window washer	0.89		
Janitor, regular	0.80		
Helper, general	0.80		

Member of job-evaluation committee

Date ____________________

FIG. 6. Factor-ranking sheet.

it sees fit is essential to the final usefulness of the plan. In many cases one or two members will agree, during the discussion, that the other members have superior knowledge and will therefore concede that their own estimates are, in comparison, mere guesses. Such admitted "guesses" are noted in the key ranking sheets (Figs. 7 through 15) by being enclosed in parentheses. In

MENTALITY

Payroll Order	Rate	Importance Order						Point Allocation						Final Assignment	
		A	B	C	D	E	Mean	A	B	C	D	E	Mean	Rank	Points
Tool and die maker	$1.59	1	1	1	2	1	1	26	28	30	25	28	27	1	30
Machinist, maintenance, rebuild	1.59	2	2	3	1	1	2	25	26	25	28	28	26	2	28
Airplane and engine maintenance mechanic	1.50	5	4	4	3	3	4	18	22	24	24	25	23	4	26
Heat treater, steel	1.50	(2)	5	5	3	4	5	25	21	23	24	24	23	5	25
Set-up man, turret lathes	1.41	3	6	5	4	5	6	24	20	23	23	23	23	6	24
Electrician, maintenance	1.41	4	3	2	4	2	3	23	23	26	23	26	24	3	27
Carpenter, maintenance	1.34	5	7	6	5	6	7	18	18	19	19	21	19	7	22
Overhead craneman	1.34	8	10	10	10	12	12	(14)	10	10	11	9	11	12	13
Assembler, structures	1.25	6	7	7	6	7	8	16	18	17	16	17	17	8	20
Drill grinder, hand	1.25	7	8	9	7	8	9	15	16	14	15	14	15	9	18
Truck driver, licensed equipment	1.16	13	12	13	12	14	16	7	8	5	6	7	7	16	7
Router operator	1.16	11	11	11	10	11	13	11	9	8	9	10	9	13	10
Riveter, aircraft	1.07	9	9	8	9	10	10*	13	12	15	14	(11)	13	10	16
Tube bender	1.07	10	9	9	8	9	11	12	12	14	13	12	13	11	15
Fork-truck operator	0.98	14	12	(11)	12	15	17	7	8	8	6	(5)	7	17	8
Cable splicer, hand	0.98	11	13	11	11	(14)	14	(11)	7	8	8	7	8	14	9
Saw operator, cut-off	0.89	12	11	12	11	13	15	10	9	7	8	8	8	15	9
Window washer	0.89	15	14	14	13	15	18	5	5	4	5	5	5	18	5
Janitor, regular	0.80	17	15	14	15	17	20	3	4	4	3	3	3	20	5
Helper, general	0.80	16	15	14	14	16	19	4	4	4	4	4	4	19	5

* Placed by decision of industrial engineer.

FIG. 7. Committee's key-job ranking for mentality.

EXPERIENCE AND TRAINING

Payroll Order	Rate	Importance Order						Point Allocation						Final Assignment	
		A	B	C	D	E	Mean	A	B	C	D	E	Mean	Rank	Points
Tool and die maker	$1.59	1	1	1	2	1	1	51	53	55	52	55	53	1	60
Machinist, maintenance, rebuild	1.59	2	2	2	1	2	2	49	50	50	54	52	51	2	55
Airplane and engine maintenance mechanic	1.50	3	4	5	6	7	6	39	40	38	40	40	39	6	40
Heat treater, steel	1.50	3	3	3	4	4	3	39	43	42	44	46	43	3	50
Set-up man, turret lathes	1.41	4	5	4	5	5	5	38	38	40	43	45	41	5	45
Electrician, maintenance	1.41	5	4	4	3	3	4	37	39	40	46	47	42	4	48
Carpenter, maintenance	1.34	5	6	5	6	6	7	37	36	38	40	41	38	7	38
Overhead craneman	1.34	8	11	9	10	12	11	22	18	20	20	18	20	11	23
Assembler, structures	1.25	6	7	6	7	8	8	31	34	32	30	28	31	8	36
Drill grinder, hand	1.25	7	8	7	8	9	9	30	33	28	29	25	29	9	32
Truck driver, licensed equipment	1.16	12	12	11	13	13	14	14	15	16	13	15	15	14	16
Router operator	1.16	13	13	13	12	(14)	15	13	12	14	15	14	14	15	15
Riveter, aircraft	1.07	9	9	8	9	10	10	20	22	21	23	20	21	10	25
Tube bender	1.07	10	10	10	10	11	12	19	20	19	20	19	19	12	20
Fork-truck operator	0.98	14	12	13	12	14	16	(10)	15	14	15	14	14	16	14
Cable splicer, hand	0.98	11	10	12	11	13	13	18	(20)	15	16	15	16	13	18
Saw operator, cut-off	0.89	14	14	14	14	15	17	10	10	11	12	10	11	17	12
Window washer	0.89	15	15	15	15	16	18	9	9	8	8	8	8	18	10
Janitor, regular	0.80	16	17	17	16	18	20	8	7	6	7	(5)	7	20	10
Helper, general	0.80	16	16	16	16	17	19	8	8	7	7	7	7	19	10

FIG. 8. Committee's key-job ranking for experience and training.

COMPLEXITY OF DUTIES

Payroll Order	Rate	Importance Order						Point Allocation						Final Assignment	
		A	B	C	D	E	Mean	A	B	C	D	E	Mean	Rank	Points
Tool and die maker	$1.59	1	1	2	1	1	1	26	28	27	30	29	28	1	30
Machinist, maintenance, rebuild	1.59	2	2	1	2	1	2	25	27	29	28	29	28	2	28
Airplane and engine maintenance mechanic	1.50	2	3	4	6	4	4	25	26	25	24	26	25	4	26
Heat treater, steel	1.50	8	5	6	5	5	6	18	23	22	25	25	24	6	24
Set-up man, turret lathes	1.41	3	4	3	3	2	3	24	25	26	27	28	26	3	27
Electrician, maintenance	1.41	4	5	5	4	3	5	23	23	24	26	27	24	5	25
Carpenter, maintenance	1.34	5	6	7	7	6	7	21	21	21	23	24	22	7	22
Overhead craneman	1.34	8	9	9	10	9	10	18	15	16	17	16	16	9	18
Assembler, structures	1.25	6	7	8	8	7	8	20	20	19	21	20	20	8	20
Drill grinder, hand	1.25	7	8	8	9	8	9	19	18	19	20	18	19	10	19
Truck driver, licensed equipment	1.16	11	12	13	15	13	15	13	12	11	11	12	12	15	11
Router operator	1.16	11	11	12	15	14	14	13	13	12	11	11	12	14	12
Riveter, aircraft	1.07	10	9	10	11	10	11	14	15	14	16	15	15	11	16
Tube bender	1.07	9	10	11	12	11	12	15	14	13	15	14	14	12	15
Fork-truck operator	0.98	12	11	13	14	13	13	12	13	11	12	12	12	13	13
Cable splicer, hand	0.98	12	13	14	13	12	16	12	11	10	13	13	12	16	10
Saw operator, cut-off	0.89	14	14	14	16	14	17	9	10	10	10	11	10	17	8
Window washer	0.89	13	15	15	17	15	18	11	9	8	9	10	9	18	7
Janitor, regular	0.80	15	17	16	19	17	20	7	7	7	6	7	7	20	5
Helper, general	0.80	15	16	16	18	16	19	7	6	7	8	8	7	19	6

FIG. 9. Committee's key-job ranking for complexity of duties.

RESPONSIBILITY FOR RESULTS															
Payroll Order	Rate	Importance Order						Point Allocation						Final Assignment	
		A	B	C	D	E	Mean	A	B	C	D	E	Mean	Rank	Points
Tool and die maker	$1.59	3	4	4	3	3	4	28	26	27	29	29	28	4	36
Machinist, maintenance, rebuild	1.59	2	3	3	2	(4)	2	30	29	28	30	28	30	2	38
Airplane and engine maintenance mechanic	1.50	4	2	2	4	2	3	27	30	29	28	30	29	3	37
Heat treater, steel	1.50	6	5	5	5	5	5	25	24	26	26	27	25	5	35
Set-up man, turret lathes	1.41	8	6	6	6	6	6	20	22	25	25	24	23	6	33
Electrician, maintenance	1.41	9	8	7	7	7	8	19	20	22	22	22	21	8	30
Carpenter, maintenance	1.34	11	10	10	9	10	11	17	18	19	19	19	18	11	24
Overhead craneman	1.34	1	1	1	1	1	1	35	32	30	33	31	32	1	40
Assembler, structures	1.25	9	9	9	10	9	10	19	19	20	18	20	19	10	26
Drill grinder, hand	1.25	12	11	12	13	13	13	16	17	16	15	15	16	13	21
Truck driver, licensed equipment	1.16	(5)	6	8	8	8	7	26	22	21	20	21	22	7	31
Router operator	1.16	10	9	11	11	11	12	18	19	18	17	18	18	12	23
Riveter, aircraft	1.07	13	12	13	12	12	14	15	14	15	16	17	15	14	19
Tube bender	1.07	15	13	14	14	14	15	13	12	13	13	13	13	15	17
Fork-truck operator	0.98	7	7	8	8	10	9	(24)	21	21	20	19	20	9	28
Cable splicer, hand	0.98	14	13	15	14	15	16	14	12	12	13	12	12	16	15
Saw operator, cut-off	0.89	16	14	16	15	16	17	11	10	11	10	10	10	17	12
Window washer	0.89	17	15	17	17	17	18	10	9	9	8	9	9	18	10
Janitor, regular	0.80	17	15	17	17	18	19	10	9	9	8	8	9	19	10
Helper, general	0.80	18	16	18	16	18	20	8	7	8	7	8	9	20	10

FIG. 10. Committee's key-job ranking in responsibility for results.

RESPONSIBILITY FOR SUPERVISION															
Payroll Order	Rate	Importance Order						Point Allocation						Final Assignment	
		A	B	C	D	E	Mean	A	B	C	D	E	Mean	Rank	Points
Tool and die maker	$1.59	5	7	7	5	6	9	5	8	9	8	5	7	9	9
Machinist, maintenance, rebuild	1.59	1	1	1	1	1	1	20	22	22	25	20	22	1	23
Airplane and engine maintenance mechanic	1.50	2	2	2	2	2	2	15	17	18	15	15	16	2	18
Heat treater, steel	1.50	5	6	5	4	4	6	5	9	11	10	8	9	6	12
Set-up man, turret lathes	1.41	5	7	6	4	4	7 *	5	8	10	10	8	8	7	11
Electrician, maintenance	1.41	3	4	4	3	3	4	10	13	14	12	10	12	4	14
Carpenter, maintenance	1.34	3	3	3	3	3	3	10	15	16	12	10	13	3	15
Overhead craneman	1.34	5	8	9	6	6	10	5	5	5	5	5	5	10	5
Assembler, structures	1.25	5	7	7	4	3	8	5	8	8	10	10	8	8	10
Drill grinder, hand	1.25	5	8	9	6	6	10	5	5	5	5	5	5	10	5
Truck driver, licensed equipment	1.16	5	7	8	5	5	9	5	8	7	8	7	7	9	9
Router operator	1.16	4	5	6	5	3	5	8	10	10	8	10	10	5	13
Riveter, aircraft	1.07	5	8	9	6	6	10	5	5	5	5	5	5	10	5
Tube bender	1.07	5	8	9	6	6	10	5	5	5	5	5	5	10	5
Fork-truck operator	0.98	5	8	9	6	6	10	5	5	5	5	5	5	10	5
Cable splicer, hand	0.98	5	8	9	6	6	10	5	5	5	5	5	5	10	5
Saw operator, cut-off	0.89	5	8	9	6	6	10	5	5	5	5	5	5	10	5
Window washer	0.89	5	8	9	6	6	10	5	5	5	5	5	5	10	5
Janitor, regular	0.80	5	8	9	6	6	10	5	5	5	5	5	5	10	5
Helper, general	0.80	5	8	9	6	6	10	5	5	5	5	5	5	10	5

* Selected by decision of evaluation engineer.

FIG. 11. Committee's key-job ranking in responsibility for supervision.

PHYSICAL EFFORT															
Payroll Order	Rate	Importance Order						Point Allocation						Final Assignment	
		A	B	C	D	E	Mean	A	B	C	D	E	Mean	Rank	Points
Tool and die maker	$1.59	11	11	12	13	14	16	10	9	11	11	10	10	19	10
Machinist, maintenance, rebuild	1.59	11	10	11	13	13	15	10	10	12	11	11	11	18	11
Airplane and engine maintenance mechanic	1.50	10	9	9	11	10	13	11	12	14	13	14	13	16	13
Heat treater, steel	1.50	8	9	8	10	9	11	13	12	15	14	15	14	14	15
Set-up man, turret lathes	1.41	12	12	13	14	15	17	8	8	10	9	9	9	20	10
Electrician, maintenance	1.41	9	8	8	9	8	9	12	13	15	15	16	15	12	17
Carpenter, maintenance	1.34	6	5	6	6	6	5	15	16	17	18	18	17	6	23
Overhead craneman	1.34	11	10	11	12	12	14	10	10	12	12	12	11	17	12
Assembler, structures	1.25	7	6	5	5	6	5	14	15	18	19	18	17	8	21
Drill grinder, hand	1.25	8	9	9	11	11	12	13	12	14	13	13	13	15	14
Truck driver, licensed equipment	1.16	7	6	5	7	4	5	14	15	18	17	20	17	7	22
Router operator	1.16	1	1	1	1	1	1	25	25	27	28	27	26	1	30
Riveter, aircraft	1.07	5	4	3	4	5	4	16	18	20	20	19	19	5	24
Tube bender	1.07	2	2	2	2	2	2	24	23	25	25	25	24	2	28
Fork-truck operator	0.98	7	6	7	8	7	7	14	15	16	16	17	16	10	19
Cable splicer, hand	0.98	3	3	4	6	5	4	20	21	19	18	19	19	4	25
Saw operator, cut-off	0.89	8	7	10	10	10	10	13	14	13	14	14	14	13	16
Window washer	0.89	4	4	3	3	3	3	17	18	20	21	22	20	3	26
Janitor, regular	0.80	6	5	6	7	6	6	15	16	17	18	18	17	9	20
Helper, general	0.80	8	6	7	7	8	8	13	15	16	17	16	15	11	18

FIG. 12. Committee's key-job ranking for physical effort.

MENTAL AND VISUAL DEMAND

Payroll Order	Rate	Importance Order						Point Allocation						Final Assignment	
		A	B	C	D	E	Mean	A	B	C	D	E	Mean	Rank	Points
Tool and die maker	$1.59	1	1	1	1	1	1	22	25	24	25	26	24	1	25
Machinist, maintenance, rebuild	1.59	2	2	2	2	2	2	20	23	22	23	24	22	2	23
Airplane and engine maintenance mechanic	1.50	6	9	7	8	6	8*	15	16	16	17	18	16	8	17
Heat treater, steel	1.50	7	10	8	9	7	10	14	15	15	16	17	15	10	15
Set-up man, turret lathes	1.41	4	3	3	4	4	4	17	21	21	21	22	20	4	21
Electrician, maintenance	1.41	7	6	4	5	5	5*	14	18	19	20	19	18	5	20
Carpenter, maintenance	1.34	6	8	6	7	7	7	15	17	17	18	17	17	7	18
Overhead craneman	1.34	3	4	3	3	3	3	18	20	21	22	23	21	3	22
Assembler, structures	1.25	9	11	8	10	8	12	12	14	15	15	16	14	12	13
Drill grinder, hand	1.25	5	5	5	6	6	6	16	19	18	19	18	18	6	19
Truck driver, licensed equipment	1.16	8	12	11	13	11	16	13	13	12	10	13	12	16	9
Router operator	1.16	7	10	9	10	9	11	14	15	14	15	15	15	11	14
Riveter, aircraft	1.07	9	13	9	12	9	14	12	12	14	13	15	13	14	11
Tube bender	1.07	10	13	10	11	11	15*	11	12	13	14	13	13	15	10
Fork-truck operator	0.98	8	12	11	13	10	13	13	13	12	10	14	14	13	12
Cable splicer, hand	0.98	6	7	5	11	7	5	15	18	18	14	17	16	9	16
Saw operator, cut-off	0.89	11	14	11	13	12	17	10	11	12	10	11	11	17	8
Window washer	0.89	12	15	12	14	13	18	8	9	10	8	9	9	18	7
Janitor, regular	0.80	14	17	14	16	15	20	5	5	4	5	5	5	20	5
Helper, general	0.80	13	16	13	15	14	19	7	8	7	6	7	7	19	5

* Assigned by decision of evaluation engineer.

FIG. 13. Committee's key-job ranking for mental and visual demand.

WORKING CONDITIONS															
Payroll Order	Rate	Importance Order						Point Allocation						Final Assignment	
		A	B	C	D	E	Mean	A	B	C	D	E	Mean	Rank	Points
Tool and die maker	$1.59	12	12	12	12	11	19	10	10	9	11	11	10	19	10
Machinist, maintenance, rebuild	1.59	13	11	11	11	9	18	9	11	10	12	13	11	18	10
Airplane and engine maintenance mechanic	1.50	5	4	3	3	4	4	17	18	19	20	19	19	4	20
Heat treater, steel	1.50	3	2	2	3	3	3	20	21	20	20	20	20	3	21
Set-up man, turret lathes	1.41	12	12	12	13	12	20	10	10	9	10	10	10	20	10
Electrician, maintenance	1.41	10	9	8	8	6	14	12	13	14	15	16	14	14	10
Carpenter, maintenance	1.34	9	7	6	7	6	9	13	15	16	16	16	15	9	15
Overhead craneman	1.34	11	10	9	9	9	17	11	12	13	14	13	13	17	10
Assembler, structures	1.25	(12)	8	7	7	7	11	(10)	14	15	16	15	15	11	13
Drill grinder, hand	1.25	8	9	9	10	10	15	14	13	13	13	12	13	15	10
Truck driver, licensed equipment	1.16	9	7	7	8	6	12	13	15	15	15	16	15	12	12
Router operator	1.16	1	1	1	1	1	1	22	24	23	25	24	24	1	25
Riveter, aircraft	1 07	4	4	4	4	4	5	18	18	18	19	19	18	5	19
Tube bender	1.07	10	10	10	10	8	16	12	12	12	13	14	13	16	10
Fork-truck operator	0.98	7	7	7	7	7	10	15	15	15	16	15	15	10	14
Cable splicer, hand	0.98	6	6	5	5	5	7	16	16	17	18	18	17	7	17
Saw operator, cut-off	0.89	7	7	8	7	8	13	15	15	14	16	14	15	13	11
Window washer	0.89	2	3	2	2	2	2	21	19	20	21	21	21	2	23
Janitor, regular	0.80	4	5	4	4	4	6	18	17	18	19	19	18	6	18
Helper, general	0.80	8	7	7	6	6	8	14	15	15	17	16	16	8	16

FIG. 14. Committee's key-job ranking for working conditions.

UNAVOIDABLE HAZARDS

Payroll Order	Rate	Importance Order						Point Allocation						Final Assignment	
		A	B	C	D	E	Mean	A	B	C	D	E	Mean	Rank	Points
Tool and die maker	$1.59	9	11	10	10	10	18	10	10	10	11	10	10	18	10
Machinist, maintenance, rebuild	1.59	9	10	9	9	9	16 *	10	11	12	12	12	11	16	10
Airplane and engine maintenance mechanic	1.50	5	5	5	2	3	5 *	15	16	16	19	18	17	5	19
Heat treater, steel	1.50	7	7	6	5	6	8 *	13	14	15	16	15	15	8	16
Set-up man, turret lathes	1.41	9	11	10	11	10	20	10	10	10	10	10	10	20	10
Electrician, maintenance	1.41	1	1	1	1	1	5	25	25	28	26	25	25	1	25
Carpenter, maintenance	1.34	4	4	3	4	5	6	16	17	18	17	16	17	6	18
Overhead craneman	1.34	6	6	6	7	7	11	14	15	15	14	14	14	11	13
Assembler, structures	1.25	6	7	6	6	6	9	14	14	15	15	15	15	9	15
Drill grinder, hand	1.25	7	8	7	8	8	12	13	13	14	13	13	13	12	12
Truck driver, licensed equipment	1.16	8	8	8	9	8	14 *	12	13	13	12	13	12	14	10
Router operator	1.16	4	4	3	4	3	4	16	17	18	17	18	17	4	20
Riveter, aircraft	1.07	7	7	6	6	6	10 *	13	14	15	15	15	14	10	14
Tube bender	1.07	7	8	9	8	9	15	13	13	12	13	12	12	15	10
Fork-truck operator	0.98	5	6	6	7	6	7	15	15	15	14	15	15	7	17
Cable splicer, hand	0.98	8	9	8	8	7	13	12	12	13	13	14	13	13	11
Saw operator, cut-off	0.89	3	3	4	3	4	3	17	18	17	18	17	18	3	21
Window washer	0.89	2	2	2	2	2	2	20	19	20	19	21	20	2	23
Janitor, regular	0.80	9	11	10	11	10	19 *	10	10	10	10	10	10	19	10
Helper, general	0.80	8	10	9	10	9	17	12	11	12	11	12	11	17	10

* Selected by decision of evaluation engineer.

FIG. 15. Committee's key-job ranking for unavoidable hazards.

other cases, when the committee as a whole is unable to agree on a relationship, it may be referred to the job-evaluation department for further study and final decision. Such cases are starred on the key ranking sheets. There will be other occasions when the committee's final decision varies widely from the average decisions of the individual members. A general discussion often raises points whose full significance is realized only by comparing notes. These variations are not specifically noted on the key ranking sheets; an example will be found in the "responsibility for supervision" rating of the router operator (Fig. 11). Here the committee found, in comparing notes, that each member had noticed the router operators doing some supervisory work and had rated the factor higher than would be expected for a $1.16 job. Because of the unexpected unanimity of this observation, further investigation by the job-evaluation department was requested. It was found that the router operators actually spent most of their time setting up work for others and telling them how to do it. In the end their "responsibility for supervision" rating was placed at 13 points, 4 points greater even than the high average of 9 points in the members' original reports.

When the committee has completed its discussions and the results have all been added up by the job-evaluation department on a master factor-comparison chart (Fig. 16), it will be found that the total points for each job do not equal the current wage, as they theoretically should. This is because the values of each factor were determined by discussion, as described above, and not by arithmetic. The evaluation committee, knowing that a whole new wage structure built around new base pay rates would later be set up, made no attempt to keep the actual wages accurate. Therefore, the fact that the total points on the chart run higher than present wages is meaningless. On the other hand, the fact that the *ranking* of several jobs varies on the chart from their original pay ranking is highly significant. The whole procedure of the committee having been aimed at establishing correct relationships, the new rankings are in all probability accurate. Therefore, the discrepancies in ranking show that, although these same key jobs were carefully chosen because their

COMMITTEE'S KEY-JOB FACTOR VALUES

Job Title	Mentality		Experience and Training		Complexity of Duties		Responsibility for Results		Responsibility for Supervision		Physical Effort		Mental and Visual Demand		Working Conditions		Unavoidable Hazards		Relative Evaluation	
	Rank	Points	Rank	Points	Rank	Points	Rank	Points	Rank	Points	Rank	Points	Rank	Points	Rank	Points	Rank	Points	Rank	Points
Machinist, maintenance, rebuild	2	28	2	55	2	28	2	38	1	23	18	11	2	23	18	10	16	10	1	226
Tool and die maker	1	30	1	60	1	30	4	36	9	9	19	10	1	25	19	10	18	10	2	220
Electrician, maintenance	3	27	4	48	5	25	8	30	4	14	12	17	5	20	14	10	1	25	3	216
Airplane and engine maintenance mechanic	4	26	6	40	4	26	3	37	2	18	16	13	8	17	4	20	5	19	4	216
Heat treater, steel	5	25	3	50	6	24	5	35	6	12	14	15	10	15	3	21	8	16	5	213
Carpenter, maintenance	7	22	7	38	7	22	11	24	3	15	6	23	7	18	9	15	6	18	6	205
Set-up man, turret lathes	6	24	5	45	3	27	6	33	7	11	20	10	4	21	20	10	20	10	7	191
Assembler, structures	8	20	8	36	8	20	10	26	8	10	8	21	12	13	11	13	9	15	8	174
Router operator	13	10	15	15	14	12	12	23	5	13	1	30	11	14	1	25	4	20	9	162
Overhead craneman	12	13	11	23	9	18	1	40	10	5	17	12	3	22	17	10	11	13	10	156
Drill grinder, hand	9	18	9	32	10	19	13	21	10	5	15	14	6	19	15	10	12	12	11	150
Riveter, aircraft	10	16	10	25	11	16	14	19	10	5	5	24	14	11	5	19	10	14	12	149
Fork-truck operator	17	8	16	14	13	13	9	28	10	5	10	19	13	12	10	14	7	17	13	130
Tube bender	11	15	12	20	12	15	15	17	10	5	2	28	15	10	16	10	15	10	14	130
Truck driver, licensed equipment	16	7	14	16	15	11	7	31	9	9	7	22	16	9	12	12	14	10	15	127
Cable splicer, hand	14	9	13	18	16	10	16	15	10	5	4	25	9	16	7	17	13	11	16	126
Window washer	18	5	18	10	18	7	18	10	10	5	3	26	18	7	2	23	2	23	17	116
Saw operator, cut-off	15	9	17	12	17	8	17	12	10	5	13	16	17	8	13	11	3	21	18	102
Janitor, regular	20	5	20	10	20	5	19	10	10	5	9	20	20	5	6	18	19	10	19	88
Helper, general	19	5	19	10	19	6	20	10	10	5	11	18	19	5	8	16	17	10	20	85

FIG. 16. Committee's final evaluation of key jobs.

pay relationships were agreed to be correct, they are not actually rated fairly. Thus the value of job-evaluation methods is demonstrated even before the evaluation plan is complete.

The job-evaluation department can do all the work from now on, the committee having finished its assignment of relating the key-job factors. The committee should, however, continue to meet occasionally for study and checking of the work as it progresses.

Converting Factor Values to Evaluation Points

The "points" in Fig. 16 still represent cents paid for the different factors, even though the values have become somewhat modified by the committee in arriving at fair relationships. If a factor-comparison system were being used, the next step would be to readjust these figures so that the total points would equal the present wage of each job. The evaluation system recommended in this book, however, now shifts from factor-comparison to point-system methods (Fig. 1), making it unnecessary to readjust to accurate dollars and cents figures. If the committee is satisfied that the relationships are correct, they could be used as they are except for two practical objections: (1) the totals are close enough to actual dollar values so that it is psychologically difficult to think of them as abstract point values; (2) the factor points are not distributed evenly enough for simplicity of handling in later stages of the work.

These objections can be overcome by first multiplying all figures by 2, as shown in Fig. 17, then making adjustments that regroup the figures for simplicity, taking great care not to change their essential relationships. The result of this manipulation is seen in Fig. 19. Note that, although the point values of all factors have been adjusted to multiples of 5, their essential relationships have not been altered from those shown in Figs. 16 and 17. For instance, the jobs with the five highest mentality ratings in Fig. 17 (28, 30, 27, 26, and 25 points) still retain the highest rating (65 points) in Fig. 19; the next four (22, 24, 20, and 18 points) are each adjusted to 50 points, and so on down the line.

These final adjustments are not made arbitrarily but result

KEY-JOB FACTOR VALUES—DOUBLED

Job Title	Mentality	Experience and Training	Complexity of Duties	Responsibility for Results	Responsibility for Supervision	Physical Effort	Mental and Visual Demand	Working Conditions	Unavoidable Hazards	Relative Evaluation
	Points	Points	Points	Points	Points	Points	Points	Points	Points	Points
Machinist, maintenance, rebuild	56	110	56	76	46	22	46	20	20	452
Tool and die maker	60	120	60	72	18	20	50	20	20	440
Electrician, maintenance	54	96	50	60	28	34	40	20	50	432
Airplane and engine maintenance mechanic	52	80	52	74	36	26	34	40	38	432
Heat treater, steel	50	100	48	70	24	15	30	42	32	426
Carpenter, maintenance	44	76	44	48	30	46	36	30	36	410
Set-up man, turret lathes	48	90	54	66	22	20	42	20	20	382
Assembler, structures	40	72	40	52	20	42	26	26	30	348
Router operator	20	30	24	46	26	60	28	50	40	324
Overhead craneman	26	46	36	80	10	24	44	20	26	312
Drill grinder, hand	36	64	38	42	10	28	36	20	24	300
Riveter, aircraft	32	50	32	38	10	48	22	38	28	298
Fork-truck operator	16	28	26	56	10	38	24	28	34	260
Tube bender	30	40	30	34	10	54	20	20	20	260
Truck driver, licensed equipment	14	32	22	62	18	44	18	24	20	254
Cable splicer, hand	18	36	20	30	10	50	32	34	22	252
Window washer	10	20	14	20	10	52	14	46	46	232
Saw operator, cut-off	18	24	16	24	10	32	16	22	42	204
Janitor, regular	10	20	10	20	10	40	10	36	20	176
Helper, general	10	20	12	20	10	36	10	32	20	170

FIG. 17. Committee's key-job point assignments, doubled.

from careful definition of the factor degrees as described in the following pages.

Establishing the Degrees of Each Factor

The degrees of a factor are the specific requirements that define how much one job differs from another within that particular factor. The lowest degree of "mentality," for example, might be the ability to read and write; the highest might be a graduate-school training; and grade school, high school, and college diplomas would be intermediate degrees. For practical use the degrees must be few enough, and widely enough spaced along the point scale, so that they can be standardized and clearly distinguished from one another; and each degree must be fitted to a definite number of points. Everyone who will work on the assignment of deciding how many standard degrees will be used for each factor and how many points should be assigned to each degree should understand the principles involved. In brief, these principles are:

1. The factor relationships determined by the committee are the basic evaluation standard. All degree definitions and every assignment of a job to a degree must conform to this standard. This basic standard is established for every factor of every job in Fig. 17. If a job rates more points than another in Fig. 17 for a certain factor, it must never be assigned to a lower degree of that factor. Practical experience has shown, however, that there is no harm in lumping several of the key jobs into a single degree of any factor, even though the jobs' point values for that factor may vary somewhat.

2. The above standard must not be interpreted as preventing point assignments higher than those of the key jobs. Though none of the factory key jobs in Fig. 17 rates over 65 points for mentality, there might easily be jobs in the factory which deserve a higher rating in this factor. When such a case confronts the evaluator who is using the plan to evaluate jobs, he should not have to invent a special non-standard degree to fit the case. Therefore, one or more standard degrees should be added above the key jobs to allow for jobs that may rate higher than any of the key jobs in the particular factor.

3. The lowest degree of each factor must carry at least as many points as shown for the lowest-rated job in Fig. 17. As developed thus far, the system assures a decent relative wage to the worker at the bottom of the scale because the points for his job are anchored to the existing wage rate, which labor representatives have agreed is fairly related to the wage rates of other key jobs. Several apparent discrepancies in Fig. 17, such as points allotted to the general helper for experience and supervision, even though his job requires no experience or supervision of others, are actually adjustments to keep his job in line with the minimum-wage principle. For this reason they must not be disturbed.

With the foregoing principles in mind, the job-evaluation department can build a chart of factor degrees with corresponding evaluation points, similar to Fig. 18. It will take a lot of work and several trials to obtain a chart in which the point assignments are grouped into definitely differentiated degrees, yet still maintain the relationships established by the committee. Each trial chart must be checked by making from it a tabulation (Fig. 19) that can be compared directly with Fig. 17. Trials must be made until the two tabulations are in essential agreement on every point.

Defining Factor Degrees

The evaluation points assigned to the key jobs in the final key-job point chart (Fig. 19) are basic data that the job-evaluation department can use in standardizing the definition of each factor degree. For example, the industrial engineers, now knowing which key jobs have been rated at different degrees of "mentality," can make a detailed spot study of the jobs, look up records on the educational backgrounds of the people who hold them, and make comparisons with other job-evaluation plans. This study will reveal quite specifically how much education is required for the key jobs that are placed in each degree on the chart. The various academic questionnaires such as "aptitude" tests, though time-consuming and often inconclusive, might also be used for determining the degree of education required by each job.

Degree	Mentality	Experience and Training	Complexity of Duties	Responsibility for Results	Responsibility for Supervision	Physical Effort	Mental and Visual Demand	Working Conditions	Unusual Hazards
9		*160 points*							
8		*140 points* Tool and die maker							
7	*100 points*	*120 points* Machinist, maintenance, rebuild			*90 points*	*70 points* Router operator; Tube bender.			
6	*80 points*	*100 points* Airplane and engine maintenance mechanic; Heat treater, steel; Set-up man, turret lathes, Electrician, maintenance; Carpenter, maintenance.	*80 points*	*100 points* Overhead craneman.	*70 points*	*55 points* Cable splicer, hand; Window washer.			
5	*65 points* Tool and die maker; Heat treater, steel; Electrician, maintenance; Machinist, maintenance rebuild; Airplane and engine maintenance mechanic.	*80 points* Assembler, structures; Drill grinder, hand, Riveter, aircraft	*65 points* Tool and die maker; Machinist, maintenance, rebuild, Airplane and engine maintenance mechanic, Set-up man, turret lathes	*80 points* Tool and die maker; Machinist, maintenance, rebuild; Set-up man, turret lathes.	*50 points* Machinist, maintenance, rebuild.	*45 points* Carpenter, maintenance; Assembler, structures; Truck driver, licensed equipment, Riveter, aircraft; Fork-truck operator; Janitor, regular; Helper, general	*50 points* Tool and die maker; Machinist, maintenance, rebuild; Set-up man, turret lathes; Overhead craneman.	*50 points*	*50 points* Electrician, maintenance; Window washer.
4	*50 points* Set-up man, turret lathes; Carpenter, maintenance; Assembler, structures; Drill grinder, hand.	*60 points* Router operator, Truck driver, licensed equipment, Overhead craneman.	*50 points* Heat treater, steel, Electrician, maintenance; Carpenter, maintenance, Assembler, structures; Overhead craneman; Drill grinder, hand.	*60 points* Airplane and engine maintenance mechanic; Heat treater, steel; Electrician, maintenance; Assembler, structures; Truck driver, licensed equipment; Fork-truck operator.	*40 points*	*35 points* Saw operator, cut-off; Airplane and engine maintenance mechanic; Heat treater, steel; Electrician, maintenance; Drill grinder, hand.	*40 points* Airplane and engine maintenance mechanic; Electrician, maintenance; Carpenter, maintenance; Drill grinder, hand; Cable splicer, hand.	*35 points* Airplane and engine maintenance mechanic; Heat treater, steel; Router operator; Window washer.	*35 points* Machinist, maintenance rebuild; Carpenter, maintenance; Router operator; Saw operator, cut-off.
3	*35 points* Overhead craneman; Tube bender; Riveter, aircraft.	*40 points* Fork-truck operator; Tube bender; Cable splicer, hand.	*35 points* Truck driver, licensed equipment; Router operator; Riveter, aircraft; Tube bender; Fork-truck operator.	*40 points* Carpenter, maintenance; Drill grinder, hand; Router operator; Riveter, aircraft.	*30 points* Airplane and engine maintenance mechanic; Heat treater, steel; Electrician, maintenance; Carpenter, maintenance.	*25 points* Machinist, maintenance rebuild; Overhead craneman; Tool and die maker.	*30 points* Heat treater, steel; Assembler, structures; Router operator; Riveter, aircraft; Fork-truck operator.	*25 points* Carpenter, maintenance; Assembler, structures; Truck driver, licensed equipment; Riveter, aircraft; Fork-truck operator; Cable splicer, hand; Saw operator, cut-off; Janitor, regular; Helper, general.	*25 points* Heat treater, steel; Overhead craneman; Assembler, structures; Riveter, aircraft; Fork-truck operator; Tool and die maker.
2	*20 points* Truck driver, licensed equipment; Router operator; Fork-truck operator; Cable splicer, hand; Saw operator, cut-off.	*30 points* Window washer; Saw operator, cut-off.	*20 points* Cable splicer, hand; Saw operator, cut-off.	*20 points* Tube bender; Cable splicer, hand; Saw operator, cut-off.	*15 points* Tool and die maker; Set-up man, turret lathes; Assembler, structures; Truck driver, licensed equipment; Router operator.	*15 points* Set-up man, turret lathes.	*20 points* Truck driver, licensed equipment; Tube bender; Saw operator, cut-off; Window washer.	*15 points* Tool and die maker; Machinist, maintenance rebuild; Set-up man, turret lathes; Electrician, maintenance; Overhead craneman; Drill grinder, hand; Tube bender.	*15 points* Machinist, maintenance rebuild; Set-up man, turret lathes; Drill grinder, hand; Truck driver, licensed equipment; Tube bender; Cable splicer, hand; Janitor, regular; Helper, general.
1	*10 points* Window washer; Janitor, regular; Helper, general.	*15 points* Janitor, regular; Helper, general.	*10 points* Window washer; Janitor, regular; Helper, general.	*10 points* Window washer; Janitor, regular; Helper, general.	*5 points* Overhead craneman; Drill grinder, hand; Riveter, aircraft; Tube bender; Window washer; Fork-truck operator; Cable splicer, hand; Saw operator, cut-off; Janitor, regular; Helper, general.	*5 points*	*10 points* Janitor, regular; Helper, general.	*5 points*	*5 points*

FIG. 18. Key-job point chart.

FINAL KEY-JOB FACTOR VALUES AND GRADING

Job Title	Mentality	Experience and Training	Complexity of Duties	Responsibility for Results	Responsibility for Supervision	Physical Effort	Mental and Visual Demand	Working Conditions	Unavoidable Hazards	Total Points	Grade	Point Range
	Points	Points	Points	Points	Points	Points	Points	Points	Points			
Machinist, maintenance, rebuild	65	120	65	80	50	25	50	15	35	505	1	Over 470
Tool and die maker	65	140	65	80	15	25	50	15	25	480	1	
Electrician, maintenance	65	100	50	60	30	35	40	15	50	445	2	436–470
Airplane and engine maintenance mechanic	65	100	65	60	30	35	40	35	15	440	2	
Heat treater, steel	65	100	50	60	30	35	30	35	25	430	3	401–435
Carpenter, maintenance	50	100	50	40	30	45	40	25	35	415	3	
Set-up man, turret lathes	50	100	65	80	15	15	50	15	15	405	3	
Assembler, structures	50	80	50	60	15	45	30	25	25	380	4	366–400
Router operator	20	60	35	40	15	70	30	35	35	340	5	331–365
Overhead craneman	35	60	50	100	5	25	50	15	25	365	5	
Drill grinder, hand	50	80	50	40	5	35	40	15	15	330	6	296–330
Riveter, aircraft	35	80	35	40	5	45	30	25	25	320	6	
Fork-truck operator	20	40	35	60	5	45	30	25	25	285	7	246–295
Tube bender	35	40	35	20	5	70	20	15	15	255	7	
Truck driver, licensed equipment	20	60	35	60	15	45	20	25	15	295	7	
Cable splicer, hand	20	40	20	20	5	55	40	25	15	240	8	211–245
Window washer	10	30	10	10	5	55	20	35	50	225	8	
Saw operator, cut-off	20	30	20	20	5	35	20	25	35	210	9	176–210
Janitor, regular	10	15	10	10	5	45	10	25	15	145	10	Up to 176
Helper, general	10	15	10	10	5	45	10	25	15	145	10	

FIG. 19. Final key-job point assignments and grading.

In the typical plans (Chapters 3 and 4), it will be found that many of the definitions of degrees are completely self-explanatory. Study of the following notes on some factors where the definition of degrees is not self-explanatory, combined with a rereading of the paragraphs on the selection of factors (near the beginning of this chapter), will throw more light on the reasoning behind the degree definitions.

Notes on Defining Degrees of Mentality

It is important to add "or equivalent" to every definition which requires a certain amount of formal education. Otherwise the job requirements may exclude good men who have obtained sufficient knowledge through self-education, correspondence courses, or by other means.

Notes on Defining Degrees of Experience and Training

It is not practical to break the experience requirement down into very short periods such as two weeks, one month, or six weeks. People do not learn in such specific times as those. It is better to use longer and less definite intervals, which correspond more realistically to the actual progress of employees: for example, up to one month, one to three months, six months to one year, or one to two years. These times must include any training courses which are too specialized for inclusion with the "mentality" factor. The "on-the-job" learning times can be established only by obtaining them from supervisors. Any changes from the supervisors' figures that are made by the committee or the industrial engineers to standardize the evaluations must be recognized as inaccuracies and held to a minimum.

Notes on Defining Degrees in Complexity of Duties

The degree of complexity can be judged by asking the following questions:

1. How much variety is there in the work?
2. How much independent planning does the job require of the employee who holds it?

3. What is the character of the operations performed in the job? (Simple short-cycle work? Simple operations? Difficult or unusual operations?)
4. Is the work standardized?
5. Are instructions available?
6. How thoroughly is the finished work checked or inspected?
7. How close is the supervision?

Defining the Degrees of Responsibility Factors

These factors are difficult to measure. The problem is to appraise not only the size of the loss that could occur but also how often it could occur as a result of incompetence or negligence of the person on the job. For instance, a night watchman may be responsible for millions of dollars' worth of property, while a machine operator can at most be responsible for ten or twenty thousand dollars' worth of equipment, yet the machine operator carries a greater load of responsibility because a large direct loss would result from a mistake that he could make at any time, whereas the watchman's responsibility is for remote contingencies, not daily operations. Likewise an airport signal-tower operator is in one sense responsible for many airplanes and many lives, yet his responsibility is indirect and therefore not so great as that of a pilot who brings in only one airplane.

Responsibility for results cannot, of course, be measured in terms of actual average losses. A low-grade machinist will spoil more tools and material than an experienced man, but the experienced man has more responsibility because he is expected to turn out more work with less loss.

For the reasons just given, no way has yet been found to measure the responsibility factors with scientific accuracy. In order to try to measure them, various companies have constructed such devices as elaborate tables, cost analyses, and graphs of normal probability. To the authors' knowledge, however, none of these systems has yet been developed to the point of practicality. The simple factor description and degree definitions given in the typical job-evaluation plans (Chapter 2) actually result in a more satisfactory evaluation than any of the so-called scientific methods.

Defining Degrees of Physical Effort

The degree definitions for this factor, as given in the typical factory evaluation plan, are less definite than those that would be used in a company where physical effort is more important. If it is desired to do so, this factor can be evaluated scientifically by measuring the calories expended during an eight-hour day by people working at the various jobs or by making careful time-and-motion studies of every job.

Setting up Point Values for a Clerical and Technical Job-Evaluation Plan

The procedure for arriving at point ratings in a clerical and technical plan differs from the method just described for the factory plan only in that slightly different factors are used. Therefore, no separate procedure is included here.

Labor Grades

All companies that have complete job-evaluation systems also use a set of standard labor grades into which all jobs are fitted, according to their point evaluations. It is recommended that a set of ten factory labor grades should be established. Ten grades are enough so that a reasonable number of promotions will be possible. At the same time the number of rates is small enough to leave room for a merit rating system between labor grades. Also, the fact that ten grades can be handled in one column by a tabulating machine, using 0 for 10, simplifies the bookkeeping. Figure 19 shows the labor grade to which each factory key job is assigned.

For clerical and technical evaluations, additional grades are required at both the top and the bottom of the scale. Inexperienced young people may be hired below the standard minimum wage, for training purposes, as the learning time for even the lowest grade in some kinds of technical work is too long to start them at the regular rate. On the other hand, pay rates of the higher-ranking office jobs must be greater than those of the highest non-supervisory factory jobs, since technical work often requires years of specialized education for which the employees must be repaid.

For consistency throughout the organization it is a good idea to give corresponding labor-grade numbers to office jobs whose pay is equal to that of factory jobs. A system like this may be used:

Factory Labor Grades	Clerical and Technical Labor Grades
	C
	B
	A
1..........	1
2..........	2
3..........	3
4..........	4
5..........	5
6..........	6
7..........	7
8..........	8
9..........	9
10..........	10
	M

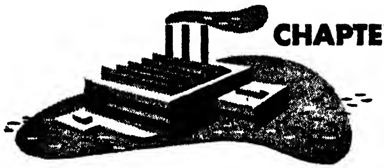
The letters are used for the additional office rates partly to prevent any possible confusion with factory rates and partly to maintain the single column for tabulating purposes.

Completing the Plan

The completed plan is a list of the labor grades with their point assignments, descriptions of the factors, and definitions and point assignments for each degree of each factor. Armed with this information, and using the procedure outlined in Chapter 6, any good industrial engineer can make an accurate point evaluation of any job in the company and assign it to the proper labor grade.

The following typical plans for factory evaluations and for clerical and technical evaluations are based on those used by Boeing Aircraft Company, the clerical and technical plan being an adaptation of the National Metal Trades Association, or "Kress plan." The same general type of plan will apply equally well to any other large organization with a complicated structure. Many details, of course, will have to be adjusted to the individual company. In adjusting the plan to fit a specific organization, it should be remembered that the relative weighting of the factors is just as important as the definition of degrees within the factors. For example, in an organization doing heavy work like stevedoring or mining, physical effort and working conditions will rate considerably more points than they do in the plans given here, and mentality and experience considerably less, whereas in a company manufacturing instruments or doing other fine precision work the mental and visual effort factor would be weighted more heavily. The plans given here were chosen partly for their proved practicality and partly because they are for the general type of company which is most likely to need a point evaluation system.

It will be noted that the point values in the two plans do not correspond in any way. This lack of correlation is due to the fact that the science of job evaluation has not yet progressed to the point where different factor weightings can be accounted for in a single plan. In the future, it may be possible to overcome this difficulty and develop a combined plan to cover factory, office, and even supervisory jobs. No such combination, however, has yet been worked out in practical detail.



CHAPTER 3

TYPICAL FACTORY JOB EVALUATION PLAN

LABOR GRADES

Grade 1	over 470 points
Grade 2	436–470 points
Grade 3	401–435 points
Grade 4	366–400 points
Grade 5	330–365 points
Grade 6	296–329 points
Grade 7	246–295 points
Grade 8	211–245 points
Grade 9	176–210 points
Grade 10	up to 176 points

EVALUATION PROCEDURE

The industrial engineer will:

1. Write up the job and describe the content of each factor in that job.
2. Match the job's factor descriptions with those on the following pages, assigning proper degrees and point values.
3. Total the assigned point values of all factors.
4. Determine the labor grade of the job by comparing its total point score with the above list.

TYPICAL FACTORY JOB-EVALUATION PLAN

MENTALITY

Divide this factor into two parts for estimating it: (1) formal education, (2) general knowledge. Consider the background essential to the performance of the duties of the job, regardless of whether this background may be acquired by formal education, by outside study, or by experience in related work. Analyze the requirements of the job, not the formal education of the person or persons performing the job.

Degree 1, 10 Points

Ability to follow written or verbal instructions plus addition and subtraction of simple numbers. Equivalent to a grammar-school education. Typical jobs: window washer; janitor, regular; helper, general.

Degree 2, 20 Points

Use simple arithmetic such as decimals and fractions; interpret simple drawings or production illustrations as necessary for the identification of parts. Accuracy, mental alertness, and adaptability to office routines. Equivalent to two years of high school. Typical jobs: router operator; fork-truck operator; cable splicer, hand; saw operator, cut-off; truck driver, licensed equipment.

Degree 3, 35 Points

Use some shop mathematics as applied to simple layout of shop methods; some trade knowledge in a specialized field, process, or mechanical operation; familiarity with a variety of precision measuring instruments or knowledge of an elementary science. Knowledge of high-school mathematics; correct use of English and grammar; accuracy in counting, checking, and posting prewritten data. Equivalent to four years of high school or two years of high school plus trades or special training. Typical jobs: overhead craneman; tube bender; riveter, aircraft.

Degree 4, 50 Points

Use of fairly complicated drawings or shop mathematics, equivalent to algebra and geometry. Must be able to interpret standard types of blueprints and have a knowledge of standard shop methods and procedures; or understand the operation of office equipment such as bookkeeping, calculating, tabulating machines, or know stenography. Equivalent to four years of high school plus specialized training in science of business procedure, or four years of high school plus additional trades training. Typical jobs: set-up man, turret lathes; carpenter, maintenance; assembler, structures; drill grinder, hand.

Degree 5, 65 Points

Use sufficient shop mathematics or a science to solve problems of advanced complexity requiring originality and ingenuity to interpret complex blueprints, lofting data; or have a basic technical knowledge sufficient to deal with technical problems. Equivalent to four years of high school plus four years' apprenticeship or two years of technical university education. Typical jobs: tool and die maker; heat treater, steel; electrician, maintenance; machinist, maintenance, rebuild; airplane and engine maintenance mechanic.

Degree 6, 80 Points

Requires basic technical knowledge sufficient to deal with complicated and involved engineering problems, or a broad knowledge of a specialized field such as cost accounting, finance, or business administration. Equivalent to a university or technical-school degree. Typical jobs: engineer, power plant; inspector, material test.

Degree 7, 100 Points

Knowledge of an advanced or specialized field such as engineering, technical or general research. Usually equivalent to a college degree plus two years of post-graduate study. Typical jobs: chemist, research; engineer, tooling research.

Experience and Training

Use this factor to record the time it usually takes an individual to acquire the ability needed for normal production and effective performance of the job's other duties. Give points for the experience factor *over and above* those given for education. In rating this factor, remember that experience is of two kinds: (*a*) previous experience on related work, either within or without the organization, or on lesser jobs, directly related to the productive attainment of this job; and (*b*) the breaking-in time, including special training courses, or period of adjustment, required to reach normal production. This factor does not include time spent in jobs due to lack of turnover ahead. Use it to weigh only the actual learning time.

Degree 1, 15 Points

Up to one month. Typical jobs: janitor, regular; helper, general.

Degree 2, 30 Points

Three to six months. Typical jobs: window washer; saw operator, cut-off.

Degree 3, 40 Points

Six to twelve months. Typical jobs: fork-truck operator; tube bender; cable splicer, hand.

Degree 4, 60 Points

One to two years. Typical jobs: router operator; truck driver, licensed equipment; overhead craneman.

Degree 5, 80 Points

Two to three years. Typical jobs: assembler, structures; drill grinder, hand; riveter, aircraft.

Degree 6, 100 Points

Three to five years. Typical jobs: heat treater, steel; electrician, maintenance; set-up man, turret lathes; carpenter, maintenance; airplane and engine maintenance mechanic.

Degree 7, 120 Points

Five to seven years. Typical job: machinist, maintenance, rebuild.

Degree 8, 140 Points

Seven to ten years. Typical job: tool and die maker.

Degree 9, 160 Points

Over ten years. Typical job: major tool designer.

Complexities

Use this factor to appraise the job's requirements for independent action, exercise of judgment, and creative effort in devising new methods or new products. Rate a job high in this factor if it requires a great deal of judgment and ability to resolve complex data or problems into units that can be evaluated and compared. Rate the job low in this factor if it is circumscribed by standard practice.

Degree 1, 10 Points

Requires the performance of routine duties involving few decisions, ability to understand and follow simple instructions, and use of simple equipment. Put repetitive jobs offering few or no alternative methods in this degree. Typical jobs: window washer; janitor, regular; helper, general.

Degree 2, 20 Points

Requires an application of clearly prescribed standard practices and the ability to work from detailed instructions. May require simple analysis of predetermined data and involve the exercise of some judgment. Typical jobs: cable splicer, hand; saw operator, cut-off.

Degree 3, 35 Points

Requires the ability to plan and perform operations or to make analyses of facts from which it is easy to determine logical answers. Make general decisions as to quality, tolerances, operation and set-up sequences; or handle routine tabulations, computations, and arithmetical studies. Typical jobs: router operator; riveter, aircraft; tube bender; fork-truck operator; truck driver, licensed equipment.

Degree 4, 50 Points

Duties require ability to plan and perform unusual or difficult work where instructions are available on general operation methods only; ability to evaluate factors, results, data, or trends; or ability to draw sound conclusions. Decisions, however, are generally based on precedent, standardized procedure, or company policy. Typical jobs: heat treater, steel; electrician, maintenance; carpenter, maintenance; assembler, structures; overhead craneman; drill grinder, hand.

Degree 5, 65 Points

Requires ability to work independently towards general results, making the analyses and evaluations necessary to set up methods or procedures. Duties require, to some extent, the solution of problems not covered by instructions, or the use of considerable ingenuity, initiative, and judgment in devising new methods. Typical jobs: tool and die maker; set-up man, turret lathes; machinist, maintenance, rebuild; airplane and engine maintenance mechanic.

Degree 6, 80 Points

Requires the frequent exercise of independent judgment, analysis of general trends, or application of specialized technical knowledge. Requires outstanding ability to deal with complex problems that demand a high degree of ingenuity, initiative, and judgment. Typical job: inspector, special assignments.

Responsibility for Results

Use this factor to measure probable amount and frequency of loss to company through incorrect decisions or other errors on the job. Such losses may include accidental damage to equipment, tools, or products; lost time; or hold-up of production. Consider only losses for which the employee would be wholly responsible. In estimating the cost of each loss, use the expected average loss from that kind of error, not a maximum or minimum figure.

Degree 1, 10 Points

A minimum of responsibility since errors can be easily and quickly detected. Possible poor decisions involve mainly the loss of employee working time and cause only minor confusion. Probable cost of losses is negligible. Typical jobs: window washer; janitor, regular; helper, general.

Degree 2, 20 Points

Errors are usually detectable in succeeding operations, and poor decisions may cause confusion and delay resulting in minor losses. Correction may involve back-checking or minor rework. Most of work is inspected or checked. Typical jobs: tube bender; cable splicer, hand; saw operator, cut-off.

Degree 3, 40 Points

Errors may involve some loss of production, waste of material, damage to equipment; also working time of others may be affected. Most of work is not subject to immediate inspection or check. Typical jobs: carpenter, maintenance; drill grinder, hand; router operator; riveter, aircraft.

Degree 4, 60 Points

Errors may have serious results such as direct production loss or somewhat extensive damage. Poor decisions may affect methods, purchases, and manufacturing results. Work mostly confined within the company but not subject to verification or check. Typical jobs: heat treater, steel; electrician, maintenance; assembler, structures; fork-truck operator; airplane and engine maintenance mechanic; truck driver, licensed equipment.

Degree 5, 80 Points

Losses owing to employee's errors may at times be extensive because there is a high degree of responsibility for material, equipment, and processes. Decisions might affect standard cost and outside relationships. Work generally is not subject to inspection or check. Typical jobs: tool and die maker; machinist, maintenance, rebuild; set-up man, turret lathes.

Degree 6, 100 Points

Exceedingly high responsibility for immediate processes, material, or equipment. Job requires a high degree of cost consciousness. Errors may cause major expenditures for equipment, material, or production; or loss of customer accounts. Work is not subject to inspection or check, requires considerable accuracy or responsibility. Typical job: overhead craneman.

Responsibility for Supervision

Use this factor to measure how much responsibility goes with the job for directing and training people, for planning and scheduling work, and for efficient use of man-hours, equipment, and materials. Always consider both (*a*) type of supervision, which depends on the degree of responsibility for the functions noted above and the pay level of the employees supervised; and (*b*) number of people supervised.

Degree 1, 5 Points

Responsible for own work or for passing detailed information on to others. Typical jobs: overhead craneman; drill grinder, hand; riveter, aircraft; tube bender; window washer; fork-truck operator; cable splicer, hand; saw operator, cut-off; janitor, regular; helper, general.

Degree 2, 15 Points

Responsible for instructing and directing helpers or for helping lower-graded employees with the details of a particular or specialized function. Typical jobs: tool and die maker; set-up man, turret lathes; router operator; truck driver, licensed equipment; assembler, structures.

Degree 3, 30 Points

Part-time immediate supervision over a group of employees, usually within the same occupation. Not responsible for methods or discipline other than recommendations to improve ultimate work performance. Two to ten employees directed. Typical jobs: airplane and engine maintenance mechanic; heat treater, steel; electrician, maintenance; carpenter, maintenance.

Degree 4, 40 Points

Immediate supervision over a group. Responsible for assigning, reviewing, and checking the work of those in the group. Seldom more than fifteen employees supervised. Typical job: inspector A, subassembly.

Degree 5, 50 Points

Responsible for instructing, directing, and maintaining the work flow and discipline in a unit or large group; eliminating ordinary work difficulties according to outlined company policies or procedures. Seldom more than twenty-five persons supervised. Typical job: machinist, maintenance, rebuild.

Degree 6, 70 Points

Direct supervision over a department of moderate size or complexity and accountability for results in terms of discipline and method. However, responsibility for general results rests with next higher supervisor. Number of persons supervised will seldom exceed one hundred persons. Typical jobs: storekeeper; assistant foreman.

Degree 7, 90 Points

Direct supervision of a department with responsibility for costs, methods, and personnel. Typical job: foreman.

Physical Effort

Consider this factor as a means of measuring the intensity of physical effort together with the percentage of time the individual is normally under load. This factor includes muscular exertion, difficult work positions, and continuity of effort. It is based on normal requirements of the job only.

Degree 1, 5 Points

Light physical exertion requiring intermittent application such as sitting, standing, or walking. Typical job: night watchman.

Degree 2, 15 Points

Light physical effort required intermittently with light-weight materials or occasionally average-weight materials; or continuous sitting, standing, or walking. Operate machines where machine time exceeds the handling time. Typical job: set-up man, turret lathes.

Degree 3, 25 Points

Intermittent physical effort with average-weight material or continuous handling of light-weight material, usually short-cycle work requiring somewhat continuous activity or an occasional difficult work position. Typical jobs: machinist, maintenance, rebuild; overhead craneman; tool and die maker.

Degree 4, 35 Points

Occasional pushing and pulling or lifting of heavy materials or sustained physical effort with average-weight materials. Operate several machines where handling time equals total machine time. May involve difficult work positions. Typical jobs: saw operator, cut-off; heat treater, steel; electrician, maintenance; drill grinder, hand; airplane and engine maintenance mechanic.

Degree 5, 45 Points

Frequent pushing and pulling or lifting heavy materials or difficult work positions. Considerable physical effort exercised for short periods of time. Typical jobs: carpenter, maintenance; assembler, structures; riveter, aircraft; fork-truck operator; janitor, regular; helper, general; truck driver, licensed equipment.

Degree 6, 55 Points

Sustained or continuous physical exertion with average-weight materials or continuous difficult work positions. Typical jobs: cable splicer, hand; window washer.

Degree 7, 70 Points

Very hard work with constant physical strain. Constant pushing and pulling or lifting heavy materials or very difficult work positions. Typical jobs: router operator; tube bender.

Mental and Visual Effort

Use this factor to appraise the degree of concentrated coordination of mind and eye necessary for the job. Consider the volume of work and how sustained the required attention is. On involved jobs requiring close tolerances and sustained mental or visual application the factor is to be rated high; on intermittent jobs where there is no monotony or no great volume of detail, the rating of this factor will be low. Do not use this factor to measure the job's requirements for constructive thinking or planning; judge it by effort expenditure, pure and simple.

Degree 1, 10 Points

A minimum of mental or visual application in the performance of simple operations where the duties require attention only at intervals. Typical jobs: janitor, regular; helper, general.

Degree 2, 20 Points

Little mental application. Work seldom is mentally confining, or operation involves only the setting of the machine or process to complete a cycle. Typical jobs: truck driver, licensed equipment; saw operator, cut-off; window washer; tube bender.

Degree 3, 30 Points

Moderate mental application in the performance of variable operations where the flow of work is repetitive or where the operation requires a good deal of alertness. Sustained mental application for long periods of time is seldom required. Typical jobs: heat treater, steel; assembler, structures; router operator; riveter, aircraft; fork-truck operator.

Degree 4, 40 Points

Constant mental application to highly variable operations that have considerable detail, or concentrated attention on planning and laying out complex work. Typical jobs: electrician, maintenance; carpenter, maintenance; drill grinder, hand; cable splicer, hand; airplane and engine maintenance mechanic.

Degree 5, 50 Points

Constant mental application to the performance of work that requires extreme care and attention. Usually plan and lay out very involved and complex jobs. Typical jobs: tool and die maker; machinist, maintenance, rebuild; set-up man, turret lathes; overhead craneman.

Working Conditions

Use this factor to measure the disagreeableness of surroundings under which the job must be performed, when the conditions cannot be controlled by the individual. Include general conditions such as noise, dust, or extremes of temperature. Take into consideration disagreeable items, such as work positions, which directly affect the physical and mental comfort of an employee. Also consider such items as personal expense, shift work, or work in outlying locations.

Degree 1, 5 Points

Good working conditions with no disagreeable elements or factors. Typical job: receptionist.

Degree 2, 15 Points

Good working conditions occasionally subject to dirt, general factory noise, and occasional minor factors which may disturb the physical or mental well-being of the employee. Typical job: maintenance dispatcher.

Degree 3, 25 Points

Intermittent disagreeable working conditions due to disagreeable elements or combination of factors such as heat, cold, dampness, fumes, or vibration; intermittent schedule dead lines. Typical jobs: carpenter, maintenance; assembler, structures; truck driver, licensed equipment; riveter, aircraft; helper, general; fork-truck operator; cable splicer, hand; saw operator, cut-off; janitor, regular.

Degree 4, 35 Points

Continuous exposure to a disagreeable element or factor, or frequent exposure to several disagreeable elements as listed above. Typical jobs: heat treater, steel; airplane and engine maintenance mechanic; router operator; window washer.

Degree 5, 50 Points

Continuous exposure to more than one disagreeable element or factor, or to one unusually severe factor. Typical jobs: inspector, magnaflux; degreaser operator.

Unavoidable Hazards

Use this factor to weigh both accidental and health hazards connected with or surrounding the job, even though all safety devices have been installed and safety procedures are strictly regulated. Consider the material being handled, the machines or tools used, the position of work, and the possibility of accident, even though accident records do not indicate a definite probability.

Degree 1, 5 Points

Work is under conditions that preclude the possibility of accident. Typical job: personnel clerk.

Degree 2, 15 Points

Exposure to minor injuries such as slight abrasions, minor burns, cuts, or bruises. Health hazards negligible. Typical jobs: set-up man, turret lathes; drill grinder, hand; tube bender; cable splicer, hand; janitor, regular; helper, general; machinist, maintenance, rebuild; truck driver, licensed equipment.

Degree 3, 25 Points

Exposure to lost-time accidents such as broken bones or minor eye injuries. Some exposure to occupational disease, not of an incapacitating nature. Typical jobs: heat treater, steel; overhead craneman; assembler, structures; riveter, aircraft; fork-truck operator; tool and die maker.

Degree 4, 35 Points

Exposure to incapacitating accident or serious health hazards involving disability, such as loss of arm or leg, impairment of vision, or other unavoidable hazards necessitating removal to another occupation. Typical jobs: machinist, maintenance, rebuild; carpenter, maintenance; router operator; saw operator, cut-off.

Degree 5, 50 Points

Exposure to accidents or occupational disease that may result in total disability or death. Typical jobs: electrician, maintenance; window washer.

CHAPTER 4
TYPICAL CLERICAL AND TECHNICAL JOB EVALUATION PLAN

SALARY GRADES

Grade C	391–415 points	Grade 5	216–240 points
Grade B	366–390 points	Grade 6	191–215 points
Grade A	341–365 points	Grade 7	166–190 points
Grade 1	316–340 points	Grade 8	141–165 points
Grade 2	291–315 points	Grade 9	116–140 points
Grade 3	266–290 points	Grade 10	101–115 points
Grade 4	241–265 points	Grade M	85–100 points

EVALUATION PROCEDURE

The industrial engineer will:

1. Write up the job and describe the content of each factor in that job.
2. Match the job's factor descriptions with those on the following pages, assigning proper degrees and point values.
3. Total the assigned point values of all factors.
4. Determine the salary grade of the job by comparing its total point score with the above list.

TYPICAL CLERICAL AND TECHNICAL JOB-EVALUATION PLAN

Mentality

Divide this factor into two parts for estimating it: (1) formal education; (2) general knowledge. Consider the background essential to the performance of the duties of the job regardless of whether this background may be acquired by formal education, by outside study, or by experience in related work. Analyze the requirements of the job, not the formal education of the person or persons performing the job.

Degree 1, 15 Points

Knowledge of simple arithmetic, English and grammar. Accuracy in checking, posting, counting. Mental alertness and adaptability to office routines. Equivalent to four years of high school. Typical job: messenger.

Degree 2, 30 Points

Knowledge of stenography, business arithmetic, operation of office equipment such as typewriter, bookkeeping or calculating machines, tabulating equipment; simple blueprint reading, etc. Equivalent to four years of high school plus short specialized training. Typical jobs: tabulating-machine operator A; clerk C; stenographer A; typist A; key punch operator.

Degree 3, 45 Points

Knowledge of a specialized field such as cost accounting, drafting, foreign trade, statistics, time study, etc. Equivalent to four years of high school plus specialized training, such as night, trade, extension, or correspondence school courses equivalent to two years of college. Typical jobs: executive secretary; placement man, personnel; librarian A; major estimator B; lead technician A, motion picture laboratory.

Degree 4, 60 Points

Broad knowledge of a general technical field, such as chemical, civil, electrical, or mechanical engineering; accounting and finance, or business administration. Equivalent to four years of college or university. Typical jobs: methods engineer B; major estimator A; assistant group engineer, aircraft design; lead engineer, aircraft design; major engineer, layout, aircraft design; engineer, layout, aircraft design; detail engineer, aircraft design; junior engineer, aircraft design; senior auditor A, internal auditing.

Degree 5, 75 Points

Broad knowledge of an advanced and specialized field. Usually equivalent to one or two years of post-graduate work. Typical job: lead instructor, engineering school.

Degree 6, 100 Points

Reserved for jobs which may require the equivalent of a Ph.D. degree. No present jobs are in this degree.

Experience and Training

Use this factor to record the time it usually takes an individual to acquire the ability needed for normal production and effective performance of the job's other duties. Give points for the experience factor *over and above* those given for education. In rating this factor, remember that experience is of two kinds: (*a*) previous experience on related work, either within or without the organization, or on lesser jobs, directly related to the productive attainment of this job; and (*b*) the breaking-in time, including special training courses, or period of adjustment, required to reach normal production. This factor does not include time spent in jobs owing to lack of turnover ahead. Use it to weigh only the actual learning time.

Degree 1, 20 Points

Up to three months. Typical jobs: key punch operator; messenger.

Degree 2, 40 Points

Three to twelve months. Typical jobs: junior engineer, aircraft design; librarian A; clerk C; stenographer A; typist A.

Degree 3, 60 Points

One to three years. Typical jobs: placement man, personnel; engineer, layout, aircraft design; detail engineer, aircraft design; tabulating machine operator A.

Degree 4, 80 Points

Three to five years. Typical jobs: methods engineer B; major engineer, layout, aircraft design; major estimator A; major estimator B; executive secretary; senior auditor A, internal auditing.

Degree 5, 100 Points

Five to seven years. Typical jobs: assistant group engineer, aircraft design; lead engineer, aircraft design.

Degree 6, 125 Points

Seven to ten years. Typical job: lead technician A, motion-picture laboratory.

Degree 7, 150 Points

Reserved for future jobs that may require more than ten years of experience. No present jobs in this degree.

COMPLEXITY OF DUTIES

Use this factor to appraise the job's requirements for independent action, exercise of judgment, and creative effort in devising new methods or new products. Rate a job high in this factor if it requires a great deal of judgment, and ability to resolve complex data or problems into units that can be evaluated and compared. Rate the job low in this factor if it is circumscribed by standard practice.

Degree 1, 15 Points

Simple routine duties, requiring the use of only a few definite procedures and little individual judgment, the work either being performed under immediate supervision or involving little choice as to method of performance. Typical jobs: key punch operator; messenger.

Degree 2, 30 Points

Duties are clearly prescribed by standard practice but require the use of several procedures and the making of minor decisions requiring some judgment. Typical jobs: clerk C; stenographer A; typist A.

Degree 3, 45 Points

Duties involve an intensive knowledge of a restricted field and require the use of a wide range of procedures and the analysis of facts to determine what action, within the limits of standard practice, should be taken. Typical jobs: detail engineer, aircraft design; junior engineer, aircraft design; tabulating-machine operator A; methods engineer B; major estimator A; major estimator B; executive secretary; placement man, personnel; librarian A.

Degree 4, 80 Points

Duties involve general knowledge of company policies and procedures and their application to cases not previously covered. Duties require working independently toward general results, devising new methods, and modifying or adapting standard procedures to meet new conditions. Decisions, however, are based on precedent and company policy. Typical jobs: major engineer, layout, aircraft design; engineer, layout, aircraft design; lead technician A, motion-picture laboratory; senior auditor A, internal auditing.

Degree 5, 75 Points

Difficult work on highly technical or involved projects, presenting new or constantly changing problems. Duties require outstanding ability to deal with complex factors not easily evaluated, or the making of decisions based on conclusions for which there is little precedent. Typical jobs: assistant group engineer, aircraft design; lead engineer, aircraft design.

Degree 6, 100 Points

Reserved for future jobs whose duties are more complex than required for degree 5. No present jobs are in this degree.

Supervision Received

Use this factor to judge the degree to which the immediate superior outlines methods to be followed or the results to be attained, checks the progress of work, and handles exceptional cases. Consider the physical proximity of the supervisor and the extent and closeness of his supervision.

Degree 1, 5 Points

Under immediate supervision, with short assignments of work at frequent intervals and a regular check of performance. Typical jobs: typist A; key punch operator; messenger.

Degree 2, 10 Points

Under general supervision, where standard practice enables the employee to proceed alone on work, referring questionable cases to supervisor. Typical jobs: detail engineer, aircraft design; junior engineer, aircraft design; librarian A; stenographer.

Degree 3, 20 Points

Under direction where a definite objective is set up and the employee plans and arranges his own work, referring questionable cases to supervisor. Typical jobs: major engineer, layout, aircraft design; engineer, layout, aircraft design; methods engineer B; major estimator A; major estimator B; tabulating machine operator A; executive secretary; placement man, personnel; clerk C; lead technician A, motion-picture laboratory.

Degree 4, 40 Points

Under general direction, working from policies and general objectives. Rarely refers specific cases to superior unless clarification or interpretation of company policy is involved. Typical jobs: assistant group engineer, aircraft design; senior auditor A, internal auditing.

Degree 5, 60 Points

Under administrative direction, setting up own standards of performance. Virtually self-supervising. Typical jobs: process unit chief; test pilot.

Responsibility for Errors

Use this factor to measure the opportunity for and probable effect of errors. Consider the degree to which the work is verified or checked, either in succeeding operations by the routines themselves or by supervision. Consider the probable monetary loss and the frequency with which opportunity for loss presents itself.

Degree 1, 5 Points

Errors can be detected easily and quickly and would result only in minor confusion or clerical expense for correction. Typical jobs: stenographer A; typist A; key punch operator; messenger.

Degree 2, 10 Points

Errors usually are detected in succeeding operations and generally confined to a single department or phase of company activities. Correction involves some trouble in back-checking by others. Most of work verified or checked. Typical jobs: detail engineer, aircraft design; junior engineer, aircraft design; librarian A; clerk C.

Degree 3, 20 Points

Errors may have serious results, involving loss of production, waste of material, hold-up of production, or damage to equipment. Effect usually confined within the company. Most of work not subject to verification or check. Typical jobs: major engineer, layout, aircraft design; engineer, layout, aircraft design; methods engineer B; tabulating-machine operator A; major estimator A; lead technician A, motion-picture laboratory; placement man, personnel; auditor A, internal auditing.

Degree 4, 40 Points

Errors are difficult to detect and may adversely affect outside relationships. Work not being subject to audit or check, employee has considerable responsibility for accuracy. Typical jobs: assistant group engineer, aircraft design; lead engineer, aircraft design.

Degree 5, 60 Points

Errors may involve major expenditures for equipment, material, or products, or loss of important customer accounts. Duties may involve the preparation of data on which top management bases important decisions. Typical jobs: motion-picture unit chief; budget supervisor.

Degree 6, 80 Points

Errors involve major expenditures for equipment, material, or products, loss of important customer accounts, or the lives of others. Duties involve the preparation of data on which top management bases vital decisions. Typical job: test pilot.

Responsibility for Contacts with Others

Use this factor for appraising the responsibility that goes with the job, for meeting, dealing with, or influencing other persons. In rating this factor consider how the contacts are made, how often, whether they involve influencing others.

Degree 1, 5 Points

Little or no contacts except with immediate associates and own supervisor. Typical jobs: detail engineer, aircraft design; typist A; key punch operator.

Degree 2, 10 Points

Contacts with other persons within the department on routine matters, or occasional outside contacts, furnishing or obtaining information only. Typical jobs: engineer, layout, aircraft design; junior engineer, aircraft design; tabulating-machine operator A; librarian A; clerk C; stenographer A; lead technician A, motion-picture laboratory.

Degree 3, 20 Points

Regular contacts with other departments, furnishing or obtaining information or reports, requiring tact to avoid friction. Typical jobs: assistant group engineer, aircraft design; lead engineer, aircraft design; major engineer, layout, aircraft design; methods engineer B; major estimator A; major estimator B; executive secretary; senior auditor A, internal auditing.

Degree 4, 40 Points

Outside or inside contacts involving the carrying out of company policy and programs and the influencing of others, where improper handling will affect operating results; or contacts with personnel of substantially higher rank where matters that require explanation, discussion, and obtaining of approval are involved. Typical job: placement man, personnel.

Degree 5, 60 Points

Outside and inside contacts requiring a high degree of tact, judgment, and the ability to deal with, and influence, persons in all types of positions. Typical job: industrial engineer A.

Degree 6, 80 Points

Reserved for jobs requiring contacts more important than those of degree 5. No present jobs in this degree.

Responsibility for Confidential Data

Use this factor to measure the integrity and discretion required in safeguarding confidential data. Consider the nature of the data used in the job, the degree to which the full import of the data is apparent to the employee, whether disclosure would affect internal relationships only or external, competitive relationships.

Degree 1, 5 Points

Few or no confidential data involved. Typical jobs: typist A; key punch operator.

Degree 2, 10 Points

Confidential data used occasionally, but the full import is not apparent and the effect of any disclosure would be negligible. Typical jobs: clerk C; stenographer A; messenger.

Degree 3, 15 Points

Confidential data are used regularly and their disclosure might have an adverse effect. Typical jobs: detail engineer, aircraft design; junior engineer, aircraft design; methods engineer B; tabulating-machine operator A; major estimator B; placement man, personnel; lead technician A, motion-picture laboratory.

Degree 4, 20 Points

Confidential data of major importance are used regularly, and their disclosure may be definitely detrimental to the company's interests. Typical jobs: assistant group engineer, aircraft design; lead engineer, aircraft design; engineer, layout, aircraft design; major estimator A; executive secretary; librarian A; senior auditor A, internal auditing.

Mental and Visual Demand

Use this factor to appraise the required degree of concentration and coordination of mind and eye. Consider the volume or flow of work, the requirement for coordinating manual dexterity with mental or visual attention, and the sustained nature of the visual attention. Do not use this factor to appraise the qualitative requirements of the job for "headwork."

Degree 1, 5 Points

Flow of work or nature of duties is intermittent and requires attention only at intervals. Typical job: messenger.

Degree 2, 10 Points

Flow of work and nature of duties involve coordination or manual dexterity; only normal mental or visual attention required. Typical jobs: executive secretary; placement man, personnel; librarian A; clerk C.

Degree 3, 15 Points

Flow of work and nature of duties involve the coordination of manual dexterity and close mental or visual attention. Typical jobs: junior engineer, aircraft design; methods engineer B; tabulating-machine operator A; major estimator A; major estimator B; stenographer A; typist A; lead technician A, motion-picture laboratory; senior auditor A, internal auditing.

Degree 4, 20 Points

Must concentrate mental and visual attention closely on work, coordinating mental and manual dexterity for sustained periods. Typical jobs: assistant group engineer, aircraft design; lead engineer, aircraft design; major engineer, layout, aircraft design; engineer, layout, aircraft design; detail engineer, aircraft design.

Degree 5, 25 Points

High degree of concentration where the volume and nature of the work require unusual coordination of mind and eye. Typical job: film editor and splicer, motion picture.

Working Conditions

Use this factor to take account of any disagreeable job conditions which cannot be controlled by the employee. Include noise, dust, extremes of temperature, difficult work positions, and any other tangible considerations that directly affect the physical and mental comfort of an employee. Such conditions also include items like personal expense, swing or graveyard shift, and work in outlying locations.

Degree 1, 5 Points

Usual office working conditions. Typical jobs: engineer, layout, aircraft design; detail engineer, aircraft design; junior engineer, aircraft design; librarian A; clerk C; stenographer A; typist A; messenger; senior auditor A, internal auditing.

Degree 2, 10 Points

Good working conditions. Occasional exposure to disagreeable factors such as noise, dust, or heat. Some disagreeable factor present in office working conditions. Typical jobs: assistant group engineer, aircraft design; lead engineer, aircraft design; major engineer, layout, aircraft design; methods engineer B; tabulating-machine operator A; major estimator A; major estimator B; placement man, personnel; key punch operator.

Degree 3, 15 Points

Somewhat disagreeable conditions due to exposure to noise, dust, heat, fumes, etc., but not continuous exposure, if several of those factors are present. Typical job: lead technician A, motion-picture laboratory.

Degree 4, 20 Points

Continuous exposure to several disagreeable factors. Typical jobs: helper, photo template; flight test engineer.

Degree 5, 25 Points

Reserved for jobs involving unusually disagreeable conditions. No present jobs in this degree.

Type of Supervision

Use this factor to judge the degree or kind of supervisory responsibility involved in a job. Consider what place the job occupies on an organization chart; the degree to which accountability for results, measured in terms of responsibility for costs, methods, and personnel, goes with the job.

Degree 1, 5 Points

Part-time, immediate supervision over several employees in the same occupation, the employee doing the same work, most of the time, as those he supervises. Typical jobs: major engineer, layout, aircraft design; methods engineer B; major estimator A; senior auditor A, internal auditing.

Degree 2, 10 Points

Immediate supervision over a group of employees where most of the time is spent assigning, reviewing, and checking work and eliminating ordinary difficulties in following a standardized procedure. Typical jobs: assistant group engineer, aircraft design; lead engineer, aircraft design; clerk C; lead technician A, motion-picture laboratory.

Degree 3, 20 Points

Direct supervision of a section, unit, or department where accountability for results rests primarily with the next higher level of supervision. Typical jobs: group engineer, aircraft design; blueprint unit supervisor; records supervisor.

Degree 4, 40 Points

General supervision of a department, involving accountability for results in terms of costs, methods, and personnel, where the complexity of duties has been rated higher than degree 3. Typical job: structural development chief.

Degree 5, 60 Points

Direct and coordinate the operations of two or three departments, through subordinate supervisors who in turn are responsible for supervision over individual departments. Set up standards of performance, check progress, and see that company policies are carried out. Typical job: project engineer, aircraft design.

Scope of Supervision

Use this factor to indicate the number of persons supervised.

Degree 1, 5 Points

Assist and direct one or two persons. Typical jobs: major engineer, layout, aircraft design; methods engineer B; major estimator A; senior auditor A, internal auditing.

Degree 2, 10 Points

Supervise a small group, seldom more than ten persons. Typical jobs: lead engineer, aircraft design; clerk C; lead technician A, motion-picture laboratory.

Degree 3, 20 Points

Supervise a group of up to about twenty-five persons. Typical job: assistant group engineer, aircraft design.

Degree 4, 40 Points

Supervise from twenty-five to fifty persons. Typical jobs: blueprint unit supervisor; group engineer.

CHAPTER 5
EVALUATING THE JOBS

Evaluators, Workers, and Supervisors

The point-system evaluation program as described up to this point has been a joint undertaking by the job-evaluation department and the job-evaluation committee. Now that the basic plan has been completed, a new distribution of responsibilities is called for. Although the committee can later review any controversial results of the evaluation, it should not be called upon to do any of the detail work described in this and the following three chapters. Under the point system the actual job evaluation can be handled most efficiently by industrial engineers assigned from the job-evaluation department, aided by the supervisors and individual workers concerned. The success of this part of the program depends on the ability of the evaluators to obtain complete cooperation both from workers and from supervisors at all levels. The procedure outlined in the illustrated charts (Figs. 20 and 21), and detailed in the following pages, is built on the assumption that the evaluators are the type of men who can inspire this cooperation.

Acquainting the Department with the Plan

The greatest weakness in most job-evaluation programs is failure to interest the supervisors soon enough. If a supervisor does not understand from the start what the ultimate results of the procedure will be, he will do his part of the work too casually. This lack of real effort will end by causing gross inequities in the rating of his men, and the supervisor himself, as well as the job-evaluation department, will have a beautiful mess on his hands. Therefore, every supervisor must be encouraged to un-

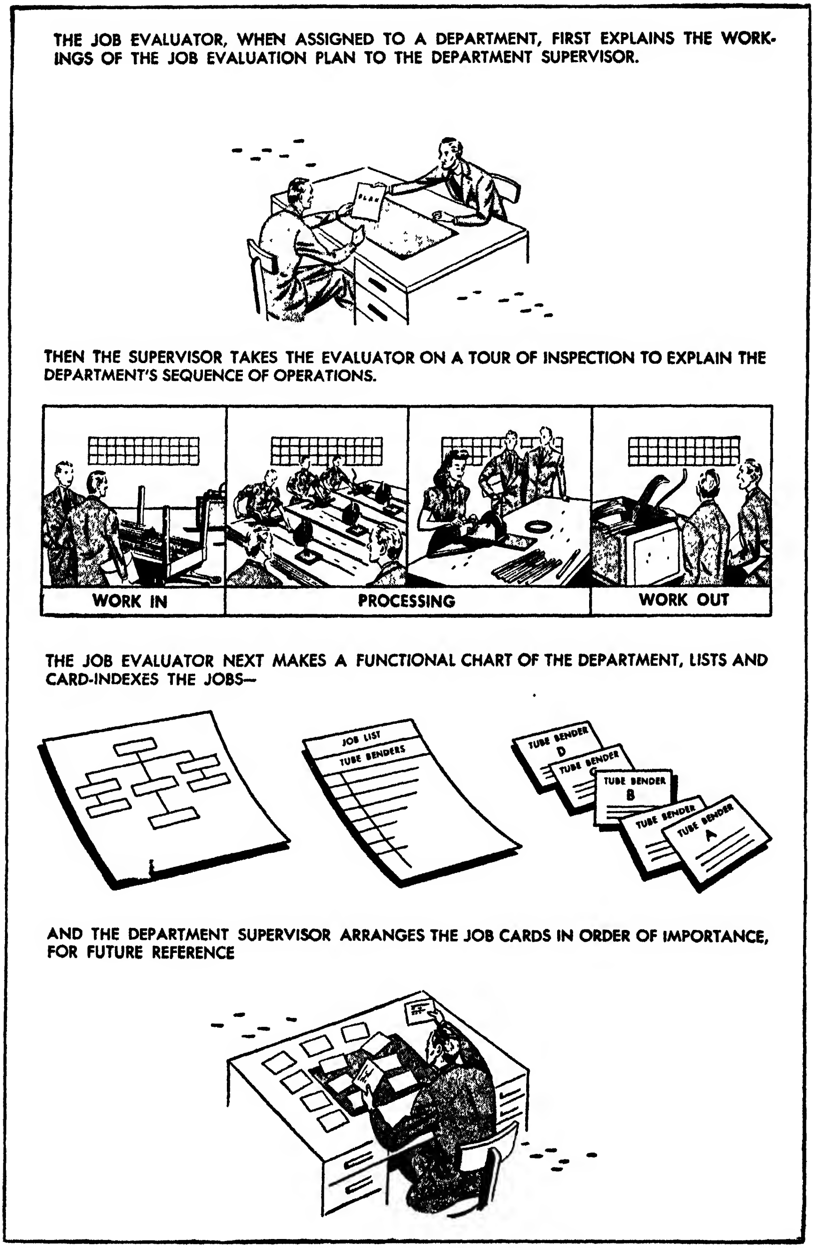
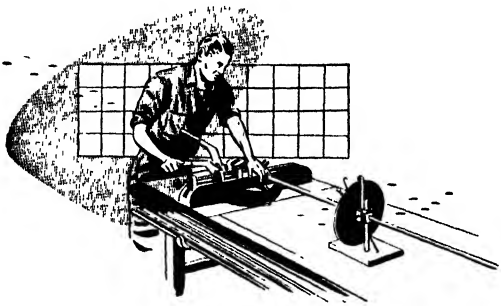


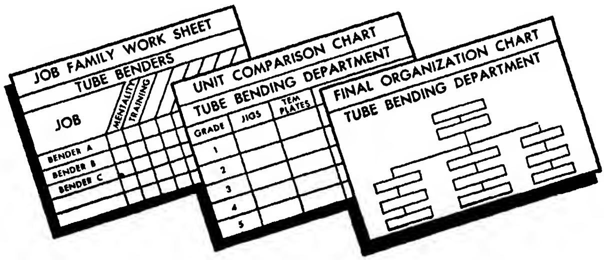
FIG. 20. Point-system job-evaluation procedure—preparation for evaluating a department.

THE JOB EVALUATOR AND DEPARTMENT SUPERVISOR SELECT A JOB IN ONE OF THE DEPARTMENT'S OPERATING UNITS, TO BE USED AS A DATUM OR "BENCHMARK" FOR MEASURING ALL OF THE OTHER JOBS IN THAT UNIT.



THE JOB EVALUATOR HAS THE UNIT FOREMAN AND THE WORKERS ON THE JOB HELP HIM TO MAKE A THOROUGH STUDY OF THE CHOSEN JOB.

THE EVALUATOR THEN ASSIGNS POINT VALUES TO THE BENCH-MARK JOB FACTORS BY THE JOB EVALUATION PLAN AND CHECKS THE RESULTING LABOR GRADE CAREFULLY.



THE OTHER JOBS IN THE UNIT ARE EVALUATED IN RELATION TO THE BENCH-MARK ON "JOB FAMILY WORK SHEETS" CHECKED BY "UNIT COMPARISON CHART" AND PLOTTED ON A FINAL ORGANIZATION CHART, WHICH IS COMPARED WITH AND ADJUSTED BY THE SUPERVISOR'S ORIGINAL ARRANGEMENT OF JOB CARDS.

THEN THE EVALUATOR

MOVES TO THE NEXT UNIT

FIG. 21. Point-system job-evaluation procedure—evaluating the jobs in a department.

derstand thoroughly the definitions of factors and factor degrees; the meaning of point ratings and labor grades; the importance of thinking in terms of jobs, not the men who hold them; and the fact that jobs in his department or group must line up with similar jobs in other parts of the company. As soon as an industrial engineer is assigned as evaluator for a department, he should give the department's supervisor enough copies of the job-evaluation plan for all unit chiefs and other supervisors in the department to study the system. At the same time the department supervisor and the evaluator must get together on the details of the plan and on the procedure for making the evaluations. The procedure should not vary much from that given here, though it may be necessary to make some allowances for variation between different types of departments.

Acquainting the Evaluator with Department Operation

Before the evaluator even begins to think about individual jobs, he should acquaint himself with the department's general methods—what operations are performed, where the materials come from, where the finished work is sent, which parts of the operations are crucial, how work progress is recorded. Then the department supervisor can take him on a tour of inspection, so that he can actually see the sequence of actions as the work goes through. At this point, an alert evaluator will begin to notice inconsistencies of procedure, organization, and job titles, if such inconsistencies exist. The foremen and leaders of the different groups will naturally be on hand to explain operational details. The evaluator will do well to get acquainted with them and take them into his confidence as to the evaluation procedure.

Preliminary Organization Chart

When the evaluator is thoroughly acquainted with the workings of the department he can make up a preliminary functional organization chart similar to Fig. 22. The theory upon which such a chart is built is simple and obvious. It is based on the differences and similarities of the department's operations, a different operation being put in each column and the jobs in each operation being ranked down the column in order of im-

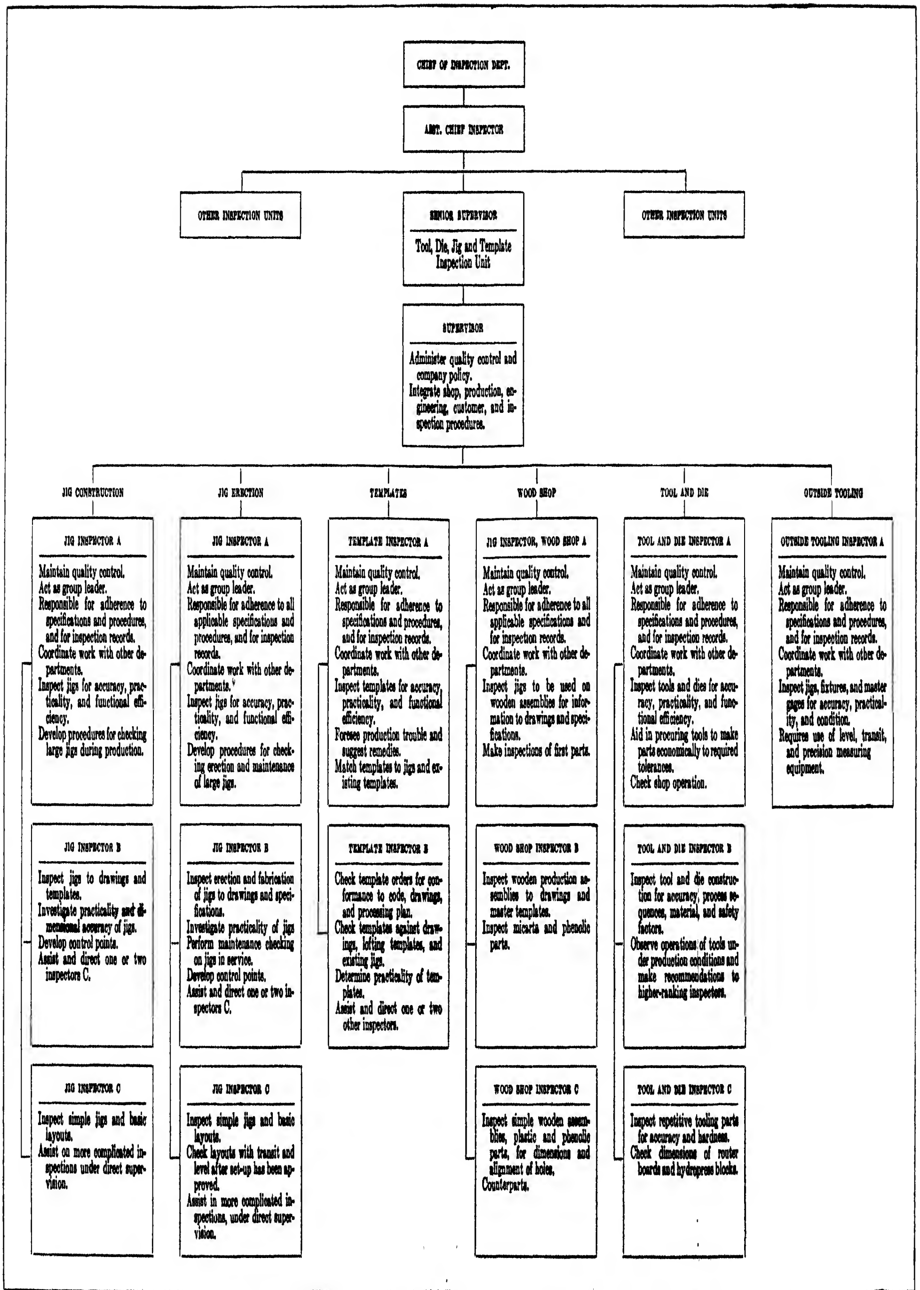


FIG. 22. Functional organization chart for one unit of inspection department.

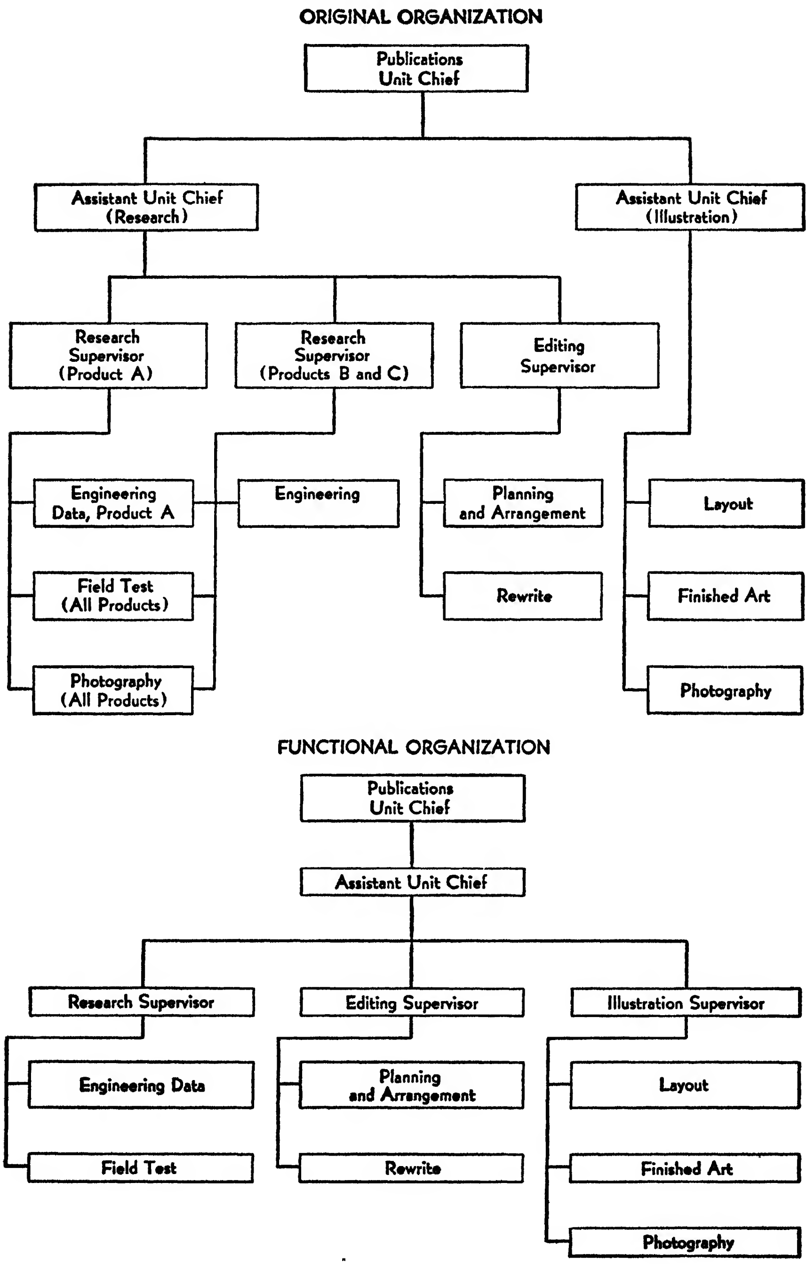


FIG. 23. Development of functional organization chart.

portance. The practice, however, is not so easy as the theory. Most companies grow more or less haphazardly, departments and units being added as the situation requires and as capable or aggressive personnel makes them possible. Thus the evaluator is likely to find an organization full of complications and inequalities that are accepted by habit or as temporary expedients but that may seem amazingly stupid to an outsider. If he is able to sell a more logical plan to the department supervisor, the rest of his work will be much easier.

Figure 23 is a simplified functional chart along with the original organization from which it was developed. The reasons for the inconsistencies in the original organization of this unit were as follows: When the company was small and the unit consisted of only a few men, a small group was assigned to do all the technical publication work in connection with each product. As the company and the unit grew, it was found that these groups could not handle all their work, so a separate art department was formed to relieve them of the illustrating. It was then found that the art and research groups had to be coordinated, so an editing group was instituted. As the unit continued to grow, further subdivisions and specialization were added where the need was found. The illustration supervisor, being an unusually capable man, was made assistant unit chief to keep him with the company, but he was not interested in research, so when an extra good research man became available he was also made assistant unit chief.

When the evaluator went to work on this unit, he found that no one was happy about the various dual and overlapping responsibilities but that the situation was accepted as normal and no one particularly wanted to change it. He was able, however, to sell his functional reorganization, by making it clear that under it the supervisory personnel could be juggled around and their new jobs evaluated so as to increase operating efficiency without cutting anyone's salary.

Supervisor's Ranking

Before he goes into the study of individual jobs, the evaluator should have the supervisor rank their importance under the present set-up, as a check against the evaluations that will be made. The simplest way to do this is to list all the jobs that are recognized in the present set-up, then have them typed off on a set of cards, one card for each job title. When the supervisor has arranged these cards according to the importance of the jobs, they should be set aside and forgotten until the evaluation is complete. This preliminary ranking is a valuable record in that it is not influenced by the job studies which will now be made, for, although these detailed factor-by-factor studies are on the whole much more accurate than a general estimate, they may overemphasize certain difficult or controversial points, thus distorting the over-all picture.

Bench-Mark Jobs

The selection and intensive study of a few "bench-mark" or key jobs within the department will speed up the evaluation work greatly. The best general rule is to pick as a bench mark for each unit the highest job in the unit that does not consist of full-time supervision. The evaluator, assisted by the unit foreman and by one or two typical employees on the job, should then make an exhaustive job study, similar to that made of the company key jobs, as described in Chapter 2. A job-analysis field sheet similar to Fig. 24 will be very useful for recording on-the-spot observations. Note that the field sheet provides specific information on individual factors as well as on the job as a whole. When all the information is gathered and put down in complete job write-ups (see Chapter 6), the evaluator will be able to assign point values to the factors according to the job-evaluation plan and to arrive at a labor grade for the job.

The labor grade of each bench-mark job must be checked thoroughly from every angle: against similar jobs (especially bench-mark jobs) in other departments, against the company key jobs, and against the department supervisor's opinion. If the job is out of line by these standards, the industrial engineer should double-check the information on which the evaluation has been based. If the information is correct, the evaluation must be considered correct.

JOB-ANALYSIS FIELD SHEET

Department Wood Shop, experimental

Location Plant 1

Date 3/16/45

Job Title Pattern Maker (Wood & Plaster)

Approx. No. Men 3 Rate $ 1.48 hr.

Description of duties (daily, periodic, and occasional duties; approximate percentages of time, if available)

- Fabricate wood contours or assembly jigs from points and/or templates. Pick up lines from layouts and detail views and devise means of bring- different views into relationship to insure that parts will have proper dimensions, shape, contour, and interchangeability. Construct base upon which plaster will be molded. Make first part check to insure proper construction, dimensions, workmanship, etc.

Remarks Examples of work are: masonite or hard wood dies, body and control surface jigs, subassembly and drill jigs, and plastic bases.

Mentality

Formal education or equivalent Shop mathematics, blueprints, some knowledge of drafting, precision instruments.

Type of work Crafts, experimental wood-shop and mock-up and model work.

Type of reports required None.

Experience and Training Design and/or arrange jigs to hold parts securely,

Type of skill involved make arrangements to assure work accessible to workers. Operate woodworking equipment.

Special training required Complete knowledge of carpentry tools and equipment.

Time to learn or "break in" Crafts application, 4 years apprenticeship

Additional time to become efficient plus 3-5 years.

Physical Effort

Type of work Lift, climb, and operate woodworking equipment.

light ____ moderate ✓ hard ____ very hard ____

Continuity of effort Intermittent.

Mental and Visual Demand

Type of mental effort Work to prints & close tolerances.
Concentration required Close and intermittent.
low ______ moderate ______ high ✓
Operations requiring visual effort First part check and layout base lines.
Precision and/or concentration required ______
low ______ moderate ______ high ✓
Fatigue produced (nervous application) Operate woodworking equipment.
low ______ moderate ✓ high ______

Responsibility for Supervision

a. Responsibility for safety of others:
Number of employees responsible for: directly 6 indirectly None.
Type of work Wood shape.
Possibility of lost-time injury ______
below normal ______ normal ✓ above normal ______
Remarks None.

Responsibility for supervision of others:
Supervision received Moderate from Foreman.
Direct supervision exercised 3 - 6 form builders.

Indirect supervision exercised None.

Type of work supervised Carpenter shop and plaster.

c. Responsibility for processing or processed materials or product:
Primary responsibilities Layout and construct wood assembly jigs.

Effect of possible error Interchangeability affected owing to improper jigs and mock-ups for plaster base.
Frequency of error ______
remote ______ seldom ______ occasional ✓ frequent ______

Inspection or other checks on work Normal experimental inspection.
close ______ routine ✓ general ______

d. Responsibility for machinery and equipment:
Responsible for proper operation of Misc. woodworking equipment.
Extent of possible damage ______
none ______ slight ______ moderate ✓ considerable ______ great ______

Responsible for mechanical condition and/or care of No.
Importance of equipment to plant or station operations Job can, in the extreme, be performed without mechanical equipment.

Working Conditions

Surroundings Wood shop, dust, noise — not disagreeable.
Physical aspects Not confining, some cramped quarters.
Day or shift Shift.
Hazards Loss of fingers and eye injuries.
Items of personal expense Own small tools.

Fig. 24.

Evaluating Other Jobs

Once the bench-mark job for a unit is established, it will be a comparatively simple problem for the evaluator to write out job-analysis field sheets for the other jobs in the unit; or if time presses he may even skip this step and go directly to the job-family work sheet (Fig. 25). In the absence of individual field sheets, the work sheet is filled out from the evaluator's general observation of the department and the preliminary organization chart. The help of the unit foreman is essential here. In doubtful cases the point assignments may also be modified after discussion with the employees concerned. There may be one or several "job families" in a unit. Each family is a set of jobs through which employees may be promoted from one to another. When the job family does not have a bench-mark job at the top, a field sheet must be filled out for the highest job and compared carefully with the bench mark, so that the two families will be correctly related.

From the job-family work sheet the jobs and their factors can be defined so as to form an even series of steps upward. This smooth flow of possible promotion will be very important to morale when the system is put into effect. If there are any gaps in the present set-up it is often advisable to fill them in, even though there is no present job at that level. Of course many job families do not have as wide a range of possible promotion as the engineering series shows; a range of two or three wage levels is more common in the shops. Some unions object strenuously to any range at all, claiming that a "carpenter is a carpenter" or a "welder is a welder," or that the only basis for increased pay should be straight seniority. If such principles are solidly and universally established in the company a single average wage or a seniority series may be used as a substitute for a job family. (This sort of compromise is certainly not wholly desirable from the job-evaluation standpoint, but neither will it be fatal.) When only a few jobs are involved it is better to evaluate the jobs like all the others and make the adjustment to special conditions later on, as noted in Chapter 9, "Relating Job Evaluation to Pay Scales."

JOB-FAMILY WORK SHEET

TYPICAL ENGINEERING DESIGN GROUP

	Mentality	Experience and Training	Complexity of Duties	Supervision Received	Responsibility for Errors	Contacts with Others	Confidential Data	Mental and Visual Demand	Working Conditions	Character of Supervision	Scope of Supervision	Total Points	Labor Grade
Assistant group engineer (Bench-mark job)	60	100	75	40	40	20	20	20	10	10	20	415	C
Lead engineer	60	100	75	20	40	20	20	20	10	10	10	385	B
Major engineer	60	80	60	20	20	20	20	20	10	5	5	320	1
Engineer	60	60	60	20	20	10	20	20	5			275	3
Detail engineer	60	60	45	10	10	5	15	20	5			230	5
Junior engineer	60	40	45	10	10	5	15	15	5			205	6
Draftsman A	45	40	30	10	10	5	15	20	10			185	7
Draftsman B	30	40	30	10	10	5	10	20	10			165	8
Tracer A	15	40	30	5	10	5	10	15	5			135	9
Tracer B	15	20	15	5	10	5	10	15	5			110	10

FIG. 25. Job-family work sheet.

Unit Comparison Chart

The unit comparison chart (Fig. 26) is used to check whether all jobs in the department are in line with one another. When

UNIT COMPARISON CHART

FABRICATION INSPECTION UNIT

Grade	Weld and Magnaflux	Fabrication	Precision	Special Assignment
1				Inspector A, first parts
2		Inspector A, machine parts	Inspector A, precision	Inspector A, machine assembly
3	Inspector A, magnaflux Inspector A, welding	Inspector A, protective coats Inspector A, fabrication		Inspector B, first parts
4		Inspector B, machine parts		Inspector B, material test
5	Inspector B, magnaflux Inspector B, welding	Inspector B, fabrication	Inspector B, precision	Inspector B, machine assembly
6		Inspector B, spotweld Inspector B, protective coats		
7	Grinder A	Inspector C, machine parts		Clerk D Inspector C, machine assembly
8	Inspector C, magnaflux	Inspector C, spotweld Inspector C, fabrication	Inspector C, precision	
9	Operator magnaflux	Clerk E Inspector C, protective coats		Operator Rockwell
10	Inspector D, general	Clerk F Inspector D, general	Inspector D, general Clerk F	Inspector D, general Typist B

FIG. 26. Unit comparison chart.

the chart appears consistent within itself, it is time to get out the cards on which the department supervisor ranked the jobs. Wherever the unit comparison chart fails to agree with the original ranking, the discrepancy must be accounted for. The evaluator should also check the unit comparison chart against those of other departments. If the jobs are found to be in line with similar ones in other departments, the job evaluator and the department supervisor can be sure that they have done a good job evaluation.

Final Organization Chart

The last step in planning the department's job set-up is not strictly evaluation but has a direct bearing on the success of the system. This final step is to combine or add to the job titles used, so as to arrive at a combination that provides essential differentiation and at the same time maximum flexibility. Any jobs that require special training or aptitudes should be differentiated. On the other hand, jobs that do not require different training and aptitudes should be grouped under one family title wherever possible. Different units or departments might use the title "assembler" for widely different types of work. In this case the title should be differentiated into, let us say, "structural assembler" and "precision assembler" according to the different job requirements. The opposite situation appears in the organization shown in Fig. 22. Here each different type of inspector has a different title, though the work is so similar that the workers need hardly any extra training for the shift from one job to another; an occasional shift is actually the only thing that saves some of the jobs from being unbearably monotonous and gives the worker a chance for ultimate promotion. If the titles of these jobs are combined as shown in Fig. 27 the organization becomes more efficient because it is more flexible; men can be shifted as needed without the paper work and other complications of formal job changes.

When job titles are differentiated or combined the newly named jobs must, of course, be at the same level as they were under the old titles. The final organization chart will thus be in effect merely an expansion of the unit comparison chart to include supervisory jobs.

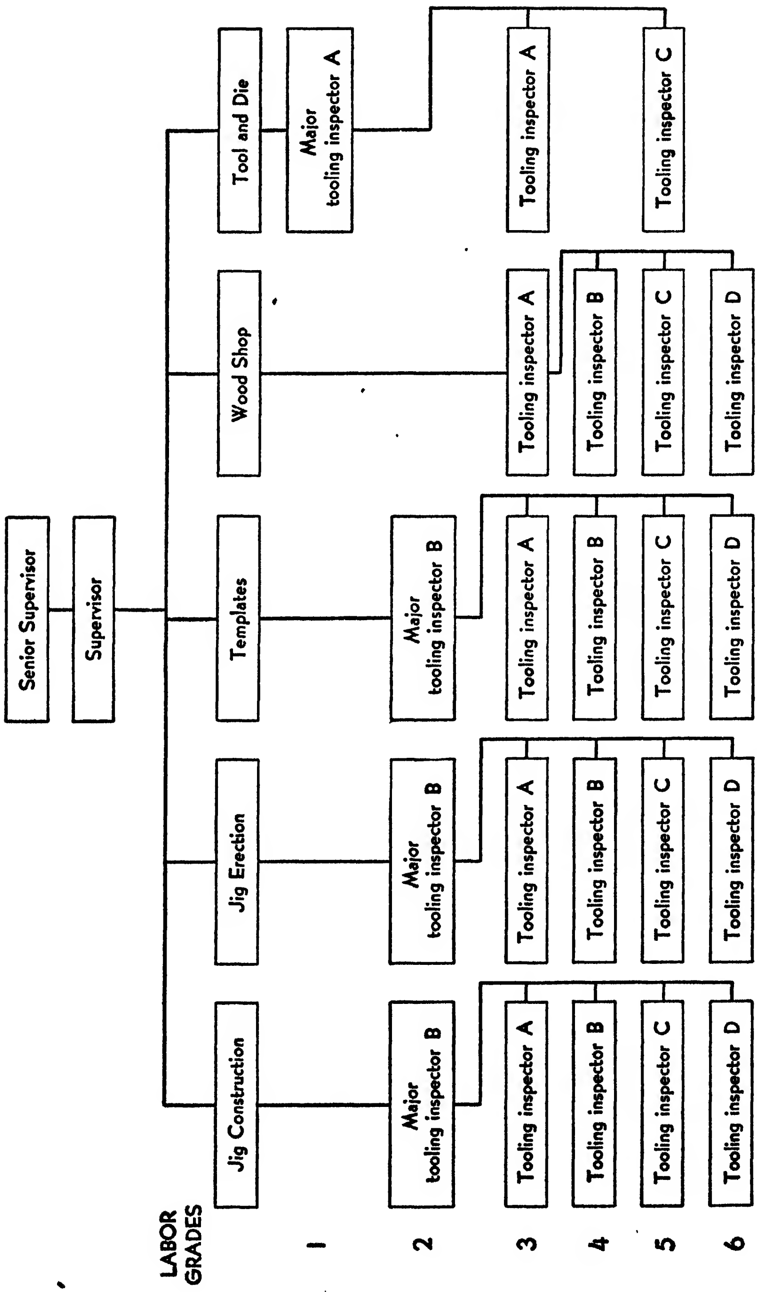
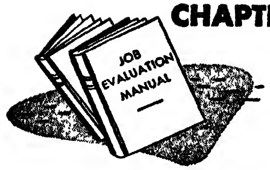


FIG. 27. Final organization chart.

For future reference the evaluator should, before leaving the department, write up all the jobs according to the form used in the job-evaluation manual (see Chapter 6). With the data now available this will be almost a routine task for an experienced evaluator who has developed the knack of writing concise, clearly differentiated descriptions.



CHAPTER 6

THE JOB EVALUATION MANUALS

Contents of the Job-Evaluation Manuals

The job-evaluation manuals, one for factory jobs and one for clerical and technical jobs, are volumes containing the job-evaluation plans and write-ups of all jobs in the company, compiled from the department evaluations described in the last chapter.

Uses of the Job-Evaluation Manual

In order to evaluate the jobs, the industrial engineers have had to analyze them carefully. The final records of these analyses are the job write-ups in the manuals. Although the immediate object of this general job analysis is job evaluation, the same records can be used for many other purposes such as:

1. *Organization planning,* to
   - *a.* Promote efficiency through the elimination of duplicate activities.
   - *b.* Determine scope of supervision required.
   - *c.* Point out means of improving methods and quality.
   - *d.* Improve the use of plant facilities and layout.
   - *e.* Provide a basis for setting cost standards and making adequate cost analyses.
   - *f.* Estimate man-power requirements and utilization of man power.
   - *g.* Develop sound organization lines, especially as they pertain to the relationship between responsibility and delegated authority.
2. *Labor relations,* to
   - *a.* Aid the maintenance of morale.
   - *b.* Provide facts for employment interview and placement.
   - *c.* Determine job relationships when planning policies of retention, rehire, and transfer.
   - *d.* Provide factual data in collective-bargaining agreement negotiations.
3. *Training,* to
   - *a.* Provide factual data for lesson analysis.

   b. Establish the exact requirements of different jobs for preparation of training programs.
   c. Determine relationship between requirements of dissimilar jobs so that training program can be planned to achieve the greatest possible economy in making transfers.
4. *Supervision,* to
   a. Keep supervisors familiar with the requirements of the jobs being supervised and increase their knowledge of detailed responsibilities.
   b. Check departmental routines and procedures.
   c. Facilitate intelligent selection and promotion of employees.
   d. Provide a factual record of job duties and thus help develop harmonious relationships between supervisor and subordinates.
5. *Wage and salary administration,* to
   a. Establish job standardization and classification.
   b. Help stabilize jobs, by providing data for intercompany or intercommunity wage comparisons.
   c. Assist in establishing relative worth of jobs to the company.

It is easy to see that, when all these uses are added together, job analysis is a major tool for sound industrial management. For instance, its use for the purpose of solving man-power utilization problems alone could be made the subject of a full-size book.

The next two chapters include a few typical examples of job write-ups such as are contained in the job-evaluation manuals. In studying them, note especially the gradation of job and factor descriptions throughout the series of jobs in each "job family" (such as the tooling inspectors, A, B, C, and D; automotive mechanics A, B, and C; and the family of aircraft design engineer jobs). These carefully studied series are very important in keeping up employee morale because they define what has to be done to earn the right to promotion. Besides defining each job in the family, they must make it clear that there is a difference between learning how to do the work of a higher-paid job and being promoted into it. For this purpose a special paragraph is included at the end of each job description (except that of the highest-paid job in a series). The paragraph referred to is worded somewhat like this: "Employees in this job may sometimes perform duties of a higher grade than those listed, to develop the skill required in a higher-ranking job." The purpose of this statement is to decrease the tendency of workers to expect wages for a higher-paid job the minute they do any work at that job and also to discourage the tendency of some supervisors to economize by having low-paid employees continue doing higher-grade work "for experience" long after they are qualified for a higher rating.

The writing style in all the job write-ups is also worthy of study. Each phrase is chopped off and compressed into the fewest possible words, regardless of formal grammar, the purpose being to devise a concise, specific standard against which corresponding characteristics of other jobs can be measured. When combined with a good plan and a thorough job study, the knack of writing and reading these concise descriptions pays dividends, because it enables the industrial engineer to hit his evaluations "right on the nose," always placing the jobs in their correct labor grades. The value of this accuracy becomes apparent whenever the reevaluation of a job is requested (as described in Chapter 11). A different engineer will do this reevaluation under critical scrutiny by those who requested it. If the result precisely confirms the original rating, respect for the job-evaluation program will naturally increase. Without the exactness of expression which results from the use of standard write-up phrases, such close agreement would not be possible.

The expense of printing job-evaluation manuals at this stage, before the cost of the program has been estimated and management given its final approval, would hardly be justified. However, as will be seen in the next chapter, the information must be available to various people for making up the cost estimate. It might be possible to get by with carbon copies; but it is better to have twenty to fifty copies run off by Ditto or some other inexpensive method.

CHAPTER 7

JOB EVALUATION MANUAL WRITE-UPS
FACTORY

GRADE 1

Job Title: Major Tooling Inspector A **475 Points**

JOB DESCRIPTION

Direct and do the work in any combination of the following kinds of tooling inspection: jig fabrication, erection, and maintenance, tool and die; templates; special tooling as assigned by the supervisor. Refer major discrepancies, suggested improvements, or changes to the supervisor for action. Originate procedures and edit reports for approval by supervisor. See that established inspection records and other procedures are properly and uniformly executed by the group. Supervise a group of not more than 15 lower-grade inspectors, referring only unusual supervision problems to the supervisor.

Inspectors in this grade may be called upon to perform any or all duties required of lower-grade inspectors.

ANALYSIS OF FACTORS

Mentality *Degree 5, 65 Points*

Use of advanced shop mathematics and handbook formulas. Interpretation of tooling or assembly drawings or lofting templates. Knowledge of machine-shop practices, shop procedure, fabrication methods. Use of a wide variety of precision measuring instruments. Equivalent to four years of high school plus four years of trades training or two years of technical training.

Experience and Training *Degree 7, 120 Points*

Five to seven years' experience is normally required for learning all phases of regular tool inspection and the relation of special aircraft tooling to inspection assignments; and to gain the experience essential for handling a group of people.

Complexity of Duties *Degree 5, 65 Points*

Duties require the use of analytical procedure and the ability to conduct preliminary investigation. Employee must be capable of performing a series of operations using standard methods. Some judgment and ingenuity is required for checking accuracy (to obtain interchangeability of finished parts), speed, and economy of processing. Decisions take into account the possibility of rework rather than rejection of parts or tools, the working qualities of metals, the checking of related dimensions toward general results, and whether tools will function economically. Employee regularly assigns work to lower-graded personnel to obtain desired results.

Responsibility for Results *Degree 6, 100 Points*

Carelessness in checking may result in production of off-standard parts, shipment of incorrect tooling equipment, with consequent production losses, and production of incorrect parts by prime or subcontractors. Employee is required to work toward general objectives, referring only unusual cases to supervisor.

Responsibility for Supervision *Degree 4, 40 Points*

Immediate supervision over a group of employees, including elimination of ordinary work difficulties. Seldom more than fifteen persons supervised.

Physical Effort *Degree 2, 15 Points*

Light and intermittent lifting. May sometimes be required to assist in lifting heavy dies and tooling materials.

Mental and Visual Demand *Degree 4, 40 Points*

Type of work requires close mental and visual attention to detailed check of aircraft tooling. Very close sustained mental or visual attention may sometimes be required.

Working Conditions *Degree 2, 15 Points*

Generally working conditions are favorable. There may be occasional exposure to normal factory noise and dirt.

Unavoidable Hazards *Degree 2, 15 Points*

No serious hazards.

GRADE 2

Job Title: Major Tooling Inspector B 445 Points

JOB DESCRIPTION

Conduct process inspection of master gages or parts thereof as directed by higher-grade inspector. Represent the company, as tooling inspector, on outside assignments at vendor plants. Inspect major assembly and subassembly jigs, releasing the same for set-up of first assembly. Institute process inspection control points for the inspection and set-up of any tools and jigs. Plan periodic maintenance inspection procedures of existing tools and jigs for approval of supervisor. Inspect all types of tools, dies, and templates for dimensional accuracy and practicability, releasing same for production use. Check first parts when required. Refer major discrepancies, suggested improvements, or changes to the supervisor for action. Supervise a group of not more than fifteen lower-grade inspectors, referring only unusual supervisory problems to supervisor.

Inspectors in this grade may be called upon to perform any or all duties required of lower-grade inspectors. Also may at times perform work of a higher grade than that listed, to develop the skill required for the higher-graded job.

ANALYSIS OF FACTORS

Mentality *Degree 5, 65 Points*

Use of advanced shop mathematics and handbook formulas. Interpretation of tooling or assembly drawings or lofting templates. Knowledge of machine-shop practices, shop procedure, and fabrication methods. Use of a wide variety of precision measuring instruments. Equivalent to four years of high school plus four years of trades training or two years of technical training.

Experience and Training — *Degree 6, 100 Points*

Three to five years of experience normally necessary to acquire all the necessary skills and related knowledge.

Complexity of Duties — *Degree 5, 65 Points*

Duties require the use of analytical procedure, ability to conduct preliminary investigation, and performance of a series of operations, using standard methods. Some judgment and ingenuity required for checking accuracy (to obtain interchangeability of finished parts), speed and economy of processing. Decisions take into account the possibility of rework rather than rejection of parts or tools, the working qualities of metals, the checking of related dimensions toward general results, and whether tools will function properly with one or more operations. Assign work to personnel to obtain desired results.

Responsibility for Results — *Degree 6, 100 Points*

Carelessness in checking may result in production of off-standard parts, shipment of incorrect tooling equipment with consequent production losses, and production of incorrect parts by prime or subcontractors. Employee is required to work toward general objectives, referring only unusual cases to supervisor.

Responsibility for Supervision — *Degree 3, 30 Points*

Assist and direct up to about fifteen lower-grade inspectors as assigned.

Physical Effort — *Degree 2, 15 Points*

Light and intermittent lifting. May sometimes be required to assist in lifting heavy dies and tooling materials.

Mental and Visual Demand — *Degree 4, 40 Points*

Type of work requires close mental and visual attention to detailed check of aircraft tooling. Very close sustained mental or visual attention may sometimes be necessary.

Working Conditions — *Degree 2, 15 Points*

Generally working conditions are favorable. There may be occasional exposure to normal factory noise and dirt.

Unavoidable Hazards *Degree 2, 15 Points*

No serious hazards.

GRADE 3

Job Title: Tooling Inspector A — 415 Points

JOB DESCRIPTION

Inspect assembly jigs for conformance to tooling and engineering requirements and specifications. Make periodic process inspection on existing assembly jigs and airframe alignment as required, referring unusual problems to a higher-grade inspector.

Also

Inspect to tooling and engineering drawing requirements and specifications: drill and locating jigs, small tools, punch and die sets, router boards, hydro-press blocks, shaper fixtures, welding fixtures, saw fixtures, mill fixtures, and other fabrication tools. Inspect drill or press plates or transfer gages (this type of inspection requires the use of templates or preset gages). Use templates and master gages as required to perform the above inspections.

Or

Inspect press plates and all types of templates.

Inspectors in this grade may be called upon to perform any or all duties as required of lower-grade inspectors, also at times to perform work of a higher grade than that listed, to develop the skill required in the higher-graded job.

ANALYSIS OF FACTORS

Mentality *Degree 5, 65 Points*

Use of advanced shop mathematics and handbook formulas. Interpretation of tooling or assembly drawings or lofting templates. Knowledge of machine-shop practices, shop procedure, and fabrication methods. Use of a wide variety of precision measuring instruments. Equivalent to four years of high school plus four years of trades training or two years of technical training.

Experience and Training — *Degree 6, 100 Points*

Three to five years of experience normally necessary to acquire the necessary skills and related knowledge.

Complexity of Duties — *Degree 5, 65 Points*

Duties require a limited use of analytical procedure. Employee must be able to perform a series of operations but only where standard methods are available. Some judgment and ingenuity are necessary to keep track of the various interrelated facts. Decisions take into account the possibility of rework rather than rejection of parts. Interpretation of standard formulas is required.

Responsibility for Results — *Degree 5, 80 Points*

Carelessness in checking may result in lost time and off-standard production. Carelessness in handling precision instruments may result in losses. Questionable decisions are referred to major inspector or supervisor.

Responsibility for Supervision — *Degree 2, 20 Points*

Has immediate supervision over several other employees and most of the time performs the same work as those supervised.

Physical Effort — *Degree 2, 15 Points*

Light and intermittent lifting. May sometimes be required to assist in lifting heavy dies and tooling materials.

Mental and Visual Demand — *Degree 4, 40 Points*

Type of work requires close mental and visual attention to detailed check of aircraft tooling. Very close sustained mental or visual attention may sometimes be required.

Working Conditions — *Degree 2, 15 Points*

Generally working conditions are favorable. There may be occasional exposure to normal factory noise and dirt.

Unavoidable Hazards — *Degree 2, 15 Points*

No serious hazards. However, the employee is frequently required to work in the factory, and is therefore subject to the normal factory hazards.

GRADE 3 (CONT.)

Job Title: Automotive Mechanic A **405 Points**

Job Description

Maintain and repair all plant automotive equipment, including trucks, motor cars, lift trucks, gas engine cranes, scooters, jitneys, and stationary gas engines. Overhaul motors. Make body, fender, and ignition repairs. Perform preventive maintenance. Operate small lathe, valve-facing and brake-lining equipment, drill press, and welding torch. Estimate and recommend the "farming out" of special repair or overhaul jobs. Maintain mileage and maintenance records. Direct and lend detailed assistance to lower-graded employees as required.

Analysis of Factors

Mentality *Degree 4, 50 Points*

Use of shop arithmetic. Ability to work from drawings and wiring diagrams. Use of precision measuring instruments and various special test equipment. Knowledge of the operational characteristics of internal-combustion engines, ignition, and small machine tools. Equivalent to four years of high school plus two years' trades training.

Experience and Training *Degree 6, 100 Points*

Three to five years of experience on repairs and maintenance of automotive equipment is normally required. Practical familiarity with repair of internal-combustion engines, body repair, ignition, and preventive maintenance is necessary.

Complexity of Duties *Degree 4, 50 Points*

Plan and perform difficult and complex work where only general operational methods are available, such as diagnosing and tracing out troubles, adjusting gaps and fuel feeds, grinding and reboring. Most decisions, however, are based on standard procedure or methods.

Responsibility for Results *Degree 3, 40 Points*

Careless use of shop equipment, improper installation of gears, bearings, and overboring cylinders, or failure to assure proper preventive maintenance may result in expensive rework. Most of work not subject to inspection or check.

Responsibility for Supervision *Degree 3, 30 Points*

Part-time, immediate supervision over a group of automobile mechanics. Number of employees directed may vary from three to twelve.

Physical Effort *Degree 4, 35 Points*

Occasional pushing and pulling or lifting heavy materials, tearing down motors, straightening fenders and frames. Occasional cramped work positions.

Mental and Visual Demand *Degree 3, 30 Points*

Moderate mental concentration required when grinding and facing valves or cylinders, tracing and rectifying trouble, replacing and adjusting parts, etc.

Working Conditions *Degree 3, 35 Points*

Disagreeable; exposed to fumes, dirt, oil, drafts, and cold concrete floors. Work is in confined quarters and cramped positions.

Unavoidable Hazards *Degree 4, 35 Points*

Subject to cuts, bruises, and abrasions. May crush fingers or toes handling heavy parts or receive eye injuries from grease, dirt, or flying particles.

GRADE 4

Job Title: Press Operator, Hydraulic and Mechanical A
395 Points

Job Description

Set up dies in single- and triple-action presses and double-action mechanical presses. Operate press for first-part check and make any necessary adjustments to the press for proper fabrication of part. Determine, and inform supervision, when the operation requires blanks to be sanded or bent prior to forming in press. Assemble dies and installation equipment for set-ups. Make master cards on all new set-ups.

Analysis of Factors

Mentality *Degree 5, 65 Points*

Use of shop mathematics and conversion charts; knowledge of construction and operation of presses; knowledge of metal-forming methods and working qualities of various metals to be formed; familiarity with forming and deep-draw die construction.

Experience and Training *Degree 5, 80 Points*

Two to three years of experience in operating and setting up hydraulic and mechanical presses is normally required.

Complexity of Duties *Degree 4, 50 Points*

Plan and perform difficult and complex work where only general operational methods are available, such as determining what kind of set-up is required by working qualities of material to be formed. Prepare master cards on new set-ups for work standards, and make first-part checks prior to production runs. Most of duties are based on standard procedures or methods.

Responsibility for Results *Degree 5, 80 Points*

Careless set-ups may cause breakage of press mechanisms or damage to dies, or may possibly result in a production run of misformed parts. Errors may involve major expenditures of money.

Responsibility for Supervision *Degree 2, 15 Points*

Responsible for the direction of a number of other employees, passing on detailed information of work assignments within a specialized function.

Physical Effort *Degree 2, 15 Points*

Light physical effort; continuous walking from machine to machine within station.

Mental Application — *Degree 4, 40 Points*

Very close mental concentration on highly variable set-ups, involving considerable detail and difficult adjustments of equipment.

Working Conditions — *Degree 3, 25 Points*

Occasional disagreeable features, such as contact with greasy material, noise and vibration of presses.

Unavoidable Hazards — *Degree 3, 25 Points*

May suffer severe injuries handling dies.

GRADE 4 (CONT.)

Job Title: Tooling Inspector B — **370 Points**

Job Description

Inspect assembly jigs for conformance to tooling and engineering requirements and specifications. Make periodic process inspection on existing assembly jigs and airframe alignment as required, referring unusual problems to a higher-grade inspector. *Or*

Inspect to tooling and engineering drawing requirements and specifications: drill and locating jigs, small tools, punch and die sets, router boards, hydro-press blocks, shaper fixtures, welding fixtures, saw fixtures, mill fixtures, and other fabrication tools. Inspect drill or press plates or transfer gages. (This type of inspection requires the use of templates or preset gages.) Use templates and master gages as required to perform the above Inspections. *Or*

Inspect press plates and all types of production templates except master or developed layout templates.

Inspectors in this grade may be called upon to perform any or all duties required of lower-grade inspectors; also at times to perform work of a higher grade than that listed in the preceding paragraphs of the job description, provided that such higher-grade work is in the nature of training, to develop the skills required by the higher-graded job.

Analysis of Factors

Mentality *Degree 5, 65 Points*

Use of advanced shop mathematics and handbook formulas. Interpretation of tooling or assembly drawings or lofting templates. Knowledge of machine-shop practices, shop procedure, and fabrication methods. Use of wide variety of precision measuring instruments. Equivalent to four years of high school plus four years of trades training or two years of technical training.

Experience and Training *Degree 5, 80 Points*

Two to three years normally necessary to acquire the necessary skills and related knowledge.

Complexity of Duties *Degree 4, 50 Points*

Duties require a limited use of analytical procedure. Employee must be able to perform a series of operations by standard methods. Employee must use some judgment and ingenuity to solve problems that are affected by various related facts; must decide when it is better to rework rather than reject parts; and must be capable of interpreting standard formulas.

Responsibility for Results *Degree 5, 80 Points*

Carelessness in checking may result in lost time and off-standard production. Carelessness in handling precision instruments may result in losses. Questionable decisions are referred to major inspector or supervisor.

Responsibility for Supervision *Degree 1, 10 Points*

No immediate supervision over other employees. Detailed information is given out as required.

Physical Effort *Degree 2, 15 Points*

Light and intermittent lifting. May sometimes be required to assist in lifting heavy dies and tooling materials.

Mental and Visual Demand *Degree 4, 40 Points*

Type of work requires close mental and visual attention to detailed check of aircraft tooling. Work sometimes requires very close sustained mental or visual attention.

Working Conditions *Degree 2, 15 Points*

Generally working conditions are favorable. There may be occasional exposure to normal factory noise and dirt.

Unavoidable Hazards *Degree 2, 15 Points*

No serious hazards.

GRADE 4 (CONT.)

Job Title: Assembler-Installer, Structures, A **380 Points**

Job Description

Plan and lay out work, make complete breakdown of blueprints, perform first assembly of parts. Check parts against blueprints and work-order specifications for proper coordination and installation of tubing, electrical and cable installations, etc. Check shop operations for proper methods, and make recommendations for corrective procedure. Write liaison and drawing change requests. Perform all advanced aircraft structural assembly operations as may be required.

Assembler-installer, structures, in this grade may sometimes be called upon to do work of a higher type than that listed, to develop the skills required in the higher-graded job.

Analysis of Factors

Mentality *Degree 4, 50 Points*

Use of shop mathematics. Thorough knowledge of blueprints and fabrication methods, exclusive of machine shop, in order to judge properly as to acceptability of finished part. Knowledge of adjustment or setting up of fabricating equipment, exclusive of machine-shop equipment, in order that part may be fabricated according to specifications.

Experience and Training *Degree 5, 80 Points*

Two to three years of experience in the fabrication, by hand and by machine, of individual aircraft parts is necessary.

Complexity of Duties *Degree 4, 50 Points*

Duties require the ability to plan and coordinate the installation of first or experimental parts where only general methods are available. Ability to check individual operations and to decide on details of procedure is required. All decisions, however, are based on standard practice.

Responsibility for Results *Degree 4, 60 Points*

Errors may have serious results. Careless checking of parts may result in spoilage of material or minor production losses. Most of work is subject to eventual inspection but not to immediate check.

Responsibility for Supervision *Degree 2, 15 Points*

Responsible for instructing and directing a number of lower-grade aircraft assemblers. May pass on directions or instructions as to normal work but shall not instruct others to improve skills.

Physical Effort *Degree 5, 45 Points*

Occasional pushing, pulling, or lifting heavy material. Considerable climbing, and frequent cramped and difficult work positions.

Mental and Visual Demand *Degree 3, 30 Points*

Moderate mental concentration is required when checking details on a variety of parts, but long-sustained concentration is seldom required.

Working Conditions *Degree 3, 25 Points*

Occasional dirty working conditions and general factory noise.

Unavoidable Hazards *Degree 3, 25 Points*

Exposure to lost-time accidents such as eye injuries or severe cuts and bruises. Also, the assembler-installer, structures, A, may on occasion be given assignments to work in the field where he is subject to danger from whirling propellers and falls from high scaffolding.

GRADE 5

Job Title: Automotive Mechanic B **335 Points**

Job Description

Perform routine repair and maintenance of automotive equipment. General duties consist of: relining brakes; ignition timing; facing valves; disassembling and assembling motors, rear ends, and electrical equipment; assisting automotive mechanic A with fender and body work, general motor overhaul, and preventive maintenance. To perform these duties, the employee must operate valve-facing equipment, drill press, brake-lining equipment, etc.; use welding torch to braze, weld, straighten, or heat-treat parts.

This job may be distinguished from the mechanic A job by noting that mechanic B is required only to do the normal work of repair, overhaul, and preventive maintenance, whereas mechanic A has the added responsibilities of diagnosing and locating trouble, and checking and directing the repairs.

Automotive mechanic B may sometimes perform work of a higher type than that listed, to develop the skill required in the higher-graded job.

Analysis of Factors

Mentality *Degree 4, 50 Points*

Use of shop arithmetic. Interpretation of drawings and electrical schematic diagrams. Some knowledge of internal-combustion engines and shop practice. Equivalent to four years of high school plus trade or specialized training.

Experience and Training *Degree 5, 80 Points*

Two to three years of experience on repair and maintenance of automotive equipment, body repair, and preventive maintenance is normally required. This experience should be in the nature of regular shop practice, including such specific items as familiarity with welding methods, as well as general knowledge of how to work with machinist's tools, and what the usual shop procedures and practices are.

Complexity of Duties *Degree 3, 35 Points*

Plan and perform operations for which standard procedures are readily available. Diagnose and locate trouble subject to ready assistance of higher-graded mechanics.

Responsibility for Results *Degree 2, 20 Points*

Careless use of equipment or failure to assure proper workmanship may result in confusion, delay, and rework.

Responsibility for Supervision *Degree 1, 5 Points*

No responsibility for directing the work of others, but detailed information must be passed on to other employees.

Physical Effort *Degree 5, 45 Points*

Frequent heavy physical effort when tearing down motors and straightening fenders and frames; occasional cramped work positions.

Mental and Visual Demand *Degree 3, 30 Points*

Moderate mental concentration when grinding and facing valves or cylinders, tracing and rectifying trouble, replacing and adjusting parts, etc.

Working Conditions *Degree 4, 35 Points*

Disagreeable; exposed to fumes, dirt, oil, drafts, and cold concrete floors. Work is in confined quarters and cramped positions.

Unavoidable Hazards *Degree 4, 35 Points*

Danger of cuts, bruises, and abrasions. Fingers or toes may be crushed handling heavy parts; and eyes may be injured by grease, dirt, or flying particles.

GRADE 5 (CONT.)

Job Title: Assembler-Installer, Structures, B **330 Points**

Job Description

Lay out and assemble prefabricated airplane parts and subassemblies into major structural assemblies. Cut, file, drill, fit, ream, clamp, form (by hand and machine), and align individual parts and pieces into their proper location with relationship to the whole, using fixtures and jigs or making temporary ones to facilitate the operation. Work out assembly sequences, and make assembly layouts. Materials used consist of such previously fabricated articles as plates, channels, stiffeners, longerons, ribs, bulkheads, wing spars, corrugations, skin sections, stabilizers, tail turret and other airplane assemblies, working for the most part from blueprints.

Assembler-installer, structures, in this grade may on occasion be called upon to perform work of a higher grade than that listed in the preceding paragraphs of this job description, provided that such higher-grade work is in the nature of training, to develop such skills and responsibilities as may be required in the higher-graded job.

Analysis of Factors

Mentality — *Degree 3, 35 Points*

Use of shop arithmetic; use of standard aircraft tools; interpret and use assembly blueprints.

Experience and Training — *Degree 4, 60 Points*

One to two years of experience in aircraft final assembly work is required.

Complexity of Duties — *Degree 3, 35 Points*

Duties include planning and performing the layout and operation sequences for aircraft assemblies; devising temporary jigs and fixtures as necessary.

Responsibility for Results — *Degree 4, 60 Points*

Errors may have serious results. Careless checking of parts may result in spoilage of material or minor production losses. Most of work is subject to eventual inspection but not to immediate check.

Responsibility for Supervision — *Degree 2, 15 Points*

May be responsible for instructing and directing helpers; must lend normal detailed assistance to lower-graded employees.

Physical Effort *Degree 5, 45 Points*

Occasional pushing, pulling, or lifting heavy material; considerable climbing; frequent cramped and difficult work positions.

Mental and Visual Demand *Degree 3, 30 Points*

Moderate mental concentration required when checking details on a variety of parts. Long-sustained concentration seldom required.

Working Conditions *Degree 3, 25 Points*

Occasional dirty working conditions and general factory noise.

Unavoidable Hazards *Degree 3, 25 Points*

Exposure to such lost-time accidents as eye injuries and severe cuts and bruises.

GRADE 6

Job Title: Tooling Inspector C **315 Points**

Job Description

Perform repetitive inspection on production jigs as specified in established control procedures. Inspect bushings and such standard tools as bucking bars, rivet sets, wrenches, etc.; perform process inspection on jigs and fixtures; use templates, as assigned. Inspect tools and dies visually for damage or wear when they are returned from the shops and before they are stored; originate repair tags as required; set up tools and checking equipment for inspector A. All the above is under direct supervision, inconsistencies being referred to higher-grade inspectors for decision.

Inspectors in this grade may be called upon to perform any or all duties required of lower-grade inspectors and sometimes to perform work of a higher grade than that listed, to develop the skill required in the higher-graded job.

Analysis of Factors

Mentality *Degree 4, 50 Points*

Use of shop arithmetic and enough trigonometry to figure angles. Interpretation of drawings, sketches, specifications. Use of scale, micrometer, calipers, fixed gages, protractors, and surface gages. Equivalent to four years of high school plus short specialized shop training.

Experience and Training *Degree 4, 60 Points*

Nine to eighteen months of experience usually needed to acquire the necessary skills and related knowledge.

Complexity of Duties *Degree 4, 50 Points*

Duties are somewhat routine and follow standard practice. Ability to interpret standard formulas and enough judgment to perform repetitive inspections are necessary.

Responsibility for Results *Degree 4, 60 Points*

Errors are usually detected; but considerable confusion and loss of time, or damage to precision measuring instruments, may result from failure to carry out assigned responsibilities.

Responsibility for Supervision *Degree 1, 10 Points*

No immediate supervision over other employees, but detailed information must be given out as required.

Physical Effort *Degree 2, 15 Points*

Light and intermittent lifting. Occasional assistance must be given in lifting heavy dies and tooling materials.

Mental and Visual Demand *Degree 4, 40 Points*

Type of work requires close mental and visual attention to the detailed check of aircraft tooling. Very close sustained mental or visual attention is occasionally required.

Working Conditions *Degree 2, 15 Points*

Generally working conditions are favorable. There may be occasional exposure to normal factory noise and dirt.

Unavoidable Hazards *Degree 2, 15 Points*

No serious hazards. However, the employee is frequently required to work in the factory, and is therefore subject to the normal factory hazards.

GRADE 6 (CONT.)

Job Title: Press Operator, Hydraulic and Mechanical, B

305 Points

JOB DESCRIPTION

Operate mechanical or hydraulic forming and deep-draw presses, forming metal aircraft parts of various sizes and shapes. Place blanks in dies, select proper rubber pads, lubricate materials, etc. Operate press through complete cycles to fabricate blanks according to specifications. Watch pressure gages, and make minor adjustments to insure correctly finished part. Assist press set-up man set dies in press, as required.

ANALYSIS OF FACTORS

Mentality *Degree 4, 50 Points*

Use of shop arithmetic such as decimals and fractions. Use of templates or drawings. Some knowledge of press-forming methods and the working properties of metals being formed.

Experience and Training *Degree 4, 60 Points*

One to two years of experience in operating and setting up the usual types of hydraulic and mechanical presses is normally required.

Complexity of Duties *Degree 3, 35 Points*

Job requires performance of work which is circumscribed by standard practice and general instructions; may require simple analyses of predetermined data, and therefore requires some judgment.

Responsibility for Results *Degree 3, 40 Points*

Carelessness in operation may break dies or necessitate scrapping of parts. Most of work may not be subject to immediate control.

Responsibility for Supervision *Degree 1, 5 Points*

Responsible only for own work and passing detailed information on to others.

Physical Effort *Degree 3, 25 Points*

Intermittent physical effort handling average-weight material; continuous light work operating press controls.

Mental Application *Degree 4, 40 Points*

Very close mental concentration required to ensure correct forming of dies, correct operation of machine controls, etc.

Working Conditions *Degree 3, 25 Points*

Occasional disagreeable features, such as contact with greasy material, noise and vibration of presses.

Unavoidable Hazards *Degree 3, 25 Points*

May suffer severe injuries handling dies.

GRADE 7

Job Title: Annealing Oven Operator A 275 Points

JOB DESCRIPTION

Operate annealing oven for the hardening and annealing of aluminum alloy parts and material by specified heat-treating processes. Prepare loads, charge and discharge oven, set heat-control instruments for the different alloys. Work with heat treat attendant A as assigned while waiting for completion of oven cycle.

ANALYSIS OF FACTORS

Mentality *Degree 2, 20 Points*

Use of simple arithmetic; interpretation of pyrometer recording charts; knowledge of heat-control instruments and proper heat-treat processes. Equivalent to two years of high school.

Experience and Training *Degree 3, 40 Points*

Six to twelve months of experience in operation of annealing oven and annealing various aluminum alloys is required.

Complexity of Duties *Degree 3, 35 Points*

Job requires the ability to plan and perform duties essential to the hardening and annealing of aluminum parts, to follow specific heat-treat processes, and to make general decisions as to heat-treating cycles and proper temperatures.

Responsibility for Results — *Degree 3, 40 Points*

Carelessness may cause aircraft parts to be burned or result in damage to equipment; may also affect working time of others. Most of work not subject to immediate inspection or check.

Responsibility for Supervision — *Degree 1, 5 Points*

Responsible for own work and for passing detailed information on to others.

Physical Effort — *Degree 4, 35 Points*

Occasional pushing, pulling, or lifting of heavy materials. Requires male help.

Mental and Visual Demand — *Degree 3, 30 Points*

Moderate mental application required, for regulating control instruments and maintenance of heat-treating charts and reports.

Working Conditions — *Degree 4, 35 Points*

Continuous exposure to heat requiring frequent use of helmet and of asbestos gloves.

Unavoidable Hazards — *Degree 4, 35 Points*

Exposed to severe burns and eye injuries that may necessitate removal to another occupation.

GRADE 8

Job Title: Automotive Mechanic C — **245 Points**

Job Description

Lubricate all automotive equipment, and change oil on hourly or mileage schedule. Attend to minor maintenance such as refueling, tire changing, and spark-plug testing. Assist automotive mechanic A or B in general maintenance of automotive equipment. Wash, clean, and polish cars and station wagons, using wash booth and low-pressure equipment.

Automotive mechanic C may sometimes perform work of a higher type than that listed, to develop the skill required by the higher-graded job.

Analysis of Factors

Mentality — *Degree 2, 20 Points*

Use of simple arithmetic such as decimals and fractions; interpretation of simple drawings as necessary for the identification of parts. Equivalent to two years of high school.

Experience and Training — *Degree 2, 30 Points*

Up to six months is normally required to obtain knowledge of lubricants and use of automotive shop equipment.

Complexity of Duties — *Degree 2, 20 Points*

Work follows clearly prescribed standard practice and is done from detailed instructions. Some judgment and ingenuity are required for assisting with general automotive repair work.

Responsibility for Results — *Degree 2, 20 Points*

Careless use of pressure guns, waste of material, improper greasing or changing of oil may result in damage to equipment. Most of work is subject to eventual check.

Responsibility for Supervision — *Degree 1, 5 Points*

None. However, detailed information may have to be passed on to other workers.

Physical Effort — *Degree 5, 45 Points*

Considerable physical effort in lifting, washing trucks and tractors, and general garage assistance.

Mental and Visual Demand — *Degree 2, 20 Points*

Slight mental and visual concentration required for greasing, oiling, and polishing equipment, and for keeping simple records.

Working Conditions — *Degree 5, 50 Points*

Continuous exposure to several disagreeable elements such as wet, steam, dirt, cold floors, lubricants.

Unavoidable Hazards *Degree 4, 35 Points*

Exposure to possible cuts, bruises, and abrasions; crushed fingers or toes when handling heavy parts; eye injuries from grease, dirt, or flying particles.

GRADE 8 (CONT.)

Job Title: Assembler-Installer, Structures, C **240 Points**

Job Description

Assemble prefabricated airplane parts and subassemblies into major structural assemblies. Cut, file, fit, drill, ream, clamp, form (by hand or power), and align individual parts and pieces into their proper location with relationship to the whole, using jigs and fixtures. Materials used consist of such previously fabricated articles as plates, channels, stiffeners, longerons, ribs, bulkheads, wing spars, corrugations, skin sections, stabilizers, and tail turret assemblies.

Assembler-installer, structures, in this grade may sometimes be called upon to perform work of a higher type than that listed, to develop the skill required in the higher-graded job.

Analysis of Factors

Mentality *Degree 2, 20 Points*

Use of simple arithmetic such as decimals and fractions; use of assembly or installation blueprints or production illustrations for reference.

Experience and Training *Degree 3, 40 Points*

Six to twelve months.

Complexity of Duties *Degree 2, 20 Points*

Work follows closely prescribed standard practices and is done according to detailed instructions.

Responsibility for Results *Degree 3, 40 Points*

Errors may cause damage, such as mislocated holes, which require rework of minor assemblies and some loss of production and the working time of others.

Responsibility for Supervision *Degree 1, 5 Points*

None, except for passing on detailed information to others.

Physical Effort *Degree 5, 45 Points*

Occasional pushing, pulling, or lifting of heavy material. Considerable climbing and frequent cramped and difficult work positions.

Mental and Visual Demand *Degree 2, 20 Points*

Normal mental concentration on fitting assembly parts in jigs. Work is varied, not monotonous.

Working Conditions *Degree 3, 25 Points*

Occasional dirty working conditions; general factory noise.

Unavoidable Hazards *Degree 3, 25 Points*

Exposure to lost-time accidents such as eye injuries and severe cuts and bruises.

GRADE 8 (CONT.)

Job Title: Press Operator, Hydraulic or Mechanical, C

240 Points

Job Description

Operate hydraulic or mechanical press to form metals. Trip buttons to operate ream or shuffle board. See that dies and material are properly in place and that personnel are clear of moving mechanism. Watch gages to be sure that pressure remains constant.

Analysis of Factors

Mentality *Degree 3, 35 Points*

Job requires use of simple arithmetic such as decimals and fractions, and reference to templates or part drawings for purposes of identification only.

Experience and Training *Degree 3, 45 Points*

Six to twelve months of experience in press-forming operations is required.

Complexity of Duties *Degree 2, 20 Points*

Job requires the performance of work according to standard instructions and the use of some judgment and care to ensure safety of operation and of personnel.

Responsibility for Results *Degree 3, 40 Points*

Carelessness in operation may break dies or necessitate scrapping of parts. Most of work may not be subject to immediate control.

Responsibility for Supervision *Degree 1, 5 Points*

Responsible only for own work and for passing detailed information on to others.

Physical Effort *Degree 3, 25 Points*

Intermittent work with average-weight material, and continuous light work operating press controls.

Mental Application *Degree 4, 40 Points*

Very close mental concentration required to ensure correct forming of dies, correct operation of machine controls, etc.

Working Conditions *Degree 3, 25 Points*

Occasional disagreeable features, such as contact with greasy material, noise, and vibration of presses.

Unavoidable Hazards *Degree 3, 25 Points*

May suffer severe injuries handling dies.

GRADE 8 (CONT.)

Job Title: Tooling Inspector D **220 Points**

Job Description

Make repetitive inspections of simple details such as bushings and other standard equipment and tools, not, however, accepting or rejecting any parts or tools. Operate hardness-testing machines under direct supervision of higher-grade inspector, and use the "H" stamp for familiarization with inspection procedures; locate and expedite tool orders, drawings, and design data; help others to handle heavy or cumbersome tools such as templates and models. Assist inspectors on jig or airframe inspection in the capacity of helper. Inspectors in this grade will not be assigned inspection stamps. The above work is assigned and closely supervised.

Tooling inspector D may sometimes perform work of a higher grade than that listed, to develop the skill required in the higher-graded job.

ANALYSIS OF FACTORS

Mentality *Degree 4, 50 Points*

Use of shop arithmetic and enough trigonometry to figure angles. Interpretation of drawings, sketches, specifications. Use of scale, micrometer, calipers, fixed gages, protractors, and surface gages. Equivalent to four years of high school plus short specialized shop training.

Experience and Training *Degree 2, 30 Points*

Up to three months.

Complexity of Duties *Degree 3, 35 Points*

Duties are somewhat routine and follow standard practices. Standard formulas must be interpreted, and some judgment is required for performance of repetitive inspections.

Responsibility for Results *Degree 2, 20 Points*

Practically none. This is primarily a training job.

Responsibility for Supervision *Degree 1, 10 Points*

None, except for giving out detailed information as may be required.

Physical Effort *Degree 2, 15 Points*

Light and intermittent lifting; occasional assistance is given in lifting heavy dies and tooling materials.

Mental and Visual Demand *Degree 3, 30 Points*

Type of work requires close mental and visual attention to the details of aircraft tooling check. Very close sustained mental or visual attention is sometimes required.

Working Conditions *Degree 2, 15 Points*

Generally working conditions are favorable. There may be occasional exposure to normal factory noise and dirt.

Unavoidable Hazards *Degree 2, 15 Points*

No serious hazards.

GRADE 9

Job Title: Bench Mechanic, Sheet Metal, C **200 Points**

Job Description

Mark and rough-trim sheet-metal parts from templates. Finish, trim, and clean up parts. Number parts from work order. Assist bench mechanic, sheet metal, A or B, as required. Use tools like drills, file burrs, disc and belt sanders, and saws. Place fabricated parts in jigs and fixtures for assembly.

Employee in this grade may sometimes be called upon to perform work of a higher grade than that listed, to develop the skill required in the higher-graded job.

Analysis of Factors

Mentality *Degree 2, 20 Points*

Use simple arithmetic such as decimals and fractions; interpret simple drawings or production illustrations to identify parts. Equivalent to two years of high school.

Experience and Training *Degree 2, 30 Points*

Three to six months.

Complexity of Duties *Degree 2, 20 Points*

Duties follow clearly standardized practices and require the use of aircraft shop and hand tools. Some judgment is necessary in marking and trimming finished parts.

Responsibility for Results *Degree 2, 20 Points*

Carelessness in handling equipment or material may result in damage or spoilage. Correction may involve rework. Most of work, however, is inspected or checked.

Responsibility for Supervision *Degree 1, 5 Points*

Responsible for own work and the passing of detailed information to other individuals.

Physical Effort *Degree 3, 25 Points*

Continuous handling of light materials.

Mental and Visual Demand *Degree 3, 30 Points*

Moderate mental concentration required in variable operations such as marking, trimming, and finishing aircraft sheet-metal parts.

Working Conditions *Degree 3, 25 Points*

Factory working conditions, with the usual intermittent disagreeable factors.

Unavoidable Hazards *Degree 3, 25 Points*

Exposed to accident hazards such as severe cuts and hand or foot injuries from handling rough sheet-metal edges.

GRADE 10

Job Title: Assembler-Installer, Structures, D **165 Points**

Job Description

Help assembler-installer, structures, A or B, locate and place parts and skins in proper location for assembly. Under direction, drill or redrill holes in skins or structure, drill out tack rivets or grommets, and file and clean parts or skins.

Assembler-installer, structures, in this grade may sometimes be called upon to perform work of a higher type than that listed, to develop the skill required in the higher-graded job.

Analysis of Factors

Mentality *Degree 1, 10 Points*

Ability to read, write, and follow written and verbal instructions is required.

Experience and Training *Degree 1, 15 Points*

Up to three months.

Complexity of Duties *Degree 1, 10 Points*

Duties are routine and are performed according to instructions. Simple equipment is used, and few decisions must be made.

Responsibility for Results *Degree 2, 20 Points*

Errors are usually detected in succeeding operations.

Responsibility for Supervision *Degree 1, 5 Points*

None, except for passing on detailed information to other workers.

Physical Effort *Degree 5, 45 Points*

Occasional pushing, pulling, or lifting heavy material. Considerable climbing and frequent cramped and difficult work positions.

Mental and Visual Demand *Degree 1, 10 Points*

Minimum of mental or visual application is required.

Working Conditions *Degree 3, 25 Points*

Occasional dirty working conditions and general factory noise.

Unavoidable Hazards *Degree 3, 25 Points*

Exposure to lost-time accidents such as eye injuries and severe cuts and bruises.

CHAPTER 8

JOB EVALUATION MANUAL WRITE-UPS
CLERICAL AND TECHNICAL

GRADE C

Job Title: Assistant Group Engineer, Aircraft Design 415 Points

JOB DESCRIPTION

1. Supervise and assist the design of some aircraft component such as body, wing, tail section, landing gear, power plant, controls, equipment, or electrical or hydraulic systems, as assigned by (or in the absence of) group engineer. To accomplish these duties the employee must: (*a*) Decide and consult, subject to final approval, on such matters as materials used, section used, and type of processing to be employed. (*b*) Assist in allocation of work to members of the group, and in coordination, as necessary. (*c*) Estimate release dates as required, to assist the group engineer.

2. Coordinate lead men within group to obtain design of components, and act as consultant on all matters relative thereto.

3. Assist correlation and contact with allied groups in connection with development of component parts, as assigned.

4. Engage in early design of component parts, as assigned.

5. Engage in actual activities necessary to layout, detailing, and checking to facilitate group functioning, as required.

6. Cooperate with group engineer to maintain required group personnel relations, grade employees, maintain necessary job evaluations, and make transfers within group.

7. Perform special investigations that are directly assigned by group engineer, and assist the maintenance of adequate records in connection with group functioning.

Assistant group engineer, aircraft design, may sometimes be called upon to perform work of a higher type than that listed, to develop the skill required in the higher-graded job.

Analysis of Factors

Mentality *Degree 4, 60 Points*

Broad knowledge of a general technical field, such as aeronautical engineering, mechanical, civil, or electrical engineering. Equivalent to an engineering degree.

Experience and Training *Degree 5, 100 Points*

Five to seven years of experience is usually required to obtain familiarity with the design, fabrication, and construction of aircraft. Particularly, should be familiar with the company's systems of master layout, mock-up, and stress analysis.

Complexity of Duties *Degree 5, 75 Points*

Duties require working on highly technical methods and procedures, their application to design, and the formulation of engineering principles. Considerable judgment and ingenuity are required for modifying or adapting standard procedures to meet new conditions. Decisions on elimination of difficulties will affect the quality and economy of aircraft design and will determine production methods and sometimes the general results. Care and accuracy must be exercised in assigning work to others and checking their work to be sure that all contingencies have been taken care of.

Supervision Received *Degree 4, 40 Points*

Work under general direction and towards general objectives. Plan and arrange own work and work of group, rarely referring specific cases to superior.

Responsibility for Errors *Degree 4, 40 Points*

Errors are difficult to detect. Most of work is not subject to verification or check. Failure to consider adequately all factors that may enter into an assigned problem may result in failure to meet planned schedules or in redesign or rework of complex drawings and layouts.

Responsibility for Contacts with Others *Degree 3, 20 Points*

Maintain regular contacts with other departments, furnishing or obtaining information or reports on specific projects, as assigned. Contacts may be made occasionally with other engineering groups or with tooling department. Most contacts, however, are made within own group. Primary responsibility rests with next-higher level of supervision.

Responsibility for Confidential Data *Degree 4, 20 Points*

Work regularly with confidential data of major importance, such as finished design of new or contemplated aircraft, advanced methods of fabrication, and new methods, the disclosure of which may be detrimental to the company's interests.

Mental and Visual Demand *Degree 4, 20 Points*

Flow of work and nature of duties require close mental or visual attention in the layout, detailing, and checking of major and minor layouts.

Working Conditions *Degree 2, 10 Points*

Usual office working conditions, complicated by the noise and confusion of crowded work areas.

Type of Supervision *Degree 2, 10 Points*

Exercise immediate supervision over a group of employees, assigning, reviewing, and checking work, and eliminating ordinary difficulties.

Scope of Supervision *Degree 3, 20 Points*

Assist and direct up to twenty-five persons.

GRADE B

Job Title: Lead Engineer, Aircraft Design **385 Points**

Job Description

1. Direct and assist the design of airplane subcomponents such as body bulkheads, wiring, spars, landing gear oleos, and hydraulic heating systems.

2. Oversee a group of lower-grade engineers, eliminating ordinary work difficulties; advising as to proper materials, load dis-

tributions, basic design, etc., to permit efficient tooling, fabrication, and final assembly.

3. Coordinate with other lead men in group as required to effect necessary design relationships.

4. Perform duties of major engineer as listed.

5. Maintain detail record for group engineer on optional design, detail drawings produced, drawing numbers, etc.

6. Check all major layout and other detail drawings, engineering department release forms, etc., as necessary.

Lead, engineer, aircraft design, may sometimes be called upon to perform work of a higher type than that listed, to develop the skill required in the higher-graded job.

Analysis of Factors

Mentality — *Degree 4, 60 Points*

Engineering background in aeronautical, mechanical, civil, or electrical engineering. Equivalent to an engineering degree.

Experience and Training — *Degree 5, 100 Points*

Four to six years of experience is usually required to obtain familiarity with company systems of fabrication, master layout, mock-up, and stress, and with the design and construction of aircraft.

Complexity of Duties — *Degree 5, 75 Points*

Duties require a technical knowledge of aircraft design and the procedures necessary to the formulation of engineering principles. Judgment and ingenuity are required in handling design problems. To some extent duties require working independently towards general results and devising new methods. Employee assists and directs layout engineers in their work on specific projects.

Supervision Received — *Degree 3, 20 Points*

Work under general direction of a group engineer where definite objectives are preplanned; plan, arrange, and assist work of a group, referring only unusual cases to group engineer.

Responsibility for Errors *Degree 4, 40 Points*

Errors may result in incorrect design basis or may upset assembly schedules and sequence. Considerable accuracy and responsibility are required.

Responsibility for Contacts with Others *Degree 3, 20 Points*

May contact other group lead men, as assigned, to iron out design difficulties, and may occasionally contact individuals of substantially higher rank. However, primary responsibility for initiating contacts rests with a higher level of supervision.

Responsibility for Confidential Data *Degree 4, 20 Points*

Disclosure of available information on new design or developments, mechanisms, materials, or manufacturing or testing methods may be detrimental to company's interests.

Mental and Visual Demand *Degree 4, 20 Points*

Must concentrate closely; coordinate mind, eye, and hand to do drafting work.

Working Conditions *Degree 2, 10 Points*

Generally good. However, may be complicated to some extent by noise and confusion of crowded work areas.

Type of Supervision *Degree 2, 10 Points*

Immediate supervision over several employees, eliminating ordinary work difficulties.

Scope of Supervision *Degree 2, 10 Points*

Assist and direct five to ten persons.

GRADE B (CONT.)

Job Title: Industrial Engineer A **385 Points**

Job Description

1. Assist in developing and carrying out departmental organization plans, analysis and evaluation of jobs, and final preparation of reports to management. These responsibilities require

the employee to: (*a*) Make general functional studies of any factory, clerical, or technical jobs in the company, as assigned; gather data to develop complete job descriptions and analyze the data to develop evaluations that differentiate and classify all jobs on a relative basis. (*b*) Contact supervisory or specialized personnel to obtain data on departmental organization, duties, and responsibilities attached to individual jobs. (*c*) Present concisely the results of field investigations. (*d*) Note and report on any supplementary information, not directly related to job evaluation, that may assist management in such matters as pay scales, company organization, or man-power utilization.

2. Act as consultant to all supervision on problems of employee up-grading and reclassification, and on establishing new jobs, when necessary to correct individual abuses caused by broad pay-rate-control programs.

3. Consult as required with the job-evaluation committee and grievance committee on methods of evaluating work, corrections of established grades of work, and placement or replacement of individuals in proper job class.

4. Be responsible for placement of individuals in correct work and rate classifications, within an assigned major division of the company.

5. Conduct wage-rate surveys; assist development of wage structures; gather data for development of company organization manuals.

6. Assist department head with special assignments, making required contacts.

7. Direct and coordinate the work of other employees in the analysis, preparation, and typing of data.

Industrial engineer in this grade may sometimes be called upon to perform work of a higher type than that listed, to develop the skill required in the higher-graded job.

Analysis of Factors

Mentality *Degree 4, 60 Points*

Broad general knowledge of manufacturing procedures, processes, and operations; ability to handle all investigations on an engineering basis. Equivalent to four years of college with a mechanical-engineering degree.

Experience and Training — *Degree 4, 80 Points*

Three to five years of experience in the same or related work.

Complexity of Duties — *Degree 4, 60 Points*

Duties require a general knowledge of company policies and procedures and their application to cases not previously covered. Duties also require individual effort in working independently toward general results; devising new methods as necessary; and modifying or adapting standard procedures or policies to meet changing conditions. All duties are, however, circumscribed by company policy.

Supervision Received — *Degree 4, 40 Points*

Work under general direction and toward general objectives, rarely referring specific cases to superior, except on matters of policy.

Responsibility for Errors — *Degree 4, 40 Points*

Errors may be serious. Incorrect classification of jobs would affect company wage policy.

Responsibility for Contacts with Others — *Degree 5, 60 Points*

Make regular contacts with all levels of personnel. A high degree of tact, judgment, and ability to deal with and influence such persons is necessary.

Responsibility for Confidential Data — *Degree 3, 15 Points*

Work regularly with confidential data the disclosure of which would have adverse effects on the company.

Mental and Visual Effort — *Degree 2, 10 Points*

Flow of work and nature of duties require normal mental and visual attention.

Working Conditions — *Degree 2, 10 Points*

Good working conditions, except that duties occasionally require exposure to factory noise and dirt.

Type of Supervision *Degree 1, 5 Points*

The employee in this job has part-time immediate supervision over several employees doing the same kind of work most of the time as himself.

Scope of Supervision *Degree 1, 5 Points*

Assist and direct one or two other persons.

GRADE A

Job Title: Lead Technician A, Motion-Picture Laboratory 345 Points

JOB DESCRIPTION

1. Supervise and coordinate all work in the film laboratory, and assist in cutting, editing, and matching motion-picture prints; develop additional duplicate prints; produce special sound effects; analyze completed sound tracks for the preliminary and final production of motion pictures.
2. Receive scenes taken in field and analyze light exposure; arrange scenes in sequential order for film editor and cutter.
3. Supervise the camera animation, determining necessary action, exposure, and editing.
4. Report back to cameraman any under- or overexposed film, and advise as to causes and cures to correct such defects.
5. Advise on: camera mechanics and optics as necessary to produce various animation effects; proper recording levels for both music and speech; correct exposure, lamp amperage, and developing formulas to produce negative contrast and fine grain.
6. Perform various laboratory and sound-recording studies as may be assigned. Lead technician in this grade may sometimes be called upon to perform work of a higher type than that listed, to develop the skill required in a higher-graded job.

ANALYSIS OF FACTORS

Mentality *Degree 3, 45 Points*

Some knowledge of formulas to produce negative contrast; thorough understanding of the elements of photography, camera mechanics, and optics. Equivalent to two years of college.

Experience and Training *Degree 6, 125 Points*

Seven to ten years of experience in professional photography, sound-track recording, film developing, editing, cutting, matching of film materials, and sectioning is normally required. Understanding of proper frequency characteristics and compensation allowances and ability to recognize mechanical difficulties in sound equipment. Knowledge of the animation camera and an understanding of camera mechanics and optics to produce various effects demanded in animation. Thorough understanding of all motion-picture laboratory equipment, methods, and procedures.

Complexity of Duties *Degree 4, 60 Points*

Duties involve an intensive knowledge of the techniques of motion-picture laboratory operation, including compensation necessary to eliminate high-frequency losses, to measure, graph, and correct these frequencies for best final results. Employee must analyze and report to cameraman any under- or over-exposed film and recommend corrective procedures. Must assist in maintaining film continuity and sequences during editing and cutting procedures.

Supervision Received *Degree 3, 20 Points*

The employee works under direction where definite objectives are set up but plans and arranges own work, referring only unusual cases to the studio director.

Responsibility for Errors *Degree 3, 20 Points*

Errors may have serious results as, in general, a motion picture is made in the laboratory. Care in the handling of very expentive laboratory equipment is required. Adverse effect is usually confined within the company; but most of work is not subject to verification or check until the completed film is rechecked.

Responsibility for Contacts with Others *Degree 2, 10 Points*

Contacts are with other persons within the department on routine matters, for furnishing or obtaining information only.

Responsibility for Confidential Data *Degree 3, 15 Points*

Regularly works with some confidential data, the disclosure of which might have an adverse effect on the company's interests.

Mental and Visual Demand *Degree 3, 15 Points*

Flow of work and nature of duties involve close mental and visual attention to editing and cutting film, checking film for proper exposure, etc.

Working Conditions *Degree 3, 15 Points*

May be somewhat disagreeable owing to exposure to developing solutions, close application under adverse lighting conditions, and confinement to considerable detail.

Type of Supervision *Degree 2, 10 Points*

Immediate supervision over a group of employees, eliminating ordinary difficulties in following a somewhat standardized procedure.

Scope of Supervision *Degree 2, 10 Points*

Supervision over more than ten persons is infrequent.

GRADE 1

Job Title: Major Engineer, Layout, Aircraft Design 320 Points

Job Description

1. Prepare major layouts of airplane details from which minor layouts and detail drawings will be prepared. To accomplish this, the employee must: (*a*) Carry out detail design of large components of aircraft structure; lay out wiring and plumbing diagrams; design cable runs; arrange and plan equipment, etc. (*b*) make necessary studies of materials, methods of fabrication, etc., to ensure efficient design. (*c*) Calculate stress, loads, wear, balance; select gears, bearings, tubing, wire sizes, etc.

2. Coordinate the breakdown of major layouts for efficient preparation of detail drawings and to ensure proper relationship with other major layouts.

3. Make minor layouts or perform detail drafting and checking as assigned.

4. Assist in the instruction of newer personnel, answering questions, and inspecting work as a precautionary measure.

5. Make contacts with special design groups as required, to obtain information about particular layouts.

Major engineer, layout, aircraft design, may sometimes be called upon to perform work of a higher type than that listed, to develop the skill required in the higher-graded job.

Analysis of Factors

Mentality — *Degree 4, 60 Points*

Engineering background in aeronautical, mechanical, civil, or electrical engineering. Equivalent to an engineering degree.

Experience and Training — *Degree 4, 80 Points*

Three to four years of experience is usually required to obtain familiarity with the company's systems of fabrication, master layout, mock-up, and stress analysis.

Complexity of Duties — *Degree 4, 60 Points*

Duties require detailed knowledge of aircraft design and procedures for layout of airplane components. A wide range of drafting, designing, and engineering mechanics is used. Calculations may involve gearing, wear, balance, stress, and other factors of layout and detail design. Analyses are made to determine the necessary action in solving problems, devising methods, and adapting standard procedures to meet new conditions.

Supervision Received — *Degree 3, 20 Points*

Plan and arrange own work. Refer only unusual cases to superior for clarification or decision.

Responsibility for Errors — *Degree 3, 20 Points*

Errors may cause production delay, material waste, damage to equipment, etc. Most of work is subject to verification and check.

Responsibility for Contacts with Others *Degree 3, 20 Points*

Contacts are made within the engineering department, to some extent with other departments within the plant, generally to obtain or transmit information only.

Responsibility for Confidential Data *Degree 4, 20 Points*

Disclosure of available information on new design or developments, mechanisms or materials, manufacturing or testing methods may be detrimental to company's interests.

Mental and Visual Demand *Degree 4, 20 Points*

Must concentrate mental or visual attention closely; coordinate mind, eye, and hand in drafting work.

Working Conditions *Degree 2, 10 Points*

Generally good, except for noise and confusion of crowded work area.

Type of Supervision *Degree 1, 5 Points*

The employee in this job has part-time immediate supervision over several employees in the same occupation, mostly performing the same work as himself.

Scope of Supervision *Degree 1, 5 Points*

Assist and direct one or two persons in the same occupation.

GRADE 1 (CONT.)

Job Title: Senior Auditor A, Internal Auditing **330 Points**

Job Description

Act in the capacity of senior auditor in charge of any type of individual audits and investigations. Audit books and records and perform special audits as directed. Perform internal audits, and occasionally audit books and records of outside companies to determine or verify expenses of operation, and verify financial condition. Write comprehensive detailed reports, make cost comparisons and studies, make detailed analyses. Make complete or partial audits of any phase of accounting records depending upon nature of particular assignment. Organize and supervise audit programs as assigned.

Senior auditor, internal auditing, in this grade may sometimes perform work of a higher type, than that listed, to develop the skills required in the higher-graded job.

Analysis of Factors

Mentality *Degree 4, 60 Points*

Broad, comprehensive knowledge of accounting. Equivalent to four years of college.

Experience and Training *Degree 4, 80 Points*

Three to five years.

Complexity of Duties *Degree 4, 60 Points*

Duties involve a general knowledge of company policies and procedures, and their application to cases not previously covered. Duties require working independently toward general results, devising new methods, and making decisions based on company policy.

Supervision Received *Degree 4, 40 Points*

Work under general direction, guided by established policies and general objectives. Rarely refer specific cases to superior unless clarification or interpretation of company policy is involved.

Responsibility for Errors *Degree 3, 20 Points*

Errors may have serious results, involving financial losses. Effect is usually confined within the company. Most of work not subject to verification or check.

Responsibility for Contacts with Others *Degree 3, 20 Points*

Regular contacts with other departments, to furnish or obtain information or reports, require tact to avoid friction.

Responsibility for Confidential Data *Degree 4, 20 Points*

Regular work with confidential data of major importance, the disclosure of which may be detrimental to the company's interests.

Mental and Visual Demand *Degree 3, 15 Points*

Flow of work and nature of duties involve the coordination of manual dexterity with close mental and visual attention.

Working Conditions *Degree 1, 5 Points*

Usual office working conditions.

Type of Supervision *Degree 1, 5 Points*

Part-time, immediate supervision over several employees in one occupation. The employee in this job mostly does the same kind of work as those he supervises.

Scope of Supervision *Degree 1, 5 Points*

Assist and direct one or two persons in the same occupation.

GRADE 2

Job Title: Industrial Engineer B **300 Points**

Job Description

Assist in general or functional studies of any jobs in the company, including factory, clerical, and technical, as assigned. This work requires the employee to: Gather data to complete job descriptions and work the data into numerical formulas by which jobs may be properly evaluated and classified. Be responsible, under general direction, for coordinating the placement of individuals in correct work and rate classifications (within an assigned area of the company). Assist in conducting wage-rate surveys as assigned; gather data for the formulation of wage-rate structures; perform special assignments as directed.

Industrial engineer in this grade may sometimes perform work of a higher type than that listed, to develop the skills required in the higher-graded job.

Analysis of Factors

Mentality *Degree 4, 60 Points*

Broad general knowledge of manufacturing procedures, processes, and operations with the prerequisite ability to handle all investigations on an engineering basis. Equivalent to four years of college with a mechanical-engineering degree.

Experience and Training — *Degree 3, 60 Points*

One to three years of experience in the same or closely related work.

Complexity of Duties — *Degree 3, 45 Points*

Duties require a thorough knowledge of a restricted field, use of a wide range of procedures, and the analysis of facts in specific situations to determine action, but only within the limits of standard practice and the scope of the job.

Supervision Received — *Degree 3, 20 Points*

Work under general supervision where a definite objective is set up. Plan and arrange own work, referring only the unusual cases to supervisor for decisions.

Responsibility for Errors — *Degree 4, 40 Points*

Errors may have serious results, since development of incorrect classifications would adversely affect company wage policy.

Responsibility for Contacts with Others — *Degree 4, 40 Points*

Makes regular contacts with personnel of all departments, to furnish and obtain information for reports. Contacts require considerable tact to avoid unnecessary friction.

Responsibility for Confidential Data — *Degree 3, 15 Points*

Regularly work with confidential data, the disclosure of which would have adverse effects.

Mental and Visual Demand — *Degree 2, 10 Points*

Flow of work and nature of duties require normal mental and visual attention.

Working Conditions — *Degree 2, 10 Points*

Good working conditions, except for occasional exposure to factory noise and dirt.

GRADE 2 (CONT.)

Job Title: Major Technician A, Artist, Motion Picture 295 Points

JOB DESCRIPTION

Follow out plans of both "cell" and mechanical animation, as assigned, to assure a satisfactory completion of such projects as apply to the preparation of motion education films. This work requires a knowledge of mechanics, illustration, design, and cartooning; familiarity with airbrush techniques, mechanical drawing, poster design, and tempera and water coloring. Job requires the ability to give accurate effect of part or subject to be represented. Employee must make special mechanical set-ups to facilitate short-cutting methods of production.

Occasionally advise and assist lower-grade artists as may be required. Major technician, artist, motion picture, sometimes performs work of a higher type than that listed, to develop the skills required in the higher-graded job.

ANALYSIS OF FACTORS

Mentality *Degree 3, 45 Points*

Familiarity with mechanics, mechanical design, both "cell" and mechanical animation. Knowledge of shading and color tones necessary in three-dimensional drawings. Inherent artistic intelligence. Equivalent to four years of high school plus specialized art training.

Experience and Training *Degree 4, 80 Points*

Three to five years of experience in solving the problems of animation are normally required to acquire necessary familiarity with mechanics and to learn the general application of such knowledge to motion pictures.

Complexity of Duties *Degree 4, 60 Points*

Duties involve a general knowledge of practices and procedures as they apply to animation cartooning, particularly in the educational field. Initiative and planning ability are required to present technical data in the most concise and apparent manner. Duties, to some extent, require working independently toward general results, devising new methods, and modifying or adapting standard procedures to meet new conditions.

Supervision Received *Degree 3, 20 Points*

Work under general direction towards definite objectives set up by art director. Plan and arrange own work, referring only unusual cases to superior.

Responsibility for Errors *Degree 2, 10 Points*

Errors are usually detected in succeeding checks, and their results are confined mainly to the reworking of projects, involving some trouble and back-checking by others.

Responsibility for Contact with Others *Degree 3, 20 Points*

Regularly make contacts with other persons and departments to gather routine data. Exercise tact in such associations.

Responsibility for Confidential Data *Degree 3, 15 Points*

Regularly work with confidential data, the disclosure of which may have some adverse effect; however, in the majority of cases the full import of the data is not apparent to the employee and the adverse effects would be only minor.

Mental and Visual Demand *Degree 5, 25 Points*

Nature of duties and of work requires an extremely high degree of concentration, unusual coordination of mind, eye, and manual dexterity.

Working Conditions *Degree 2, 10 Points*

May at times be somewhat disagreeable, owing to the use of paints and oils, and the confining nature of the work.

Type of Supervision *Degree 1, 5 Points*

Part-time, immediate supervision over a few employees in one occupation. The employee in this job mostly performs the same kind of work as those he supervises.

Scope of Supervision *Degree 1, 5 Points*

Assist and direct one or two persons in the same occupation.

GRADE 3

Job Title: Engineer, Layout, Aircraft Design **275 Points**

Job Description

1. Make minor layouts of airplane parts and details from which subsequently detail drawings will be prepared. This work requires the employee to: (*a*) Do detail designing of parts, such as forgings, fittings, or castings; and layout of parts and assemblies, such as simple frames and brackets. (*b*) Make studies of materials, methods of fabrication, etc., as necessary to produce efficient design. (*c*) Perform simpler stress calculations, select standard gears, bearings, wire sizes, etc.

2. Work from layouts; prepare detail drawings of complicated assemblies; coordinate the detail drawings of the particular assembly.

3. Perform other detail drafting, change-order work, and simple checking, as assigned.

Engineer, layout, aircraft design, may sometimes perform work of a higher type than that listed, to develop the skills required in the higher-graded job.

Analysis of Factors

Mentality *Degree 4, 60 Points*

Engineering background in aeronautical, mechanical, civil, or electrical engineering. Equivalent to an engineering degree.

Experience and Training *Degree 3, 60 Points*

Two to three years of experience is usually required to obtain a knowledge of the details involved in the minor layout of airplane parts and to become familiar with engineering layout and drafting procedures.

Complexity of Duties *Degree 4, 60 Points*

Duties require a general knowledge of aircraft design and engineering principles and an intensive knowledge of layout and drafting procedures. Analysis of facts to determine action is required, but only within the limits of standard practice. Duties call for some judgment and ingenuity to determine efficient design. Independent work toward general results in the minor design of parts and standards may be required; however, decisions on basic design are not usually made by employees in this job.

Supervision Received *Degree 3, 20 Points*

Work under general supervision. The standard nature of assigned duties enables employee to proceed alone.

Responsibility for Errors *Degree 3, 20 Points*

Errors may be serious and cause considerable loss of engineering time. Effect is usually confined within the company.

Responsibility for Contacts with Others *Degree 2, 10 Points*

Contacts are with other persons within the department on routine matters, for furnishing or obtaining information or collaborating in minor layout problems, as necessary.

Responsibility for Confidential Data *Degree 4, 20 Points*

Regularly work with confidential data, such as new design, new materials, or new processes, the disclosure of which may be detrimental to company's interests.

Mental and Visual Demand *Degree 4, 20 Points*

Concentrated mental and visual attention required, to coordinate mind, eye, and hand in drafting work.

Working Conditions *Degree 1, 5 Points*

Generally good. Although the engineer, layout, aircraft design, is occasionally exposed to the noise, dust, and heat of factory areas, such exposure is infrequent and, rather than being disagreeable, is generally considered a welcome break in the routine of drafting-table work.

GRADE 4

Job Title: Personnel Representative, A, Liaison 255 Points

JOB DESCRIPTION

1. Act as local personnel representative in an assigned shop area to smooth out problems that affect employee morale or general attitudes, endeavoring to reduce labor turnover. This responsibility requires the employee to: (*a*) Confer with dissatisfied employees, or employees seeking transfers, to determine the basic causes of their dissatisfaction. Make contacts with supervisors to arrange satisfactory transfers, eliminate local causes of irritation, to plan better utilization of employee capabilities, etc. (*b*) Arrange various aids, through supervisor or employee service, for employees whose personal difficulties have a direct bearing on work attitude.

2. Interview employees who are leaving the company, to determine the true reasons for their leaving.

3. As may be required within the scope of set policy, check the value of individual employees to shops, their ability to fit into other work, etc.

4. Compile routine statistical information on such subjects as causes of grievances and maladjustments, to assist the preparation of data for management.

5. Supervise personnel liaison activities within assigned major area of the plant, as required.

ANALYSIS OF FACTORS

Mentality *Degree 3, 45 Points*

General knowledge of the field of personnel administration, basic knowledge of human behavior, and ordinary mental alertness and adaptability are required for investigation of basic reasons for individual attitudes, and to make and supervise the tabulation of adequate records on a large number of individual employees. This requirement is approximately equal to two years of college training.

Experience and Training *Degree 3, 60 Points*

Normally one to three years of practical experience is required, either in welfare work, in general personnel relations, or in a capacity where contacts with others have an important part.

Complexity of Duties *Degree 3, 45 Points*

Duties require an understanding of intangible factors in personnel interviewing, advising, and settling grievances. This entails the ability to follow a general policy while handling each case as an individual problem; analysis of facts or situations; making minor decisions according to standard practice or procedure.

Supervision Received *Degree 3, 20 Points*

Work under general direction where a definite objective is set up. The employee plans and arranges own work, referring only unusual cases to supervisor.

Responsibility for Errors *Degree 2, 10 Points*

Errors may affect the personnel situation within the department and may possibly cause a higher rate of employee turnover. However, full responsibility for this factor is not vested in this job.

Responsibility for Contacts with Others *Degree 3, 20 Points*

Make regular contacts with other departmental personnel on matters that require considerable tact to avoid friction.

Responsibility for Confidential Data *Degree 3, 15 Points*

Regularly work with confidential data, the disclosure of which will be against the company's best interest.

Mental or Visual Demand *Degree 2, 10 Points*

Flow of work and nature of duties are such as to require normal mental and visual attention.

Working Conditions *Degree 3, 15 Points*

Subject to somewhat disagreeable factory working conditions, including noise, fumes, and confusion of crowded work areas.

Type of Supervision *Degree 1, 5 Points*

Part-time, immediate supervision over several employees. The employee in this job mostly does the same kind of work as those supervised.

Scope of Supervision *Degree 2, 10 Points*

Assist and direct up to ten persons in the same occupation.

GRADE 5

Job Title: Detail Engineer, Aircraft Design 230 Points

Job Description

1. Make drawings of airplane parts and assemblies from major and minor layouts as furnished. This work requires employee to: (*a*) Carry out detail drafting, involving proper dimensioning, use of drafting materials, and knowledge of standard parts and practices. (*b*) Prepare change orders and deviations, involving minor detail studies of parts, as assigned. (*c*) Perform routine algebraic, geometric, and trigonometric calculations as required to determine sizes, shapes, and locations. (*d*) Design simple casting and forging details; determine web sizes, location of bolts, etc., from incomplete minor or major layouts.

2. Write engineering parts release schedules, giving information on quantities to release unit for production purposes.

Detail engineer, aircraft design, may sometimes perform work of a higher type than that listed, to develop the skills required in the higher-graded job.

Analysis of Factors

Mentality *Degree 4, 60 Points*

Engineering background in aeronautical, mechanical, civil, or electrical engineering. Equivalent to an engineering degree.

Experience and Training *Degree 3, 60 Points*

One to two years of experience is normally required, to obtain the necessary detailed knowledge of airplane part and assembly layout and to become familiar with engineering systems of layout and drafting procedure.

Complexity of Duties *Degree 3, 45 Points*

Duties are somewhat routine but require an intensive knowledge of the application of drafting principles and procedures to the making of detail drawings of aircraft parts and assemblies. Analysis of facts and occasional mathematical calculations are required in determining sizes and locations of parts, and in interpreting relationships. Work is generally within the limits of standard practice.

Supervision Received *Degree 2, 10 Points*

Work under general supervision where the standard nature of assigned duties enables the employee to proceed alone, referring questionable cases to superior.

Responsibility for Errors *Degree 2, 10 Points*

Errors are usually detected, as most of work is checked. Correction may involve some trouble in back-checking by others.

Responsibility for Contacts with Others *Degree 1, 5 Points*

Little or no contacts except with immediate associates and own supervisor.

Responsibility for Confidential Data *Degree 3, 15 Points*

Regularly works with confidential data such as release quantities and confidential or restricted drawings, the disclosure of which may have some adverse effect. However, complete nature of such confidential data is seldom realized.

Mental and Visual Demand *Degree 4, 20 Points*

Concentrated mental and visual attention, to coordinate mind, eye, and hand in drafting work.

Working Conditions *Degree 1, 5 Points*

Good. Occasional exposure to factory conditions and outside weather is not considered disagreeable, being infrequent and a welcome relief from drafting-table routine.

GRADE 5 (CONT.)

Job Title: Industrial Engineer C **230 Points**

Job Description

Make functional studies of specific jobs as assigned. Gather data to develop complete job descriptions, and analyze these data for the application to a numerical formula, thereby obtaining evaluation of work by which all jobs may be properly classified. Engage in special studies of statistical control, and assist in the development of details from which procedures may be subsequently evolved. Also assist in the setting up and current maintenance of adequate reports and graphical presentations necessary to the efficient functioning of the industrial engineering control.

Industrial engineer in this grade may engage in various special assignments, to acquire the skills necessary for advanced work, such assignments being directed by the supervisor.

Analysis of Factors

Mentality *Degree 4, 60 Points*

Broad general knowledge of manufacturing procedures, processes, and operations with the prerequisite ability to handle all investigations on an engineering basis. Equivalent to four years of college with a mechanical-engineering degree.

Experience and Training *Degree 2, 40 Points*

Six to twelve months in the same or closely related work.

Complexity of Duties *Degree 3, 45 Points*

Duties require a thorough knowledge of a restricted field, use of a wide range of procedures, and the analysis of facts in specific situations to determine action, but only within the limits of standard practice and the scope of the job. Occasionally some independent action is required, or a decision must be made, but in all such cases the general result towards which such actions and decisions are aimed is determined elsewhere.

Supervision Received *Degree 2, 10 Points*

Work under general direction. The standard nature of the work requires little immediate supervision; but supervision is always available, and most of the work is assigned.

Responsibility for Errors *Degree 3, 20 Points*

Errors may cause failure to determine correct classifications; however, all work that would affect the general company wage policy is checked.

Responsibility for Contacts with Others *Degree 3, 20 Points*

Regular contacts with other departments, furnishing or obtaining reports and information essential to the carrying out of responsibilities.

Responsibility for Confidential Data *Degree 3, 15 Points*

Regularly work with confidential data, the disclosure of which might have adverse effects.

Mental and Visual Demand *Degree 2, 10 Points*

Flow of work and nature of duties require normal mental and visual attention.

Working Conditions *Degree 2, 10 Points*

Good, except that duties sometimes require exposure to factory working conditions.

GRADE 5 (CONT.)

***Job Title:* Tabulating-Machine Operator A** **225 Points**

Job Description

Set up and operate tabulating equipment such as accounting machine, summary punch, reproducers, collators, interpreters, and sorters. Make complicated new set-ups with occasional assistance from supervisors. Make simpler new set-ups that involve responsibility for accuracy and on which there may be no suitable check.

Tabulating-machine operator A may sometimes perform work of a higher type than that listed, to develop the skills required in the higher-graded job.

Analysis of Factors

Mentality *Degree 2, 30 Points*

Knowledge of the operation of tabulating equipment. Equivalent to four years of high school, plus short specialized training in the operation of tabulating machines.

Experience and Training *Degree 3, 60 Points*

One to three years.

Complexity of Duties *Degree 3, 45 Points*

Semi-routine duties involve an intensive knowledge of a restricted field, requiring the use of a wide range of procedures and the analysis of facts in situations to determine what action should be taken, within the limits of standard practice.

Supervision Received *Degree 3, 20 Points*

Work under direction, where a definite objective is set up and the employee plans and arranges his own work, referring only unusual cases to supervisor.

Responsibility for Errors *Degree 3, 20 Points*

Errors may have serious results, involving loss of production, waste of material, or damage to equipment. Effect is usually confined within the company or to a single phase of activity. However, the correction of errors may involve some trouble in back-checking by others.

Responsibility for Contacts with Others *Degree 2, 10 Points*

Contacts with other persons within the department on routine matters, or occasional outside contacts, for furnishing or obtaining information only.

Responsibility for Confidential Data *Degree 3, 15 Points*

Regularly work with confidential data, the disclosure of which might have adverse effect.

Mental and Visual Demand *Degree 3, 15 Points*

Flow of work and nature of duties involve the coordination of manual dexterity with close mental and visual attention.

Working Conditions *Degree 2, 10 Points*

Generally good working conditions, with occasional exposure to noise and grease.

GRADE 5 (CONT.)

Job Title: Secretary A **235 Points**

Job Description

Make minor decisions on parts of supervisor's work, under his name, handling completely, or in part, correspondence, telephone, and other inquiries. Arrange for and make appointments. May direct others as to required handling of statistics, typing, stencil cutting, diversified prewritten data, and records or files in connection with supervisor's job. Handle confidential data such as those pertaining to operation of an entire organization or division. Take dictation and transcribe notes.

Analysis of Factors

Mentality *Degree 2, 30 Points*

Knowledge of stenography, business arithmetic, office procedures; operation of typewriter. Equivalent to four years of high school plus short business-school training.

Experience and Training *Degree 4, 80 Points*

Three to five years of experience in secretarial work.

Complexity of Duties *Degree 3, 45 Points*

Duties involve a general knowledge of the activities and function of supervisor, knowledge of company and departmental procedures, their relationships to other departments, and exercise of sufficient judgment to make decisions within the scope of the job.

Supervision Received *Degree 3, 20 Points*

Work under general direction, planning and arranging own work, referring to supervisor only those matters requiring his attention. Work from general directions; screen and arrange the work of supervisor to assure the best utilization of his time.

Responsibility for Errors *Degree 3, 20 Points*

Errors may have serious effect, involving loss of supervisor's time, records, etc. Much of work is not subject to check or verification.

Responsibility for Contacts with Others *Degree 3, 20 Points*

Make regular contacts with other departments, furnishing and obtaining necessary information for reports, etc., but not ordinarily dealing in policy matters. Outside contacts require tact to avoid unnecessary unpleasant reactions.

Responsibility for Confidential Data *Degree 3, 15 Points*

Regularly work with some confidential data, the disclosure of which might be against the best interests of the company.

Mental or Visual Demand *Degree 2, 10 Points*

Flow of work and nature of duties involve the coordination of manual dexterity with close mental and visual attention for intermittent periods only. Much of the time only normal mental and visual attention is required.

Working Conditions *Degree 1, 5 Points*

Usual office working conditions.

GRADE 6

Job Title: Junior Engineer, Aircraft Design **210 Points**

Job Description

Perform simple detail drafting, make routine engineering tests; perform routine engineering computations, prepare change orders and deviations, assist an engineer of a higher rate in the carrying out of engineering procedure. Work in any engineering group or project, performing all work under supervision.

Junior engineer, aircraft design, may sometimes perform work of a higher type than that listed, to develop the skills required in the higher-graded job.

Analysis of Factors

Mentality *Degree 4, 60 Points*

Broad knowledge of a general technical field such as chemical, civil, electrical, or mechanical engineering. Equivalent to four years at a college or university.

Experience and Training *Degree 2, 40 Points*

Three to nine months.

Complexity of Duties *Degree 3, 45 Points*

Semi-routine duties require an intensive knowledge of restricted engineering procedures, and analysis of facts to determine action, but only within the limits of standard engineering practice.

Supervision Received *Degree 2, 10 Points*

Details of work are under general supervision. Standard practice enables the employee to proceed alone on routine work, referring questionable cases to supervisor.

Responsibility for Errors *Degree 2, 10 Points*

Errors are mostly detected in succeeding operations, and generally confined to one group. Mistakes cause some trouble in back-checking by others. Most of work verified or checked.

Responsibility for Contacts with Others *Degree 2, 10 Points*

Contacts are with persons within engineering department on routine matters, for furnishing or obtaining information only.

Responsibility for Confidential Data *Degree 3, 15 Points*

Regularly work with confidential engineering data, the disclosure of which might have adverse effects.

Mental and Visual Demand *Degree 3, 15 Points*

Flow of work and nature of duties involve the coordination of manual dexterity with close mental and visual attention.

Working Conditions *Degree 1, 5 Points*

Good drafting-room working conditions.

GRADE 6 (CONT.)

Job Title: Assistant to the Women's Supervisor A 210 Points

Job Description

Supervise and assist personnel engaged in handling routine female problems on shift. These responsibilities require the employee to: (1) Have a thorough knowledge of plant rules, of location of safety stations, and of the proper channels for employee service and personnel activities. (2) Make scheduled tours of rest rooms to check on loitering and to aid in matters of feminine hygiene. (3) Lend general assistance to foremen in the routine handling of female problems; however, if problems are non-routine all cases are referred to women's supervisor. (4) Report any matters pertaining to housekeeping in rest rooms, and inform women's supervisor of any dissatisfaction of female employees about work conditions, supervision, or plant facilities. (5) In the absence of women's supervisor, conduct the indoctrination program for new female employees.

Analysis of Factors

Mentality *Degree 2, 30 Points*

Knowledge of manufacturing operations and of the problems of women workers in industry. Equivalent to four years of high school, plus specialized training.

Experience and Training *Degree 3, 60 Points*

One to two years' experience is normally required for the employee to attain proficiency in dealing with special problems that affect the attitudes of women in industry.

Complexity of Duties *Degree 3, 45 Points*

Duties involve a knowledge of a restricted field, ability to direct and supervise women, and ability to analyze the facts of a situation to determine what action, within the limits of standard practice, should be taken.

Supervision Received *Degree 2, 10 Points*

Work under general supervision. Standard practice enables the employee to proceed alone on work, referring only questionable cases to supervisor.

Responsibility for Errors *Degree 2, 10 Points*

Errors of judgment might adversely affect employee morale. However, as a general rule, if problems are serious they will be taken care of by the women's supervisor personally so the assistant's responsibility for errors is definitely limited.

Responsibility for Contacts with Others *Degree 2, 10 Points*

Make contacts with women employees about their personal problems. Also make contacts with shop foremen or assistants.

Responsibility for Confidential Data *Degree 2, 10 Points*

Work with some confidential personal data on individual employees, but the effect of any disclosure would be negligible.

Mental and Visual Demand *Degree 1, 5 Points*

Duties are intermittent and require attention only at intervals.

Working Conditions *Degree 2, 10 Points*

Good working conditions. Occasional exposure to noise, dust, and heat.

Type of Supervision *Degree 2, 10 Points*

Immediate supervision over a group of employees. Most of supervising time is spent assigning and reviewing work and eliminating ordinary difficulties.

Scope of Supervision *Degree 2, 10 Points*

Supervise a small group, seldom more than ten people.

GRADE 7

Job Title: Staff Nurse B **185 Points**

Job Description

Take care of first-aid cases up to that level which may require the services of a physician, and assist as necessary with physical examinations. Do follow-up work on employees with physical defects, on measures for eliminating industrial hazards, and on such other medical and safety matters as may arise. Also take care of the details of checking on jobs and social-service problems such as nutrition, cleanliness, getting the employees back for necessary medical rechecks, and other preventive medical measures.

Included in this group are what may be termed relief nurses, or floaters, who work in the various first-aid stations as necessary. They are nurses who have seniority beyond the group that is regularly working in the stations and have demonstrated the ability to fill in on any of the different phases of work that may come up. Specifically, they relieve where there is any shortage of nurses, and they handle other immediate problems of more than average difficulty, including minor organizational difficulties. Handle area problems in the absence of staff nurse A, as required.

Analysis of Factors

Mentality *Degree 3, 45 Points*

This job requires a registered nurse, calling for high-school graduation plus three years (twelve months each) of nurse's training (equivalent to two years of college).

Experience and Training *Degree 2, 40 Points*

Six to twelve months.

Complexity of Duties *Degree 2, 30 Points*

Duties are somewhat routine, involving the application of clearly prescribed standard practice, requiring the use of several procedures and the making of minor decisions requiring some judgment.

Supervision Received *Degree 2, 10 Points*

Works under general supervision where the standard nature of the duties enables the employee to proceed alone on routine work, referring questionable cases to physician.

Responsibility for Errors *Degree 2, 10 Points*

Errors are normally detected, since most of the work is verified or checked.

Responsibility for Contacts with Others *Degree 2, 10 Points*

Make contacts with other persons throughout the plant on routine matters, furnishing or obtaining information or services only.

Responsibility for Confidential Data *Degree 3, 15 Points*

Regularly work with confidential data, the disclosure of which might have adverse effects.

Mental and Visual Demand *Degree 2, 10 Points*

Flow of work and nature of duties require only normal mental or visual attention.

Working Conditions *Degree 3, 15 Points*

May be somewhat disagreeable owing to exposure to factory working conditions, and to the normal disagreeableness generally associated with care of the sick or injured.

GRADE 8

Job Title: Lister, B, Parts **160 Points**

Job Description

1. Write up part and assembly cards from drawings and be able to write change notices on cards already released.
2. Check parts lists on drawings for required form.

3. Assist the preparation of parts catalogs; this duty involves breaking down drawing lists and listing the items under appropriate headings. Also assist the preparation of numerical parts lists, interchangeability lists, and assignment of dash numbers to new parts, obtaining required information from parts card files.

4. Prepare data in proper form for typing and eventual dittoing.

Employees in this grade may sometimes perform a higher type of work than that listed, to develop the skill required in a higher-graded job.

Analysis of Factors

Mentality *Degree 1, 15 Points*

Knowledge of simple arithmetic, English, and grammar. Accuracy in checking, posting, and counting. Mental alertness and adaptability to office routines. Equivalent to four years of high school.

Experience and Training *Degree 2, 40 Points*

Six to twelve months of experience is normally required to obtain familiarity with drafting, parts listing, and filing systems.

Complexity of Duties *Degree 2, 30 Points*

Duties are more or less routine, involving the application of clearly prescribed standard practices and the exercise of some judgment in taking assemblies from lists and in writing them up so that all information is available.

Supervision Received *Degree 2, 10 Points*

Work under general supervision. Standard practice enables the employee to proceed alone on routine work, referring only questionable cases to supervisor.

Responsibility for Errors *Degree 3, 20 Points*

Errors may result in failure to release parts, wrong airplane numbers, and considerable confusion from the listing of improper quantities, etc. Most of work is not subject to immediate verification or check.

Responsibility for Contacts with Others *Degree 2, 10 Points*

Contacts are made with other persons within the department, furnishing or obtaining information relative to the maintenance of parts catalog, or assigning dash numbers to new parts.

Responsibility for Confidential Data *Degree 2, 10 Points*

Occasionally work with confidential data such as drawings, change notices, and parts lists, but the full import of such information is not apparent, and the effect of any disclosure would be negligible.

Mental and Visual Demand *Degree 3, 15 Points*

Somewhat sustained mental or visual application is required in writing up parts and assemblies, in the listing of catalog items, and in the preparation of material for typing.

Working Conditions *Degree 2, 10 Points*

Usual office working conditions, complicated to some extent by the noise and confusion of crowded work areas.

GRADE 9

Job Title: Billing Machine Operator C — 135 Points

Job Description

Operate billing machine to post issues or receipts; post open commitments. Make postings to ledger control from proof tapes. Compute extensions. May help run trial balances.

Employees in this grade may sometimes perform a higher type of work than that listed, to develop the skill required in a higher-graded job.

Analysis of Factors

Mentality *Degree 2, 30 Points*

Knowledge of business arithmetic; operation of office equipments such as typewriter and bookkeeping and calculating machines. Equivalent to four years of high school plus short specialized training.

Experience and Training *Degree 1, 20 Points*

Up to three months is usually sufficient experience for the employee to gain the necessary familiarity with standard forms and procedures. Although the job sometimes requires that the employee keep up various specific records, books, or miscellaneous ledgers, the instructions for doing the work are simple and do not require specialized training to understand.

Complexity of Duties *Degree 2, 30 Points*

Duties involve the application of clearly prescribed standard practice, requiring the use of several procedures and the making of minor decisions requiring some judgment.

Supervision Received *Degree 2, 10 Points*

Work under general supervision. Standard practice enables the employee to proceed alone on work, referring only questionable cases to supervisor.

Responsibility for Errors *Degree 2, 10 Points*

Errors are usually detected in succeeding operations. Correction involves loss of time in back-checking. Most of work is verified.

Responsibility for Contacts with Others *Degree 1, 5 Points*

Little or no contact except with immediate associates and own supervisor.

Responsibility for Confidential Data *Degree 2, 10 Points*

Occasionally work with confidential data, but the full import is not apparent and the effect of any disclosure would be negligible.

Mental or Visual Demand *Degree 3, 15 Points*

Flow of work and nature of duties require the employee to concentrate closely, as considerable coordination of manual dexterity with mental and visual attention is called for.

Working Conditions *Degree 1, 5 Points*

Usual office working conditions.

GRADE 10

Job Title: Blueprint Cutter and Folder **105 Points**

Job Description

Inspect, fold, and cut blueprints, ozalids, black-and-white prints, and Vandykes as they come from the reproduction machine. Receive prints from machine on a continuous roll of print paper, and inspect prints for legibility and color. Cut prints from continuous print run from machine, fold to standard file size, and place in proper stack for sorter. Perform any miscellaneous cutting and folding as assigned by supervisor.

Employees in this grade may sometimes perform a higher type of work than that listed, to develop the skill required in a higher-graded job.

Analysis of Factors

Mentality *Degree 1, 15 Points*

Knowledge of simple English, accuracy in checking and counting blueprints. This knowledge is approximately equivalent to that acquired in four years of high school.

Experience and Training *Degree 1, 20 Points*

Two weeks to one month of experience is required to become familiar with the established standards for the color and legibility of blueprints.

Complexity of Duties *Degree 1, 15 Points*

Duties are routine, involving the inspection, cutting, and folding of prints, and require little judgment.

Supervision Received *Degree 1, 5 Points*

Work under immediate supervision, with short assignments and a regular check of performance.

Responsibility for Errors *Degree 1, 5 Points*

Errors can be detected easily and would result only in minor confusion or clerical expense for correction.

Responsibility for Contacts with Others *Degree 1, 5 Points*

Little or no contacts except with immediate associates and supervisor.

Responsibility for Confidential Data *Degree 2, 10 Points*

Occasionally work with some confidential prints, but the full import is not apparent and the effect of any disclosure would be negligible.

Mental or Visual Demand *Degree 3, 15 Points*

Very close visual attention is required to inspect the entire surface of the print as it comes from the machine.

Working Conditions *Degree 3, 15 Points*

Equivalent to shop conditions. Must stand continually on concrete floor and lean over cutting and folding table in a tiring position. Fumes and noise of machine are unpleasant.

GRADE M

***Job Title:* Clerk G** **100 Points**

Job Description

Perform routine clerical work as assigned and under direction, such as posting, filing, answering telephones, chasing parts or materials, using tools and supplies, supplying clerical information from records, and sorting records and forms. This classification shall be utilized for beginner clerks who have no previous educational or related experience to qualify for higher type of work.

Employees in this job may sometimes perform work of a higher type than that listed, to develop the skill required in the higher-graded job.

Analysis of Factors

Mentality *Degree 1, 15 Points*

Knowledge of simple arithmetic, English and grammar. Accuracy in checking, posting, counting, etc. Mental alertness and adaptability to office routine. Equivalent to four years of high school.

Experience and Training *Degree 1, 20 Points*

Normally, up to three months of experience is required.

Complexity of Duties *Degree 2, 30 Points*

Duties are somewhat routine, involving the making of minor decisions and use of some judgment as to procedures to be followed under standard systems. Initiative is required to assure the coordination of a volume of detail.

Supervision Received *Degree 1, 5 Points*

Work under immediate supervision, with short assignments of work and a regular check of performance.

Responsibility for Errors *Degree 1, 5 Points*

Errors can be detected quickly and easily and would result only in minor confusion or clerical expense for correction.

Responsibility for Contacts with Others *Degree 1, 5 Points*

Little or no contact except with immediate associates and own supervisor.

Responsibility for Confidential Data *Degree 1, 5 Points*

Few or no confidential data involved.

Mental or Visual Demand *Degree 2, 10 Points*

Flow of work and nature of duties require only normal mental or visual attention.

Working Conditions *Degree 1, 5 Points*

Usual office working conditions.

CHAPTER 9

RELATING JOB EVALUATION TO PAY SCALES

The Problem of Cost Estimating

Job evaluation, because of its basic fairness, is a morale-building program and as such will pay dividends. However, the principle of equal pay for equal work cannot be applied without changing the present wage relationships; therefore, unless the payroll is increased, some wages will be raised and others cut, a condition that will cause dissension and tend to destroy instead of improve morale. Such a condition can be avoided by continuing at their present overpaid rates those employees whose jobs are evaluated below their present wages. This arrangement will cause an immediate rise in the payroll, but it will gradually drop down again as the overpaid workers gain experience enough to earn their wages and as new employees are hired at the evaluated rates. To forecast the cost of job evaluation under this plan, both immediate and ultimate expense must be estimated. The procedure for making these estimates is as follows:

1. Establish a code system for machine tabulation of the new job titles.
2. Find out what present jobs at what present rates will be in each labor grade under the proposed set-up.
3. Make industry- and community-wide check-ups of wage scales (as information for the company management).
4. Study the values of different types of wage structures (for management's information).
5. Get decisions from management on base-pay rates and type of wage structure to be used.
6. Figure predicted wages of all present employees under the proposed set-up (from management's decisions and from labor grades estimated in step 2).

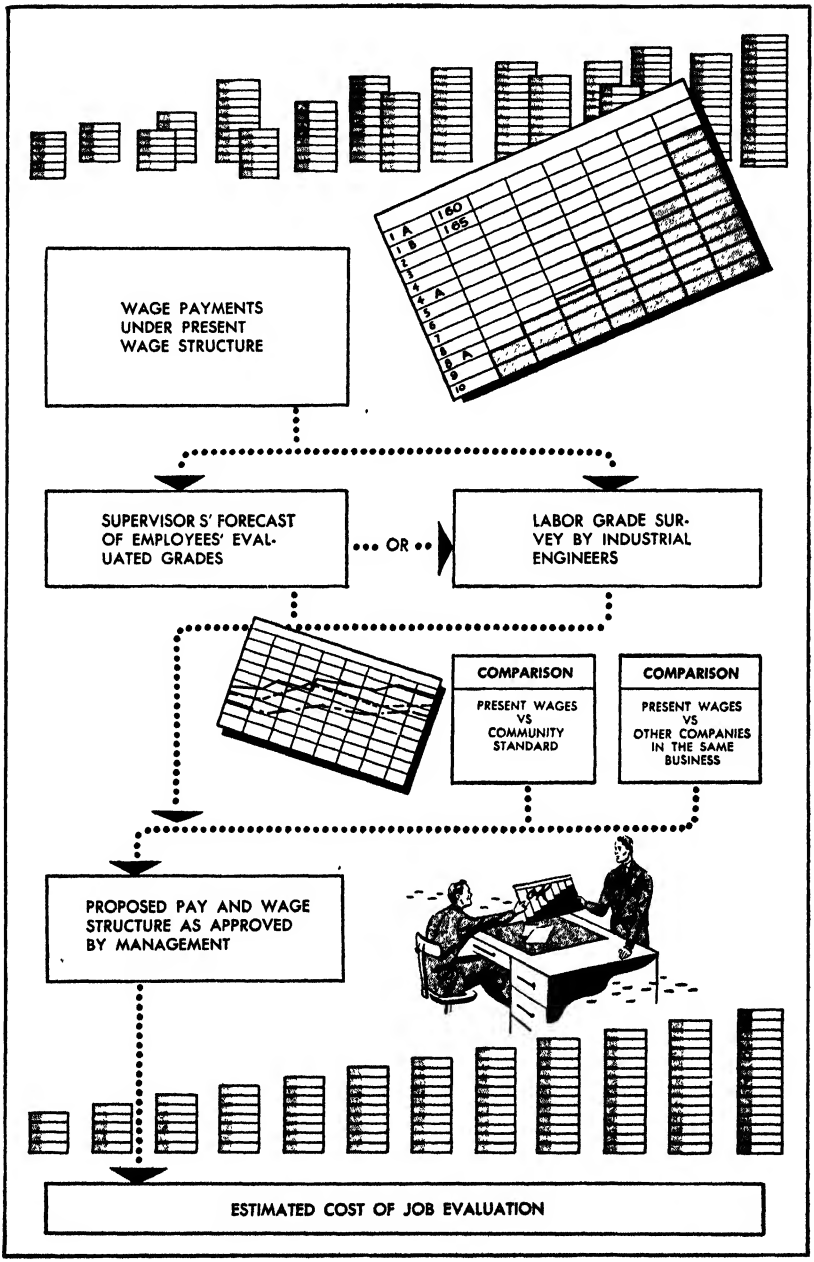


FIG. 28. Point-system job-evaluation procedure—cost estimating.

7. Prepare a chart comparing present wage costs (recorded in step 2) with proposed immediate and ultimate wage costs (estimated in step 6) for management's approval.

The following pages contain some discussion of the steps in this procedure.

Job Coding

A four-digit code number for each job title provides the best combination of comprehensiveness with brevity for machine tabulation. The following code was designed to include the most possible information in four digits.

First Digit: major department (inspection, engineering, fabrication, plant maintenance, etc.).

Second and Third Digits: job title (millwright, riveter, aircraft design engineer, etc.).

Fourth Digit: labor grade (as shown on the first pages of the job-evaluation plans, Chapters 3 and 4).

Examples:

1. Assembler-installer, structures, B; in the fabrication department, which is a grade 6 job (as shown by its write-up in Chapter 7).

Fabrication department = 2
Assembler-installer, structures = 37
Grade 6 = 6
Complete code designation: 2376

2. Assistant group engineer, aircraft design, in grade C (as shown by its write-up in Chapter 8).

Engineering department = 5
Aircraft design engineer = 26
Grade C = C
Complete code designation: 526C

This coding system will be practical if, as previously recommended, the number of labor grades and job titles is kept down to the minimum necessary for adequate differentiation.

Supervisors' Forecast of Employees' Evaluated Grades

The quickest method for finding out what employees will be in each of the new labor grades is simply to ask their supervisors.

If the industrial engineers in the job-evaluation department have succeeded in working up a cooperative spirit among the supervisors, this is an excellent method. It gives the supervisors a responsibility that will start them thinking about their all-important later role of placing their personnel in the right jobs. If, however, the supervisors are not mentally prepared to take the forecast seriously, the results will be inaccurate and perhaps costly to the company. The chief industrial engineer must weigh the possibility of inaccuracy against time-saving. If he decides to have the job forecast made by supervisors, he should direct that the same industrial engineers who evaluated each department be selected to instruct the supervisors in that department on how to use the departmental job-classification sheets (Fig. 29) and the job-classification record cards (Fig. 30).

On the job-classification sheets every job in the department is listed by the job title and code number it will have in the proposed set-up. Evaluated grades and point ratings are also given. In conjunction with the job write-ups (which must be available to every supervisor), these sheets will enable the supervisors to classify their workers according to the jobs they will probably hold when the job-evaluation program goes into effect.

The job-classification record cards, one for each employee, are used to record the decisions of the supervisors as to what employees will probably be placed in what jobs. For convenience and efficiency, the card is used that will be the employee's permanent record when the evaluation system goes into effect. The date will show that this is merely a forecast, subject to change, and not the final rating of the employee. The pay rate given is, of course, the employee's present rate, since the wages for the evaluated labor grades have not yet been determined. The "rate range" and "merit rating" columns are for future use and are not to be filled in at this time.

The industrial engineer, when giving his instructions to the supervisor, should make it very clear that *only the type of work the employee does, not his individual characteristics,* is to be considered in filling out the job names and classes on the cards. If personalities are allowed to influence ratings at this point, the

JOB-EVALUATION PROGRAM

Standard Job Classification

Supervisors will use this information when filling out job-classification record cards for all employees. A job description for each job title listed below will be provided by the job-evaluation department.

Machine Shop

Code Number	Job Title	Grade	Points
1172	Layout man A	2	445
1253	Lathe operator, vertical A	3	405
1183	Set-up man, automatic screw machine	3	430
1193	Set-up man, Keller machine	3	415
1203	Set-up man, milling machines	3	410
1213	Set-up man, turret lathes	3	405
1223	Boring-machine operator (Lucas)	3	415
7074	Lathe operator, engine A	4	375
7084	Lathe operator, turret A	4	375
7114	Milling-machine operator A	4	370
1234	Grinder operator A	4	370
1244	Heat-treat batteryman A	4	395
1335	Drill-press operator A	5	355
0575	Material man B	5	365
1175	Layout man B	5	345
1235	Grinder operator B	5	335
0525	Chief clerk, shops	5	350
7346	Keller operator	6	325
7076	Lathe operator, engine B	6	315
1286	Shaper operator, horizontal and vertical	6	315
1266	Borematic operator	6	305
1276	Broach operator	6	305
7086	Lathe operator, turret B	6	305
7116	Milling-machine operator B	6	305
1246	Heat-treat batteryman B	6	300
7037	Do-all saw operator	7	275
0697	Straightening-press operator	7	260
0527	Senior clerk, shops	7	250
7118	Milling-machine operator, hand C	8	225
1318	Saw operator, hack saw	8	215
1308	Tapping-machine operator	8	215
1338	Drill-press operator B	8	240
1299	Engraving-machine operator	9	205
0929	Degreaser	9	195
1339	Drill-press operator C	9	195
0529	Shop clerk	9	190
1320	Automatic screw-machine operator	10	175
0620	Helper, general	10	145

Fig. 29. Departmental job-classification sheet.

JOB CLASSIFICATION RECORD

EMPLOYEE NO. 1147

NAME Adams, (LAST) John (FIRST) Randall (MIDDLE) DATE EMPLOYED June 3, 1944

DATE	JOB NAME	CLASS	JOB NO.	SHIFT	RATE RANGE	RATE	MERIT RATING	REMARKS
8/23/44	Riveter	B	3737	1		.97½		

FIG. 30. Job-classification record card.

whole purpose of job evaluation will be nullified. If a system of merit ratings, such as is described in Chapter 13, is to be started when the job-evaluation system goes into operation, this fact should be made clear to every supervisor. It will be much easier for him to fill out the cards on an impersonal basis if he knows that there will be an opportunity later to reward individual merit.

In general it will be best, once the industrial engineer has given his instructions, for the employees' *immediate* supervisors to place them in the proper jobs, the decisions of the immediate supervisors, however, being closely checked and coordinated by the department's top men. Some of the actual work of filling in the details can probably be left to the personnel department. It should not take more than a week or two for the cards to be filled out and returned to the job-evaluation department.

The record cards should definitely not be shown to the workers. The assignments are predictions only at this stage, subject to change between this time and the time when the system is actually put into effect.

Labor-Grade Survey by Industrial Engineers

In many ways it is more satisfactory to have the industrial engineers rather than supervisors make the employee inventory that has just been described. The engineers' results are likely to be more impersonal and more accurate. The supervisors' time is not taken up with paper work, and there is less danger of employees' getting false ideas of what job evaluation will do for them. If the chief industrial engineer decides that several extra weeks can be spared for his staff to do the job themselves, they will be assigned to make individual studies of the workers in the departments whose jobs they evaluated and wrote up. Working with the employees' immediate supervisors, watching closely what each man or woman does, asking questions of individual people as necessary, the industrial engineer can, for each person, arrive at an unbiased decision that will fit the general conception of the evaluation system and the previously planned department organization plan.

Coordinating Present Wages with Proposed Labor Grades

The job-classification record cards are the fundamental data on which all the following procedure is based. The first step in organizing the data to give a picture of what will happen when job evaluation goes into effect is to group the job titles and corresponding present wage rates by departments. Figure 31 is a convenient form for this purpose. Many industrial engineers, in fact, prefer to use it for making trials even before the record cards are filled out.

The form is practically self-explanatory. The "weighted average" item is simply the average labor cost for getting the job under consideration done; i.e., each of the rates now being paid for a job is multiplied by the number of people in that rate, the results for the different rates are added up, and the sum is divided by the total number of people doing the job.

When a set of these labor-grade survey sheets has been completed for each department, wide discrepancies will probably show up among the pay rates of people doing almost exactly the same work, as shown in the example. Such irregularities exist in almost any large department whose jobs have not previously been evaluated, and they are seldom found to represent differences in the employees' actual rates of production. They are much more likely to result from incomplete organization planning and the inability of supervisors to get together on pay standards because they lack the kind of information that the standard job-evaluation write-ups provide. It will be remembered that the bringing to light of such irregularities was listed in Chapter 1 as one of many ways in which job evaluation pays off.

It is also likely that a few of the discrepancies in pay standards are the result of fixed standard practice, special wage agreements, or other factors that may be beyond the control of the job-evaluation program. If such cases are recognized at this stage, they should be covered by off-standard pay-rate cards, as described in the following chapter, and estimated at the rates they will probably receive, even though such rates disagree with the evaluations.

JOB EVALUATION FIELD SURVEY

Department *Fabrication* ......Shop...*68*.... .... Date of Survey....*6-15*.. . .....

JOB TITLE	GRADE	.67	.69½	.72	.77	.82½	.84½	.87½	.92½	.94½	.95	.97½	.99½	1.00	1.02½	1.04½	1.07½	1.12½	1.17½	1.22½	1.24½	1.27½	1.32½	1.37½	1.42½	1.47½	Points	Minimum Wage	Maximum Wage	Weighted Average	Number of Employees
Bench Mech., Parts Stra.	8											24															273	.975	.975	.975	24
" " ., Steel Welding	8											54					11										230	.975	1.075	.992	65
Cutter, ~~A~~ B	8					6		~~3~~	1			1															240	.825	.975	.856	8
" , Cable, A	8					4		1											1								235	.825	1.175	.891	6
Drill Grinder B	8					2			1			16															225	.825	.975	.956	19
~~Saw Operator, Hack Saw~~	~~8~~											~~2~~															~~245~~	~~.975~~	~~.975~~	~~.975~~	~~2~~
Drill Press Operator B	8											53 ~~48~~			~~5~~												225	.975	.975 ~~1.025~~	.975 ~~.979~~	53
Flaring Machine Operator	8					11													1								235	.825	1.175	.854	12
Hand ~~Metal~~ Former B	8											7					2										235	.975	1.075	.997	9
Hand ~~Cable~~ Splicer A	8											10							1								235	.975	1.175	.993	11
Material Man C	8											8							~~1~~								215	.975	.975	.975	8
Mech., Instrument & Elect., C	8					8						8															230	.825	.975	.900	16
Metal Finisher, Hand a Pneumatic A	8																4		18								245	1.075	1.175	1.157	22
Multiple Stripper Punch Operator A	8														2												240	1.025	1.025	1.025	2
Offset Press Operator A	8											28															220	.975	.975	.975	28
Punch Press Operator B	8											30					26										235	.975	1.075	1.021	56
Saw Operator, Table, A	8							43				8															215	.875	.975	.891 ~~.991~~	51
~~Saw Operator, Table, Cut Off, Arm B~~	8							~~8~~	~~2~~																						

FIG. 31. Labor-grade survey sheet.

WAGE RATE ANALYSIS

Grade	Job Title	Points	Min. Rate	Max. Rate	Avg. Rate	Total Empl.	Rate Distribution						
							0.75	0.83	0.93	1.03	1.13	1.23	1.33
1	Machinist and millwright, maintenance	505	1.23	1.23	1.23	6						6	
1	Tool and die maker A	480	1.33	1.33	1.33	52							52
2	Electrician, maintenance, A	445	1.23	1.23	1.23	1						1	
2	Engine and airplane maintenance mechanic	440	1.13	1.23	1.182	65					31	34	
2	Jig borer A	450	1.33	1.33	1.33	11							11
2	Layout template man A	450	1.13	1.13	1.13	39					39		
2	Mock-up man A	440	1.13	1.23	1.15	5					4	1	
3	Jig builder A	430	1.13	1.23	1.176	144					78	66	
3	Machinist, general, A	435	1.13	1.23	1.18	8					4	4	
3	Test assembler A	415	1.13	1.13	1.13	13					13		
3	Wood worker A	405	1.13	1.23	1.149	26					21	5	
4	Assembler, precision bench, A	370	1.13	1.23	1.143	122					106	16	
4	Material man A	380	1.13	1.23	1.19	5					2	3	
4	Set-up man, punch presses, A	385	1.13	1.23	1.152	41					32	9	
4	Tester, electrical, experimental A	390	0.93	1.13	1.005	4			2	1	1		
4	Welder, gas, A	395	1.23	1.23	1.23	36						36	

5	Assembler, power plant, A	360	1.13	1.23	1.145	59					50	9	
5	Dispatcher, automotive, A	340	1.23	1.23	1.23	2						2	
5	Jig builder B	335	0.93	1.13	1.074	259			72	2	185		
5	Millwright, spotweld, B	355	0.93	1.13	1.05	8			3		5		
5	Test assembler B	355	0.93	1.13	1.005	20			11	3	6		
5	Tester, hydraulic, experimental, A	360	0.93	1.23	1.11	5			1		3	1	
6	Assembler, instrument panel	325	1.03	1.23	1.13	6				2	3	1	
6	Automotive mechanic B	300	0.93	0.93	0.93	4			4				
6	Bench mechanic, spotweld, A	320	0.93	1.13	1.08	4			1		3		
6	Milling-machine operator B	305	0.93	1.13	1.067	45			14		31		
6	Punch-press operator A	315	0.93	1.23	1.066	69			1	45	20	3	
7	Assembler, shields, A	250	0.93	1.13	1.021	61			33		28		
7	Instrument repair man B	260	0.93	1.03	0.98	8			4	4			
7	Press plate maker B	290	1.03	1.13	1.119	9				1	8		
7	Shaper operator, spindle, A	255	0.93	1.13	0.972	82			38	40	4		
7	Test assembler C	280	0.83	0.93	0.88	2		1	1				
8	Assembler, major subassembly, B	240	0.93	1.03	0.931	479			475	4			
8	Inspector, shipping, C	220	0.75	0.75	0.75	9	9						
8	Saw grinder A	230	0.93	1.13	0.987	7			5		2		
9	Assembler, wire group, A	200	0.93	1.13	1.01	144			86		58		
9	Material man C	185	0.83	0.93	0.87	5		3	2				
10	Hand sewer A	170	0.83	0.83	0.83	5		5					
10	Staker, cable terminals, A	160	0.83	0.83	0.83	7		7					

FIG. 32. Page of wage-survey document.

Tabulating Labor Grade and Wage Data

As soon as a department has been surveyed and the basic wage data have been accumulated on survey sheets, the information can be typewritten in final form as illustrated in Fig. 32. It is suggested that this material be put on vellum with an electric typewriter so that copies can be made as necessary. When the data from all departments have been typed and the copies bound, it becomes the basic cost estimating document. The document, when finished, is a complete statement of the company's current wage rates, arranged for use as basic data for constructing a usable and equitable wage structure.

Charting Labor Grades and Wage Data

Graphic charts are the best means for making a clear picture out of the confused mass of individual items in the labor-grade document. The truest picture would be a scatter diagram, with an individual dot, representing each employee, plotted by placing his present pay rate on one coordinate and his evaluated labor grade on the other. For a company with thousands of employees this type of chart is not possible, and a line chart with averages, maximum, and minimum in place of individuals, as shown in Fig. 33, is much more effective. Another variation is the block type of chart (Fig. 34). This type has the advantage of emphasizing that equal pay is not always given for equal work under the present set-up, the discrepancies in pay rates showing up as definite areas. It is, therefore, excellent for use in making up wall charts or documents to sell the idea of job evaluation. Incidentally, it is interesting to note that, although point values instead of labor grades are measured on the horizontal coordinate of Fig. 34, this chart closely follows Fig. 33, illustrating once again that for practical purposes ten labor grades are enough to produce equitable pay relationships.

Intercompany Wage Surveys

With all the basic data on the company's wage rates collected and correlated for management to study, it is desirable next to obtain rate information from outside the organization. Information obtained from various companies within the local community should be sufficient for jobs which are common to many industries. For specialized jobs the information must be obtained from companies in the same industry, even if they are geographically remote. Wage information from other communities is, however, more difficult to use, and less reliable, because it must be weighted for differences in cost of living. Various methods may be used in gathering outside wage data. The simplest and perhaps the least accurate method is to obtain data by job title only, submitting to various other companies lists of job titles and requesting from those industries the rate ranges, the number of people involved, and the weighted average rate or the actual labor cost for each job, as illustrated in Fig. 35. Where time-saving is important, the inaccuracies of this method may be overlooked, especially if sufficient data can be obtained from a large number of industries so that the inaccuracies tend to balance out.

A more detailed and considerably more accurate method is to prepare short job descriptions of the work on which information is required, and submit the descriptions to industries within the area, requesting that they be matched up with similar types of work, and that the rate ranges and weighted average rates for these types of work be filled in, on a form similar to Fig. 36. Here again inaccuracies may develop, because in a survey of this type the written word is not always interpreted uniformly by those who reply to the requests.

The most accurate method usually available for collecting intercompany and interindustry wage data is to assign to a qualified member of the job-evaluation department the responsibility of visiting the outside companies with complete standard job write-ups, including factor descriptions. With the cooperation of the companies and industries visited, very accurate information can thus be obtained.

Intercompany Wage Comparisons

When all the data necessary to make proper comparisons have been collected, by any or all of the three previously mentioned methods, it is possible to develop a comparative wage chart like

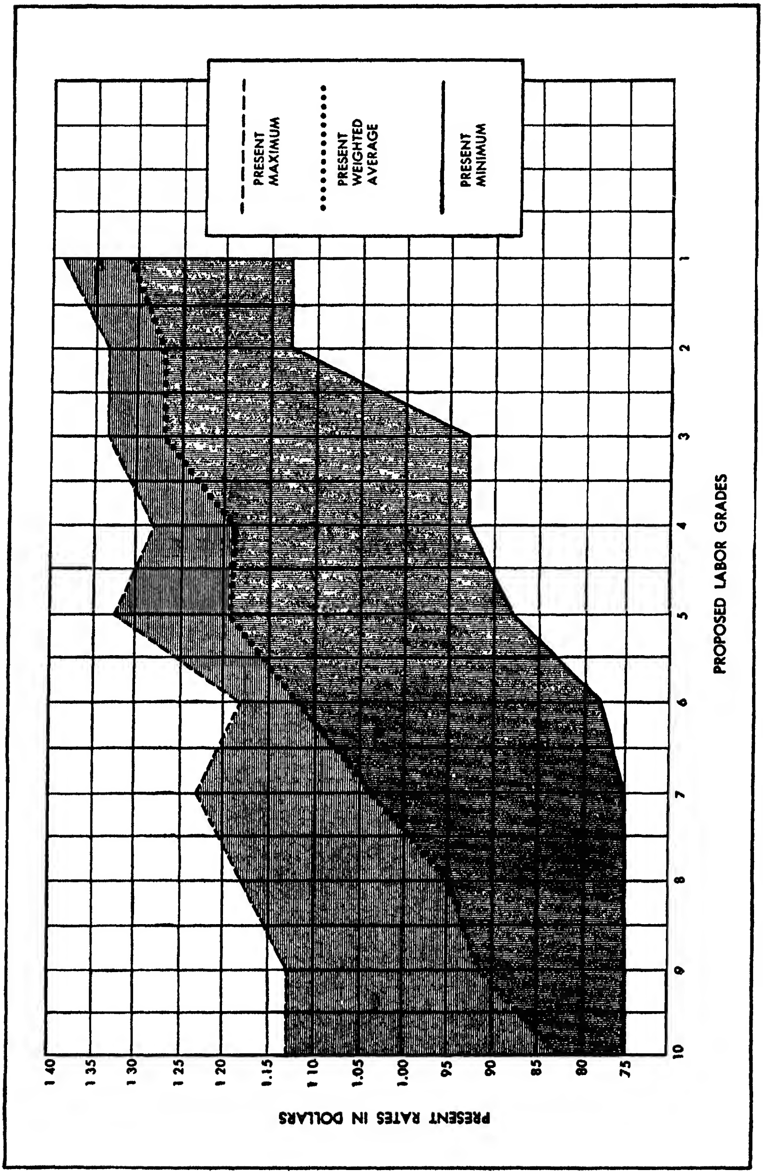


FIG. 33. Variations of present wages within proposed labor grades—line chart.

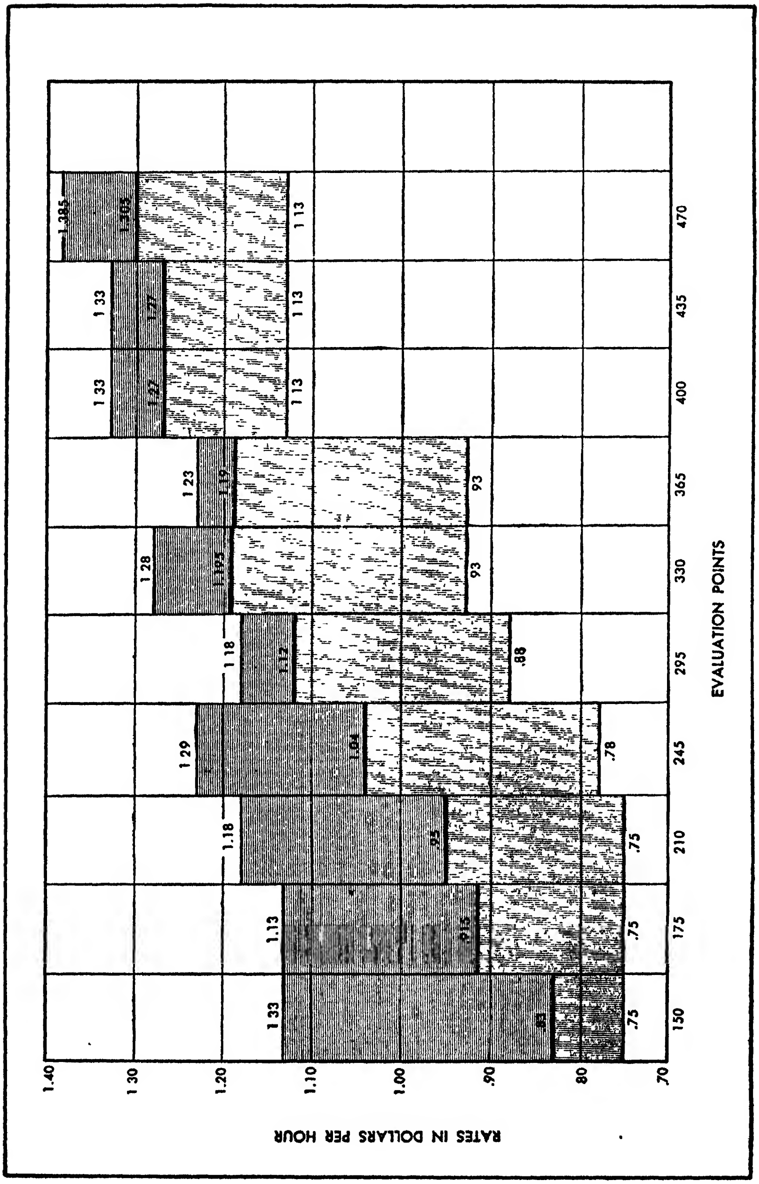


FIG. 34. Variations of present wages within proposed point ranges—block chart.

S A M M A M I S H   S O U N D   S H I P B U I L D E R S

Seattle, Washington

9 February 1944

Mr. J. E. Christian
Job Study Department
Reed-McGinnis Corporation
Seattle, Washington

Dear Sir:

Relative to our telephone conversation requesting salary rate ranges for certain office classifications, the following job titles are involved:

	No. of Employees	Wage Rate Range	Average Wage
Typists			
Stenographers			
Private Secretaries			
Executive Secretaries			
Calculator Operator			
Junior Clerks			
Senior Clerks			
Chief Clerks			
Junior Key Punch Operator			
Timekeepers			
Timekeeper Leaders			

This company is filing a Form No. 10 requesting revised office salary rate ranges on the above classifications. Comparative information for the area and for the industry will be made part of the application, and any information you may be able to furnish will be used for this purpose. As indicated above, the essential information is the number of employees, rate range, and weighted average rate for such job title.

Thanking you for your cooperation, we remain

Very truly yours,

SAMMAMISH SOUND SHIPBUILDERS

R. H. Sewell
R. H. Sewell
Assistant to Comptroller

RHS:1

FIG. 35. Request for wage data by job title only.

Fig. 37, showing the relationship between industry in general and the company being evaluated.

Practical Wage Structure

For the sake of simplicity it will be assumed here that the company intends to pay wages on a straight hourly basis, without any piece work or wage-incentive system. Several additional steps are involved in setting up a correct, usable hourly wage structure. Wage structures that are based on labor grades may be divided into two general classes: (1) flat-rate structures, with a single rate for each grade of work (Figs. 38 and 40); and (2) structures with a spread, or rate range, for each grade of work (Figs. 39 and 41). The flat-rate structure, as well as the rate-range structure, may be built upon either a constant *percentage* increment (Figs. 40, 41, and 42) or a constant *dollar* increment (Figs. 38 and 39) between labor grades. Rate structures with percentage increments, though seldom used because unions tend to feel that they do not favor the great mass of employees, have nevertheless the logical advantage that greater merit or seniority raises are possible in proportion as actual promotions become more difficult towards the top of the scale. When a rate-range structure is chosen, a wide range of pay within each labor grade can be obtained from top to bottom of the scale by using "overlapping" rates, either in a percentage-increment rate structure, illustrated by Fig. 42, or in a straight dollar-increment structure. The basic merits of this kind of structure are as follows:

It provides a wider range of rates between the minimum and maximum for each grade without resorting to an extremely low rate for low-ranking jobs or an extremely high rate for high-ranking jobs. It provides for a greater degree of flexibility within labor grades, so that management can sell the employee on the idea of a great number of merit increases allowable within each labor grade—a feature that, of course, has a tendency to build up the morale of the employee by allowing him to anticipate reasonable annual increases within his present job. The basic difficulty with the overlapping structure is that employees in lower labor grades may, through merit, reach higher rates than employees in higher labor grades. Unless accurate figures

Related Experience	Occupation	Description	No. Empl. M	No. Empl. W	Salary Rates Max	Salary Rates Min	Salary Rates Avg	Avg. Length Service
		General Office						
Up to 3 mos.	Office boy or messenger A	Run errands; open, collect, and distribute mail. Perform minor clerical duties. Deliver mail, memos, etc., between office or factory departments.						
2 to 3 mos.	Mail clerk B-2	Distribute and dispatch interoffice and outgoing mail and parcel post. Open, sort, and distribute incoming mail. May perform miscellaneous simple office work.						
12 to 18 mos.	File clerk C-3	Sr. Classify, index, and file correspondence or other office records Responsible for filing system and arrangement. May involve supervision.						
2 to 3 mos.	B-2	Jr. File invoices, vouchers, orders, correspondence for the most part previously classified. May perform minor routine clerical duties. No previous filing or clerical training required.						
12 to 18 mos.	Telephone operator C-2	Sr. Operate multiple switchboard, handle and record toll calls. May act as receptionist.						
6 to 12 mos.	B-3	Int. Operate single position switchboard, handle and record toll calls. May act as receptionist. May perform miscellaneous, minor clerical duties.						
2 to 3 mos.	B-2	Jr. Operate monitor-type switchboard. Act as receptionist. Perform miscellaneous clerical work like typing, filing. Switchboard duties incidental to clerical work.						

1 to 2 yrs.	Comptometer operator C-2	Sr. Operate comptometer in work of more than average difficulty, such as making computations that constantly involve large numbers of items of large denominations (not in round numbers), or making computations where addition, subtraction, multiplication, and division are all frequently necessary. Work continually varying or requiring specialized knowledge, training, and experience. Compute, check, and verify all types of calculations; post, summarize, and tabulate. Comptometry training course.						
3 to 6 mos.	B-3	Jr Operate comptometer, making routine computations and computations of average difficulty, involving other arithmetic processes as well as addition.						
Up to 3 mos.	Duplicating-machine operator	Operate addressograph, ditto, mimeograph, etc. Make minor adjustments on machine when required.						
2 yrs. and over	Dictating-machine operator C-2	Stenographic Sr. Transcribe matter in which technical expressions occur frequently and in which there is constant variation in subject matter. Or direct work of other dictating machine operators, involving distribution of work, instructing new operators, keeping records, responsibility for quality and quantity of work. Ability to transcribe matter of more than average difficulty accurately.						
6 mos. to 1 yr.	B-3	Jr. Transcribe routine matter such as letters, briefs, reports, containing some technical terms. May involve occasional typing from rough copy. Ability to transcribe routine matter accurately under supervision.						
4 to 5 yrs.	Secretary	Sr. Secretary to an administrator or executive						

FIG. 36. Request for wage data from condensed job descriptions.

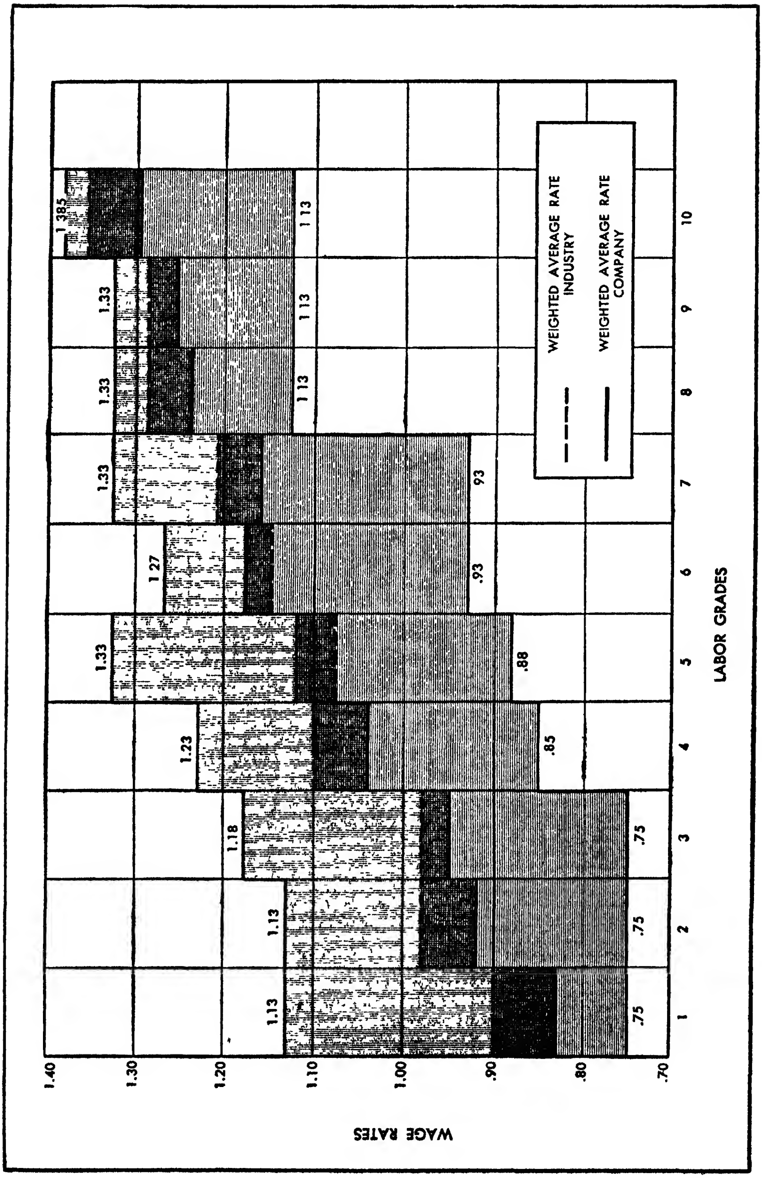


FIG. 37. Inter-company wage comparison.

on individual productivity can be kept, and used for control, this situation will lead to violations of the "equal pay for equal work" principle. Individual differences of opinion as to the pro and con of the overlapping wage structure are too numerous to discuss here. The authors have not found it advisable to recommend it to any company, but many organizations do operate very successfully under this type of wage structure.

Community custom, wage agreements, and other factors affecting the company may result in the development of variations within the foregoing basic types of wage structures, but each type can be adapted to any industry.

The main thing is to end with a simple structure that anyone can understand. Some of the industrial engineers in the department may want to formulate a wage structure based on a complicated mathematical formula. If they wish to prove their curves by applying algebraic formulas for their own information, no harm is done, but such complications should not go into the finished wage structure. The principal reason why many recent wage plans have failed is that they involve complicated mathematics, which the employee does not understand. In applying a wage structure to any job-evaluation plan, the more complicated the wage structure the more likelihood for breakdown and failure in its application and administration. It is the authors' opinion, therefore, that wage calculations must be kept simple and understandable so that the wage earner can know the "why" of his pay check, which is the most important thing in his working life.

Basic Wages

The job-evaluation department now has the information on which the company management can base a decision as to maximum and minimum wages. It is very much worth while to have a good artist plan a forceful and attractive form for the charts that compare the company's wage scale with industry and community standards, and that show the advantages and disadvantages of the various types of wage structures. The charts may be studied not only by management but also by representatives

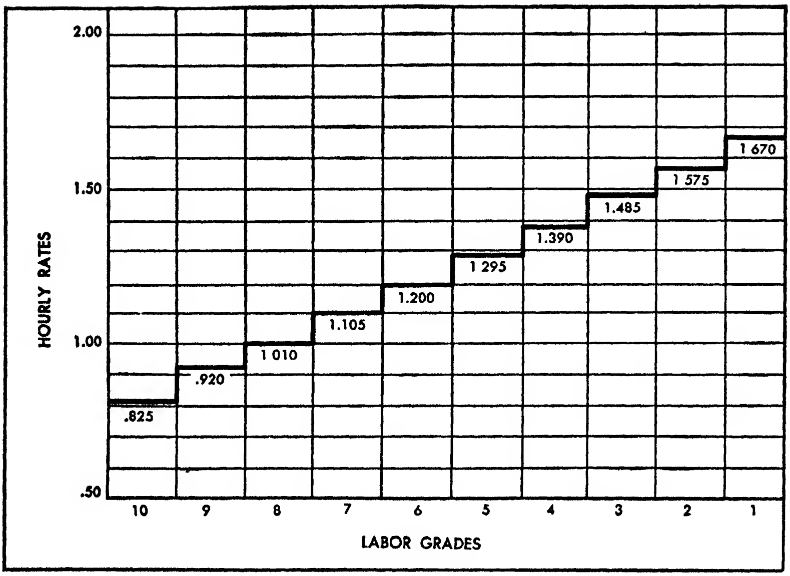


Fig. 38. Flat-rate structure with dollar increments.

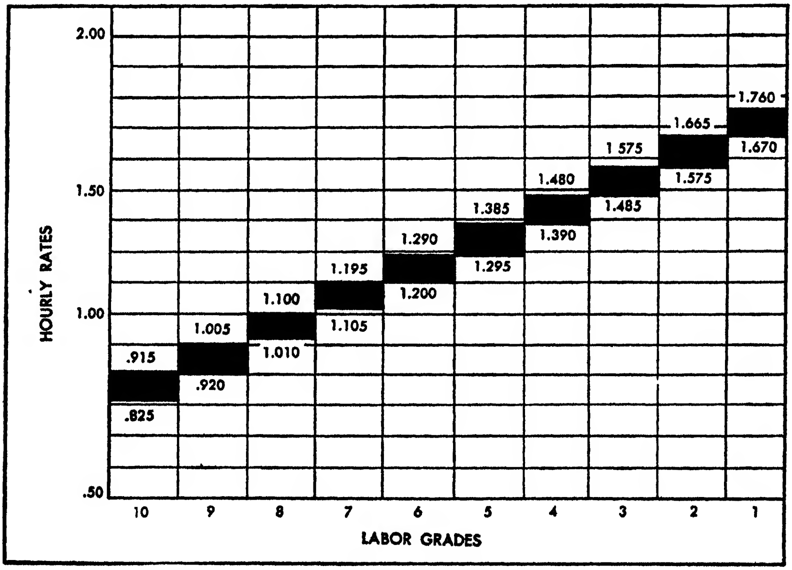


Fig. 39. Rate-range structure with dollar increments.

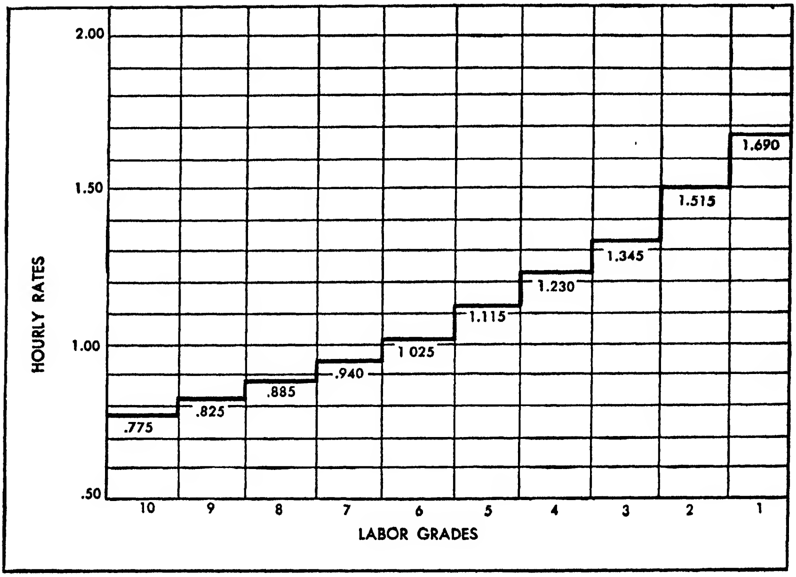


FIG. 40. Flat-rate structure with percentage increments.

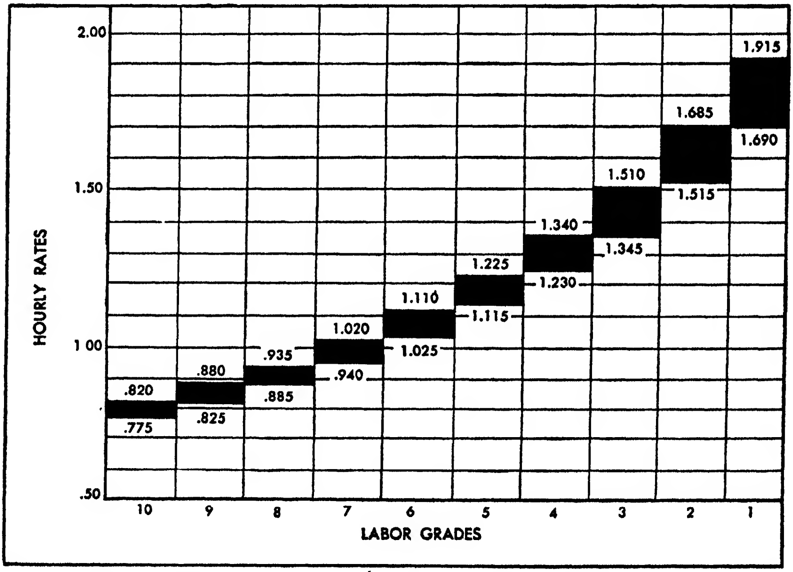


FIG. 41. Rate-range structure with percentage increments.

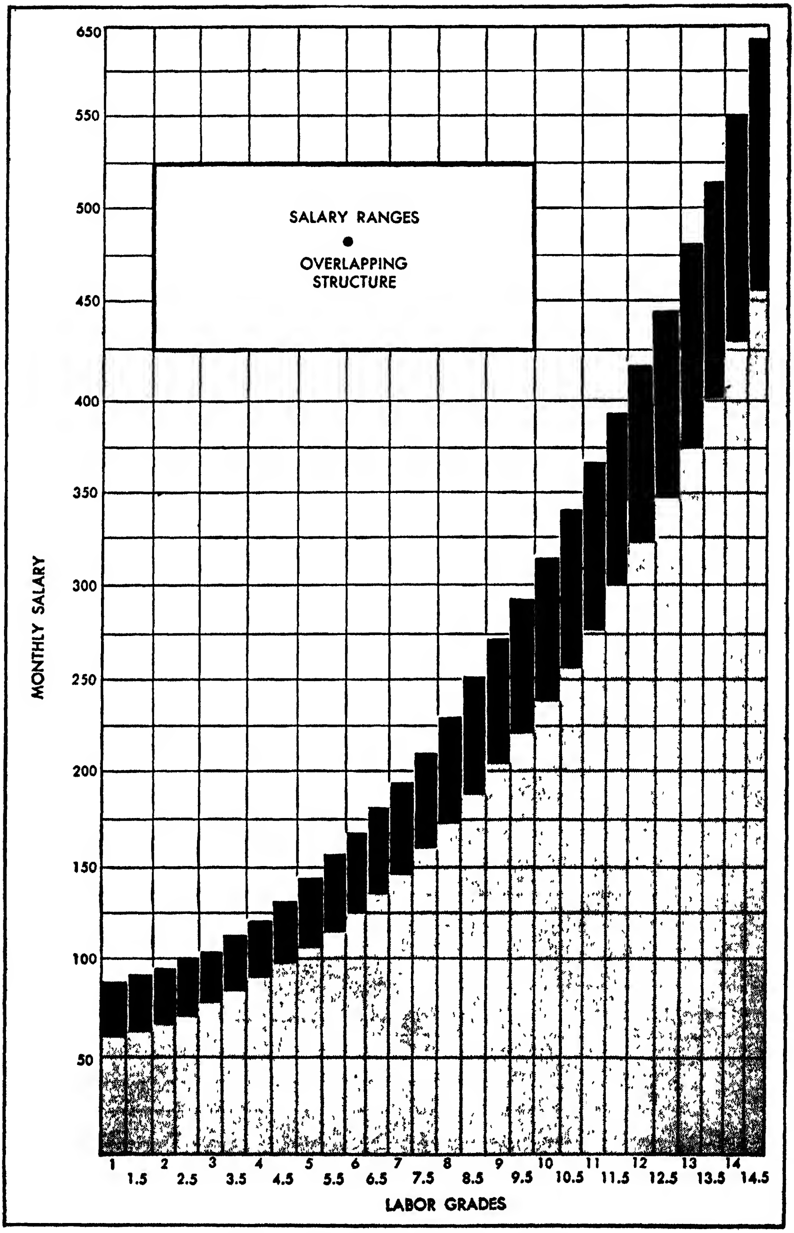


Fig. 42. Overlapping rate structure.

of collective-bargaining and other agencies concerned with the company's wage rates.

Cost Estimating

A final estimate of the cost of a job-evaluation program can be made up as soon as a decision has been reached on maximum

ANALYSIS OF THE EFFECT ON RATES OF DEPARTMENTAL PERSONNEL WHEN COMPLETE JOB ANALYSIS AND EVALUATION ARE APPLIED

SHOP 24—JIG BUILDING

Job Title	*Class*	*Evaluated Grade*	*Number of Employees*	*Present Rate*	*Proposed Rate*	*Amount Present Rate is under or over Proposed Rate Amount*
Jig-borer operator	A	1	3	$1.37½	$1 60	$0 225 under
Jig builder	A	2	51	1 27½	1 49	0 225 under
Lathe operator, engine	A	3	3	1 27½	1.39	0.115 under
Drill-press operator, radial	A	3	1	1 27½	1 39	0 115 under
Grinder operator	A	3	1	1 27½	1.39	0 115 under
Milling-machine operator	A	3	4	1 27½	1.39	0.115 under
Planer operator	A	3	2	1 27½	1 39	0 115 under
Jig builder	B	4	91	1 17½	1.29	0.115 under
Shaper operator	A	5	2	1.27½	1 20	0.075 over
Shaper operator	A	5	2	1 17½	1.20	0 025 under
Welder burner, gas and arc	A	5	6	1 24½	1 20	0.045 over
Welder burner, gas and arc	A	5	8	1 17½	1.20	0 025 under
Drill-press operator	A	5	1	1.17½	1.20	0 025 under
Lathe operator, engine	B	6	8	1.17½	1 11	0.065 over
Lathe operator, turret	B	6	4	1 17½	1 11	0 065 over
Milling-machine operator	B	6	3	1 17½	1.11	0.065 over
Grinder operator	B	6	3	1.17½	1 11	0 065 over
Saw operator, do all	A	7	1	1.17½	1.03	0.145 over
Saw operator, abrasive	A	7	2	0.97½	1.03	0.055 under
Saw operator, friction	A	7	1	1.17½	1 03	0 145 over
Jig worker	C	8	24	0.97½	0.96	0 015 over
Jig worker	C	8	8	0.82½	0.96	0.135 under
Saw operator, cut-off	A	9	3	0.97½	0.89	0.085 over
Shear operator	B	9	1	0 97½	0.89	0.085 over
Helper	A	10	11	0.67	0.82½	*

* Employees will reach 0.825 through automatic escalation.

FIG. 43. Cost-estimating sheet.

and minimum wages and on the type of wage structure to be used.

Let us assume that the factory jobs to be evaluated are fixed within the range of 82½¢ to $1.60 per hour, and that the wage structure is to be of the flat-rate, constant dollar-increment type. The pay of the different grades can then be figured easily. As shown in the "proposed rate" column of Fig. 43, the increment between grades is 7¢, except between rates 10 and 9, where it is set at 6½¢ to make the other increments come out even.

When the proposed pay rates of the different grades are known, it is a simple (though very laborious) job to build up cost estimate sheets like Fig. 43, using the basic data described in the first part of this chapter. From these sheets a complete cost estimate like Fig. 44 can be prepared for all divisions of the company that are to be affected by the job-evaluation program.

No procedure for cost-estimating the clerical and technical program has been given because such a procedure would be almost exactly like that for the factory program, the only difference being between monthly and hourly rate calculations. If all employees are on a 40-hour-a-week schedule, comparison between monthly and hourly rates can be made by this formula:

$$\frac{\text{Rate per month} \times 12}{2080} = \text{Rate per hour}$$

Another point worthy of note is that on the whole it is more difficult to define the functions of office jobs than those of factory jobs. For this reason a wage structure of the rate-range type which has more flexibility for recognition of individual productivity is highly desirable in the clerical-technical program.

The estimate shown in Fig. 44 does not give a true picture of job-evaluation's cost (it was made at a time when wages were going up anyway), but it is a good illustration of what information should be presented to management. It was made up by the method given in this chapter, and its degree of accuracy was tested by subsequent adoption of the program. The difference between the estimated and actual number of employees receiving increases was 0.7 per cent; the difference between the estimated and actual number of employees receiving no increase was 2 per cent; and the difference between the estimated and actual number of employees receiving no increase because of the fact that their present rates were above the rates for the grades to which they were assigned was 0.7 per cent. The difference between the estimated average rate increase per employee and the actual rate increase per employee was $0.0188 per hour.

NUMBER OF EMPLOYEES AT EACH EVALUATED GRADE WHOSE PRESENT RATES ARE BELOW THE PROPOSED RATE FOR THE EVALUATED GRADE

Grade	.40	.395	.35	.345	.32	.31	.30	.295	.28	.275	.26	.25	.245	.242	.24	.225	.22	.215	.21	.20	.185	.175	.165
1		5		3				58					2										
2	19		2				182					27								20			
3						86					57								187				
4				2										15				345					42
5					22												20						
6										2						27						15	
7									11														
8															1						170		
9												9								11			
10	1334 employees automatically escalate from present rate to 0.925 in three steps.																						
	19	5	2	5	22	86	183	58	33	2	57	36	2	15	1	27	20	345	187	31	170	15	42

Grade	.16	.15	.145	.135	.13	.125	.12	.115	.11	.095	.085	.08	.075	.07	.065	.05	.045	.035	.03	.025	.02	.015
1																						
2		5																				
3	40								9													
4			5					261							11							7
5							3542							40		1					108	
6						60							8							483		
7					1815							20							68			
8				65							7							2961				
9		10								787							27					
10	1334 employees automatically escalate from present rate to 0.925 in three steps.																					
	40	15	5	65	1815	60	3542	261	9	787	7	20	8	40	11	1	27	2961	68	483	108	7

NUMBER OF EMPLOYEES AT EACH EVALUATED GRADE WHOSE PRESENT RATES ARE ABOVE THE PROPOSED RATE FOR THE EVALUATED GRADE

Grade	.005	.015	.02	.05	.055	.065	.07	.075	.10	.105	.12	.15	.165	.17	.20	.22	.255	.35
1																		
2																		
3																		
4																		
5																		
6		1						1										
7			101				132				2			37		1		
8		18				65							38					
9	18				279					8							3	
10				27					27			180			1			10
	18	19	101	27	279	65	132	1	27	8	2	180	38	37	1	1	3	10

Total employees whose rates are under proposed rates for the several evaluated grades	11,697	63.[illegible]%
Total employees whose rates at present equal proposed rates for the several evaluated grades	4,507	24.[illegible]%
Total employees whose rates automatically escalate to the proposed working rate for grade 10	1,334	7.[illegible]%
Total employees whose rates are above proposed rates for the several evaluated grades	943	5.[illegible]%
Grand total	18,481	100.[illegible]%
Total cost per hour to raise rates of 11,697 employees to proposed rate for evaluated grade	$1,343.18	
Cost reduction as new employees take jobs now overpaid	$90.37	
Average per cent increase to all employees	7.26%	

FIG. 44. Estimate of wage increase under job evaluation.

The gains to be balanced against this cost are better employee morale, reduced labor turnover, and simplification of accounting, payroll, and personnel records. The improvement in morale and turnover rate depends a good deal on the efficiency with which the system will later be put into effect and operated, but even at the start this improvement will be as great as if a flat pay increase of the same size were granted. No actual figures are available on savings in paper work, but, in every company the authors have been able to observe, it has been considerable.

CHAPTER 10

ASSIGNING EMPLOYEES TO

EVALUATED JOBS

Cooperation

When management has given its okay to a job-evaluation plan the real headaches begin. Up to this point we have been talking in terms of sound theory. We have worked out plans and job write-ups and wage structures on which a good workable program can be built. The supervisors and workers have met the industrial engineers, politely answered their questions, and helped them with their plans; but no one's job or wages has yet been affected. Unless the industrial engineers have been almost inhumanly discreet, the rumoı bureau probably has a pay raise in the bag for everybody. During the interlude between the wage survey and the go-ahead signal many supervisors may have been figuring out ways in which they can take advantage of the new system to increase the prestige of their departments. The labor organizations have probably been doing a little thinking too.

The job-evaluation department is going to step from its theoretical stratosphere into a practical bedlam of ideas and schemes about who will get how much pay. It is obvious that everyone will be primarily looking out for himself and his men. It is up to the industrial engineers to see that this self-interest takes an enlightened angle. They must sell every employee from top to bottom on the basic fairness of job evaluation and the fact that the plan has so much backing that the evaluation department will be able to stand firm in enforcing this fairness. "Equal pay for equal work" must be put into everyone's mind to the exclusion of "Here comes the gravy train!" If it is not, there will

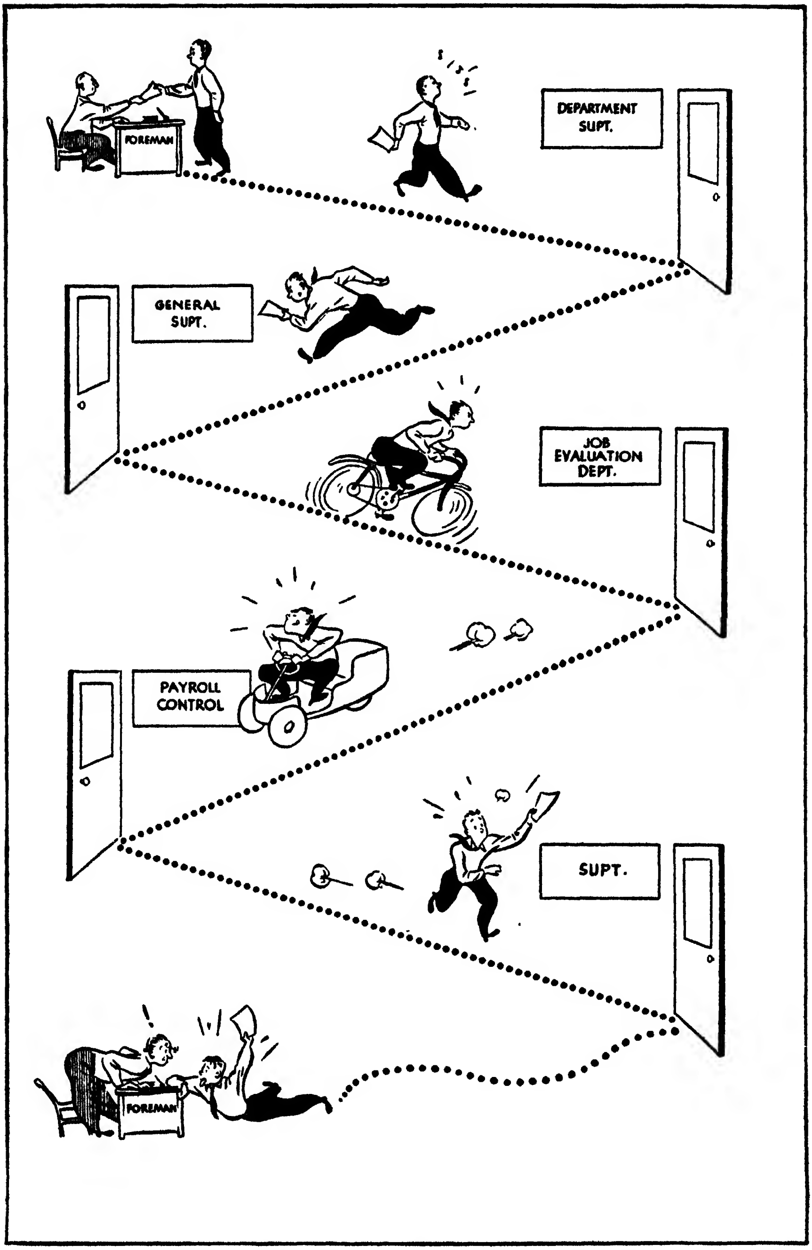


FIG. 45. Point-system job-evaluation procedure—assigning employees to jobs.

be many a disappointment, and a drop in morale, when the new wages are announced. In other words, a selling campaign is imperative. If the sales job is well done, the first big hurdle in the way of getting all-round cooperation is cleared. Since every company has its own intraplant publicity methods, no suggestions will be made here as to actual procedures for gaining the employees' intelligent understanding and support for job-evaluation principles. It is enough to say that such understanding and support are just as important as the theoretical soundness of the program.

Next comes the detailed education of all concerned as to the part they must play in carrying out the scheme. First of all, the job-evaluation manual or manuals should be printed and placed where they are available to everyone who is interested. As will be remembered, each manual contains not only the write-ups of all jobs affected, but also the basic plans by which the jobs were evaluated. The industrial engineers should encourage the study of the manuals and answer frankly all questions on any detail of the basic plan or the individual job write-ups. They should also give talks, attend meetings, and supply all necessary detailed written information. This will be a busy and crucial period for the job-evaluation department.

Basic Instructions

A basic instruction letter should be sent to all supervisors as soon as the publicity campaign has had time to take effect. All necessary forms should also be printed and ready for distribution, so that the actual changeover to the new system will be as smooth and rapid as possible. The quicker the change, the less interruption of work, the less confusion in bookkeeping, and, perhaps most important, the less likelihood of the workers' building up unjustified hopes for wage raises. Figure 46 suggests a possible basic instruction letter. Its form would, of course, be modified to suit the organization and procedures of the particular company. Along with the instruction letter, the job-evaluation department should supply:

1. A list of the tentative job assignments, made during the preliminary job survey. (The list should include only employees

who are still working in the department. If the lapse of time since the preliminary survey has been so great that a large percentage of employees may have changed their status, it is inadvisable to include this list at all.)

2. Copies of the job-family work sheets, unit comparison charts, and final organization charts that were made up for the department when the jobs were evaluated (see Figs. 25, 26, and 27 in Chapter 5).

3. A preassignment form filled out as a sample (Fig. 47) and a supply of blank forms.

4. A copy of every employee's personnel record, and a sample (Fig. 48) to show what spaces the supervisor is to fill in.

5. A payroll-change authorization filled out as a sample (Fig. 49), and a supply of blank forms set up in triplicate (three colors).

"Bugs"

During this procedure a great many unpredictable difficulties will arise. The industrial engineers may be called in to settle disputes or to defend their job write-ups. Irregularities may be found in the payroll-change authorizations when the job-evaluation department checks them. Speed in making the special studies and decisions to get rid of these "bugs" is just as important as speed in the general procedure.

Unjustified Upgrading

Though unpredictable in detail, these troubles tend to group themselves into certain categories. For instance, in spite of all possible persuasion and in spite of the department superintendents' check, some supervisors will almost certainly rate all their people above their actual qualifications. If unjustified upgrading is allowed to occur in one department, the relative ranking throughout the company is thrown out of gear. In some actual cases of this kind, the wage standards of whole communities have been upset, even though only a few workers were originally involved. In the long run, such uncoordinated lowering of standards can do as much harm to the workers as a general cut in wages equal to the unjustified increase to the favored group.

To: All supervisors

Subject: Assignment of employees to evaluated jobs

A. Final responsibility for assigning employees correctly to the jobs described in the job-evaluation manual rests with the job-evaluation department. Final authorization of pay rates rests with the payroll-control department. However, the assignments and pay rates established by foremen and checked by department superintendents as described below will be respected in every case where such assignments and pay rates are in accordance with the company's job-evaluation policy.

B. Procedure for Assigning Factory Personnel. Shop foremen will fill out the preassignment forms and personnel cards (samples attached) according to the job-evaluation manual and forward them to the department superintendent.

It will be the department superintendent's direct responsibility to determine: (1) actual existence in the shop of each job, as described in the job-evaluation manual; (2) whether or not any additional personnel assigned by the superintendent is needed for the job as described; (3) whether or not each employee is qualified for the job to which he is assigned.

If the department superintendent finds that the foreman has filled out the preassignment forms and personnel cards in good order, he will fill out a payroll-change authorization (sample attached) in triplicate for each employee, sign it, obtain the foreman's signature, and forward the authorizations and preassignment forms to the general superintendent's office. The department superintendent will hold the personnel cards until the payroll-change authorizations are routed back to him.

(Note: If clarification or advice on the above steps is needed, the job-evaluation department will assign an industrial engineer to assist. Industrial engineers, however, do not ordinarily take part in this part of the procedure.)

In the general superintendent's office the rate and statistical coordinators will edit the payroll-change authorizations for correct code numbers, pay rates, and job titles and will fill in the code numbers on the preassignment forms. They will also be responsible for recording statistical information and for controlling the wage rates within the rate range of each labor grade so as to maintain the correct average rate for the grade. When this work is done, the coordinators will have the general superintendent sign the authorizations and forward them to the job-evaluation department.

The job-evaluation department will check all payroll-change authorizations for conformance with company job-evaluation policy, settle questionable cases with factory supervision, fill in the "new-salary" and "dollar increase" columns of the preassignment forms, and forward the forms and the Authorizations to the payroll-control department.

The payroll-control department will give final approval to the payroll-change authorizations, keep the original for payroll purposes, and return both copies with the preassignment forms to the general superintendent's office, where the rate and statistical coordinators will check their records and return the material to the proper department superintendents.

Each department superintendent will check the personnel cards for agreement with the completed payroll-change authorizations, initial and date them, and return all the material (forms, cards, two copies of each authorization) to the proper foremen.

Each foreman will distribute to the employees under his supervision their copies of the payroll-change authorizations and file his own copies.

C. Procedure for Assigning Clerical and Technical Personnel. The procedure for office personnel will be the same as that outlined for factory personnel except for substituting corresponding titles, such as unit chief for foreman and division chief for general superintendent.

FIG. 46.

PRE-ASSIGNMENT FORM - GENERAL OFFICE JOB EVALUATION PROGRAM

DEPT 480 PROJECT OR UNIT 384 GROUP: ______ JOB FAMILY Engineering IMMEDIATE SUPV. R. Outsen

EMPLOYEE'S NAME	PRESENT TITLE	SUMMARY OF DUTIES	NUMBER SUPER-VISED	OLD SALARY	NEW SALARY	% IN-CREASE	CODE NO
J J Jewett	Lead Layout Engr.	Has charge of 7 engineers and 1 clerk Checks all hydraulic drawings and electric work of the 384 airplane project. Considerable time spent checking layouts.	7	267.80			
Edgar Savage	Major Layout Engr.	Handles the checking of power plant drawings with very little supervision Checks all other kinds of work when occasion demands	0	247.80			
D F Battman	Layout Engr	Assists in checking structural drawings under some supervision. Spends most of time checking detail drawings.	0	207.80			
Hugo Erlichmann	Major Layout Engr.	Specializes in checking control systems Needs close supervision on other kinds of work	0	257.80			
Glenn M Miller	Layout Engr	Checks miscellaneous work. Capable of checking master layout work with some supervision, and checks detail work with little or no supervision	0	207.80			
Ben J Mauser	Detail Engr	Assists in checking simple detail drawings under close supervision and also checks simple deviations and change orders. All work closely checked by others.	0	197.80			
Wm B Parker	Junior Engr	Checks simple deviations and change orders under close supervision. May do errands for other engineers, getting drawings or miscellaneous information.	0	167.80			

SUPERVISORS: DO NOT WRITE IN THESE SPACES

FIG. 47. Sample preassignment form, as filled out by supervisor.

A frequent source of this difficulty is that supervisors give the "benefit of the doubt" when they are not certain about the distinctions between different grades in a job family. This lack of understanding may not be entirely the supervisors' fault but may result from the indefiniteness of job write-ups in the evaluation manual. This indefiniteness usually occurs in write-ups where job titles have been consolidated. As an example, study the job write-up of assembler installers, Structures, A, B, C, and D (grades 4, 6, 8, and 10, in Chapter 7). These write-ups are consolidated from a large number of original job evaluations, covering many different shops. In fact 20 per cent of all workers employed by the company which uses these write-ups are included under the four jobs described. As has already been explained, this consolidation is desirable. It allows flexibility in the use of man power to meet variations in production schedules. At the same time it gives the employees an opportunity to get broader experience in different plant activities without changing their

Dept. 140 Clock No. 1622 **PERSONNEL RECORD**

Name Denton, Donald L. Address 3159 E. 81st Phone AV. 3570
Date Employed 2-9-42 Birth Date 1-26-17 Single
Date Re-employed Social Security No. 545-22-2966 Married X
Date Transferred 6-1-42 From Dept. 120 Medical Restriction: Yes ☐ No ☒

EDUCATION

High School Boone High School, Boone, Iowa Dates 1931 to 1935 Courses College
College Iowa State College, Ames, Iowa Dates 1935 to 1939 Degree B. S. in Mech. Eng.

Major Courses Engr. mechanics; aero. engr.; power plant engr.; engr. shop
Trade or Business School Dates Courses
Defense Courses
Drafting Typing Shorthand Other

EXPERIENCE

Type of Work	Where	When
General shop engr. & maintenance (part-time)	Iowa State College	1937-1939
Mech. engr. (designing & testing furnaces)	Sennot Furnace Co., Ames, Iowa	Aug. 1939-Feb. 1942

Date	Job Name	Job No.	Salary	Project or Unit	Initials I.E.	Remarks
6-1-42	Detail engr.		185.	Mech. equip		
10-16-42	Minor layout engr.		200.	" "		Reclassification
3-1-43	Minor layout engr.		200.	Power Plant		
7-1-43	Minor layout engr.		215.	" "		Merit
10-8-43	Minor layout engr.		215.	Mech. equip.		
11-16-43	Major layout engr.		235.	" "		Reclassification
9-1-43	Major Engineer, Layout	1201	270	" "	HJ. 8/22	Job evaluation

SUPERVISOR TO FILL OUT THIS LINE ONLY

Resigned ( ) Dismissed ( ) Reason:

(Back)

Fig. 48. Sample personnel card.

general line of work and hence to improve their chances for promotion. This same flexibility, however, tends to generalize the write-ups so that some specific jobs are inadequately defined. These are the jobs about which supervisors should be encouraged to ask the job-evaluation department for help. The industrial engineers not only have had wide and exacting experi-

Important: Give Complete Information

PAYROLL CHANGE AUTHORIZATION

Date 6-5-44
Social Security No. 531-14-6519

Dept. 123 Clock 2651 Name Donovan, (Last) Charles (First) P. (Middle)

Effective 9-1-43 The following rate and/or job classification changes are authorized:

Change from:	Change to:
Former Job Title Layout Engineer	New Job Title Engineer, layout, aircraft design
Former Code No.	New Code No. 1203
Former Rate 207.80 Date of Last Change	New Rate 240.00

Reason for Change:
Reclassification [X] Merit [ ] Effective on transfer from dept. ____ Correction [ ]

Remarks:

Acct. Dept. Salaried Payroll

Foreman or Supervisor M. G. Sturgis
Department Head F. H. Brush, Jr.
General Supt. or Division Chief Hugh Romans

Approved Everett Hines
Job Evaluation Department

Approved B. P. Wiley
Pay Rate Control

FIG. 49. Payroll-change authorization.

ence in judging what characteristics place a job in a certain grade, but they also can dig up the original specific write-ups of particular jobs that were later included under the consolidated job title. Knowing exactly what the job requires, the supervisor will probably be able to make a new and better judgment in his assignment of workers.

Established Practices in Conflict with Job Write-ups

Another difficulty that often does not become fully apparent until this stage is the effect of established company practices and labor-union rulings. Even though supervisors and labor representatives, serving on the job-evaluation committee, set the standards on which the evaluations were built (see Chapter 2), they may not have realized all the ultimate results of their decisions. Some of the superintendents' pet ideas, or customary practices such as fixed craft wage scales, may suddenly show up as being in direct conflict with the evaluated wages. Troubles of this type cannot always be corrected as quickly as supervisors' misunderstandings about upgrading. In many cases there will not be time to settle them before the system goes into effect. To avoid possible deadlocking of the whole change over, it is suggested that some form such as that shown in Fig. 50 be used to cover off-standard rates that cannot quickly be brought into line with the job write-ups. The evaluation system can then go into effect and controversial items be settled later, as time and opportunity permit.

Non-Controversial Off-Standard Jobs

Some non-controversial jobs will fail to fit into the job-evaluation scheme because of unusual features. These jobs can be covered by the same kind of form that is used in controversial cases (Fig. 51). Note, however, that the form for clerical and technical jobs such as this one is slightly different from the factory form for the welding job.

Bottlenecks

Most of the remaining problems at this stage of the procedure will be minor. There will be clerical bottlenecks, misrouted

OFF-STANDARD PAY RATE (OFFICE)

Date 11-5-44

Job Title Flight Test Engineer A — Code No. 215B

Evaluation of This Job			Evaluation of Other Jobs for Comparison					
			Job Title Lead Tech. A, Test Lab. Code No.			Job Title Code No.		
Factor	Deg.	Pts.	Factor	Deg.	Pts.	Factor	Deg.	Pts.
Mentality	4	60	Mentality	4	60	Mentality		
Exp. & training	4	80	Exp. & training	4	80	Exp. & training		
Complexity of duties	4	60	Complexity of duties	4	60	Complexity of duties		
Supervision received	3	20	Supervision received	3	20	Supervision received		
Resp. for errors	3	20	Resp. for errors	3	20	Resp. for errors		
Resp. for contacts	3	20	Resp. for contacts	3	20	Resp. for contacts		
Resp. for confid. data	4	20	Resp. for confid. data	4	20	Resp. for confid. data		
Mental & visual demand	4	20	Mental & visual demand	4	20	Mental & visual demand		
Working conditions	4	20	Working conditions	2	10	Working conditions		
Character of supervision	-	-	Character of supervision	-	-	Character of supervision		
Scope of supervision	-	-	Scope of supervision	-	-	Scope of supervision		
Total Points		320	Total Points		310	Total Points		
Evaluated Salary Grade		1*	Labor Grade		1	Labor Grade		
Actual Grade		1*	Reason for Wage Discrepancy					

Does this difference apply to all employees on this job [X] or to individual cases [ ] ?
If it applies to individuals, how many? ____________

Extreme hazards involved in this job are not accounted for in clerical and technical evaluations; they are covered by a special $5.00 per hour flight bonus.

Approved *Harold J. Folsom* Chief Industrial Engineer

FIG. 50. Off-Standard pay-rate record—factory jobs.

OFF-STANDARD PAY RATE (FACTORY)

Date 4-11-45

Job Title Welder B — Code No. 5353

Evaluation of This Job

Factor	Deg.	Pts.
Mentality	4	50
Exp. & training	5	80
Complexity of duties	3	35
Resp. for results	4	60
Resp. for supervision	1	5
Physical effort	5	45
Mental & visual demand	4	40
Working conditions	4	35
Unusual hazards	4	35
Total Points		385
Evaluated Labor Grade		4
Actual Labor Grade		3

Evaluation of Other Jobs for Comparison

Job Title Welder A — Code No. 3353

Factor	Deg.	Pts.
Mentality	4	50
Exp. & training	6	100
Complexity of duties	4	50
Resp. for results	4	60
Resp. for supervision	1	5
Physical effort	5	45
Mental & visual demand	4	40
Working conditions	4	35
Unusual hazards	4	35
Total Points		420
Labor Grade		3

Job Title — Code No.

Factor	Deg.	Pts.
Mentality		
Exp. & training		
Complexity of duties		
Resp. for results		
Resp. for supervision		
Physical effort		
Mental & visual demand		
Working conditions		
Unusual hazards		
Total Points		
Labor Grade		

Does this difference apply to all employees on this job [X] or to individual cases [ ] ?
If it applies to individuals, how many? ____________

Reason for Discrepancy

Trade standards and collective-bargaining agreements make no distinction between different classes of welders.

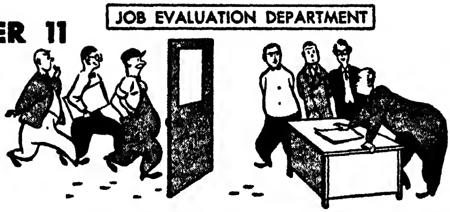
The welder A job, which is in the maintenance department, actually requires greater skill than the welder B job, in shops.

Approved *Harold J. Folsom* — Chief Industrial Engineer

FIG. 51. Off-standard pay-rate record—office jobs.

forms, supervisors absent at the wrong time, and all the other little irritations that tend to delay any large-scale reorganization. With management solidly behind the program, none of these small troubles need cause either any serious delay or any deviation whatever from job-evaluation principles.

CHAPTER 11



THE SYSTEM IN OPERATION

Problems and Procedures

The first months of operation will see a continuation and cleaning up of the kind of problems that developed while the employees were being assigned to their new pay rates. At the same time procedures must be established to take care of the changes that occur constantly in any large and progressive company, and adequate statistics must be maintained to keep the program under control. Therefore, after the system has been put into operation by assigning the employees to their new jobs, the evaluation department will have the triple role of (1) fixing policy on job assignments and labor utilization, (2) evaluating new jobs and new departments, and (3) building up, and acting on, control statistics.

Defining Jobs

There are two separate parts to making an ironclad definition, that will really stick, for any given job. First the actual work done by the person on the job must be known; then all phases of the work must be adequately defined in words. Of course, the industrial engineers aimed to do these very things when they evaluated and helped to assign the jobs; however, there is no way of knowing, until the system goes into effect, just which jobs will become controversial issues, and the same type of definition that is perfectly sufficient for a non-controversial job is likely to break down under fire. Many of the disputes on this subject will have started when the jobs were being assigned and have been half settled at that time to get the plan into operation quickly.

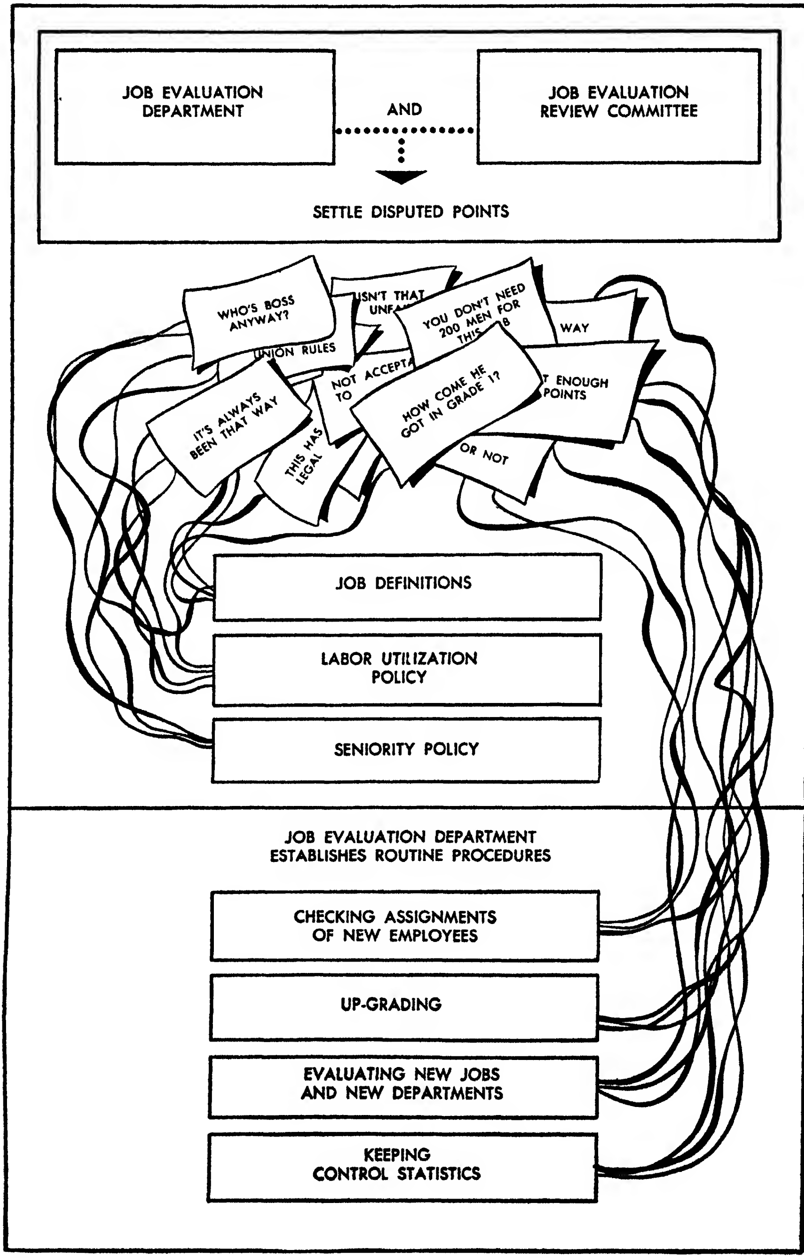


FIG. 52. Point-system job-evaluation procedure—the system in operation.

Now the matter can be studied thoroughly and a final solution reached.

Defining the Details of Actual Work Performed

Arguments as to what actual work is to be done start most frequently over new or specialized jobs. The following example of the press-plate-making job series, taken from the authors' personal experience, shows how this type of difficulty can be overcome:

A press plate is a simplified form of die that can be used in place of the more expensive standard type for piercing and blanking operations. Making press plates requires far less skill than making standard dies, and they generally cost between $50 and $75 per unit, against $200 to $500 for comparable standard dies. The company was naturally anxious to take advantage of this economy and incidentally to avoid paying top-grade tool-and-diemakers' wages for making the press plates. A special series of descriptions was obviously required for these specialized jobs, and so the industrial engineers prepared the following job-family write-ups, which they believed would cover the situation satisfactorily.

***Job Title:* Press-Plate Maker A** **Grade 4, 370 Points**

JOB DESCRIPTION

Lay out press plates from templates and perform all necessary machine and bench operations to fabricate press-plate punches and dies. The operations in general are as follows: scribe outline of punch and die from template onto plow-steel punch and Kirksite (or sometimes plow-steel) die; cut out punch, using machine and necessary tools; mount punch on holder plate; cut out die, using machine and necessary tools; clean up die as required, and mount it on holder plate; try out press plate in fabrication shops.

Employees on this job may sometimes do work of a higher type than that listed, to develop the skill required on the higher-graded job.

Job Title: Press-Plate Maker B — Grade 7, 349 Points

JOB DESCRIPTION

Perform machining operations to fabricate and finish press plates. Operate band saws; surface grinding, filing, and turret machines, etc.; place stripper pads in die.

Employees on this job may sometimes do work of a higher type than that listed, to develop the skill required on the higher-graded job.

Job Title: Press-Plate Maker C — Grade 9, 200 Points

JOB DESCRIPTION

Rivet press-plate punches and dies to holding plates. Part-number press plates, using stamps or stencils. Operate riveting machine. Operate band saw or drill press as directed. Place stripper pads.

Employees on this job may sometimes do work of a higher type than that listed, to develop the skill required on the higher-graded job.

These descriptions seem quite specific; the jobs, however, proved to be so closely allied to tool and die making that considerable controversy arose when it came to making the actual assignments. The general job write-ups could not be improved to the satisfaction of both the collective-bargaining agent and supervision. It was finally concluded that, in spite of the extra cost and loss of time that would result, the only logical method of making these assignments stick was to undertake a detailed factual study of the work and then assign each function or element of work to a particular job within the job family. The following study shows how each detail of the work was segregated and assigned to press-plate maker A, B, or C:

PRESS-PLATE-MAKING PROCEDURE AND WORK ASSIGNMENT

Class		
A	(1)	Scribe outline of template on $\frac{3}{16}$-inch plow steel.
B	(2)	Saw and file plow steel punch to size, being sure *all* edges are square.

A (3) Lay punch on die face down, and scribe outline of punch on die.

A (4) Take punch off die and scribe line 1/32 inch *inside* punch outline on die.

B (5) Saw die on line 1/32 inch inside punch outline on 15-degree angle, and file to size.

A (6) Lay out rivets in die, using 7/16-inch margin and 1¼-inch maximum spacing for medium dies. (Smaller dies require shorter spacing.)

A (7) Locate die on backing plate.

B (8) Drill and rivet die to backing plate; drive countersunk rivets both sides.

A (9) Lay out and drill 3/32-inch locations for 3/16-inch-diameter dowel pins, which will guide material through die 11/32 inch from cutting edge of die. The pins should be in the back of the press, located so the material will run from right to left across the press.

A (10) Lay punch face down on die to line scribed in step 3; broach the punch into the die.

A (11) Pilot piercing holes in plow-steel punch, using layout template, master hold layout template, or master drill gage, according to tool order.

A (12) Lay out rivets in punch, using a 7/16-inch margin with 1¼-inch maximum spacing. There must be at least ⅛ inch of material between edge of countersunk head of rivet and edge of piercing hole in punch after it is drilled to size.

A (13) Locate punch on backing plate.

B (14) Drill and rivet punch to backing plate; countersink rivets on both sides.

A (15) Drill 3/32-inch piercing punch holes (which were piloted in punch) into punch-backing plate.

A (16) Enter punch into die, and drill 3/32-inch pierce-punch hole locations through the punch and its backing plate into backing plate of die. Also drill No. 14 hole for guide pin location.

A (17) Drill and ream through press-plate holes for piercing punches. (Example: for 0.250-inch-diameter pierce-punch drill hole 15/64 and ream hole with 0.250-, 0.251-, or 0.252-inch-diameter reamer.)

A (18) Take press plate apart and ream the piercing holes in the plow steel for a minimum of 0.002-inch clearance.

A (19) Drill slug clearance holes in through the punch-backing plate to the plow-steel punch, making them at least 1/16 inch larger in diameter than the piercing punches.

A	(20)	Ream the back of punch with a taper-pin reamer to allow slug clearance.
A	(21)	Counterbore or drill die for heads of piercing punches.
A	(22)	Press punch into die, and send both punch and die to be surface ground.
A	(23)	Put the punch and die together, and locate press plate on the drill plate with the plow-steel backing plate against the drill plate.
A	(24)	Drill holes for dowel pins and screws.
A	(25)	Take press plate off the drill plate, and drill a 5/16-inch hole near dowel pins, to be tapered 3/8 inch for getting press plate out of holder.
A	(26)	Ream dowel pin holes.
A	(27)	Take press plate apart, and countersink screw and pin holes.
A	(28)	Press guide pins made of 3/16-inch-diameter material into the punch, and drill the guide-pin holes in the die to 1/4 inch to allow clearance.
B	(29)	Tap 3/8-inch steel hole for removing press plate from holder.
B	(30)	Put dowel pins in press plate.
B	(31)	Cut, drill, and rivet 1/8-inch steel plate on back of die to hold piercing punches in backing plate.
A	(32)	Locate parallel bars on back of punch for slug blow-out, with No. 30 hole.
C	(33)	Part-number press plate.
B, C	(34)	Rubber the press plate.
C	(35)	Paint "top" and "front" on press plate with red paint.
A	(36)	Try out press plate.

By the time this detailed study was complete the controversy over this particular set of jobs had evaporated, and press-plate makers were assigned to the jobs in a manner satisfactory to all.

Defining the Meaning of Job Descriptions

The second type of dispute that is likely to arise over job assignments results from misunderstandings about the *meaning* of the job write-ups, even though the *actual duties* of the job are thoroughly understood. Difficulties about word meanings, in contrast to those that concern actual duties, generally center around well-known jobs to which large numbers of employees are assigned. Another set of actual examples will illustrate this kind of difficulty. Here are the job-evaluation manual descriptions of the riveter job family, with the terms that caused disputes printed in *italics:*

Job Title: Riveter A **Grade 6, 305 Points**

JOB DESCRIPTION

Operate any and all riveting machines, yoke riveters, hand-pneumatic rivet guns, hydraulic squeezers, spar cap riveting machines, etc., to perform any type of riveting operation on the completed airplane assemblies, installations, skins, etc., using lights or mirrors and performing blind riveting as necessary. Drive rivets of ¼-inch diameter or over, more than 50 per cent of the time, or perform *difficult* or *"pick-up"* riveting more than 50 per cent of the time. Redrill rivet holes and drill out faulty rivets when necessary, and be familiar with operation of *non-standard equipment.*

Job Title: Riveter B **Grade 8, 240 Points**

JOB DESCRIPTION

Operate hand rivet set, pneumatic riveting guns, yoke riveters, hydraulic squeeze, automatic riveters, etc., to rivet aircraft assemblies, installations, skins, etc. Redrill holes where necessary, and drill out faulty rivets, using portable electric drill. Make *minor adjustments to equipment* as required.

Job Title: Riveter C **Grade 9, 180 Points**

JOB DESCRIPTION

Operate rivet gun, hand or air squeezers, or hand rivet set to do straight, flat riveting only, on installations, assemblies, or parts. Occasionally redrill holes to proper size and drill out faulty rivets with portable electric drill.

These job descriptions are carefully phrased to provide a promotional series, so that there will be a possibility for advancement to provide an objective for the large majority of workers, who are normally in the B and C jobs. This is a fundamentally healthy principle, but it also presents an opportunity for anyone who so desires to confuse the problem of job assignments by hitting upon one particular phrase of a description and then insisting that all workers who do this one part of the job be assigned to that job, regardless of whether they are capable of doing all the work described in the write-up. This kind of difficulty will not occur with supervisors or labor leaders who really understand the job-evaluation plan and are sold on it. But, since those of them who have not yet grasped the principles will probably not do so in a hurry, it is usually best to say nothing about principles and drive straight at the immediate cause of the trouble.

The most direct solution to this problem is to make closer definitions of those phrases that have been used as an excuse for unjustified upgrading. In the riveter A job description, the phrase ". . . perform difficult or 'pick-up' riveting more than 50 per cent of the time" occurs. A claim was made that certain B riveters were doing this work and therefore should be promoted to class A. Investigation showed that the workers in question were not capable of doing A work and furthermore were not actually doing really difficult riveting. The claim that they were doing "pick-up" riveting was based on the fact that they occasionally completed work left out by the previous shift. The following definitions settled this particular dispute once and for all, without resorting to general principles.

Pick-up Riveting

The words "pick-up riveting" designate work left out in previous operations because of jig interference; or the installation of rivets omitted at one station and completed at another, to suit production requirements for constant work flow.

Difficult Riveting

Difficult types of riveting are considered to be those where installation of additional parts such as brackets, sidewalls, and fairings requires riveting to be done in closed or hard-to-get-at areas, and where advanced experience in devising special bucking bars or dies is required for proper and speedy riveting.

Other disputes about the same job series were ended by these definitions:

Non-Standard Equipment

The phrase "non-standard types of equipment" as used in the riveting description means bars, dies, hand punches, etc., which are made by the riveter, or which require sanding, filing, or grinding to drive rivets properly.

Minor Adjustments of Equipment

1. *Automatic Drilling, Punching, and Riveting Machines.* The term "minor adjustments" as used in the riveting job description shall include the changing of pilots, adjusting of pilot lights, etc., but shall not be construed as overhaul or maintenance work such as die changes, setting of machine cycle, or rework of machine for slug clearance from punches.

2. *Other.* The minor adjustment of stationary equipment covered in the job description includes such adjustments as length of stroke or the changing of dies or anvils for the proper forming of rivet heads. This adjustment is not intended to include overhaul or rework of the equipment such as changing of cylinders, rework of anvils or yokes for proper alignment of dies, or other established maintenance work.

Labor Utilization

When its program first goes into effect, the job-evaluation department will be asked to solve many problems of labor utilization. These do not strictly belong in the evaluation field and should be handled by a separate labor-utilization department under the chief industrial engineer. Many companies, however, do not have labor-utilization departments, and the job-evaluation engineers are in an excellent position to do trouble shooting along this line. The over-all picture of plant activities obtained while making job-evaluation studies provides the department's personnel with a nearly perfect background for locating the causes of difficulties in the use of man power. A few notes on the subject are, therefore, appropriate here.

The definition of labor utilization is simple. Labor utilization is the art of placing personnel so that the right number of qualified people will be on hand to do each necessary job. When job evaluation goes into effect there will be all sorts of discussions as to how many people should be assigned to the different jobs. Some of these arguments can be settled as described in the preceding pages by defining accurately what constitutes each job. When the definition does not solve the problem, the first step is to determine how much work is required and how many qualified people are available to do it. If the two quantities do not match, the answer is easy as far as the industrial engineer is concerned. He can simply recommend that more people be trained or that some of the workers be assigned to other jobs, according to whether the surplus is of work or of workers. But suppose that the desired work requirements are known and cannot be altered, the number of people available is known and is considered to be adequate, and yet the desired result is not being obtained or there is a continual stirring up of trouble. What, then, is the answer? In a situation of this sort, it is obvious that either unnecessary work is being assigned or the workers are not contributing their full time effectively. Unnecessary work may consist of anything from keeping records that no one uses to moving materials back and forth because of poor sequence planning. Or the work, though necessary in itself, may be a duplication of what is done elsewhere, as for example duplicate inspections of a part. Failure of workers to contribute all their time effectively can have several causes. An employee may not know what he is supposed to do; or he may know what he is supposed to do but not how to do it; or he may know what he is supposed to do and how to do it but just not want to, either because he does not like that particular job or because he dislikes all work. Unless conditions have been such as to ruin their health not many employees are likely to be definitely in the last class. Therefore, there is nearly always something to be done, and that is where the job-evaluation department can do some very effective trouble shooting if it is authorized to do so. Given this authority, the first step in investigating any complaint of inefficient operation, is to make a thorough recheck of the job-evaluation work done for the department concerned. The following questions should be answered carefully:

1. Are any of the duties described in the job write-ups unnecessary?

2. Where the same duties are written up for more than one job (whether in this or in another department), do they constitute duplicate activities?

3. Is the same job being done in several places under the same or different job titles?

4. Do the job write-ups fit the organization charts accurately?

5. Are the organization charts completely free of duplicated activity?

6. Do all the education and experience requirements in the factor descriptions match the duties of the jobs as described?

7. Do the employees' personnel cards show that their education and experience are sufficient, and of the right kind, for the jobs they are assigned to?

8. Do the supervisors' preassignment forms (if available) agree with the job-family work sheets and unit comparison chart?

If these and other questions all show that the job-evaluation program is in good shape, the trouble is likely to be either that the supervisors have failed to tell their workers specifically enough what they are to do, when they are to do it, where to get additional instructions, what responsibilities they have, and what the scope of their authority is, or that there is some personality conflict among the top men. The industrial engineers have probably already noticed these failures or conflicts, so the present study will be merely for confirmation. Once a manpower utilization problem has been diagnosed, the methods of eliminating it will vary so much with company policy and other special circumstances that there is no point in discussing them here.

Seniority Policy

When there is a normal labor market, job evaluation provides an aid to seniority promotion. This is so because job evaluation promotes classificational work series through which seniority upgrading can be made and through which work similarities can be made distinct. On the other hand, in times of rapid expansion and quick labor turnover, the job-evaluation program tends to advance workers according to how fast they can learn to do a higher-ranking job. Naturally there will be some conflict between the administration of job-evaluation and seniority plans, and the answers to the causes of these conflicts can be worked out only by the parties involved. Under extremely rigid seniority contracts and when there is extremely rapid labor turnover, job evaluation and seniority simply cannot work at the same time, and one principle or the other must be sacrificed. It has been proved, to the authors' satisfaction, that under any and all conditions strict job-evaluation principles will in the end do more for the average worker's advancement than strict seniority.

Job-Evaluation Review Committee

Even with the most intelligent application of the methods described in the preceding pages, the job-evaluation department cannot make a final settlement of every dispute. Establishment of an arbitration committee is therefore necessary. If possible this committee should include the same members who served on the planning committee described in Chapter 2. Having conceived the plan, these men will understand its working principles better than anyone else. If not the same individuals, at any rate the same high type of people, representing labor and management equally, should be selected, and the chief industrial engineer should serve as chairman.

This committee should be called on to consider only those cases which have proved too difficult for the job-evaluation department and which involve jobs rather than individuals. (Individual grievances should be handled through the appeal procedure described in Chapter 12.)

Routine Operation of Job Evaluation

So far in this chapter only controversial issues have been discussed. During the first months of operation any system that affects pay checks as decidedly as job evaluation does will inevitably produce such controversies, but at the same time a routine must be established for handling the normal upgrading and new evaluations that result from personnel shifts and changes in the work being done.

New Employees

Placing of beginners is not, of course, a function of the job-evaluation department; but the department's industrial engineers should exercise some sort of control to be sure that people are never hired into jobs above their qualifications. A job-evaluation check of all beginners hired above the lowest starting rate is recommended. If industrial engineering man power for such a strict check is not available, at least the qualifications of everyone taken in at grade 8 or higher should be examined.

Upgrading Procedure

A thorough check should be made, by one or more industrial engineers, of every request for a change in an employee's job classification. The great majority of these requests will be for upgrading to higher-paid jobs, and only those that are economically justified should be granted. Otherwise the requests will snowball until job evaluation loses its true purpose and becomes a system of highest pay to the loudest squawkers. One way to help minimize irresponsible individual demands for higher ratings is to insist on a logical written procedure. Figures 53 and 54 are examples of forms that can be used for the employees' supervisor (and shop committeeman, if the workers are organized) to recommend a change in labor grade. Such forms not only give the industrial engineer a basis for his decisions but also encourage the supervisor or shop committeeman to take each request seriously and consider its merits with some degree of impartiality.

Note that the case illustrated in Fig. 53 occurred during a period of rapid labor turnover in a shop which was working under a seniority agreement, yet the seniority rule was waived. (See preceding "seniority policy" paragraph for reasons why this action is recommended.)

Cases where the employee believes he should be in a higher-paying job but cannot persuade his supervisor or shop committeeman to make the request, or where the supervisor and shop committeeman do not agree with each other, must, of course, be handled by some different method. Such a method is suggested in Chapter 12, "Appeal Procedure."

Whenever the job-evaluation department approves a request for upgrading, a triplicate payroll-change authorization (Fig. 49) must be made out, signed, and the copies distributed. Also the employee's personnel card must be brought up to date.

Evaluating New Jobs

If the company is developing at all vigorously there will be a steady change in the nature of the work being done. The job-evaluation department must keep in touch with all parts of the company and note every job that has changed enough to justify either small changes in the write-up or a complete reevaluation. Some entirely new jobs will appear also, as equipment or operating methods are modernized. The problem of observing these jobs, writing them up, and fitting them into the organization plan will ordinarily present no difficulties other than those already noted in this and previous chapters.

Evaluating New Departments

When a new department or other operating unit is organized, the problem is likely to be a tough one. A new unit is naturally started to do a new kind of work, where precedents are a hindrance rather than a help. This was typically true of a newly organized series of branch plants which once came to the authors' attention. These plants were set up to face the special problem of war production—maximum capacity regardless of cost. This case is typical of new departments, not because of any likelihood that the next new department will be a war baby but because most new departments do develop from an unusual situation of some kind.

It was assumed that the job write-ups and evaluated labor grades set up for the main plant would work equally well for the branch plants, since these evaluations are independent of base-pay rates and therefore would not be affected by any differences between living costs or wage standards in the main plant's big city and the small towns where the branch plants were set up.

This assumption proved to be incorrect. In the first place, the difference in the size of the operations completely changed the job relationships. In the home plant, for instance, specialized jobs were written up for drill-press operators, bench assemblers, and assembly mechanics. In the smaller plants one employee had to perform all these operations. The branch-plant foreman did not know what to do about job assignments, since there were no job titles to fit the work done. (One foreman, having heard stories of inefficiency in war industries, decided that this was it, and assigned a different man to each specialized job title, including a degreaser operator, who only had to work a few hours on a busy day. This operator was an enterprising man and soon had a thriving private business cleaning automobile parts for all the garages in town. This use soon broke down the degreaser, but there were no degreaser maintenance men in the plant, so there was a week's delay while maintenance specialists from the main plant were sent for. Meanwhile the operator went home, figured out the design, built a degreaser for himself, and was taking care of the company's work as well as his private trade by the time the company degreaser was fixed.)

At first company management could not see its way clear to allow enough flexibility in job assignments to meet this situation, and the job-evaluation department was able to take only half measures, which ended by adding to the confusion. It was also discovered that changes in the design of the product had a much more drastic effect on small plants that were making only one subassembly than on the main plant. A design change that in the main plant would merely cause the transfer of a few specialists from one shop to another might involve a complete realignment of work in a branch plant and require retraining of nearly all the employees.

The final solution, of course, was a complete new evaluation program for branch plants, each branch being evaluated according to the principles that were right for its individual situation. Thus, it was usually found that the job titles had to be broadened out to include various types of work, the standard for the "com-

RECLASSIFICATION REQUEST
JOB EVALUATION

To Industrial Engineering　　　　Effective Date 4/1/44

Subject Job Evaluation

Name Wilmer Anderson　　　　Clock No. 540-943

Present Job Inspector, Final Assembly, B　　　　Code No. 5155

1. Division Final Assembly Inspection

2. Actual work operations of new job (be specific)
Inspect installation and operation of flight controls and control surfaces. Make final inspection of wing and empennage installations. Other final assembly inspections as required.

3. Above operations necessitate following previous training
Blueprint reading, BAC and AAF specifications, rigging of aircraft, BAC inspection requirements, and general knowledge of airplane.

4. Supervision received from (to what extent)
Inspector A. Questionable cases referred to A. Constant spot check by A.

5. Employee contacts (for what reasons)
Own department, customer (army), and shop personnel. Giving and receiving information relative to own inspection duties.

6. Works in what areas (show % of time in each)

	%		%
Shop . 310	100 %		%

7. Directs the work of 2 employees who have the following jobs

(job title)	(code number)
Inspector, final assembly C	5158
Inspector, general, D	5050

Above direction not continuous — usually for training new personnel.

This reclassification ~~is~~ (is not) in accordance with the seniority agreement

True seniority has been waived for the following reasons
Employee has more seniority than any present employee capable of performing this work.

Howard V. Clukey　　　　William M. Wright
Shop Committeeman　　　　Supervisor

FIG. 53. Factory request for upgrading.

RECOMMENDATION FOR CHANGE IN CLASSIFICATION
FOR
EMPLOYEES UNDER WLB CLERICAL-TECHNICAL EVALUATION

To: Personnel Unit Date: July 7, 1944

Name: Jeannette Bane Clock No: 2353

Project or Unit: Service Group: B-29 Change Notice and Service Bulletin

Present Job Title: Typist B New Job Title: Stenographer B

Reclassify from WLB Code: 1740 To: 1659

When did the employee start to perform the duties outlined below: July 6, 1944

Explain in detail the duties being performed now which are a part of the job description of the recommended job reclassification:

Maintain files and indexes on all B-29 change notices and service bulletins and on all correspondence pertaining to B-29 changes. Types all B-29 change notices and service bulletins. Takes dictation and types all wires, letters and miscellaneous correspondence originating in the B-29 change notice and service bulletin group.

Additional Remarks: This girl does extremely accurate typing at approximately 70 words per minute and is very satisfactory at taking dictation at approximately 100 words per minute.

I have studied the job description in the job evaluation manual thoroughly and the person recommended fulfills all qualifications.

Supervisor: Dudley Pratt

APPROVED BY: Robert G. Hanson

Project or Unit Chief: Robert V. Wright

Salary Committee Member: H Johnson

Industrial Engineer: B. F. Reno Jr.

Refer all questions, suggestions, or corrections on job descriptions to the personnel unit.

FIG. 54. Office job request for upgrading.

plexity of duties" factor had to be set much higher, and the organization charts had to be made much simpler and more flexible. As soon as the new evaluations were complete and workers assigned by them, the confusion and man-power waste disappeared; branch-plant efficiency reached and then exceeded that of the main plant.

Control Statistics

Both the job-evaluation department and the company management will want to keep informed on trends that may affect labor costs as the evaluation program develops. A few simplified statistical records, made up from payroll figures, will suffice for this purpose. The records should be broken down by departments, or into smaller units whenever there are indications that a particular unit in the department may be getting out of line. The statistical records should answer two main questions: (1) how many employees are currently assigned to each labor grade, and (2) what is the department's average pay rate? Figures 56 and 57 illustrate types of charts that will answer these questions, Fig. 55 being the tabulated statistics from which the charts are made.

The employee totals in Fig. 55 show that the department is growing fast. The pay-rate graph (Fig. 56) reveals instantly that the job-evaluation program has kept pay rates under close control. A little study of Fig. 57, however, will give rise to several questions. Why the general trend towards a smaller percentage of employees in grade 10, while the percentage in grade 9 increases correspondingly? Why the sudden increase of grade-7 employees on February 15, followed by a return to normal at the next pay period? What happened on March 15 to shift such a large percentage of workers from grade 8 to grade 7?

The job-evaluation department will have to give the company management good answers to such questions. These symptoms, though they have not caused any average pay boost in the department, may nevertheless be the beginning of an upgrading tendency which could upset the company's wage system. For the examples given, typical answers would be:

1. The shift from grade 10 to grade 9 is thoroughly legitimate. Shortly before job evaluation was put into effect the pro-

DEPARTMENT, NUMBER OF EMPLOYEES BY LABOR GRADE

Production Control and Stores

Grade	Number of Employees													
	1943			1944										
	Nov. 7	Dec. 6	Dec. 28	Jan. 21	Feb. 1	Feb. 15	Mar. 1	Mar. 15	Apr. 1	Apr. 15	May 1	May 15	June 1	June 15
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	8	11	13	13	11	12	12	14	15	15	16	19	26	26
3	48	49	48	47	46	49	50	50	49	49	51	49	45	45
4	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5	119	125	127	139	139	150	146	151	151	153	153	151	169	169
6	60	75	74	69	65	65	64	65	67	65	60	64	61	61
7	36	36	38	46	47	113	45	88	87	88	88	99	105	115
8	118	135	139	138	142	154	155	119	120	114	119	124	130	131
9	247	262	275	315	337	360	377	393	390	402	401	448	459	479
10	370	433	467	460	439	429	448	467	468	461	430	402	429	465
Total	1006	1126	1181	1227	1226	1332	1297	1347	1347	1347	1318	1356	1424	1491
Average hourly rate	.9934	.9894	.9851	.9864	.9862	.9963	.9864	.9886	.9889	.9893	.9936	.9962	9975	.9931

FIG. 55. Statistics for a department's first seven months under job evaluation.

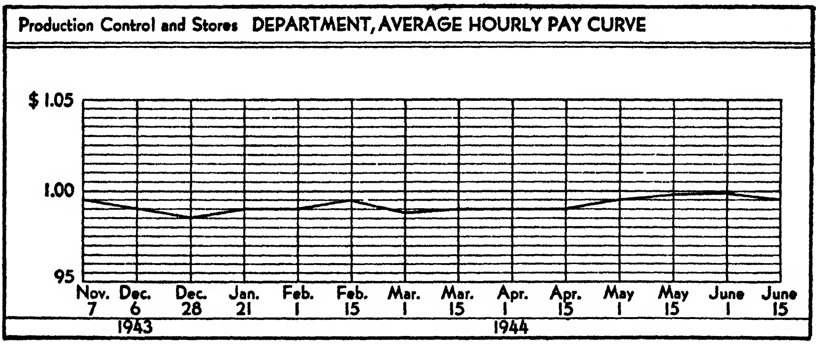


FIG. 56.

duction-control department had been given a special assignment to plan and operate a matériel control program for the company's widespread operations. As the program developed, new clerks, hired as green help, were being gradually promoted to their permanent jobs.

2. The temporary increase in grade-7 employees during the February 15 pay period represents the peak load caused by the closing out of a very large contract at the same time that the new matériel control program was being put into effect. A corps of accountants and other specialists were assigned temporarily to handle the final inventory and other paper work with the least possible delay to other contracts.

3. The sudden shift of employees from grade 8 to grade 7 on March 15 resulted from a decision by the job-evaluation department that expediter C had been misevaluated in the original program, so the 38 people assigned to this job were upgraded. There are bound to be some adjustments of this sort when a large company is evaluated.

Workers' Qualifications

A word of caution about the foregoing statistics: they do not mean anything unless workers' qualification standards are maintained. Human nature being what it is, a supervisor will naturally tend to fill any vacancies in high-paying jobs with the best people he has, even if they do not quite measure up to the job

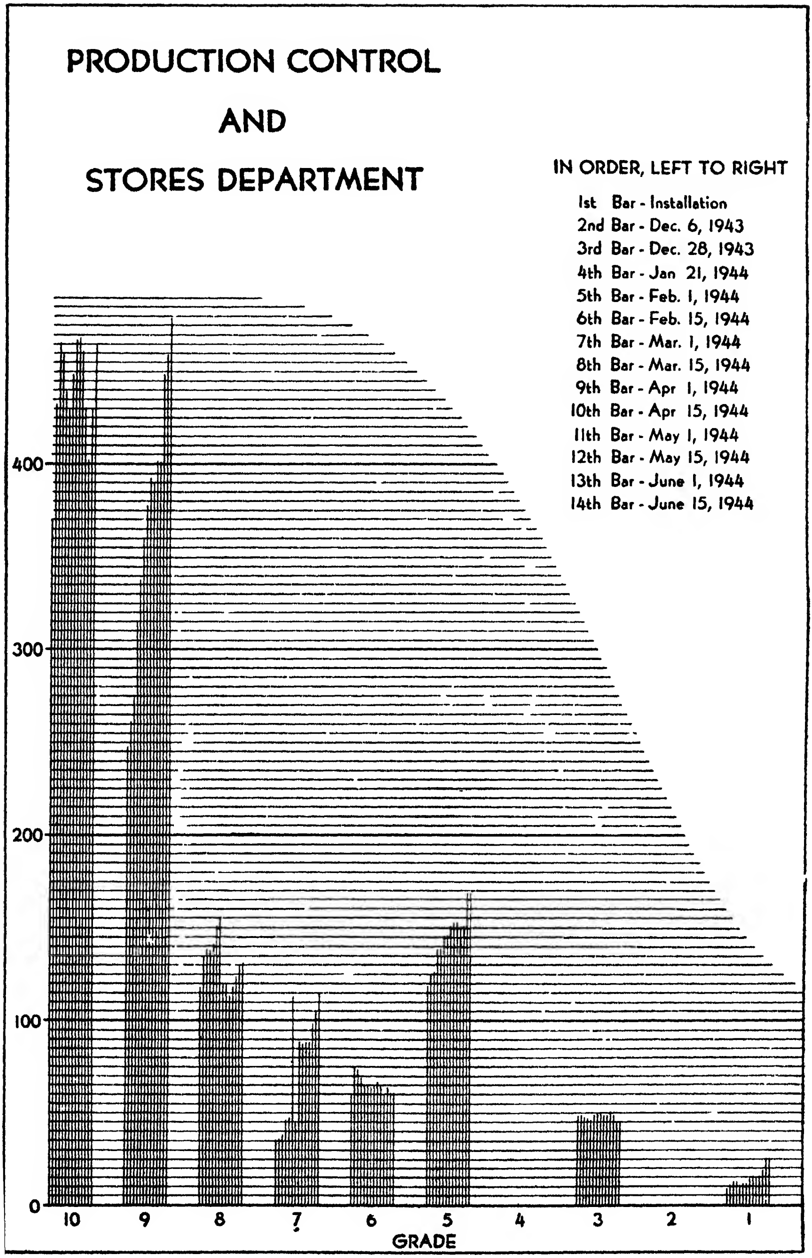


FIG. 57. Bar chart, showing percentage of employees in each grade during each pay period.

write-ups. This tendency seems to be inevitable, even with supervisors who are honestly trying to abide by job-evaluation principles. It is particularly strong in union-organized shops, where labor representatives are sure to notice any good jobs that are not filled.

Additional control statistics to cover workers' qualifications would be very useful for resisting these pressures, but such statistics are unfortunately very cumbersome to prepare and would always be either too inaccurate or too late. The answer to this problem is for the industrial engineers to keep on their toes; they must keep abreast of new developments in the departments to which they are assigned and must foresee, without benefit of statistics, any important shortage of skilled men. Once aware that a shortage of skilled help will arise, they can make sure that the company's special training, labor-recruiting, and labor-utilization programs are capable of providing the necessary qualified personnel. When these programs appear inadequate the job-evaluation department should recommend their expansion to handle the anticipated shortage. If the supply of qualified workers can be kept up, there will be far less tendency to devaluate jobs by filling them with half-qualified people. It must never be forgotten that devaluation of jobs is like any other inflation. Those workers who get jobs above their qualifications will have a temporary advantage, but if too many are upgraded without justification the company will be forced to readjust its standards, and the average employee will one way or another pay for the special privileges granted to some.

CHAPTER 12

APPEAL PROCEDURE

Need for Appeal

This chapter establishes a method for handling complaints arising from *workers' job assignments.* (Procedure for settling controversies about the *evaluation of jobs* has already been discussed.) It will be evident that the procedure to be described could, and probably would, be used to handle all kinds of personal grievances, not just those related to job assignment. Miscellaneous grievances are, however, beyond the scope of this book and will receive no further mention.

A standard appeal procedure must be established. Otherwise assignment troubles may result in serious organizational dislocation. There are too many causes for complaint for casual handling of the cases to be practicable. The employee and his supervisor may misunderstand or disagree about the meaning of job write-ups; one or both of them may fail to grasp or to respect the principles of job evaluation; a change in the nature of a job which makes satisfactory assignments impossible may not be recognized for what it is—a problem of evaluation, not of assignment; there may be a personality conflict; or the people concerned may happen to be naturally avaricious, ornery, emotional, overimpressed with themselves, or neurotic. To put it briefly, job evaluation deals with all kinds of human beings whose behavior will be typically human.

Not only is a standard appeal procedure necessary to deal with the inevitable dissatisfactions, but also, if well publicized, it will automatically reduce the number of dissatisfied employees. Many people, when convinced that they can get a fair hearing by taking a little trouble, will decide that their grievances are not worth the trouble.

Essentials of Good Appeal Procedure

Figure 58 should be studied before the following paragraphs on the essentials of good appeal procedure are read. The method outlined in this illustration was built around the idea that the most important requirements for a successful procedure are simplicity, freedom from technicalities, speed, elimination of cases as near to the source as possible, careful choice of review board members, and complete records.

Simplicity

The appeal procedure must be simple enough so that everyone concerned can understand it. This understanding will both promote fairness and save time. The basic simplicity of the proposed method should be evident from the illustration.

Freedom from Technicalities

Unnecessary technicalities should be eliminated; they are likely to conceal the true facts. Overpowering the complainant with confusing technicalities and ramifications is no way to settle an appeal. Anyone should be able to follow the reasons for every step that is taken, whether it leads towards granting one's claim or towards revealing basic fallacies in it. The suggested plan has no unnecessary technicalities. Like any other plan, however, it must be operated with breadth of vision and good judgment, or confusing pettiness will soon creep in to obscure the basic simplicity.

Speed

Appeal procedure must provide methods for taking up cases promptly and for rendering judgment as speedily as thoroughness permits. The employee may take a long time making up his mind to put in his petition, but once his complaint has been made he chafes under delay. He begins, perhaps, to feel that the practice of hearing cases in the order in which they are re-

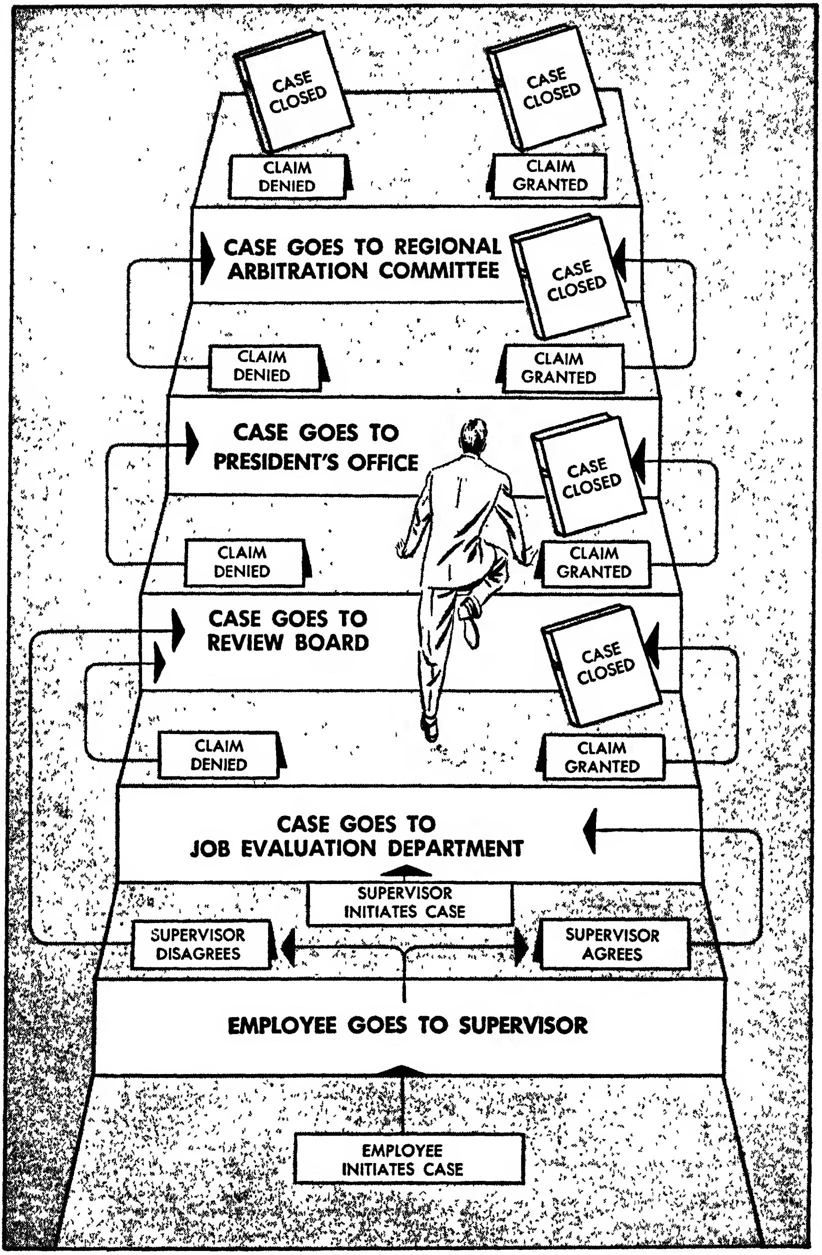


FIG. 58. Point-system job-evaluation procedure—appeal of individual grievances.

ceived is only a device to delay his own hearing. Then, when his hearing is actually in progress, he will often revert to dawdling, or dwelling on irrelevant and petty facts, thus delaying the next case. These reactions are natural, and impatience with the employee will not do any good; but the best appeal procedure will fail to build morale if it operates too slowly. The common-sense solution is to provide a large enough staff so that the cases can be taken care of as fast as they are presented. As will be seen later in the detailed description, this need for adequate man power is recognized in the suggested procedure.

Eliminating Trouble Near the Source

Conferences between a dissatisfied employee, his supervisor, and the industrial engineer assigned to the department will often reveal facts about job relationships that have previously been overlooked. A ready and satisfactory solution is usually automatic when these oversights are corrected, whether it is the employer, the supervisor, or the industrial engineer who changes his mind. The first two steps of the procedure as recommended provide for this preliminary airing of the problem.

Choice of Review Board Personnel

Since the review board (step C, Fig. 58) will be expected to settle practically every case that is not eliminated at the source (steps A and B), the importance of having it manned by highly qualified and disinterested people is clear. Review board members must have tolerance, open-mindedness, tact, analytical ability, and the courage to make fair decisions even though their decisions are contrary to popular feeling. It is usually well to have mature and liberally educated members. Officious or narrow-minded people emphatically must not be selected.

Aside from these general qualities of character, the board members should have as much experience as possible in the industry (for understanding the operations involved in the cases which will be heard), and in personnel administration (for the technique of understanding and handling the people involved). They should also have specialized experience in job evaluation, for people who are unfamiliar with the subject will have a hard time making successful decisions. Their decisions not only must give a square deal to uninformed workers who do not know the best way to present their claims but also must stand up in the opinion of the expert pleaders who will handle some cases; and every decision must also preserve the pay relationships and qualification standards fixed by the job-evaluation policy. The situation is essentially similar to that in the field of jurisprudence, where judges are selected only from the ranks of trained and accredited attorneys.

If job-evaluation specialists are not available to serve on the board, a specialized training course for those who do serve should be encouraged, so that as soon as possible they can hear the cases as experts, not novices.

The make-up and membership of the board will of course be partly determined by whether the employees have a collective-bargaining agency. If there is such an agency, its previously selected representatives will undoubtedly be appointed to the board to represent member employees; or there may be a complete arbitration board or committee, set up before job evaluation was started, whose responsibilities can be extended to cover job-evaluation appeals. However, if this committee is uninformed on the subject and specialists are available to represent all parties it may be advisable to set up an entirely new board. The workers are entitled to have their cases heard by experts; both the company and the collective-bargaining agency will gain because decisions made by an expert group will stick and will thereby help to build a firm foundation for good future industrial relationships.

Complete Records

A set of precedents based on complete records will both speed up the hearing of future cases and forestall many hearings of claims similar to previous ones. Knowledge by all parties of past decisions in similar cases will settle many a complaint before it reaches the appeal stage. These records must be complete and accurate; also they should be reduced to tabulated or statistical form for convenience in studying trends and in locating similar cases.

It is necessary to have a written "processing" record of the original complaints and all the steps they have gone through, so that there will be no question about their having been handled properly.

The proceedings of the review board that hears each case should be recorded in a word-for-word transcription. A transcription will settle any later arguments as to what was said, and it will save much time and trouble if the appeal is carried to higher authorities.

The detailed description of the suggested procedure will show how these records are kept.

Details of the Recommended Appeal Procedure

The procedure detailed in the next few pages is recommended as being thoroughly practical. It is based on those essentials for good appeal procedure that have just been discussed.

Step A, Initiation of Complaint

Either the worker himself or his supervisor may be dissatisfied with a worker's job assignment. As shown in Fig. 58, there is a difference in procedure according to which of them originates the claim. A supervisor initiates his case directly with the job-evaluation department; the worker must first of all consult his supervisor. It is a good idea for the supervisor to call in an industrial engineer when he finds difficulty in agreeing with the employee, but only to make sure that the case is really one of assignment and not of job evaluation. It would obviously be very bad practice for the industrial engineer to take sides in any dispute between an individual worker and his supervisor. Therefore if the employee and supervisor, once both of them understand the principles involved, still disagree the case bypasses the job-evaluation department and goes directly to the review board.

Step B, Case Referred to Job-Evaluation Department

If the supervisor and worker agree that the worker's job assignment is incorrect, they can pass the question to the job-evaluation department simply by filling out a standard request for upgrade (Chapter 11, Figs. 53 and 54). Should the department approve the request, the case is closed without appeal; if the department denies the request, it must be appealed formally. The department's ground for refusal may be either the employee's lack of qualification, as judged by the company's general standards, or lack of sufficient available work in the higher-paying job, for it is the duty of the job-evaluation department to keep close check on any tendency towards job inflation.

Step C, Case Referred to Review Board

If the procedure reaches an impasse in steps A or B, the complaint, to go any further, must become a formal appeal. Figure 59 is the form on which either worker or supervisor initiates the appeal. When the person filing it has filled out the upper part, he forwards it to the review board, where a routing slip (Fig. 60) is filled out (above the first double line only) and sent to the supervisor. The supervisor fills out the next section and returns it to the board.

In the example given, the case by-passes the job-evaluation department because it was initiated by the employee and the supervisor does not agree with her. In other cases the form would be routed to the job-evaluation department, where the space assigned to that purpose would be filled out and the slip again returned to the review board.

Organization of the Review Board

It is necessary now to digress from the progress of the individual case to explain the organization of the board that will hear it.

As previously noted, the make-up of the board will depend partly on whether the employee whose case is to be heard is to be represented by a collective-bargaining agency. Where there is such an agency, it and the company will usually have equal representation on the review board and will have selected a chairman by mutual agreement. The chairman may serve regularly on the board, or he may be called in only to act as a conciliator or arbitrator when there is a deadlock, being in effect a "court of second appeal." (Where a government agency has jurisdiction, Please fill out completely

REQUEST FOR HEARING BY REVIEW BOARD

Name Cynthia Baker Dept. 35 Clock 89 Shift 1st

Assignment (Title) Comptometer Operator B Code Number 1130

Description of Duties Add up columns, make extensions, check work of other comptometer operators for accuracy. Do odd jobs which are not required of other comptometer operators B, such as figure time cards, extend expense accounts, etc. (Continue on Reverse Side)

Reason for Request I have been here longer than other comptometer operators B. I think my greater experience with the company causes my supervisors to give me the more difficult assignments. I do not have my own set of records to maintain, but the extra things I do should entitle me to the same grade as comptometer operators who are responsible for keeping up their own records. (Continue on Reverse Side)

My Representative on the Review Board Will Be Wm. Hanford

of Dept. 35, Cl. 21 (If you elect to represent yourself, please so state)

Date 8-13-42 Signed Cynthia Baker

— This Space to Be Filled in by Review Board —

Disposition Board finds employee is properly assigned on basis of duties performed and evaluation thereof. She is not performing the job comptometer operator A as described and evaluated in manual. She is entitled to a merit increase of $5 above the minimum of rate range 10 because of her relatively long period of service, and because she is given some assignments not given other comptometer operators B.

Date of Disposition 8-24-45 By J.E. Crawford, Chairman

Classification of Disposition 142 By O.N. Belvue, Member

By Wm. Hanford (Member, Dissenting)

FIG. 59. Employee's appeal.

ROUTING SLIP—REQUEST FOR HEARING BY REVIEW BOARD

Name Cynthia Baker Dept. 35 Clock Number 89

Assigned to Job Title Comptometer Operator B Code Number 1130

Supervisor Rejected Employee's Claim X Supervisor Approved Employee's Claim

Supervisor Initiated Claim Employee Withdrew Claim

Remarks: Properly assigned to comptometer operator B, grade 10. Duties require little or no clerical experience. Any beginner who is trained to operate comptometer could handle duties.

8/15/42 L. V. Hansen
Date Supervisor

Rejected Above Claim Reassigned Employee

Revised Job and Reassigned Employee Employee and/or Supervisor Withdrew Claim

Remarks:

Date Industrial Engineer
Job Evaluation Department

Request Placed on Agenda for Hearing by Review Board X Employee Withdrew Request

Additional Data Brought to Attention of Job Evaluation Department, Resulting in Reassignment

Additional Data Brought to Attention of Job Evaluation Department, Resulting in New Job Write-up

Remarks: Because she has been here longer than most operators in same grade, employee feels she is entitled to comptometer operator A in grade 9. There is a possibility her duties may be slightly more complex and varied than duties of operator B as set forth in job description, and as ordinarily interpreted. However, it is doubtful if there is sufficient difference to warrant assignment to comptometer operator A, because she has no responsibility for keeping a specific set of records and the data her work is commonly done on are arranged by others. Formal hearing by review board required to determine disposition.

8/20/42 O. N. Belvue
Board Member

FIG. 60. Routing slip for employee's appeal.

(and his personal representative if any) is told to be on 20-minute call and is notified when his case is about to be heard.

There must be a stenographer, phonographic recorder, or stenotypist at every hearing to record the proceedings. The stenotypist is best and the stenographer next best; phonographic recordings are likely to leave some doubt as to who is speaking.

The hearing is opened by the chairman. He explains how the hearing will be conducted, with instructions as to methods of addressing the chair and cross-questioning. He states how much time, within reasonable limits, is allowed for the presentation of the case by each side, what rules are to be followed in calling witnesses and submitting evidence, and how the final vote will be taken. Then the case is read into the record from the employee's request form and its routing slip.

The complainant is next directed to present his case. While he does so, no interruption by the opposing side or anyone else is allowed, unless the chairman or one of the members of the board believes that extraneous matter is being brought in. Even this type of interruption is to be used with the greatest moderation. When the complainant has presented his entire case, calling any witnesses and presenting any evidence that he feels is relevant, the opposite side of the case is heard in the same way, subject to the same courtesies.

Witnesses may be required or permitted to sit through the entire hearing, or just that part to which their testimony is pertinent. Such details are best settled by experience, as the procedure develops.

When both sides have been presented, a period may be allowed each side for uninterrupted rebuttal; or the chairman may call for open discussion subject to only two limitations: that requests to speak must be granted by the chairman, and that all discussion must be relevant. Open discussion is, in general, more desirable than a rebuttal period because it leads to a less formal atmosphere and a better chance that the case will end in a satisfactory understanding between the opposing sides. The discussion continues until closed by mutual agreement or by majority decision. If the issue is now clear, a vote is taken. If not, the chairman attempts to clarify the issue before the vote is taken. The vote is taken by open statement, as a secret ballot would be out of character in an open hearing like this.

The result may, of course, be a compromise that requires two or more separate votes, as in the case illustrated by Fig. 59, where the complainant was refused a change in classification but was granted a merit raise.

Second Appeal

When the appeal procedure is organized so that the review board's chairman sits in only to settle deadlocked cases, the conduct of the hearing that he calls will be similar to the regular board hearings except that the transcript of the original hearing will replace much of the evidence and discussion that would otherwise be necessary.

Steps D and E, Appeal to Higher Authority

It should seldom be necessary to carry a case to the president's office or to still higher authority such as the regional arbitration committee suggested in Fig. 58. If the review boards are composed of good men, and if they are vested with proper authority to represent the company and the employees, their decisions will almost invariably be respected. However, every employee should have the knowledge that he can carry his appeal right on up if he wants to. This knowledge of possible recourse will make him feel better about accepting an adverse decision from the review board. The same knowledge will encourage the board members to make the best possible decisions.

We have no suggestions for an appeal procedure beyond the review board, except that all transcriptions and other records must be open to the employee, so that he can use them in making his further appeals.

Statistical Records of Job-Evaluation Appeals

Statistical records are very helpful in formulating precedents if the company is large enough so that the review board is unable to remember its individual decisions. The statistics can also be used for spotting trends so that desirable ones can be encouraged, and undesirable ones can be corrected before they gain momentum. The trends revealed would include, among others, increases or decreases in the frequency of cases; increase in cases involving a particular job, a particular group of jobs, or a particular department; and the tendency of the board to grant a greater or less percentage of claims. The board members being naturally intent on individual cases, such general trends may sometimes escape detection without the help of statistics.

Most of the necessary information—departments, job titles, labor grades, pay rates, dates, etc.—is probably already coded for machine tabulation, so that the statistical reports can be made complete merely by adopting codes for the nature and origin of complaints and their disposition. Here is a simple three-digit code covering cases for both the job-evaluation review committee and the review boards.

First Digit:

1. Assignment, initiated by employee.
2. Assignment, initiated by supervisor.
3. Evaluation, initiated by individual employee.
4. Evaluation, initiated by collective-bargaining agency.
5. Evaluation, initiated by job-evaluation department.
6. Grievances not connected with job evaluation.

Second Digit:

1. Employee's assignment upgraded.
2. Employee's assignment unchanged.
3. Employee's assignment downgraded.
4. Employee's assignment unchanged, merit raise granted.
   Etc.

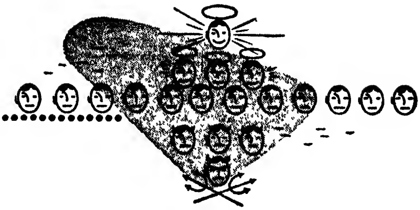
Third Digit:

1. Job reevaluated to higher grade.
2. Job evaluation unchanged.
3. Job reevaluated to lower grade.
   Etc.

An example of this coding is seen near the bottom of Fig. 59, where "classification of disposition—142" means, "Employee asked for reclassification; merit raise granted; no change in assignment or evaluation."

CHAPTER 13

RECOGNITION OF INDIVIDUAL MERIT



Need for Merit Recognition

Job evaluation pays the company because, given good write-ups and correct job assignments, it will result in the *average* worker earning his wages ("equal pay for equal work"). But this statistically average worker is not a real person. Among any group of people all of whom are properly qualified to hold a certain job, some will be better producers or otherwise be of more value to the company than others. If encouragement can be given to these more valuable people, morale and production will be better. People want to feel that they are progressing, or at least they want to know where they stand. Moreover, supervisors need a tangible means of encouraging good workers without having to promote them too soon out of a job where they are needed, and of jacking up the less useful employees, short of actually firing them. Therefore, some definite merit-recognition system is needed in addition to the job-evaluation program. Anything from piece work to service buttons could be considered as merit recognition. The merit-rating system to be outlined here is recommended as being a specific complement to the job-evaluation program.

In a small company individual recognition is simple. An occasional pat on the back or well-timed reprimand by the foreman can keep every worker informed as to how he stands. But in a company large enough to have a job-evaluation program it is inevitable that some supervisors will be harsh and some lenient; and no two supervisors will judge workers by the same set of characteristics. Also, the workers and supervisors may be shifted around so that the supervisor who knows a man best may not be there when a question of pay raise, promotion, or layoff arises.

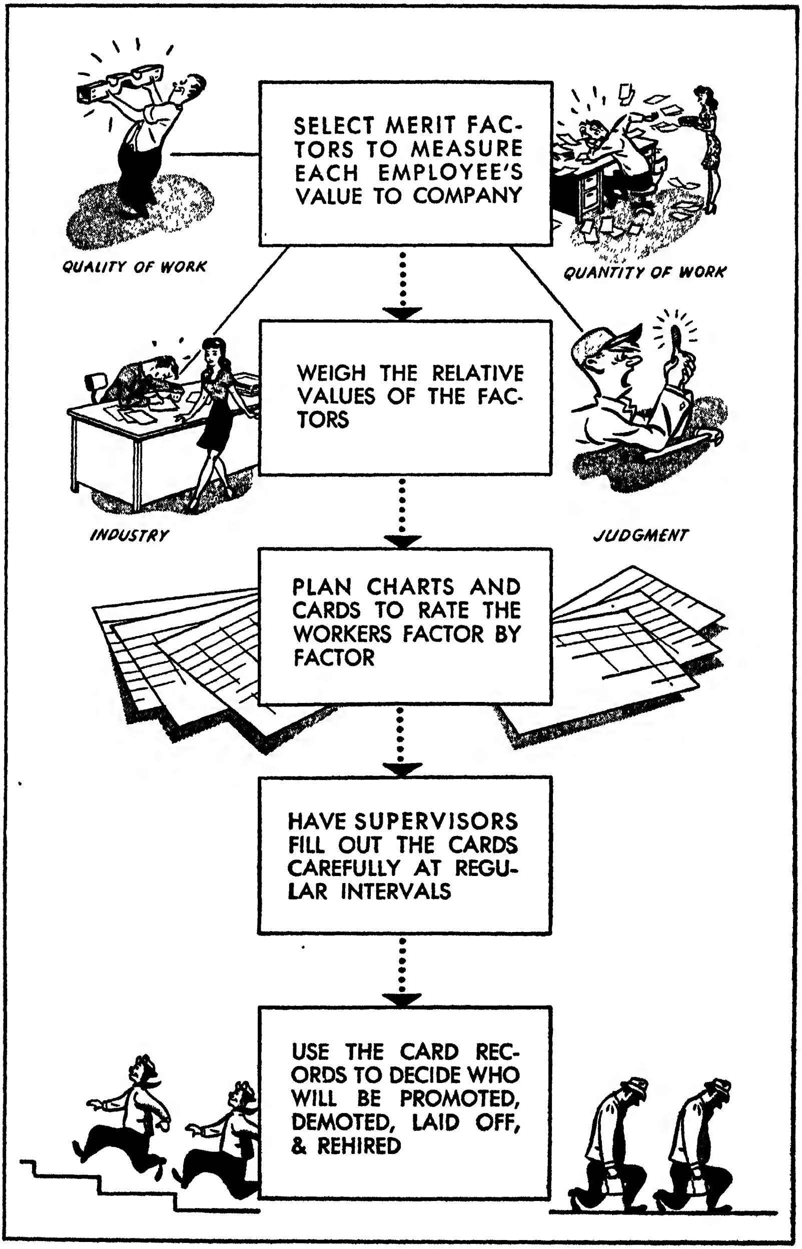


FIG. 61. Merit-rating procedure.

In a large company, then, a system is needed for standardizing and recording pats on the back and reprimands.

Employee Merit Analysis

Granting that some system for recognizing individual accomplishment must be devised and used to the fullest extent to discover, develop, retain, and utilize properly the most efficient employees, it is necessary first of all to make a clear distinction between the rating of jobs (job evaluation) and the rating of employees (employee analysis). The distinction lies in the answers to two fundamental questions that continually confront anyone who is responsible for the efficiency of a large work force: (1) *What does the job require of the worker?* (2) *How well does the individual worker perform his assigned duties?*

Job evaluation is the answer to the first question. It is used to measure those job requirements which can be put into specific, objective categories. Employee analysis is the answer to the second question. It is used for purposes of merit rating, which is a subjective problem. Here the emphasis is on the worker and the quality of his performance, and not on the cold facts about the job itself. A good merit-rating plan can simplify the process of analyzing the workers' abilities; but because the problem is subjective the results will have meaning only in proportion as every supervisor applies real effort and good judgment to his rating of each employee. Though less tangible than the physical aspects of a job, the personal qualifications of the workers are nevertheless capable of systematic analysis and recording; and the benefits of such records are many. Some of the useful results of a merit system are:

1. It uncovers weaknesses of individual workers, providing a basis for helping them to correct their faults.
2. It reveals strong points in individuals which may justify transfers or upgrading.
3. It uncovers group or general weaknesses of employees, aiding in planning a useful training program.
4. It encourages supervisors to study employees under their direction with more detachment, resulting in better use of individual capabilities.

5. If the program is well planned and well administered, it develops morale by making ability, not favoritism, the basis for advancement.

6. It can determine the order of layoff and rehire (or supplement the seniority program for these purposes if merit is not to be the governing factor).

7. It encourages, by providing an effective check on their results, the improvement of personnel and employment practices.

Merit recognition is not a device for the regimentation of workers, as many labor leaders and others have claimed. To seek out individual workers and reward them for their skill and effort is exactly the opposite of regimentation. The word "regimentation" is actually only a battle cry to express labor's fear that management will use the merit system as a means of concealing, under a mass of paper work, policies which are against the interests of labor. Such fears can usually be dispelled by eliminating any merit pay from the program. While the writers believe firmly in the morale value of merit-pay raises within the evaluated range of the workers' jobs, they do not consider the issue so important that the whole program should be abandoned if merit pay has to be eliminated. Merit pay is not necessary to obtain the benefits noted in the foregoing list.

Merit System Plans

The planning and procedure of a merit-rating program are the same regardless of whether merit pay is involved. A merit-rating plan resembles a job-evaluation plan in that it has factors, factor degrees, and point values. But, whereas the job-evaluation plan can be fairly complex, because its operation is controlled by trained industrial engineers who are organized in a specialized unit, the merit-rating plan, on the other hand, must be simpler, since it has to be applied to every employee individually by numerous supervisors in all parts of the company.

Many companies and labor unions have put a great deal of thought into the merit-rating problem. Merit plans have in fact been in longer and more widespread use than job-evaluation plans; but, because the values involved are less tangible, there is still considerable controversy as to what they are and how they should be obtained. The writers have no definitive system to offer for settling the controversy but will merely present an analysis of some plans that have proved workable. The main thing is to have a plan. Altogether too frequently companies feel that their merit-rating policy is adequate when in reality they have no plan at all. For example, take the following procedure, which has actually been used to determine layoffs:

"(1) If two employees are equal in all other respects, keep the one with the best work record; (2) if they are still equal, keep the employee who has been longest with the company; (3) if they are still equal, keep the more needy worker."

That is the "plan," in its entirety. The inadequacy of such an oversimplified procedure is obvious. In the first place two employees rarely have the same work qualifications, but how can the company know and prove whether they do, without systematic records kept for the purpose over the whole period of the workers' employment? Is the worker's need sufficient reason for retaining him? And, if so, how can the relative needs of two employees be measured, especially without records? A real merit plan is much more than a list of vaguely expressed alternatives. It must make it possible for all supervisors to treat the employees on a fair and uniform basis so that workers will be laid off, rehired, or given merit raises, on the same basis in one department as in any other.

How simple can the plan be and still fulfil the foregoing requirement? A very simple plan like the employee progress report illustrated in Fig. 62 has two advantages. First, it requires little work of the supervisor who makes the ratings; second, since the whole plan is printed on file cards, the clerical work is simple and inexpensive. But such a simple plan is useful, as the title suggests, only for indicating progress to the individual employees. It does not make fine enough distinctions to serve the general purposes of a merit system. It merely separates the best and the poorest workers from the typical ones. It would show too many employees with exactly similar average ratings, if an attempt were made to use it for determining layoffs or promotions. Also, there are so few factors that a supervisor could make or break

FACTORY EMPLOYEE, PROGRESS REPORT

Name Ramsdale Phapp Social Security No. 537-01-9485

Rating Key				Ratings												
Above Average	Average	Below Average	Poor	Date, 1945	Jan. 4	Feb. 5	Mar. 3	Apr. 3	May 4	June	July	Aug. 8	Sept.	Oct.	Nov. 3	Dec.
				Department	123	123	123	123	123			123			123	
				Payroll No.	1242	1242	1242	1242	1242			1242			1242	
				Job Code No.	2108	2108	2108	2128	2128			2128			2126	
				Pay Rate	1.01	1.01	1.01	1.01	1.01			1.01			1.20	
34	26	17	9	Job performance	17	26	26	17	34			34			17	
20	15	10	5	Industry and dependability	15	10	10	20	20			20			20	
18	14	9	4	Disposition and attitude	14	9	14	18	18			18			18	
14	10	7	3	Judgment and resourcefulness	7	7	7	10	10			10			10	
14	10	7	3	Ability to learn	7	7	10	10	14			14			14	
Total rating points					60	59	67	75	96			96			79	
Graded by					TRN	TRN	TRN	W. A.	W. A.			W. A.			W. A.	

(See other side for instructions)

INSTRUCTIONS

This report will be filled out by the employee's immediate supervisor; checked by higher supervision.

New employees will be rated every month until the end of the second quarter during which they have been employed; thereafter only once each quarter.

Study the following questions very carefully, and keep them in mind when rating the employees:

Job Performance. Does the employee work well and fast, with a minimum of wasted time and materials? Can he do every part of the assigned job?

Industry and Dependability. Does the employee take orders in the right spirit? Does he cooperate with his fellow-workers and supervisors? Does he seem interested in furthering the company's plans, policies, and objectives?

Judgment and Resourcefulness. Can the employee handle work assignments without detailed instructions and constant supervision? Does he think along original lines? Does he make frequent practical suggestions for improved operating methods?

Ability to Learn. Is the employee quick at grasping new ideas? Does he adapt himself readily to different situations as they occur? Does he sense the relationship between his job and others? Does he get to the root of each problem?

Measure each employee's qualifications against those of other workers in the same labor grade and doing the same general type of work.

Total point ratings have the following significance: 35 or less, poor; 36–60, below average; 61–80, average; 81 or more, above average.

The space below may be used for special notes on the employee's qualifications.

This man is an electrical specialist and not suited to this routine job. Should be transferred. J.R.N. 1-4-45
2/5/45 Ditto. Have suggested transfer to the new electrical trouble-shooting group. J.R.N. W.O. OK
5/4/45 This man should be rate 6. W.O.
8/8/45 Strongly recommend rate 6. W.O.

Fig. 62. Employee progress report (front and back).

OFFICE EMPLOYEES—STANDARD MERIT-RATING CHART

To all supervisors who have immediate supervision over employees in WLB labor grades:

Use this chart to determine the merit-rating points which you are to fill out on the individual office employee's merit cards.

You must fill out a card every month for each employee up to the end of the second quarter during which he has been employed. Thereafter you fill it out only once each quarter. The proper cards will be forwarded to you at each rating period. You must then return them to the personnel unit within three working days, properly filled out and initialed in the "approved by" space.

To do your part in keeping grades uniform throughout the company, study the questions in the "qualification" column at the left, as well as the short descriptions in the rating blocks.

To decide whether an employee is "average," "above average," etc., *compare him only to other employees in the same labor grade and in similar jobs.*

Your ratings will determine promotions, layoffs, and other matters of vital concern to your people. It is an important part of your job as a supervisor to judge their value accurately. Take this rating seriously and *do not make snap judgments.*

Qualification	Poor	Below Average	Average	Above Average	Excellent
Job Performance. Does the employee maintain a high standard of workmanship? Does he work fast? Judge by department standards and comparison with others in same grade.	Unsatisfactory workmanship.	Barely acceptable workmanship.	Workmanship generally satisfactory, meets standards.	Fast and efficient, better than average production.	Does unusually rapid, good-quality, and complete work.
	14–26	38–54	78–124	138–150	166–175
Knowledge of Work. Can employee do every type of work the job requires? Judge by over-all understanding of regular work, not formal education. Consider experience on this and related jobs, and how much employee needs to know.	Inadequate; knows little about job.	Knows one part of job, needs considerable instruction.	Fair working knowledge of job.	Understands job thoroughly; experienced worker.	Expert on job; has wide related experience.
	12–24	34–50	70–116	124–136	142–150
Judgment and Resourcefulness. Is the employee able to act independently and with good judgment? Is he willing to make decisions? Is he ingenious and resourceful in planning and doing his job?	Always waits to be told what to do. Has poor sense of values.	Lacks perception; relies heavily on others.	Fairly independent; tries to reason things out.	Resourceful; develops assignments ably, with common sense.	Sees what to do and does it; makes sound judgments based on pertinent facts.
	12–24	34–50	70–116	124–136	142–150

Supervision Required. How closely must details of work be explained to the employee? How closely must his progress be checked? Can he handle exceptional cases?	Can do only short jobs, constantly supervised.	Work must be continually assigned, regularly checked.	Follows regular procedures with little supervision.	Plans own work; needs help only in rare cases.	Sets own standards; almost self-supervising.
	8–16	22–34	47–75	81–91	94–100
Industry and Dependability. Does the employee work hard and steadily? Are his attendance and punctuality good? Is he reliable?	Loafs, comes late. quits early, habitual absentee.	Not very reliable, watches the clock.	Usually reliable; does a fair day's work if checked.	Consistently dependable; works willingly all day.	Always 100% on the job and does more than asked.
	8–16	22–34	47–75	81–91	94–100
Ability to Learn. Does the employee learn quickly, grasp new ideas? Can he sense relations between ideas and get at the root of problems?	Dull, poor memory; can do only limited work.	Learns slowly; requires excessive instructions.	With usual help, learns new work related to old.	Can do nearly anything in his line; picks up ideas quickly.	Learns rapidly; an all-round man.
	8–16	22–34	47–75	81–91	94–100
Disposition and Attitude. Does the employee have a helpful attitude towards his supervisor and his fellow workers? Is he interested in the company's plans, policies, and objectives?	Antagonistic; surly.	Shows practically no sign of enthusiasm or helpfulness.	Satisfied with company; fairly well satisfied with job.	Good disposition, generally a morale booster.	Goes out of way to be agreeable and help others.
	6–12	17–25	35–58	62–68	71–75
Personal Qualities. Does the employee have good personal habits? Is he free of conceit? Is his appearance neat? Does he make a good general impression?	Slovenly, careless; habits questionable.	Habits and appearance somewhat undesirable.	Appearance and habits acceptable.	Appearance and habits both above average.	Highest personal characteristics.
	4–8	11–17	23–41	43–47	48–50
Accuracy. Does employee's work conform to established standards of accuracy? Does he remember detailed instructions? Can he concentrate continuously on detailed work, detect omissions, etc.	Makes far too many mistakes.	Frequent mistakes.	Work reasonably correct, some errors.	Seldom makes errors.	Practically never makes errors.
	4–8	11–17	23–41	43–47	48–50
Contacts with Others. Can the employee successfully meet, deal with, and influence other people? Is he tactful when necessary?	Can work only with associates and supervisor.	Can make contacts in the department to supply or give information.	Can make contacts with other departments; has some tact.	Can make outside contacts and deal with people of higher rank.	Great tact, and ability to deal with people in any position.
	4–8	11–17	23–41	43–47	48–50

FIG. 63. Merit-rating chart.

an employee's record by a single error of judgment or slip of the pen in rating one of them.

The authors believe that in most companies a more refined system, such as the one shown in Figs. 63 and 64, will thoroughly justify the added burden on supervisors. After all, accurate judgment of each employee's value to the company is the mark of a good supervisor, and the thought required by this system will help to develop that judgment. The superiority of this plan over the simpler one will become clear as the following pages are read. The more complex or technical the work being done, the more necessary is the refined merit plan.

Choice of Merit Factors

The exact choice and weighting of factors (qualifications) for judging individual merit depend on whether the company's situation and type of operation call for a simple or refined merit-rating plan, and on what types of employees are to be rated. The five standard basic factors, which can be combined or subdivided according to the special requirements, are:

1. Job performance.
2. Industry and dependability.
3. Disposition and attitude.
4. Judgment and resourcefulness.
5. Ability to learn (aptitude).

Job Performance

The thoroughness, speed, and accuracy of the employee in doing his job comprise the most important factor in any merit system. The efficient worker who does not waste materials or time by making mistakes is naturally valuable to the company. The easiest way to measure over-all efficiency of most factory workers would be to keep a record of work produced. This method, however, has the basic weakness of any piece-work system: it looks like the whole picture but it is not. A speed demon on the road, if he is not a good driver, is a menace to the public; a speed demon in the shop, if he is not otherwise a good worker, is equally dangerous to the company's profits. It is very impor-

OFFICE EMPLOYEE'S MERIT-RATING CARD

To be filled out by employee's immediate supervisor. Ratings to be determined from standard merit-rating chart. (If you do not have a copy of the chart, call Main Plant Ext. 6399.)

Name Lavendolsky (Last) Myrtle S. (First) Soc. Sec. No. 531-20-7829

Date	1/5/45	4/2/45	7/6/45									
Department No.	211	211	211									
Payroll No.	1824	1824	1824									
Job code No.	1130	1130	1139									
Pay rate	135.00	135.00	150.00									
Job performance	20	124	20									
Knowledge of work	100	120	125									
Initiative and judgment	40	140	40									
Supervision required	25	110	70									
Industry and dependability	85	85	85									
Ability to learn	50	70	80									
Disposition and attitude	55	55	70									
Personal qualities	50	50	50									
Accuracy	15	32	45									
Contacts with others	15	25	40									
Total	46.5	81.1	62.5									
Graded by	DBS	DBS	DBS									
Approved by	LC	LC	LC									

(Over)

THIS SIDE MAY BE USED FOR SPECIAL NOTES ON EMPLOYEE'S QUALIFICATIONS

4/2/45 Strongly recommend this girl be promoted to rate 9. She is an excellent worker. D.B.J.

FIG. 64.

tant, in judging the job-performance factor, to balance speed against thoroughness, accuracy, adherence to the required standards of workmanship and procedure, and general efficiency.

In many jobs there is no way of measuring quality by direct inspection. Here it may be necessary to judge by the employee's work habits, such as skill and precision in handling tools or materials and sureness in taking measurements.

In a refined plan, *knowledge of work* will be a separate factor from job performance. It is measured by the degree to which the employee is familiar with all parts of the job, his ability to use the necessary tools, his familiarity with procedures and standard requirements, his efficiency in dealing with unusual cases that are nevertheless covered by standard practice, and his ability to increase production temporarily, in an emergency, without loss of quality.

Accuracy, though definitely a part of job performance, has a special importance in many types of clerical and technical work and for this reason deserves a place as a separate factor in an office workers' merit-rating plan. Accuracy is measured by watching the employee's degree of conformance to established standards, memory for detailed instructions, ability to concentrate steadily on detailed work, and ability to detect omissions.

Industry and Dependability

An employee's job performance is the measure of how *well* he works. The industry and dependability factor measures how *much* he works. Does he work steadily while on the job? Is his attendance record good? Does he stretch out his rest periods and lunch hour? Next to actual performance on the job, this is the most important factor. It would be still more important except for the fact that really lazy and unreliable people do not ordinarily stay with a company long enough to require merit ratings.

Disposition and Attitude

This factor is necessary because every company must have teamwork to get results. A cooperative and enthusiastic employee, who helps those around him, will often be of more value to the company than a more efficient worker who is in everyone's hair. Perhaps the best indication of the worker's attitude, and certainly the most obvious to the supervisor, is the person's attitude towards supervision. Does he accept orders cheerfully and understandingly, or does he resent them as though supervision were a personal affront? Other indications of good attitude are willingness to help clear up trouble that might slow down the job, helping out fellow workers as necessary, popularity with other workers, and interest in the company's programs and policies. A common symptom of poor attitude is continual complaining about other people—someone else should do more of the work or so-and-so should not have been promoted.

Personal qualities and *ability to make contacts* with others are closely related to disposition and attitude. They are often considered to be of small importance in factory work and therefore are omitted from the factory merit plan as separate factors. Around the office, however, there is no question but that the employee must have tact and acceptable personal traits to get along.

Personal traits include appearance and habits. They also include such characteristics as modesty or conceit, confidence or instability, generosity or selfishness, intellectual honesty or insincerity, breadth of vision or fussiness, interest in people or egoism. These characteristics are, in general, those that distinguish employees who can advance to supervisory positions from those who cannot. Educational background and practical experience in various outside lines of work might be considered under this factor, since they indicate adaptability, which may be valuable to the company.

Smoothness of the company's operations depends on having, in the right positions, people who are good at making intracompany contacts. The company's success in the business field depends on having good people for outside contacts. Many such men and women are to be found in the ranks of ordinary workers, and it is important to find them. A person with other personal qualities that make him valuable to the company may or may not be good at making contacts. In fact, there is only one way to judge this particular ability when it is rated as a separate factor, and that is by results. Does the employee get other people to do gladly what he wants them to do? If so, he is a good contact man.

Judgment and Resourcefulness

Initiative, judgment, and resourcefulness are such closely interrelated qualities that it is suggested they should always be treated together as one factor. The degree to which an employee has these characteristics is indicated in many ways. A worker should be rated high in the factor if he can handle a job without instructions, if he can analyze an assignment and carry it through to completion with due consideration for all related factors, if he frequently suggests ways of improving his own job and uses the company's suggestion system (when there is one), and if he is able to foresee future situations and to meet them effectively when they occur.

Supervision received is an additional factor, closely related to judgment and resourcefulness, often used for office and technical jobs where it may be especially important that the employee be able to work independently.

Ability to Learn

This factor is used to credit the employee for adaptability, general intelligence, breadth of understanding, and ability to learn to do new kinds of work. Does he know why he is doing his job the way he does, and what its relation is to other jobs and to the company's policies and over-all operations? Does he sense which are the important aspects of his job? Is he quickly picking up the knowledge needed on his job? Does he have the right aptitudes and the right kind of muscular dexterity for the general type of work he is in? Is he alert to what is going on around him? This factor must not be confused with "job knowledge." Job knowledge is a measure of what has already been achieved, regardless of how long it took to achieve it. Ability to learn, though it must be judged from past performance, is a measure of potential future value. One worker may have taken three years to learn his job, and another may have learned the same job equally well in three months. Their job knowledge is equal, but the second worker obviously has greater ability to learn. This ability makes him more valuable to the company because his record indicates that he will be quick at learning any other job he is assigned to.

Merit Factors Not Included in Recommended Plan

The authors have made thorough investigations of a great many existing merit systems, and the factors noted up to this point have been tested by widespread successful use. There are many other factors, however, that may affect the employees' value to the company under certain circumstances. Some of these factors are discussed in the following paragraphs, with the reasons why they are not included in the suggested standard plan. The reasons against them may not be valid for a particular company; every company operates under its own set of conditions and should, of course, build its plan to fit them.

Ability to Do Other Jobs

Quite a few companies consider this factor important enough to include in their merit-rating systems. It is not included in the plans given here for several reasons. If a man can do another job better than the one he is doing, and if the other job is useful to the company, he should be working at the other job. On the other hand, if he cannot do the other job as well as his present one, or if the other job is not useful to the company, it is hard to see why he should get special credit for it. There is no particular virtue in an employee's being a jack-of-all-trades and master of none. If he has the genuine adaptability, breadth of vision, general capability, and quickness of understanding to be a master of several trades, he will get credit for these qualities on the job he has, through the "judgment and resourcefulness" and "ability to learn" factors.

Seniority as a Merit Factor

The question of seniority is frequently brought into merit-rating discussions. Objections to merit rating are raised on the ground that seniority is not considered. Actually, length of

Merit-Rating Instructions to Supervisors

Like job evaluation itself, the merit-rating system will be good only if the supervisors make it so. A good plan will help a supervisor to rate his people fairly, but only if he studies the plan and tries hard to make it work. If the supervisors already understand and believe in job-evaluation principles, they will be able to take merit rating in their stride. On the other hand, if merit rating is to be established *before* job evaluation, there must be a vigorous selling campaign like that suggested in the first part of Chapter 10. The instructions printed on the plans are included merely as reminders of points that the supervisors should already know. Every supervisor should have the advantage of attending several meetings for discussion of the program before he is expected to do any actual rating of employees. At these meetings the following points should be stressed:

1. Any good supervisor already knows which of his employees he considers decidedly above or below average. The purpose of the plan is to make finer distinctions possible and to get them on record.

2. Appraisal of human characteristics is at best an approximation. Supervisors must use every aid in making their judgments sound, or the ratings will not be even approximately correct.

3. Difficult though it is to deal objectively with one's daily coworkers, genuine impartiality will in the end produce not only a better merit-rating program but also greater respect for and appreciation of the supervisor himself.

4. In the interest of standardization, all ratings must be checked by higher supervisors before they become final.

5. Any employee who so requests must be shown his grade card, and every employee who has a below-average rating in any factor must be notified. The authors have seen much unnecessary labor turnover because employees were not immediately advised of low ratings. If he is not informed of his weaknesses, the worker has little chance of correcting them, and later he will be bitterly disappointed, perhaps quit the company, when his low rating prevents a pay raise or promotion.

6. Any employee who is promoted to a higher-ranking job must be told that he will probably get lower merit ratings than

he did in his old job. Employees in each labor grade are rated in comparison to one another, and a worker new to the job cannot expect to equal those who have held it for some time.

7. The natural tendency is to grade too high. This tendency must be checked or everyone will have high ratings and the system will be meaningless. It is particularly important not to rate a worker excellent just because he is the best in the group. The "excellent" column must be saved for those who actually do excel. Any employee who honestly rates "excellent" in every factor should be made at least a vice-president of the company.

8. It is easy to be overimpressed by a strong personality. The supervisor must be on his guard not to give special consideration to a person who is unusually kind, energetic, persuasive, or glamorous. If the employee's personality is valuable to the company its value will be accounted for by the factor ratings as they stand.

9. When a large group of workers in the same labor grade are to be rated, it will save time to write each name on a small card, then arrange the names in order of merit for the first factor (job performance). Next the degree definitions on the chart should be studied and the name cards divided into five groups, for excellent, above average, etc. It will then be easy to assign point values to the workers in each rating and write the points onto the merit-rating card (Fig. 64). After the name cards are shuffled, the next factor can be rated, and so on.

10. A new employee should never be rated separately, but only by comparing his qualifications in each factor to those of everyone in the group.

Merit-Rating Statistics

Figure 65 is a typical record of the average merit ratings given by each supervisor in a department with about 500 workers. Records like this should be kept for proper control of the program. In the example shown, the average ratings for the department varied less than 4 per cent during the period recorded. This was a good record and indicated that, in general, the program was being well handled. It was observed, however, that some supervisors rated their people unusually high, others un-

SUPERVISORS' MERIT-RATING GRADE AVERAGE

Supervisor	November	December	January	February	March	April
Adams, Wm. J.	66	65	65	73	68	71
Agnew, John M.	64	64	64	64	59	63
Barrett, Andrews L.	74	81	75	76	74	75
Bennett, Wm. M.	62	64	65	64	70	74
Bostinian, Aram	71	71	72	75	78	77
Burnham, Marjorie	87	89	90			
Cartwright, Edgar	76	72	73	70	69	67
Catlett, Marshal J.	77	79	80	80	73	75
Collins, A. B.	66	64	67	70	71	74
Comstock, Henry M.	55	50	62			
Dabney, George A.	72	75	72	72	67	65
Darling, John H.	70	73	71			
Davis, Sherman	71	70	71	69	70	71
Deming, Robert	69	69	61	59	57	58
Dilling, L. M.	73	74	69		67	66
Eberling, Paul T.	*58*	*55*	*63*	*64*	*64*	*64*
Ekdahl, Harold S.	90	91	89	91	88	84
Ellinger, P. W.	65	63	64	70	67	68
Emmett, Howard	64	65	66	64	61	66
Enthoven, Kathryn	61	61	58	63	61	62
Farnsworth, Thomas L.	67	65	69	74	70	71
Featherstone, Cyril	*90*	*90*	*87*	*77*	*75*	*75*
Foster, J. K.	89	89	89	88	83	81
French, Alan A.	61	60	59	62	71	72
Gaspard, Emile	74	70	73	70	67	73
Gray, Frank T.	61	62	63			72
Harper, Thomas K.	73	78	75	76	71	71
Hinman, H. T.	73	75	77	78	81	82
Huston, David S.	66	67	66	73	73	72
Johnson, Willard L.	*79*	*81*	*85*	*85*	*85*	*87*
Johnston, Marvin	62	65	64	62	62	63
Kimball, John T.	52	63		67	57	64
Lamping, Henry S.	69	69	70	72	71	70
Lindholm, Christopher	76	77	77	78		82
Lundberg, Martin	65	67	66	78	66	66
Martin, Ethel M.	58	59	58	59	65	69
Mason, Edwin K.	*49*	*57*	*55*	*64*	*67*	*66*
Nasby, George E.	71	68	70	66	63	63
Orton, Roger F.	66	68	66	69	72	71
Phillips, Oscar	62	61	61	61	61	59
Randall, Douglas J.	66	67	72	67	66	69
Ristine, William M.	73	67	68	69	70	70
Sampson, H. L.	62	62	59	69	65	66
Sisley, Arthur T.	66	66	68			
Tasco, Joe		58	59	61	58	59
Thompson, George K.	73	79	81	77	76	75
Vitulli, R. P.	68	67	69	67	79	73
Westberg, Elmer B.	77	81	84	83	82	82
Young, David T.	71	73	72	66	83	83
Zech, Eric	65	65	71			
Department average	69	69	68	72	69	70

FIG. 65. Merit-rating record.

usually low, and the job-evaluation department was asked to investigate these cases, four of which are italicized in Fig. 65. The investigators found that the variations were mostly justified. Mr. Johnson, for example, was in charge of a bookkeeping group that had been together for a long time. The routine nature of the work prevented any large number of promotions, but the workers were doing an excellent job and fully deserved the merit pay that went with their high ratings. Mr. Eberling's group had a low average grade because it was a training unit and the workers were transferred out to regular jobs as soon as they became proficient. A few supervisors were found to be "off the beam." For example, Mr. Mason, whose workers complained vigorously after their first rating, did not understand about comparing the employees' work only to that of others in the same labor grade. In his engineering group he was rating beginners as poor engineers when they were actually doing all right in the low labor grade to which they were assigned. An explanation corrected this mistake. Mr. Featherstone was a more difficult problem. He gave unjustifiably high grades just to make the boys happy, and was slowed down in the end only by hints of serious disciplinary action. It is obvious that only a current tabulated record, like that shown in Fig. 65, will permit the detection of such inconsistencies in time to nip them in the bud.

CHAPTER 14 JOB EVALUATION TRENDS AND EXPECTATIONS

IN the preceding chapters the method of obtaining our formula has been described, but, up to this point, the broader objectives and the philosophy which underlie all phases of job evaluation have been mentioned only incidentally. The importance of understanding them should, however, have become clear to the reader by now.

Failure to grasp the basic principles involved has sometimes led to controversies in which either labor or management or both have balked at the installation of job-evaluation programs. Also, the comparative unfamiliarity of executives and labor leaders with the technicalities of the subject, or overoptimistic appraisal of its real significance, have sometimes led to programs of a magnitude and complexity altogether out of proportion to the need and actual possibilities.

Both labor and management circles have tended to accept job evaluation as a scientific formula that will give positive answers and solve most, if not all, money-wage-rate questions. Job evaluation is not such a formula. The assumption that it is has led to grief and will lead to more grief if not recognized and corrected.

We contend that sound job-evaluation procedure must be based upon the specific requirements of the organization to which it is to be applied. Further, we wish to emphasize that the employee is the prime consideration in the eventual solution to the problem. The procedures, therefore, must provide an incentive that will constructively energize individual accomplishments.

It should also be apparent that job-evaluation techniques are not scientific in the true sense of the term but are systematic only. When this systematic procedure is applied through the pooled judgment of a number of trained individuals the results approach, as nearly as possible, those that will be obtained by the scientific procedures of the future.

In the past, work classifications were generally patterned to the crafts, where the job required an over-all knowledge of the functions performed within the individual company. Work assignments were generally resolved to apprentice, helper, journeyman, and lead man. Today it is different. A major portion of the skill formerly required has been taken from the human hand and transferred to the machine. Mass-production methods and the division of labor require a specialization that does not permit the old system of job classification. The specializing of jobs has brought about problems of individual attitudes that were not encountered when all employees were required to perform any assigned task. Now it is required that each work assignment be justly weighed and balanced in relation to all other assignments within a company; and before the demands of collective bargaining can be met an entire community may have to be surveyed. To handle justly the problems that are brought about by the grouping of a large number of people in a cooperative enterprise, an analytical approach is required. Any analysis consists of breaking down a problem into its elements and then weighing these elements individually. In this way, and in this way only, can we determine the relationship among the parts and between any part and the whole. This is what job evaluation does for a company's job structure.

As to wages, job evaluation provides a wage relationship rather than an absolute value. It indicates whether a job is higher or lower, within a predetermined scale, than other jobs weighed on the same relative basis. The actual money differences between the different jobs are, however, established elsewhere.

All job-defining factors and their relationships are selected, defined, estimated, and weighed very largely on the basis of judgment. Experience, knowledge, care, method, and standardization can give effective guidance and assistance, but the element of judgment still remains predominant. There is not only a factual problem of work and work assignments to be considered, but also an emotional factor. This factor is ever present in dealing with human beings. It must be recognized that human emotion is more permanent and unchangeable than any economic system under which work may be performed. If we consider and accept this to be true, then it becomes apparent that the philosophy of job evaluation must recognize both the economic and emotional aspects of the problem. The procedure can then be such as to keep errors of human judgment within acceptable limits.

No mathematical formula yet devised gives positive, unquestionable job values, unless we accept existing key-job levels as being correct from the start. As has been seen, the formula itself is not as important as the procedure followed in its application. Almost any formula, if it includes the four basic defining factors —skill, responsibility, effort, and job conditions—is adequate if properly handled. But the procedures and policies followed in applying the factors are frequently erroneous, mishandled, or unduly complex. Those who assume or pretend that a certain formula or set of rules will do the work cannot be fully aware of the realities and even less of the potentialities. Just as different companies get entirely different operating results under the same wage-incentive plan according to the policies followed and the men employed, so will the policies and individuals in the installation and maintenance of a job-evaluation formula make or break the entire program. Only through the application of a sound and reasonable philosophy, approved by both management and labor, may one hope to obtain maximum accuracy and maximum satisfaction to both workers and management.

The question always arises, "Why should we have job evaluation?" It has been proved, time and again, that the primary cause of dissatisfaction about wages arises from differential pay rather than "take-home" amounts. For example, it has been seen after the installation of a plan of job evaluation that all employees were completely satisfied until they found out what some of their fellow workers were receiving. Then, even though the higher-paid workers were performing a more responsible type of work, some of the employees immediately became more dissatisfied than if no raise in wage rates had been granted. However, if the job evaluation has been properly studied and installed, these differential wages are explainable to the satisfaction of normally intelligent employees. Of course, there will always be some bitterness, but it will be minimized if the employees are made to realize that management intends to make the axiom, "equal pay for equal work," a genuine objective.

Because of the importance of job evaluation to the workers, the program should be administered by men with broad experience and training if the established procedures are to produce the proper results. The personnel department may recommend general industrial-relations policies for coordinating the job-evaluation program with existing methods and organization, but it cannot be expected to cope with the specialized, detailed work of setting up the program and putting it into action. These functions belong to the job-evaluation committee and department. The committee (on both management's and labor's sides) should include those who are most intimate with the jobs and have lived with them, so to speak, under all possible conditions. The definition of occupational requirements and evaluation factors and their relationship should be left to these trained industrial engineers and practical operating men whose word, so far as the job characteristics and requirements are concerned, is above question. Persons having little or no knowledge of job requirements, even though thoroughly familiar with a job-evaluation formula, cannot readily appreciate all the qualifications and implications of a job through their own limited study and observation.

It must not be assumed, however, that the industrial engineers or the committee can by themselves make a program of job evaluation succeed, even if the preinstallation work has been conscientiously and faithfully accomplished. The success of the program is derived from the *supervisors'* actual placement of individuals in the jobs that have been developed, defined, and evaluated. The results of any industrial project rest largely on the cooperation received and the control developed; and only through an enlightened and intelligent supervision can the type of cooperation needed to develop the essential control be obtained.

Each supervisor, no doubt, has a general idea of the duties and qualifications required for each job in his unit. It is logical to suppose that he also realizes the importance of proper placement and has attempted to place qualified individuals. However, without job evaluation the information by which he places his workers may lack definiteness and clarity. Under any circumstances it is difficult for a supervisor to be purely objective when he realizes that he is competing with other units for production. It is extremely difficult for him to realize that what is intricate in one unit may be relatively simple in others. Regardless of these difficulties, it is still up to the supervisor to select employees to fill jobs and to determine whether they are performing the jobs in a satisfactory manner. Most discussion with supervisors concerning job-evaluation procedure reverts to the assignment of individuals rather than to the correctness of the evaluation formula. So we must be practical and realize that no system for devising correct job relationships is of any value unless the supervisors and other employees are convinced of the fairness of these relationships.

A great many factors beyond those included in the job write-ups enter into a sound and defensible assignment of individuals to job classifications. Among these factors are trade and shop customs, differences of opinion between various department heads as to the values of the same or similar work, personal problems of the employees, supervisors' plans for subsequent advanced work assignments, and minor differences in working conditions between shops. If the supervisor realizes that a well-balanced and intelligent use of job evaluation, as it applies to wages, overcomes employee discontent, he will readily understand the importance of the assignment function and will therefore be inclined to make intelligent assignments. On the other hand, thoughtless and inaccurate individual job assignments, even in small plants, may cause unjustified changes in rates of pay throughout a community.

Job evaluation follows the principles of scientific management. The scientific method of approaching a business problem is based on a systematic way of thinking. It is not necessary that we have laboratory-devised and control-tested formulas in order to establish such a system. But it is necessary to establish a uniform, inflexible framework for thinking about jobs, so that the plan administrators and the supervisors will use the same factor values. Within this inflexible framework, however, a good plan provides for that flexibility of approach and exercise of individual judgment that are inherent in all human-relations problems.

The authors have observed that there is a general tendency among supervisors to make snap judgments, or special adjustments, to meet temporary conditions. Hard and fast policy is needed to meet this type of leniency. Other causes for indefensible individual work assignments are: (1) failure to analyze carefully the actual qualifications of the employee to do the job; (2) the tendency to take advantage of any loophole in the system which may make possible an unwarranted pay-rate increase; (3) poor decisions made as a result of special pressure; (4) confusion brought about by unusual circumstances, such as rapidly changing organization, depleted man power, high labor turnover, or sudden cutbacks of production; (5) complications brought about by the conflict between the job-evaluation merit principle and the principle of seniority agreements.

The last two causes of improper individual assignments are inevitable, but their harmful effects can be largely overcome if management will provide a clear, written policy for settling questions such as when seniority will be waived in favor of merit in deciding on layoffs, promotions, etc. If there is a specific answer in writing, the supervisors will be able to act intelligently. Indefinite, unrecorded, or ambiguous policy presents obvious opportunity for differing interpretations that lead inevitably to chaos through lack of cooperation and unnecessary friction. The development of policy on this subject demands foresight as to the specific situation and cannot be generalized. Each company must act according to its own requirements and limitations.

It has been brought out before that the supervisor's place in job evaluation is of the utmost importance. Further, it has been implied that one of the primary difficulties in arriving at and maintaining an equitable job-evaluation program is the fact that supervisors may not be fully familiar with the limitations, flexibilities, and possibilities of the system. The supervisor must be a full partner if the program is to operate successfully. All this indicates that a supervisory training program should be carried on before the installation of the plan. If we are to proceed on the premise that supervision will be required to assume a large share of the burden in this regard, then it is reasonable to assume that supervision must be made to feel the import of the program and understand its magnitude. As a matter of fact, it is very difficult to make supervisors realize the far-reaching effects of their failure to operate within the framework of the plan. It is generally felt by the supervisors themselves that the remedy for this problem is education for supervisors.

There is a general tendency on the part of supervisors to compare the jobs in their units with the jobs in other units; then to vie with one another to see who can get the most pay for his employees. If this happens, distorted pay relationships will soon evolve, with such disproportionate values that the chances of the ultimate success of the whole program are endangered. On the other hand, if supervisors are taught the true principles of job evaluation, its benefits and pitfalls, the program will become a successful venture. Adequate wage and salary administration will result, and the productivity of the individual supervisor's unit will be increased.

The system recommended in this book provides a yardstick that can be readily interpreted. Too often, in the attempt to provide tools of measurement (and job evaluation is essentially nothing but a tool for measurement), impractically close tolerances are specified. Our system uses, we believe, a practical discrimination in the breakdown of the defining factors. Only those "degrees" have been selected that can be estimated by observation or by consultation with supervisors. Our philosophy of job rating is based on the simple premise that any intangible that can be evaluated without a system can be evaluated much more accurately when a system is employed.

The principle underlying the rating of jobs by breaking them down into evaluation factors, rather than by merely comparing one job as a whole with another, is that if judgment is focused on each factor in turn, a more thorough analysis results than if all factors are considered simultaneously. The possibility of overlooking or duplicating factors is thus reduced.

Any system for evaluating industrial work requires the collecting of essential information concerning a large number of jobs or activities and relating this information by comparative analysis. It is of interest to note and recognize that all methods of job evaluation, whether point system or ranking system, have one principle in common, namely, relative appraisal. The formula described in this book is a point system of relative appraisal. It is the authors' belief that the point system is more definite than other job-evaluation methods in that its weighting of job elements is based upon a definite scale of values and therefore results in a more nearly scientific formula. The definite point values provide management with a plausible and readily understood method of presenting the basic principles of wage and salary administration to the employees. The question always arises whether it is better, when determining the worth of job elements, to use monetary values or points. Points, obviously, are more universal and more permanent than money values. When jobs are rated in terms of monetary units, all rates will have to be changed whenever there is a wage-level change or a fluctuation in the value of the dollar. Also, the emotional aspect of the situation is obviously such that greater accuracy will be obtained if the money factor is kept in the background. It is much easier to make unbiased judgments about abstract points than about dollars. Many wage relationships can be expressed properly only in terms of something more universal and more interpretable than money. However, to understand the principles of point evaluation and to apply them to a company's wage and salary policy, one should realize that point ratings must be equitable and anchored to the existing rate structure, because ultimately they will affect wage payments. When a selection of related point values is assigned to a set of defined job factors and when some interpretive or defining degree has been established, those responsible for the administration of job evaluation are able to determine not only the relative value of the factor, but also to exactly what extent it applies to the job.

Job evaluation has enjoyed considerable success, especially when it has been applied to large industrial units. In these large concerns the many jobs and many variations of the same job have made the projects into huge and complex enterprises. When one considers the hundreds and even thousands of different occupations, the complexities of comparing and correlating the individual job descriptions and analyses, and the innumerable variations and conditions requiring clarification, it is easy to realize the immensity of the problem. The task is further complicated by the fact that jobs of the same title may be and often are quite different.

Job evaluation has long been under close observation, but we may be sure that it will be submitted to the most critical examination of its entire history in the near future, when it will be used for something else than the upward wage revisions that have been occurring for several years. How are we going to handle, to the satisfaction of labor, the coming technological changes which will eliminate a substantial proportion of the skill requirements for many jobs? How shall we materially improve working conditions? Or how shall we perhaps reduce the requirements of some of the other factors? There is only one answer. The job-evaluation system must be sufficiently adaptable to new conditions so that it will continue to provide a control which is economical and which at the same time can be proved equitable to the workers. Those who apply this control must consider the new work requirements from every angle, especially their relationship to the specific organization, and must make logical adjustments to meet the changed conditions, for any system that under any circumstances results in wages either too high or too low for economical production is wasteful, and any system of job evaluation that fails to provide a workable control over wages is more confusing than no system whatsoever.

It has been the intent of this book to provide a factual method to aid the interpreting of job classifications and to present a means for systematized but flexible pay-rate control. The formula and procedures for practical installation have been developed from facts and have been tested by continuous use for more than four years, under rapidly changing conditions. Since this type of system has proved that it can meet successfully the challenge of every change, we believe that it will continue to do so in meeting whatever new problems the future may hold.

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