



NIHON KOHDEN
CORPORATION

OPERATOR'S MANUAL

BIOELECTRIC INPUT PANEL

PB-680G, PB-640G

BIOELECTRIC INPUT BOX

JB-682G, JB-642G

- WITH CIRCUIT DIAGRAMS -

GENERAL HANDLING PRECAUTIONS

This device is intended for use only by qualified medical personnel.

Please read these precautions thoroughly before attempting to operate the instrument.

1. To satisfy and effectively use the instrument, its operation must be fully understood.

2. When installing or storing the instrument, take the following precautions:

- (1) Avoid moisture or contact with water, extreme atmospheric pressure, excessive humidity and temperatures, poorly ventilated areas, and dusty saline or sulphuric air.
- (2) The instrument should be placed on an even, level floor. Vibration and mechanical shock should be avoided even during moving.
- (3) Avoid placing in an area where chemicals are stored or where there is danger of gas leakage.
- (4) The power line source to be applied to the instrument should correspond in frequency and voltage to specifications, and have allowable current capacity.
- (5) Choose a room where a proper grounding facility is available.

3. Before Operation

- (1) Check that the instrument is in perfect operating order.
- (2) Check that the instrument is grounded properly.
- (3) Check that all cords are connected properly.
- (4) Pay extra attention when the instrument is in combination with other instruments to avoid misdiagnosis or other problems.

(5) All circuitry used for direct patient connection must be doubly checked.

(6) Check that battery voltage and battery condition are perfect when using battery-operated models.

4. During Operation

- (1) Both the instrument and the patient must receive constant, careful attention.
- (2) Turn power off or remove electrodes and/or transducers when necessary to assure the patient's safety.
- (3) Avoid direct contact between the instrument and the patient.

5. To Shutdown After Use

- (1) Turn power off with all controls returned to their original positions.
- (2) Remove the cords gently; do not use force to remove them.
- (3) Clean the instrument together with all accessories to keep them ready for their next use.

6. The instrument must receive expert, professional attention for maintenance and repairs. When the instrument is not functioning properly, it should be clearly marked to avoid operation while it is out of order.

7. The instrument must not be altered or modified in any way.

8. Maintenance and Inspection:

- (1) The instrument and parts should undergo regular maintenance inspection at least every 6 months.
- (2) If stored for extended periods without being used, make sure prior to operation that the instrument is in perfect operating condition.

9. When the instrument is used with an electro-surgical instrument, careful attention should be paid to the application and/or location of electrodes and/or transducers to avoid possible burn to the patient.

10. When the instrument is used with a defibrillator, make sure that the instrument is protected against defibrillator discharge. If not, remove patient cables and/or transducers from the instrument to avoid possible damage.

WARRANTY POLICY

Nihon Kohden Corporation (NKC) shall warrant its products against all defects in materials and workmanship for one year from the date of delivery. However, consumable materials such as recording paper, ink, stylus and battery are excluded from the warranty.

NKC or its authorized agents will repair or replace any products which prove to be defective during the warranty period, provided these products are used as prescribed by the operating instructions given in the operator's and service manuals.

No other party is authorized to make any warranty or assume liability for NKC's products. NKC will not recognize any other warranty, either implied or in writing. In addition, service performed by someone other than NKC or its authorized agents or technical modification or change of products without prior consent of NKC may be cause for voiding this warranty.

Defective products or parts must be returned to NKC or its authorized agents, along with an explanation of the failure. Shipping costs must be pre-paid.

In the USA and Canada other warranty policies may apply.

BIOELECTRIC INPUT PANEL

MODEL PB-680G, PB-640G

BIOELECTRIC INPUT BOX

MODEL JB-682G, JB-642G

INTRODUCTION

The Bioelectric Input Panel PB-680G and the Input Box JB-682 (8-ch) (JB-640 ---- 4-ch) are designed so that biophysical signals of 8-channels (4-channels) can be measured easily and efficiently. The Input Panel receives signals such as EEG, ECG, ENG, EMG etc., through the Input Box and distributes them into the amplifier modules (plug-in amplifiers).

It provides single- and three-channel ECG lead configurations, free EEG lead selection, a calibration signal and an electrode resistance measurement.

Please read this manual thoroughly prior to operation. Also please refer to the instruction manuals of the bioelectric amplifier AB-620G and the Polygraph Amplifier Console RMP-6008/6004.

FEATURES

1. Selects various combinations of the signals and applies them to the preamplifier modules (plug-in units).
2. Provides various calibration voltages ranging from 20 μ V to 10mV.
3. Selects the electrodes from 1 to 24 freely and therefore electrode replacement is not needed.
4. Since buffer amplifiers are built-in the ECG lead configuration, a clear, AC interference free ECG can be recorded.
5. An electrode-to-skin contact resistance measurement circuit is built-in.
6. 4 EEG patterns (montages) can be built-in optionally.

COMPOSITION

The unit consists of a Bioelectric Input Panel PB-680G, an Input Box JB-682G, and a set of accessories.

When this unit is used as a composition of the RM-6000 polygraph, a rack mounting kit DH-641G is supplied as an accessory.

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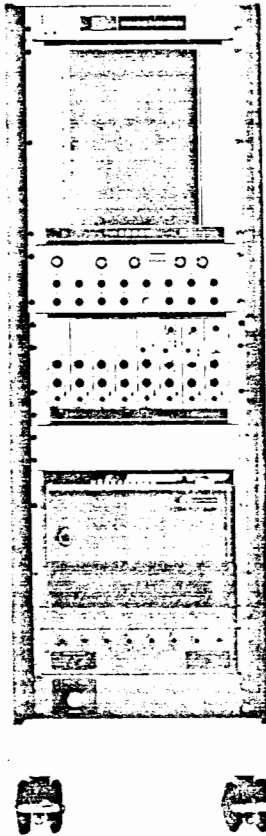


Fig. 1
Composition of
the RM-6000 Series.
The Bioelectric Input
Panel is mounted on
the RM-6000.

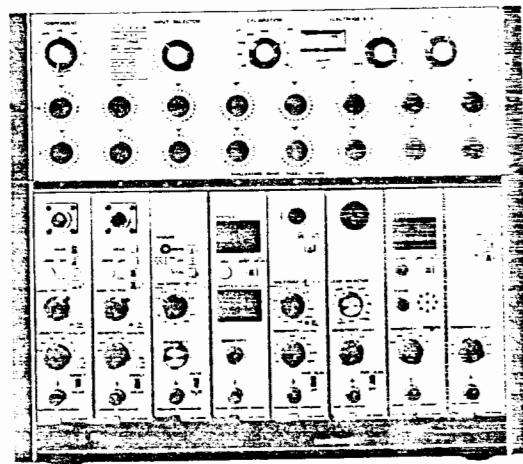


Fig. 2
Composition of the Panel with
the Console RMP-600S.

FRONT PANEL DESCRIPTION

◇ Bioelectric Input Panel. PB-680G

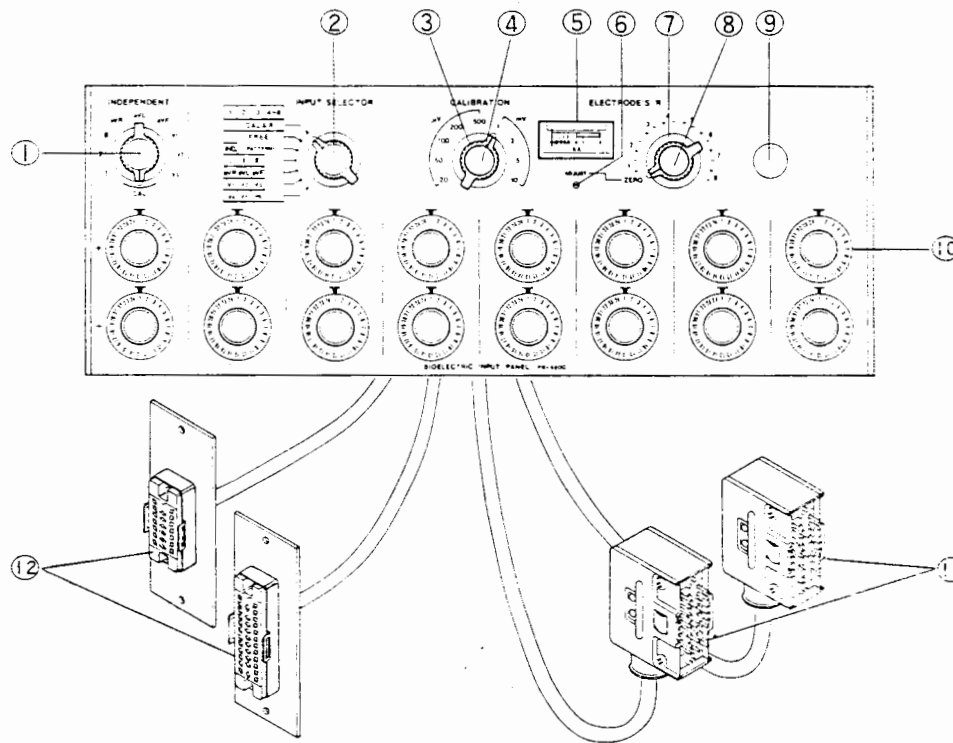


Fig. 3

Items	Description
<p>① INDEPENDENT ECG Lead Selector switch</p>	<p>When the INPUT SELECTOR switch ② is set to the IND-FREE position, the INDEPENDENT ① selects the ECG lead. I, II, III, aVR, aVL, aVF, V₁, V₂, V₃ ---- ECG is measured CAL ---- the Calibration signal selected by the CALIBRATION selector ⑤ is recorded.</p>
<p>② INPUT SELECTOR CAL & R</p>	<p>Selects the signals to be applied to the amplifiers in channels 1 to 8. A position for applying the calibration signal and for measuring electrode-to-skin contact resistance. * By selecting the calibration signal with the CALIBRATION selector ⑤ and pressing the CAL switch ④, a calibration signal can be applied to all channel amplifiers. * By selecting the channel with the ELECTRODE'S R selector and pressing the Electrode Resistance Check switch ⑧, the resistance can be measured.</p>

FREE	<p>The signals selected by the FREE SELECTOR ⑩ are connected to the amplifiers. If optional Pattern (EEG montages) wirings are built in the place numbered ⑨, either the FREE or PATTERN mode can be selected.</p>
IND-FREE (PATTERN)	<p>An ECG signal is supplied to channel 1. The signals selected by the FREE Selector ⑩ or the optional PATTERN selector are supplied to the 2 ~ 8 channels.</p>
I, II, III aV _R , aV _L , aV _F V ₁ , V ₂ , V ₃ V ₄ , V ₅ , V ₆	<p>FREE ----- Standard ECG leads to be recorded on channel 1, 2 and 3 respectively. The signals selected by the Free Selector ⑩ or optional PATTERN selector are supplied to the 4 ~ 8 channels.</p>
③ CALIBRATION	<p>Calibration signal selector.</p>
④ CAL switch	<p>Switch to apply calibration signal. When the INPUT SELECTOR ② is set to CAL & R position and this switch is pressed, a calibration signal is applied to all channels. When the INPUT SELECTOR ② is set to IND-FREE and the INDEPENDENT ECG lead Selector ① is set to CAL, a calibration signal is applied to channel 1.</p>
⑤ ELECTRODE'S	<p>Meter to indicate electrode-to-skin contact resistance. When the indicator remains within the green scale, resistance is within the acceptable range (less than 10KΩ).</p>
⑥ ADJUST (Zero)	<p>Adjustment for zero level of the ELECTRODE'S R meter. Adjust this Adjustment so that the ELECTRODE'S R meter indicates the zero point when the INPUT SELECTOR ② is set to CAL & R and the ELECTRODE'S R Selector ⑦ is set to ZERO.</p>
⑦ ELECTRODE'S R Selector	<p>Selects the electrode, the electrode-to-skin resistance of which is to be measured. Set this selector to the channel, the electrode-to-skin resistance of which is to be measured, and press the Electrode Resistance Check switch ⑧. The resistances between + and E and between — and E are displayed on the ELECTRODE'S R meter.</p>
⑧ Electrode Resistance Check Switch.	<p>Push the switch to measure the electrode resistance.</p>

⑨ Optional Switch Mounting Space

⑩ FREE Selector

⑪ CONNECTOR for RMP-6008

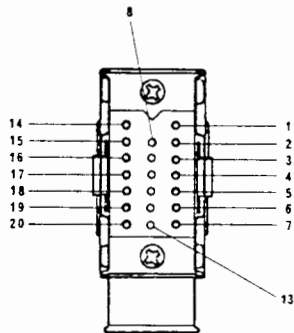


Fig. 5

The EEG Pattern selector switch, which has 4 EEG pattern wirings, can be mounted in this place.

When the INPUT SELECTOR ② is set to FREE (PATTERN), the EEG patterns can be selected by the optional EEG PATTERN selector.

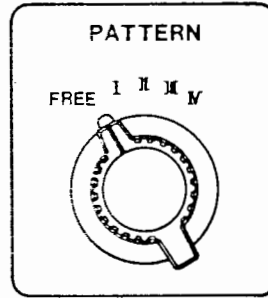


Fig. 4

When the INPUT SELECTOR ② is set to FREE, the signals to be applied to each channel are selected by this FREE Selector. This selector selects a signal out of 24 electrodes. The connector to connect the PB-680G INPUT PANEL to the Polygraph Amplifier Console, model RMP-6008.

One connector connects the signals of 4-channels.

Pin No.	Signals		
1	0 volt	11	-signal of ch4 or 8
2	+signal of ch1 or 5	12	0 volts
3	+signal of ch2 or 6	13	+21 volt
4	+signal of ch3 or 7	14	shield
5	+signal of ch4 or 8	15	
6	not connected	16	not connected
7		17	
8	-signal of ch1 or 5	18	CAL
9	-signal of ch2 or 6	19	INST
10	-signal of ch3 or 7	20	-21 volts

Connector

Type : P-1320-CEA(HIROSE) 20p male
Code number : 5411537

The connector to be connected to the above connector.

Type : S-1320-SB(HIROSE) 20p female
Code number : 5411207

⑫ CONNECTORS for JB-682G

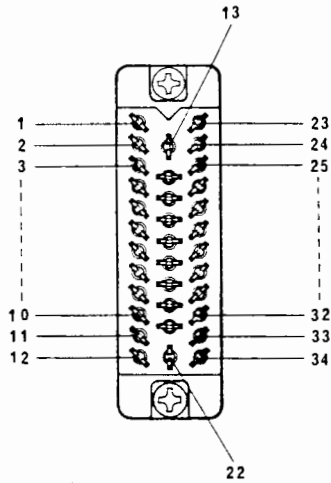


Fig. 6

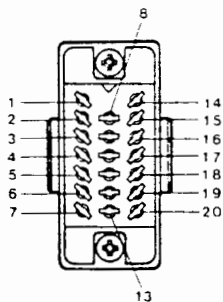


Fig. 7

The connectors to connect the INPUT BOX JB-682G to the PB-680G INPUT PANEL.

These connectors are mated with the Output connectors ⑮ of the JB-682G.

BIOELECTRIC INPUT ① --- Inputs for electrodes

BIOELECTRIC INPUT ② --- Inputs for ECG signals.

BIOELECTRIC INPUT ③

Pin Number Signals

1	} Signals supplied from each input terminal of the Input Box. The number of the input terminals corresponds to the Pin number.	
2		
...		
...		
...		
23		
24		
25		0 volt
26		} not connected
...		
...		
...		
33		
34	shield	

Type : S-1354-SB(HIROSE) 34p female
Code number : 5411724

The connector to be mated with the above

Type : P-1354-CEA(HIROSE) 34p male

Code number : 5411715

BIOELECTRIC INPUT ④

Pin Number	Signals	Pin Number	Signals
1	R	11	} not connected
2	L	12	
3	F	13	
4	V ₁	14	
5	V ₂	15	
6	V ₃	16	
7	V ₄	17	
8	V ₅	18	
9	V ₆	19	
10	0 volt	20	

Type : S-1320-SB(HIROSE) 20p female
Code number : 5411207

The connector to be mated with above connector
Type : P-1320-CEA(HIROSE) 20p male
Code number : 5411537

◇ BIOELECTRIC INPUT BOX (JB-682G)

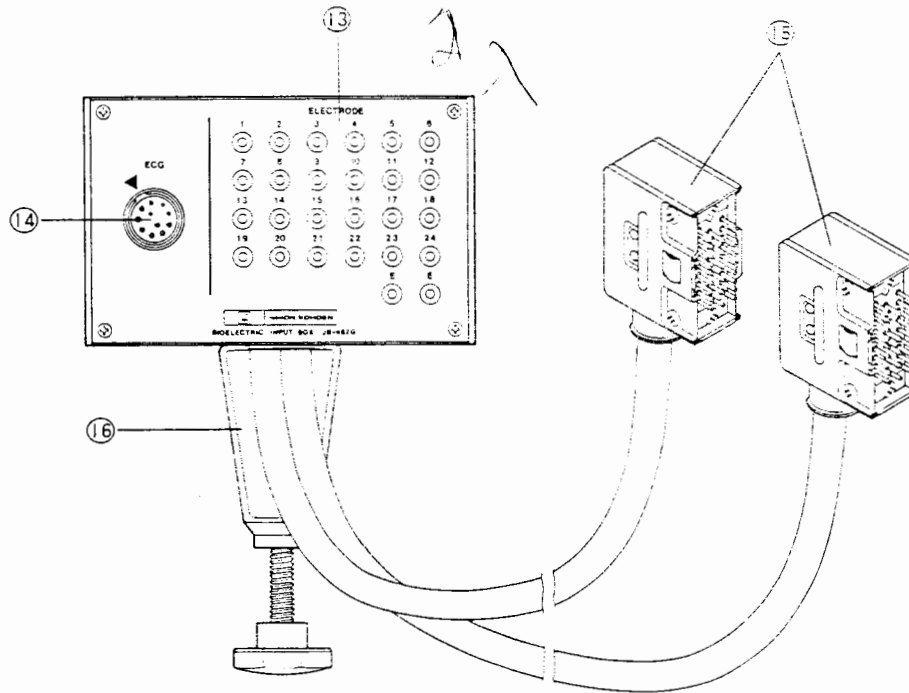


Fig. 8

Items	Description
⑬ ELECTRODE	The terminals to connect the electrodes.
⑭ ECG Patient cable connector	Connects to the ECG patient cable.

Pin No.	Signals
1	R
2	L
3	F
4	V ₁
5	V ₂
6	V ₃
7	V ₄
8	V ₅
9	V ₆
10	RF
11	Shield

Fig. 9

⑮ Output Connector

To be mated with the CONNECTORS for JB-682G
① and ② which are mounted on the INPUT
PANEL PB-680G.

⑯ Mounting Frame

To mount and fix the Input Box on the standard
KC-610G etc.

PRECAUTION

1. If an AC interference is induced at the normal measuring condition, a patient protection fuse (5mA), which is built in the JB-682 input box, might be broken.
In such a case, replace the fuse.

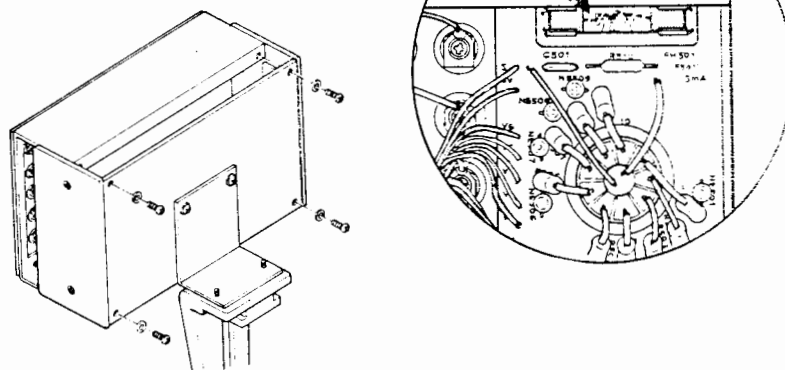


Fig. 10

2. The Bioelectric Amplifier (Input isolation type : AB-600G) cannot be connected to this Input Panel, PB-680G.

PREPARATION FOR MEASUREMENT

1. When an optional Floor Stand KC-610G is used, mount the Input Box JB-682G on the Stand KC-610G.
2. Mount the CONNECTORS for JB-682G ⑮ on the rear panel of the Polygraph. When the Auxiliary Input Panel PI-600G is used, the Input Box JB-682G can be connected on the front panel.
3. Connect the Bioelectric Input Box JB-682G to the Bioelectric Input Panel PB-680G.
4. Check that the controls on the bioelectric amplifier AB-620G, which are plugged in the RMP-6008, are properly set and turn the power on. (Please refer to the instruction manual of the AB-620G)

ELECTRODE PLACEMENT

◇ ECG Electrode

A) Limb Electrodes

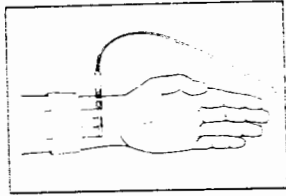


Fig. 11A
ECG Limb Electrode
Position (Arm)

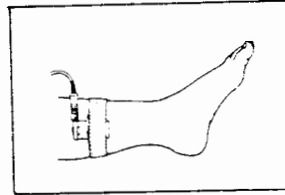


Fig. 11B
ECG Limb Electrode
Position (Leg)

B) Chest Electrodes

V_1 : On the fourth intercostal space at the right sternal margin.

V_2 : On the fourth intercostal space at the left sternal margin.

V_3 : Midway between V_2 and V_4 leads.

V_4 : On the fifth intercostal space at the left midclavicular line.

V_5 : On the left anterior axillary line at the horizontal level of V_4 lead.

V_6 : On the left midaxillary line at the horizontal level of V_4 lead.

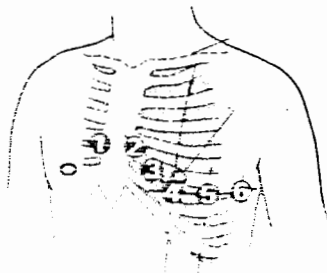


Fig. 12

1. Clean the skin surface with alcohol to reduce the contact resistance between the electrode and the skin.
2. Apply ECG paste where the electrodes are to be placed.
3. Apply the paste to the contacting surfaces of the electrodes. Place the electrodes on the skin.
Be careful that the paste applied on one place on the chest is not connected to the paste applied on another place on the chest.

4. Fasten limb electrodes with limb straps.
5. Connect the patient cable to the ECG Patient Cable Connector (14).

NOTE: For animal experiments needle electrodes can be used.
In such a case, the paste is not needed.

◇ EEG Electrodes

There are various systems for the electrode placement, such as Illinois, Montreal, Aird, and Cohn methods, etc.
Reference is made hereafter to the International Ten-Twenty system (Montreal method), which is most commonly used at present.

1	2	3	4	5	6	7	8	9	10
Fp ₁	Fp ₂	F ₃	F ₄	C ₃	C ₄	P ₃	P ₄	O ₁	Oz
11	12	13	14	15	16	17	18	19	20
A ₁	A ₂	F ₇	F ₈	T ₃	T ₄	T ₅	T ₆	Fz	Pz
21	22	23	24						
	PG ₁	PG ₂	Cz						

The numerical nomenclature of the International Ten-Twenty system corresponds to the anatomical nomenclature as shown in the above table :

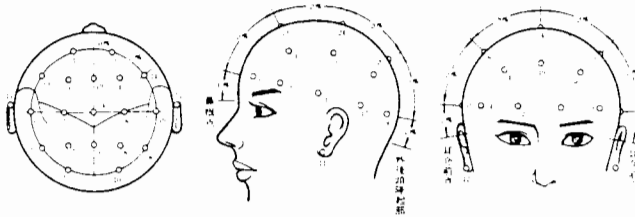


Fig. 15 EEG Electrode Positions.

a) Scalp Disc Electrode

1. Clean the skin where the electrodes are to be mounted with a gauze pad moistened with alcohol.
2. Apply a small amount of EEG paste to the cleaned skin spot.
Do not apply more paste than is necessary ; limit the space to about 1cm in diameter.
3. Apply a small amount of paste to the disc electrode and put it on the pasted skin spot pressing slightly.
4. Cover the electrode with a small gauze pad or an absorbent cotten.

NOTE : Do not apply excessive pressure to the electrode, as this may cause direct skin-to-electrode contact which may generate unnecessary polarization voltage.

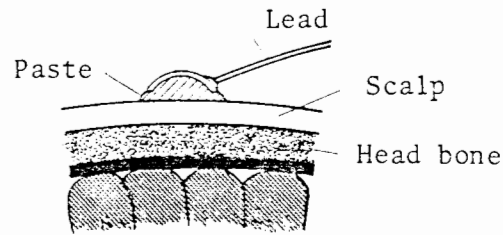


Fig. 14 Sectional View

6. Connect the EEG lead terminals to the ELECTRODE terminals (13).

How to ground the patient when EEG and ECG are recorded simultaneously.

1. When EEG recording is more important than ECG recording.
 Disconnect the RL lead from the patients right leg.
 In this case, the patient is grounded through the EEG machine.
 (The ECG waveform varies in this case. However, it can be used as a reference signal.)
2. When ECG recording is more important than the EEG recording.
 Disconnect the EEG ground (ear piece or on forehead).
 In this case, the patient is grounded through the RL lead.
 (The EEG should be recorded by a bipolar recording)

b) Needle Electrode

1. Sterilize the electrode adequately.
2. Clean the skin spots on which the electrodes are to be placed.
3. Wait until all alcohol has been evaporated from the skin in order to minimize the patient's pain.
4. Put the needle electrode as shown in the following figure.

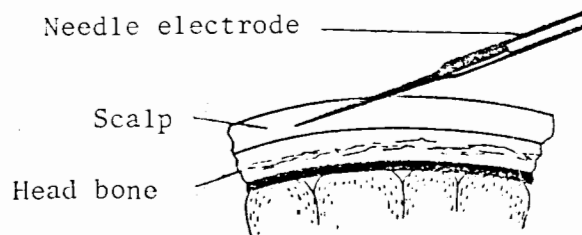


Fig. 15 Sectional view of Needle Electrode Insertion

NOTE : a) New electrodes should be immersed in a saturated saline solution before use to minimize polarization voltage.

b) Be sure to sterilize the electrode before use.

◇ EMG Needle Electrode

A unipolar needle electrode has a following construction.

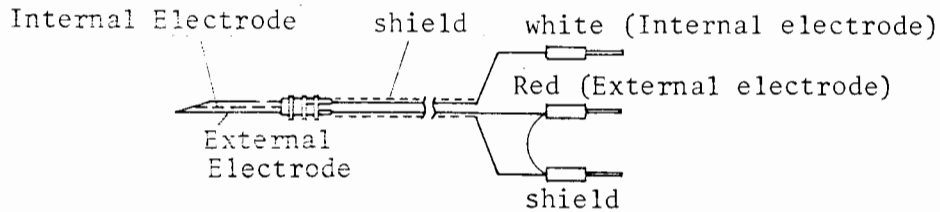


Fig. 16

Connections of the electrode to the EMG amplifier are as follows :

A. When a reference electrode is not used.

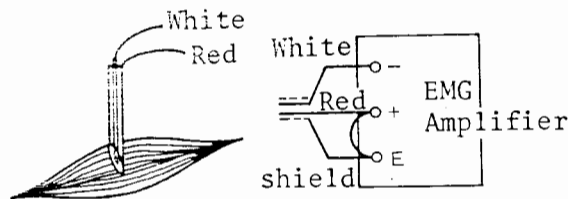


Fig. 17

B. When a reference electrode is used.

Place the reference electrode (surface electrode) on the right leg or on the skin close to the measuring site.

Connect the reference electrode to the ground terminal of the EEG amplifier.

In this case, disconnect the lead which connects the red lead and shield lead.

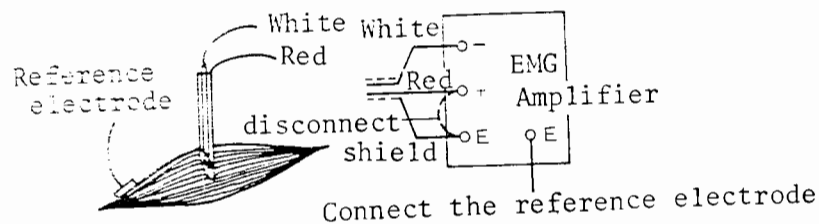


Fig. 18

OPERATION

◇ Measurement of Electrode Resistance.

1. Set the INPUT SELECTOR ② to the CAL & R position.

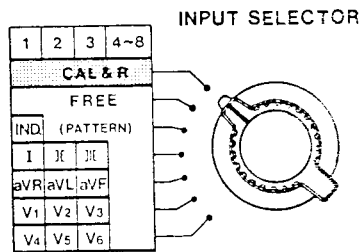


Fig. 19

2. Set the ELECTRODE'S R selector ⑦ to the electrode, the resistance of which you want to measure.
Then press the Electrode Resistance Check Switch ⑧.

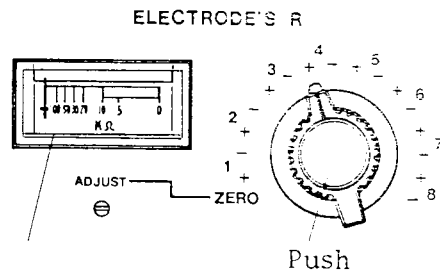


Fig. 20

3. Read the ELECTRODE'S R meter ⑤.

◇ Application of the Calibration Signal.

1. Set the INPUT SELECTOR ② to the CAL & R position.
2. Set the CALIBRATION ③ to a desired calibration voltage and press the CAL switch ④.

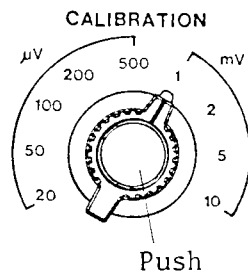


Fig. 21

B. When recording EEG and EMG

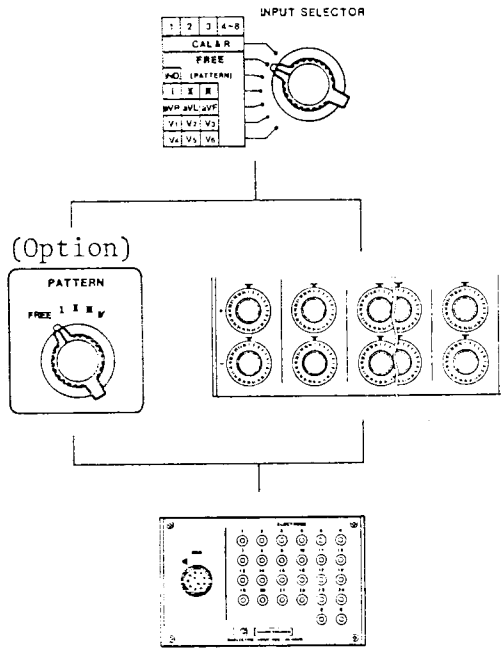


Fig. 23

◇ INST switch

When the INPUT SELECTOR ② is turned or when the subject moves, base line of the recording trace varies largely. In such a case, push the INST switch mounted on the Polygraph Amplifier Console, RMP-6008.

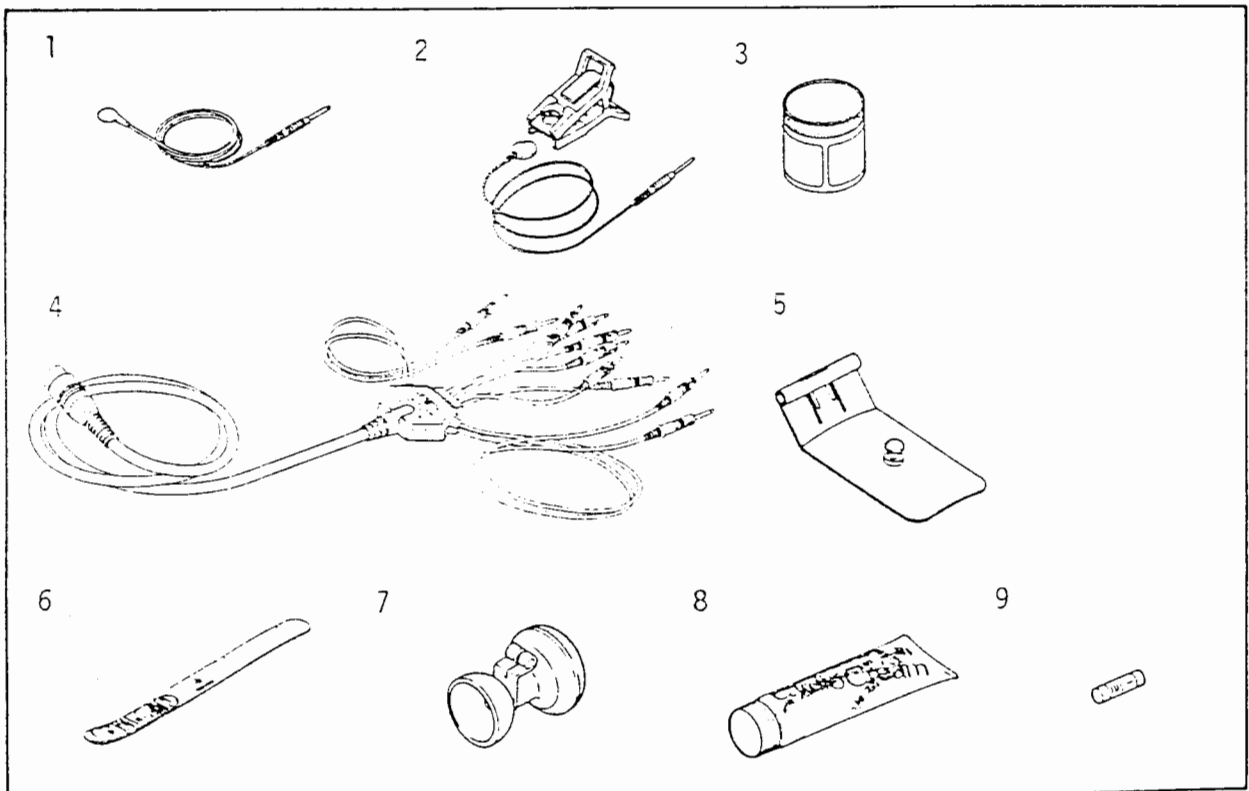
SPECIFICATIONS

Calibration Signals	20, 50, 100, 200 μ V, 1, 2, 5 and 10mV accuracy within $\pm 5\%$
C.M.R.R	At ECG leads : 60dB or better at 65Hz. Except ECG leads : To be determined by the amplifier connected.
Dimensions and Weight	*Bioelectric Input Panel (PB-680G) 410W x 150H x 300D (mm) Approx. 6kg *Bioelectric Input Box (JB-682G) 155W x 200H x 900D (mm) approx. 2.3kg

ACCESSORIES

JB-682G, PB-680G
8CH BIOELECTRIC INPUT BOX/PANEL

No.	Description	Q'ty	Code No.
1	EEG scalp disc electrode NE-103S, 26psc/set	1	5021236
2	Earlobe electrode, 2pcs/set	1	5021254
3	EEG paste, P-10E 400g, 3pcs/set	1	5090036
4	Patient cable, BJ-261D	1	5570383
5	Limb electrode, adult	4	5030003
6	Limb strap, adult	4	5030021
7	Chest electrode, adult	6	5030378
8	ECG paste(CardioCream), 100g	1	5090027
9	Spare fuse, 5mA	2	5620071



⊙ The calibration signal cannot be superimposed on the biophysical signals. Whenever the calibration signal recording is desired, the INPUT SELECTOR ⊙ should be set to the CAL & R position. However, when the Bioelectric Amplifier AB-620G is mounted on the Polygraph Amplifier Console (RMP-600S), a calibration signal switch is built-in the amplifier can be superimposed on the biophysical signal by pressing the CAL switch on the RMP-600S.

◇ Measurement

Set the INPUT SELECTOR ⊙ to a desired position.

A. When recording ECG and EEG.

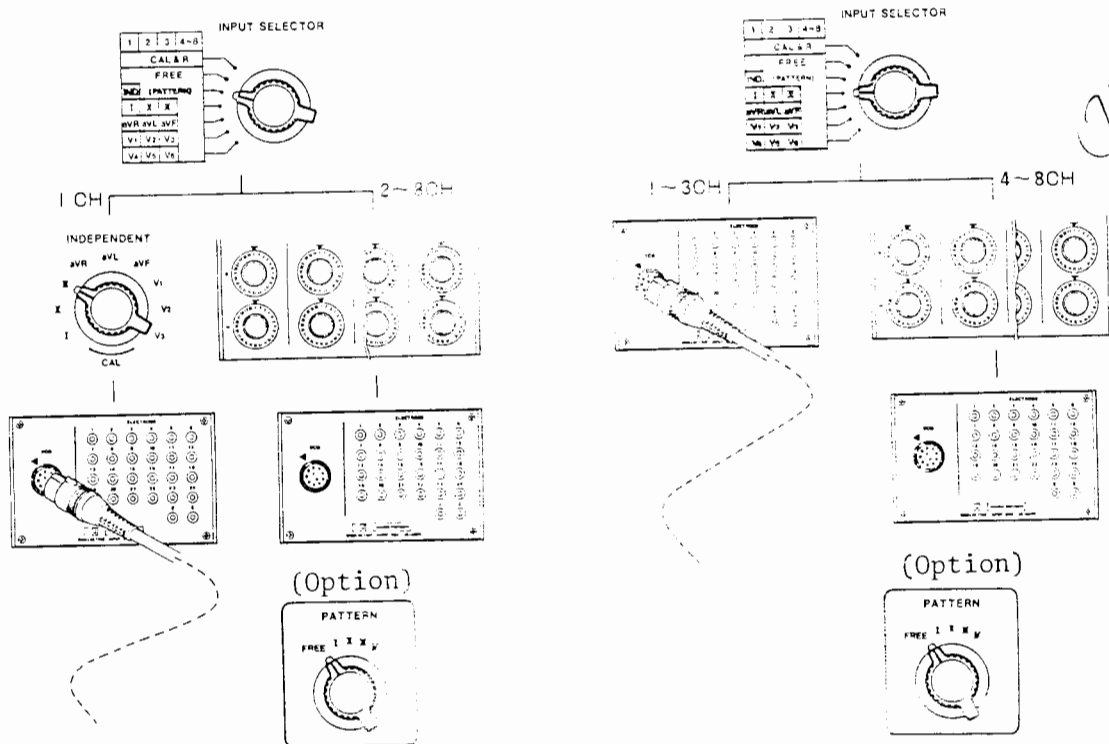


Fig. 22

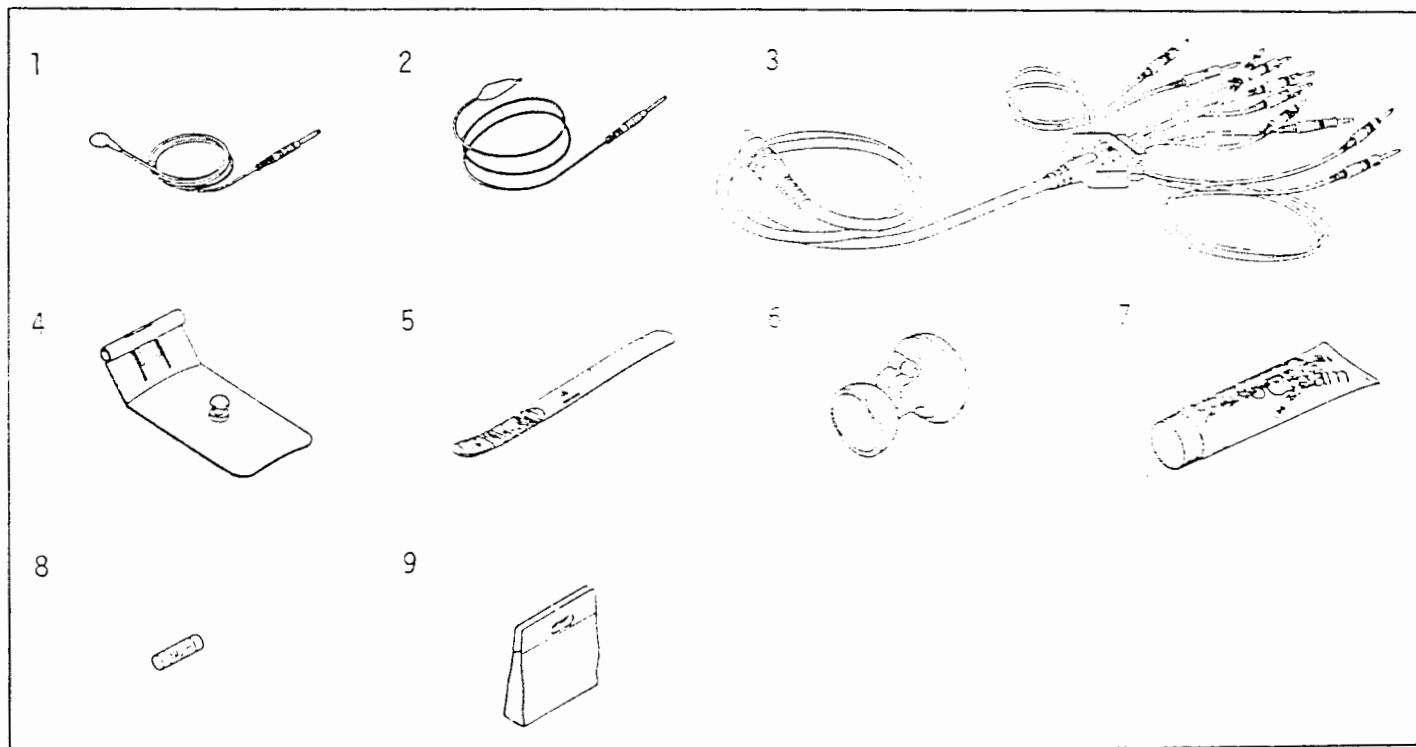
JB-642G, PB-640G
 4CH BIOELECTRIC INPUT BOX/PANEL

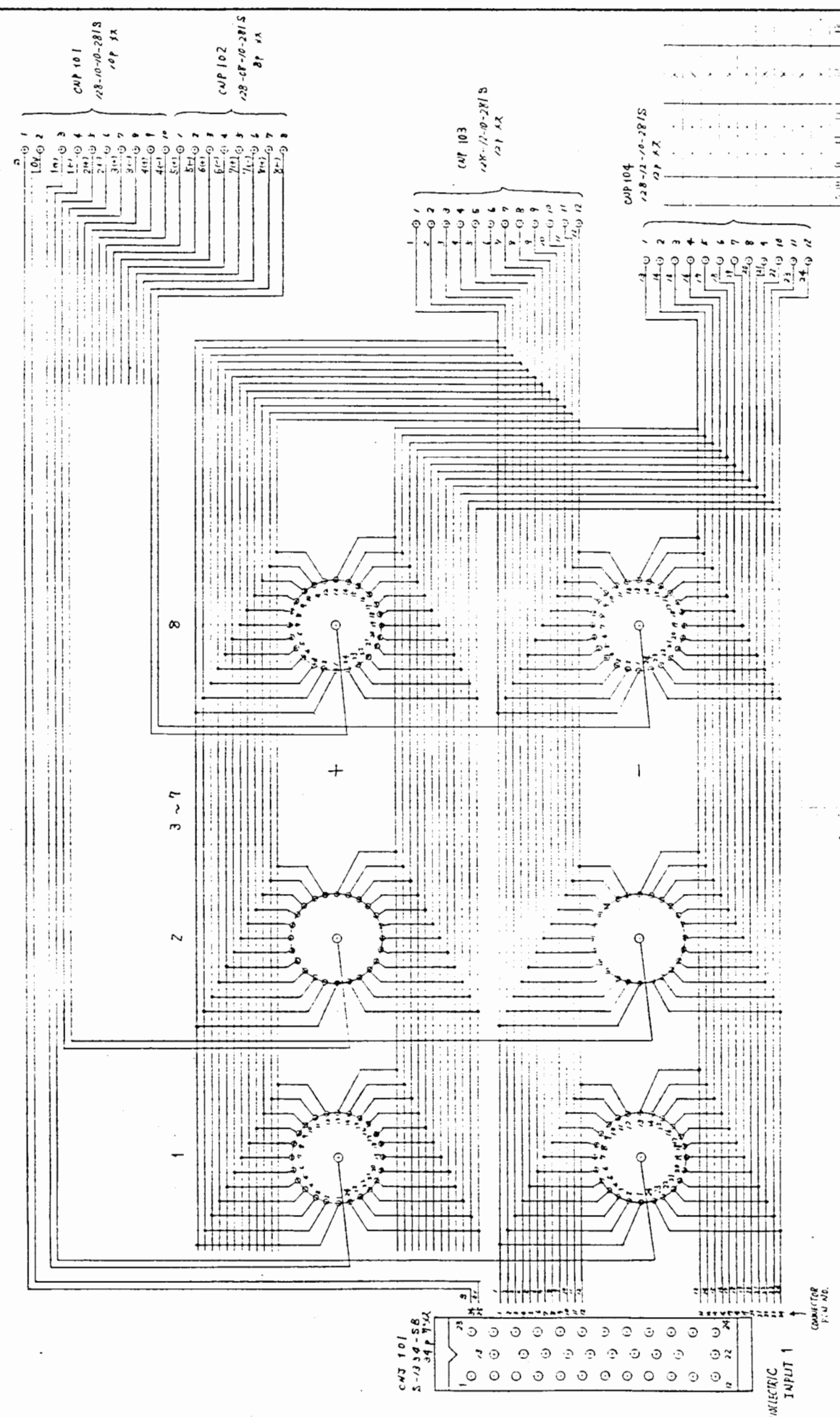
No.	Description	Q'ty	Code No.
1	EEG scalp disc electrodes NE-101A, 3pcs/set	4	5021218
2	EEG lead wire, BE-3BK	6	5020535
3	Patient cable, BJ-261D	1	5570383
4	Limb electrode, adult	4	5030003
5	Limb strap, adult	4	5030021
6	Chest electrode, adult	6	5030373
7	ECG paste(Cardiocream),100g	1	5090027
8	Spare fuse, 5mA	2	5620071
9	Accessory bag	1	1133-000142

OPTIONAL ACCESSORY



Floor stand for input box
 KC-610G

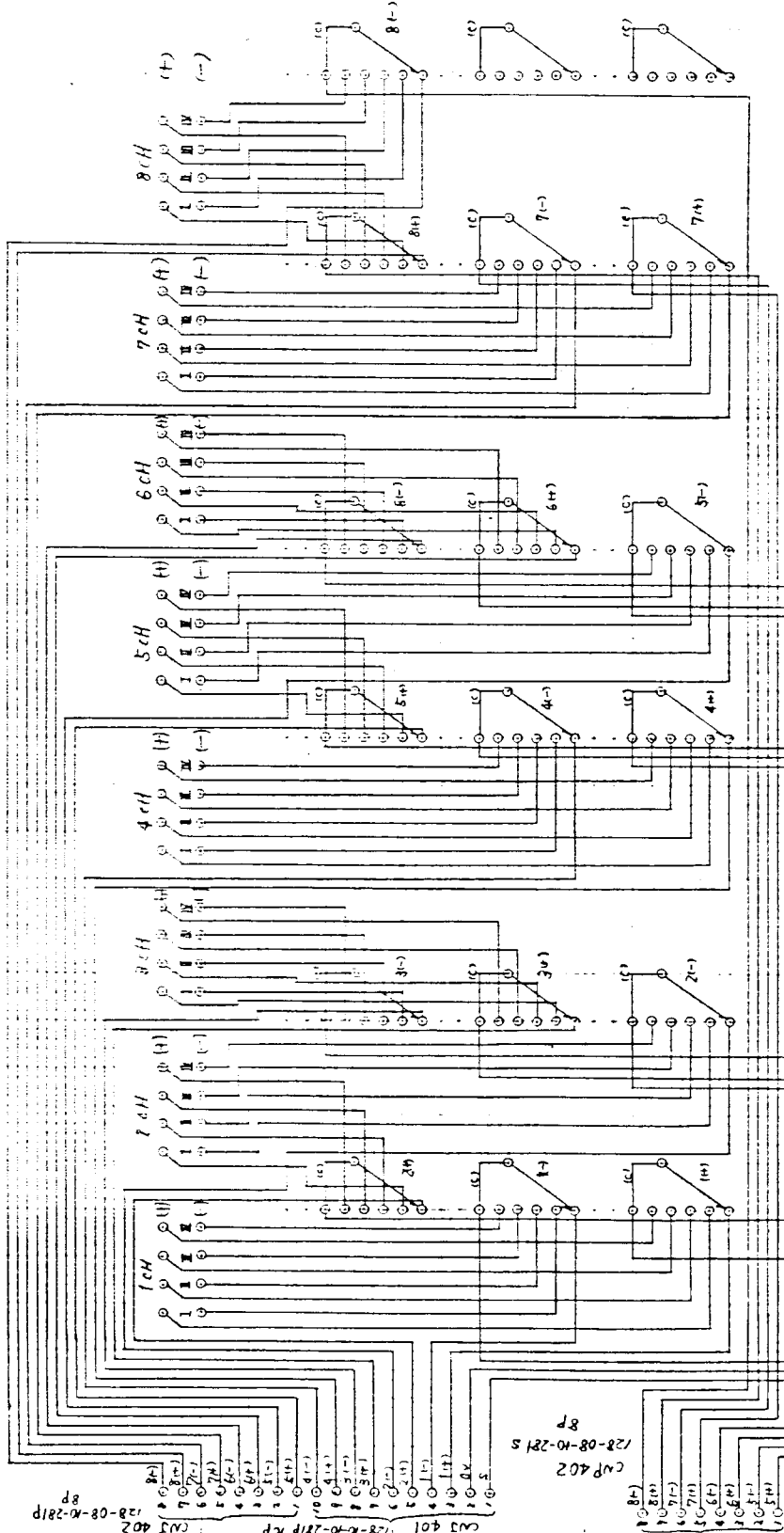
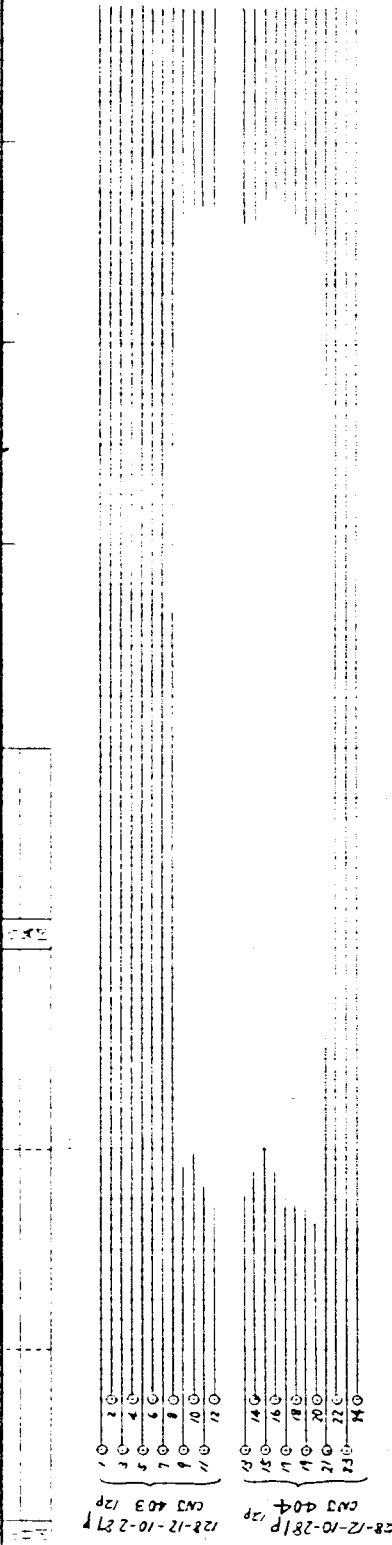




101
 102
 103
 104
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 117
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 119
 120

51 10 20
 101559
 PB-680G
 BIOELECTRIC INPUT PANEL
 Nihon Kohden

A 109-7-2277 UP-3170 4 組込ケーブル = 接続ケーブル
 CMP 101 UP-3170 4 UP-3170
 CMP 101 TO CMP 202
 CMP 102 - CMP 203
 CMP 103 - CMP 204
 CMP 104 - CMP 205



S 401
 PS 43P
 6-18-5 15°

101562
 UP-3170
 BIOELECTRIC INPUT
 PANEL (2/2)
 Nihon Kohden

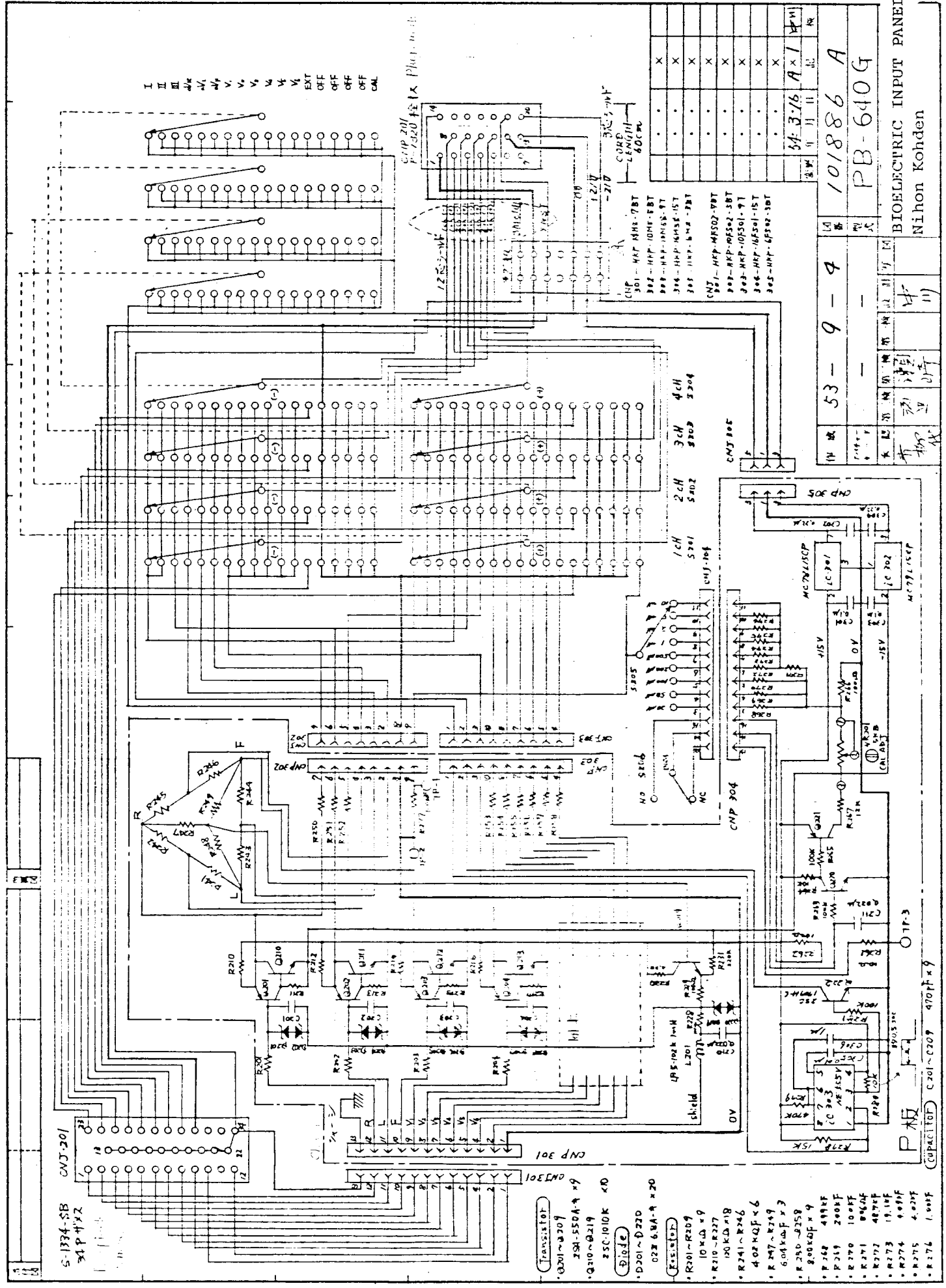
51 10 27
 70
 土
 田

9317007 - P.I.P.Z. S.K

CNS 401
 128-10-281S
 10P

CNS 402
 128-08-10-281S
 8P

I II III IV V VI VII VIII EXT OFF OFF OFF CAL



S-1334-SB
31P 4X2

CNJ 301

Transistor
Q201-Q207
Q208-Q214
Q215-Q219
Q220-Q224

Diode
D201-D220
D221-D240 x 20

Resistor
R201-R209
R210-R227
R228-R246
R247-R259
R260-R276 x 4

Capacitor
C201-C207
C208-C214
C215-C219
C220-C224

IC 301-304

Transformer
T1

Bridge Rectifier
BR1

Filter Capacitor
C207

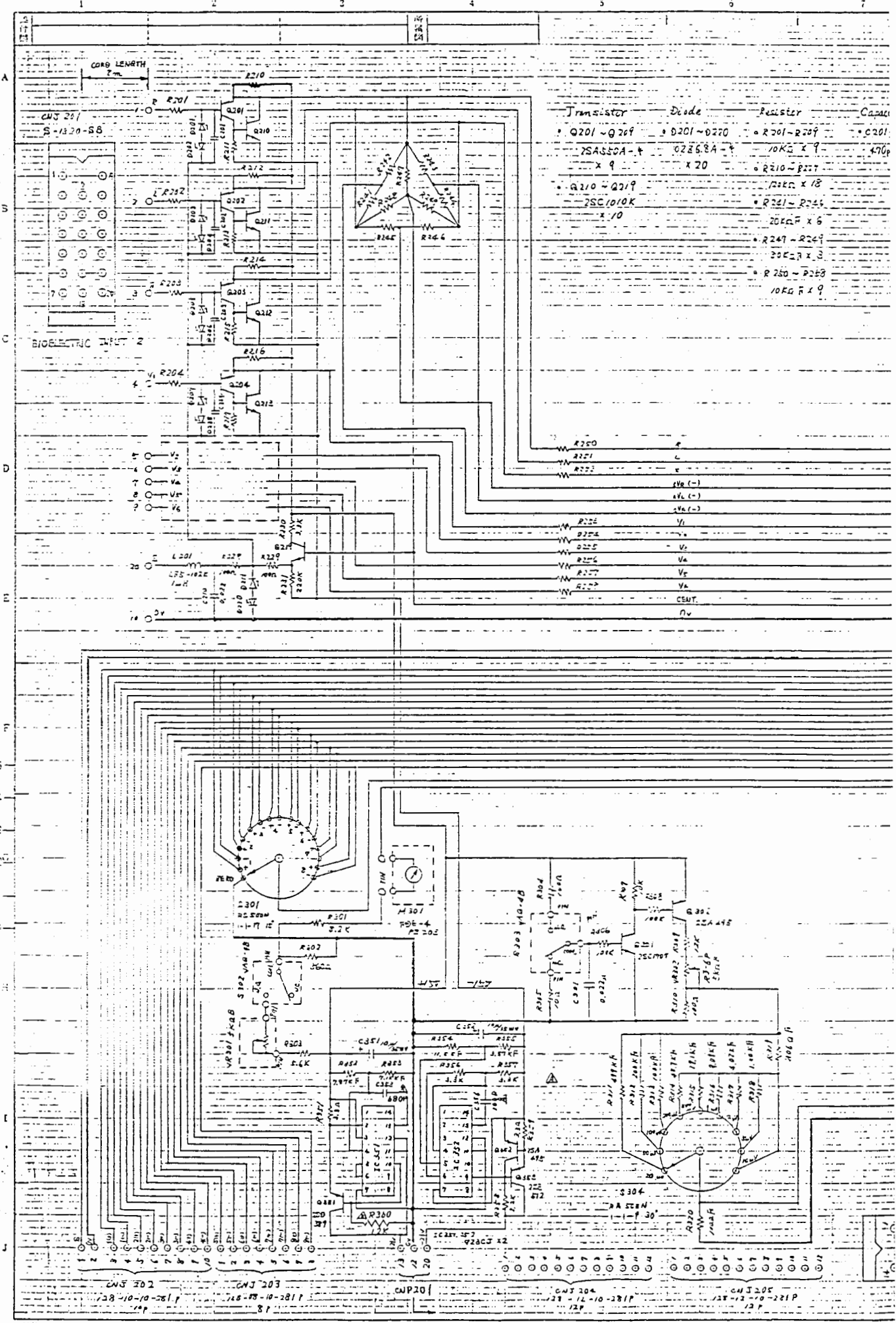
Regulated Output
C201

Other Components
CNP 301, CNJ 301, CNJ 302, CNJ 303, CNJ 304, CNJ 305, IC 301, IC 302, IC 303, IC 304, BR 1, T 1, C 207, C 201, R 201, R 202, R 203, R 204, R 205, R 206, R 207, R 208, R 209, R 210, R 211, R 212, R 213, R 214, R 215, R 216, R 217, R 218, R 219, R 220, R 221, R 222, R 223, R 224, R 225, R 226, R 227, R 228, R 229, R 230, R 231, R 232, R 233, R 234, R 235, R 236, R 237, R 238, R 239, R 240, R 241, R 242, R 243, R 244, R 245, R 246, R 247, R 248, R 249, R 250, R 251, R 252, R 253, R 254, R 255, R 256, R 257, R 258, R 259, R 260, R 261, R 262, R 263, R 264, R 265, R 266, R 267, R 268, R 269, R 270, R 271, R 272, R 273, R 274, R 275, R 276

DATE	53-9-4
REV	
BY	
CHECKED	
APPROVED	
TESTED	
DATE	53-3-16
BY	A X I
TESTED	
DATE	53-3-16
BY	A X I
TESTED	

DATE	53-9-4
REV	
BY	
CHECKED	
APPROVED	
TESTED	
DATE	53-3-16
BY	A X I
TESTED	
DATE	53-3-16
BY	A X I
TESTED	

101886 A
PB-640G
BIOELECTRIC INPUT PANEL
Nihon Kohden



Transistor	Diode	Resistor	Capacitor
• Q201 - Q209	• D201 - D270	• R201 - R309	• C201
2SA550A - 4	0Z86.8A - 4	10KΩ x 9	470p
x 9	x 20	• R210 - R217	
• Q210 - Q219		10KΩ x 18	
7SC1010K		• R221 - R245	
x 10		20KΩ x 6	
		• R247 - R269	
		20KΩ x 3	
		• R280 - R283	
		10KΩ x 9	

B 304

