HIOKI

INSTRUCTION MANUAL

EPR-10B

ELECTRONIC POLYRECORDER

HIOKI E. E. CORPORATION

CONTENTS

Suggestions for Handling

1. Keep from oiling the travelling part such as pen guide rod pen carriage, etc., even when travelling speed of the pen declines, or binding of the pen is seen.

   Oiling the parts deteriorates the movement on the contrary. Wipe pen guide rod with a clean dry cloth, when pen speed declines.

2. The variable resistor which is equipped in SPAN adjusting hole should never be rotated, except for calibration under standard voltage, otherwise the sensitivity will be altered.

3. By suspension of chart driving and giving an instruction with keeping the pen in down state, the recording paper may be broken resulting into staining of the chart travelling section. Therefore, exercise attention to keep the pen in up state without fail.

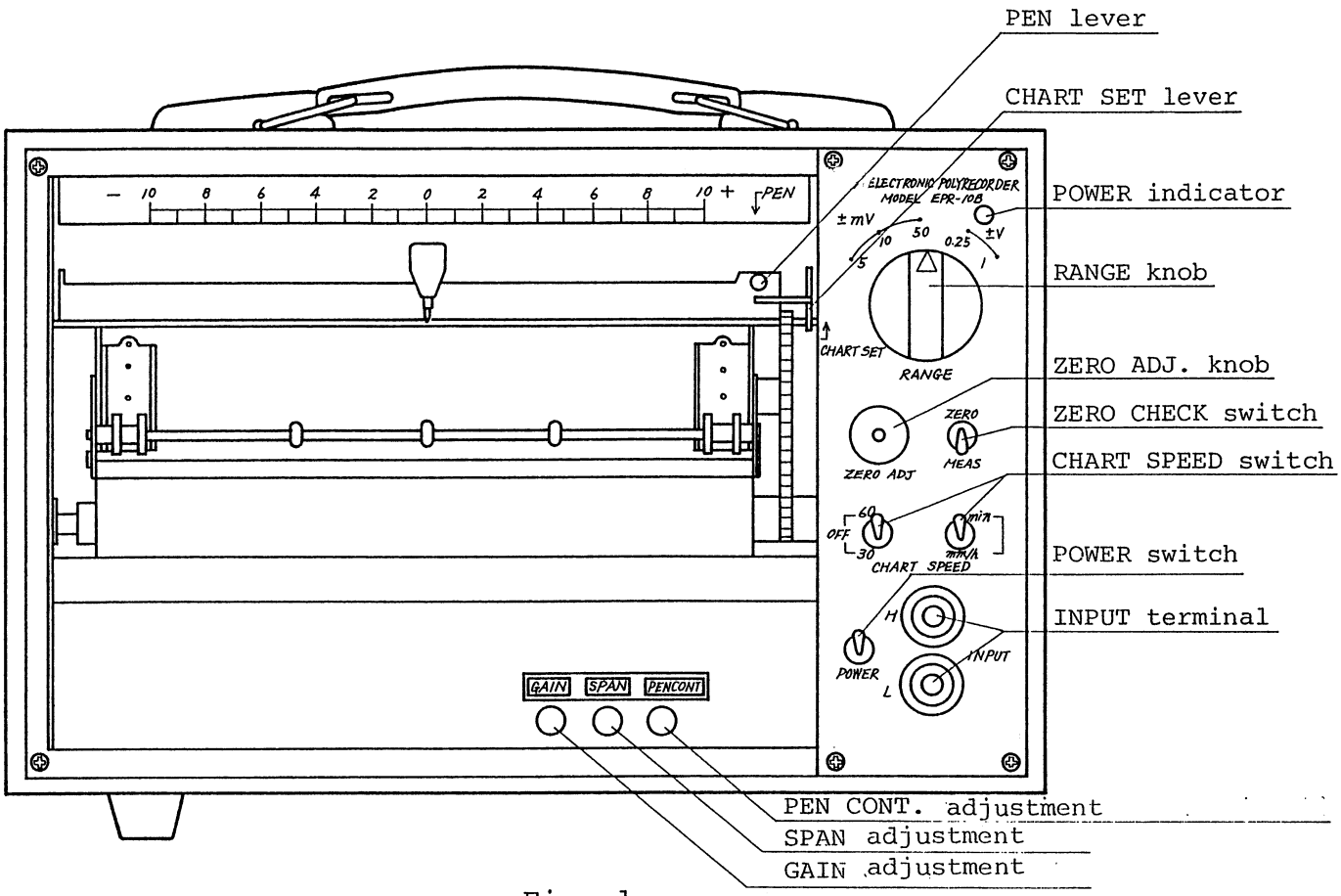

PEN lever
CHART SET lever
POWER indicator
RANGE knob
ZERO ADJ. knob
ZERO CHECK switch
CHART SPEED switch
POWER switch
INPUT terminal
PEN CONT. adjustment
SPAN adjustment
GAIN adjustment
ELECTRONIC POLYRECORDER
MODEL EPR-10B
PEN
CHART SET
RANGE
ZERO ADJ
ZERO
MEAS
CHART SPEED
OFF
POWER
INPUT
H
L
GAIN
SPAN
PENCONT

Fig. 1

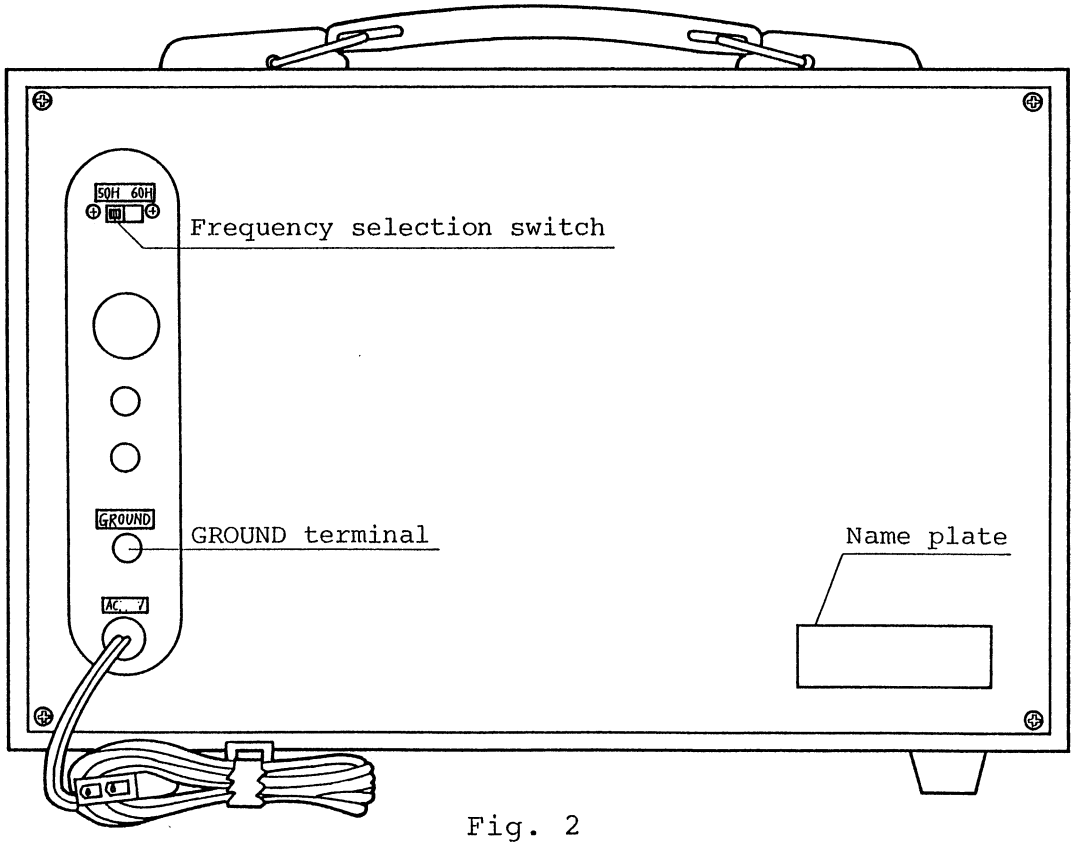

50H 60H
Frequency selection switch
GROUND
GROUND terminal
AC. 7
Name plate

Fig. 2

1. How to Handle

1.1 Name and Function of Each Component

Panel board of this recorder comprises the following components on its surface (Refer to Fig. 1).

POWER switch:	Overall power turning on/off switch for this recorder
INPUT terminal:	Measuring lead shall be connected to this terminal. Red(H) terminal is connected to the high impedance side to the ground, and black(L) one is connected to the low side.
ZERO check switch:	During measurement or whenever required, use this switch for confirming zero point.
ZERO ADJ. knob:	ZERO point adjustment or displacement of pen can be made with this knob. The pen can be displaced all over the effective recording area.
CHART SPEED selection switch:	Performance and speed of record paper feeding can be altered with this switch.
RANGE knob:	Full scale range is selected by this knob.
CHART SET lever:	By moving this lever upward, the recording paper receiving section is pushed forward to be ready to accept the paper, or for replacing the papers.

PEN lever:	Recording pen is moved upward or downward with this lever.
Gain adjustment:	The gain of balancing amplifier can be adjusted. Clockwise turning increases the gain.
SPAN adjustment:	The indication value can be calibrated. Clockwise rotation increases the span.
PEN CONT. adjustment (The electronic pen is an optional item.)	Thickness of locus line of the pen can be adjusted. Clockwise rotation increases the thickness.
FUSE:	A 0.3A fuse is used.
GROUND terminal:	The terminal for grounding the recorder
50 Hz - 60 Hz Frequency selection switch:	The frequency of power supply to this recorder shall be selected with this switch.

1.2 Preparation for Measurement

a. Loading of recording paper

Recording paper shall be loaded in the following order:

(1) Operation of CHART SET lever

When the CHART SET lever on the side of the front panel is moved upward, the chart receiving section rotatingly opens itself to your side.

(2) Loading of recording paper

There are three types of recording paper available for this recorder, i.e. SE-10Z-2 Z fold recording paper for writing with ink; rolled recording paper for writing with ink; SE-10-A rolled recording paper for electronic pen.

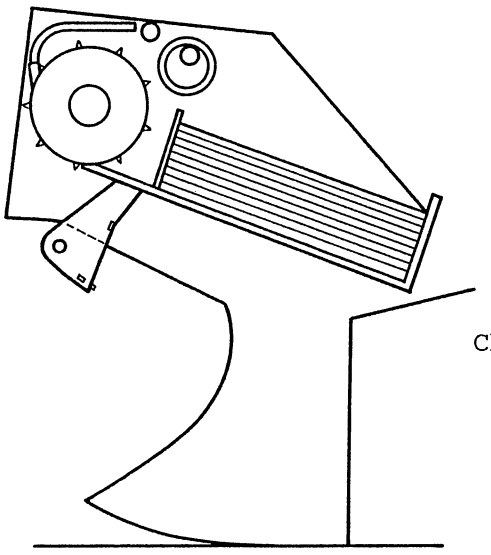
(a) Loading of Z folded recording paper (SE-10Z-2)

Upon taking out one set of the recording paper from the package, arrange the set so that each fold is surely separable from another fold. Place the set of the paper into the accepting section with the oblong holed side on the right side. Pull out tip of the paper for about 30 cm, then move upward the accepting section by rotating it, and replace the section in the original position. Following the above, set the perforated part of the paper on the projection of sprocket, then turn slowly upward the chart holding roller to come into close contact with the recording paper.

(b) Loading of rolled recording paper (SE-10, SE-10-A)

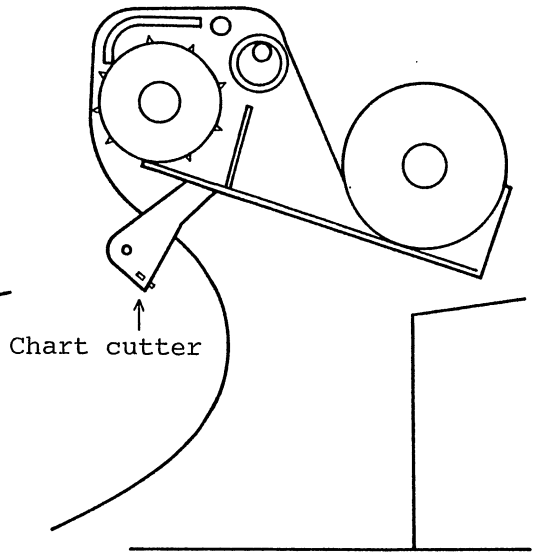
Both the recording paper for writing with ink, SE-10, and that for writing with electronic pen, SE-10-A shall be handled in an identical manner so that each is placed in the accepting section with its oblong hole on the right, then, pull out about 30 cm of its tip and handle in the same manner as in the case of above-mentioned Z folded paper to complete loading of the recording paper.

In order to cut recording paper during work, make use of the chart cutter equipped under the chart retainer.



Folded recording paper

Fig. 3



Rolled recording paper

Fig. 4

b. Equipping with a recording pen

Two types of recording pen, a pen for ink and electronic pen (optional item), respectively, are available for this recorder and both are of cartridge type. The pen for ink shall be used with the recording paper for writing with ink, while the electronic pen shall be for the paper for electronic pen.

(a) Infusion of ink (only for the pen for ink)

Remove the cap of the provided ink bottle, let the infuser absorb 0.6 cc of the ink as the amount for one time of replenishment. Insert the infusing needle

deep into the small opening "H" of the ink-pen. Ink may leak out when more than 0.6 cc of ink has been infused. Please be careful of this.

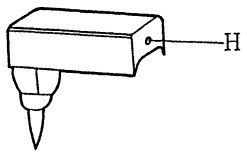


Fig. 5

(b) Equipping with recording pen

The following equipping procedures shall apply alike to ink-pen and electronic pen:

When looked at under the graduated plate, the pen accepting metal piece will be seen. Now, remove the cap of the recording pen, and insert the pen into the metal piece. Either infuse ink or replace with a new pen when the infused ink has been exhausted.

c. Connection to power source

This recorder shall be driven by an AC power source. Please confirm that the power frequency both of the available AC power source and that set of the recorder are identical. In the case they are not the same, use the frequency selection switch on the rear surface of the recorder to attain the compatibility. A remarkable amount of error in chart speed results if used without equality of power frequency.

1.3 Measurement

a. Connection with input lead

Connect with a proper lead wire the INPUT terminal on the panel board and the circuit to be measured. At this time the pen swings to the right when positive voltage is applied to H terminal.

b. Setting of range knob

For measurement of unestimated signal voltage, be always sure to gradually enhance the full scale sensitivity only from the maximum voltage range.

c. Setting of chart speed

Chart speed can be differentiated into four steps of 60 mm/min, 30 mm/min, 60 mm/h, and 30 mm/h. Feeding of chart stops at OFF position. This setting is made according to the input signals, therefore, set the left switch at OFF position and set down whether mm/min or mm/h.

d. Starting to record

Following the above operations, arrange the following setting.

POWER switch: ON

ZERO check switch: Lower side (MEAS.)

CHART SPEED switch: 30 or 60, and

PEN lever is set down, then, the recording is started.

When checking of zero point during measurement is wanted, move the ZERO check switch upward, then the input to this recorder is disconnected from signal source and short-circuit to enable checking of zero point.

The zero point can be moved to a requested proper position by means of ZERO ADJ. knob.

1.4 Arrangements for Suspending Measuring Work

When measurements have been completed, move the PEN lever upward, and move POWER switch down to disconnect the power supply. When an ink-pen has been used, please cover the pen nib with the provided cap so that pen nib is free from being dried.

2. Maintenance and Adjustment

2.1 Replacement of Recording Paper

Z fold recording paper for ink-pen (SE-10Z-2) and roll recording paper for electronic pen (SE-10-A) are both in a 15 m length. They need be replaced with a new one after use for the following period of time:

Chart speed	Used time (Hour)	Chart speed	Used time (Hour)
60 mm/min	About four hours	60 mm/min	About ten days
30 "	About eight hours	30 "	About twenty days

With the approach to the end, the indication appears on the paper, therefore, make ready for replacement, and replace upon reaching the end.

2.2 Removing the Casing

For checking of inner side or parts replacement, it is necessary that the casing be removed. Remove the two screws at each lower part of both sides of the casing, then the casing can be removed.

2.3 Replacement of Fuse

Fuse is fixed at harness AC-3 as mentioned in Fig. 6 at lower right side when the casing is removed. Removal of the fuse from the harness AC-3 can be accomplished when the harness is opened as shown in Fig. 7 below:

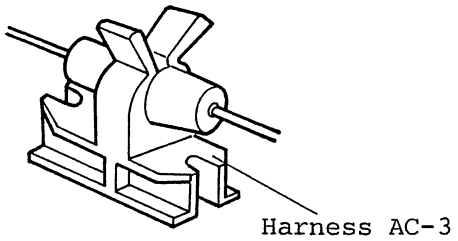


Fig. 6

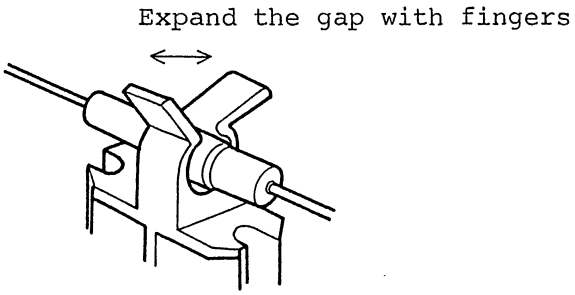


Fig. 7

2.4 Replacement of Driving Thread

When the driving thread is disengaged from the pulley, remove the casing, set the thread on motor shaft pulley and the pulley on the other end. Replace with a new one when the thread is cut. Replacement of the driving thread, as a rule, is carried out by the manufacturer themselves or its agent. Please, therefore, instruct us for the replacement.

2.5 Maintenance of the Counter Electrode for Electronic Pen (an Optional Item)

The COUNTER electrodes for the electronic pen for this recorder are at the same time chart-pressing rollers as shown in Fig. 8. Adherence of foreign matters such as dust, ink, etc., on its rolling surface can result into unclear (too fine) locus of the electronic pen or no locus at all. In this case, the roller surface should be cleared by being wiped with clean dry cloth either as it is or damped with water (do not use oil or solvent under any circumstances.)

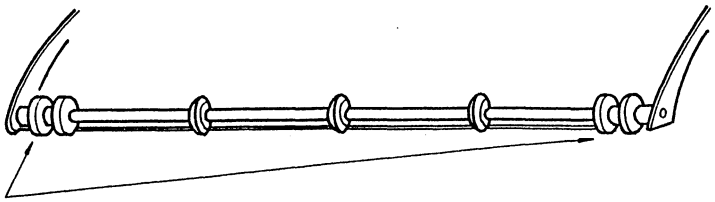


Fig. 8

2.6 Replacement of Parts

Components of this recorder is formed into a block or P.C. board by functions. Therefore, replacement of defect part is, as a rule, carried out by replacement of the entire block or P.C. board.

2.7 Adjustment

Some adjustment points of this recorder can be operated from external side; however, no particular adjustment thereof is necessary as it was adjusted into an optimum condition prior to shipment. Nevertheless, it becomes necessary for users to make such adjustments as are necessary for higher gain, thicker locus by electronic pen, improvements by extension or contraction of the chart after use for a long period of time. Therefore, the ways to adjust are outlined as follows:

a. Adjustment of gain

Both the reduced gain and excessive gain of balancing amplifier render increased dead band and unstable oscillation, respectively.

In either of the above cases, adjust the variable resistor for adjusting the gain so that the dead band becomes about one third or a quarter of a graduation.

b. Adjustment of sensitivity

Extension or contraction of recording paper causes the recorded result fail to satisfy the guaranteed accuracy. When such conditions arise, set RANGE knob at 50 mV, move to upper side (zero) the ZERO check switch, set the ZERO point in the center by means of ZERO ADJ. knob, then adjust the variable resistor for adjusting the SPAN so that the pen is caused to correctly swing for 50 graduations (one half of the entire effective recording width) when ±50 mV is applied to INPUT. With all the above, the entire range span sensitivity is calibrated.

c. Adjustment of the thickness of the locus of electronic pen (an optional item)

The thickness of the locus of the electronic pen can be increased to some degree by adjusting the variable resistor for PEN CONT. adjustment, when the pen is used. Thicker locus will be obtained by clockwise rotation of the resistor.

3. General Statement

3.1 Outline

This is a portable general purpose recorder which size is small, weight is light, and price is reasonable. It employs an easily replaceable cartridge type ink-pen, role chart, and Z fold chart.

3.2 Composition

This recorder comprises servo amplifier composing the basic recorder with 100 mV sensitivity, pulse motor driving section for feeding the recording paper, power source section to supply power and input section for dividing and amplifying the input signals.

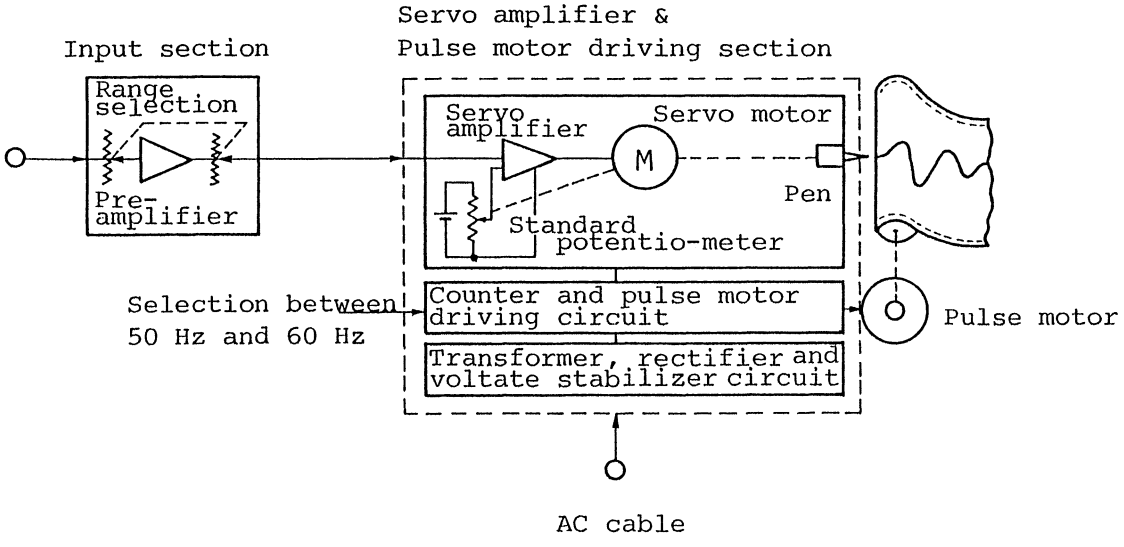


Fig. 9

3.3 Specifications

Type	:	D.C. servo system with pre-amplifier and single point continuous pen
Range	:	Five ranges of ±5 mV, 10 mV, 50 mV, 0.25V and 1V
Input resistance	:	About 1 Mohm
Allowable signal source resistances	:	10 KΩ or less
Accuracy	:	±1% of full span
Temperature range	:	From 0°C to +40°C
Drift	:	5 μV/°C Typ.
Balanced speed	:	About 600 mm/sec.
Zero adjust	:	Adjustable in the entire range in every range
Zero check	:	Possible even during measurement by means of panel board switch
Recording pen	:	Cartridge type ink-pen
Applicable recording paper	:	(Effective recording width x length) Rolled recording paper for ink-pen (No. SE-10) 150 mm x 20 m Z folded recording paper for ink-pen (No. SE-10Z-2) 150 mm x 15 m
Chart speed	:	Four step speed variation of 30 mm/h, 60 mm/h, 30 mm/min, and 60 mm/min Feed speed error (on the basis of power frequency): ±1%
Power source	:	AC V ± 10%, 50 Hz and 60 Hz (Selection by a switch)
Dimensions of the main body	:	Approx. 280 mm (width) x 180 mm (Height) x 170 mm (Depth)
Weight of the main body	:	Approx. 3.1 kg

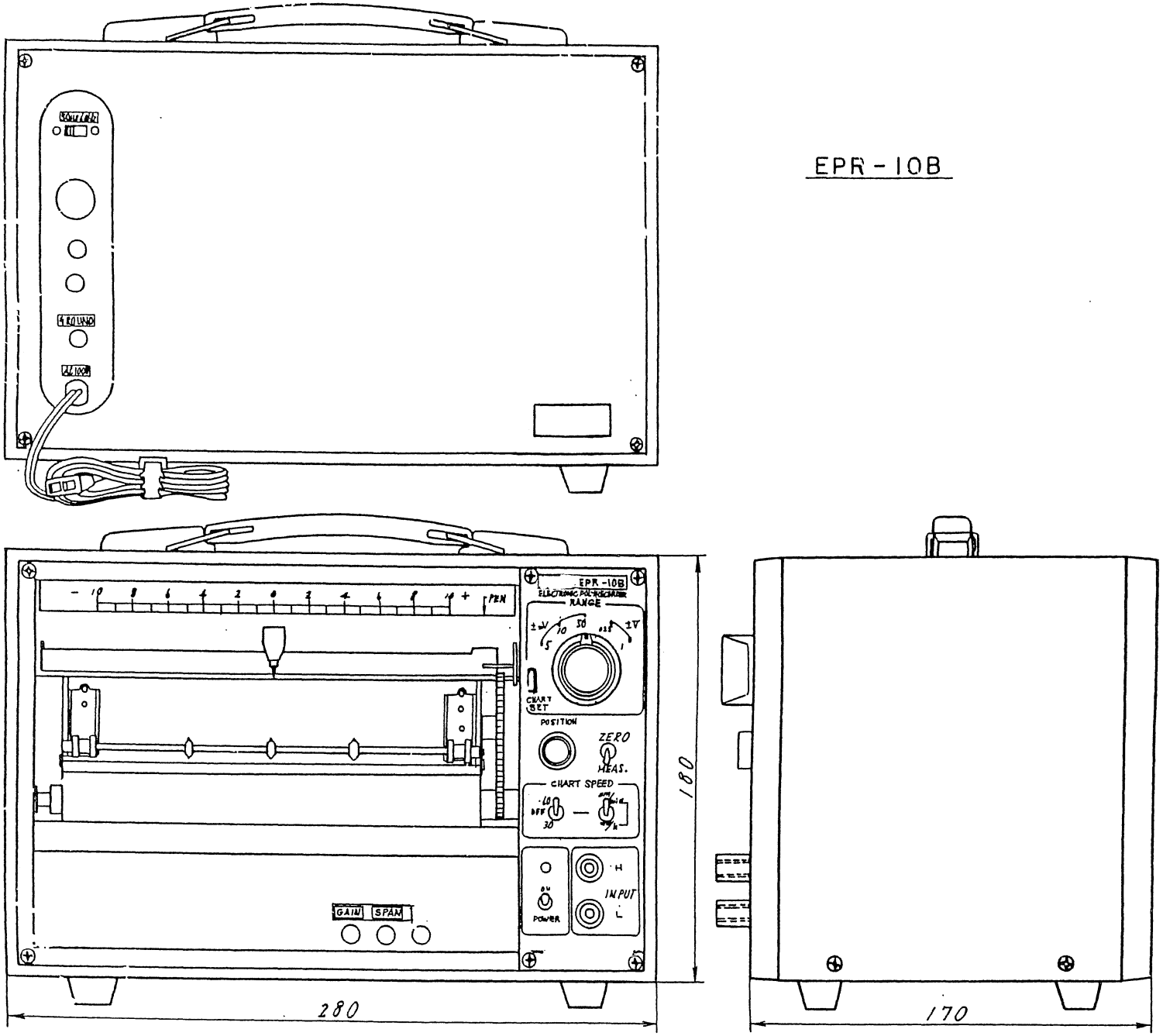
3.4 Optional Items

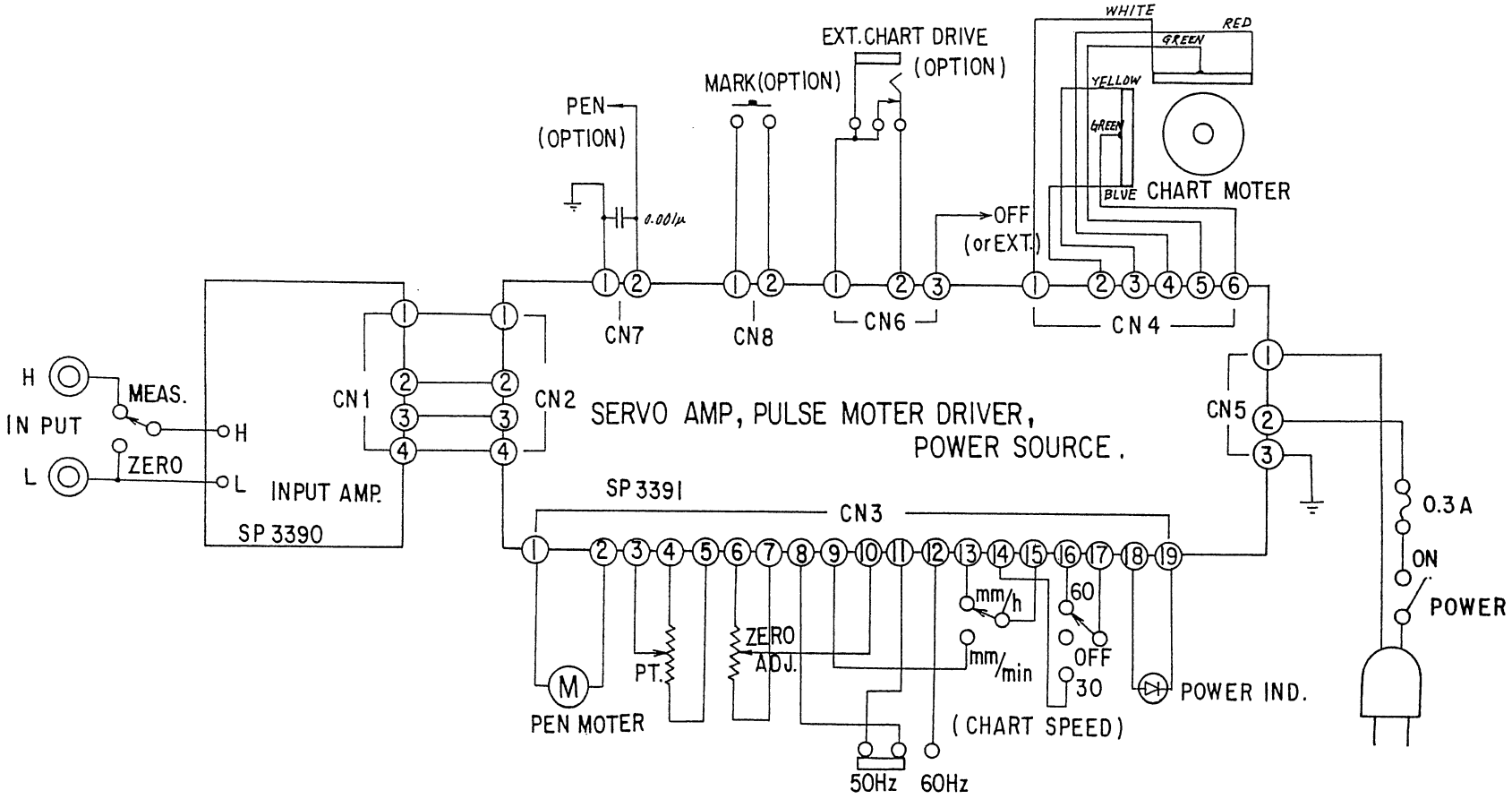
Electronic pen	:	Cartridge type electronic pen for use with roll recording paper for electronic pen (SE-10-A)
Marker	:	Dip marker method
External driving of chart	:	0.025 mm/1 pulse, Highest response frequency: 200 pulse/sec.
Input divider	:	1/100 ATT
Upper and lower limiter	:	Built-in lead switch

3.5 Standard Accessories

Cartridge ink-pen	1 piece	Z fold recording paper for ink-pen (SE-10Z-2)	1 set
Red ink 10 cc	1 bottle		
Ink infuser	1 piece	Operation manual	1 copy

EPR-10B


EPR-10B
ELECTRONIC POTENTIOMETRIC RECORDER
RANGE
CHART SET
POSITION
ZERO
MEAS.
CHART SPEED
POWER
INPUT
H
L
GAIN
SPAN
PEN
280
180
170



SCHEMATIC DIAGRAM OF MODEL EPR - 10B

HIOKI EPR-10B ELECTRONIC POLYRECORDER
Instruction Manual

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