

ISLAMIC REPUBLIC OF PAKISTAN
DETAILED DESIGN REPORT
ON
CENTRAL TELECOMMUNICATION RESEARCH LABORATORIES
ISLAMABAD
(RESEARCH FACILITIES)
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Section 1 TELEPHONE EQUIPMENT

Spec. No.	SPECIFICATIONS
1.1	Telephone Equipment for High Loss Subscriber's Line
1.4	Small Type Push Button Telephone
1.5.1	4MH ₂ Picture Phone
1.5.2	4MH ₂ Small Picture Phone
1.5.3	Picture Phone Controller
1.8	Memory Scope
1.9	Reference Equivalent Measuring Set
1.16	Artificial Telephone Cable
1.20	Trolley for Measuring Sets
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Spec. No. 1.1
Telephone Equipment for High Loss Subscriber's Line

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
 2. Quantity: 4 units
 3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)
 - 3.1 Electrical Requirements
 - (1) This equipment shall be available for subscribers of high loss line. It shall be provided with high sensitivity telephone transmitter and receiver and shall be possible to reduce the side tone by using switching tap so as to keep impedance balance with individual line.
 - (2) The impulse shall be come out normally by dialing.
(10 ± 1 p.p.s.)
 - 3.2 Mechanical Requirement
Upon setting the hand-set ON HOOK, the hook button shall be down completely.
 - 3.3 Construction Dimensions:
Standard sizes shall be within 230 (l) x 225 (W) x 130 (H) mm
- Notes:
1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, shall be attached to pannel, metal casing or cover. All the other descriptions on panel shall be in English.
 2. Color of individual set shall be red, ivory, blue and green.
 3. Nominated manufacturers: Nakayo Telecommunication Inc.,
Hitachi Ltd. 600L type
4. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 1.4
Small Type Push Button Telephone

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 4 units

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Electrical requirements

- (1) This equipment shall be provided with the facilities of tone-ringer and speaker and the sound control shall be possible.
- (2) Nominal low group frequency and high group frequency oscillated by pushing a button dial shall be as follows:

Button		1	2	3	4	5	6	7	8	9	*	0	#
Nominal frequency (Hz)	Low group	697	697	697	770	770	770	852	852	852	941	941	941
	High group	1,209	1,336	1,477	1,209	1,336	1,477	1,209	1,336	1,447	1,209	1,336	1,477

- (3) The speech shall be clearly made.

3.2 Mechanical Requirement

Upon setting the hand-set ON HOOK, the hook button shall be down completely.

3.3 Construction Dimensions

- (1) The dial shall be assembled in the hand- set.
- (2) The set shall be available in the both ways for desk and wall.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other descriptions on panel shall be in English.
2. Painting color is to be of manufacturer's standard.

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Spec. No. 1.4

3. Nominated manufacturers: Fujitsu Limited, Nippon Electric Co., Hitachi Ltd. and Oki Electric Industry Co.
700P type
4. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies; Catalogue, 3 copies; Invoice and Packing list, 4 copies each (one each of them is attached to the equipment)

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Spec. No. 1.5.1
4MHz Picture Phone

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 unit

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Constitution:

The set shall be constituted from camera unit, picture unit and telephone unit.

3.2 Facility

- (1) Transmitted picture monitor, transmitted picture stop.
- (2) Automatic adjustment of camera sensitivity.
- (3) Adjustment of contrast and brightness.
- (4) Automatic answering.
- (5) Focus adjustment of transmitted picture.
- (6) Mechanically panning

3.3 Electrical Requirements

Picture frequency range	4MHz	
Roll-off characteristics	24 dB attenuation (at 4 MHz)	
Synchronous method	Power source asynchro- nous	Power source synchronous
Interlace	2 : 1 locked	Random
Field frequency	60 Hz	50 Hz
Number of frames	30 pcs./sec.	20 pcs./sec.
Number of scanning lines	525 lines	630 lines
Line frequency	15.75 kHz	
In-put out-put impedance	140Ω balance or 75Ω unbalance	
Transmitted picture signal level	3Vpp or 1Vpp (75Ω conversion)	

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Spec. No. 1.5.1

Standard eye distance	80cm (figure) 40cm (painting)
Screen size	15cm (length) x 20cm (width)
Picture tube	9 inch Braun tube
Camera tube	1 inch vidicon
Illumination of subject	200 - 2,000 lux
Power source required	AC 230 \pm 10V

Notes:

1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other descriptions on panel shall be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Oki Electric Industry Co. Type DV-4002
4. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing List 4 copies each (one each of them is attached to equipment).

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Spec. No. 1.5.2
4MHz Small Size Picture Phone

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 unit

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Constitution:

Picture, telephone and power source shall be united and miniaturized.

3.2 Facility:

The transmitted picture monitoring shall be made.

3.3 Electrical Requirements:

Picture frequency range	4MHz
Roll-off characteristics	None
Number of scanning lines	525 lines ***
Number of frames	30 pcs./sec. ***
Scanning method	Random interlace
Synchronous method	Asynchronous power source ***
Line frequency	15.75 kHz
Field frequency	60 Hz
Input & output impedance	75 unbalance
Transmitted picture signal level	1 Vpp (75Ω)
Standard eye distance	80cm
Screen size	8 cm (length) x 10.5cm (width)
Picture tube	5 inch Braun tube
Camera tube	2/3 inch vidicon
Illumination of subject	100 - 2,000 lux
Power source required	AC 230V ± 10V

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*** It shall be possible to use on the power source synchronous method. In this case, however, number of scanning lines shall be approx. 630 lines and number of frames 25 pcs. at 50Hz of power source frequency.

Notes:

1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other descriptions on panel shall be described in English.
 2. Painting color is to be of manufacturer's standards.
 3. Nominated manufacturer: Oki Electric Industry Co., Type DV-4102
4. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to equipment).

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Spec. No. 1.5.3
Picture Phone Controller

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 unit

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)
This equipment shall be the control device for connecting one pair of picture phones as indicated on Fig. 1.

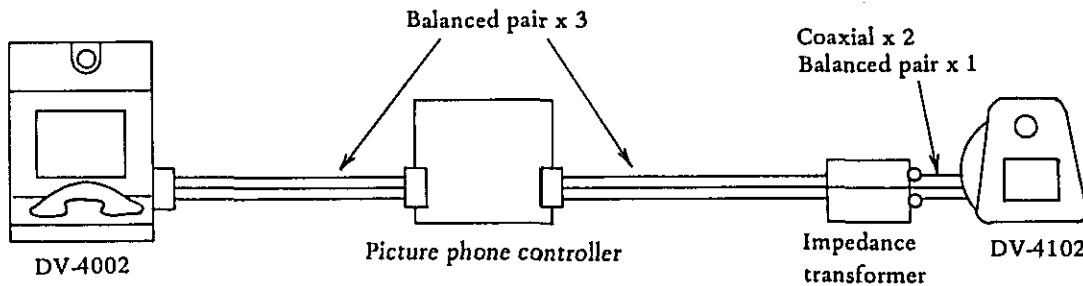


Fig. 1 Connection diagram of picture phone controller

Notes:

1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other descriptions on panel shall be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: OKI Electric Industry Co., DV-4201 type

4. Accessories and Spare Parts:

Impedance transformer 1 unit (for connecting DV-4002 and DV-4102)
Cable for connecting

5. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Installation Work description 2 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (one each of them is attached to equipment).

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Spec. No. 1.8
Memory Scope

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 unit

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Performance

o Braun tube

Braun tube:	E2666B1, 5 inch (130mm)
Effective Display area:	80mm (D) x 100 mm (W)
Acceleration voltage:	Approx. 2.2kV
Recording speed:	40 μ s/cm over
Viewing time:	Approx. 5 hours
Erasing time:	Within 0.5 s

o Vertical deflection system: (Both channel 1 and 2 shall have performances listed in the below)

Sensitivity:	2mV/cm - 1V/cm (x1) Accuracy \pm 3% 200 μ V/cm - 2.5V/cm continuously variable with vernier and magnifier
Input RC:	(Direct) 1M \pm 2% 50pF \pm 5pF
Frequency band width:	DC - 2MHz, -3dB at DC coupling 4Hz - 2Hz, -3dB at AC coupling

o Horizontal deflection system

Sweep mode:	Trigger sweep, free running, single-sweep
Trigger mode:	Internal (CH1, CH2) external (EXT), Power source (LINE)
Trigger coupling:	DC, AC, (AC) HF REJ, TV-V
Minimum trigger level:	Internal 5mm (DC - 1MHz), 10mm (1 - 2MHz) External 0.2Vp-p (DC - 1MHz), 0.3 Vp-p (1 - 2 MHz)

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Sweeping time range:	0.5 μ s/cm - 0.5s/cm, accuracy \pm 3% 0.5 μ s/cm - 1.25s/cm continuously variable
Sweep magnifier	5 times, accuracy \pm 5%
Single-sweep:	Possible
CH1-Y · CH2-X:	Sensitivity is the same as the CH2 vertical deflection system
o Calibration out-put voltage	Square wave of 1kHz, 12/120mV
o Power source:	AC100/117/217/234V \pm 10%, 50 - 400Hz Wattage consumption; approx. 65W
3.2 Dimensions	Approx. 270(Width) x 156(Height) x 416 (Length) mm

Notes:

1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other descriptions on panel shall be described in English.
 2. Painting color is to be of manufacturer's standard.
 3. Items other than those given in the specifications shall comply with the manufacturer's catalogue.
 4. Nominated manufacturer: Iwatsu Electric Co., MS-5021 type
4. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to equipment).

Spec. No. 1.9
Electric Sound Transmission Measuring Device

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1 set
3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Outline of Device

This device is designed for the acoustic analysis of telephone equipment and transmission system.

- (1) It shall be able to measure the sensitivity of telephone receiving, transmitting, side tone, Klirrfaktor, frequency response and reference equivalent etc.
- (2) Each item shall be controlled at the front panel without changing any connection cable.
- (3) The accurate and stable signal shall be provided for the telephone equipment by a continuous fast reciprocating sweep or a slow one-way sweep via 1023 type sine wave generator.
- (4) The output from the telephone shall be fed to 4904 type meter, 2113 type frequency analyser, 4712 type response tracer and 2307 type level recorder, for analysis, display, recording and measurement.
- (5) The sweep range shall conform to multiplex standards, travelling from 300Hz to 3300Hz back to 300Hz once per second. A front-panel switch shall convert this to the standard 200Hz to 4KHz back to 200Hz once per second.
- (6) The test head of 4905 type shall be use REF and AEN mode position and meet the requirements of European and American conditioning practices.
- (7) The artificial ear couplers shall be complied with NBS 9A, ANSI (ASA), Braun, IEC standards and the frequency analyser with IEC 179, IEC 225 standards.

3.2 Items of Measuring

This equipment shall be able to measure the following items.

- (1) Objective reference equivalent meter (OREM)
 - 1) OREM A (UK): measuring by UK standard
 - 2) OREM B: measuring by GERMAN standard

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- 3) American: measuring by American loudness new standard
- (2) Acoustic measuring
- 1) As for receiver and transmitter
 - a) Frequency response
 - b) Sensitivity measuring
 - c) Klirrfaktor measuring
 - d) Acoustic coupling for telephone receiver
 - e) Test for standard adaptability
 - 2) As for telephone transmitter
 - a) Measuring the noise level from telephone transmitter
 - b) Noise removal characteristics; noise control
 - c) Measuring the sensitivity variation caused by environment
 - d) Measuring the linearity
 - 3) As for telephone circuit
 - a) Frequency response
 - b) Measuring the Klirrfaktor
 - c) Measuring the Insertion loss
 - d) Line matching test
 - e) Adjustment of characteristics - characteristics variation by electric current
 - f) Polarity change effect
 - g) Influence to the characteristics by changing a part of telephone equipment circuit
 - 4) As for transmission circuit and general circuits
 - a) Frequency response
 - b) Measuring the influences of power supply circuit
 - c) Measuring the balance returning loss
 - d) Transmission loss
 - 5) Other various acoustic tests

3.3 Constitution of equipment

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Model	Name of item	Quantity
1023A	Sine wave generator	1 unit
2113A	Frequency spectrometer	1
2307A	Level recorder	1
2608A	Amplifier for measuring	1
2619S	FET Pre-amplifier	1
4134	1/2 inch micro-phone	1
4144	1 inch micro-phone	1
4219	Artificial voice (with 4136 type 1/4 inch micro-phone)	1
4230	Microphone calibrator	
4712	Frequency response tracer	1
4904	Objective reference equivalent meter	1
4905	Telephone test head	1
4906	Telephone power supply	1
KC3354	Rack system and accessories	1
KE0069	Mahogany box with accessoires	1
UA0086	Stand for receiver capsule holder	1
UA0095	Stand for transmitter capsule holder	1
ZM0047	Sweep control unit	1
QP1142	Roll of telephone-scale paper (100mm by 60m)	3
AO0014	Screened cable (B & K plugs, 1.2m)	1
AO0019	Screened cable (B & Z plugs, 3m)	3
AO0027	Microphone extention cable (3m)	1
AO0064	Screened cable (B & K-BNC11.2m)	1
AO0071	Multicable joining meter to power supply	1
AO0142	Screened cable (BNC plugs, 3m)	3
AO0143	Multicable joining meter to sweep unit	1
AQ0011	Cable (with banana plugs)	1
AQ0034	Control cable with 8-pin DIN plugs	2
AQ0035	Control cable with 7-pin DIN plugs	2
JP0144	B & K to BNC plug adaptor	2
JP0150	Banana plug to BNC plug adaptor	1

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Other accessories, names of items, quantities and spec. of each equipment shall depend on the catalogue of 3354 model (type 3354 product data sheet).

Notes:

1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other descriptions on panel shall be described in English.
 2. Painting color is to be of manufacturer's standard.
 3. Items other than those given in the specifications shall comply with the manufacturer's catalogue.
 4. Nominated manufacturer:
Brüel & Kjaer (Denmark) 3354 type
4. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (one each of them is attached to equipment).

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Spec. No. 1.16
Artificial Telephone Cable

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 3 units (Type SCK-15, 16, 17 one each)

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Electrical Requirements:

Type	SCK-15	SCK-16	SCK-17
Type of cable artificialized	Star quad cable		
Imaginary diameter of cable	0.4mm	0.5mm	0.65mm
Imaginary max. distance of cable	7.5km	7.5km	20km
Component of distance	0.5/1/2/4km	0.5/1/2/4km	1/2/2/5/10km
Accuracy	Resistance: Within $\pm 0.2\%$ Capacitance: Within $\pm 2\%$ (at 1KHz)		

3.2 Construction Dimensions:

Type	SCK-15	SCK-16	SCK-17
Dimensions (including front panel cover) (Approx.)	220(H)x300(W)x250(D)mm		220(H)x350(W) x250(D)mm
Weight (Approx.)	10kg	10kg	11kg

Notes:

1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other descriptions on panel shall be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Ando Electric Co., Ltd.
Type: SCK-15, SCK-16, SCK-17

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Spec. No. 1.16

4. **Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (one each of them is attached to equipment).**

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Spec. No. 1.20
Trolley for Measuring Sets

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 unit

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Electrical Requirements:

The power cord with reel and two power sockets for A.C. 230V shall be provided.

3.2 Mechanical Requirements:

(1) Mounting Weight

Main mounting plate: approx. 40kg

Supplementary mounting plate: approx. 30kg

(2) Main mounting plate shall be put at the angle of inclination; horizontal, $+10^\circ$, $+20^\circ$.

3.3 Weight: Approx. 25kg

3.4 Dimensions: Approx. 750(H) x 450(W) x 700(D)mm

Notes:

1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other descriptions on panel shall be described in English.
 2. Painting color is to be of manufacturer's standard.
 3. Nominated manufacturer: Ando Electric Co., Ltd. Type AT-16A
4. Materials to be Submitted: Operational instruction manual (English) 5 copies (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (one each of them is attached to equipment).

Spec. No. 1.22
Transmission Measuring Test Set

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1 unit
3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Electrical Requirements:

(1) Level Measurement

Frequency range:	30Hz to 10KHz
Measuring range:	-90 to +25dBm
Accuracy:	Within ± 0.3 dB
Input impedance:	600 Ω (balanced) and high

(2) Gain and Loss Measurement

Frequency range:	0.2 to 10KHz
Measuring range:	0 to 80 dB
Accuracy:	Within ± 0.3 dB
Line impedance:	600 Ω (balanced)

(3) Power requirements: AC 230V, 50Hz; DC-24V

(4) Power consumption: Approx. 4VA

3.2 Dimensions: Approx. 1100(H) x 400(W) x 550(D)mm

3.3 Weight: Approx. 60kg

Notes:

1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other descriptions on panel shall be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Ando Electric Co., Ltd. Type VST-262

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Spec. No. 1.22

4. **Materials to be Submitted:** Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (one each of them is attached to equipment).

Section 2 SWITCHING SYSTEM

Spec. No.	SPECIFICATIONS
2.1	Electronic Exchange
2.2	Electro Magnetic Oscillograph
2.5	Sub Assembly Unit for Subscriber Identification Equipment
2.6	Transistor Curve Tracer
2.7	Wave Analyser
2.9	Impulse Sender
2.12	Multi-Function Meter

Spec. No. 2.1
Electronic Exchange

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad, to be established under an agreement between the government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1 system
3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 General

3.1.1 General

(1) *Purpose of Installation*

This exchange is to be installed at Pakistan Central Telecommunication Laboratories, placing it at the acquirement of technology and research activities.

(2) *Scope of Work*

The manufacturer shall be responsible for the manufacture of this exchange, sea-transportation, installation and adjustment.

(3) *Performance of the Exchange*

The performance of the exchange shall be equivalent to the up-to-date D-20 electronic exchange of the stored program control local switching system developed by N.T.T. in Japan. Also the numbering system and the signalling system shall interwork with the existing network in Pakistan.

(4) *Weather Condition*

- (a) The exchange shall make a normal operation under ambient temperature $+5 - +55^{\circ}\text{C}$ and humidity 20% - 95%.
- (b) Besides the air conditioner is provided for the laboratory, the exclusive one for this exchange is to be installed separately. The ambient temperature is to be kept below 40°C by operation of them. Other special air conditioner, therefore, is not be required.

(5) *System Expansion*

This exchange shall have an ample flexibility for future system expansion.

3.1.2 Capacity of the Exchange

The traffic capacity of this exchange shall be maximum 800 erlangs and the number of subscribers' terminals accommodated shall be approx. 16,000

Spec. No. 2.1

terminals. (The final capacity).

3.1.3 Numbering system

The numbering system shall be based on the Pakistan numbering plan which will be given separately (including the special numbering plan).

3.1.4 Signalling System

(1) Signalling System of Subscriber's Line

- (a) The exchange equipment shall be suitable for Dial pulse (10 p.p.s. and 20 p.p.s.) and Push button dial (CCITT standard)
- (b) Besides normal ON HOOK & OFF HOOK signal shall be supervisory signals, HOOKING signal for a short time shall be available as signal of new services.

(2) Inter-office Signal

The inter-office signal shall be required to take interface with F1 and EMD exchanges which is now being used in Pakistan. The signal condition will be indicated separately.

(3) Audible Signal Tone

Audible signal tones shall comply with the following requirements.

- (a) Dialling tone
450 Hz continuous
- (b) Ringing back tone
450 Hz: On/one sec., Off/4 sec.
- (c) Busy tone for trunk circuit.
450 Hz: On/1.25 sec., Off/0.75 sec.
- (d) Busy tone for subscriber
450 Hz: On/1.25 sec., Off/0.75 sec.
- (e) Uninterrupted burst of ringing back tone
450 Hz: One second

3.1.5 Service Standard

The exchange shall be provided to keep the following standards:

(1) Internal Blocking Rate

Originating stage:	Within 0.1%
Terminating stage:	Within 2%

(2) Dial Tone Delay

Average dial tone delay shall be within one second and the percentage of calls requiring more than 2 seconds delay shall not exceed 2%.

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- (3) Loss rate in the intra-office connection.

It shall be within 4%

3.1.6 Line Lock Out

- (1) Busy-tone sending

The busy-tone shall be sent to the calling subscriber at the following conditions

- (a) When the subscriber fails to dial within a time interval 10 – 20 seconds after receiving dial tone.
 (b) When the subscriber fails to complete dialling i.e. when more than 20 seconds between two consecutive digits.
 (c) When the subscriber makes a selection which is not allowed according to his service class.

- (2) Inter-digital Time

Minimum: at least 350ms for rotary dial set.
 at least 50ms for push button set.

Maximum: same as the above (1) (b)

- (3) Hold or Release of Calls

The speech path shall be controlled by calling party except special cases.

3.1.7 Signal Transmission Level

Signal transmission level shall comply with the following requirements at the out-going terminal of exchange. (at 600Ω terminal)

- (1) Dial Tone

-10dBm – -15dBm

- (2) Other Tones

-5 ± 1dBm

3.1.8 Ringing Signal

Frequency: 25Hz Voltage: 75V

- (1) Ringing tone: Period On/one sec. Off/4 sec.

- (2) Uninterrupted burst ringing tone: One sec.

3.1.9 Charging system

The charging information shall be measured by the charge processing program and the up-to-date charging data shall be always stored in a fixed area of magnetic drum for each subscriber. The charging information shall be read out on the teletypewriter or the magnetic tape by a command from the teletypewriter. The charging condition in Pakistan is as follows:

Spec. No. 2.1

Local area call ... At the answer of the called party, one unit charge shall be applied to the calling party irrespective of the duration of call.

Toll call ... Charging shall start at the answer of the called party. Charging pulse shall be sent by the toll exchange.

3.1.10 International subscriber dialling call ... International subscriber dialling via the international gateway exchange shall be possible by additional work needed in soft-wear and hard-wear.

3.1.11 Subscriber service class

Establishing enough of subscriber service classes shall be possible for future requirements.

3.1.12 New Services (Special Services)

Additional work of softwear and hardware without difficulty shall make the flexibility for various new services which will meet the needs of the future.

These services are as follows:

- a. Abbreviated dialling (for push button subscribers)
- b. Call waiting
- c. International subscriber dialling
- d. Transfer
- e. Automatic answering
- f. Alarm service
- g. Telephone rest
- h. Hot line
- i. Add-on
- j. Camp-on
- k. Holding

The items a. and b. of them shall be provided for the time being.

3.1.13 Conditions for terminal equipment

(1) Standards of Subscriber's Telephone Equipment

Dial Telephone Equipment

Pulse speed: 8 - 22/sec.

Break-to-

make ratio: 30 - 70% (at pulse speed 8 - 12)

40 - 60% (at pulse speed 18- 22)

Spec. No. 2.1

Push Button Telephone Equipment

The 2VF signal which is recommended by CCITT shall be used.

Maximum speed: 11 figures/sec.

(2) Number of Branches

The number of telephones branched shall not be limited. But the capacity between a-line and b-line is to be less than 3MF.

(3) Main Distribution Frame

Protection against lightning discharges and contact with power lines shall be provide for all subscriber lines. Junction lines shall only have terminal strips.

3.1.14 Operational Facilities

(1) Independency between subscriber number and accomodated terminal

Subscribers shall be able to transfer to any other terminal without any restriction.

(2) Digit storage capacity of register

The register shall have the storage capacity of maximum 15 figures of dial number.

(3) Out-going trunk selection

The trunk selection shall be conditioned by the following.

(a) The route discrimination shall be made by the called office code.

The number of out going trunks per a Route shall not be limited .

(b) The maximum number of routes shall be more than 150.

(4) Traffic control

The following traffic control shall be performed against the abnormal traffic congestion and troubles.

(a) Out-going connection control

The calls to the specified area shall be controlled step by step in order to relief an abnormal congestion of terminating office.

(b) Originating control

The calls from subscribers shall be controlled in case an abnormal congestion occures in its office.

The control shall be performed according to the priority oders given to the subscribers.

(5) The alternate routes shall be selected more than 3 times.

Spec. No. 2.1

(6) Traffic Measurement

The following traffic data shall be read out on the typewriter or the magnetic type by a command through the teletypewriter.

- All originating call attempts
- Complete originating calls
- All incoming call attempts
- Complete incoming calls
- Intra-office originating calls
- Complete intra-office originating calls
- Originating calls on special number
- Originating STD calls
- Complete STD calls
- Restricted originating calls
- Incomplete incoming calls
- Number of times of called party busy
- Calls on abbreviating dial service
- New service registering and cancelling calls
- Calls on each specified destination within each designated route
- Occupancy of the central controller (period 20 sec.)
- Occupancy of the switch controller (period 1 sec.)
- Occupancy of the switch controller (period 1 sec.)
- Traffic of transaction (period 1 sec.)
- Traffic of each route (period 3 minutes)
- Traffic on the specified subscriber (period 20 sec.)

(7) Charge Observation

Detailed charging data on each call of subscribers designated by a command shall be automatically recorded in the file memory. The data shall be as follows:

Calling subscriber number, Called number, Calling date and time, Response time, Disconnected time and Metering data before and after call.

These data shall be able to be typed out as required. The observation of eight subscribers shall be possible at the same time.

3.1.15 Testing Facility

(1) Automatic Test for Subscriber's Line

Spec. No. 2.1

The line insulation resistance test and the false cross and ground test shall be made automatically by a command from the teletypewriter.

(2) Subscriber's terminal equipment test

The facility test including subscriber's line shall be made in the method that the telephone is automatically connected to the test circuit by dialing special number.

(3) Trunk Automatic Test

The specified trunk group shall be tested automatically and continuously by an operator command from the teletypewriter.

3.1.16 Service Order

Such service order task as adding new subscriber, changing subscriber number, suspending in service, etc. shall be done by an operator command from the teletypewriter.

3.1.17 Blocking of Equipment

The blocking of trunk, common equipment and link etc. shall be made by an operator command from the teletypewriter and the list of equipments under blocking shall be read out on the teletypewriter by a command.

3.1.18 Fault Recovery Processing

The main device of this exchange shall be of the redundant constitution to provide continuous and accurate service in spite of hardware and software fault. The program shall be provided with the function of detection and recognition for troubles of main device. The fault recovery process shall be carried out in the following sequence when troubles occur in the main device.

- (1) detect troubles
- (2) identify whether the trouble is caused by a temporary error or by permanent fault
- (3) in the case of permanent fault, discriminate the faulty unit and remove it from service
- (4) reorganize the system available for operation
- (5) restart call processing
- (6) type out message of faulty unit separated

3.2 Scale of Mounting Equipments

As aforesaid, this equipment is used for research activities and is expected to have the

Spec. No. 2.1

maximum research effect by the limited expenditure. From this point of view, the initial mounting equipment scale of this contract shall be as follows:

3.2.1 Model and Quantity of Telephones

Push button telephones 20 units

Rotary dial telephones 20 units (10pps; 10 units 20pps; 10 units)

3.2.2 Switch Network

LLN: 256 terminals and TLN: 128 terminals equivalent to the minimum switch unit.

3.2.3 Common Equipment

The main devices shall be duplexed completely and the devices corresponding to traffic capacity shall be partially duplexed so that the various operations equivalent to the commercial conditions can be made.

(1) Requirement of Complete Duplex

Central controller

Magnetic drum channel

Magnetic drum

Signal receiver distributor

Maintenance scanner

(2) Partial Duplex

Switch controller

Main memory

Relay controller

3.2.4 Trunks

The scale of trunks shall be as follows.

(1) Incoming and outgoing trunks

3 - 4 routs, 4 circuit for each route

(2) Intra-office trunks

16 circuits

(3) Special number trunks

1 - 2 circuits for each route in accordance with Pakistan circumstances.

3.2.5 Miscellaneous Equipments

(1) The following miscellaneous equipments shall be installed for the maintenance operation of exchange.

Supply and Test Frame

Spec. No. 2.1

Misc. Frame

Alarm Receiver Frame

- (2) The main distribution frame and the signal source equipment shall be provided.
- (3) The subscriber line testing device shall be installed.
- (4) Two teletypewriters shall be provided, one for the equipment room and the other for remote control.

3.2.6 Suggestions

(1) Traffic Capacity

The traffic capacity is to be required to be correspondence to 100 subscribers by taking consideration of additional installation made by Pakistan.

(2) DC Power Source: -48V

It is to be supplied in separate work

3.2.7 Block Diagram

The block diagram of this system is shown on Fig. 1.

Notes:

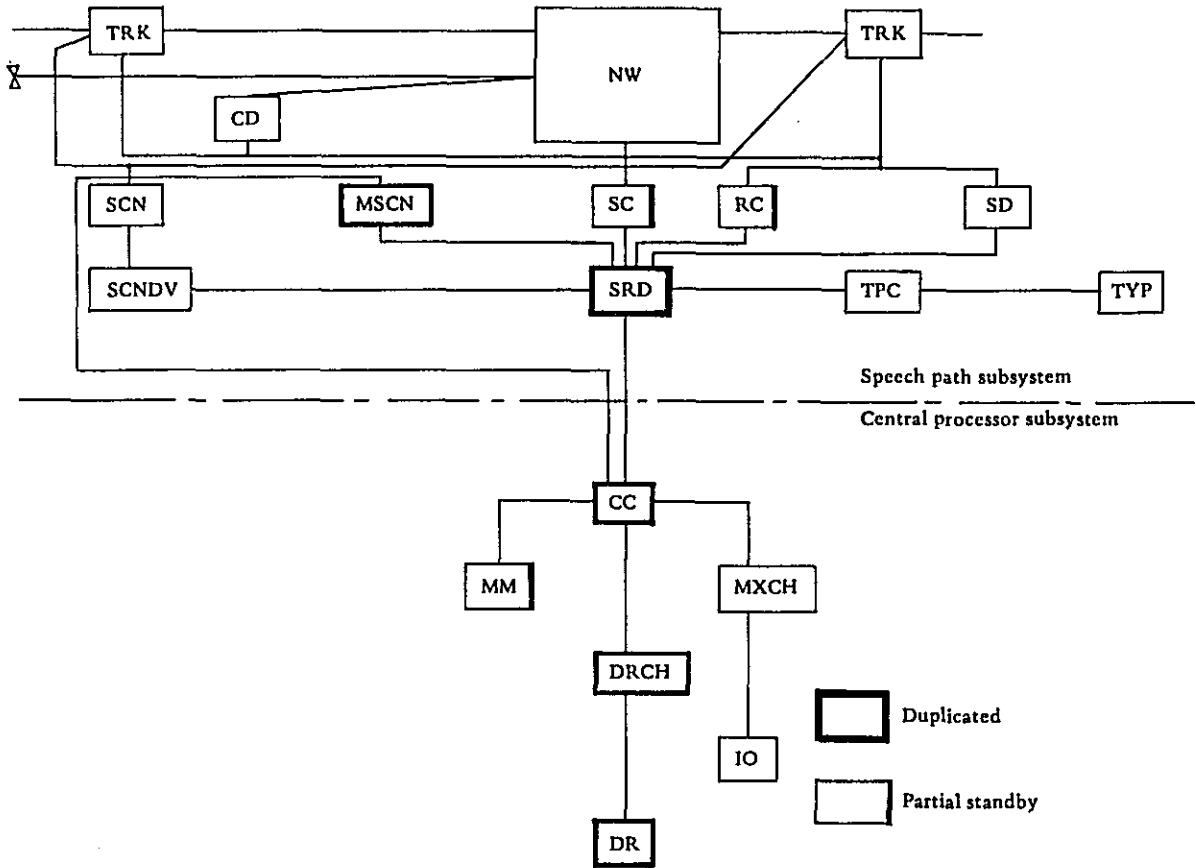
- 1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other description on panel shall be described in English.
- 2. Nominated manufacturers: Oki Electric Industry Co., Hitachi Ltd, Fujitsu Limited and Nippon Electric Co.

4. Accessories and Spare Parts

Spare parts for two years' maintenance shall be supplied.

- 5. Materials to be submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (one each of them shall be attached to equipment.)

Spec. No. 2.1



NW: Switching network
TRK: Trunk circuit
CD: Call detector
SCN: Scanner
SCNDV: Scanner driver
MACN: Maintenance scanner
SC: Switch controller
RC: Relay controller
SD: Signal distributor

SRD: Signal receiver distributor
TPC: Typewriter controller
TYP: Typewriter
DD: Central controller
MM: Main memory
DRCH: Magnetic drum channel
DR: Magnetic drum
MXCH: Multiplex channel
IO: Input-output equipment

Fig. 1 Block Diagram

Spec. No. 2.2
Electro Magnetic Oscillograph

1. **Purpose of Application:** To be used at Central Telecommunication Research Laboratories, Islamabad, to be established under an agreement between the government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** 1 unit
3. **Standards:** (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 This device is of the direct recording type.

The light beam from the small light source of the high-tension mercury arc lamp shall be polarized by the fixed high frequency trember's mirror and shall record a wave form on the ultraviolet rays photographic paper. The main performance shall be as follows.

Classification	Specification
No. of channels	6
Light source	High-tension mercury arc lamp with lamp current selection switch
Optical lever	Approx. 450mm
Grid line	Recorded at 2mm interval with every fifth line accentuated along the longitudinal axis of the paper
Dielectric strength	AC 250V for 60 sec. between two input circuits and between the input circuit and the case
Power source	AC 230 \pm 10% approx. 300VA 50Hz, 60H

3.2 Dimension and Weight

Dimension: 195 x 420 x 300mm

Weight: Approx. 19kg

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other descriptions on panel shall be described in English.
2. Painting color is to be of manufacturer's standard.

S-2

Spec. No. 2.2

3. Nominated manufacturer: YOKOGAWA Electric Works Ltd. 2901 type

4. Accessories and Spare Parts

Item No.	Name of item	Specification				Q'ty	Unit
1	Item of Specification	Uniform sensitivity (within $\pm 5\%$)	Coil resist.	Sensitivity $\mu A/mm$	Max. safety current		
	No. of parts	Max. frequency Hz					
	Galvanometer 2916-01	100	22	Approx. 3.3	1	2	pc.
	' 2916-02	400	27	' 120	50	2	pc.
	' 2916-03	1,000	27	' 460	100	2	pc.
	' 2916-06	50	33	' 1.25	1	2	pc.
' 2916-11	2,000	30	' 1,000	100	2	pc.	
2	Resistance box	Type-2904				1	unit
3	Recording paper 2909-03	12.7cm x 35m (roll)				5	pc.
4	Mercury lamp	Type - 2913-01				2	pc.
5	Vacuum switch	Type - 2914				1	pc.
6	Timing lamp	Type - 2919					
7	Trembler protection fuse	Type-2921 (10 mA or 50 mA or 100mA specified)				5 pcs.	set

5. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (one each of them shall be attached to equipment).

Spec. No. 2.5
Sub Assembly Unit for Subscriber Identification Equipment

1. **Purpose of Application:** To be used at Central Telecommunication Research Laboratories, Islamabad, to be established under an agreement between the government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** 1 set
3. **Standards:** (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 **Construction Dimension:**

Height 2740mm Width 1104mm Depth 165mm (excluding cable supporter)

3.2 **Constitution:**

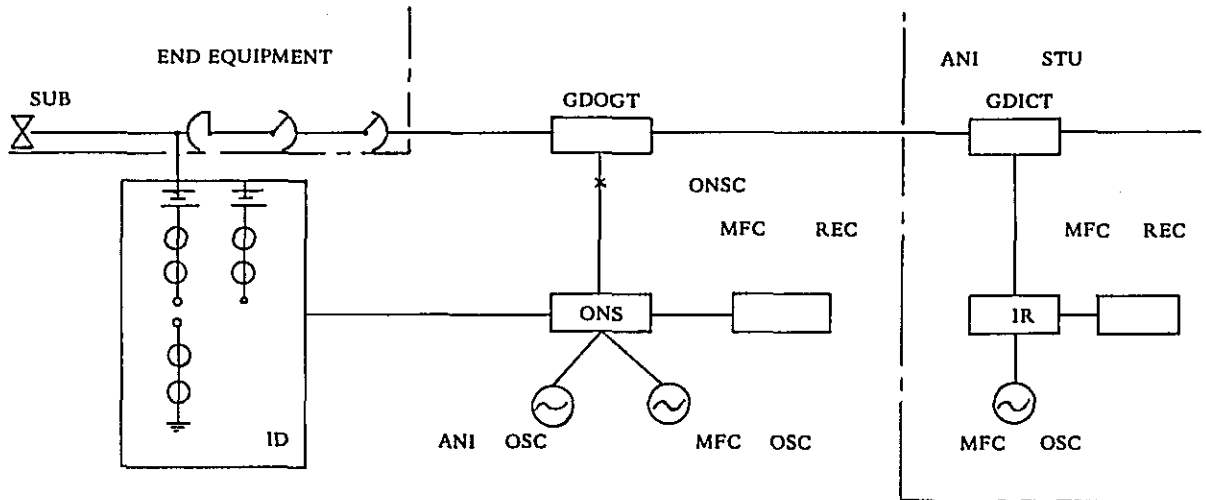
This device shall be used on the bases of trunking diagram shown on Fig. 1, and its constitution shall be indicated on table 1. Wiring among the equipments is not to be required.

3.3 **Power Source:**

-48V (DC)

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing and cover. All the other description on panel shall be described in English.
 2. Painting color is to be of manufacturer's standard
 3. Nominated manufacturer: NIPPON Electric Co., ANI type
4. **Accessories and Spare Parts:**
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (one each of them shall be attached to equipment).



- ID: Coupling Condenser Unit
- Ring Coil Unit
- Jumper Terminal
- Package Unit
- Relay Unit

- SUB: Originating Subscriber
- ID: Identifier
- GDOGT: GD Outgoing Trunk
- ONSC: Originating Number Sender Connector
- ONS: Originating Number Sender
- MFC REC: MFC Receiver
- MFC OSC: MFC Oscillator
- ANI OSC: ANI Oscillator
- ANI STU: ANI Signal Test Equipment

Fig. 1 Trunking Diagram of ANI Model Equipment

Spec. No. 2.5

Table 1

<i>Item No.</i>	<i>Equipment</i>	<i>Description</i>
1	ANI MODEL EQUIPMENT FRAME	Frame to mount all equipments shown in Fig. 1, Face Layout of ANI Model Equipment Frame
2	ANI SIGNAL TEST UNIT	<ol style="list-style-type: none"> 1. Composed of Incoming Trunk (ICT), Incoming Register (IR) with MFC Receiver and MFC oscillator 2. Confirmation test of all over operation of ANI equipment including inter-office ANI signalling 3. Consist of JKL
3	3 CIRCUITS GD OUTGOING TRUNK	<ol style="list-style-type: none"> 1. Relaying found dial pulses from preceding equipment to succeeding equipment. 2. Reception and memorizing of ANI request signal (<i>false answer signal</i>). 3. Starting of the succeeding equipment 4. Starting of ONCS and seizing of ONS
4	ORIGINATING NUMBER SENDER	<ol style="list-style-type: none"> 1. Transfers to calling party's number information to the higher ranking office. 2. The maximum number of digits to be sent out is 11 including one digit for class of service information 3. Signalling system is MFC signalling
5	ORIGINATING NUMBER SENDER CONNECTOR	<ol style="list-style-type: none"> 1. Connector between the OGT and the ONS. 2. Can be connected to a maximum of four ONS's. 3. One ONSC is to be installed for a maximum of 12 OGT's.
6	MFC OSCILLATOR UNIT	<ol style="list-style-type: none"> 1. Consist of 2 circuits (Main and Standby unit). 2. Generation of 6 frequencies (High frequency group). 3. Switched over from main to standby automatically.
7	MFC RECEIVER	<ol style="list-style-type: none"> 1. MFG signalling receiver for backward signal (Low frequency group). 2. One unit is installed to one unit of ONS.
8	ANI OSCILLATOR UNIT	<ol style="list-style-type: none"> 1. Consists of 2 circuits (Main and Standby unit). 2. Generation of 11.8kHz AC signal.

Spec. No. 2.5

Item No.	Equipment	Description
9	COUPLING CONDENSER UNIT	3. Provided with lever's adjusting facility 4. Switched over from main to standby automatically.
10	RING COIL UNIT	1. One each for every subscriber 2. Provided for 200 subscribers 1. Unit of detecting the calling subscriber number 2. Ten ring coils are mounted and used for tens and units by five each
11	JUMPER TERMINAL	1. Terminals for jumpering of subscriber class information 2. Consists of terminals of 200 subscribers and subscriber class
12	RING COIL UNIT	1. Unit of detecting the subscriber class information. 2. Consists of 6 ring coils
13	PACKAGE UNIT	1. Provided between the secondary side of ring coil and relay unit, and perform the detection of both subscriber number (2 out of 5) and subscriber class (2 out of 6).
14	RELAY UNIT	1. Stores the subscriber number and class detected by a package unit, and transfers them to ONS.

Spec. No. 2.5

(CXD-9 FRAME)

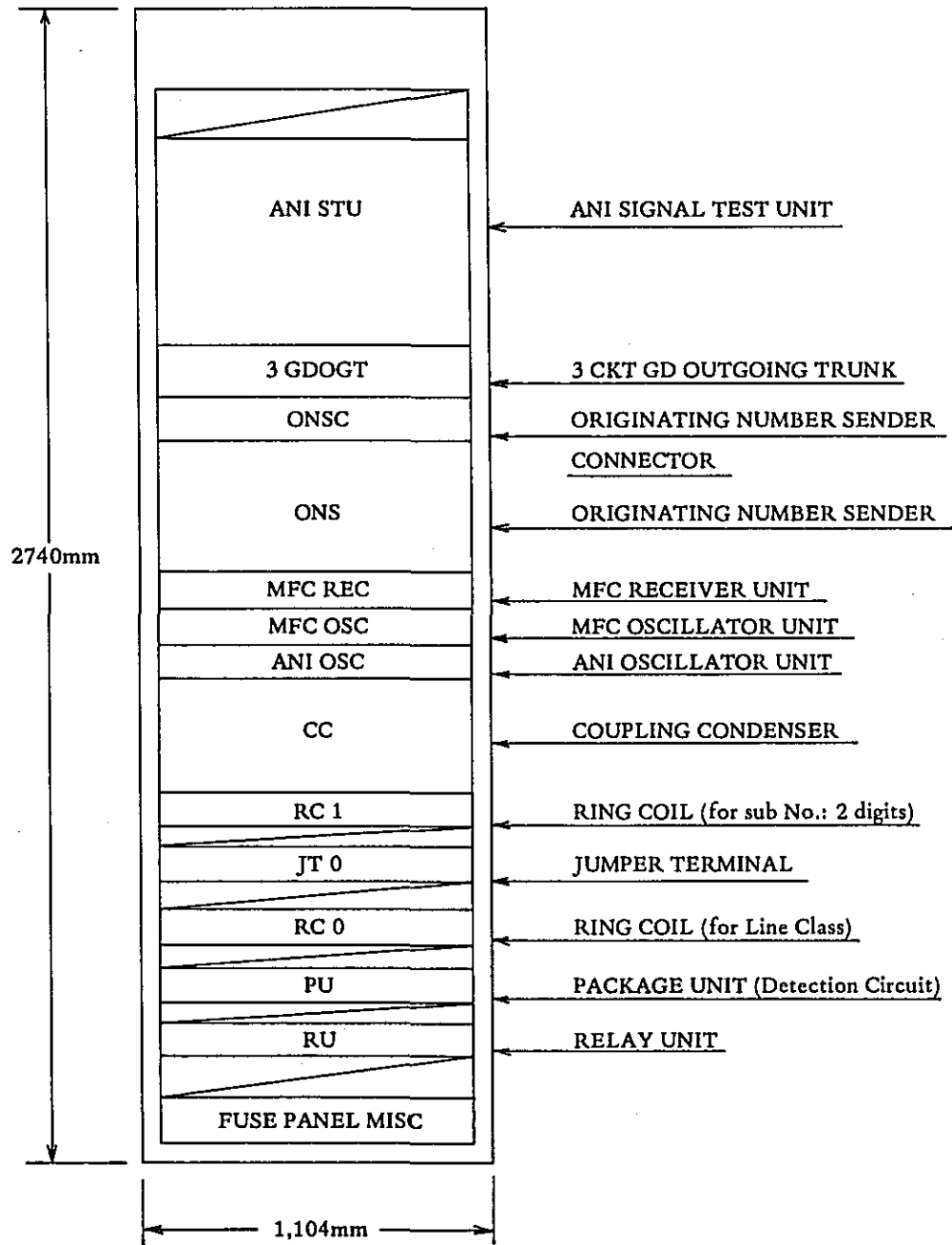


Fig. 2 Face Layout of ANI Model Equipment

Spec. No. 2.6
Transistor Curve Tracer

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 unit

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Electrical Requirements:

(1) Collector sweep source

Wave form:	Sinusoidal wave, rectified sinusoidal wave (Polarity changeable)
Peak voltage (current):	0 - 20V (10A), 0 - 100V (2A), 0 - 500V (0.4A)
Collector dissipation limiting resistor:	0 - 1 M Ω 20 ranges
Repetition rate:	100 or 120 depending on power frequency

(2) Base step source

Wave form:	step wave, step pulse
Number of step:	4 - 12 steps
Step generation:	REPEATIVE, SINGLE, OFF
Zero step:	At NORMAL practicable more than approx. 10% At SHIFT practicable more than approx. 100% in reverse polarity
Polarity:	(+), (-), NORMAL
Series resistance:	0, 10k Ω , 100k Ω switchover and external resistor
Current step:	1 μ A/step - 200mA/step 17 ranges \pm 3%
Voltage step:	0.01 - 2V/step 8 ranges \pm 3%
Repetition:	Step at the minimum of Vc Wave) Step at the maximum of Vc Wave) Step at the maximum and minimum) 3 ranges of Vc Wave)

(3) Vertical axis

Spec. No. 2.6

- | | |
|---------------------|--|
| Collector current: | 10 μ A/div - 1A/div, 16 ranges, $\pm 3\%$
Multiplier x 0.1, x 2 |
| Base voltage: | 0.01 - 0.5V/div, 6 ranges, $\pm 3\%$ |
| | Changeable to base current of base power voltage |
| (4) Horizontal axis | |
| Collector voltage: | 0.01 - 50V/div, 12 ranges, $\pm 3\%$ |
| Base voltage: | 0.01 - 2V/div, 8 ranges, $\pm 3\%$ |
| | Changeable to base current, base power voltage or gate power voltage |
| (5) Power source: | 230V $\pm 10\%$ 50Hz |

3.2 Dimensions & Weight

Approx. 406(W) x 323(H) x 550(D)mm

Approx. 30kg

Notes:

1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other descriptions on panel shall be described in English.
 2. Painting color is to be of manufacturer's standard.
 3. Nominated manufacturer: Kokuyo Electric Co., Ltd. Type TCT-7D
4. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (one each of them is attached to equipment).

Spec. No. 2.7
Wave Analyser

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 unit

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Electrical Requirements:

(1) Frequency characteristics

Range:	15Hz to 50KHz
Display:	5 digit LED readout
Resolution:	1Hz
Accuracy:	±3Hz
Typical stability:	±10Hz/hr after 1 hour and ±5Hz/°C

(2) Amplitude characteristics

Instrument range

Linear:	30V to 100 nV full scale
Log:	+30dBm or dBV to -150dBm or dBV

Amplitude accuracy

Frequency response (15Hz - 50kHz):

Log;	± 0.4dB
Linear;	± 4%

Dynamic range: > 80dB

Noise sidebands: Greater than 70dB below CW signal
10 bandwidths away from signal

Superior responses: > 80dB below input reference level

(3) Sweep characteristics

Scan width: 50Hz to 50KHz

Sweep error light: This LED indicates a sweep that is too fast to capture full response.

When the light is on, response will be lower than it should be.

External trigger: A short to ground stops the normal sweep.

Spec. No. 2.7

Opening the short then enables a sweep

- (4) Input characteristics
- Impedance: $1M\Omega$, 30pF
- Maximum input level: 100V rms, $\pm 100V$ DC
- (5) Output characteristics
- Tracking generator output (also known as BFO or tracking oscillator output)
- Restored output
- Range: 0 to 2V rms
- Frequency response: $\pm 3\%$ 15Hz to 50KHz
- X-Y recorder outputs:
- Vertical: 0 to +5V $\pm 2.5\%$
- Horizontal: 0 to +5V $\pm 2.5\%$
- Impedance: $1K\Omega$
- Pen lift: Contact closure to ground during sweep
- (6) Power requirement: 230V, 50Hz; approx. 10VA

3.2 Dimensions: 203.2(W) x 412.8(H) x 285.8(D)mm

3.3 Weight: Approx. 11.5kg

Notes:

1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other descriptions on panel shall be described in English.
 2. Painting color is to be of manufacturer's standard
 3. Nominated manufacturer: Yokogawa Hewlett Packard Co. Type 3581A
4. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (one each of them is attached to equipment).

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Spec. No. 2.9
Impulse Sender

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1 unit
3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Electrical Requirements:

- (1) Send out impulses :
 - Impulses: Any number from 1 to 10 or continuous
 - Sending speed: 1 to 39 pps in 1 pps steps
 - Sending accuracy: Within $\pm 0.2\%$ for 1 to 30 pps
 - Make ratio range: 1 to 99% in 1% steps
- (2) External impulse measurements:
 - Speed measurement range: 1 to 39 pps
 - Speed measurement accuracy: Within $\pm 0.1\%$ for 1 to 30 pps
 - Make ratio measurement range: 1 to 99%
 - Make ratio measurement accuracy: Within $\pm 0.1\%$ for 5 to 95%
 - Display: 3-digit numerical display
- (3) Power requirements: AC 230V, 50Hz

3.2 Dimensions: Approx. 150(H) x 280(W) x 200(D) mm

3.3 Weight: Approx. 5.7kg

Notes:

1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other descriptions on panel shall be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Ando Electric Co., Ltd. Type TSD-31

S-2

Spec. No. 2.9

4. **Materials to be Submitted:** Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (one each of them is attached to equipment).

Spec. No. 2.12
Multi-function Meter

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 unit

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 DC Voltmeter

Ranges:	$\pm 100\text{mV}$ to $\pm 1000\text{V}$ in 9 ranges in 10dB steps
Accuracy:	$\pm 2\%$ of range
Input resistance:	$10\text{M}\Omega$
Overload protection:	1200V DC

3.2 AC Voltmeter

Ranges:	10mV to 300V in 10 ranges in 10dB steps
Frequency range:	10Hz to 1MHz
Response:	Responds to average value, calibrated in rms.
Accuracy:	

Frequency	Range	
	0.01 to 30V	100V to 300V
10Hz to 100KHz	2% of range	2% of range
100KHz to 1MHz		—

Input impedance:	10mV to 1V range, $10\text{M}\Omega$ shunted by $<40\text{PF}$; 3V to 300V range, $10\text{M}\Omega$ shunted by $<20\text{PF}$;
Overload protection:	300V rms momentarily, 1V range and below, 425V rms max above 1V range

3.3 Ohmmeter

Ranges:	10Ω to $10\text{M}\Omega$ center scale in 7 decade ranges
Accuracy (from 0.3 to 3 on scale):	$\pm 5\%$ of reading
Source current (ohms terminal positive):	
Open circuit voltage;	0.1V (x10 range) - 1V (x10M range)

Spec. No. 2.12

Short circuit current;	10mA (x10 range) - 0.1MA (x10M range)
3.4 Power:	> 300 hr operation per battery
3.5 Dimensions:	Approx. 130(W) x 159(H) x 203(D) mm
3.6 Weight:	Approx. 2.4 kg

Note:

1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, shall be attached to panel, metal casing or cover. All the other descriptions on panel shall be described in English.
 2. Painting color is to be of manufacturer's standard.
 3. Nominated manufacturer: Yokogawa Hewlett Packard Co. Type 427-A
4. *Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (one each of them is attached to equipment).*

Section 3 TELEGRAPH

Spec. No.	SPECIFICATIONS
3.1	Voice Frequency Telegraph Terminal Equipment
3.2	Datex Time Division Multiplexer
3.3.1	Universal Counter
3.3.2	Short Interruption Measuring Unit
3.3.3	Digital Printer
3.3.4	Level Meter
3.3.5	Noise Meter
3.3.6	Code Generator
3.3.7	Start-Stop Distortion Measuring Set
3.3.8	Trolley for Measuring Set
3.4	Arabic Letter-graphic Typewriter

Spec. No. 3.1

Voice Frequency Telegraph Terminal Equipment (50B - 200B) TGFR []

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 2
3. Standards: (Construction dimension, Electrical requirement and mechanical requirement etc.)

3.1 Outline

This equipment is designed to use a telephone and a data communication simultaneously by using one circuit of four wire (4W) voice frequency band circuit. And high speed data communication in a telephoneband and 50 B/S 4CH, 100 B/S 2CH or 200 B/S in a telegraphy-band can be made frequency arrangement.

3.2 Electrical Requirement

3.2.1 Telephone

Transmission line:	4 wire telephone circuit
Line impedance:	Nominal 600Ω balanced
Frequency band width of telephone circuit	0.3 - 2.6kHz
Input level at telephone equipment terminal (4 wire):	-8dBm
Output level at transmission line terminal:	0 - -30dBm
Input level at transmission line terminal:	0 - -30dBm
Output level at telephone equipment terminal (4 wire):	0dBm
Signal frequency for telephone circuit at telephone equipment terminal:	16 - 20Hz (Ring Down)
Signal frequency for telephone circuit at transmission line terminal:	2,000Hz (standard)

Spec. No. 3.1

Signal level of telephone circuit at input terminal of transmission line:	} less than 10dBm of voice level
Signal level of telephone circuit at output terminal of transmission line:	

3.2.2 Telegraph

	50.75BPS	100BPS	200BPS
Transmission line	4w telephone circuit		
Line impedance	Nominal 600Ω balanced	Same with the left	Same with the left
Band width of telegraphy circuit	Table 1		
Modulation system	F.S.		
Data signalling rate	50.75BPS	100BPS	200BPS
Channel space	120Hz	240Hz	480Hz
Shift frequency	±30Hz	±60Hz	±120Hz
Signal distortion	50BPS; within ±7% 75BPS; within ±10%	Within ±10%	Within ±10%
Line transmission level	-14dBm/CH(standard)		
Line reception level	-26dBm/CH(standard)	Same with the left	Same with the left
Input & output DC circuit	±60V ±20mA (double current)		
Alarm facility	Lamp and buzzer can indicate alarm at the time when receiving level of telegraph signals are getting low or anything unusual happens in power source.		

3.2.3 Supply Voltage:

AC 230V ±10V 50Hz

Spec. No. 3.1

Table 1 Data CH, Frequency

50.75 BPS		100 BPS		200 BPS	
CH.No.	fo (Hz)	CH.No.	fo (Hz)	CH.No.	fo (Hz)
24	3,180	12	3,120	6	3,000
23	3,060				
22	2,940	11	2,880		
21	2,820				

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Toyo Communication Equipment Co., Ltd.

4. Constitution Table

Duplex Transmission Equipment

Item No.	Name of Item Spec.	Q'ty	Unit	Remarks
	Frame (includes Jack board)	2	pcs.	
	Transmitting channel unit (50B)	8	'	CH21 - 24, 2 pcs. each
	Transmitting channel unit (100B)	4	'	CH11, 12, 2 pcs. each
	Transmitting channel (200B)	3	'	CH 6, 2 pcs. & spare
	Receiving channel unit (50B)	8	'	CH21 - 24, 2 pcs. each
	Receiving channel unit (100B)	4	'	CH 11, 12, 2 pcs. each
	Receiving channel unit (200B)	3	'	CH 6, 2 pcs. & spare
	Transmitting & receiving amplifier unit	3	'	include spare 1 pce.
	Transmitting HYB unit (Include LF, HF)	3	'	include spare 1 pce
	Receiving HYB unit (Include LF, HF)	3	'	'

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Spec. No. 3.1

<u>Item No.</u>	<u>Name of Item Spec.</u>	<u>Q'ty</u>	<u>Unit</u>	<u>Remarks</u>
	Power source unit (AC 230V)	2	pcs.	
	VF HYB unit	2	'	
	Signal generator in Band	2	'	
	Test Cords plugs	1	set	

Constructional Kit

<u>Item No.</u>	<u>Name of Item Spec.</u>	<u>Q'ty</u>	<u>Unit</u>	<u>Remarks</u>
	Transmitting channel unit (50B)	8	pce.	CH21 - 24, 2 pce each
	Receiving channel unit (50B)	8	'	'
	Transmitting & receiving amplifier unit	2	'	
	Transmitting HYB unit	2	'	
	Receiving HYB unit	2	'	
	Power source unit (AC for 230V)	2	'	
	VF HYB board unit	2	'	
	Signal generator in band	2	'	
	Test cords & plugs	1	set	

5. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (one each of them is attached to equipment).

6. Remarks:

Spec. No. 3.2
Datax Time Division Multiplexer

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 2

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Outline

This equipment is designed so that plural low speed channels (60/75/100/150/200/1200 BPS) can be made the time division multiplex, and its out-put is transmitted by one unit of synchronous high speed MODEM (1200/2400/4800/9600 BPS) and is separated, and allocated to the corresponding low speed channel in the receiving equipment.

3.2 Facility

- (1) To be capable of processing asynchronous data of 50 - 1200BPS and synchronous data of 2400 and 4800 BPS even though they are mixed with one another.
- (2) To be capable of processing 5 - 8 bit codes of different unit numbers which are mixed with one another as desired.
- (3) The control signal for a terminal equipment or MODEM is to be transmitted in the same way as in transmitting data.
- (4) The quality of high speed channel and the format of low speed channel is always to be monitored and the change of speed, code unit number, and stop bit length is to be made easily.
- (5) The automatic remote loop back facility, which can automatically make the return test of the other station at own office, even if the other station is unat-tendant, is to be provided, and also the facilities that can generate a test pattern and measure an error bit are to be provided, too.

3.3 Standard and Performance

The standard and performance of this equipment are as follows:

- (1) Multiplexing system

Character interleaved:	asynchronous data
Bit interleaved :	asynchronous data

Spec. No. 3.2

- (2) Transmission speed
- Low speed channel: asynchronous data
50/75/100/134.5/150/200/1200 BPS
synchronous data
2400/4800 BPS
- High speed channel: synchronous data
1200/2400/4800/9600 BPS
- (3) Number of multiplexed channels
- Asynchronous data: 52 channels
Synchronous data: 2400 BPS 3 channels 4800 BPS 1 channel
- (4) Multiplized channel number N
- $$N < \frac{E_1}{E_2} \times \frac{R_2}{R_1} - 1$$
- E_1 : Element number of low speed channel
 E_2 : Element number of high speed channel
 R_1 : Data signaling rate of low speed channel
 R_2 : Data signaling rate of high speed channel
- (5) Communication system
Full duplex communication shall be made in both low speed channel and high speed channel and also semi-duplex communication shall be possible in low speed channel.
- (6) Code unit number (except start and stop bit)
Free combination of 5,6,7 and 8 unit are to be possible.
- (7) Number of stop bits
Free combination of 1.0, 1.5 and 2.0 is to be possible.
- (8) Transmitting signal distortion (low speed asynchronous channel)
Less than 1%
- (9) Receiving margin (low speed asynchronous channel)
More than 45%
- (10) Allowable transmission speed deviation (low speed synchronous channel)
Less than 0.2%
- (11) Interface
Based on CCITT V24 and V28

3.4 Power Source: AC 230V \pm 10% 50Hz

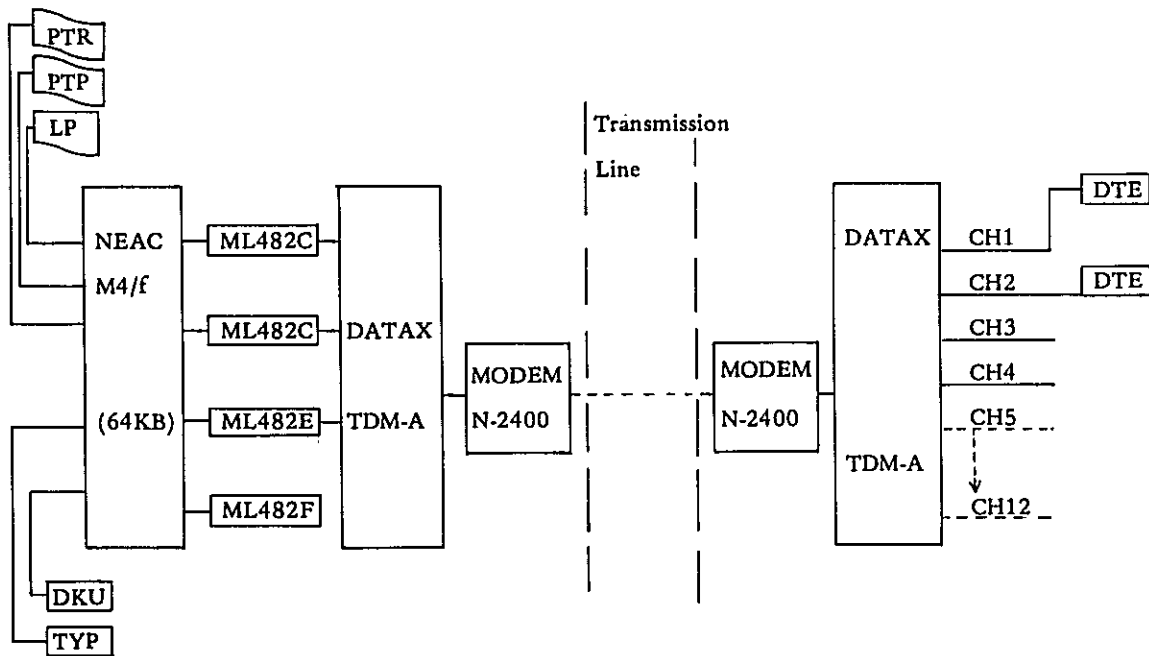
Spec. No. 3.2

Reference Data:

This equipment is to be used based on the following constitution. Data speed of the channel to be used and the character constitution are described in the below;

CH No.	Data speed (B/S)	Character constitution (bit)			Connect. form	Interface	Communication method
		ST	DT	SP			
1	50 - 1200	1	8	1	Direct connect.	Based on spec.	F/DX or HF/DX (type C)
2	50 - 1200	1	8	1	'	'	'
3	50 - 1200	1	8	1	'	'	'
4	50 - 1200	1	8	1	'	'	'

Table of CH Performance



Block Diagram

Spec. No. 3.2

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
 2. Painting color is to be of manufacturer's standard.
 3. Nominated manufacturer: Nippon Electric Company Ltd.
-
4. Accessories and Spare Parts:
 5. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (one each of them is attached to equipment).
 6. Remarks:

Spec. No. 3.3:1
Universal Counter MF-51B

1. **Purpose of Application:**

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. **Quantity:** 1

3. **Standards:** (Construction dimension, electrical requirement and mechanical requirement etc.)

This equipment is the integrated circuit universal counter and possesses the measuring facilities of frequency, single period, average periods, frequency ratio, time interval and summing counter, and its main performances are as follows:

Classification	Performance
In-put voltage	30mV - 300V (rms)
In-put impedance	ATT range x 1: 100k Ω , Shunted by, 40PF (connector: BCN female) ATT range x 10, x 10 ² , x 10 ³ : \geq 1M Ω Shunted by \geq 30PF (Connector: BCN female)
Frequency measurement range	10Hz - 100MHz
Period measurement range	10Hz - 15MHz
Summing counter	10Hz - 100MHz signal is made a summing counter
Stability of standard generator	5 x 10 ⁻⁹ /day, after 24 hours heat run

3.1 **Construction**

This equipment is put in a portable metal case and its standard size; 145mm(H), 210mm(W), 300mm(D).

3.2 **Electrical Requirement:**

Power source; 230V \pm 10%, 50Hz

3.3 **Option:**

BCD out-put part is to be incorporated.

Spec. No. 3.3.1

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
 2. Painting color is to be of manufacturer's standard.
 3. Nominated manufacturer: Anritsu Electric Co., Ltd.
-
4. Accessories and Spare Parts:

Measuring cord:	3CA-P1 · RG-58A/U · 3CA-P2	1m 1pce.
Measuring cord:	3CA-P2 · RG-58A/U · bag-worm clips	1m 1pce.
 5. Materials to be Submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list - 4 copies each (One of them is attached to equipment).
 6. Remarks.

Spec. No. 3.3.2
Short Interruption Measuring Unit MH 414A

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1
3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)
This equipment is a unit used for measuring the short interruption of channel pilot signal in conjunction with a universal counter, and its main performances are as follows:

Classification	Performance			
Frequency range	700Hz - 12.5MHz			
In-put impedance	600 Ω balance: I-214 form (700Hz - 20kHz), High: $\geq 10k\Omega$, Shunted by $\leq 100pF$ 75 Ω balance: I-214 form (10 - 650kHz), High: $\geq 1.5k\Omega$, Shunted by $\leq 100pF$ 75 Ω unbalance: BNC female (700Hz - 12.5MHz) High: $\geq 1.5k\Omega$, Shunted by $\leq 100pF$ DC input: No. 239D Jack: $\geq 100k\Omega$ Shunted by $\leq 100pF$			
In-put level	-50 - +4dBm, DC in-put only: +3 - +5Vo-p, -3 - -10Vo-p			
Short interruption level	Makes -10dB level from normal as short interruption on 600 Ω (balance), 75 Ω (balance, unbalance) in-put, variable trigger level at more than -3 - +3V range on DC in-put			
Ignored short interruption time (at the time of complete interruption)	Less than 0.3ms $\pm 20\%$	Less than 5ms $\pm 20\%$	Less than 20ms $\pm 20\%$	Less than 300ms $\pm 20\%$
Minimum frequency	40kHz	2kHz	700Hz	700Hz
Max. summing time	999s	9,999s	9,999s	9,999s
Max. summing number	9,999,999 times	9,999,999 times	9,999,999 times	9,999,999 times

3.1 Construction

This equipment is put in MF51B universal counter as a unit, and its standard dimen-

Spec. No. 3.3.2

sion is 86mm(H), 186mm(W), 225mm(D).

3.2 Electrical Requirement

The power source is supplied from MF51B universal counter and the performance shall be satisfied at temperature 0°C - 45°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
 2. Painting color is to be of manufacturer's standard.
 3. Nominated manufacturer: Anritsu Electric Co., Ltd.
4. Accessories and Spare Parts:
Bag-worm clip measuring cable with No. 110 plug. 1m 1pc., Measuring cable with BNC 1m 1 pce.
Measuring cable with I-214 plug 1m 1pce. connecting cable 1m 1pce.
5. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to equipment).
6. Remarks.

Spec. No. 3.3.3
Digital Printer

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 unit**3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)****3.1 Outline**

This equipment is capable of recording the out-put data which are made by the universal counter (1, 2, 4, 8 BCD code and IC level).

3.2 Performance

Max. typing speed:	Approx. 3 lines/sec.
Recording paper:	Folding type, Width 89 ± 1 mm, Length 178 ± 1 mm, Total length-approx. 45m and 250 pages.
Typing capacity:	9 columns (Data in-put)
Size:	178mm(H), 217mm(W), 338mm(D)
Power source:	AC 230V $\pm 10\%$ (50 Hz)

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Anritsu Electric Co.

4. Accessories and Spare Parts:

Ink ribbon:	the actual equipped - 1, Spare - 1
Recording paper:	the actual equipped - 1, Spare - 3
Fuse:	the actual equipped - 1, Spare - 2
Power source cord - 1, Connecting cord - 1, Dust cover - 1	

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Spec. No. 3.3.3

5. **Materials to be Submitted:** Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is to be attached to the equipment).

6. **Remarks:**

Spec. No. 3.3.4
Level Meter ML412A

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1
3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)
This equipment is widely used for measuring various transmission levels in transmission systems, and for testing various high fidelity equipment dealing with audio and video transmission, and as universal measuring instrument with high accuracy. Its main performances are as follows:

Classification		Performance
Frequency range		10Hz - 20MHz
As level measuring instrument	Level measuring range	-60 - +20dBm, -70 - +22dBm (using a meter gauge)
	Level measuring accuracy	+0.2dB (20Hz - 6MHz), ± 0.3 dB (10Hz - 10MHz), ± 0.5 dB (10Hz - 20MHz) at 0dB in the indicator scale
As Amplifier	Gain	0 - 6dB, variable in 1dB step
	Gain accuracy	± 0.2 dB (20Hz - 6MHz), ± 0.3 dB (10Hz - 10MHz), ± 0.5 dB (10Hz - 20MHz)
	Distortion factor	≤ -35 dB, 2nd and 3rd harmonics respectively
	Out-put impedance	75 Ω , Return Loss ≥ 20 dB
In-put impedance		75 Ω , unbalance and high (10Hz - 20MHz), 75 Ω , balance, high (10 - 650kHz), 150 Ω , balance, high (10 - 650kHz), 600 Ω , balance and high (0.3 - 150kHz)

3.1 Construction

This equipment is accommodated into a portable metal case, and its standard size is 145mm(H), 282mm(W), 200mm(D).

3.2 Electrical Requirement

The performance shall be satisfied at power source voltage 230V \pm 10% and temperature 0°C - 45°C.

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Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
 2. Painting color is to be of manufacturer's standard.
 3. Nominated manufacturer: Anritsu Electric Co., Ltd.
4. Accessories and Spare Parts:
- | | |
|-----------------|---------------------------------------|
| Coaxial cord: | 3Cz-p.-.3CZ-p 1m, 2m 1 pce each |
| Balancing cord: | I-214APS.-.I-214APS 1m, 2m 1 pce each |
| Z-49A U link: | 1 pce |
5. Materials to be Submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to equipment).
6. Remarks:

Spec. No. 3.3.5
Noise Meter NM-31

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

This equipment is used for measuring psophometric voltage of noise voltage induced in a voice-band, and possesses the psophometric characteristics based on CCITT recommendation, and its main performances are as follows:

Frequency range	Flatness	30Hz - 10kHz
	Psophometry	50Hz - 5kHz
Measuring range	-80 - +30dBm (includes meter gauge)	
In-put impedance	600Ω/High Balance	

3.1 Construction

- (1) This equipment is accommodated into a portable metal case and its size is approx. 200mm(H), 300mm(W), 250mm(D).
- (2) AC power source cord with a double pole attachment plug (usual voltage to be used: AC 230V) is about 3m length.
- (3) Electrical requirement

Stability: AC power source voltage is 230V $\begin{matrix} -15V \\ +10V \end{matrix}$, or
 DC power source voltage is $\begin{matrix} -21V \\ -3V \\ +2V \end{matrix}$, or
 builtin battery voltage is $\begin{matrix} -24V \\ -5V \\ +2V \end{matrix}$ and the
 measuring stability is to be within $\pm 0.5\text{dB}$
 against the change of temperature $20^{\circ}\text{C} \pm 15^{\circ}\text{C}$,
 when the test is to be made at the condition of
 psophometric value.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal

Spec. No. 3.3.5

casing or cover. All the other descriptions on panel are to be described in English.

2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Ando Electric Co., Ltd.

4. Accessories and Spare Parts:

1. Cord for measurement: 1
2. dBm - mV conversion table: 1
3. Fuse: Current using numbers x 2 (except the actual equipage)
4. Battery: 1 set

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to equipment).

6. Remarks:

Spec. No. 3.3.6
Code Generator PW-105B

1. **Purpose of Application:**

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. **Quantity:** 1

3. **Standards:** (Construction dimension, electrical requirement and mechanical requirement etc.)

This equipment is a code generator used for telegraph circuits ranging from 50 bit/s to 200 bit/s of telegraphic speed, and its main performances are as follows:

Data signaling rate	50, 75, 100, 150, 200 BPS
Code construction	1:1, 2:2, 1:6, 6:1, SQ9, MARK, SPACE
Out-put current	10 - 40mA at 0.5 - 3k Ω load (single or double current by switching)

3.1 **Construction**

- (1) This equipment is accommodated into a portable metal case, and its sizes are approx. 200mm(H), 280mm(W), 400mm(D).
- (2) AC power source cord with a double pole attachment plug (usual voltage to be used AC 230V) is approx. 3m length.

3.2 **Electrical Requirement**

A code distortion is within $\pm 0.5\%$ at AC power source voltage $230 \pm 10\%$ and temperature $20^{\circ}\text{C} \pm 15^{\circ}\text{C}$.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Ando Electric Co., Ltd.

4. **Accessories and Spare Parts:**

1. Power source cord: 1

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2. Fuse and plugs: Current using numbers x 2 (except the actual equipage and neon lamp)
3. Lamp pull out tool: 1

5. Materials to be Submitted:
Operational instrument manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and packing list 4 copies each (One each of them is attached to equipment).

6. Remarks:

Spec. No. 3.3.7
Start-Stop Distortion Measuring Set TGK-13F

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1
3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)
This equipment is used for measuring signal distortion of, start-stop system telegraph circuits without affecting communication circuit operation and has a cathode ray tube to display the distortion and its main performances are as follows:

Code signaling rate		50, 75, 100, 150, 200 BPS (50 - 200 BPS at an external synchronism)
Measuring range		0 - $\pm 47\%$ - both of the total start-stop distortion and the start-stop distortion of each element
In-put voltage/ current	Balance circuit	$\pm (10 \pm 3)\text{mA}$, $\pm (20 \pm 3)\text{mA}$
	Unbalance circuit	Double current $\pm 6 - \pm 50\text{V}$, $\mp 6 - \mp 50\text{V}$ Single current $+6 - +100\text{V}$, $-6 - -50\text{V}$
Code unit		5, 6 and 8 unit

3.1 Construction

- (1) This equipment is accommodated into a portable metal case and its sizes are approx. 300mm(H), 250mm(W), 435mm(D).
- (2) AC power source cord with a double pole attachment plug (usual voltage to be used is AC 230V) is approx. 3m length.

3.2 Electrical Requirement

The accuracy of distortion measurement is within $\pm 0.5\%$ at AC power source voltage $230\text{V} \pm 10\%$ (50/60Hz $\pm 1\text{Hz}$), temperature 5 - 40°C and humidity 40 - 80%.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.

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2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Ando Electric Co., Ltd.

4. Accessories and Spare Parts:
 1. Hood for cathoderay tube: 1
 2. Fuse: Current using numbers x 2 (except the actual equipage)

5. Materials to be Submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to equipment).

6. Remarks:

Spec. No. 3.3.8
Trolley for Measuring Set AT-16A

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1**3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)**

This equipment is a trolley for loading a big size measuring set and its main performances are as follows:

Loading weight	Loading trolley	40 kg
	Auxiliary trolley	30 kg
Power source	Capacity	AC 230V 8A (2 pcs. of plug sockets)
	Cord	With automatic winder

Construction:

- (1) Power source cord with a double pole attaching plug is approx. 3m length.
- (2) The size of this equipment is approx. 750mm(H), 450mm(W), 700mm(D).
- (3) A loading trolley is an inclination variable type (horizontal, +10°, +20°).

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Ando Electric Co., Ltd.

4. Accessories and Spare Parts:

- | | |
|----------|--|
| 1. Fuse: | Current using numbers x 2 (except the actual equipage) |
| 2. Belt: | 1 |

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet

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3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each among them is attached to equipment).

6. Remarks

Spec. No. 3.4
Arabic Letter - Graphic Typer

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Outline

This equipment can receive the signals from a key-board or other out-put device and types alphabet figures or Arabic letters on the recording sheet driving the platen and a ball point-pen horizontally and vertically in steps.

It may punch the tape simultaneously.

3.2 Constitution

The constitution of this equipment is as follows:

Classification	Name	Q'ty	Remarks
Machinery Part	Keyboard unit	1	
	Typing unit	1	
	Tape paper perforation unit	1	
	Tape paper reading unit	1	
	Cover	1	
Controller	Letter signal generation unit	1	
	Device control unit	1	
	Line control unit	1	
	Power source unit	1	
	Trolley	1	
	Connection cord	1 set	

3.3 Standards

- (1) Code: 5 unit two rows signal (as to English figures, however, CCITT No. 2 code is used).
- (2) Operational speed: English figures (5 unit one row) approx. 6.7 codes/sec., Arabic letters (5 units two rows)

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- approx. 13.3 codes/sec. It is, however, based on the modulation rate when it is using with the line control unit.
- (3) Keyboard unit
- Method: Electronic method
- Key arrangement: It will be in the annex 1.
- Key operation speed: Depends on the Key touching speed of operator
- Shift mode: 4 shift
- Alphabet mode; letter shift, figure shift
- Arabic mode; lower shift, upper shift
- Roll-over; 40 key roll-over method
- (4) Typing unit
- Typing method: Stroking method with ball point pen
- Printing speed: Average 400 letters/minute
- Printing letter spacing: 2.54mm
- Line spacing: Alphabet figures 4.23mm, 8.47mm } switch-
Arabic letters 8.47mm, 16.94mm } able
- Max. numbers of typed letters in one line: 80 ± 1 letters or 69 ± 1 letters
- Number of character set: Alphabet figures below 49
Arabic letters are shown in Annex 2.
- Platen: Fixed sprocket platen
Sprocket pin-pitch 12.7mm
Diameter of sprocket pin 3.97ϕ
- Color of ball-point pen: Black
- Letter matrix: Alphabet figures 12 x 8
Arabic letters 37 x 16
- Step distance: 0.2116mm
- (5) Paper tape reading unit
- Reading method: By star-wheel lever
- Reading code: 5 unit code
- Reading speed: Max. 13.3 codes/sec.
- Driving method: Magnet feed
- (6) Paper tape perforating unit
- Perforation code: 5 unit code

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Perforation speed:	Max. 13.3 codes/sec.
Driving method:	By Electric motor
(7) Medium standard	
5 unit standard tape:	The specifications for 5 unit standard tape are M11-10216
Standard of printing paper:	Roll paper with sprocket's hole Standard is M11-10217
(8) Line control unit	
Communication speed:	50 B/S
Communication method:	Two-wire system. Half duplex.
Signal conditions:	Start-stop system 5 unit (excluding start 1 stop 1.5 unit)
Signal standards:	Z polarity; mark 20mA \pm 3mA A polarity; space 0mA
Receiving margin:	Over 40%
Total start-stop distortion:	Below 3%
(9) Answer-back	
Max. numbers of answer back codes:	20 codes
Sending-out method:	Automatic
Code generator:	Diode matrix
(10) Power source voltage:	230V \pm 10% (50Hz)

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Yamura Shinko Seisakusho Co., Ltd.

4. Accessories and Spare Parts:

(1) Ball point pen	10 pcs.
(2) Roll paper with sprocket's hole:	10 pcs.
(3) Extender board	1 pce
(4) Tool	1 set

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						b ₅	1	1	1	1	1	1	1	1
						b ₄	0	0	0	0	0	0	0	0
						b ₃	0	0	0	0	1	1	1	1
						b ₂	0	0	1	1	0	0	1	1
						b ₁	0	1	0	1	0	1	0	1
b ₅	b ₄	b ₃	b ₂	b ₁	X	0	1	2	3	4	5	6	7	
0	0	0	0	0	0									
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Annex 2 Character Set of Arabic Letter

Section 4 DATA COMMUNICATION

Spec. No.	SPECIFICATIONS
4.1.1	Datax N200 MODEM
4.1.2	Datax N1200 MODEM
4.1.3	Datax N2400 MODEM
4.2.1	MODEM Tester
4.2.2	Data Transmission Testing Set (Transmitting Part)
4.2.3	Data Transmission Testing Set (Receiving Part)
4.2.4	Multi Channel Counter
4.2.5	Group Delay Measuring Set
4.2.6	Data Transmission Measuring Set
4.8	Data Terminal Equipment

Spec. No. 4.1.1
Datax N200 MODEM

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 2 units
3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)
This equipment is to be based on the CCITT recommendation V21, and its features are as follows:
 - 1) Applicable circuit: Two-wire leased circuit or general switched telephone network.
 - 2) Line interface impedance: 600Ω balanced
 - 3) Communication system: Full duplex communication
 - 4) Modulation system: Frequency modulation
 - 5) Data signaling rate: Up to 300 BPS
 - 6) Carrier frequency: Low group ($1,080 \pm 10$) Hz
High group ($1,750 \pm 10$) Hz
 - 7) Transmission level: (0 - -30) dBm (Adjustable in 1dB steps)
 - 8) Receiving level: (0 - -40) dBm
 - 9) Interface circuit sending voltage: $\pm (5 - 15)V$, at the load resistance of (3 - 7)k Ω
 - 10) Interface circuit load impedance: To be (3 - 7)k Ω at the applied voltage of $\pm(3 - 15)V$
 - 11) Power source: AC(90 - 110)V, (50 - 60)Hz
 - 12) Temperature and humidity requirement: The performance shall be satisfied at (5 - 40) $^{\circ}C$ (5 - 95)%.

Note:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other description on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Nippon Electric Company Ltd.

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Spec. No. 4.1.1

4. Accessories and Spare Parts:

Fuse, lamps:

Current using numbers x 2 (except the actual equipage)

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to equipment.)

6. Remarks:

Spec. No. 4.1.2
Datax N1200 MODEM

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 2 units
3. Standards: (Construction size, electrical requirement and necessary mechanical requirement etc.)
This equipment is to be based on the CCITT V23, and its features are as follows:
 - 1) Applicable circuit: Four-wire or 2-wire leased circuit or general switched telephone network
 - 2) Line interface impedance: 600Ω balanced
 - 3) Communication system: Full duplex communication on 4-wire leased circuit
Semi-duplex communication on two-wire leased circuit, or on general switched telephone network.
 - 4) Modulation system: Frequency modulation
 - 5) Data signaling rate: Up to 1200 BPS.
 - 6) Carrier-frequency: (1700 ± 400) Hz
 - 7) Transmission level: $(0 - -30)$ dBm, (Adjustable in 1dB steps)
 - 8) Receiving level: $(0 - -40)$ dBm
 - 9) Interface circuit sending voltage: $\pm(5 - 15)$ V, at the load resistance of $(3 - 7)$ k Ω
 - 10) Interface circuit load impedance: $(3 - 7)$ k Ω , at the applied voltage of $\pm(3 - 15)$ V.
 - 11) Power source: AC $(90 - 110)$ V, $(50 - 60)$ Hz
 - 12) Temperature and humidity requirement: The performance shall be satisfied at $(5 - 40)^{\circ}\text{C}$,
 $(5 - 95)\%$

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
 2. Painting color is to be of manufacturer's standard
 3. Nominated manufacturer: Nippon Electric Company Ltd.
4. Accessories and Spare Parts:

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Spec. No. 4.1.2

Fuse, lamps:

Current using numbers x 2 (except the actual
equipage)

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet
3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is to
be attached to the equipment)

6. Remarks:

Spec. No. 4.1.3
Datax N2400 MODEM

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under and agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 2 units
3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)
This equipment is to be based on the CCITT V26 and V26 bis, and its electrical features are as follows:
 - 1) Applicable circuit: Four-wire leased circuit or general switched telephone network
 - 2) Line interface impedance: 600Ω balanced
 - 3) Communication system: Full duplex communication on four wire leased circuit. Semi-duplex communication on general switched telephone network
 - 4) Modulation system: Four phase differential phase modulation (A or B recommended by CCITT) ... for 2400 bit/sec.
Two phase differential phase modulation ... for 1200 bit/sec.
 - 5) Detection system: Synchronous detection
 - 6) Data signaling rate: 2400 BPS. or 1200 BPS
 - 7) Transmission level: (0 - -30) dBm, Adjustable in 1dB steps
 - 8) Receiving level: (0 - -40) dBm
 - 9) Interface circuit sending voltage: $\pm (5 - 15)V$, at the load resistance of (3 - 7) $k\Omega$
 - 10) Interface circuit load impedance: (3 - 7) $k\Omega$, at the applied voltage of $\pm (3 - 15)V$
 - 11) Power source: AC 100V $\pm 10\%$, AC 117V $\pm 10\%$, (50 - 60) Hz
 - 12) Temperature and humidity requirement: The performance shall be satisfied at (5 - 40) $^{\circ}C$, (5 - 95)%.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.

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Spec. No. 4.1.3

3. Nominated manufacturer: Nippon Electric Company Ltd.
4. Accessories and Spare Parts
Fuse, lamps: Current using x 2 (except the actual equipage)
5. Materials to be Submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment)
6. Remarks:

Spec. No. 4.2.1
MODEM Tester TSD-108C

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 2 units

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

This equipment is the tester of making the facility test of MODEM for the data communication, and its main characteristics are as follows:

Data signaling rate:	200, 300, 600, 1200, 2400, 4800, 9600 BPS and less than 10 kbit/sec, by the external synchronization.
Testing code:	A, Z, 1:1, 1:4, 4:1, Pseudo random code and self-checking code
Distortion measuring range:	0 - 50%
Synchronization:	Synchronous system and start-stop synchronous system (5, 6, or 8 unit)
Bit error indicator:	Indication by the decimal 3 column and over-flow.
Voltage measuring range:	0 - \pm 25V

3.1 Construction

- (1) This equipment is accommodated into a portable metal case, and its size is approx. 360mm(H), 450mm(W), 130mm(D).
- (2) AC power source cord with a double pole attachment plug (usual working voltage: AC230V) is approx. 3m. length.

3.2 Electrical Requirement

The performance shall be satisfied at power source voltage AC230V \pm 10% and temperature 20°C \pm 15°C;

- (1) The deviation of Data signaling rate (200, 300, 600, 1200, 2400, 4800, 9600 bit/sec.) is to be less \pm 0.01%.
- (2) The distortion of testing signal is within \pm 1.0% at less than 1200 bit/sec.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name

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Spec. No. 4.2.1

of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.

2. Painting color is to be of manufacturer's standard
3. Nominated manufacturer: Ando Electric Co.

4. Accessories and Spare Parts:
 1. Cord for measuring: 1
 2. Fuse: Current using numbers x 2 (except the actual equipage)

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment)

6. Remarks

Spec. 4.2.2

Data Transmission Testing Set - Transmitting Part MEV-1

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Out line

This equipment is used for generating data code signals for evaluating the transmission quality of the data transmission line.

3.2 Construction

This equipment is composed of plug-in units which drawn up as in the following list in universal main frame.

Nmae	Q'ty	Width	Description
Clock generator	1	25mm	(MH24A)
Input interface circuit	1	25mm	For ST ₂ (MH14A)
Pattern generator	1	50mm	(MH25A)
Output interface circuit	1	25mm	For SD (MH13C)
Output interface circuit	1	25mm	For ST ₁ (MH13A)
Main frame	1	-	with 7 of (MZ16A1) blank panel

3.3 Electrical requirement

(1) Clock generator unit

Internal generator

Data signaling rate: 50, 100, 200, 600, 1.2K, 2.4K, 4.8K, 9.6K, 48K, 96K, 240K BPS.

Stability: $\pm 5 \times 10^{-5}$

External driving

Data signaling rate: 50BPS - 2M BPS by the in-put signal ranging from 100Hz to 4MHz

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Spec. No. 4.2

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to equipment)

6. Remarks:

Spec. No. 4.2.3
Data Transmission Testing Set - Receiving Part MEV-1

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1
3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Outline

This equipment is used for evaluating the quality of a transmission line or equipment, by measuring the error rate, the signal distortion etc.

3.2 Construction

This equipment is composed of plug-in units which drawn up as in the following list in universal main frame.

Name	Q'ty	Width	Description
Input interface circuit	1	25mm	For RD (MH14D)
Distortion measuring unit	1	50mmx2	(MH215A)
Input interface circuit	1	25mm	For RT (MH14B)
Clock regenerator	1	25mm	(MH210B)
Automatic synchronizer	1	25mm	(MH29A)
Pattern generator	1	50mm	(MH25A)
Error detector	1	25mm	(MH316A)
Block error detector	1	25mm	(MH326A)
Burst error detector	1	50mm	(MH313B)
Main frame	1	-	(MZ16A1)

3.3 Electrical requirement

- (1) Input interface circuit unit (for RD and RT)

Data signaling rate: 50BPS - 20K BPS

Input signal voltage: Logic '1' -6 - -10V

Logic '0' +6 - +10V

Input Impedance: $3.5 \pm 0.5k\Omega$ unbalanced

- (2) Distortion measuring unit

Data signaling rate

Spec. No. 4.2.3

- | | | |
|-----|---|--|
| | Internal clock: | 50, 100, 200, 600, 1.2K, 2.4K, 4.8K, 9.6K, 48K, 96K, 240K BPS |
| | External clock: | 50 - 300 K BPS (by 100 times multiplied frequency of clock pulse) |
| | Distortion measuring range: | $\pm 1 - 49\%$ (1% steps) |
| | Measurement accuracy | |
| | Internal clock: | $\pm 1\%$ ($\pm 2\%$ in 64 K BPS, 240 K BPS) |
| | External clock: | $\pm 2\%$ |
| | Input level of the external clock: | 0dBm (75 Ω unbalanced) |
| (3) | Clock regenerator unit | |
| | Input level of the external clock: | 0dBm (75 Ω unbalanced) |
| (4) | Pattern generator unit | |
| | Data signaling rate: | 50BPS - 2M BPS |
| | Data pattern: | Pseudo random pattern of 511 bits repeated and programmable pattern of 10 bits repeated that is possible to be set freely by switch |
| (5) | Error detector unit: | |
| | The types of error: | Insertion (S \rightarrow M), omission (M \rightarrow S) sum of the insertion and the omission (total) and the block error per 10 bits. |
| | Output signal for counting error: | TTL level |
| | Data signaling rate: | 50 - 2M BPS |
| (6) | Block error detector unit | |
| | Data signaling rate: | 50 - 2M BPS |
| | Block length: | 2 ⁿ bits and repetition periods of the pseudo random pattern (n=9 - 17) |
| | Output signal level: | TTL level |
| (7) | Burst error detector unit | |
| | Data signaling rate: | 50 - 20M BPS |
| | Burst monitoring period: | 1,2,5,10,20,50,100,200,500,1000,10000 bits |
| | Number of error bits for deciding as burst error: | 1,2,5,10,20,50,100,200,500,1000,2000 bits |

Spec. No. 4.2.4
Multi-Channel Counter MS 313A

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Construction dimension, Electrical requirement and mechanical requirement etc.)

3.1 Outline

This equipment is capable of collecting and recording continuously for a certain period of information generated over a long period.

3.2 Construction

- (1) This equipment is consisted of a multi-channel counter and a digital printer.
- (2) The multi-channel counter is accommodated into a portable metal case, and its standard size is 195mm(H), 426mm(W), 450mm(D).
- (3) The digital printer is accommodated into a metal case, that size is 148mm(H), 200mm(W), 355mm(D).

3.3 Performance

- (1) Number of input circuit: 6 routes
- (2) Input pulse: Voltage $\geq +3V$, TTL level
Width $> 50ns$
Pulse interval $> 100ns$
- (3) Display: Decimal 5 digits and 3 digits with 'OVER FLOW' lamps
5 digits: 2 routes 3 digits: 4 routes
- (4) Recording: The content of counter and the observing time (up to 99 days, 23 hours, 59 minutes and 59 seconds) are printed over 3 lines (using a printer of 14 letters/line)
- (5) Repetition period: 2,5,10 second and 1, 10 minute (selected by a switch)
- (6) Recording paper: Approximately 90mm width (rolling or folding)

Spec. No. 4.2.4

(7) Power source voltage: AC 230V \pm 10% 50Hz

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Anritsu Electric Co., Ltd.

4. Accessories and Spare Parts:

Multi wire cord 57-30500 - 57-30500 1.5m:	1 pc.
Ink ribbon:	1 pc.
Recording paper (folding type):	10 pcs.

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to equipment).

6. Remarks:

Spec. No. 4.2.5
Group Delay Measuring Set MS11A and MH11A

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1
3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Outline

This measuring equipment is used for measuring of group delay characteristics which are a cause of waveform distortion when carrying out waveform transmission in the voice frequency band telephone circuit. Measurements are performed by the Nyquist method.

3.2 Construction

This measuring equipment is separately accommodated into a portable metal case as main part (MS11A) and subsidiary part (MH11A).

The standard size of main part is 370mm(H), 520mm(W), 213mm(D) and subsidiary's is 220mm(H), 520mm(W), 213mm(D).

3.3 Electrical Requirement

- (1) Measuring frequency: 200Hz - 10KHz
- (2) Modulation frequency: 12.5Hz
- (3) Sending frequency (forward): (200Hz - 10KHz) \pm 12.5Hz
" (backward): 1200Hz \pm 12.5 Hz
- (4) Input/output impedance: 600 Ω balanced
- (5) Transmitting level: -25 - +5dBm
- (6) Receiving level: -30 - 0dBm
- (7) Measuring range of delay: -5 - +20ms
- (8) Measuring accuracy: 50 μ s + 5%
- (9) Power source voltage: AC 230V \pm 10% 50Hz

Notes:

1. A name plate on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal

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Spec. No. 4.2.5

casing or cover. All the other descriptions on panel are to be described in English.

2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Anritsu Electric Co., Ltd.

4. Accessories and Spare Parts
Balancing cord I-214APS - I-214APS 1m: 2 pcs.

5. Materials to be Submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to equipment).

6. Remarks:

Spec. No. 4.2.6
Data Transmission Measuring Set

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1
3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Outline

This equipment is a portable tester for the voice frequency band transmission lines, consisting of an oscillating section and a level measuring section.

3.2 Construction

This equipment is accommodated into a portable metal case, and its standard size is approximately 150mm(H), 280mm(W), 250mm(D).

3.3 Electrical Requirement

- | | |
|--------------------------------|-----------------------------------|
| (1) Oscillating frequency: | 0.2 - 10KHz |
| (2) Frequency accuracy: | Within $\pm (0.4\% + 2\text{Hz})$ |
| (3) Output level: | -40 - +4dBm |
| (4) Output impedance: | 600 Ω balanced |
| (5) Measuring frequency range: | 0.2 - 10KHz |
| (6) Measuring level range: | -60 - +10dBm |
| (7) Input impedance: | 600 Ω balanced and high |
| (8) Power source voltage: | AC 230V \pm 10% 50Hz |

Notes:

1. A name plate on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard
3. Nominated manufacturer: Ando Electric Co., Ltd.

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Spec. No. 4.2.6
Data Transmission Measuring Set

4. Accessories and Spare Parts

Cord for measurement:	2 pcs.
Dry cell case:	1 pc.

5. Materials to be submitted

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to equipment).

6. Remarks:

Spec. No. 4.8
1200 BPS Data Terminal Equipment Oki Typer 8000

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 2
3. Standards: (Construction dimension, electrical requirement and mechanical requirement etc.)

3.1 Outline

This is a terminal device which transmits and receives data at the rate of 1200 BPS utilizing the general switched telephone network or direct leased circuit, with the connection of MODEM.

It is capable of printing coarse mesh simulated character of 9 x 7 by wire type dot matrix at high speed of 120 characters/sec.

It also has a tape paper reader and a tape paper punch rate of 120 characters/sec.

3.2 Construction

The constitution of this equipment is as follows.

- (1) Controller section
- (2) Printing section
- (3) Keyboard section
- (4) Paper tape reader section
- (5) Paper tape punch section

3.3 Performance

(1) Controller section

Data signalling rate:	1,200 bits/sec \pm 0.2%
Margin:	More than 45%
Synchronization:	Start-stop
Communication method:	Half duplex
MODEM interface:	To be based on CCITT-V24
Error detection:	Horizontal and vertical parity check

(2) Keyboard section

Character key arrangement:	To be shown in annex 1, 2
Ten key:	

Spec. No. 4.8

- (3) Printing section
- | | |
|---|---|
| Printing method: | 9 x 7 wire dot matrix |
| Printing speed: | 120 character/sec |
| Spacing: | 2.54mm |
| Line spacing: | 4.23mm(1/6 inches) or 8.46mm (1/3 inches) |
| Max. number of letter
Printed in one line: | 132 columns |

- (4) Paper tape reader section
- | | |
|-----------------|-------------------------|
| Reading method: | Photo reading |
| Reading code: | 8 unit code tape |
| Reading speed: | Max. 500 character/sec. |

- (5) Paper tape punch section
- | | |
|--------------------|--------------------|
| Perforation code: | 8 unit code |
| Perforation speed: | 120 character/sec. |

3.4 Power source: AC 110V \pm 10% 50Hz

3.5 Dimension:

Keyboard printer and controller: Under than 650mm(W), 1035mm(D),940mm(H)

Paper tape reader punch: Under than 650mm(W), 700mm(D), 1,050mm(H)

Notes:

1. A name plate on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Oki Electric Industry Co.

4. Accessories and Spare Parts:

- | | |
|---------------------|--|
| (1) Fuse and lamp: | Current using numbers x 2 (except the actual equipage) |
| (2) Paper tape: | 10 pcs. |
| (3) Printing paper: | 10 pcs. |

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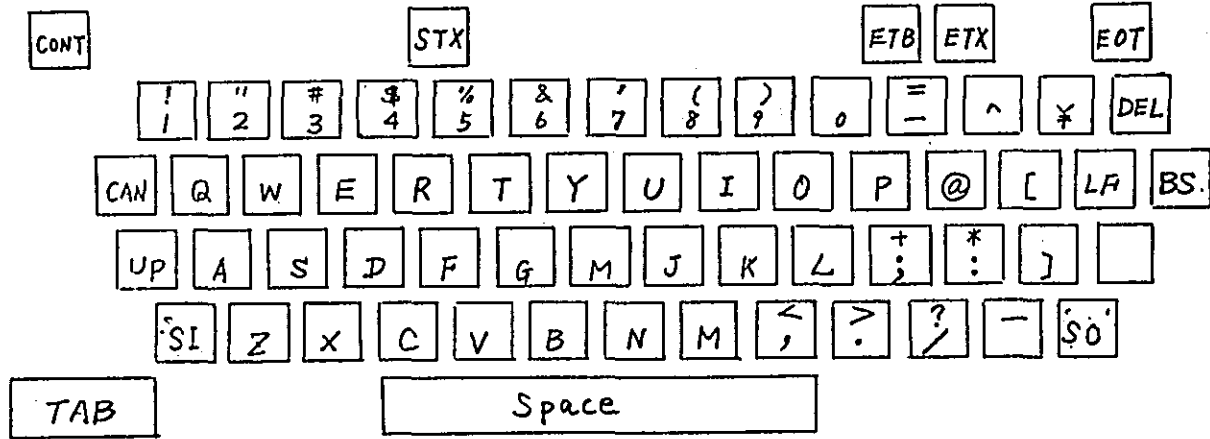
Spec. No. 4.8

5. Materials to be submitted

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to equipment).

6. Remarks:

Spec. No. 4.8



Annex 1 Key Board Arrangement

R \ C	0	1	2	3	4	5	6	7
0	NUL		SP	0	@	P		
1	SOH		!	1	A	Q		
2	STX		"	2	B	R		
3	ETX		#	3	C	S		
4	EOT		\$	4	D	T		
5			%	5	E	U		
6			&	6	F	V		
7		ETB	'	7	G	W		
8	BS	CAN	(8	H	X		
9	TAB)	9	I	Y		
10	LF		*	:	J	Z		
11			+	;	K	[
12			,	<	L	¥		
13			-	=	M]		
14	SO		.	>	N	^		
15	SI		/	?	O	-		DEL

Annex 2 Table of Alphabet Code

Section 6 MICROWAVE

Spec. No.	SPECIFICATIONS
6.1	TR6G2700 Microwave Radio Telecommunication System <ol style="list-style-type: none">1. Microwave System Analyzer ME525A2. Measuring Equipment of Transmitter and Receiver ME612A3. Noise Measuring Equipment WJ-006S4. Transmission Measuring Set ME428A5. Selective Level Meter ML42B
6.3	Sampling Oscilloscope 180C/1810A
6.5	TV System Analyzer ME V5
6.7	Noise Loading Test Set MEV8
6.8	Vector Voltmeter 8405A
6.9	DC Volt-Ammeter 4304B
6.16	Frequency Counter for Microwave Range MF 72C
6.17	X-Y Recorder 3077
6.18	Dummy Load WD 071A, WD 171A, WD 271A
6.23	Wide Band Dual Trace Oscilloscope SS-5212
6.28	Noise Figure Meter MS 71B, MP 62A, MP 64A, MP 65A
6.43	Universal Bridge 4260A

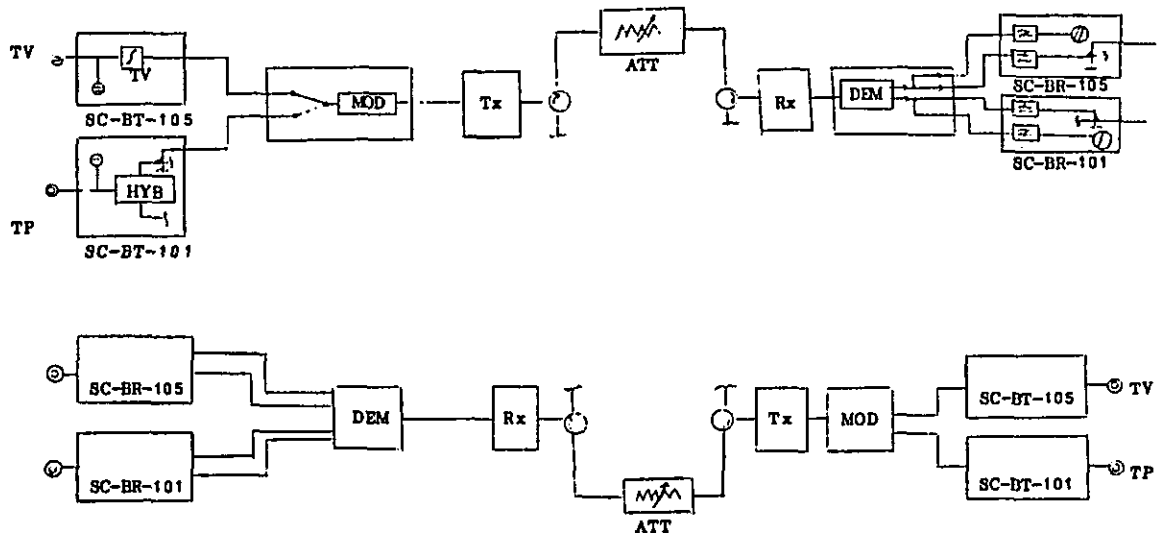
Spec. No. 6.1
TR6G2700 Microwave Radio Telecommunication System

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1 system
3. Standards: (Construction dimension, electrical requirement and necessary requirement etc.)

3.1 System constitution: as the attached block diagram

System facility:

- 1) The system is to be composed one hop radio link (both ways with no standby channel). The automatic base-band switching system (1 + 1 protection) and the occasional TV transmission can be made.
- 2) The transmission capacity per 1 RF channel is to be 2700 telephone circuits.
- 3) Radio frequency used is to be 6GHz upper band (CCIR recommendation 384-2).
- 4) Addition of supervisory system and the expansion to complete 1 + 1 protection switching system in the future are to be considered.
- 5) Modulator/Demodulator shall be transmitted both telephone signals and TV signal with sound.



Block Diagram of TR6G2700 Microwave Radio Telecommunication System

Spec. No. 6.1

3-2 Equipment Constitution

1)	Transmitter receiver	TR-7G2700-()	2 units
2)	Modulator demodulator	MD-2700-()	2 units
3)	RF attenuator set		1 set
4)	Dummy load		4
5)	Measuring instrument		1 set

3-3 Size of Main Equipment

TR	Approx. 260(W) x 225(D) x 2100(H)mm
MODEM	Approx. 520(W) x 225(D) x 2100(H)mm

3-4 Electrical Requirement (*: guarantee, **: typical, No mark: nominal)

- 1) Receiver
 - Radio frequency: 6430 to 7110MHz (CCIR Rec. 384-2)
 - * Local frequency stability: $\pm 3 \times 10^{-5}$ (for terminal type)
 - ** Noise figure: 8.5dB (-20dBm Receiver input)
 - IF center frequency: 140MHz
 - IF output level: +4dBm (or 0.5V Rms for international connection)
 - IF output impedance: 75Ω unbalanced
 - * Amplitude/frequency response at standard gain: Less than 0.2dB within $F_0 \pm 16\text{MHz}$
 - * AGC characteristics: IF output +5 to +3dBm for receive input power of -15 to -65dBm
 - * Squelch operation: Adjustable to operate the squelch circuit for receive input power in a range of -72 to -76dBm
- 2) Transmitter
 - Radio frequency: 6430 to 7110MHz (CCIR Rec. 384-2)
 - * Local frequency stability: $\pm 3 \times 10^{-5}$ (for terminal type)
 - Transmitter output power: +41.8dBm (including branching circuit loss)
 - IF center frequency: 140MHz
 - IF input level: +4dBm (or 0.3V Rms for international connection)
 - * Amplitude/frequency response: Less than 0.2dB within $F_0 \pm 16\text{MHz}$
- 3) Overall characteristics
 - Test tone frequency deviation: 140kHz Rms

Spec. No. 6.1

Limit of baseband occupied by telephone channel:	312 to 12,388 kHz
* Delay distortion:	Less than 2nsec within $F_0 \pm 16\text{MHz}$
Power source and consumption	-20 to -26V DC, approx. 250W at -24V DC
4) Modem:	
Signal transmitted:	2700CH FDM telephone signal
Baseband frequency range:	312kHz to 12,388kHz (2700CH)
Baseband signal input level:	-37dBm/CH
Baseband signal output level:	-28dBm/CH
Baseband impedance:	75 Ω unbalanced, return loss more than 24dB/ 312kHz to 12,388kHz
Intermediate frequency:	140MHz
Modulation:	Frequency modulation with pre-emphasis recommended by CCIR
Frequency deviation:	140kHz Rms/CH
Frequency stability of modulation:	Within 140MHz \pm 100KHz
IF signal input and output level	\pm 4dBm nominal
IF impedance:	75 Ω unbalanced; VSWR less than 1.10/ \pm 16MHz
Modulation or demodulation nonlinearity:	Less than 3%/ \pm 12MHz, 4%/ \pm 16MHz
Frequency response:	+0.6dB -0.8dB / 312kHz to 12,388kHz ($f_0=0.608 f \text{ max.}$)
Frequency and stability of the continuity pilot signal:	13,627kHz, 5×10^{-5}
Sub-baseband signal frequency range:	0.3kHz to 252kHz
Sub-baseband input and output impedance:	150 Ω balanced; (or 600 Ω balanced: optional)
Power source and consumption for one pair of modulator and demodulator:	-20 to -28V DC, Approx. 60W (at 24V)
5) Dummy:	Used for TR6G2700
6) RF attenuator set:	The continuous variable damping can be made

Spec. No. 6.1

from the standard receiving level to the
squench level

Description

-1. Directional coupler with dummy	2
-2. Variable attenuator type 4A310	4
-3. Transducer	4
-4. Coaxial cable (3m) with connectors	2
-5. Coaxial fix attenuator	2
-6. Isolator	2

7) Measuring instrument

Item No.	Name	Specification	Q'ty	Unit	Remarks
1)	Microwave system analyzer	<p>Next items are to be measured at 70MHz band and 140MHz band.</p> <ol style="list-style-type: none"> 1. IF amplitude characteristics 2. Group delay characteristics 3. Differential phase characteristics 4. Linearity and differential gain characteristics 5. Return loss measurement 6. Sensitivity measurement of modulator/demodulator 7. Measurement of AM/PM conversion 	1	unit	<p>Anritsu Electric Co. Ltd. ME525A</p> <p>(1) Optional higher BB frequency 4.43 MHz 8.2 MHz 12.39 MHz</p> <p>(2) Optional accessories</p> <ul style="list-style-type: none"> . Test Mobile MB4A . IF & BB Return Loss Set . Protecting Cover of Front Panel . Coaxial Cord <p>S-5DWP.5D.2W.S-5DWPx3 3CV-P2.3C-2V.3CV-P2x3 M-P-3.3C-2V.3CV-P2x3SP SP-3CP.3C-2WS.SP-3CPx3 SP-3CP.3C-2V.BNC-Px3 P-5CP.5C-2W.P.5CPx3 M-P-5.5C-2V.M-P-5x3</p> <ul style="list-style-type: none"> . Coaxial adapter <p>N-P·N-Px3,N-J·N-Jx3 N-P·BNC-Jx3, N-P·M-Jx3 N-J·M-Px3,N-J·BNC-Px3 N-J·NNC-Jx3,BNC-P·M-Jx3 NC-P·SP3CRx3</p>

Spec. No. 6.1

Item No.	Name	Specification	Q'ty	Unit	Remarks
2)	Measuring equipment of Transmitter and Receiver	Next items are to be measured at 140MHz IF band and 6.3-7.2GHz band. 1. RF-RF, RF-IF, IF-IF, IF-RF amplitude characteristics 2. RF and IF level 3. RF, VSWR 4. RF, IF operation as a standard signal generator	1	unit	Anritsu Electric Co. Ltd. ME612A () Option . Frequency meter . Reflectometer
3)	Noise measuring equipment	Composed of Sending unit, Send 2700ch unit, Receiving 2700ch unit, Recorder and Testmobile 1. Sending signal includes: Pilot signal (250, 13627kHz) and noise signal (316 to 12388kHz for noise loading test, more than 13627 ± 100 for detector adjustment) 2. Recording signal includes: Pilot signal (250, 4287, 13627kHz) and noise signal (268, 13628kHz)	1	unit	Anritsu Electric Co. Ltd. WJ-006S
4)	Transmission measuring set	Composed of an Oscillator, Key box, and Level meter, 1. Frequency: 10Hz to 20 MHz 2. Variable resistance attenuator: 0 to 91dB 3. Output level: -50 to +15 dBm 4. Measuring level: -60 to +20dBm 5. Impedance: 75Ω, 150Ω, 600Ω	1	unit	Anritsu Electric Co. Ltd. ME 428A

Spec. No. 6.1

Item No.	Name	Specification	Q'ty	Unit	Remarks
5)	Selective level meter	1. Frequency: 30kHz to 30 MHz 2. Level measuring range: -100 to +30dBm 3. Input impedance: 75Ω	1	unit	Anritsu Electric Co. Ltd. ML42B

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover, All the other descriptions on panel are to be described in English.
 2. Painting color is to be of manufacturer's standard.
 3. Nominated manufacturer: Nippon Electric Company Ltd. TR7G2700 type
4. Accessories and Spare Parts:
- 1) Materials for installing this equipment are to be attached
 - 2) Spare parts necessary for operating this equipment are to be attached.
5. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Installation manual (English) 2 copies (Japanese) 1 copy, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (One each of them is attached to the equipment).

Spec. No. 6.3
Sampling Oscilloscope 180C/1810A

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Construction dimension, electrical requirement and necessary mechanical requirement etc.)

This equipment is used to observe the high speed signal repeated and its main performances are as listed in the below table.

Classification	Characteristic
Bandwidth	DC - 1GHz
The measuring range	2mV/Div - 200mV/Div
Input impedance	50Ω ± 2%

3.1 Construction

- (1) Standard size: 200(W) x 289(H) x 540(D)mm
- (2) The input connecting plug is to be the BNC connector
- (3) Power source connecting connector is to be a Triode attachment plug (with a conversion plug to a double pole) with 2.2m length of cable.

3.2 Electrical Requirement

Working power source: 230V, 50Hz

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is to attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Anything but the specified in this specification is to be subject to the catalogue.
4. Nominated manufacturer: YHP 180C/1810A

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5. **Materials to be Submitted:**

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 6.5
TV System Analyzer MEV5

1. **Purpose of Application:**
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** 1 unit
3. **Standards:** (Construction dimension, electrical requirement and necessary mechanical requirement etc.)

This equipment is used for the transmitting circuit for TV, which is satisfied with the international standards of CCIR and CMTT etc., and its principal features are as follows:

Classification	Features
Items of measurement	Non-linear distortion: Amplitude distortion (DG) Phase distortion (DP) etc. Linear distortion: Luminous wave form distortion, Chro-luminous wave form distortion etc.
The measuring range	DG: 0.1 - 30%, DP: 0.1 - 30°, wave form distortion: 1 - 20%
Input and output	75Ω unbalanced

3.1 Construction

- (1) This equipment is consisted of transmission unit, 3 pcs. of units plugged in the unit (the unit can be accommodated less than 2 pcs. simultaneously) and 3 pcs. of units of receiving part. Descriptions are to be referred to the table in Remarks.
- (2) SP connector as the input and output connection is to be used.
- (3) The three (3) core code (approx. 2.5m length) is to be used as power source connecting strip.

3.2 Electrical Requirement

The standard is to be satisfied at power source voltage AC/230V \pm 10% and temperature 0°C - 45°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel,

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metal casing or cover. All the other descriptions on panel are to be described in English.

2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Anritsu Electric Co., Ltd.

4. Accessories and Spare Parts:

Accessories and spare parts are to be prepared according to standard.

- Optional accessories:
- (1) Test mobile
 - (2) Cases for unit

5. Materials to be Submitted:

Optional instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

6. Remarks:

Item No.	Name	Specification	Q'ty	Unit	Remarks
1	MG311A1 TV Signal Generator	Measurement: 145(H), 426(W), 450(D)	1	unit	Transmission unit
(1)	MH321A Modulated SIN ² Generator		1		2 pcs. of units among them can be plugged in the transmission unit simultaneously
(2)	MH322A1 T·2T & DGDP Generator		1		
(3)	MH323A1 Multiburst Generator		1		
2	MS321A1 Color Gain & Delay Test Set	Measurement: 95(H), 426(W), 450(D)	1	unit	
3	MS322A1 DG-DP Measuring Set	Measurement: 95(H), 426(W), 450(D)	1	unit	
4	MW35A1 Waveform Monitor	Measurement: 145(H), 426(W), 450(D)	1	unit	

Spec. No. 6.7
Noise Loading Test Set MEV8

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 unit

3. Standards: (Construction dimension, electrical requirement and necessary mechanical requirement etc.)

This equipment is to be used for the noise loading test in the base band at the time of the transmission test for the coaxial carrier system or the microwave system, which is satisfied with the international standards of CCIR and CCITT etc., and its characteristics are as follows:

Classification	Characteristics
Measuring items	Noise ratio (NPR, S/N), Noise Level
Frequency range	12kHz - 18MHz
Numbers of measuring slots	Max. 7 wave according to CCIR and CCITT
Measuring range	NPR: 0 to 70dB, S/N: 20 to 90dB (at T/L-30dBr)

3.1 Construction

- (1) This equipment is consisted of the transmission unit, the receiving unit and the various Filter unit plugged in them, and its standard size is 195(H) x 426(W) x 450(D)mm for each transmission and receiving unit. (Descriptions on each constitution unit are to be referred to the Table).
- (2) SP connector as the input and output connection is to be used.
- (3) The three (3) core code (approx. 2.5m of length) is to be used as the power source connecting strip.

3.2 Electrical Requirement

The standard is to be satisfied at power source voltage $230V \pm 10\%$ and temperature $0^{\circ}C - 45^{\circ}C$.

Notes:

1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, is attached to panel,

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metal casing or cover. All the other descriptions on panel are to be described in English.

2. Painting color is to be of manufacturer's standard.
3. Anything but the specified in this specification is to be subject to the catalogue.
4. Nominated manufacturer: Anritsu Electric Co., Ltd. MEV8

4. Accessories and Spare Parts:

Accessories and spare parts are to be prepared according to standard. Optional accessories (1) Test mobile (2) A connecting cable for remote control operation.

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (One each of them is attached to the equipment).

Item No.	Name	Specification	Q'ty	Unit	Remarks
1	MG431A Noise Generator		1		Transmission unit
(1)	MH446C High Pass Filter	316kHz	1		Plugged in the transmission unit
(2)	MH449K Low Pass Filter		1		'
(3)	MH451H Band Stop Filter	534kHz	1		'
(4)	MH451L Band Stop Filter	1248kHz	1		'
(5)	MH451L Band Stop Filter	2438kHz	1		'
(6)	MH451R Band Stop Filter	3886kHz	1		'
(7)	MH451T Band Stop Filter	5340kHz	1		'
(8)	MH451U Band Stop Filter	7600kHz	1		'
(9)	MH451V Band Stop Filter	11700kHz	1		'
2	ML415A Noise Receiver		1		Receiving unit
(1)	MH450K CH Unit		1		Plugged in the receiving unit
(2)	MH452H Band Pass Filter	534kHz	1		'
(3)	MH452L Band Pass Filter	1248kHz	1		'
(4)	MH452N Band Pass Filter	2438kHz	1		'
(5)	MH452R Band Pass Filter	3886kHz	1		'
(6)	MH452T Band Pass Filter	5340kHz	1		'
(7)	MH452U Band Pass Filter	7600kHz	1		'
(8)	MH452V Band Pass Filter	11700kHz	1		'

Spec. No. 6.8
Vector Voltmeter 8405A

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Construction dimension, electrical requirement and necessary mechanical requirement etc.)

This equipment is used to measure the phase, voltage, gain, damping volume and impedance etc. of the various electronic parts and equipments, and its main characteristics are as follows:

Classification	Characteristics
Measuring range	1MHz - 1,000MHz
The phase measuring range	0 - 360° resolution 0.1°
Voltage & measuring range	100μV - 1V full scale
Input and output impedance	100kΩ and parallel capacity 2.5PF

3.1 Construction

- (1) Standard size: 425(W) x 177(H) x 467(D)mm
- (2) The input uses the attachment probe.
- (3) The power source connecting connector is to be a triode attachment plug (with a conversion plug to a double pole) and the length of cable is approx. 2.2m.

3.2 Electrical Requirement: The power source to be used: AC 230V, 50Hz

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Anything but the specified in this specification is to be subject to the catalogue.
4. Nominated manufacturer: YHP 8405A type

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Spec. No. 6.8

4. Accessories and Spare Parts:

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 6.9
DC Volt-Ammeter 4304B

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standard: (Construction dimension, electrical requirement and necessary mechanical requirement etc.)

This equipment is used to measure the DC voltage and current, and its principal characteristics are as follows:

Classification	Characteristics
Voltage measuring range	$\pm 1\text{mV} - \pm 300\text{V}$ full scale
Current measuring range	$\pm 1\text{nA} - \pm 300\mu\text{A}$ full scale
DC amplification gain	60dB
Input impedance	Voltmeter $10\text{M}\Omega$ Ammeter $1.00\text{M}\Omega - 3.33\Omega$

3.1 Construction

- (1) Standard size is 130(W) x 164(H) x 204(D)mm
- (2) Input connecting plug uses a banana terminal
- (3) The power source connecting connector is to be a Triode attachment plug (with conversion plug to a double pole) and the length of cable is approx 2.2m.

3.2 Electrical Requirement

The power source to be used: AC 230V, 50Hz

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Anything but the specified in this specification is to be subject to the catalogue.
4. Nominated manufacturer: YHP 4304B type

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Spec. No. 6.9

4. Accessories and Spare Parts:

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies,(Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (One each of them is attached to the equipment).

Spec. No. 6.16
Frequency Counter for Microwave Range MF72C

1. **Purpose of Application:**
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** 1
3. **Standards:** (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is used for frequency measurement in microwave range. Its main performances are shown in the following Table:

Classification	Performance	
Frequency range	10Hz - 26GHz	
Frequency stability of reference crystal oscillator	2×10^{-9} /day (after 24 hours from power ON)	
Sensitivity (sine wave)	30mV	10Hz - 500MHz
	-35dBm	0.5 - 12GHz
	-25dBm	12 - 18GHz
	-15dBm	18 - 26GHz
Display	8 digits	

3.1 Construction

This equipment is accommodated in a portable metal case, and its standard sizes are: 145H, 282W, 400Dmm.

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC 230V \pm 10%.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Anritsu Denki K.K.

4. Accessories and Spare Parts:

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Spec. No. 6.16

Coaxial code:	(UG 21 D/U·RG - 9A/U·UG 21 D/U) 1m	One
	(3CA-P2·RG - 58A/U·3CA-P2) 1m	One

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 6.17
X-Y Recorder 3077

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1
3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is used for recording the correlation of various phenomena. Its main performances are shown in the following table.

Classification	Performance
Input ranges (X-axis, Y-axis)	0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50mV/cm 0.1, 0.2, 0.5, 1, 2, 5, 10V/cm, 16 range
Input resistance	1M Ω (for all input range)
Accuracy	$\pm 0.3\%$ full scale

3.1 Construction

This equipment is accommodated in a portable metal case, and its standard sizes are: 399H, 430W, 153Dmm.

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC230V $\pm 10\%$ and temperature 0°C - 45°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be in English.
 2. Painting color is to be of manufacturer's standard.
 3. Nominated manufacturer: Yokogawa Electric Works, Ltd.
4. Accessories and Spare Parts To be supplied in accordance with catalogue.
 5. Materials to be Submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 6.18
Dummy Load WD071A, WD171A, WD271A

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One for each frequency range

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This dummy load is used as a terminator for high power microwave transmitter. It consists of three parts corresponding to frequency range of 2GHz, 4GHz and 6GHz. Standards are shown in the following table:

Freq. range Standards	2GHz	4GHz	6GHz
Frequency (GHz)	1.8 - 2.3	3.6 - 4.3	5.8 - 6.5
VSWR	1.10	1.10	1.10
Maximum power			
Average (W)	800	50	50
Peak (KW)	800	50	50
Waveguide	WRJ-2	WRJ-4	WRJ-6
Flange	BRJ-2	BRJ-4	BRJ-6
Approximate overall length (mm)	500	300	150
Remarks	SPC WD071A	SPC WD171A	SPC WD271A

Notes:

1. A name plate on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be in English.
 2. Painting color is to be of manufacturer's standard.
 3. Nominated manufacturer: SPC Electronics Corporation
4. Accessories and Spare Parts: To be supplied in accordance with catalogue.
5. Materials to be Submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 6.23
Wide Band Dual Trace Oscilloscope SS-5212

1. **Purpose of Application:**
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** 1
3. **Standards:** (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is a dual trace oscilloscope. Its main performances are shown in the following table:

Classification	Performance
Sensitivity	1mV/div - 2V/div at GAIN x 10 10mV/div - 20V/div at GAIN x 1
Bandwidth	DC - 15MHz, -3dB at GAIN x 1 DC - 7MHz, -3dB at GAIN x 10

3.1 Construction:

This equipment is accommodated in a portable metal case, and its standard sizes are: 165H, 300W, 390Lmm

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC 230V \pm 10%.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be in English.
 2. Painting color is to be of manufacturer's standard
 3. Nominated manufacturer: IWATSU Electric Co., Ltd.
4. **Accessories and Spare Parts:** Dust cover ... 1, Accessory Bag ... 1, Fuse ... 2, Adjusting Driver ... 1.
 5. **Materials to be Submitted:**
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 6.28
Noise Figure Meter MS71B, MP62A, MP64A, MP65A

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 set

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is used for measuring the noise figure of high sensitivity receivers. Noise figure measurements are carried out by connecting a noise source to the input of the receiver to be measured, and connecting the noise figure meter to its out terminal. Its main performances are shown in the following table:

Classification	Performance	Remarks
Noise Figure Meter Measuring range Input level Accuracy (indicator)	3 to 20dB (in NF) -50 to 0 dBm ±0.5dB at NF: 6 to 18 dB ±1.0dB at NF: 3 to 6dB and 18 to 20dB	Anritsu MS71B
Noise Sources Frequency (GHz)	2.0 to 2.7 3.4 to 4.9 4.8 to 7.0	Anritsu MP62A MP64A MP65A

3.1 Construction

This equipment is composed of a Noise figure meter and three noise sources corresponding to 2GHz, 4GHz and 6GHz band. The noise figure meter is accommodated in a portable metal case, and its standard sizes are: 200H, 300W, 265Dmm.

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC 230V ± 10% and temperature 0°C - 40°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and

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name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be in English.

2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Anritsu Denki K.K. MS71B, MP62A, MP64A, MP65A

4. Accessories and Spare Parts:

Noise figure meter:

Coaxial cord (SP-3CP·3C-2WS·SP-3CP): 2m	One
Fixed attenuator: 25dB	One
Power cord (RM12BPG-3S·—·AC plug): 2.5m	One

Noise source:

Discharge tube	Each one
Coaxial cord (5D-2W) (MP62A)	One
Power cord	Each one

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment)

Spec. No. 6.43
Universal Bridge 4260A

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is used for measurements of Resistance, Capacitance, Inductance, D (dissipation factor of capacitor) and Q (quality factor of coil). Its main performances are shown in the following Table:

Classification	Performance
Measuring range:	
Resistance	10mΩ to 10MΩ
Capacitance	1pF to 1,000μF
Inductance	1μH to 1,000H
D	0.001 to 50 (at 1 KHz)
Q	0.02 to 1,000 (at 1 KHz)

3.1 Construction

This equipment is accommodated in a portable metal case, and its standard sizes are: 166H, 198W, 305Dmm

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC 230V ± 10%.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be in English.
2. Painting color is to be of manufacturer's standard
3. Nominated manufacturer: YHP Model 4260A

4. Accessories and Spare Parts:

Accessories and Spare Parts are to be prepared according to standard.

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment.)

Section 7 V H F

Spec. No.	SPECIFICATIONS
7.1	Measuring Equipment for VHF and UHF Range <ol style="list-style-type: none">1. RF Signal Generator MG5182. Linear Detector MH 422A, MS61A (include 7.1.5, 7.12 and 7.15)4. CM Type Power Meter6. Field Intensity Measuring Equipment ML512A7. Transmission Measuring Set ME427A8. Selective Level Meter ML21A9. Noise Meter MN3210. Distortion Factor Meter 816A11. Resistance Attenuator MN510C12. Reactance Attenuator AT-S-5313. Low-Pass Filter M-238C14. High-Pass Filter M-253B15. Others
7.2	Mobile Radio Telephone System
7.3	RF Impedance Bridge YB-3, RD-1B (Include 7.4, 7.5)
7.6	Return Loss Measuring Equipment MR31A, MR52B
7.8	Frequency Counter for VHF Range MF56D
7.11	Linear Wide Band Amplifier for VHF Range MH530B
7.18	Q-Meter for HF and VHF Range 4342A
7.21	Spectrum Analyzer upto VHF Range MS62B

Spec. No. 7.1
Measuring Equipment for VHF and UHF Range

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: Shown in the following table.

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This item consists of measuring equipment for VHF and UHF range. Name, specification and quantity of each equipment are shown in the following table:

Item No.	Name	Specification	Q'ty	Unit	Remarks
1)	RF Signal Generator	Carrier frequency (10-520MHz) Out-put level, -21 +120dB μ (50 Ω , open end) Modulation, AM, FM, AM-FM, PM Power source, AC 230V 50Hz	1	unit	Anritsu Electric Co., Ltd.
2)	FM Linear Detector	Frequency 20MHz - 1000MHz Input level 100 - 126dB μ Power source AC 230V, 50Hz	1	set	Anritsu Electric Co., MH422A, MS-61A
4)	Power Meter CM Type	Measuring range 48 - 68MHz Impedance 75 Ω Measuring range 360 - 470MHz Impedance 50 Ω Frequency range 0 - 500MHz Impedance 50 Ω Frequency range 50 - 170, 140 - 500 MHz Impedance 50 Ω	1 1 1 1	unit unit unit unit	Japan Radio Company NJM-053C-0602 Japan Radio Company NJM-058C-4003 Fujisoku Electric Co., Ltd. TP5JIA Fujisoku Electric Co., Ltd. TLD52B
5)	Dummy Type	Frequency range 260 - 470MHz Impedance 50 Ω	1	unit	Fujisoku Electric Co., Ltd. WD-207
6)	Field Strength Meter	Frequency 25 - 500MHz Impedance 50 Ω Sensitivity 20dB μ /15kHz width	1	unit	Anritsu Electric Co., Ltd. ML512A Optional accessories Doublet Antenna MZ18A Antenna Tripod MB9A

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Item No.	Name	Specification	Q'ty	Unit	Remarks
		Out-put 100m Vrms(+)/50Ω Power source 230V, 50Hz			DC Power Supply MZ15A CM Directional Coupler MP520C RF Fuse MP612A Connecting cable with counter
7)	Transmission Measuring Sets	Frequency range 10Hz - 10MHz Impedance 75Ω,150Ω,600Ω Power source 230V 50Hz	1	unit	Anritsu Electric Co., Ltd. ME427A
8)	Selective Level Meter	Frequency range 200Hz - 200KHz Level measuring range -115 - +31 dBm Input impedance 75Ω, 600Ω Power source AC230V 50Hz	1	unit	Anritsu Electric Co., Ltd. ML21A
9)	Noise Meter	Measuring range -80 +25dBm Input impedance 600Ω Power source 230V 50Hz	1	unit	Ando Electric Co., Ltd. NM-32
10)	Distortion Factor Meter	Frequency range (Fundamental) 20Hz - 100KHz 4 range Measuring range 0.1 - 100% Full scale 7 range	1	unit	Shiba Soku 816A
11)	Resistance Attenuator	Frequency range 0 - 500MHz Impedance 50Ω	1	unit	Anritsu Electric Co., Ltd. Ltd. MN510C
12)	Reactance Attenuator	Frequency range 0.3 - 4GHz Max. attenuation 120dB Impedance, 50Ω (nominal)	2	pcs.	Nihon Koshuha K.K. AT-S-53
13)	Low-pass Filter	Frequency 50KHz - 18.1MHz Impedance 75Ω	1	unit	Anritsu Electric Co., Ltd. M-238C
14)	High-pass Filter	Frequency 70KHz - 25.6MHz Impedance 75Ω	1	unit	Anritsu Electric Co., Ltd. M-253B
15)	Others				
15.1)	T-Pad	Frequency range 0 - 1000MHz Impedance 50Ω	2		Anritsu Electric Co., Ltd. Z-164A
		Frequency range 0 - 200MHz Impedance 75Ω	2		Anritsu Electric Co., Ltd. Z-164B
15.2)	Pad	Frequency range 0 - 200MHz	2		Anritsu Electric Co., Ltd. MP51A

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Item No.	Name	Specification	Q'ty	Unit	Remarks
		Frequency range 0 - 200MHz	2		Anritsu Electric Co., Ltd. MP52A
15.3)	50Ω-75Ω Impedance Transformer	Frequency range 10 - 1200MHz	4		Anritsu Electric Co., Ltd. MP614A
15.4)	RF Fuse Holder	Frequency range 0 - 1000MHz	2		Anritsu Electric Co., Ltd. MP612A
		Frequency range 0 - 280MHz	2		Anritsu Electric Co., Ltd. MP612B
			2		Anritsu Electric Co., Ltd. MP613
15.5)	CM Directional Coupler	Frequency range 25 - 500MHz Impedance 75Ω	2		Anritsu Electric Co., Ltd. MP520A
		Frequency range 25 - 500MHz Impedance 50Ω	2		Anritsu Electric Co., Ltd. MP520C
15.6)	Branch	Frequency range 0 - 700MHz Impedance 50Ω	2		Anritsu Electric Co., Ltd. MP640A
15.7)	Attenuator	Attenuation 3dB	2		Anritsu Electric Co., Ltd. MP616A
		Attenuation 6dB	2		Anritsu Electric Co., Ltd. MP616B
		Attenuation 10dB	2		Anritsu Electric Co., Ltd. MP616C
15.8)	Termination	Impedance 50Ω	4		Anritsu Electric Co., Ltd. MP720A
15.9)	Coaxial Cord	S-5DWP·5D-2W(1m)·S-5DWP	5		Anritsu Electric Co., Ltd.
		3CV·P2·3C-2V(1m)·3CV·P2	5		
		M-P-3·3C-2V(1m)·3CV·P2	5		
		SP-3CP·3C-2WS(1m)·SP-3CP	5		
		SP-3CP·3C-2V(1m)·BNC-P	5		
		P-5CP·5C-2W(1m)·P-5CP	5		
		M-P-5·5C-2V(1m)·M-P-5	5		
15.10)	Balancing Cord	I-214APS·CIUUS(1m)·I-214APS	5		Anritsu Electric Co., Ltd.
		CS1-MM2	5		Anritsu Electric Co., Ltd.

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Item No.	Name	Specification	Q'ty	Unit	Remarks
15.11)	Coaxial Adaptor	N-P·N-P	2		Anritsu Electric Co., Ltd.
		N-J·N-J	2		
		N-P·BNC-J	2		
		N-P·M-J	2		
		N-J·M-P	2		
		N-J·BNC-P	2		
		N-J·BNC-J	2		
		BNC-P·M-J	2		
		NC-P·SP3CR	2		

3.1 Construction

These equipments are accommodated in a portable metal case except Item No. 15.

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC 230V \pm 10% in case of equipment which is supplied from AC power source.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be in English.
 2. Painting color is to be of manufacturer's standard.
 3. Nominated manufacturer: Anritsu Electric Co., Japan Radio Co., Ando Electric Co., Shiba Soku, Nihon Koshuha K.K.
4. Anything but the specified in this specification is to be subject to the catalogue.
5. Materials to be Submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 7.2
Mobile Radio Telephone System

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 set

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is the automatic telephone equipment to make the intercommunication between the mobile telephone set mounted to the automobile and the public telephone set or the mobile telephone set.

3.1 Equipment Constitution

The constitution of this system is consisted of each equipment as listed below.

- 1) Antenna: 2 pcs.
- 2) The transmitting and receiving equipment of base station: 2 units
- 3) Exchange equipment: 1 unit
- 4) Mobile telephone set: 4 units

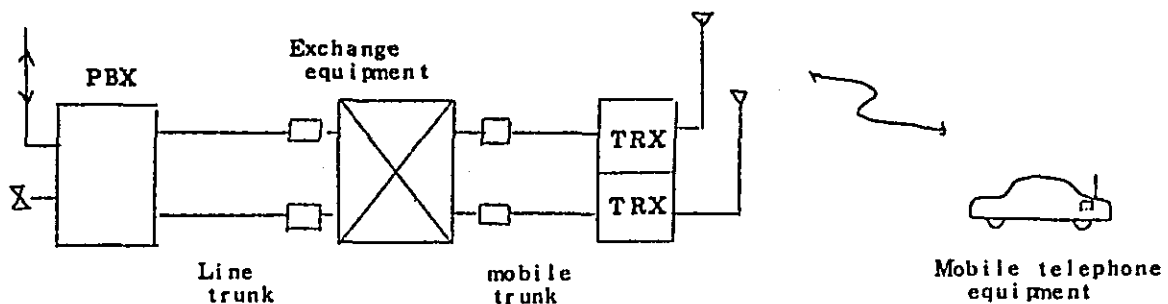


Fig. 1

Spec. No. 7.2

3.2 Facility and Electrical Characteristic

3.2.1 Antenna system: Consist of antenna part and antenna duplexer.

3.2.2 The transmitting and receiving equipment of the base station:

Frequency: 400MHz band

Channel separation: 25kHz

Frequency deviation: Max. 5kHz

RF input and output

impedance: 50Ω (nominal)

Distortion factor: Less than 5%

Power source: DC 24V

Transmitter

Transmitter output: $20W_{-30}^{+20}$ (%)

Modulation system: Phase modulation

Spurious radiation: More than 70dB (below carrier)

Distortion factor: More than 25dB

Frequency stability: Within $\pm 5 \times 10^{-6}$

Modulator input impedance: $600\Omega \pm 20\%$

Modulator input level: -10dBm (nominal)

S/N ratio: More than 45dB

Receiver

Receiving system: Double super-heterodyne

Sensitivity: Less than 6dBμ

Selectivity: Less than -70dB at ± 15 kHz

Sensitivity control: More than 80dBm

Frequency stability of

local oscillator: Within $\pm 5 \times 10^{-6}$

Receiver bandwidth: More than 15kHz at 6dB down

Spurious radiation: More than 65dB (below carrier)

Intermodulation sensitivity: More than 70dB

S/N ratio: More than 45dB

3.2.3 The mobile telephone set

This equipment is consisted of the transmitter unit, the receiver unit and the logical unit.

Transmitter

Transmitter output: $10W_{-40}^{+20}$ (%)

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Modulation system:	Phase modulation (max. frequency deviation $\pm 5\text{kHz}$)
Spurious radiation:	More than 60dB (below carrier)
Distortion factor:	More than 20dB
Frequency stability:	Within $\pm 5 \times 10^{-6}$
Modulator input impedance:	$600\Omega \pm 20\%$
Modulator input level:	0dBm (nominal)
S/N ratio:	More than 40dB

Receiver

Receiving system:	Double super-heterodyne
Sensitivity:	Less than $6\text{dB}\mu$
Selectivity:	Less than -70dB at $\pm 15\text{kHz}$
Spurious receiving sensitivity:	More than 70dB (carrier ratio)
Intermodulation sensitivity:	More than 65dB
S/N ratio:	More than 40dB
Frequency stability of local oscillator:	Within $\pm 5 \times 10^{-6}$
Receiving passing-bandwidth:	More than 15kHz at 6dB lower of bandwidth
Sensitivity control:	More than $70\text{dB}\mu$
Distortion factor:	More than 20dB
Demodulator output level:	0dBm (nominal)

Logical terminal

The following functions are to be provided, besides the transmitting and receiving of signal.

- (1) Make an identification of selective calling signal from exchange equipment.
- (2) Make dial signal transmitting from a mobile subscriber.
- (3) Make an out of area display.
- (4) Make circuit cut-out.

3.2.4 Exchange equipment

This equipment is the exchange equipment for making the selective calling signals transmission to the mobile subscribers and the repeating of dial signals from the mobile subscribers etc. by connecting the subscriber terminals of PBX interior line with the radio circuits, and also possesses the capacity accommodating 4 circuits of PBX interior terminals and 2 circuits of radio circuits. The power source to be used is -60V.

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3.3 Signaling system

3.3.1 Frequency

The signal frequency (nominal) of radio section is as follows:

- 1) Seizure tone signal: 2107.5 (Hz)
- 2) Selective calling signal: the combination of the frequency shown as follows;

A_0 : 502.5 (Hz)	B_0 : 862.5 (Hz)
A_1 : 532.5 (Hz)	B_1 : 892.5 (Hz)
- 3) Dial signal: As shown on the Table 1.

3.4 Dimensions and Weight

- 3.4.1 Base station antenna 60mm ϕ pipe, 3.5m(H), 10kg
- 3.4.2 Transmitter and receiver 490 x 440 x 150mm, 30kg
- 3.4.3 Exchange equipment 620 x 600 x 225mm, 70kg
- 3.4.4 Mobile telephone set
 - (1) Transmitter and receiver 65 x 220 x 320mm, 6kg
 - (2) Control unit 94 x 128 x 23mm, 2kg

Table 1 Dial Signal Frequency

No.	f(Hz)	No.	f(Hz)
1	832.5	6	1,582.5
2	982.5	7	1,732.5
3	1,132.5	8	1,882.5
4	1,282.5	9	2,032.5
5	1,432.5	0	2,182.5

Note:

1. A name plate, on which name of item, data manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Anything but the specified in this specification is to be subject to the catalogue.
4. Nominated manufacturer: NEC

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4. Accessories and Spare Parts:

- (1) Spare parts necessary for operating this equipment are to be attached.
- (2) Materials for installing this equipment are to be attached.

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Installation manual (English) 2 copies (Japanese) 1 copy, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

6. Remarks:

One Engineer for giving the instruction of this equipment installation works is to be dispatched for 3 weeks.

Spec. No. 7.3
RF Impedance Bridge YB-3, RD-1B

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1
3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This item is a measuring device used for measuring impedance in RF range. It consists of an impedance bridge and a detector. Its main performances are shown in the following table:

Classification	Performance	Remarks
RF impedance bridge Frequency range Measuring range	1 - 30MHz 1 - 15MHz G200 - 111,100 $\mu\Omega$ C100 - 600pF 15 - 30MHz G200 - 50,000 $\mu\Omega$ C10 - 100pF	YB-3
Detector Amplifier Frequency range Input level Impedance	1 - 30MHz 4 range 0.5 μ V - 1mV High	RD-1B

3.1 Construction

This equipment is accommodated in a portable metal case, and its standard sizes are as follows:

YB-3: 215H, 400W, 230Dmm RD-1B: 200H, 280W, 250Dmm

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC 230V \pm 10%.

Notes:

1. A name plate, on which name of item, data manufactured, serial number and

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name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be in English.

2. Painting color is to be of manufacturer's standard
 3. Nominated manufacturer: Ando Electric Co., Ltd.
4. Accessories and Spare Parts:
Measuring cords
5. Materials to be Submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 7.6
Return Loss Measuring Equipment MR31A, MR52B

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is used for measuring the return loss at the input and output of networks and electronic equipment. Its main performances are shown in the following table:

Classification	Performance	Remarks
Frequency range Impedance Measuring range	3KHz - 1.5MHz 50Ω - 60Ω balanced/unbalanced 0 - 50dB	MR31A
Frequency range Impedance Measuring range	1 - 500MHz 75Ω unbalanced 0 - 40dB	MR52B

3.1 Construction

This equipment is accommodated in a portable metal case, and its standard sizes are as follows:

MR31A: 145H, 426W, 200Dmm MR52B: 145H, 426W, 200Dmm

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC 230V ± 10%.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be in English.
2. Painting color is to be of manufacturer's standard
3. Nominated manufacturer: Anritsu Denki K.K.

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4. Accessories and Spare Parts:

MR31A:	Coaxial cord 3CV-P2·3C-2V·3CV-P2	1m	Two
MR52B:	Coaxial cord SP-3CP·3C-2WS·SP-3CP	1m	Two
	Standard Resistor (MP516A)	75Ω	Two

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

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DC power cord	2.5m	One
Measuring cord	3CA-P2·RG-58A/U·3CA-P2	1m One
	3CA-P2·RG-58A/U·Alligator clips	One

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

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Spec. No. 7.11
Linear Wide Band Amplifier for VHF Range MH530B

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is a linear wide band amplifier for VHF range. Its main performances are shown in the table:

Classification	Performance
Frequency range	1 - 500MHz
Input level	-35dBm±5dB
Output level	-60 - +10dBm
Output impedance	75Ω (nominal)

3.1 Construction

This equipment is accommodated in a portable metal case, and its standard sizes are: 95H, 426W, 450Dmm

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC 230V ± 10%.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be in English.
2. Painting color is to be of manufacturer's standard
3. Nominated manufacturer: Anritsu Denki K.K.

4. Accessories and Spare Parts:

Coaxial cord: SP-3CP·3C-2WS·SP-3CP 1m Two

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5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 7.18
Q-Meter for HF and VHF Range 4342A

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1**3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)**

This equipment is a direct-reading type Q-meter for HF and VHF range. Its main performances are shown in the following table:

Classification	Performance		
RF range	22KHz to 70MHz		
Q range	5 to 1000		
Q accuracy (%) (at 25°C)	Q	22KHz-30MHz	30MHz-70MHz
	5-300	± 7	±10
	300-600	±10	±15
	600-1000	±15	±20

3.1 Construction

This equipment is accommodated in a portable metal case, and its standard sizes are: 138H, 425W, 414Dmm.

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC 230V ± 10% and temperature 0°C - 50°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be in English.
2. Painting color is to be of manufacturer's standard
3. Nominated manufacturer: YHP

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Spec. No. 7.18

4. **Accessories and Spare Parts:**

5. **Materials to be Submitted:**

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 7.21
Spectrum Analyser MS62B

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is a spectrum analyser upto UHF range. Its main performances are shown in the following table :

Classification	Performance
Frequency range Amplitude measuring range and CRT display range	100KHz to 1700MHz LOG 10dB/div: -122 to +20dBm, CRT display range: 72dB 5dB/div: -100 to +20dBm, CRT display range: 40dB 1dB/div: -68 to +20dBm, CRT display range: 8dB LIN -100 to +20dBm, CRT display range: 0 to 1.6 EXP Expanded display from 1.44 to 1.6 of LIN scale

3.1 Construction

This equipment is accommodated in a portable metal case, and its standard sizes are: 195H, 426W, 450Dmm.

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC230V \pm 10%.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be in English.
2. Painting color is to be of manufacturer's standard
3. Nominated manufacturer: Anritsu Denki K.K.

4. Accessories and Spare Parts:

Coaxial cord	(S-5DWP·5D-2W·S-5DWP) 1m	One
	(BNC-P·RG-55/U·BNC-P) 1m	One
Coaxial adapter	[BNC(J)-N(P)]	One
Earphone		One
Light shield for close-up		One

5. Materials to be Submitted:

Optional instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Section 8 H F

Spec. No.	SPECIFICATIONS
8.1	Electronic Voltmeter
8.2	Digital Multi-Thermometer

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Spec. No. 8.1
Electronic Voltmeter

1. Purpose of Use:

This item is used by Pakistan Central Telecommunication Laboratory established based on the agreement made between Pakistani and Japanese governments.

2. Quantity: 1

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

Voltage measuring range; 0 - 1000V (7 range) Resistance measuring range; 0 - 500M Ω (7 range)

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Anything but the specified in the specification is to be subject to the catalogue.
4. Nominated manufacturer: Fujisoku EV 801 type

4. Accessories and Spare Parts: RF probe 1 unit

5. Materials to be Submitted: Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 8.2
Digital Multi-Thermometer

1. Purpose of Use:

This item is used by Pakistan Central Telecommunication Laboratory established based on the agreement made between Pakistani and Japanese governments.

2. Quantity: 1

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is the digital thermometer so as to be able to read the temperature by connecting with one of each among 5 sorts of the thermocouple PR, CA, IC, CC and CRC in accordance with the measuring temperature, and also can measure as high as DC voltage 200mV. Its principal performances are shown below.

Classification	Specification	
Operation system	Feedback pulse-width modulation counter system	
Input type	Floating	
Indication	LED (luminous diode) indication	
Range conversion	Manual	
Linearizer	5 sorts built-in	
Answering time	Approx. 1.5s	
Max. Indication	°C and mV	
Temperature		
CC	-50 - 199.0°C	
IC	0 - 800°C	
CA	0 - 1200°C	
PR	0 - 1600°C	
CRC	0 - 800°C	
DC voltage	Measuring range	Measuring range
	20mV	0 - ±19.90mV
	200mV	0 - ±199.0mV

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.

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2. Painting color is to be of manufacturer's standard.
 3. Anything but the specified in this specification is to be subject to the catalogue.
 4. Referred Manufacturer: YEW 2809 type
4. Accessories and Spare Parts:
- | | |
|------------------------------|--------------------|
| Multipoint conversion switch | (Type 2813) 1 unit |
| Detecting end for 2809 | (Type 6052) 1 pce |
5. Materials to be Submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Section 9 CARRIER

Spec. No.	SPECIFICATIONS
9.1.1	12MHz Coaxial Cable System
9.1.2	Transmission Characteristic Measuring Set ME428A
9.1.3	Frequency Synthesizer MG430A
9.1.4	Selective Level Meter ML42B
9.1.5	Pilot Measuring Equipment ME435A
9.1.6	Pilot Level Meter ML417C
9.1.7	Resistance Attenuator M-215C
9.1.8	Low-Pass Filter M-238C
9.1.9	High-Pass Filter M-253
9.1.10	Key Box MN53A
9.2	Pulse Echo Tester MW33A
9.3	Filter Curve Tracer

Spec. No. 9.1.1
12MHz Coaxial Cable System

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1 system
3. General Requirement
 - 3.1 The actual amount of equipment is to be suitable for operating at the laboratory.
 - 3.2 Power source: The equipment is to be operated at DC 24V \pm 10%.
4. Equipment Constitution (Relay system is as shown on Fig. 1)
 - 4.1 Multiplex Terminal

(1) Mastergroup and supermastergroup translating equipment equipped with one SMG, without AGC facility	2 sets
(2) Mastergroup and supermastergroup distribution frame	2 sets
(3) Master oscillator equipment equipped with master oscillator, MG carrier supply and SMG carrier supply facility	2 sets
(4) Mastergroup pilot oscillator equipment	2 sets
(5) Jack panel	2 sets
(6) Fuse panel	2 sets
(7) Rack	2 sets
 - 4.2 Line Equipments

(1) Terminal repeater equipment equipped with one sys. and PF facility	1 set
(2) Terminal repeater equipment equipped with one sys. and RET PSF but not PF facility	1 set
(3) Remote supervisory equipment equipped with one direction facility	2 sets
(4) Intermediate repeater equipment with T-AGC equipped with one sys.	1 set
(5) Intermediate repeater equipment with P-AGC equipped with one sys.	1 set
(6) Artificial line equipment	3 sets

4.3 Others

- | | |
|---|-------|
| (1) Accessories and tools for maintenance | 1 lot |
| (2) Consumable spare parts | 1 lot |
| (3) Spare panels | 1 lot |
| (4) Installation material | 1 lot |
| (5) Hand books | 1 lot |
| (6) Parts (Transistors, diodes etc.) | 1 lot |

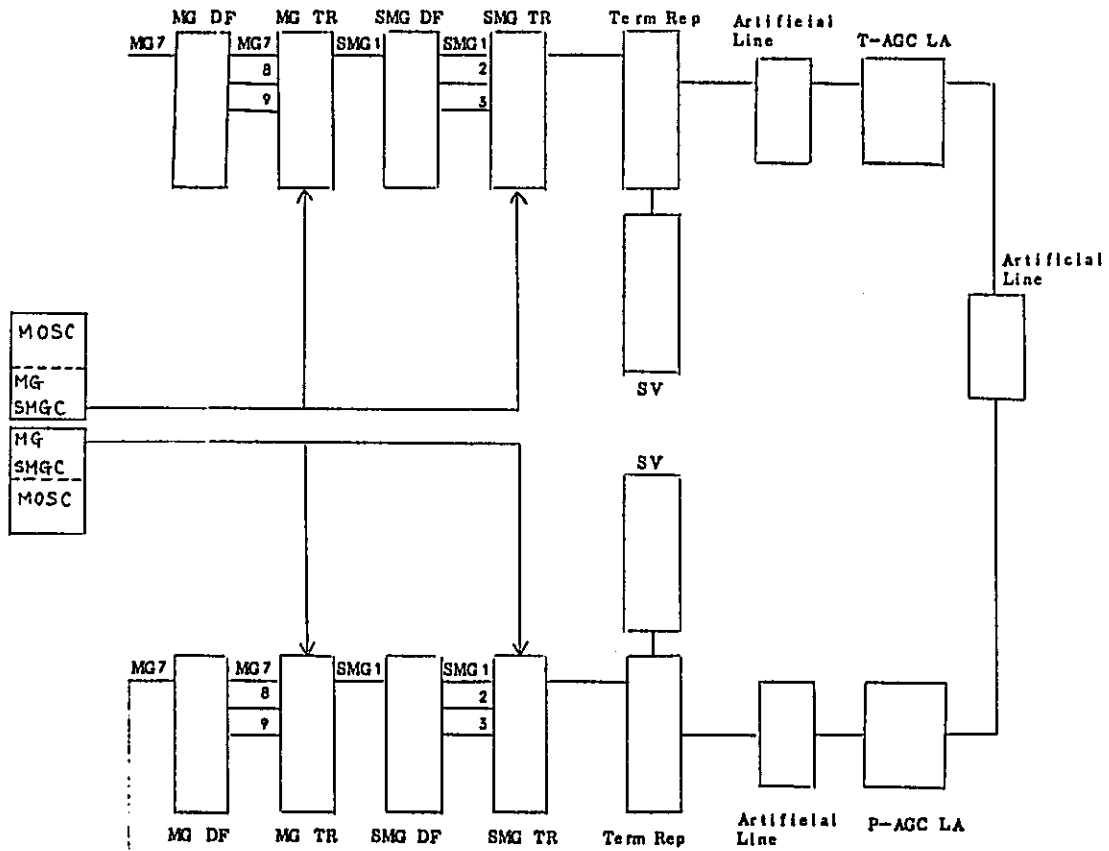


Fig. Biref Equipment Configuration for 12MHz Coaxial Cable System

Spec. No. 9.1.1

5. Equipment Standard

5.1 Master-group translating equipment

- | | |
|--|---|
| (1) Capacity of channel: | 900CH |
| (2) Transmission frequency band: | Basic master-group frequency band;
812 - 2044kHz
Basic super master-group frequency band;
8516 - 12388kHz |
| (3) Input and output impedance: | 75Ω unbalanced (nominal) |
| (4) Modulation system: | SSB system |
| (5) Sending and receiving level diagram: | MG S in; -36dBr MG R out; -23dBr S out;
-30dBr R in; -28dBr |
| (6) Transmission characteristic: | The deviation of transmitting frequency characteristic on the side of sending and receiving is within 1dB at 812 - 2044kHz. |
| (7) Overall noise: | The returning overall noise in the basic super master-group band of the master-group translating equipment is less than 40pW. |
| (8) Super master-group monitoring current: | 11096kHz Level; 20dB less than talking level |
| (9) Main carrier wave: | 10560kHz, 11880kHz, 13200kHz |
| (10) Mismatching attenuation: | MG S in/MG R out/S out/R in
Mismatching attenuation in the transmission band against 75Ω pure resistance is as follows;
MG S in; more than 15dB MG R out; more than 20dB S out; more than 20dB R in; more than 12dB |
| (11) Carrier wave leakage: | Transmission side; More than 30dB less than talking level
Reception side; More than 20dB less than talking level |
| (12) Linear crosstalk attenuation: | Far-end crosstalk; More than 80dB
Near-end crosstalk; More than 80dB |

5.2 Super Master Group Translating Equipment

- | | |
|--------------------------|--------|
| (1) Capacity of channel: | 2700CH |
|--------------------------|--------|

Spec. No. 9.1.1

- (2) Transmission frequency band:
 Basic super master group
 frequency band; 8516 - 12388kHz
 Channel frequency band; 316 - 12388kHz
- (3) Input and output impedance: 75 Ω unbalanced (nominal)
- (4) Modulation system: SSB system
- (5) Transmission and reception
 level diagram: SMG S in; -34dB R out; -34dB S out;
 -32dB R in; -35dB
- (6) Transmission characteristic:
 The deviation of transmission frequency characteristics on the side of
 transmission and reception is within 1dB at 8516 - 12388kHz, and within
 0.5dB at the band equivalent to 812 - 2044kHz.
- (7) Overall noise: The returning overall noise in the channel
 frequency band is less than 40pW
- (8) Channel monitoring current: 308kHz
 Level; 10dB less than speech level
- (9) Super master group carrier wave; 12704kHz; 16720kHz
- (10) Mis matching attenuation: SMG S in/SMG R out/S out/R in
 Mismatching attenuation in the transmission band against 75 Ω pure
 resistance is as follows; SMG S in; more than 12dB
 SMG R out; more than 20dB
 S out; more than 20dB R in; more than 20dB
- (11) Carrier wave leakage:
 Sending side; More than 35dB less than speech level
 Receiving side; More than 25dB less than talking level
- (12) Linear crosstalk attenuation:
 Far-end crosstalk; More than 80dB
 Near-end crosstalk; More than 80dB

5.3 Carrier Supply Equipment

- (1) Basic wave, carrier wave, pilot current, frequency purity and high harmonics
 distortion:

Spec. No. 9.1.1

	Frequency	Purity	Harmonics distortion (Second Third)
No. 7 master group carrier wave	10560kHz	more than 80dB	more than 20dB
No. 8 master group carrier wave	11880kHz	more than 80dB	more than 20dB
No. 9 master group carrier wave	13200kHz	more than 80dB	more than 20dB
No. 1 super master group carrier wave	12704kHz	more than 80dB	more than 20dB
No. 2 super master group carrier wave	16720kHz	more than 80dB	more than 20dB
Line pilot current	308kHz		more than 20dB
Super master group pilot current	11096kHz		more than 20dB

(2) Accuracy of frequency

Master group carrier wave/
super master group carrier
wave: 5×10^{-8}

11096kHz super master
group pilot current/308kHz
line pilot current: 5×10^{-8}

(3) Carrier wave switching time and switching level:

	Switching time	Switching level (alarm generating level)
Master group carrier wave/super master group carrier wave:	Within 1mS	-1 - -3.5dB
11096kHz super master group pilot current/308kHz line pilot current:	Within 7mS	-0.5 \pm 0.2dB - +0.5 \pm 0.2dB

(4) Master oscillator oscillation

frequency: 2500kHz

5.4 Terminal repeater equipment

- (1) Capacity of channel: 2700CH
- (2) Transmission frequency band: 308 - 12435kHz
- (3) Channel monitoring current: 308kHz, 4287kHz, 12435kHz
- (4) Input and output impedance: 75 Ω unbalanced
- (5) Input and output level: S in; -32dB R out; -32 - -35dB

Spec. No. 9.1.1

Channel output; -19dB/308kHz, -19dB/12435kHz

Channel monitoring current

(308kHz, 4287kHz, 12435kHz): 10dB less than voice level

- (6) Transmission characteristic:
Within ± 0.5 dB against the standard level at 300kHz - 12435kHz with in the loop condition of transmitting and receiving channel, however, pilot current rejector, fault locating current rejector, automatic equalizer and artificial line are to be replaced with ATT.
- (7) Mismatching attenuation:
More than 15dB at input and output point of main transmission channel against 75Ω pure resistance.
- (8) Power supply voltage: DC ± 350 V (max.)
- (9) Basic noise (unweighted value): Line amplifier less than -92dBm/3.1kHz width, at 12388kHz
Fix gain amplifier less than 100dBm/3.1kHz width, at 12388kHz
- (10) Linear crosstalk attenuation: More than 90dB
- (11) Fault locating current: 13004 - 13120kHz
30 frequencies in every 4kHz
- (12) Adjustable span length: Approx. 1.03km - 4.75km in the case of 2.6/0.5mm coaxial cable
- (13) 4287kHz/12435kHz oscillator frequency accuracy: $\pm 1 \times 10^{-5}$
- (14) Automatic gain control:
Repeater receiving input level variation; 3.0dB/12435kHz
Compression ratio ; less than 0.1dB against standard level ± 3 dB input level variation

5.5 Intermediate repeater equipment with P-AGC

- (1) Capacity of channel: 2700CH
- (2) Transmission frequency band: 308 - 12435kHz
- (3) Output level: -19dB/308kHz, -9dB/12435kHz
- (4) 12435kHz line pilot current: 10dB less than talking level
- (5) Fault locating current: 30dB less than talking level

Spec. No. 9.1.1

- (6) Adjustable span length:
Approx. 3.91km - 4.75km at the time of using 2.6/9.5mm coaxial cable
- (7) Transmission characteristics: Within ± 0.2 dB against the standard level at 300 - 12435kHz
- (8) Mismatching attenuation: More than 15dB against 75 Ω pure resistance
- (9) Basic noise (unweighted value): Less than -92dBm/3.1kHz width at 12388kHz
- (10) Automatic gain control:
Line Amp input level variation; ± 3.0 dB/12435kHz
Compression ratio; 1/10
- 5.6 Intermediate repeater equipment without AGC
- (1) Capacity of channel: 2700CH
- (2) Transmission frequency band: 308 - 12435kHz
- (3) Output level: -19dBm/308kHz, -9dBm/12435kHz
- (4) 12435kHz line pilot current: 10dB less than talking level
- (5) Fault locating pilot: 30dB less than talking level
- (6) Adjustable span length: Approx. 3.91km - 4.75km in the case of using 2.6/9.5mm coaxial cable
- (7) Transmitting characteristic: Within ± 0.2 dB against the standard level at 300 - 12435kHz.
- (8) Mismatching attenuation: More than 15dB against 75 Ω pure resistance
- (9) Basic noise: Less than -99dBm/3.1kHz width at 12388kHz
- 5.7 Remote supervisory equipment
- (1) Possesses 2 W/4 W order line
2 wire order line: 16Hz ring down system
4 wire order line: Speaker call system
- (2) Fault locating current monitoring facility
The level of 30 fault locating current can be monitored in every one frequency.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described

Spec. No. 9.1.1

in English.

2. Painting color is to be of manufacturer's standard
3. Anything but the specified in this specification is to be subject to the CCITT or NTT standards.
4. Nominated manufacturer: NEC, Fujitsu

5.15 Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 9.1.2

Transmission Characteristic Measuring Set ME428A

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1
3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment can measure transmission circuit, transmission equipment in 10Hz - 20MHz band and gain and loss of various electronic circuit, and its performances are as shown in the following table:

Classification	Performance		
Frequency range	10Hz - 20MHz		
Accuracy of transmission characteristic measurement	75Ω unbalanced	75Ω, 150Ω, 600Ω balanced	
	Constant output Level measurement	0 - 30dB 0 - 75dB	±0.15dB ±0.3dB
	Constant input Level measurement		0 - 30dB ± 0.15dB 0 - 45dB ± 0.3dB
Impedance	75Ω unbalanced (10Hz-20MHz) connector; BNC jack 75Ω balanced (10-650kHz) connector; I-214 150Ω balanced (10-650kHz) connector; I-214 600Ω balanced (0.3-150kHz) connector; I-214		

3.1 Construction

This item is accommodated in a portable metal case, and its standard dimensions are 450H, 282W, 250Dmm.

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC 230V ± 10% and temperature 0°C - 45°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and

Spec. No. 9.1.2

name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.

2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Anritsu Denki K.K.

4. Accessories and Spare Parts:

Measuring code	1 set
Fuse	Spare 1 unit

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 9.1.3
Frequency Synthesizer MG430A

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is mainly used as a signal source for testing and adjusting various type of coaxial multiplex telephone systems and equipments, and its principal performances are as follows:

Classification	Performance
Frequency range	10kHz - 29.99MHz (step dial), - 30MHz (continuous dial)
Frequency stability	Less than 2×10^{-6} (24H after 1H warm up in step setting)
Frequency accuracy	Less than ± 500 Hz after calibration in continuous setting
Output level range	-40 - +15dBm 1dB step and fine adjustment is possible
Output level accuracy	± 0.2 dB, at +5dBm output 75 Ω unbalanced 1MHz; for 150 Ω balanced 100kHz
Output level frequency characteristic	≤ 0.3 dB at +5dBm output
Output impedance	75 Ω unbalance (10kHz - 30MHz) return loss ≥ 30 dB 150 Ω balanced (10 - 650kHz) return loss ≥ 35 dB
Relative harmonic content	≤ 35 dB, 2nd and 3rd harmonics respectively
Surious	(except harmonics of signal) ≤ 60 dB (below 20MHz), less than ≤ 50 dB (over 20MHz)
Output for frequency-ganging with SLM	50.01 - 80MHz
Dimensions, weight	145H, 426W, 350Dmm, ≤ 12 kg

3.1 Construction

- (1) 3C connector for unbalanced and I-214 connector for balanced are to be used for output connecting plug.
- (2) 3 core-code (approx. 5m of length) is to be used as the power source connecting strip.

Spec. No. 9.1.3

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC 230V \pm 10%, temperature $^{\circ}$ C - 45 $^{\circ}$ C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
 2. Painting color is to be of manufacturer's standard.
 3. Nominated manufacturer: Anritsu Denki K.K.
4. Accessories and Spare Parts:
- | | | | |
|----------------------------|------------------------|--------------------------------|--------|
| Coaxial code: | 3CV-P2.3C-2V.3CV-P2 | 1m, 2m each | 1 |
| Balanced connection strip: | I-214APS.-----I-214APS | | 1m one |
| Fuse: | | Current using number x 2 units | |
5. Materials to be Submitted:
- Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment)

Spec. No. 9.1.4
Selective Level Meter ML42B

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is a selective level meter to measure such a low level that can not be measured by an ordinary (flat) level meter without being affected by the noises or the unnecessary frequency components, and its main performances are shown in the following table.

Classification	Performance
Frequency range	30kHz - 30MHz, One band
Frequency accuracy	$\pm (1\% + 5\text{kHz})$ after calibration at 500kHz and 30MHz.
Level measuring range	-100 - +30dBm
Level measuring accuracy	$\pm 0.3\text{dB}$ (30kHz - 15MHz), $\pm 0.5\text{dB}$ (15 - 30MHz) at 0dB deflection.
Input impedance	75 Ω unbalanced, return loss $\geq 35\text{dB}$ (up to 15MHz) $\geq 30\text{dB}$ (up to 30MHz)
Selectivity	Bandwidth; $\geq 3\text{kHz}$ (3dB), Rejection $\geq 60\text{dB}$ ($\pm 4\text{kHz}$) and $\geq 80\text{dB}$ ($\pm 10\text{kHz}$)
Intrinsic distortion	$\leq 60\text{dB}$, 2nd and 3rd harmonics respectively at DISTORTION

3.1 Construction

This equipment is accommodated in a portable metal case, and its standard sizes are: 245H, 426W, 250Dmm.

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC 230 V $\pm 10\%$ and temperature 0°C - 40°C, the stability of level measurement, however, is $\pm 0.5\text{dB}$ against the variation of temperature $20 \pm 20^\circ\text{C}$.

Spec. No. 9.1.4

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be in English.
 2. Painting color is to be of manufacturer's standard
 3. Nominated manufacturer: Anritsu Denki K.K.
4. Accessories and Spare Parts:
- | | | |
|---------------|------------------|-----------------|
| Coaxial code: | 3CZ-P.-----3CZ-P | 1m, 2m each one |
| Fuse: | | 1 pc. |
5. Materials to be Submitted:
- Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 9.1.5
Pilot Measuring Equipment ME435A

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1
3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is used for making the various tests of 12MHz Coaxial Carrier system, measuring gain, loss and level of each Pilot, and its principal performances are shown in the following table:

Classification	Performance	
Measuring frequency	Line pilot	308, 4287, 12435kHz (3 waves)
	Auxiliary measuring pilot	560, 808, 1304, 1592, 2912, 5608, 6928, 8248, 8472, 9792, 11112kHz (11 waves)
	Master group, super master group pilot	1552, 11096kHz (2 waves)
Gain and loss measuring range	0 - 50dB	
Impedance	75Ω unbalanced	

3.1 Construction

- (1) This equipment is mounted on a mobile-stand by making a pilot oscillator (MG432A), a pilot level meter (ML416A), a damping board (MN49A) and a switching board one set, and its standard sizes are 1100H, 400W, 620Dmm.
- (2) BNC connector is to be used for Input and Output connecting plug.
- (3) 3 cores code (approx. 2.5m length) is to be used as a power source connecting strip.

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC230V \pm 10% and temperature 5°C - 35°C.

Spec. No. 9.1.5

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached on panel, metal casing or cover. All the other descriptions on panel are to be described in English.
 2. Painting color is to be of manufacturer's standard
 3. Nominated manufacturer: Anritsu Denki K.K.
4. Accessories and Spare Parts:
- | | |
|-----------------------|-------------------|
| Code for measurement: | 1 set |
| Fuse: | Spare parts 1 set |
| AC code: | 1 set |
| Lamp: | Spare 1 set |
5. Materials to be Submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them attached to the equipment).

Spec. No. 9.1.6
Pilot Level Meter ML417C

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1
3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is a portable type meter used for measuring the level of the line pilot in 12MHz Coaxial carrier system, and its principal performances are shown in the following table:

Classification	Performance
Measuring frequency	308, 4287, 12435kHz
Level measuring range	-65 - -15dBm
Impedance	75Ω unbalance
Power source to be used	AC, DC $(21 \begin{smallmatrix} +3 \\ -2 \end{smallmatrix})$ V, built-in (these three kinds)

3.1 Construction

- (1) This item is accommodated in a portable case, and its standard sizes are: 250H, 165W and 215Dmm.
- (2) BNC connector is used for input connecting plug.
- (3) 3 cores code (approx. 2.5m of length) is used as connecting code at the time of using power source.

3.2 Electrical Requirement

The AC power source voltage is satisfied with the standard at AC 230V \pm 10% and temperature 5°C - 35°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.

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Spec. No. 9.1.6

2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Anritsu Denki K.K.

4. **Accessories and Spare Parts:**

Code for measuring:	1 roll
Fuse:	Spare 1 unit
Dry battery (UM-3):	Current using 12 pcs.
Probe:	1 pc.

5. **Materials to be Submitted:**

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

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Spec. No. 9.1.7
Resistance Attenuator M-215C

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 2 units

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This item is a variable resistance attenuator used for measuring the 75 Ω systems, and its main performances are shown in the following table:

Classification	Performance
Frequency range	DC - 30MHz
Max. attenuation	91dB
Step dial	30dB x 1, 10dB x 5, 1dB x 10, 0.1dB x 10
Attenuation accuracy	± 0.2 dB (at 1kHz), frequency characteristic ≤ 0.3 dB
Max. input	0.25W (+24dBm)

3.1 Construction

This item is accommodated in a portable metal case, and its standard dimensions are: 95H, 320W and 93Dmm.

3.2 Electrical Requirement

Electrical requirement is satisfied with the standard at temperature 0°C - 45°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Anritsu Denki K.K.

4. Accessories and Spare Parts:

Measuring cable	3CV-P2.3CV-2V.3CV-P2	1m 1 roll 2m 1 roll
-----------------	----------------------	------------------------

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Spec. No. 9.1.7

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 9.1.8
Low-Pass Filter M-238C

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 unit

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is a variable low-pass filter used for improving the percentage of high frequency content of measuring signal, or removing the high frequency noise, and its main performances are as follows:

Classification	Performance
Frequency range	50kHz - 18.1MHz
Cut-off frequency (fc)	70.7, 100, 141, 200, 283, 400, 556, 800kHz 1.13, 1.6, 2.26, 3.2, 4.53, 6.4, 9.05, 12.8, 18.1MHz
Effective attenuation	$\geq 40\text{dB at } \sqrt{2} f_c - 3\sqrt{f_c}$
Loss of pass filter	$\leq 3\text{dB}$
Impedance (nominal)	75 Ω unbalance, connector: BNC jack

3.1 Construction

This item is accommodated in a portable metal case, and its standard sizes are: 120H, 520W and 213Dmm.

3.2 Electrical Requirement

Electrical requirement is satisfied with the standard at temperature 0°C - 45°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Anritsu Denki K.K.

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Spec. No. 9.1.8

4. Accessories and Spare Parts:

Coaxial code

3CV-P2.3C-2V.3CV-P2

1m 2 rolls

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoices and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 9.1.9
High-Pass Filter M-253

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 unit

3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is a variable high-pass filter used for removing the basic wave at the time of measuring the distortion factor, or removing the low frequency noise, and its main performances are as follows:

Classification	Performance
Frequency range	70kHz - 25.6MHz
Cut-off frequency (fc)	70.7, 100, 141, 200, 283, 400, 556, 800kHz 1.13, 1.6, 2.26, 3.2, 4.53, 6.4, 9.05, 12.8, 18.1MHz
Effective attenuation	$\geq 40\text{dB at } fc/3 - fc/\sqrt{2}$
Loss of pass-filter	$\leq 3\text{dB}$
Impedance (nominal)	75 Ω unbalance, connector: BNC jack

3.1 Construction

This item is accommodated in a portable metal case, and its standard sizes are: 120H, 520W and 213Dmm.

3.2 Electrical Requirement

Electrical requirement is satisfied with the standard at temperature 0°C - 45°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Anritsu Denki K.K.

4. Accessories and Spare Parts:

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Spec. No. 9.1.9

Coaxial code

3CV-P2.3C-2V.3CV-P2 1m 2 rolls

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 9.1.10
Key Box MN53A

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1 unit
3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is a key box for measuring used when gain or loss of equipment in DC-VHF-UHF Band is measured by the substitution method, and its main performances are as shown in the following table:

Classification	Performance
Frequency range	DC - 300MHz
Crosstalk attenuation	\geq 120dB: between input and output terminal \geq 80dB: between input terminal and between output terminals
Impedance	75 Ω unbalance return loss \geq 30dB (DC-70MHz) \geq 25dB (DC-200MHz) \geq 20dB (DC-300MHz) Connector: SP jack
Insertion loss	0.2dB (DC-70MHz), 0.4dB (DC-300MHz)

3.1 Construction

This item is accommodated in a portable metal case, and its standard sizes are: 95H, 200W, 101Dmm.

3.2 Electrical Requirement

Electrical requirement is satisfied with the standard at temperature 0°C - 45°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.

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Spec. No. 9.1.10

2. Painting color is to be of manufacturer's standard.
3. Nominated manufacturer: Anritsu Denki K.K.

4. Accessories and Spare Parts:
Coaxial code: SP-3CP.3C-2WS.SP-3CP 1m 2 rolls

5. Materials to be Submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 9.2
Pulse Echo Tester MW33A

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1 unit
3. Standards: (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is to measure the distance from the transmitting end to the fault point, the transmitting time of pulse, the inequality of impedance and the cable impedance (end impedance) observed from the transmitting end, and its main performances are as shown in the following table:

Classification	Performance
Transmitting pulse Wave form Mesial width Peak amplitude Repetition frequency Measurable range Time measurement Distance measurement	Sine squared wave $0.05\mu s \pm 20\%$, $0.1\mu s \pm 20\%$, $0.2\mu s \pm 20\%$ $\geq 30V$ (at 75Ω load) $5kHz \pm 1\%$ 0 - $87.5\mu s$ 0 - 12.5km (at S type 9.5mm coaxial cable)
Receiving amplifier	The transmission pulse appeared on a braun tube shall be more than 1cm when the attenuation of input attenuator is 80dB and half side of output connection is opened.
Input attenuator	1dB step: 10dB, 10dB step: 70dB
End impedance measurement	Possible

3.1 Construction

This item is accommodated in a portable metal case, and its standard sizes are:

Unit:	245H, 426W, 535Dmm
Balanced network:	141H, 124W, 125Dmm
Standard core:	395H, 395W, 195Dmm

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC 230V $\pm 10\%$ and temperature 0°C - 45°C.

Spec. No. 9.2

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
 2. Painting color is to be of manufacturer's standard.
 3. Nominated manufacturer: Anritsu Denki K.K.
4. Accessories and Spare Parts:
- | | |
|-----------------------------|---------------|
| Power source code: | 1 roll (10m) |
| Code for measuring: | 2 rolls (50m) |
| Sunshade hood: | 1 pc. |
| Coaxial cable end resistor: | 10 pcs. |
5. Materials to be Submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 9.3
Filter Curve Tracer

1. **Purpose of Application:**
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** 1 unit
3. **Standards:** (Construction dimensions, electrical requirement and necessary mechanical requirement etc.)

This equipment is used for measuring the characteristics of filters etc. consisting of MG417C synthesizer and MH418A sweep adaptor, and its main performances are as shown in the following table:

Classification	Performance
Frequency range	300Hz - 30MHz
Measuring level range	-70 - +10dBm
Logarithm compressed dynamic range	80dB Linearity: ± 3 dB
Input impedance	75 Ω and high impedance
Max. sweep width	1MHz
Sweeping time	30mS - 200sec
Marker	Center marker, Side marker
Output	X axis, Y axis, Z axis and Penlift signal
Dimensions and weight	MG417C: 195H, 426W, 450Dmm, less than 30kg MH418A: 95H, 426W, 450Dmm, less than 12kg

3.1 Construction

- (1) For input and output connecting plug, 3C for unbalance and I-214 connector for balance are used.
- (2) 3 cores code (approx. 5m length) is used as power source connecting strip.

3.2 Electrical Requirement

The power source voltage is satisfied with the result at AC 230V \pm 10% and temperature 0°C - 45°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel,

Spec. No. 9.3

metal casing or cover. All the other descriptions on panel are to be described in English.

2. Painting color is to be of manufacturer's standard
3. Nominated manufacturer: Anritsu Denki K.K.

4. Accessories and Spare Parts:

Coaxial code:	3CV-P2.3C-2V.3CV-P2	1m 3 rolls, 2m 1 roll
Balanced connection strip:	I-214APS.---.I-214APS	1m 3 rolls, 2m 1 roll
Fuse:	Current using numbers x 2 units	

5. Materials to be Submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Section 10 PCM

Spec. No.	SPECIFICATIONS
10.1.2	Test Set PMS-16 (Same Type with Type KB101A)
10.1.3	Fault Locating Set MS34E
10.1.4	Repeater Checker MH32F
10.1.5	Error Rate Measuring Set MS315A
10.1.6	17 Range Volt Meter YEW-2012
10.2	Pulse Pattern Generator MG526A
10.3	Error Rate Measuring Equipment ME57A
10.4	Pulse Generator MG511A

Spec. No. 10.1.2
Test Set PMS-16 (Same Type with Type KB101A)

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is the test meter used for maintaining the PCM terminal station unit, and its main performances are as follows:

Oscillation part	Oscillating frequency	0.3 – 3.4 KHz 10 point
	Output level	-40 – +15 dBm
	Output impedance	600 Ω balance
Level meter part	Frequency range	300 – 4,000 Hz
	Level measuring range	-60 – +20 dBm
	Input impedance	600 Ω balance
Filter part	Gain	20 dB
	Input & output impedance	600 Ω
	Selection characteristic	900 Hz band elimination filter

3.1 Construction

- (1) This item is composed of two simplexes, which are main part and filter part, and each of them is accommodated in a portable metal case, and its sizes are:

Main part	approx. 200 (h) x 520 (w) x 250 (d) mm
Filter part	approx. 100 (h) x 320 (w) x 250 (d) mm

- (2) AC power source code is a these pole attachment plug (normal operating voltage AC V) with approx. 3 m length.

3.2 Electrical Requirement

Frequency stability is within $\pm 0.2\%$ against temperature $20^{\circ}\text{C} \pm 15^{\circ}\text{C}$.

Spec. No. 10.1.2

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to pannel, metal casing or cover. All other descriptions on pannel are to be described in English.
 2. Painting color is to be of manufacturer's standard.
 3. Anything but the specified in this specification is to be subject to the catalogue.
 4. Nominated Manufacturer: ANDO DENKI, PMS-16
4. Accessories and Spare Parts:
- | | |
|-------|---|
| Code: | Current using number |
| Fuse: | Current using number x 2 (except the actual equipped) |
5. Materials to be submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one copy each of them is attached to the equipment).

Spec. No. 10.1.3
Fault Locating Set MS34E

1. **Purpose of Application:**
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** 1
3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is composed of the transmission parts oscillate the ranging signal of fault repeater and the selective level meter measuring signal level returning from repeater, and its main performances are as shown in the following table:

Classification		Performance
Clock frequency		2.048 MHz
Pulse output transmission part	Wave form	HDB 3 and pulse-trio (duty factor 50%)
	Pattern	pulse-trio \pm , +, -, HDB 3 mark factor 1/2, 2047 bit repeating)
	Output voltage	$6 \pm 0.6 V_{p-p}$ (120 Ω balance)
	Repeater locating frequency (pulse-trio low frequency)	1,005 - 3,016 Hz, $\pm 0.1\%$, 24 frequency
Reception part monitoring signal	Pulse-trio density	1/4 - 1/11
	Reception frequency	Pulse-trio low frequency component frequency
	Level range	More than -95 -- 30 dBm continuous
	Selection characteristic	Passing band width: less than 20 Hz (3 dB point)

3.1 Construction

- (1) This item, which includes transmission part and level meter, is accommodated in the one portable metal case, and its standard dimensions are: 295 H, 426 W and 250 D mm.
- (2) Input and output connection plug is suitable for 1 - 214 plug.
- (3) 3 cores code (approx. 2.5 m length) is to be used as the power source connecting strip.

Spec. No. 10.1.3

3.2 Electrical Requirement

The power source voltage is to be satisfied with the standard at AC230 V $\pm 10\%$ and temperature 0°C – 45°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to pannel, metal casing or cover. All the other descriptions on pannel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated Manufacturer: ANRITSU DENKI K.K.

4. Accessories and Spare Parts:

Cables:	Current using numbers
Fuse and lamps:	Current using numbers x 2 sets (except the actual equipped)

5. Materials to be submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 10.1.4
Repeater Checker MH32F

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is to be used for testing the simplex of relay board by combining with MS34E, and its main performances are as shown in the following table:

Classification	Performance
Input impedance	120 Ω , 10% (balance) at 1.024 MHz
Built-in artificial line	40 dB \pm 0.4 dB at 1.024 MHz
Insulation	\geq 5 M Ω (adding DC 500 V among input and output terminal and the box body)
Power source	Supply to the repeater via 130 Ω resistance with receiving DC-24 V supply from MS34E

3.1 Construction

- (1) This item is accommodated in a portable metal case, and its standard dimensions are: 195 H, 282 W and 200 D mm.
- (2) Input and output connecting plug is suitable for 1 - 214 plug.
- (3) 3 cores code (approx. 2.5 m length) is to be used as power source connecting strip.

3.2 Electrical Requirement

The power source voltage receiving DC-24 V from MS34E is to be satisfied with the standard at temperature 0°C - 45°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to pannel, metal casing or cover. All the other descriptions on panel are to be described in English.

Spec. No. 10.1.4

2. Painting color is to be of manufacturer's standard.
3. Nominated Manufacturer: ANRITSU DENKI K.K., MH32F

4. Accessories and Spare Parts:
 - Cables: Current using numbers
 - Fuses and lamps: Current using numbers x 2 sets (except the actual equipped one)

5. Materials to be submitted:
 - Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 10.1.5
Error Rate Measuring Set MS315A

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: 1
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is composed of the transmission parts, which sends pattern signal to the system to be measured, and the reception parts, which detects and indicates the error rate by receiving the pattern passing through the system to be measured, and its main performances are as shown in the following table:

Classification		Performance
Clock frequency		2.048 MHz, 8.448 MHz
Transmission part	Pattern	Artificial random pattern (32,767 bits repeating) and programmable pattern (10 bits)
	Output format	AMI and HDB-3 (duty factor 50%)
	Output level	2.048 MHz - CH1, CH2, 6 V _{p-p} (120 Ω balance) 8.448 MHz - CH1, CH2, 4.74 V _{p-p} (75 Ω unbalance) } 6 bits delay, CH2 against CH1
Reception part	Error detection	Bit error (same pattern as the transmission part) Bipolar error (optional pattern of format AMI and HDB-3)
	Input impedance	Direct measurement: 120 Ω, 75 Ω Parallel measurement: ≥ 3 KΩ (1,200 Ω side) ≥ 1.5 KΩ (75 Ω side)
	Error factor indication	Lamp indication (4 lamps of 10 ⁻⁷ , 10 ⁻⁶ , 10 ⁻⁵ , 10 ⁻³ are turned on at more than each value.)
	Recorder output	Send-out by 7 levels (less than 10 ⁻⁷ , 10 ⁻⁷ - 10 ⁻⁶ , 10 ⁻⁶ - 10 ⁻⁵ , 10 ⁻⁵ - 10 ⁻³ more than 10 ⁻³ , input signal failure and synchronising signal failure)

Spec. No. 10.1.5

3.1 Construction

- (1) This item together with transmission and reception parts are accommodated in the one portable metal case, and its standard size are: 195 H, 282 W and 300 D mm.
- (2) Input and output connection plugs are suitable for 1 – 214 plug (120 side) and SP-3CP (75 side).
- (3) 3 cores code (approx. 2.5 m length) is used as power source connection strip.

3.2 Electrical Requirement

The power source voltage is to be satisfied with the standard at AC 230 V \pm 10% and temperature 0°C - 45°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.
3. Nominated Manufacturer: ANRITSU DENKI K.K., MS315A

4. Accessories and Spare Parts:

Cables:	Current using numbers
Fuses:	Current using numbers x 2 sets (except the actual equipped one)
Transducer	
for parallel measurement:	1 pce.

5. Materials to be submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

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Spec. No. 10.1.6
17 Range Volt Meter YEW-2012

1. Purpose of Application:

To be used to Control Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is a portable type DC Volt-Ampere meter, and its main performances are shown in the following table:

Classification	Performance
Measuring range	3, 10, 30, 100, 300, 1,000 V, 1, 3, 10, 30, 100, 300 mA 1, 3, 10, 30 A, 50 mA
Dimensions	260 H, 180 W and 115 D mm, approx. 218 kg

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be English.
2. Painting color is to be of manufacturer's standard.
3. Nominated Manufacturer: YOKOGAWA ELECTRIC WORKS

4. Accessories and Spare Parts:

Shunt: 1 set

5. Materials to be submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 1 copy, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 10.2
Pulse Pattern Generator MG526A

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is composed of 3 kinds of plug-in units of oscillator unit, pattern generator unit, output unit and main unit, and its main performances are as shown in the following table:

Main unit (MG526A)	Operation frequency: 1 MHz – 200 MHz, Timing output: 1 V _{p-p} (75 Ω) 2 units can be equipped together with one unit each of MH514(), MH520() and MH516(), or MH518
Oscillator unit (MH514)	MH514A: 1.544 MHz ($\pm 2 \times 10^{-5}$), MH514L: 2.048 MHz ($\pm 2 \times 10^{-5}$)
Pattern Generator unit (MH520A)	Operation frequency: 1 MHz – 20 MHz Sorts of patterns: Artificial random pattern (32,767 bits repeating, mark factor: 1/4, 1/2, 3/4) Programmable pattern (18 bits)
Output unit (MH516A, MH518A)	MH516A. Operation frequency: 1 MHz – 20 MHz, Wave form: Bipolar Output level: 6 V _{p-p} (110 Ω balance) Duty factor: 50% MH518A. Operation frequency: 1 MHz – 20 MHz Wave form: Unipolar (NRZ) Output level: 1 – 5 V continuously variable (75 Ω unbalance) Off-set level: 0.2 V

3.1 Construction

- (1) This item is accommodated in a metal case, and its standard dimensions of the actual unit equipped are: 195 H, 426 W and 300 D mm.
- (2) Input and output connecting plugs accord with 3C connector (75 side) and MI plug (110 side).

Spec. No. 10.2

- (3) 3 cores code (approx. 2.5 m length) is used as the power source connection strip.

3.2 Electrical Requirement

Power source voltage is to be satisfied with the standard at AC 230 V \pm 10% temperature 0°C – 45°C.

Notes:

- 1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other description on panel are described in English.
- 2. Painting color is to be of manufacturer's standard.
- 3. Nominated Manufacturer: ANRITSU DENKI K.K., MG526A

4. Accessories and Spare Parts:

- Cables: Current using numbers
- Fuses: Current using number \times 2 sets (except the actual equipped one)

5. Materials to be submitted:

Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Spec. No. 10.3
Error Rate Measuring Equipment ME57A

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is composed of pulse pattern generator, error detector, error counter and mobile stand, and pulse pattern generator and error detector are armoured with the plug-in unit. The performances are as shown in the attached:

Name of item	Constitution	Standard size
Pulse pattern generator MG526A	o Main unit: MG526A o Pattern generator unit: MH520A	the attached item No.1 refer the attached item No.2 refer
Error Detector MS59A	o Main unit: MS59A o Bipolar input unit: MH517A o Unipolar input unit: MH519A o Oscillator unit: MH519A MH515L	the attached item No.3 refer the attached item No.4 refer the attached item No.5 refer the attached item No.6 refer the attached item No.7 refer
Error counter MS520A	one box unit	the attached item No.8 refer
Mobile stand		the attached item No.9 refer

3.1 Construction

- (1) Construction and size
- (2) Input and output connecting plug refer to the attached.
- (3) 3 cores code (approx. 2.5 m length is used as the power source connecting strip.

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC230 V $\pm 10\%$ and temperature $0^{\circ}\text{C} - 45^{\circ}\text{C}$.

Spec. No. 10.3

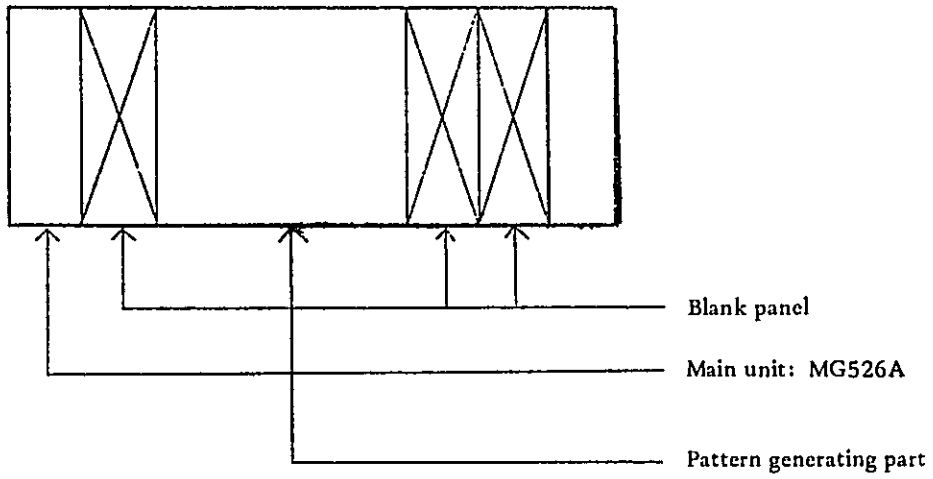
Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other description on panel are to be described in English.
 2. Painting color is to be of manufacturer's standard.
 3. Nominated Manufacturer: ANRITSU DENKI K.K., ME57A
4. Accessories and Spare Parts:
- | | |
|--------------|---|
| Cables: | Current using numbers |
| Fuses: | Current using numbers x 2 sets (except the actual armoured one) |
| Blank panel: | 3 pcs. |
5. Materials to be submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

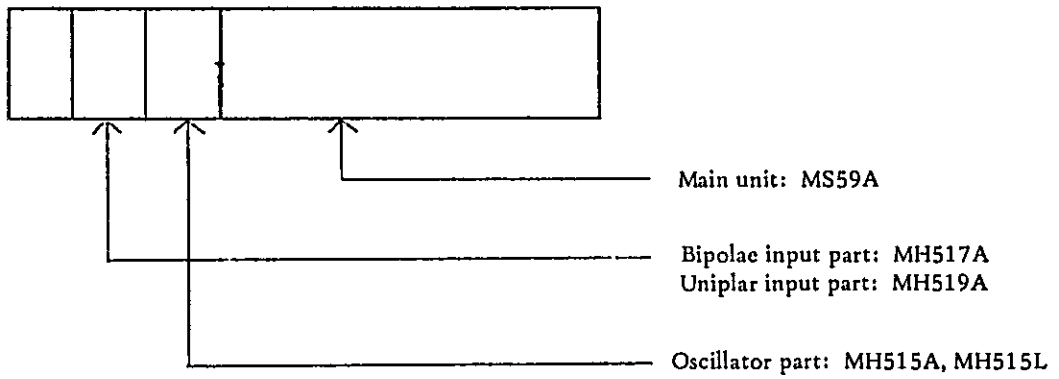
Spec. No. 10.3

Item No.	Name	Specification	Quantity
1	Pulse pattern generator MG526A	Operation frequency: 1 MHz - 200 MHz Timing output: 1 V _{p-p} (75 Ω) Size: 195 H, 426 W, 300 D mm	1
2	Pattern generator MH520A	Sorts of pattern: o Artificial random pattern (32,767 bits repeating) o Programmable pattern (18 bits) Operation frequency: 1 MHz - 200 MHz	1
3	Error detector MS59A	Operation frequency: 1 MHz - 200 MHz External timing input: 1 V (75 Ω) Error pulse output: 1 V (75 Ω) Synchronization: Automatic Size: 145 H, 426 W, 300 D mm Connector: 3 C	1
4	Bipolar input MH517A	Operation frequency: 1 MHz - 20 MHz Input level: 6 V _{p-p} (110 Ω balance) Duty factor: 50% Connector: Suitable for MI plug	1
5	Unipolar input unit MH519A	Operation frequency: 1 MHz - 20 MHz Input level: 1 - 3 V _{p-p} (75 Ω balance) Duty factor: 100% Connector: 3 C	1
6	Oscillator unit MH515A	Centre frequency: 1.54 MHz ($\pm 3 \times 10^{-5}$)	1
7	Oscillator unit MH515L	Centre frequency: 2.048 MHz ($\pm 3 \times 10^{-5}$)	1
8	Error counter MS520A	Operation frequency: DC-200 MHz Error factor measuring range: $0.99999 \times 10^{-1} \times 10^{-10}$ Range of error squaring attribute: 0.99999 Input level: 1 V (75 Ω) Measuring mode: Automatic, manual one time measurement Timer built-in: Max. 99 days 23 hrs. 59 min. Printer output: BCD output Connector: 3 C Size: 195 H, 426 W, 300 D mm	1
9	Mobile stand	Size: 750 M, 550 W, 400 D mm	

Construction of pulse:



Construction of Error Detector:



Spec. No. 10.4
Pulse Generator MG511A

1. **Purpose of Application:**
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** 1
3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is the device to oscillate pulse necessary for measuring the high speed operation, high speed repeating operation, transmitting time, reverse recovering time, operation limited value and noise level, and its main performances are as shown in the following table:

Classification	Performance
Repeating frequency	1 KHz – 100 MHz
Output voltage	150 mV – 5 V (500 Ω load)
Up and down time	Less than 1ns, 2 - 500 ns
Pulse width	5 ns – 100 μ s

3.1 Construction

This item is accommodated in a portable metal case, and its standard sizes are: 95 H, 426 W and 300 D mm.

3.2 Electrical Requirement

The power source voltage is satisfied with the standard at AC 230 V \pm 10% and temperature 0°C – 45°C.

Notes:

1. A name plate, on which name of item, date manufactured, serial number and name of manufacturing company are described in English, is attached to panel, metal casing or cover. All the other descriptions on panel are to be described in English.
2. Painting color is to be of manufacturer's standard.

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Spec. No. 10.4

3. Nominated Manufacturer: ANRITSU DENKI K.K., MG511A type
4. Accessories and Spare Parts:
Coaxial code: 1 m, 2 rolls
5. Materials to be submitted:
Operational instruction manual (English) 5 copies, (Japanese) 3 copies, Test resulting sheet 3 copies, Catalogue 3 copies, Invoice and Packing list 4 copies each (one each of them is attached to the equipment).

Section 11. OUTSIDE PLANT

Spec. No.	SPECIFICATIONS
11.1.1	Electrostatic Induction Type Line Finder
11.1.2	Automatic Splicing Machine
11.1.3	No. 2 Cable Core Collator
11.1.4	Tools and Materials for Splicing Cable
11.2.1	No. 2 BW Tester
11.2.2	Search Signal Oscillator Type 20F
11.2.3	Search Signal Amplifier Type-3
11.2.4	Cable Faulty Detector Pick-up Coil and Holder
11.2.5	Search Coil for Measuring the Depth of Underground Cable
11.2.6	Line Fault Direction Locator
11.2.7	Model 3 Portable Line Fault Locator
11.2.8	Capacity Bridge I--E
11.2.9	SD Wire Trouble Searcher Antenna
11.3	Cable Fault Locator MW32B
11.5.1	Electronic Polirecorder Model EPR-200A
11.5.2	No. 1 Earth Voltage Meter
11.5.3	No. 2 Earth Voltage Meter
11.5.4	No. 3 Earth Current Meter
11.5.5	External Shunt for No. 3 Earth Current Meter
11.5.6	Portable Glass Electrode pH Meter Model HM-1F
11.5.7	Specific Earth Resistance Tester
11.5.8	Earth Tester, Type 3235
11.5.9	External 50A Shunt, Type 2215-51
11.5.10	External 150A Shunt, Type 2215-54
11.5.11	External 500A Shunt, Type 2216-41
11.6.1	Direct Reading Type Impedance Bridge, DRZ-1
11.6.2	Oscillator TCO-28
11.6.3	Amplifier TA-18
11.6.4	Impedance Compensating Network
11.6.5	Decade Attenuator AL-352
11.6.6	Level Meter TLM-44
11.6.7	Decade Register SOKUHAN-2

Section 11. OUTSIDE PLANT

Spec. No.	SPECIFICATIONS
11.6.8	Crosstalk Measuring Set 50-B
11.6.9	Matching Transformer
11.6.10	Voice Frequency Repeating Coil VR 1600-1
11.6.11	Voice Frequency Repeating Coil
11.6.12	Return Loss Measuring Set UM-11B
11.6.13	V-2 HYB Unit
11.6.14	Noise Meter NM-31
11.6.15	Switching Unit SH-1B
11.6.16	Level Meter TLM-23
11.6.17	Direct Reading Impedance Bridge DRZ-3
11.6.18	Oscillator MS0-251B
11.6.19	Amplifier TA-15B
11.6.20	Crosstalk Measuring Set MXT-25A
11.7.1	250 V, 50 M Transistorized Insulation Resistance Tester
11.7.2	Ultra Megohmmeter Model SM-10E
11.8	Pihole Detector
11.9.1	Selemo MS13A
11.9.2	Selemo MS23A
11.9.3	Frequency Counter MF55D
11.10	Type 521 Fault Locator
11.11.1	Type 4 Manometer
11.11.2	Portable Air Dryer
11.11.3	Materials and Tools for Gas Equipment
11.11.4	Polyethylene Cap with Valve
11.12	Electrostatic Coupling Measuring Set CUB-6B

Spec. No. 11.1.1
Electrostatic Induction Type Line Finder

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is to be used for collation of core wire of communication cable without giving damage to insulation of core wire nor disturbing the communication through other core wires than that is under inspection, and the item is comprised from the followings:

Transmitter

Receiver

Pick-up

3.1 Construction

(1) Transmitter

This item is to be contained in a portable metal casing of which dimensions will be approx. 100 (H) x 230 (W) x 185 (D) mm

(2) Receiver

This item is to be contained in a portable metal case of which dimensions will be approx. 100 (H) x 230 (W) x 185 (D) mm

(3) Pick-up

The dimensions of this item is to be approx. 23 mm in diameter and 170 mm in length.

3.2 Electrical Requirements

This item is to satisfy the standards indicated in the following items at: Electric power source voltage of 6 - 9 volts, temperature of 20 degrees \pm 15 degrees, and humidity of 65 \pm 25%.

3.3 Characteristic of Transmitter

Oscillation frequency 270 \pm 5 Hz

Output voltage 5 V (r.m.s.) or larger at net resistance load of 150

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Distortion factor Less than 5% (with output of 5 V)

3.4 Characteristic of Receiver

Filtering Characteristic:

-3 dB band width $f_0 \pm 10$ Hz or larger

-20 dB band width $f_0 + 140$ Hz or larger, -70 Hz or smaller

$f_0 = 270$ Hz (measured by means of filtering characteristic check terminal)

Operational Level of Comparator:

-75 dBm or lower (at 300) at 270 Hz of input level of receiver

Gain:

60 dB or larger at 270 Hz, pick-up terminal input, transmitter, receiver terminal outputs

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to panel or metal case and cover. All other descriptions on panel to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer Nominated: ANDO ELECTRIC CO., LTD.

4. Accessories and Spare Parts:

Dry battery	2 sets
Carrying bag	2 ea.
Shoulder belt	2 ea.
Cord for pick-up	1 ea.
Cords for transmitter and receiver	2 ea.

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 each copies of Invoices and Packing list (of which one each copy is to be attached to the equipment).

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Spec. No. 11.1.2
Automatic Splicing Machine

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: 1 set

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is the device for automatically splicing conductor of multipair communication cable of between 0.32 mm and 0.65 mm in diameter by use of pin-sleeve type connector.

Applicable diameter of conductor	0.32 - 0.65 mm (copper conductor)
Type of splicing	Pine-leaf type splicing (2 or 3 pcs.)
Splicing speed	1.2 sec./splice (with 50 Hz)
Power source and electric	AC 90 - 110 V (1 ph. 50 Hz)

3.1 Construction

This item is to be contained in a portable metal casing. The standard dimensions and weight are as mentioned below:

Approx. 12.6 (W) x 21.4 (H) x 29.6 (D) cm, Approx. 16 kg

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal case. All other descriptions on panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer Nominated: SUMITOMO ELECTRIC INDUSTRIES LTD.,
FURUKAWA ELECTRIC CO., LTD. and
FUJIKURA CABLE WORKS LTD.

4. Accessories and Spare Parts:

Accessory tools, carry-on-back belt, spare fuses, connector clipper for electrical test, portable transformer (100 W, 230 V, 100 V).

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5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 each copies of Invoice and Packing list (of which one each copy is to be attached to the equipment).

Spec. No. 11.1.3
No. 2 Cable Core Collator

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is used for collation of core wire of communication cable and provide by actuating the switch of transmitter, alternative current collation method, direct current collation method, and relay collation method.

The maximum distance for which this item is able to provides collations are about as shown in the table below:

Classification	Characteristic
AC collation method	(circuits in use, circuits in reserve) approx. 10 km
DC collation method	(circuits in reserve) approx. 30 km
Relay collation method	(cable with faulty insulation) approx. 33 km

3.1 Construction

	Transmitter	Receiver
Dimensions	115 x 80 x 105 mm	80 x 55 x 95 mm
Weight	2.5 kg	0.6 kg
Battery used	4 x UM - 1 dry battery	1 x UM - 1 dry battery

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal case and the cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer Nominated: NAKAYO TELECOMMUNICATIONS, INC.

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Spec. No. 11.1.3

4. Accessories and Spare Parts:

Description	Quantity
Type F Head Mount Transmitter-Receiver	1 set
No. 2 Head Mount Transmitter-Receiver	1 set

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 each copies of Invoice and Packing list (of which one each copy is to be attached to the equipment).

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Spec. No. 11.1.4
Tools and Materials for Splicing Cable

1. **Purpose of Application:**
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** As indicated in the accompanying sheets.
3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturers are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. **Manufacturer (Nominated):** SUMITOMO ELECTRIC INDUSTRIES LTD.,
FURUKAWA ELECTRIC CO., LTD. and
FUJIKURA CABLE WORKS LTD.

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Item No.	Description	Q'ty	Unit	Remarks
1	Tools for Splicing Cable (Overhead)	2	set	
2	Tools for Splicing Cable (Underground)	2	set	
3	Tools for Splicing Aluminum Cable	2	set	
4	No. 2 Cable Sheath Cutter	2	pcs.	
5	No. 2 Cable Sheath Cutter Blade	2	pcs.	
6	No. 1 Soldering Iron	2	pcs.	
7	No. 2 Soldering Iron	3	pcs.	
8	No. 2 Cable Bender	2	pcs.	
9	Cable Cutter	2	pcs.	
10	Cable Cutter Spare Blade	10	pcs.	
11	No. 1 Lead Sheath Cutter	2	pcs.	
12	No. 2 Lead Sheath Cutter	2	pcs.	
13	Aux. Lead Tube Caulking Roller Tool	2	pcs.	
14	No. 1 Caulking Tool	2	pcs.	
15	No. 2 Caulking Tool	2	pcs.	
16	A-No. 4 Nipper	5	pcs.	
17	B-No. 4 Nipper	5	set	
18	A-No. 5 Nipper	5	set	
19	B-No. 5 Nipper	5	set	
20	No. 5 Plier	5	set	
21	No. 6 Plier	5	set	
22	Torch	5	pcs.	0.5
23	0.5 mm, 400 Pair Unit Junction PEF LAP Non-Armored Cable	250	m	Mfr. Sumitomo, Furukawa, Fujikura
26	0.9 mm, 100 Pair Toll PEF-P Non-Armored Cable	250	m	Mfr. Sumitomo, Furukawa, Fujikura
27	0.5 mm, 400 Pair Unit Local Stalpth Non-Armored Cable	250	m	Mfr. Sumitomo, Furukawa, Fujikura
30	60 - 400 Lead Tube	30	pcs.	
31	70 - 500 Lead Tube	150	pcs.	
32	90 - 500 Lead Tube	150	pcs.	
33	100 - 500 Lead Tube	150	pcs.	
34	120 - 500 Lead Tube	150	pcs.	
35	150 - 500 Lead Tube	30	pcs.	
36	55 - 130 Lead Tube	80	pcs.	
37	65 - 130 Lead Tube	100	pcs.	
38	85 - 130 Lead Tube	100	pcs.	
39	120 - 40 Twin Draw Up Branch Lead Tube	30	pcs.	
40	50 - 130 Aux. Lead Tube	100	pcs.	
41	No. 125 Material for Forming Terminal	30	pcs.	
42	No. 150 Material for Forming Terminal	30	pcs.	
43	Perforated Lead Plate	300	pcs.	
44	No. 1 Wire Solder	100	kg	
45	No. 2 Solder	10	kg	

Spec. No. 11.1.4

Item No.	Description	Q'ty	Unit	Remarks
46	No. 3 1.6 Solder	5	kg	
47	No. 4 Solder	50	pcs.	1 pack contains 200 g
48	Plumbing Flat	70	pcs.	1 pack contains 250 g
49	Adhesive Glass Tape	10	pcs.	
50	C-cement	20	pcs.	1 pack contains 100 g
51	Tape for Forming Terminal	20	pcs.	
52	No. 1 Protective PVC Tape	140	pcs.	
53	No. 2 Protective PVC Tape	240	pcs.	
54	No. 1 Self-Fusion Tape	20	pcs.	
55	No. 2 Self-Fusion Tape	10	pcs.	
56	VN Tape	200	pcs.	
57	PE Tape	30	pcs.	
58	Glass Tape	70	pcs.	
59	No. 1 Adhesive Aluminum Tape	60	pcs.	
60	No. 2 Adhesive Aluminum Tape	10	pcs.	
61	No. 1 PVC Tape	20	pcs.	
62	No. 2 PVC Tape	20	pcs.	
63	No. 1 Sealing Tape	50	pcs.	
64	No. 2 Sealing Tape	50	pcs.	
65	No. 3 Sealing Tape	150	pcs.	
66	No. 4 Sealing Tape	230	pcs.	
67	Spacer Tape	200	pcs.	
68	Anti-Corrosive Tape	100	pcs.	
69	Laminate Tape for Forming Terminal	30	pcs.	
70	No. 1 Heat Resisting Glass Sheet	50	pcs.	
71	Bond for Splicing Aluminum Tape	30	pcs.	
72	Paper Sleeve for 0.5 mm Wire	400	pack	1 pack contains 200 pcs.
73	Paper Sleeve for 0.65 mm Wire	1,000	pack	1 pack contains 200 pcs.
74	P.E. Sleeve for 0.5 mm Wire	200	pcs.	1 pack contains 200 pcs.
75	P.E. Sleeve for 0.65 mm Wire	100	pcs.	1 pack contains 200 pcs.
76	0.65 mm Admixture Contained PE Sleeve	300	pcs.	1 pack contains 50 pcs.
77	0.65 mm PE Tube	300	pcs.	1 pack contains 200 pcs.
78	Dryer	200	pcs.	1 pack contains 200 g
79	Type 200 Connecting Terminal Box for Straight Line	30	pcs.	
80	Type 200 Connecting Terminal Box for Straight Line	20	pcs.	
81	4-Terminal Block for Connecting Terminal Box	100	pcs.	
82	Connector for CCP	2,000	pcs.	

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Spec. No. 11.1.4

Item No.	Description	Q'ty	Unit	Remarks
83	No. 1 PE Sleeve for Finishing End	1,000	pcs.	
84	C--Connector for Splicing Machine	40	pcs.	1 pack contains 1,300 pcs.
85	Tape for Binding Holder	40	pcs.	
86	200 mm ² , 600 V Vinyl Wire	200	m	
87	5 mm Cable Tying String	50	pcs.	1 pc. 200 m long
88	1.6 Galvanized Iron Wire	5	kg	
89	Caulking Roller	1	pc.	
90	80 - 600 Lead Tube	20	pcs.	
91	0.5 mm, 200 Pair Local CCP-P Cable	250	m	

Spec. No. 11.2.1
No. 2 BW Tester

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: One (1) unit
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)
 - 3.1 Structural Dimensions
Approx. 700 (H) x 500 (W) x 350 (D) mm
 - 3.2 Purpose of Use:
This is the tester that performs simultaneous insulation breakdown and fusing together at faulty location by applying 3 types of DC voltage in sequence between conductors of cable of which insulation effectiveness has declined. And this provides easier measurement of loop resistance up to faulty location as well as making it easier for the use of line fault location detector.
 - 3.3 Rating:

Output voltage:	Primary voltage 1,100 V, secondary voltage 1,000 V, Tertiary voltage 1,650 V
Power source used:	AC 230 V, 50 Hz
 - 3.4 Weight: Approx. 50 kg
 - 3.5 Constitution:

Accessories:

Power source cord	1 pc. (Vinyl clad cable of 5 m long)
Output application cord	1 set (3 of vinyl cord, each 3 m long)
Cord for grounding	1 pc. (Vinyl cord, 5 m long)

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or

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metal casing and cover. All other descriptions on the panel are to be in English.

2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): SHINKO ELECTRIC CO., LTD.

4. Materials to be submitted:
5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 each copies of Invoice and Packing list (of which one each copy is to be attached to the equipment).

Spec. No. 11.2.2
Search Signal Oscillator Type 20F

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item provides, by combination with Search Signal Amplifier Type-3 and, Cable Faulty Detector Pick-up Coil and Holder, etc., the detection of faulty location of cable or the detection of buried location and the measurement of the depth of underground cable.

3.1 Construction

- (1) This item is to be contained in a portable metal casing of which dimensions are to be approx. 150 (H) x 250 (W) x 185 (D) mm.
- (2) AC power source cord is to be with two-pin plug (normal working voltage of AC 230 V) and is 3 m long.

3.2 Necessary Electrical Requirements

To be of satisfying the following standards with power source voltage of AC 230 V $\pm 10\%$ or DC 17.5 - 9 V, at temperature of $20^{\circ}\text{C} \pm 15^{\circ}\text{C}$.

Oscillation frequency	2.5 kHz $\pm 0.5\%$
Output	400 mW or larger (with 9 V), 250 mW or larger (with 7.5 V)
Output impedance	600 $\pm 20\%$ (at 2.5 kHz)
No. of make-and-break	120 ± 30 times/min.
Measured voltages are at two point;	7.5 V and 9 V.

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

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4. Accessories and Spare Parts:
One set of Dry Battery.

5. Materials to be submitted:
5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese,
3 copies of Test result sheets, 3 copies of Catalogues, and 4 each copies of Invoice and
Packing list (of which one each copy is to be attached to the equipment).

Spec. No. 11.2.3
Search Signal Amplifier Type-3

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit**3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)**

This item provides, by combination with Search Signal Oscillator Type 20F, and Cable Faulty Detector Pick-up Coil and Holder, etc., the detection of faulty location of cable or the detection of buried location and the measurement of the depth of underground cable.

3.1 Construction

This item is to be contained in a portable metal casing, and its dimensions are to be approx. 45 (H) x 100 (W) x 150 (D) mm.

3.2 Necessary Electrical Requirements

To be of satisfying the following standards with power source of DC 4.5 – 6 V, at temperature of 20°C ±15°C:

Voltage gain	65 dB or larger (8 at Speaker Terminal)
Output	5 mW or larger (8 at Speaker Terminal)
3 dB band width	$f_0 \pm 4 - 13$ Hz ($f_0 = 2,500$ Hz)
Attenuation	20 dB or more at $f_0 \pm 35$ Hz ($f_0 = 2,500$ Hz)

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

4. Accessories and Spare Parts:

Receiver	1 ea.
Water-Proof Bag	1 ea.

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Spec. No. 11.2.3

Dry Battery 1 set

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.2.4
Cable Faulty Detector Pick-up Coil and Holder

1. **Purpose of Application:**
 To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** One (1) unit
3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)
 - 3.1 **Construction**
 (A) Detector coil, (B) Aux. stem, (C) Mounting stem
 - 3.2 **Purpose of Use:**
 This item is used to detect faulty location in cable by receiving and from the fluctuation of audible signal that has been impressed by Search Signal Oscillator Type 20F to faulty core wires of the communication cable, of which faulty location had been fused together by No. 2 BW Tester. Further, this equipment is consisted of detector coil, detector coil mounting stem and aux. stem. And the detector coil is mounted on top of the mounting stem for use for overhead cable.
 - 3.3 **Rating:**

Coil:	DC resistance	600
	Inductance	300 mH
 - 3.4 **Dimensions and Weight:**
 Mounting stem (6 stems, approx. overall length of 6 m, 2.3 kg)
 Detector (Approx. 0.3 kg)

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): SHINKO ELECTRIC CO., LTD.

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4. Accessories and Spare Parts:

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 each copies of Invoice and Packing list (of which one each copy is to be attached to the equipment).

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Spec. No. 11.2.5

Search Coil for Measuring the Depth of Underground Cable

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) set

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is used to determine, in combination with search signal oscillator type 20F and search signal amplifier, type 3, the location and the depth of underground cable.

3.1 Construction

This item is composed of the Search Coil for measuring buried depth of cable and supporting base and is to be contained in a portable metal case.

3.2 Necessary Electrical Requirements

DC resistance	90 or under
Inductance	75 ±10 mH

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal case and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

4. Accessories and Spare Parts:

Connecting cord 1 ea., Cord for grounding 2 ea., Grounding bar 2 ea.,
Container case 1 ea.

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 each copies of Invoice and Packing list (of which one each copy is to be attached to the equipment).

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Spec. No. 11.2.6
Line Fault Direction Locator

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: One (1) unit
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

3.1 Construction

Approx. 250 x 150 x 70 mm, approx. 3 kg with shoulder belt

3.2 Electrical Requirements

- (1) to determine, without cutting the line, the direction of faulty location in open-wire line from the point where the measurement is attempted.
- (2) to have function of telephonic call out and communication by means of built-in oscillator.
- (3) Power source is to be two (2) UM-1 dry batteries and two (2) UM-2 dry batteries.

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): TOKAI KAGAKU KOGYO CO., LTD.,
Model LINE TBL

4. Accessories and Spare Parts:

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 each copies of Invoice and Packing list (of which one each copy is to be attached to the equipment).

Spec. No. 11.2.7
Model 3 Portable Line Fault Locator

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

3.1 Structural Dimensions

Approx. 305 x 200 x 205 mm, approx. 6 kg, outer casing is to be made of wood.

3.2 Electrical Requirements

(1) As Resistance Measurement Device, by use of wheatstone bridge:

Scope of resistance measurement: 0 – 10 M Ω

Measurement error: Within $\pm 0.1\%$ at the range of 100 Ω – 10 k Ω

(2) As Line Fault Tester:

to determine faulty location in communication line by means of murray method, varley method and direct reading.

(3) Power source:

Built-in battery: 2 pcs of UM-1 dry battery

External electric source: DC 500 V or lower

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): TOKAI KAGAKU KOGYO CO., LTD.

4. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 each copies of Invoice and Packing list (of which one each copy is to be attached to the equipment).

Spec. No. 11.2.8
Capacity Bridge I-E

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is a capacity bridge that measures 0.00005 – 6 μF of electrostatic capacity, and its performance is as follows:

Applicable frequency	1 kHz
Measurement range:	
Balanced circuit against ground	50 pF – 6 μF
Unbalanced circuit against ground	0.002 – 6 μF

3.1 Construction

This item is to be contained in a portable metal casing which is measured as approx. 230 (H) x 324 (W) x 200 (D) mm.

3.2 Necessary Electrical Requirements

Measurement error:

to satisfy the following standards at the temperature of $20^{\circ}\text{C} \pm 15^{\circ}\text{C}$

Balanced circuit against ground:

Standard condenser (μF)	0.00001	0.001	0.01	0.1	1
Range of measurement (μF)	0.00005	0.0002	0.002	0.02	0.2
	~0.0002	~0.002	~0.06	~0.6	~6
Measurement error of under (%)	10pF+5	5	3	1.5	1

Unbalanced circuit against ground (in case x terminal side is grounded):

Standard condenser (μF)	0.01	0.1	1
Range of measurement (μF)	0.002	0.02	0.2
	~0.02	~0.6	~6
Measurement error of under (%)	5	1.5	1

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3.3 Weight: Approx. 5.7 kg

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other description on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

4. Accessories and Spare Parts:

Receiver 1

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 each copies of Invoice and Packing list (of which one each copy is to be attached to the equipment).

Spec. No. 11.2.9
SD Wire Trouble Searcher Antenna

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is to determine, in combination with search signal oscillator, Type 20F and search signal amplifier Type 3, the broken location in SD wire.

3.1 Construction

This item is of metal construction with slide extension system and the fully extended length is approx. 4.6 m.

3.2 Electrical Requirements

DC resistance:

10 Ω or lower (between top ball of antenna and 4-pair connecting plug at the condition where accompanying connecting cord is connected and antenna is fully extended).

Notes:

1. Name plate, on which name of item, date manufactured, serial number and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

4. Accessories and Spare Parts:

Connecting cord	1
Cord for transmission	1
Grounding cord	1 set
Grounding bar	2
Carrying bag	1

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Spec. No. 11.2.9

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 each copies of Invoice and Packing list (of which one each copy is to be attached to the equipment).

Spec. No. 11.3.1
Cable Fault Locator MW32B

1. **Purpose of Application:**
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** One (1) unit
3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is to measure the distances up to faulty location in communication cable and the location where water penetrated, and the performance of the item is as follows:

Classification		Performance
Cables subject to measurement		CCP 0.4, CCP 0.5, CCP 0.65, CCP 0.9, PEF 0.65, PEF 0.9 mm in diameters of conductors
Transmission pulse	Wave form Peak value Pulse width	Sin square wave 35 V or larger (measured with the condition where 140 of load is applied on terminal being measured) 0.2 μ S \pm 20% (when range of measurement is 500 m) 0.5 μ S \pm 20% (when ranges of measurements are 1 km, 2 km, 5 km) 1 μ S \pm 20% (when range of measurement is 10 km)
Distance measurement	Range of measurement Measurement for whole range Partial measurement	10 km 0 – 500 m, 0 – 1 km, 0 – 2 km, 0 – 5 km, 0 – 10 km 500 m – 1 km, 1 – 1.5 km, 1.5 – 2 km

3.1 Construction

This item is to be contained in a portable metal case and its' dimensions are approx. 145 (H), 282 (W) and 505 (D) mm.

Spec. No. 11.3.1

3.2 Electrical Requirements

To satisfy the standards with power source voltage of AC 230 V $\pm 10\%$ or DC 12 V, at the temperature of 0°C – 45°C.

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other description on the panel are to be in English.
 2. Painting color is to be of manufacturer's standard.
 3. Manufacturer (Nominated): ANRITSU ELECTRIC CO., LTD.
4. Accessories and Spare Parts:
- | | |
|--------------------------|------------|
| AC, DC power source cord | 1 pc. each |
| Sunshade hood | 1 |
5. Materials to be submitted:
- 5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 each copies of Invoice and Packing list (of which one each copy is to be attached to the equipment).

Spec. No. 11.5.1
Electronic Polirecorder Model EPR-200A

1. **Purpose of Application:**

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. **Quantity:** Three (3) units

3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is used for continuous monitoring for level and noise, etc. of various communication circuits and for recording field strength. It is operated on three-source-operation method. The recording system is of dual-point continuous writing by ink pen and inkless pen. Its principal features are as follows:

Classification	Features
Range	16 ranges such as $\pm 1, 2.5, 5, 10, 25, 50, 100, 250$ mV, 0.5, 1, 2.5, 5, 10, 25, 50, 100 V for both input I and II.
Input resistance	2 M Ω constant
Accuracy	0.5%
Balancing speed	Approx. 300 mm/sec.
Chart speed	5, 10, 20, 40, 80, 160 mm/H, 5, 10, 20, 40, 80, 160, 320 mm/M

3.1 **Construction**

- (1) To be portable by single hand and its dimensions are approx. 370 (W) x 220 (H) x 210 (D) mm.
- (2) Roll chart adapter, come with the equipment as an accessory is to be installed inside the body to roll up recording paper.

3.2 **Electrical Requirements**

- (1) Accuracy is to be within 0.5% with power source of 230 V $\pm 10\%$.
- (2) The equipment should be operated with 6 x UM-1 (1.5 V) dry batteries contained in it and/or DC 12 – 24 V from outside batteries.

3.3 **Weight:** Approx. 8.5 kg

Spec. No. 11.5.1

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Anythings but those specified in this specifications are subject to the catalogue of TOA Corder U, 2-pen type.
4. Manufacturer (Nominated): TOA ELECTRONICS LTD.
Model EPR-200A

4. Accessories and Spare Parts:

Accessories:

Charger circuit system, roll adapter, carrying case, nickel-cadmium battery (6 pcs.)

Spare Parts:

Fuse, cartridge electronic pen, ink pen, all twice as much as presently used.

(Except those installed in the equipment.)

Ten rolls of recording paper for each of writing with ink and pen, and with electronic pen.

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 each copies of Invoice and Packing list (of which one each copy is to attached to the equipment).

Spec. No. 11.5.2
No. 1 Earth Voltage Meter

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: Three (3) units

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is used to determine the distribution status of current leakage from electric-car rails, etc. which could be a cause of holes made by electrolysis to metal structures of communication cable, etc. buried underground. The principal feature of this equipment is as shown in Table 1 below:

Table 1.

Classification	Specification
Range of measurement	1.5 / 15 / 150 mV / 1.5 V

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): YOKOGAWA ELECTRIC WORKS, LTD.

4. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 copies each Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.5.3
No. 2 Earth Voltage Meter

1. **Purpose of Application:**
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** Three (3) units
3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is used to determine the distribution status of current leakage from electric-car rails, etc. which could be of a cause of holes made by electrolysis to metal structure of communication cable, etc. buried underground. The principal feature of this equipment is as shown in Table 1 below:

Table 1.

Classification	Specification
Range of measurement	0.15 / 1.5 / 15 / 150 V

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and over. All other descriptions on the panel are to be in English.
 2. Painting color is to be of manufacturer's standard.
 3. **Manufacturer (Nominated):** YOKOGAWA ELECTRIC WORKS, LTD.
4. **Materials to be submitted:**
5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.5.4
No. 3 Earth Current Meter

1. **Purpose of Application:**

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. **Quantity:** Three (3) units

3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is used to determine the distribution status of current leakage from electric-car rails, etc. which could be of a cause of holes made by electrolysis to metal structure of communication cable buried underground. The principal feature of the equipment is as shown in Table 1 below:

Table 1.

Classification	Specification
Range of measurement	0.15 / 1.5 / 15 / 150 A

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): YOKOGAWA ELECTRIC WORKS, LTD.

4. **Accessories and Spare Parts:**

5. **Materials to be submitted:**

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

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Spec No. 11.5.5
External Shunt for No. 3 Earth Current Meter TYPE2216-42

1. **Purpose of Application:**
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** Three (3) units
3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is used, by externally mounted on an instrument, to make measuring range of the instrument broader or to insulate the instrument from high pressure circuit.

Classification	Specification
Grade	JIS C1721 Class 0.2
Rated voltage drop	50 mV

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
 2. Painting color is to be of manufacturer's standard.
 3. **Manufacturer (Nominated):** YOKOGAWA ELECTRIC WORKS, LTD.
4. **Materials to be submitted:**
5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.5.6
Portable Glass Electrode pH Meter Model HM-1F

1. **Purpose of Application:**
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** One (1) unit
3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is used for investigation for electrolytic corrosion, and is a portable pH meter to measure pH of standing water and soil. The principal features are as described below:

Classification	Features
Range of measurement	1 – 13 pH
Minimum scale	0.2 pH
Accuracy	±0.1 pH

3.1 Construction

- (1) This item is consisted of glass electrode detective means and measuring means (indication meter), and the dimensions are approx. 179 (D) x 147 (W) x 60 (H) mm.
- (2) The glass electrode detective means and the measuring means are contained (indication meter) in a carrying case.

3.2 Electrical Requirements

- (1) This equipment can be in action by one 006P/dry battery.

Notes:

1. Name of item, date manufactured, serial number, and name of manufacturer are to be described in English on name plate. All other descriptions on panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. **Manufacturer (Nominated): TOA ELECTRONICS, LTD.**
Model HM-1F

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Spec. No. 11.5.6

4. Accessories and Spare Parts:

Accessories:

Composite electrode, standard fluid x 2 bottles, saturated potassium chloride solution, powdered standard fluid x 2 bottles, thermometer, soft case.

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is attached to the equipment).

Spec. No. 11.5.7
Specific Earth Resistance Tester

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is to investigate geological feature and structure of the ground by measuring specific earth resistance by means of specific resistance method, and its' principal features are shown in Table 1 below:

Table 1.

Classification	Specifications
Measuring range	0.3 / 3 / 30 / 300 Ω
Scales	0 – 30 Ω 0.5 /scale
Multiplication factor dial	x 0.01, x 0.1, x 1, x 10
Tolerance	$\pm 3\%$ of indicated value at scale of 10 – 30
Tolerance	$\pm 1\%$ of maximum scale value at scale of less than 10
Measured voltage	150 / 300 / 600 V
Measured frequency	10 – 40 Hz
Power source	Transistor inverter (external mount battery)

3.1 Constructional Dimensions

This item is to be contained in a carrying case of which dimensions are approx. 248 (D) x 348 (W) x 211 (H) mm.

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.

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Spec. No. 11.5.7

3. **Manufacturer (Nominated):** YOKOGAWA ELECTRIC WORKS, LTD.
Model L-10
4. **Accessories and Spare Parts:**
Electrode bar x 5 pcs., Electrode container bag x 1 pc.,
Leadwire 330 m x 2 pcs., 110 m x 2 pcs., 5 m x 1 pc.
5. **Materials to be submitted:**
5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese,
3 copies of Test result sheets, 3 copies of Catalogues, and 4 copies each of Invoice and Packing
list (of which one copy each is to be attached to the equipment).

Spec. No. 11.5.8
Earth Tester, Type 3235

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is used for measuring grounding resistance of communication equipments and electrical equipments, and its principal features are as shown in Table 1 below:

Classification	Specification
Range of measurement	Grounding resistance: 0 – 10 – 100 – 1,000 Ω (logarithmic scale) Grounding voltage: 0 – 30 V
Tolerance	Grounding resistance: 0 – 2 Ω $\pm 0.14 \Omega$ 2 – 20 Ω $\pm 0.5 \Omega$ 20 – 200 Ω $\pm 5 \Omega$ 200 – 1,000 Ω $\pm 50 \Omega$ Ground voltage: $\pm 5\%$ on max. scale
Measured frequency	500 Hz
Battery used	Dry batteries: UM-1 x 4 pcs.

3.1 Construction Dimension

This item is to be contained in a carrying case, of which dimensions are approx. 140 (D) x 210 (W) x 135 (H) mm.

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.

Spec. No. 11.5.8

3. Manufacturer (Nominated): YOKOGAWA ELECTRIC WORKS, LTD.
Model 3235

4. Accessories and Spare Parts:

Carrying bag
Measuring leads (for grounding (green) 5 m 1)
(for voltage (yellow) 10 m 1)
(for current (red) 200 m 1)
Aux. grounding bar 2
Accessories container bag 1

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

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Spec. No. 11.5.9
External 50A Shunt, Type 2215-51

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: Three (3) units

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is externally mounted on the instrument for the purpose of broadening the measuring range of the instrument or insulating the same from high pressure circuit.

Classification	Specification
Grade	JIS C1721, Class 0.2
Rated voltage drop	50 mV

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): YOKOGAWA ELECTRIC WORKS, LTD.
Model 2215-51

4. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is attached to the equipment).

Spec. No. 11.5.10
External 150A Shunt, Type 2215-54

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: Three (3) units

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is mounted externally on the instrument for the purpose of broadening the measuring range of the instrument or insulating the same from high pressure circuit.

Classification	Specification
Grade	JIS C1721, Class 0.2
Rated voltage drop	50 mV

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): YOKOGAWA ELECTRIC WORKS, LTD.
Model 2215-54

4. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 copies each of Invoice and Packing list (of which one copies each is to be attached to the equipment).

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Spec. No. 11.5.11
External 500A Shunt, Type 2216-41

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: Three (3) units

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is externally mounted on the instrument for the purpose of broadening the measuring range of the same or to insulate the instrument from high pressure circuit.

Classification	Specification
Grade	JIS C1721, Class 0.2
Rated voltage drop	50 mV

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
 2. Painting color is to be of manufacturer's standard.
 3. Manufacturer (Nominated): YOKOGAWA ELECTRIC WORKS, LTD.
Model 2216-41
4. Materials to be submitted:
5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.6.1
Direct Reading Impedance Bridge, DRZ-1

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is to provide measurements and give direct readings of absolute value of impedance and phase angle of line and equipment prepared for voice frequency, and its principal features are as follows:

Measured frequency		200 – 5,000 Hz
Measuring range:	Impedance	10 – 10 K Ω
	Phase angle	0 – $\pm 90^\circ$

3.1 Construction

This item is to be contained in a portable metal casing, and its dimensions are approx. 230 (H) x 440 (W) x 180 (D) mm.

3.2 Necessary Electrical Requirements

Error is to satisfy the following standards at the temperature of 5 – 35°C and relative humidity of 40 – 85%:

Measuring range	at 50 – 3,000 Ω
Impedance	within $\pm(1\% + 0.1 \Omega)$
Phase angle	within $\pm 0.5\%$

The above errors are of balancing circuit, and the ones with unbalancing circuit are to be as 3 times as the above.

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.

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Spec. No. 11.6.1

3. **Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.**
Model DRZ-1

4. **Accessories and Spare Parts:**

Receiver 1

5. **Materials to be submitted:**

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.6.2
Oscillator TCO-28

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: One (1) unit
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is an oscillator and its principal features are as follows:

Oscillation frequency	0.3 – 10 kHz at 1 Hz step
Accuracy of frequency	within (± 1 Hz +0.2%)
Output level	-10 – +15 dBm
Output impedance	600 Ω balanced

3.1 Construction

- (1) This item is to be contained in a portable metal casing and its dimensions are approx. 155 (H) x 300 (W) x 215 (D) mm.
- (2) AC power source cord is to be with double-pole applying plug (normal working power source voltage is AC 230 V) and the length is to be approx. 2 m.

3.2 Necessary Electrical Requirements

Stability: Frequency variation, with AC power source voltage of 230 V $\pm 10\%$ or DC power source voltage of 21 V -2 V & +3 V at 20°C $\pm 15^\circ\text{C}$ is to be within $\pm(0.2$ Hz +0.1%), and output level variation is to be within ± 0.5 dB.

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.
Model TCO-28

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Spec. No. 11.6.2

4. Accessories and Spare Parts:

Power source cord	1
Fuse	No. of presently used x 2 (exceptings Nos. mounted on the equipment)

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.6.3

Amplifier TA-18

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is an amplifier and its principal features are as follows:

Range of frequency	0.03 – 10 kHz
Gain	15 – 60 dB at steps of 5 dB
Maximum output	+15 dBm
Input impedance	600 Ω /high balanced
Output impedance	600 Ω balanced

3.1 Construction

- (1) This item is to be contained in a portable metal casing, and its dimensions is approx. 150 (H) x 300 (W) x 200 (D) mm.
- (2) AC power source cord is to be with double-pole applying plug (normal working voltage is AC 230 V) and the length is to be approx. 2 m.

3.2 Necessary Electrical Requirements

Stability: Variation of the gain is to be within ± 0.3 dB with AC power source voltage of 230 V $\pm 10\%$ or DC power source voltage of (21 V -2 V and +3V) at temperature of 20°C ± 15 °C.

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.
Model TA-18

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Spec. No. 11.6.3

4. **Accessories and Spare Parts:**

Fuse: No. of presently used x 2 (except those installed in the equipment)

5. **Materials to be submitted:**

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.6.4
Impedance Compensating Network

1. **Purpose of Application:**

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. **Quantity:** Four (4) units

3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is a compensating network for measuring line characteristics, in case terminal loading section of B-type loading cable has more than 10% of deviation from the distance of standard half section, and its principal features are as follows:

Classification	Features
Range of adjustment	50 m – 500 m
Adjustment interval	Every 50 m

3.1 **Construction**

This item is contained in a portable metal casing for the sake of convenience of measuring, and its external dimensions are approx. 250 x 180 x 135 mm.

3.2 **Electrical Requirements**

Insulation resistance:

50 MΩ or more when humidity is 85% or less, and 30 MΩ or more when humidity is 85 – 99%, as measured at DC 500 V between external box and terminals and DC 100 V among each terminal.

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): TAMURA SEISAKUSHO CO., LTD.

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Spec. No. 11.6.4

4. Accessories and Spare Parts:

One set (2 pcs.) of cord A for measuring:

Vinyl cord of approx. 3 m together with alligator clip and arrow tip

One set (2 pcs.) of cord B for measuring:

Vinyl cord of approx. 1 m together with arrow tips on both ends.

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.6.5
Decade Attenuator AL-352

1. **Purpose of Application:**
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** Two (2) units
3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is a decade attenuator to be used for measuring gain, loss, and other transmission characteristics of various types of carrier telephone equipments, and its principal features are as follows:

Range of frequency	DC–150 kHz (600 Ω), DC–700 kHz (75 Ω)
Range of attenuator	0 – 91 dB
Impedance	600 Ω balanced (0 – 150 kHz) 75 Ω balanced (0 – 700 kHz)

3.1 **Construction**

This item is to be contained in a portable metal casing and its size is approx. 100 (H) x 420 (W) x 220 (D) mm.

3.2 **Electrical Requirements**

The accuracy of attenuation is to be as follows (as measured at 1 kHz):

Range of Attenuation	Working Steps	Error
0 – 1.0	0.1	± 0.05
0 – 11	0.1, 1.0	± 0.1
0 – 61	0.1, 1.0, 10	± 0.2
0 – 91	Whole steps	± 0.2

Notes:

1. Name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions are to be in English.
2. Painting color is to be of manufacturer's standard.

Spec. No. 11.6.5

3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.
Model AL-352

4. Materials to be submitted:
5 copies of OPERational instruction manuals in English, 3 copies of the same but in Japanese,
3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies of Invoice and Packing
list (of which one copy each is to be attached to the equipment).

Spec. No. 11.6.6
Level Meter TLM-44

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: One (1) unit
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is a level meter used by terminal stations or main relay stations for the maintenance of basic group of coaxial super multiplex system and various carrier system, and its principal features are as follows:

Range of frequency	0.3 – 150 kHz
Measuring range	-60 – +20 dBm
Input impedance	0.3 – 30 kHz, 600 Ω /high balanced 5 – 150 kHz, 75 Ω /high balanced

3.1 Construction

- (1) This item is to be contained in a portable metal casing, and its dimensions are approx. 155 (H) x 300 (W) x 215 (D) mm.
- (2) AC power source cord is to be with double-pole applying plug (normal working voltage AC 230 V) and the length is to be approx. 2 m.

3.2 Electrical Requirements

Stability: The variation of level indication value is to be within ± 0.3 dB, with AC power source voltage of $230 \pm 10\%$, or DC power source voltage of 0 (21 V -2V and +3V), at the temperature of $20^\circ\text{C} \pm 15^\circ\text{C}$.

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.
Model TLM-44

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Spec. No. 11.6.6

4. Accessories and Spare Parts:

Power source cord 1 pc.

Fuse No. of presently used x 2 (excepting of those mounted on the equipment)

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the panel).

Spec. No. 11.6.7
Decade Resistor SOKUHAN-2

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: Two (2) units

3. Standards: (Constructional Dimensions, Electric Requirements and Necessary Mechanical Requirements, etc.)

This item is a decade resistor used for testing and experiment of various equipments of maximum frequency of 150 kHz, and its principal features are as follows:

Range of frequency	DC–150 kHz
Range of variation of resistance	0.1 Ω – 11.110 k Ω

3.1 Construction

This item is to be contained in a portable casing and it's dimensions are approx. 135 (H) x 245 (W) x 175 (D) mm.

3.2 Electrical Requirements

The allowable error and allowable maximum current of DC resistance of each resistor element is as follow, provided that the measurement taken at normal temperature and humidity and the measured values are to be converted to as those of at 20°C:

Scale of Dial	Allowable Error of DC Resistance	Allowable Max. Current
0.1 Ω – 10 Ω	$\pm(0.3\% + 0.03\Omega)$	500 mA
10 Ω – 100 Ω	$\pm(0.3\% + 0.03\Omega)$	70 mA
100 Ω – 1,000 Ω	$\pm 0.2\%$	20 mA
1,000 Ω – 10,000 Ω	$\pm 0.2\%$	5 mA

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.

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Spec. No. 11.6.7

2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

4. Materials to be submitted:
5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is attached to the equipment).

Spec. No. 11.6.8
Crosstalk Measuring Set 50-B

1. **Purpose of Application:**
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** One (1) unit
3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is to measure the crosstalk attenuation and its principal features are as follows:

Measured frequency	1 kHz
Measuring range	40 – 85 dB
Output impedance	Possible to switch to 600, 1,200, 1,800 Ω
Measured circuit	Mutually among side circuits and from phantom circuits to side circuits

3.1 Construction

This is to contained in a portable metal casing and its dimensions are approx. 225 (H) x 4,600 (W) x 205 (D) mm.

3.2 Electrical Requirements

Error: to satisfy the following standards by being measured at 1 kHz at normal temperature and humidity:

Measuring range	Measuring error
40 – 70 dB	within ± 1 dB
70 – 85 dB	within ± 2 dB

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

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Spec. No. 11.6.8

4. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.6.9
Matching Transformer

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: Four (4) units each.

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is a transformer to be used by inserting it between measuring device and power source line at the time of taking measurement of voice, and carrier frequency, and the principal features are as follows:

Name of Item	Nominal impedance adjusted	Transmission band kHz	Transmission loss Attenuation less than dB	Degree of Adjustment	
				Test frequency kHz	Return loss more than dB
Type 1 Transformer Carrier Measurement Model 600	600Ω : 600Ω	0.3 – 150	0.7	1/100	20
Type 1 Transformer Carrier Measurement Model 300	600Ω : 300Ω	0.03 – 40	0.7	1/30	20
Type 1 Transformer Carrier Measurement Model 170	600Ω : 170Ω	0.3 – 150	0.7	1/100	20
Type 1 Transformer Carrier Measurement Model 145	600Ω : 145Ω	0.3 – 150	0.7	1/100	20
Type 1 Transformer Carrier Measurement Model 75	600Ω : 75Ω	0.3 – 150	0.7	1/100	20
Type 1 Transformer Carrier Measurement Model 65	600Ω : 65Ω	0.3 – 150	0.7	1/100	20
Type 1 Transformer Voic Measurement Model 600	600Ω : 600Ω	0.03 – 10	0.7	0.1/10	20

Spec. No. 11.6.9

3.1 Construction

Construction and Dimensions: This item is to be contained in a portable metal casing and its standard dimensions are approx. 124 (W) x 145 (H) x 84 (D) mm.

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
 2. Painting color is to be of manufacturer's standard.
 3. Manufacturer (Nominated): TAMURA SEISAKUSHO CO., LTD.
4. Materials to be submitted:
5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

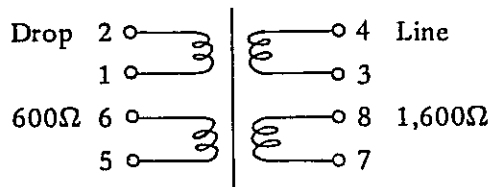
Spec. No. 11.6.10
Voice Frequency Repeating Coil VR1600-1

1. **Purpose of Application:**
 To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** Four (4) units
3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is a repeating coil used in 16 Hz signal and voice frequency band for the matching of impedance.

3.1 Constructional Dimensions and Circuit Drawing

The dimensions of this item are approx. 106.4 (W) x 117 (H) x 65.2 (D) mm.



3.2 Electrical Requirements

Transmission frequency band	0.3 – 3.0 kHz
Nominal matching impedance	600Ω (1–2) – (5–6) : 1,600Ω (3–4) – (7–8)
Return loss	More than 15 dB
Working attenuation	Less than 0.5 dB
Insulation resistance	More than 100 MΩ at 500 V DC
Dielectric strength	Abnormality is not be seen for one minute at 500 V AC

Notes:

1. Indications are to be in English, and name of item, specifications' number, circuit drawing, date manufactured, serial number, name of manufacturer are to be stamped in front.

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2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): IRIICHI TSUSHIN KOGYO CO., LTD.

5. Materials to be submitted:
5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese,
3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and
Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.6.11
Voice Frequency Repeating Coil

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: As indicated in the accompanying sheets

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is a repeating coil used in 16 Hz signal and voice frequency band for the matching of impedance.

3.1 Constructional Dimensions

The dimensions of this items are approx. 90 (W) x 102 (H) x 38 (D) mm.

3.2 Electrical Requirements

Transmission frequency band	0.3 – 3.4 kHz
Nominal matching impedance	As indicated in the accompanying sheets
Return loss	More than 15 dB
Working attenuation	Less than 0.5 dB
Insulation resistance	More than 100 M Ω at 500 V DC
Dielectric strength	Abnormality is not be seen for one minute at 500 V AC

Notes:

1. Indications are to be in English and Name of item and circuit drawing and on terminal face, and specifications' number, date manufactured, serial number, name of manufacturer are stamped in the front.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): IRIICHI TSUSHIN KOGYO CO., LTD.

4. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese,

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3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Item No.	Name of Item	Specification	Q'ty	Unit
		Impedance adjusted;		
	Repeating Coil VR-100A	600Ω : 100Ω	4	pcs.
	Repeating Coil VR-200B	600Ω : 200Ω	4	pcs.
	Repeating Coil VR-300A	600Ω : 300Ω	4	pcs.
	Repeating Coil VR-500A	600Ω : 500Ω	4	pcs.
	Repeating Coil VR-600A	600Ω : 600Ω	4	pcs.
	Repeating Coil VR-750A	600Ω : 750Ω	4	pcs.
	Repeating Coil VR-970A	600Ω : 970Ω	4	pcs.
	Repeating Coil VR-1400A	600Ω : 1,400Ω	4	pcs.
	Repeating Coil VR-1600A	600Ω : 1,600Ω	4	pcs.
	Repeating Coil VR-2000A	600Ω : 2,000Ω	4	pcs.

Spec. No. 11.6.12
Return Loss Measuring Set UM-11B

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is to measure return loss of communication equipment in carrier frequency band by comparison method against standard resistance, and its principal features are as follows:

Frequency range	30 Hz – 150 Hz
Measuring range	0 – 60 dB by 0.1 dB steps
Impedance in circuit being measured	600Ω (can be used for 100 – 1,000Ω practically)

3.1 Construction

This item is to be contained in a portable metal casing and its dimensions are approx. 160 (H) x 360 (W) x 180 (D) mm.

3.2 Electrical Requirements

Measuring error: as against measured impedance of 600Ω.

Measuring range	Error
15 – 35 dB	within ±0.5 dB
10 – 50 dB	within ±1 dB
0 – 60 dB	within ±1.5 dB

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

Spec. No. 11.6.12

4. Accessories and Spare Parts:

Standard resistor 1

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.6.13
V-2 HYB Unit

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: Two (2) units
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is used for changing toll telephone lines of 4-wire type over to 2-wire type, and its principal features are as follows:

Classification	Features
Range of frequency	0.3 – 3.4 kHz
Impedance	600Ω, on 2-wire side 600Ω, on 4-wire side

3.1 Construction

This item is so constructed as to be mounted on to the board, and its standard size is approx. 34 (W) x 54 (H) x 180 (D) mm.

3.2 Electrical Requirements

(1) Impedance:

2-wire side – 600Ω ±10%, 4-wire side – 600Ω ±15%, provided measured frequencies are to be; 0.3, 0.4, 0.8, 2.0, and 3.4 kHz, and C1 – C5 are short-circuited and all but measuring terminal are to be net resistance terminal of 600Ω.

(2) Echo loss:

Echo loss of transformer only is to be more than 60 dB, and is to be more than 40 dB when C1 – C4 are short-circuited, provided measured frequencies and terminal requirements are to be as same as (1).

(3) Transmission loss:

The loss of each direction of transmission is to be less than 4 dB as measured at 800 Hz, and the deviation of transmission loss within the band is to be within 0.5 dB, short-circuiting C1 – C5.

Spec. No. 11.6.13

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
 2. Painting color is to be of manufacturer's standard.
 3. Manufacturer (Nominated): TAMURA SEISAKUSHO CO., LTD.
4. Accessories and Spare Parts:
- C-1 Plug 1 ea.
5. Materials to be submitted:
- 5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.6.14
Noise Meter NM-31

1. **Purpose of Application:**
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** One (1) unit
3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is to evaluate and measure the noise voltage inducted into voice band and has an evaluation characteristics that comply with the recommendations by CCITT. The principal features of this item are as follows:

Frequency range	Flat	30 Hz – 10 kHz
	Evaluation	50 Hz – 5 kHz
Measuring range		-80 – +30 dBm (incl. meter scale)
Input impedance		600Ω/high balanced

3.1 Construction

- (1) This item is to be contained in a portable metal casing, and its dimensions are approx. 300 (H) x 300 (W) x 250 (D) mm.
- (2) AC power source cord is to be fitted with double-pole applying plug (normal working voltage is AC 230 V) and the length is to be approx. 3 m.

3.2 Necessary Electrical Requirements

Stability: The fluctuation of indicated value is to be within ± 0.5 dB, with AC power source voltage of $230 \pm 10\%$, or dry battery voltage of $-(24 \text{ V} - 5 \text{ V} \text{ and } +2 \text{ V})$ and under the variation of temperature of $20^\circ\text{C} \pm 15^\circ\text{C}$, provided that the test is carried out under non-evaluation measurement.

Notes:

1. A name plate, on which described in English are name of item, date manufactured, serial number, and name of manufacturer, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

Spec. No. 11.6.14

4. Accessories and Spare Parts:

Cord for measuring	1 ea.
dBm – mV conversion table	1 ea.
Fuse	Number to be used x 2 (except the numbers mounted in equipment)
Dry battery	1 set

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

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Spec. No. 11.6.15
Switching Unit SH-1B

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: Two (2) units

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is a switching unit used in carrier frequency band, and its principal features are as follows:

Range of frequency	DC-150 kHz
Impedance	600Ω balanced

3.1 Construction

This item is to be contained in a portable casing, and its dimensions are approx. 110 (H) x 280 (W) x 280 (D) mm.

3.2 Electrical Requirements

Crosstalk attenuation is to be more than 60 dB between contacts, and is to be more than 120 dB between circuits.

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

4. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

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Spec. No. 11.6.16
Level Meter TLM-23

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: One (1) unit
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is a level meter and its principal features are as follows:

Range of frequency	0.3 – 10 kHz
Measuring range	-60 – +25 dBm
Input impedance	600Ω/high balanced

3.1 Construction

- (1) This item is to be contained in a portable metal casing and its size is approx. 155 (H) x 300 (W) x 215 (D) mm.
- (2) AC power source cord is to be fitted with double-pole applying plug (normal working power source voltage is AC 230 V) and the length is to be approx. 2 m.

3.2 Electrical Requirements

Stability: Fluctuation of indicating value of level is to be within 0.3 dB, with AC power source voltage of 230 V $\pm 10\%$, or DC power source voltage -(21 V -2 V and +3 V), and at the temperature of 20°C $\pm 15^\circ\text{C}$.

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

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Spec. No. 11.6.16

4. Accessories and Spare Parts:

Power source cord	1
Fuse	Numbers used x 2 (except numbers mounted in the equipment)

5. Materials to be submitted:

5 copies of Operational Instruction Manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to equipment).

Spec. No. 11.6.17
Direct Reading Impedance Bridge DRZ-3

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: One (1) unit
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is to directly read and measure the absolute value and phase angle of the line and the equipment in the carrier frequency, and its principal features are as follows:

Measuring frequency		3 – 150 kHz
Measuring range	Impedance	10Ω – 10kΩ
	Phase angle	0 – ±90°

3.1 Construction

This item is to be contained in a portable metal casing and its size is approx. 230 (H) x 440 (W) x 180 (D) mm.

3.2 Electrical Requirements

Accuracy is to satisfy the following standards at the temperature of 5 – 35°C and relative humidity of 40 - 85%.

Measuring range		at 50 – 3,000 Ω
Impedance		within ±(1% + 0.1 Ω)
Phase angle		within ±(Afz (%)) + 0.5°

where, A: Proportional constant (2×10^{-2}),
 f: Measuring frequency (kHz), and
 z: Measured impedance (kΩ)

The accuracy shown above is the value with balancing circuit, but the error with non-balancing circuit is to be three times as the above.

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.

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Spec. No. 11.6.17

2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

4. Accessories and Spare Parts:
Receiver 1

5. Materials to be submitted:
5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese,
3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and
Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.6.18
Oscillator MSO-251B

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: One (1) unit
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is an oscillator and its principal features are as follows:

Oscillation frequency		0.3 – 130 kHz
Accuracy of frequency*	10 – 30 kHz	within $\pm(5 \text{ Hz} + 0.2\%)$
	0.3 – 130 kHz	within $\pm(10 \text{ Hz} + 0.5\%)$
Output level		-36, -10 – +15 dBm
Output impedance	0.3 – 30 kHz	600 Ω balanced
	5 – 130 kHz	75 Ω balanced

* As measured at power source voltage of AC 230 V or DC -21 V, temperature of 20°C.

3.1 Construction

- (1) This item is to be contained in a portable metal casing and its size is approx. 155 (H) x 300 (W) x 215 (D) mm.
- (2) AC power source cord is to be with double-pole applying plug, and the length is to be 2 m.

3.2 Electrical Requirements

Stability: Fluctuation of output level is to be within $\pm(5 \text{ Hz} + 0.2\%)$ and variation of output level is to be within 0.5 dB, as with AC power source voltage of AC 230 V $\pm 10\%$, or DC power source voltage of $-(21 \text{ V} - 2 \text{ V}$ and $+3 \text{ V})$ at temperature of 20°C $\pm 15^\circ\text{C}$.

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.

Spec. No. 11.6.18

- 2. Painting color is to be of manufacturer's standard.
- 3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

4. Accessories and Spare Parts:

- Power source cord 1
- Fuse Number used x 2 (excl. nos. of those mounted to the equipment)

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies of each of Invoice and Packing list (of which one copy each is attached to the equipment).

Spec. No. 11.6.19
Amplifier TA-15B

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: One (1) unit
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is an amplifier used for measuring crosstalk of balancing cable carrier system, etc. and the principal features are as follows:

Range of frequency	3 – 150 kHz
Gain	15 – 60 dB in 5 dB increment
Maximum output	+10 dBm
Input impedance	600Ω/high balanced, 75Ω/high balanced
Output impedance	600Ω, 75Ω balanced

3.1 Construction

- (1) This item is to be contained in a portable metal casing and its dimensions are approx. 200 (H) x 300 (W) x 250 (D) mm.
- (2) AC power source cord is to be with double-pole applying plug and is approx. 2 m long.

3.2 Electrical Requirements

Stability: Variation of gain is to be within $\pm 0.2\%$ against AC power source voltage of $230 \pm 10\%$, or battery voltage of 24 V -8 V and $+2$ V, and temperature of $20^{\circ}\text{C} \pm 15^{\circ}\text{C}$.

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

4. Accessories and Spare Parts:

- Measuring cord 2
- Fuse Number used x 2 (excl. nos. of those mounted on).
- Dry battery One set

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.6.20
Crosstalk Measuring Set MXT-25A

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: One (1) unit
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is used for measuring crosstalk in balancing cable and its principal features are as follows:

Frequency range	3 – 150 kHz
Range of measurement	0 – 120 dB
Impedance in the circuit being measured	75Ω balanced

3.1 Construction

This item is to be contained in a portable metal casing and its size is approx. 250 (H) x 300 (W) x 200 (D) mm.

3.2 Necessary Electrical Requirements

Error: Error is to be as follows at temperature of 20°C ±15°C and humidity of 45 – 85%:

Measuring frequency Range of measurement	Less than 3 – 50 kHz	50 – 150 kHz
Less than 0 – 100 dB	within ±1 dB	within ±2 dB
100 – 120 dB	within ±2 dB	within ±3 dB

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions are to be in English.

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- 2. Painting color is to be of manufacturer's standard.
- 3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

4. Accessories and Spare Parts:

Measuring cord 2

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

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Spec. No. 11.7.1
250 V, 50 MΩ Transistorized Insulation Resistance Tester

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is to test insulation resistance of communication lines and communication equipments, insulation resistance of electrical distribution lines and electrical equipments, and its principal features are as follows:

Classification	Specification
Effective measuring range	0.05 – 50 MΩ
Tolerance	5% of indicated value within effective measuring range.

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): YOKOGAWA ELECTRIC WORKS, LTD.
Model 3213-12

4. Accessories and Spare Parts:

Measuring lead wire	1 set
Carrying bag	1 pc.
Battery (UM-3)	8 pcs.

Other accessories as follows:

Spec. No. 11.7.1

Item No.	Name of Item	Specification	Q'ty
1	Eliminator power source	Type 3215	1
2	Hard case (with leads container bag)	Type 3216	1
3	Container bag of replacement tip for probe	Type 3217	1
4	Probe lead with switch	Type 3218	1
5	Replacement tip, No. 2 for probe	Type 3219-02	1
6	Replacement tip, No. 3 for probe	Type 3219-03	1
7	Replacement tip, No. 4 for probe	Type 3219-04	1
8	Replacement tip, No. 5 for probe	Type 3219-05	1
9	Container bag for leads	Type 3299-08	1

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.7.2
Ultra Megohmmeter Model SM-10E

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is a ultra megohmmeter capable of stably measuring resistance of from 1×10^5 up to maximum of $2 \times 10^{16} \Omega$, and it has a built-in plane electrode for test specimen that is able to measure the cubical specific resistance and surface specific resistance.

3.1 Electrical Requirements

Power source	AC 230 V, 50 Hz
Measuring voltage	10 V DC – 1,000 V DC, 7 ranges
Measuring range	$1 \times 10^5 \Omega$ – $2 \times 10^{16} \Omega$

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): TOA DENPA ELECTRONIKS LTD.
Model SM-10E

4. Accessories and Spare Parts:

SME-202 – 2010 Plane Mercury Electrode for Solid Specimen
 SME-50 Box for Measuring Electrode
 SME-30 Electrode for Liquid Specimen
 SR-1 Box for Standard Resistor

Spare Parts: Fuse x 2 ea.
 Measuring bar (red and black) x 2 sets

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Spec. No. 11.7.2

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese,
3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and
Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.8
Pinhole Detector

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is used for detecting leak hole in gas-pressurized cable, and it comprises from the followings:

- Pinhole detector
- Microphone
- Spiral cord (with plug)
- Reflector
- Search rod

3.1 Construction

(1) Pinhole detector:

This item is to be contained in a portable metal casing and its size is approx. 55 (H) x 105 (W) x 160 (D) mm.

(2) Microphone:

This is to be contained in a metal cylinder and its size is approx. 75 (Diameter) x 175 (L) mm.

(3) Spiral cord (with plug):

This item is to be fitted with 3 and 4-pin plugs at its both ends, and is more than 200 cm long as it is put at vertical position.

(4) Reflector:

This item comprises from reflecting surface, that makes an angle of 45 degrees against microphone, and fitting section, and is fitted to the microphone but is to be removable.

(5) Search rod:

Three rods compose a set of this item and is to be extendable, and the length fully extended is to be 195 cm or more. This is to be so designed that a microphone can be attached to the top.

Spec. No. 11.8

3.2 Electrical Requirements

The pinhole detector and the microphone are to satisfy the following standards with the range of power source voltage of 5.0 V – 6.0 V:

(1) Overall characteristics:

The output voltage is to be 1.0 V or more with distance between source (gas pressure is 300 g/cm², diameter of orifice is 0.8 mm) and microphone is 50 cm with the setting of decade resistor at maximum position, connecting pinhole detector and microphone under room temperature (20°C ± 15°C and 65% ± 2% humidity).

(2) The peak value of gain of the pinhole detector, when it is terminated at 30 KΩ of resistance at output terminal under normal temperature (20°C ± 15°C) and humidity (65% ± 20%), is to be 65 dB or more within the range of input frequency of 35 – 45 kHz.

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, to be attached to the panel, metal casing or cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.

4. Accessories and Spare Parts:

Dry battery	1 set
Carrying bag	2
Earphone	2

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.9.1
Selemo MS-13A

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: One (1) unit
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is a measuring instrument that has a function of measuring transmission characteristics, and its principal features are as shown in the following table:

Classification		Performance
Oscillating section	Range of frequency	20 Hz – 20 kHz
	Accuracy for frequency	$\pm(0.5\% + 50 \text{ Hz})$ as corrected at two points as 200 Hz and 200 kHz
	Range of output level	-50 – +20 dBm
	Output impedance	600 Ω balanced, 600 Ω unbalanced
Selection level measuring section	Rate of inclusion of harmonics	-30 dB or less at secondary and tertiary, respectively
	Accuracy and range of frequency	As same as oscillating section
	Range of level measurement	-100 – +30 dBm
	Input impedance	600 Ω balanced, 600 Ω unbalanced and high
	Input connector	Balancing terminal: I-214 type Unbalancing: BNC type

3.1 Construction

This item is to be contained in a portable metal casing, and its standard size is 245 (H) x 426 (W) x 250 (D) mm.

3.2 Electrical Requirements

This is to satisfy the standards with power source of 230 V $\pm 10\%$, and at temperature of 0°C – 45°C.

3.3 Weight: Approx. 25 kg

Spec. No. 11.9.1

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
 2. Painting color is to be of manufacturer's standard.
 3. Manufacturer (Nominated): ANRYITSU ELECTRIC CO., LTD.
Model MS13A
4. Accessories and Spare Parts:
- | | |
|---------------------|---|
| Coaxial cord: | 3CV-P2·3C-2V·3CV-P2
one piece each of 1 m and of 2 m |
| Fuse: | 1 set |
| Balanced type cord: | I-214APS·—·I-214APS
one piece each of 1 m and of 2 m |
| Balanced type cord: | 3CA-P2·RG58A/U·Bagworm clip
one piece of 1 m |
5. Materials to be submitted:
5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogue, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.9.2
Selemo MS23A

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. Quantity: One (1) unit
3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is measuring device that has a function of measuring transmission characteristic, and its principal features are as shown in the following table:

Classification		Performance
Oscillating section	Range of frequency Accuracy for frequency Range of output level Output impedance Rate of inclusion of harmonics	200 Hz – 200 kHz $\pm(0.5\% + 50 \text{ Hz})$ as corrected at two points as 2 kHz and 200 kHz -50 – +20 dBm 75 Ω unbalanced (all bands), 75 Ω balanced (10 – 200 kHz), 600 Ω balanced (300 Hz – 150 kHz) -30 dBm or less at secondary and tertiary, respectively
Selecting level measuring section	Accuracy and range of frequency Range of level measurement Input impedance Input connector	As same as oscillating section -100 – +30 dBm 75 Ω unbalanced and High (all bands), 75 Ω balanced and high (10 – 200 kHz), 600 Ω balanced and high (300 Hz – 150 kHz) Balancing terminal: I-214 type Unbalancing: BNC type

3.1 Construction

This is to be contained in a portable metal casing, and its standard size is approx. 245 (H) x 426 (W) x 250 (D) mm.

Spec. No. 11.9.2

3.2 Electrical Requirements

This item is to satisfy the standards with power source of 230 V $\pm 10\%$, and at temperature of 0°C – 45°C.

3.3 Weight: Approx. 25 kg

Notes:

1. A name plate, on which name of item, date manufactured, serial number, name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
 2. Painting color is to be of manufacturer's standard.
 3. Manufacturer (Nominated): ANRITSU ELECTRIC CO., LTD.
Model MS23A
4. Accessories and Spare Parts:
- | | |
|---------------------|------------------------------|
| Coaxial cord: | 3CV-P2·3C-2V·3CV-P2 |
| | 1 pc. each of 1 m and of 2 m |
| Balanced type cord: | I-214APS – I-214APS |
| | 1 pc. each of 1 m and of 2 m |
| Fuse: | 1 set |
5. Materials to be submitted:
- 5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.9.3
Frequency Counter MF55D

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is the counter for measuring the frequency of five figures, and its principal features are as shown in the following table:

Classification	Performance	
Range of frequency	10 Hz – 100 MHz	
Range of input voltage	ATT 0 dB 25 mV – 10 Vrms 25 mV – 1 Vrms	ATT 20 dB 250 mV – 100 Vrms (less than 10 Hz - 10 kHz) 250 mV – 10 Vrms (10 kHz – 100 MHz)
Input impedance	1 MΩ or more, 35 pF or less (BNC type)	
Basic stability of oscillator	Less than 5×10^{-8} /day, after 30 minutes of operation	

3.1 Construction

This item is to be contained in a portable metal casing, and its standard size is approx. 85 (H) x 205 (W) x 280 (D) mm.

3.2 Electrical Requirements

This item is to satisfy the standards with power source of AC 230 V 10% or DC + 10 – +30 V and at temperature of 0°C – 45°C.

3.3 Weight: Approx. 4.5 kg

Notes:

1. A name plate, on which name of item, date manufactured, serial number, name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.

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2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANRITSU ELECTRIC CO., LTD.
Model MF55D
4. Accessories and Spare Parts:

Cord for AC power source:	1 pc. of 2.5 m long
Measuring cable:	3CA-P2·RG-58A/U·Bagworm clip
	1 pc. of 1 m long
Cord for DC power source:	1 pc. of 2.5 m long
Measuring cable:	3CA-P2·RG-58A/U·3CA-P2
	1 pc. of 1 m long
5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.10
Type 521 Fault Locator

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is used for locating such faults occurring in overhead open wire lines or communication cables as breakage, short circuit or crosstalk, and has the features as listed below:

Measurable distance:	Max. approx. 72 km (for overhead open wire lines) Max. approx. 20 km (for 1.2 ϕ communication cable)
Pulse output:	100 V or more with 200 Ω load (with 1/10 switch)
Pulse width:	Switching 3 μ S and 6 μ S
Time base sweepage:	Sine wave sweep method (1 kHz)
Dial scale of measuring distance:	Max. 240 μ S
Picture tube:	75 mm diameter
Power source voltage:	DC 11 – 14 V, but will be AC 230 V \pm 10% when power source adapter is used.
Items subject to the measurement:	The locations of breakage, short circuit, crosstalk and perfect grounding (distance from the point where the measurement is performed): if conditions allow, defect in insulation against earth could be detected.
Size, weight:	Body (with case) – approx. 210 (W) x 250 (H) x 370 (D) mm approx. 13 kg Power source adapter (with case) – approx. 140 (W) x 180 (H) x 230 (D) mm approx. 5.5 kg

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.

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Spec. No. 11.10

3. Manufacturer (Nominated): TSUKEN ELECTRIC INDUSTRY CO., LTD.
Model FF521

4. Accessories and Spare Parts:

Fuse and lamp Nos. used x 2 sets (except those mounted in the equipment)

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese,
3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and
Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.11.1
Type 4 Manometer

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: Four (4) units

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This equipment is a Gottingen type, carrying manometer used for measuring the gas pressure of gas-pressurized communication cables.

- | | | |
|-----|-------------------------|---|
| 3.1 | Measuring range: | 0 – 800 g/cm ² |
| 3.2 | Minimum scale: | 2 g/cm ² |
| 3.3 | Standard temperature: | 20°C |
| 3.4 | Accuracy: | ±1 g/cm ² (at 20°C) |
| 3.5 | Leakage: | No leakage should not occur upon applying 800 g/cm ² of pressure on to pressure inlet for 10 minutes or more. |
| 3.6 | Filter: | The filter mounted at upper parts of mercury sump and glass tube is to be readily passing air (gas) but should not be penetrated through by mercury under pressure of 500 g/cm ² . |
| 3.7 | Amount of mercury used: | 250 g |
| 3.8 | Construction: | To be comprised from body, tripod and leather case. |
| 3.9 | Dimensions: | Height – 1,280 ±20 mm (with tripod mounted on the body) |

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Height of body – 750 ±10 mm

3.10 Weight: Approx. 4.5 kg (incl. tripod and leather case)

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): SHIN MEGRO METER CO., LTD.
SUZUKI KOSAKUSHO CO., LTD.

4. Accessories and Spare Parts:

- Cleaning wire 1 ea.
- Spanner 1 ea.
- L-shape tube connector 1 ea.
- Filter 2 ea.
- Blind packing 1 ea.

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.11.2
Portable Air Dryer

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: One (1) unit

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This equipment is a heatless and recycle type portable air dryer used as replacement for permanent air dryer while it is under maintenance work and for blow-off during the cable work.

- | | | |
|-----|--------------------------------|--|
| 3.1 | Max. capacity: | 15 liter/min. |
| 3.2 | Supplying pressure: | 0 – 650 g/cm ² (adjustable) |
| 3.3 | Dryness of air supplied: | Dew point – less than -50°C
(at 3 – 35°C, 80% RH) |
| 3.4 | Method of drying: | Heatless |
| 3.5 | Pressure at demisting section: | 3 ±0.25 kg/cm ² |
| 3.6 | High-pressure safety valve: | 3.5 ^{+0.5} / _{-0.25} kg/cm ² |
| 3.7 | Humidity warnings: | Lamp is lit, air supply is ceased, buzzer is sounded by short circuiting warning circuit, when moisture rate in supply air deteriorated down to R ±1.25% RH (at 0.65 kg/cm ² , 20 ±15°C). R is to be determined by the following formula:
R (% RH) = -0.05 t + 3.25
where: t; ambient temperature (°C)
at element of sensing moisture. |

Spec. No. 11.11.2

3.8	Power source:	AC 100 V \pm 10%, 50 – 60 Hz, 800 VA
3.9	Insulation resistance:	DC 500 V, 2 M Ω or more (between AC circuit and earth atmosphere).
3.10	Resisting voltage:	AC 1,000 V for one minute (between AC circuit and earth).
3.11	External dimensions:	Approx. 500 (H) x 400 (W) x 500 (D) mm
3.12	Weight:	50 kg or less

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
 2. Painting color is to be of manufacturer's standard.
 3. Manufacturer (Nominated): SHIN MEGRO METER CO., LTD.
SUZUKI KOSAKUSHO CO., LTD.
4. Accessories and Spare Parts:
- | | |
|-------------------------------------|--------|
| Monkey spanner of 200 mm | 1 pc. |
| Double-ended spanner: 6 in set | 1 set |
| + shape screw driver: JIS 4633 #2 | 1 pc. |
| - shape screw driver: 6 mm x 100 mm | 1 pc. |
| Buzzer: AC 100 V | 1 pc. |
| Lamp tool | 1 pc. |
| Conversion joint | 2 pcs. |
| Moisture mixing tube | 1 pc. |
| Valve joint | 2 pcs. |
| Power source cord | 1 pc. |
| Wiring and piping drawings | 1 pc. |
5. Materials to be submitted:
- 5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to equipment).

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Spec. No. 11.11.3
Materials & Tools for Gas Equipment

1. Purpose of Application:

To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: As attached sheet.

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

Materials, parts and tools for gas equipment are as attached sheets.

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): SHIN MEGURO METER CO., LTD.
SUZUKI KOSAKUSHO CO., LTD.

4. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to equipment).

Spec. No. 11.11.3

Item No.	Description	Q'ty	Unit	Remarks
1	No. 1 borer for lead sheath	2	pcs.	
2	No. 2 borer for lead sheath	2	pcs.	
3	Special pressure applicator	3	pcs.	
4	Gauge for special pressure applicator	50	pcs.	
5	Base for mixture applicator	80	pcs.	
6	Cap for mixture applicator	80	pcs.	
7	Packing for mixture applicator	80	pcs.	
8	6 mm gas pipe	100	m	
9	16 mm gas pipe	100	m	
10	Soft vynil pipe for gas	200	m	
11	Portable pressure gauge	4	m	
12	No. 2 contactor	5	m	(350 g/cm ²)
13	No. 2 capsule retainer	3	m	
14	L-shaped valve joint	5	m	
15	No. 6 pressure valve	100	m	
16	No. 6 pressure valve joint	100	m	
17	Temporary valve	20	m	
18	No. 5 pressure valve	100	m	
19	No. 5 pressure valve inside	200	ea.	
20	No. 5 pressure valve chuck	10	ea.	
21	No. 5 pressure valve joint	50	ea.	
22	Trident tube with valve	20	ea.	
23	No. 1 gas pipe joint	10	ea.	
24	No. 3 gas pipe joint	10	ea.	
25	No. 1 cable cap (with valve)	100	ea.	
26	No. 11 cable cap (with valve)	100	ea.	
27	No. 2 A resin	60	ea.	(contain 1 kg)
28	No. 2 A hardner	60	ea.	(contain 200 g)
29	No. 3 A mixture	100	ea.	(contain 1 kg)
30	No. 3 A mixture	50	ea.	(contain 4 kg)
31	No. 5 mixture	100	ea.	
32	Water proof mixture	100	ea.	(contain 1 kg)
33	Pressure gauge 15 kg/cm ² JIS B7505 B 1.5 T 1/4 x 75 x 15 kg f/cm ²	1	ea.	
34	Pressure gauge 3 kg/cm ² JIS B 7505 B 1.5 T 1/4 x 75 x 3 kg f/cm ²	1	ea.	

Spec. No. 11.11.4
Polyethylene Cap with Valve

1. Purpose of Application:
To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.

2. Quantity: For filling gas, 40 mm ϕ 200 pieces
For measuring gas pressure, 40 mm ϕ 200 pieces

3. Standards: (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

3.1 Composition

This item is a cap made of polyethylene with a valve attached air tight to one end and the other is closed.

There are two kinds of caps as follows:

- (1) Polyethylene cap with valve for filling gas
- (2) Polyethylene cap with valve for measuring gas pressure

3.2 Requirements for Air Tightness

The air leaking shall not occur through cap body and the section where the valve attached after sealing one end of polyethylene cap by use of a adequate jig, and then filling 650 g/cm² of air through valve.

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): SUMITOMO ELECTRIC INDUSTRIES LTD.

4. Accessories and Spare Parts:

- (1) Heat fusing adhesive
- (2) Heat contraction tube
- (3) Mouth piece for torch 3 pieces

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Spec. No. 11.11.4

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

Spec. No. 11.12
Electrostatic Coupling Measuring Set CUB-6B

1. **Purpose of Application:**
 To be used at Central Telecommunication Research Laboratories, Islamabad to be established under an agreement between the Government of Japan and the Islamic Republic of Pakistan.
2. **Quantity:** One (1) unit
3. **Standards:** (Constructional Dimensions, Electrical Requirements and Necessary Mechanical Requirements, etc.)

This item is used for measuring electrostatic coupling both between two pairs of side lines, and between each pair of side lines and phantom circuit in a cable, and principal features are as follows:

Measuring frequency	1,000 Hz
Measuring range	$\pm 1,200$ pF

3.1 Construction

The bridge unit measuring electrostatic coupling, the oscillator unit giving 1 kHz measuring frequency to the bridge unit, the detector amplifier unit detecting the null point in bridge balancing, and the supply unit operating the oscillator and the detector-amplifier units, are incorporated in a carry-on metal casing and its dimensions are approx. 300 (H) x 400 (W) x 225 (D) mm.

3.2 Electrical Requirements

Minimum scale division	2 pF
Accuracy	$\pm(1\% \pm 2$ pF)
Power requirement	AC 230 V, 50 Hz DC 18 V

Notes:

1. A name plate, on which name of item, date manufactured, serial number, and name of manufacturer are described in English, is to be attached to the panel or metal casing and cover. All other descriptions on the panel are to be in English.
2. Painting color is to be of manufacturer's standard.
3. Manufacturer (Nominated): ANDO ELECTRIC CO., LTD.
 Model CUB-6B

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Spec. No. 11.12

4. Accessories and Spare Parts:

Measuring cord 1 set

5. Materials to be submitted:

5 copies of Operational instruction manuals in English, 3 copies of the same but in Japanese, 3 copies of Test result sheets, 3 copies of the Catalogues, and 4 copies each of Invoice and Packing list (of which one copy each is to be attached to the equipment).

