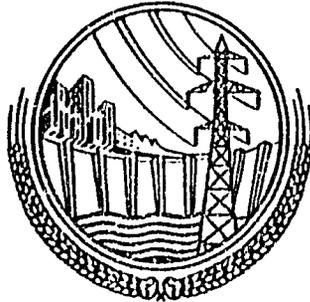


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PAKISTAN

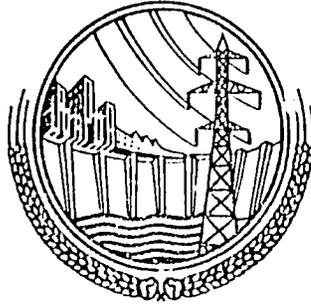
**WATER AND POWER DEVELOPMENT  
AUTHORITY**



**DESCRIPTION OF A  
TYPICAL CENTRALIZED AEB METER  
TEST LABORATORY**

**WAPDA  
POWER DISTRIBUTION WING  
LAHORE, PAKISTAN  
APRIL 1990**

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WAPDA  
POWER DISTRIBUTION WING  
LAHORE, PAKISTAN  
APRIL 1990



S.M. Arshad Bokhari  
General Manager,  
(Operation)

Telephones Off : 213820, 211099, 69911/227

Res : 872075

# Water And Power Development Authority

44-G, WAPDA HOUSE,  
LAHORE

No. 2947-48/Pn/GMO

Dated 30-11-1990

Mr. L.A. Rodrigueze  
CC Png, Engg & Opr, PTAT  
LEA Plaza - Lahore

Subject: ENERGY METER MANUALS

Reference your IOM No. 11/ 90/013, dated 18.2.1990

The Energy Meter Manuals, as received from you,  
are hereby approved.

  
( S.M. Arshad Bokhari )

cc: G.M. (PE&O) WAPDA, LEA Plaza Lahore  
with reference to above.

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## Purpose

The purpose of this report is to provide WAFDA with a description of a typical centralized meter test laboratory. This information can be used as a benchmark in establishing centralized meter test laboratories in the WAFDA AEBs.

## General

This report describes a typical centralized meter test laboratory in the WAFDA System and its relation to the M&E division meter personnel. It includes a description of the laboratory, a sketch of the meter lab layout showing the various work areas, organizational block diagrams of the meter lab and M&E division meter personnel, and position descriptions of the meter personnel who work in the laboratory and in the M&E divisions.

## I. FUNCTIONS OF THE CENTRALIZED AEB METER LABORATORY

The centralized AEB meter laboratory is located in the AEB office complex and supports the metering requirements of one AEB and its divisions and areas with the following functions :

### 1. Maintains the Standard Watthour for Calibration of the AEB Watthour Measurement Standards.

Each AEB will have a watthour standard that will be used to calibrate the field watthour test equipment and watthour meter test board. This standard watthour should be sent once per year to KEMA, Holland or some other location that maintains an international watthour for calibration. The Field and Watthour Meter Test Board Standards will be calibrated once every 3 months by the AEB Standard and by doing this the Field Equipment and Watthour Meter Test Board Standards are traceable to a recognized international standard.

### 2. Initiates purchase orders for Test Equipment and Spare Parts, and Furnishes New Meters and Instrument Transformers to the Divisions.

An engineer in the laboratory initiates the purchase orders for test equipment and spare parts. New meters and transformers will be sent to the centralized test laboratory for test and establishment of the initial history record. An engineer in the laboratory communicates with the Division personnel once per month to determine the Division's requirements for meters and instrument transformers. The meters and instrument transformers will be supplied from the laboratory on demand from the Divisions. The laboratory stock will be replenished from the store room on demand from the laboratory.

### 3. Tests and repairs new and used kWh, demand and combination kWh/kw meters.

All new single phase meters receive a visual check and are sample tested before being placed in service. The manufacturer's seal on any new single phase or polyphase meter shall not be broken in the laboratory during initial testing. All meters removed from service for sample or periodic testing or because they are malfunctioning, are given visual checks, accuracy checks and repaired if needed. The upscale accuracy and timing mechanism on demand meters are checked on the demand meter test boards. Meters are repaired if it is determined that the cost of repair is less than 50% of the cost of the meter. All used meters receive a dielectric test before returning them to service.

### 4. Tests Instrument Transformers

All new instrument transformers are tested for ratio and phase angle error before they are put into service. All instrument transformers removed from service are also tested for ratio and phase angle error and in addition all six hundred (600) volt instrument transformers are given a dielectric test.

5. Evaluates all new types of watthour, demand and combination meters for possible use on the WAPDA system.

Before any new type of watthour, demand meter or combination meter can be used on the WAPDA system, it has to be acceptance tested to verify that it meets all published specifications. Each new meter tested for acceptance will first receive a thorough visual check then all the IEC design criteria for which the meter is designed will be verified. If the meter meets the published specifications and WAPDA's requirements, the meter will be placed on the approved equipment list and given to the purchasing department for soliciting bids for new meters.

6. Develops and oversees training programs for training meter employees and assigned personnel as required.

A training course for educating meter testers and linemen, developed by the XEN M&E meter is administered twice per year. The meter engineer is responsible for organizing the course each time it is given making sure that all eligible employees have the opportunity to attend the course to fulfill part of the requirements for work assignment and advancement. The XEN is responsible for advice to revise the curriculum as the technology changes and keep it current.

7. Establishes history records for all new meters and instrument transformers and accumulates and submits meter test data for entry into the meter records system.

For new meters and instrument transformers, the original history card is completed by the meter clerk at the time the device is received. Test cards are completed with the original test accuracy data by the meter tester when meters are received in the laboratory for sample and periodic tests or for repair. Test cards are completed by the meter tester showing the as found and as left accuracy test data. All of the meter test cards are given to the meter clerks for entry into the meter records system.

8. Coordinates and schedules the shipping of metering and instrument transformers to and from the divisions.

After being tested, the meters and instrument transformers are put into stock at the test laboratory. As the divisions need additional meters and instrument transformers, they notify the test laboratory who fills their requirements from the laboratory stock. The divisions are responsible for removing defective meters and meters for sample tests. The divisions notify the test laboratory when their sample meters will be removed and the laboratory schedules a shipment of meters to the divisions to replace the meters removed for sample and at the same time picks up metering equipment being returned to the laboratory for test, repair or maintenance.

9. Notifies the appropriate WAPDA Agency when defects to Metering Equipment and failures to Field Equipment Occur

One function of the Laboratory is to contact the appropriate WAPDA Agency to notify them of defects and failures to metering equipment. Occasionally, shipments of meters must be returned to the suppliers because they fail to meet the sample accuracy test or because too many of the meters in the shipment were defective or because some of the meters in a shipment had serious defects. Whenever these things happen, the meter laboratory is responsible for notifying the appropriate WAPDA Agency so that the supplier is notified to replace the defective equipment.

11. METER LABORATORY LAYOUT

The Meter Laboratory is laid out in seven general work areas as shown on Figure 1.

1. Meter Testing

Meter testers are assigned to work in this 138.3 sq.mtrs. area. It contains three automatic Watthour meter test boards for testing single phase and polyphase meters, and four test boards for testing single phase and polyphase demand meters.

There is one meter tester working at each of the four Watthour meter test boards and one tester keeps track of the tested and untested meters by logging them in and out of stock. Two testers are operating the demand meter test boards.

2. Meter Repair

This 30 sq.mtrs. area contains a work bench for repairing demand meters and polyphase meters. Meters are repaired if the cost of repair is less than 50% of the cost of the meter. Two meter testers are assigned to repairing meters.

3. Instrument Transformer Testing

This 27 sq.mtrs. area contains an instrument transformer comparator for testing the accuracy and polarity of instrument transformers. It also contains a work bench where transformers receive a high potential test. It also contains a cage for testing high voltage transformers. One tester is assigned to this area.

4. Standardizing Room

Two (2) meter technicians work in this room which occupies 32.5 square meters of space. It contains the Scientific Columbus watthour standards, and the Rotek precision wattmeter and watthour meter calibration source for calibrating meters, instruments, transfer standards and rotary substandards.

5. Shop

No personnel are permanently assigned to the shop. It occupies 28 square meters of space and contains a grinder, drill press, lathe, ultrasonic cleaner, and a motor generator set for supplying 220/230 volt AC 50 Hz isolated from the building supply and is used to power equipment that is sensitive to power fluctuations, harmonics, spikes, etc. This area also contains workbenches with a vice and an area for painting. Work is performed here on an as needed basis and, therefore, does not have a specific personnel assigned to it.

6. Storage

No personnel are permanently assigned to the storage area. This area occupies 275.3 square meter of space. This is the area where new and used metering equipment enters and leaves the meter shop and is used for storing:

- i. New and used, tested and untested meters;
- ii. New and used, tested and untested instrument transformers.

This is the area where new and used metering equipment is received from the divisions and stores and is shipped back to the stores.

7. Office

The Meter Laboratory has two offices; one for the Assistant Engineer Central Meter Shop and one for the Meter Supervisor. The two (2) offices account for 28 square meters of space. The Assistant Engineer Central Meter Shop is the highest ranking person. The meter supervisor shares an office with the clerk.

In order to make the maximum use of the meter test boards, this area is operated ten (10) hours per day, six (6) days per week. For this reason, more testers are needed than are indicated in the foregoing paragraphs. In all, 12 meter testers are needed to perform the required volume of work.

III. METER LABORATORY PERSONNEL

As shown on the organization chart for the Laboratory, the XEN M&E Meter is the head of the Meter Laboratory. He reports to the Director CM&O AEB and is responsible for the operation of the AEB M&E Meter Laboratory.

Reporting to the XEN M&E Meter are three Assistant Engineers; 1. Field Metering; (2) Central Meter Shop; (3) Meter Shop. The Assistant Engineer Central Meter Shop is responsible for overseeing the operation of the meter laboratory.

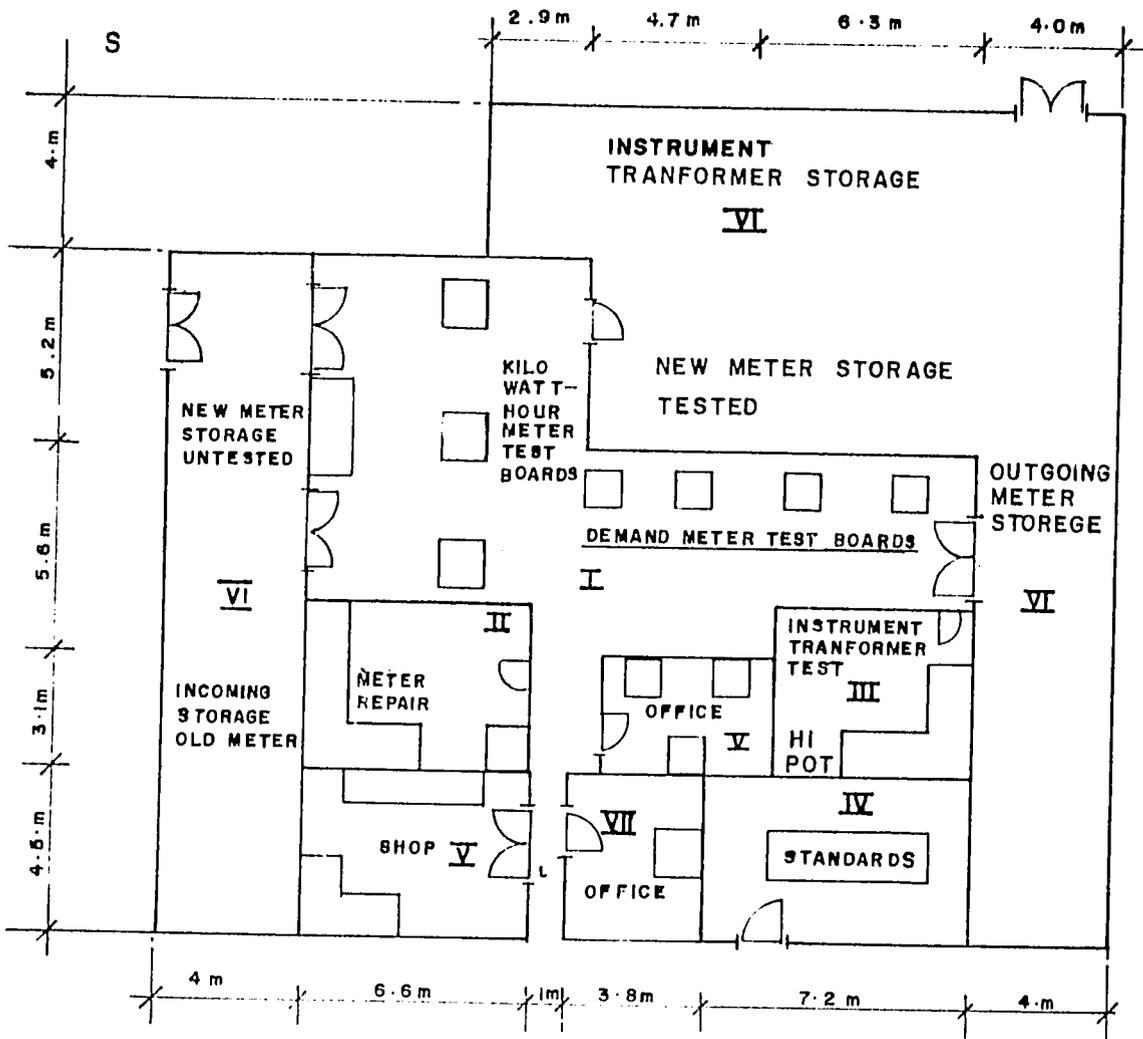
The Assistant Engineer Field Metering is responsible for testing, and installing transformer rated meters. The Assistant Engineer Meter Shop is responsible for the operation of the Meter Shop.

The Meter Supervisor, Test Inspector Standards, Senior Store Keeper and Supervisor Rubber Safety Equipment Testing all report to the Assistant Engineer Central Meter Shop. The Meter Supervisor oversees all meter testing, repair, meter records and instrument transformer and hi pot testing. The Supervisor Rubber Safety Equipment Testing oversees the testing of all insulation protective equipment, and the Test Inspector insures that all Standards maintain their accuracy.

More detailed information regarding the responsibilities of the meter laboratory personnel will be found in the following position descriptions.

# CENTRALIZED METER TEST LABORATORY

SCALE : 1 : 200

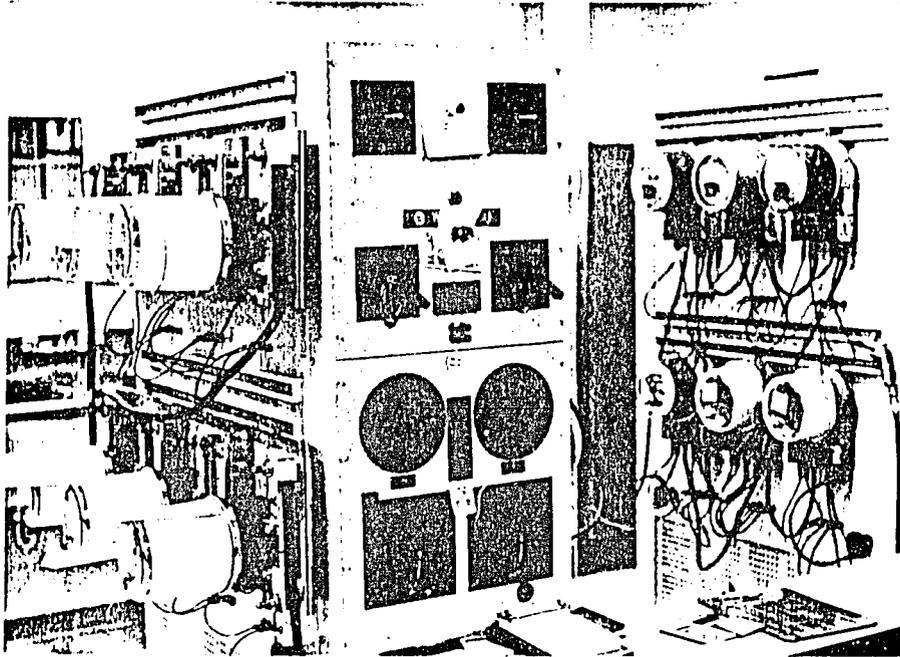


LOCATION	USE	APPROX. AREA M <sup>2</sup> .
I	METER TESTING	130.3
II	METER REPAIR	30.0
III	INSTRUMENT TRANSFORMER TESTING	27.0
IV	STANDARDS ROOM	32.5
V	SHOP	28.0
VI	STORAGE	275.3
VII	OFFICE	28.0

FIGURE - 1

.11

CENTRAL METER TEST LABORATORY

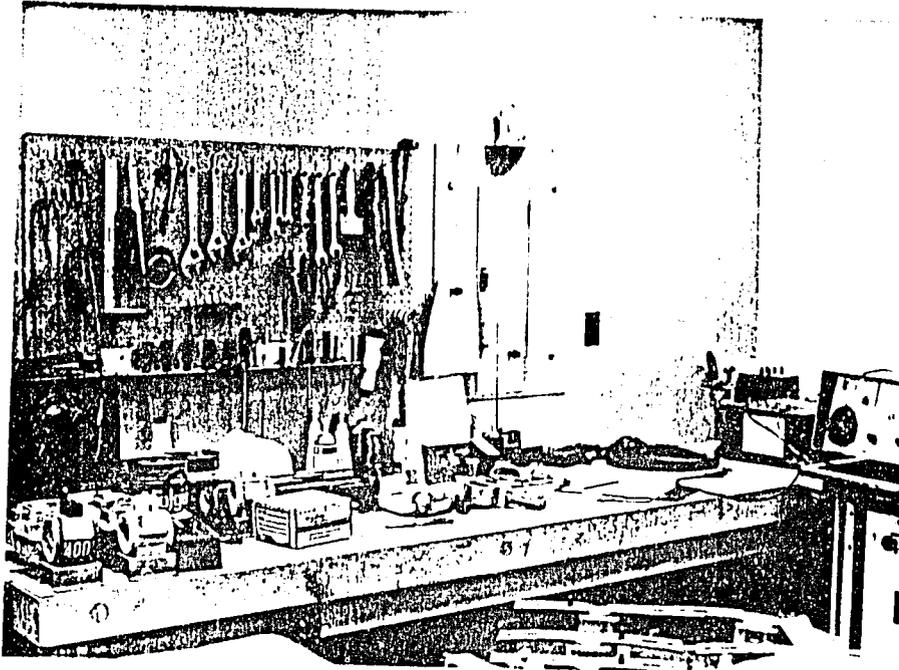


Demand Meter Test Boards

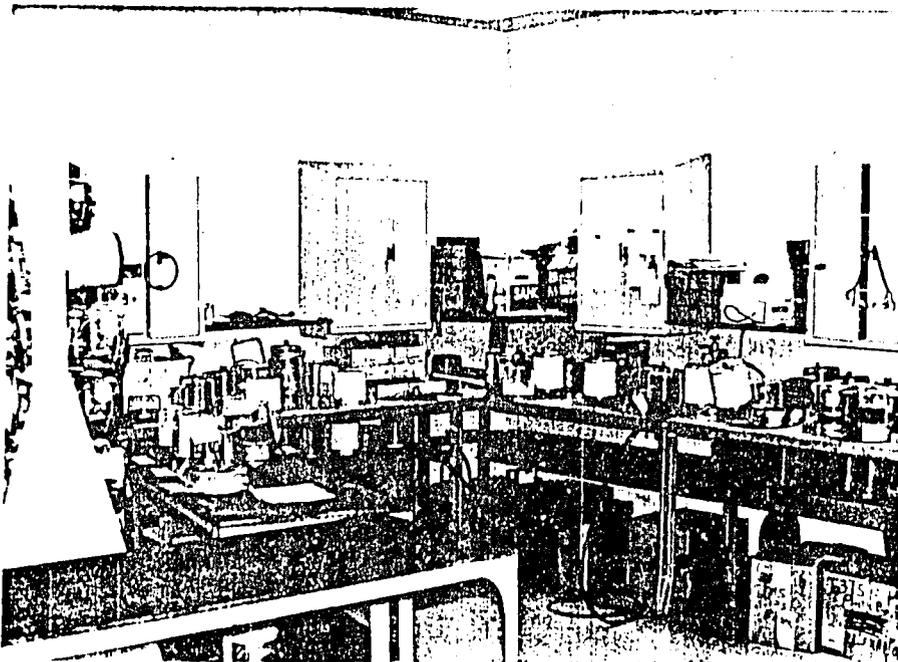


Meter tester at work with automatic meter test board. Note portable meter racks

CENTRAL METER TEST LABORATORY

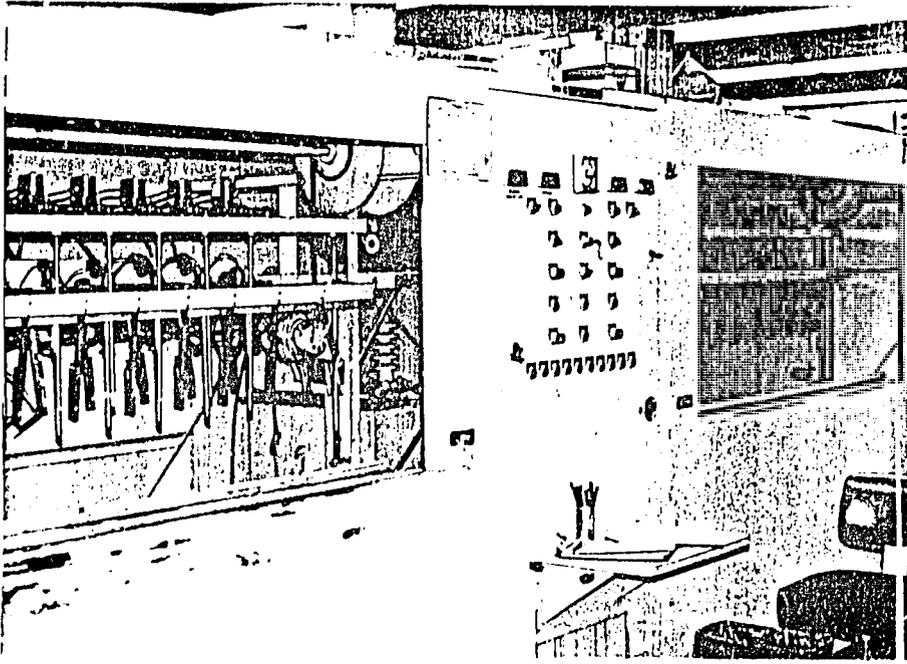


Instrument transformer repair bench in  
Central Meter Laboratory

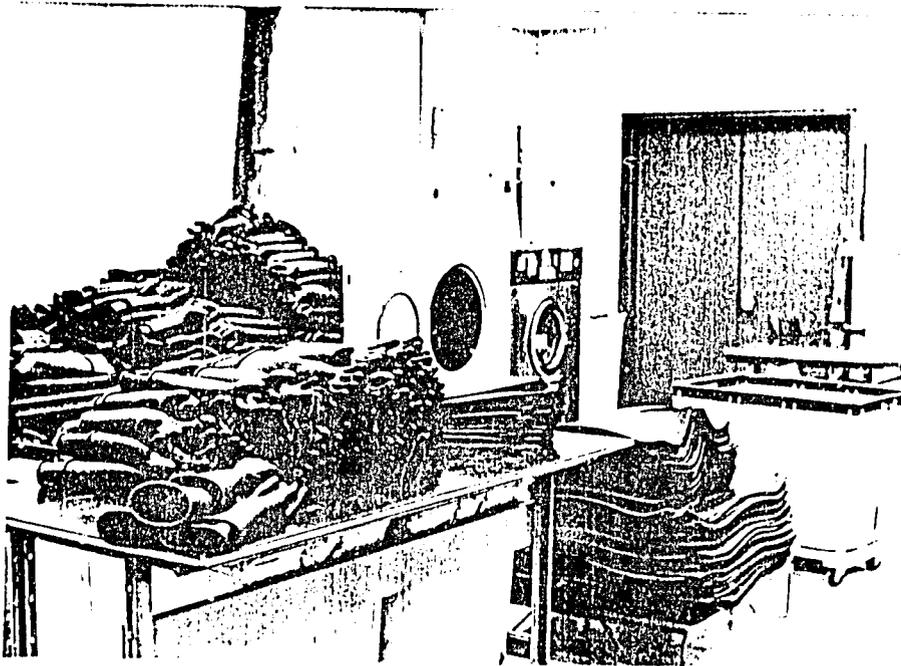


Polyphase/single phase meter repair bench in  
Central Meter Laboratory

CENTRAL METER TEST LABORATORY



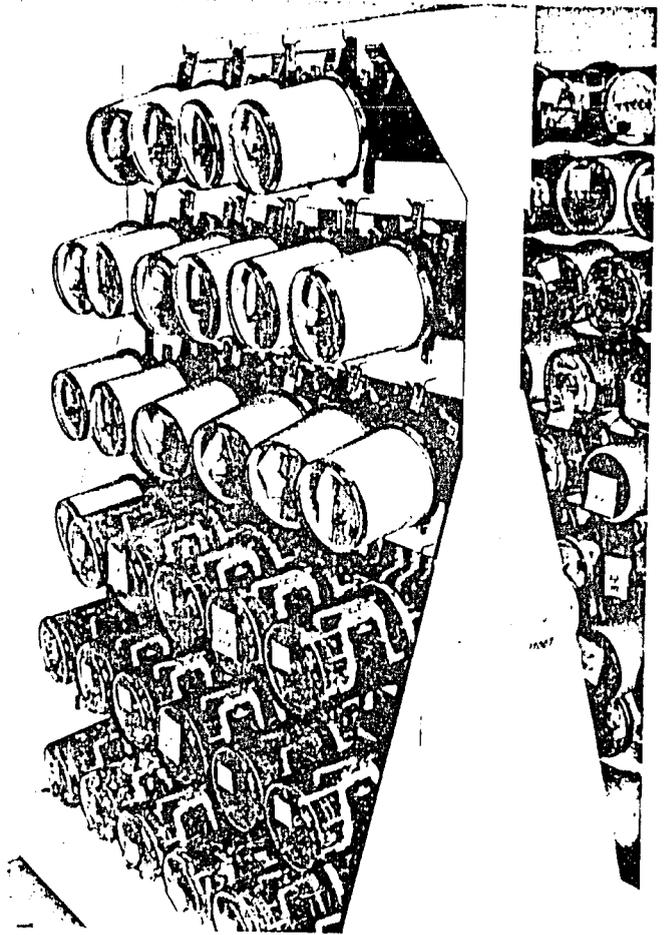
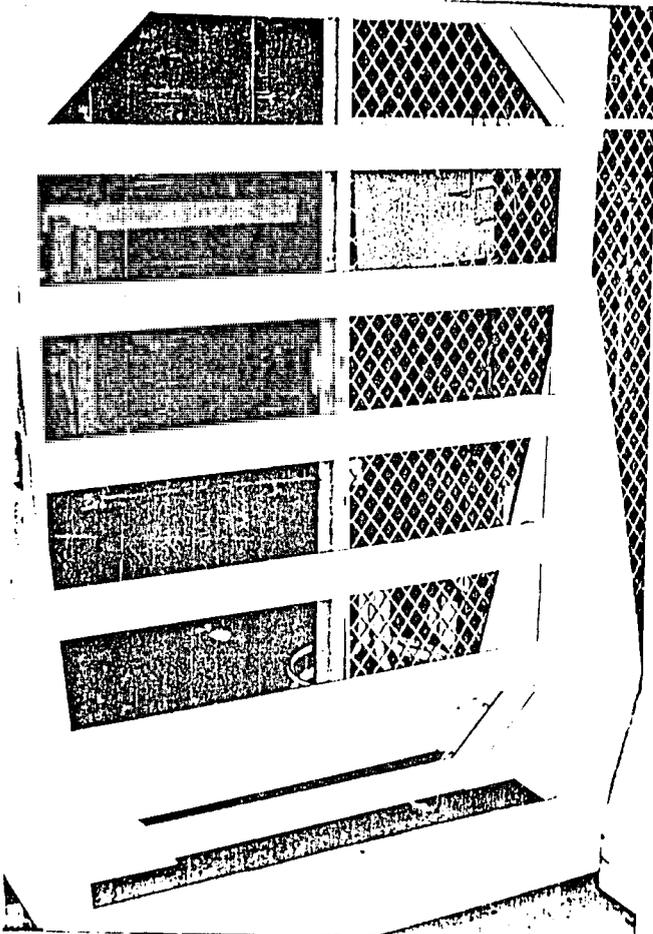
Protective rubber gloves and blanket automatic test facility.



Rubber gloves and blanket cleaning and drying room.

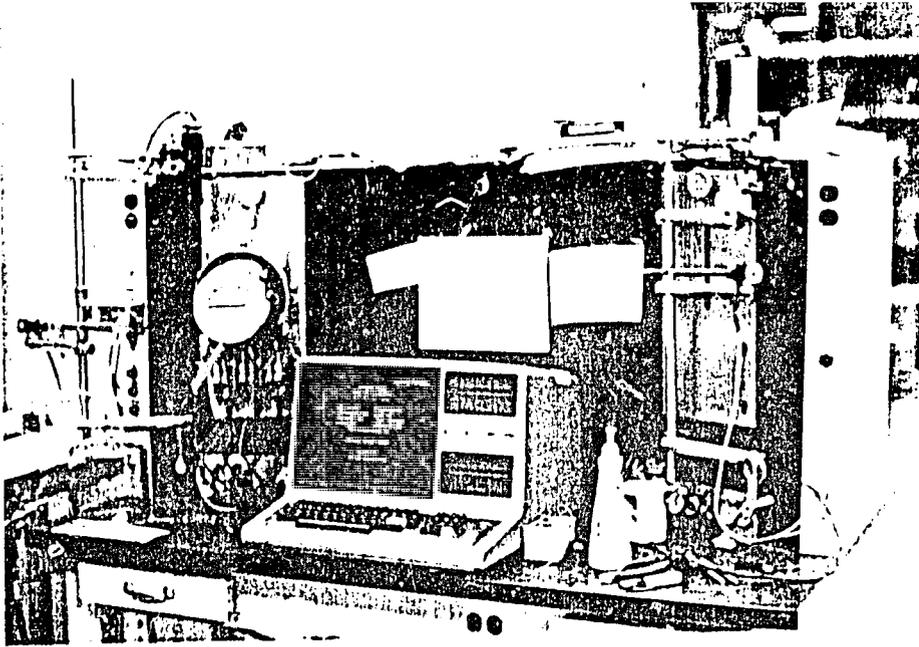
CENTRAL METER TEST LABORATORY

Meter Test Laboratory  
rack storage for  
meters.

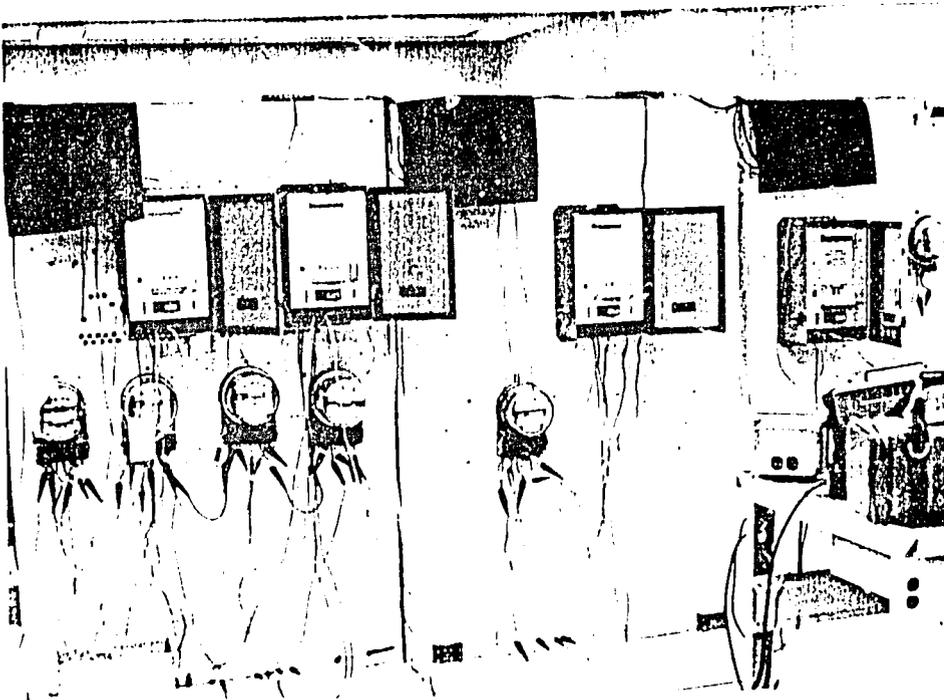


Meter Test Laboratory  
portable meter rack  
to move meters to test  
stations.

CENTRAL METER TEST LABORATORY

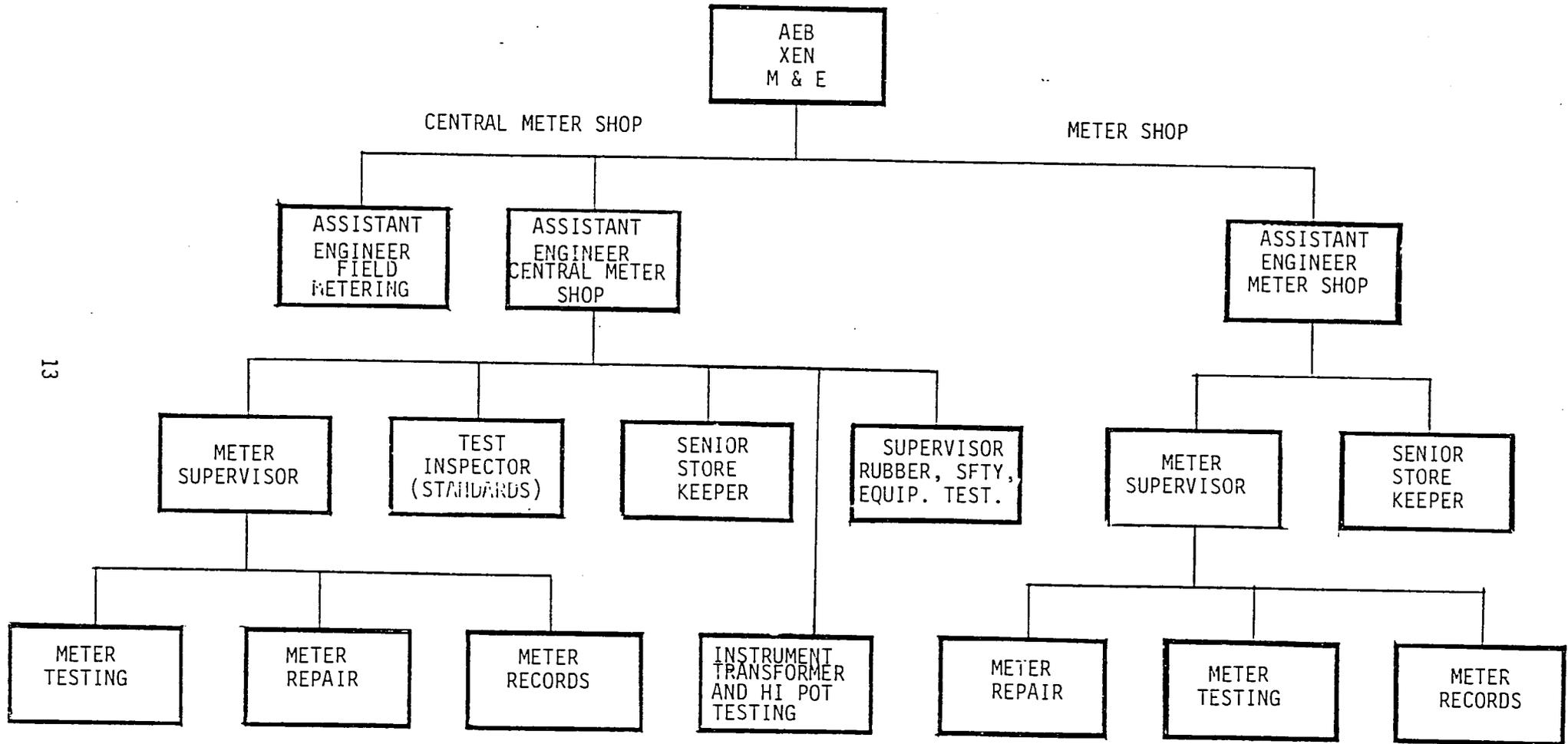


Automatic Computerized meter test board



Electronic meter testing and evaluation room

ORGANIZATION  
OF THE  
CENTRAL METER SHOP AND THE METER SHOP



NOTE: If any AEB at any time feels that its work load of meter, instrument transformer, rubber goods, and field testing has increased to the point that it is difficult to carry on with one XEN M&T, one or more XEN M&Ts may be appointed in which case the above chart will be duplicated  
While only one Meter Shop Organization is shown on this Chart, more than one may exist.

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IV. POSITION DESCRIPTIONS FOR METER TEST LABORATORY PERSONNEL

1. AEB XEN M&E
2. Assistant Engineer, Field Metering
3. Assistant Engineer Central Meter Shop  
Assistant Engineer Meter Shop
4. Meter Supervisor  
Supervisor, Rubber Safety Equipment Tester
5. Test Inspector

POSITION TITLE: Executive Engineer Meters and Equipment

GRADE: BPS-18

BASIC FUNCTIONAL DESCRIPTION:

The Executive Engineer Meters and Equipment will be responsible to the AEB Director Construction, Maintenance & Operation for the direction, monitoring and control of central meter and equipment repair and testing workshops and any additional facilities. He will ensure that these activities perform efficiently and comply with WAPDA's standards, policies, procedures and practices and achieve targets as set from time to time. He will be responsible for the installation of testing of MDI's and connections involving load from 500 KW and above. He will advise the operating divisions on matters relating to repair, testing of meters, line and communication equipment. He will also oversee the activities of the field team/s responsible for the installation and testing of the MDIs at site for 70 KW to 500 KW load.

MAJOR DUTIES AND RESPONSIBILITIES:

- Ensures that meter and equipment shops under his control are managed efficiently to complete the assigned tasks and produce quality production.
- Directs and monitors the work of Field Team/s responsible for the installation and testing of MDIs at site for connections having load from 70 KW to 500 KW.
- Ensures that his supervisors implement approved standards, procedures and practices relating to the testing, servicing and repair of meters and equipment in their workshops.
- Coordinates and schedules the allocation of new meters for issue to Field Stores for distribution to the Operation Divisions.
- Ensures that supervisors in charge of workshops prepare and submit through him for procurement, the material requirements for the repair and servicing of meters and equipment in accordance with the WAPDA procurement procedures.
- Prepares annual operation and maintenance budgets for his meter and equipment workshops and for field teams.
- Supervises the installation and testing of MDI's for connections having load 500 KW and above.
- Provides direction and guidance to his supervisors in the preparation of requisitions for purchase, replacement, repair and maintenance of workshop tools, instruments and test equipment, within the limits of management policy and authorization.
- Participates in programs to prevent tampering of energy meters and measuring equipment through unauthorized use.

- Assists in development of more efficient methods and practices for improving distribution measurement equipment, with adherence to safety and service..
- Assists in the dissemination, testing and trial implementation of new Distribution Measurement Quality Assurance concepts.
- Makes performance evaluation, recommends changes in salaries, promotion, demotion, transfers, disciplinary action, leave of absence, hiring and release of personnel supervised and approves the same for lower levels of management.
- Develops and recommends training for employees in the meter and distribution equipment repair, servicing and testing fields and assigns personnel as required.
- Implements the enforcement of WAPDA Safety Program, policies and practices.
- Assumes other duties and responsibilities as assigned.

DESIRED QUALIFICATIONS

- a) Education  
Bachelor's degree in the engineering discipline preferably with a major in electric power.
- b) Prior Work Experience  
Minimum of 5 years experience in a major functional area of power distribution.
- c) Language Proficiency  
Must be fluent in written and spoken English and Urdu.
- d) Knowledge of Specific Areas  
Technical knowledge of the distribution and utilization of electric energy and the equipment involved. Should be familiar with various metering methods and devices, maintenance and repair of power distribution equipment, different types of control and communications equipment.
- e) Abilities and Skills
  - . Strong communication skills in both written and oral form.
  - . Technical ability to comprehend, evaluate and solve problems.

POSITION ELEMENTS

a) Supervision Received

Under general supervision of the Director Construction, Maintenance & Operation, follows approved policies, standards and practices:

b) Available Guidelines

Has available policies, procedures and electrical standards, engineering service rules, safety code and financial budgets.

c) Exercise of Judgment

Adequate judgment, discretion and professional integrity is required for dealing with administrative and technical matters.

d) Authority to Make Commitments

Has authority to make commitments on approved policies, procedures and budgets within the limits assigned.

e) Nature, Level and Purpose of Contact

Frequent contact with technical management within the AEB, the Circle and Operation Divisions.

f) Supervision Exercised

Functional guidance to and supervision of of Assistant Engineers and shop and field personnel assigned under his control.

POSITION TITLE: Assistant Engineer Field Metering

GRADE: BPS-17

BASIC FUNCTIONAL DESCRIPTION:

The Assistant Engineer Field Metering is responsible to the Executive Engineer Meters and Equipment. His functions include supervising installation, field testing and calibration of MDI's for load from 70 KW to 500 KW. He assists in programs to prevent unauthorized use of energy, tampering of energy meters and associated metering equipment.

MAJOR DUTIES AND RESPONSIBILITIES:

- Supervises installation, testing and field calibration of MDI meters for connections having load from 70 KW to 500 KW.
- Applies approved standards, procedures, practices related to the meter installation and field testing to ensure quality and integrity of the metering devices.
- Ensures that portable test equipment for site testing of meters is periodically checked and calibrated for accuracy.
- Ensures that portable test equipment on his charge is kept in a serviceable state and is promptly repaired and serviced when rendered defective.
- Supervises meter record keeping and meter transaction records as required.
- Assists in the development and formulation of recommendations for approval of policies, practices and procedures relating to meter installation and testing at site.
- Studies new methods, procedures, development and equipment for electrical measurement and field testing of meters to determine application in WAPDA system.
- Assists in development of more efficient methods and practices for improving, testing, storage and records of distribution measurement equipment.
- Develops and advises on training programs for training of field personnel.
- Participates in the testing and trial implementation of new distribution measurement quality assurance concepts.
- Assists in developing improved installation standards and procedures related to distribution measurement standards.
- Assists in the preparation of annual operation and maintenance budget for his activities.

- Implements programs to prevent tampering through unauthorized use of energy meters and measuring equipment:
- Implements the enforcement of WAPDA Safety Program, policies and practices:
- Makes performance evaluation, recommends changes in salaries, promotion, demotion, transfer, disciplinary action, leave of absence, hiring and release of personnel supervised.
- Assumes other duties and responsibilities as assigned:

DESIRED QUALIFICATIONS:

a) Education

Bachelor's degree in the engineering discipline preferably with a major in power.

b) Prior Work Experience

Minimum of 3 years experience in a major functional area of power distribution.

c) Language Proficiency

Must be fluent in written and spoken English and Urdu:

d) Knowledge of Specific Areas

Technical knowledge of the distribution and utilization of electric energy and the equipment involved: Should be familiar with various metering devices and their testing and repair methods:

e) Abilities and Skills

Effective communication skills in both written and oral form.

Technical ability to comprehend, evaluate and solve problems:

POSITION ELEMENTS:

a) Supervision Received

Under general guidance and supervision of Executive Engineer Meters & Equipment, follows approved policies, criteria and standards established.

b) Available Guidelines

Has available planning policies, procedures and criteria approved, electrical standards, engineering service rules, safety code and financial budgets.

c) Exercise of Judgment

Adequate judgment, discretion and professional integrity is required to carry out activities of the meter field organization within the AEB jurisdiction.

d) Authority to Make Commitments

Has authority to make commitments on approved policies and budgets within the limits assigned:

e) Nature, Level and Purpose of Contact

Frequent contact with technical management within the AEB.

f) Supervision Exercised

Monitoring programs for prevention of tampering with energy meters. Direct supervision of personnel assigned.

POSITION TITLE: Assistant Engineer Central Meter Shop

GRADE: BPS-17

BASIC FUNCTIONAL DESCRIPTION:

The Assistant Engineer Meter Shop is responsible to the Executive Engineer Meters & Equipment for the supervision of Meter Shop responsible for testing new meters, repair and calibration of defective meters and periodic calibration of test equipment in an AEB.

MAJOR DUTIES AND RESPONSIBILITIES:

- Supervises the activities of the Meter Shop responsible for testing new meters, repair and calibration of defective meters, including PT's & CT's, and issue to the Field Stores/Operation Divisions repaired, tested and calibrated meters and PTs/CTs.
- Establishes and maintains the standard watt-hour for periodic calibration of watt-hour measurement standards which are in use in the AEB.
- Ensures through his supervisory staff that assigned production targets are accomplished as planned.
- Applies approved standards, procedures and practices related to the testing, servicing and repair of energy meters to ensure quality and integrity of the metering devices.
- Prepares and submits through XEN (M&E) material requirements for servicing and repair of meters and related equipment for procurement in accordance with the WAPDA procurement procedures.
- Supervises meter history record keeping and meter transactions records as required.
- Develops and advises on training programs for training of meter personnel.
- Participates in the testing and trial implementation of new Distribution Measurement Quality Assurance concepts.
- Assists in development of more efficient methods and practices for improving testing, storage and records of distribution measurement equipment.
- Assists in the development and formulation of recommendations for approval of policies, practices applicable to the Meter Shop activities.
- Ensures timely repair and maintenance of the test equipment and tools used in the Meter Shop.

- Submits requisitions for purchase/replacement/repair of test and related equipment and tools for the Meter Shop.
- Assists in the preparation of annual operation and maintenance budget for his activities.
- Studies new methods, procedures, developments and equipment for electrical measurement and meter testing to determine application in WAPDA System.
- Assists in programs to prevent tampering of energy meters and measuring equipment.
- Maintains close liaison with the Operation Divisions for the return of defective meters and for issue of new and repaired meters and calibrated test equipment.
- Implements the enforcement of WAPDA Safety Program, policies and practices.
- Makes performance evaluation, recommends changes in salaries, promotion, demotion, transfers, disciplinary action, leave of absence, hiring and release of personnel supervised.
- Assumes other duties and responsibilities as assigned.

DESIRED QUALIFICATIONS:

a) Education

Bachelor's degree in the engineering discipline preferably with a major in power.

b) Prior Work Experience

Minimum of 3 years experience in a major functional area of power distribution.

c) Language Proficiency

Must be fluent in written and spoken English and Urdu.

d) Knowledge of Specific Areas

Technical knowledge of the distribution and utilization of electric energy and the equipment involved. Should be familiar with various metering devices and their testing and repair methods.

e) Abilities and Skills

Effective communication skills in both written and oral form.

Technical ability to comprehend, evaluate and solve problems.

POSITION ELEMENTS

a) Supervision Received

Under general directions of the Executive Engineer Meters & Equipment, follows approved policies, practices, criteria and standards established.

b) Available Guidelines

Has available policies, procedures, electrical standards, engineering service rules, safety code and financial budgets.

c) Exercise of Judgment

Adequate judgment, discretion and professional integrity is required to carry out activities of the meter shop.

d) Authority to Make Commitments

Has authority to make commitments on approved policies and budgets within the limits assigned.

e) Nature, Level and Purpose of Contact

Frequent contact with technical management within the AEB.

f) Supervision Exercised

Direct supervision of personnel assigned.

POSITION TITLE: Meter Supervisor  
Supervisor Rubber Safety Equipment Tester

GRADE: BFS 16

BASIC POSITION DESCRIPTION:

The Meter Supervisor has functional responsibility to the Assistant Engineer Central Meter Shop for shop testing and repairing of all new and old kilowatt-hour, kilovarhour, demand meters and associated equipment of the AEB, for testing and repairing of current and potential transformers, associated meter records, and for scheduling and shipping of meter devices to and from the AEB divisions.

MAJOR DUTIES AND RESPONSIBILITIES:

- o Instructs, directs, and immediately supervises assigned work and personnel for the most efficient use of personnel and equipment.
- o Supervises testing, calibration and repairing of old kilowatt hour, kilovarhour and demand meters.
- o Supervises the function of rubber goods testing.
- o Supervises testing and repairing of old current and potential transformers including high voltage units, and Hi Pot testing.
- o Supervises the testing of all new metering units purchased by the AEB using the latest practices of sample testing.
- o Directs compilation of all necessary history and test records as required in the operation of the meter test laboratory.
- o Initiates orders and maintains adequate inventories for the entire AEB of the following :  
  
Spare parts for meter repair, testing equipment supplies, meter jewels and bearings for laboratory and field use, and shipping facilities for meter and safety equipment.
- o Coordinates and schedules the shipping and transferring of metering units to and from the AEB Divisions and areas.
- o Coordinates all programs for establishment and maintenance of meter records.
- o Supervises activities of personnel assigned to meter record keeping, within the general organization of the AEB.
- o Provides functional guidance and supervision to AEB Division meter records personnel.
- o Trains meter personnel of all classifications for meter shop work and field meter work.

- o Makes recommendations with respect to hiring, promotions, disciplining, transferring and wage adjustment for assigned employees and administers the provisions of the employee handbook.
- o Inspects and tests rubber protective equipment gloves, sleeves and blankets.
- o Coordinates periodic test schedule with the operating Divisions.
- o Conducts examinations for advancement of various meter personnel throughout the AEB.
- o Maintains an adequate complement of trained meter personnel to keep abreast of test schedules and to provide trained personnel for the divisions to meet their requirements.
- o Plans, designs and/or constructs laboratory and shop test equipment as required.
- o Promotes and enforces all safety practices to safeguard employees, the general public and AEB equipment.
- o Develops new testing and operation procedures, methods and equipment that will improve the efficiency of the operation of the AEB meter laboratory.
- o Assumes other duties and responsibilities as assigned.

DESIRED QUALIFICATIONS:

a. Education

3 year Diploma in the engineering discipline.

b. Prior Work Experience

Minimum of 7 years of related metering experience and a thorough knowledge of meter testing.

c. Language Proficiency

Must be fluent in written and spoken English and Urdu.

d. Knowledge of Specific Areas

Technical knowledge of all types of meters, instrument transformers and the technical aspect of testing them. Must have a thorough knowledge of electric energy, demand and the theory of measurement.

e. Abilities and Skills

- Strong communication skills in both written and oral forms.
- Technical ability to comprehend complex problems and the ability to direct implementation of their solutions.

POSITION ELEMENTS:

a. Supervision Received

Under general direction of the Assistant Engineer Central Meter Laboratory, follow approved policies, criteria and standards established.

b. Available Guidelines

Has available approved WAPDA Meter Standards Manual, Engineering Service Rules, Safety Code and financial budgets.

c. Exercise of Judgment

Substantial technical judgment, discretion and professional integrity is required to interface with AEB division meter personnel, AEB test laboratory personnel and assigned personnel.

d. Authority to Make Commitments

Has authority to make commitments on approved policies, procedures, and budgets within the limits as assigned.

e. Nature, Level and Purpose of Contact

Frequent contact with technical and operating staff of the AEB divisions and with assigned personnel to exchange job related matters.

f. Supervision Exercised

Direct supervision of meter testers and clerk.

POSITION TITLE: Test Inspector

GRADE: BFS 12

BASIC POSITION DESCRIPTION:

The Test Inspector Standards has functional responsibility to the Assistant Engineer Central Meter Shop for performing standardizing calibration, testing and maintenance of the meters and instrument transformers, instruments, standards and associated work in the laboratory.

MAJOR DUTIES AND RESPONSIBILITIES

- o Test transfer watt-hour standards against the laboratory watt-hour standard and obtain correction data.
- o Make performance tests on all types of meters in accordance with IEC specifications.
- o Test watt-hour meter test board standards against the laboratory watt-hour standard and obtain correction data.
- o Test and repair all types of kilowatt-hour and demand meters.
- o Test current and potential transformers at various loads and burdens and obtain correction data.
- o Perform Hi Pot tests on meters and instrument transformers.
- o Assist meter engineers and employees of equal or higher classification.
- o Test and calibrate instruments.
- o Function with safety and proficiency.
- o Test all newly purchased kilowatt-hour and demand meters before being sent to the Divisions for installation.
- o Repair, test and calibrate all types of portable and graphic instruments.
- o Make special dielectric tests on meter equipment.
- o Prepare reports and records as required by his work.
- o Supervise and advise the meter mechanics and related staff in his Section in the performance of their duties.

DESIRED QUALIFICATIONS

a. Education

3 year Associate Engineer's diploma in Electrical Engineering.

b. Prior Work Experience

Minimum of 3 years experience as a Meter Technician.

c. Language Proficiency

Must be fluent in written and spoken English and Urdu.

d. Knowledge of Special Areas

Ability to read and understand electrical prints and diagrams of metering, and measuring control circuits including all types of electronic circuits used therein.

e. Abilities and Skills

- Reasonable communication skills in both written and oral forms.
- Technical ability to implement instructions from supervisory staff.

POSITION ELEMENTS

a. Supervision Received

Under direct supervision of the Assistant Engineer Central Meter Shop follow approved policies, criteria, and standards established.

b. Available Guidelines

Has available approved WAPDA Meter Standards Manual, Engineering Service Rules, Safety Code and financial budgets.

c. Exercise of Judgment

Substantial technical judgment, discretion and professional integrity are required in the performance of duties.

d. Authority to Make Commitments

Has authority to make commitments on approved policies, procedures and budgets within the limits as assigned.

e. Nature, Level and Purpose of Contact

Frequent contact with the technical staff of the meter laboratory to exchange job related matters.

f. Supervision Exercised

Direct Supervision of semi-skilled and unskilled employees as assigned.

V. FUNCTIONS OF THE DIVISION METER ORGANIZATION

1. Remove and Install Kilowatthour Meters

Remove defective self contained meters and ship them to the Central Meter Shop for repair. Install new meters in their place.

2. Test all Single Phase and Polyphase Meters

Perform tests on meters where high bill complaints are received. Perform tests on all meters suspected of meter tampering.

3. Perform Preventive Maintenance

Any preventive maintenance required to insure the accuracy of the meter installation without removing the meter cover.

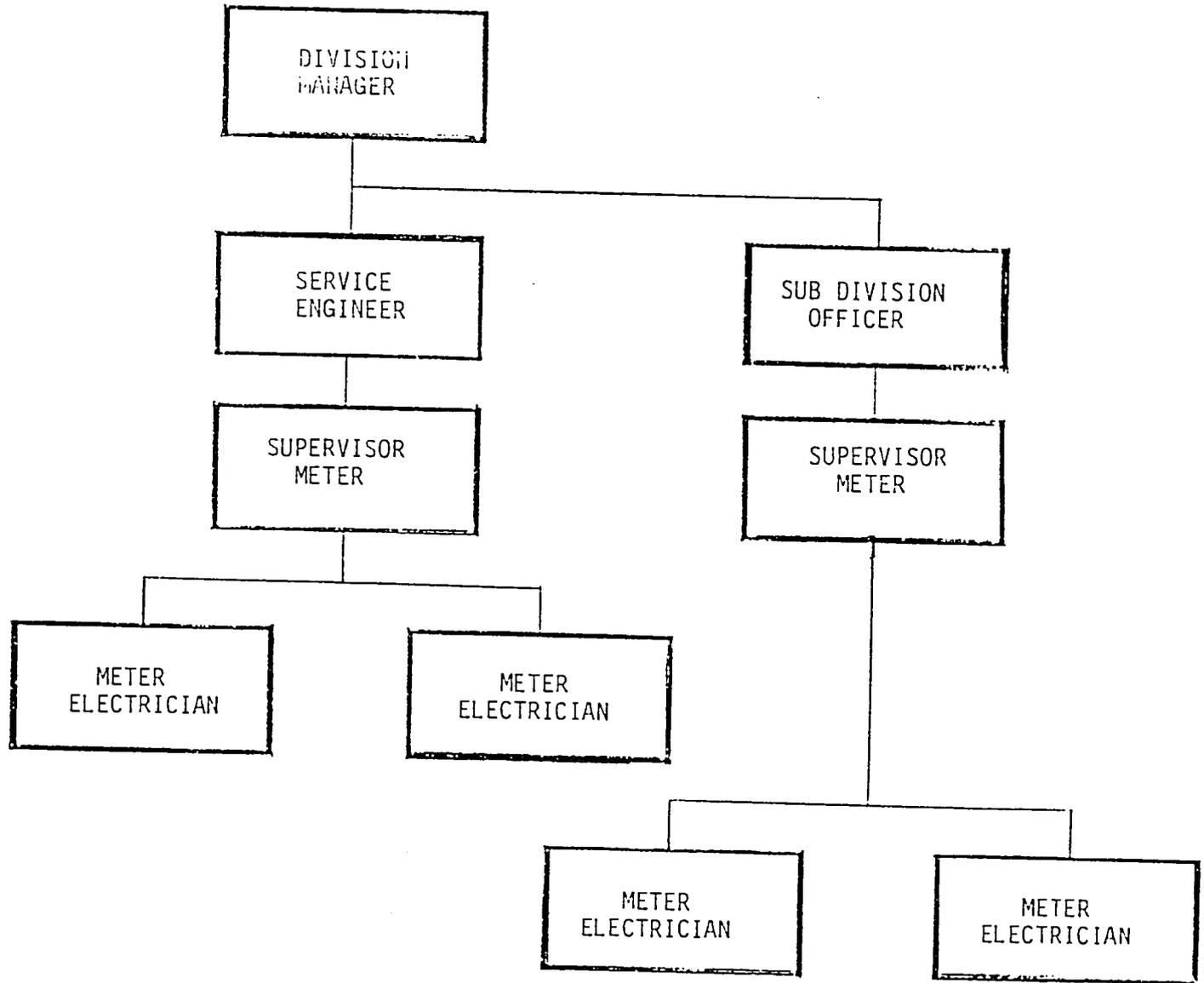
4. Meter Sampling and Periodic Testing

Remove the meters for the meter sampling program and return them to the meter laboratory for testing. Install replacement meters. Conduct periodic testing on the meters installed on the large customers. The meters to be tested have connected loads of less than 70 kw.

VI. DIVISION METER PERSONNEL

As shown in the Organization Chart, Meter Supervisors in the Divisions report to the Division Service Engineer and Meter Supervisors in the sub divisions report to the Sub Division Officer. The meter electricians who perform the meter testing, removal and installation work report to the Meter Supervisor.

DIVISION METER ORGANIZATION



VII. POSITION DESCRIPTIONS FOR THE DIVISION METER ORGANIZATION

1. Supervisor Meter
2. Meter Electrician

POSITION TITLE: Supervisor Meter

GRADE: KPS-12

BASIC POSITION DESCRIPTION:

The Supervisor Meter has functional responsibility to the Division Service Engineer or the S.D.O. for supervision and coordination of work involved in the testing, maintenance, removal/replacement and inspection of meters and the related equipment.

MAJOR DUTIES AND RESPONSIBILITIES

- o Supervises field test, inspection, maintenance, removal and replacement of all types of self contained single and three phase meters, and the related equipment.
- o Checks meter and service installations on customer premises and assures conformity with company standards and satisfactory operating conditions.
- o Supervises the preparation of meter reports and records.
- o Implements monitoring of meter work and record collection.
- o Insures cooperation and coordination of activity among employees to enhance operation of WAPDA.
- o Assists in the administration of the WAPDA Safety program and the enforcement of safety policies and practices.

DESIRED QUALIFICATIONS

a. Education

3 years diploma in electrical engineering

b. Prior work Experience

Minimum of 5 years experience in a major functional area of distribution.

c. Language Proficiency

Must be fluent in written and spoken English and Urdu.

d. Knowledge of Specific Areas

Technical knowledge of the distribution and utilization of electric energy and its measurement.

e. Abilities and Skills

. Reasonable communication skills in both written and oral forms.

POSITION ELEMENTS:

a. Supervision Received

Under general direction of the Service Engineer/S.D.O. follows approved policies, criteria and standards established.

b. Available Guidelines

Has available approved WAFDA Meter Standards Manual, engineering service rules, safety code and financial budgets.

c. Exercise of Judgment

Substantial technical judgment, discretion and professional integrity is required to interface customers, supervise work and assign personnel.

d. Authority to make Commitments

Has authority to make commitments on approved policies, procedures and budgets within the limits as assigned.

e. Nature, Level and Purpose of Contact

Frequent contact with customer, technical and operating staff of the Sub-division AEB and with assigned personnel to exchange job related matters.

f. Supervision Exercised

Direct supervision of Meter Electricians, semi-skilled and unskilled staff assigned.

POSITION TITLE: Meter Electrician

GRADE: BPS 11

BASIC POSITION DESCRIPTION

The Meter Electrician is responsible to the Meter Supervisor. He performs all types of work involved in the field maintenance, testing, removal/replacement and inspection of meters and the related equipment.

Major Duties & Responsibility

- o Tests, inspects and maintains in accordance with approved schedules, all types of self contained single and three phase meters and the related equipment; tests at customer premises for proper operation, grounds, proper wiring and registration.
- o Inspects meter and service installations on customer premises for conformity with company standards and satisfactory conditions.
- o Removes and replaces the defective and/or inaccurate meters at the customer premises and forwards the same to the AEE Meter Shop for repair etc.
- o Makes calculations and prepares reports of removals and replacements of meters for billing and record purposes.
- o Reports irregular and abnormal conditions and observations of unauthorized use of energy for action by the concerned staff.
- o Maintains equipment, tools and work area in a clean and orderly condition.
- o Performs work in accordance with company meter standards, safety rules and operating regulations and practices.

DESIRED QUALIFICATIONS

- a. Education  
Diploma in Electrical Technology (Associate Engineer)
- b. Prior Work Experience  
Minimum of 4 years experience in distribution work.
- c. Language Proficiency  
Reasonable fluency in written and spoken English. Must be fluent in Urdu.
- d. Technical knowledge of the distribution and utilization of electric energy and the equipment involved.
- e. Abilities and Skills
  - . Effective communication skills in both written and oral forms.
  - . Technical ability to implement instructions from supervisory staff.

POSITION ELEMENTS

a. Supervision Received

Under general guidance of the Service Engineer/Meter Supervisor - Division/Subdivision follows approved policies, criteria and standards established.

b. Available Guidelines

Has available approved WAPDA Meter Standards Manual, engineering service rules and safety codes.

c. Exercise of Judgment

Technical judgment and professional integrity is required.

d. Authority to make Commitments

Does not have authority to make commitments.

e. Nature, Level and Purpose of Contacts

Frequent contact with customer, technical and operating staff to exchange job related matters.

f. Supervision Exercised

Direct supervision of semi-skilled and unskilled employees assigned.

VIII. RECOMMENDED STANDARDIZED LIST OF METERING EQUIPMENT  
 REQUIRED FOR A TYPICAL AEB METER LAB, AEB FIELD METER TEAM  
 AND A TYPICAL OPERATING DIVISION  
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EQUIPMENT	MINIMUM QUANTITY/ LOCATION			PRIORITY
	AEB METER LAB	AEB METER FLD TEAM	OPERATING DIVISION	HIGH-1 MEDIUM-2 LOW-3
1. POLYPHASE SOLID STATE KILOWATTHOUR STANDARDS.	1	0	0	1
2. POLYPHASE SOLID STATE KILOWATT- HOUR FIELD SUBSTANDARDS.	1	1	1	1
3. " " " SINGLE PHASE	0	0	2	1
4. POLYPHASE PHANTOM LOAD	1	1	1	1
5. " " " SINGLE PHASE	0	0	2	1
6. POLYPHASE METER TEST BENCHES	2	0	0	1
7. SINGLE PHASE METER TEST BENCHES	2	0	0	1
8. VOLTAGE/CURRENT TRANSFORMER COPYRATOR	1	0	0	1
9. PRECISION POWER SOURCE FOR TESTING/CALIBRATING INSTRUMENTS	1	0	0	1
10. HOT TEST BOARD	2	0	0	1
11. RUBBER PROTECTIVE EQUIPMENT TRUCKER	1	0	0	1
12. CLIP ON WATTMETER	0	0	3	1
13. ULTRASONIC CLEANER	1	0	0	1
14. VOLTAGE LEAKAGE TESTER	3	0	0	2
15. HIGH VOLTAGE DC HI POT TESTER	1	0	0	2
16. PHASE SEQUENCE ANALYZER	2	0	0	2
17. PHASE SEQUENCE INDICATOR	0	1	3	2

TITREMPLES

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EQUIPMENT	MINIMUM QUANTITY/ LOCATION			PRIORITY
	A&B METER LAB	A&B METER FLD TEAM	OPERATING DIVISION	HIGH-1 MEDIUM-2 LOW-3
18. EARTH RESISTANCE TEST EQUIPMENT	0	1	1	1
19. AIR CONDENSER	1	0	0	1
20. HEATER FOR INSULATION TESTING	0	1	1	1
21. CABLE FAULT LOCATOR	0	1	0	2
22. AIR COMPRESSOR	1	0	0	1
23. WELDING EQUIPMENT	0	1	0	1
24. SPLIT CORE CURRENT TRANSFORMERS	1	1	0	1
25. DIGITAL CLIP ON MULTIMETERS	4	1	3	1
26. STOP WATCHES	2	2	3	1
27. CALCULATORS	8	2	3	1
28. TOOLS AND EQUIPMENT FOR PATCHING & REPAIRING MSBs AND HUBS	2	0	0	1
29. DRILL PRESS INCLUDING BITS	1	0	0	2
30. VICE	1	0	0	2
31. PORTABLE GRINDER	2	1	0	1
32. HAND DRILLS INCLUDING BITS	1	1	0	2
33. SOLDERING IRONS	2	1	0	1
34. DOBBLES	2	2	0	1
35. FLASHLIGHTS	0	1	0	1
36. LADDER	2	1	0	1

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EQUIPMENT	MINIMUM QUANTITY/ LOCATION			PRIORITY
	WAB METER LAB	WAB METER FLD TEAM	OPERATING DIVISION	HIGH-1 MEDIUM-2 LOW-3

37. SMALL TOOLS

A. OPEN END WRENCHES	4	1	0	1
B. BRUSHES	4	1	0	1
C. MAGNETIC AIR GAP CLEANER	4	0	0	1
D. MAGNETIC AIR GAP BRUSH	4	0	0	1
E. JEWEL PUNCHES	4	0	0	1
F. JEWEL REMOVERS	4	0	0	1
G. TYPOL REMOVERS	4	0	0	1
H. BALL DROPPER	4	0	0	1
I. MAGNETIC GLOBE GLASS	4	0	0	1
J. PLIERS	4	2	0	1
K. WIRE CUTTERS	4	2	0	1
L. HAMMERS	4	1	0	1
M. SCREWDRIVERS (REGULAR AND PHILLIPS HEAD)	4	1	0	1
N. INSULATION STRIPPER	0	1	0	1
O. FILES	0	1	0	1
P. ADJUSTABLE WRENCHES	0	1	0	1
Q. WIRE BRUSH	0	1	0	1
R. POLISH BRUSHES	0	1	0	1
S. GLOVES	0	1	0	1
T. SCRAPER	0	1	0	1
U. SAND PAPER	0	2	0	1
V. METAL MEASURING TAPE	0	1	0	1
W. LEVEL	0	1	0	1

**IX. IMPORTANT FEATURES/PARAMETERS FOR RECOMMENDED  
STANDARD LIST OF METERING EQUIPMENT FOR THE  
DIVISIONS, SUB DIVISIONS AND  
OPERATING DIVISIONS**

**1. Polyphase Solid State Kilowatthour Standards**

The accuracy of this standard should be at least  $\pm 0.04\%$  of reading. It is used to calibrate the standards in the meter test boards and field sub standards.

**2. Polyphase Solid State Kilowatthour Field Substandards**

The accuracy of this substandard at least  $\pm 0.1\%$  of reading. It is used for field testing of meters.

**3. Solid State Kilowatthour Field substandard - Single Phase**

The accuracy of this instrument is at least  $\pm 0.1\%$  of reading is used for field testing single phase meters.

**4. Polyphase Phantom Load**

This instrument should have a 50 Amp load capability and have a switched power factor capability to test meters for 50% power factor loads. This instrument is necessary for field testing of meters.

**5. Phantom Load - Single Phase**

This instrument should have a 50 Ampere load capability and have switched power factor capability to test meters at 50% power factor loads. This instrument is necessary for field testing single phase meters.

**6. Automatic Polyphase Meter Test Benches**

These Boards should be equipped with polyphase solid state kilowatthour sub standards, optical pick up devices, and the latest solid state circuitry. These will be required to test a larger quantity of meters in the laboratories when periodic testing is introduced as well as for testing all new meters before installation. Included also is a multi gang suspension rack.

**7. Automatic Single Phase Meter Test Bench**

These benches should be equipped with single phase solid state kilowatthour sub standards optical pick up devices, and the latest solid state circuitry. These

are required for testing all new single phase meters received from the suppliers, defective meters received from the field and meters on the sample test program. This equipment includes multi gang suspension racks.

**8. Voltage/Current Transformer Comparator**

This should be a combined device for testing the accuracy and polarity of current and voltage transformers as well as ,or demagnetizing current transformers. It should include all necessary voltage and current transformer standards. Test System Accuracy within  $\pm 0.025\%$  on ratio and  $\pm 2$  minutes on phase angle at 1.2 or less accuracy class both for current and voltage transformers is recommended.

**9. Precision Power Source for Testing/Calibrating Instruments**

This instrument is used to test and calibrate AC and DC ammeters, voltmeters, Ohmmeters, multimeters and Wattmeters. It should provide an accuracy of 0.0005% DC and 0.05% AC.

**10. MDI Meter Test Board**

This should be a multi gang test board in the laboratory devoted to testing demand meters. It should be capable of maintaining rated meter test current for prolonged periods of time. It should provide a solid state standard for monitoring watts consumed.

**11. Rubber Protective Equipment Tester**

This tester should be capable of testing rubber gloves, sleeves, and blankets at 20,000 volts for three minutes.

**12. Clip on Wattmeter**

Minimum of  $\pm 2.5\%$  accuracy, rugged, analog or digital, 230V, 400V AC, with scales of 3, 6, 12, 30, 60, 120, 300 kW.

**13. Ultra Sonic Cleaner**

This device is used for cleaning Mechanical Demand Registers and should be large enough to immerse a Mechanical Demand Register.

**14. Voltage Leakage Tester**

This tester is used to test the leakage current between the voltage coil and the current coil and between the

coils and the meter base. It should be capable of producing 2500 V DC at 400 microamperes.

15. High Voltage DC High Pot Tester

This is for testing cables and should be capable of producing 0-30 kV D.C.

16. Phase Sequence Analyzer

This instrument is needed for reactive metering installations to determine the phase sequence and should indicate phase on both leading and lagging power factor.

17. Phase Sequence Indicator

This is a rugged, light weight instrument for determining phase sequence or phase rotation upto 600 V.

18. Earth Resistance Test Equipment

This device is used to test for ground resistance and has no special parameters.

19. Air Conditioners

The air conditioner should be sized to cool and condition the air in the room for which it will be used.

20. Megger for Insulation Testing

This device shall have a voltage rating of 1000 volts.

21. Cable Fault Locator

No special parameters required.

22. Air Compressor

This compressor should have a capability of 20 psi. It will be used for cleaning metering equipment in the Centralized Meter Test Lab.

23. Welding Equipment

This equipment should be portable for operation in the field and specified for use in sealing meter security boxes (MSBs). It should be supplied by propane gas rather than electric. See WAPDA Specifications.

24. Split Core Current Transformers

These transformers should be in sets of 3 for field testing three phase meters. Each set should be single ratio. The ratios required are 100:5, 200:5, and 400:5. 600 volt rating.

25. Digital Clip on Multimeters

These should be capable of reading Amperes, volts, resistance, power factor and Watts. They will be used for meter testing.

26. Stop Watches

These should be capable of reading minutes and seconds for use in field testing.

27. Calculators

These are four function calculators with memory.

28. Tools and Equipment for Painting Meters and Meter Boxes

This is a spray device of low volume capacity.

29. Drill Press

This is a free standing machine for use in the laboratory.

30. Vice

No special parameters required mounted on a bench.

31. Portable Grinder

No special parameters required.

32. Hand Drill including Bits

This is a 1/2" drill - double insulated.

33. Soldering Irons

Two types should be purchased. Low wattage (50 - 100 Watts) and high wattage (100 - 200 Watts).

34. Goggles

No special parameters required.

35. Flashlights

No special parameters required.

36. Ladder

Two/three meter high wood ladder.

37. Small Tools

No special parameters required.

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