



**Pacific Gas and  
Electric Company.**

# LETTER AGREEMENT NO. 07-50-PGE

**IBEW**



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LABOR RELATIONS DEPARTMENT  
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INTERNATIONAL BROTHERHOOD OF  
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LOCAL UNION 1245, I.B.E.W.  
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STEPHEN A. 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 95696

Dear Mr. Dalzell:

The Company and Union agreed to revisions of the Apprentice Instrument Repairman Training Program in Letter Agreement 06-55. Since that time, the subcommittee had developed additional revisions that 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 Instrument Repairman Training Program.

If you are in accord with the foregoing and agree thereto, please so indicate in the space provided below 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 INSTRUMENT REPAIRMAN PROGRAM OF INSTRUCTION**

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**References**

1. Training Program for the Apprentice Instrument Repairman in Nuclear Power Plants, 3/1/89 Edition
2. TQ1.ID4, Non-Accredited training Records
3. I&C Initial Training Program of Instruction
4. M/M Initial Training Program of Instruction
5. EM Training Program of Instruction
6. Lab-Volt CBT Course 91001, DC Fundamentals
7. Lab-Volt CBT Course 91003, AC 1 Fundamentals
8. Lab-Volt CBT Course 91005, Semiconductor Fundamentals
9. Lab-Volt CBT Course 91006, Transistor Amplifier Circuits
10. Lab-Volt CBT Course 91007, Transistor Power Amplifiers
11. Lab-Volt CBT Course 91008, Transistor Feedback Circuits
12. Lab-Volt CBT Course 91009, Power Supply Regulators
13. Lab-Volt CBT Course 91010, FET Fundamentals
14. Lab-Volt CBT Course 910012, Operational Amplifier Fundamentals
15. Lab-Volt CBT Course 910014, Digital Logic Fundamentals
16. Lab-Volt CBT Course 910015, Digital Circuit Fundamentals 1
17. Lab-Volt CBT Course 910016, Digital Circuit Fundamentals 2
18. Lab-Volt CBT Course 91019, Transducer Fundamentals

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*Continued on next page*

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AUTHOR:	DAVE LARSON	DATE:	10/5/06
REVIEWED BY:	GUY VAUGHAN TRAINING LEADER	DATE:	5/20/05
REVIEWED BY:	MARK TAYLOR UNION COMMITTEE	DATE:	5/20/05
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REVIEWED BY:	BOB CHOAT ASSISTANT BUSINESS MANAGER	DATE:	5/20/05
APPROVED BY:	JOINT APPRENTICESHIP AND TRAINING COMMITTEE	DATE:	7/8/2005 REV. 0A

**Remarks**

1. Assumed entry level skills and knowledge – The Apprentice Instrument Repairman 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.
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 per the Master Assignment Chart Review and Comments form.
3. Changes will be documented by revision bars in the right margin.

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*End of Remarks*

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## **SECTION I - Introduction**

### **A. Introduction**

Upon selection of the Instrument Repairman 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 rapid 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 select training material has been assembled. This material has been carefully chosen to give sound training in the discipline of I&C maintenance.

This training program will provide the Apprentice candidate with the means to associate theories with the practices of the Instrument Repairman 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.

There is no simple way to acquire the related information and skills of any trade. Considerable study and diligent work are 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 Instrument Repairman, Journeyman Instrument Repairman, Apprentice Control Technician and 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.

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*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 "theory", principals of operation, and construction. Academic instruction includes CBT lessons and works in conjunction with performance-based training such as OJT, laboratory, and CBT laboratory. 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.

### **B. On-The-Job Training**

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 to provide practical training with hands-on applications 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 and by line and other than line personnel, providing they are task qualified in the task to be trained. The OJT hours shown in Section V.B., General Program Schedule, are adequate to complete the program in the allotted time.

Scheduling - OJT is divided into 10 categories (e.g., Control System Equipment, Test equipment, etc.) with minimum hourly OJT requirements given (see Section IV). The foreman is responsible for assigning the Apprentice to plant work. Utilizing the Master Assignment Chart (Attachment 6) and long-term training schedule, the foreman will be capable of resource loading the P-3 schedule for the required Apprentice OJT training hours when practical.



### C. Program Management

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 entering into the Instrument Repairman 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 Instrument Repairman 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 Instrument Repairman Initial Training Program of Instruction. Supervision of the Apprentice Training Program is the responsibility of the maintenance Foreman. The maintenance foreman is responsible for assigning the apprentice to plant work, review of training records, and remedial study plans. The foreman is assisted, as necessary, by other plant personnel such as Journeyman and training department instructors.

#### D. Progress Evaluation

Evaluation of successful progress through the Instrument Repairman Apprentice Program consists of two criteria. The first is academic achievement evaluated by tests and exams. The second is hourly recommended OJT as stated in Section IV of this document. Periodic tests and reviews will be held for the purpose of evaluating overall progress and determining success within the program. If academic progress becomes unsatisfactory, below the minimum level of 70%, the Foreman/instructor will review performance and recommend steps for remediation. It is recognized that it may not be possible to attain the scheduled OJT hours due to plant evolutions or training availability in a particular area. Should the Apprentice fail to complete the scheduled hours, they may be made up at a later date. Satisfactory completion of the Apprentice Program requires completing the total OJT hours as shown in Section V.B., General Program Schedule.

After a failure of a test or exam, line supervision will be notified, and the Apprentice shall be offered remediation and allowed to retake the test. Two additional tests shall be allowed at line supervision discretion. Academic failure will be addressed per SECTION F of the Company-Union Agreement.

The above shall also apply to hourly requirements of OJT given in conjunction with academic training. Records of progress will be kept and reviewed as part of the evaluation process.

If an Apprentice does not maintain an acceptable academic work and OJT level, notice shall be given to the Union's Business Representative or their designee. Progress to the next higher wage step, or demotion, shall be in accordance with Paragraphs F3, 4, 5, and 6 of the Master Apprenticeship Agreement. An Apprentice shall not be held back from the next higher wage step because the necessary academic training was not provided prior to one of these steps.

#### E. Apprentice Responsibility

It is the Apprentice's responsibility to maintain a grade average above the minimum level of 70%, satisfy the program OJT hourly requirement, and complete applicable TPEs to remain in the program. If the need for assistance arises, it is the Apprentice's responsibility to discuss these matters with plant supervision.

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*End of Section II*

### **SECTION III – Guidelines**

#### **A. Goals of the Apprentice Instrument Repairman 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 program Map and General Program Schedule in Section V also specify those training periods in which the Apprentice shall receive related academic or classroom training.

The amount of OJT as specified in Section IV 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.

### C. General Guidelines

It is intended that assignment 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 capability.

As an Apprentice, work may be assigned without direct supervision only after instruction on the required duties and/or work procedures; after such work has been performed under direct supervision; and after the capability of performing such work safely has been demonstrated. At DCP, only task-qualified personnel will perform work independently.

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.

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 VII – Progress Documentation Procedures and Attachment 6, Master Assignment Chart.

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 Instrument Repairman's work by participating in such work. The Apprentice will become familiar with the various Clearance Procedures, General Orders and Instructions applicable to the work that they perform.

The academics will be provided as outlined in Section IV and in accordance with the program map of Section V.

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 Instrument Repairman's duties. A Minimum number of training hours has been established for each phase of the OJT as shown on the Master Assignment Chart in Attachment 6.

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*End of Section III*

**SECTION IV - General Outline of Subject Matter**

A. Academic Training

Academic training will consist of four courses. The instructional settings, facility, and duration for these courses are outlined in the paragraphs that follow. Course content is described in Section IV.C. Specific details, such as lesson titles, lesson numbers and JPMs are covered in Attachments 1 through 4.

<b>Academic Course Content</b>	<b>Training Hours</b>
Mathematics	40
I&C Basic Sciences	120
I&C Fundamentals	970
I&C Basic Technician Qualifications-	613
<b>Total:</b>	<b>1743</b>

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 phase of the OJT, a minimum number of training hours have been established and is shown on Attachment 6. The total hours are as follows:

<b>Equipment</b>	<b>Training Hours</b>
Control System Equipment	530
RCA Work Practices	180
Miscellaneous Equipment	540
Machine Shop Tools	30
Test Equipment	365
Controllers	150
Control Valves & Indicators	200
Supervisory Instruments	380
Recorders and Indicators	340
Boiler System Equipment*	(850)
<b>Total:</b>	<b>2715 / (3565)</b>

\* - N/A DCPD

Each category is divided into individual items or components and the schedule (see Attachment 5 – Daily OJT Hours) specifies the training hours the Apprentice shall devote to complete the required level of training for each of the items.

Electricity and Electronic Experiments OJT is performed during the CBT phase and is not documented on Attachment 5.

Boiler System Equipment is N/A to DCPD and is annotated as such on Attachment 5. These hours apply to an IR who wishes to transfer to a fossil generating plant.

### C. Program Overview

#### **Mathematics:**

**Mathematics:** (TBS01) 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, trigonometric functions, graph plotting and information from strip, circular charts and nomograms.

#### **I&C Basic Sciences:**

Provides instruction in the following topics:

**Physics:** (MBS0100) 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:** (MBS0200) 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.

**Heat Transfer and Fluid Flow:** (MBS0500) 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:** (MBS0600) 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:** (MBS0700) 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 types of sampling methods used at DCP.

**Basic Atomic and Nuclear Physics:** (MBS0400) 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.

**Properties of Nuclear Plant Materials:** (MBS0300) 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.

**Reactor and Refueling Systems:** (MPS1) 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:** (MPS2) 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:** (MPS3) 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 containment.

**Feed Systems:** (MPS4) 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.

**Safety Systems:** (MPS5) provides instruction in Chemical and Volume Control System (CVCS), Reactor Makeup Water System, Residual Heat Removal (RHR) System, Emergency Core Cooling System (ECCS), Component Cooling Water (CCW) System, and Auxiliary Salt Water (ASW) System to include purpose, block diagrams, major components, functions and locations, process flow paths, and importance to plant safety and radioactive containment, relationship with other plant systems and the physical connections and/or cause effect relationships between the Fire Water System and the Centrifugal Charging Pumps (CCPs).

**Ventilation and Control Systems:** (MPS6) 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:** (MPS7) 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:** (MPS8) 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:** (MPS9) 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.

**I&C 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 you should develop to safely work on energized equipment/circuits, and the use and care of rubber protective tools associated with electrical safety.

**Basic Test Equipment Fundamentals:** (IABFTE) provides instruction in M&TE definition, concepts with test equipment hierarchy, how used to perform an instrument calibration, identify terms and concepts, determine cal status and restrictions associated with test equipment with special use labels, interpret restrictions associated with test equipment, test equipment checkout process during and after normal working hours, restrictions associated with test equipment control, and determine requirements for use and control of M&TE from control references.

**Basic Electronic Test Equipment:** (IABETE) provides instruction in purpose and capability of Fluke digital multimeter to include purpose/function of controls, connections, indicators and adjustments, process for obtaining resistance, voltage or current measurements, precautions and limitations, interpret info in site references associated with Ronan calibrator and Omnilight recorder, and applying human performance concepts.

**Basic Specialized Test Equipment:** (IABSTE) provides instruction in purpose and major components, operational features of digital o-scope, probes, determining electrical measurements waveform, Tektronix digital o-scope, Time Domain Reflectometer, determine cable condition from display, interpret info in site references associated with Tektronix TDR, interpret info in site references associated with Hewlett Packard function generator, and applying human performance concepts.

**DC Electronics:** Computer based training with two lessons that provide instruction in:

**DC Fundamentals:** (91001)

- Unit 1 – Trainer Familiarization
- Unit 2 – Safety
- Unit 3 – Electronic Quantities
- Unit 4 – DC Power Sources
- Unit 5 – Switches and Switching Concepts
- Unit 6 – Ohm's Law
- Unit 7 – Series Resistive Circuits
- Unit 8 – Parallel Resistive Circuits
- Unit 9 – Series/Parallel Resistive Circuits
- Unit 10 – Power in DC Circuits
- Unit 11 – Potentiometers and Rheostats
- Unit 12 – Voltage and Current Divider Circuits
- Unit 13 – Direct Current Meters

**Magnetism:** (91020)

- Unit 1 – Magnetism
- Unit 2 – Electromagnetism

**AC Electronics:** Computer based training with one lesson that provides instruction in:

**AC1 Fundamentals** (91003):

- Unit 1 – The AC Waveform Generator
- Unit 2 – AC Measurements
- Unit 3 – Inductance
- Unit 4 – Inductive Reactance
- Unit 5 – Transformers
- Unit 6 – Capacitance
- Unit 7 – Capacitive Reactance
- Unit 8 – Time Constants

**Semiconductors:** Computer based training with one lesson that provides instruction in:

**Semiconductor Fundamentals:** (91005)

- Unit 1 – Introduction to Semiconductors
- Unit 2 – Diodes and Half-Wave Rectification
- Unit 3 – Full-Wave Rectification and Filtering
- Unit 4 – Diode Wave Shaping and Zener Regulation
- Unit 5 – Transistor Junctions & PNP DC BIAS
- Unit 6 – Transistor Load Lines and Gain

**Electronic Circuits:** Computer based training with seven lessons that provide instruction in:

**Transistor Amplifier Circuits:** (91006)

- Unit 1 – Introduction to Transistor Amplifiers
- Unit 2 – Common Base Circuit
- Unit 3 – Common Emitter Circuit
- Unit 4 – Common Collector Circuit
- Unit 5 – Bias Stabilization
- Unit 6 – Transistor Specification Sheet
- Unit 7 – RC Coupling
- Unit 8 – Transformer Coupling
- Unit 9 – Direct Coupling

**Transistor Power Amplifiers:** (91007)

- Unit 1 – Circuit Board Familiarization
- Unit 2 – Single-ended Power Amplifier
- Unit 3 – Phase Splitter
- Unit 4 – The Push-pull Power Amplifier
- Unit 5 – The Complementary Power Amplifier
- Unit 6 – The Darlington Pair

**Transistor Feedback Circuits:** (91008)

- Unit 1 – Introduction to the Circuit Board
- Unit 2 – Series Feedback
- Unit 3 – Shunt Feedback
- Unit 4 – Multistage Amplifier Feedback
- Unit 5 – Differential Amplifiers

**Power Supply Regulators:** (91009)

- Unit 1 – Circuit Board Familiarization
- Unit 2 – Shunt Voltage Regulator
- Unit 3 – Series Voltage Regulator
- Unit 4 – Voltage Feedback Regulation
- Unit 5 – Current Regulator
- Unit 6 – Three-Pin IC Regulator
- Unit 7 – DC to DC Converter

**FET Fundamentals:** (91010)

- Unit 1 – Circuit Board Familiarization
- Unit 2 – Junction FETS
- Unit 3 – JFET Amplifier
- Unit 4 – JFET Current Source
- Unit 5 – Dual Gate MOSFET
- Unit 6 – Unijunction Transistors
- Unit 7 – Hartley and Colpits Oscillators 5
- Unit 8 – Transducers

**Operational Amplifiers fundamentals:** (91013)

- Unit 1 – The Operational Amplifier
- Unit 2 – The Inverting Amplifier
- Unit 3 – The Noninverting Amplifier
- Unit 4 – The Voltage Follower
- Unit 5 – The Inverting Summer
- Unit 6 – The Noninverting Summing Amplifier
- Unit 7 – The Difference Amplifier
- Unit 8 – Voltage Comparators

**Thyristor & Power Control circuits:** (91011)

- Unit 1 – Thyristors and Power Control Circuits
- Unit 2 – Silicon Controlled Rectifier
- Unit 3 – SCR DC Control
- Unit 4 – SCR AC Control
- Unit 5 – UJT Triggered SCR Power Control
- Unit 6 – TRIAC Devices
- Unit 7 – TRIAC AC Power Control

**Basic Digital Electronics:** Computer based training with one lesson that provides instruction in:

**Digital Logic Fundamentals:** (91014)

- Unit 1 – Introduction to the Circuit Board
- Unit 2 – Fundamental Logic Elements
- Unit 3 – Exclusive-OR/NOR Gates
- Unit 4 – Open Collector and Other TTL Gates
- Unit 5 – Flip-Flops
- Unit 6 – JK Flip-Flop
- Unit 7 – Tri-State Output
- Unit 8 – TTL and CMOS Comparison
- Unit 9 – Data Bus Control

**Advanced Digital Electronics:** Computer based training with two lessons that provide instruction in:

**Digital Circuit Fundamentals 1:** (91015)

- Unit 1 – Circuit Board Introduction
- Unit 2 – Asynchronous Ripple Counter
- Unit 3 – Synchronous Counter
- Unit 4 – 4-BIT Shift Register
- Unit 5 – 4-BIT Adder
- Unit 6 – 4-BIT Comparator

**Digital Circuit Fundamentals 2:** (91016)

- Unit 1 – 1 Circuit Board Familiarization
- Unit 2 – Decoder and Priority Encoder
- Unit 3 – ADC and DAC Operation
- Unit 4 – Multiplexer and Demultiplexer
- Unit 5 – 7-Segment Driver/Display
- Unit 6 – Parity Generator/Checker



**Motor Controls:** Computer based training with one lesson that provides instruction in:

**Motors Generators and Controls:** (91024)

- Unit 1 – Familiarization
- Unit 2 – DC Motor Positioning
- Unit 3 – DC Speed Control
- Unit 4 – AC Asynchronous Motor Control
- Unit 5 – The Stepper Motor and Controller
- Unit 6 – Troubleshooting
- Unit 7 – Microprocessor Interface

**Transducer Fundamentals:** Computer based training with one lesson that provides instruction in:

**Transducer Fundamentals:** (91019) *This module is for information only, no objectives reside in VISION and is not part of the ICPOI. No test, PIMS (or equivalent database) credit only upon completion of the module.*

- Unit 1 – Familiarization
- Unit 2 – IC Temperature Transducer
- Unit 3 – The Thermistor
- Unit 4 – The RTD
- Unit 5 – The Thermocouple
- Unit 6 – The Capacitance Sensor
- Unit 7 – The Strain Gauge
- Unit 8 – Ultrasonic Transducers
- Unit 9 – The Infrared Controller
- Unit 10 – Computer Interfacing

**Microprocessor Basics:** (ICMB04) provides instruction in definition of terms, converting digital units, use of logic circuits, truth tables, flip flop operation, storage and memory, interconnections within a microprocessor, bus types and functions, and identifying the different types of CPU's used at DCP and their differences.

**Basic Physical Test Equipment:** (IABPTE) provides instruction in analog pressure gauge purpose and capability, construction and operation, process to calibrate, interpret info in site references associated with Heise/Mensor pressure gauge, requirements to select replacement bolt or fastener, how fasteners are torqued and commonly encountered problems during torquing, use and operation of torque wrenches and accessories, and applying human performance concepts.

**I&C Print Reading:** (ICPR01) provides instruction in major features, classifications, document control, types of drawings, PIMS, use of PG&E programs to support maintenance activities, circuit numbers and equipment location codes, interpreting a DCPD print for circuit operation, applying human performance concepts to print reading.

**Systematic Approach to I&C Troubleshooting:** (IABTS) provides instruction in the seven step procedure, equipment failure, precautions, site references, electrical safety precautions, failure analysis, operability tests, indications of failure, precautions to minimize static electricity damage, effects of site requirements concerning minor maintenance work orders affects on troubleshooting.

**I&C Basic Technician Qualifications:**

Provides instruction in the following topics:

**Basic Soldering and Circuit Board Repair for Electronics:** (IACD01) provides instruction in soldering, soldering preparations, procedures, component replacement methods, and printed circuit board repair techniques. Lab portion provides familiarization for soldering electrical and electronic components.

**Control Power Splices and Terminations:** (IABCPT) provides instruction in conductors and connectors, terms and definitions, preparation and fabrication, selecting terminations, site information available in termination references, using site references to determine requirements to fabricate a connection. Lab portion provides familiarization for making control power splices and terminations.

**Tubing and Fittings:** (IZAB010) provides instruction in fabricating fittings, bending tubing, tube cutting, bending and de-burring tools, Swagelok installation, tightening, re-tightening and gap measurement common errors, safety considerations, fittings used at DCP. Lab portion provides familiarization for bending, installing, removing, and leak checking instrument tubing and fittings.

**Measurement Fundamentals:** (IAFA010) provides instruction in identifying components within an instrument channel and their functions, identifying terms and definitions, interpreting linear, log, and square root scales, determining input and output values for a five-point calibration and conditions that may require an instrument to be calibrated.

**Temperature Sensors:** (IPSI01T) provides instruction in fundamental temperature concepts, temperature sensors, operating principles, thermocouples, RTD, thermistor and industry events. During lab, utilizing Hart dry-well calibrator and Omega digital calibrator, calibrating bimetallic temperature sensor and bulb temperature switch, and checking a thermocouple and RTD.

**Pressure and Flow Sensors:** (IPSI01PF) provides instruction in fundamental pressure concepts, pressure references, fluid flow and flow through a restriction, Bernoulli's equation, types of flow sensors, analog pressure gauge, calibrating an analog pressure gauge. Lab portion provides familiarization for calibrating plant pressure gauges, D/P indicating switch and vacuum or pressure switch.

**Level Sensors:** (IPSI01L) provides instruction in principles of sightglass operation, concepts associated with buoyancy, theory of operation of ball-float detectors to include the Magnetrol level switch, construction and theory of operation of a displacer level detector, process to adjust a buoyancy level sensor, concepts of hydrostatic pressure and density affects on level measurement, and the construction and theory of operation of a bubbler level detector. Lab portion provides familiarization for checking a float sensor.

**Pneumatic Instruments:** (IPSI02) provides instruction in pressure concepts, definitions, Instrument Air System operation pneumatic signal transmission, links and levers, specialized components, flapper-nozzle assembly, pilot valve, pneumatic relay, self-balance pneumatic transmitter, moment-balance pneumatic transmitter, force-balance pneumatic transmitter and pneumatic pressure transmitters, problems and safety issues maintenance on pneumatic instruments. Lab portion provides familiarization for calibrating a pneumatic temperature, pressure or flow transmitter.

**Electronic Devices:** (IPSI03) provides instruction in terminology, purposes and functions, signal ranges, hydrostatic static principles and applications, site specific level measurement systems, safety precautions, calibration procedures and optimization, configuration control, site references for maintenance and calibration, preventive and corrective maintenance precautions. Lab portion provides familiarization for calibrating the following instruments: R/I, I/I, bistable/comparator, I/P, Rosemount dP transmitter, Barton dP transmitter, and DPU and sensing line fill and vent.

**Environmentally Qualified Equipment:** (IZA) provides instruction in defining EQ, basic categories of instruments subject to EQ requirements, how an Important to Safety device may be exempt from EQ requirements, environmental factors, the EQ status of an instrument, and identifying requirements for working on EQ devices. Lab portion provides familiarization for EQ maintenance on Rosemount and Barton Transmitters.

**Plant Recorders:** (IPSI04) provides instruction in purpose, classification and operational features of DCPD recorders, construction and theory, DCPD specific recorders. Lab portion provides familiarization for calibrating analog electronic and digital recorders.

**Controller Fundamentals:** (IPSI06C) provides instruction in terms and definitions, operational characteristics, feedback, feedforward, cascade and ratio control, , proportional band and proportional control action, offset, integral control action, PID controller response to error signal, types of controller tuning methods, and industry events.

**Pneumatic Controllers:** (IPSI06P) provides instruction in elementary operation of a pneumatic controller to include proportional, reset, and derivative action, transmission of a pneumatic signal, construction and operation of Fisher LevelTrol, Foxboro 43A, and Fisher 4150/4160 pneumatic controllers, how maintenance can affect loop operation, use of site references to obtain information, industry events associated with controllers in the nuclear industry and how using the two-minute rule improves human performance techniques. Lab portion provides familiarization for calibrating a pneumatic proportional plus reset controller.

**Electronic Controllers:** (IPSI06E) provides instruction in amplifiers, op amps used in P, I, and D control actions, site references for maintenance and calibration, operational characteristics, functions and major components of programmable controller, input/output modules, symbols for discrete field devices, analog input/output module, ladder and relay logic diagrams, programmable timer and counter, site references for maintenance and calibration, and industry events. Lab portion provides familiarization for calibrating an electronic PID controller.

**Control Valves and Actuators:** (IPSI07) provides instruction in the purpose and definitions for control valves, construction of pneumatic instrument mechanical devices, pneumatic control valve, construction and theory of operation of: flapper nozzle amplifier; pneumatic pilot; and pneumatic relay, valve travel adjustments, bench set, industry events associated with control valves in the nuclear industry, Fisher Type 3582 positioner, limit switch adjustments and the features of the AirCet test equipment.

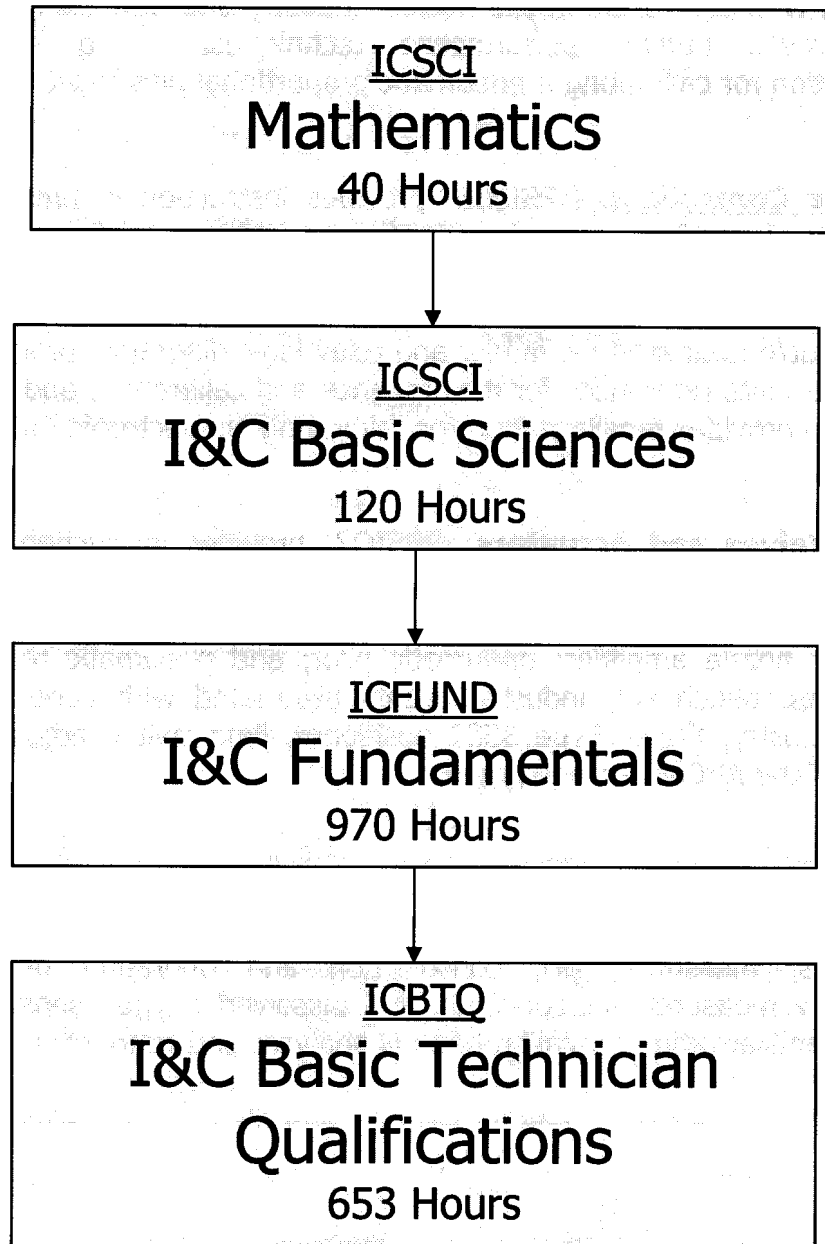
**Analytical Measurements:** (IPSI09) provides instruction in types and principles of operation of analytical instruments, sampling conditions, appropriate safety precautions, measuring pH, construction and operation of pH analyzers, conductivity measurement concepts, and dissolved oxygen sensor. Lab portion provides familiarization for calibrating pH analyzer and conductivity analyzers.

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*End of Section IV*

**SECTION V – Apprentice IR Program Map and Schedule**

A. Program Map



B. General Program Schedule

Months to Complete	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
OJT Hours	300						400						600						400						600					
OJT Hours (Program Completion)	The above numbers represent the minimum required OJT hours per 6 month period to meet the period review OJT requirements. The program requires an <b>additional 415 hours</b> of OJT be completed prior to achieving Journeyman status. These additional OJT hours may be completed at any time during the course of the program but completed no later than 36 months from the Apprentice IR job award date.																													
<b>ACADEMIC TRAINING</b>																														
Should start within 3 months and be completed no later than 30 months from the Apprentice IR job award date																														

*End of Section V*

## **SECTION VI – Training Records Management**

Auditable records are required for documentation of training in support of the Instrument Repairman 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., I&C Basic Sciences – Chemistry, Physics, etc.) a Training Attendance Record will be developed for each lesson.

### **B. On-The-Job Training –Qualification Book**

Each Apprentice will be issued a Qualification Book upon his/her acceptance into the Apprentice Training Program. The Qualification Book consists of OJT tasks that will be completed and signed off during the 36-month apprenticeship. Each apprentice is responsible for obtaining his/her sign-offs by a qualified Journeyman OJT Trainer. It should be noted that obtaining a sign-off for completed OJT does not by itself fulfill the hourly requirements stipulated in Section D of this document. Nor does OJT sign-offs task qualify the apprentice.

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.



Thus, OJT will be documented by the line organization in accordance with the hourly requirements of Section D, I. of this document. The forms provided in Attachment 5 and 6 will be used to maintain a record of hourly performance in the various subject areas covered by the OJT portion of the Apprentice Training Program. The Supervisor will verify OJT hours completed on a weekly basis. As progress through this training is achieved, the Supervisor will review and evaluate performance on each apprentice.

C. TPE Evaluation

Task Performance Evaluation (TPE) - 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. Task qualification is accomplished with TPEs. Task qualification will not be granted until academic and OJT requirements are completed. TPEs will be documented in accordance with TQ2.ID4, Training Program Implementation.

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*End of Section VI*

**SECTION VII – Progress Documentation Procedures**

**A. Daily OJT Hours**

Attachment 5 "Training Hours" column is the total hours required for the entire 30-month period for each of the items listed.

The required hours for each 6-month period are shown on Attachment 6, On-The-Job Training. The Apprentice should meet or exceed these times for each area.

OJT hours in the specified areas shown on Attachment 5, Daily OJT Hours, will be documented as follows:

The Apprentice will document hours spent in the non-shaded block of Attachment 5 for that date. The Journeyman who is assigned to work with the Apprentice will initial in the shaded block immediately below the hours marked to indicate that the time spent was acceptable. See example below.

(Portion of Attachment 5, Daily OJT Hours)

Item	Training Hours	Total Hours	Day of the Month				
			1	2	3	4	5
Pitot Tube	5				3		
					RG		
Volt Meter	7			1			2
				JT			RG
Ammeter	7					4	
						JT	

At the end of each month, the Apprentice will add the hours in each area and record the total time in the "Total Hours" column. See example below.

(Portion of Attachment 5, Daily OJT Hours)

Item	Training Hours	Total Hours	Day of the Month				
			1	2	3	4	5
Pitot Tube	5	3			3		
					RG		
Volt Meter	7	3		1			2
				JT			RG
Ammeter	7	5	1			4	
						JT	

The supervisor will review and initial at the bottom of each topic area as shown below.

(Portion of Attachment 5, Daily OJT Hours)

Item	Training Hours	Total Hours	Day of the Month			
			13	14	15	16
Pitot Tube	5	4		1		
				JT		
Volt Meter	7	5	1			1
			RG			RG
Ammeter	7	4				
Supervisor Review				RJT		

**B. Total Hours**

At the end of each month, the Apprentice will total the "Total Hours" column in Attachment 5 and insert this number in the "TOTAL HOURS FOR MONTH" on Attachment 5 and the "Actual Hours" block of the appropriate month on Attachment 6. When a 6-month training phase has been completed, he will total the hours listed in each month and put that number in the row below the required "Training Hours." The "Training Hours" are the minimum number of hours that must be completed at that time. The "Actual Hours" should equal or exceed the number in the "Training Hours."

Each month the Apprentice will shade in the "Time in Program" bar.

The supervisor will review and verify the hours and initial and date each month period. He will also review the "Actual Hours" at the end of each training period and initial in the shaded block below the recorded hours for that period.

The Machine Shop hours shown on the General Program Schedule are intended to provide hands-on training of various hand held power tools and those larger stationary tools such as drill press, bench grinder, wire wheel and others as determined by supervision. Training will include precision instruments such as dial micrometers and calipers. Hours will be documented on Attachment 5, Daily OJT Hours.

(Portion of Attachment 6, Master Assignment Chart)

Supervisor's Initials	RJT	RJT	RJT	RJT	RJT	RJT	RJT					
Date (Month and Year)	01/06	02/06	03/06	04/06	05/06	06/06		07/06				
Month	3			6			9					
Time in Program												
Program Period							1					

ON-THE-JOB TRAINING

Control System Equipment	Training Hours							225				
	Actual Hours	45	47	36	45	38	31	24	5			
	Supervisor Initials							2	1			
Recorders and Indicators	Training Hours							RJT				
	Actual Hours	6	8	10	8	11	8	51	8			
	Supervisor Initials							RJT				

Submit Attachments 5 and 6 and the Master Assignment Chart Review and Comments form on the following page to the Line Manager for his review and comment at the start of the seventh, thirteenth, nineteenth, twenty-fifth and thirtieth month. The Line Manager will forward the forms to the Division Personnel Department for their review and comment and return them to the plant prior to the end of the month. These forms will be filed in the Apprentice's training folder.

*End of Section VII*



**Attachment 1 – Mathematics**

COURSE ICSCI – MATHEMATICS

# LESSONS: 1

TOTAL HOURS: 40

STUDENTS: 12

<b>Lesson Number</b>	<b>Title</b>	<b>CR Hours</b>
TBS01	Mathematics	40/60
Total Hours		<b>40/60</b>

CR = Classroom  
Scheduled for 60 hours.

**Attachment 2 – I&C Basic Sciences**

COURSE ICSCI – I&C BASIC SCIENCES

# LESSONS: 16

TOTAL HOURS: 120

STUDENTS: 12

<b>Lesson Number</b>	<b>Title</b>	<b>CR Hours</b>
MBS0100	Physics	5
MBS0200	Electrical Science	5
MBS0500	Heat Transfer and Fluid Flow	5
MBS0600	Fundamentals of Hydraulics and Pneumatics	6
MBS0700	Basic Chemistry	7
MBS0400	Basic Atomic and Nuclear Physics	6
MBS0300	Properties of Nuclear Plant Materials	6
MPS1	Reactor and Refueling Systems	80/86*
MPS2	Primary Systems	
MPS3	Steam Systems	
MPS4	Feed Systems	
MPS5	Safety Systems	
MPS6	Ventilation and Control Systems	
MPS7	Electrical Systems	
MPS8	Plant Protective Systems	
MPS9	Miscellaneous Systems	
<b>Total Hours</b>		<b>120</b>

CR = Classroom

MPS1-9 listed in MM Initial POI

\* - Probably should schedule 90 - 120 hours to allow for in-plant systems walk-downs.

**Attachment 3 – I&C Fundamentals**

COURSE ICFUND – I&C FUNDAMENTALS

# LESSONS: 24

TOTAL HOURS: 970

STUDENTS: 12

<b>Lesson Number</b>	<b>Title</b>	<b>Hours</b>
ME000401	Electrical Safety – see EM program	5
IABFTE	Basic Test Equipment Fundamentals	10
IABETE	Basic Electronic Test Equipment	20
IABSTE	Basic Specialized Test Equipment	40
ICF001	DC Fundamentals (91001)	80
ICF020	Magnetism (91020)	20
ICF003	AC1 Fundamentals1 (91003)	80
ICF005	Semiconductor Fundamentals (91005)	80
ICF006	Transistor Amplifier Circuits (91006)	45
ICF007	Transistor Power Amplifiers (91007)	35
ICF008	Transistor Feedback Circuits (91008)	40
ICF012	Operational Amplifiers Fundamentals (91012)	50
ICF011	Thyristor and Power Control Circuits (91011)	40
ICF010	FET Fundamentals (91010)	40
ICF009	Power Supply Regulators (91009)	40
ICF014	Digital Logic Fundamentals (91014)	80
ICF015	Digital Circuit Fundamentals 1(91015)	30
ICF016	Digital Circuit Fundamentals 2 (91016)	30
ICF024	Motors Generators and Controls (91024)	40
ICF019	Transducer Fundamentals (91019, <i>Info Only</i> )	35
ICMB04	Microprocessors	40
IABPTE	Basic Physical Test Equipment	20
ICPR01	I&C Print Reading	40
IABTS	Systematic Approach to I&C Troubleshooting	30
<b>Total Hours</b>		<b>970</b>



**Attachment 4 – I&C Basic Technician Qualifications**

COURSE ICBTQ – I&C BASIC TECHNICIAN QUALIFICATION

# LESSONS: 16

TOTAL HOURS: 613

JPMs: 30

TOTAL JPM HOURS: 78

STUDENTS: 12

<b>Lesson Number</b>	<b>Title</b>	<b>CR Hours</b>	<b># JPMs /Time</b>	<b>JPM Hours</b>
IACD01	Basic Soldering and Circuit Board Repair for Electronics	80	1 @ 12	12
IABCPT	Control Power Splices and Terminations	10	1 @ 2	2
IZAB010	Tubing and Fittings	5	1 @ 2	2
IAFA010	Measurement Fundamentals	20	–	–
IPSI01T	Temperature Sensors	20	4 @ 2	8
IPSI01PF	Pressure and Flow Sensors	40	2 @ 4, 1 @ 2	10
IPSI01L	Level Sensors	20	1 @ 2	2
IPSI02	Pneumatic Instruments	80	1 @ 2	2
IPSI03	Electronic Devices	88	6 @ 2, 1 @ 4	16
IZA	Environmentally Qualified Equipment	10	2 @ 2	4
IPSI04	Plant Recorders	40	1 @ 1, 1 @ 2	3
IPSI06C	Controller Fundamentals	40	–	–
IPSI06P	Pneumatic Controllers	40	1 @ 4	4
IPSI06E	Electronic Controllers	40	1 @ 3	3
IPSI07	Control Valves and Actuators	40	3 @ 2	6
IPSI09	Analytical Measurements	40	2 @ 2	4
<b>Total Hours</b>		<b>613</b>	<b>30 JPMs</b>	<b>78</b>

CR = Classroom

JPM = Job Performance Measure

**JPMs Associated with I&C Basic Technician Qualifications**

Lesson	Title	JPM	Title	Hrs
IACD01	BASIC SOLDERING and CIRCUIT BOARD REPAIR FOR ELECTRONICS	IJP00A	Solder Electrical and Electronic Components	12

Lesson	Title	JPM	Title	Hrs
IABCPT	CONTROL POWER SPLICES and TERMINATIONS	IJP00C	Control Power Splices and Terminations	2

Lesson	Title	JPM	Title	Hrs
IZAB010	TUBING and FITTINGS	IJP00B	Bend, Install, Remove, and Leak Check Instrument Tubing and Fittings	2

Lesson	Title	JPM	Title	Hrs
IPSI01T	TEMPERATURE SENSORS	IJP0504A	Check/Replace a Thermocouple	2
		IJP0505	Bulb Temperature Switch	2
		IJP0506	Check an RTD	2
		IJP0508	Bimetallic Temperature Sensor PM	2

Lesson	Title	JPM	Title	Hrs
IPSI01PF	PRESSURE AND FLOW SENSORS	IJP0405	Calibrate a Plant Pressure Gauge	4
		IJP0701	Calibrate D/P Indicating Switch	4
		IJP0702	Vacuum or Pressure Switch PM	2

Lesson	Title	JPM	Title	Hrs
IPSI01L	LEVEL SENSORS	IJP0501	Check a Float Sensor	2

Lesson	Title	JPM	Title	Hrs
IPSI02	PNEUMATIC INSTRUMENTS	IJP0200	Calibrate a Pneumatic Temperature, Pressure or Flow Transmitter	2

Lesson	Title	JPM	Title	Hrs
IPSI03	ELECTRONIC DEVICES	IJP0707	Calibrate R/I Transmitter	2
		IJP0709	Calibrate I/I Module	2
		IJP0710	Calibrate Bistable/Comparator Module	2
		IJP0808A	Calibrate I/P Converter	2
		IJP0713A	Calibrate a Rosemount 1151, 1152, 1153, or 1154 DP Transmitter	2
		IJP0714	DPU and Sensing Line Fill and Vent	2
		IJP0715A	Calibrate a Barton DP Transmitter	4

Lesson	Title	JPM	Title	Hrs
IZA	ENVIRONMENTALLY QUALIFIED EQUIPMENT	IJP2804	EQ Maintenance on a Rosemount Transmitter	2
		IJP2805	EQ Maintenance on a Barton Transmitter	2

Lesson	Title	JPM	Title	Hrs
IPSI04	PLANT RECORDERS	IJP0413	Calibrate an Analog Electronic Recorder	1
		IJP0415	Calibrate a Digital Recorder	2

Lesson	Title	JPM	Title	Hrs
IPSI06P	PNEUMATIC CONTROLLERS	IJP1009	Calibrate a Pneumatic Proportional Plus Reset Controller	4

Lesson	Title	JPM	Title	Hrs
IPSI06E	ELECTRONIC CONTROLLERS	IJP1011	Calibrate an Electronic Controller (PID)	3

Lesson	Title	JPM	Title	Hrs
IPSI07	CONTROL VALVES and ACTUA	IJP0906	Calibrate Valve Stroke	2
		IJP0916	Calibrate a Valve Positioner	2
		IJP0926	Calibrate Valve Position Switches	2

Lesson	Title	JPM	Title	Hrs
IPSI09	ANALYTICAL MEASUREMENTS	IJP1101	Calibrate a pH Analyzer	2
		IJP1102	Calibrate a Conductivity Analyzer	2









Attachment 5 - Daily OJT Hours (Page 4 of 6)

NAME \_\_\_\_\_ USER ID \_\_\_\_\_ PLANT \_\_\_\_\_ MONTH/YEAR \_\_\_\_\_

**CONTROLLERS**

**TOTAL HOURS FOR MONTH**

Item	Training Hours	Total Hours	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		
On-Off	20																																		
Pneumatic P/PI/PID	30																																		
Digital P/PI/PID	30																																		
Analog P/PI/PID	30																																		
Basic Controller Tuning	40																																		
Supervisor Review																																			

**CONTROL VALVES & INDICATORS**

**TOTAL HOURS FOR MONTH**

Item	Training Hours	Total Hours	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			
AOV	30																																			
Solenoid Valve	20																																			
Hydraulic (EH) Valve	20																																			
Positioners	40																																			
Regulators/Relief Valves	20																																			
Instrument (Dragon) Valves	10																																			
Valve Position Indicators	30																																			
Limit Switches	30																																			
Supervisor Review																																				



Attachment 5 - Daily OJT Hours (Page 5 of 6)

NAME \_\_\_\_\_ USER ID \_\_\_\_\_ PLANT \_\_\_\_\_ MONTH/YEAR \_\_\_\_\_

**SUPERVISORY INSTRUMENTS**

**TOTAL HOURS FOR MONTH**

Item	Training Hours	Total Hours	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	
Vibration	65																																	
Eccentricity	65																																	
Speed and Cam	65																																	
Expansion	65																																	
Gas Analyzers	60																																	
Rotor Position	50																																	
Plant Data Network & Data Recording	10																																	
Supervisor Review																																		

**BOILER SYSTEM EQUIPMENT**

**TOTAL HOURS FOR MONTH**

Item	Training Hours	Total Hours	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		
Flue Gas Analyzers*	50																																		
Boiler Feedwater Controls*	150																																		
Boiler Temperature Controls*	200																																		
Boiler Combustion Controls*	450																																		
Supervisor Review*																																			

\* - N/A DCP

Attachment 5 - Daily OJT Hours (Page 6 of 6)

**RECORDERS AND INDICATORS**

**TOTAL HOURS FOR MONTH**

Item	Training Hours	Total Hours	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		
Analog Recorders	60																																		
Digital Recorders	60																																		
Multi-Pen Recorders	60																																		
Control/Alarm Output	40																																		
Analog Meters	60																																		
Digital Meters	60																																		
Supervisor Review																																			

**MACHINE SHOP TOOLS**

**TOTAL HOURS FOR MONTH**

Item	Training Hours	Total Hours	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			
Hand-Held Power Tools	15																																			
Stationary Power Tools	10																																			
Precision Instruments	5																																			
Supervisor Review																																				

REMARKS BY SUPERVISOR: \_\_\_\_\_

\_\_\_\_\_  
(Signed) Supervisor

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Signed) Apprentice

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Signed) Line Manager

\_\_\_\_\_  
Date

**Attachment 6 - Master Assignment Chart**

Name \_\_\_\_\_ USER ID \_\_\_\_\_ Plant \_\_\_\_\_ Starting Date \_\_\_\_\_

Supervisor's Initials \_\_\_\_\_  
Date (Month and Year) \_\_\_\_\_

Month \_\_\_\_\_ 3 \_\_\_\_\_ 6 \_\_\_\_\_ 9 \_\_\_\_\_ 12 \_\_\_\_\_ 15 \_\_\_\_\_ 18 \_\_\_\_\_ 21 \_\_\_\_\_ 24 \_\_\_\_\_ 27 \_\_\_\_\_ 30 \_\_\_\_\_

Time in Program \_\_\_\_\_  
Program Period \_\_\_\_\_ 1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5 \_\_\_\_\_

**ON-THE-JOB TRAINING**

Control System Equipment	Training Hours	106	212	318	424	530
	Actual Hours					
	Supervisor Initials					
RCA Work Practices	Training Hours	36	72	108	144	180
	Actual Hours					
	Supervisor Initials					
Miscellaneous Equipment	Training Hours	108	216	324	432	540
	Actual Hours					
	Supervisor Initials					
Machine Shop Tools	Training Hours	30	0	0	0	30
	Actual Hours					
	Supervisor Initials					
Test Equipment	Training Hours	73	146	219	292	365
	Actual Hours					
	Supervisor Initials					
Controllers	Training Hours	30	60	90	120	150
	Actual Hours					
	Supervisor Initials					
Control Valves & Indicators	Training Hours	40	80	120	160	200
	Actual Hours					
	Supervisor Initials					
Supervisory Instruments	Training Hours	76	152	228	304	380
	Actual Hours					
	Supervisor Initials					
Recorders & Indicators	Training Hours	68	136	204	272	340
	Actual Hours					
	Supervisor Initials					

Attachment 6 - Master Assignment Chart (Page 2 of 2)

ACADEMIC TRAINING

Phase	1	2	3	4	5
Mathematics	<input type="checkbox"/>				
I&C Basic Sciences	<input type="checkbox"/>				
I&C Fundamentals	<input type="checkbox"/>				
I&C Basic Technician Qualifications	<input type="checkbox"/>				