

OPERATOR'S MANUAL

ENG AMPLIFIER	AN-601G
ENG INPUT PANEL	PN-640G
ENG INPUT BOX	JN-640G

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.

CONTENTS

	PAGE
INTRODUCTION	1
FEATURES	1
COMPOSITION	1
CONTROLS AND SWITCHES	3
PREPARATION	7
Internal Switch Setting	
Connection Board Wiring	
Power On	
Electrodes and Cords Connection	
Electrode Placement	
Electrode Resistance Measurement	
MEASUREMENT (ENG Waveform)	10
Internal Switch Setting	
Connection Board Wiring	
Measurement	
MEASUREMENT (ENG and Velocity Waveform)	12
Internal Switch Setting	
Connection Board Wiring	
Calibration	
Measurement	
MEASUREMENT (ENG and Velocity Waveform,	16
and Nystagmus Frequency)	
Internal Switch Setting	
Connection Board Wiring	
Measurement	
SPECIFICATIONS	17
STANDARD ACCESSORIES	18
OPTIONAL ACCESSORIES	18
RELATED INSTRUMENTS	18
PANEL ILLUSTRATION	19

Introduction

The electronystagmograph AN-601G is a plug-in unit for Polygraph system RM-6000.

This unit is designed for measuring electrical potential change in accordance with eyeball movement.

In combination with the ENG Input Box JN-640G and the ENG Input Panel PN-640G, the ENG is measured up to 4 channels simultaneously with simple operation.

Please read this manual thoroughly prior to operation. Also refer to the operator's manual of the main unit and the other plug-in units.

Features

1. A DC amplifier with automatic balance circuit, actuated by the INST switch on the console, provides accurate ENG recording with high fidelity even in slow changing signal speed.
2. Exclusively designed ENG Input Box and Panel provides easy lead selection for up to 4 channels.
3. Supplied Ag/AgCl electrodes have less polarization voltage than that produced by conventional electrodes, permitting stable recording.
4. A stimulation mark signal or a biophysical signal other than the ENG signal applied to the external input is recorded with the ENG signal.
5. An electrode impedance measuring circuit is built into the Input Panel.

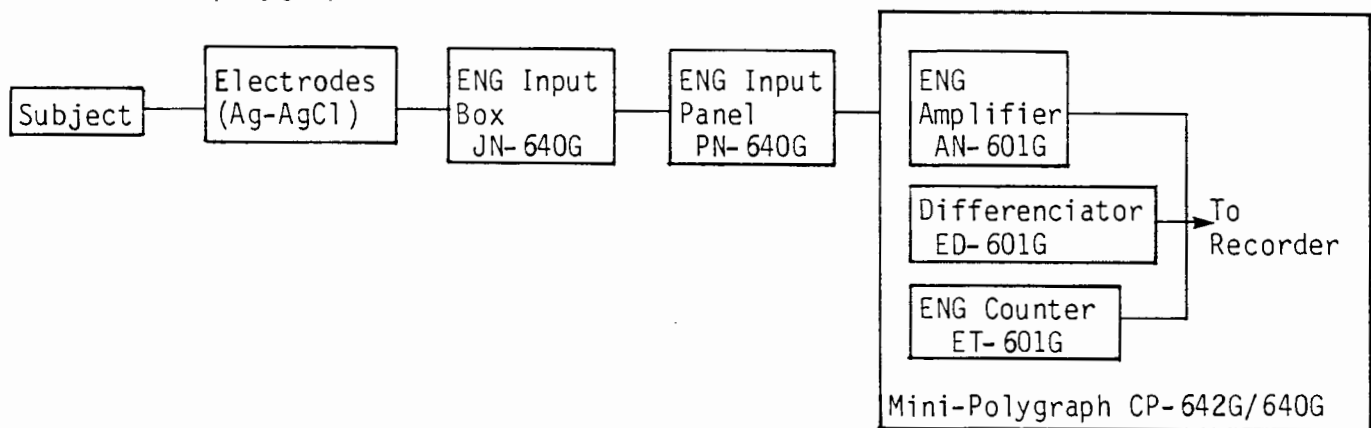
Composition

The AN-601G is plugged in the Polygraph Amplifier Console RMP-6004/6008/6018.

Examples of the system composition and a block diagram are shown in the following figures:

COMPOSITION EXAMPLES

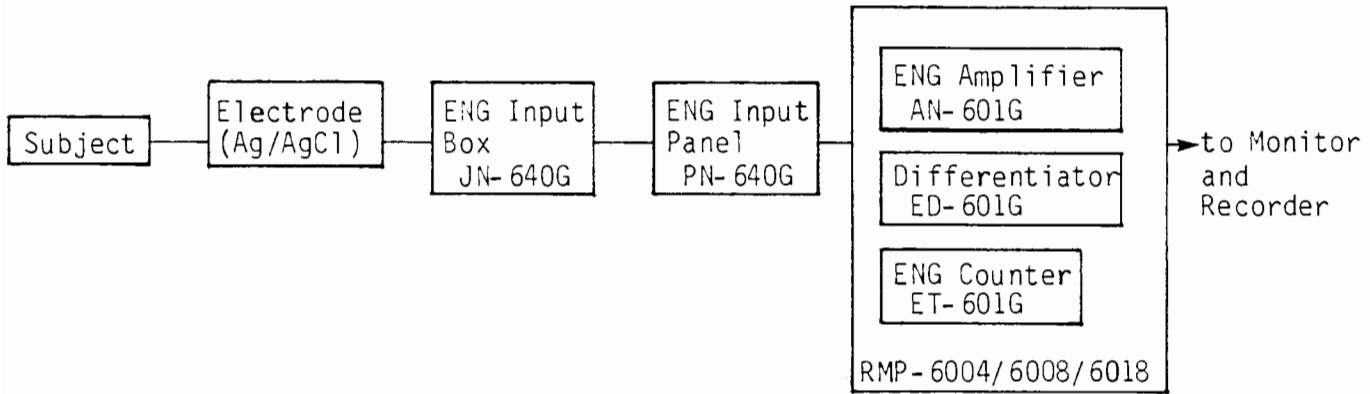
RM-6100 Minipolygraph system



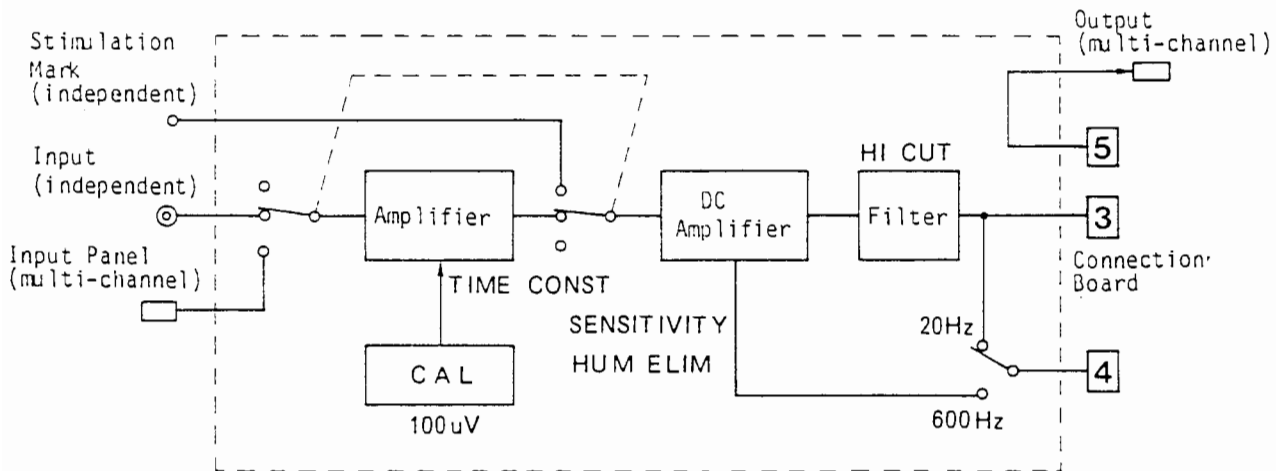
	For routine		For research
	Ex. 1	Ex. 2	Ex. 3
Ch-1	AN- 601G	AN- 601G	AN- 601G
Ch-2	AN- 601G	ED- 601G	ED- 601G
Ch-3	AN- 601G	AN- 601G	ET- 601G
Ch-4	AN- 601G	ED- 601G	-----

AN- 601G : ENG waveform
ED- 601G : Velocity waveform
ET- 601G : Numerical frequency
of Nystagmus

Polygraph system (RM- 6000)



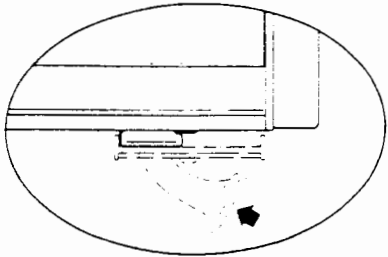
BLOCK DIAGRAM



Controls and Switches

ENG AMPLIFIER AN-601G

Refer to the illustration on page 19.

(1) MEAS-OFF	Selects input signal. MEAS : Amplifies input signals. OFF : Turns amplifier off.
(2) TIME CONST	Selects time constant of the amplifier.
(3) HI CUT	Selects cut-off frequency of the amplifier.
(4) SENSITIVITY Step control	Selects amplifier sensitivity.
(5) SENSITIVITY Fine control	Provides fine continuous sensitivity control.
(6) HUM ELIM	Eliminates AC interference. As this filter may distort the waveform slightly, set this switch to off if not required.
(7) Module Lock Lever	Pull this lever to draw out the unit from the Polygraph Amplifier Console. After setting the internal switches, be sure to attach the side shield plate and restore the unit. 
(8) Input Selector	Selects the input signal source. (Refer to CORD CONNECTION on page 7.) IND.SIG : An input is applied to the independent input connector on the rear of the Polygraph Amplifier Console (RMP-6004/6008/6018) or of the Minipolygraph. PAN.SIG : An input is applied to the multichannel connector through the ENG Input Panel. IND.STIM : Stimulation mark signal is applied to the independent connector on the rear of the Polygraph Amplifier Console (RMP-6004/6008/6018) or of the Minipolygraph from a stimulator. (DC input of low sensitivity)

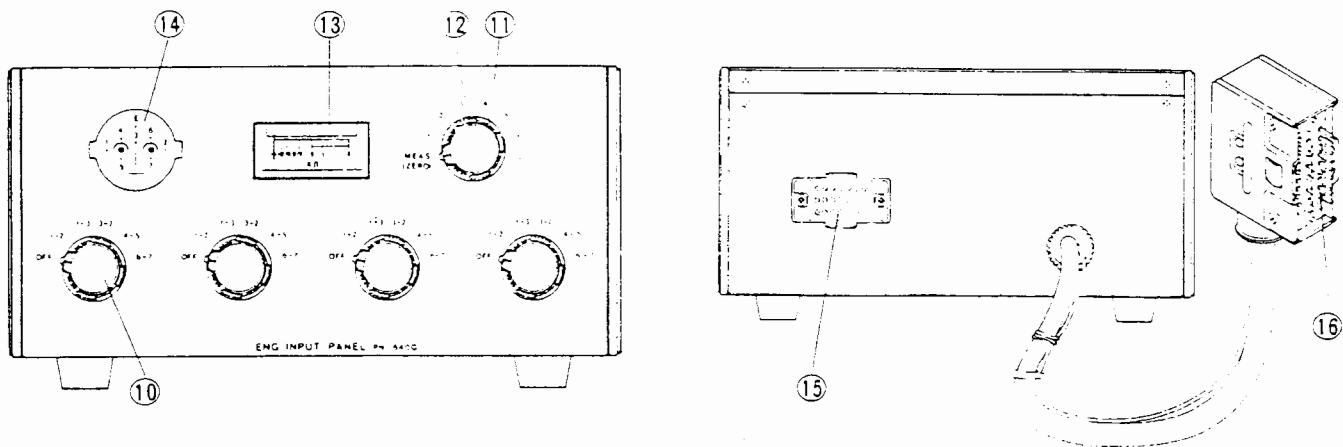
(9) Auxiliary Output Filter Selector

Selects the high cut frequency of the auxiliary output signal for the differentiator. Output signal appears at socket No.4 of the connection board.

There are 2 internal filter settings of 20Hz and 600Hz. When 600Hz is selected, front panel HI CUT Control settings do not operate. When 20Hz is set, front panel HI CUT settings are effective.

- 600Hz : Cut-off frequency is 600Hz.
Select when the high frequency is required.
- 20Hz : Cut-off frequency is 20Hz.
Two step filter reduces high frequency noise more sharply.
Select when the output signal is used for the differentiator.

ENG INPUT PANEL PN-640G



(10) Lead Selector

Selects ENG leads.

(11) Electrode Selector

When this selector is set to a certain electrode position and the switch(12) is pressed, the resistance between the E terminal and the electrode is displayed on the electrode resistance meter(13).

(12) Electrode Resistance

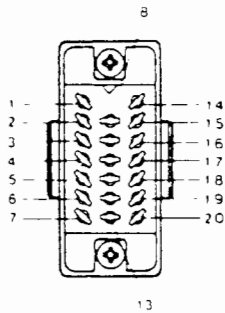
(13) Electrode Resistance Meter

(14) Electrode Position

Illustrates the electrode placement positions for ENG measurement.

(15) Input Connector

Accepts the connector of the Input Box JN-640G.



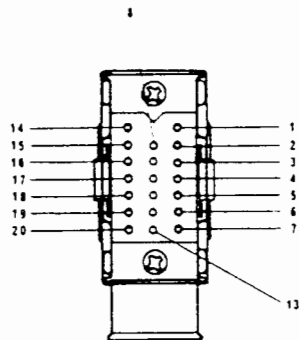
Pin No.	Signal
1	E
2	1 (Pin No. of JN)
3	2
4	3
5	4
6	Not used
7	Not used
8	5
9	6
10	7
11-13	Not used
14	Shield
15-20	Not used

Connector type : S-1320-SB (HIROSE), 20P
 Female, Receptacle
 Code No. : 5411207

Mating connector is
 Connector type : P-1320-CEA (HIROSE), 20P
 Male, Plug
 Code No. : 5411537

(16) Output Connector

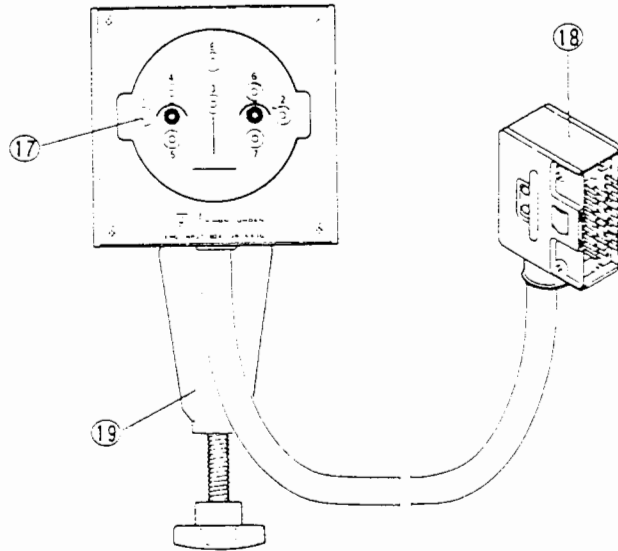
Connects to the multi-channel connector on the Polygraph Amplifier Console or the Minipolygraph.



Pin No.	Signal
1	E
2	1 ch(+)
3	2 ch(+)
4	3 ch(+)
5	4 ch(+)
6	Not used
7	Not used
8	1 ch(-)
9	2 ch(-)
10	3 ch(-)
11	4 ch(-)
12	E
13	+21V
14	Shield
15-20	Not used

Connector type : P-1320-CEA (HIROSE), 20P
 Male, Plug
 Code No. : 5411537

ENG INPUT BOX (JN-640G)



(17) Electrode Terminals	Accepts the electrode connectors.
(18) Input Connector	Connects to the input connector(15) of the Input Panel.
(19) Mounting Bracket	Mounts the Input Box to a stand or a bed arm.

Preparation

INTERNAL SWITCH SETTING CONNECTION BOARD WIRING

Above items are described according to the parameters in later sections.

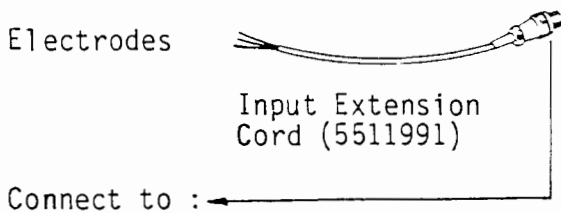
POWER ON

After making sure that the ground lead and power cord are properly connected, turn on the power of the rack, console, monitor and recorder. Check to see that the power indication lamps light.

ELECTRODES AND CORDS CONNECTION

A. When using Input Extension Cord Code No.5511991 (accessory of Polygraph Amplifier Console)

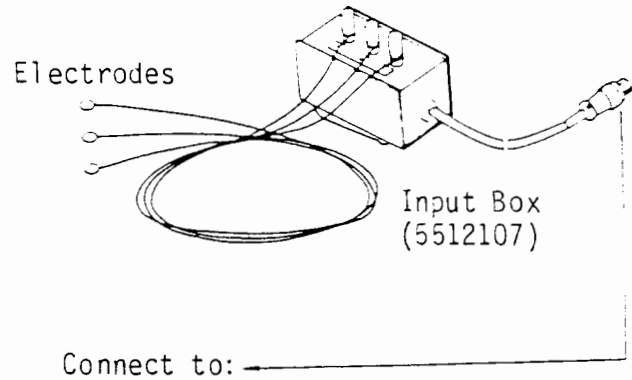
Set the internal switch to IND.SIG.



- * Input Panel PI-680G
- * Polygraph Amplifier Console, rear
- * Extension Cord Code No.5512125
- * Extension Cord Code No.5512161

B. When using Input Box Code No.5512107 (Option)

Set the internal switch to IND.SIG.

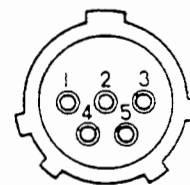


- * Input Panel PI-680G
- * Polygraph Amplifier Console, rear
- * Extension Cord Code No.5512125
- * Extension Cord Code No.5512161

Pin assignment of a receptacle connector is as follows.

For ENG signal For stimulator

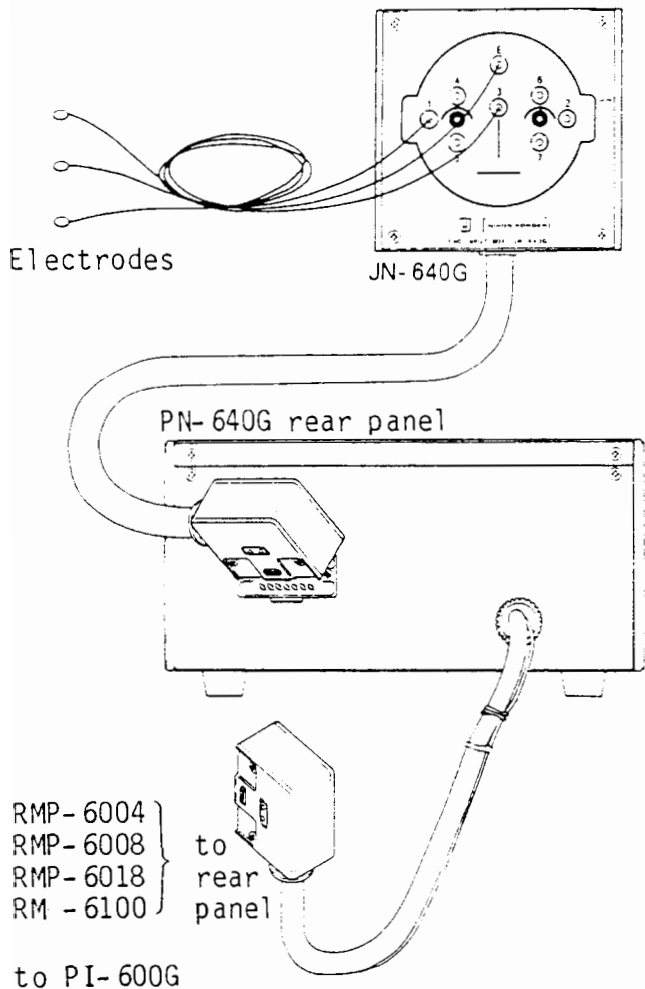
- | | |
|--------------|--------------|
| 1 : Shield | 1 : Not used |
| 2 : + input | 2 : + input |
| 3 : Not used | 3 : Not used |
| 4 : Ground | 4 : Ground |
| 5 : - input | 5 : Not used |



Connector type : JRC13P-5P
Code No. 5310067

C. When using the ENG Input Panel (PN-640G)

Set the internal switch to PAN.SIG.

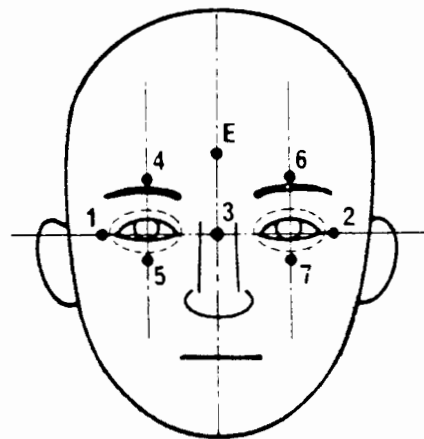


The ENG Input Box (JN-640G) can not be connected to the Polygraph Amplifier Console (RMP-6004/6008/6018) or the Minipolygraph (RM-6100) directly. Be sure to connect the ENG Input Box to the ENG Input Panel (PN-640G).

ELECTRODE PLACEMENT

Use the Ag/AgCl electrodes for measurement. If other types of electrodes are used, a large polarization voltage will be superimposed on the ENG signal. Brand-new electrodes should be immersed in physiological saline solution for a day to reduce polarization voltage in measurement. Polarization voltage fluctuates the baseline and sometimes creates amplification saturation.

Electrode Positions



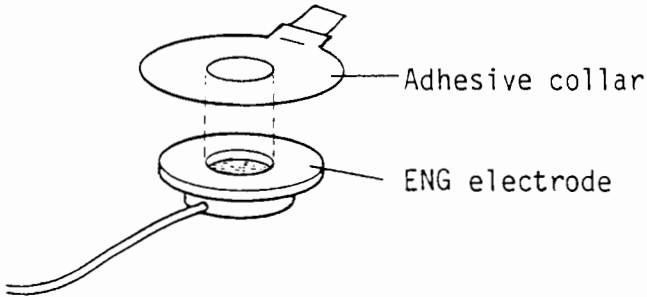
- (1),(2): At the outside corners of the eyes.
- (3) : Nasal point
- (4),(6): On the upper margin of the eyebrow and on a vertical line which crosses the midpoints of right and left lid-fissures.
- (5),(7): Under the lower margin of the orbit and on a vertical line which crosses the midpoints of right and left lid-fissures.
- (E) : On a central vertical line bisecting the forehead.

Electrode Placement

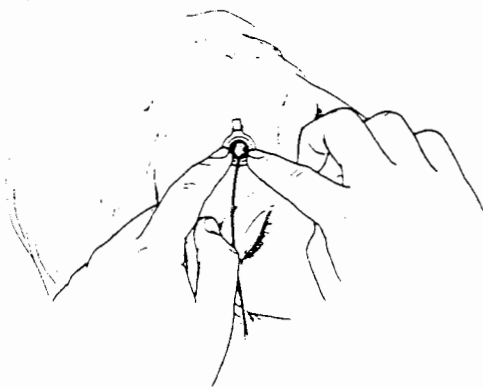
1. In order to decrease the electrode contact resistance, wipe the skin surface where the electrodes are to be placed, with either an alcohol-soaked gauze pad or absorbent cotton. Dry off the skin with dry gauze.



2. Peel off the paper-backing of one side from the adhesive collar and attach the collar to the ENG electrode.



3. Fill the electrode hollow with CardioCream and peel off the upper paper-backing from the adhesive collar.
4. Attach the electrode to the clean skin location.

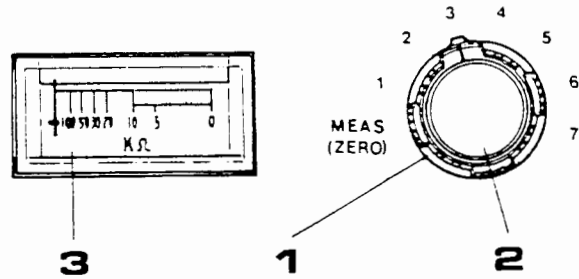


5. Connect the electrode lead tips to the corresponding terminals of the input box.



When measuring DC nystagmograph, apply CardioCream to the place where an electrode is to be mounted 20 to 30 minutes before the measurement. Attach the electrodes firmly to eliminate artifacts.

Electrode Resistance Measurement



Read Electrode Selector Press

1. Select the electrode site to be measured with the electrode selector(11).
2. Press the electrode resistance measuring switch(12).
3. The meter indicates(13) the electrode resistance. The resistance should be $10k\Omega$ or less. If the resistance is more than $50k\Omega$, reattach the electrodes.
4. After measurement, return the electrode selector(11) to the MEAS position.

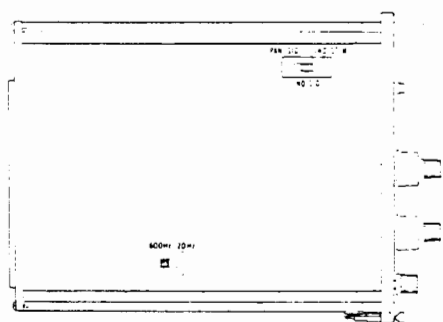
Measurement

(ENG WAVEFORM)

INTERNAL SWITCH SETTING

Pull the unit lock lever and draw out the AN-601G from the Polygraph Amplifier Console. Remove the side shield plate from the amplifier and check to see that the following switches are set properly as follows.

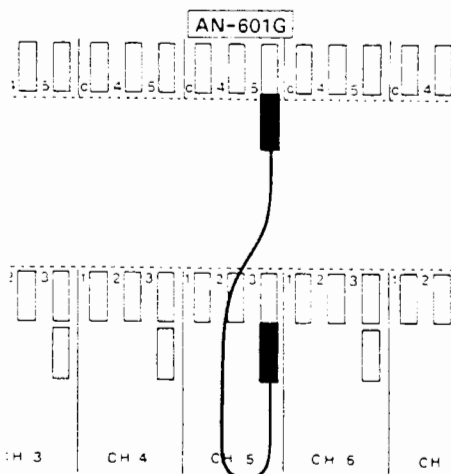
- Input selector (8)
 - Single-channel input IND.SIG
 - Multi-channel input PAN.SIG
- Filter selector (9)
 - Either position will do.



After setting the internal switches, be sure to re-attach the side shield plate to the plug-in unit and restore the unit.

CONNECTION BOARD WIRING

Draw out the connection board from the Polygraph Amplifier Console. Connect sockets 3 and 5 of the corresponding channel with the connection lead. After connection, restore the connection board to the console.



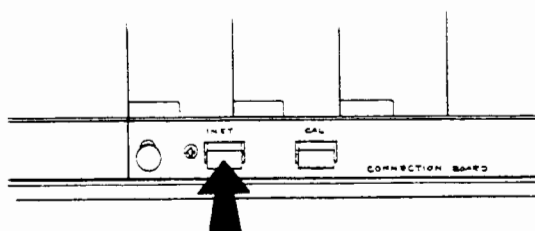
MEASUREMENT

1. Place the electrodes as described in the PREPARATION section on the previous page.

NOTE

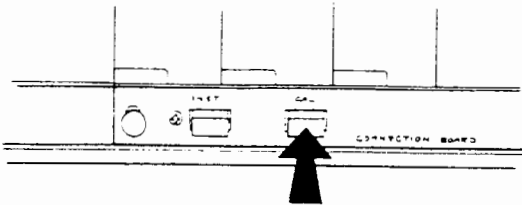
After placing the electrodes, leave them for about 30 minutes to allow the electrode to become stable. Do not measure electrode resistance frequently since the electrode resistance measurement destabilizes the electrodes.

2. Push the MEAS of the MEAS-OFF switch (1). At the same time, press the INST switch on the Polygraph Amplifier Console to activate the automatic balance circuit.

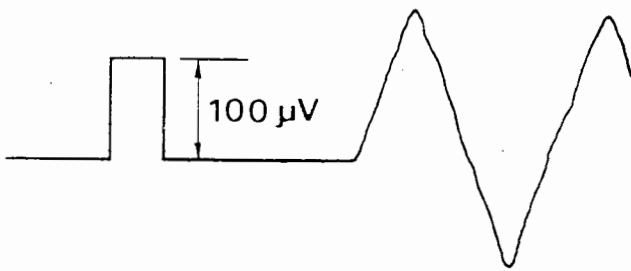


At this time, no output will appear. Then release the INST switch, and the balanced ENG waveform will appear after 1 second.

3. Set the TIME CONST(2), HI CUT(3) and SENSITIVITY(4) properly.
4. Press the CAL switch.



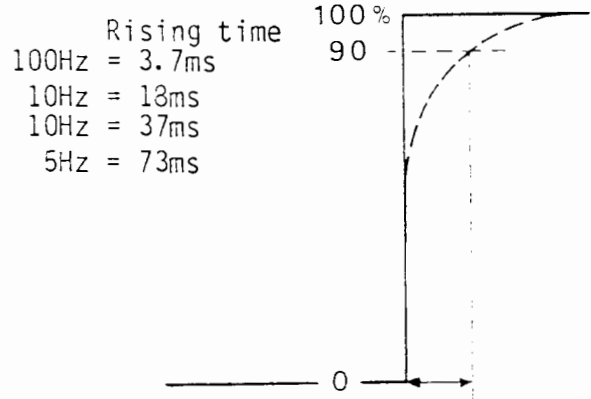
100 μ V amplitude corresponds to 10° of eyeball movement from the center line.



If the TIME CONST(2) is set to DC, press the INST switch when the SENSITIVITY selector is turned to reset the saturated trace.

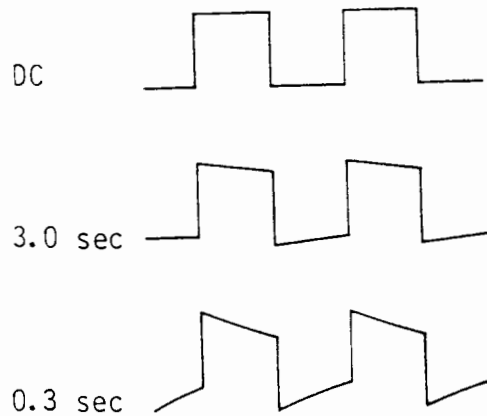
HI CUT Filter

The high cut filter determines rising time of the signal. For example, a step waveform will be distorted to round corner. Relation between the rising time and the cut-off frequency is as follows. (Rising time is defined as the time that the signal rises from 0% to 90% of the final amplitude.)



LO CUT Filter

The time constant (low cut filter) determines the time that the trace returns to the zero line. Ideally the DC position is the best for measurement, however, when the baseline fluctuates, decrease the time constant. A square waveform changes according to the time constant setting as follows.



Measurement

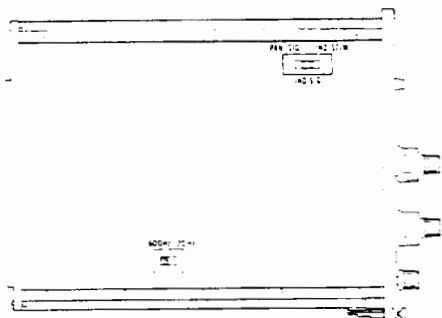
(ENG AND VELOCITY WAVEFORM)

INTERNAL SWITCH SETTING

Pull the unit lock lever and draw the AN-601G out from the Polygraph Amplifier Console. Remove the side shield plate from the amplifier and check to see that the following switches are set properly as follows.

- Input selector (8)
 - Single-channel IND.SIG
 - Multi-channel PAN.SIG.
- Auxiliary output filter selector (9)
 - Connection-1 Setting does not matter.
 - Connection-2 600 or 20 Hz*

* Note When the filter selector is set to 20Hz, filter characteristic is also determined by the HI CUT selector(3) on the front panel.



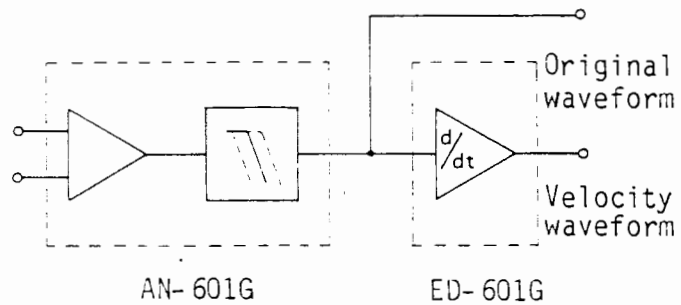
After setting the internal switches, be sure to re-attach the side shield plate to the plug-in unit and restore the unit.

CONNECTION BOARD WIRING

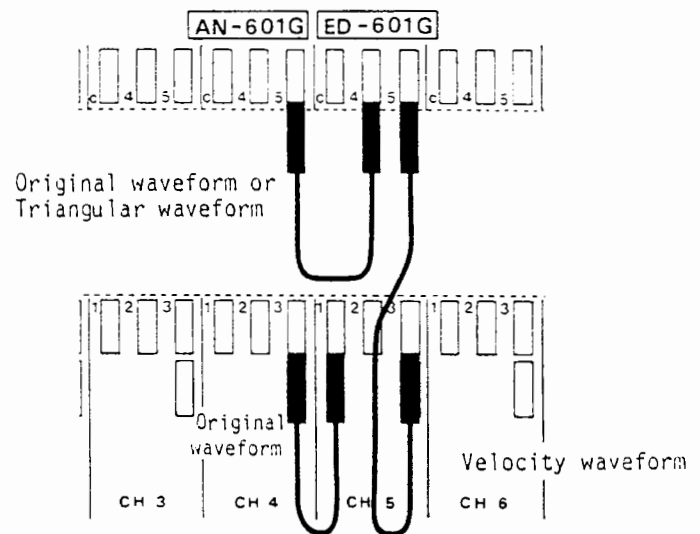
There are two connection methods according to the signal to be differentiated.

Connection-1

The ENG waveform which is the same as the signal outputted to the recorder and monitor is applied to the differentiator.



Draw out the connection board from the Polygraph Amplifier Console. Connect sockets as follows.



Socket No.3 to 5
Connection for velocity signal output.

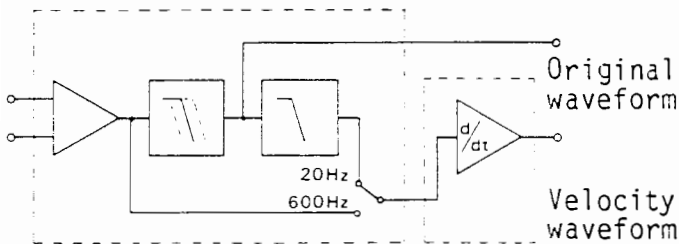
Socket No.3 to 1
Connection for the input of the ENG signal to the differentiator.

Socket No.5 to 4
Connection for simultaneous calibration of the ENG waveform and the differentiated waveform.

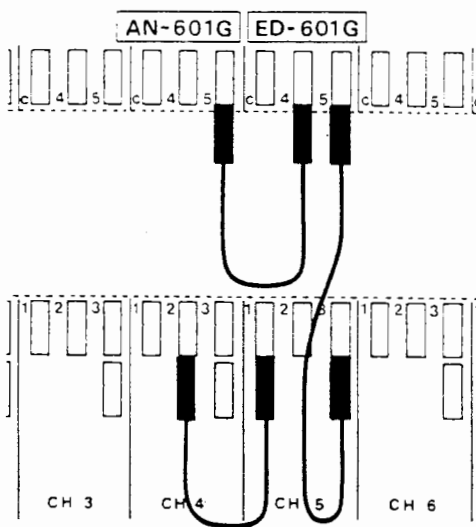
The AN-601G outputs the ENG signal at MEAS or OFF position, while the triangular waveform is output at CAL position.

Connection-2

The ENG signal which is not filtered by the HI CUT selector (pre-filtered at 600Hz) or filtered by the 20Hz high cut filter.



Draw out the connection board from the Polygraph Amplifier Console. Connect terminals as follows.



Socket No.3 to 5

Connection for velocity signal output.

Socket No.2 to 1

Connection for the input of the filtered ENG signal (20Hz or 600Hz) to the differentiator.

Socket No.4 to 5

Connection for simultaneous calibration of the ENG waveform and the differentiated waveform.

The AN-601G outputs the ENG signal at MEAS or OFF position, while the triangular waveform is output at CAL position.

CALIBRATION

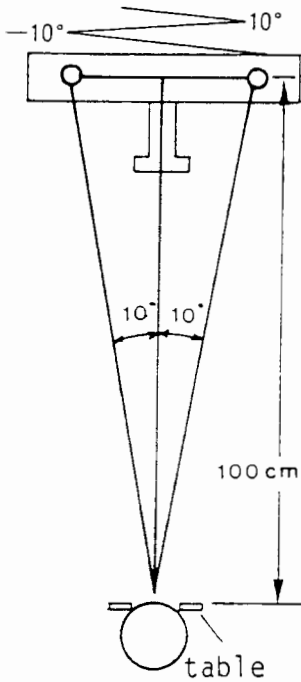
The ENG waveform and the differentiated waveform are calibrated simultaneously in the following procedures.

1. Set the MEAS-OFF switch(1) of the ENG amplifier to MEAS. Set the MEAS-OFF-CAL switch of the differentiator to OFF.
2. Select the Bi-temporal lead or the Vertical lead with the lead selector (10).
3. Set the paper speed to 5 or 10mm/sec. Turn the recording switch from CHECK to RUN.
4. Shift the visual target right, left, up and down and have the patient watch the visual target. The Nystagmo Stimulator SLE-5100 is recommended for use as the visual target.

Set the visual target 100cm straight ahead of the patient.

The visual target should move so that the deflecting angle of the eyeball is 10° from the center.

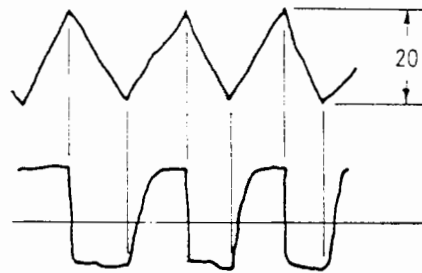
When the patient follows the target in four directions, the recording pen deflects in accordance with the eyeball movement. Check to see that the pen deflects upward when the eyeball moves rightward or upward, and deflects downward when the eyeball moves leftward or downward.



8. Set the TIME CONST of the differentiator to a proper value according to the speed of the eyeball movement, and using the sensitivity control(4) and (5), adjusts the amplitude for easy reading.

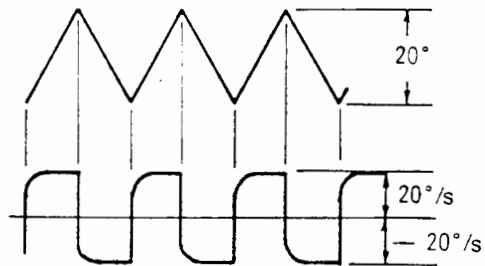
After the above operations, the following waveforms are recorded.

Original waveform (Time const 3.0 s)



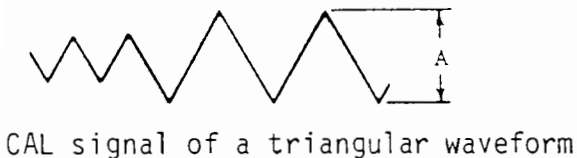
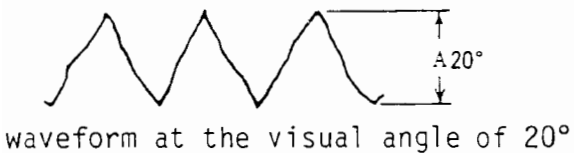
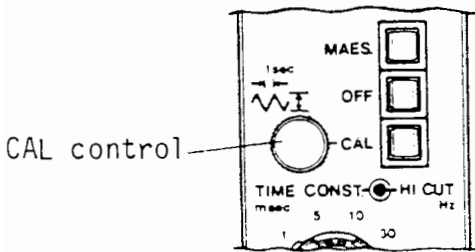
Velocity waveform (Time const 50 ms)

CAL signal of a triangular waveform



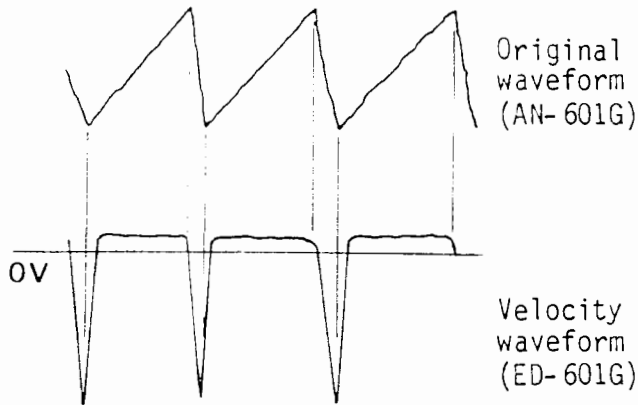
Differentiated CAL signal of triangular waveform

5. Adjust the pen deflection of the ENG waveform to 2cm with the SENSITIVITY control(4) and (5) of the ENG amplifier.
6. Set the MEAS-OFF-CAL switch of the differentiator to CAL.
7. Run the recorder.
Adjust the pen deflection of the CAL waveform to 2cm with the CAL control of the differentiator.



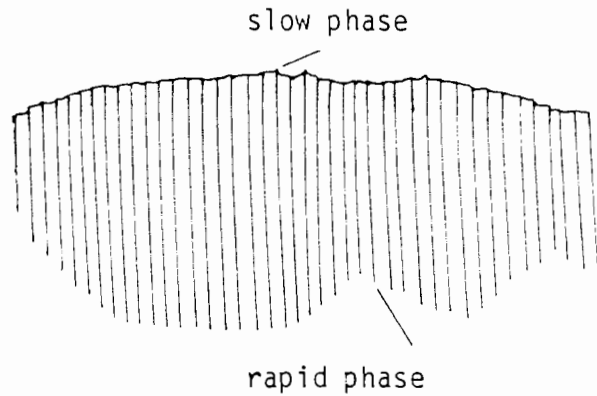
MEASUREMENT

1. Measure the ENG waveform in the same manner as described in the MEASUREMENT section of the ENG waveform.
2. Set the MEAS-OFF-CAL switch of the differentiator to MEAS.



HI CUT Filter

In optokinetic pattern measurement, both slow and rapid phases are recorded. As a high cut filter is used to eliminate differential noise in the slow phase, signal amplitude of the rapid phase is not applied to the velocity waveform measurement but applied to the pattern recognition.



Differentiation Time Constant

Differentiation time constant determines the rising time of the velocity waveform at the point of inflection. For accurate differentiation, time constant should be as small as possible, and as output gain decreases, sensitivity has to be increased. Thus noise will increase. Conversely a large time constant makes the waveform distorted.

Suitable time constant and high cut frequency for the main frequency component of the ENG signal is as follows.

Main frequency of the signal (Hz)	HI CUT (Hz)	TIME CONST (ms)	Application
100	10	1 or 5	Rapid phase
20	2	10	Slow phase
10	1	30	
5	0.5	50	

Measurement

(ENG AND VELOCITY WAVEFORM, AND NYSTAGMUS FREQUENCY)

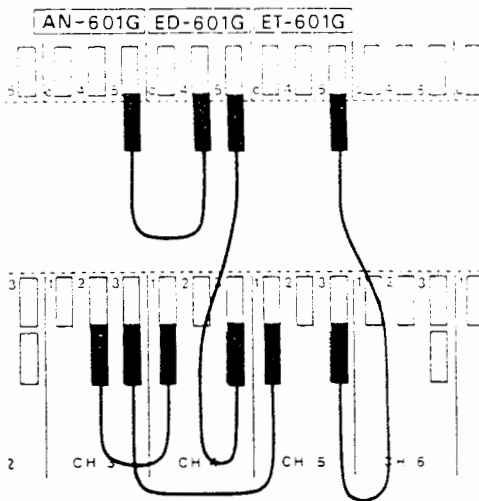
INTERNAL SWITCH SETTING

Same as for the previous section.

Socket No.3 to 5
Connection for the analog output of the ENG count.

CONNECTION BOARD WIRING

Draw out the connection board from the Polygraph Amplifier Console.



Socket No.2 to 1
Connection for the input of the filtered ENG signal (20Hz or 600Hz) to the differentiator.

Socket No.4 to 5
Connection for simultaneous calibration of the ENG waveform and the differentiated waveform.

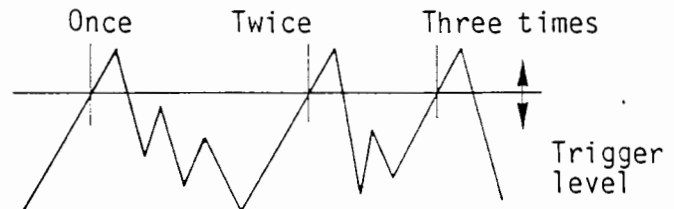
The AN-601G outputs the ENG signal at MEAS or OFF position, while the triangular waveform is output at CAL position.

Socket No.3 to 5
Connection for the output of the velocity signal.

Socket No.3 to 1
Connection for the ENG signal input to the ENG counter.

MEASUREMENT

1. Measure the ENG and velocity waveform in the same manner as described in the previous section.
2. The ENG counter counts the number of the ENG waveforms which exceeds the trigger level set by the LEVEL knob of the ET-601G. The level should be adjusted in SLICE mode.



3. Set the SLICE-COUNT switch to COUNT and the count value will be displayed. Refer to the operator's manual of the ENG counter for details.

Specifications

Input Resistance	5M Ω -E-5M Ω , differential input (For ENG signal) 2M Ω -E, single-ended input (For ENG stimulation)
Internal Noise Level	<3 μ Vp-p (Input OFF, HICUT = 20Hz)
Maximum Sensitivity	>1V/20 μ V
Sensitivity	
Step Control	6dB x 8 steps, accuracy < \pm 3%
Fine Control	10 \pm 2dB, continuously variable
High Cut	5-10-20-100(OFF)Hz (-3dB), accuracy < \pm 15% 5, 100Hz : -6dB/oct 10, 20Hz : -12dB/oct
Time Constant	0.3-1.5-3sec-DC, accuracy < \pm 15%
Linearity	< \pm 1% at full scale
Maximum Output Voltage	> \pm 5V
Input Current	<1 x 10 ⁻⁸ A
Polarization Voltage Tolerance	Sensitivity change < \pm 2% for polarization voltage of \pm 50mV
Calibration Voltage	100 μ V, accuracy < \pm 3% Calibration signal is superimposed on the ENG waveform.
CMRR	>60dB (DC to 65Hz)
AC Interference Rejection Ratio	>23dB
Output Resistance	<50 Ω
Stability	
Temperature Drift	<100 μ V/ $^{\circ}$ C
Time Drift	<100 μ V/h (After 10 minutes' warm-up)
Dimensions and Net Weight	AN- 601G : 50(W) x 200(H) x 280(D)mm, approx. 1kg PN- 640G : 210(W) x 100(H) x 250(D)mm, approx. 1.7kg JN- 640G : 160(W) x 210(H) x 90(D)mm, approx. 1.7kg

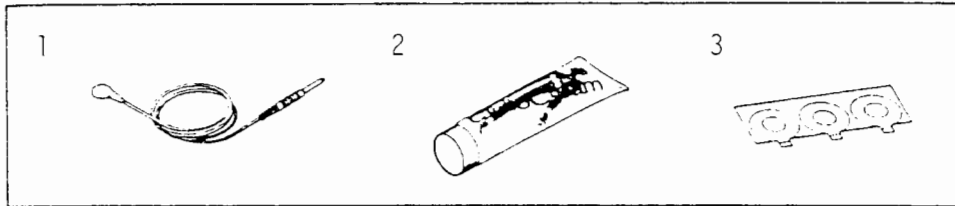
Standard Accessories

AN-601G

No accessories

JN-640G
PN-640G

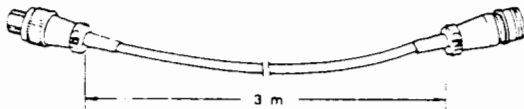
Description	Q'ty	Code No.
1. ENG electrode (5pcs/set)	1	5031724
2. CardioCream	1	5090027
3. Adhesive collar (5pcs/sheet x 20)	1	5090295



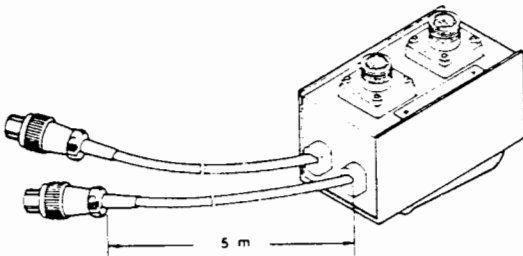
Optional Accessories

Related Instruments

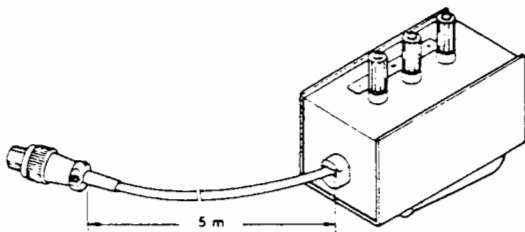
Input Extension Cord Code No.5512125



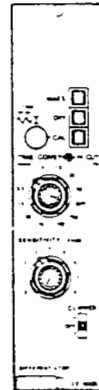
Input Box Code No.5512161



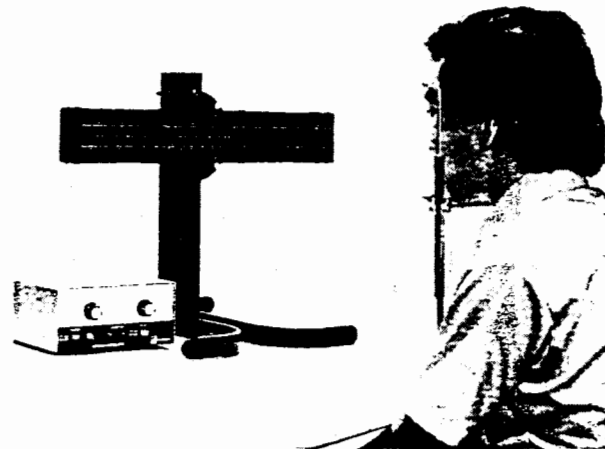
Input Box Code No.5512107



DIFFERENTIATOR ED-601G



NYSTAGMO STIMULATOR SLE-5100



Panel Illustration

