Arboga Elektronikhistoriska Forening
www.aef.se 6184

200.

Tillhör
AM55

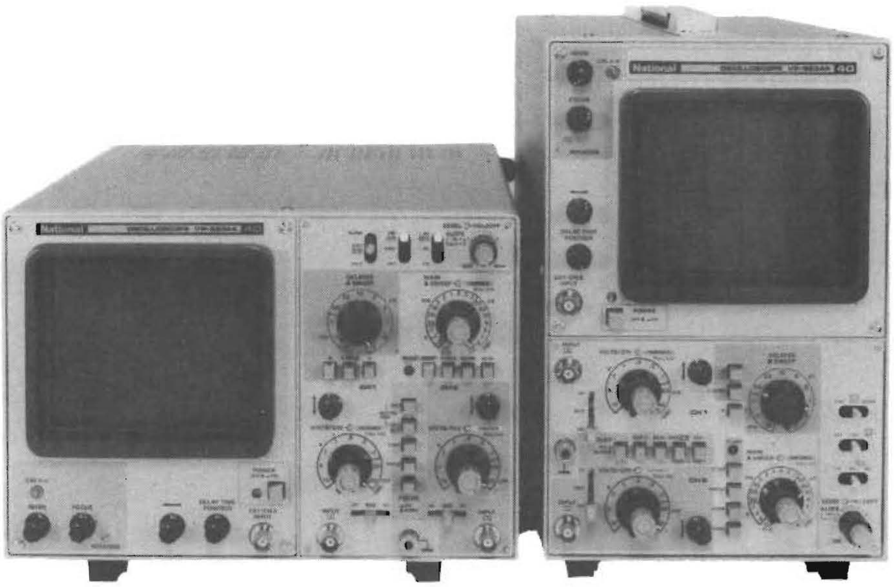
INSTRUCTION MANUAL

OSCILLOSCOPE

VP-5234A/S

National

Before operating this set, please read these instructions completely



CORRECTION

Line Voltage

The line voltage described in this instruction manual is 115 V AC. When the instrument is modified at the factory before shipment for some other line voltage, a tag marking this voltage is attached to the power cord. Please correct the circuit diagram and description according to the line voltage indication on the tag.

CONTENTS

SECTION 1 GENERAL

The VP-5234A/S oscilloscope is intended to cover a wide range of usages for such equipment as audio, video, digital, and many more similar electronic devices.

It has a 6-inch square CRT with an internal graticule, and incorporates a variety of useful functions.

Both the VP-5234A horizontal and VP-5234S vertical type oscilloscopes are available for selection by users.

It is a compact, lightweight unit designed for use in laboratories, maintenance, as well as for non-professional use at home. The oscilloscope provides low cost performance ratio and high operational reliability.

Distinctive features of the VP-5234A/S are:

(1) A 6-inch square CRT with the adoption of an internal graticule.

(2) Both horizontal (VP-5234A) and vertical (VP-5234S) Models are available.

(3) Triple wave signals can be observed.

(4) A built-in delayed sweep function

(5) Digital signals can be readily observed by holdoff control.

(6) Easy sweep triggering is provided by AUTO FIX.

(7) Hi-mic has been adopted to enhance reliability (objective MTBF value: 15,000H)

(8) A built-in TV synchronous separator circuit

(9) Observation of two non-correlated signals by a built-in alternate trigger

(10) Output terminal for recording vertical signals (option)

SECTION 2 SPECIFICATIONS

2.1 VERTICAL DEFLECTION SYSTEM

2.1.1 Deflection factor

20 mV/DIV ~ 10 V/DIV (with no magnifier)

2 mV/DIV ~ 1 V/DIV (with magnifier set at ×10)

9 steps in 1 - 2 - 5 sequence

2.1.2 Deflection factor accuracy

Within 3% of indicated deflection

with VARIABLE set at CAL position

2.1.3 Uncalibrated (variable) range

Provides continuously variable deflection factors between the calibrated steps. Extends maximum uncalibrated deflection factor to at least 25 V/DIV.

2.1.4 Frequency response

Bandwidth	Risetime
DC ~ 30 MHz (at ×1)	11.7 nsec
DC ~ 25 MHz (at ×10)	14 nsec

2.1.5 Input impedance

Direct 1 MΩ paralleled by approx. 30 pF

With probe 10 MΩ paralleled by approx. 20 pF

2.1.6 Maximum input voltage

500 V_{p-p} (DC + AC_{p-p})

2.1.7 Input coupling

AC or DC selected by front-panel Input Coupling switch (AC-GND-DC).

2.1.8 Vertical display modes:

CH1, CH2, DUAL, ADD, TRIPLE

(DUAL; CHOP ... 0.5 S/DIV ~ 0.1 mS/DIV
ALT ... 50 μS/DIV ~ 0.1 mS/DIV)

2.1.9 Chopping rate

500 kHz ±30 %

2.1.10 Polarity inversion

Displayed signal on CH2 can be inverted.

2.1.11 CH3 deflection factor

INT ; 1/5 of the displayed signal ±30%

EXT; 1 V/DIV ±30%

Frequency response

DC ~ 10 MHz

Position

(1 ± 0.2) DIV from the bottom graticule line

2.2 TRIGGERING

2.2.1 Trigger mode

NORM, AUTO FIX

2.2.2 Trigger source

INT (NORM, CH1, CH2), LINE, EXT

2.2.3 Trigger coupling

AC-DC-TV

(TV; 0.5 S/DIV ~ 0.1 mS/DIV ... TV-V
50 μS/DIV ~ 0.2 μS/DIV ... TV-H)

2.2.4 Slope

Sweep can be triggered from positive-going or negative-going portion of trigger signal.

2.2.5 Maximum external input voltage

300 V_{p-p} (DC + AC_{p-p})

2.2.6 External input impedance

1 MΩ ± 20% paralleled by 30 pF ± 20%

2.2.7 Trigger level control range

±1 V ~ ±2 V

2.2.8 Trigger sensitivity

NORM TRIGGER

		INT	EXT
AC	30 Hz ~ 5 MHz	0.4 DIV	0.2 V
	~40 MHz	2.0 DIV	1 V
DC	DC ~ 5 MHz	0.4 DIV	0.2 V
	~40 MHz	2.0 DIV	1 V
TV	Video signal (Composite sync)	1 DIV_{p-p}	0.5 V_{p-p}

AUTO FIX TRIGGER

		INT	EXT
AC	400 Hz ~ 5 MHz	0.5 DIV	0.2 V
	400 Hz ~30 MHz	2 DIV	1 V
DC	400 MHz ~ 5 MHz	0.5 DIV	0.2 V
	400 Hz ~30 MHz	2 DIV	1 V
TV	Video signal (Composit sync)	1 DIV_{p-p}	0.5 V_{p-p}

2.2.9 Auto triggering

Stable display is presented with signal amplitudes (given in internal and external sensitivities) above 100 Hz. When no sweep is triggered, nor is any input signal, the sweep goes free running.

2.3 SWEEP

2.3.1 Trigger mode

AUTO, NORM, SINGLE

2.3.2 HORIZ DISPLAY

A, A INTEN, B

40-88-5097

2.3.3 A SWEEP

0.5 S/DIV ~ 0.2 μS/DIV in 20 calibrated steps in 1-2-5 sequence

2.3.4 B SWEEP

0.5 mS/DIV ~ 0.2 μS/DIV in 11 calibrated steps in 1-2-5 sequence

2.3.5 Uncalibrated (variable) sweep rates

Provides continuously variable sweep rate between the calibrated steps. Extends slowest uncalibrated sweep rate to at least 1.25 S/DIV for A sweep, or 1.25 mS/DIV for B sweep.

2.3.6 Sweep rate accuracy

0.2 S/DIV ~ 0.2 μS/DIV	±3%
0.5 S/DIV	±4%

2.3.7 Sweep magnification

Display is magnified 10 times at center screen.

2.3.8 Magnification accuracy

Unmagnified sweep rate accuracy plus 2%.

2.3.9 Delayed sweep starting point

0.5 to 10 divisions for A sweep

2.3.10 Delay time jitter

One part or less in 10000 of the maximum available delay time

2.3.11 Single sweep

"A" sweep generator produces only one time when triggered.

2.3.12 Holdoff

Holdoff time is continuously variable up to 4 times or longer.

2.4 X-Y OPERATION

2.4.1 External horizontal input (1)

CH1 = X, CH2 = Y

Deflection factor

For both X and Y ... 2 mV/DIV ~ 10 V/DIV ±5%

Frequency bandwidth

DC ~ 1 MHz

Phase difference

3° or less at 1 MHz

2.4.2 External horizontal input (2)

EXT INPUT = X

CH1 and CH2 = Y (Dual signal operation is enabled)

Deflection factor

X ... 0.2 V/DIV ±20%

Frequency bandwidth

DC ~ 1 MHz

Input impedance

1 MΩ ± 20% paralleled by 30 pF ± 20%

2.5 Z AXIS

2.5.1 Polarity

5-volt peak-to-peak signal produces noticeable modulation at normal intensity.

2.5.2 Frequency range

DC ~ 10 MHz

2.5.3 Input resistance

47 kΩ ± 20%

2.5.4 Maximum allowable input voltage

50 V_{p-p} (DC + AC_{p-p})

2.5.5 Input coupling

DC coupling

2.6 CALIBRATION VOLTAGE

2.6.1 Output voltage

0.1 V

2.6.2 Accuracy

±1%

2.6.3 Waveform

Positive square wave

2.6.4 Frequency and risetime

1 kHz ± 10%, 10 μsec or less

2.7 CATHODE-RAY TUBE

2.7.1 Tube type

Square CRT with internal graticule.

2.7.2 Accelerating potential

6 kV/1.5 kV

2.7.3 Graticule area

8 divisions vertical by 10 divisions horizontal
(1 division   9.5 mm)

2.8 POWER SOURCE

2.8.1 Line voltage

100 V	90 V ~ 110 V
115 V	104 V ~ 126 V
215 V	194 V ~ 236 V
230 V	207 V ~ 250 V

2.8.2 Line frequency

50 Hz ~ 400 Hz

2.8.3 Power consumption

39 W

2.9 ENVIRONMENTAL CHARACTERISTICS

2.9.1 Operating temperature

0 ~ 50°C

2.9.2 Storage temperature

-20 ~ 70°C

2.9.3 Operating relative humidity

20 ~ 80%

2.9.4 Vibration and shock requirement

Factory sampling tests assure the following operating and non-operating performance.

(1) Vibration test
15 minutes of vibration along each of three major axes at a total displacement of 0.6 mm peak-to-peak from 600 - 3300 - 600 r.p.m. in one minute cycles.
Held at 3300 r.p.m. for 3 minutes on each axis; total test time, 54 minutes.

(2) Shock test
Two shocks of 30 G, one-half sine, on each surface. Total of 12 shocks.

(3) Transportation package drop
55-cm drop on a corner and three edges, and 65-cm drop on each flat surface. Total of 10 drops.

These tests repeated twice or more may cause partial cause to the instrument.

2.10 STANDARD ACCESSORIES

Probe (VQ-054K3015) 10:1	2
BNC adaptor (YXFC46004190)	1
Grounding adaptor (YXFC76J003)	1
Rush proof fuse (YXAFTSC1A)	1
Instruction manual	1
Allen wrench (5/64 inch)	1
Allen wrench (3/64 inch)	1

2.11 OPTIONS

- Readout circuit
- CH1 Signal out
- Front cover

2.12 MECHANICAL CHARACTERISTICS

2.12.1 Overall dimensions

		Width (mm)	Height (mm)	Depth (mm)
VP-5234A (Horizontal type)	Main body only	264 ± 3	177 ± 3	375 ± 3
	(Measured at maximum points)	294 or less	197 or less	450 or less
VP-5234S (Vertical type)	Main body only	177 ± 3	264 ± 3	375 ± 3
	(Measured at maximum points)	184 or less	294 or less	450 or less

2.12.2 Net weight (without accessories) about 7.8 kg

SECTION 3 OPERATING INSTRUCTIONS

3.1 OPERATIONS

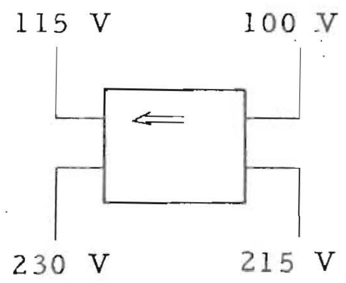
3.1.1 Line voltage

The Model VP-5234A/S can be operated from either a 100 V or 200 V nominal line voltage. Please check before turning on the instrument whether the conversion plug has been set properly.

The fuse current capacity must be determined based on the fuse data indicated on the rear panel.

A line frequency of 50 Hz to 400 Hz can be used.

Line voltage range	
100 V	90 ~ 110 V
115 V	104 ~ 126 V
215 V	194 ~ 236 V
230 V	207 ~ 250 V



1A	90 ~ 126 V
0.5A	194 ~ 250 V

3.1.2 Description of Controls and Connectors

A brief description of the function and operation of the front-, side- and rear-panel controls and connectors follows:

· Front panel

(1)	INTEN	Controls brightness of display.
(2)	FOCUS	Provides adjustment for optimum display difini-tion.
(3)	ROTATION	Corrects inclination of the trace caused by earth magnetism.
(4)	CAL 0.1 V	Used to calibrate the vertical deflection factor and the square waveform of a 10:1 probe. 0.1-volt square wave of a frequency of 1 kHz is obtained. For probe calibration, a display of 5 divisions is obtained by setting the VOLTS/DIV switch to 2 mV/DIV (magnifier set at X10).
(5)	INPUT	Input connector for channel deflection signals. (X) and (Y) are used as the connections for the X- and Y- signals, respectively, in X-Y operation.
(6)	AC-GND-DC	Selects method of coupling input signal to gate of Input Amplifier. AC: DC component of input signal is blocked with a capacitor; only AC component is passed to the Input Amplifier. A notable sag appears for the square waveform with a frequency of 1 kHz or lower. Low frequency limit (-3 dB point) is approximately 3.4 Hz. GND: Input circuit is grounded (does not ground applied signal). DC: All components of the input signal are passed to the Input Amplifier.

7 VOLTS/DIV — Selects vertical deflection factor in 1-2-5 sequence. (VARIABLE knob 8 must be in CAL position for indicated deflection factor.)

8 VARIABLE PULL X10 — Provides continuously variable uncalibrated deflection factor between the calibrated settings of the VOLTS/DIV switch. The indicated deflection factor may be reduced in minimum 1/2.5 ratio. The factor can be multiplied by 10 by pulling this knob.

9 CH1 CH2 DUAL TRIPLE
BOTH IN ADD

Selects vertical mode of operation.

CH1: The signal connected to the INPUT CH1 connector is displayed.

CH2: The signal connected to the INPUT CH2 connector is displayed.

DUAL: 0.5 S/DIV ~ 0.1 mS/DIV ... CHOP
50 μS/DIV ~ 0.2 S/DIV ... ALT

Remove the housing to reveal a slide switch on the frame side of the printed circuit board fitted with the TIME/DIV switch. CHOP-ALT is inverted by sliding the switch forward.

CHOP ... Dual-trace display of signals on both channels. Display is switched between channels at a repetition frequency of 500 kHz regardless of the sweep.

ALT .... Dual-trace display of signals on both channels. Display is switched at end of each sweep.

TRIPLE: Triple-trace display of signals on three channels with the trigger circuit used as CH3 to which the EXT INPUT signal is input.

ADD: Signals applied to the INPUT CH1 and INPUT CH2 connectors are algebraically added and the algebraic sum is displayed on the CRT by simultaneously pressing CH1 and CH2 buttons.

(10) POLAR — Two-motion switch which inverts CH2 display, when pressed, and the polarity returns to normal when pressed again.
(INV ▬ ; NORM ■)

(11) $\updownarrow$ — Controls vertical position of trace.

(12) NORM-CH1-CH2 — Selects source of internal trigger signal from vertical deflection system.

NORM: Sweep circuits are triggered from displayed channel(s). In the ALT mode, sweep is triggered alternately, even by signal sources having no timing relation. However, no stable display is obtained in the CHOP mode.

CH1: Sweep circuits are triggered only from signal applied to INPUT CH1 connector.

CH2: Same as above, except INPUT CH2.

(13) INT-LINE-EXT — Selects source of trigger signal.

INT: Internal trigger signal obtained from vertical deflection system.

LINE: Trigger signal obtained from sample of the line voltage applied to this instrument. (Selection range is narrow for the 400-Hz line voltage.)

EXT: Trigger signal obtained from an external signal applied to the EXT INPUT connector.

(14) AC-DC-TV

Determines method of coupling trigger signal to trigger circuit.

AC: Rejects DC components of trigger signal with a capacitor.

DC: Accepts all trigger signals.

TV: Trigger signal is obtained from TV synchronizing signal separator circuit.

TV-V; 0.5 S/DIV ~ 0.1 msec/DIV

TV-H; 50 μS/DIV ~ 0.2 μsec/DIV

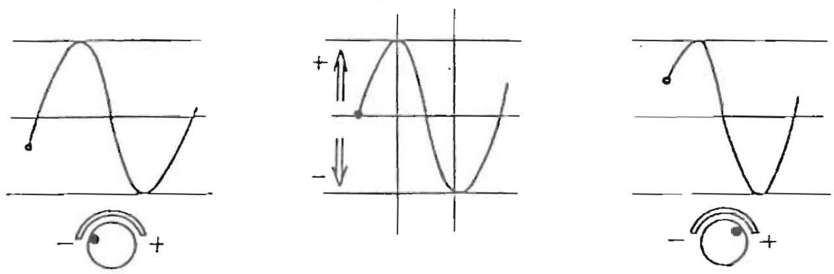
Signal polarity can also be inverted See (9).

(15) HOLDOFF

Used to get stable display with such a complex and repetitive waveform that sweep cannot be triggered by simple trigger level control. Holdoff time increases when this knob is turned clockwise.

(16) LEVEL

Selects amplitude point on trigger signal at which sweep is triggered.



When this knob is pulled, sweep can be triggered from negative going portion of trigger signal. When this knob is turned to the extreme left, the switch clicks, causing the horizontal system to go FIX trigger. In this triggering mode, sweep is triggered automatically by a signal above a certain level.

(17)	MAIN A SWEEP	Selects the sweep rate of the A sweep circuit and the delay time for delayed sweep.

EXT X-Y — X-Y operation is set when this switch is rotated fully counterclockwise.

(i) An X-Y oscilloscope with CH1 = X and $\boxed{\text{CH2}}$ = Y is obtained by setting the V MODE (9) to $\boxed{\text{CH2}}$, INT TRIG SOURCE (12) to $\boxed{\text{CH1}}$, TRIG SOURCE (13) to INT, and COUPLING (14) to $\boxed{\text{AC}}$ or $\boxed{\text{DC}}$.

(ii) An X-Y oscilloscope where EXT INPUT = X and CH1 or CH2 = Y is obtained by setting the V MODE (9) to any position, TRIG SOURCE (13) to EXT, and COUPLING (14) to AC or DC. When the V MODE (9) is set to DUAL, X-Y dual-trace operation occurs.

(18)	A VARIABLE PULL X10	Provides continuously variable A sweep rate at least 1-2.5 times between the calibrated settings selected by the MAIN A SWEEP (TIME/DIV) switch "A" sweep rate is calibrated when VARIABLE control is set to CAL. Pulling this control increases sweep rate to ten times setting of A or B TIME/DIV switch by horizontally

expanding the center division of the display.
The maximum sweep rate is 20 nsec/DIV.

(19) AUTO-NORM-SINGLE-RESET

Determines the operating mode for A sweep.

AUTO: A stable display is obtained in a sweep-triggered state. When there is no trigger signal or its level is deviated, the sweep free runs at the sweep rate selected by the TIME/DIV switch.
This is useful to measure the DC voltage.

NORM: Sweep is initiated by the applied trigger signal using the A triggering controls.
No trace when there is no trigger signal.

SINGLE: Sweep is triggered only once when there is a trigger signal.

RESET: When the RESET button is pressed, a single display will be presented (with correct triggering). After the sweep is completed, the RESET button must be pressed again before another sweep can be displayed.

(20) EXT-CH3 INPUT

This external input terminal serves not only as external trigger signal connector, but also as CH3 input connector for triple-trace display.
It is also used as an external horizontal input connector, and provides the X-axis signal for X-Y operations. See (17).

(21) ←→

Controls horizontal position of display.

(22)	DELAYED B SWEEP	This B TIME/DIV switch is used to select sweep rate in the DELAYED SWEEP mode of operation.
(23)	A-A INTEN-B	Selects horizontal mode of operation. A: Horizontal deflection is provided by A sweep. A INTEN: Horizontal deflection is provided by A sweep. An intensified portion appears on the display during the B sweep time. This switch position provides a check of the duration and position of B sweep (delayed sweep) with respect to the delaying sweep A. B: Horizontal deflection is provided by B sweep. The intensified portion at A INTEN is displayed.
(24)	DELAY TIME POSITION	Selects the portion to be magnified by B sweep. The A sweep deflection range is 0.5 DIV to 10.5 DIV.
(25)	POWER	Power ON-OFF switch controls power to the instrument. The pilot lamp indicates that power is on and the instrument is connected to a line-voltage source.
(26)	⏚	Grounding terminal.

· Rear panel

(27)	A GATE	Output connector providing a positive square pulse coincident with A sweep. (Option)
(28)	B GATE	Output connector providing a positive square pulse coincident with B sweep. (Option)

29	Z AXIS INPUT	Input connector for intensity modulation of the CRT display.
30	FUSE	1-amp fuses are used for 90 to 126 V lines, and 0.5-amp fuses for 194 to 250 V lines. Fuses are removed and fitted with a philips screwdriver.
31	CH1 SIG OUT	Output terminal for CH1 signals. (Option)
32	⏚	Protection grounding terminal.
33	RECORD OUT	Output connector for the sampling output signal to record the waveform displayed on the CRT into an X-Y recorder ... and for the pen lift signal. (Option)

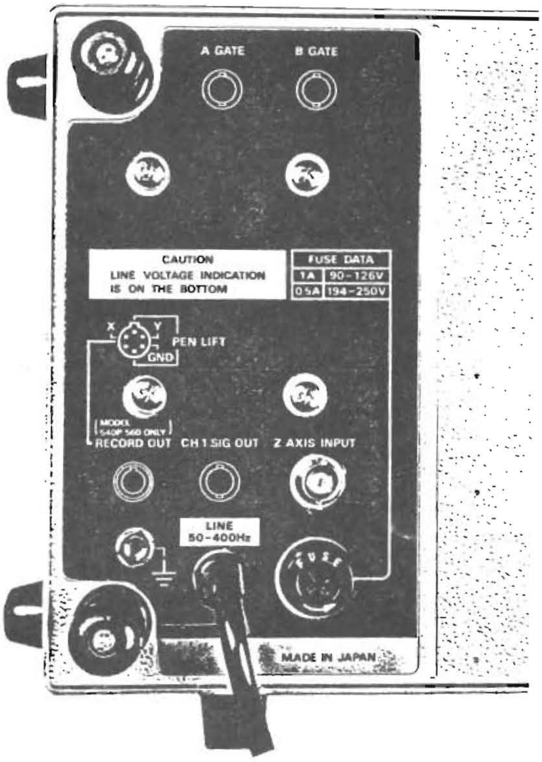
· Bottom panel or Left side panel

34	CH3 POSITION	Adjusts CH3 display position. It has been set to the third DIV from the center of the graticule. Readjust as required.
35	(Line voltage conversion plug)	The plug is inserted to the 100V, 115V, 215V, or 230V position based on the line voltage.
36	CH1 GAIN	Adjusts the CH1 gain. Adjust it by setting CH1 VOLTS/DIV switch (7) to the 20 mV/DIV position.
37	CH2 GAIN	Adjusts the CH2 gain. Adjust it by setting CH2 VOLTS/DIV switch (7) to the 20 mV/DIV position.
38	CH1 STEP ATT BAL	Screwdriver adjustment for CH1 amplifier DC balance. It must be adjusted so the trace does not shift when the CH1 VOLTS/DIV switch (8) is pulled.

(39) CH2 STEP ATT BAL — Screwdriver adjustment for CH2 amplifier DC balance. It must be adjusted so the trace does not shift when the CH2 VOLTS/DIV switch (8) is pulled.

3.2 RECORD OUT OPERATION (Option)

1. Connect the X and Y axis on the rear of the instrument to the X-Y recorder.
   The output sensitivity (gain) is 600 mV/DIV for the X-axis, and 100 mV/DIV for the Y-axis.
   If the recoder has a pen-lift signal terminal, connect it with the Record Out connector of this instrument.



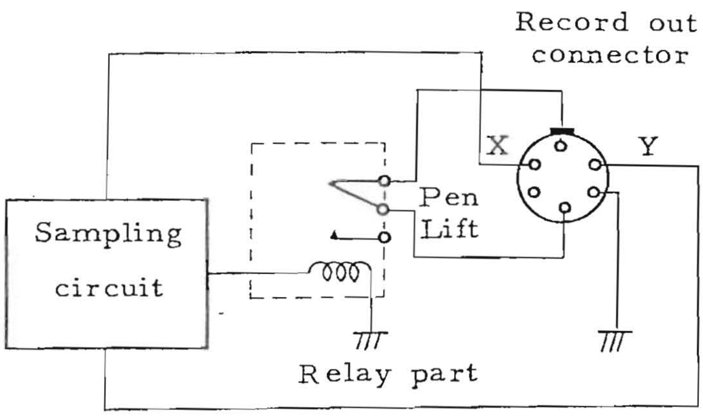


Fig. 3-2-1 Record out connector

2. Obtain a desplay of a waveform to be recorded on CRT screen, and adjust appropriate controls for proper amplitude and sweep rate.

3. Change the Horizontal mode to the A INTEN position, and pull the scan switch knob to set to SCAN.
Now, with the controls set as described above, the delayed sweep travels on the displayed waveform in approximately 20 seconds from left to right.

4. For the easier observation, set the B sweep switch at a position between 1/100 and 1/1000 of the A sweep switch setting.

5. When the pen lift switch is set to ON in the X-Y recoder, a waveform per scanning is recorded.

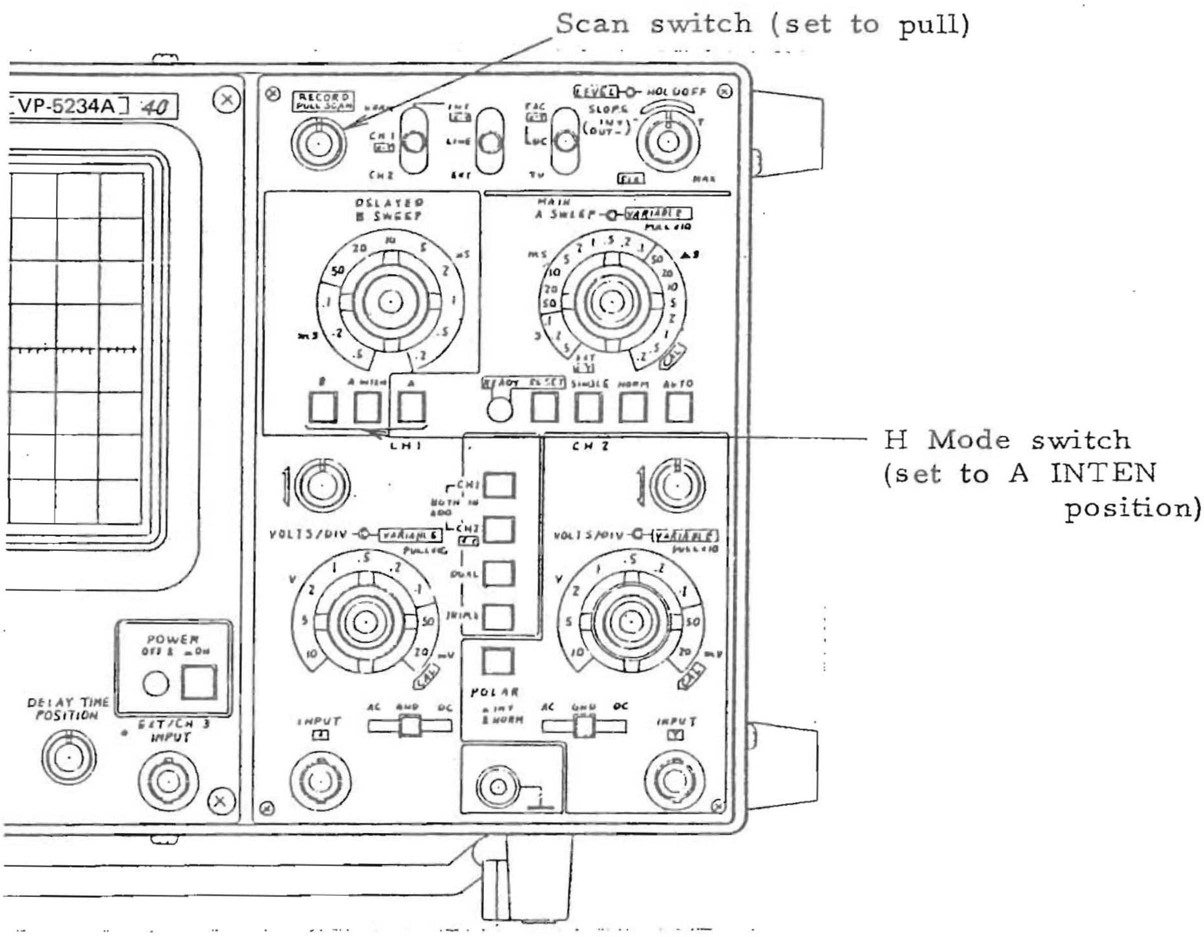


Fig. 3-2-2 Control settings

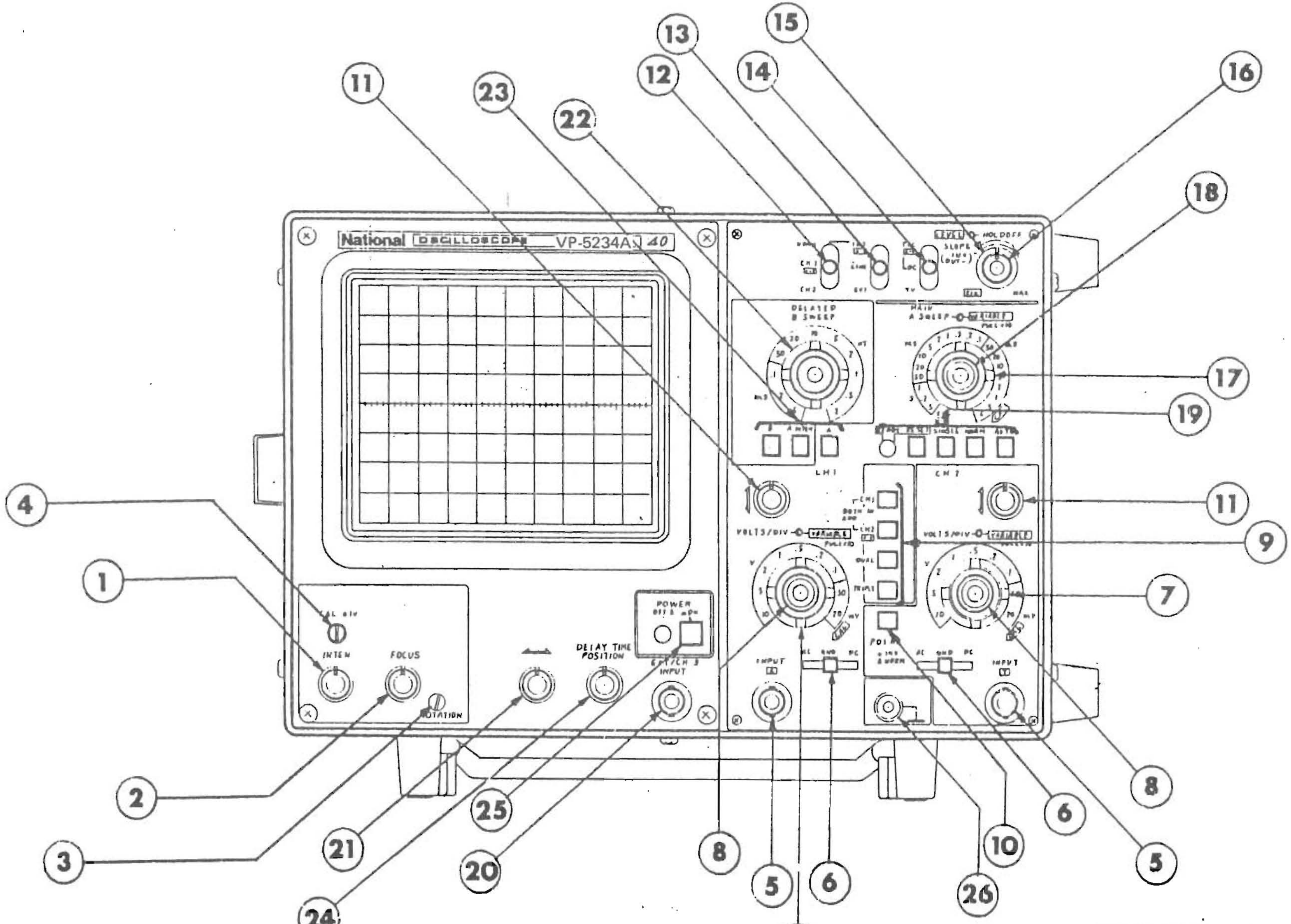


Fig. 1

VP-5234A

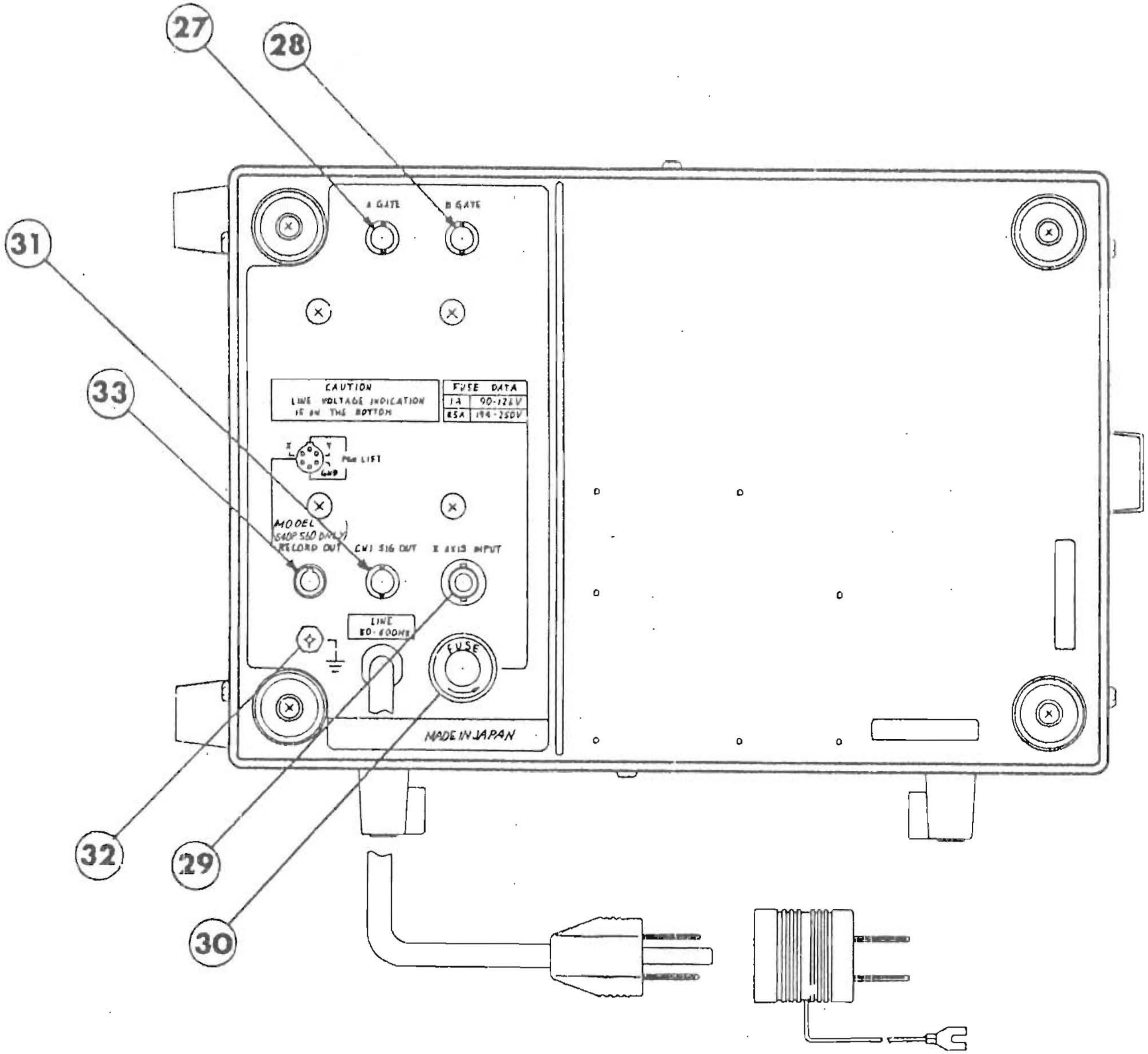


Fig. 2

REAR VIEW
VP-5234A

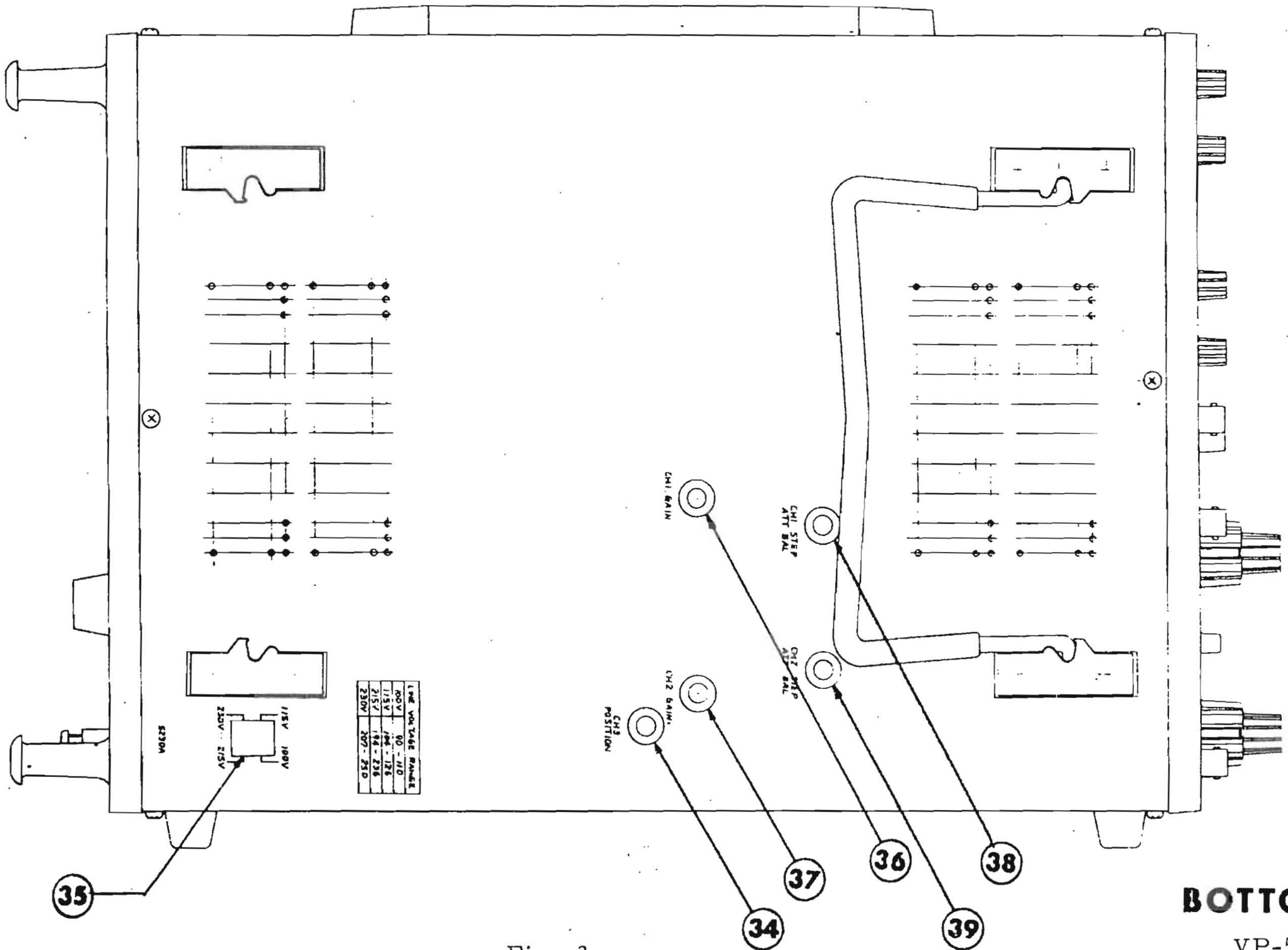


Fig. 3

BOTTOM VIEW

VP-5234A

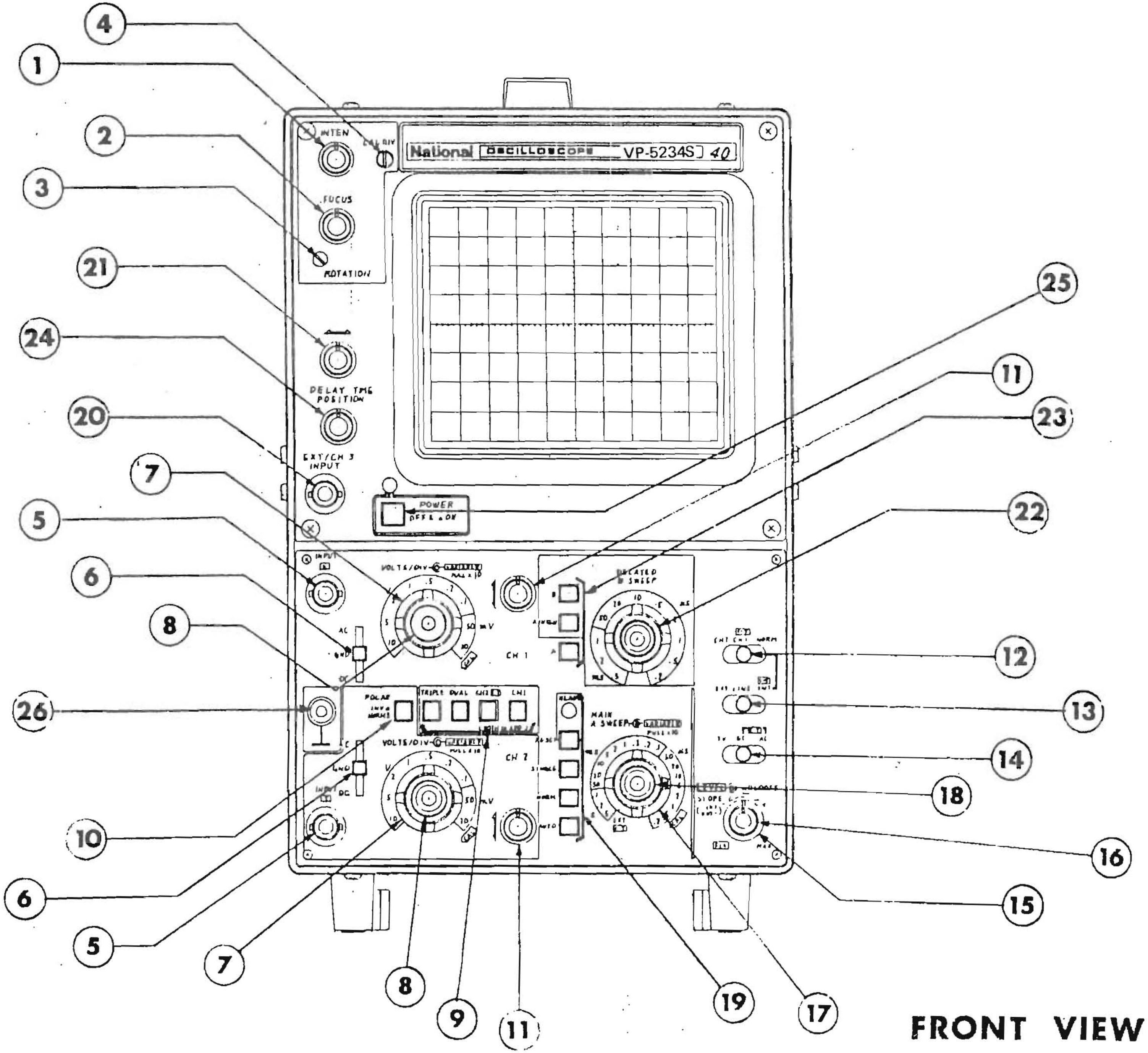


Fig. 4

FRONT VIEW

VP-5234S

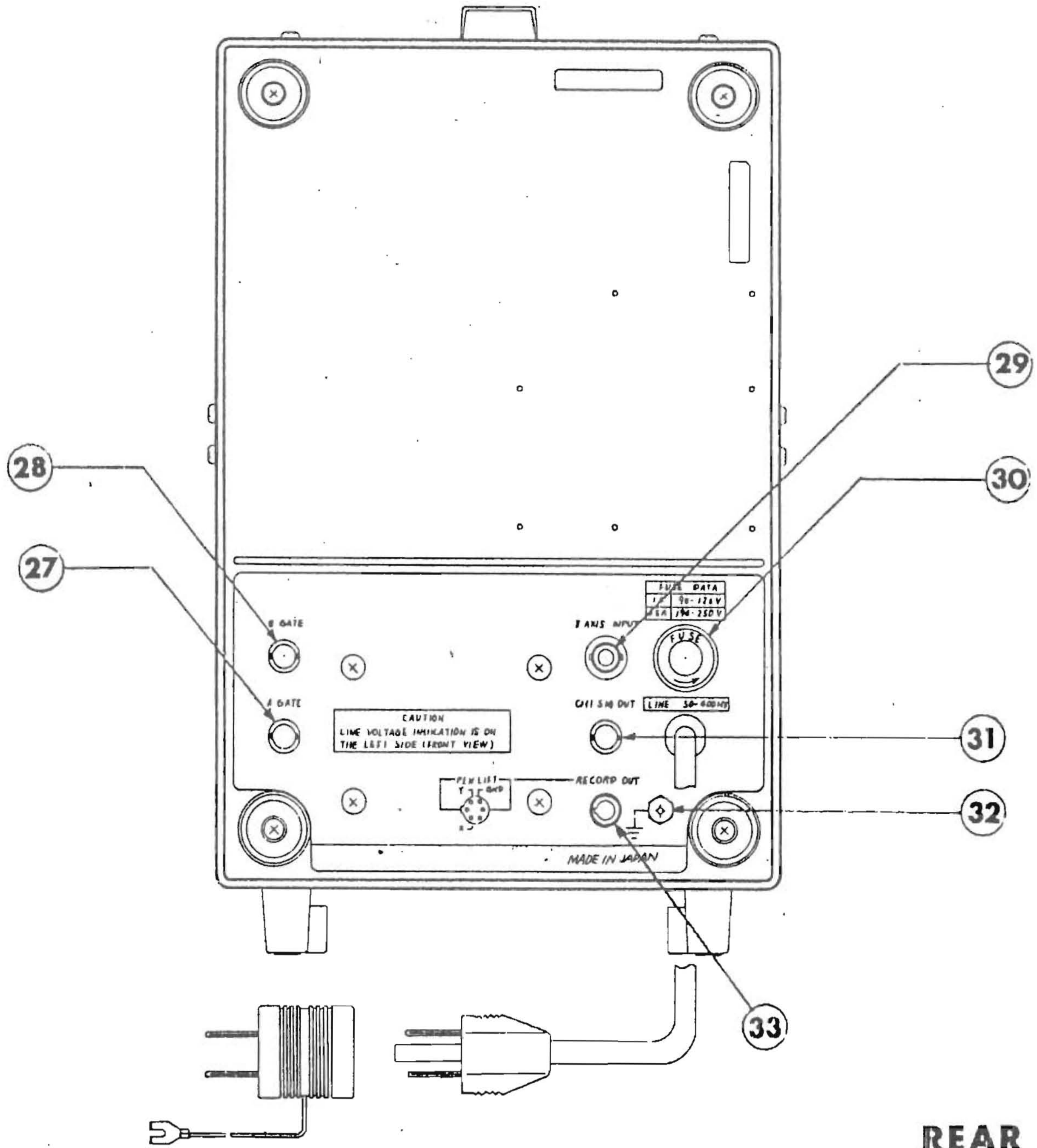


Fig. 5

REAR VIEW

VP-5234S

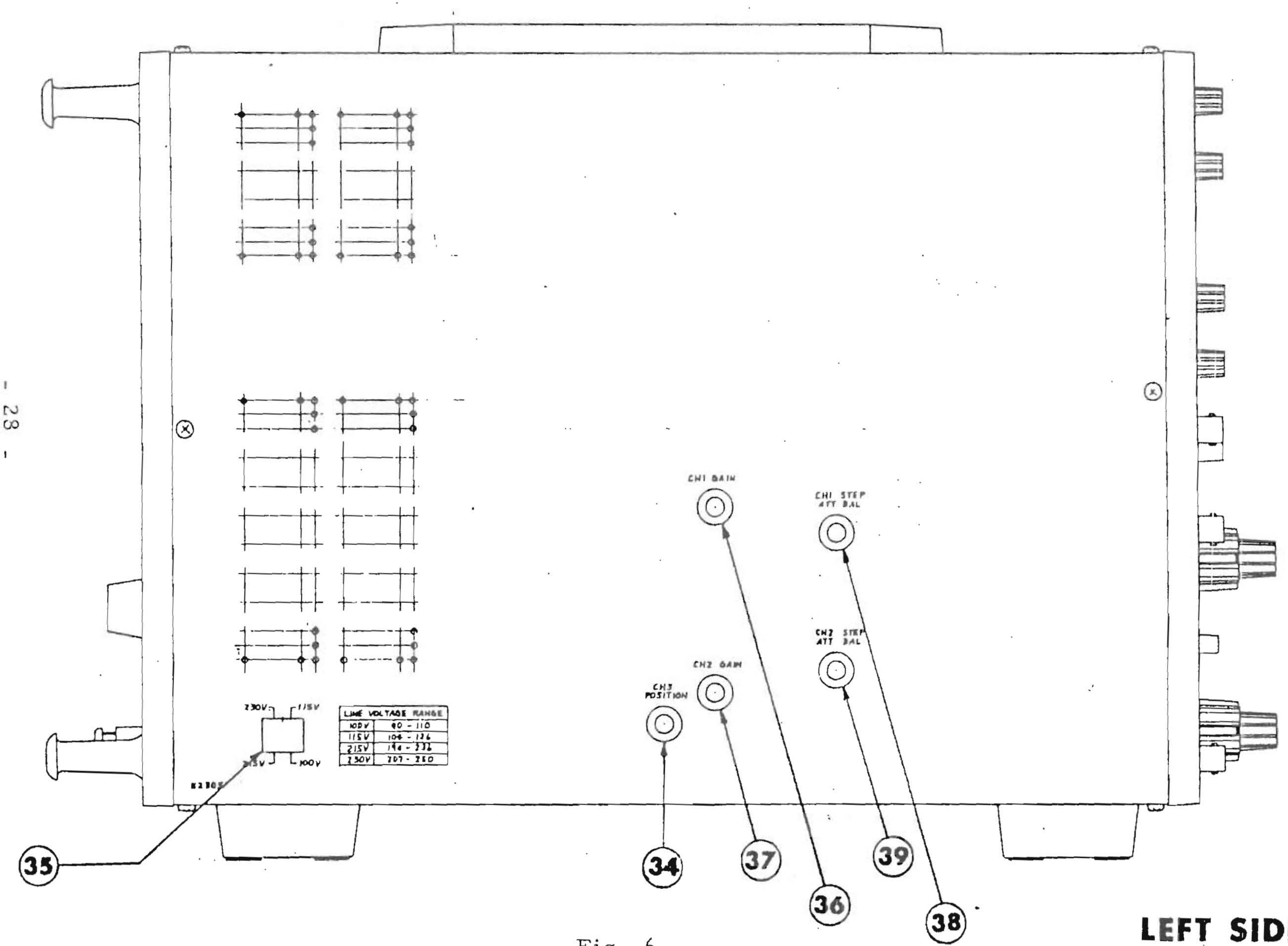


Fig. 6

LEFT SIDE VIEW

VP-5234S