

OPERATOR'S MANUAL

PCG AMPLIFIER	AS-601H
PCG AMPLIFIER	AS-611H
PCG COUPLER	AS-650H
DIRECT INPUT COUPLER	AJ-650H

GENERAL HANDLING PRECAUTIONS

This device is intended for use only by qualified medical personnel. Use only Nihon Kohden approved products with this device. Use of non approved products or in a non approved manner may affect the performance specifications of the device. This includes, but is not limited to, batteries, recording paper, pens and extension cables and cords for electrodes, input boxes and AC power.

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

1. To safely 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) Place the instrument on an even, level floor. Avoid vibration and mechanical shock 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 must correspond in frequency and voltage to specifications, and have sufficient 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 must 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.
- (3) Technical information such as circuit diagrams, parts list, descriptions, calibration instructions or other information is available for qualified user technical personnel upon request from your Nihon Kohden distributor.

9. When the instrument is used with an electrosurgical instrument, pay careful attention 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.

This warranty does not apply to products that have been modified, disassembled, reinstalled or repaired without Nihon Kohden approval or which have been subjected to neglect or accident, damage due to accident, fire, lightning, vandalism, water or other casualty, improper installation or application, or on which the original identification marks have been removed.

In the USA and Canada other warranty policies may apply.

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Introduction

These models are the plug-in units of the RM-6000 Series Polygraph System. The AS-601H and the AS-611H can be used to measure PCG in combination with the PCG coupler, model AS-650H. Three types of filters are included in the PCG Amplifiers. These are Type A and Type B of the JIS standard and the Maass and Weber type. These filters can be selected by a switch mounted in the amplifier.

AS-601H is designed for direct measurement of the PCG, while the AS-611H is designed to measure the PCG by modulating the PCG with 80Hz sine waves. The modulation type, AS-611H is used when the frequency characteristic of the recorder is less than 100Hz or so.

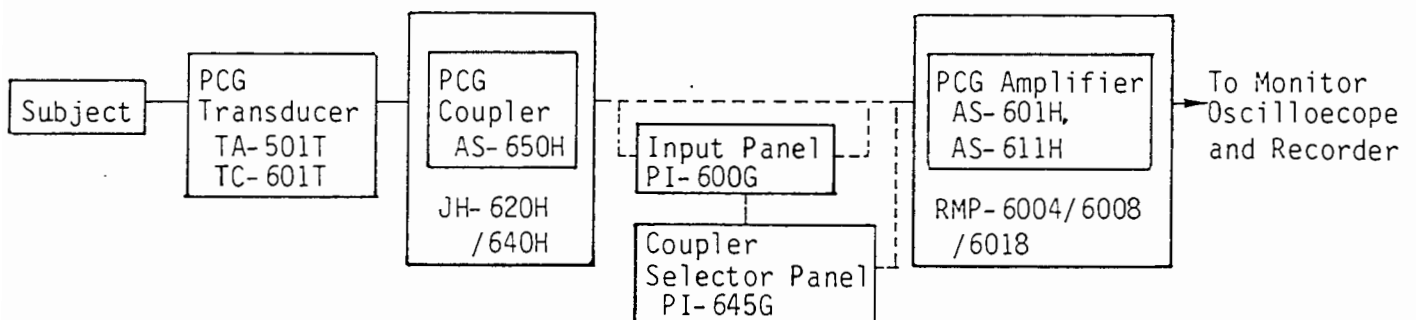
Please read this manual thoroughly prior to operation. Also please read the operator's manuals of the polygraph Amplifier Console and other plug-in units.

Composition

These units can be mounted on the Polygraph Amplifier Consoles (RMP-6004/6008/6018.) The block diagrams of several compositions of the PCG transducer, the PCG couplers, the coupler selector panels, etc. are shown in the following figures.

COMPOSITION EXAMPLE

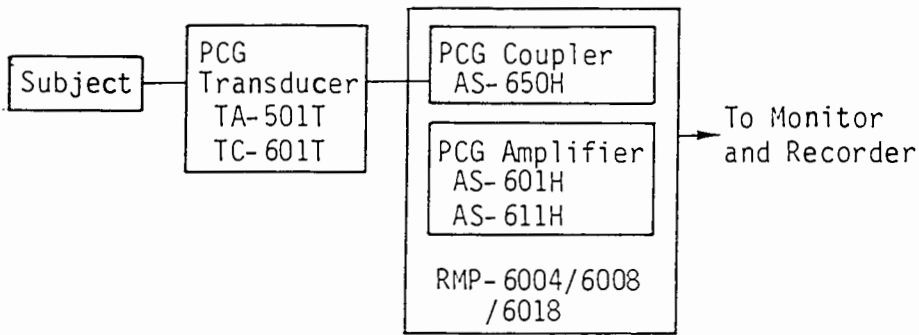
* Single-channel example 1



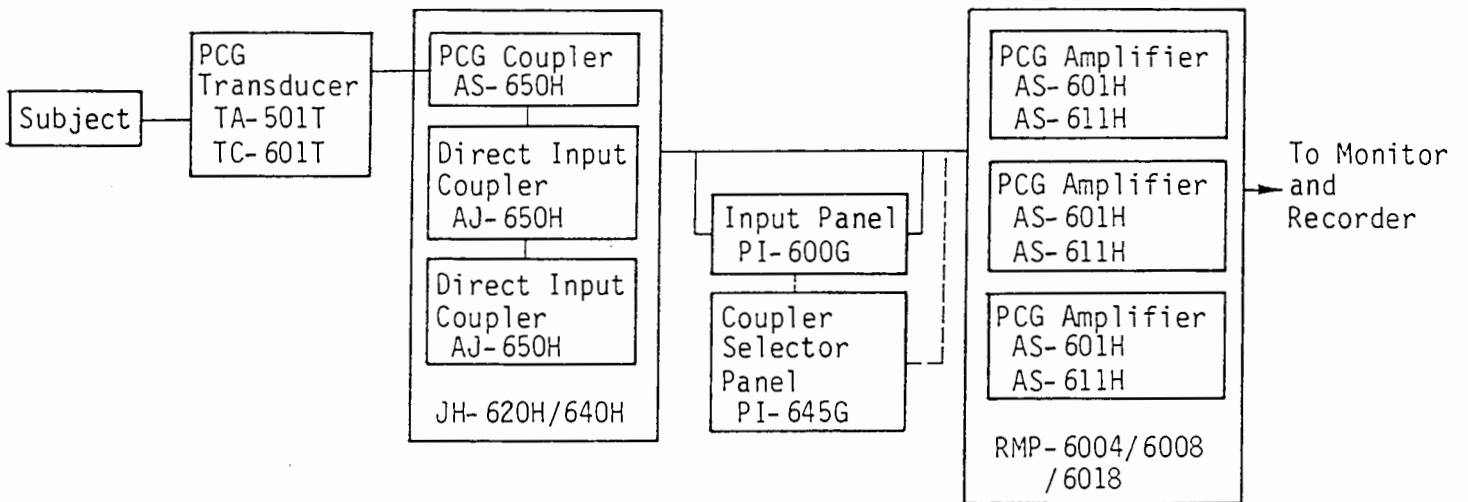
Features

1. Three types of PCG filters, type A, B (JIS) and the Maass and Weber type can be selected inside the amplifier.
2. A calibration signal can be applied simultaneously to each channel amplifier by the CAL switch on the Polygraph Amplifier Console.
3. By combining the PCG coupler AS-650H, the Direct input couplers AJ-650H and the PCG Amplifiers, the PCGs measured through the different filters can be recorded simultaneously.
4. The modulation(80Hz) type PCG amplifier enables the PCG to be recorded with a low frequency response recorder (approx. 100Hz).
5. Excessive input signal protector eliminates uncomfortable noise of EMG sound monitoring caused by body movement.

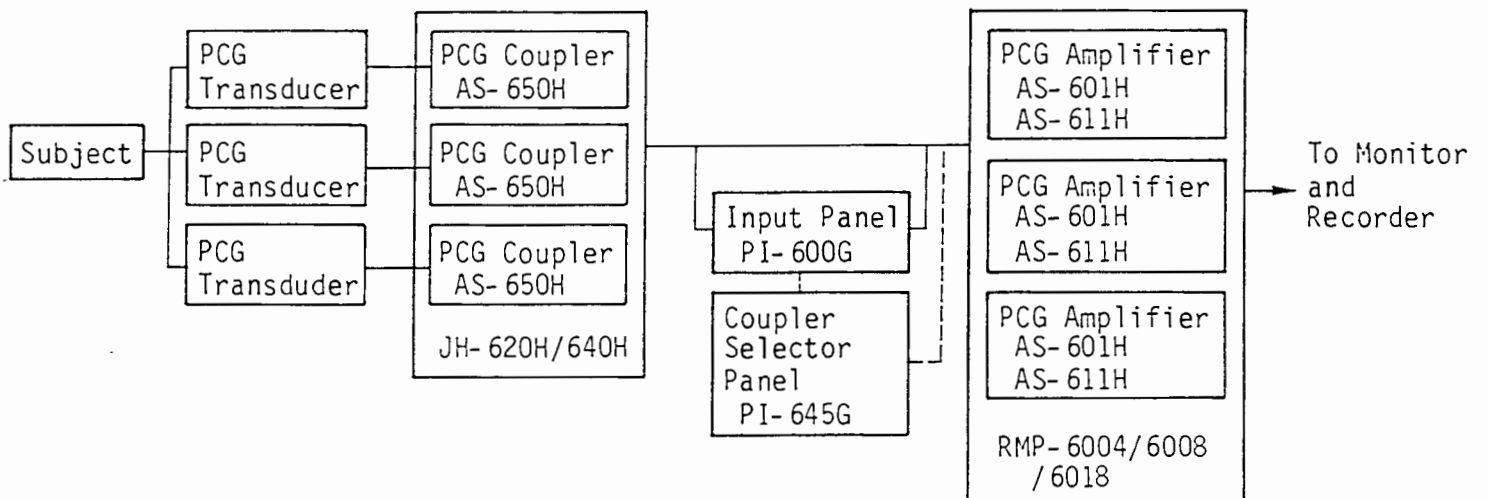
* Single-channel example 2



* Multi-channel example 1

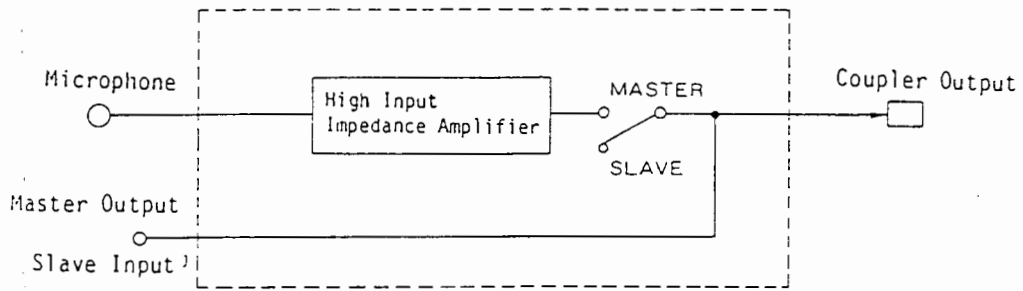


* Multi-channel example 2

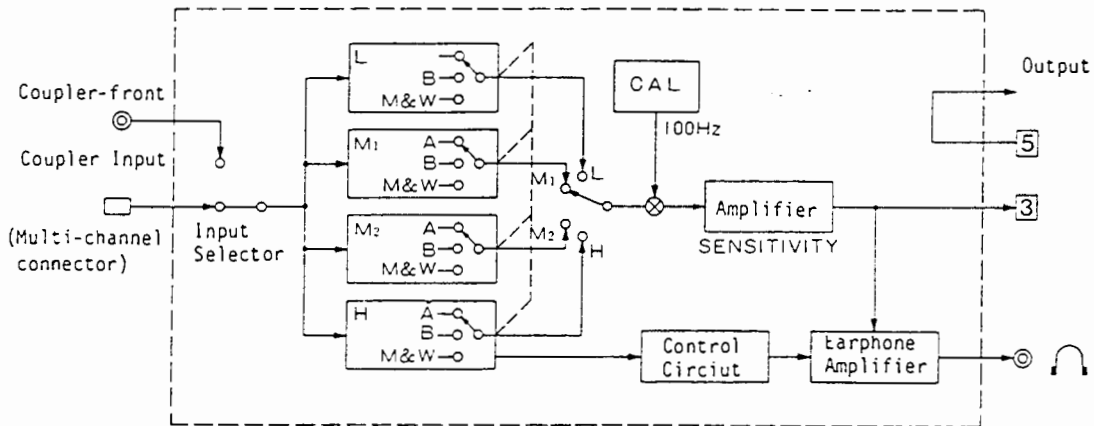


BLOCK DIAGRAM

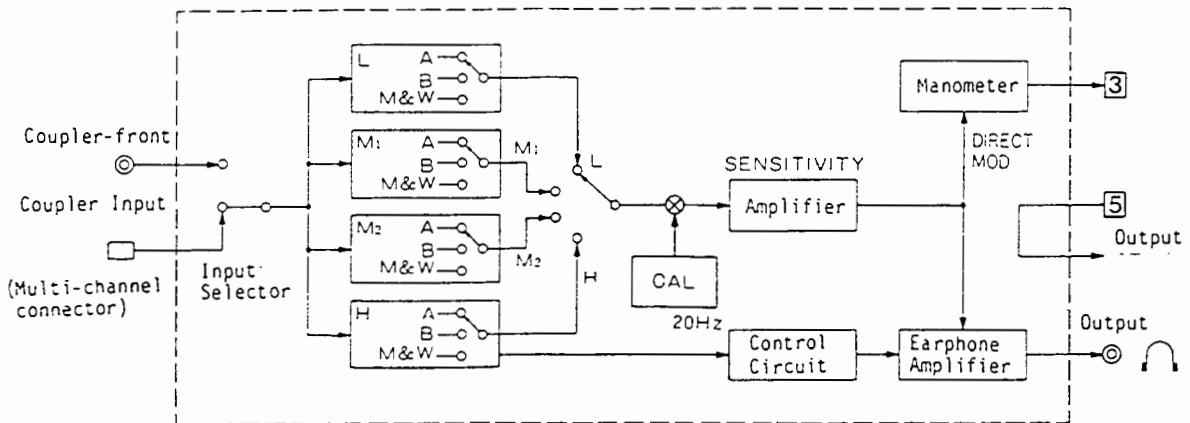
* AS-650H



* AS-601H



* AS-611H

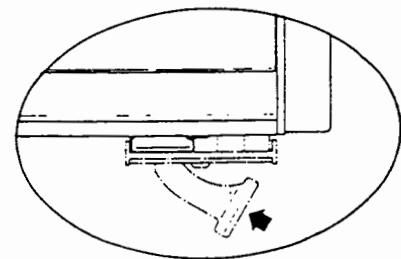
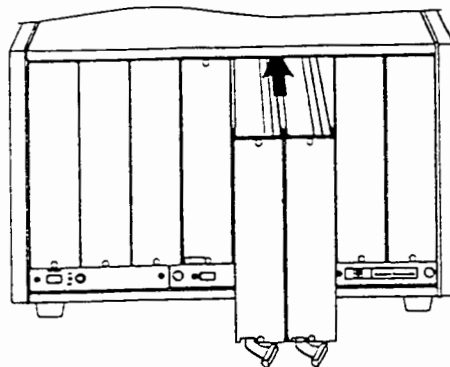


Controls and Switches

Refer to figure in page 13.

AS-601H/611H

(1) Coupler Accomodation	The place where the coupler is to be plugged in. When the coupler is not plugged in here, mount a blank panel (EK-650H) at this location.
(2) OFF-MEAS (OFF-L, M1, M2, H)	Selects the filter. Please refer to the specifications described later for the characteristics of the filters.
(3) SENSITIVITY Selector	Adjusts sensitivity of the amplifier. Turning the knob clockwise increases the sensitivity by 6dB (twice). Turning the knob counterclockwise decreases the sensitivity to 1/2.
(4) SENSITIVITY (Fine)	Sensitivity fine adjustment.
(5) EAR ADJ.	Adjusts the sound volume of the earphone.
(6) Earphone terminal	Signal for the earphone is obtained at this terminal.
(7) DIRECT-MOD	Selects output mode. DIRECT : Outputs direct PCG. MOD : Outputs modulated PCG of 80Hz signal.
(8) Module Lock Lever	Pull the lever to remove the module from the Polygraph Amplifier Console. Push the lever to lock the module in the Polygraph Amplifier Console.



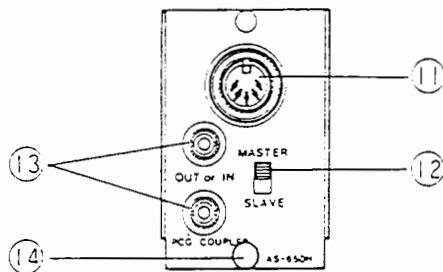
(9) FRONT-COUPLER
(Input Selector switch)

FRONT : Set this switch to FRONT when the coupler is plugged in the Coupler Amplifier.
COUPLER : Set this switch to COUPLER when the coupler is plugged in the Coupler Housings.

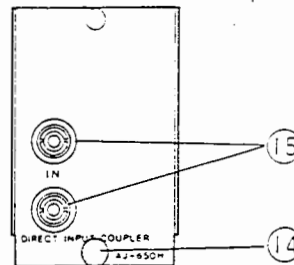
(10)PCG FILTER mode selector
A, B, Maass and Weber

Selects the filter mode.
Three types of filters, A type, B type and the Maass and Weber type are available.

PCG COUPLER
AS-650H



DIRECT INPUT COUPLER
AJ-650H



(11)Input Connector

A connector for the microphone. A yellow mark is indicated around the connector and the microphone. Since the transducer and the mating connector are color coded, an erroneous connection between the transducer and the connector is avoided by the color matching.

(12)MASTER-SLAVE

When this switch is set to MASTER, a signal supplied to the input connector from the microphone is connected to the PCG amplifier. The same signal supplied to the Input Connector(11) appears at the OUT or IN terminal(13). When this switch is turned to SLAVE, a signal applied to the Input Connector(11) is not connected to the PCG amplifier. This SLAVE position is mainly used to measure and record the PCGs simultaneously in multiple channels.

(13)OUT or IN
(Input or Output terminal)

When this switch is set to MASTER, signal supplied to the input connector(11) is applied to the PCG amplifier and the OUT or IN terminals. When this switch is set to SLAVE, signal supplied to the input connector(11) is not applied to the PCG amplifier and signal supplied to the OUT or IN terminals is applied to the PCG amplifier. The OUT or IN terminals are connected to each other in parallel.

(14)Coupler Fixing Knob

For fixing the Coupler to the PCG amplifier.

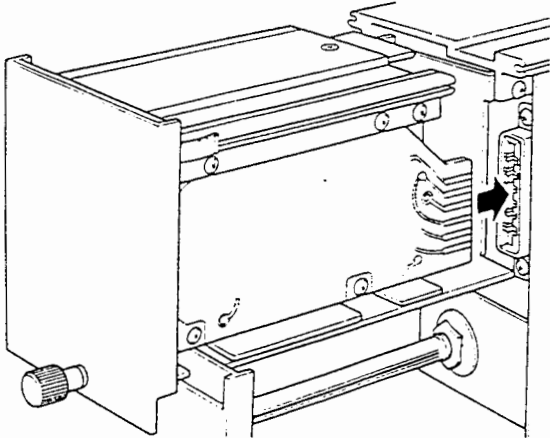
(15)IN

Input terminals used when a transducer is connected to plural PCG amplifiers.

Measurement

SYSTEM COMPOSITION

When using a Coupler in the Amplifier
 Insert the PCG coupler into the PCG amplifier. Turn the Coupler Fixing Knob(14) clockwise to fix the coupler.

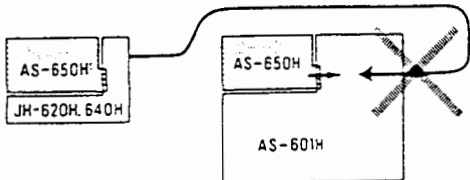


When using a Coupler in the Coupler Housing
 Insert the PCG coupler and Input coupler into the Coupler Housing. Turn the Coupler Fixing Knob(14) clockwise to fix the coupler.

NOTE

Be sure to cover the coupler accommodation opening with the Blank Panel (EK-650H) when the Coupler is plugged into the Coupler Housing.

Do not connect two PCG couplers to a PCG Amplifier simultaneously.



INTERNAL SWITCH SETTING

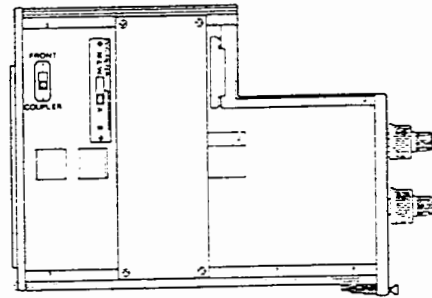
Pull the Module Lock Lever(8) to extract the PCG Amplifier from the Amplifier Console.

Remove the shield plate mounted on the side of the unit and set the internal switches as follows.

To set the FRONT-COUPLER(9)

- When the Coupler is plugged in the Coupler Housings --- set to COUPLER
- When the Coupler is plugged in the PCG Amplifier ---- set to FRONT

Set the PCG FILTER(10) as desired.



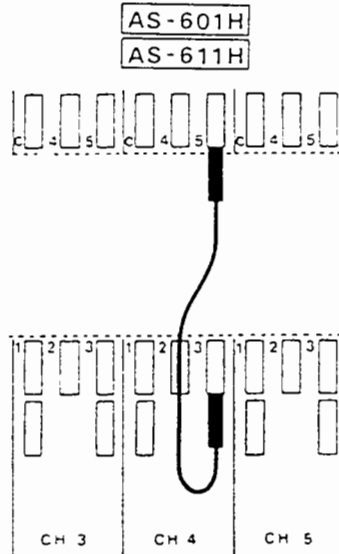
Set the OFF-MEAS switch(2) to OFF, and the SENSITIVITY(3) to zero.

Then insert the unit into the Amplifier Console.

CONNECTION BOARD WIRING

Draw out the Connection Board from the Amplifier Console.

Connect pin terminal(3) to pin terminal(5) of the channel where the PCG amplifier is plugged in. After connecting the pin terminals, insert the connection board into its original location.



Example: Assuming that the AS-601H (or the AS-611H) is plugged into Channel 4.

POWER ON

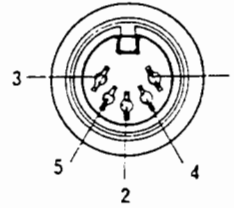
After making sure that the ground lead and power cord are properly connected, push the power switch of the rack, Polygraph Amplifier Console, monitor oscilloscope and recorder to turn the power on.

Check to see that the power indication lamp lights.

TRANSDUCER CONNECTION

Connect the PCG transducer(acceleration type) to the Input Connector(11).

The pin terminal connection of the connector is as follows.



Pin terminal

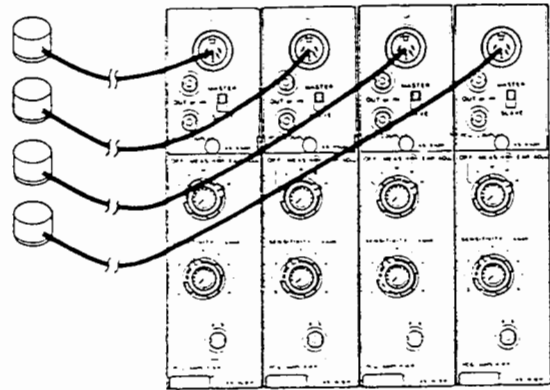
- 1 : not connected
- 2 : shield
- 3 : + signal
- 4 : not connected
- 5 : not connected

Type : MAB5100S 5p female
Code number : 5490095

To measure the PCG in multiple channels simultaneously, set the MASTER-SLAVE(12) properly and connect the signals using the OUT or IN(13) terminals etc. according to the purpose of measurement. Examples of the connections are shown below.

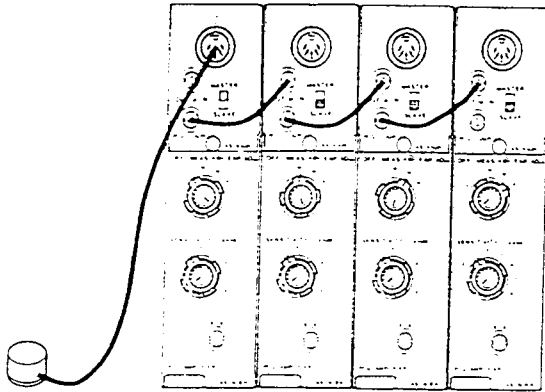
[Example-1]

To measure 4 PCGs simultaneously using 4 PCG microphones.



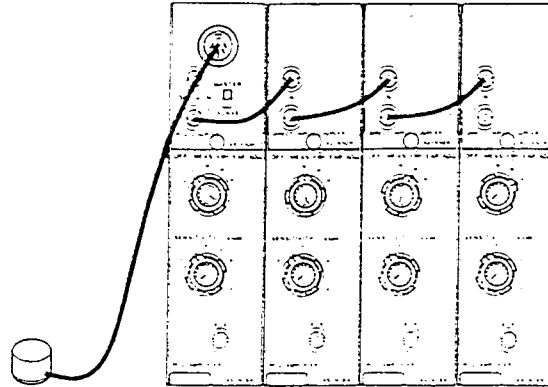
[Example-2]

To measure 4 PCGs (through the Filters L, M1, M2, H) simultaneously using one PCG microphone.



[Example-3]

To measure 4 PCGs (through the filters L, M1, M2, H) simultaneously using one PCG microphone.

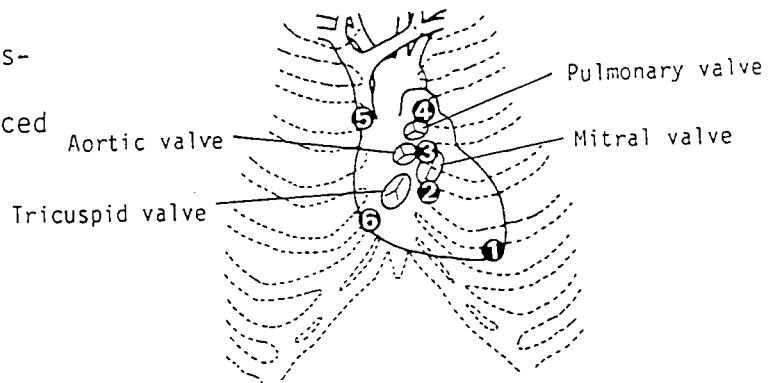


PCG TRANSDUCER PLACEMENT

Placement position

Find the best place for the PCG transducer using a stethoscope.

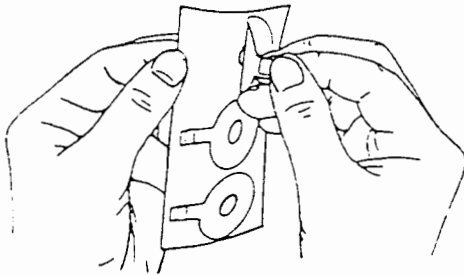
Generally, the PCG transducer is placed at one of the following 6 locations.



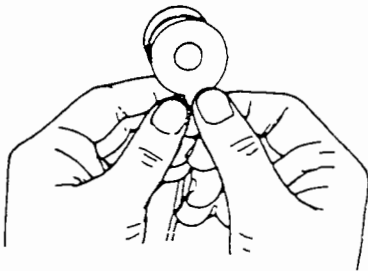
LOCATIONS	THE VALVES TO BE DIAGNOSED
(1) Apex	Mitral valve sound detection
(2) 4th intercostal space and left end of the sternum	Mitral valve
(3) 3rd intercostal space and left end of the sternum	Pulmonary valve and Aortic valve
(4) 2nd intercostal space and left end of the sternum	Pulmonary valve and Aortic valve
(5) 2nd intercostal space and right end of the sternum	Aortic valve and Pulmonary valve
(6) 5th intercostal space and right end of the sternum	Tricuspid valve and Aortic valve

How to place the transducer

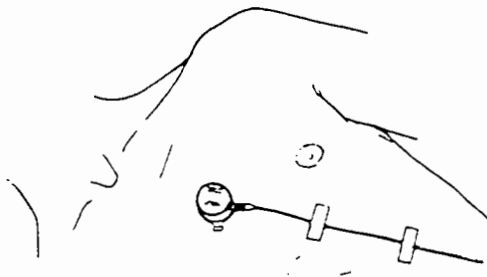
- 1) Clean the skin surface where the transducer is to be placed with alcohol.
- 2) Peel off the adhesive collar.



- 3) Apply the adhesive collar to the transducer and peel off the covered paper from the front of adhesive collar.

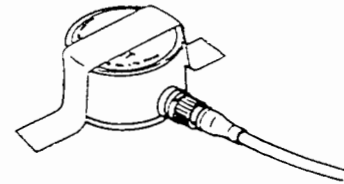


- 4) Apply the transducer on the patient site where the PCG is to be measured. Fix the output cord with adhesive tape.



NOTE

When the transducer is not properly fixed or when the PCG will be measured for a long period, additionally fix the transducer with adhesive tape.



PRECAUTIONS

1. The PCG measurement must be made in a quiet place.
2. Place the recorder as far from the patient as possible in order to reduce the recorder noise picked up by the PCG microphone.
3. Remove clothing from the upper half of the patient in order to reduce noise that may be generated by the clothing.
4. When the Coupler is mounted in the Coupler Housing and not in the PCG amplifier, cover the coupler accommodation opening of the PCG amplifier with the Bland Panle(EK-650H).

MEASUREMENT

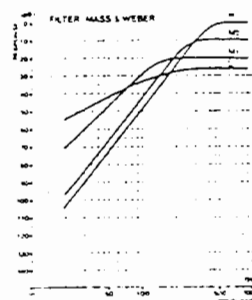
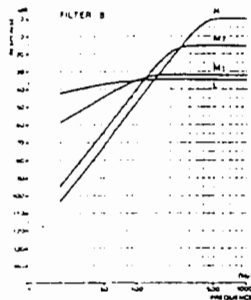
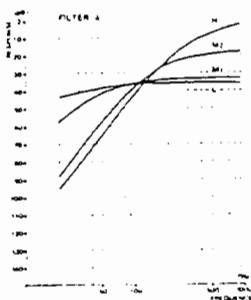
1. Set the baseline position as desired with the control on the monitor oscilloscope and the recorder.
2. Set the OFF-MEAS switch(2) to the desired position.
3. Turn the SENSITIVITY control(3) clockwise from 0 to 1, 2, ----- consecutively to get the proper PCG amplitude.
4. Set the DIRECT/MOD(7) selector according to frequency response of the recorder (AS-611H)
5. Record the PCG at 50mm/sec speed having the CAL switch on the Polygraph Amplifier Console at the end of the record.

The following specifications apply only to the AS-611H.

Carrier frequency	80Hz \pm 20%	
Calibration signal	20Hz \pm 20%	
	The amplitude is 30mvp-p \pm 5%, referred to input, at maximum sensitivity, Filter L.	
Dimensions and weight	AS-601H	50(W) x 200(H) x 280(D) mm, approx. 1kg
	AS-611H	50(W) x 200(H) x 280(D) mm, approx. 1.2kg

DIRECT INPUT COUPLER (AS-650H)

Input impedance	2.7M Ω or more, single-ended input
Amplitude	32 \pm 2dB
Frequency characteristics	>2.0KHz (-3dB)
Internal noise	<15 μ v-p referred to input
Output impedance	<500 Ω
Input selection	MASTER-SLAVE
Dimensions and weight	50(W) x 75(H) x 125(D) mm approx. 0.2kg



Standard Accessories

Items	Q'ty	Code number
PCG cord	1	5511982

Optional Accessories

Acceleration Type PCG Transducer (TA-501T)

Air Conductive Microphone (TC-601T)

Earphone

Related Instruments

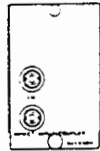
Blank Panel

EK-650H



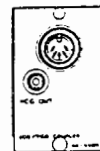
Direct Input Coupler

AJ-650H



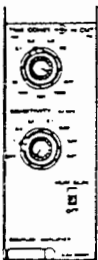
ACG/CAP coupler

AK-650H

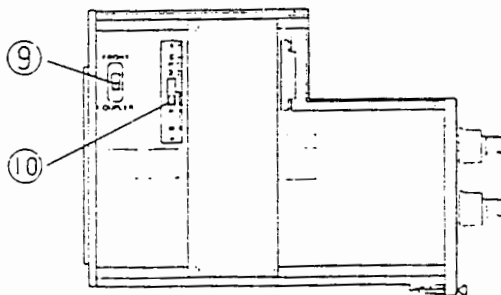
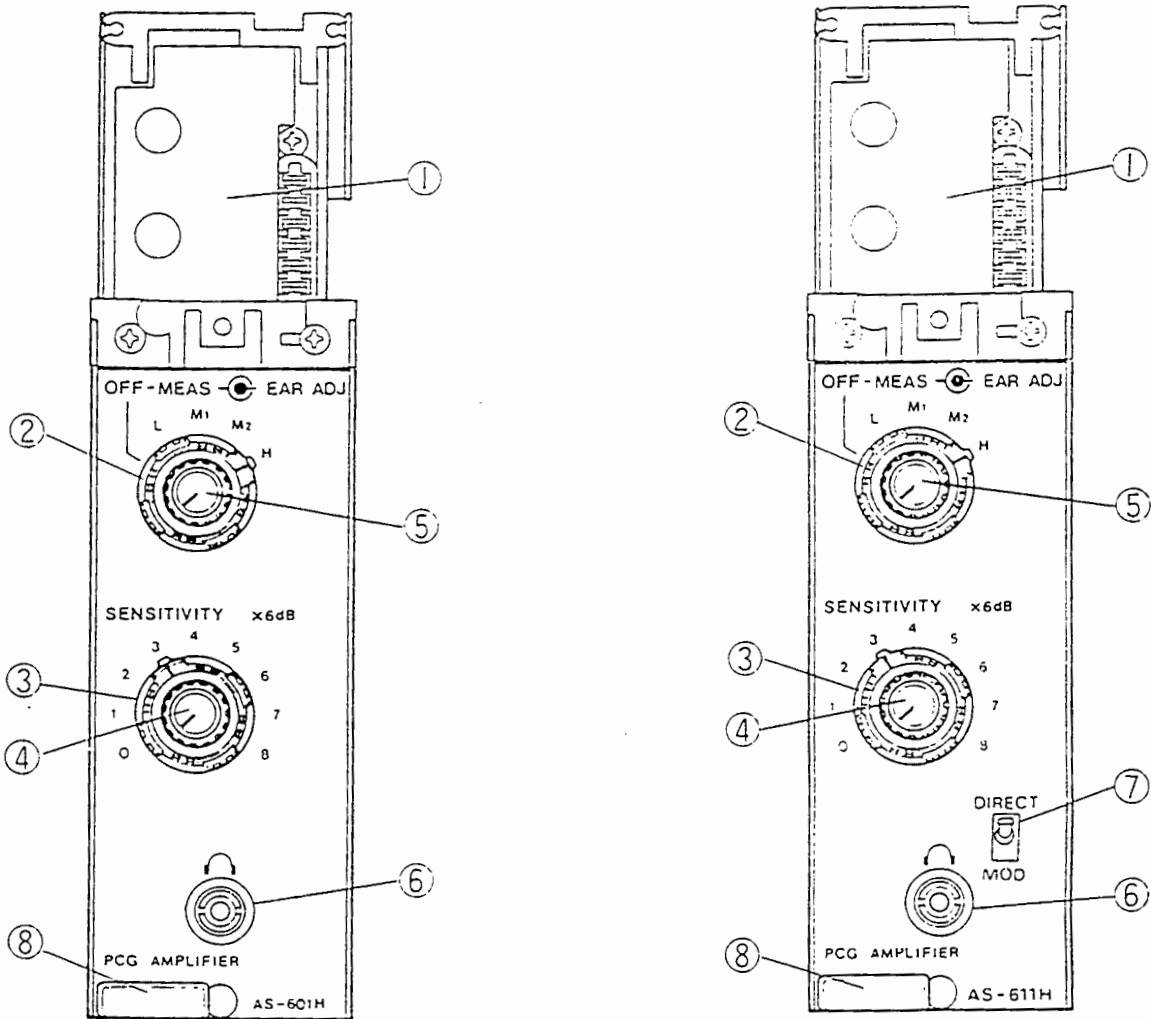


Coupler Amplifier

AA-601H



Panel Illustration



AS- 601H/611H/650H
AJ- 650H(A)

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The model and serial number of your instrument are identified on the rear or bottom of the unit. Write the model and serial number in the spaces provided below. Whenever you call your distributor concerning this instrument, these two pieces of information should be mentioned for quick and accurate service.

Model _____

Serial number _____

YOUR DISTRIBUTOR