PACIFIC GAS AND ELECTRIC COMPANY

PG&E

245 MARKET STREET • SAN FRANCISCO, CALIFORNIA 94106 • (415) 781-4211 • TWX 910-372-6587

February 11, 1985

Local Union No. 1245
International Brotherhood of
Electrical Workers, AFL-CIO
P.O. Box 4790
Walnut Creek, California 94596

Attention: Mr. Jack McNally, Business Manager

Gentlemen:

The Electric School's Relay and Vector course was divided into three separate and different courses in 1977 in order to meet the specific training needs of the Apprentice Control Technician, Electrician and Meterman classifications.

The courses meet the training requirement for the specific apprenticeships however, they are different enough from one another that any one of the courses does not meet the needs of the others. Therefore, Company proposes to amend the academic requirements of the Training Guidelines for the Apprentice Control Technician, Electrician and Meterman classifications by changing the course title from Relay and Vector to Substation Maintenance, Generation Maintenance and Metering Vectors.

The above courses would apply as follows:

- Substation Maintenance
  Apprentice Electrician (0481) Hydro Generation
  Apprentice Electrician (0481) Substation Maintenance
  Apprentice Electrician (0483) Materials

- Generation Maintenance
  Apprentice Electrician (0482) Steam/Nuclear Generation
  Apprentice Control Technician (2398) Steam/Nuclear Generation

- Metering Vectors
  Apprentice Meterman (1433) Transmission and Distribution

The changes in course titles will require that employees changing from one line of progression to another must complete the academic requirements for the new position. For example, an Apprentice Electrician bidding to Apprentice Meterman will be required to take Metering Vectors even though the apprentice may have completed Substation Maintenance.

Employees, other than journeyman Electricians in either Substation Maintenance or Steam Generation and Nuclear Generation, will be placed in the new apprenticeship pursuant to Apprentice Agreement 82-10, however, an employee who has met the Relay and Vector requirement for the employee's previous apprenticeship will be allowed to enter the new apprenticeship at the 18-month wage step provided all other academic requirements have been met. Such employee must be scheduled to the next available Relay and Vector course. Further wage progression will depend upon successful completion of the appropriate Relay and Vector course.

A journeyman Electrician, from one of the above Departments, who bids to the apprenticeship of any of the other will continue to be placed at the 24 month wage step consistent with the Job Definitions. However, the employee will be required to take and pass the appropriate Relay and Vector course for such apprenticeship.

Attached are copies of the Training Guidelines amended as proposed.

If you are in accord with the foregoing and its attachment and agree thereto, please so indicate in the space provided below and return one executed copy of this letter to Company.

Yours very truly,

PACIFIC GAS AND ELECTRIC COMPANY

By _____
Manager of Industrial Relations

The Union is in accord with the foregoing and its attachment and agrees thereto as of the date hereof.

LOCAL UNION NO. 1245, INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS, AFL-CIO

Feb 20, 1985

By _____
Business Manager

GUIDELINES FOR THE

APPRENTICE ELECTRICIAN TRAINING PROGRAM

MATERIAL CONTROL SHOPS

EMERYVILLE

I. Objective of the Apprentice Electrician Training Program

The need for trained and fully qualified employees to accomplish the duties specified in the journeyman electrician definition in a manner consistent with Company's Standards of Safety and Performance has resulted in this program which coordinates extensive on-the-job and related academic training. The systematic acquisition of knowledge and skill offers the employee in training the vehicle to attain self-confidence, assuredness and satisfaction in his work, and the correct and safe method of performing Company's work.

II. Training

During the 36 months of the apprenticeship, the apprentice will be offered job training divided into six time periods which coincide with the wage steps of the classification. In order that uniform and safe practices will be followed in the training period, assignment of duties and work procedures shall be provided in each of the wage steps as outlined in these guidelines and the attached Schedule. The amounts of time or units of work as indicated in the Schedule are believed sufficient to permit the apprentice to develop proficiency in such duty or work procedures, but should not be considered as inflexible dependent on the demonstrated ability of each individual apprentice.

The attached Schedule also specifies those training periods in which the apprentice shall receive related academic or class training.

On-the-job training in the duties, and amount of such training, as specified in the Schedule shall apply to the extent that such duties are performed by journeymen in the shop where the apprentice is assigned. In the event such duty is not performed by journeymen in the shop during the assigned period and therefore not available in the training of an apprentice, it shall be noted in his work record. However, his progression through the apprenticeship or to journeyman or to higher classifications shall not be deterred for this reason.

If in the course of his apprenticeship or as a journeyman such duty later becomes available, he shall receive on-the-job training as may be required to attain expected journeyman proficiency. If, after a reasonable opportunity, he fails to attain such proficiency, his bids for progression to higher classifications may be subject to the provisions of Section 205.11 of the Agreement.

A. General Guidelines

1. It is intended that assignment of the specified hours of training on the job for each period of the apprenticeship will be made to the apprentice as early in the period as is practicable.

2. Hours shown on the Schedule exclude any travel time needed to reach the place where training is to be given; however, such hours include time needed to prepare tools and equipment.

3. Except where otherwise specified, apprentices shall be trained by assignment to work with qualified journeymen.

4. Progressive work experience in all phases of electrician work will be provided throughout the first five periods of the apprenticeship in accordance with the attached Schedule.

5. Assignments during the last or sixth period will be made for the purpose of rounding out the apprentice's experience.

6. Upon entering each new wage step and period of training, the work assignments in the period shall be such that the apprentice will gain the basic knowledge and confidence in himself, the equipment and the procedure being used. More complex assignments shall be made progressively as the apprentice gains in knowledge and capability.

7. Assignments of duties and work procedures in any period of training shall be confined to those specified for the period or of a prior period.

8. During the first year, an apprentice shall not be assigned to work on any circuit energized in excess of 750 volts.

9. As an apprentice, he may be assigned to work without direct supervision only after he has been instructed and trained on the duties or work procedures required; has performed such work under direct supervision; and is capable of performing such work safely. Such assignments shall be for the purpose of developing and demonstrating proficiency and shall not be made merely to avoid use of a journeyman.

10. Except in emergency circumstances, an apprentice shall not be temporarily assigned to the classification of Subforeman. If assigned to such classification, the apprentice shall not be given the responsibility for duties or work assignments beyond his current step of training.

B. Notices

1. An apprentice who is scheduled to attend any of the centralized training programs shall be given notice of such assignment as early as possible by Material Control Shop supervision.

2. At their request, Union's representatives or their designates will be informed by Material Control representatives of Company's intentions in scheduling individuals to attend centralized training sessions.

3. When the roster is available, Company shall notify the Union's Apprenticeship Committee of the apprentices attending a centralized training school.

4. When an apprentice attending a centralized training school is not maintaining an acceptable level of work, notice shall be given to the Union's Apprenticeship Committee. Such notice shall also be given in the event he fails the school or if he is dropped from the school by Company.

5. If an apprentice does not maintain an acceptable on-the-job work level, notice shall be given to Union's Business Representative or his designate.

C. Guidelines for Training Periods

1. 0 to 6-month step:

During this period the apprentice shall learn the operation and use of shop equipment. He shall gain the general knowledge of crew work by participation in the servicing and/or rebuilding of transformers. He shall become familiar with standard practices which pertain to the shop and regulations applicable to the work that he performs as indicated on attached Schedule.

As early as possible in this training period, he shall be assigned to the Basic Electricity Course (Emeryville) for the training in electricity and transformers and the three-month plant administered course on Operating Procedures.

(a) An agreed-upon test will be given at the completion of the course and should an apprentice fail to receive a passing score, he shall be given notice in writing of the areas in which he was deficient.

(b) After such failure, he shall be allowed to retake the test upon his request any time after one month's time from his failure. He shall be allowed two additional retests, spaced at least one month apart.

(c) He shall complete the course and pass the agreed-upon test not later than the end of his ninth month of training, regardless of the number of retests that he has requested. His failure to meet this standard of achievement will be cause for his removal from the classification in accordance with Paragraph G 6 of the Master Apprenticeship Agreement.

(d) His progression to the second step of the apprentice classification shall be in accordance with Paragraphs G 3, 4, and 5 of the Master Apprenticeship Agreement.

2. 7 to 12-month step:

He shall continue to perform functions of the prior period as it applies to servicing voltage regulators and, in addition, learn the duties outlined for this period on the attached Schedule.

As early as possible in this training period, he shall be assigned to the Basic Electronics Course in Emeryville.

(a) Agreed-upon tests will be given at the conclusion of the school and if he failed to receive a passing score, the apprentice shall be notified in writing of the reasons for his failing.

(b) His retesting opportunities shall be in accordance with the schedule outlined in Paragraph 1 of these guidelines. In the event of failure to meet either the academic or on-the-job standards of achievement, his progression shall be in accordance with Paragraphs G 4, 5, and 6 of the Master Apprenticeship Agreement.

3. 13 to 18-month step:

He shall become familiar with the standard practices and regulations applicable to the servicing and/or rebuilding of high voltage bushings and, in addition, learn the duties outlined under the appropriate period on attached Schedule.

As early as possible in this training period, he shall be assigned to the Substation Maintenance course at Emeryville for classroom training and testing procedures on protective relay equipment.

(a) Agreed-upon tests will be given at the conclusion of the school and if he failed to receive a passing score, the apprentice shall be notified in writing of the reasons for his failing.

(b) His retesting opportunities shall be in accordance with the schedule outlined in Paragraph 1 of these guidelines. In the event of failure to meet either the academic or on-the-job standards of achievement, his progression shall be in accordance with Paragraphs G 4, 5, and 6 of the Master Apprenticeship Agreement.

4. 19 to 24-month step:

The apprentice will learn the standard procedures and practices and regulations applicable to the servicing of circuit breakers and, also, the duties outlined for this period on the attached Schedule.

5. 25 to 36-month step:

The apprentice now must learn care and use of electrical instruments and their application. The application of Test Standards he will learn as well as the Safety Practices that are rigidly observed in the Test Department. These duties are outlined under the appropriate period on attached Schedule.

D. Records

1. It shall be the responsibility of each apprentice to maintain his own records in collaboration with each Foreman or Subforeman to whom he is assigned. Upon completion, each periodic record shall be submitted to the Superintendent of Shops.

2. It shall be the responsibility of the Superintendent of Shops to keep necessary files of records on each apprentice and to ascertain that each apprentice has a reasonable opportunity of meeting the standards of achievement set forth in these guidelines.

3. Such records shall at all times be available during the apprenticeship for review by Foreman, the employee, and representatives of Union.

4. In addition to and precedent to these guidelines, the provisions of the Master Apprenticeship Agreement are applicable.

APPRENTICE ELECTRICIAN TRAINING SCHEDULE

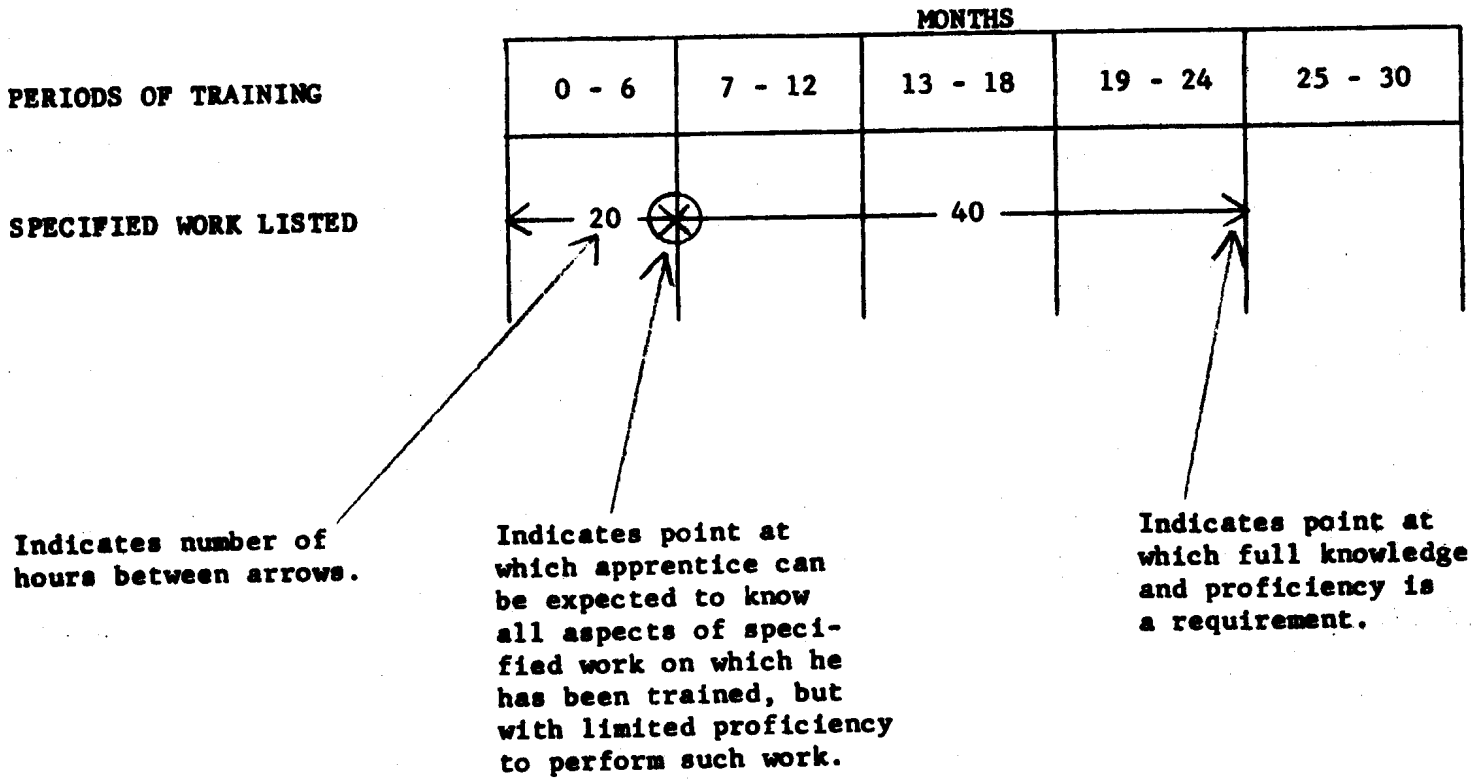
ACADEMIC ASSIGNMENT MONTH	0 - 6	7 - 12	13 - 18	19 - 24	25 - 30
BASIC ELECTRICITY	160				
SHOP OFFICE REPORTS AND RECORDS	16				
BASIC ELECTRONICS		120			
SUBSTATION MAINTENANCE			120		

ON-THE-JOB PROCEDURES AND DUTIES	0 - 6	7 - 12	13 - 18	19 - 24	25 - 30
1. SAFETY PRACTICES	10	10	10	10	10
2. MOVING AND HANDLING PRACTICES	40	40	40	40	
3. OPERATION OF SHOP EQUIPMENT	15	5	15		
4. PRELIMINARY INSPECTION AND TESTS	15	20	20	15	40
5. INTERNAL INSPECTION AND UNTANKING PROCEDURES	40	50		30	
6. SERVICING TANKS AND COVERS	40	40		40	
7. BUSHING TEAR-DOWN PROCEDURES			100		
8. GASKET MAKING AND APPLICATION TECHNIQUES	20	20	20	20	
9. SERVICING AND DRYING PROCEDURES	60	60	60	60	
10. ASSEMBLY PROCEDURES	100	100	60	60	
11. APPLY INSTRUCTION BOOK AND/OR SERVICE BULLETIN INFORMATION	15	20	20	60	40
12. BASIC INTERPRETATION AND APPLICATION OF WIRING DIAGRAM INFORMATION	20	30		50	40
13. REASSEMBLY AND ALIGHMENT OF CONTACTS		60		120	
14. CHECK CONTROL SETTINGS AND CORRECT OPERATION		40		60	
15. PREPARATION FOR FINAL TESTS	40	40	40	40	
16. FINAL PREPARATIONS FOR SHIPPING	20	20	20	30	

ON-THE-JOB PROCEDURES AND DUTIES	0 - 6	7 - 12	13 - 18	19 - 24	25 - 30
17. REPORTS, RECORDS, SKETCHES, DRAWINGS	15	15	15	15	
18. TEST SETUP PROCEDURES					100
19. ELECTRICAL INSTRUMENTS - TYPES, RATINGS, USES AND HANDLING PRECAUTIONS					20
20. INSTRUMENT TRANSFORMERS - RATINGS, USES, OPERATIONAL PRECAUTIONS					20
21. TEST STANDARDS AND THEIR APPLICATION					120
22. OPERATION OF TEST EQUIPMENT					100
23. SPECIAL TESTS AND RESULT ANALYSIS					60
24. TEST RECORDS AND REPORTS					10

The work schedule and manpower requirements may preclude the possibility of having on-the-job duties occur in the order listed for any given six month period.

GUIDE TO USE OF THE SCHEDULES



GUIDE LINES FOR THE APPRENTICE ELECTRICIAN TRAINING PROGRAM (MAINT.)

I. Objective of the Apprentice Electrician Training Program

The need for trained and fully qualified employees to accomplish the duties specified in the journeyman electrician definition in a manner consistent with Company's Standards, Safety and Performance has resulted in this program which corrdinates extensive on-the-job and related academic training. The systematic acquisition of knowledge and skill offers the employee in training the vehicle to attain self-confidence, assuredness and satisfaction in his work, and the correct and safe method of performing Company's work.

II. Training

During the 36 months of the apprenticeship, the apprentice will be offered job training divided into six time periods which coincide with the wage steps of the classification. In order that uniform and safe practices will be followed in the training period, assignment of duties and work procedures shall be provided in each of the wage steps as outlined in these guide lines and the attached Schedule. The amount of time or units of work as indicated in the Schedule are believed sufficient to permit the apprentice to develop proficiency in such duty or work procedures, but should not be considered as inflexible dependent on the demonstrated ability of each individual apprentice.

The attached Schedule also specifies those training periods in which the apprentice shall receive related academic or class training.

On-the-job training in the duties, and amount of such training, as specified in the Schedule shall apply to the extent that such duties are performed by journeymen where the apprentice is headquartered. In the event such duty is not performed by journeymen at his headquarters, and therefore not available in the training of an apprentice, it shall be noted in his work record. However, his progression through the apprenticeship or to journeyman or to higher classifications shall not be deterred for this reason.

If in the course of his apprenticeship or as a journeyman such duty later becomes available, he shall receive on-the-job training as may be required to attain expected journeyman proficiency. If, after a reasonable opportunity, he fails to attain such proficiency, his bids for progression to higher classifications may be subject to the provisions of Section 205.11 of the Agreement.

A. General Guide Lines

1. It is intended that assignment of the specified hours of training on the job for each period of the apprenticeship will be made to the apprentice as early in the period as is practicable.

GUIDE LINES FOR THE
APPRENTICE ELECTRICIAN TRAINING PROGRAM

A. General Guide Lines (Continued)

2. Hours shown on the Schedule exclude any travel time needed to reach the place where training is to be given; however, such hours include time needed to prepare tools and equipment.

3. Except where otherwise specified, apprentices shall be trained by assignment to work with qualified journeymen.

4. Progressive work experience in all phases of electricians work will be provided throughout the first five periods of the apprenticeship in accordance with the attached Schedule.

5. Assignments during the last or sixth period will be made for the purpose of rounding out the apprentice's experience.

6. Upon entering each new wage step and period of training, the work assignments in the period shall be such that the apprentice will gain the basic knowledge and confidence in himself, the equipment and the procedure being used. More complex assignments shall be made progressively as the apprentice gains in knowledge and capability.

7. Assignments of duties and work procedures in any period of training shall be confined to those specified for the period or of a prior period.

8. During the first year, an apprentice shall not be assigned to work on any circuit energized in excess of 750 volts.

9. As an apprentice, he may be assigned to work without direct supervision only after he has been instructed and trained on the duties or work procedures required; has performed such work under direct supervision; and is capable of performing such work safely.

10. Working alone as an apprentice, he may be assigned to perform certain of the duties of any of the following classifications when he has attained a wage rate equal to or greater than the wage rate of the classification that performs such duty:

Truck Driver
Heavy Truck Driver
Transformer Repairman (Elect. Maint.)
Painter (Elect. Maint.)

Those certain duties of these classifications to which he may be assigned shall be limited to those duties within his current or prior training periods for which he is qualified and which are within the

A. General Guide Lines (Continued)

duties normally performed by a journeyman in the course of his work. Further, such assignments shall include as a purpose, the development of the apprentice's proficiency and self-confidence to perform such work as a journeyman, and shall not be made to the extent that the apprentice is in jeopardy of failing to attain goals set forth in the attached Schedule.

11. Except in emergency circumstances, an apprentice shall not be temporarily assigned to the classification of Sub-Foreman. If assigned to such classification, the apprentice shall not be given the responsibility for duties or work assignments beyond his current step of training.

12. Notices

(a) An apprentice who is scheduled to attend any of the centralized training programs shall be given notice of such assignments as early as possible by Division supervision through his immediate supervisor.

(b) At their request, Union's Representatives or their designates will be informed by Division representatives of Company's intentions in scheduling individuals to attend centralized training sessions.

(c) When the roster is available, Company shall notify the Union's Apprenticeship Committee of the apprentices attending a centralized training school.

(d) When an apprentice attending a centralized training school is not maintaining an acceptable level of work, notice shall be given to the Union's Apprenticeship Committee. Such notice shall also be given in the event he fails the school or if he is dropped from the school by Company.

(e) If an apprentice does not maintain an acceptable on-the-job work level, notice shall be given to Union's Business Representative or his designate.

B. Guide Lines for Training Periods

1. 0 to 6 Months' Step

During this period the apprentice shall learn the use and care of tools and equipment in the performance of substation maintenance, substation

B. Guide Lines for Training Period (Continued)

construction and other related work which is sometimes assigned to the substation department.

He shall gain the general knowledge of substation work by participating in all work which is performed by the substation maintenance forces, and by participation in work performed by related departments when under direct supervision.

At no time during this training period shall the apprentice be exposed nor be in proximity of electrical devices, lines, buses or any other type of electrical equipment when energized in excess of 750 volts.

He shall become familiar with the various standards, general orders and regulations applicable to the work that he performs. He shall acquaint himself with substation bulletins and the safety aspects of his job.

He shall be trained in the duties of an electrician as indicated for the 0-6 months' period on the attached Schedule.

He may use aerial lift equipment when he has been properly trained and instructed in the use of such equipment. Such work will not be performed in such position that the apprentice may bring himself or the equipment into a position where he encroaches on the contact area or into the safe working distance with respect to the primary voltage.

As early as possible in this training period, he shall be assigned to the Basic Electricity Course (Emeryville) for training in electricity and transformers.

(a) An agreed-upon test will be given at the close of the school and should an apprentice fail to receive a passing score, he shall be given notice in writing of the areas which caused his failure.

(b) After such failure, he shall be allowed to retake the test upon his request any time after one month's time from his failure. He shall be allowed two additional retests, spaced at least one month apart.

(c) He shall complete the course and pass the agreed-upon test not later than the end of his ninth month of training, regardless of the number of retests that he has requested. His failure to meet this standard of achievement will be cause for his removal from the classification in accordance with Paragraph G 6 of the Master Apprenticeship Agreement.

B. Guide Lines for Training Period (Continued)

(d) His progression to the second step of the apprentice classification shall be in accordance with Paragraphs G 3 and 4 of the Master Apprenticeship Agreement.

2. 7 - 12 Months' Step

He shall continue to perform functions of the prior period and, in addition, shall learn the duties outlined in the 7 - 12 months' period on the attached Schedule.

He shall continue his work on circuits and devices energized below 750 volts. Under direct supervision of journeyman or another qualified employee he may perform routine switching operations, may bypass and drop loads.

As early as possible in this training period, he shall be assigned to the Basic Electronics Course in Emeryville.

(a) Agreed-upon tests will be given at the conclusion of the school and if he failed to receive a passing score, the apprentice shall be notified in writing of the reasons for his failing.

(b) His retesting opportunities shall be in accordance with the schedule outlined in Paragraph 1 of these guide lines. In the event of failure to meet either the academic or on-the-job standards of achievement, his progression shall be in accordance with Paragraphs G 4, 5, and 6 of the Master Apprenticeship Agreement.

3. 13 - 18 Months' Step

He shall continue to perform the duties specified for prior periods and, in addition, learn the duties outlined on the Schedule for this period of his apprenticeship.

If required by emergency or load conditions, he may work with direct supervision of journeyman or other qualified employee of higher classification on energized circuits and equipment of any voltage level not prohibited by regulation or Company directive.

When working with the journeyman he shall learn the use and proper care of rubber gloves, protective equipment, voltage detectors and any other safety device, as appropriate, for work on and in proximity to energized equipment or devices. He may perform work from an aerial lift or similar device when accompanied by journeyman or another qualified employee who shall be the operator.

B. Guide Lines for Training Period (Continued)

As early as possible in this training period, he shall be assigned to the Substation Maintenance course at Emeryville for classroom and testing procedures on protective relay equipment.

(a) Agreed-upon tests will be given at the conclusion of the school and if he failed to receive a passing score, the apprentice shall be notified in writing of the reasons for his failing.

(b) His retesting opportunities shall be in accordance with the schedule outlined in Paragraph 1 of these guide lines. In the event of failure to meet either the academic or on-the-job standards of achievement, his progression shall be in accordance with Paragraphs G 4, 5, and 6 of the Master Apprenticeship Agreement.

4. 19 - 24 Months' Step

The apprentice shall continue to work as provided in the prior periods and, in addition, will learn the duties outlined on the attached Schedule for the appropriate period. He shall gain proficiency in the use of tools and equipment and protective devices on all types of electrical work when accompanied by a journeyman.

5. 25 - 30 Months' Step

He shall continue work of the previous periods and will continue to learn substation construction and maintenance, methods on all types of electrical equipment and related devices while working with a journeyman or a sixth-step apprentice.

6. 31 - 36 Months' Step

The apprentice will be allowed to do any work normally performed by a journeyman, under the direction of a journeyman, as required by the job.

C. Records

1. It shall be the responsibility of each apprentice to maintain his own records in collaboration with each Foreman or Sub-Foreman to whom he is assigned. Upon completion, each periodic record shall be submitted to the General Foreman or District Superintendent.

C. Records (Continued)

2. It shall be the responsibility of each General Foreman or District Superintendent to keep necessary files of records on each apprentice and to ascertain that each apprentice has a reasonable opportunity of meeting the Standards of Achievement set forth in these guide lines.

3. Such records shall at all times be available during the apprenticeship for review by the Foreman or higher levels of supervision, the employee, and representatives of Union.

4. In addition to and precedent to these guide lines, the provisions of the Master Apprenticeship Agreement are applicable.

Attachment

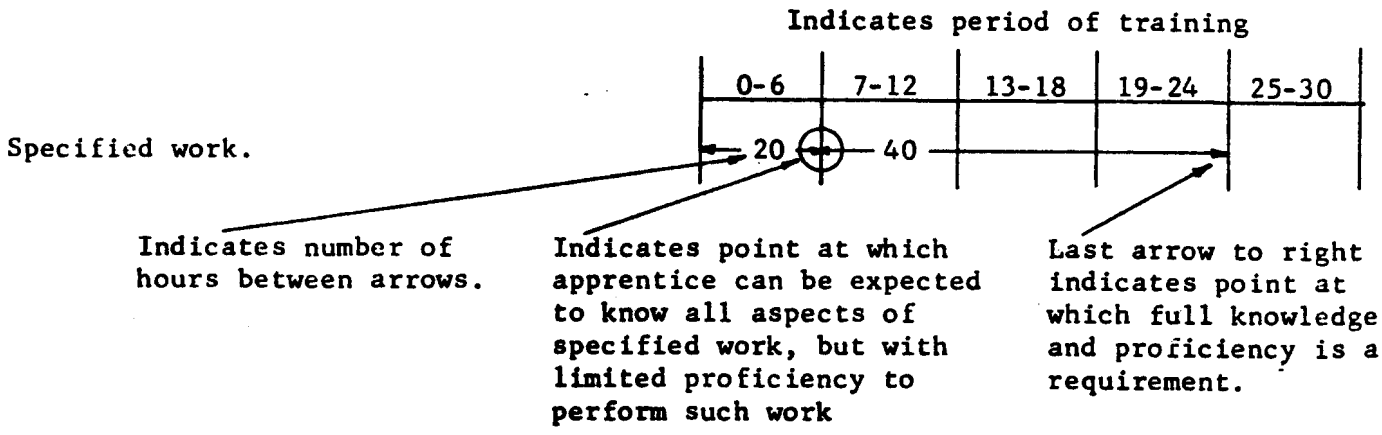
APPRENTICE ELECTRICIAN TRAINING PROGRAM

SCHEDULE

ACADEMIC ASSIGNMENTS	0-6	7-12	13-18	19-24	25-30
1. Basic Electricity Course - Emeryville	160				
2. Basic Electronics Course - Emeryville		120			
3. Substation Maintenance Course - Emeryville			120		
ON-THE-JOB ASSIGNMENTS					
1. Safety, First Aid, Resuscitation, etc.	8	8	8	8	8
2. Operating Procedures	16	16	16	24	
3. Job Orientation	8	8	12		
4. Job Methods, Procedures and Techniques	12	12		36	
5. Paper and Book Work	10	24	45		
6. Aerial Lifts	4	4	12		
7. Fire Control Systems	8	8	16		
8. Batteries, D-C Power Supplies	16	16	48		
9. Other D-C Equipment	8	8	24		
10. Meters and Metering	24	24	72		
11. Cooling Systems: Air, Liquid or Fluid	8	8		16	
12. Lubricating Systems	8	8		18	
13. Power Circuit Breakers: Oil, Air, Vacuum, etc.	54	62	62	124	
14. Transformers and Reactors	32	36	33	75	
15. Regulators and Regulating Transformers	38	46	54	72	
16. Capacitors and Controls	16	16	16	16	
17. A-C Rotating Equipment	10	18	18	32	

ON-THE-JOB ASSIGNMENTS (cont'd)	0-6	7-12	13-18	19-24	25-30
18. D-C Rotating Equipment	10	10	8	24	
19. Alarms, Annunciators, Telemetry, Supervisory, etc.	8	8	8	24	
20. Overhead Line Equipment		24		8	
21. Pneumatics, Hydraulics, and Mechanics	8	8	8	8	
22. Automatics: Transfer Schemes, Flip-Flop, Load Shedding, Reclosing, etc.	16	16	32	64	
23. Construction and Erection a. Conduit b. Pipes c. Iron Work d. Other	24	24	24	48	
24. Wiring and Cabling: Indoor and Outdoor	24	24	24	48	
25. Tools, Measuring Equipment, Test Equipment, etc.	24	24	24	50	
26. Hot Washing, Wiping	8	8	8	12	
27. Relays		48			24
28. Blueprints, Drawings, Sketches, Instruction Manuals, Standard Symbols, P. G. and E. Symbols, Drafting, etc.	24	24	24	48	
29. Air Switches: Automatic and Manual	16	16	16	24	24
30. Industrial Electronics		12		4	4
31. Communication Systems		12		12	

GUIDE TO USE OF THE SCHEDULE



Revised December 20, 1983

GUIDELINES FOR THE

APPRENTICE ELECTRICIAN TRAINING PROGRAM

(THERMAL)

I. Objective of the Apprentice Electrician Training Program

The need for trained and fully qualified employees to accomplish the duties specified in the journeyman Electrician definition in a manner consistent with Company's Standards of Construction, Safety, and Performance has resulted in this program which coordinates extensive on-the-job and related academic training. The systematic acquisition of knowledge and skill offers the employee in training the vehicle to attain self-confidence, assuredness, and satisfaction in his work, and the correct and safe method of performing Company's work.

II. Training

During the 36 months of the apprenticeship, the apprentice will be offered job training divided into six time periods which coincide with the wage steps of the classification. In order that uniform and safe practices will be followed in the training period, assignment of duties and work procedures shall be provided in each of the wage steps as outlined in these guidelines and the attached Schedule. The amounts of time or units of work as indicated in the Schedule are believed sufficient to permit the apprentice to develop proficiency in such duty or work procedures, but should not be considered as inflexible dependent on the demonstrated ability of each individual apprentice.

The attached Schedule also specifies those training periods in which the apprentice shall receive related academic or class training.

On-the-job training in the duties, and amount of such training, as specified in the Schedule shall apply to the extent that such duties are performed by journeymen where the apprentice is headquartered. In the event such duty is not performed by journeymen at his headquarters, and therefore not available in the training of an apprentice, it shall be noted in his work record. However, his progression through the apprenticeship or to journeyman or to higher classifications shall not be deterred for this reason.

If in the course of his apprenticeship or as a journeyman such duty later becomes available, he shall receive on-the-job training as may be required to attain expected journeyman proficiency. If, after a reasonable opportunity, he fails to attain such proficiency, his bids for progression to higher classifications may be subject to the provisions of Section 205.11 of the Agreement.

A. General Guidelines

1. It is intended that assignment of the specified hours of training on the job for each period of the apprenticeship will be made to the apprentice as early in the period as is practicable.

2. Hours shown on the Schedule exclude any travel time needed to reach the place where training is to be given; however, such hours include time needed to prepare tools and equipment.

3. Except where otherwise specified, apprentices shall be trained by assignment to work with qualified journeymen.

4. Progressive work experience in all phases of Electrician's work will be provided throughout the first five periods of the apprenticeship in accordance with the attached Schedule.

5. Assignments during the last or sixth period will be made for the purpose of rounding out the apprentice's experience.

6. Upon entering each new wage step and period of training, the work assignments in the period shall be such that the apprentice will gain the basic knowledge and confidence in himself, the equipment and the procedure being used. More complex assignments shall be made progressively as the apprentice gains in knowledge and capability.

7. During the first year, an apprentice shall not be assigned to work on any circuit energized in excess of 750 volts.

8. As an apprentice, he may be assigned to work without direct supervision only after he has been instructed and trained on the duties or work procedures required; has performed such work under direct supervision; and is capable of performing such work safely.

9. Except in emergency circumstances, an apprentice shall not be temporarily assigned to the classification of Subforeman. If assigned to such classification, the apprentice shall not be given the responsibility for duties or work assignments beyond his current step of training.

10. At the end of the first five-month period, and at the end of each succeeding six-month period the progress of the apprentice will be examined to determine that he meet the standards of achievement for his relative position in the program and is qualified to advance to the next succeeding step in the program.

11. Notices

(a) An apprentice who is scheduled to attend any of the centralized training programs shall be given notice of such assignment as early as possible by Division supervision through his immediate supervisor.

(b) At their request, Union's Representatives or their designates will be informed by Division Representatives of Company's intentions in scheduling individuals to attend centralized training sessions.

(c) When the roster is available, Company shall notify the Union's Apprenticeship Committee of the apprentices attending a centralized training school.

(d) When an apprentice attending a centralized training school is not maintaining an acceptable level of work, notice shall be given to the Union's Apprenticeship Committee. Such notice shall also be given in the event he fails the school of if he is dropped from the school by Company.

(e) If an apprentice does not maintain an acceptable on-the-job or academic work level at his headquarters, notice shall be given to Union's Business Representative or his designate.

B. Guidelines for Training Periods

1. 0 to 6 Months' Step

During this period the apprentice shall learn the use and care of tools, instruments, and equipment in the performance of electrical maintenance, construction, and other related work. He shall gain general knowledge of a journeyman electrician's work by participating in such work. At no time during this training period shall the apprentice be exposed nor in the proximity of electrical devices lines, buses, or any other type of electrical equipment which is energized in excess of 750 volts.

He shall become familiar with the various Clearance Procedures, Standards, General Orders, Instructions and Regulations applicable to the work that he performs.

He shall be trained in the duties of an Electrician, as indicated for the 0-6 months' period on the attached Schedule.

As early as possible in this training period, he shall be assigned to the Basic Electricity Course (Emeryville) for the training in electricity and transformers and the three-month plant administered course on Operating Procedures.

(a) An agreed-upon test will be given at the completion of the course and should an apprentice fail to receive a passing score, he shall be given notice in writing of the areas in which he was deficient.

(b) After such failure, he shall be allowed to retake the test upon his request any time after one month's time from his failure. He shall be allowed two additional retests, spaced at least one month apart.

(c) He shall complete the course and pass the agreed-upon test not later than the end of his ninth month of training, regardless of the number of retests that he has requested. His failure to meet this standard of achievement will be cause for his removal from the classification in accordance with Paragraph G 6 of the Master Apprenticeship Agreement.

(d) His progression to the second step of the apprentice classification shall be in accordance with Paragraphs G 3, 4, and 5 of the Master Apprenticeship Agreement.

Near the end of this period he shall be assigned the plant administered course on Description and Operation of Power Plant Electrical Equipment. This course is scheduled for completion in 24 months.

(a) Agreed-upon progress tests will be given at the end of eleven months of his apprenticeship and at succeeding six-month periods with a final examination at the completion of the course. If an apprentice fails to receive a passing score in any of these tests, he shall be given notice in writing of the areas in which he was deficient.

(b) Retesting, progress to the next higher wage step, or demotion shall be in accordance with Paragraphs G 3, 4, 5, and 6 of the Master Apprenticeship Agreement.

2. 7 to 12 Months' Step

He shall continue to perform functions of the prior period and, in addition, shall learn the duties outlined in the 7-12 months' period on the attached Schedule. He shall continue his work on circuits and devices engergized below 750 volts. Under direct supervision of a journeyman or another qualified employee he may perform routine switching operations, may bypass and drop loads.

As early as possible in this training period, he shall be assigned to the Basic Electronics Course in Emeryville.

(a) Agreed-upon tests will be given at the conclusion of the school and if he failed to receive a passing score, the apprentice shall be notified in writing of the reasons for his failing.

(b) His retesting opportunities shall be in accordance with the schedule outlined in Paragraph 1 of these guidelines. In the event of failure to meet either the academic or on-the-job standards of achievement, his progression shall be in accordance with Paragraphs G 4, 5, and 6 of the Master Apprenticeship Agreement.

3. 13 to 18 Months' Step

He shall continue to perform the duties specified for prior periods and, in addition, learn the duties outlined on the Schedule for this period of his apprenticeship. If required by emergency or load conditions, he may work with direct supervision of journeyman or other qualified employee of higher classification, on energized circuits and equipment of any voltage level not prohibited by regulation or Company directive. When working with the journeyman, he shall learn the use and care of rubber gloves, protective equipment, voltage detectors, and any other safety device, as appropriate for work on or in the proximity of energized equipment of devices.

4. 19 to 24 Months' Step

The Apprentice shall continue to work as provided in the prior periods and, in addition, will learn the duties outlined on the attached Schedule for the appropriate period. He shall gain proficiency in the use of tools and equipment and protective devices on all types of electrical work when accompanied by a journeyman.

As early as possible in this training period, he shall be assigned to the Generation Maintenance course at Emeryville for classroom training and testing procedures on protective relay equipment.

a. Agreed-upon tests will be given at the conclusion of the school and if he failed to receive a passing score, the Apprentice shall be notified in writing of the reasons for his failing.

b. His retesting opportunities shall be in accordance with the schedule outlined in Paragraph 1 of these guidelines. In the event of failure to meet either the academic or on-the-job standards of achievement, his progression shall be in accordance with Paragraphs G 4, 5, and 6 of the Master Apprenticeship Agreement.

5. 25 to 30 Months' Step

He shall continue work of the previous periods and will continue to learn electrical maintenance and construction methods on all types of electrical equipment and related devices while working with a journeyman or a sixth-step Apprentice.

6. 31 to 36 Months' Step

The Apprentice will be allowed to do any work normally performed by a journeyman, under the direction of the Foreman or a journeyman, as required by the job.

C. Records

1. It shall be the responsibility of each apprentice to maintain his own records in collaboration with each Foreman to whom he is assigned. Upon completion, each periodic record shall be submitted to the Power Plant Superintendent for his review.

2. It shall be the responsibility of the Foreman and Power Plant Superintendent to keep necessary files of records on each apprentice and to ascertain that each apprentice has a reasonable opportunity of meeting the Standards of Achievement set forth in these guidelines.

3. Such records shall at all times be available during the apprenticeship for review by the Foreman or higher levels of supervision, the employee, and representatives of Union.

4. In addition to and precedent to these guidelines, the provisions of the Master Apprenticeship Agreement are applicable.

STEAM ELECTRIC GENERATION DEPARTMENT
APPRENTICE ELECTRICIAN TRAINING PROGRAM
GENERAL OUTLINE OF SUBJECT MATTER FOR COMPLETE COURSE

Subject and Minimum Electrician Requirement	0-6 Month Period	7-12 Month Period	13-18 Month Period	19-24 Month Period	25-30 Month Period
I. SAFETY PROCEDURES AND PRACTICES					
1. Thoroughly know company and department clearance procedures. Be thoroughly familiar with the following material: a. P.G.& E. accident prevention rules as applied to steam plant electrical work. b. General Operating Orders.	1. Learn plant clearance procedures.	1. Learn how to test and ground plant low voltage equipment. Learn how to determine if low voltage equipment is properly cleared and safe to work on.	1. Learn how to test and ground plant high voltage equipment. Learn how to determine if high voltage equipment is properly cleared and safe to work on.		1. Learn clearance procedure for switchyard and transmission equipment. Learn how to test and ground this equipment. Learn how to determine if this equipment is properly cleared and safe to work on.
2. Know how to safely work on or near energized plant equipment.	2. Learn safety precautions to be observed near energized electrical equipment.	2. Learn working clearances for work near energized electrical equipment. Learn how to act as an observer for an electrician working on or near energized equipment.		2. Learn use, care and limitations of protective equipment for hot work. Learn procedures and precautions for hot work.	2. Obtain some experience relative to working on hot equipment.
II. FUNDAMENTAL CONCEPTS AND LAWS OF ELECTRICITY					
1. Be familiar with the basic concepts and laws of electricity.	1. Learn the fundamental concepts of circuits voltage, current, power, resistance and inductance in direct current circuits. Learn Ohm's Law and Kirchoff's Law and be able to apply them to simple direct current circuts.	1. Learn the concepts and characteristics of alternating current electricity including voltage, current, resistance, inductance, capacitance, reactance, impedance, power, volt-amperes, phase angle and power factor. Learn to apply Ohm's law and Kirchoff's laws to simple single-phase A-C circuits.		1. Learn the laws and concepts of three-phase A-C circuits. Learn three-phase circuit arrangements and connections. Learn to apply the basic principles to determine voltage, current and power relationships in balanced three-phase circuits.	1. Review as necessary to meet final requirements.

Subject and Minimum Electrician Requirement	0-6 Month Period	7-12 Month Period	13-18 Month Period	19-24 Month Period	25-30 Month Period
II. FUNDAMENTAL CONCEPTS AND LAWS OF ELECTRICITY (Continued)					
2. Have a working knowledge of vectors and vector diagrams as applied to single-phase and balanced three-phase circuits.		2. Learn elementary trigonometry if not sufficiently qualified in this subject.	2. Learn elementary vector theory and applications of vectors to single-phase circuits.	2. Learn to apply vectors to balanced three-phase circuits.	
III. KNOWLEDGE OF ELECTRICAL MACHINERY AND EQUIPMENT					
1. Know the basic principles of operation, construction and characteristics of plant electrical machines and equipment.	1. Learn construction and characteristics of primary and secondary batteries.	1. Learn the principles of operation, construction and characteristics of common D-C machines and solenoids.	1. Learn the principles of operation, construction and characteristics of transformers and A-C solenoids.	1. Learn the principles of operation, construction and characteristics of common A-C machines. Learn the principles of operation and construction of A-C Generators.	1. Learn the principles of operation, construction and characteristics of specialized plant electrical equipment.
2. Know Maintenance procedures and practices for plant electrical machines and equipment. Be able to identify and correct common troubles in plant electrical equipment. Be familiar with storage battery installation in plant and maintenance and testing required.	2. Learn to be an intelligent assistant to an electrician when repairing or overhauling electrical equipment. Learn routine battery servicing procedure.	2. Learn to overhaul small motors and make minor repair to low voltage air circuit breakers.	2. Learn to replace brushes on operating equipment. Be able to overhaul induction motors, repair air circuit breakers and other equipment of a similar nature.	2. Learn to test motors and circuit breakers. Be familiar with common commutator problems and maintenance required.	2. Learn to intelligently 'shoot trouble' on the various pieces of electrical equipment. Be familiar with battery troubles and their symptoms.
IV. ELECTRICAL SYSTEMS AND PROTECTIVE SCHEMES AND DEVICES.					
1. Be familiar with all A-C electrical system in plant and yard.	1. Obtain elementary knowledge of various A-C plant electrical systems and be able to draw a single line diagram of the 4.16 and/or 2.3 KV circuits as well as the 13.8 and/or 18 KV circuits.	1. Learn the basic 480 V, low voltage A-C system and be able to represent this system in a single line diagram.	1. Learn the 4160 volt and 13.8 KV and/or 18 KV system and be very familiar with these systems. Be able to draw single line diagrams of above systems from memory.	1. Learn the Instrument A-C Control System.	1. Learn the transmission and/or distribution system associated with the plant.

Subject and Minimum Electrician Requirement	0-6 Month Period	7-12 Month Period	13-18 Month Period	19-24 Month Period	25-30 Month Period
IV. ELECTRICAL SYSTEMS AND PROTECTIVE SCHEMES AND DEVICES (Continued)					
2. Be familiar with all D-C systems in plant and yard. This includes D-C station service and D-C excitation systems.	2. Learn the reason for using a D-C control system.	2. Obtain elementary knowledge of Station D-C Control System. Learn fundamentals of locating grounded circuits.	2. Become very familiar with D-C control System and procedure for locating grounds on this system.	2. Learn fundamentals of M-G battery charging installation.	2. Learn fundamentals and become familiar with all generator excitation schemes
3. Be familiar with protective schemes as applied to equipment under electric department jurisdiction. Know testing and maintenance procedures for the protective schemes and devices used.	3. Obtain elementary knowledge of plant electrical systems with reference to location and layout of associated electrical switchgear. Learn the fundamentals of operation and be able to check simple auxiliary and alarm relays.	3. Become familiar with thermal and magnetic thermal type of overcurrent protection. Learn principles of operation and construction of simple induction type relays and be able to bench test such relays.	3. Become familiar with simple relays such as IAV, IAC and auxiliary relays. Learn how plant systems are tied together and what their functions are. Be able to bench test relays as specified above.	3. Be able to make overall tests on Over Current Relays Become familiar with the more complicated relays and their applications in the plant.	3. Be able to complete test any relay or relay scheme in use in the plant.
V. ELECTRICAL OPERATION					
1. Know operating procedures and practices for plant electrical machines.		1. Learn the reason for overcharging the station D-C battery installation. Learn the procedure for transferring battery charging sets and the principles involved.	1. Learn the procedure for transferring excitation on the generators. Learn the principles of voltage regulation and the procedure of transferring between automatic and manual voltage regulation.	1. Learn the procedure for paralleling generators to the system.	1. Be able to assist in the operation of any electrical equipment in the plant.
2. Know switching procedures and practices for plant and yard electrical systems.	2. Become familiar with racking 480 V breakers in or out and clearing contactors on 480 V motor control panels. Become familiar with clearing D-C motor contactors.	2. Become familiar with procedure for racking potential transformers in or out and changing fuses.	2. Become familiar with procedure for changing breakers on 4160 and/or 2300 volt equipment.	2. Become familiar with switching procedure for clearing Main and House generators. This also includes excitation system.	2. Become familiar with switching procedure associated with clearing main transformer banks and also high voltage switching in the yard.

Subject and Minimum Electrician Requirement	0-6 Month Period	7-12 Month Period	13-18 Month Period	19-24 Month Period	25-30 Month Period
VI. ELECTRICAL INSTRUMENTS AND ELECTRICAL INSTRUMENTATION					
1. Know the operating principles, construction and characteristics of common electrical instruments.	1. Become familiar with the proper care required for all test instruments.			1. Learn the basic principles of design and operation of frequency meter and power factor meters. Learn the basic principles of design and operation of wattmeters and varmeters.	1. Learn to clean, test and make minor repairs to electrical instruments used in the plant.
2. Be familiar with plant electrical instrumentation systems.	2. Become familiar with the basic metering associated with the plant D-C electrical system. Become familiar with the reason for using shunts.	2. Learn the application and safety precautions to be observed with respect to A-C current transformers. Learn the application of A-C potential transformers.	2. Become familiar with basic plant electrical instrumentation.	2. Learn the basic fundamental associated with metering three-phase electrical systems.	2. Become quite familiar with all phases of electrical instrumentation associated with a main generator. Be very familiar with the electrical diagrams associated with plant and main unit metering.
3. Be familiar with the use and application of all plant electrical test instruments.	3. Become familiar with 'clamp-on' ammeter, megger and other portable test instruments.	3. Be able to make simple application in the use of an ohmeter, ammeter and voltmeter. Be able to use such instruments as voltmeters, ammeters and ohmeters in simple trouble-shooting applications.	3. Be able to set up and use the required meters for bench testing simple electrical equipment using rheostats, powerstats, voltmeters, ammeters, time and ohmeters.	3. Become familiar with the use of special test equipment such as phase angle meters, osciloscope, phase shifter, etc. Be able to set up and use the electrical instruments for simple relay testing.	3. Become quite familiar with all test equipment available to the extent of being able to set up and conduct special tests as well as gather electrical information required to operate or set up equipment.
VII. ELECTRONICS					
1. Know the basic principles of vacuum tubes and their application in rectifier, amplifier and oscillator circuits.		1. Learn the fundamentals of A-C power rectification. Become familiar with resistors, capacitors and inductance coils as applied in electronic circuits.		1. Learn the basic fundamentals of vacuum tube construction and operation.	1. Learn the fundamentals of amplifiers and oscillators.
2. Be able to "trouble-shoot" on plant electronic equipment.		2. Learn drawing symbols of electronic components.			2. Be able to use instruments and Schematic Diagrams to maintain electronic equipment.

Subject and Minimum Electrician Requirement	0-6 Month Period	7-12 Month Period	13-18 Month Period	19-24 Month Period	25-30 Month Period
VII. ELECTRONICS (continued)					
3. Be familiar with semi-conductor devices.					3. Learn the basic principles of semi-conductor devices.
4. Be familiar with saturable reactors.					4. Learn the basic principles of saturable reactors.
VIII. ELECTRICAL CONTROL SYSTEMS					
1. Be familiar with the various plant control and alarm systems and their operation	1. Obtain elementary knowledge D-C control circuits and D-C alarm circuits.	1. Become quite familiar with alarm circuits and testing alarm circuit components.	1. Learn control system for 480 V switchgear and automatic transfer circuits.	1. Learn control system for 4160 V and/or 2300 V switchgear. This includes automatic transfer schemes. Learn control system associated station service transformer banks.	1. Learn control systems associated with turbine generators, transformers and yard oil circuit breakers.
2. Be able to shoot trouble on the various control and alarm systems.	2. Learn to be a competent assistant to an electrician when working on control circuits.	2. Learn to intelligently test and shoot trouble on defective alarm circuits.	2. Be able to test and correct elementary control troubles on 480 V equipment.	2. Become fairly competent in the process of isolating control circuit trouble on 4160 volt equipment.	2. Be able to correct the majority of cases of trouble with control circuits associated with any piece of plant or yard equipment under the jurisdiction of the Electric Department.
IX. DRAWINGS AND INSTRUCTION BOOKS					
1. Be able to locate and use the various electrical drawings for the plant--also the important mechanical, piping, and instrument drawings.	1. Become familiar with the various shop prints files. Learn to read a simple single line diagram.	1. Learn to use the more common elementary electrical drawings. Learn to use simple wiring diagrams.	1. Become familiar with the more complex elementary electrical diagrams.	1. Be able to check continuity of a circuit using an ohmeter, elementary diagram and wiring diagram. Become familiar with plant mechanical and instrument drawings.	1. Be very familiar with all electrical drawings used in the plant and be proficient in the use of drawings as an aid to electrical trouble shooting.
2. Be able to represent electrical circuits in single line, elementary and wiring diagram form.	2. Learn electrical symbols as used in electrical drawings.	2. Learn to represent simple circuits by means of elementary drawings.	2. Learn to draw a sketch of the electrical wiring associated with tracing out a simple circuit as encountered in trouble shooting.	2. Learn to draw elementary drawings as a means of expression when dealing with electrical circuits.	2. Learn to make corrections to a print and be able to follow circuit changes as shown by drawing changes.

Subject and Minimum Electrician Requirement	0-6 Month Period	7-12 Month Period	13-18 Month Period	19-24 Month Period	25-30 Month Period
IX. DRAWINGS AND INSTRUCTION BOOKS (Continued)					
3. Be able to make a useable sketch from which a simple mechanical device could be made.	3. Learn the elementary fundamentals of mechanical drawing.		3. Learn to make freehand drawings of simple mechanical devices which could furnish the required information for someone else to build the device.		
4. Be able to locate instruction books and to apply the information they contain.	4. Become familiar with the various instruction books available and their location.	4. Become familiar with plant instruction books containing information on operating electrical equipment.	4. Learn to intelligently apply the information contained in instruction books. Learn to use these books to obtain information about equipment before working on same.		4. Learn to follow testing and adjustment procedures as contained in instruction books.
X. METHODS AND MATERIALS OF CONSTRUCTION					
1. Know how to do a simple wiring job involving the installation of conduit, wire, electrical devices and their connections.	1. Learn the various types of conduit, wire and cable that are used in power plant installations.	1. Learn methods of bending conduit and installing same. Learn conduit fittings that are used and places of application.	1. Learn about wire pulling and the permissible number of conductors of various sizes allowed in various conduit sizes.	1. Learn the elements of board wiring and be able to make simple installation or alterations.	1. Be able to do a neat and satisfactory alteration or simple construction installation.
2. Know what codes and standards are applicable to electrical installations, where to obtain them, and how to use them.		2. Become familiar with Company Engineering standards and how to apply this information.	2. Learn about provisions contained in the National Electrical Code with particular reference to industrial applications.		2. Be able to obtain information pertaining to safety and fire prevention on electrical installations.
XI. RECORDS AND PROCEDURES					
1. Be familiar with electrical department records, their purpose, and method of keeping and using them.	1. Learn daily job assignment procedure.	1. Learn to use shop and electric department office files and records.	1. Learn to maintain shop files and records.		
2. Be familiar with plant procedures and policies concerning accounting, time keeping, requisitions and personnel.	2. Learn to make out a satisfactory time card and pink accident form.	2. Become familiar with common accounting procedures.		2. Learn to make out minor report forms.	

APPRENTICE ELECTRICIAN
MASTER ASSIGNMENT CHART

NAME.................................PLANT.................................STARTING DATE.................................., 19........

SUPERVISOR'S INITIALS
DATE (Month and Year)

MONTH	3	6	9	12	15	18	21	24	27	30
TIME IN PROGRAM										
PROG. PERIOD		1		2		3		4		

ON-THE-JOB TRAINING

		Period 1	Period 2	Period 3	Period 4	Final Grade
Safety Procedures	TRAINING HOURS	20	40	60	100	120
	ACTUAL HOURS					
	GRADE					
Electrical Machinery	TRAINING HOURS	140	290	440	580	720
	ACTUAL HOURS					
	GRADE					
Electrical Systems	TRAINING HOURS	140	290	440	580	720
	ACTUAL HOURS					
	GRADE					
Electrical Operation	TRAINING HOURS	25	50	75	100	120
	ACTUAL HOURS					
	GRADE					
Electrical Instrumentation	TRAINING HOURS	30	70	110	150	180
	ACTUAL HOURS					
	GRADE					
Electronics	TRAINING HOURS	75	200	325	425	530
	ACTUAL HOURS					
	GRADE					
Electrical Control Systems	TRAINING HOURS	25	60	90	120	150
	ACTUAL HOURS					
	GRADE					
Drawings, Instruction Books, Records & Proc.	TRAINING HOURS	20	40	60	80	100
	ACTUAL HOURS					
	GRADE					
Methods and Materials	TRAINING HOURS	10	25	40	60	75
	ACTUAL HOURS					
	GRADE					

ACADEMIC TRAINING

Course		Entries
Mathematics Electricity Emeryville School	Math. Lesson 1st 6 Months (Four weeks) Indicate weeks	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
Electronics Emeryville School	7–12 Months (Four weeks) Indicate weeks	
Gen. Maint. Emeryville School	19 – 24 Months (Four weeks) Indicate weeks	
Electricity and Electronics	Experiments and Tests	ELECTRICITY: EXP. 1–25, PT, EXP. 26 – 49, PT; ELECTRONICS: EXP. 1 – 20, PT, EXP. 21 – 38, PT
Description & Operation Power Plant Equipment (24 months)	Lesson / Comp. / Grade	1, 2, 3, 4, 5, 6, PT, 7, 8, 9, 10, 11, 12, PT, 13, 14, 15, 16, 17, 18, PT, 19, 20, 21, 22
Operating Procedures (3 months)	Lesson / Comp. / Grade	1, 2, 3, 4, 5, 6, 7, PT, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, PT, 19, 20, 21, 22, 23, 24, 25, 26, 27, PT

Revised 5/74 — *LEGEND: P.T. = Progress Test* — *(See reverse side for instructions)*

Subject and Minimum Electrician Requirement	0-6 Month Period	7-12 Month Period	13-18 Month Period	19-24 Month Period	25-30 Month Period
XII. SELF RELIANCE LEADERSHIP AND ATTITUDE					
1. Be able to plan and carry out a job within the scope of an electrician's classification with a minimum of detailed supervision.	1. Learn to keep busy.	1. Learn to carry on a job for short intervals without supervision.	1. Learn to perform and complete minor jobs alone.		1. Be able to accept responsibility and satisfactorily complete routine electrician jobs.
2. Be able to direct and supervise assistants on the job.				2. Be able to assume leadership on a job for fellow workers who are in a lower classification.	
3. Be helpful and cooperative.	3. Contribute intelligently to the progress of any job he is assigned to.			3. Take an active interest in the various plant jobs that are being done by his fellow workers.	3. Learn to offer constructive ideas that will contribute to good job planning.
XIII. PLANT ORIENTATION					
1. Know the general function of all the main plant components. Obtain a good understanding of the purpose and relative importance of electric operated components and auxiliaries.	1. Obtain a good general concept of the function of a steam power plant and learn the function of the major components.	1. Obtain a good working knowledge of the circulating water system associated with the plant. Be familiar with the controls on the various pumps and be familiar with the motor operated valves.	1. Obtain a good working knowledge of the steam cycle and the various controls associated with the motor operated valves.	1. Obtain a good working knowledge of the boilers and boiler feed water pumps and their associated electrical controls.	1. Obtain a good working knowledge of the turbine generators and their functions. Learn the associated electrical control circuits.

Revised December 20, 1983

APPRENTICE CONTROL TECHNICIAN TRAINING PROGRAM

GENERAL OUTLINE OF PROGRAM

DEFINITIONS

Apprentice Control Technician

An employee engaged in performing Control Technician's work as an assistant to or under the general direction of a Technician. In order to gain experience for advancement to Control Technician, he may work alone or under indirect supervision on jobs for which it has been determined he has been adequately trained and instructed. The employee's education and general qualifications must be such that he is considered capable of attaining Technician status.

Control Technician (Traveling Control Technician)

An employee who, without direct supervision, tests, calibrates, maintains and may install all power plant control, monitoring, computer, alarm and indicating systems and their individual components. These will include, but are not necessarily limited to, digital and analog computer controls, logging or monitoring systems; automatic boiler light-off and combustion control systems; temperature, pressure, level and flow control and indicating systems; radiation measurement and environmental monitoring equipment and accessories; test and laboratory equipment; in addition, he may be required to maintain in-plant electrical protection and communication systems where F.C.C. licensing is not a requirement. He may be required to assist plant engineers in performing and evaluating plant tests. His background of apprenticeship and experience must be such as to qualify him to perform these duties with skill and efficiency.

GENERAL

To enter the Apprentice Control Technician classification, an employee will be required to pass a written examination based upon the first two years of apprenticeship in either the Apprentice Electrician or Apprentice Instrument Repairman classification depending upon the line of progression that the candidate is in. If he is in neither of these lines of progression, he may have his choice of the two examinations, but will be given only one.

Written examinations to enter the program:

Part A — Qualification Examinations - Electrician and Instrument Repairman to Apprentice Control Technician.

Part B — Qualification Examination - Electrician to Apprentice Control Technician.

Part B — Qualification Examination - Instrument Repairman to Apprentice Control Technician.

An Electrician or Instrument Repairman who is the successful bidder on a vacancy in the Apprentice Control Technician classification will be placed at the wage rate step applicable at the end of 24 months, and such employee will not have subsequent bids on Control Technician vacancies considered under Subsection 205.7(b) until he has accrued 24 months' classification seniority as an Apprentice Control Technician. In addition, he will not be considered for automatic progression to Unassigned Control Technician under the provisions of the Master Apprenticeship Agreement until he has accrued 30 months' classification seniority as an Apprentice Control Technician.

PROGRAM

The 24-month Apprentice Control Technician program is developed in such a manner as to provide coverage for those entering the program from either the Electrical or Instrument Repairman classifications. The material for the program is the same in both cases, but the hours scheduled for each subject are such as to prevent duplication of material previously covered in the first two years of the Electrician or Instrument Repairman Apprentice programs.

The Apprentice Control Technician's total apprentice time will generally be 48 months when the minimum of two years as Apprentice Electrician or Apprentice Instrument Repairman is considered.

The program is divided into eight sections. An outline of the overall program together with individual outlines for each section, both academic and on-the-job, is attached.

Section I - ~~GENERATION~~ MAINTENANCE

This three-week course at the Emeryville school will be attended during the second six-month section by Instrument Repairmen and Electricians who did not attend the school as part of their apprenticeship.

Section II - Introduction to Nuclear Power

A two-week course to be conducted at a nuclear power plant for both Electricians and Instrument Repairmen. It is deemed essential that all Apprentice Control Technicians receive this training to provide them with a basic background in nuclear instrumentation and radiation protection. The course is essentially for those assigned to fossil fuel plants, but the course and tests will be given to all Apprentice Control Technicians.

Section III - Electronics

The importance of a strong foundation in electronics has led to an expanded program in the electronics section. The course will consist of the regular assigned study material from a standard text as well as on-the-job training. To supplement and reinforce the program, a lab assignment or experiment will be conducted in conjunction with each lesson. A set of lab manuals for each apprentice plus a special regulated power supply and an experiment kit purchased for each power plant (or Division), where an Apprentice Control Technician is training, will be part of the electronics section.

Section IV - Print Reading

This course for both Instrument Repairmen and Electricians will be assigned during the first year. It is a company Text and Supplements developed to provide the apprentice with the background to read the many types of company and manufacturers' prints used during the apprentice program and later as a Control Technician.

Section V - Electrical Systems

This section is designed to update the Instrument Repairman then continue to increase the knowledge of both Instrument Repairman and Electrician in both academic and on-the-job areas of plant electrical systems. The Text for the course consists of material previously developed by the company. The course is laid out in assignments based on the text material together with associated on-the-job related assignments. All tests in this course are to be taken by both Electrician and Instrument Repairman regardless of assigned hours for each.

Section VI - Digital Principles and Applications

The academic portions of this section are designed with a textbook approach and will be followed by the apprentice even though a digital computer is not plant equipment. The on-the-job portions of this section, developed for those plants with digital computers, must be reapportioned to analog type equipment in those plants without digital computers.

Section VII - Test Equipment and Applications

As outlined; will provide the apprentice with the fundamentals of test equipment operation and measuring techniques. Emphasis will be placed on the basic principles of operation in the academic portion, leaving specific test equipment to the on-the-job training portion.

Section VIII - Instrumentation and Control Systems

Working with previously prepared company material and a new textbook for the academic portions together with appropriate on-the-job assignments, this course is designed to bring both the Electrician and Instrument Repairman to a high level of knowledge and skill in these systems.

The Apprentice Control Technician program has been developed in a manner to provide reasonable updating of the Electrician in the Instrument Repairman's area and the Instrument Repairman in the Electrician's area. Generally, the first and second six-month periods have been used to accomplish this. No attempt has been made to cover all the material of the other program. It is recognized that some variation in the on-the-job portions of the program will be necessary depending on the type of plant (fossil or nuclear fuel) and special equipment (automatic burner light-off, computer, etc.) at each location. This has been taken into consideration when assigning on-the-job hours.

On-the-job and academic training requirements and grading procedures as outlined in the Administrative Manual for Supervisors, Sections III and IV, are applicable to this apprentice program.

Apprentice Control Technician Training Program

General Outline

Hours

Section	Previous Rate	First (6) Months OTJ*	First (6) Months Academic	Second (6) Months OTJ	Second (6) Months Academic	Third (6) Months OTJ	Third (6) Months Academic	Fourth (6) Months OTJ	Fourth (6) Months Academic
(1) Generation Maintenance (Emeryville School)	IR**			------120----					
	Elect***								
(2) Introduction to Nuclear Power (Nuclear Power Plant)	IR	----------80----------							
	Elect	----------80----------							
(3) Electronics	IR	120	18	150	20	200	24	300	36
	Elect	120	18	150	20	200	24	300	36
(4) Print Reading	IR	40	6	40	6				
	Elect	40	6	40	6				
(5) Electrical Systems	IR	150	18	80	12	40	6	40	6
	Elect	20	0	50	6	40	6	40	6
(6) Computer	IR	40	12	150	20	200	24	150	24
	Elect	40	12	150	20	200	24	150	24
(7) Test Equipment and Applications	IR	80	12	40	6	30	4		
	Elect	120	18	40	6	30	4		
(8) Instrument and Control Fundamentals	IR	30	0	60	14	100	14	50	6
	Elect	120	18	150	14	100	14	50	6
TOTALS	IR	500	66	680	78	570	72	540	72
	Elect	500	72	620	72	570	72	540	72

*OTJ - On-The-Job
**IR - Instrument Repairman
***Elect. - Electrician

Revised December 20, 1983

GUIDELINES FOR THE APPRENTICE METERMAN TRAINING PROGRAM

I. Objective of the Apprentice Meterman Training Program

The need for trained and fully qualified employees to accomplish the duties specified in the Senior Meterman definition in a manner consistent with Company's Standards of Construction, Safety, and Performance has resulted in this program which coordinates extensive on-the-job and related academic training. The systematic acquisition of knowledge and skill offers the employee in training the vehicle to attain self-confidence, assuredness and satisfaction in his work and the correct and safe method of performing Company's work.

II. Training

During the 36 months of the apprenticeship, the apprentice will be offered job training divided into six time periods which coincide with the wage steps of the classification. In order that uniform and safe practices will be followed in the training period, assignment of duties and work procedures shall be provided in each of the wage steps as outlined in these guidelines and the attached schedule. The amounts of time or units of work as indicated in the schedule are believed sufficient to permit the apprentice to develop proficiency in such duty or work procedures, but should not be considered as inflexible dependent on the demonstrated ability of each individual apprentice.

The attached schedule also specifies those training periods in which the apprentice shall receive related academic or class training.

On-the-job training in the duties and amount of such training as specified in the schedule shall apply to the extent that such duties are performed by journeymen where the apprentice is headquartered. In the event such duty is not performed by journeyman at his headquarters and, therefore, not available in the training of an apprentice, it shall be noted in his work record. However, his progression through the apprenticeship or to journeyman or to higher classifications shall not be deterred for this reason.

If in the course of his apprenticeship or as a journeyman such duty later becomes available, he shall receive on-the-job training as may be required to attain expected journeyman proficiency. If, after a reasonable opportunity, he fails to attain such proficiency, his bids for progression to higher classifications may be subject to the provisions of Section 205.11 of the agreement.

A. General Guidelines

1. It is intended that assignment of the specified hours of training on the job for each period of the apprenticeship

will be made to the apprentice as early in the period as is practicable.

2. Hours shown on the schedule exclude any travel time needed to reach the place where training is to be given; however, such hours include time needed to prepare tools and equipment.

3. Except where otherwise specified, apprentices shall be trained by assignment to work with qualified journeymen.

4. Progressive work experience in all phases of meter work will be provided throughout the first five periods of the apprenticeship in accordance with the attached schedule.

5. Assignments during the last or sixth period will be made for the purpose of rounding out the apprentice's experience.

6. Upon entering each new wage step and period of training, the work assignments in the period shall be such that the apprentice will gain the basic knowledge and confidence in himself, the equipment and the procedure being used. More complex assignments shall be made progressively as the apprentice gains in knowledge and capability.

7. Assignments of duties and work procedures in any period of training shall be confined to those specified for the period or of a prior period.

8. During the first year, an apprentice shall not be assigned to work on any circuit energized in excess of 750 volts.

9. As an apprentice, he may be assigned to work without direct supervision only after he has been instructed and trained on the duties or work procedures required, has performed such work under direct supervision, and is capable of performing such work safely.

10. Working alone as an apprentice, he may be assigned to perform certain of the duties of a Shop Meterman or Senior Meterman. Those certain duties of these classifications to which he may be assigned shall be limited to those duties within his current or prior training periods for which he is qualified and which are within the duties normally performed by a journeyman in the course of his work. Further, such assignments shall include as a purpose the development of the apprentice's proficiency and self-confidence to perform such work as a journeyman and shall not be made to the extent

that the apprentice is in jeopardy of failing to attain goals set forth in the attached schedule.

11. Although d. c. metering training is not provided specifically in the Schedule, it is expected that in those divisions where d. c. facilities are located, training on d. c. metering shall be given in the same manner as a. c. metering.

12. Notices

a. An apprentice who is scheduled to attend any of the centralized training programs shall be given notice of such assignment as early as possible by division supervision.

b. At their request, Union's representatives or their designates will be informed by division representatives of Company's intentions in scheduling individuals to attend centralized training sessions.

c. When the roster is available, Company shall notify the Union's Apprenticeship Committee of the apprentices attending a centralized training school.

d. When an apprentice attending a centralized training school is not maintaining an acceptable level of work, notice shall be given to the Union's Apprenticeship Committee. Such notice shall also be given in the event he fails the school or if he is dropped from the school by Company.

e. If an apprentice does not maintain an acceptable on-the-job work level, notice shall be given to Union's business representative or his designate.

B. Guidelines for Training Periods

1. 0 to 6 Months' Step

During this period, the apprentice will be instructed in the following areas.

a. Shop Operations and Practices

(1) Learn different methods of cleaning meters
(2) Learn safety precautions
(3) Learn how to identify and number meters

(4) Learn how to determine when a meter should be retired
(5) Learn how to check metering equipment in and out of shop
(6) Learn test procedures for single phase meters

b. Academic Training at Emeryville (4 Weeks)

(1) Review elementary mathematics - Company outline
(2) Learn the fundamental laws and concepts of magnetism, voltage, current, reistance, and power in electric circuits
(3) Transformers; theory and operation - Company outline

c. Methods of Installation

(1) Learn the various types of conduit, wire and cable and their characteristics
(2) Learn how to make a good soldered connection
(3) Learn how to make a good clamp type (pressure) connection on wire, cable, tubing, and flat bar
(4) Learn how to use metering tools and keep them in good condition

d. Field Testing (None in This Period)

e. Field Operation and Maintenance of Metering Equipment

(1) Observe and assist Senior Meterman

f. Electrical Instruments and Calibration

(1) Learn the proper use and care of test instruments
(2) Learn to accurately read ammeters, voltmeters, and wattmeters, and to compare them to test instruments

g. Instruction Books and Circuit Diagrams

(1) Become familiar with the schematic symbols used to represent metering equipment

h. Records and Related Procedures

(1) Learn the daily field job assignment procedure
(2) Learn how to make out a satisfactory time card and pink accident form
(3) Become familiar with warehousing procedures and clerical functions as related to the electric meter shop

1. Self-Reliance, Aptitude, and Leadership

   (1) Learn to keep busy
   (2) Learn to contribute intelligently to the progress of any assigned job
   (3) Be courteous and cooperative in working with customers and other Company departments

He shall be trained in the duties of a Senior Meterman, as indicated for the 0 to 6 months' period. In conjunction with such work, he may use test equipment when he has been properly trained and instructed in the use of such equipment. Such work will not be performed in such position that the apprentice may bring himself or the equipment into a position where he encroaches on the contact area or into the safe working distance with respect to the primary voltage.

As early as possible in this training period, he shall be assigned to the basic electricity course (Emeryville) for the mathematic's review and training in electricity and transformers.

a. An agreed-upon test will be given at the close of the school, and should an apprentice fail to receive a passing score, he shall be given notice in writing of the areas which caused his failure.

b. After such failure, he shall be allowed to retake the test upon his request any time after one month's time from his failure. He shall be allowed two additional retests, spaced at least one month apart.

c. He shall complete the course and pass the agreed-upon test not later than the end of his ninth month of training, regardless of the number of retests that he has requested. His failure to meet this standard of achievement will be cause for his removal from the classification in accordance with Paragraph G 6 of the Master Apprenticeship Agreement.

d. His progression to the second step of the apprentice classification shall be in accordance with Paragraphs G 3 and 4 of the Master Apprenticeship Agreement.

2. 7 to 12 Months' Step

He shall continue to perform the functions of the prior period and in addition shall be instructed in the following:

a. Shop Operations and Practices

(1) Learn to work safely around energized meters
(2) Learn how to use test equipment to identify single phase, three phase, power leg, etc.
(3) Learn how to repair single phase watt-hour meters
(4) Learn how to make shop test records
(5) Learn how to test and adjust single phase meters
(6) Learn how to check register ratio and disc constant

b. Academic Training (Metermen's Handbook, 7th Edition)

(1)	Introduction to Meter Department, Chapter 1 (Safety)	2 hrs.
(2)	Math, Chapter 3 including Trig supplement	16 hrs.
(3)	D. C., Chapter 4 (Review)	4 hrs.
(4)	A. C., Chapter 5 (Review)	8 hrs.
(5)	Watt-Hour Meters, Chapter 7 including supplement	26 hrs.
		56 hrs.

c. As early as possible in this training period, he shall be assigned to the Basic Electronics course in Emeryville.

(1) Agreed-upon tests will be given at the conclusion of the school and if he failed to receive a passing score, the apprentice shall be notified in writing of the reasons for his failing.

(2) His retesting opportunities shall be in accordance with the schedule outlined in Paragraph B-1 of these guide lines. In the event of failure to meet this academic standard of achievement, his progression shall be in accordance with Paragraphs G 4, 5, and 6 of the Master Apprenticeship Agreement.

d. Methods of Field Installation

(1) Learn the reasons for keeping metered and unmetered wiring separate
(2) Learn how to pull wire into conduit
(3) Learn how to test and identify wires installed in conduit
(4) Become acquainted with the various types of raceways suitable for meter wiring
(5) Become familiar with Company standards and learn how

to read a meter drawing

e. Field Testing

(1) Assist in the testing of self-contained meters
(2) Learn proper conduct on customer's premises
(3) Learn the methods of locating meters to be tested
(4) Learn to check for proper meter connections
(5) Learn how to make test connections
(6) Learn the sequence of operations for recording data and testing

f. Field Operation and Maintenance of Metering Equipment

(1) Learn the characteristics of three phase meters with different loads and connections
(2) Be able to make minor repairs to meters in the field
(3) Learn how to originate and complete a field test tag

g. Electrical Instruments and Calibrations

(1) Learn connections and use of ammeter, voltmeter, ohmmeter, and phase angle meters.
(2) Learn the application of current and potential transformers and the safety precautions to be observed when they are energized

h. Instruction books and Circuit Diagrams

(1) Learn to use the more common elementary electrical drawings
(2) Become familiar with the P. G. and E. meter drawings
(3) Become familiar with the P. G. and E. requirements for metering
(4) Learn to select the proper size meters and instrument transformers for given load

i. Records and Related Procedures

(1) Learn to use shop files and records
(2) Learn to use forms for meter testing and installation
(3) Become familiar with Company's accounting procedures

j. Self-Reliance, Aptitude, and Leadership

(1) Learn to carry on a job without continuous supervision

Agreed-upon tests will be given at the conclusion of the 7 to 12 months' academic training, and if he fails to receive a passing score, the apprentice shall be notified in writing of the reasons for his failing.

His retesting opportunities shall be in accordance with the schedule outlined in Paragraph 1 of these guidelines. In the event of failure to meet either the academic or on-the-job standards of achievement, his progression shall be in accordance with Paragraphs G 4, 5, and 6 of the Master Apprenticeship Agreement.

3. 13 to 18 Months' Step

He shall continue to perform the duties specified for prior periods and, in addition, learn the duties outlined on the schedule for this period of his apprenticeship.

As early as possible in this training period, he shall be assigned to more advanced duties in the shop and field.

a. Shop Operations and Practices

(1) Learn how to determine if metering equipment is safe to work on
(2) Learn to test current transformers
(3) Learn how to clean and repair demand registers
(4) Learn how to make minor repairs to shop test equipment
(5) Learn how to test and adjust transformer rated meters with watt-hour demand registers
(6) Learn to wire test blocks and switches to meters

b. Academic Training (Metermen's Handbook, 7th Edition)

(1)	Meter Reading, Chapter 18	4 hrs.
(2)	Watt-Hour Meter Testing, Chapter 15	8 hrs.
(3)	Meter Test Tables, Chapter 19	8 hrs.
(4)	Demand Meters, Chapter 8	12 hrs.
(5)	Demand Meter Testing, Chapter 16	8 hrs.
(6)	RKVA Meters, Chapter 9 including supplement	16 hrs.
(7)	Telemetering and Totalization, Chapter 10	16 hrs.
(8)	Instrument Transformers, Chapter 11	20 hrs.
(9)	Compensating Metering, Chapter 12	4 hrs.
(10)	Duncan and G. E. Meters, Chapters 20 and 21	4 hrs.
(11)	Sangamo and Westinghouse, Chapters 22 and 23	4 hrs.

c. As early as possible in this training period, he shall be assigned to the Metering Vectors course in Emeryville.

(1) Agreed-upon tests will be given at the conclusion of the school and if he failed to receive a passing score, the apprentice shall be notified in writing of the reasons for his failing.

(2) His retesting opportunities shall be in accordance with the schedule outlined in Paragraph B-1 of these guidelines. In the event of failure to meet this academic standard of achievement, his progression shall be in accordance with Paragraphs G 4, 5, and 6 of the Master Apprenticeship Agreement.

d. Methods of Installation

(1) Learn how to determine the permissible number of conductors of various sizes allowed in different conduit sizes
(2) Learn about the provisions contained in the National Electrical Code with reference to industrial and power applications
(3) Be familiar with the P. G. and E. system of numbering wires in current and potential metering circuits
(4) Learn the importance of neatness in the installation of electrical equipment
(5) Learn to install CTs and PTs
(6) Be able to install or remove self-contained meters without supervision

e. Field Testing

(1) Be able to test self-contained meters without direct supervision
(2) Learn to interpret meter test readings
(3) Learn the value of recording operating loads and separate element rotation tests
(4) Learn to test indicating demand and transformer rated meters under supervision
(5) Learn the voltage check points of reactiformers

f. Field Operation and Maintenance of Metering Equipment

(1) Learn the characteristics of "demand meters" in field use
(2) Be able to make demand register replacements in the field
(3) Learn the characteristics of instrument transformers under field conditions and precautions to be observed
(4) Learn the characteristics of varhour meters under different load conditions

g. Electrical Instruments and Calibration

(1) Learn how to use and purpose of the current transformer test equipment
(2) Learn the application and use of rheostats, variacs, voltmeters, ammeters, etc.

h. Instruction Books and Circuit Diagrams

(1) Become familiar with the more complex metering drawings

(2) Be able to trace a meter circuit on the wiring diagram and make a readable copy of the circuit
(3) When maintaining or repairing a piece of equipment, be able to use the manufacturer's instruction books to do a more efficient job

i. Records and Related Procedures

(1) Learn to maintain meter files and records in an intelligible manner

j. Self-Reliance, Aptitude, and Leadership

(1) Learn to plan and complete minor jobs alone
(2) Take an active interest in the various jobs that are being done by fellow workers

4. 19 to 24 Months' Step

The apprentice shall continue to work as provided in the prior periods and, in addition, will be instructed in the following areas.

a. Shop Operations and Practices

(1) Learn to safely test potential transformers
(2) Learn to assemble a watt-hour meter field test set
(3) Learn to repair printing, graphic and magnetic tape demand meters.
(4) Learn how to test and adjust pulse operated demand meters and meter pulse initiator

b. Academic Training (Metermen's Handbook, 7th Edition)

(1)	Terms, Chapter 2	2 hrs.
(2)	Meter Laboratory, Chapter 17	4 hrs.
(3)	Instruments, Chapter 6	16 hrs.
(4)	Meter Wiring Diagrams, Chapter 13	20 hrs.
(5)	Services and Installations, Chapter 14 (P. G. and E. requirements Eng. Stds.)	20 hrs.
(6)	Necessary standard practices letters, etc.	4 hrs.

c. Electronic, Application to Metering

(1) Become familiar with the use of resistors, capacitors, and inductance coils, etc., as applied in metering circuits

(2) Know the application of diodes, transistors, and Hall crystals
(3) Learn to interpret symbols for electronic components used in metering
(4) Learn how to check and service amplifiers and oscillators used in impulse generators
(5) Learn to use instruments and schematic diagrams to maintain electronic equipment, such as pulse generators, magnetic tape recorders, totalizers, etc.

d. Methods of Installation

(1) Learn the wiring connections for switchboard type meters
(2) Learn to trace a metering circuit and make a sketch
(3) Learn how to locate a ground on a circuit
(4) Learn the precautions to be observed when making meter changes on energized circuits

e. Field Testing

(1) Be able to test demand and transformer rated meters
(2) Be able to use a phase angle meter and draw vectors for any meter installation
(3) Learn to test and check contacts and associated demand devices
(4) Learn to check totalizing relays

f. Field Operation and Maintenance of Metering Equipment

(1) Know the operation, construction, and maintenance requirements of all revenue meters and accessories
(2) Know the operation and maintenance of demand meter contacts (mechanical, electrical)
(3) Be able to change magnetic tapes, charts and maintain inking on graphic demands

g. Electrical Instruments and Calibration

(1) Learn the basic principles of design and operation of rotating standards
(2) Know the use of wattmeters and varmeters
(3) Know the use of special test equipment, such as phase angle meter, phase shifter, etc.

h. Instruction Books and Circuit Diagrams

(1) Be able to check continuity of a circuit using an ohmmeter

(2) Learn to draw diagrams as a means of recording the connections of metering circuits

i. Records and Related Procedures

(1) Learn to make out meter report forms

j. Self-Reliance, Aptitude, and Leadership

(1) Be able to assist fellow workers who have less experience
(2) Learn when it is necessary to secure assistance from other sources

5. 25 to 30 Months' Step

The apprentice will be allowed to do any work normally performed by a Journeyman under the direction of the Foreman, Subforeman, or a Journeyman as required by the job, and in addition, learn the duties outlined on the Schedule for this period of his apprenticeship.

a. Shop Operations and Practices

(1) Learn to safely perform all shop duties
(2) Learn to prefabricate meter panels for KVAR and other complex installations
(3) Learn to shoot trouble and make repairs on field test set
(4) Be able to shoot trouble and repair totalizing demand installations
(5) Be able to test and adjust totalizing demand meter installations

b. Electronics On The Job

(1) Testing and checking pulse generating, totalizing, and recording equipment

c. Methods of Installation

(1) Be able to "shoot trouble" on meter wiring on a new switchboard or on additions to an existing switchboard
(2) Learn how to make a neat installation
(3) Be able to install any of the metering equipment used in the P. G. and E. system

d. Field Testing

(1) Be able to test any meter installation without supervision
(2) Know the limitations of various meters and systems
(3) Be able to apply the various checks to determine if the metering is operating properly
(4) Be able to determine when maintenance is required
(5) Know how various kinds of customer's loads influence meter operation

e. Field Operation and Maintenance of Metering Equipment

(1) Become acquainted with the construction, characteristics and maintenance requirements of all specialized equipment
(2) Be able to identify trouble on any metering system
(3) Be able to replace worn or damaged parts on complex meter systems
(4) Become acquainted with test procedures on intertie metering

f. Electrical Instruments and Calibration

(1) Learn to clean, test, and make minor repairs to the common electrical instruments used
(2) Know the required frequency of checking rotating standards
(3) Be able to recognize errors or defects in test equipment

g. Instruction Books and Circuit Diagrams

(1) Learn to adjust metering equipment according to written instructions
(2) Learn to make corrections to a metering print and be able to make circuit changes as shown on a drawing
(3) Be familiar with all drawings pertaining to metering
(4) Know all applicable standard practices and rules

h. Self-Reliance, Aptitude, and Leadership

(1) Be able to accept responsibility for the satisfactory completion of all revenue metering jobs
(2) Learn to offer constructive ideas
(3) Be courteous and intelligent in discussing metering

problems with customers, electricians, and contractors

(4) Be able to secure cooperation from others in altering installations to comply with P. G. and E. standards

6. 31 to 36 Months' Topping Off

The apprentice will be allowed to do any work normally performed by a journeyman. It will be the object of this step to attain satisfactory proficiency in all the areas where the apprentice has been instructed.

7. Records

(a) It shall be the responsibility of each apprentice to maintain his own record in collaboration with each Foreman or Subforeman to whom he is assigned. Upon completion, each periodic record shall be submitted to the Division Meter Foreman.

(b) It shall be the responsibility of each Meter Foreman to keep necessary files of records on each apprentice and to ascertain that each apprentice has a reasonable opportunity of meeting the Standards of Achievement set forth in these guidelines.

(c) Such records shall at all times be available during the apprenticeship for review by the Division Meter Foreman or higher levels of supervision, the employee, and representatives of Union.

(d) In addition to and precedent to these guidelines, the provisions of the Master Apprenticeship Agreement are applicable.

SCHEDULE

	ACADEMIC ASSIGNMENT MONTH	0 - 6	7 - 12	13 - 18	19 - 24	25 - 30
A.	Basic Electricity Course - Emeryville	160				
B.	Basic Electronics Course - Emeryville		120			
C.	Metering Vectors Course - Emeryville			120		
D.	Metermen's Handbook		56	104	66	
	"ON-THE-JOB" PROCEDURES AND DUTIES					
1.	Safety, First Aid, and Resuscitation	8	8	8	8	8 ⊛
2.	Shop Operations and Practices	180	128 ○	60	40	10 ✳
3.	Electronics				32	68 ⊛
4.	Methods of Installation	64	64	110 ○	100	94 ✳
5.	Field Testing		48	166 ○	164	204 ✳
6.	Field Operation and Maintenance	48	48	60 ○	60	40 ✳
7.	Electrical Instruments and Calibration	48	48	60	60 ○	40 ✳
8.	Instruction Books and Circuit Diagrams	96	96	20 ○	20	20 ✳
9.	Records and Related Procedures	60	64 ○	20	20	20 ✳
10.	Self-Reliance, Aptitude, and Leadership	4	4	4	4	4 ⊛

○ Indicates point at which apprentice can be expected to know all aspects of specified work but with limited proficiency to perform such work.

✳ Indicates point at which full knowledge and proficiency is a requirement.