

DOPPLER LOG

JLN-202

INSTRUCTION MANUAL

JRC *Japan Radio Co., Ltd.*

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DOPPLER LOG MODEL JLN-202

1. GENERAL

The JRC Model JLN-202 Doppler Log is a unit for measuring and displaying the speed and distance of associated ship and providing an output to be applied to utilizations. It is provided with a transducer assembly mounted on the hull bottom to emit an ultrasonic signal in two downward directions simultaneously and measure resultant Doppler shifts of return echoes in the sea.

For accurate measurement, one beam of the signal is directed obliquely forward with respect to the ship and the other directed also obliquely backward.

2. FEATURES

1) High accuracy

A high accuracy pulse Doppler system is employed and a high-frequency ultrasonic signal is used to ensure track echo signals reflected from approximately 1.8 to 3 m underwater below the hull bottom.

The system detects a Doppler shift from each echo signal.

This assures a high accuracy of the speed relative to the water, indifferent to some disturbance such as wake flow, etc.

2) Little error against ship's motions

A pair-beam system is employed, which emits a pair of beams of ultrasonic signal in respective obliquely downward directions: one to fore side and the other to aft side. In this system, the ship's speed relative to the water is calculated from the difference between Doppler shifts of both echo signals from the fore and aft

sides. As a result, errors due to some motion of the ship will be cancelled to result in no influence upon the measurement.

3) Flat type transducer

A small sized transducer unit is employed, which can be installed so that its radiation face is flat with the hull-bottom board to result in no projection from the board. This flat shape of the transducer unit will little cause the bubble trouble and eliminates the possibility that driftwood or other matter floating in the sea causes the unit to be damaged.

In addition, there is no need to fall down and shed up the transducer head every when the ship is incoming into and outgoing from a port, unlike other types.

Project types are also provided in addition to the flat type. Each of the project types can be easily installed.

4) Easy operation

Once power-on, the unit provides a stable digital display of a measured speed in a wide range from very low speed to high speed.

The digital display is a three-digit type providing a clear indication.

3. SPECIFICATIONS

3-1 Performance

Operation type	Dual-beam pulse Doppler type
Speed range	0 to ± 30 knots
Operation depth range	More than 3 m underwater below the hull bottom
Accuracy	± 0.1 knots or $\pm 1.0\%$ R.M.S whichever larger
Sound speed calibration	Automatic calibration with thermistor in transducer
Distance counter signal	200 pulses/NM from contacts outputs; four circuits contained
Ultrasonic frequency	2 MHz
Tracking speed	40 seconds
Magnetic compass safe distance	1.0 m for main electronics 0.4 m for remote display 0.4 m for distance counter
Operating temperature range	Main electronics: -15 to $+55^{\circ}\text{C}$ Remote display : -15 to $+55^{\circ}\text{C}$ Transducer : -10 to $+70^{\circ}\text{C}$ Junction box : -15 to $+70^{\circ}\text{C}$
Power source	100/110/115/220 V AC $\pm 10\%$, with selectable tap; 50/60 Hz, single phase, 100 VA

NWW-5 REMOTE DISPLAY (Digital)

<p>Speed presentation</p>	<p>3-digit numerical display on highbrightness numerical indicator</p> <p>Minimum division of display 0.1 knot</p> <p>Indicating of headway and sternway travels Arrow-marks lamps</p> <p>WITH EXTERNAL DIMMER</p>
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NWW-16A/16B REMOTE DISPLAY (Digital)

<p>Speed presentation</p>	<p>3-digit numerical display on high-brightness numerical indicator</p> <p>Minimum division of display 0.1 knot</p> <p>Indicating of headway and sternway travels. Arrow-marks lamps</p>
<p>Distance presentation</p>	<p>Digital display on 6-digit electromagnetic counter.</p> <p>Minimum division of display 0.01nm</p> <p>Provide a manual reset</p>
<p>Type</p>	<p>NWW-16A Flush mount type</p> <p>NWW-16B Wall mount type</p>

NWW-7 DISTANCE COUNTER

<p>Distance presentation</p>	<p>Digital display on 6-digit electromagnetic counter</p> <p>Minimum division of display 0.01nm</p> <p>Provide a manual reset</p>
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NWW-24/25/26 REMOTE DISPLAY (Analog)

Speed presentation	Wide-angle analog display Display area 3 type EL plate Green or Orange Minimum division of display 0.5 knots
Type	Flush Mount Type NWW -24 Wall Mount Type (with Dimmer) NWW -25 Panel Mount Type NWW -26

MODEL

		NWW-24 (Flush Mount)		NWW-25 (Wall Mount)		NWW-26 (Panel Mount)	
Area	Size	Green	Orange	Green	Orange	Green	Orange
-4 ~ 20KT	L	NWW-24L20G	NWW-24L20O	NWW-25L20G	NWW-25L20O	NWW-26L20G	NWW-26L20O
	M	/	/	/	/	NWW-26M20G	NWW-26M20O
	S	NWW-24S20G	NWW-24S20O	NWW-25S20G	NWW-25S20O	NWW-26S20G	NWW-26S20O
-5 ~ 25KT	L	NWW-24L25G	NWW-24L25O	NWW-25L25G	NWW-25L25O	NWW-26L25G	NWW-26L25O
	M	/	/	/	/	NWW-26M25G	NWW-26M25O
	S	NWW-24S25G	NWW-24S25O	NWW-25S25G	NWW-25S25O	NWW-26S25G	NWW-26S25O
-6 ~ 30KT	L	NWW-24L30G	NWW-24L30O	NWW-25L30G	NWW-25L30O	NWW-26L30G	NWW-26L30O
	M	/	/	/	/	NWW-26M30G	NWW-26M30O
	S	NWW-24S30G	NWW-24S30O	NWW-25S30G	NWW-25S30O	NWW-26S30G	NWW-26S30O

3-2 COMPOSITION

No.	COMPONENT	TYPE	WEIGHT	Q'ty	REMARKS
1	Main electronics	NJC-202	12.5Kg		
2	Remote (Digital) display	NWW-5	1.5Kg		Max. 4 units
3		NWW-16A	2.5Kg		Flush mount type
4		NWW-16B	2.0Kg		Wall mount type
5	Remote display (Analog)	NWW-24□□□	6.5Kg		Flush mount type Standard:NWW-24L30G
6		NWW-25□□□	7Kg		Wall mount type Standard:NWW-26L30G
7		NWW-26□□□	1.5Kg		Panel mount type Standard:NWW-26L30G
8	Distance counter	NWW-7	0.8Kg		Max. 2 units
9	Transducer	NKF-530E	13.0Kg		Flush type
10		NKF-531E	48.0Kg		Gatevalve type
11		NKF-585E	18.0Kg		Protrusive type
12	Junction box	NQD-382B	1.0Kg		
13	Junction box	NQD-559	2.5Kg		
14	Analog board	CHD-42	0.5Kg		Include in NJC-202
15	Transducer cable	M-933	960g/m		
16	Spare parts	6ZXBS00122	0.5Kg		
17	Instruction manual				

4. OPERATING PROCEDURE

4-1 Starting

- 1) Turn on the power switch at the power distribution board.
- 2) Place the power switch of this equipment in the ON position.
- 3) Set the Dimmer for desired brightness of display.
- 4) Allow about 5 minutes for stabilization of display.

When turning on the power, an indication of 0.0 knot appears about 1 minute and then gradually will follow up the speed.

- 5) Depress the reset button at the distance counter for zero-reading thereon.

4-2 Calibration Signal

A calibration signal generator circuit is contained to calibrate the measured speed and check the operating conditions.

The calibration signal is available, as described below, while referring to Section 6, Speed Test, for speed calibration.

- 1) Set to the main electronics switch to TEST.
- 2) Allow for stable reading on the display. In this time, a reference speed of 13.5 knots will be displayed.

(After calibration of the speed, another reference speed will be displayed, as described in Paragraph 6-2.)

- 3) Distance counter check

Be sure a reading of 0.23 NM per minute is obtained for the reference speed of 13.5 knots.

4) Distance output signal check

Be sure a run output signal of 45 pulses per minute for the same reference speed of 13.5 knots.

5) After checking the operation, return the switch to the ON position.

4-3 Receiver Monitor

The receiver monitor feature always monitors the received signal condition and informs the user of an abnormal state with blinking the digital speed display, in the event that the signal level under monitor goes down below predetermined threshold level.

During blinking, the reading on the speed display remains not updated but represents previous speed. However, only a short-time blinking may result from bubble disturbance, which can cause a temporary lowering of the received signal level.

In this case, the user may use regardlessly, since little error arises.

4-4 Maintenance and Check

- 1) Both the main unit and display unit have no mechanical parts and therefore does not require any periodic maintenance. However, the user should always try to keep each unit clean.
- 2) Periodically check the transducer for sea water leakage through the gland clamps and gaskets.

- 3) When entering a dockyard, take care of the transducer's radiation surface condition for adhesion of seaweeds, algae, oysters, and similar foreign matter. If necessary, carefully remove them, without applying a strong shock to the radiation surface.

4-5 Display Lamps Replacement

- 1) Numerical indicators replacement (NWW-5 and NWW-16/16B)

Open the upper cover of the Display unit. Draw out the indicator unit (CDE-133B/CDJ-90A). The numerical indicator has a socket. Remove defective parts and insert spare numerical indicators, with taking care of their vertical orientation.

- 2) Headway and sternway indicator lamps replacement

The headway/sternway indicator lamp has been soldered to associated printed circuit board. When replacing, take care of the circuit pattern on the board, which is liable to be damaged due to replacement.

5. FUNCTIONAL DESCRIPTION

5-1 Theory of Operation of Doppler Log

In general, there appears a difference between the frequency of a sonic wave or radio wave radiated from a source and that returned from an object, while both the source and object are relatively moving.

When both are moving away from each other, the return frequency is lower than the radiation frequency. When both are approaching to each other, the situation is reverse.

This phenomenon is widely known as the Doppler effect.

The Doppler log is one of the applications of this effect and available for measurement of the ship's speed relative to the water.

It is provided with a transducer assembly, which is usually mounted on the hull bottom to radiate an ultrasonic signal in obliquely downward directions.

Thus radiated ultrasonic signal into the sea is scattered and reflected therein and again received through the transducer. The received signal has been subjected to the Doppler effect to result in a frequency change proportional to the difference between the speeds of both the source and object, i.e., the ship's speed relative to the water.

As illustrated in Figure 2, resulting Doppler frequency shift f_d is given by

$$f_d = 2V f_0 \cos \theta / C,$$

where, θ : Radiation angle of ultrasonic wave

f_0 : Radiation frequency

V : Ship's speed

C : Sound velocity in sea water

According to above Doppler shift equation, the ship's speed is proportional to the Doppler frequency shift. This fact can be utilized to calculate the ship's speed from the Doppler frequency shift after its measurement.

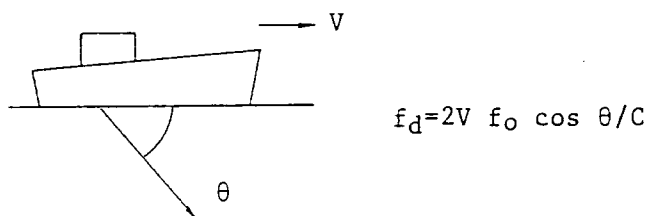


Fig. 2 Doppler Effect

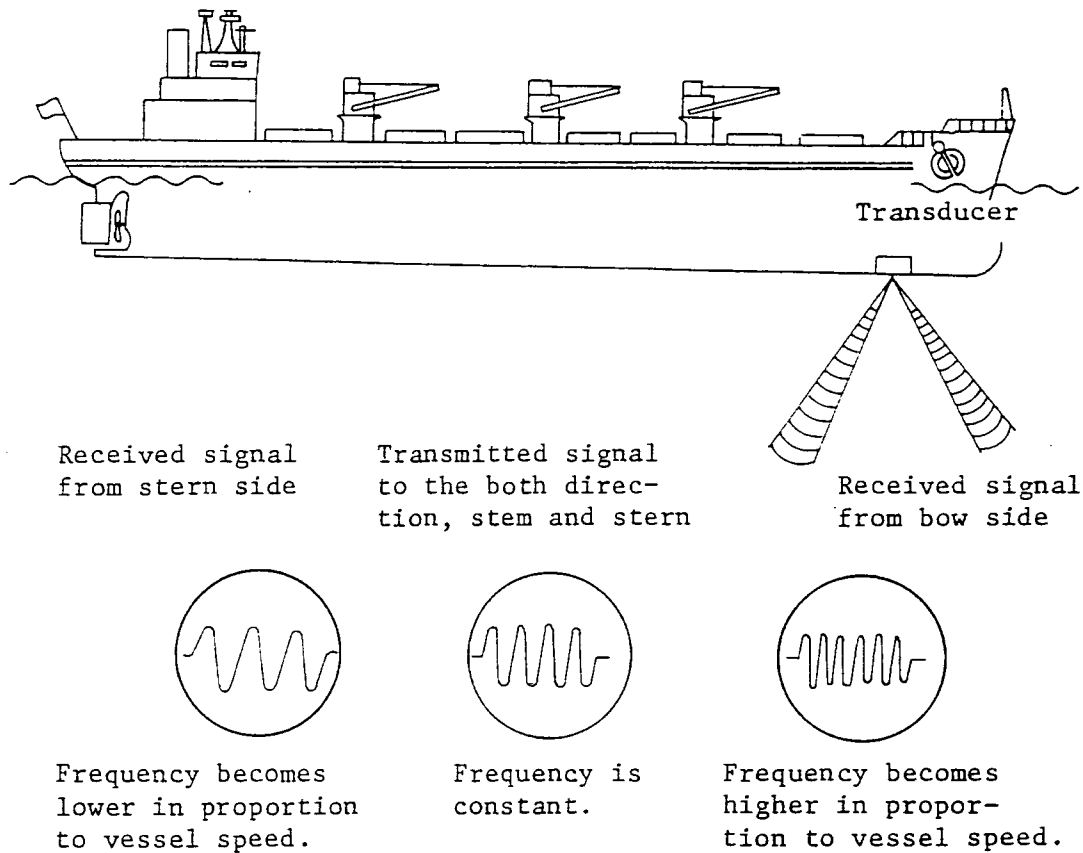


Fig. 3 Pair Beam System

5-2 Main Electronics, NJC-202

The main electronics is composed of eight (8) printed circuit boards for processing all the signals and hence a heart of this equipment.

The block diagram is shown below. Individual blocks' operation is described in this paragraph.

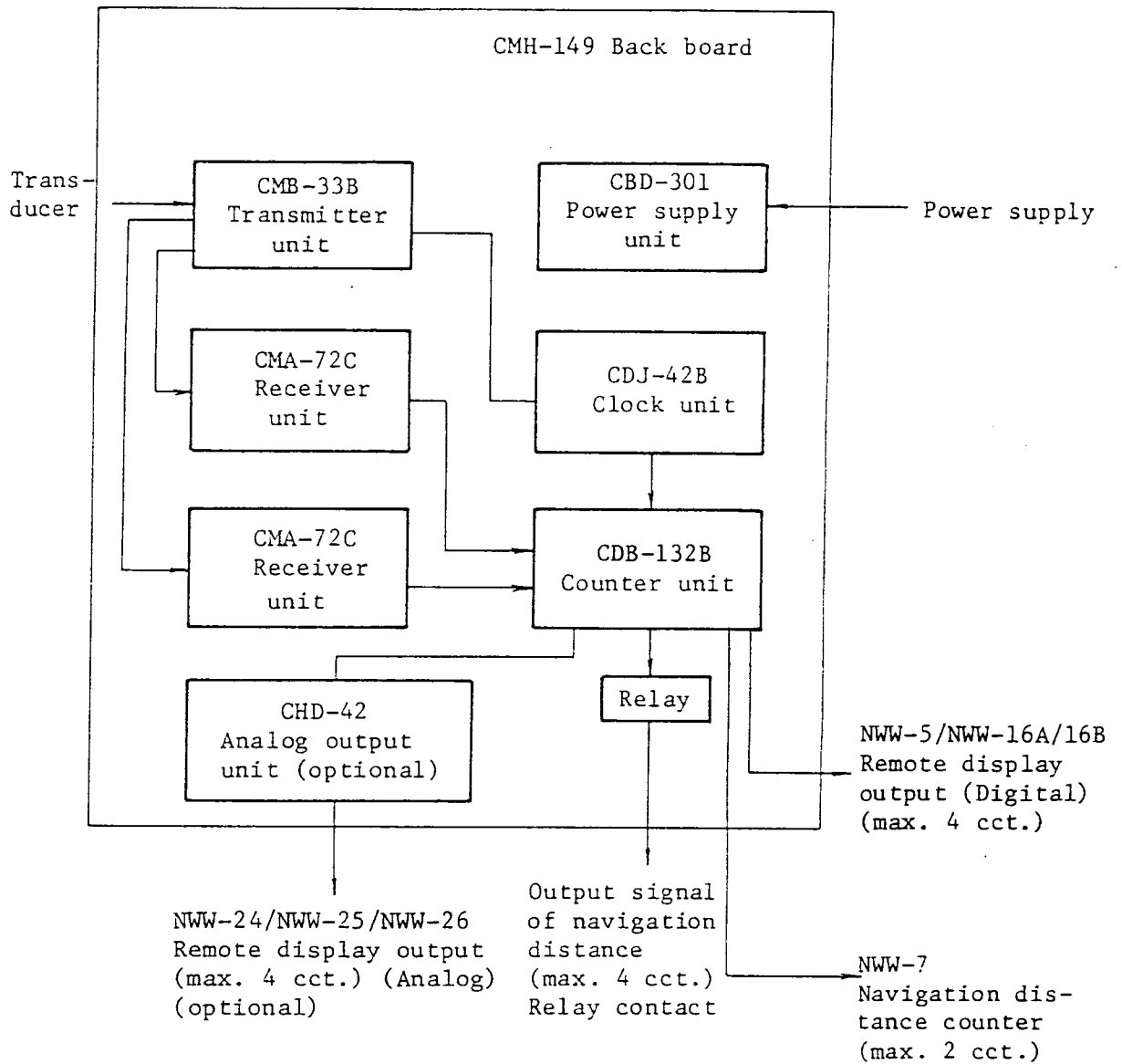


Fig. 4 Block Diagram of Main Electronics

1) Transmitter, CMB-33B

Consisting of two pairs of power amplifiers and duplexer circuit for the forward and backward transmission.

The transmitter amplifies a reference signal fed from the clock generator up to a sufficient power level and sends it to the transducer.

2) Receiver, CMA-72C

Amplifies return signals received at the transducer and selects an effective Doppler signal from the return signals in a frequency tracking circuit.

The receiver uses identical circuits for receiving the return signals in both the forward and backward directions.

3) Clock generator, CDJ-42B

Consisting of a timing clock generator circuit, in-sea water sound velocity corrector circuit and test signal generator circuit.

The clock generator controls the timing operation of the entire equipment.

4) Counter, CDB-132B

Counts the Doppler signals fed from the receiver and converts them into a speed signal.

5) Analog unit, CHD-42 (Option)

Converts a signal into an analog signal.

6) Power supply unit, CBD-301

Regulates power voltages to provide stable supply voltages used in the entire equipment.

7) Back board, CMH-149

Interconnects the units and connect with external equipment.

5-3 Remote Display (Digital), NWW-5/NWW-16A/16B

Provided with a high-brightness numerical indicator for displaying a digital value of the speed signal fed from the main electronics.

It provide a 3-digit display area and is capable of indicating the value from 0.1 to 30.0 knots.

Two arrow-mark lamps are provided for indicating the headway and sternway travels of the ship. In addition to the speed display means, type Type NWW-16 incorporates a distance counter.

5-4 Remote Display (Analog), NWW-24/NWW-25/NWW-26

Provided with a wide-angle analog meter for displaying the speed signal fed from the main electronics in a range of -6 knots to 30 knots, -5 knots to 25 knots or -4 knots to 20 knots.

The minimum division of scale is 0.5 knots.

An electroluminescence display board is employed to provide a uniform brightness over the scale board.

5-5 Distance Counter, NWW-7

Provided with a 6-digit counter for displaying the distance signal fed from the main electronics in a range of 0.00 to 9999.99 NM.

This meter is an electromagnetic type, which holds the display of distance even with power-off.

5-6 Transducer, NKF-530E/NKF-531E/NKF-585E

Composed of ceramic transducer elements and thermistors for detecting the water temperature. Each transducer element is used for transmitting and receiving an ultrasonic wave signal in the forward and backward directions.

In addition, the Type NKF-531E is furnished with a 2.5-inch gate valve for replacing the transducer element. This allows for replacement of the element without laying the hull on a dry dockyard.

5-7 Junction Box, NQD-382B/NQD-559

Installed between the transducer and main electronics to connect them with cables.

The Type NQD-382B is used for connection of the cable furnished with the transducer assembly and the transducer cable.

The Type NQD-559 is used for extension of the transducer cable.

6. SPEED TEST

To make the most of the excellent features of this Doppler log, the value of speed displayed on the log must be compared with an actually measured ship's speed, after installation, and if necessary, must be calibrated for correction.

For speed calibration, the ship usually goes and comes back between two marking posts to obtain a calibrated value. The measured values at this time must be accurately recorded on a Doppler log speed test paper and stored.

The record will serve for accurate adjustment when some circuit boards or the like will be replaced because of failure in this equipment.

6-1 Mile Post Running Test

Prior to the Mile Post running test, a pre-run should be performed to reduce the speed change during running between the Mile Post, possibly as practicable.

In addition, the ship must run correctly in specified direction relative to the Mile Post.

Measurement may be made during one round trip between the posts, if the influences of the tidal current and wind are regarded constant in time.

When these influences are seen varying in time, it is desirable to repeat the round trip twice or more for accurate measurement.

In addition, if the measured value in the same direction still deviates in excess of 0.5 knots, the measurement must be further repeated.

The procedure is as follows:

- 1) The Mile Post running test is usually conducted during four round trips with four different powers of the main engine: 1/4, 2/4, 3/4 and 4/4 of its rated power.
- 2) Set the propeller rotation speed and course of the ship to specified values, at least, one nautical mile before entering the entrance Mile Post.
- 3) The instant the ship passes over Point A, depress both a stopwatch 1 and the reset button of the distance counter in this equipment, as shown in Figure 6.
- 4) The instant the distance counter indicates a value of 0.01 NM, depress another stopwatch 2.
- 5) The instant the ship passes Point B, depress the stopwatch 1 again to obtain the time t_1 required for running between the Mile Post. In addition, record the reading of distance on the distance counter.
- 6) The instant the distance counter indicates a value of 0.01 NM, depress the stopwatch 2 to obtain the other time t_2 required for running a distance of 1.00 NM, from the Doppler log.

NOTE: Steps 5) and 6) may be reversed in time.

- 7) From the foregoing measured values, the ship's speeds are calculated, as follows:

$$\text{True speed} = a \times 3600/t_1 \text{ (kt),}$$

where a is distance between the Mile Post (nautical mile) and
 t is required time (second).

$$\text{Log speed} = 1 \times 3600/t^2 \text{ (kt)}$$

- 8) The ship preferably takes one route for going and another for return back during measurement in such a manner as the turns largely round when entering the return route from the going and should run with holding both the speed and course constant from post to post.

The same measurement is performed in the return trip.

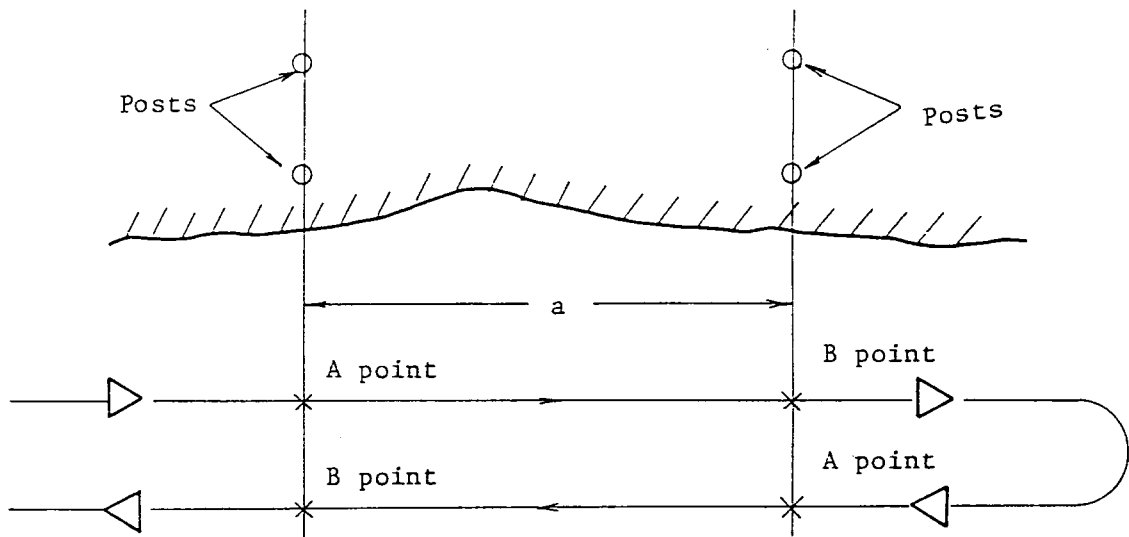


Fig. 6 Mile Post Running Test

6-2 Speed Calibration Procedure

Before executing the Mile Post running test, place the switch of the main electronics in the test position and be sure the reference speed of 13.5 knots is displayed.

Then, calculate the mean true speed and mean log speed from the Mile Post running test, and calculate the reference speed after calibration, according to Equation (6-1).

For the speed calibration, set the switch to the test position to display the reference speed value.

Adjust a variable resistor RV401 located on the CDJ-42B clock generator circuit board so that the reading on the display agrees with the value of reference speed calibrated according to Equation (6-1).

This value is the reference speed proper to this ship, after completion of the speed calibration, as follows:

$$\begin{aligned} & \text{Reference speed after calibration} \\ & = 13.5 \times \left(\frac{\text{Mean true speed} - \text{Mean log speed}}{\text{Mean true speed}} + 1 \right) \dots\dots\dots (6-1) \end{aligned}$$

7. TROUBLESHOOTING

Possible causes of various troubles are listed below.

For troubleshooting of this equipment, required a sufficient knowledge and training.

Do not replace parts on the printed circuit boards or do not perform the similar works.

This section describes the procedure for determining the condition of a trouble and locating a defective.

SYMPTOM	CHECK POINT
1. No display with power switch on	<ul style="list-style-type: none">• Adjust dimmer.• Check AC power voltage from ship's power line.• Check the fuse at front panel of main electronics, for blow-out.
2. A part of numeric display incorrect	<ul style="list-style-type: none">• Locate defective numerical indicator and replace it according the procedure described in Paragraph 4-5.
3. Erratic display of speed	<ul style="list-style-type: none">• Set switch to TEST and verify correct reference speed is displayed.• Be sure monitor lamp at CMB-33B transmitter illuminates. If not illuminating, take out the transmitter unit and replace fuse F201.• Refer to Sections 6 and 7.
4. No distance counter operating	<ul style="list-style-type: none">• Check connection at terminal board TB103 or 104 in CMH-149 back board.• Measure voltage at Pin #3 of terminal board of distance counter to check if 24V DC on-off signal is provided thereat.
5. No Log signal provided	<ul style="list-style-type: none">• Refer to Paragraph 4-3.• Replace relay K101 for run Log signal.

6. Speed indication
blinking some times

- a. Check connections of transducer cable.
- b. Make sure the monitor lamp illuminates on CMB-33B transmitter block.
If not illuminating, take out the transmitter block to check the condition of fuse F201.
If blown, replace.
- c. Check if foreign matter such as oyster and barnacle deposits on the radiating face of transducer.
- d. In case the monitor lamps illuminate on CMB-33B transmitter block and CMA-72C receiver block, the receiver block will be abnormally received.

Thus, calibrate the receiver block following below.

In the first place, take out the fuse F201 from the CMB-33B transmitter block. Then, measure the noise level in the receiver block. Connect an oscilloscope to the test terminal TP02 of the CMA-72C receiver block to check the waveform.

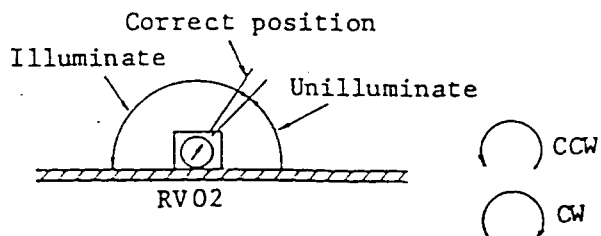
If has, in usual, a white noise of 1.0 Vp-p. If this waveform is pulsive, it may involve much external noise.

Recheck all the connections and shields of the cables; they must have been correctly connected. In addition, make sure the hold lamp on the CMA-72C receiver circuit board illuminates in this time.

Measurement is made for both the ahead and astern side receivers, separately.

NOTE: The hold lamp illuminates only when the received signal level goes down below a threshold level.

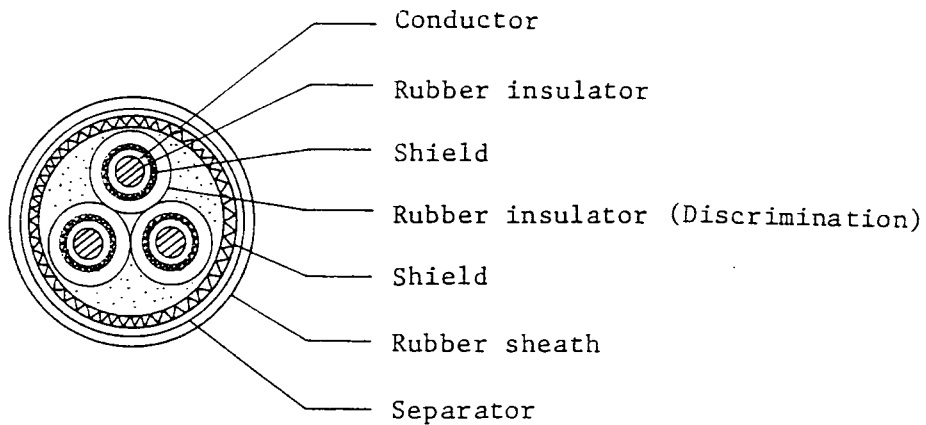
If the noise level is correct level and the hold lamp illuminate, must adjust the threshold level. Rotate the RV02 for a threshold level adjust to CCW slowly, the hold lamp illuminate and slightly rotate to CCW at that point, this is the correct position.



8-1 Construction of the Cable

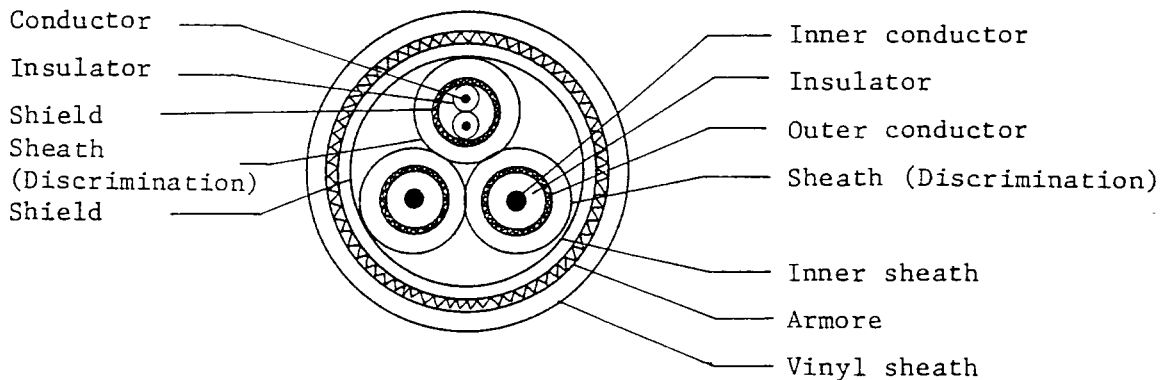
1) W1 Transducer accessories cable

Type : PNCTF-SBK/SB $3 \times 0.5 \text{ mm}^2$
 Structure : 3 core shielded cabtyre
 Discrimination: ① , ② , ③
 Sheath size : 13.2 mm




2) W2 Transducer cable

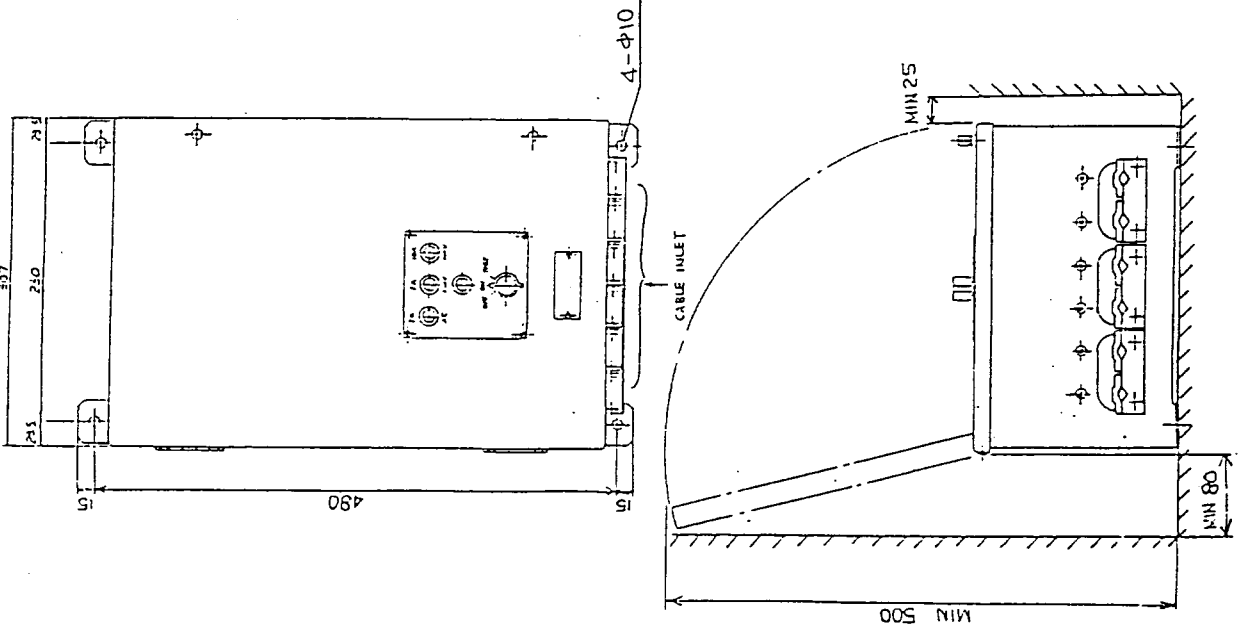
Type : M-933
 Structure : 3 core compound coaxial armored cable
 Coaxial cable : 50Ω , 5D-2V equivalent
 Discrimination : Red, black, gray
 Inner sheath size: 22.2 mm
 Sheath size : 26.6 mm



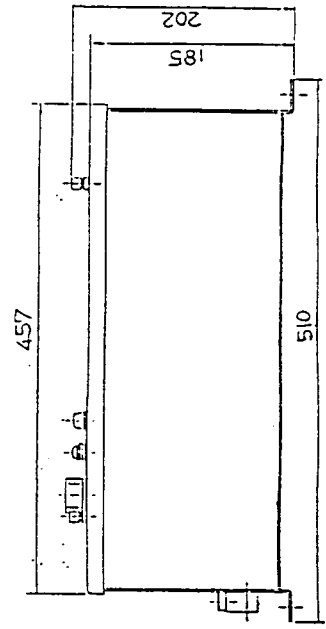
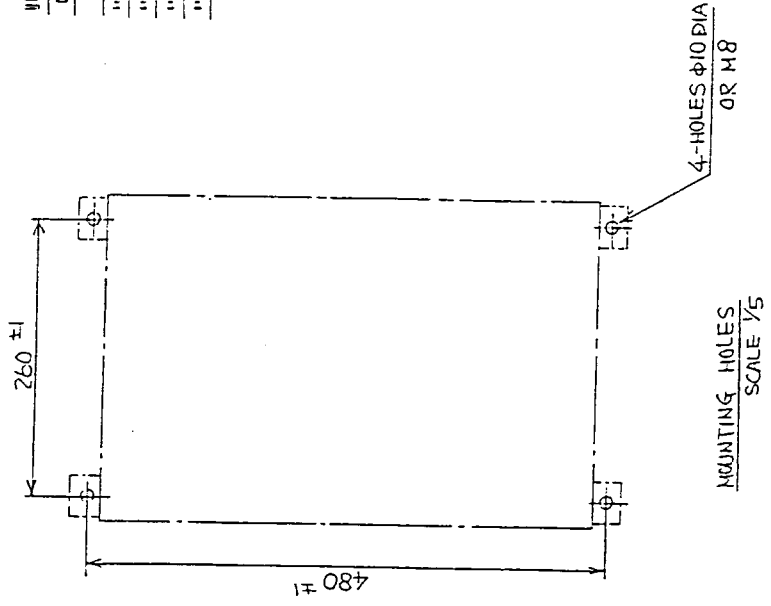
MEASUREMENT DATA OF SPEED LOG

Ship's Name: _____ Date: _____ Ship's Officer: _____
 JRC SPEED LOG Model JLN-202 Serial No. _____ Engineer in charge: _____

Run No.	Load of Main Engine	R.P.M of Propeller	Speed calibration after calibration: _____ kt				Location				Sea condition				Draught Fore Mid Aft					
			Distance		Time		Speed		Average Speed		Error		Ship's Course Ture	Wind 	Remark					
			True	Log	True min sec	Log min sec	True kt	Log kt	True kt	Log kt	kt	%								



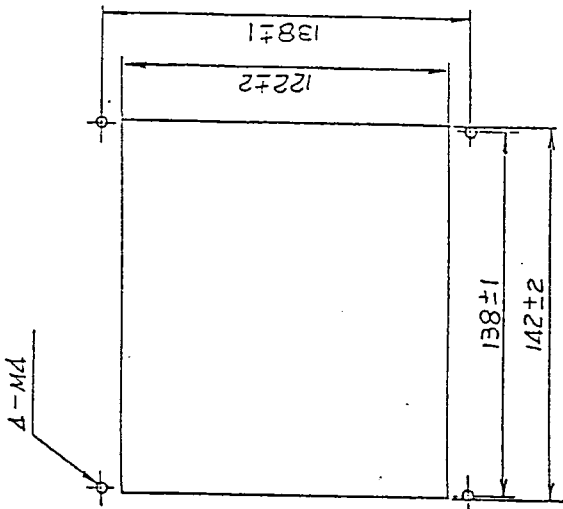
UNLESS OTHERWISE SPECIFIED	
DIMENSION SPECIFIED	TOLERANCE
1	± 1
15	± 2
50	± 4
100	± 8
1000	± 12



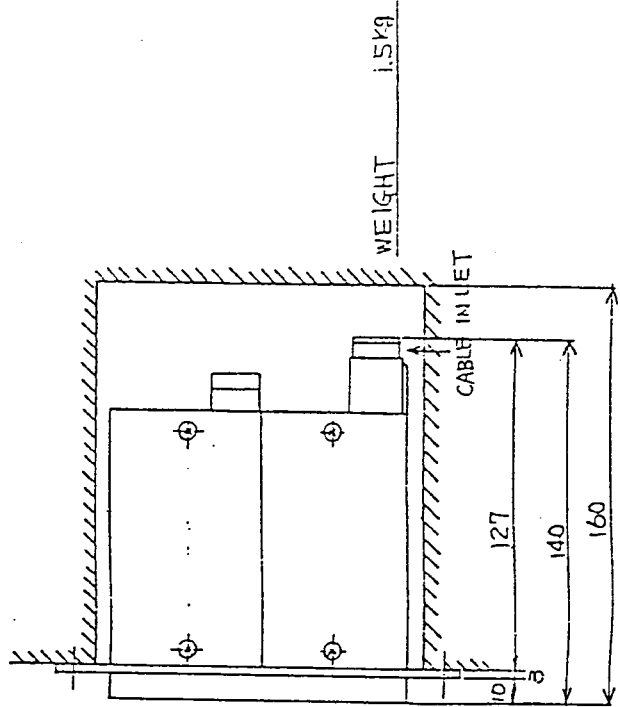
WEIGHT 12.5 kg

MODEL NJC-202
 OUTLINE & INSTALLATION OF
 MAIN ELECTRONICS

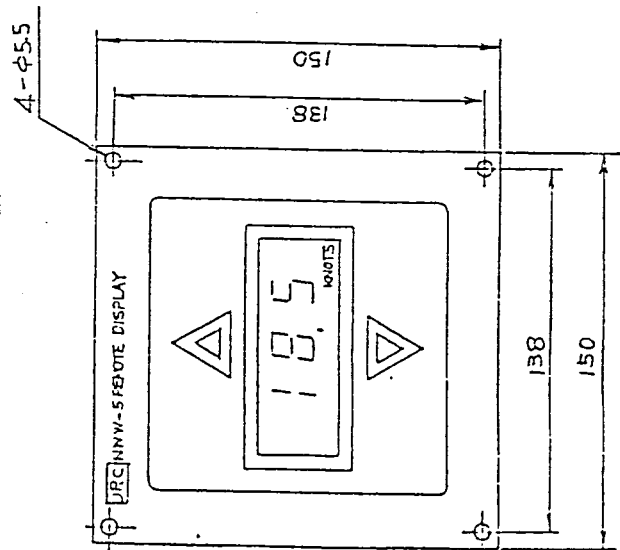
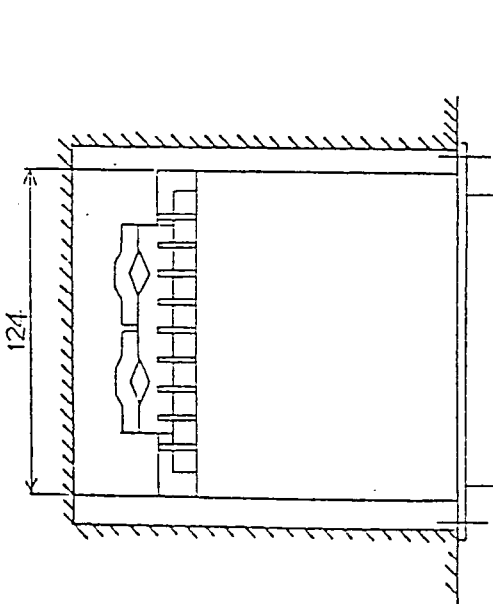
UNLESS OTHERWISE SPECIFIED		TOLERANCE
DIMENSION SPECIFIED		
1	to 16	± 1
16	to 31	± 2
31	to 75	± 4
75	to 150	± 8
150	to 300	± 12



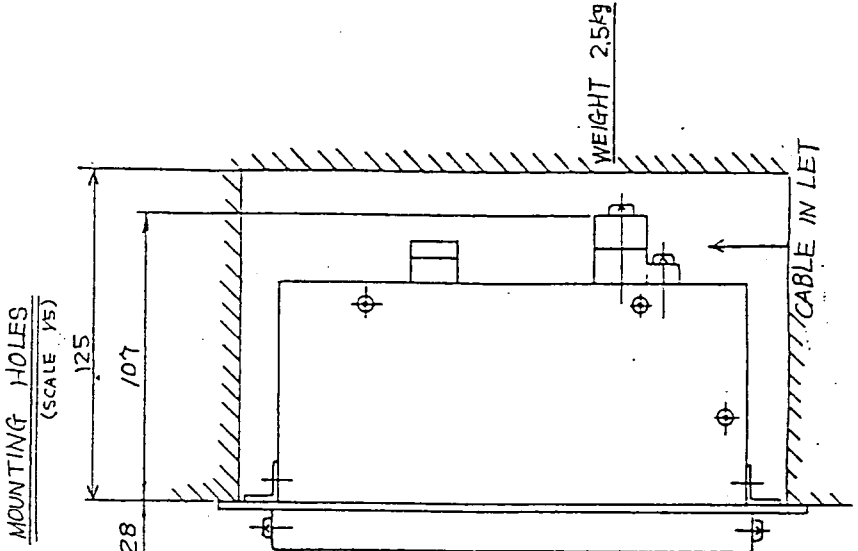
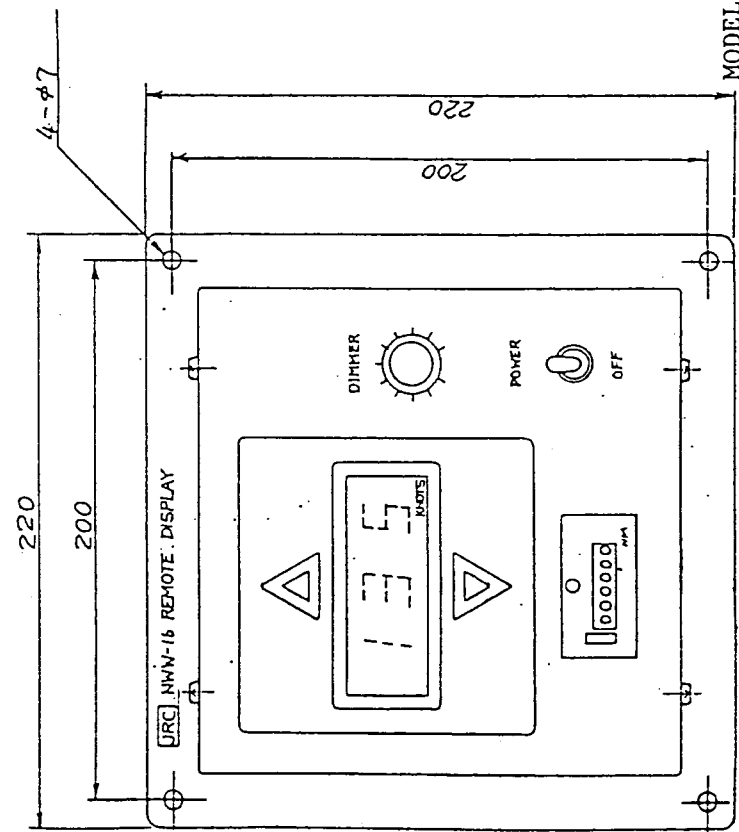
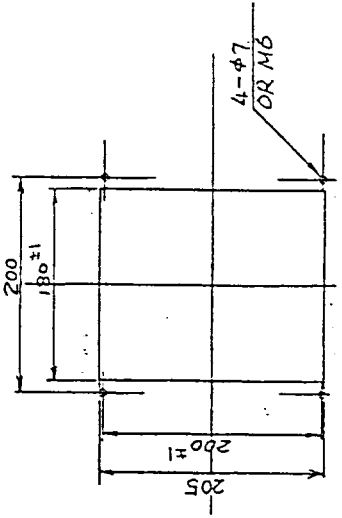
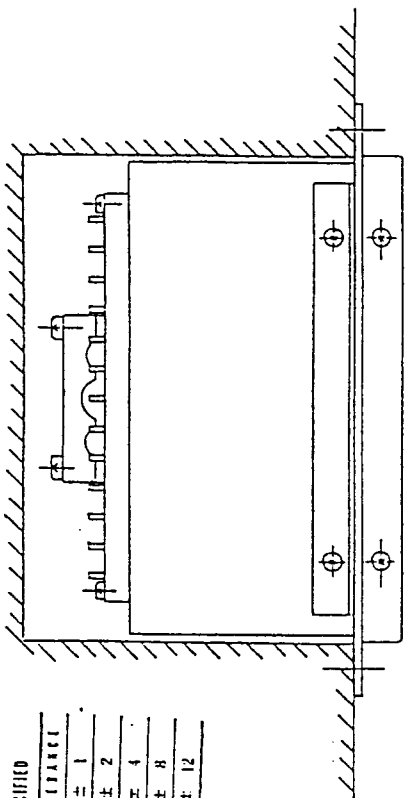
MOUNTING HOLES
SCALE 1/2



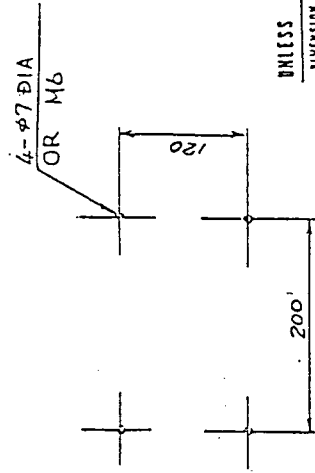
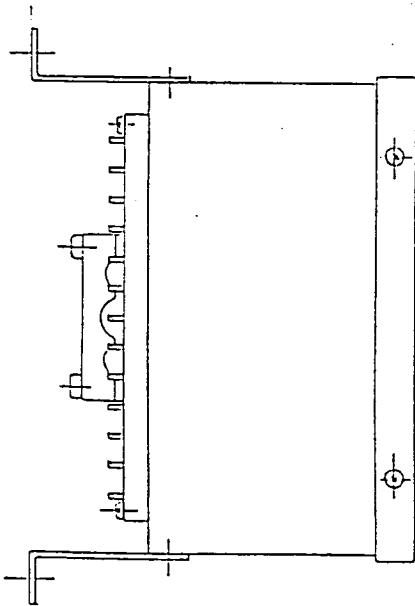
MODEL NWM-5
(DIGITAL FLUSH MOUNT)
OUTLINE & INSTALLATION OF
REMOTE DISPLAY



UNLESS OTHERWISE SPECIFIED	
DIMENSION SPECIFIED	TOLERANCE
1 TO 13	± 1
14 TO 21	± 2
22 TO 35	± 4
36 TO 100	± 8
101 TO 200	± 12



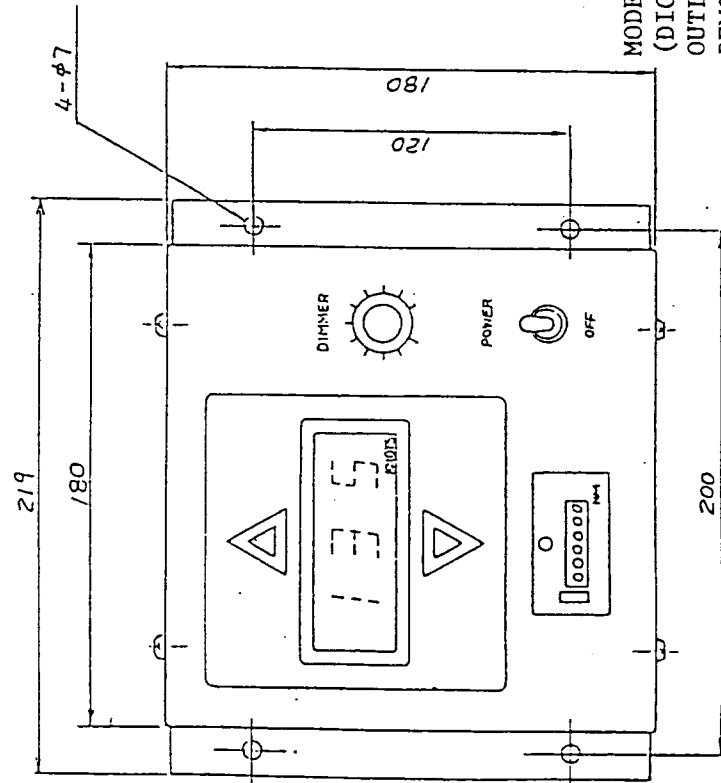
MODEL. NWW-16A
 (DIGITAL FLUSH MOUNT)
 OUTLINE & INSTALLATION OF
 REMOTE DISPLAY



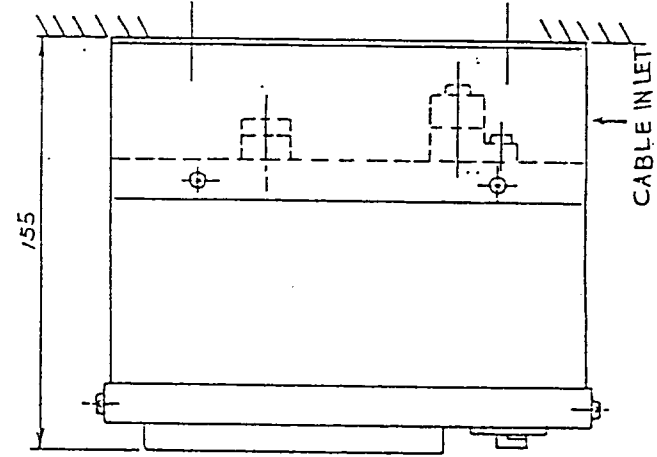
UNLESS OTHERWISE SPECIFIED "

DIMENSION SPECIFIED	TOLERANCE
1 " 10	± 1
100 " 50	± 2
1000 " 100	± 4
10000 " 1000	± 8
100000 " 10000	± 12

MOUNTING HOLES
SCALE 1/5

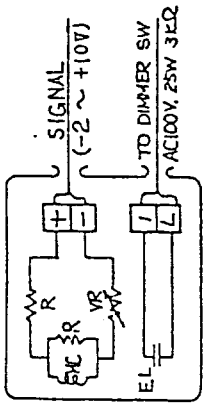


MODEL NWW-16B
(DIGITAL WALL MOUNT)
OUTLINE & INSTALLATION OF
REMOTE DISPLAY

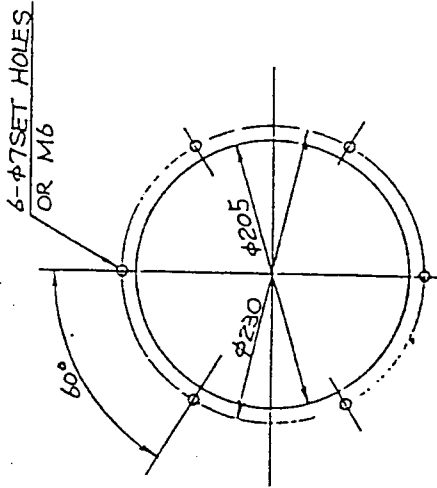
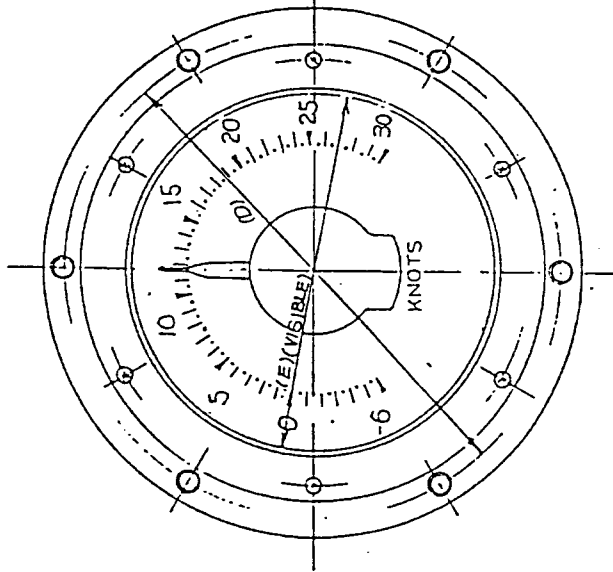


WEIGHT 2 kg

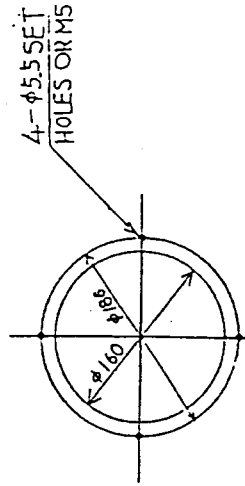
UNLESS OTHERWISE SPECIFIED	
DIMENSION	TOLERANCE
1	± 1
2	± 2
3	± 4
4	± 8
5	± 12



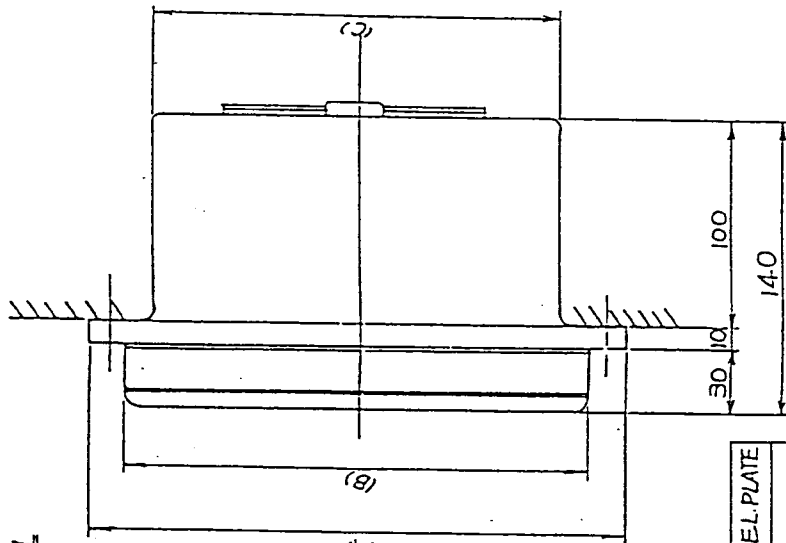
CONNECTION DIAGRAM



MOUNTING HOLES OF MODEL NWV-24L
SCALE 1/5



MOUNTING HOLES OF MODEL NWV-24S
SCALE 1/5



TYPE	A	B	C	D	E	WEIGHT	SCALE	EL. PLATE
NWV-24L	φ250	φ216	φ190	φ230	φ170	6.5kg	-4~20 -5~25 -6~30	GREEN
NWV-24S	φ200	φ173	φ150	φ186	φ125	3kg		ORANGE

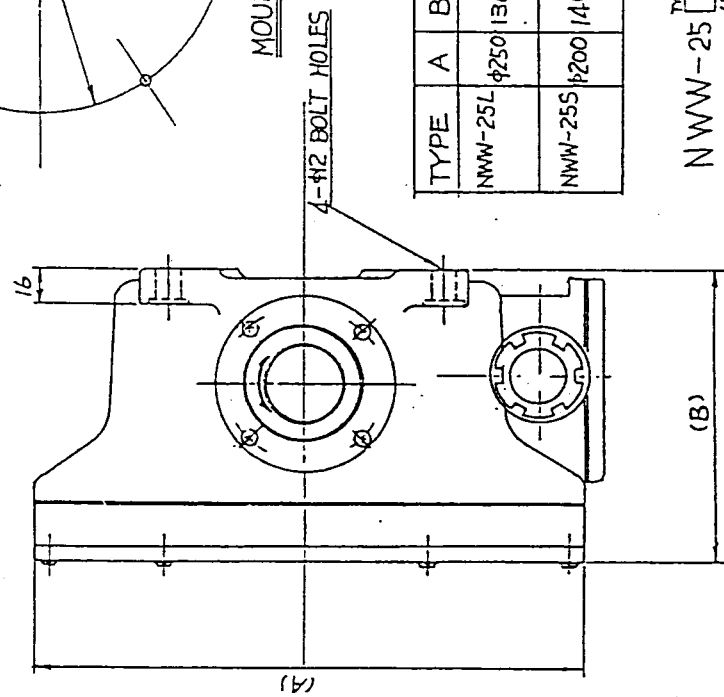
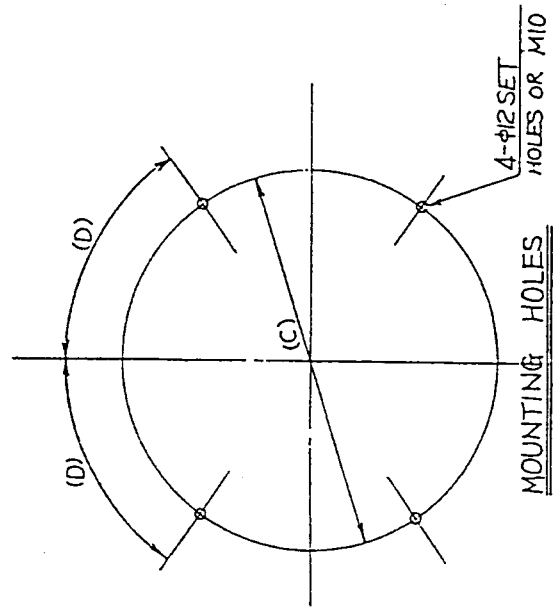
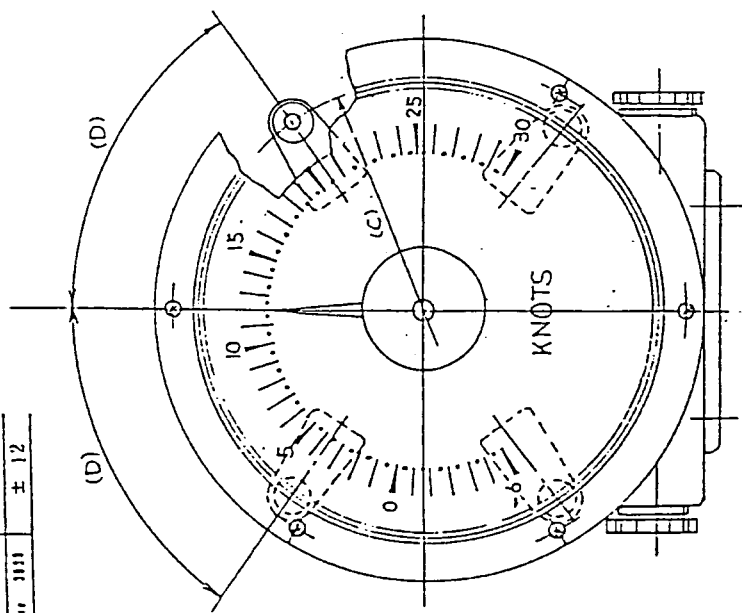
MODEL NWV-24
(ANALOG FLUSH MOUNT)
OUTLINE & INSTALLATION OF
REMOTE DISPLAY

TYPE SCALE EL. PLATE PAINTING COLOR



NWV-24L
(1) (2.0) (4)
(5) (2.5) (10)
(30)

UNLESS OTHERWISE SPECIFIED	
DIMENSION	TOLERANCE
1	± 1
11	± 2
14	± 4
15	± 8
110	± 12



TYPE	A	B	C	D	WEIGHT	SCALE	EL PLATE
NW-25L	φ250	136	φ220	55°	7kg	-4~20	GREEN
NW-25S	φ200	140	φ180	60°	5kg	-5~25	ORANGE

NW-25

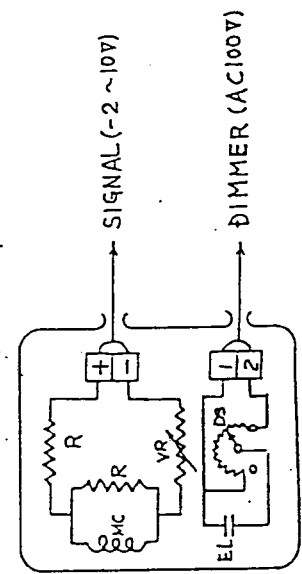
TYPE SCALE EL PLATE PAINTING COLOR

(L) (2 0) (4)

(S) (2 5) (0)

(3 0)

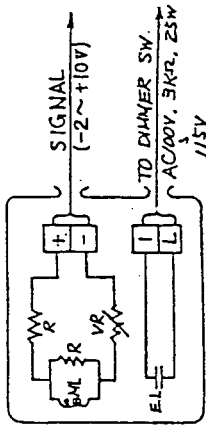
MODEL NW-25
(ANALOG WALL MOUNT)
OUTLINE & INSTALLATION OF
REMOTE DISPLAY



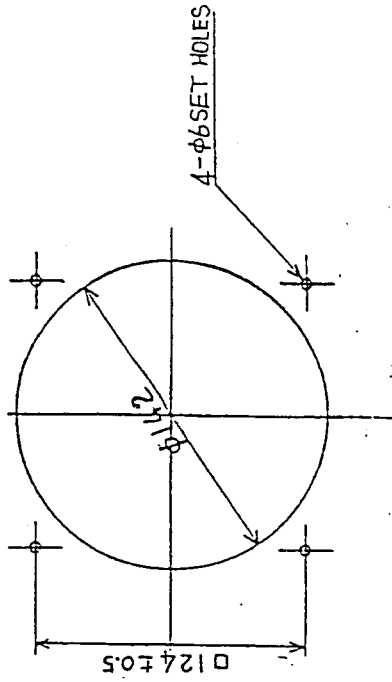
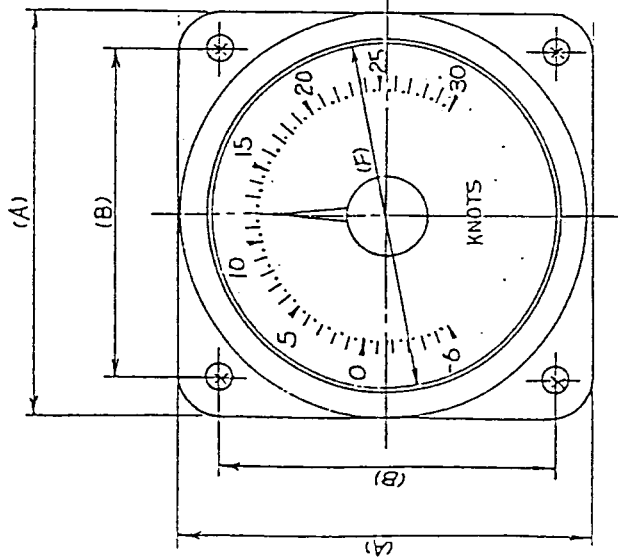
CONNECTION DIAGRAM

UNLESS OTHERWISE SPECIFIED

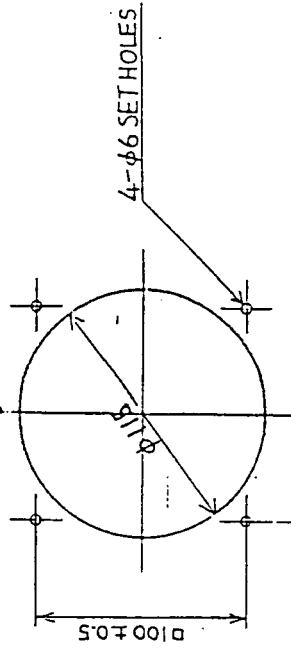
DIMENSION SPECIFIED	TOLERANCE
1 " 11	± 1
10 " 11	± 2
100 " 11	± 4
1000 " 11	± 8
10000 " 11	± 12



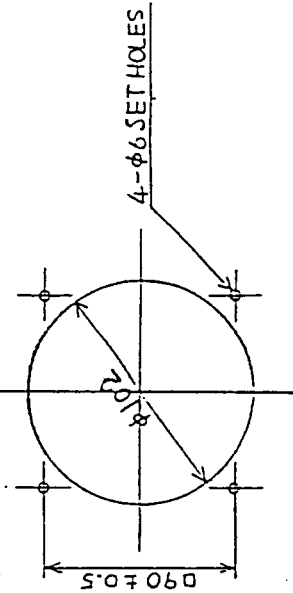
CONNECTION DIAGRAM



MOUNTING HOLES OF MODEL NWW-26L



MOUNTING HOLES OF MODEL NWW-26M



MOUNTING HOLES OF MODEL NWW-26S

TYPE	A	B	C	D	E	F	WEIGHT	SCALE	EL. PLATE
NWW-26L	150	124	110	26	20	$\phi 28$	2.5kg	-4~20	GREEN
NWW-26M	120	100	90	23	15	$\phi 100$	1.5kg	-5~25	ORANGE
NWW-26S	110	90	75	11	15	$\phi 100$	1kg	-6~30	ORANGE

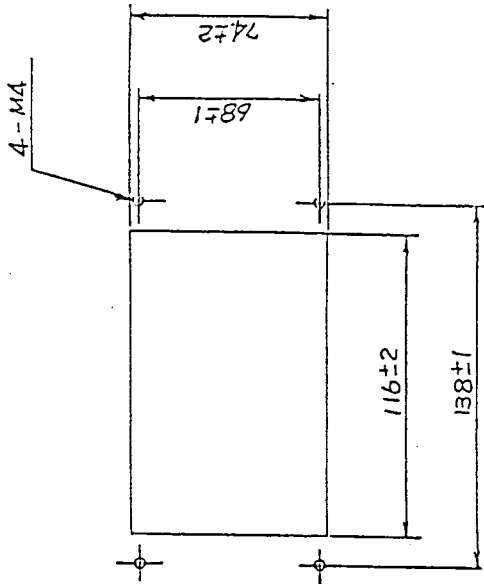
MODEL - NWW-26
(ANALOG PANEL MOUNT)
OUTLINE & INSTALLATION OF
REMOTE DISPLAY

NWW-26 TYPE SCALE EL. PLATE PAINTING COLOR

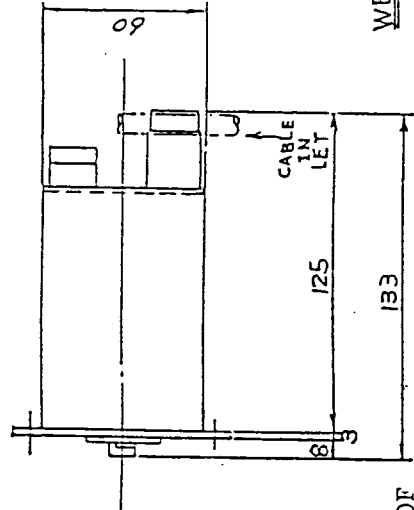
(L) (20) (G)
 (M) (25) (O)
 (S) (30)

UNLESS OTHERWISE SPECIFIED

DIMENSION SPECIFIED	TOLERANCE
1 " "	± 1
100 " "	± 2
1000 " "	± 4
10000 " "	± 8
100000 " "	± 12

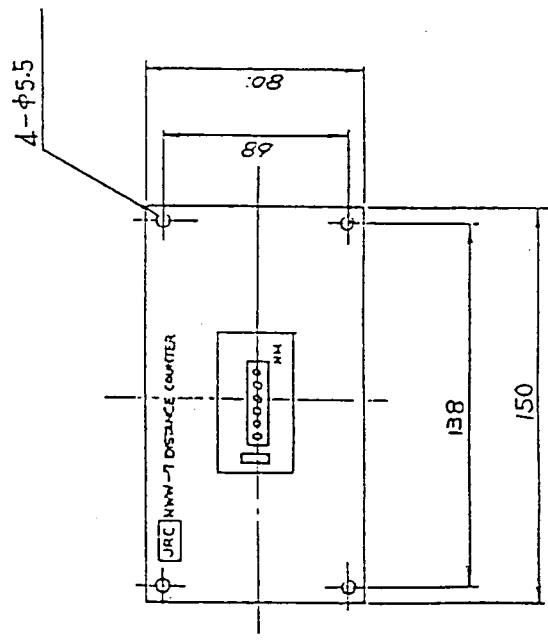
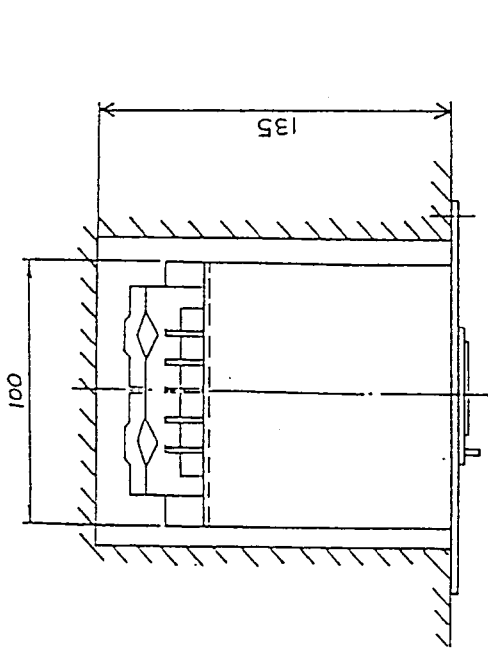


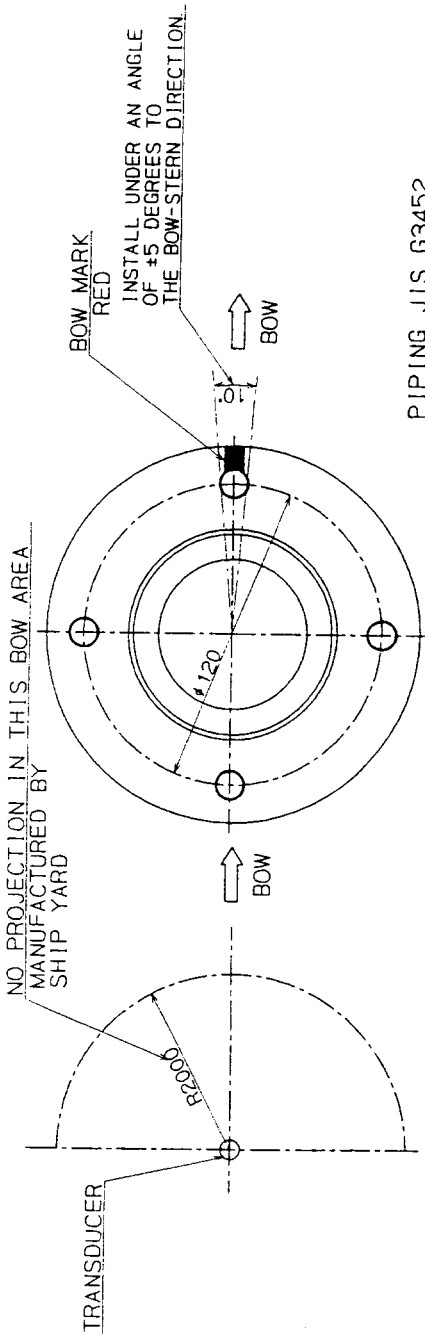
MOUNTING HOLES
SCALE 1/2



WEIGHT 0.8Kg

MODEL NWW-7
(FLUSH MOUNT)
OUTLINE & INSTALLATION OF
DISTANCE COUNTER





PIPING JIS G3452
1 1/4" INCH (SHIP YARD)

NOTE 1) 2) 3)

FLANGE JIS B 2220
(10K-32 THIN TYPE)
(SHIP YARD)

CABLE (13.2) 25m
(SUPPLY BY JRC)

SEPARATE FROM POWER CABLE

UNLESS OTHERWISE SPECIFIED	DIMENSION	TOLERANCE
0 TO 30	± 1	
OVER 30 TO 120	± 1.5	
OVER 120 TO 400	± 2.5	
OVER 400 TO 1000	± 4	
OVER 1000 TO 2000	± 6	
OVER 2000 TO 3000	± 8	

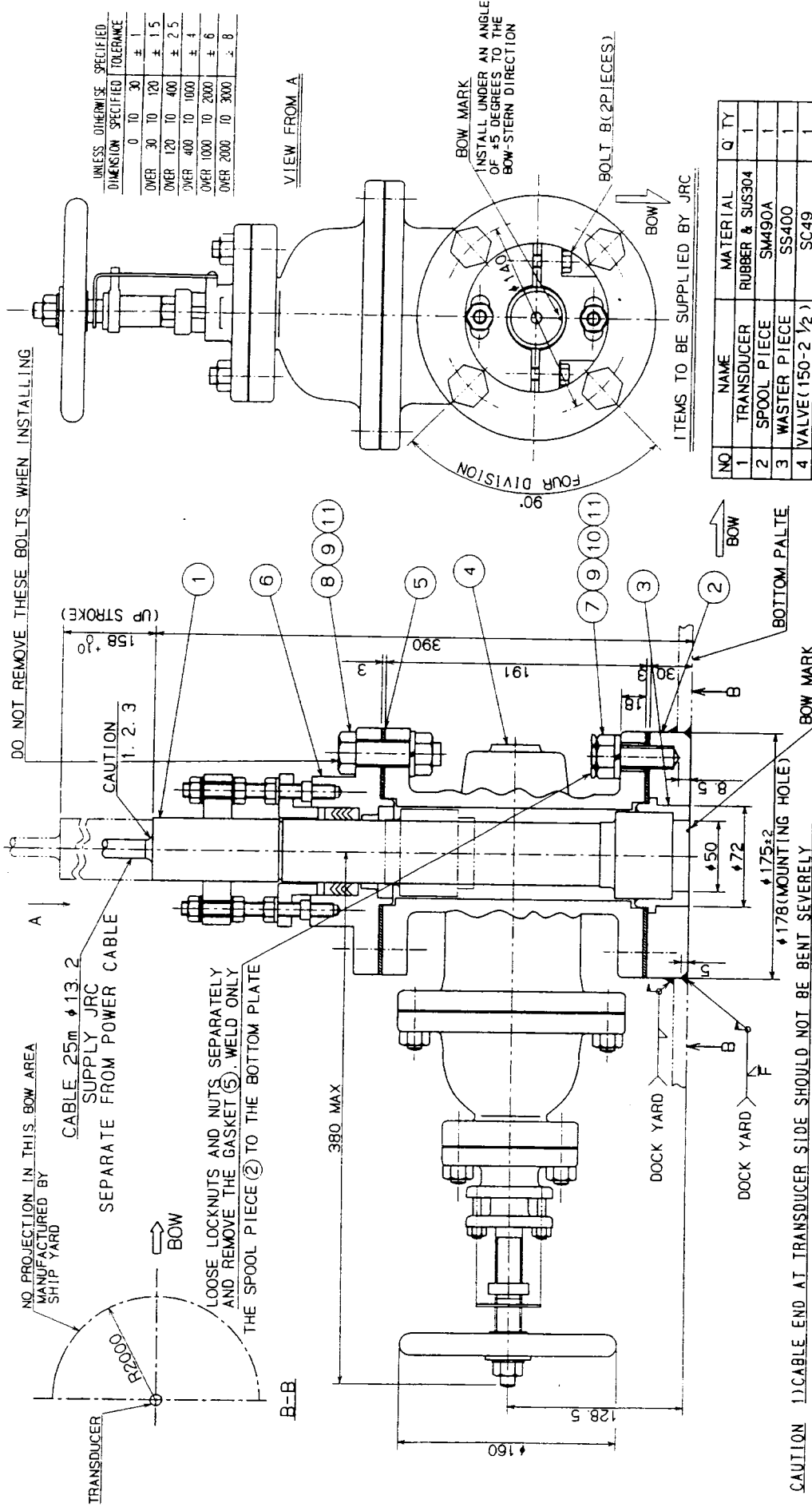
WHEN REMOVE THE MOUNTING
BASE ①, LOOSEN NUTS AND
LOCKNUTS SEPARATELY.

PARTS LIST (SUPPLIED BY JRC)

NO	NAME	TYPE	MATERIAL	QTY
1	MOUNTING BASE	MTL028789	SM490A	1
2	TRANSDUCER COVER	MTL035203	SS400	1
3	MOUNTING PLATE	MTL018747	SS400	1
4	GASKET	MPPK00659A	JOINT SHEET	1
5	GASKET	MPPK00939A	JOINT SHEET	1
6	M12 NUT		SUS304	12
7	M12 SPRING WASHER		SUS304	8
8	GLAND	MTL024005	SUS304	1
9	GASKET	MPPK01221	RUBBER	1
10	WASHER	MTD003720	SPCC	1
11	M12 BOLT		SS400	4
12	TRANSDUCER	CFT-0228		1
13	M12X40 BOLT		SUS304	4

WEIGHT 13kg

MODEL NKF-530E
OUTLINE & INSTALLATION OF
TRANSDUCER



UNLESS OTHERWISE SPECIFIED, DIMENSION SPECIFIED TOLERANCE

0 TO 30	± 1
OVER 30 TO 120	± 1.5
OVER 120 TO 400	± 2.5
OVER 400 TO 1000	± 4
OVER 1000 TO 2000	± 6
OVER 2000 TO 3000	± 8

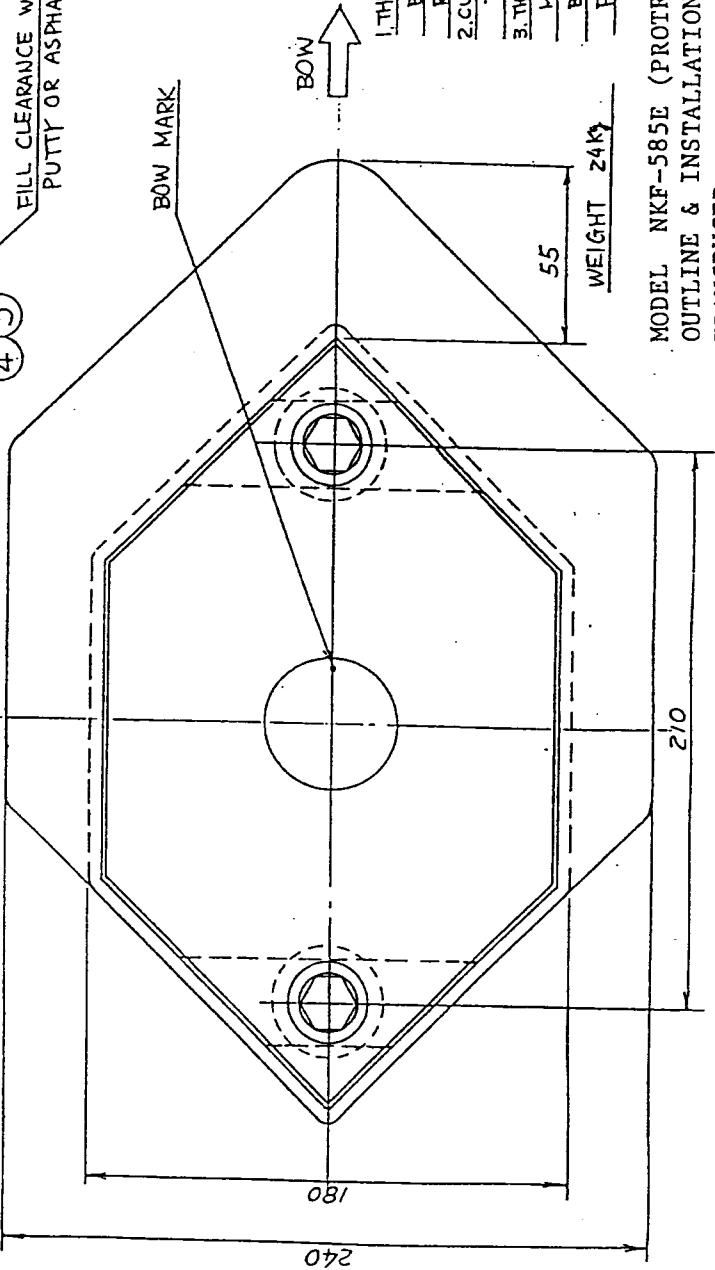
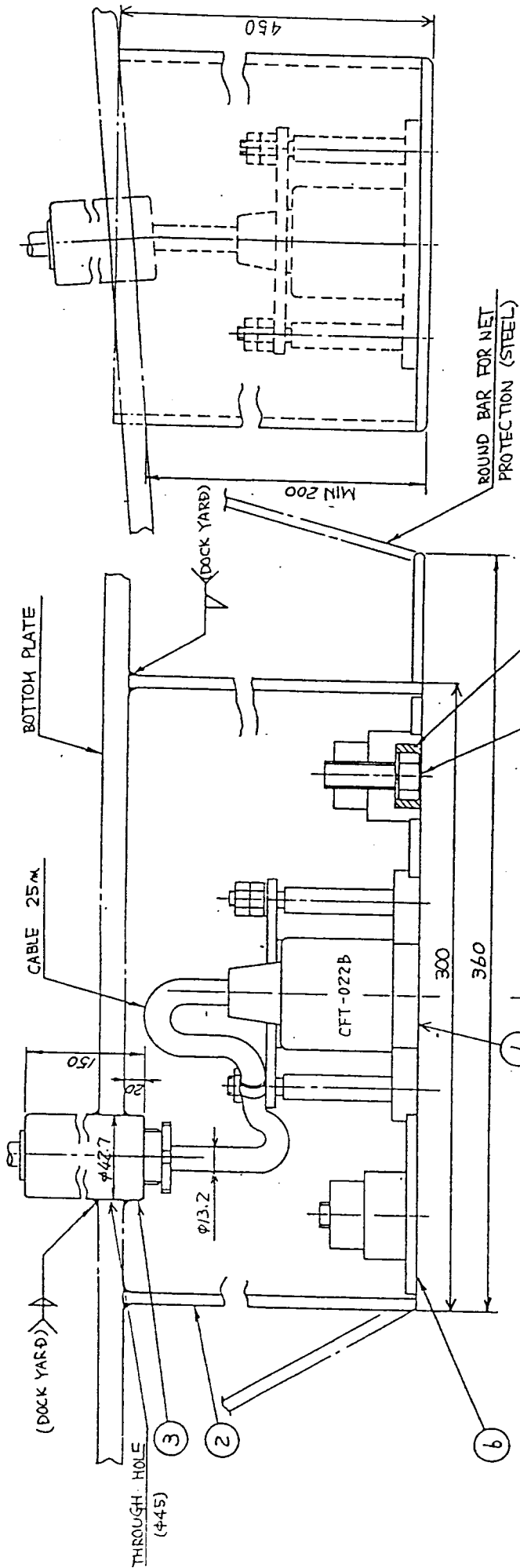
ITEMS TO BE SUPPLIED BY JRC

NO	NAME	MATERIAL	Q'TY
1	TRANSDUCER	RUBBER & SUS304	1
2	SPOOL PIECE	SM490A	1
3	WASTER PIECE	SS400	1
4	VALVE (150-2 1/2)	SC49	1
5	GASKET	JOINT SHEET	2
6	SEA CHEST	SS400	1
7	BOLT M16	SS400	4
8	BOLT M16X80	SUS304	4
9	NUT M16	SUS304	8
10	LOCK NUT M16	SUS304	4
11	SPRING WASHER M16	SUS304	8

MODEL NKF-531E
OUTLINE & INSTALLATION OF
TRANSDUCER

WEIGHT 48Kg

- CAUTION**
- 1) CABLE END AT TRANSDUCER SIDE SHOULD NOT BE BENT SEVERELY WHEN MAKING INSTALLATION.
 - 2) CABLE END AT TRANSDUCER SIDE SHOULD BE SECURELY FASTEN TO AVOID VIBRATION.
 - 3) DO NOT PULL THE CABLE WHEN TWISTED.
 - 4) TIGHT THE BOLT 8 AFTER RESETING THE TRANSDUCER (1).
 - 5) WHEN WELD THE SPOOL PIECE (2) ON THE BOTTOM PLATE, SET THE DIRECTION CONSIDERING OPERATION OF THE GATE VALVE HANDLE.
 - 6) IF THE BOW DIRECTION OF THE TRANSDUCER WOULD BE TURN BY 5) LOOSE THE BOLT 8 AND RESET THE DIRECTION.
 - 7) DO NOT PAINT THE RADIATION SURFACE OF TRANSDUCER.
 - 8) BOTTOM OF THE WASTER PIECE (3) SHOULD BE PAINTED IN THE SAME WAY TO THE OUTSIDE OF THE BOTTOM PLATE.



NO	NAME	TYPE	MATERIAL	Q.TY
1	TRANSDUCER	CFT-022B		1
2	TRANSDUCER COVER	HPBX15375	SPHC	1
3	STUFFING TUBE	HRJD00799	STB33	1
4	MIX 35 BOLT	BRTG 00687	SUS304	2
5	MIX SPRING WASHER	BRTG 00404	SUS304	2
6	MOUNTING PLATE	MPBX0581B	SPHC	1

ITEMS TO BE SUPPLIED BY JRC

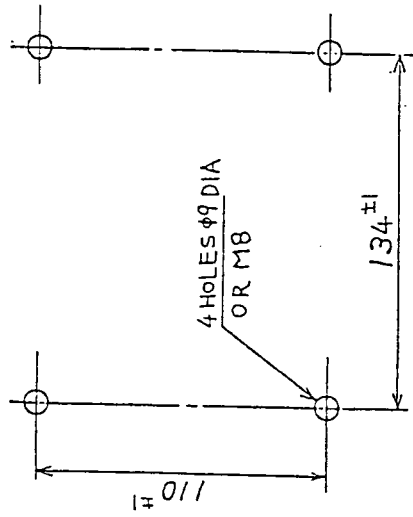
FILL CLEARANCE WITH POLYESTER PUTTY OR ASPHALT AFTER TIGHTENING & BOLT (DOCK YARD)

1. THE TRANSDUCER COVER SHOULD BE MOUNTED TO THE BOTTOM PLATE IN SUCH A MANNER THAT THE RADIATION SURFACE OF TRANSDUCER IS HORIZONTAL
2. CUT TRANSDUCER COVER IN ACCORDANCE WITH THE SLOPE OF HULL BOTTOM
3. THE ROUND BAR FOR NET PROTECTION SHOULD BE MANUFACTURED BY SHIP YARD. (DIAMETER OF BAR SHOULD BE LARGE ENOUGH SO THAT FISH HOOK WILL NOT CATCH)

MODEL NKF-585E (PROTRUSIVE)
OUTLINE & INSTALLATION OF
TRANSDUCER

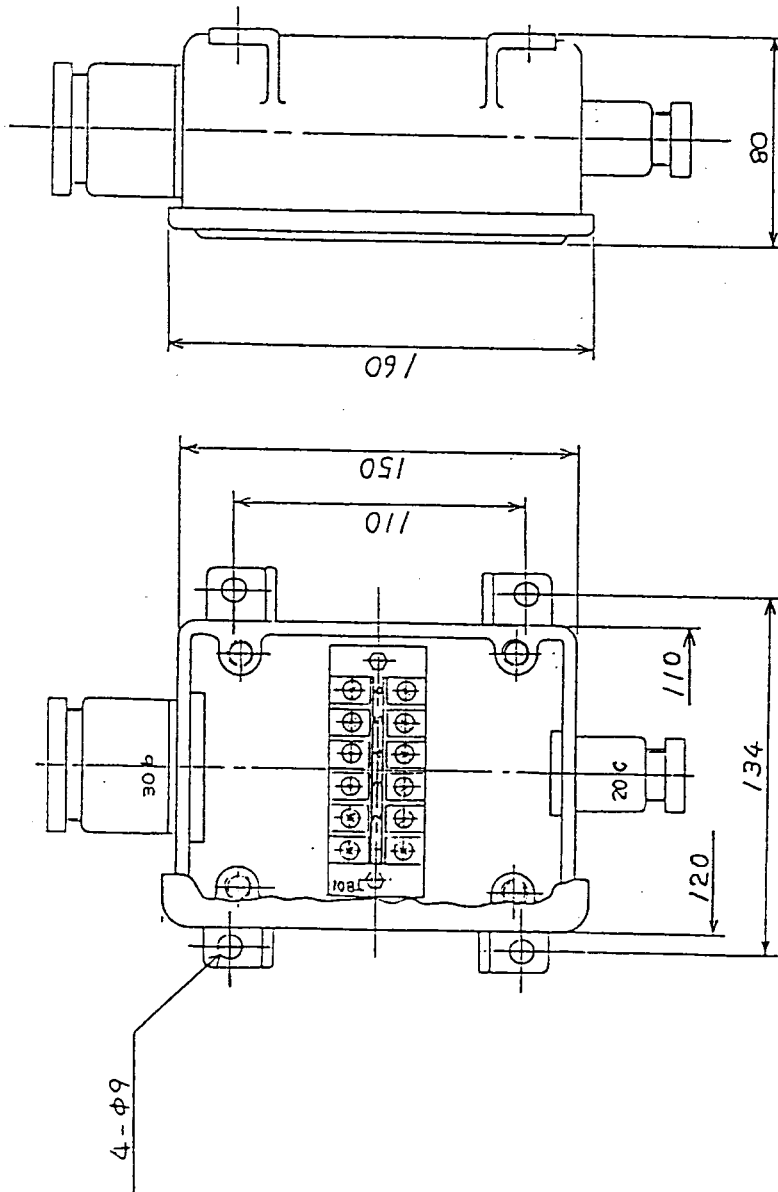
UNLESS OTHERWISE SPECIFIED

DIMENSION SPECIFIED	TOLERANCE
1 " 16	± 1
10 " 30	± 2
100 " 250	± 4
1000 " 10000	± 8
10000 " 30000	± 12



MOUNTING HOLES
SCALE 1/2

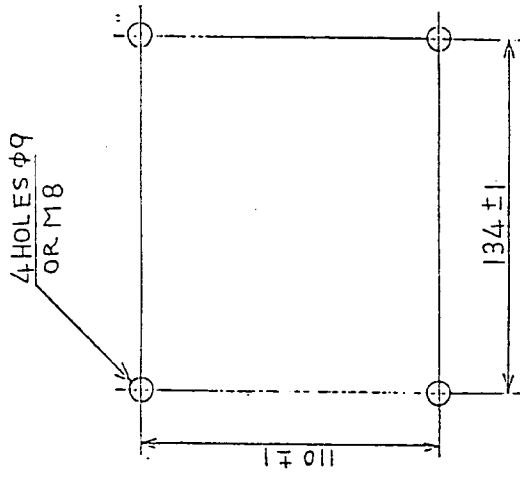
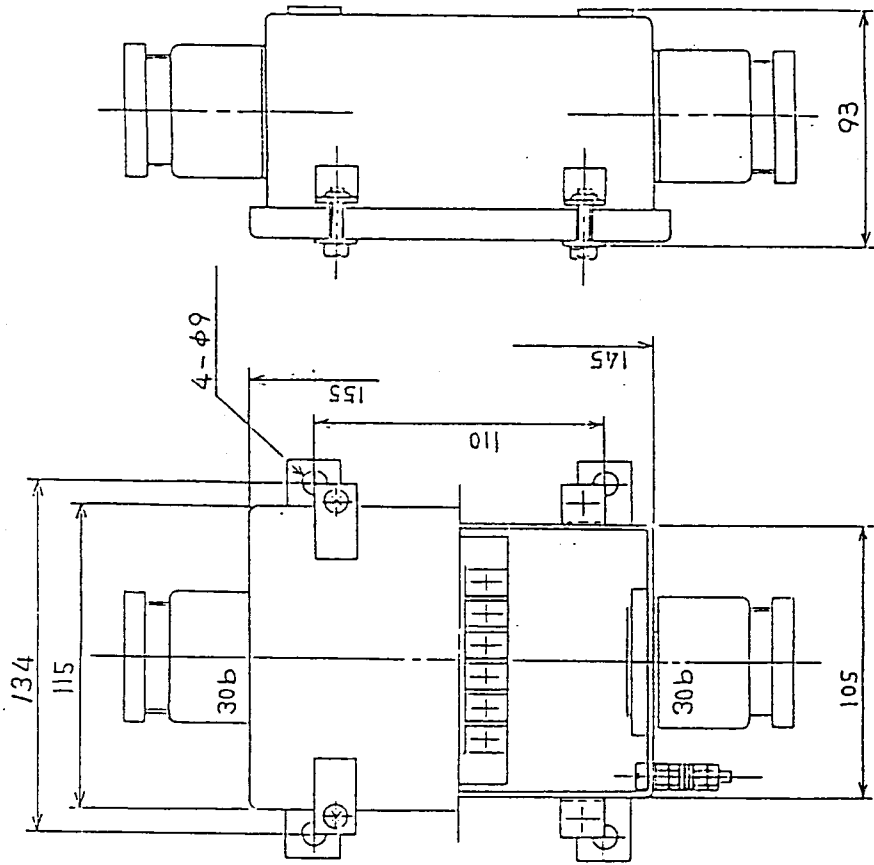
WEIGHT 1 kg



MODEL NQD-382B
OUTLINE & INSTALLATION OF
JUNCTION BOX

UNLESS OTHERWISE SPECIFIED *

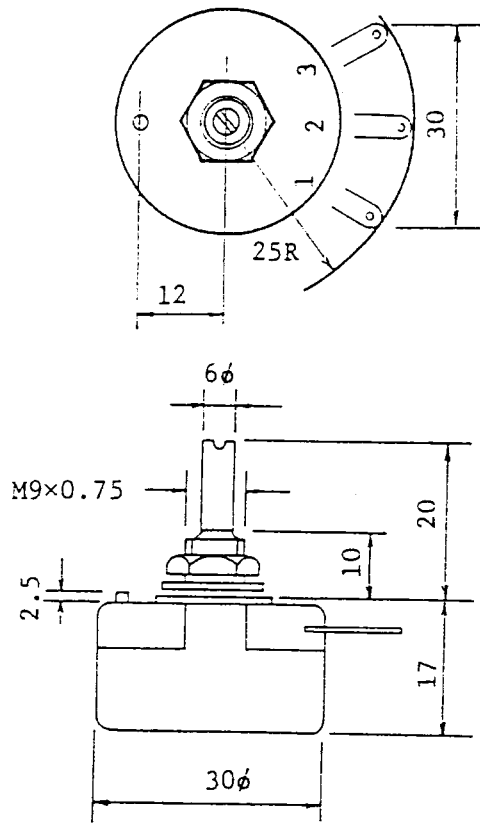
DIMENSION SPECIFIED	TOLERANCE
0	± 1
00	± 2
000	± 4
0000	± 8
00000	± 12



MOUNTING HOLES
SCALE 1/2

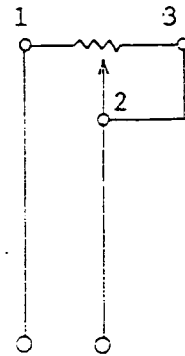
WEIGHT 2.5kg

MODEL NQD-559
OUTLINE & INSTALLATION OF
JUNCTION BOX



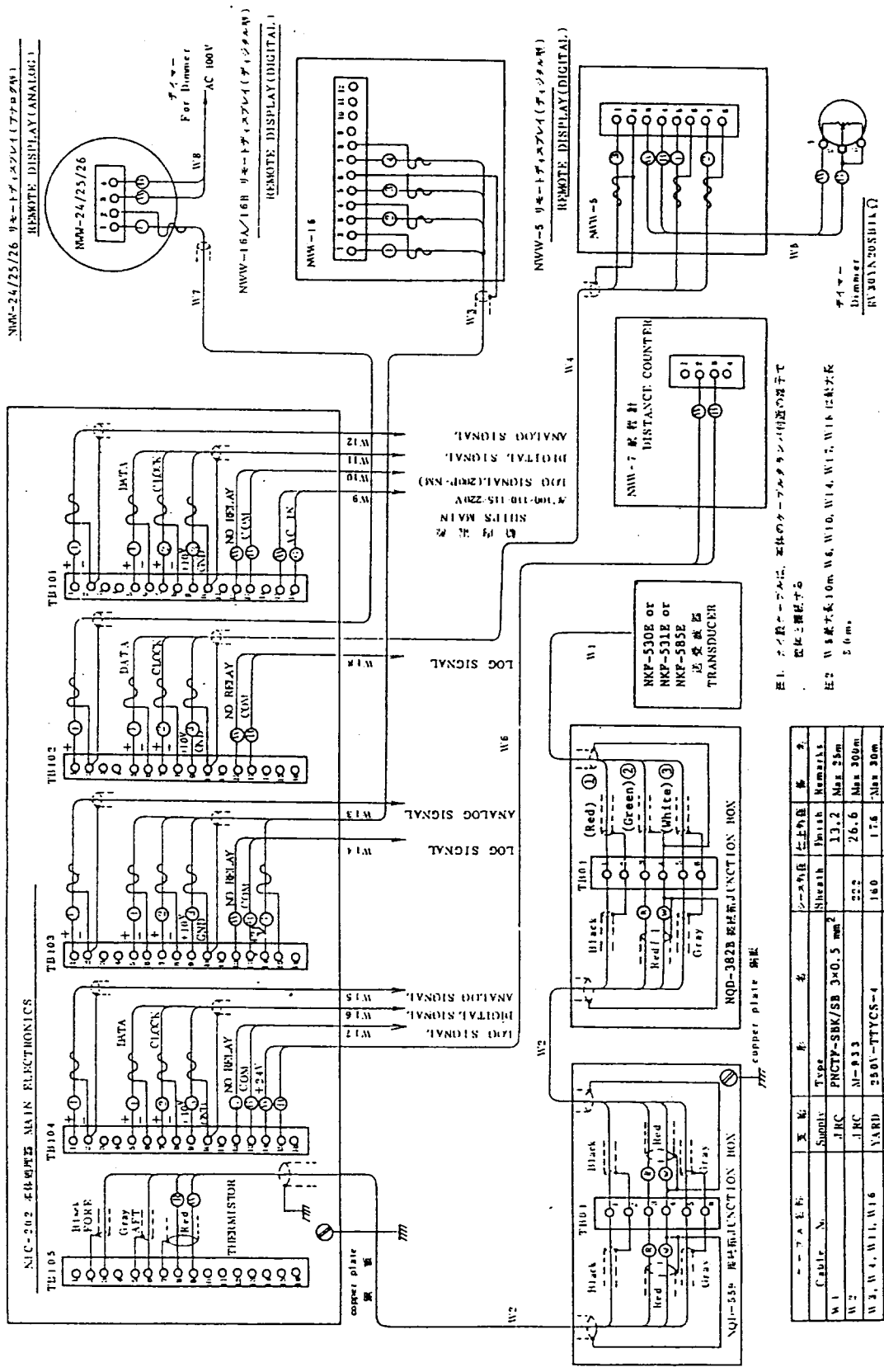
Variable Carbon Resistor

1. Resistance value: 1 kΩ
2. Variation characteristic: B
3. Rated power: 1 W
4. Type: RV30YN20SB1kΩ



Connection

9-1 Variable Resistor for Dimmer



MM-24/25/26 リモートディスプレイアナログ
REMOTE DISPLAY (ANALOG)

NIW-16 リモートディスプレイ (デジタル)
REMOTE DISPLAY (DIGITAL)

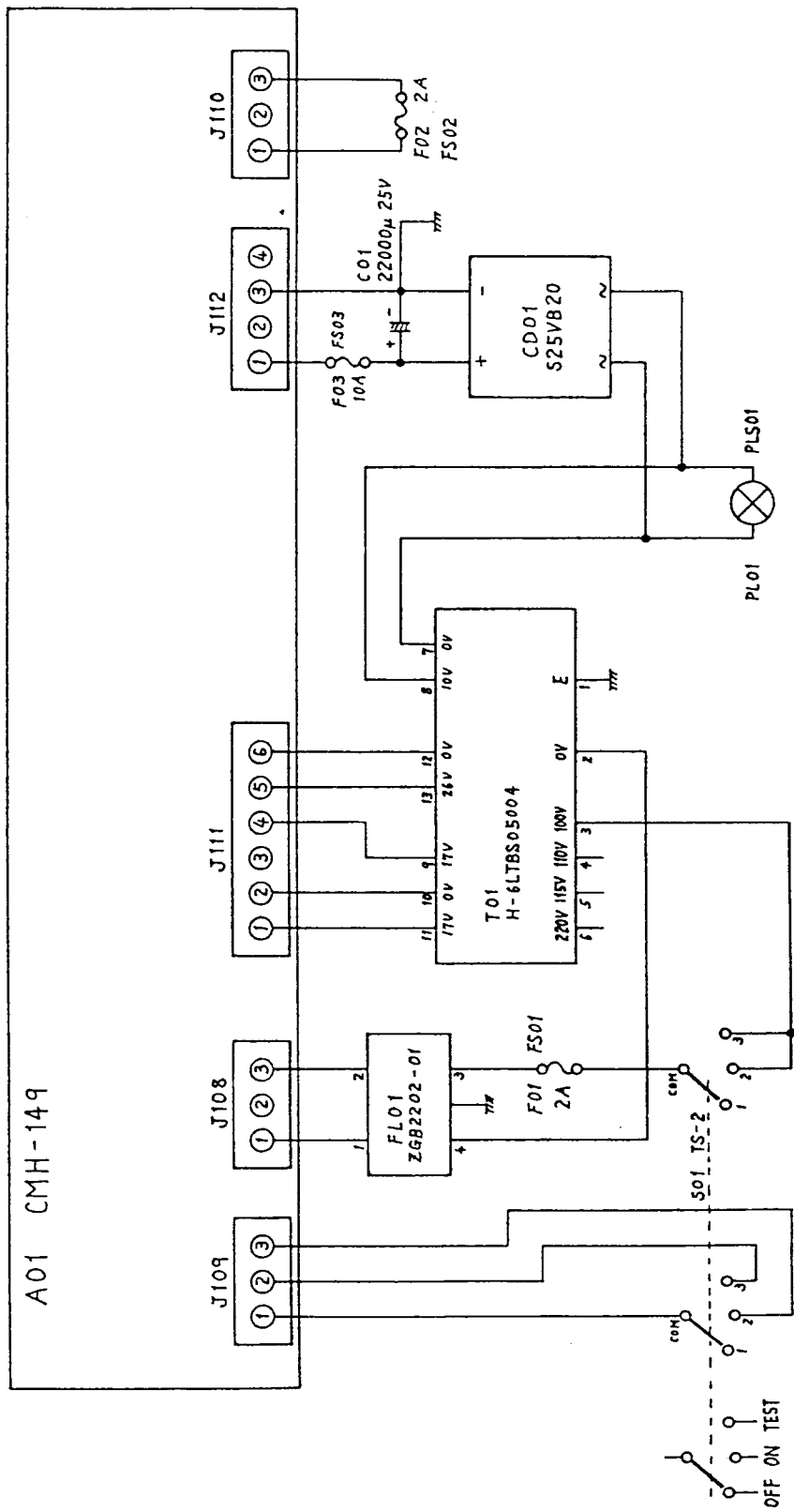
NIW-5 リモートディスプレイ (デジタル)
REMOTE DISPLAY (DIGITAL)

注1. ナイロンケーブルは、本体のケーブルラックラッシュ付の端子で
取付と接続する
注2. W5 最大長 10m, W6, W10, W14, W17, W18 は最大長
5.6m.

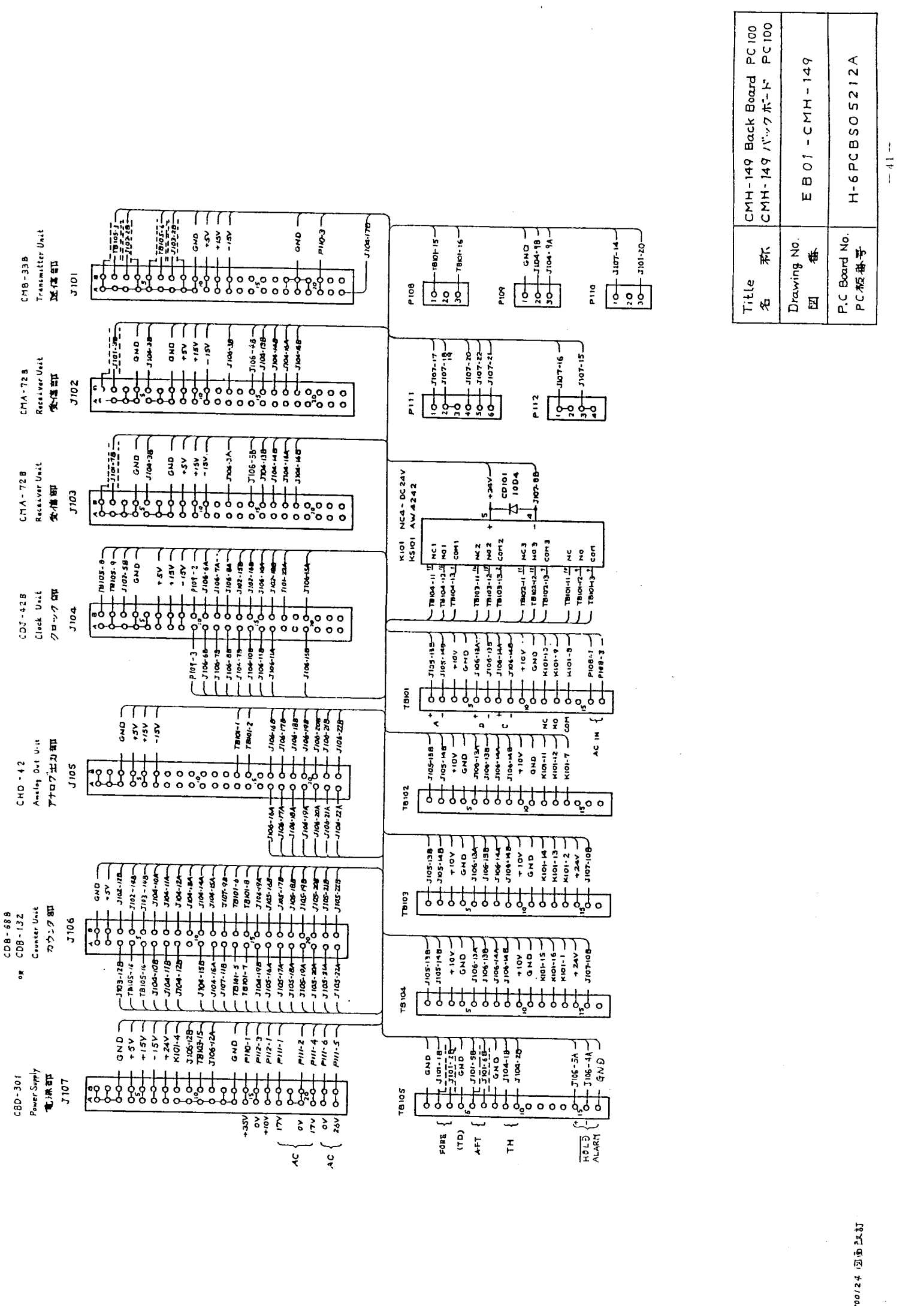
ケーブル名	型式	長さ	シールド径	外径	長さ
W1	PNCTV-SBK/SB	3x0.5	mm ²	13.2	Max 25m
W2	NY-033		222	26.6	Max 30m
W3, W4, W11, W16	YARD	250V-TTYCS-4	160	176	Max 30m
W7, W12, W13, W15	YARD	250V-TTYCS-2	139	153	Max 30m
W8, W9, W19, W20, W21, W22, W23, W24, W25, W26, W27, W28, W29, W30, W31, W32, W33, W34, W35, W36, W37, W38, W39, W40, W41, W42, W43, W44, W45, W46, W47, W48, W49, W50, W51, W52, W53, W54, W55, W56, W57, W58, W59, W60, W61, W62, W63, W64, W65, W66, W67, W68, W69, W70, W71, W72, W73, W74, W75, W76, W77, W78, W79, W80, W81, W82, W83, W84, W85, W86, W87, W88, W89, W90, W91, W92, W93, W94, W95, W96, W97, W98, W99, W100	YARD	250V-DNYC-1.25	103	119	Note 2

Note 1 The shield of armored cable is grounded at the terminal near the cable clamp of the main electronics.
Note 2 Cable W5 is 10m long maximum, Cable W6, W10, W14, W17, W18 is 30m long maximum.

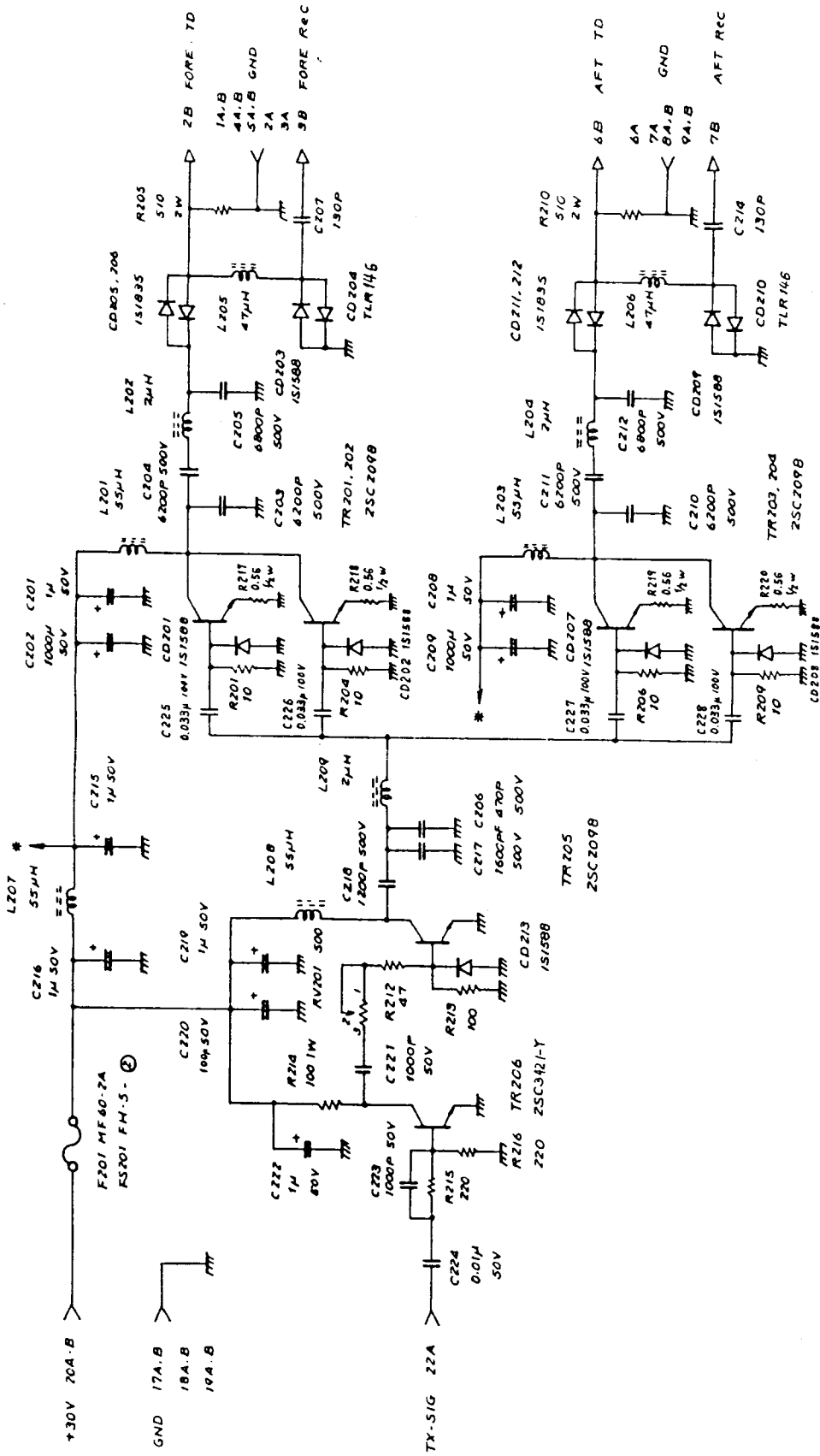
NJC-202 概観接続図
NJC-202 OVERALL CONNECTION DIAGRAM
- 39 -



NJC-202 Main Electronics

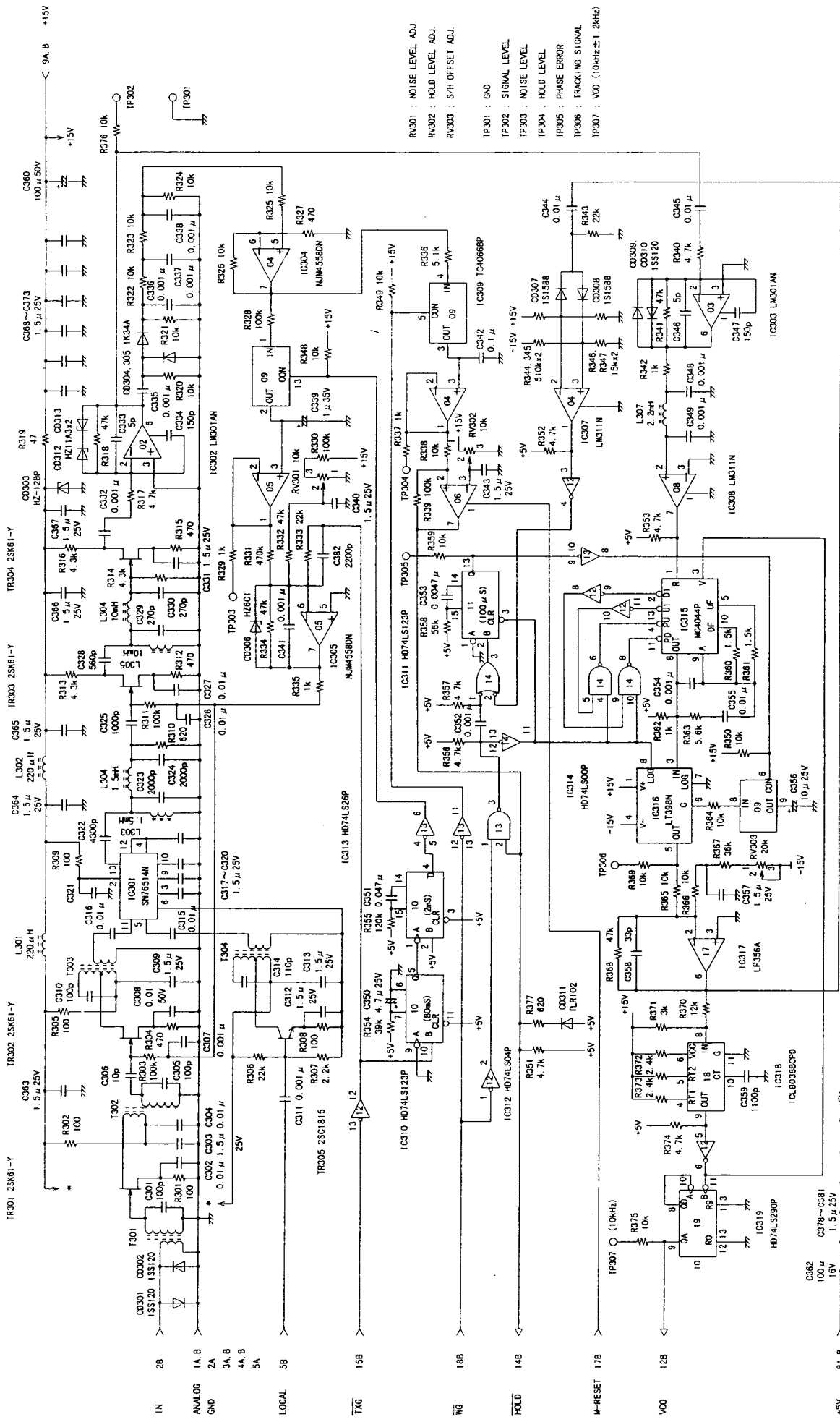


Title 名称	CMH-149 Back Board PC100 CMH-149 バックボード PC100
Drawing No. 図番	E B 01 - CMH - 149
P.C Board No. PC板番号	H-6 PCBS05212A



TR201 ~ TR204 散热器付
 TR201 ~ TR204 With Heatsink

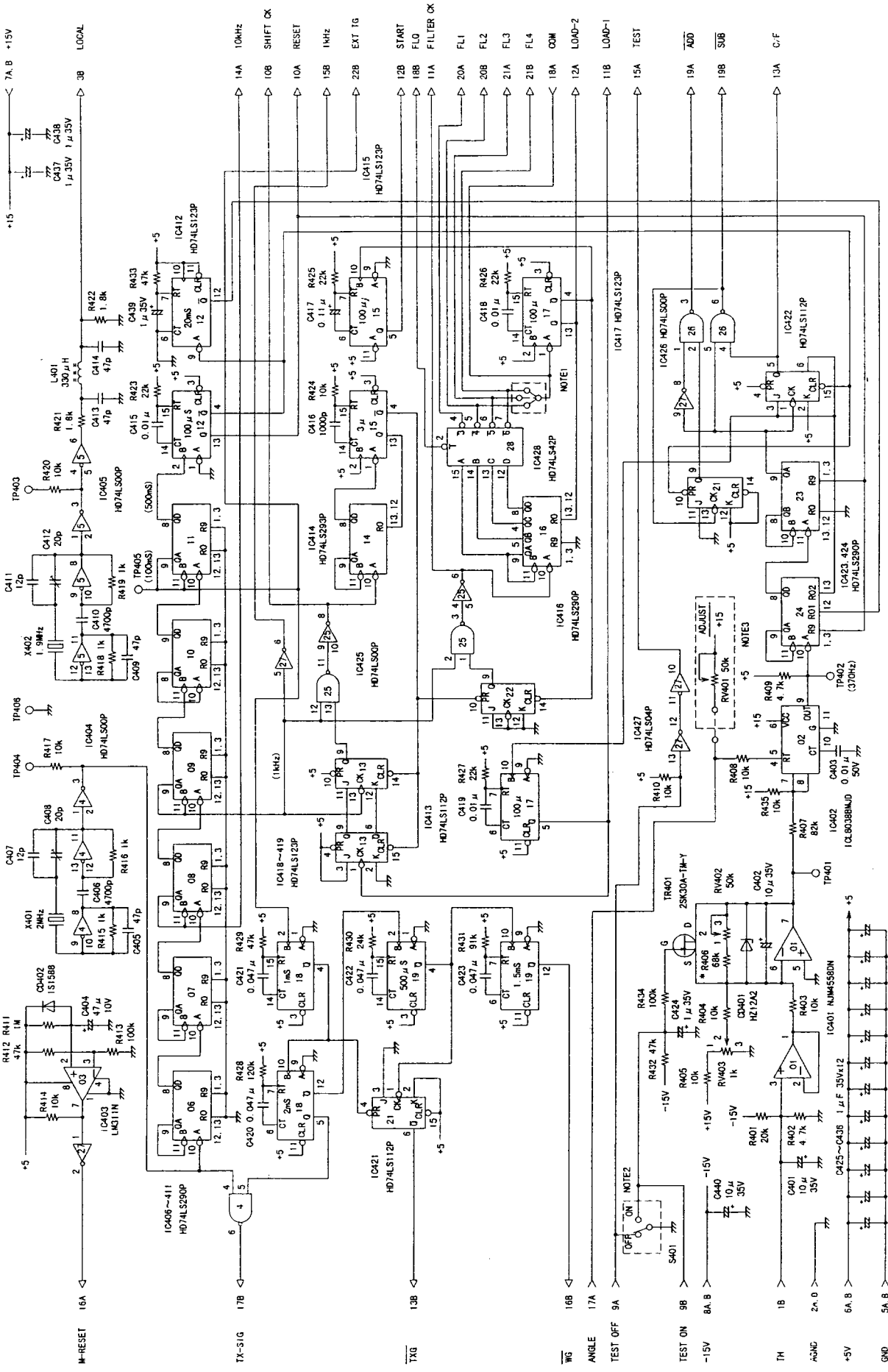
TITLE 名称	CMB-33B TRANSMITTER UNIT PC200 CMB-33B 送信部 PC200
DRAWING NO 图番	ED03-CMB-33B
BOARD NO 基板番号	6PCBS05253A



PARTS No.	QTY	DESCRIPTION	REF. DES.	VAL.	UNIT	PN No.
IC301	6	SN7514N	6	2	7 4	
IC302, 303, 317	8	LM103	8	4	7 4	
IC304, 305, 306, 307, 308	8	LM103	8	4	7 4	
IC309	7, 10-12	LM103	7, 10-12	14	7 4	
IC312, 313, 314, 315, 319	7	LM103	7	14	7 4	
IC316	7	LM103	7	1 4	7 4	
IC318	11	LM103	11	6	7 4	

TITLE	CMA-72C RECEIVER UNIT PC300
DRAWING No.	ED02-CMA-72C
P.C BOARD No.	6PCBS05238B

- RV201 : NOISE LEVEL ADJ.
- RV305 : HOLD LEVEL ADJ.
- RV303 : S/N OFFSET ADJ.
- TP301 : GND
- TP302 : SIGNAL LEVEL
- TP303 : NOISE LEVEL
- TP304 : HOLD LEVEL
- TP305 : PHASE ERROR
- TP306 : TRACKING SIGNAL
- TP307 : VCO (10KHz±1, 2KHz)



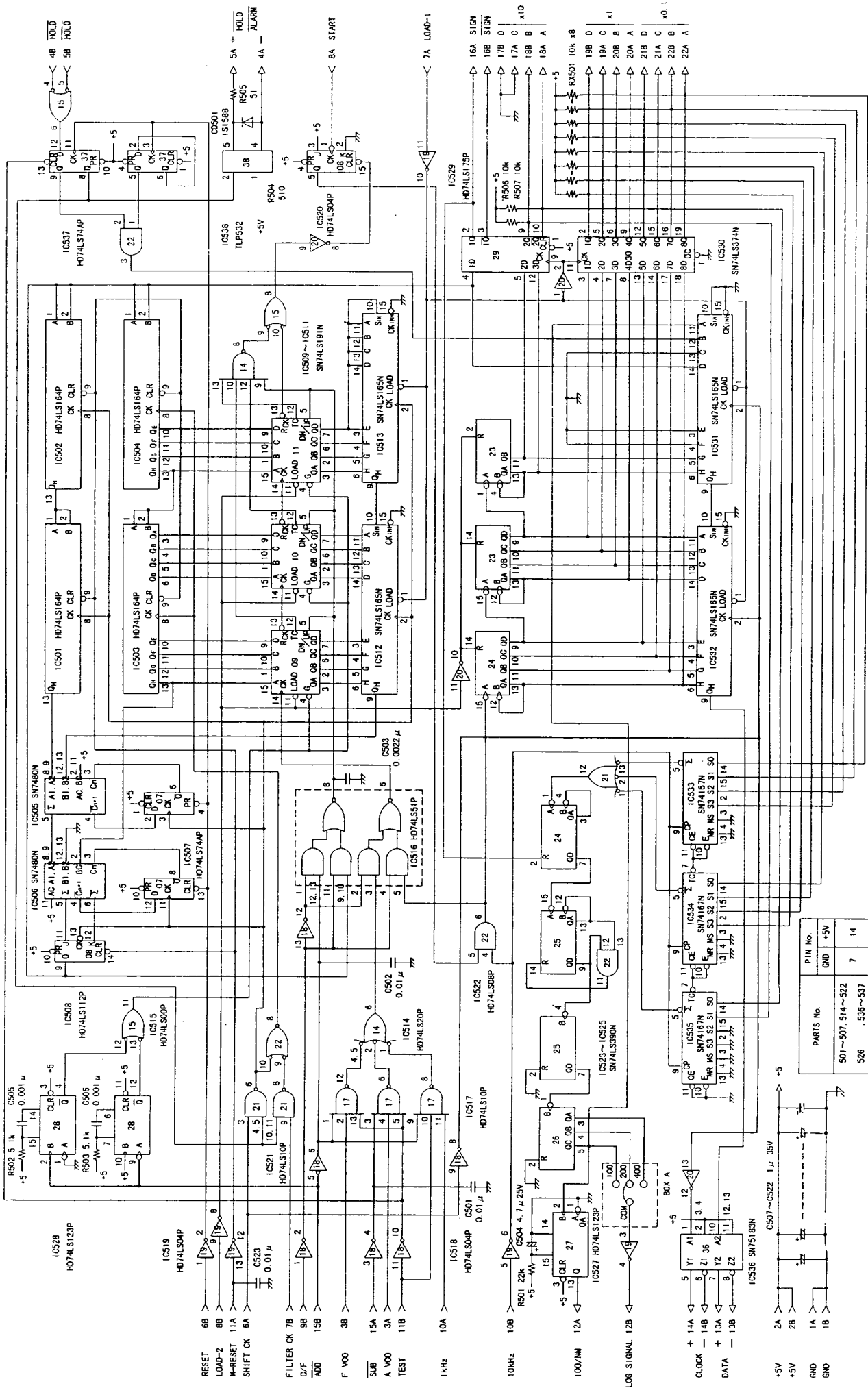
NOTE1: AVERAGE TIME SELECTION
 MODEL JUL-201, JUL-202 ONLY
 AVERAGE TIME
 0-1 20 Sec
 0-2 40 Sec
 0-3 80 Sec

NOTE2: MODEL JUN-2018
 MODEL JUN-202
 MODEL JUN-201
 MODEL JUN-202

NOTE3: MODEL JUN-201
 MODEL JUN-202

PARTS No.	PIN No.	PARTS No.		PIN No.	
		GND	+5V	GND	-15V
404~411, 414, 416	7 14	401	8 4		
423~427		402	11 8		
412, 413, 415, 417~422, 428	8 16				
403	4 8				

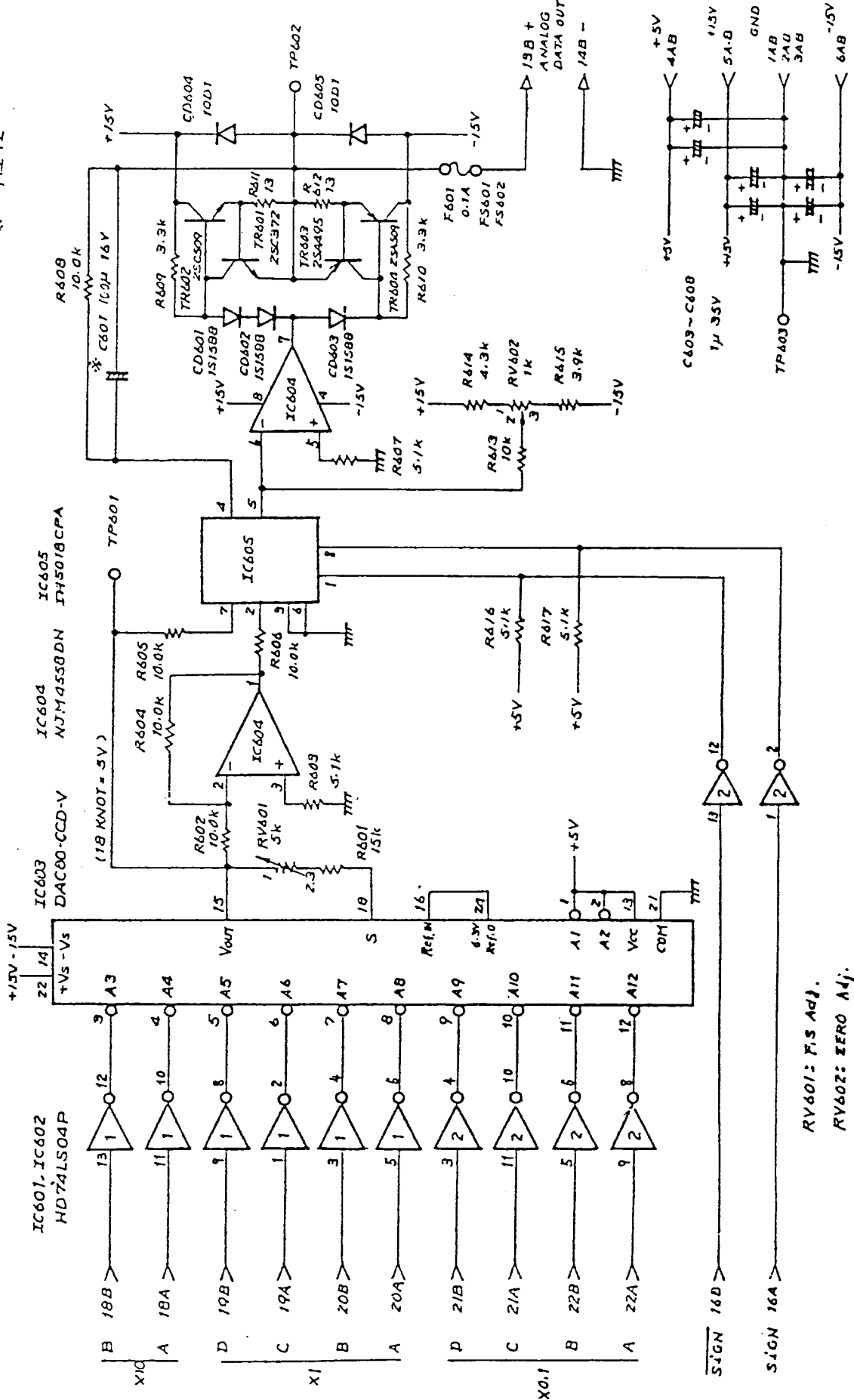
TITLE	CDJ-42B CLOCK UNIT PC400
DRAWING No.	ED05-CDJ-42B
P.C BOARD No.	H-6 PCB S05254C



TITLE	C08-132B COUNTER UNIT PC500
DRAWING No.	ED05-CDB-132B
P.C BOARD No.	6PCBS05278D

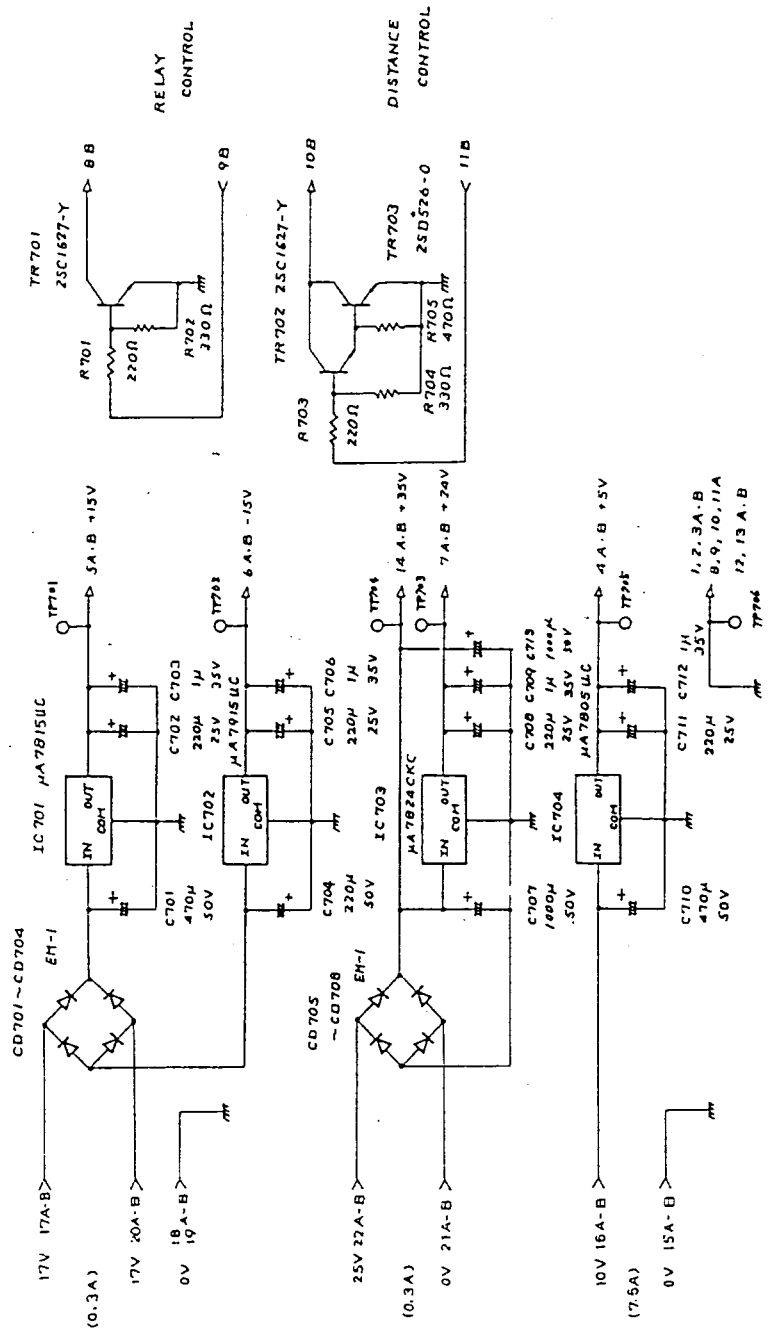
PARTS No.	PIN No.	
	GND	+5V
501~507, 514~522	7	14
526	536~537	8
508~513, 523~525	531~535	16
527~529, 531~535	530	10, 20

※ 高线性

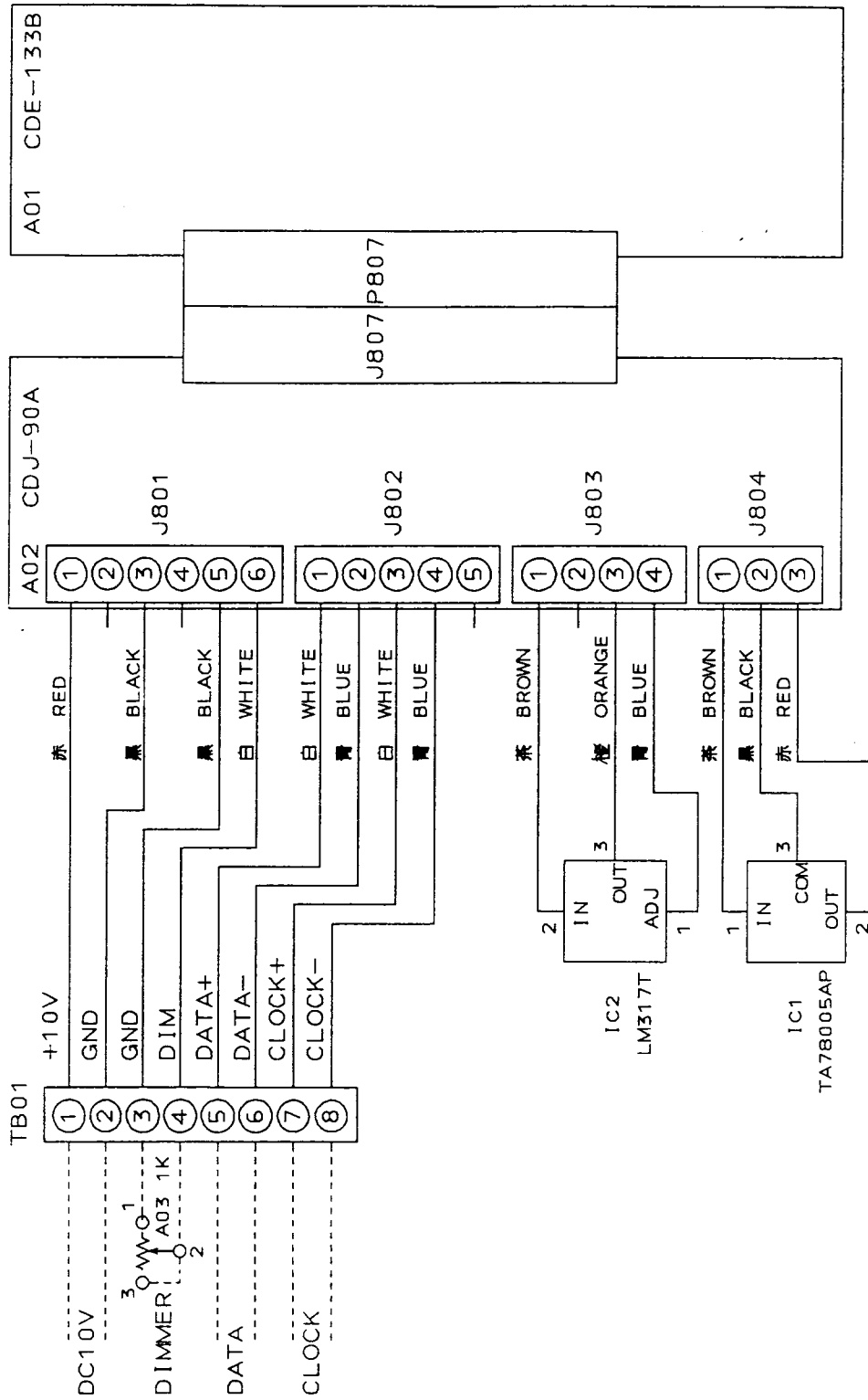


RV601: F.S Adj.
RV602: ZERO Adj.

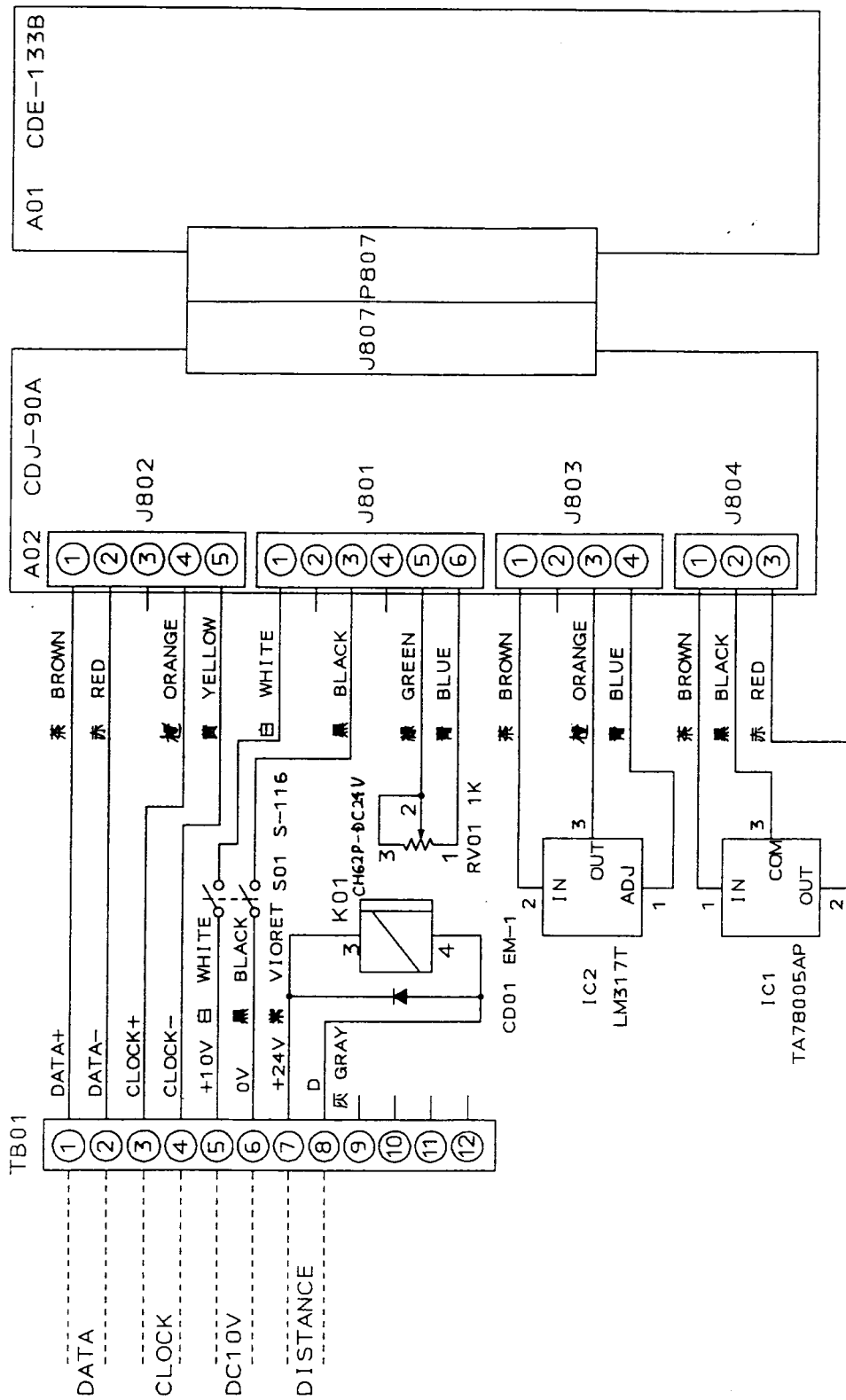
Title	CHD-42 Analog Out PC600
Drawing No.	ED00 - CHD - 42



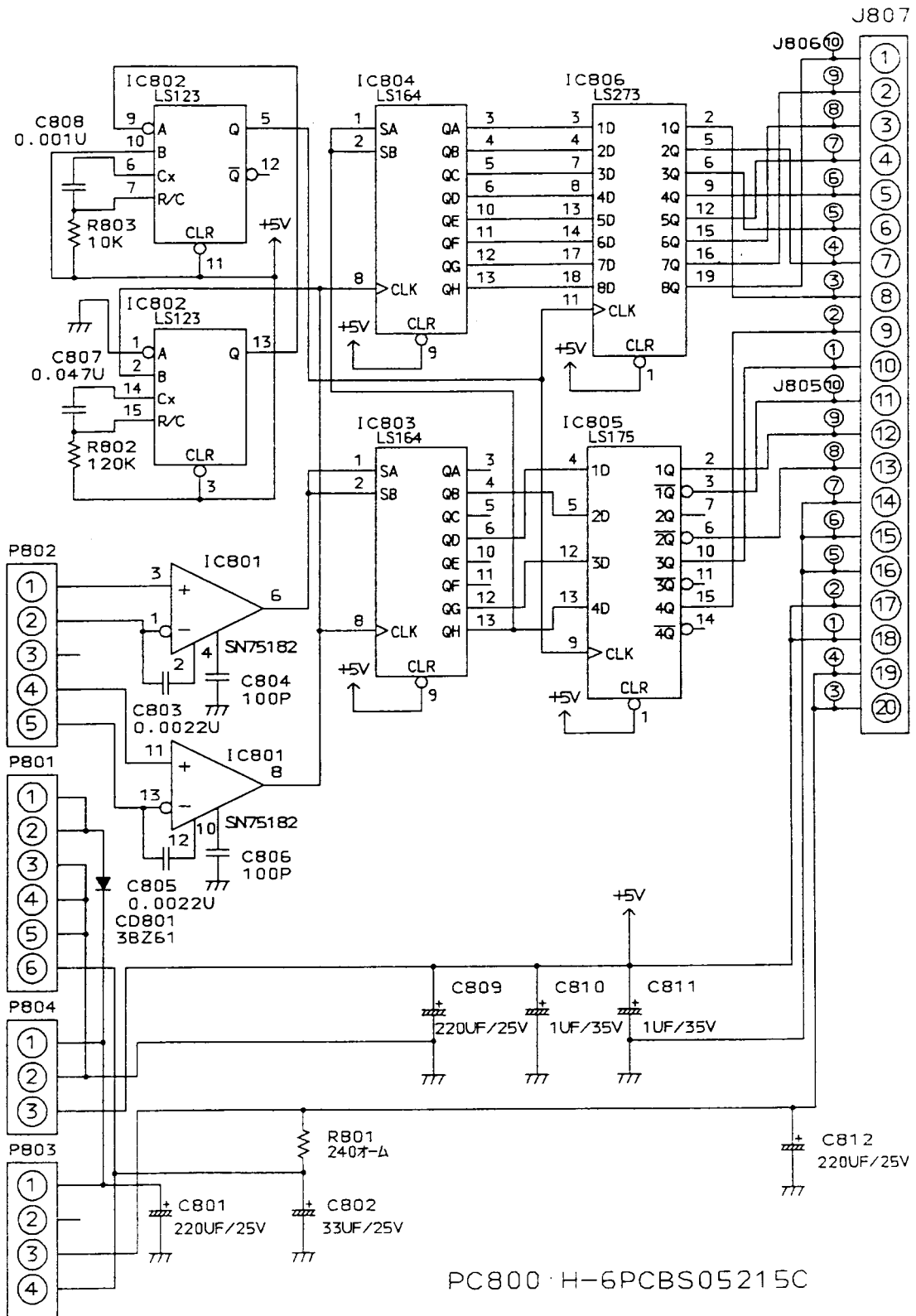
Title	CBD-301 Power Supply PC 700
Drawing No.	ED01-CBD-301
P.C Board No.	H-6PCBS05213



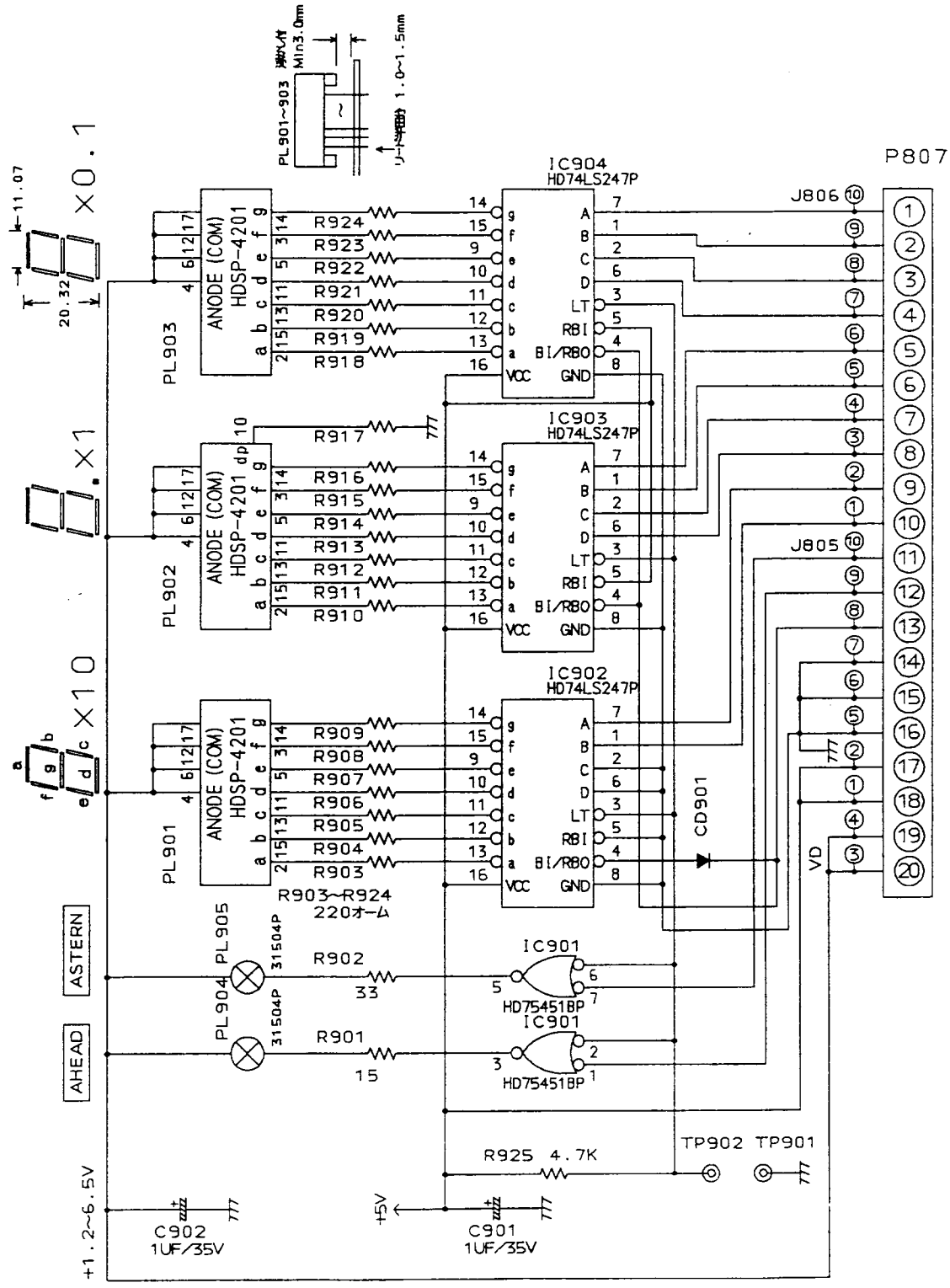
NWW-5 REMOTE DISPLAY (DIGITAL)



NWW-16A/16B REMOTE DISPLAY (DIGITAL)

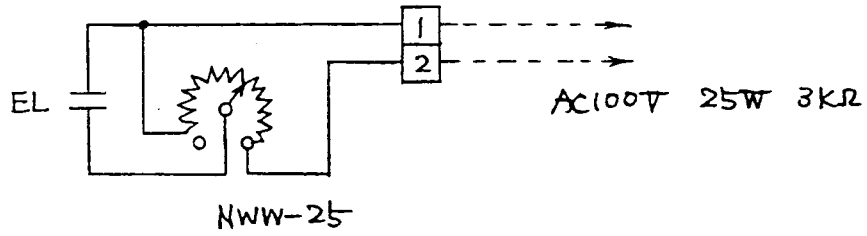
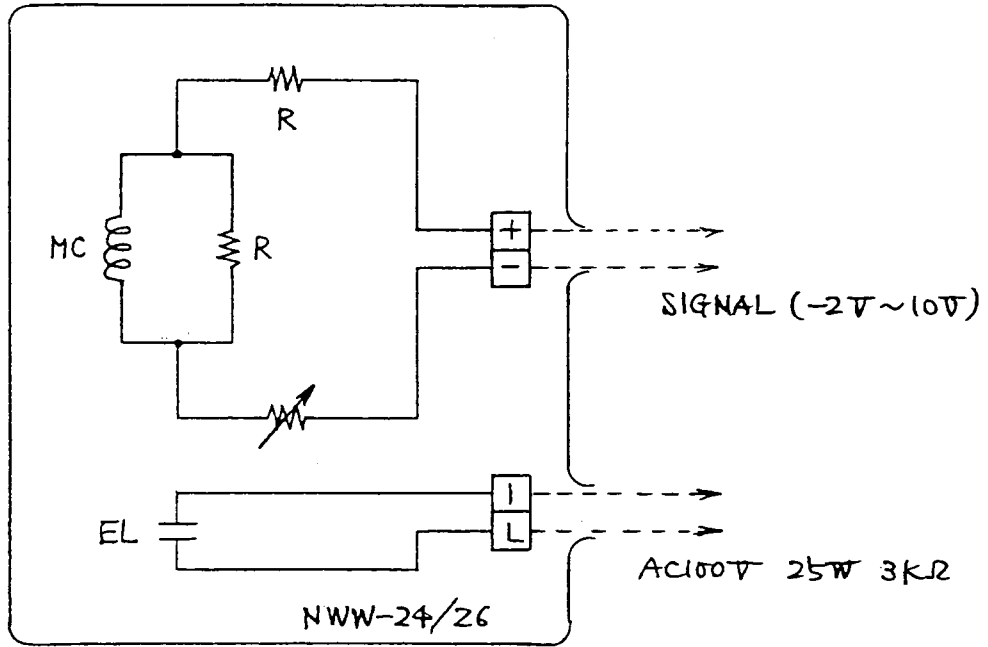


CDJ-90A Display Controller



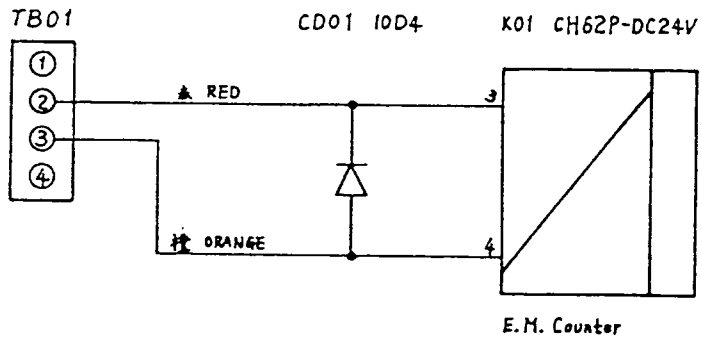
PC900:H-6PCBS05214D

CDE-133B Display

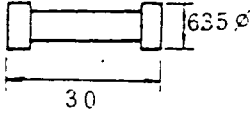
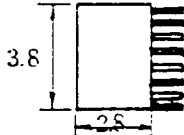
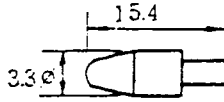
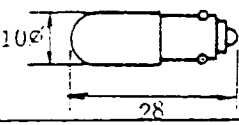
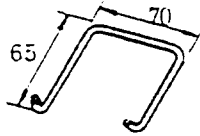
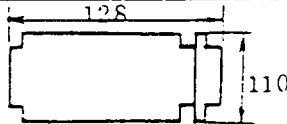


-4~20KT	-5~25KT	-6~30KT	SIGNAL
-4KT	-5KT	-6KT	-2V
0	0	0	0
20	25	30	10

NWW-24/25/26 REMOTE DISPLAY
(ANALOG)



NW-7 Distance Counter

SHIP NO.	SPARE PARTS LIST FOR		U S E			SETS PER VESSEL	
	Doppler Log MODEL: JLN-202						
ITEM NO.	NAME OF PART	OUTLINE (Dimension in mm)	QUANTITY			REMARKS	
			WORKING PER SET	PER VESS	SPARE	DESCRIPTION JRC CODE NO.	SUB MARK OF BOX NO.
1	Fuse		3		3	MF60-2A 5ZFAD00015	
2	"	"	1		1	MF60-10A 5ZFAD00018	
3	Relay		1		1	NC4D-DC24V	
4	Lamp Pilot		2		3	31504P	
5	"		1		1	1-141B-756 5WAAB00085	
6	Pullout Tool		0		1	MPHD00 312	
7	Extension Board		0		1	CFO-275	
MFR'S NAME		JAPAN RADIO CO., LTD.	DRW. NO.		6ZXBS00122	1/1	

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