

ISLAMIC REPUBLIC OF PAKISTAN

IDENTIFIED INSTITUTION REPORT

ON

CENTRAL TELECOMMUNICATION RESEARCH LABORATORIES

ISLAMABAD

(RESEARCH FACILITIES)

VOL. I

DECEMBER 1977

JAPAN INTERNATIONAL COOPERATION AGENCY

P R E F A C E

In compliance with the request of the Government of the Islamic Republic of Pakistan, the Government of Japan decided to extend a grant-aid for Central Telecommunication Research Laboratories Construction Project as part of Japan's overseas cooperation programmes, and Japan International Cooperation Agency (JICA) has conducted detailed design on this project.

JICA organized and dispatched a survey team of 10 experts, headed by Mr. Yoshio Utsumi of the Ministry of Posts and Telecommunications from July 5 to August 9, 1976 to Pakistan, and made a necessary survey for detailed design on the project.

The survey was carried out smoothly with the extensive cooperation of the Government of Pakistan.

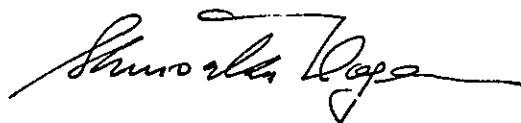
Basing on the data collected by the survey team, JICA prepared and submitted a detailed design report on the buildings to be constructed to the authorities concerned of the Government of Pakistan in January, 1977 in accordance with the implementation schedule of the project. As for the detailed design on research facilities, JICA dispatched a team of 8 experts led by Mr. Masaaki Minami of the Ministry of Posts and Telecommunications from October 8 to 21, 1977 to Pakistan, discuss the draft report with officials concerned of the Government of Pakistan. By a result, this report has been prepared and is being submitted hereby as the final report of the detailed design on the research facilities.

I sincerely hope that this report will serve for the progress of the project and for promoting friendly relations between Pakistan and Japan.

Finally, I would like to take this opportunity to extend my deep appreciation to all the staff who participated in conducting of this study, and also express my gratitude to the staff members concerned of the Government of Pakistan for the full cooperation extended to the visiting teams.

November, 1977

Shinsaku Hogen



President

Japan International Cooperation Agency

JICA LIBRARY



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I. INTRODUCTION:

Japan International Cooperation Agency (JICA) submits herein the DETAILED DESIGN REPORT OF CONSTRUCTION PROJECT (VOLUME OF RESEARCH FACILITIES) in the Central Telecommunication Research Laboratories, Islamabad.

The research facilities provided to the laboratory, whose construction is now being planned, have so far been discussed over several times between a Japanese government dispatched survey team and Pakistan PTT, TRC, and the list of research facilities have finally been made between Utsumi Mission (Detailed Survey) and Pakistan PTT last year.

JICA based on this item of equipment and also based on the supporting budget contributed by the Japanese government for this new laboratory establishment plan has made a selection of the equipment suitable to the new laboratory, as well as made the specifications and price estimates after conducting researches on manufacturing and selling condition of the equipment concerned, system designing, prices, etc. by mobilizing specialists in every field in Japan.

In this operation, the full view exchange with those specialists who have been dispatched to Pakistan TRC from Japan by the Colombo Plan has been made by paying deep regard to the required spec. offered by Pakistan PTT.

Finally, the list of facilities was adjusted to meet the budget and in consideration of the priority order of the research projects in CIRL.

Furthermore, the survey team conducted by Mr. M. Minami was sent to the Government of Pakistan from October 8 to 21, 1977. The agreement, in which the result of discussion between the Government of Pakistan and the team was stated, was signed by both representatives. The agreement is attached herein as Annex of Vol. I. The list and specifications of equipment are amended and finalized in accordance with the agreement.

II. GENERAL CONDITION FOR ELECTING SPECIFICATIONS

In preparing the specifications of the equipment for study, the following conditions were considered, and, for matters regarding the Contract, the instruction from Japanese government separately could be expected; therefore, only technical specifications are described in this report.

- (1) Within the limits of the supporting budget contributed by Japanese government, this would be fully effective to future study activity by Pakistan CTRL.
- (2) To pay regard to the required equipment specifications from Pakistan PTT.
- (3) Equipment, in principle, are to be of Japanese made.
- (4) As for Electronic exchange (clause 21), Electronic Computer (clause 15.1) and Common (Power source facilities for telecommunication equipment) (clause 19.1),

specifications include manufacturing, marine transportation, works or superintendence of works and adjustment; however, the rest of the equipment are to be delivered at the port (such as Karachi port) nominated by Pakistan PTT.

- (5) Working electric power source for equipment is suitable to commercial electric power source in Pakistan if possible.
- (6) As for components and consumable materials among the equipment, the selection is difficult to make at the present stage; therefore, it has been deleted from specifications, but ¥ 2 million as a budget has been allocated.

III. LIST AND COST ESTIMATE OF RESEARCH EQUIPMENT

The list and estimated costs of equipment for study becoming the object of supply are given in the following pages; these costs are:-

- i) Marketing price in Japanese domestic market,
- ii) Sea freightage from Japan to Pakistan (not including insurance) and
- iii) Commission of trading company concerned.
- iv) As for electric Exchange, Electronic Computer, Common (Power source facilities for telecommunication equipment), included miscellaneous expenses including staying expenses for works or superintendence of works and adjustment in new laboratory.

However, inspection cost of equipment which are deemed as Pakistan PTT's liabilities (including inspection in the presence of witness at manufacturing factory), insurance, customs duty in Pakistan, and cost of maintenance and operation after installation are not included.

This cost estimate shall vary more or less in accordance with the contract method, tenderer's intention or price conditions from now on.

No.	Section	Price, Thousand Yen
1	Telephone Equipment	22,601
2	Switching System	129,616
3	Telegraph	22,727
4	DATA Communication	17,020
5	Power Plant	0
6	Microwave	64,977
7	VHF	36,461
8	HF	329
9	Carrier	53,734
10	PCM	9,338
11	Outside Plant	24,086
12	Standard	10,037
13	Semiconductor	35,327
14	Circuit Component	22,038
15	Computer	75,500
16	Work Shop	32,392
17	Administration	13,975
18	Chemical Lab/Testing Lab	16,162
19	Common	45,400
20	Parts and Materials	2,000
	(Reserve)	60
Total		633,780

S - 1 Telephone Equipment Section

<u>No.</u>	<u>Research Equipment</u>	<u>Quantity</u>	<u>Price, Thousand Yen</u>
1.1	Telephone Equipment for High Loss Subscriber's Line	4	33
1.4	Small Type Push Button Telephone	4	260
1.5.1	4MH Picture Phone	1	1,716
1.5.2	4MH Small Picture Phone	1	902
1.5.3	Picture Phone Controller	1	565
1.8	Memory Scope	1	509
1.9	Electric Sound Transmission Measuring Device	1	16,768
1.16	Artificial Telephone Cable	3	858
1.20	Trolley for Measuring Sets	1	76
1.22	Transmission Measuring Test Sets	1	914
		Total	22,601

S - 2 Switching System Equipment

<u>No.</u>	<u>Research Equipment</u>	<u>Quantity</u>	<u>Price, Thousand Yen</u>
2.1	Electronic Exchange	1	120,200
2.2	Electro Magnetic Oscillograph	1	699
2.5	Sub Assembly Unit for Subscriber Identification Equipment	1	6,227
2.6	Transistor Curve Tracer	1	752
2.7	Wave Analyser	1	1,145
2.9	Impulse Sender	1	396
2.12	Multi-function Meter	1	197
		Total	129,616

S - 3 Telegraph Section

No.	Research Equipment	Quantity	Price, Thousand Yen
3.1	Voice Frequency Telegraph Terminal Equipment (50B-200B)	2	9,206
3.2	Datax Time Division Multiplexer	2	6,900
3.3.1	Universal Counter	1	574
3.3.2	Short Interruption Measuring Unit	1	347
3.3.3	Digital Printer	1	357
3.3.4	Level Meter	1	195
3.3.5	Noise Meter	1	301
3.3.6	Code Generator	1	866
3.3.7	Start-Stop Distortion Measuring Set	1	765
3.3.8	Trolley for Measuring Set	1	76
3.4	Arabic Letter-graphic Typewriter	1	3,140
Total			22,727

S - 4 DATA Communication Section

No.	Research Equipment	Quantity	Price, Thousand Yen
4.1.1	Datax N200 MODEM	2	510
4.1.2	Datax N1200 MODEM	2	510
4.1.3	Datax N2400 MODEM	2	1,380
4.2.1	MODEM Tester	2	1,408
4.2.2	Data Transmission Testing Set (Transmitting Part)	1	540
4.2.3	Data Transmission Testing Set (Receiving Part)	1	1,070
4.2.4	Multi Channel Counter	1	2,388
4.2.5	Group Delay Measuring Set	1	1,728
4.2.6	Data Transmission Measuring Set	1	226
4.8	1200BPS, Data Terminal Equipment	2	7,260
Total			17,020

S - 6 Microwave Section

No.	Research Equipment	Quantity	Price, Thousand Yen
6.1	TR6G2700 Microwave Radio Telecommunication System including following measuring equipment 1. Microwave System Analyzer 2. Measuring Equipment of Transmitter and Receiver 3. Noise Measuring Equipment 4. Transmission Measuring Set 5. Selective Level Meter	1 sys.	48,849
6.3	Sampling Oscilloscope	1	1,497
6.5	TV System Analyzer	1	3,935
6.7	Noise Loading Test Set	1	4,549
6.8	Vector Voltmeter	1	1,446
6.9	DC Volt-Ammeter	1	215
6.16	Frequency Counter for Microwave Range	1	2,420
6.17	X-Y Recorder	1	440
6.18	Dummy Load	1 set	352
6.23	Wide Band Dual Trace Oscilloscope	1	218
6.28	Noise Figure Meter	1 set	748
6.43	Universal Bridge	1	308
		Total	64,977

S - 7 VHF Section

No.	Research Equipment	Quantity	Price, Thousand Yen
7.1	Measuring Equipment for VHF and UHF Range		
	1. RF Signal Generator	1	1,760
	2. Linear Detector	1 set	880
	4. CM Type Power Meter	1	740
	6. Field Intensity Measuring Equipment	1	1,639
	7. Transmission Measuring Set	1	660

No.	Research Equipment	Quantity	Price, Thousand Yen
8.	Selective Level Meter	1	1,030
9.	Noise Meter	1	520
10.	Distortion Factor Meter	1	460
11.	Resistance Attenuator	1	220
12.	Reactance Attenuator	1	480
13.	Low-Pass Filter	1	200
14.	High-Pass Filter	1	200
15.	Others	1	702
7.2	Mobile Radio Telephone System	1 sys.	19,000
7.3	RF Impedance Bridge	1 set	1,177
7.6	Return Loss Measuring Equipment	1 set	930
7.8	Frequency Counter for VHF Range	1	1,540
7.11	Linear Wide Band Amplifier	1	690
7.18	Q-Meter for HF and VHF Range	1	740
7.21	Spectrum Analyzer upto VHF Range	1	2,893
		Total	36,461

S - 8 HF Section

No.	Research Equipment	Quantity	Price, Thousand Yen
8.1	Electronic Voltmeter	1	35
8.2	Digital Multi-Thermometer	1	294
		Total	329

S - 9 Carrier Section

No.	Research Equipment	Quantity	Price, Thousand Yen
9.1.1	12MHz Coaxial Cable System	1 sys.	45,400
9.1.2	Transmission Characteristic Measuring Set	1	650
9.1.3	Frequency Synthesizer	1	736
9.1.4	Selective Level Meter	1	828
9.1.5	Pilot Measuring Equipment	1	1,473

No.	Research Equipment	Quantity	Price, Thousand Yen
9.1.6	Pilot Level Meter	1	282
9.1.7	Resistance Attenuator	1	87
9.1.8	Low-Pass Filter	1	217
9.1.9	High-Pass Filter	1	217
9.1.10	Key Box	1	108
9.2	Pulse Echo Tester	1	1,191
9.3	Filter Curve Tracer	1 set	2,545
		Total	53,734

S - 10 PCM Section

No.	Research Equipment	Quantity	Price, Thousand Yen
10.1	Measuring Equipment for 30CH PCM System		
10.1.2	Test Set PMS-16	1	639
10.1.3	Fault Locating Set	1	606
10.1.4	Repeater Checker	1	87
10.1.5	Error Rate Measuring Set	1	1,300
10.1.6	17 Range Volt Meter	1	37
10.2	Pulse Pattern Generator	1	1,733
10.3	Error Rate Measuring Equipment	1	4,102
10.4	Pulse Generator	1 set	834
		Total	9,338

S - 11 Outside Plant Section

No.	Research Equipment	Quantity	Price, Thousand Yen
11.1.1	Electrostatic Induction Type Line Finder	1	195
11.1.2	Automatic Splicing Machine	1	2,092
11.1.3	No.2 Cable Core Collator	1	10
11.1.4	Tools and Materials for Splicing Cable	1 set	6,846
11.2.1	No.2 BW Tester	1	275

No.	Research Equipment	Quantity	Price, Thousand Yen
11.2.2	Search Signal Oscillator Type 20F	1	119
11.2.3	Search Signal Amplifier Type-3	1	62
11.2.4	Cable Faulty Detector Pick-up Coil and Holder	1 set	41
11.2.5	Search Coil for Measuring the Depth of Underground Cable	1	102
11.2.6	Line Fault Direction Locator	1	65
11.2.7	Model 3 Portable Line Fault Loctor	1	50
11.2.8	Capacity Bridge I-E	1	179
11.2.9	SD Wire Trouble Searcher Antena	1	325
11.3	Cable Fault Locator MW32B	1	704
11.5.1	Electronic Polirecorder Model EPR-200A	3	1,349
11.5.2	No. 1 Earch Voltage Meter	3	121
11.5.3	No. 2 Earch Voltage Meter	3	121
11.5.4	No. 3 Earth Current Meter	3	121
11.5.5	External Shunt for No. 3 Earth Current Meter	3	44
11.5.6	Portable Glass Electrode PH Meter Model HM-IF	1	60
11.5.7	Specific Earth Resistance Tester	1	145
11.5.8	Earth Tester, Type 3235	1	48
11.5.9	External 50A Shunt, Type 2215-51	3	8
11.5.10	External 150A Shunt, Type 2215-54	3	11
11.5.11	External 500A Shunt, Type 2216-41	3	29
11.6.1	Direct Reading Impedance Bridge, DRZ-1	1	162
11.6.2	Oscillator TCO-28	1	282
11.6.3	Amplifier TA-18	1	227
11.6.4	Impedance Compensating Network	4	79
11.6.5	Decade Attenuator AL-352	2	234
11.6.6	Level Meter TLM-44	1	180
11.6.7	Decade Resister SOKUHAN-2	2	173
11.6.8	Crosstalk Measuring Set 50-B	1	152
11.6.9	Matching Transformer	28	309
11.6.10	Voice Frequency Repeating Coil VR 1600-1	4	19
11.6.11	Voice Frequency Repeating Coil	40	159
11.6.12	Return Loss Measuring Set UM-11B	1	195

No.	Research Equipment	Quantity	Price, Thousand Yen
11.6.13	V-2 HYB Unit	2	11
11.6.14	Noise Meter NM-31	1	303
11.6.15	Switching Unit SH-1B	2	78
11.6.16	Level Meter TLM-23	1	184
11.6.17	Direct Reading Impedance Bridge DRZ-3	1	190
11.6.18	Oscillator MSO-251B	1	303
11.6.19	Amplifier TA-15B	1	232
11.6.20	Crosstalk Measuring Set MXT-25A	1	217
11.7.1	250V, 50M Ω Transistorized Insulation Resistance Tester	1	36
11.7.2	Ultra Megohm Meter Model SM-10E	1	702
11.8	Pinhole Detector	1	55
11.9.1	Selemo MS13A	1	866
11.9.2	Selemo MS23A	1	888
11.9.3	Frequency Counter MF55D	1	314
11.10	Type 521 Fault Locator	1	650
11.11.1	Type 4 Manometer	4	150
11.11.2	Portable Air Dryer	1	704
11.11.3	Materials and Tools for Gas Equipment	1 set	586
11.11.4	Polyethylene Cap with Valve	400	2,075
11.12	Electrostatic Coupling Measuring Set CUB-6B	1	249
		Total	24,086

S - 12 Standard Section

No.	Research Equipment	Quantity	Price, Thousand Yen
12.1	DC Voltage, Current Standard	1	1,325
12.2	AC Meter Correcting Equipment	1	891
12.3	Secondary Standard of Frequency	1	758
12.4	High Precision Type Frequency Meter	1	368
12.5	Contact Resistance Meter	1	287

No.	Research Equipment	Quantity	Price, Thousand Yen
12.6	Small Current Electric Potentiometer	1	671
12.7	Power Equipment for Measuring Super High Insulation Resistance	1	195
12.8	Precision Type Double Bridge	1	263
12.9	Insulation Resistance	1	379
12.10	Electrolytic Condenser Tester	1	390
12.11	Universal Bridge 4260A	1	310
12.12	DC Super Imposed Inductance Bridge	1	200
12.13	Dielectric Loss Measuring Set TRS-10C	1	1,906
12.14	Gaus Meter	1	388
12.15	Magnetic Flux Meter	2	180
12.17	Sound Meter	1	194
12.18	Digital Multimeter	1	682
12.19	Universal Counter	1	650
Total			10,037

S - 13 Semiconductor Section

No.	Research Equipment	Quantity	Price, Thousand Yen
13.1	Manufacturing Facilities of Hibrid IC		
1)	Micro-Plotter	1 set	1,941
2)	Reduction Camera	1 unit	288
3)	Ultra-Sonic Washer	2 units	394
4)	Dryer	2 units	249
5)	Vacuum Deposition Equipment	1 set	9,855
6)	Mask Aligner	1 unit	2,708
7)	Spinner	1 unit	509
8)	Viscosity Meter	1 set	67
9)	Etching Equipment	1 unit	173
10)	Hot Plate	2 units	76
11)	Vacuum Furnace for Heat Treatment	1 unit	2,491

No.	Research Equipment	Quantity	Price, Thousand Yen
12)	Resistor Trimming Equipment	1 set	572
13)	Soldering Bath and Soldering Iron	1 set	179
14)	Infrared Furnace	1 unit	108
15)	Screen Printer	1 unit	2,198
16)	Cure Furnace	1 unit	3,130
17)	Contact Printer	1 set	986
18)	Framer for Screen	1 unit	265
19)	Cutter	1 unit	325
20)	Drilling Equipment for Print Board	1 set	179
21)	Prober	1 set	1,440
22)	Clean Bench	2 units	1,902
23)	Deionised Water Supplier	1 set	1,267
24)	Compressor	1 unit	249
25)	Vacuum Set	1 unit	60
26)	Microscope for Inspection	2 units	467
27)	Small Item, Chemicals, Materials	1 set	3,249
Total			35,327

S - 14 Circuit Component Section

No.	Research Equipment	Quantity	Price, Thousand Yen
14.1	Manufacturing Equipment for Fixed Carbon Film Resistor	1 set	8,936
14.2	Manufacturing Equipment for Ceramic Capacitors	1 set	10,577
14.6	High Sensing X-Y Recorder	1 unit	449
14.7.1	Low Temperature Storage	1 unit	693
14.7.2	Large Size Electric Refrigerator	1 unit	238
14.8	Metal Construction Dryer	1 unit	164
14.9	Vibration Tester	1 set	981
Total			22,038

S - 15 Computer Section

No.	Research Equipment	Quantity	Price, Thousand Yen
15.1.1	Mini Computer System	1	71,500
15.1.2	Data Terminal Equipment	2	4,000
Total			75,500

S - 16 Workshop Section

No.	Research Equipment	Quantity	Price, Thousand Yen
16.1	Small Electroplating Plant for Small Parts		
16.1.1	Electroplating Installations	1 set	1,738
16.1.2	Chemicals for Electroplating	1 set	641
16.1.3	Miscellaneous Electroplating Implements	1 set	115
16.1.4	Draft Chamber	1 unit	709
16.2	Bending Machine		
16.2.1	Press Brake	1 unit	3,716
16.2.2	Universal Bender	1 unit	260
16.3	Welding Facilities		
16.3.1	A.C. Arc Welder	1 unit	86
16.3.2	Welding Tools	1 set	84
16.3.3	Miscellaneous Welding Implements	1 set	336
16.3.4	Spot Welding Machine	1 unit	698
16.4	Woodworking Tools	1 set	347
16.5	Fitters Tools		
16.5.1	Vises and Clamps	1 set	332
16.5.2	Surface Gauges and Steel Compasses	1 set	10
16.5.3	Hammers	1 set	37
16.5.4	Punch Sets, Chisels and Marking Tools	1 set	41
16.5.5	Wrenches and Spanners	1 set	97
16.5.6	Screw Drivers and Screw Driver Sets	1 set	30
16.5.7	Nippers and Pliers	1 set	74
16.5.8	Scissors and Nail Pullers	1 set	35
16.5.9	Brushes	1 set	21

No.	Research Equipment	Quantity	Price, Thousand Yen
16.5.10	Box Block with V-groove	1 set	13
16.5.11	Universal Type Screen Projector	1 unit	1,275
16.5.12	Air Compressor	1 unit	164
16.5.13	Surface Plates	2 pcs.	292
16.5.14	Micrometers	1 set	183
16.5.15	Vernier-calipers and Vernier Height Gauge	1 set	87
16.5.16	Dial Gauges and Stands	1 set	206
16.5.17	Squares and Stright-edges	1 set	74
16.5.18	Scales and Gauges	1 set	144
16.5.19	Implements for Measuring Work	1 set	209
16.5.20	Cutting Tools	1 set	1,172
16.5.21	Implements for Machining Work	1 set	518
16.5.22	Surface Roughness Tester	1 unit	1,040
16.6	Engraving Machine	1 stand	1,208
16.7	Machine Tools		
16.7.1	Precision Lathe	1 stand	3,228
16.7.2	Precision Surface Grinder	1 stand	2,034
16.7.3	Presses	1 set	157
16.7.4	Treadle Shearing Machine	1 unit	292
16.7.5	Contour Machine	1 unit	1,415
16.7.6	Drilling Machines	1 set	1,187
16.7.7	Universal Milling Machine	1 stand	5,015
16.7.8	Electric Bench Grinders	1 set	292
16.8	Electric Furnace	1 unit	1,029
16.9	Parts and Materials		
16.9.1	Screws	1 set	213
16.9.2	Metalic Materials	1 set	416
16.9.3	Non-metalic Materials	1 set	340
16.9.4	Parts Cases	1 set	181
16.10	Carrying Implements	1 set	66
16.11.1	Miscellaneous Tools	1 set	227
16.11.2	Hardness Tester	1 set	308
Total			32,392

S - 17 Administration Section

No.	Research Equipment	Quantity	Price, Thousand Yen
17.1	Offset Copier	1	2,621
17.2.1	Copier for Ordinary Paper	1	1,040
17.2.2	Large-size Copier	1	1,136
17.3	Slide Projector 35 mm	1	153
17.4	Slide Projector with Tape Recorder	1	178
17.7	Motor Wagon	1	3,249
17.8	Desk-type Minicomputer	1	285
17.9	Overhead Projector	1	102
17.10	Pocket-size Calculator	10	542
17.11.1	Drafting Machine D-70	4	295
	D-90	1	87
17.11.2	Drawing Table and Drawing Chair		
	A-800	3	85
	B-20	1	84
	DC-2	4	95
17.11.3	Drawing Storage Cabinet		
	Al-5B	1	66
	RL-106B	1	86
17.11.4	Equipment for Drawing Section	1	659
17.12	Tape Recorder for Steno	2	212
17.15.1	Camera for Microfilm	1	880
17.15.2	Microfilm Reader	1	101
17.15.3	Printer	1	1,045
17.15.4	Paper (A4) (250M Roll)	50	500
17.15.5	Microfilm Cabinet	1	100
17.15.6	Micro Filming Equipment with Accessoires	1	374
Total			13,975

S - 18 Chemical Lab./Testing Lab. Section

No.	Research Equipment	Quantity	Price, Thousand Yen
18.1	Transistor and IC Testing Facilities		

No.	Research Equipment	Quantity	Price, Thousand Yen
18.1.1	Transistor h Parameter Measuring Set Transistor Checker	1 unit	1,570
18.1.2	Transistor Checker	1 unit	265
18.1.3	Transistor In-circuit Auto Checker	1 unit	444
18.1.4	Transistor f_T Measuring Set	1 unit	2,870
18.1.5	Thyristor-Curve Tracer	1 unit	572
18.1.6	Integrated Circuit Tester	1 unit	953
18.1.7	Linear IC Tester	1 unit	3,411
18.12	Temperature and Humidity Chamber	1 unit	6,077
		Total	16,162

S - 19 Common

No.	Research Equipment	Quantity	Price, Thousand Yen
19.1	Power Source Facilities for Telecommunication Equipment	1	45,400
		Total	45,400

S - 20 Parts and Materials

No.	Research Equipment	Quantity	Price, Thousand Yen
20.1	Parts and Materials		2,000
		Total	2,000

IV. PROCUREMENT AND INSTALLATION SCHEDULE

1. The time for delivery

The time for delivery of the equipment shall be settled in the contract; however, in ordinary circumstances, it will supposedly take the time as follows:

- (1) The equipment of which specifications provide for no installation work.
 - i) The time required for designing and manufacturing the equipment is about for between three months and nine months. That depends on the kind of equipment.
 - ii) The time required for marine transportation is about two months.
- (2) The equipment of which specifications provide for installation work.
 - i) Electronic Exchange
 - a. The time required for designing and manufacturing the equipment is about nine months.
 - b. The time required for marine transportation is about two months, and the time required for entry must be added.
 - c. The time required for land transportation in Pakistan is about one month.
 - d. The time for installation is about three months.
 - ii) Electronic Computer
 - a. The time required for designing and manufacturing the equipment is about eight months.
 - b. The time required for marine transportation is about two month, and the time required for entry must be added.
 - c. The time required for land transportation in Pakistan is about one month.
 - d. The time required for installation is about one month.
 - iii) Common (Power source facilities for telecommunication equipment)
 - a. The time required for designing and manufacturing the equipment is about four month.
 - b. The time required for marine transportaton is about two month, and the time required for entry must be added.
 - c. The time required for land transportation in Pakistan is about one month.
 - d. The time required for installation is about three month.

2. The time for inspection

In case the purchaser intends to inspect the equipment before its delivery, the necessary time for inspection must be added to the time above mentioned.

3. Relation between installation of Electronic Exchange and Common (Power source facilities for telecommunication equipment)

D.C. power for Electronic Exchange is required to be supplied by the time when the installation work of Electronic Exchange begins in the room appointed.

4. Relation between installation of Electronic Computer and A.C. power supply

A.C. power for Electronic Computer is required to be supplied by the time when the installation work of Electronic Computer begins in the room appointed.

5. Relation between bringing in of equipment and construction work of CTRL Building

The equipment delivered is required to be carried into the place appointed in CTRL immediately to ensure its performance. For that reason, the delivery time of the equipment is desirable to be adjusted to the schedule of construction work of the building of CTRL, or when circumstances require a warehouse must be prepared to store the equipment safely in Pakistan.

V. ANNEX

MEMORANDUM OF UNDERSTANDING

Islamabad, the 20th Oct, 1977

MEMORANDUM OF UNDERSTANDING

The JICA Mission of the Government of Japan held discussions with the Pakistan Telegraph & Telephone Department from 10th to 20th of October, 1977, in order to finalise the list of specifications of equipment which is to be procured for the Central Telecom. Research Laboratories, being established at Islamabad, under the Japanese Grant Assistance. As a result of this discussion and clarifications furnished by both the sides following understandings were reached in regard to the equipment and specifications required for the effective functioning of the C.T.R.L.:-

- 1) The list of equipment and specifications as presented by the JICA Mission in 3 volumes were examined in detail. It was understood by the Pakistan Telegraph & Telephone Department that due to the limitations of budget and the amount of Grant Assistance, viz. ¥ 633 million it is not possible to include additional testing instruments which were informed to the Japanese authorities by the Pakistan Telegraph & Telephone in August, 1977.
- 2) It was also understood that the scope of the CTRL project as recommended by the JICA Mission may not be reduced and some minor substitutions would be done in the list. The items which are agreed to be added for the CTRL are indicated in Annexure 'A'. The items which will not be procured at this stage for budgetary reasons are mentioned at Annexure 'B'.
- 3) In order to achieve the ultimate aims of establishment of CTRL the JICA Mission evaluated the additional items as shown in Annexure 'C'. This evaluation is considered necessary for ultimate capability of the CTRL. This is purely a technical evaluation and does not in any way give any commitment in regard to financing. In their judgement the items are useful for the Central Telecom. Research Laboratories.

(MASAAKI MINAMI)
Leader of JICA Mission

(MASOOD AHMAD)
Project Director (CTRL)
Pakistan Telegraph & Telephone
Department, Islamabad.

EQUIPMENT LIST (To be deleted from the Draft Report)

Unit: Thousand Yen					
No.	Equipment	Manufacturer	Type	Q'ty	Price
S - 1					
1.2	Push Button Telephone	Fujitsu, Hitachi, Iwatsu, NEC, OKI, Toshiba.	600P	4	57
S-1 Total:					57
S - 5					
5.2	Portable Wattmeter	Yokogawa	2042-03	1	112
5.3	Load Resister	Shindengen		1	2,491
5.4	Portable Pointer Type Frequency Meter	Yokogawa	2038-01	1	34
S-5 Total:					2,637
S - 7					
7.1	400 MHz. TX/RX without accessories except measuring equipments	-	-	1	9,508
7.7	Spec. No. 3.4.8 VHF Walkie Talkie	Toyo, Matsushita, JRC, NEC, Sanyo	-	3	450
7.9	Spec. No. 3.4.10 Dual Trace Oscilloscope	Iwatsu	SS-5215	1	218
7.10	Spec. No. 3.4.11 Electronic Voltmeter	Anritsu	ML 69A	1	220
S-7 Total:					10,396
S - 9					
9.1	Change of constitution (deletion below SG stage)	NEC, Fujitsu	-	-	14,000
S-9 Total:					14,000

Unit: Thousand Yen					
No.	Equipment	Manufacturer	Type	Q'ty	Price
S - 10					
10.1	PCM-30CH system exclude measuring equipment	NEC, Fujitsu, OKI	-	1	14,100
				S-10 Total:	14,100
S - 11					
11.4	Spec. No. 11.4.2 No. 11.4.3 Sample of Coaxial Cable	-	-	2 sets	76
				S-11 Total:	76
S - 16					
16.2.1	Precision Universal type folding machine	Shinchi Shoten	HB-24-150	1	617
16.7.7	Vertical Milling Machine	ENSHU	VA-type	1	3,050
				S-16 Total:	3,667
S - 17					
17.5	Electric Typewriter	IBM	Model D	2	606
			Model 895	3	1,043
17.6	Micro-bus	-	-		1,971
				S-17 Total:	3,620
				GRAND TOTAL:	48,553

ANNEXURE 'A'

EQUIPMENT LIST (To be added to the Draft Report)

Unit: Thousand Yen

No.	Equipment	Manufacturer	Type	Q'ty	Price
S - 1					
1.4	Small Type Push Button Telephone	Fujitsu, NEC, Hitachi, OKI	700P	4	260
1.5.1	4MH Picture Phone	OKI	DV-4002	1	1,716
2	4MH Small Size Picture Phone	OKI	DV-4102	1	902
3	Picture Phone Controller	OKI	DV-4201	1	565
1.16	Artificial Telephone Cable	Ando	SCK-15	1	253
			SCK-16	1	253
			SCK-17	1	352
1.20	Trolley for Measuring Sets	Ando	AT-16A	1	76
1.22	Transmission Measuring Test Set	Ando	VST 262	1	914
				S-1 Total:	5,291
S - 2					
2.6	Transistor Curve Tracer	Kokuyo	TCT-7D	1	752
2.7	Wave Analyser	YHP	3581-A	1	1,145
2.9	Impulse Sender	Ando	TSD-31	1	396
2.12	Multi-function Meter	YHP	427-A	1	197
				S-2 Total:	2,490
S - 4					
4.2	MODEM Tester	Ando	TSD-108C	1	704
4.8	Data Terminal Equipment	Oki	DT-1216	2	7,260
				S-4 Total:	7,964
S - 6					
6.5	TV System Analyzer	Anritsu	MEV 5	1	3,935
6.16	Frequency Counter for Microwave Range	Anritsu	MF72C	1	2,420
6.17	X-Y Recorder	YEW	3077	1	440
6.18	Dummy Load	SPC. Elec. Corp.	(For 2GHZ)	1	176

No.	Equipment	Manufacturer	Type	Q'ty	Price
			(For 4GHZ)	1	88
			(For 6GHZ)	1	88
6.23	Wide Band Dual Trace Oscilloscope	Iwatsu	SS-5212	1	218
6.28	Noise Figure Meter	Anritsu	MS7 1B	1	418
			MP62A	1	110
			MP64A	1	110
			MP65A	1	110
6.43	Universal Bridge	YHP	4260A	1	308
				S-6 Total:	8,421
S - 7					
7.18	Q-meter for HF and VHF range	YHP	4342A	1	740
7.21	Spectrum analyser upto VHF range	Anritsu	MS62B		2,893
				S-7 Total:	3,633
S - 16					
16.2	Press Brake	Spec.		1	3,716
			Capacity max 50 ton		
			Table length 2,000mm		
			Work thickness max. 3.2mm		
			Length of stroke > 75mm		
			Gap of Frame > 200mm		
			Motor 3.7kW x 4 or 5.5kW		
			with accessories		
16.3	Spot Welding Machine	Hitachi Seisaku-sho	25KVA, SP-AG with SA-3A	1	698
16.5	Surface Roughness Tester	Kosaka	SE-4A	1	1,040
16.7	Precision Lathe	Washino Kikai	B type for	1	900
(a)	Copy Attachment		LPT-35C		
16.7	Universal Milling	Shizuoka	SPU-CH	1	5,015
(b)	Machine	Machine Tool			
16.11	Hardness Tester	Akashi	PHT	1	308
				S-16 Total:	11,677
S - 17					
17.15.1	Camera for Microfilm	Canon	161 G	1	880
2	Microfilm Reader	Canon	200 W	1	101
3	Printer	Minolta	RP 405	1	1,045

No.	Equipment	Manufacturer	Type	Q'ty	Price
17.15.4	Paper (A4) (250 M Roll)	Minolta	30-1214	50 roll	500
5	Microfilm Cabinet	Yaesu	30-1214	1	100
6	Micro Filming Equipment with Accessories	NCK	Selecs PS 811		374
				S-17 Total:	3,000
S - 18					
18.12	Temperature and Humidity Chamber	Tabai	TBL 3	1	6,077
				S-18 Total:	6,077
				TOTAL:	48,553

ANNEXURE 'B'

Sl. No.	Detail of Equipment	Quantity
1.	TELEPHONE EQUIPMENT SECTION:	
1.12	Transmission measuring set Consisting of Level Meter, Attenuator & Oscillator	1
2.	SWITCHING SYSTEM SECTION:	
2.13	Portable Precision D.C. Ammeter and Voltmeter	1
2.17	Automatic Incircuit Transistor Checker	1
2.19	Synchroscope Dual Trace	1
2.21	Capacitor Variable	1
2.22	Cross-talk Measuring Set	1
2.23	Impulse Recorder	1
3.	TELEGRAPH LABORATORY EQUIPMENT:	
3.4	Graphic Typewriter	1
3.7	High Speed Facsimile Equipment	2
3.17	D.C. Precision 17 Range (YEW) Volt Ammeter	1
3.19	Direct Acting Electrical A.C. Recording Voltmeter (YEW)	1
3.20	Direct Acting Electrical D.C. Recorder (YEW)	1
3.24	Electronic Poly Recorder (TOA)	2
3.27	Handy Insulation Tester (YOKOGAWA)	2
3.37	Portable Lux Me tor (YEW)	1
3.46	Surface Temperature Indicator (YEW)	1
3.47	Specific Earth Resistance Tester (YOKOGAWA)	1
3.58	Variable Attenuator (ANDO)	1
4.	DATA COMMUNICATION SECTION:	
4.7	Transmission, Impairment Set	1
4.9	Data Terminal Controller	2
4.10	High Speed Tape Reader	2
4.11	High Speed Tape Punch	2

Sl. No.	Detail of Equipment	Quantity
4.2.2	Data Transmission Testing Set (Transmitting Part)	1
4.2.3	Data Transmission Testing Set (Receiving Part)	1
4.2.4	Multi Channel Counter	1
4.2.6	Data Transmission Measuring Set	1
5. POWER PLANT SECTION:		
5.1	Charge/Discharge Display	1
5.5	Digital Voltmeter	1
6. MICROWAVE SECTION:		
6.10	Signal Generator for Microwave Range, 2,4,6 GHz.	
6.22	Antenna Pattern Measuring Set	
6.32	Envelope Delay Measuring Equipment	
6.37	Wave Guide Attenuator	
6.41	Digital Voltmeter	
9. CARRIER SECTION:		
9.5	Automatic In-Circuit Transistor Checker Model T-713 (Eujisoko Electric Co., Ltd., JAPAN)	1
9.8	Group Delay Measuring Test Set	
9.9	Reflecto Mat	
9.11	Coil Winding Machine	
9.13	Frequency Counter (Precision)	
9.14	Noise Figure Measuring Facilities	
9.19	Distortion Factor Meter	
9.23	Selective Level Measuring Instrument Type FS-1	
9.25	Variable Attenuator Type MVAT-25A	
9.26	Variable Attenuator Type MVAT-752A	
9.27	Variable Attenuator Type MVAT-751A	
9.32	Dial Variable Resister, Type REC-402	
9.33	Dial Variable Capacitor Type CD-41	
9.40	White Noise Generator	
9.41	GRN-2 White Noise Detector	

Sl. No.	Detail of Equipment	Quantity
10.	PCM SECTION:	
10.5	PCM Signal Generator 2,048 m Bits/Sec.	
10.6	Level Digital Oscillator (with Noise Generator)	
10.7	Level Meter with Psophometer	
10.8	Measurement of Total Distortion Including Quantizing Distortion PCM Level Tester Set	
10.9	Error Detection Meter	
10.10	Error Rate Generator	
10.11	Oscilloscope with Polaroid Camera	
10.13	Amplitude Delay Distortion Analyser	
13.	SEMICONDUCTOR SECTION:	
13.3		
6.	Thickness Measuring Instrument	
9.	Capacitance Bridge	
10.	Pulse Generator	
11.	Sampling Oscilloscope	
12.	Network Analyzer	
15.	Mask Measuring Instrument	
18.	Platinum Resistance Thermometer	
14.	CIRCUIT COMPONENT SECTION:	
14.10	Manufacturing Facilities of All Types of Filters including Mechanical Crystal etc.	1
14.11	Facilities for Crystal Cutting Grinding, Tapping etc. and Equipment for Determining their Polarization	1
14.12	Magnet Making Machine	1
14.13	Coil Winding Machine	
	i. Big Size (Automatic)	
	Height (width)max. 250mm	
	Outside dia. max. 500mm	
	Windable wire size: 0.35, 2.3mm	
	Inside diameter of core max.: 40 mm	
	(Price = ¥ 4,800,000)	

Sl. No.	Detail of Equipment	Quantity
2.	Small size machine	
	Height (width) max.	95mm
	Outside dia. max.	150mm
	Windable wire size:	0.2, 1mm
	Inside dia. of core max.:	22mm
	(Price = ₹ 1,300,000)	
15.	COMPUTER SECTION:	
15.9	Oscilloscope Digital Memory Oscilloscope	
15.10	X-Y-PLOTTER	
16.	WORKSHO SECTION:	
16.12	Power Press	1
16.13	Shearing and Cutting Machines	1
16.16	Arrangement for Making Pot Cores	1
16.17	Thermosetting Machine	1
16.18	Injection Moulding Machine	1
18.	CHEMICAL LAB/TESTING LAB SECTION:	
18.2		
2.	Electronic Microscope with High Resolution Powers	
26.	Photo Colorimeter and Dark Room	
27.	Spectrometer for Determining Impurities in Different Alloys	
32.	PH Meter for Plastics and Liquids	
42.	Automatic Recorder for Temperature and Humidity (Hodo Graph)	

ANNEXURE 'C'

Sl. No.	Detail of Equipment	Quantity
1.	TELEPHONE EQUIPMENT SECTION	
1.3	Small Type Telephone	2
1.6	Auto Dial Telephone	2
1.7	Button Telephone (3 systems)	2 each
1.10	Parts and Consumable Material	
1.11	High Voltage Insulation Tester	1
1.13	Automatic Voltage Regulator	1
1.14	Regulated DC Power Supply	1
1.15	Vacuum Cleaner Input Voltage 220V	1
1.19	Side Tone Attenuation Measuring Set	1
1.21	Wheatstone Bridge No. 2.	1
2.	SWITCHING SYSTEM SECTION	
2.10	Contact Fault Locator	1
2.11	Transmission Measuring Set Consisting of Level Meter, Attenuator & Oscillator	1
2.14	Automatic Voltage Regulator	1
2.15	Coil Winding Machine (Hand)	1
2.16	Regulated DC Power Supply	1
2.18	Vacuum Cleaner Input Voltage 220V	1
2.26	Millisecond Meter	1
2.27	Noise Generator	1
2.28	Recorder 4 Channel Portable	1
2.29	Resistance Variable Dial Type	1
2.30	Resistance Variable Slide SS	1
2.31	Relay Tester No. 4	1
2.33	Test Trolley	1
3.	TELEGRAPH LABORATORY EQUIPMENT:	
3.6	VF Facsimile Equipment	4
3.12	Contact Resistance Meter	1

Sl. No.	Detail of Equipment	Quantity
3.13	Digital Volt Ammeter	1
3.15	Cable Search Coil and Depth Meter (NICHIDEN)	1
3.16	D.C. Precision 17 Range Volt Ammeter (YEW)	1
3.18	D.C. Micro Ammeter (YEW)	1
3.21	DECADE Resistance Box (YEW)	1
3.22	Dual Trace SYNCHROSCOPE (IWATSU)	1
3.23	Earth Resistance Tester (YEW)	1
3.26	Fault Detector Pick Up Coil (NICHIDEN)	1
3.29	Impedance Bridge (YHP)	1
3.30	L.C.R. Meter (YHP)	1
3.34	Polarized Relay Tester (TOHO DENKI)	1
3.36	Portable Line Fault Localizer (TOKAI KAGAKU KOGYO)	1
3.38	Portable 3 Phase Wattmeter (YEW)	2
3.39	Regulated D.C. Power Supply Model 733 (KIKUSUI)	1
3.40	RC Oscillator Model	1
3.41	Signal Generator Panel 25 c/s	1
3.42	Slide Rhoostat Gen. Single Core (ANDO)	1
3.43	Single Core Slide Rheostat Gen. Type (ANDO)	1
3.44	Slide Transformer (Slidac) (YAMABISHI)	1
3.45	Sliding A.C. Voltage Regulator (Slidac) (MATSUNAGA)	3
3.48	Synchroscope Model	1
3.50	Tex-1 Impulse Tester (OKI)	1
3.51	Level Measuring Set (ANDO)	1
3.56	Solid Stage Analog Voltmeter (YHP)	1
3.57	Variable Condenser Type 1 (ANDO)	1
3.59	Variable High Pass Filter (ANDO)	1
3.60	Variable Low Pass Filter (ANDO)	1

4. DATA COMMUNICATION SECTION:

4.6	Distortion Analyser
4.7	Dual Trace Synchroscope (IWATSU)
4.8	Digital Tape Recorder
4.9	Magnetic Oscilloscope
4.10	Tape Paper Winder
4.11	Digital Volt Ammeter

Sl. No.	Detail of Equipment	Quantity
4.12	Multicounter	
4.13	No. 3 - Keitai Tester	
5. POWER PLANT SECTION:		
5.6	Oscillo Scope	1
5.2	Wattmeter	1
5.3	Artificial Water Load	1
5.4	Frequency Meter	1
6. MICROWAVE SECTION:		
6.2	<i>Circuit Elements for Microwave System</i> Pads, Variable Attenuators, Terminators, Connectors, Wave Guide Components, Cable (low-medium, high power, directional coupler, watching phase shifter, isolator, magic T etc.)	
6.4	Monitor TV	1
6.11	Transistor Curve Tracer	
6.13	Mis-Match Measuring Equipment	
6.14	Gain Versus Frequency, Differential Gain, Differential Phase etc. Measuring Equipment	
6.15	Microwave Power Meter	
6.20	Spectrum Analyser	
6.21	Vector Scope (6.8)	
6.25	Slotted Lines	
6.26	Square Law and Linear Detector	
6.27	Laser Proto-Type Model for Experimental Use in the Lab.	
6.29	Test Gear for Digital Equipment	
6.30	Strip Line and Micro-Strip Making Set Up	
6.31	Crystal Detector	
6.34	Resonant Cavity Wave Length Meter	
6.35	Barreter Mount	
6.38	Haromonix Mixer, Tuners and Phase Shifter	
6.39	Emphasis, Pre-Emphasis Units	

Sl. No.	Detail of Equipment	Quantity
6.40	Solid State Amplifier for 2, 4, 6, 7, 11 GHz.	
6.42	Analog Voltmeter HP 3400 A	
6.44	Level Test Set	
	(a) Level Oscillator Siemens H. 2074	
	(b) Level meter Siemens D. 2074	
6.45	Power Supplies	
7.	VHF SECTION:	
7.13	Solar Battery	1
7.20	Incircuit Transistor Tester	
7.22	Rotatable Yagi Antenna	
7.23	Band Pass Filter	
7.25	Frequency Convertor Unit	
7.7	Walkie Talkie Sets VHF Range	
7.9	Oscilloscope Dual Beam upto VHF Range	
7.10	VTVM upto VHF Range	
8.	RESEARCH FACILITIES:	
	H.F. SECTION	
9.	CARRIER SECTION:	
9.4	Frequency Counter Model TR-3824X (Takeda Riken Co., Ltd., Tokyo, Japan)	1
9.6	Universal Bridge, Model TF 1313A (Marconi Instruments Ltd., England)	1
9.20	VF Power Meter	
9.21	Transmission Measuring Equipment	
9.22	Psophometers	
9.24	Test Trolley Type SF-1	
9.28	Variable Low Pass Filter Type MVLF-93A	
9.29	Variable Low Pass Filter Type MVLF-75A	
9.30	Variable High Pass Filter Type MVHF-14A	
9.31	Variable High Pass Filter Type MVHF-75A	

Sl. No.	Detail of Equipment	Quantity
9.34	Slidace (Mains Transformer)	
9.35	Cathodo Day Oscilloscope Model VP-311B	
9.36	Resistance Attenuator Type M-215C	
9.37	Decade Resistance Box, RV 41H	
9.38	Decade Capacitor Type Sokuham 1-M	
9.39	Pulse Generator Type 503AS	
10.	PCM SECTION:	
10.12	Wave Analyser	
11.	OUTSIDE PLANT SECTION	
11.13	Tool Kit, Test Cords	
11.14	Cross Talk Measuring Test Set	
12.	STANDARD SECTION	
13.	SEMICONDUCTOR SECTION:	
13.3	Measuring Instruments	
13.3.3	Four Point Measuring Set	
13.3.5	Inspection Machine	
13.3.7	Optical Microscope	
13.3.8	Curve Tracer	
13.3.13	I.C. Tester	
13.3.14	Gaugematic Sectioning System	
13.3.16	Wafer Prober	
13.3.17	Ultrasonic Cleaner	
14.	CIRCUIT COMPONENT SECTION:	
14.13	Transformer Turn – Ratio Measuring Device	1
14.14	Wiring Wrapping and Unwrapping	2

Sl. No.	Detail of Equipment	Quantity
15.	COMPUTER SECTION:	
15.3	Computer Soft Wares	2
16.	WORKSHOP SECTION:	
16.9	Die Sinking Machine with Facilities to Invert	1
16.10	Pipe Making Machines (Seamless)	1
16.14	Filing Machines	1
16.15	Extrusion Press	1
17.	ADMINISTRATION SECTION:	
17.13	VCR with Playback Unit	1
17.14	Closed Circuit TV System for Laboratory Monitoring	1
18.	CHEMICAL LAB/TESTING LAB SECTION:	
18.2	Material Analysis and Plastic (Used in Telecommunication Field). Testing Facilities	
1.	Micro Meter and Vernier Callioer	
3.	Tensile Testing Machine with Elongation Measuring Tape Capacity 100 Kgs.	
4.	Keisistance Measuring Bridge upto 1m Ohm	
5.	Apparatus for Detecting Defects in Copper Enamelled Wires with a D.C. Voltage Scuree Supply (100 volts)	
6.	Terra Ohm Meter for Measuring High Resistances Measuring Range upto $10^{12} \Omega$	
7.	Die Electric Loss Factor Meter Measuring Frequency 800 Hz and Voltage Source 100 Volts A.C. with a Range from 0 - .06	
8.	Apparatus for Determining the Softening Temperature of Enamel Insulation	
9.	High Voltage Tester 0 - 5 KV and 0 - 10KV (C.C))	
10.	Different Grades of Pencils for Determining the Bardness of Enamel Insulation	

Sl. No.	Detail of Equipment	Quantity
11.	Different Type of Mandrels and Winding Machine with Adjustable Speed	
13.	Oven upto 400°C	
14.	Apparatus for Measuring Capacitance with A.C.	
15.	Apparatus for Measuring Capacitance Unbalances at Frequencies Form 800 - 1000 Hz.	
16.	Analytical Balance	
17.	Refrigerator upto - 10°C	
18.	Low Temperature Impact Apparatus Temperature Range upto - 40°C	
19.	Apparatus for Testing Rubber and Plastics (Behaviour Towards Liquids Vapours, Ozone Gas etc.)	
20.	Different Types of Bending Devices for Plastics at Low Temperature	
21.	Hardness Testing Meter for Rubber	
22.	Desicater, Vacuum Desicator and Vacuum Pump	
23.	Electric Furnace Temperature upto 1,200°C	
24.	Vacuum Oven	
25.	U V Cabinet for Testing Stability of Polymers Against UV	
28.	Cooreivity Meter	
29.	Flux Meter	
30.	Hardness Testing Machine for Plastics	
31.	Thermostat with Automatic Control of Temperature	
33.	Apparatus for Testing the Solderability of Copper Enamelled Wires and Tin Coated Wires	
34.	Bending Testing Machine	
35.	Abrasion Testing Machine for Rubber and Plastics	
37.	Commercially Available Apparatus for Testing the Melt Index of Thermo-Plastic Materials	
38.	Capillary Viscometer for Testing the Relative Viscosity and Determining the Melecular Weight of Polymers	
39.	Vicats Testing Apparatus for the Thermal Stability of Plastics	
40.	Fatigue Testing Machine for Springs	
41.	Fatigue Testing Machine for Hand-Set Coils	
43.	Aneroid Barometer	

Sl. No.	Detail of Equipment	Quantity
44.	Apparatus for Measuring Electroplastic Limit Charging and Half Value Time of Discharge	
45.	Apparatus for Determining the Properties of Ferromagnetic Materials	
46.	Steam Oven, Automatic Control of Temperature and Humidity	
47.	Apparatus for Determining Amount of X-Linking Among Polymer	
48.	Flaw Detection in Castings X-Rays & Ultrasonics	

RECORD OF DISCUSSIONS

During the discussions held on Sunday, October 16th, 1977 between the visiting Japanese delegation and the Pakistan Telegraph and Telephone Department, the following understanding were reached:

1. The Japanese side explained to the Telegraph and Telephone Department the budgetary allocation for the purchase of Research Equipment for the Central Telecommunication Research Laboratories (CTRL) was limited to 633 million yen and that the cost of the purchase of equipment, including the measuring and testing instruments, could not exceed this amount. Moreover, the Japanese side stressed upon the T & T Department the importance of ensuring a good start to the CTRL project.
2. Since in the light of the explanation of the Japanese Mission this could not be helped, both the sides agreed to delete some equipment from Sections VHF, PCM and small portion of C-12 from the draft list and to add some Measuring instruments and Testing Equipment to make CTRL operative from the beginning. The Japanese side expressed the apprehension that the deletion of the above mentioned items may affect the scope of the CTRL operations. T & T shared the apprehensions of the Japanese side. However, T & T did not want to reduce the scope of the operations of the CTRL and therefore the items now deleted would have to be made good. T & T would try its utmost to ensure that all possible efforts were made to launch the CTRL to a good start.
3. The Japanese side appreciated the position of the Director-General and informed him that the Government of Japan would very likely continue future technical assistance to the CTRL but the extent of this assistance will be determined by the initial performance of the Laboratories, specially with regards to management of research personnel, maintenance and handling of equipment and utilisation of research facilities.
4. The Director-General expressed his own and his Department's gratitude to the Government of Japan for its guidance and assistance in establishing the CTRL and stated that he will *continue to look forward* for such guidance, help and assistance of the Government of Japan for further promotion of the CTRL project.

(NOBUYA NOGUCHI)
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