

**FACILITIES AND EQUIPMENT INSTALLATION PLAN
(TECHNICAL SUBJECTS - II -)
RIYADH ELECTRONICS TECHNICAL INSTITUTE
THE KINGDOM OF SAUDI ARABIA**

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国際協力事業団	
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8. TV Engineering

Cost of equipment:

Price Thousand Yen : 233,230

Price US \$: 1,196,051

8-1 Exploded demonstration monochrome TV receiver set

Room No. & name of facilities	Da 307 Workshop Mono-TV TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	100	8	800

Specifications:

Same as No. 5-23.

8-2 Exploded demonstration colour TV receiver set

Room No. & name of facilities	Da 306 Workshop Color-TV TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	600	8	4,800

Specifications:

Same as No. 5-24

The colour circuit must be exploded in detail.

Shall be arranged for easy understanding of SECAM system.

8-3 Monochrome TV receiver

Room No. & name of facilities	Da 307 Workshop Mono-TV TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	20	32	640

Specifications:

8 - 14-inch monochrome TV receiver (8-inch TV set is preferable)

Each circuit consists of the combination of transistors and IC for eaching materials.

Each circuit board should be simple and not be so small for easy adjustment.

The adjustment parts must be firm and can be easily handled from the front.

Power source: AC 220V, 60 Hz

Remarks:

For the practice of adjustment

Each block must be taken out for easy inspection and maintenance.

8-4 Colour TV receiver

Room No. & name of facilities	Da 306 Workshop Colour-TV TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
	130	32	4,160

Specifications:

14-inch colour TV receiver:

All-transistor type

SECAM system and Teaching Materials Center (No. 12) system

Each circuit board should be handled simply for the practice (waveform observation and adjustment of each circuit).

The adjustment parts must be firm and can be handled from the front for students' practice.

Power source: AC 220V, 60 Hz

Remarks:

The outer case should be removed simply, and the adjustment parts should be handled easily.

8-5 Exploded demonstration video recorder

Room No. & name of facilities	Da 306 Workshop Colour-TV TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	600	8	4,800

Specifications:

Each section of this cassette video recorder should be exploded for easy understanding, especially for the practice of electric circuit.

The mechanism must be covered with transparent materials for clear observation from outside.

Colour video recorder used for the Teaching Materials Center (No. 12) System.

Power source: AC 220V 60 Hz

Accessories:

- 1. Wagon 1
- 2. Cassette tape 3
- 3. Adjustment manuals 1
- 4. Mechanical handling and maintenance manuals 1

Remarks:

Each circuit must be exploded for easy observation.
The electrical part and the wave-form can be adjusted.

8-6 Video recorder

Room No. & name of facilities	Da 306 Workshop Colour-TV TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	250	12	3,000

Specifications:

Colour cassette video recorder using SECAM system and Teaching Materials Center system.

Easy testing of the internal circuits.

Equipped with measurement terminals.

Arranged for the practice of each circuit and the handling of electrical circuit.

Power source: AC 220V 60 Hz

Accessories:

- 1. Cassette tape 3**

Remarks:

Colour cassette video recorder for students' practice

Can record for 2 hours.

8-7 Colour video recorder

Room No. & name of facilities	Da 306 Workshop Colour-TV TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	350	12	4,200

Specifications:

Open type colour video recorder:

For recording and playback of video signal for more than 60 minutes using SECAM system and Teaching Materials Center System

Measurement terminals shall be provided.

Easy adjustment

The adjustment and testing of the mechanical part such as wow & flutter, tape speed, etc. can be easily made.

Easy observation of the characteristics and waveforms of electrical circuits.

Remarks:

Open type colour video recorder for students' practice

8-8 Variable element Yagi antenna

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	20	11	220

Specifications:

Five-element Yagi antenna for receiving frequency from about 100MHz to 500MHz.

Variable element length: ± 10 cm

The output terminals have a detector and the output can be indicated by a indicator.

Remarks:

Element length: variable

8-9 - 15 TV studio equipment

Room No. & name of facilities	Da 303 Lab. Studio TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	-	-	-

Specifications:

SECAM, shall be an instrument for East European color system. It is desirable that the testing of individual section can be made for each section as far as possible, for this makes easier to understand the combination of fundamental circuits.

- No. 8-9 : Monochrome ITV camera with tripod and lens 2 sets**
- No. 8-10: Color camera with tripod and lens 2 sets**
- No. 8-14: Television control console with monitor including microphone for audio circuit 1 set**
- No. 8-12: Pattern generator 1 set**
Capable of supplying signal for measurement in centralized system with each signal oscillator
- No. 8-15: Film, slide, image converter 1 set**
- No. 8-13: Illuminating apparatus, a whole set for illuminating studio as students' practice**
- No. 8-11: Video-recorder, open system in color**

A comprehensive set of said apparatus especially convenient for practicing television receiving. Capable of ditributing to practice benches minultaneously by image signal and VHF signal, etc.

Remarks:

The equipment is for practicing on SECAM system (more desirable if other system can also be operated) color video instruments and also for practicing on the receiver by sending image signal and signals of various kind to practic rooms. It shall also be a simple equipment for practicing handling and adjusting television transmitting instruments.

8-9 Monochrome ITV camera

Room No. & name of facilities	Da 303 Lab. Studio TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
SONY	300	2	600

Specifications:

Monochrome video camera, as specified in situ with view finder, microphone (condenser mike), 5-times zoom lens, and remote control equipment with tripod (capable of switching 90° right and left, capable of manual operation also).

Accessories:

1. Cable with connector
2. A set of maintenance parts

Remarks:

Monochrome standard camera for easy understanding by students

8-10 Colour ITV camera

Room No. & name of facilities	Da 303 Lab. Studio TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
SONY	1,200	2	2,400

Specifications:

Colour television camera with remote controll (up, down, right and left) equipment

System: SECAM and specified in situ otherwise

Scanning line: horizontal resolution, 250 lines or more

Minimum intensity of illumination: 250 lux or more

With microphone and zoom lens (5-times zoom)

Mounted on the movable stand

Accessories:

- 1. Cable with connector**
- 2. A set of maintenance parts**

Remarks:

Colour ITV Camera suitable for students' practice and capable of remote control and manual operation.

8-11 Video recorder

Room No. & name of facilities	Da' 303 Lab. Studio TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	1,500	1	1,500

Specifications:

SECAM system: specified in situ

Open type tape recorder capable of editing and for color.

Capable of recording for more than 60 minutes

Horizontal resolution: more than 240 lines

Accessories:

1. Open reel tape10 pcs.
2. A set of editing instruments and cables
3. A set of parts for maintenance

Remarks:

Of open reel system for color, to be used in studio.

Includes a set of equipment capable of editing.

Practical and sturdy enough for students' use.

8-12 Pattern generator

Room No. & name of facilities	Da 303 Lab, Studio TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Shibasoku	3,000	1	3,000

Specifications:

Integrated pattern generator: specified in situ SECAM system

1. Color bar signal
2. Cross bar signal
3. Picture signal: test pattern, portrait, 3 kinds or more
4. Dot signal
5. White signal
6. Synchronizing signal

Capable of distributing color signal to 30 desks.

The existing cable wiring shall be utilized.

The signals shall be distributed also to the practice desk for the monochrome television set by the existing cable.

Accessories:

1. Cables with connectors to be attached to the each desk
2. A set of maintenance parts.

Remarks:

Wiring to each of the 30 desks in each of the two class-rooms with terminals

A set in integrated system for color television.

Capable of adjusting and testing monochrome television receiver.

8-13 Lighting equipment

Room No. & name of facilities	Da 303 Lab. Studio TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
SONY	200	1 set	200

Specifications:

Flat light: 1kW 10 pcs.

Spot light: 1kW 4

With adjuster (controllable in studio)

Accessories:

Light 3 for each

Remarks:

A set of auxiliary lighting equipment for studio

For color camera and to be used by students

8-14 TV control console

Room No. & name of facilities	Da 303 Lab Studio TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
SONY	1,800	1 set	1,800

Specifications:

Monitor television:

- For color 2 sets
- For monochrome 2

Television receiver: Channels in situ, SECAM system

Voice signal input: announce microphone x 1, microphone x 2
remote control microphone x 1, record x 1
mixer x 1, W chime x 1, spare x 2

VTR input/output: Playback input x 3, picture recording output x 3

Tape input/output: Playback input x 3, picture recording output x 1

Picture system output: 2 series

Voice system output: 2 series

Monitor output: master monitor x 1, coice monitor x 1

Connection circuit: inter-com x 5, tally x 4, talk back x 1, cue x 1

Color telop apparatus: built-in (letter /background /letter /background switching system)

Special effect apparatus: fade-in/out, overlap, wipe, superimpose, keying

Camera for studio, voice control console: capable of ternary broadcasting

Shall be of the specification to suit the system in situ.

Remarks:

A control console for picture and voice to be used in studio:
with switching apparatus for sending picture and voice to each workshop

8-15 Film video signal converter

Room No. & name of facilities	Da 303 Lab, Studio TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	1,800	1	1,800

Specifications:

For converting movie film and slide into television pictures

Teaching materials display unit:

Illumination: 150 W x 2

An apparatus capable of projecting materials

Dimension of material: 29 x 21 cm

With field lens, built-in multi-pressor, TV camera stand, and projector stand

(1) Color ITV camera

ITV camera: specified in situ, SECAM system

(2) 16m/m, 8m/m movie projectors: with magnetic and optical recording/playback standard-type cinema projector

(3) Slide projector for 35 m/m slide

Remarks:

For school broadcasting: to be convenient for making autonomous program and other materials

A set of converting apparatus from 16 m/m movie projector and slide projector into television of convenient handling

8-16 Video transmitter control rack

Room No. & name of facilities	Da 303 Lab. Studio TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
--	1,500	1	1,500

Specifications:

A movable rack for testing, adjusting and measuring in maintenance of television camera and AV control console

With signal generator for testing, cathode ray tube oscilloscope for TV, electronic volt-resistance meter, IC simple tester, a set of tools

Remarks:

A measuring rack for adjusting picture to be used in maintenance of studio instruments, including a set of measuring instruments.

8-18 Circuit tester

Room No. & name of facilities			
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Sanwa Electric instrument Type EM-1000	30	12	360

Specifications:

Measurement range:

±DC-V: 10, 30mV, 0.1, 0.3, 1, 3, 10, 30, 100, 300V, 1k, 30kV

AC-V : 10, 30mV, 0.1, 0.3, 1, 3, 10, 30, 100, 300V, 1kV (p-p value proportional type)

dB : -59.5 ~ 61.5, -69.5 ~ 59.5 (11 ranges) 2

±DC-A: 0.01, 0.1, 1, 10, 100, 300μA, 1, 3, 10, 30, 100, 300mA, 1, 10A

AC-A : 0.1, 1, 10, 100, 300μA, 1, 3, 10, 30, 100, 300mA, 1, 10A
ohm 100, 1K, 10K, 100K, 1M, 10M, 100M, 1000M
(Minimum value: 0.01Ω, central value: 0.5Ω) 3

Remarks:

Self-calibration

8-19 Electronic volt & ohm meter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	30	12	360

Specifications:

Same as No. 3-22

8-20 Electronic voltmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	100	12	1,200

Specifications:

Same as No. 4-27

8-21 Monochrome TV set characteristics measuring system

Room No. & name of facilities	Da 307 workshop Mono-TV TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Kimura Electric Works	1,000	30	30,000

Specifications:

A table for students' practice and experiment with measuring instruments and signal terminals in front

Electronic volt-ohm meter, DC stabilized power source (0 - 30V 1A),
Clamp-on DC ammeter, oscilloscope

Pattern signal output terminal (signal wired from No. 8-21)

Sweep marker signal output terminal (integrated system)

Sweep marker integration machine:

Output impedance: 75 Ω balanced

Output voltage: 0.3V. rms, deviation: ± 1 dB

Output flatness: ± 0.5 dB

Attenuator:

Output: 10dB \times 8 + 10dB (continuously variable)

Local oscillating display: course marker: ± 10 MHz of IF frequency

IF marker : ± 1.5 MHz of IF frequency

Oscillation frequency: signal frequency in situ

sweep width: 20 MHz,

display linearity: within 2%

Marker frequency: specified in situ

Side marker: voice marker in situ

Number of distribution: to 30 desks

Horizontal output: 8 Vp-p

Accessories:

1. A set of tools
2. A set of wiring materials

Remarks:

A table for practice with a set of measuring instruments, with a side table, a chair, parts and a set of tools, and with built-in testers for adjusting every part inside television set and observing waveform, equipped with a characteristic band measuring equipment in high frequency region using cathode ray tube.

8-22 Colour TV set characteristics measuring system

Room No. & name of facilities	Da 306 Workshop Colour-TV TV		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Kimura Electric Works	2,000	30	60,000

Specifications:

A desk for experiment and practice by student with measuring instruments and signal terminals on the front

Measuring instruments:

Electronic volt-ohm meter

Clamp-on DC ammeter

Videoscope: with terminals for pattern signal, sweep marker signal and colour signal

Sweep marker signal generator (integrated system)

Output voltage: 0.3V. rms, deviation: ± 1 dB

Impedance: 75 Ω balanced

Output flatness: ± 0.5 dB

Attenuator: output: 10 dB x 8 + 10 dB (continuously variable)

Local oscillation display: course marker: ± 10 MHz of IF frequency
IF marker: ± 1.5 MHz of IF frequency

Oscillation frequency, marker frequency, side marker (voice):
specified in situ

Sweep width: 20 MHz

Display linearity: within 2%

Number of distribution: to 30 desks

Horizontal output: 8 Vp-p

Colour signal (signal terminal distributed from No. 8-21)

Subcarrier, and color adjusting pattern and signal (including color bar, dot, grid, rainbow color signal)

DC stabilized power source: 0 - 30V 1A

Accessories:

1. A set of tools
2. A set of wiring materials

Remarks:

A desk equipped with a set of measuring instruments for color television by students as practice with a side table, chair, standard parts and a set of tools

Capable of adjusting color television set and observing waveform

Capable of displaying characteristics of high frequency circuit on the cathode ray tube

Capable of measuring the characteristics of color circuit

8-23 Antenna characteristics measuring rack

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Anritsu Electric Type ML-51A	300	11	3,300

Specifications:

For measuring the pattern and gain of antenna and the field strength by using a field strength meter for TV frequency

Electronic tuning and automatic sweep type

Frequency range: 25 500 MHz

direct reading scale and calibration by built-in oscillator

Voltage measurement range:

Minimum value: less than 10 dB μ

Maximum value: more than 120 dB μ

Accuracy: \pm 2dB

Field strength measurement range:

Minimum value: within 1 - 28 dB

Maximum value: more than 110 dB

Detection system: Quasi-peak value

High-frequency attenuator: 10 db step, 60 dB (variable)

IF attenuator: 60 dB (continuously variable)

Recording output: more than IV with 100K Ω load at the full scale of indicator

Monitoring output: receiving A₂, A₃, F₃ signals

Accessories:

- 1. Doublet antenna 1
- 2. Tripod 1
- 3. Directive coupler 1

Remarks:

For measurement of the characteristics of TV Yagi antenna

8-24 Voltmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
DC voltmeter	20	40	800
AC voltmeter	16	30	480
	(Total)		1,280

Specifications:

Same as No. 3-23

1. DC voltmeters

Range:

0.3/1/3/10 (V)..... 30 sets
 3/10/30/100 (V) 10

2. AC voltmeters

Range:

30/100/300 (V) 10
 15/30 (V) 10
 75/100 (V) 10

8-25 Ammeter

Room No. & name of facilities	—		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
DC ammeter	18	40	720
AC ammeter	14	30	420
	(Total)		1,140

Specifications:

Same as No. 3-24

1. Moving coil type DC ammeters

Range:

- 3/10/30/100 (μ A) 10 sets
- 1/3/10/30 (mA) 10
- 10/30/100/300 (mA) 10
- 1/3/10/30 (A) 10

2. Moving coil type AC ammeters

Range:

- 20/100 (mA) 10
- 0.2/1 (A) 10
- 5/25 (A) 10

8-26 Digital circuit tester

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	150	12	1,800

Specifications:

Same as No. 4-28

8-27 Resistor

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	70	32	2,240

Specifications:

Same as No. 3-30

8-28 Resistor

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	30	32	960

Specifications:

Same as No. 3-29.

1,400 Ω 16 pcs.
 600 Ω 16

8-29 Resistance attenuator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Ando Electric Variable attenuator type AL-511SP	50	10	500

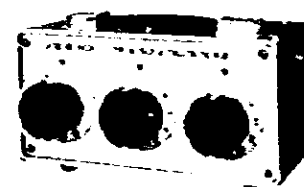
Specifications:

Frequency range: DC to 250 MHz

Characteristic impedance: 75 Ω unbalanced

Attenuation:

1. Range: 0 to 91 dB
2. Step: 0.1 dB x 10; 1 dB x 10, 10 dB x 8



TYPE AL-511SP

8-30 Standard inductance

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	65	6	390

Specifications:

Same as No. 4-53

8-31 Standard capacitor

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	30	6	180

Specifications:

Same as No. 4-54

8-32 Oscilloscope

Room No. & name of facilities	--		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Iwatsu Electric Synchroscope type SS-6100	880	3	2,640

Specifications:

CRT: 5-inch (130 mm)

Vertical sensitivity: 5mV/cm - 5 V/cm

Frequency range: DC to 100 MHz

Sweep time: 50 μ s/cm - 2 s/cm

Sweep magnifier: 10 times

Calibrator:

Output voltage: 20mV, 0.2 V, 2 Vp-p

Delayed sweep, single sweep, X-Y operation

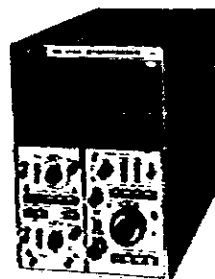
Power source: AC 220 V, 60 Hz

Accessories:

- 1. Camera mounting device 1 set
- 2. Scope wagon 1
- 3. 35 mm single lens reflex camera 1

Remarks:

For the practice of television, especially for photo-recording.



8-33 Videoscope

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Iwatsu Electric Synchroscope type SS-6050 (TV)	600	17	10,200

Specifications:

CRT: 6-inch

Vertical Sensitivity: 5mV/cm - 10 V/cm

Frequency range: DC 50 MHz or more

Sweep time: 0.1 μs/cm - 5s/cm

Calibrator:

Output voltage: square wave, 20mV, 0.2V, 2Vp-p

Full auto trigger and alternate trigger

TV synchronization: possible

TV₁, TV₂, sin₂

TV delay: possible

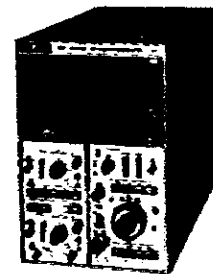
X-Y operation, single sweep: possible

Sweep magnifier: 10 times

Power source: AC 220 V, 60 Hz

Accessories:

- 1. Measuring probe 2
- 2. Scope wagon 1



SS-6050 (TV)

Remarks:

For waveform observation of TV receivers

For the observation and measurement of TV sets

8-34 Wave meter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Mita Musen Type SP-3	10	10	100

Specifications:

Same as No. 5-48

However, the frequency range is from 260 MHz to 700MHz or more.

8-35 Digital frequency counter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	400	12	4,800

Specifications:

Same as No. 3-27

8-36 Q-meter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	300	8	2,400

Specifications:

Same as No 3-36

However, the frequency range is from 20 to 230 MHz or more.

8-37 Radio frequency bridge

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	300	3	900

Specifications:

Same as No. 5-50

8-38 Waveform analyzer

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	1,000	2	2,000

Specifications:

Same as No. 5-53

8-39 Standard signal generator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Anritsu Electric Type MG-528A	400	6	2,400

Specifications:

Carrier frequency characteristics:

Range: 38 - 520 MHz or more
 Accuracy: $\pm 0.5\%$
 Can calibrate

Output characteristics:

Level range: -21 - 120 dB μ
 Level accuracy: ± 0.7 dB
 Attenuator: 1dB x 11, adjustable in the range of 130 dB by 10 dB step
 Impedance: 50 Ω

Modulation characteristics:

1. AM:

Internal modulation frequency: 0.3, 0.4, 0.5, 1, 2, 3 KHz
 Modulation rate: 0 - 50 %
 Distortion: less than -30 dB at 30 % modulation

2. FM:

Internal modulation frequency: 0.3, 0.4, 0.5, 1, 2, 3 KHz
 Frequency deviation: 0 - 7.5 KHz
 Distortion: less than -30dB for 1kHz modulation frequency
 at 30kHz frequency deviation

3. S/N ratio: as low as possible

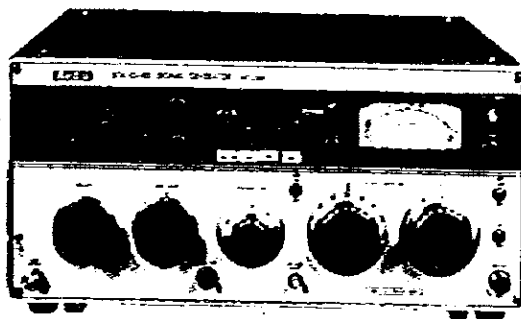
Power source: AC 220 V, 60 Hz

Accessories:

1. Power source cord 1
2. Output cable 1

Remarks:

**Standard signal generator for VHF and UHF
AM and FM modulation**



MG528A

8-40 Standard signal generator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	400	6	2,400

Specifications:

Same as No. 3-38

8-41 Test oscillator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	20	22	440

Specifications:

Same as No. 7-34

However, the frequency range is from 30 kHz to 500 MHz or more.

8-42 Sweep generator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	600	5	3,000

Specifications:

Same as No. 3-41

8-43 Oscillator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	170	5	850

Specifications:

Same as No. 3-37

8-44 Transistor characteristics display unit

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	700	3	2,100

Specifications:

Same as No. 5-64

8-45 Transistor checker

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	350	5	1,750

Specifications:

Same as No. 3-34

8-46 IC tester

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	200	5	1,000

Specifications:

Same as No. 3-33

1. Type DIC-10 2 sets
2. Type AIC-10 3 sets

8-47 LCR meter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	110	6	660

Specifications:

Same as No. 3-25

8-48 Phase meter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Shibasoku Video frequency delay distortion measuring instrument type 763NA	500	12	6,000

Specifications:

For measuring the delay distortion for color TV sets.

Input impedance: 75 Ω

Sweep frequency range: 50 kHz - 4.8 MHz

Frequency characteristics: 50 kHz - 5.5 MHz, ± 0.5 dB

Sweep repeat frequency: about 5 Hz

Marker frequency: 0.25 / 1 / 2 / 3 / 3.75 / 4.43 / 4.8 MHz built-in

Measuring signal output: 0.1 - 1.1 Vp-p

Measuring frequency range: 250 kHz - 4.8 MHz or more, error: ± 10 ns

Measuring range: +150 ns - 450 ns

Phase adjustment range: about 0 - 5 μ s / 5 - 10 μ (changeover)

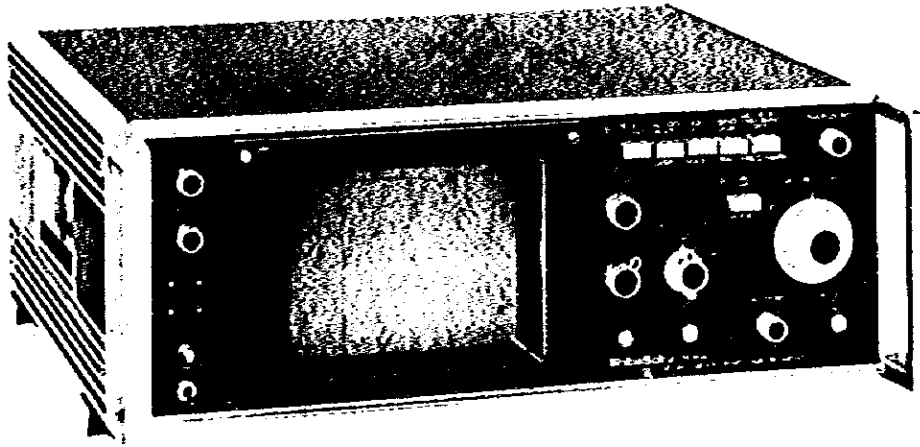
Accessories:

1. Coaxial cable 1
2. Extension circuit board 1

Remarks:

For measuring the frequency vs delay distortion characteristics of color TV circuit.

Can measure color edge distortion by envelope delay characteristics.



8-49 X-Y recorder

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	550	4	2,200

Specifications:

Same as No. 4-63

8-50 Field strength

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
LEADER TV-field intensity meter type LFC-944A			

Specifications:

Electric field intensity meter for VHF and UHF bands.

Receiving frequency: specified in situ.

Measuring level range: VHF, UHF

Accuracy: within ± 4 dB

Selectivity: about 500 kHz

Accessories:

Standard antenna 1

8-51 UHF test rack

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
<p>LEADER TV-VHF swimmer generator type LSW-353A</p>	600	12	7,200

Specifications:

**VHF and UHF tuner characteristics direct viewing device:
mounted in a rack**

Frequency range: specified in situ
 Output voltage: 0.5 V rms
 Impedance: 75 Ω unbalanced
 Output deviation: ± 1 dB
 Output flatness: ± 0.5 dB

Attenuator: 1dB x 10, 10 dB x 8
 Horizontal output voltage: 10 Vp-p

Brightness marker output: 10 Vp-p

Sweep width: 20 MHz

Sweep time: 8 ms

Display linearity: within 2 %

Marker frequency: video carrier frequency () ± 4.5 , ± 5.5 MHz

Side marker: ± 4.5 , ± 5.5 MHz (in pulse shape)

Marker accuracy: 1×10^{-4}

Local oscillation indication range: course marker: ± 10 MHz of IF frequency

IF marker: ± 1.5 MHz of IF frequency

Display linearity: 10%

Marker frequency: specified in situ

Accuracy: 1×10^{-4}

With automatic tracking

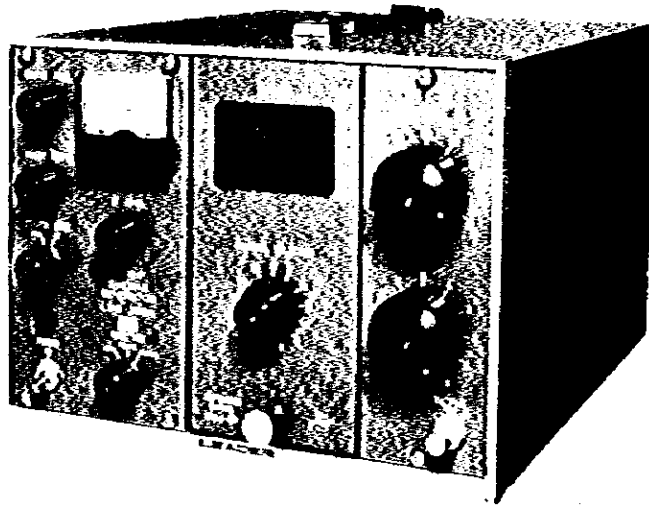
Accessories:

Cable7

Remarks:

Tester for UHF receiver

Tuner tester for VHF and UHF receiver



8-52 Video tape testing arrangement

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Shibasoku VTR test signal generator VTR jitter meter	600	10	6,000

Specifications:

VTR test signal generator:

- Synchronized signal : $-4.0V \pm 1.0V_{p-p}$
- Subcarrier signal level: $2.0V_{p-p}$
- Signal output: video level: $+0.174V_{p-p}$
synchronized level: $-0.286V_{p-p}$
- Step-form wave signal: 10 steps,
Linearity: $\pm 3\%$
- Square sine wave signal: half value width: $0.25 \mu S$ (2T)
linking: 2%
- Multi-burst signal : $f=1.5/2/3/3.6/4.2$ MHz
Accuracy: 2% amplitude deviation: 3%
- Square wave signal: width $16 \mu S$ rise time $0.2 \mu S$
- Insertion position signal: band 1 - 4 (1)
band 5 - 8 (2)
band 9 - 15 (3)

VRT jitter generator:

- Linearity characteristics: 0.01% reading on $\pm 0.1\%$ full scale
- For measuring H of jitter during 1V period by using oscilloscope at the same time
- Can measure tape speed

Wow and flutter meter: for measuring the rotational fluctuation (wow and flutter) and the deviation of rotational frequency

Remarks:

For measurement of the characteristics of color video tape recorder mechanism and for electrical measurement of the general tests.

8-53 Eliminator power unit

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	250	10	2,500

Specifications:

Same as No. 4-69

8-54 Constant-voltage unit

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	50	10	500

Specifications:

Same as No. 3-46

Voltage: 0 - 15 V or more, if possible, 30 V

Electric current: more than 3A

8-55 Workbench

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Workbench	-	-	3,150
Chair	5	70	350
	(Total)		3,500

Specifications:

Same as No. 2-32

Desk for teacher 2 sets x 30,000 = 60,000 yen

Workbench

1. 1,500 x 500 x 760 H m/m 3 sets x 30,000 = 90,000

2. 1,300 x 1,000 x 760 H m/m 60 sets x 50,000 = 3,000,000

(Total) 3,150,000

Chair 70 sets x 5,000 = 350,000 yen

8-56 Locker

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Shelf	60	5	300
Rack	55	10	550
	(Total)		850

Specifications:

Same as NO. 2 - 33

- 1. Shelf 5 sets
- 2. Rack 10

Remarks:

For storing measuring instruments

8-57 Movable blackboard

Room No. & name of facilities	Da 307 Lab. Mono-TV Da 306 Lab. Colour-TV	TV TV	
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
	50	2	100

Specifications:

Same as No. 2-34

8-58 Copier

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	400	2	800

Specifications:

Same as No. 1-4

8-59 Overhead projector

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	150	2	300

Specifications:

Same as No. 1-11

8-60 Automatic slide projector

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
	120	2	240

Specifications:

Same as No. 2-35-3

8-61 Movie projector

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	750	2	1,500

Specifications:

Same as No. 1-12

8-62 Amplifier for lecture

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	150	2	300

Specifications:

Same as No. 1-8

8-63 Tape recorder

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Cassette tape recorder	60	2	120
Cassette tape	0.5	40	20
	(Total)		140

Specifications:

Same as No. 3-57

Accessories:

1. Cassette tape (C-60) 40 pcs.
2. AC power source code ... 2

8-64 VTR unit

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
--	1,000	2	2,000

Specifications:

Same as No. 1-15

8-66 Wires

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	6	180	1,080

Specifications:

Same as No. 3-59

8-67 Parts

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	-	-	10,000

Specifications:

Same as No. 3-60

Remarks:

A set of parts for TV, L.C.R. and the other small parts

8-68 Tool set

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	110	100	11,000

Specifications:

Same as No. 2-8

Remarks:

A set of tools for practice in a cabinet

8-69 Tools for preparatory work

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	50	5	250

Specifications:

Same as No. 2-39

9a TC-3 Electronic telecommunication I (wire telecommunication,
data transmission)

Cost of equipment:

1. Price Thousand Yen : 199,820

2. Price US\$: 1,024,718

9-1 Electric telecommunication network display panel

Room No. & name of facilities	Da 309 Workshop wire Telecom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	4,500	1	4,500

Specifications:

1. Shall include scale, facilities and apparatuses for satisfying items stated in the above remarks, and be provided with electric and electronic construction required.
2. Shall withstand a long-term use and have audiovisual function for explaining the contents.
3. Power source: AC 220 V, 60 Hz

Remarks:

1. Educational display panel system for understandably displaying information concerning main lectric telecommunication network and telecommunication system centering on the school.
2. Capable of clearly expressing a system, contents classification and relation of each type of telecommunication networks.
3. Possible to display relation between Equipment No. 9-107 ~ 9-109.

9-2 Electric telecommunication network model

Room No. & name of facilities	Dá 309 Workshop Wire Telecom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	400	1	400

Specifications:

1. The telecommunication network and the system thereof shall be clearly, precisely and easily understandable with respect to the construction, system and configuration.
2. The system shall have functions for explanation and illustration in the main device itself.
3. Power supply: AC 220V, 60 Hz

Remarks:

1. Shall withstand a long-term use, be solid and beautiful
2. Shall be put in an accommodating case having a shape suitable for the practical purposes.
3. Possible to be the associated models with Equipment No. 9-107~9-111

9-3 Experimental cable circuit

Room No. & name of facilities	Da 309 Workshop Wire Telecom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	1,500	2	3,000

Specifications:

1. For training use in signal propagation in telecommunication, and local telephone cables having impedance of 600Ω are provided with frame facilities over the effective extension length of 2 km.
2. Transmitting terminals and receiving terminals as well as intermediate terminals must be provided and also terminal boards must be provided so as to be suitable for the training.

9-4 Dummy line

Room No. & name of facilities	Da 309 Workshop Wire Telecom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Ando Electric Type TSE-3	150	10	1,500

Specifications:

1. Shall have constant and characteristics as dummy line for telecommunication.
2. Shall be suitable for measuring line constant and propagation characteristics.
3. Shall have characteristics as dummy line for wired telecommunication training.

Frequency: 0.3 - 3.4 kHz

Equivalent point of delay amplitude: 200 Hz step between 0.2 - 3.6 kHz

Low: 0.45 - 1.15 ms

Loss: -3.5 - 0 dB

High: 0.9 - 2.3 ms

Gain: 0 - +3.5 dB

Input/output impedance: 600Ω balance

Calibration portion: 0.3 - 3.4 KHz

Sweep time: approx. 5 seconds

Sweep output: 1V/1 KHz

Remarks:

1. Arbitrary voice links must be constructed by adjusting the propagation delay and amplitude in the voice frequency.
2. Calibration of delay and amplitude must be carried out.
3. AC power source must be suitable for the specification in situ.

9-5 Attenuator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Anritsu Electric Resistance attenuator type MN-31A, 32A, M-215C, M-510C/D	80	18	1,440

Specifications:

Variable resistance attenuators: step dials type

1. Type MN-31A:

Frequency: DC to 1 MHz

(1) Impedance: 150 Ω unbalanced, Max. attenuation: 11/dB.....

(2) Impedance: 600 Ω balanced, Max. attenuation: 11/dB

(3) Impedance: 300 Ω unbalanced, Max. attenuation: 11/dB

2. Type MN-32A:

Frequency: DC to 1 MHz

Impedance: 600 Ω unbalanced

Max. attenuation: 111 dB

3. Type M-215C

Frequency: DC to 30 MHz

Impedance: 75 Ω balanced

Max. attenuation: 91 dB

4. Type MN-510C

Frequency: DC to 500 MHz

Impedance: 50 Ω unbalanced

Max. attenuation: 91 dB

5. Type MN-510D

Frequency: DC to 500 MHz

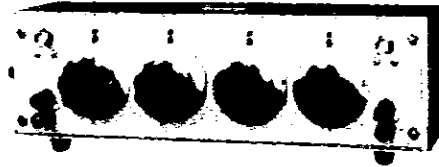
Impedance: 75 Ω unbalanced

Max. attenuation: 91 dB

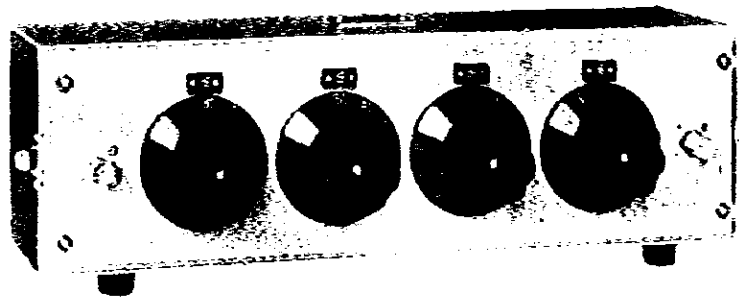
Remarks:

Must be solid and withstand a long-term use.

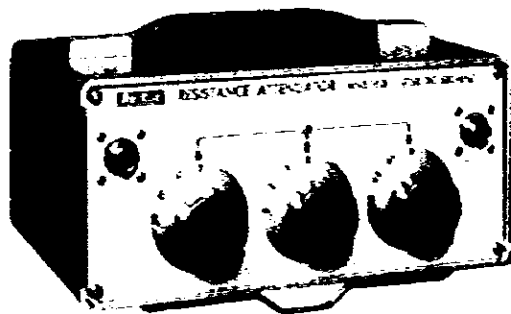
Must have extremely low change in accuracy with elasp of time.



MN31A
MN32A



(U-215C)



(VA5100)

9-6 Filter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Anritsu Electric Low-pass filter type M-238C	100	9	900
High-pass filter type M-253B	100	9	900
	(Total)		1,800

Specifications:

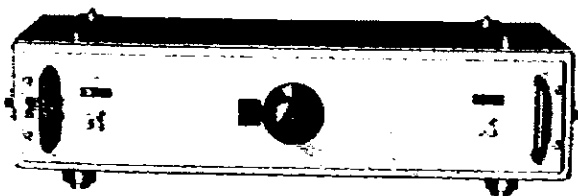
Cut off frequency and variable dial type

1. Low-pass filter 9 sets
 Frequency: 50 kHz - 18.1 MHz
 Nominal impedance: 75 Ω unbalanced
2. High-pass filter 9 sets
 Frequency: 70 kHz - 25.6 MHz
 Nominal impedance: 75 Ω unbalanced

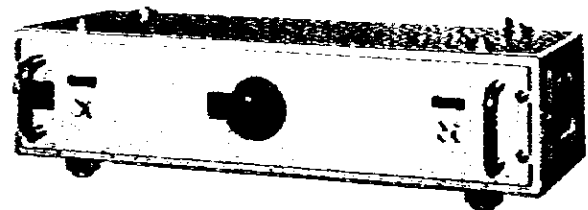
0.1 Hz - 200 kHz, 3-digit decade setting 2CH 24 dB/oct
 0.1 Hz - 100 kHz, 3-digit decade setting 2CH 48 dB/oct
 2Hz - 20 kHz, continuously variable 24 dB/oct

Remarks:

1. Easy handling and solid type
2. High accuracy and high stability



M - 238C



M - 253B

9-7-1 Cables

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Showa Electric Wire & Cable	100	18	1,800

Specifications:

1. Must be telecommunication cable specimens of each kind and must have clear indication of internal construction.
2. Must have indications which are capable of easily understandable electric constants, purpose of use, characteristics and the like.

9-7-2 Cables

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Ando Electric type SCK- 15, 16, 17, 18, 43	100	18	1,800

Specifications:

1. Must be artificial cables for use in characteristic tests and measurements of telephone circuits, and distortion measurement of dial impulse transmitting must be possible.
2. Simulating on psudo distance length: 7.5 km, 20 km, 47 km
3. Construction of elements: 0.5 + 1 + 2 + 4 km
 1 + 2 + 2 + 2 + 5 + 10 km
 2 + 5 + 10 + 10 + 20 km
4. Range of frequencies: 0.25 - 100 MHz

9-8 Lecher wire testing arrangement

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Shimadzu Scientific Instrument Radio wave experiment apparatus type EU-60	100	10	1,000

Specifications:

Transmitter:

Frequency: 500 MHz band

Output power: with 0.1 - 1 watt variable oscillation strength meter

Modulation: AM, internal modulation and external modulation change-over by the power source frequency changeable in degree of modulation

Antenna: Yagi antenna with reflector, horizontal polarization

Receiver:

Frequency: same as the oscillator

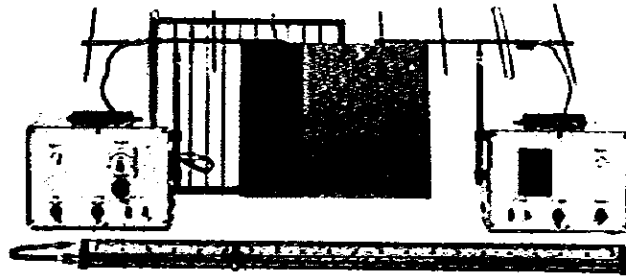
Detection: it must be possible for the receiver to carry out the relative measurement of the reception strength by the crystal detector, voice amplifier, speaker and output level meter.

Antenna: have wave length doublet antenna + wave guide + reflector rotatable by 360° in construction and also have angle indicating portion.

Lecher wire: parallel two-line Lecher wires are fixed at the strong wooden bed having a scale of about 1.5 in length and they must have removable short-circuit slide and lamp slide element for the indication of the standing wave.

Remarks:

1. Small-type transmitter and receiver of 500 MHz band and transmitting and receiving antennas must be used in which transmission and reception trainings must be carried out in rooms.
2. Standing waves must be directly visualized by the connection of the Lecher wire wave meter instead of an antenna to the receiver with the use of a small bulb or small discharge tube as well as the directivity characteristic of the receiving antenna and wave.



137-049 整流变频器 EU-60形

9-9 Experimental telegraph arrangement

Room No. & name of facilities	Dc 304 Workshop Teletype TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	80	35	2,800

Specifications:

1. Construction

- Key
- Keyboard
- Audio apparatus
- Video RAM & CRT display
- CW adapter
- RTTY adapter
- CPU (micro processor)
- ROM & RAM
- I/O port interface
- Built-in 800 Hz oscillator for training
- Center frequency of filter 800 Hz, band width of ± 75 Hz, -20 dB
- With software

- 2. Power source:** stabilized power source for eliminator is provided at the input side - specification in situ

Remarks:

Consist of key, keyboard, video RMA, CRT display, processor, I/O interface, ROM AND RAM, used as a terminal device of a learning system for simultaneously per forming telegraph experiment by a number of people.

9-10 Telegraphy training arrangement

Room No. & name of facilities	Dc 304 Workshop Teletype TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	200	1 set	200

Specifications:

- | | |
|-----------------------|------------------------------|
| Transmission keys | EP ROM |
| CW adapter | DISK, keyboard, case |
| RTTY adapter | RTTY reader |
| CPU (micro processor) | TTY & RTTY hard copy printer |
| RAM & VRAM | |
| I/O interface board | |

Power source is provided at the input side of stabilized power source for eliminator.

Remarks:

1. Practical system for carrying out telegraphy training by many trainees at the same time. Capable of checking at any time the transmitting conditions of each trainee by an instructor and capable of hearing their transmitting tones or display the corresponding tones on the CRT.
2. Must have all softwares necessary for the training.

9-11 Teletype arrangement

Room No. & name of facilities	Db 302 Workshop Tel. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
NEC	2,500	12	30,000

Specifications:

Construction:

- Console terminal
- Graphic console
- General input/output devices
- CM memory, DISK memory unit with I/F
- CPU, LAB systems

Software:

- System utility
- Language software
- Library
- Operating system
- Diagonostics

Power source: input side of the stabilized power source for eliminator - specified in situ

Remarks:

1. This is a multi-console terminal system under the CPU control and is the one which carries out the transmission and control of character data and pictures as well as the practice of operation and processing.
2. Must have necessary and sufficient software for the above purpose.

9-12 Adjusting instruments

Room No. & name of facilities	Dc 304 Workshop Teletype TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	500	3	1,500

Specifications:

Synchroscope:

Multi-phenomena, timing pulse display band width frequency

Logic analyzer:

Data display positive and negative logic pattern trigger, clock qualifying function, timing pattern binary, octal and secadecimal notations

Movable frame:

Other necessary measuring instruments and apparatuses are carried thereon.

Remarks:

This is provided with measuring instruments and apparatuses necessary for adjustment, testing, maintenance, and repair of the devices such as experimental telegraph arrangement, telegraphy training arrangement and teletype arrangement on the movable frame.

9-13 Typewriter

Room No. & name of facilities	--		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
--	200	12	2,400

Specifications:

Full-automatic universal English typewriter with more than 44 keys.

The letters are pika or elite.

Tab-letter free type

Remarks:

Must be solid and durable for a long-term use.

Power source must be suitable for the specification in situ.

Clear and balanced printing must be available.

9-14 Telephone set

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Iwatsu Electric Magneto telephone type 61M	20	20	400

Specifications:

Signal power source: incorporating a hand-rotating magneto generator: 16 - 20 Hz, 50 - 70 V

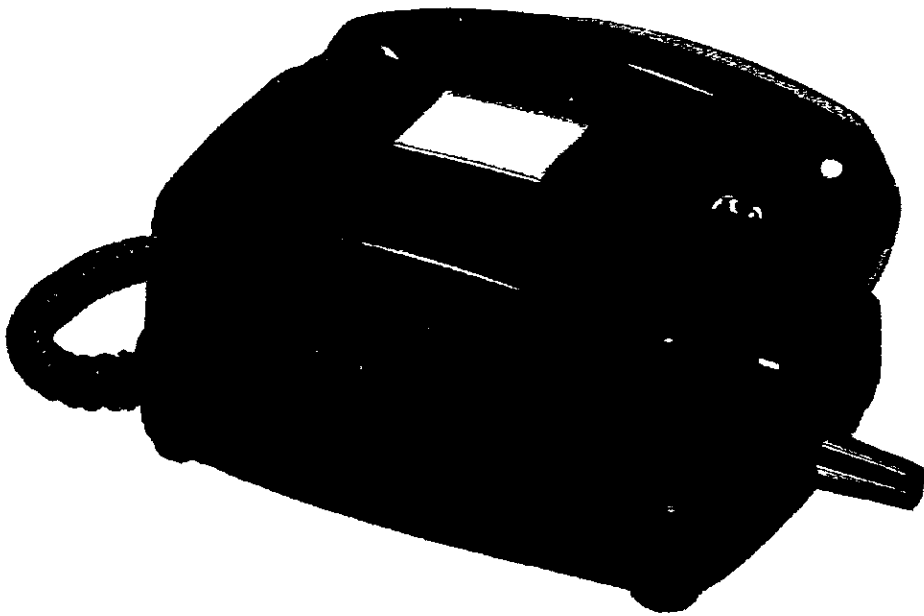
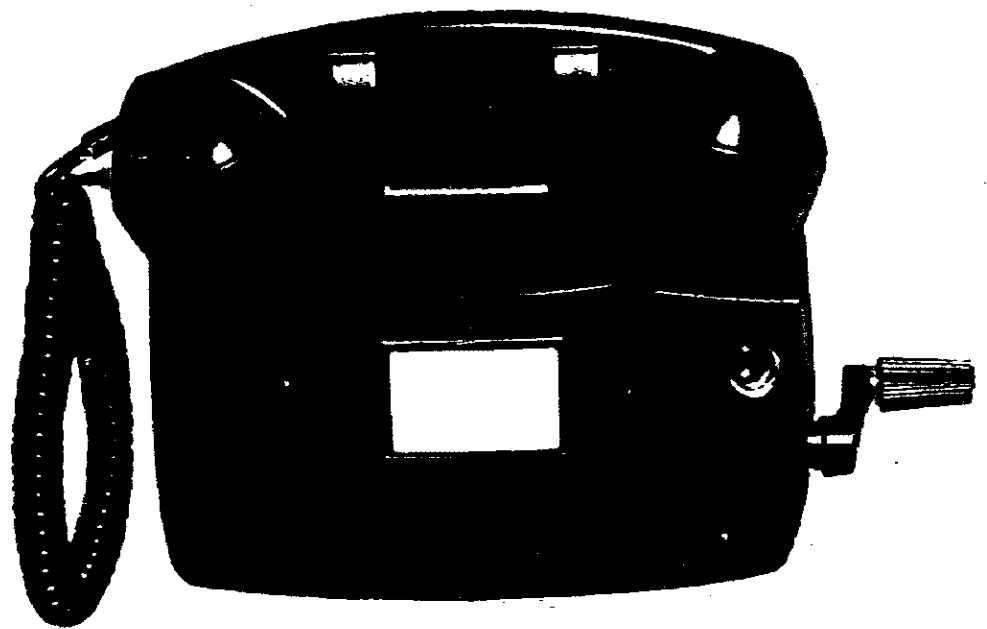
Telephone power source: dry batteries

Model: must have performance equal or more than the No. 41 handset type

Remarks:

Solid and easy for handling.

Durable for along-term use and excellent in characteristics.



9-15 Telephone set

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Iwatsu Electric Common-power telephone set	10	20	200

Specifications:

Transmitter:

Characteristic equal to or more than the T-60 model

Receiver:

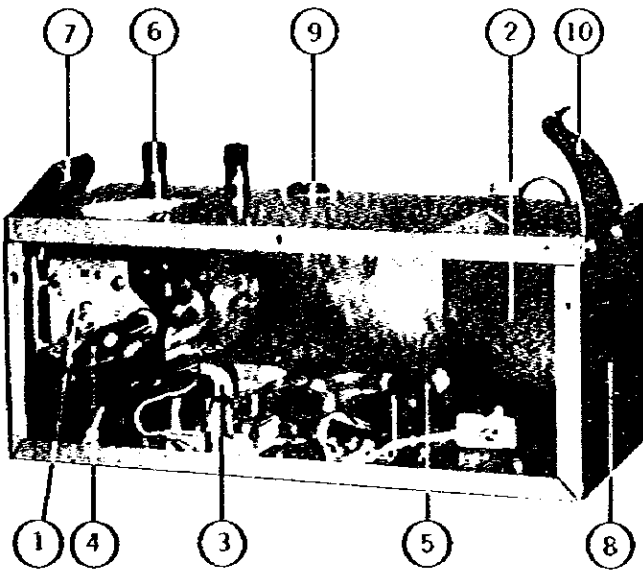
Characteristic equal to or more than the R-60 model

Plastic handset type

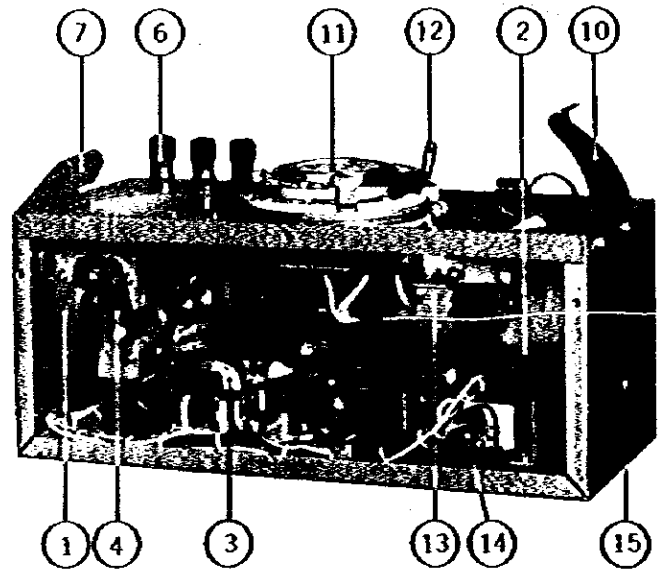
Remarks:

Solid, excellent in characteristic and durable for a long-term use.

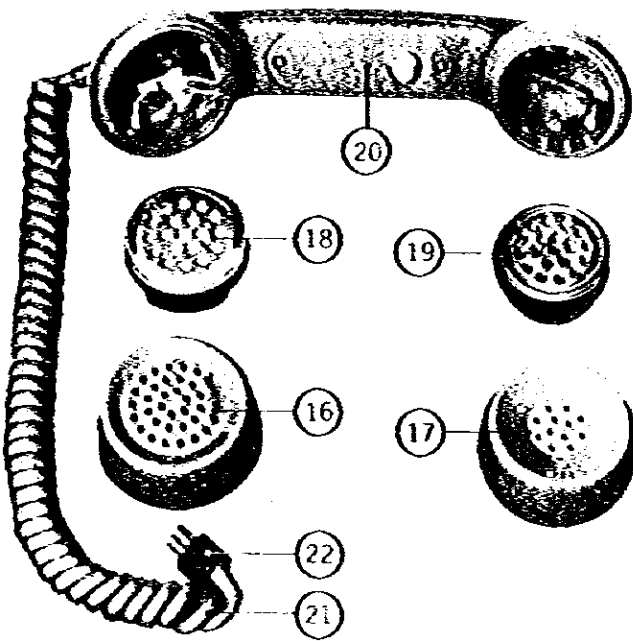
Component Parts List:



Inside of PT-71



Inside of PT-72



PT Handset Assembly

1. G-5B Magneto Generator
2. Dry Cell Compartment
3. B-106 Magneto Bell
4. Generator Handle
5. N-71 Network
6. Line Exchange Terminal
7. Handset Holder A
8. PT-71 Chassis
9. Jack
10. Handset Holder B
11. PT Dial
12. Change-over Switch
13. Hookswitch Assembly
14. N-72 Network
15. PT-72 Chassis
16. H-60 Mouthpiece
17. H-60 Earpiece
18. T-60 Transmitter Capsule
19. R-60 Receiver Capsule
20. PT Handset Body
21. PT Handset Cord
22. PT Handset Plug

9-16 Telephone set

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Iwatsu Electric Automatic telephone set type 600	15	50	750

Specifications:

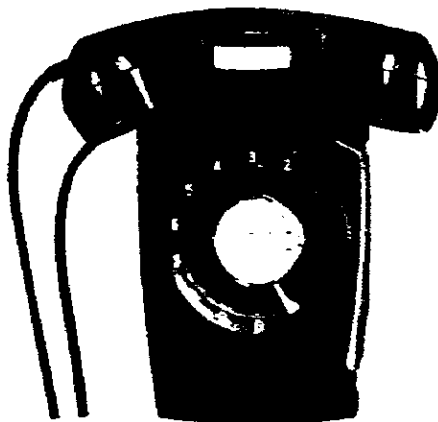
Performance equal to or more than type 600 dial automatic telephone.

The transmitter must have characteristics equal to or more than that of Type T-60 and the receiver must have equal to or more than that of Type R-60. The transmitter-receiver must be Type H-60.

Including PBX telephone of each kind.

Remarks:

Solid and durable for a long-term use.
Excellent in characteristic.



600-A1 W

9-17 Telephone set

Room No. & name of facilities	-			
Name of manufacturer & type for reference	Unit price	Q'ty	Amount	
Iwatsu Electric Push-button-dial automatic telephone set	20	50	1,000	

Specifications:

Built-in oscillation circuit as a signal power source, which generate some kinds of frequencies.

Must have more than twelve push-button selection mechanisms.

Remarks:

Solid and excellent in characteristics.

Durable for a long-term use under the environmental condition of the site.

9-18-1 Exchange

Room No. & name of facilities	Db 302 Workshop Tel. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Iwatsu Electric Magneto-type telephone exchange	150	1	150

Specifications:

Must be possible to identify the 'call' signal from the magnetic telephones and be possible to connect the communication channel by means of cord circuit plug, jack or switch circuit.

Must be provided with a signalling device for signalling the end of 'call' and calling subscribers.

Number of subscriber lines: 20 lines

Remarks:

Manual exchange for performing mutual exchange training of magneto-type telephone

Solid, durable for a long-term use, easy for handling and secure in operation.

9-18-2 Exchange

Room No. & name of facilities	Db 302 Workshop Tel. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Iwatsu Electric Common-power telephone exchange	200	1	200

Specifications:

- Common-power room exchange**
- Including a floating power source**
- Console station line relay board type**
- Complete common control system**

Remarks:

Solid, high reliability, secure in operation.

9-19-1 Exchange

Room No. & name of facilities	Db 302 Workshop Tel. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
--	5,000	1	5,000

Specifications:

Step-by-step type switch

Line switches and mounting frames

Selector switches and mounting frames

Connectors, switches and mounting frames

Signal current generator

Power source: eliminator system

Accessories and spare parts

Remarks:

Shall be possible to construct the minimum system of step-by-step automatic exchange by providing each switch of step-by-step system on the independent frame and also by connecting the terminal board thereof, and be possible to perform experiments of mutual selection, calling and communication.

9-19-2 Exchange

Room No. & name of facilities	Db 302 Workshop Tel. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Nissei Tsushin Kogyo NYC6 automatic telephone exchange training device	2,000	1	2,000

Specifications:

Basic function:

Shall be possible to learn the construction of the cross-bar type automatic exchange and operations of the constructing parts thereof.

Must understand and confirm the operation of the common control circuit by a display panel.

Must learn the operation of each relays and circuits thereof.

Must learn the construction of the cross-bar switches and the operating principles thereof.

Must learn the principle of the power source.

Must have the following functions:

Extension mutual communication, station line auromatic oscillation, station line arrival of signals, call-back function, automatic exchange during night, automatic release, call signal indentification, marker sequence operation display board.

Others:

Must be possible to learn the construction and function of data telecommunication and telecommunication network.

Must be possible to learn the operation and circuit on the telecommunication network controller.

Must be possible to learn the opration and circuit of modem devices.

Must be possible to learn the transmission control procedure.

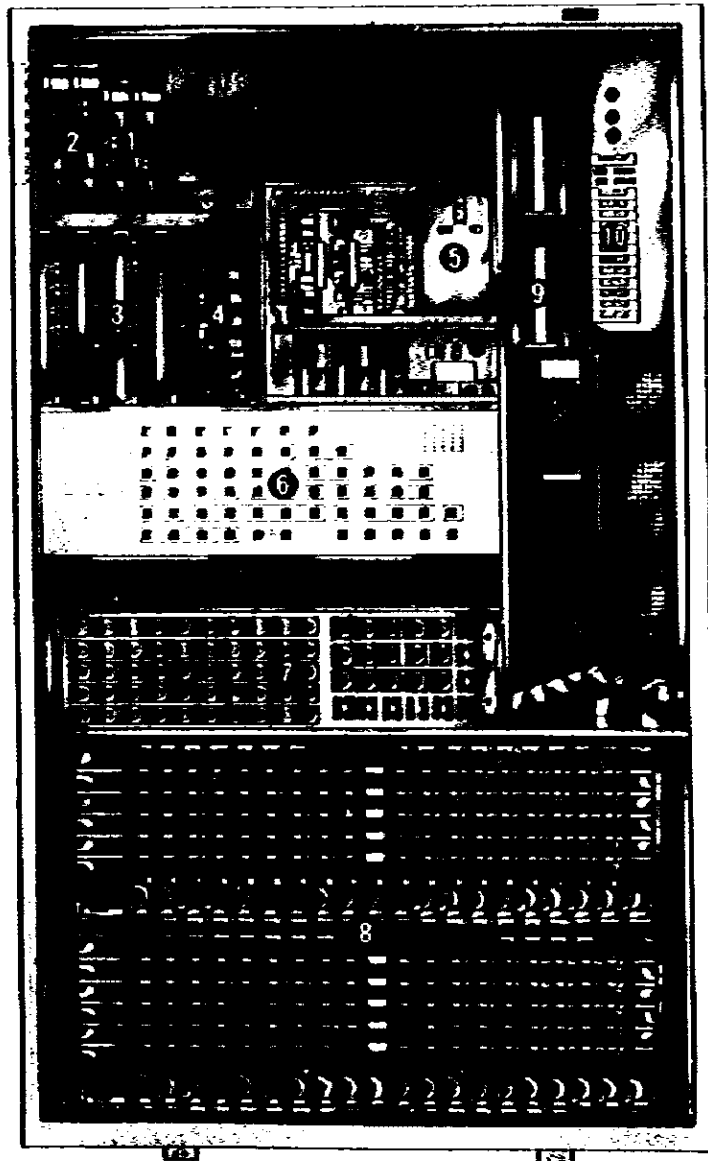
Must be possible to learn the assembling and transmission of the transmission condes.

Must be possible to learn the practical trainings of data transmission and reception.

Remarks:

Must be the one for performing training experiments of operation and test of the cross-bar type automatic exchange and must be secure in operation, easy for handling and durable for a long-term use.

Must have automatic exchange function for data telecommunication.



9-20 Adjusting instruments

Room No. & name of facilities	Db 302 Workshop Tel. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
—	500	3	1,500

Specifications:

Same as No. 9-12

9-21 Experimental carrier telecommunication arrangement

Room No. & name of facilities	Da 309 Workshop Wire Telecom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Ando Electric	6,000	2	12,000

Specifications:

Premodulation: 12 kHz, 20 kHz

Group modulation: 96 kHz, 120 kHz

Training items:

- Learning of the construction and operation principle of the carrier telecommunication
- Learning of the operation and characteristic of the modulator
- Learning of the operation and characteristics of the demodulator
- Practical training of the carrier wave transmission and characteristic measurement of the amplifiers
- Practical training of voice wave transmission and characteristic measurement of amplifiers
- Characteristic measurement of filters
- Characteristic measurement of attenuator-equalizer
- Characteristic measurement of hybrid coil circuits
- Over-all characteristic measurement

Accessories and spare parts

Remarks:

Device for performing basic training on the carrier telecommunication in which a pair of carrier communication terminal stations are connected thereto by cables.

Must be considered so as to easily perform the trainings on the operation principle of each part consisting of the device and characteristic test and measurements.

9-22 Experimental frequency division multiplex system

Room No. & name of facilities	Da 309 Workshop Wire Telcom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Ando Electric	1,000	2	2,000

Specifications:

1. Construction

- Carrier wave generator
- Voice amplifier
- Equalizer-attenuator
- Filter (low-pass, high-pass, band-pass, band-bloc of each kind)
- Balance modulator
- Amplifier
- Equalizer
- Demodulator
- Circuit network
- Attenuator

Must systematize all the construction as an experiment device and mount them on an experimental frame.

2. Power source

Eliminator power: at the input side, specification in situ

Remarks:

Must be an experimental device for learning the principle and operation of the experimental frequency division multiplex system having the basic construction of the experimental frequency division telecommunication system.

Must be possible to observe the balance modulation wave shape, frequency band width, filter characteristic, carrier wave shape, and voice wave shape and to perform the transmission and reception experiment of more than two channels.

9-23 Experimental time sharing telecommunication arrangement

Room No. & name of facilities	Da 309 Workshop Wire Telecom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Ando Electric	1,000	2	2,000

Specifications:

1. Construction

- Carrier wave generator
- Time division signal generator
- Time division convertor
- Time division demodulator
- Signal transmitter
- Power source

2. Function

Capable of learning the principle operation of the signal transmission of more than two channels through the time division multiplex system by the observation of waves.

3. Power source

Eliminator stabilized power source: input side, specification in situ

Remarks:

Must be the test device for learning the principle and operation of the experimental time division multiplex system, having the basic construction of the experimental time sharing multi-telecommunication arrangement.

Must be possible to perform wave observations of each part and characteristic measurements.

9-24 Experimental PCM telecommunication arrangement

Room No. & name of facilities	Da 309 Workshop Wire Telecom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	1,200	2	2,400

Specifications:

1. Construction

- Pulse code modulation device
- Regenerative repeater
- Encoder
- Decoder
- Memory
- A-D converter
- D-A converter
- Synchronous device
- Input-output device
- Display unit

2. Function

Must fully satisfy the functions indicated in the remarks.

3. Power source

Eliminator stabilized power source: input side, specification in situ

Remarks :

This is intended for understanding the PCM control by the observation or measurement of coded symbols and response waves, using the PCM system as a communication switch circuit, and for the purpose of learning the principle of PCM multiplex telecommunication system.

9-25 Adjusting Instruments

Room No. & name of facilities	Da 309 Workshop Wire Telecom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
	500	3	1,500

Specifications:

Same as No. 9-12

9-26 Computer system

Room No. & name of facilities	Dc 304 Workshop Teletype TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Hitachi Fujitsu NEC	14,000	1 set	14,000

Specifications:

1. Construction

- Central processor
- External memory
- Input/output device
- Display
- Transmission line
- Interface
- Modem device
- Telecommunication control device

2. Function

- Memory capacity: more than 16 kW
- Cycle time: less than 0.6 μ S
- Operation speed: less than 1.4 μ S
- Telecommunication speed: 100 - 1,200 baud
- Code: standard ASCII code
- Software: must attach software necessary for the operations including OS software.

Remarks:

A computer system for performing the training of small-scale data transmission and telecommunication.

A system construction full necessary for performing data telecommunication between plural terminals centering the minicomputer.

9-27 Peripherals

Room No. & name of facilities	Dc 3.04 Workshop Teletype TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Hitachi Fujitsu NEC		2 sets	

Specifications:

1. Memory

- Magnetic disk or magnetic drum memory
- Magnetic tape memory
- Magnetic bubble memory

2. Input/output

- Console intelligent
 - Display, X-Y plotter, line printer
 - Tape and card puncher
 - Tape and card reader
 - High speed data acquisition device

3. Magnetic memory media

- Tape and card, accessories

4. Editor and software

Remarks:

Memory and console intelligent including software necessary for performing the on-line or real time simultaneous terminals mutual experiments in a computer system for data telecommunication trainings.

9-28 Experimental data transmission system

Room No. & name of facilities	Dc 304 Workshop Teletype TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
NEC Fujitsu Hitachi		17	

Specifications:

1. Construction

- Data processor
- Line controller
- Modem device
- Transmission channel
- Terminal controller
- Terminal
- Power source

2. Function

- Modem modulation system FM
- Center frequency: 1,200 - 1,750 Hz
- Circuit construction: two-wire or four-wire type
- Speed: 200 - 1,200 B/S

3. Software

- Software for control, service program
- Application program

Remarks:

This is TTY and console display device functioning as an intelligent terminal for data telecommunication computer and for performing practice of data transmission and on-line system between terminals.

9-29 Adjusting Instruments

Room No. & name of facilities	DC 304 Workshop Teletype TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	500	3	1,500

Specifications:

Same as No. 9-12

9-30-1 Phototelegraphic arrangement:

Room No. & name of facilities	Db 310 Workshop Facsimile		TC
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
NEC Hitachi Matsushita Tsushin Anritsu Electric	1,500	2	3,000

Specifications:

Scanning: continuous recording system
Scanning speed: 60, 90, 120 rpm
Cooperating coefficient: 576, 288
Scanning line density: 5, 2.5 l/mm
Synchronous system: Quartz oscillation control independent synchronization system
Phase matching: automatic and manual control
Receiving: double superheterodine system
Receiving frequency: 3 - 24 MHz
Reception sensitivity: 2 μ V (SN ratio: 20 dB) or less
Receiving band width: 2 kHz or more
Environmental condition: -10°C - +50°C, humidity: less than 95% (at 35°C)
Power source: AC 220 V, 60 Hz

Remarks

1. Must be solid, easy for handling, and have high reliability for enduring environmental condition under high temperature and drying.
2. Must have sufficient practical sensitivity at the site, capable of receiving clearly broadcasting weather forecast.

9-30-2 Phototelegraphic arrangement

Room No. & name of facilities	Db 310 Workshop Facsimile TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
NEC Hitachi Japan Radio Matsushita Tsushin	1,500	2	3,000

Specifications:

Picture size: B4

Picture line density: 4 - 18 1/mm

Maximum transmission frequency: 4 kHz

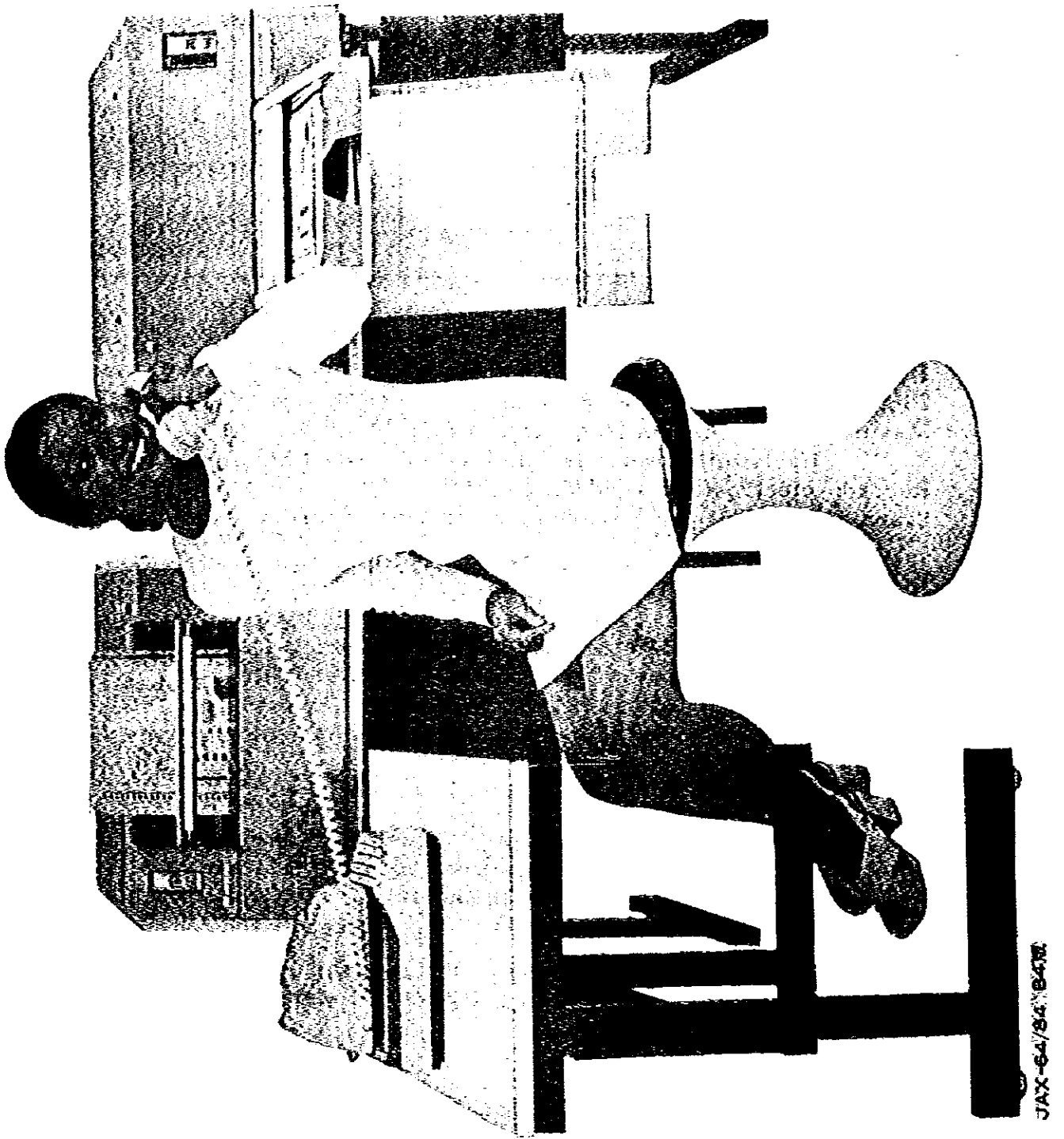
(facsimile transmission possible through telephone line)

Record: electrostatic recording system

Scanning system: plane scanning continuous recording system

Remarks:

Capable of accurately reproducing, at the picture receiver, the original and photo attached on the picture transmitter.



9-31 Facsimile telegraphy arrangement

Room No. & name of facilities			
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
	800 x 2	2	3,200

Specifications:

9-32 Electrowriter

Room No. & name of facilities			
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
	450	6	2,700

Specifications:

9-33 EL display unit

Room No. & name of facilities			
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
	300	3	900

Specifications:

9-34 Liquid crystal display unit

Room No. & name of facilities			
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
	300	3	900

Specifications:

9-35 Plasma display unit

Room No. & name of facilities			
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
	400	3	1,200

Specifications:

9-36 Leser holographic device

Room No. & name of facilities			
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
	800	2	1,600

Specifications:

9-37 Electrofax

Room No. & name of facilities			
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
	1,000	2	2,000

Specifications:

9-38 Voltmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	20	120	2,400

Specifications:

Same as No. 4-23

Class: JIS C1102 0.5 class

9-39 Voltmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	7	100	700

Specifications:

Same as No. 4-23

Class: JIS C1102 2.5 class

9-40 Voltmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	16	60	960

Specifications:

Same as No. 4-25

Class: JIS C 1102 0.5 class

9-41 Voltmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
--	7	50	350

Specifications:

Same as No. 4-25

Class: JIS C 1102 2.5 class

9-42 Ammeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
--	20	120	2,400

Specifications:

Same as No. 4-22

Class: JIS C 1102 0.5 class

9-43 Ammeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	7	100	700

Specifications:

Same as No. 4-22

Class: JIS C 1102 2.5 class

9-44 Ammeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	16	60	960

Specifications:

Same as No. 4-24

Class: JIS C 1102 0.5 class

9-45 Ammeter

Room No. & name of facilities	--		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
--	7	50	350

Specifications:

Same as No. 4-24

Class: JIS C 1102 2.5 class

9-46 Wattmeter

Room No. & name of facilities	--		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
--	42	6	252

Specifications:

Same as No. 4-39

9-47 Circuit tester

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	20	40	800

Specifications:

Same as No. 3-21

9-48 LCR meter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	130	6	780

Specifications:

Same as No. 3-31

9-49 Resistor

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	40	50	2,000

Specifications:

Same as No. 4-52

9-50 Resistor

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	30	50	1,500

Specifications:

Same as No. 3-29

9-51 Resistor

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	70	50	3,500

Specifications:

Same as No. 3-30

9-52 Inductance

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	65	30	1,950

Specifications:

Same as No. 4-53

9-53 Capacitor

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	30	30	900

Specifications:

Same as No. 4-54

9-54 Oscilloscope

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	200	10	2,000

Specifications:

Same as No. 3-43

9-55 Oscilloscope

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	200	10	2,000

Specifications:

Same as No. 3-43

9-56 Oscilloscope

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	150	35	5,250

Specifications:

Same as No. 5-42

9-57 Laser projection oscilloscope

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	600	1	600

Specifications:

9-58 Oscillograph

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	620	2	1,240

Specifications:

Same as No. 4-62

9-59 X-Y recorder

Room No. & name of facilities	--		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
--	550	6	3,300

Specifications:

Same as No. 4-63

9-60 Counter

Room No. & name of facilities	--		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
--	400	6	2,400

Specifications:

Same as No. 3-27

9-61 Bridge circuit unit

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	300	6	1,800

Specifications:

Same as No. 5-50

9-62 Q-meter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	300	3	900

Specifications:

Same as No. 3-36

9-63 Distortion factor meter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	300	3	900

Specifications:

Same as No. 5-46

9-64 Level meter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	300	3	900

Specifications:

Same as No. 5-46

9-65 Amplifier

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	200	10	2,000

Specifications:

Same as No. 5-61

9-66 Modulator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	250	10	2,500

Specifications:

9-67 Demodulator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	150	10	1,500

Specifications:

9-68 Oscillator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	280	10	2,800

Specifications:

9-69 Standard signal generator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	400	6	2,400

Specifications:

Same as No. 3-38

9-70 Special waveform generator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	400	6	2,400

Specifications:

Same as No. 4-61

9-71 Pulse generator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Iwatsu Electric Type PG-230	450	6	2,700

Specifications:

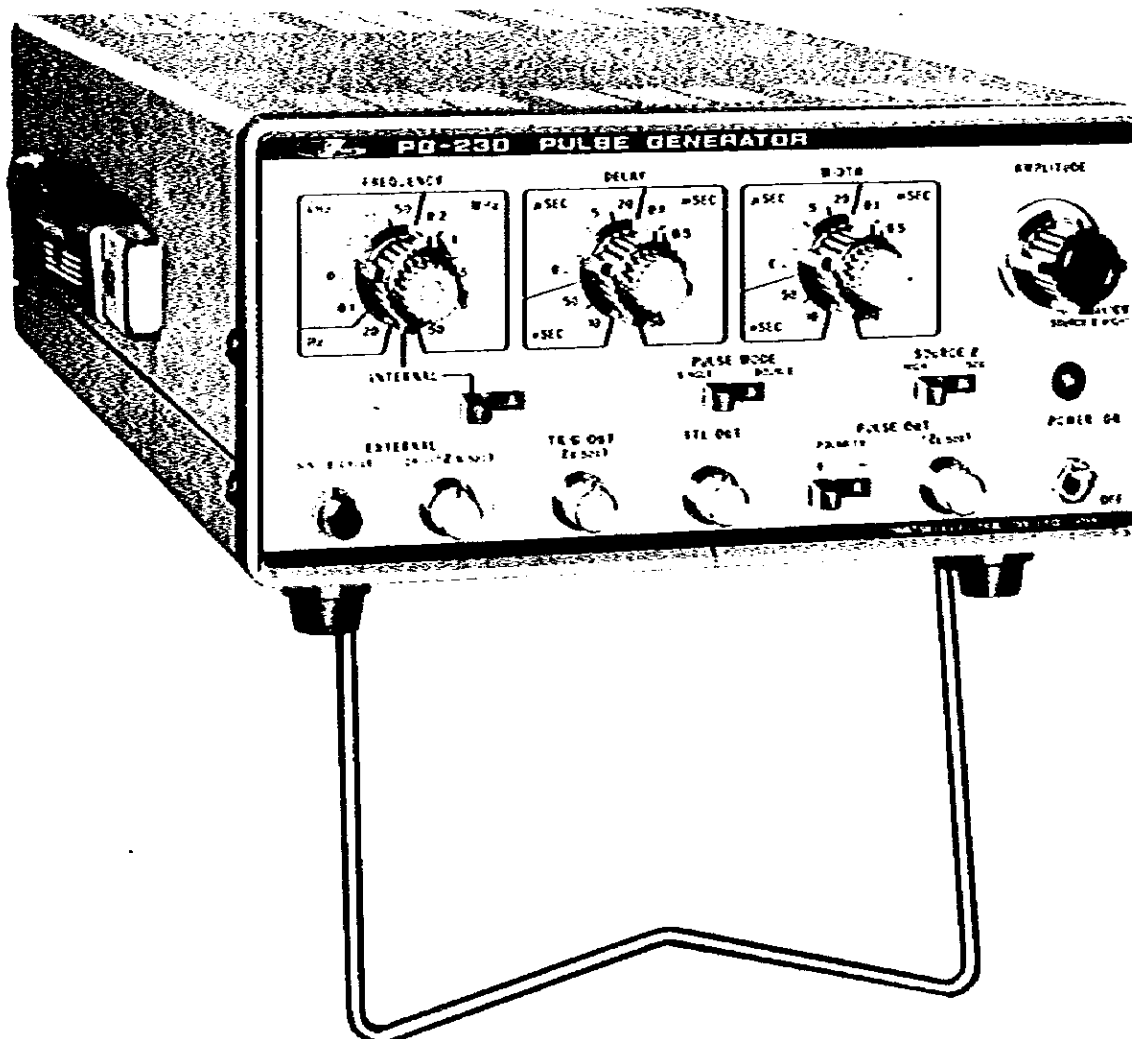
Repetition rates:

Internal: 20 - 50 MHz
 External: DC - 50 MHz

Output voltage: 0 - ± 10 V (with 50 Ω load)

Pulse width: 10 ns - 50 ms

Power requirement: AC 220V, 60 Hz



9-72 Characteristics display unit

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	750	6	4,500

Specifications:

9-73 Frequency analyzer

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	1,000	2	2,000

Specifications:

Same as No. 5-53

9-74 Electronic voltmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	100	6	600

Specifications:

Same as No. 4-27

9-75 Electronic element tester

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	950	3	2,850

Specifications:

Same as No. 3-32, 3-33, and 3-34

9-76 Copier

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	400	1	400

Specifications:

Same as No. 1-4

9-77 Overhead projector

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	150	1	150

Specifications:

Same as No. 2-35-2

9-78 Automatic slide projector

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	120	1	120

Specifications:

Same as No. 2-35-3

9-79 Movie projector

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	750	2	1,500

Specifications:

Same as No. 1-12

9-80 Movie projector

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Fuji Photo Type SH30	200	1	200

Specifications:

8 m/m projector

Power source: 220, V A.C. /60 Hz

Projection lens: 15-25 mm f/1.3 zoom, or 14-28 mm f/1.0 zoom

Projection lamp: 21V, 150W halogen lamp with dichroic mirror.
Provided with high/low switchover.

Motor: Electronically controlled D.C. motor.

Film: Single-8, Super-8.

Film threading: Fully automatic up onto the take-up reel.

Film transport: Forward and reverse.

Still projection: Knob-controlled mechanical film stopper.

Projection speed: 18 and 24 f.p.s. Provision for fine adjustment
(± 1.5 f.p.s.)

Reel capacity:

	10" reel
Single-8 film	360 m (1,200 ft.)
Super-8 film	240 m (800 ft.)

Frame counter: Counts 18 frames as 1.

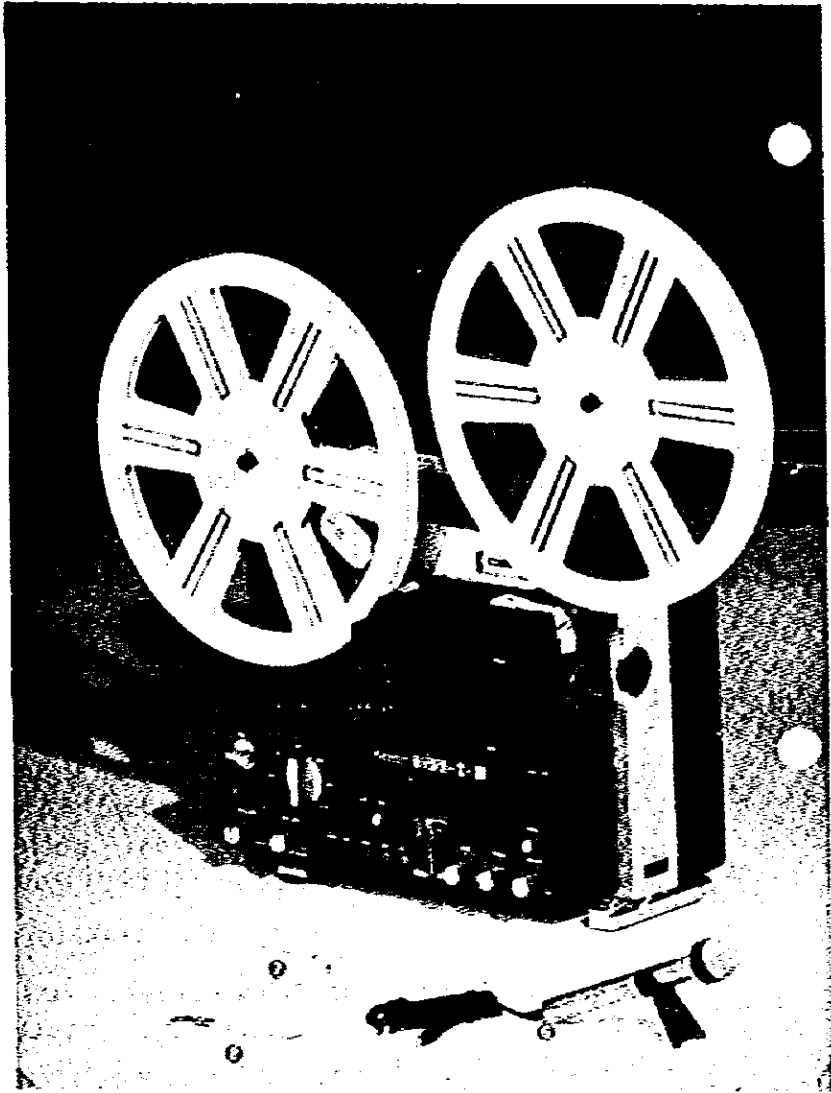
Projection angle: Vertically and horizontally adjustable.

Accessories

150 W Halogen lamp 3 pcs.

Remarks:

Convenient as an audiovisual materials.



9-81 Amplifier for lecture

Room No. & name of facilities	--		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
--	150	1	150

Specifications:

Same as No. 1-8

9-82 Taperecorder

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
SONY Type TCR 7-2	218	2	436
DP-30	5	2	10
Super A A7-120	1	10	10
LC Engineering	-	-	62
	(Total)		518

Specifications:

Tape speed: 2-speed or above including 38 cm/sec, and 19cm/sec.
 Frequency response: 30 - 30,000 Hz ± 3 dB (at 38cm/sec.) or above
 30 - 20,000 Hz ± 3 dB (at 19cm/sec.) or above

Wow and flutter: less than 0.05% (at 38cm/sec, 19cm/sec.)

SN ratio: more than 60 dB

Minimum input level/impedance: MIC 0.2 - 0.3 mV/1 - 10 k Ω
 LINE 60 - 100 mV/50 - 100 k Ω

Output level: 0.3 - IV

Headphone impedance: 8 Ω usable

Distortion factor: less than 1%

Separation: more than 50 dB (1kHz)

Minimum load impedance: less than 10 k Ω

Accessories:

1. Dust cover: SONY type DP-30 or equivalent 2 pcs.
2. Open-reel tape: with #7 reel, normal bias
 normal equalizer, SONY
 Super A type A7-120 or equivalent10 pcs.
3. Open-reel test tape: LC Engineering
 - a) LCT-101: for 38cm/sec tape speed, wow and flutter measurement, 3 kHz
 - b) LCT-102: for 19cm/sec tape speed, wow and flutter measurement, 3 kHz
 - c) LCT-103: for 9.5cm/sec tape speed, wow and flutter measurement, 3 kHz
 - d) LCT-104: frequency response 30 - 15 kHz, 38cm/sec, 50 μ sec FULL
 - e) LCT-105: frequency response 50 - 15 kHz, 19cm/sec, 50 μ sec FULL
 - f) LCT-106: frequency response 50 - 7.5kHz, 9.5cm/sec, 50 μ sec FULL

9-84 Mass reaction psychometer

Room No. & name of facilities	Da 309 Workshop Wire Telcom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
AVCC Mass reaction psychometer	7,000	1 set	7,000

Specifications:

1. Construction

- Analyzer main body (micro-computer, built-in printer)**
- Analyzer driving unit**
- Correct-answer display**
- Response device**
- Response device connector and metal fittings**

2. Function

- **Digital display of answering (response) distribution in terms of the number of people or percentage**
- **Can record the followings by the built-in printer**
 - a) **Response ratio time accumulating graph (% graph):**
 - % graph of response condition every two seconds**
 - b) **Individual response of each answering (including record of the correct answer number)**
 - c) **Record of the number of correct answer (total points)**
- **Setting and display of correct answer**
- **The answering device is an electronic memory system and has the following functions .**
 - a) **Registration of presence**
 - b) **Electronic simultaneous reset or simultaneous closing from the instructor's side**
 - c) **Feedback of the correct answer after closing**

Remarks:

Apparatus in which centering an analyzer mounted on an instructor's desk, students send their response or answer at the same time to the teaching material display by using a branch circuit device, count and record them while indicating the correct answers at the same time.

9-85 - 87 Testing bench, desks and chairs

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	-	-	-

Specifications:

See No. 9-187 - 189.

9-88 Movable blackboard

Room No. & name of facilities	Da 309 Workshop Wire Telcom. Db 311 Workshop Measurement		TC TC
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	50	6	300

Specifications:

Same as No. 2-34

9-89 Locker

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Shelf	60	20	1,200

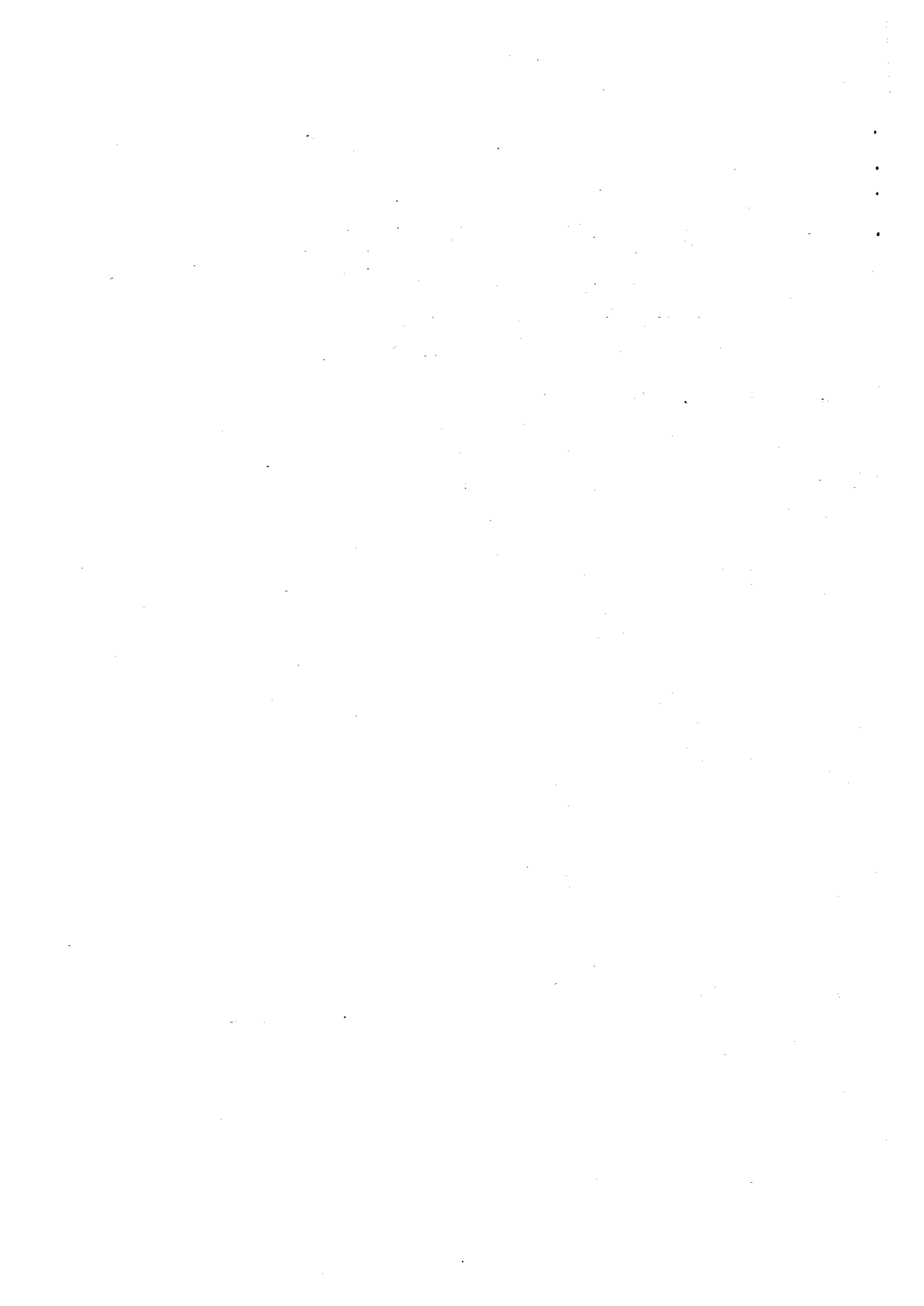
Specifications:

Same as No. 2-33

9b. TC-4 Electronic telecommunication (wireless telecommunication, radar, etc.)

Cost of equipment:

1. Price Thousand Yen:	261,945
2. Price US \$: 1,343,308



9-90 Hertz wave experimental arrangement

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Shimazdu Scientific Instrument	100	6	600

Specifications:

1. Construction

- Induction coil device
- Discharge electrode
- Resonance circuit
- Antenna and resonance element
- Receiver
- Wave observation device
- Frequency wave meter
- Power source: input side, specification in situ

2. Function

Must be possible to learn the room propagation of each frequency by generating a spark due to the induction coil and electric eave due to the resonance circuit as well as receiving means.

Must be possible to observe the attenuating wave shape by an oscilloscope or-through a voltage step-down device.

Remarks:

This is the training device in which a spark discharge is generated by an induction coil and also an attenuating electromagnetic wave is produced by a resonance circuit, and these are received by the receiver so as to understand the principle of the propagation of hertz wave and its phenomena.

9-91 Fundamental electric wave testing arrangement

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Shimazdu Scientific Instrument	250	6	1,500

Specifications:

1. Construction

Transmitter:

Frequency: 200 - 500 MHz band
 Output power: 1 to 10W decreasingly exchangeable
 Modulation: AM or FM
 Antenna: half-wave length dipole
 reflector of each kind, wave guide, removable

Receiver:

Frequency: same as that of the transmitter
 Characteristics: for measuring antenna directivity pattern.
 Must be capable of measuring reception strength.
 Antenna: reflector of each kind, wave guide with removable horizontal plane directivity characteristic measuring frame

Feeder and others:

Coaxial cable feeder, matching coupling device, standing wave ratio meter, reflector plate, screen, accessories.

Remarks:

For performing transmission and reception experiment in a room by using a small transmitter and receiver of 200 through 500 MHz band and transmitting and receiving antenna.

Possible to perform experiments such as propagation, reflection, passing, cut-off, intervention and directivity of the wave.

Possible to perform experiment of matching with feeder and measurement of the standing wave ratio

9-92 Antenna

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	800	2	1,600

Specifications:

9-93 Antenna

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	400	3	1,200

Specifications:

3-94 Antenna

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	250	3	750

Specifications:

9-95 Antenna

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	100	3	300

Specifications:

9-96 Antenna erection equipment

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	200	5	1,000

Specifications:

9-97 Feeder system

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	150	6	900

Specifications:

9-98 Antenna control equipment

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	100	6	600

Specifications:

9-99 Radio station equipment

Room No. & name of facilities	Dc 303 Radio TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Japan Radio NEC	6,000	1	6,000

Specifications:

1. Transmitter

	<u>Main transmitter</u>	<u>Reserve transmitter</u>
Frequency range:	medium wave 405 - 535 kHz medium & short wave 1605-3850 kHz short wave 4 - 25.11 MHz	405 - 535 kHz 1605 - 3850 kHz 2 - 9 MHz
Electric wave mode & power of output:	medium wave A1 400W A3, A2H 100W medium & short wave A1, A3J 100/50W A3H 50/25W short wave A1, F1 500W	35 W dummy 50 W A3 15 dummy A1 75W dummy
Power reduction:	3 steps	2 steps

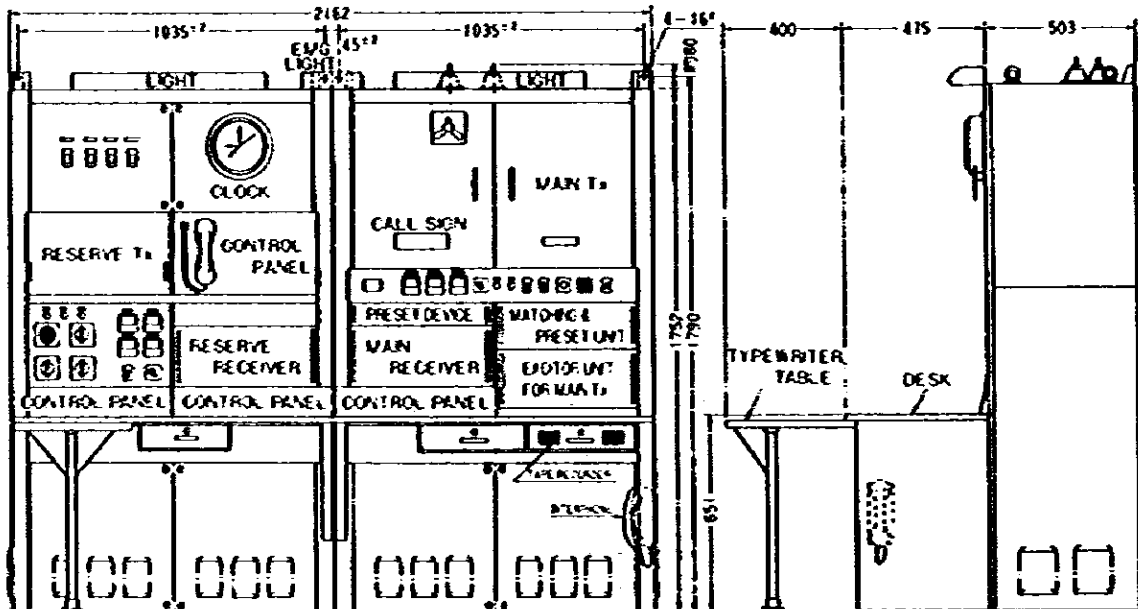
2. Receiver

	<u>Main receiver</u>	<u>Reserve receiver</u>
Frequency range:	100 kHz - 30 MHz	100 kHz - 30 MHz
Receiving system:	quadruple, triple and double super-heteridyne	double superheterodyne
Electric wave mode:	A1, A2, A3, A3H, A3A, A3J and F1, F4 adapter	

Remarks:

This is the one having mainly an SSB telephone communication and radio station facility teletype combined with teletype. With respect to the transmitter, a dummy antenna is used for mainly performing adjustment operation. The receiver is intended for learning the maintenance and adjusting operations.

For reference: dimensions & weights



9-100 Amateur station equipment

Room No. & name of facilities	Dc 303 Radio TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
<p>NEC Japan Radio</p>	<p>2,000</p>	<p>1</p>	<p>2,000</p>

Specifications:

1. Transmitter:

Electromagnetic wave mode: output

HF: 4 - 27 MHz, 100 W

VHF: 50 MHz, 110 MHz, 150 MHz, 50 W

RTTY/CW/USB/LSB/AM

Circuit system: non-adjustment crystal control power amplification

Telecommunication speed: 30 bauds or more

Power decreasing: two steps

2. Receiver:

Frequency range: 100 kHz - 30 MHz, 30 bands

Receiving mode: tripple superheterodine

Sensitivity:	S/N 10dB	CW/SSB	AM
	1.6 - 30 MHz	less than 0.5 V	less than 2 V
	10 - 1,600 MHz	less than 10 V	less than 40 V

Image ratio: 100 KHz - 1 MHz , more than 40 dB
 more than 1 MHz , more than 70 dB

Remarks:

This is the one having all devices necessary for standard amateur radio stations and is intended for the training of adjustment test, maintenance, operation, etc. thereof.

9-101 Transmitter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Japan Radio Anritsu Electric	1,000	2	2,000

Specifications:

Frequency range: middle wave band 405 535 kHz, 8 waves
middle and short
wave bands 1.6 3.8 MHz, max. 30 waves
short wave band 4 25 MHz, 10 bands each, total
70 waves
PLL digital synthesizer preset system

Wave mode: A1, A2H, A3J, A3H
Telegraph: break-in system
Telephone: press-talk system
Artificial load: 50 built-in
Frequency stability: less than 10 Hz
Sprious strength: less than 20 dB
Telecommunication speed: 25 bauds
Power source: suitable for the specifications in situ
Size: approx. 380 x 400 x 140 mm
Weight: about 25 kg

Remarks:

This is an MF, HF band transmitter for use in performing practical training such as adjustment, test, operation, maintenance and running of the radio transmitter.

9-102 Transmitter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Japan Radio Anritsu Electric	400	2	800

Specifications:

Frequency range: 50 MHz - 150 MHz

Modulation: FM (F3)

Telecommunication system: press-talk

Control system: crystal control

Frequency deviation: less than $\pm 1 \times 10^{-5}$

Maximum frequency deviation: ± 1 kHz

Ratio output: 20 W

Remarks:

This is the HF and VHF transmitter for use in performing the practical training such as adjustment, test, operation, maintenance, manipulation of the radio transmitter.

9-103 Transmitter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Japan Radio NEC	300	10	3,000

Specifications:

Frequency range: 140MHz 400 MHz

Electromagnetic wave mode: F 3

Antenna impedance: 50 or 75Ω

Transmission output: Max. 25W

Frequency deviation: less than $\pm 10 \times 10^{-6}$

Environment temperature: -10°C ~ 50°C

Power source: must be suitable for specifications in situ.

Remarks:

This is the VHF and UHF transmitter for use in performing the practical training such as adjustment, test manipulation maintenance, and operation of the radio transmitter.

9-104 Transmitter/receiver

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Japan Radio 10 W two-way mobile radio type JHV-224	600	10	6,000

Specifications:

Communication system: press-talk
Electromagnetic wave mode: F3
Frequency range: 142 166 MHz
Transmission output: 10 W (5 W)
Control mode: crystal oscillation
Frequency deviation: less than $\pm 1 \times 10^{-5}$
Modulation system: variable reactance phase modulation
Maximum frequency deviation: ± 5 kHz
Receiving mode: double superheterodine system
Sensitivity: less than 6dB/ μ V
S/N ratio: more than 40 dB at the input of 40 dB/ μ V
Squelch: must open below 20 dB noise suppression sensitivity and must not suppress the signal above 40 dB.

Remarks:

This is the one for use in the practical training the radio transmitter handling.



9-105 Transmitter/receiver

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Japan Radio	300	10	3,000

Specifications:

- Frequency range: 400 - 470 MHz**
- Telecommunication system: single or multi-communication system**
- Electromagnetic wave mode: F3**
- Antenna impedance: 50 Ω**
- Rated output: 20 W**
- Modulation: variable reactance phase modulation**
- Frequency deviation: within $\pm 1 \times 10^{-5}$**
- Maximum frequency deviation: ± 5 kHz (100% modulation)**

- Standard modulation input: -4 ± 3 dBm**
- S/N ratio: more than 40 dB at the time of standard modulation**
- Receiving system: single superheterodyne**
- Receiving sensitivity: less than 4 dB at 20 dB QS**
- Receiving output: 0.5 W**
- Squelch critical sensitivity: operation at less than 0 dB**

Remarks:

This is the one for use in the training of the adjustment, manipulation, maintenance and operation of UHF band transmitter / receiver.

9-106 Field strengthmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	600	10	6,000

Specifications:

9-107 Wireless remote measuring equipment

Room No. & name of facilities	Da 309 Workshop Wire Telecom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Japan Radio NEC	2,500	2	5,000

Specifications:

1. Construction:

Sensor: temperature, humidity, wind speed, wind direction, floating dust, etc.

Secondary converter

Observation station: carrier-type digital or analog telemeter using the radio links

Monitoring control station: display board, operation console, recorder, data processor

2. Function:

Capable of performing remote monitoring, control, and instrumentation by radio system

Capable of coupling the monitoring and control station, monitored station (observation station), telecommunication links, and transmitter/receiver and of performing practical experiment on control and measurement.

Remarks:

Deveice for outputting statistically processed data warning after radio-transmitting the information from the station and processing the information on real time base in a monitor station.

Durable for a long-term use, stable and highly reliable.

9-108 Wireless remote control equipment

Room No. & name of facilities	Da 309 Workshop Wire Telcom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Tokyo RC center Sanwa Electric	250	3	750

Specifications:

1. Construction:

5 to 7 channels, 4 to 5 servo-proportional FM transmitter

A-class helicopter with a control object model pitch controller or an equal control object

With receiver, servo-motor, power source and accessories

2. Function:

Must be the one for independently multi-controlling the wireless remote control object by the digital multi-channel FM proportional radio transmitter, be excellent in reproductivity and reliability, be stable operation and easy handling.

3. Others:

Must attach things, such as charging devices, startors, auxiliary batteries, exchange parts of each kind, exclusive hand tools, cord connectors, auxiliary materials, fuel, paints and other consumables which are all necessary for maintenance, operation, repairing, and adjustment of the controlled object models.

Remarks:

This is a device for performing the experiment of a multi-channel servo-motor control by the RC helicopter or RC plane together with a digital proportional controller.

The helicopter or plane must be solid in construction, easy for handling and adjustment and stable in operation.

Capable of easily performing the mixing adjustment.

9-109 Adjusting device for radio equipment

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Iwatsu Electric Ando Electric	600	6	3,600

Specifications:

1. Construction:

High-frequency wattmeter
Frequency meter/counter
Oscilloscope
Digital tester
Power source and cables

2. Functions:

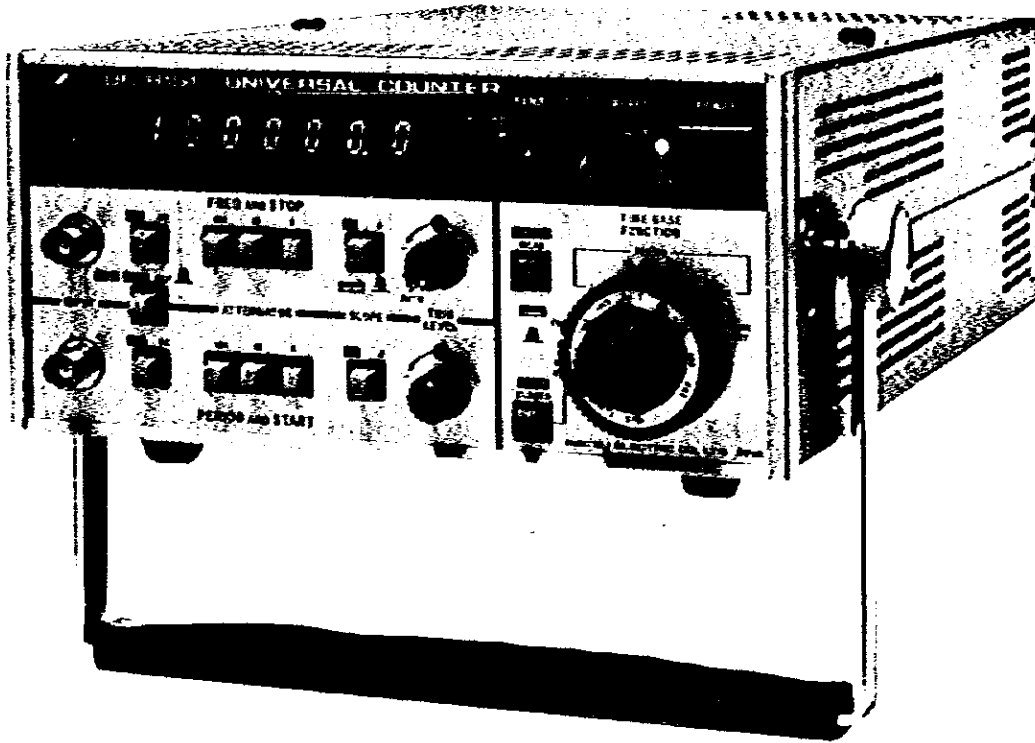
DC and AC voltage measurement
High frequency current and power measurement
Low and high frequency-wave, pulse-wave observation and measurement
Frequency measurement
Others: power source and accessories

Remarks:

This is the one in which basic measuring instruments for the adjusting device for radio equipment are collectively provided on a movable frame, and is intended for use in the training of the maintenance, adjustment, repairing and measurement of each radio apparatus and device.

Easy handling, secure in operation and durable in a long-term use.

For reference:



9-110 Power unit

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	250	18	4,500

Specifications:

Same as No. 3-47

9-111 Receiver

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Japan Radio Co. Ltd. AN Epoch-making Amateur All-ware Receiver NRD-505	500	35	17,500

Specifications:

Receiving frequency range: 100 kHz to 30 MHz (30 bands in 1 MHz - increments)

Receiving modes: RTTY/CW/SUB/LSB/AM

Receiving system: double superheterodyne

first IF: 70,455 MHz

second IF: 455 kHz

Sensitivity (S/N 10 dB):

	<u>CW/SSB</u>	<u>AM</u>
1.6 to 30 MHz:	less than 0.5 μ V	less than 2 μ V
100 to 1,600 kHz:	less than 10 μ V	less than 40 μ V

Selectivity:

	<u>-6 dB</u>	<u>-60 dB</u>
AM (W) :	4.4 to 7.0 kHz	10 kHz or less
RTTY/CW(W)/SSB/A :	2.0 to 2.6 kHz	6 kHz or less
CW(N) :	0.5 to 1.0 kHz	3 kHz or less

Frequency stability: less than 100 Hz per hour after warm-up

Image rejection ratio: 70 dB or more

IF rejection ratio: 70 dB or more

Input impedance: 50 dB or more

Input impedance: 50 to 75 ohms unbalanced

AF outputs:

Speaker output: 1W or more (4 to 8 ohms)

Record/line output: 1mW or more

Power requirements: AC 200V, 60 Hz, approx. 50 VA

Semiconductors: 66 ICs, 18 FETs, 54 transistors, 103 diodes

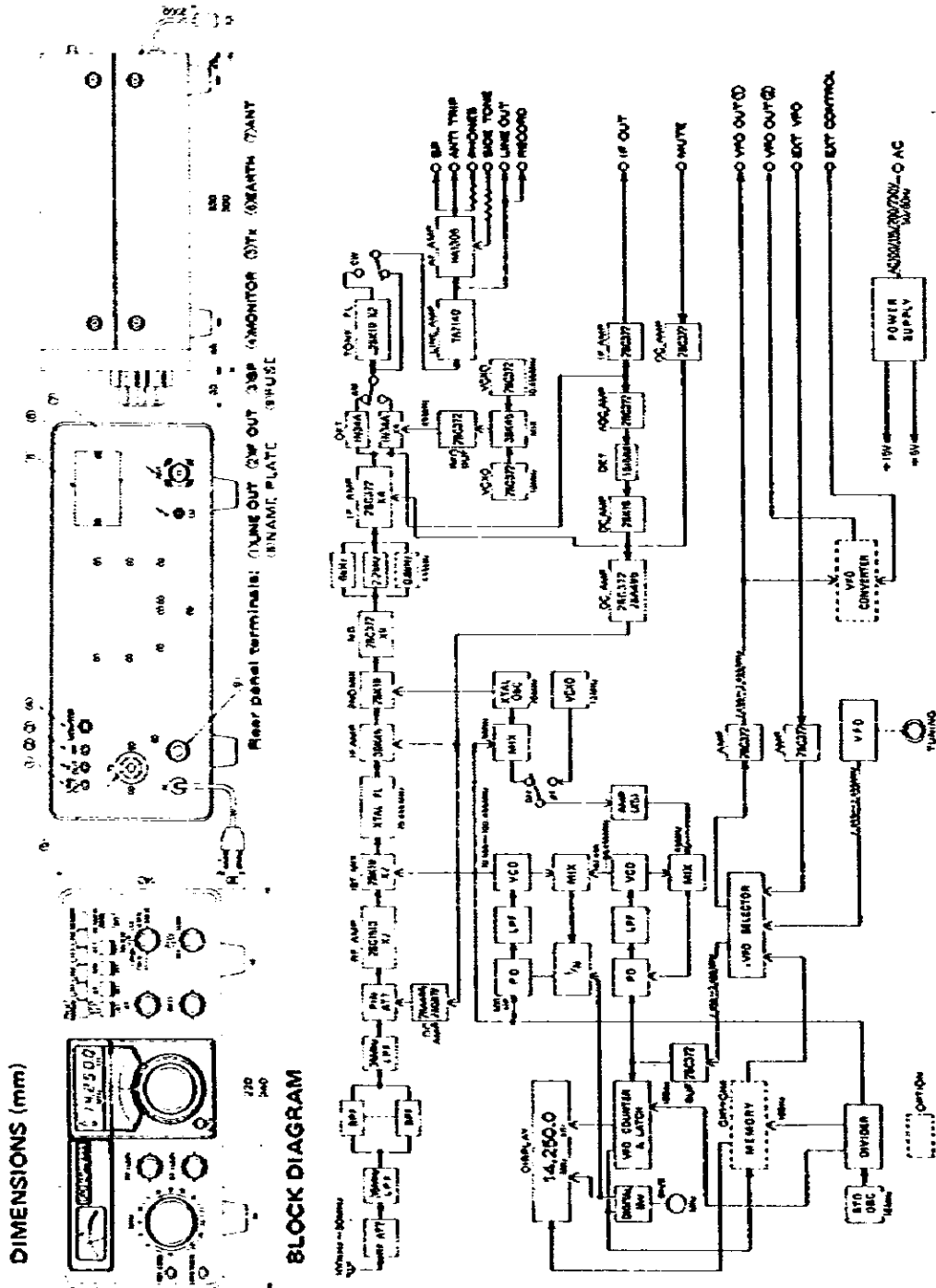
Dimensions: 340 mm wide x 140 mm high x 300 mm deep (approx.)

Weight: Approx. 10 kg

Accessories: Instruction Manual (1 copy), M-type coaxial plug (1 pc.), headphone and recording plug (2 pcs.), RCA plug (3 pcs.), 8P US plug (1 pc.), fuse (1 pc.), pilot lamp (3 pcs.).

Remarks:

1. This is an all-wave receiver with high sensitivity & high-fidelity by PLL digital synthesizer method.
2. The dial is characterized by total absence of backlash: excels in linearity of frequency, temperature characteristics, secular variation and earthquake-proof, and of solid construction.



DIMENSIONS (mm)

BLOCK DIAGRAM

9-112 TV video signal transmitter

Room No. & name of facilities	Da 301 Workshop TV TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
NEC	5,000	1	5,000

Specifications:

1. Construction

- Image signal unit
- Aural signal unit
- Color TV camera
- Aural signal forming device
- Standard synchronizing signal generator
- VTR input coupler and aural signal coupler
- Control console

2. Functions

- Small-sized camera shall be both for portable and for traveling-rack installation
- With image, synchronizing, hue adjusting device
- With signal level, corrugated monitoring device
- With image-sending couput monitor

3. Accessories and others

- Connection cable
- Power source
- Spare parts

Remarks:

This device is for generating standard TV video signals that may conduct the adjustment, repair and image-receiving as you please and simultaneously make it possible to receive images through a numerous receivers in the class room.

It is necessary to be sure in action, high in reliability, strong in construction, stand a long-term use, easy to handle, and superior in reproducibility.

9-113 TV program circuit

Room No. & name of facilities	Da 301 Workshop TV TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
<p>NEC JRC</p>	<p>5,000</p>	<p>1</p>	<p>5,000</p>

Specifications:

1. Construction

Relay installation: system method both in image and voice amplifiers
 Power amplifier unit
 Change-over control unit
 Power source unit: switching regulator method

2. Functions

Frequency: site TV channel specifications

Impedance:

Input: VSWR within the receiving channel zone is less than 1.2 (however, except for the input filter)

Output: can be matched into the load of less than VSWR 1.4

Frequency response: ± 0.5 dB at designated frequency ± 3 MHz

AGC response: within the range of image rated input level (60 dB/ μ V) ± 10 dB, output changes within 1 dB

Remarks:

Can relay and radiate the standard signal electric waves by the wireless to many TV receivers in the classroom in connection with TV video signal transmitter (No. 9-112)

Conform to the specifications of the site TV broadcast standard system.

9-114 TV video recorder

Room No. & name of facilities	Da 301 Workshop TV TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	1,000	2	2,000

Specifications:

Same as No. 1-15

9-115 TV receiver

Room No. & name of facilities	Da 301 Workshop TV TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	130	18	2,340

Specifications:

Same as No. 8-4

9-116 TV receiver

Room No. & name of facilities	Da 301 Workshop TV TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	20	18	360

Specifications:

Same as No. 8-3

9-117 TV receiver

Room No. & name of facilities	Da 301 Workshop TV TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	100	18	1,800

Specifications:

Same as No. 5-23

9-118 TV measuring instruments

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	3,000	10	30,000

Specifications:

Same as No. 8-21 and 8-22

9-119-1 Radar arrangement

Room No. & name of facilities	Dc 302 Radar TC			
Name of manufacturer & type for reference	Unit price	Q'ty	Amount	
Anritsu Electronic Works Japan Radio Large-type marine radar for AR-G51 type JMA-131	4,300	1	4,300	

Specifications:

Turnover transmission output: 30 - 50 kW

Transmission frequency: 9,000 MHz band

Azimuthal angle: less than 1°

Display unit: more than 12 inches

STC range: 4-step change-over

Speed of revolution of antenna: 20 r.p.m.

With protection apparatus of crystal, TR pipe

Power source: AC 220V 60 Hz single-phase Capacity: 1 - 1.5 kVA

Accessories:

Waveguide,
Directional coupler
Spare parts
etc.

Dimensions & weight: refer to the attached references

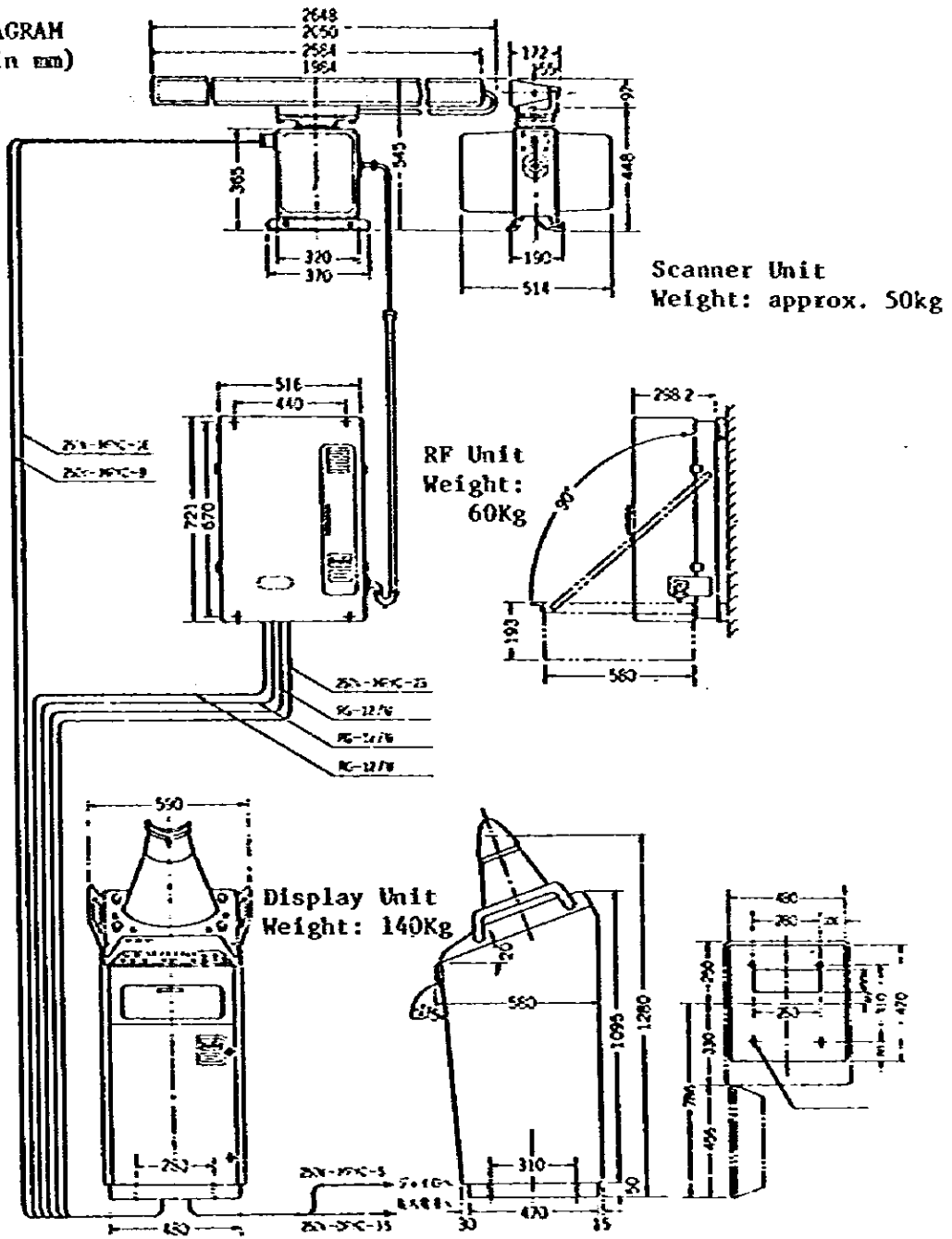
Remarks:

Since it is for diverting to other purpose of scanning and making display of surrounding earth by fixing and installing the apparatus onto the schoolhouse, it is necessary to install the antenna scanner unit that may be suitable for the said purpose.

It is necessary to fully consider the countermeasures against sand dust.

It is necessary for devices such as the display unit, the power source unit, etc. to be so arranged as to serve the practical purpose.

SCHEMATIC DIAGRAM
(Dimensions in mm)



9-119-2 Radar arrangement

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Japan Radio Compact marine radar type JMA-305	1,000	1	1,000

Specifications:

- Turn-over output: 5kW
- Cathode ray tube: 7-inch
- Distance range: 0.5, 2, 4, 8, 20 miles
- Range discrimination: 20 m
- Bearing accuracy: 30
- Frequency: 9,000 MHz band
- Rotation speed: approx. 20 r.p.m.
- Power source: DC 12 24V for loading onto vehicle
- Dimensions and Weight: refer to the/reference drawing

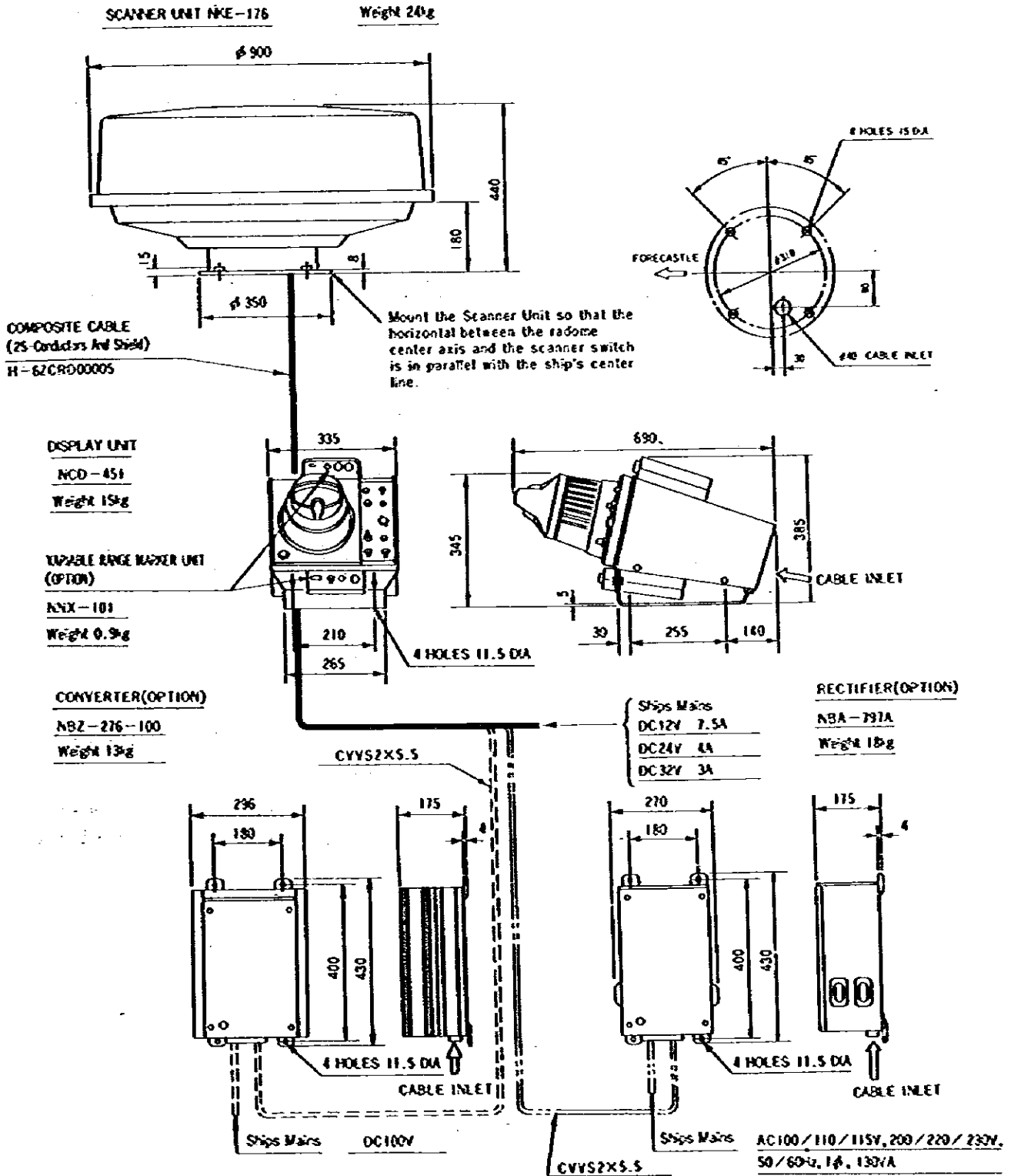
Standard accessories

Remarks:

1. Can be applied to the radar operation practice used both as a mobile wireless station also, loading the compact marine radar onto vehicle
2. Radome type scanner unit: compact size, light in weight dust-proof type
3. Power source specifications and power source unit: suitable for mobile radio vehicle

SCHEMATIC DIAGRAM

(Dimensions in mm)



Note: The cable lengths between the units should be as follows:
 Scanner Unit to Display Unit 8m (standard), 15m (maximum)
 Display Unit to Converter or Rectifier Unit 5m (standard), 10m (maximum)

9-120 Radar arrangement

Room No. & name of facilities	Dc 302 Radar TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
NEC Milli-wave radar	3,500	2	7,000

Specifications:

Turn-over transmission output: 10 kW

Frequency: milliwave band

Antenna: earth-surface horizontal rotation scanning

Range discrimination: 2m

Bearing accuracy: 0.5°

Display cathode ray tube: 7-inch

**Dimensions & weight: in accordance with the microwave pulse radar
(Item No. 9-119-2)**

Standard accessories

Remarks:

- 1. Used for the milli-wave operation practice: to display things on the area around schoolhouse as an objective on the CRT**
- 2. Scanner unit: can endure high temperature, dryness, and sand-dust and operate without trouble any time of long rest and driving**

9-121 Radar arrangement

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Japan Radio Radar-type vehicle speed measuring system JMA-2	2,000	2	4,000

Specifications:

Frequency: UHF band

Antenna: antennas for transmission and reception acute in directivity, with directional fine-adjusting rack

Measuring distance: within the visual distance

Speed measuring range: 0 200 km/h

Power source: AC power source and vehicle power source (change-over)

Dimensions: setting within 60 x 40 x 1,000 cm

Weight: approx. 40 kg

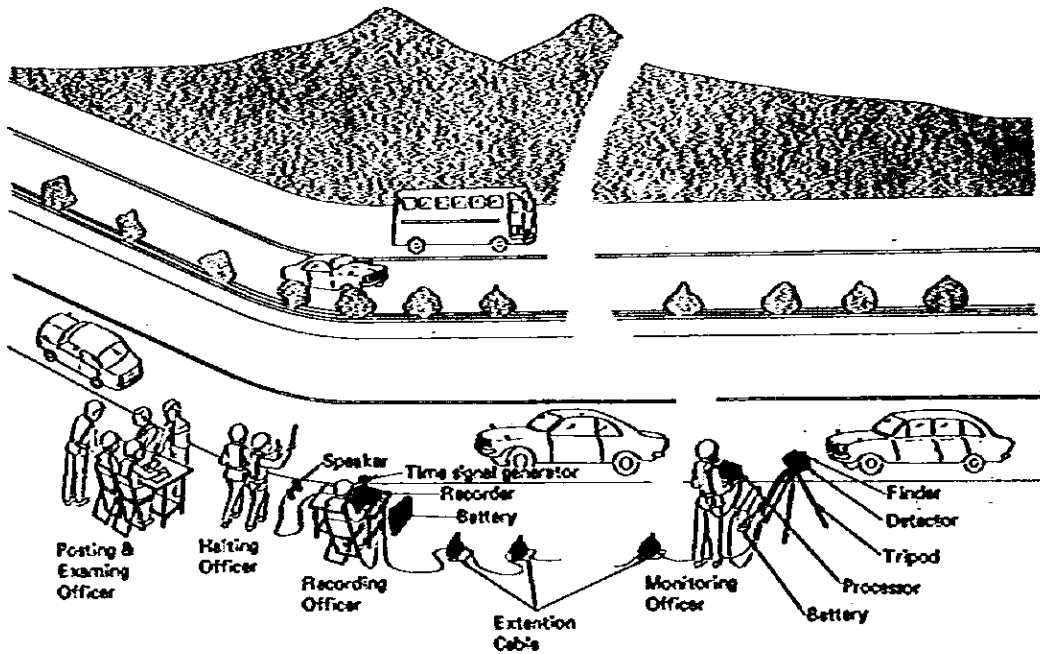
Standard accessories.

Remarks:

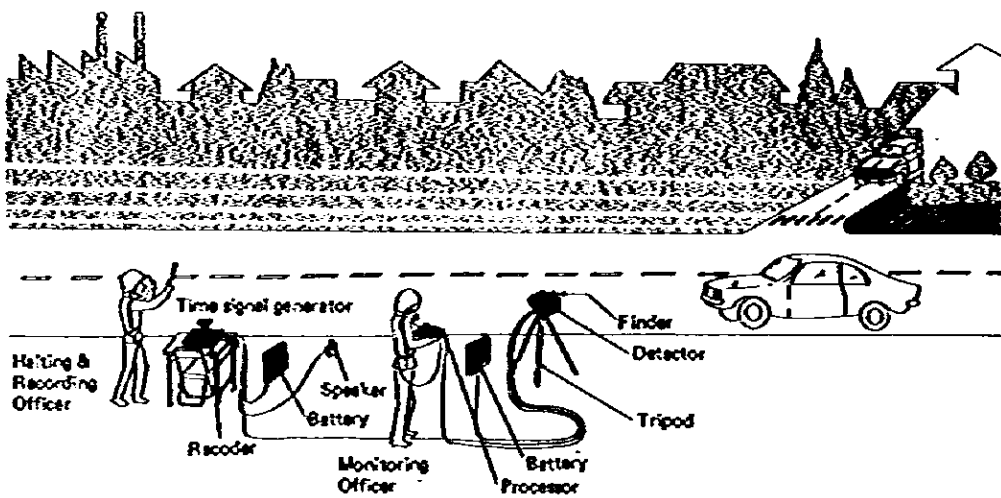
1. Doppler radar capable of detecting the speed of vehicle approaching or leaving on the road at once.
2. Measurement values shall be correct and high in accuracy
3. Easy to move.



Arrangement of JMA-2 (Radio Wave Irradiation Angle 27 deg.)



Arrangement of JMA-2 (Radio Wave Irradiation Angle 0-10 deg.)



9-122 Radio direction finder

Room No. & name of facilities			
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Japan Radio	400	2	800

Specifications:

Receiving frequency range: 100 kHz - 30 MHz

Receiving system: double & triple superheterodyne

Number of bands: 20 - 30

Electric wave formulas: A1, A2, A2H, A3, A3H, A3J: and F1, F4 by means of adapter

Power source: AC 220V 60 Hz, single-phase

Standard accessories

Remarks:

For measurement of azimuth of coming electric wave by means of high-sensitive receiver which has a gonio-system loop antenna.

9-123 Loran receiver

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Qty	Amount
Japan Radio Loran C/A receiver type JNA-108B	1,200	2	2,400

Specifications:

Receiving frequencies: 1, 2, 3, 4 ch., 1,950 kHz - 100 kHz
 Loran electric wave frequencies in the Middle East area

Receiving method:

Individual repeated frequencies: 1,000 μ s - 10 ms, 100 μ s - 10 μ s
 divided perimeter

Basic frequencies per basic time: 100 kHz (SS, SL, SH, S, L, H)

Basic repeated period: S, L, H 8 kinds for each

Dimensions & weight: On-the-desk installation type

Body proper: 32 kg

Rack: 5 kg

Antenna coupler: 2.2kg

Power source: AC 220V 60 Hz and DC 24V (change-over)

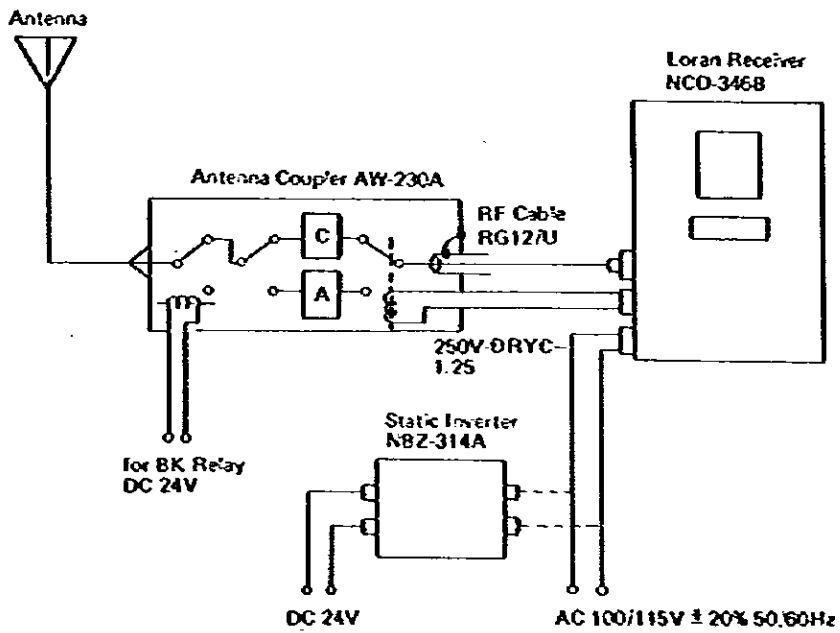
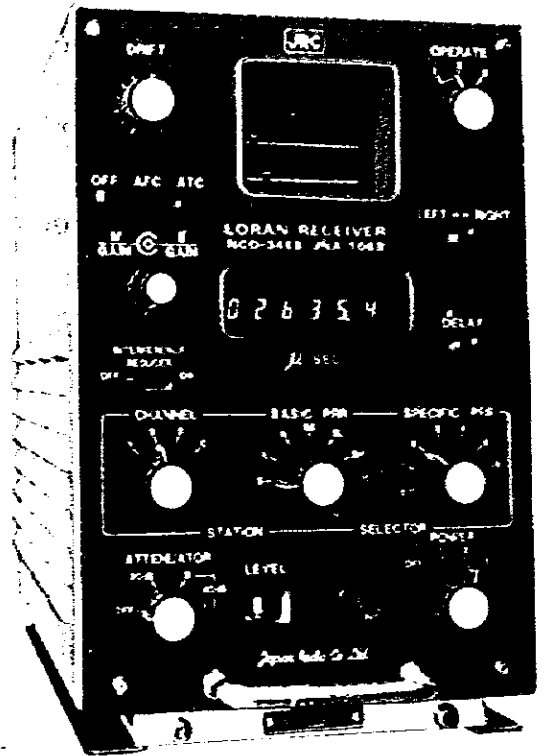
Accessories: cables

A set of spare parts

Remarks:

Solid-state loran receiver: low-electric power, high-performance receiving capacity

Direct reading of measurement, durable, easy to handle, and long term use.



9-124 Decca receiver

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Decca Navigator Mark 21 type 1896A (including installation material kit)	4,000	2	8,000

Specifications:

Receiving frequencies:

Lane discrimination signal: 70 kHz - 130 kHz

Besides the standard pattern frequencies (6f, 8f, 9f, 5f, etc.), capable of receiving the Decca chain electric waves of Middle East area.

Time signal: standard signal 20 Hz

Phase control: standard time schedule

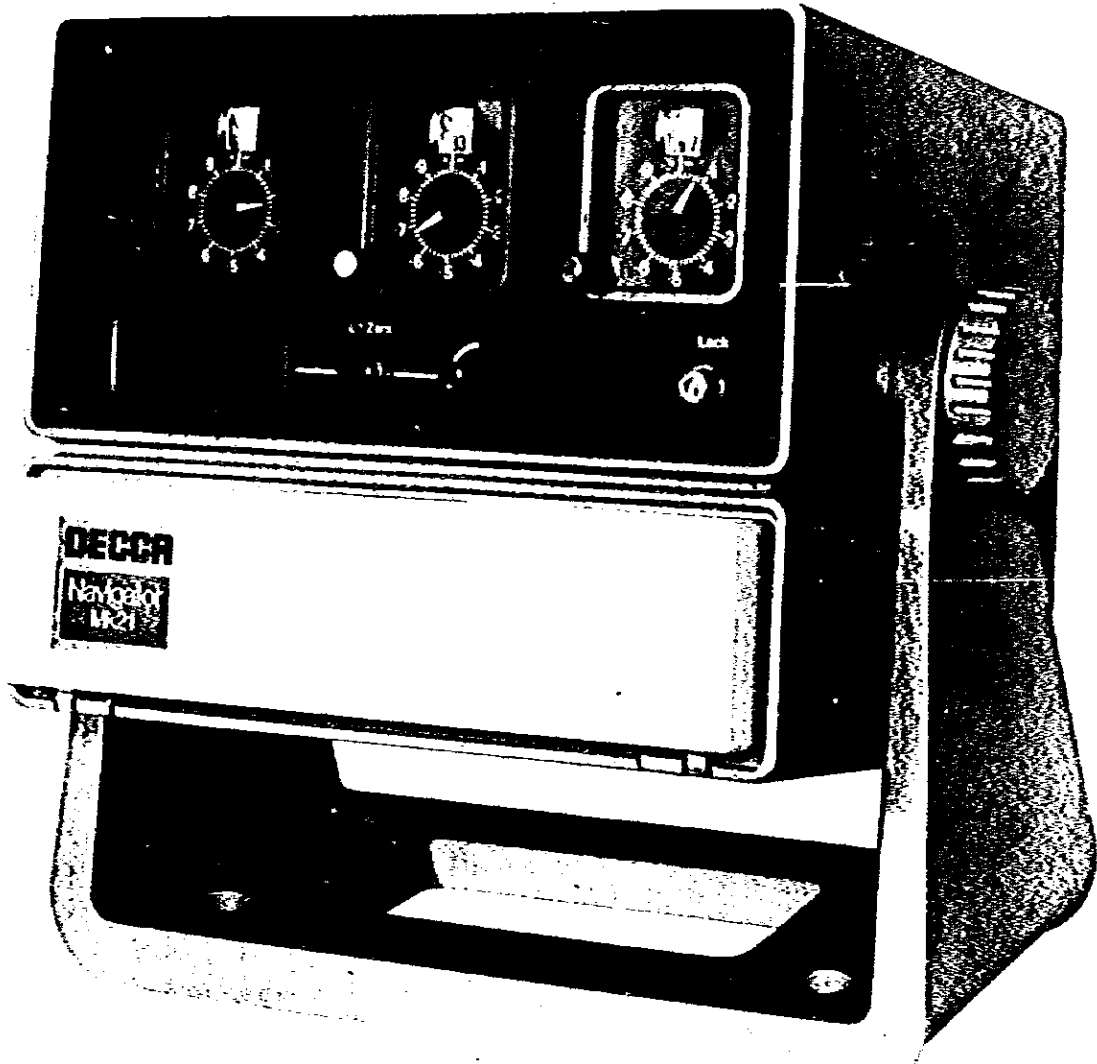
In case of Omega receiver:

Receiving frequencies: 10.2, 13.6, 11.33 kHz

Including 2-ch chart-recorder, antenna and coupler

Remarks:

1. Can measure the accurate location by receiving the signal electric wave of Decca chain of Middle East area.
2. In case of Decca system being unfit, it will be all right with Omega system receiver.



9-125 Adjusting trimming instruments

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	2,000	2	4,000

Specifications:

Same as No. 7-7 and 7-8

9-126 Experimental mobile radio station equipment

Room No. & name of facilities	Dc 303 Radio TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Japan Radio NEC	5,000	1	5,000

Specifications:

Communication method: pre-stoke system or simultaneous transmitting & receiving system

Frequency range: 140 MHz band or 450 MHz band

Frequency stability: within $\pm 0.001\%$

Environmental conditions: -30°C - +50°C

Transmitting output: base station 10W
mobile station 5W

Modulation method: phase modulation or frequency modulation

Spurious radiation:

Inside band: less than -80 dB

Outside band: less than -70 dB

Receiving method: single or double superheterodyne system

Sensitivity: base station - less than 4 dB μ

mobile station - less than 6 dB

Band width: 12 kHz (less than 6 dB)

Power source: base station AC 60 Hz

mobile station DC 12V

Standard accessories

Remarks:

1. Solid, endure a long-term use and have high reliability.
2. Radio telephone apparatus: consist of receiver and transmitter of base station and those of mobil station
3. Endure a long-term use under dryness and high temperature, and have anti-dust mechanism.
4. The mobil station shall be installed in the mounted vehicle.

9-127 Mobile radio equipment

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Japan Radio 150 MHz FM 10W Mobile radio type JHV-224	530	15	7,950

Specifications:

Frequency: 150 MHz or 400 MHz

Number of channels: 1 - 5 channels

Telecommunication method: pre-stoke, tone-squelch talking

Modulation method: phase or frequency modulation

Receiving method: double superheterodyne system

Frequency stability: $\pm 0.001\%$

Transmitting electric power : several W

Power source: self-contained NiCd with reserves

Exclusive-used charger with spare accessories

Standard accessories

Optional accessories:

1. Antenna
2. Adjusting rod

Remarks:

1. Mutual communication system: use a plural number of portable telephones and can communicate with transmitter and receiver of the experimental mobile radio station equipment (No. 9-126).
2. Can endure a long-term use, be solid and easy to handle.



9-128 Experimental microwave testing arrangement

Room No. & name of facilities	Da 309 Workshop Wire Telcom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	1,000	2	2,000

Specifications:

Same as No. 5-14

2-129 Microwave telecommunication equipment

Room No. & name of facilities	Da 309 Workshop Wire Telecom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Ando Electric	1,000	2	2,000

Specifications:

1. **Microwave generator:**
Frequency: 9GHz band
Klystron mount assembly
2. **Circuits & elements:**
Waveguide, directional coupler, variable attenuator, cavity wavemeter, transmitting & receiving antenna, matching device, standing wave measurement instrument
3. **Modulator and detector:**
Amplifier for modulation, modulator, detection amplifier
4. **Power source:** AC 220V 60 Hz
5. **Accessories and spare parts**

Remarks:

For measurement of the modulation response, impedance response and gain response of microwave

It is also possible to measure the gain of antenna by using the standard antenna.

9-130 Experimental microwave terminal station arrangement

Room No. & name of facilities	Da 309 Workshop Wire Telcom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Japan Radio NEC	2,500	2	5,000

Specifications:

Microwave wireless terminal station transmitting rack:

1. Circuit connection rack
2. Switching device
3. Modulator
4. Transmitting device
5. Wave-branching machine
6. Antenna

Microwave wireless terminal station receiving rack:

1. Antenna
2. Wave-branching machine
3. Receiving device
4. Demodulator
5. Switching device
6. Circuit connection rack

Supervisory control operation console

Remarks:

For adjustment and testing and measurement of the characteristics of each block of microwave terminal station rack

Capable of adjusting and testing the microwave relay system in connection with the experimental microwave relaying station arrangement (No. 9-131).

It is necessary to consider of the installation work at the site.

9-131 Experimental microwave relaying station arrangement

Room No. & name of facilities	Da 309 Workshop Wire Telcom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
NEC Japan Radio	1,800	2	3,600

Specifications:

- Relay unit
- Microwave antenna
- Antenna coupler
- Matching unit
- Input branching wave machine
- Output branching wave machine
- Power source unit
- Supervisory adjusting control console

Remarks:

For the purpose of conducting the fundamental experiment concerning microwave circuit relay unit

Consists of a basic relay unit by means of heterodyne method for the adjustment, measurement and operation of relay unit.

Can perform the telecommunication experiment of microwave circuit in connection with the experimental microwave terminal station arrangement (No. 9-130).

9-132 Experimental microwave antenna arrangement

Room No. & name of facilities	Da 309 Workshop Wire Telcom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
NEC Japan Radio	1,000	2	2,000

Specifications:

Gain standard antenna

Various microwave antennas:

Various parabola antennas

Horn reflector antenna

Kasegren antenna

Various electrohorns

Various path-length antennas

Various slot antennas

Helical antenna

Alley antenna

Corner antenna

Etc.

Installation rack for each antenna

Coupler

Change-over switch

Maching unit

Directional measurement unit

Remarks:

For the measurement of characteristic of microwave antenna in combination with the microwave telecommunication equipment (No. 9-129) and the experimental microwave relaying station arrangement (No. 9-131).

9-133 Experimental microwave transmission arrangement

Room No. & name of facilities	Da 309 Workshop Wire Telcom. TC		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
NEC Japan Radio	1,200	2	2,400

Specifications:

Telephone circuit: 24 CH at maximum

Tele raph circuit: teletype circuit

Coaxial cable: 10 50 m

Carrier terminal station: 2 racks

Power source: battery and charger

Signal generator: carrier-wave electric current supply unit

Terminal unit: telephone and telex terminals, etc.

Remarks:

Multiplex transmission experimental apparatus: for the experiment of telephone, telegraph or TV channel transmission in combination with the experimental apparatus of microwave telecommunication circuit

Basic unit of carrier telecommunication terminal station

9-134 Adjusting instruments

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	900	6	5,400

Specifications:

9-135 Ultrasonic telecommunication equipment

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	1,000	1	1,000

Specifications:

9-136 Light telecommunication equipment

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	300	1	300

Specifications:

9-137 Experimental laser telecommunication equipment

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	1,800	1	1,800

Specifications:

9-138 Cosmic noise measuring equipment

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	6,000	1	6,000

Specifications:

9-139 Experimental secrecy communication equipment

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	1,000	1	1,000

Specifications:

9-140 Voltmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	20	100	2,000

Specifications:

Same as No. 4-23

Class: JIS C 1102 0.5 class

9-141 Voltmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	7	50	350

Specifications:

Same as No. 4-23

Class: JIS C 1102 2.5 class

9-142 Voltmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	16	30	480

Specifications:

Same as No. 4-25

Class: JIS C1102 0.5 class

9-143 Voltmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	7	30	210

Specifications:

Same as No. 4-25

Class: JIS C1102 2.5 class

9-144 Ammeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	20	100	2,000

Specifications:

Same as No. 4-22

Class: JIS C1102 0.5 class

9-145 Ammeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	7	50	350

Specifications:

Same as No. 4-22

Class: JIS C1102 2.5 class

9-146 Ammeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	16	30	480

Specifications:

Same as No. 4-24

Class: JIS C1102 0.5 class

9-147 Ammeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	7	30	210

Specifications:

Same as No. 4-24

Class: JIS C1102 2.5 class

9-148 Wattmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	42	6	252

Specifications:

Same as No. 4-39

9-149 Circuit tester

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	20	36	720

Specifications:

Same as No. 3-21

9-150 LCR meter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	130	6	780

Specifications:

Same as No. 3-31

9-151 Resistor

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	40	50	2,000

Specifications:

Same as No. 4-52

9-152 Resistor

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	20	50	1,000

Specifications:

Same as No. 4-55

9-153 Resistor

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	70	50	3,500

Specifications:

Same as No. 3-30

9-154 Inductance

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	65	30	1,950

Specifications:

Same as No. 4-53

9-155 Capacitor

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	30	30	900

Specifications:

Same as No. 4-54

9-156 Oscilloscope

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	1,200	3	3,600

Specifications:

9-157 Oscilloscope

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Iwatsu Electric Type SS-5410	500	5	2,500

Specifications:

Same as No. 7-24

9-158 Oscilloscope

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	200	35	7,000

Specifications:

Same as No. 3-43

9-159 Laser projection oscilloscope

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	600	1	600

Specifications:

Same as No. 9-57

9-160 Oscillograph

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	620	2	1,240

Specifications:

Same as No. 4-62

9-161 X-Y recorder

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	550	3	1,650

Specifications:

Same as No. 4-63

9-162 Counter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	400	3	1,200

Specifications:

Same as No. 3-27

9-163 Bridge circuit unit

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	300	3	900

Specifications:

Same as No. 5-50

9-164 Q-meter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	300	3	900

Specifications:

Same as No. 3-36

9-165 Distortion factor meter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	300	3	900

Specifications:

Same as No. 5-46

9-166 Level meter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	300	3	900

Specifications:

Same as No. 5-46

9-167 Amplifier

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	200	10	2,000

Specifications:

Same as No. 5-61

9-168 Modulator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	250	10	2,500

Specifications:

Same as No. 9-66

9-169 Demodulator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	150	10	1,500

Specifications:

Same as No. 9-67

9-170 Oscillator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	280	10	2,800

Specifications:

Same as No. 9-68

9-171 Standard signal generator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	400	10	4,000

Specifications:

Same as No. 3-38

9-172 Special waveform generator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	400	3	1,200

Specifications:

Same as No. 4-61

9-173 Pulse generator

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	450	3	1,350

Specifications:

Same as No. 9-71

9-174 Characteristics display unit

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	750	3	2,250

Specifications:

Same as No. 9-72

9-175 Frequency analyzer

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	1,000	3	3,000

Specifications:

Same as No. 5-53

9-176 Electronic voltmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	100	6	600

Specifications:

Same as No. 4-27

9-177 Electronic voltmeter

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	250	6	1,500

Specifications:

Same as No. 5-33

9-178 Copier

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	400	1	400

Specifications:

Same as No. 1-4

9-179 Overhead projector

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	150	1	150

Specifications:

Same as No. 1-11

9-180 Automatic slide projector

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	120	1	120

Specifications:

Same as No. 2-35-3

9-181 Movie projector

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	750	1	750

Specifications:

Same as No. 1-12

9-182 Movie projector

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	200	1	200

Specifications:

Same as No. 9-80

9-183 Amplifier for lecture

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	150	1	150

Specifications:

Same as No. 1-8

9-184 Taperecorder

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
SONY Type TCR 7-2	218	2	436
DP-30	5	2	10
Super A A7-120	1	10	10
LC Engineering	-	-	62
	(Total)		518

Specifications:

Same as No. 9-82

9-185 VTR unit

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	1,000	1	1,000

Specifications:

Same as No. 1-15

9-186 Mass reaction psycometer

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
--	1,500	1	1,500

Specifications:

9-187 - 189 Workbench, testing bench, desks and chairs

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
Worktable	-	44	1,640
Chair	5	70	350
	(Total)		1,990

Specifications:

Same as No. 2-32:

Dimension :

- 1. 1,500 x 500 m/m20 sets x 30,000 = 600,000 yen
- 2. 1,500 x 75020 x 40,000 = 800,000
- 3. 1,800 x 1,000 4 x 60,000 = 240,000

(Total) 44 sets 1,640,000 yen

Chairs: 70 sets x 5,000 = 350,000 yen

9-190 Movable blackboard

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	50	6	300

Specifications:

Same as No. 2-34

9-191 Lockers

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
- Shelf	60	10	600

Specifications:

Same as No. 2-33

9-192 Cables and wires

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	8	45	360

Specifications:

9-193 Tools and materials

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	3	45	135

Specifications:

9-194 Electronic parts

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	5	45	225

Specifications:

9-195 Materials for data processing

Room No. & name of facilities	-		
Name of manufacturer & type for reference	Unit price	Q'ty	Amount
-	5	45	225

Specifications: