



**Pacific Gas and
Electric Company™**

LETTER AGREEMENT NO. 07-48-PGE

IBEW



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STEPHEN RAYBURN
DIRECTOR AND CHIEF NEGOTIATOR

TOM DALZELL
BUSINESS MANAGER

October 22, 2007

Mr. Tom Dalzell, Business Manager
Local Union No. 1245
International Brotherhood of
Electrical Workers, AFL-CIO
P.O. Box 2547
Vacaville, CA 95687

Dear Mr. Dalzell:

The Company and Union agreed to revisions of the Apprentice Electrician Training Program in Power Generation, Diablo Canyon Power Plant. The joint subcommittee's recommendations have been reviewed and agreed to by the Joint Apprenticeship and Training Committee.

The JATC recommends and approves the attached revised program to replace the existing Apprentice Electrician Training Program.

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

Very truly yours,

PACIFIC GAS & ELECTRIC COMPANY

By: _____


Stephen A. Rayburn
Director and Chief Negotiator

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

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

_____, November 29, 2007

By: _____


Tom Dalzell
Business Manager

TITLE: **APPRENTICE ELECTRICIAN PROGRAM OF INSTRUCTION**

References

1. Training Program for the Apprentice Electrician in Nuclear Power Plants, 3/1/89 Edition
2. TQ1.ID4, Non-Accredited training Records
3. TQ2.ID4, Training Implementation
4. TQ2.ID6, Training Records Management
5. I&C Initial Training Program of Instruction
6. M/M Initial Training Program of Instruction
7. EM Training Program of Instruction
8. San Ramon Training Facility
9. Lab-Volt (Model 8001) "Electric Power & Controls"
10. Lab-Volt (Model 3100) "Industrial Controls"

AUTHOR:	JOE RAPPA	DATE:	4/24/07
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	POWER GENERATION TRAINING SPECIALIST		
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	ASSISTANT BUSINESS MANAGER		
APPROVED BY:	JOINT APPRENTICESHIP AND TRAINING COMMITTEE	DATE:	_____

REV. 0

TITLE: **APPRENTICE ELECTRICIAN PROGRAM OF INSTRUCTION**

Remarks

1. The Apprentice Electrician Training Program is an entry level program and assumes little or no maintenance experience from Apprentice candidates. Candidates will meet the following:
 - Applicable union bidding specifications as dictated by the Division Master Apprenticeship Agreement.
 - Satisfactory completion of the Arithmetic Computation Test (ACT) as dictated by the Division Master Apprenticeship Agreement.
 - Satisfactory completion of discipline Aptitude Test at the discretion of plant Supervision
 - Completion of one year as a Plant Utility Worker in the Electrical Maintenance Department.
2. Evaluation of students will be conducted per TQ1.ID4. The frequency of evaluations will be the end of each course/lesson. Additionally, the Apprentices will be evaluated every six month period and documented per the Review and Comment section of Attachment I of this document.

End of Remarks

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SECTION I - Introduction

A. Introduction

Upon selection of the Electrical Apprenticeship, the candidate has embarked in an occupation that might well become a life long vocation. The management of Pacific Gas and Electric is committed in its endeavor of guiding and assisting each Apprentice candidate through the Apprentice Training Program. The objective is your satisfactory completion of both the "On-the-Job" (OJT) training phase and the related "technical training" of your chosen craft. It is intended that each Apprentice become familiar with how the Apprentice Training Program is organized and how to optimize comprehension and retention of the learning material presented in each training phase.

The Apprentice program is comprised of 30 months of classroom, laboratory, and OJT. An additional 6 month period will be utilized for continued, additional or make-up qualification necessary to complete the program.

Each Apprentice will be exposed to challenges and opportunities, which, if accepted enthusiastically, will result in successful completion of the Apprentice Program and the attainment of Journeyman level status.

The expansion of nuclear power generation and the increasing complexity of power plant equipment during the last few decades have necessitated the selection of personnel with specific qualifications and job potential. Through cooperative efforts, a great deal of selected training material has been assembled. This material has been carefully chosen to give sound training in the discipline of Electrical Maintenance.

This training program will provide the Apprentice candidate the means to associate theories with the practices applicable to the Electrician craft. Once the training is mastered, the candidate will be able to plan work and solve problems relating to his/her job. The academic portion of this training program is enhanced by progressive experiences of OJT. This is essential for the successful advancement to a higher level of skill.

SECTION I – Introduction, continued

There is no simple way to acquire the related information and skills of any trade. Considerable study and diligent work is required to master the extensive amount of technical knowledge and practical skills that is part of every modern craft. This apprentice-training program has been designed to make the acquisition of this knowledge in a logical manner. You will cover the material systematically with frequent checks on your progress and on the thoroughness of your learning. It is the Apprentice's responsibility to gain the maximum knowledge possible during the apprenticeship training.

B. Job progression and Bidding Procedure

Within your chosen field, normal lines of progression have been established and agreed to by both Company and Union. These lines of progression are shown in Exhibit VI B of the Company-Union Agreement. Your foreman can show them to you if you desire to review them. Generally the line of progression for the various maintenance classifications in ascending order is Utility Worker, Apprentice Electrician, Journeyman Electrician, Apprentice Electrical Control Technician, and Electrical Control Technician.

The procedures related to the job bidding and promotions are beyond the scope of this section. They can be found in Section 205 of the Company-Union Agreement.

End of Section I

SECTION II – Program Overview

A. Academic Training

The academic phase of the Apprentice Training Program is designed to provide sufficient technical knowledge to solve problems encountered as a journeyman. Academic instruction places emphasis on worker safety, “electrical theory”, principles of operation, and maintenance. Academic instruction works in conjunction with performance-based training such as OJT, and laboratory assignments. Academic instruction is tested by quizzes, tests, and exams that become part of the apprentice’s training record.

Tests and exams will be administered at the end of each lesson or course, respectively, in accordance with TQ2.ID4, Training Implementation.

The Academic Training hours are outlined in Part A of Section IV, *General Outline of Subject Matter*, of this document.

B. On-The-Job Training (OJT)

OJT training is performance-based training designed to provide instruction in job-related skills and knowledge in a work environment. The “OJT” phase of the Apprentice Training Program is designed to allow the Apprentice to work side-by-side with Journeyman level personnel. OJT provides the practical training with hands-on training to prepare for Journeyman responsibilities. It is preferred that OJT be conducted by task qualified Journeyman level personnel. It is, however, recognized that in-plant OJT may not always be available or feasible. Therefore, portions of OJT may be conducted in a laboratory or simulator setting by line and other than line personnel, providing they are qualified in the task to be trained.

The OJT hours are outlined in Part B of Section IV, *General Outline of Subject Matter* of this document.

C. Scheduling

OJT is divided into 14 categories (e.g., motors, breakers, etc.) with minimum hourly OJT requirements given (see Section IV). The foreman / GF is responsible for assigning the Apprentice to plant work that will provide the job training necessary to fulfill those requirements.

Continued on next page

SECTION II– Program Overview, continued

D. Program Management and Responsibilities

It is the intent of the Apprentice Training Program and PG&E management that rather than completing this Apprentice program in its entirety and then enter into the Electrician Initial Training Program, the Apprentice candidate will complete selected portions of the Apprentice program and be allowed to enter into the applicable qualification portions of the Electrician Initial Training Program. It is intended that the apprentice finish the Apprentice Training Program with some or all of his/her fundamental and basic qualifications as listed in the Electrician Initial Training Program of Instruction (POI).

The responsibilities for effectively administering the training program include:

The Electrical Maintenance Manager who is responsible for:

- Sixth month wage approval based on review of the apprentice's progress.
- Initiate apprentice wage progression hold or removal in accordance with the Master Apprentice Agreement if the "Standards of Achievement" as outlined in this document is not met.
- Notify the Joint Apprentice Training Committee (JATC), of any academic or OJT failures that has the potential of initiating an apprentice wage progression hold or removal.

The Electrical Maintenance General Foreman is responsible for the implementation of the Electrical Apprentice Training Program. His duties include:

- Overall performance of the Apprentice Electrician training program and apprentice progress.
- Perform a monthly review of the apprentice's academic and OJT progress, and provide guidance to ensure program timeline requirements are being met.
- Provide program orientation and responsibilities to new apprentices, first line supervisors and journeymen.

SECTION II– Program Overview, continued

Program Management and Responsibilities, continued

The Maintenance Foreman is responsible for:

- Assigning the apprentice to plant work as outlined in Section IV of this document.
- Monthly review of the apprentice training records to assure all duty areas are being assigned where available.
- Provide remedial study plans, if needed. He may be assisted, as necessary, by other plant personnel such as Learning Services and journeymen.

Learning Services Department is responsible for:

- Providing the academic training outlined in Section IV of this document.
- Immediately informing the program owner (General Foreman) of any academic test failures, which affect the apprentice’s progress in the program and wage increase.
- Assisting in the development and administration of a remediation plan to improve the apprentice’s performance when needed.

Journeymen are responsible for:

- Providing hands-on training and instruction while performing assigned tasks.
- Providing coaching and feedback to the apprentice when appropriate.
- Displaying a “roll model” attitude regarding safety, human error reduction techniques, procedure adherence, and management expectations.

SECTION II– Program Overview, continued

Apprentices are responsible for:

- Maintaining an academic grade average above the minimum level of 70%.
- Satisfying the minimum program OJT hourly requirements of 600 hours per 6-month period.
- Completing applicable performance objectives (TPE's) where the apprentice has received prior instruction and training as well as demonstrated proficiency in performing such tasks.
- Notifying plant supervision if the need for assistance arises.
- Maintaining and documenting monthly assignment records.

E Progress Evaluation

Evaluation of successful progress or “Standards of Achievement” in the Electrical Apprentice Program consists of two criteria:

- Periodic tests and review exam for the purpose of evaluating overall academic progress and success within the program.
- Successful performance of OJT activities outlined in Section IV of this document for the purpose of determining the apprentice's ability to perform such activities.

The Standards of Achievement in this document is defined as the satisfactory grade above 70% for all periodic tests and review exam within each 6-month progression period and successful completion of OJT hours for that period.

- Periodic tests evaluate the comprehension of specific subjects discussed during the week or month.
- The 6-month review exam evaluates the retention of all subject matter discussed prior to the completion of each progression period.

Failure to meet the Standards of Achievement by the end of each progression period constitutes cause for no step progression and wage increase in the program until all previous tests and OJT hours are satisfactory.

SECTION II– Program Overview, continued

Academic Progress:

If academic progress becomes unsatisfactory, below the minimum level of 70%, the General Foreman / Instructor will review performance and recommend steps for remediation.

The Apprentice shall be offered remediation and allowed to retake the test. Only two additional tests shall be allowed at line supervision discretion

Should the Apprentice fail to complete any test or review exam in any given 6-month period, he shall not have met the Standards of Achievement.

Progress to the next higher wage step, or demotion, shall be in accordance with Section F of the Master Apprenticeship Agreement.

OJT Progress:

Satisfactory completion of the Apprentice Program also requires completing the total OJT hours as shown in Part B of Section IV, *General Outline of Subject Matter*. It is recognized that it may not be possible to attain the scheduled OJT hours in each duty area due to plant evolutions or training availability in a particular area. An Apprentice shall not be held back from the next higher wage step because the necessary academic training or OJT was not provided.

However, should the Apprentice fail to complete the scheduled OJT hours for any given 6-month period, he shall not have met the Standards of Achievement.

Progress to the next higher wage step, or demotion, shall be in accordance with Section F of the Master Apprenticeship Agreement.

End of Section II

SECTION III – Guidelines

A. Goals of the Apprentice Electrician Program

The need for trained and fully qualified employees to accomplish their duties in a manner consistent with the Company's Standards of Construction, Safety, and Performance has resulted in this program, which coordinates OJT and related academic training.

The systematic acquisition of knowledge and skills offers the employee in training the vehicle to attain self-confidence, assuredness, satisfaction in his/her work, and to learn the correct and safe method of performing the Company's work.

B. Training

During the 36 months of the Apprenticeship, the Apprentice will be offered job training divided into six time periods that coincide with the wage steps of the classification. To ensure that uniform and safe practices will be followed during training, assignment of duties and work procedures shall be provided in each of the wage steps as outlined here and in Sections IV and V. The amounts of time or units of work as indicated in these sections are believed to be sufficient for the apprentice to develop proficiency, but should not be considered as inflexible, and could vary depending on the demonstrated ability of each individual Apprentice.

The amount of OJT as specified in Section IV B shall apply to the extent that such duties are performed by Journeymen where the Apprentice is headquartered. In the event a duty is not performed by the Journeymen at the Apprentice's headquarters, and is therefore not available in the training program, it shall be noted in the Apprentice's work record. Progression through the Apprenticeship, or to Journeyman, or to higher classification shall not be deterred for this reason. If such a duty later becomes applicable, the Apprentice (or Journeyman if classification has since changed) shall receive the training as may be required, to attain the expected journeyman proficiency. If, after a reasonable opportunity, proficiency is not attained, bids for progression to higher classification may be subject to the provisions of Section 205.11 of the Agreement.

The Program Map and Schedule in Section V specifies the allotted hours required and periods in which the Apprentice shall receive the academic or classroom training.

Continued on next page

SECTION III – Guidelines, continued

C. General Guidelines

It is intended that one fifth (1/5) of the specified hours of OJT (Section IV) for each period of the apprenticeship will be made to the Apprentice as early in the period as is practical.

Hours shown in Section IV 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.

Except where otherwise specified, Apprentices shall be trained by assignment to work with qualified Journeymen. Progressive work experience in all phases of work should be provided throughout the first five periods of the Apprenticeship. Assignments during the last or sixth period will be made for the purpose of rounding out the Apprentice's experience.

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 on the equipment and the procedures being used. More complex assignments shall be made progressively as the Apprentice gains knowledge and ability.

As an Apprentice, work may be assigned without direct supervision only after he has:

- Achieved 2-years experience as an electrical worker.
- Received instruction on the required duties and/or work procedures.
- Performed the work under direct supervision.
- Demonstrated the capability of performing such work safely.
- Qualified to perform assigned work independently.

Repeated assignments where the apprentice is already qualified should be avoided since it takes away time for developing proficiency in other duty areas needed to complete the apprentice program.

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 beyond their current step of training.

SECTION III – Guidelines, continued

At the end of the first six-months, and at the end of each succeeding six-month interval, progress will be examined to determine that the Standards of Achievement for current status in the program have been met and to determine whether the apprentice is qualified to advance to the next step in the program in accordance with Section II, Part E – Progress Evaluation.

D. Guidelines for Training Periods

During the training periods, the Apprentice shall learn the use and care of tools and equipment and will gain knowledge of a Journeyman Electrician's work by participating in such work. The Apprentice will become familiar with the various Clearance Procedures, Workorders and Instructions applicable to the work that they perform.

The OJT portion of the Apprentice Program has been planned, both in the subject material covered and the amount of training given, to provide the basic knowledge of the Electrician's duties. A minimum total number of OJT hours has been established for each duty area and is shown in Section IV, Part B. It is expected that one fifth of the minimum total hours will be achieved each period.

The academic training should be provided in accordance with the Program Map and Schedule outlined in Section V of this document.

End of Section III

SECTION IV - General Outline of Subject Matter

A Academic Training

Academic training consists of courses in the areas listed below. The instructional settings, facility, and duration for these courses are outlined in the paragraphs that follow. Course content is described in Section IV, Heading C of this document.

Academic Course Content	Training Hours
Maintenance Orientation	20
Basic Sciences	200
Electrical Theory ((ME0004ET), which includes Investigation in Electric Power Technology (Lab-Volt 8100) Grob's Basic Electronics	460
Industrial Controls Troubleshooting Skills (Lab-Volt 3100)	200
Electrical Fundamentals (ME010000 thru ME140000)	500
Electrician Basic Qualifications	220
Total	1600

Continued on next page

SECTION IV, continued
General Outline of Subject Matter

B On-The-Job Training

The OJT portion of this Apprentice Program has been carefully designed, both in the subject matter covered and the amount of time. For each category of OJT, a minimum number of training hours have been established and is shown below.

Equipment	Training Hours
Safety Procedures, Policies, and Practices	Daily
Print Reading	350
Shop Tools	40
Test Equipment	400
Grounding	100
Basic Relay Maintenance	150
Battery Maintenance	170
Motor Maintenance	420
Motor Controls	300
Plant Cranes/Hoist Maintenance	100
Valve Actuators	300
Breaker Maintenance	250
Ground Isolation	40
Wire Terminations	100
Battery Charger Maintenance	50
Inverter Maintenance	50
Voltage Regulators	100
Total	2920

SECTION IV, continued
General Outline of Subject Matter

On-The-Job Training, continued

Each category is divided into individual items or components and is outlined on Attachment I – Daily OJT Hours located in the back of this document. The attachment specifies the training hours the Apprentice shall devote to complete the required level of training for each of the items.

It is the apprentice's responsibility to record the hours worked for the items listed in the attachment.

SECTION IV, continued**General Outline of Subject Matter****C Course Program Overview**

1. Maintenance Orientation: - Provides an overall indoctrination in departmental procedures and policies. It also includes tools to improve human performance, such as STAR, OJT training fundamentals, as well as an overview of the “clearance” process and maintenance “workorders”.

2. Basic Sciences: - Provides instruction in the following topics:

Mathematics: - provides instruction in numbers and fractions, equation solving, simplifying expressions, unit analysis, converting quantities, significant figures, powers of ten, exponential and logarithmic problem solving, square, cube and fractional exponent problem solving, and trigonometric functions

Physics: provides instruction in defining terms, energy conversion from one form to another, the six basic simple machines and Newton’s laws of motion and gravity.

Electrical Science: provides instruction in structure of the atom, generating electricity, electrical properties of materials, definition of electrical terms, magnetism and electricity, the requirements for inducing a voltage, advantages and disadvantages of alternating current, and the basic elements of electrical safety.

Properties of Nuclear Plant Materials: provides instruction in description of three basic metal crystal structures, simple stresses which may affect materials, basic properties of metals, metal failure mechanisms, properties of metals found in nuclear plant components, effects of corrosion on metals and corrosion controls, thermal stress, and radiation effects.

Basic Atomic and Nuclear Physics: provides instruction in structure and components of the atom, units for atomic structure and particle nomenclature, the radioactive decay process, nuclear interactions such as charged particles, photons and neutrons, the nuclear fission process, reactor reactivity control, and types of reactors used for power generation.

SECTION IV, continued

General Outline of Subject Matter

Basic Sciences, continued

Heat Transfer and Fluid Flow: provides instruction in identifying terms, heat cycle and plant components, modes of heat transfer, pressure, temperature and specific volume, effects of plant components on fluid parameters, causes and effects of water hammer, centrifugal and positive displacement pumps, and the causes and effects of cavitation.

Fundamentals of Hydraulics and Pneumatics: provides instruction in the transmitting force and energy, solids, liquids and gases, Pascal's Law, gauge pressure scales and applications, defining basic terms and concepts, how hydraulic energy is transmitted through a system, resistance and pressure in a hydraulic system, effects of heat, pressure differential, velocity and flow rate.

Basic Chemistry: provides instruction in definition of terms, the periodic table, atomic symbology, properties and states of matter, acids, bases and salts, the pH scale, corrosion and factors that promote corrosion, impurities in plant water systems, water chemistry control, controlling reactor coolant chemistry, effects that plant components and systems can have on secondary water chemistry, and type of sampling methods used at DCPD.

End of Basic Sciences

SECTION IV, continued**General Outline of Subject Matter****3. Power Plant Fundamentals**, Provides instruction in the following topics

Reactor and Refueling Systems: provides instruction in reactor vessel & internals, core components, Spent Fuel Pool Cooling (SFP) system, and Fuel Handling system, importance to plant safety, interrelationships between them and other systems, Technical Specification LCOs and ECGs, purpose of Integral Fuel Burnable Absorbers, system flow paths, and fuel handling tools and components.

Primary Systems: provides instruction in Reactor Coolant System (RCS), Reactor Coolant Pump System (RCP), the Steam Generator system (SG), Containment Structure System, and Containment Spray System to include block diagrams, major components, functions and locations, process flow paths, importance to plant safety and/or radioactive containment and relationship with other plant components, and the physical connections between the RCS and containment.

Steam Systems: provides instruction in the Main Steam (MS) System, Moisture Separator Reheaters (MSRs), Main Turbine System, EH Oil Supply System to include block diagrams, major components, functions and locations, process flow paths, importance to plant safety and relationship with other plant systems. It also discusses Main Turbine – Generator LO System, turbine supervisory instrumentation, and Steam Dump System importance to radioactivity in containment.

Feed Systems: provides instruction in the Condensate System, MFW System, Auxiliary Feedwater Water (AFW) System, Condenser and Condenser Air Removal System, and Circulating Water System (CWS) to include block diagrams, major components, functions and locations, process flow paths, importance to plant safety and relationship with other plant systems.

SECTION IV, continued

General Outline of Subject Matter

Power Plant Fundamentals, continued

Ventilation and Control Systems: provides instruction in Auxiliary Building Ventilation System, Control Room Ventilation System, Fuel Handling Building Ventilation System, Rod Control System, and Main Feedwater Control System to include purpose, block diagrams, major components, functions and locations, process flow paths, Control Room Ventilation System alignments, and importance to plant safety and radioactive containment, and relationship with other plant systems.

Electrical Systems: provides instruction in the Plant Electrical System, Main Generator and related equipment, and the DG System to include purpose, block diagrams, major components, functions and locations, process flow paths, Control Room Ventilation System alignments, and importance to plant safety and radioactive containment, and relationship with other plant systems.

Plant Protective Systems: provides instruction in Reactor Protections System (RPS), Eagle 21 and Solid State Protection Systems (SSPS), Nuclear Instrumentation (NI) Systems, Incore Instrument Systems, DC Power System, and Instrument AC System to include purpose, block diagrams, major components, functions and locations, process flow paths, importance to plant safety and radioactive containment, and relationship with other plant systems.

Miscellaneous Systems: provides instruction in Liquid Radwaste Systems, Gaseous Radwaste System (GRS), Service Cooling Water (SWC) System, Fire Detection System, Cardox System and Fire Water System. Areas covered include purpose of system, block diagram, importance to plant safety and/or radioactive containment, basic interrelationship between other systems, major components, and specific area/and or components of each system are discussed.

SECTION IV, continued

General Outline of Subject Matter

4. **Electrical Fundamentals**, Provides instruction in the following topics:

Electrical Safety: (ME000401) - Provides instruction in the responsibilities of employees, electrical definitions associated with the Electrical Safety Program Procedure OM6.ID12, the protection boundaries for shock and flash hazards and the proper Personal Protective Equipment (PPE) requirements, safety requirements and concerns of specific technical areas, the attitude and the key physical habits that should be developed to safely work on energized equipment/circuits, and the use and care of rubber protective tools associated with electrical safety.

Electrical Test Equipment Fundamentals. (ME040101) - Provides instruction on the basic use of ammeters, voltmeters, ohmmeter, and multimeters.

Electrical Sciences, *(ME000402) – Introduces the student to the electrical charge, magnetic fields, conductor and insulators, electron flow, Ohm’s Law, and how electricity is produced.

DC Circuit Principles, Part I *(ME000403) – Provides instruction the fundamentals regarding DC electrical circuits, Kirchoff’s Laws for Voltage and Current, inductors and capacitors.

DC Circuit Principles, Part II *(ME000404) – Provides instruction on the principles of the battery cell, DC generators and motors.

SECTION IV, continued

General Outline of Subject Matter

Electrical Fundamentals, Provides instruction in the following topics:

AC Circuit Fundamentals: *(ME000405) - Provides instruction on the theory of AC circuits. The lesson includes a multitude of subjects such as frequency, peak, peak-to-peak, Average, and RMS voltage, circuit reactances and its relation to power.

Three Phase AC Circuit Fundamentals, *(ME000406) - Provides instruction on three phase generators, phase sequencing, apparent power, reactive power, and true power.

Grounding Principles, *(ME000407) - Provides instruction on the different types of station and personal grounds, why they are used, as well as when and how to use them.

Transformer fundamentals *(ME000408) - Provides instruction on the theory, construction, and operating characteristics of the single-phase transformer.

Three-Phase Transformer Fundamentals *(ME000409) - Provides instruction on the theory, construction, connection, and operating characteristics of the three-phase AC transformer.

Semiconductors (ME000410) - Provides instruction on the theory and operation of solid state devices that is applicable to electrical circuits and controls.

SECTION IV, continued
General Outline of Subject Matter

Electrical Fundamentals, Provides instruction in the following topics:

AC Machines *(ME110202) - Provides instruction on the theory, construction, and operating characteristics of single-phase and three-phase AC motors.

AC Generators *(ME110206), Provides instruction on the theory, construction, and operating characteristics of AC generators.

*NOTE: Lessons ME000402 thru ME000409, ME110202, and ME110206 incorporate Lab-Volt **Investigation in Electric Power Technology** (8001) experiments that are relative to the subjects discussed.

SECTION IV, continued

General Outline of Subject Matter

Electrical Fundamentals, continued

Industrial Controls Troubleshooting Skills: (3100), This Lab-Volt course series is a fault-assisted controls training program that allows the student to select and mount control devices, form typical control circuits, and troubleshoot control circuits listed below.

- Unit 1 – Introduction to Motor Controls
- Unit 2 – Control Pilot Devices
- Unit 3 – Circuit Layout Connections and Symbols
- Unit 4 – Basic Control Circuits
- Unit 5 – AC Reduced Voltage Starters
- Unit 6 – Three Phase, Multi-speed Controllers
- Unit 7 – Wound Rotor Controllers
- Unit 8 – Synchronous Machine Controls
- Unit 9 – DC Controllers
- Unit 10 – Jogging Circuits
- Unit 11 – Braking Methods
- Unit 12 – Rectifier Circuits
- Unit 13 – Electronic Power Controls
- Unit 14 – Limit Sensing Switches

The Lab-Volt exercises are designed to develop the students troubleshooting skills as they learn about various control devices.

The courses consist of reading the Lab-Volt text material provided on certain controllers, connecting control circuit using the controllers, then troubleshoot and locate the fault inserted by hidden fault switches selected by the instructor.

Course administration is self-study with instructor oversight.

Continued on next page

SECTION IV, continued

General Outline of Subject Matter

Electrical Fundamentals, continued

Print Reading: (ME010000) - Provides instruction on the construction standards and features, between the different types of mechanical, instrument, and electrical drawings. The course includes the use of PG&E programs such as PIMS and SRData to obtain drawings using circuit numbers and equipment location codes, as well tracing electrical circuits to determine operation and point-to-point configuration.

Bolting Practices: (ME020000) – Provides instruction in fastener failure mechanisms and the proper methods to prevent them.

Lubrication-Bearings-Couplings: (ME030000) – Provides instruction on the various types of bearings, lubrication methods, and failure mechanisms.

Electrical Test Equipment: (ME040000) – Provides instruction on some of the common test equipment used by electricians such as voltage, current, frequency sources, timers, oscilloscopes, meggers, breaker testers, load test and relay test equipment.

Grounding, Cabling, and Conduit: (ME050000) – Provides instruction on the different types of electrical conductor materials and insulation, how to test them, and how to select the proper crimping device to join them.

Meters: (ME060000) – Provides instruction on the different types of meters, how to connect and test them.

Transformers: (ME070000) – Provides instruction on the function and operation of transformers, the terminology applied to their construction and operation, and considerations and procedures for various transformer connections.

SECTION IV, continued
General Outline of Subject Matter

Electrical Fundamentals, continued

Circuit Protection: (ME080000) – Provides instruction on the construction and function of the different types of circuit protection devices such as fuses, overload heaters, and circuit breakers.

Relays: (ME090000) – Provides instruction on the basic relays such as control relays, over / under voltage relays, non-directional over / under current and differential relays

Rotating Electrical Machinery: (ME110000) – Provides instruction on DC /AC Motor and Generator machine fundamentals

Controllers and Pilot Devices (ME130000) - Provides instruction in fundamental temperature concepts, temperature sensors, operating principles, thermocouples, RTD, and thermistor.

Systematic Approach to Troubleshooting: (ME140000) provides instruction in the seven step process on troubleshooting including precautions, site references, electrical safety precautions, troubleshooting plan boundaries, failure analysis, operability tests,

SECTION IV, continued

General Outline of Subject Matter

5. **Electrician Basic Initial Qualifications** - Upon completion of the Apprenticeship program, the student will have attained satisfactory completion of the training and job performance elements to be qualified in the "Basic" Electrical tasks listed below:

ME05Q102, Install Ground Buggy: – Install personal grounds (up to 500Kv) and 4Kv and 12Kv station ground buggies.

ME05Q303 Low Voltage Terminations: - Lift, land, relug, and install voltage terminations on AC and DC circuits up to 480Vac.

ME08Q301, Molded Case Circuit Breakers – Install, remove, test, and repair AC and DC molded case circuit breakers.

ME09Q104, Basic Relay Maintenance – Remove, clean, inspect, calibrate, reinstall, and perform off-line or standard functional tests of basic relays.

ME10Q101, Battery Maintenance – Perform specific gravity readings and corrections, cleaning, connection checks, voltage checks, and charging on station batteries.

ME11Q306, AC Machine Maintenance – Perform preventative and corrective maintenance on low voltage single phase and three phase motors.

ME11Q406, DC Machine Maintenance – Perform preventative and corrective maintenance on DC motors.

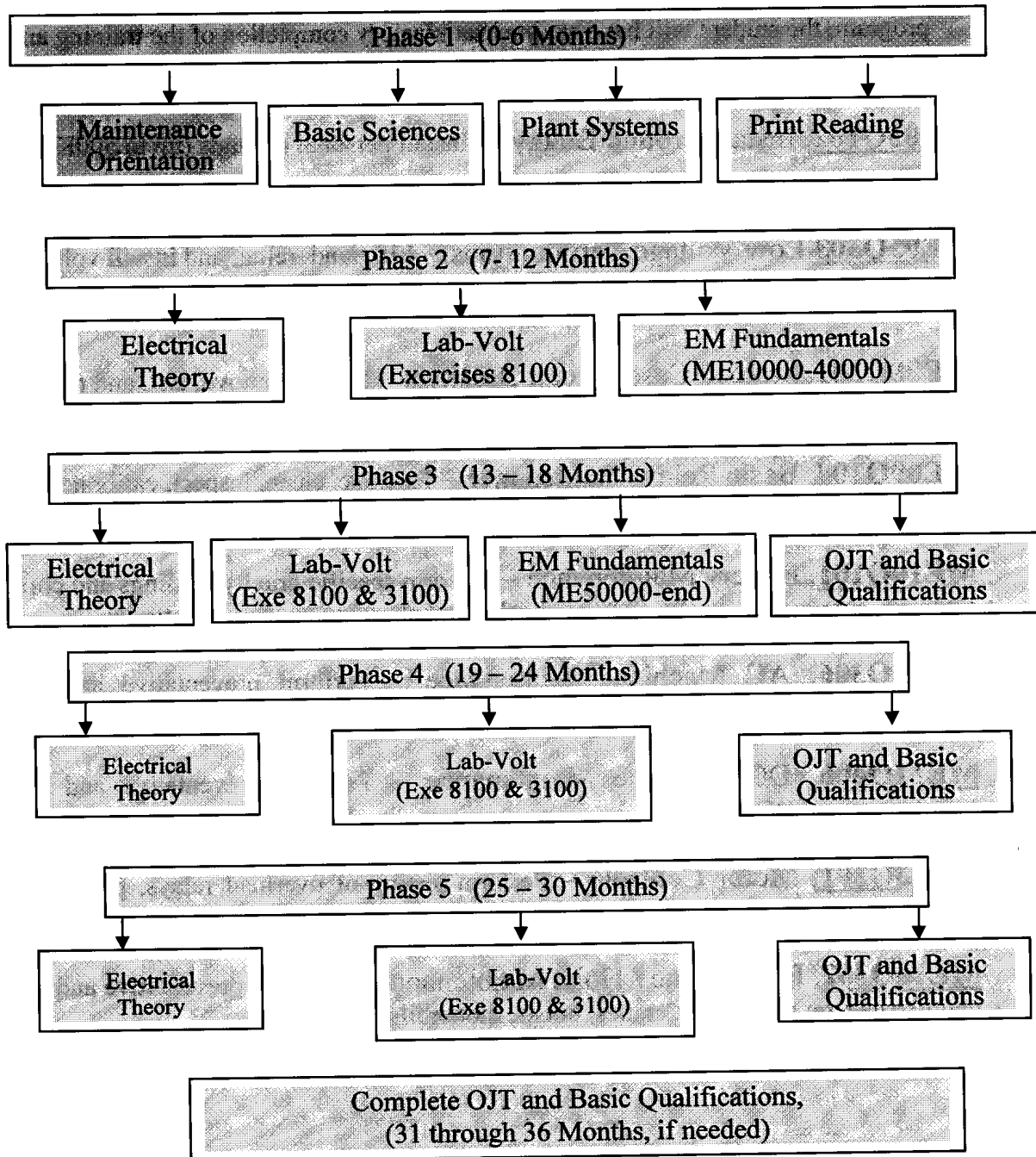
ME13Q201, Motor Controls – Perform testing of overload relays, preventative and corrective maintenance on motor control circuits for AC and DC motors less than 600 volts.

ME18Q302, Plant Crane / Hoist Maintenance – Perform preventative and corrective maintenance on small plant cranes, hoists, monorails, and winches.

End of Section IV

Section V - Program Map and Schedule

A. Program Schedule



TITLE: **APPRENTICE ELECTRICIAN PROGRAM OF INSTRUCTION**

B. Academic Schedule

Academic Schedule						
Period	0 to 6 months	7 to 12 months	13 to 18 months	19 to 24 months	25 to 30 months	31 to 36 month
Maintenance Orientation	DCPP (20 Hours)					
Basic Sciences						
Basic Sciences	110 Hours					
Plant Systems	100 Hours					
Print Reading	40 Hours					
Electrical Safety (ME000401)	5 Hours					
Electrical Theory (ME040401 & ME000402 thru ME000404)		130 Hours				
Electrical Theory (ME000405 thru ME000410)			275 Hours			
Investigation into Electric Power Technologies (Lab-Volt 8001)		200 Hours				
Industrial Controls Troubleshoot Skills (Lab-Volt 3100)				200 Hours		
Basic Qual Prereq's (ME010000 thru ME140000)			230			
EM Basic Initial Training					260 Hours	
Basic Qualifications						65 Hours

End of Section V

SECTION VI - Training Records Management

Auditable records are required for documentation of training in support of the Journeyman Electrician Apprentice Program. Training records will be established for each Apprentice candidate for both academic and OJT provided in accordance with TQ2.ID6, Training Records Management and TQ1.ID4, Non-Accredited Training Records.

A. Academic Training Courses

Each academic course taught will be documented with a Training Attendance Record. Training Attendance Record should include: Program/Course and Topic information, date of training, class number, lesson revision number and date, class title, number of class hours, instructor(s) signature(s), program coordinator signature, date student attended, student name, student identification, student signature, quiz, test, and/or exam score, as applicable. If a course is made up of multiple lessons (e.g., EM Basic Sciences – Chemistry, Physics, etc.) a Training Attendance Record will be developed for each lesson.

B. Basic Qualifications

Task qualifications are accomplished with TPEs. TPE (Task Performance Evaluation) is the evaluation of the student's performance of a task under controlled conditions and measured against observable and quantifiable standards. TPE is the evaluation of those skills and knowledge performed during the OJT phase of apprentice training.

It is recognized that academic and OJT, while vital to the learning process, are not by themselves a stand-alone methodology to completely train the apprentice in all the skills and knowledge necessary for Journeyman status. This program recognizes the importance of plant work and time-in-grade to complete a well-rounded training program.

Task qualification will not be granted until the apprentice has a minimum of 24-months as an electrical worker, and the appropriate academic and OJT requirements are completed.

TPEs will be documented in accordance with TQ2.ID4, Training Program Implementation.

By the end of this program, the apprentice will have met the requirements and obtained the Basic Qualifications for Journeyman Electrician. The requirements for the Basic Qualifications are outlined in the Electrical Maintenance Program of Instruction (POI). The successful completion for those qualifications will be documented in accordance with TQ2.ID6, *Training Records Management*.

Completed records of monthly assignments and progress will be kept in a file with the General Foreman, and reviewed with the apprentice as part of the evaluation process. Upon successful completion of the program, these files may be given to the apprentice or destroyed.

SECTION VII - Progress Documentation Procedures

A. Documenting OJT Hours (Attachment I)

OJT hours are recorded daily on **ATTACHMENT I, Daily OJT Hours**.

Attachment I "Minimum Training Hours" column is the total hours required for the entire 30-month period for each of the items listed.

The Apprentice will document hours spent on Attachment I for that date.

(Portion of Attachment I, Daily OJT Hours)

Item	Minimum Training Hours	Previous Month(s) Total	This Month's Total	Day of the Month				
				1	2	3	4	5
Single Lines	50		8			3	5	
Schematics	100		3	1				2
Diagram of Connections	100		5	1			4	
Vendor Drawings	50		5	1			4	

TITLE: APPRENTICE ELECTRICIAN PROGRAM OF INSTRUCTION

At the end of each month, the Apprentice will add the hours accumulated in each area and record the total time in the "This Month's Total" column. See example below. The Foreman and General Foreman will then review, comment, and sign document at the bottom of page one in Attachment I. This is to acknowledge the apprentice's progress, and adjust the apprentice's crew assignment as necessary in order to provide OJT hours for each item listed.

(Portion of Attachment I, Daily OJT Hours)

Item	Minimum Training Hours	Previous Month(s) Total	This Month's Total	Day of the Month				
				1	2	3	4	5
Single Lines	50	10	18			3	5	
Schematics	100	20	23	1				2
Diagram of Connections	100	5	10	1			4	
Vendor Drawings	50	10	15	1			4	

Monthly

Foreman Sign _____

Comments _____

G.F. Sign _____ / _____

Comments _____

TITLE: APPRENTICE ELECTRICIAN PROGRAM OF INSTRUCTION

At the end of each period, (sixth, twelve, eighteenth, twenty-fourth, and thirtieth –month), the Attachment I for that month is forwarded Line Manager for his review and comment. The Line Manager will forward the forms to the Human Resources Department for their review and comment and return them to the plant prior to the end of the next month. These forms will be filed in the Apprentice’s training folder.

6-Month Periods

Line Manager _____ / _____

Comment _____

HR Rep _____ / _____

Comment _____

NOTE: Attachment I in this document is for discussion and reference only. The actual version is on an EXCEL spreadsheet. The spreadsheet provides automatic calculations to track total hours for each item. Use of this feature is optional. To access to the file, click on the hyperlink below.

[Shortcut to EM Apprentice Electrician Daily OJT Hours Tracking Sheets.xls.lnk](#)

B. Academic Training and Documentation

Academic training will be administered through the Training Department.

The apprentice will be evaluated for each academic subject by a written test. Passing score is 70%. Documentation will be per TQ2.ID6, *Training Records Management*.

End of Section VII



Attachment I, Academic Training Schedule (Sheet 1 of 6) (Sample Sheets)

Name: _____

User ID: _____

Plant _____

Month / Year ____ / ____

Print Reading (300 hours)

Item	Minimum Training Hours	Previous Month Total	This Month's Total	DAY OF THE MONTH																																
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
Single Lines	50	0	0																																	
Schematics	100	0	0																																	
Diagram of Connections	100	0	0																																	
Vendor Drawings	50	0	0																																	

Shop Tools (40 hours)

Item	Minimum Training Hours	Previous Month Total	This Month's Total	DAY OF THE MONTH																																	
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
Tool Pouch tools	2	0	0																																		
Drill motor & Press	2	0	0																																		
Grinders / Files	2	0	0																																		
Electric/Hand Conduit Benders	20	0	0																																		
Greenlee Knock-outs	2	0	0																																		
Torque Wrenches	2	0	0																																		
Micrometers	10	0	0																																		
Hyd / Mech Presses	2	0	0																																		

Monthly

Monthly

6-Month Periods

Foreman Sign _____

G.F. Sign _____ / _____

Line Manager _____ / _____

Comments _____

Comments _____

HR Rep _____ / _____

Comment _____

Attachment I, Academic Training Schedule (Sheet 6 of 6)

Name _____ User ID _____ Plant _____ Month / Year ____ / ____

Battery Chargers, Inverters, & Voltage Regulators (200 Hours)

Item	Minimum Training Hours	Previous Month(s) Total	This Month's Total	DAY OF THE MONTH																															
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Battery Charger Maintenance	50	0	0																																
Inverter Maintenance	50	0	0																																
Main Generator Voltage Regulator	50	0	0																																
Diesel Generator Voltage Regulator	50	0	0																																

End