352
10-14-85

Service Manual

Type 2553
DC VOLTAGE/CURRENT
STANDARD

TUCKER MASTER

YEW
YOKOGAWA ELECTRIC WORKS

SM 2553-1E

CONTENTS

1. OPERATING PRINCIPLE AND CONFIGURATION

1.1 Introduction

The Type 2553 DC Voltage/Current Standard has been developed with a new concept as a sister model of the portable instrument now popular on the market. Its output is exact and stable by adoption of a D-A conversion based on a correct time instead of a conventional resistive division.

All settings by logic signals reduce influence by contact resistance of switches and provide the high precision and multi-function instrument with an expandability to a programmable instrument in keeping with present trends. The instrument features:

- **Temperature setting—mV generating function incorporated**

A dc mV equal to the thermo-emf centered on 0 °C and corresponding to any of five thermocouples (PR, CA, CRC, CC, IC) specified in JIS C 1602 and selected on the switch is automatically obtained just by setting a desired temperature with three controls. The incorporated ROM which memorizes the thermo-emf table for all the above thermocouples permits to deliver accurate outputs.

When calibrating a recorder, converter or measuring instrument for thermocouples, therefore, a thermo-emf table is no longer necessary. The Type 2578-25 Temperature Probe which is practical for calibrating the instrument itself and reference junction compensation circuit is optionally available.

- **Output dividing function incorporated**

The output divider dials have a function of obtaining n/m ths of a set output ($m = 1 \sim 15$, $n = 0 \sim 15$, $n/m \leqq 1$). When the output of the instrument is set at the full scale value of the measuring instrument or industrial instrument under test, therefore, inspection of its master graduations or linearity can quickly be effected just by turning the dial. Repeated settings at every master graduation is no longer necessary.

Because this output dividing function is also applicable to the temperature range, a mV output for each divided temperature of a set temperature indicated can be obtained.

- **No-contact output setting by photocouplers**

The output setting dials are of a no-contact mechanism using two photoelectric elements. The microprocessor discerns the rotating direction and counts the number of displacement steps according to two phase rotation detecting outputs. Range setting, output divider setting and other information are also treated in the form of logic signals for processing by the microprocessor. Influence by change of contact resistance of the switch or thermo-emf is eliminated, whereby the instrument operation remains unaffected.

Thus the repeatability and stability are excellent, and the high reliability is maintained.

- **Automatic carry and borrow function adopted on output setting dial**

While on the classic instruments a carry from 9999 to 10000 or a borrow from 10000 to 9999 entailed troublesome manipulations, this instrument is provided with an automatic carry and borrow function which permits such an operation just by the LSD dial. On this instrument, troublesome operation is not only unnecessary at carry or borrow but also the output can be changed continuously. Such features make the instrument suited for alarm setting inspection and hysteresis measurement.

- **GP-IB system adopted**

The Type 2553-01 incorporates GP-IB (General Purpose Interface Bus) which conforms to IEEE Std. 488-1975 both electrically and structurally. It permits to externally set the range, output level, polarity and output ON/OFF and also to externally output the setting information. These features make the instrument useful as a component of an automatic testing system.

- **Self-calibration adopted**

On this instrument, compensation corresponding to zero and span adjustments for each range is made digitally by a self-calibration according to memorization in the incorporated memory elements.

1.2 Operating Principle

Figure 1-1 shows the block diagram and signal waveforms of this instrument.

In the figure, the reference voltage V_S enters the integrator, where it is integrated for the pulse duration corresponding to a value set on the front panel. The integrator output V_I enters the sample hold circuit, where the final value is held. Its output V_H enters the amplifier, where it is amplified to a final output V_O according to the range setting.

The pulse width which determines an integration period is obtained by dividing the oscillation frequency of the crystal oscillator and, therefore, is excellent in linearity and stability against temperature change.

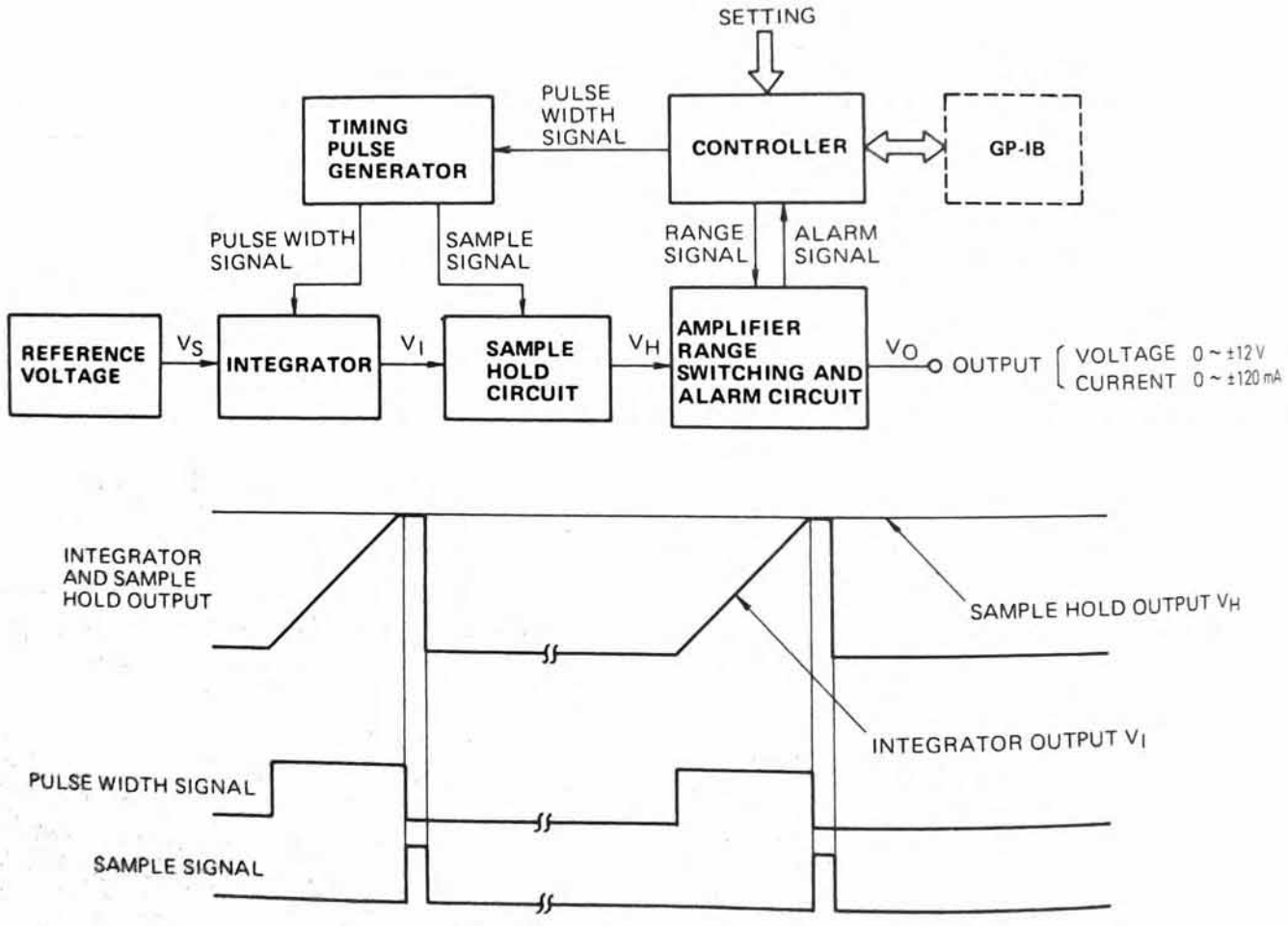


Figure 1-1. Operating Principle.

1.3 Configuration

1.3.1 Power Supply Assembly

The assembly consists of fuse, main switch, power transformer, noise filter and battery for protecting calibration constant memory. The OUT GUARD output appears on the connector on the mother board parts side, and the IN GUARD output on screwed compression terminal on the mother board pattern side.

1.3.2 Display Assembly

The assembly consists of display PCB assembly and photoelectric switch mechanism.

A. Output Setting Dials

All the three output setting dials consist of no-contact photoelectric switches. All the switches for three digits are of an incremental type. The rotating direction and number of clicks in rotation are detected by two-phase output signals.

B. Range and Output Divider Dials

Because the information from the range and output divider dials is also digital signals to be inputted to the microprocessor, the configuration is so arranged that increase of the contact resistance of the switches up to about 500 Ω does not cause setting errors.

They are designed in such a manner that their operation is toward a safer side when erroneously handled as described below:

- When changing the range, output is automatically turned off.
- When setting beyond the output setting span of the range, the set value does not change even by rotating the dial.
- When setting has become beyond the output span after changing the range, the output is not turned on. (For example, if the range is changed to 10 V after 1600 °C is set at the PR range, the output setting becomes 16 V but output is not turned on. Output is turned on by reducing the output setting to 12 V or lower.)
- The output divider dials are of an auto lock mechanism so that the coefficient does not surpass 1.

1.3.3 Mother Board Assembly

Comprises two stabilized power supplies, one for logics (+5 V) and the other for relays (+6.2 V), and an unregulated power supply of ±28 V for analog circuits.

The mother board assembly also includes LED driver for connecting the display control assembly and display assembly, and relay driver for actuating relays on the A-D/D-A assembly.

1.3.4 CPU Card Assembly

This is a CPU (Central Processing Unit) card provided with μPD8085A whose operating clock is at 2.5 MHz.

It also includes 4 k byte MASK ROM: μPD 2332C as program memory, 256 byte RAM: μPD8156C having I/O port as data memory, 256 × 4 bit FUSE ROM: μPB403C as calibration constant memory, and 256 × 4 bit CMOS RAM: μPD5101 LC.

1.3.5 A-D/D-A Card Assembly

Consists of all the analog section and the output circuit of the Type 2553.

As shown in the A-D/D-A Card Assembly block diagram in Figure 1-2, analog conversion is made by sample hold of the integrator output at a timing corresponding to digital setting, and its output is changed according to the range setting to obtain an instrument output.

By the comparator for the A-D conversion which compares the integrator output with the temperature probe output voltage, an output of a pulse width corresponding to the probe output voltage (A-D conversion output) is obtained.

The A-D and D-A conversion has a resolution of 16 bits (65536 counts/rating).

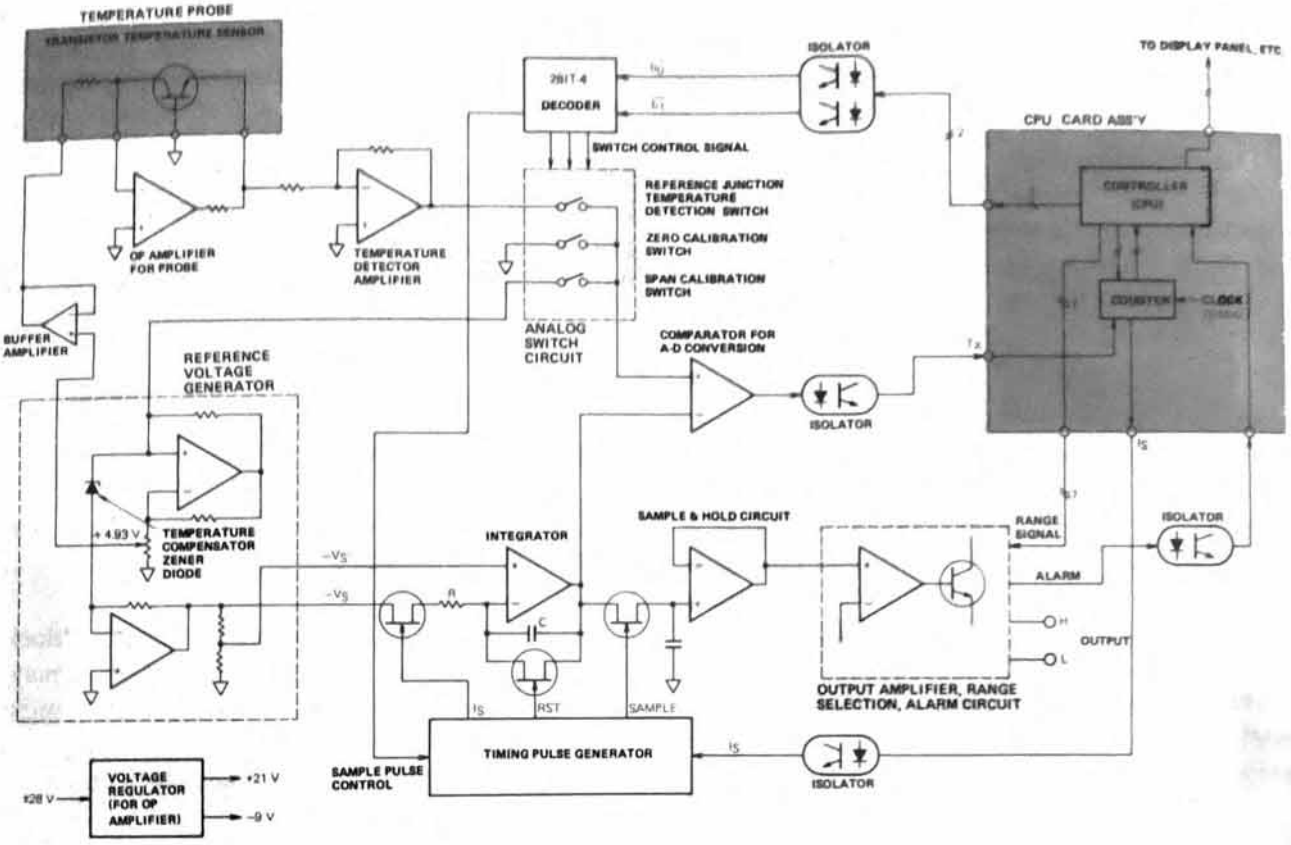


Figure 1-2. A-D/D-A Card Ass'y Block Diagram.

2. INSPECTION

2.1 Introduction

This chapter concerns the inspection of the Type 2553.

Although the Type 2553 is factory-adjusted to satisfy all the specifications described in 2.2 and delivered after strict intracompany inspection, periodical inspection and readjustment are necessary in order to maintain the accuracy for an extended length of time and operate the instrument usefully.

For the inspection, refer to 2.4 and 2.5. If adjustment is necessary incidental to the inspection or when parts are replaced for repair, refer to "4. ADJUSTMENT" and "5. CALIBRATION".

For general handling of the instrument at the time of inspection or adjustment, refer to the separate **instruction manual for the Type 2553 DC Voltage/Current Standard.**

2.2 Specifications

Range		Span	Accuracy (at 23 ± 3 °C)		Max. Output	Inner Resistance	Output Resolution
10V		0 ~ ±12.000 V	±0.02 % of range		Approx. 120 mA	10 mΩ max.	1 mV
1 V		0 ~ ±1.2000 V	±0.02 % of range		Approx. 120 mA	10 mΩ max.	100 μV
100 mV		0 ~ ±120.00 mV	±0.02 % of range		*1) Approx. 1 kΩ	Approx. 1 Ω	10 μV
10 mV		0 ~ ±12.000 mV	±(0.02 % of range +4 μV)		*1) Approx. 1 kΩ	Approx. 1 Ω	1 μV
100 mA		0 ~ ±120.00 mA	±0.02 % of range		*2) Approx. 9 V	Approx. 1 MΩ	10 μA
10 mA		0 ~ ±12.000 mA	±0.02 % of range		Approx. 15 V	Approx. 10 MΩ	1 μA
1 mA		0 ~ ±1.2000 mA	±0.02 % of range		Approx. 15 V	Approx. 10 MΩ	0.1 μA
DC voltage (mV) according to thermo-emf table in JIS C 1602-1974 is generated for following temperatures			At 25 °C step settings centered on 0 °C	At settings other than left			
*4) Thermocouple type	PR	0 ~ 1600.0 °C	± 2.7 °C	± 3.0 °C		Approx. 1 Ω	Approx. 1 °C
	CA	0 ~ 1200.0 °C	± 0.40 °C	± 0.47 °C		Approx. 1 Ω	Approx. 0.1 °C
	CRC	0 ~ 700.0 °C	± 0.25 °C	± 0.31 °C		Approx. 1 Ω	Approx. 0.1 °C
	IC	−200.0 ~ 600.0 °C	*3) ± 0.37 °C (± 0.68 °C)	*3) ± 0.44 °C (± 0.90 °C)		Approx. 1 Ω	Approx. 0.1 °C
	CC	−200.0 ~ 200.0 °C	*3) ± 0.2 °C (± 0.35 °C)	*3) ± 0.25 °C (± 0.50 °C)		Approx. 1 Ω	Equivalent to 1 μV

*1) Minimum load resistance at which −0.1 % of error occurs
*2) Approx. 15 V up to 50 mA
*3) Value in parentheses is for setting below 0 °C
*4) When transistor prove is used, accuracy of reference junction compensation is ±0.38 °C (±0.66 °C for PR) at measurement range comprised between 0 and +50 °C

Output setting :
By 3 dials (no-contact type with photo-couplers)
Dials 1, 2 . . . . . 16 steps/rev
Dial 3 . . . . . 32 steps/rev
Setting display : 5 digit LEDs
Units display : mV/V/mA/°C
Divided output :
$= \text{setting} \times \frac{n}{m}$
m; 1, 2, ... , 15 (equally divided by 15)
n; 0, 1, ... , 15
where $n \leqq m$
Divider accuracy : Within ±1 LSD
Output ripple :
100 mV/1/10 V/10/100 mA ranges
±0.01 % of range (dc to 60 Hz component)
1 mA range
±0.05 % of range
Temperature coefficient :
50 ppm/°C at 5 to 40 °C
Warmup : 30 min minimum
CMRR : For dc to 60 Hz
voltage output . . . Approx. 120 dB
current output . . . Approx. 0.1 μA/V
Line regulation :
±0.02 % of range at 100 V ac ±10 %
Calibration cycle : 3 months
Current limiter :
Approx. 200 mA (manual reset)
Voltage limiter :
Approx. 15 V (manual reset)
Operating temperature range :
5 to 40 °C
Operating humidity range :
5 to 95 % RH
Insulation resistance :
100 MΩ min./500 V dc between power supply and case
100 MΩ min./500 V dc between case and guard
Dielectric strength :
1500 V ac for 1 min between power supply and case
100 V ac for 1 min between case and guard
Power source :
100 V ac ±10 %, 50/60 Hz
(120, 200, 220, 240 V ac available upon request)
Power consumption : 50 VA

External dimensions :
Approx. 149 × 228 × 365 mm
Weight : Approx. 8 kg
Accessories :

1 pc	power cord
2 pcs	fuses
1 copy	instruction manual
2 pcs	dry cells (SUM-3N)

Type 2589-01 GP-IB Block (incorporated in Type 2553-01 only)

Electrical specifications :
Conform to IEEE Std. 488-1975
Structural specifications :
Conform to IEEE Std. 488-1975
Functional specifications :
SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0
Employed code : ISO code
Address designation :
Select switch sets talker/listener address out of 0 to 15
Remote status reset :
Remote status is reset by throwing selector to LOCAL mode unless LOCAL LOCK-OUT is made by controller

Type 2578-25 Temperature Probe (option)

Measurement range : −20 to 60 °C
Accuracy :
±0.3 °C combined with Type 2553 (in temperature measurement at R.J. TEMP range)
Insulation resistance :
100 MΩ min./500 V dc between terminal tip and Type 2553 ⏚ terminal
Dielectric strength :
100 V ac, 50/60 Hz for 1 min between terminal tip and Type 2553 ⏚ terminal
Cord length : Approx. 2 m
Terminals : Material . . . copper
: Shape . . . . round
Accessories : 5 pcs round tips

REFERENCE

For the Type 2553-01 individually, GP-IB Block functions are as shown in the table below:

Function	Contents
SH1	With all transmission handshake functions
AH1	With all reception handshake functions
T6	Basic talker function
	Serial polling
	Talker cancel function by MLA
L4	Basic listener function
	Listener cancel function by MTA
SR1	With all service request functions
RL1	With all remote local functions
PP0	Without parallel polling function
DC1	With all device clear functions
DT1	With all device trigger functions
C0	Without control function

The Type 2553-01 itself has functions of T5 (T6 and talk only mode) as a talker but, when used individually, the talk only mode cannot be used.

The talk only mode can be used only when the instrument is incorporated in the Type 2560-03, 04 DC Calibration System.

2.3 Rewiring of Power Transformer Primary and Change of Fuse Incidental to Change of Line Voltage

The power transformer primary is wired as illustrated in Figure 2-1 according to the particular line voltage. When using the instrument in a district where the line voltage is different, therefore, rewire the primary windings of the power transformer mounted on the Power Supply Assembly: B9268DA.

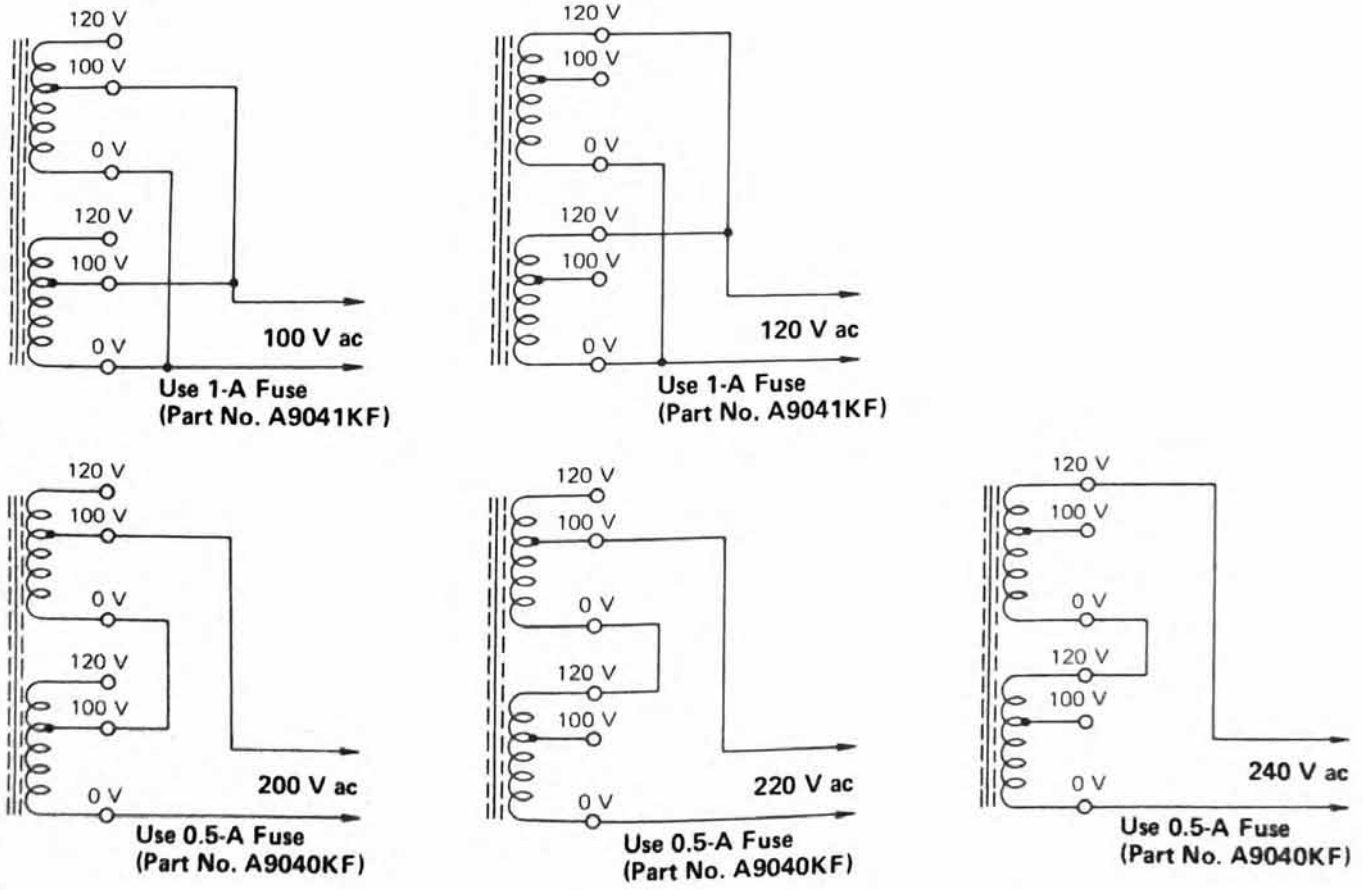


Figure 2-1. Tap Connection of Power Transformer.

Use a 1-A fuse (P/N: A9041KF) for a line voltage 100/120 V or a 0.5-A fuse (P/N: A9040KF) for 200/220/240 V.

2.4 Inspection (general)

Inspect this instrument using the following instruments or equivalent instruments the accuracy of which is warranted by periodical inspections at a testing organ where traceability to the national standards is available.

Particularly for accuracy inspections, use calibrated instruments for inspection and pay utmost attention to their errors themselves.

YEW won't be responsible for troubles attributable to improper instruments for inspection.

2.4.1 Output Accuracy Inspection

A. Instruments for Inspection

- Digital Voltmeter :
  YEW Type 2501
  Accuracy; V ranges . . . ±0.005 %
  mV ranges . . . ±0.01 %
- Standard Resistors :
  YEW Type 2792
  1 pc each of 100 Ω, 1 kΩ, 10 kΩ
  Tolerance . . . . . ±0.005 %

B. Inspection Conditions

- Temperature and humidity :
  23 ± 3 °C, 75 % RH max.
- Power source :
  Rated line voltage, 50/60 Hz
- Inspection setup : As specified below

C. Voltage Output Accuracy Inspection

a) Connect this instrument and Type 2501 as shown in Figure 2-2, and set the range and output of this instrument to 1 V.

b) Turn on power for this instrument and Type 2501 and allow more than a four hour warmup.

c) Measure output voltages at settings of this instrument given in Table 2-1 by the Type 2501 to check if they conform to the specified accuracy.

Table 2-1.

Range	Setting	Accuracy
10 V	+00.000 V	±2 mV
	+01.000 V	
	+02.000 V	
	+03.000 V	
	+04.000 V	
	+05.000 V	
	+06.000 V	
	+07.000 V	
	+08.000 V	
	+09.000 V	
	+10.000 V	
	+11.000 V	
	+12.000 V	
	−10.000 V	

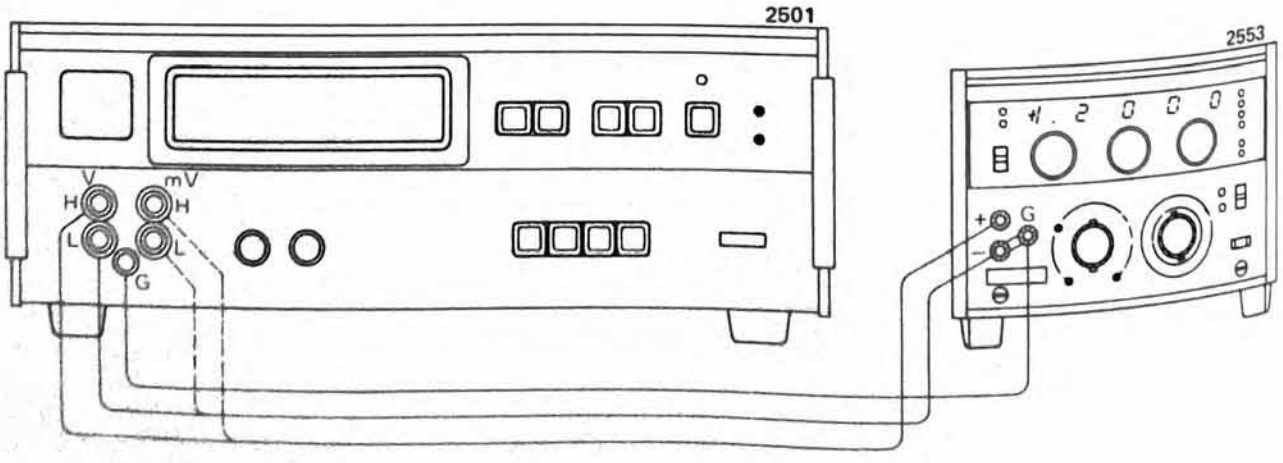


Figure 2-2. Setup for Voltage Output Accuracy Inspection.

Table 2-1. (continued)

Range	Setting	Accuracy
1 V	+0.0000 V +0.1000 V +1.0000 V −1.0000 V	±0.2 mV
100 mV	+000.00 mV +010.00 mV +100.00 mV −100.00 mV	±20 μV
10 mV	+00.000 mV +01.000 mV +10.000 mV −10.000 mV	±6 μV

Accuracy: 10 V, 1 V, 100 mV ranges; ±0.02 % of range
10 mV range; ±(0.02 % of range +4 μV)

D. Current Output Accuracy Inspection

a) Connect this instrument, Type 2501 and Type 2792 as shown in Figure 2-3 and measure voltage drops across the voltage terminals of the Type 2792 at each setting given in Table 2-2 by the Type 2501.

b) Recalculate the values into currents to check if the output currents at each of the inspection points conform to the specified accuracy.

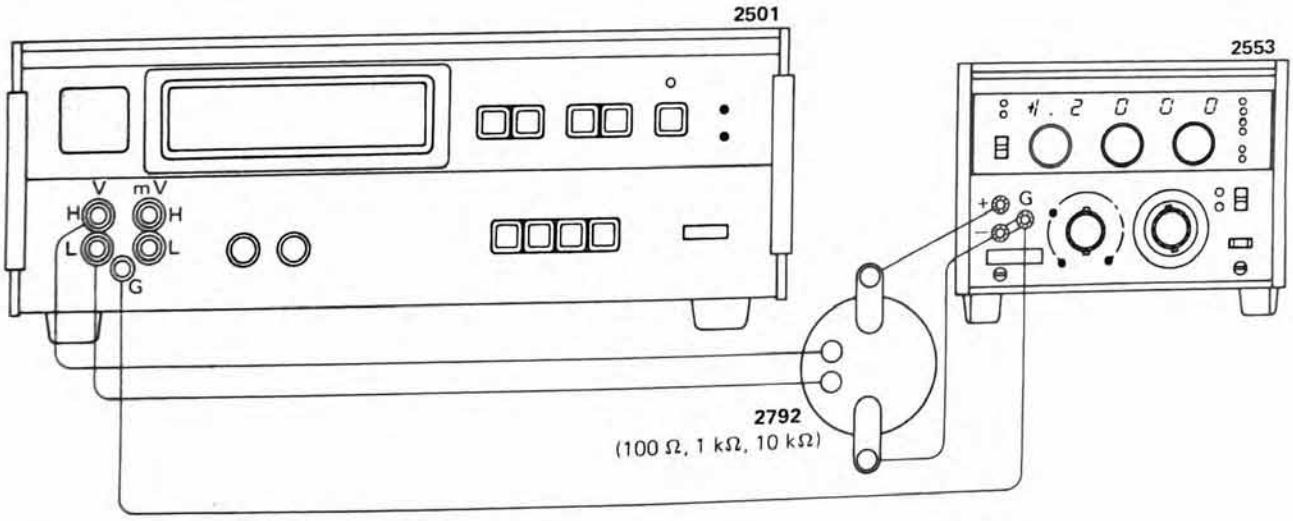


Figure 2-3. Setup for Current Output Accuracy Inspection.

Table 2-2.

Range	Setting	Type 2792 Used	Voltage Accuracy	Recalculated Current Accuracy
100 mA	+000.00 mA +010.00 mA +100.00 mA −100.00 mA	100 Ω	±2 mV	±20 μA
10 mA	+00.000 mA +01.000 mA +10.000 mA −10.000 mA	1 kΩ		±2 μA
1 mA	+0.0000 mA +0.1000 mA +1.0000 mA −1.0000 mA	10 kΩ		±0.2 μA

Accuracy: ±0.02 % of range

E. Accuracy Inspection of DC mV Output Corresponding to Thermo-emf

a) Connect this instrument and Type 2501 as shown in Figure 2-4, and measure mV output voltages of this instrument at each setting given in Table 2-3 by the Type 2501.

b) Check if the dc mV outputs conform to the specified accuracy.

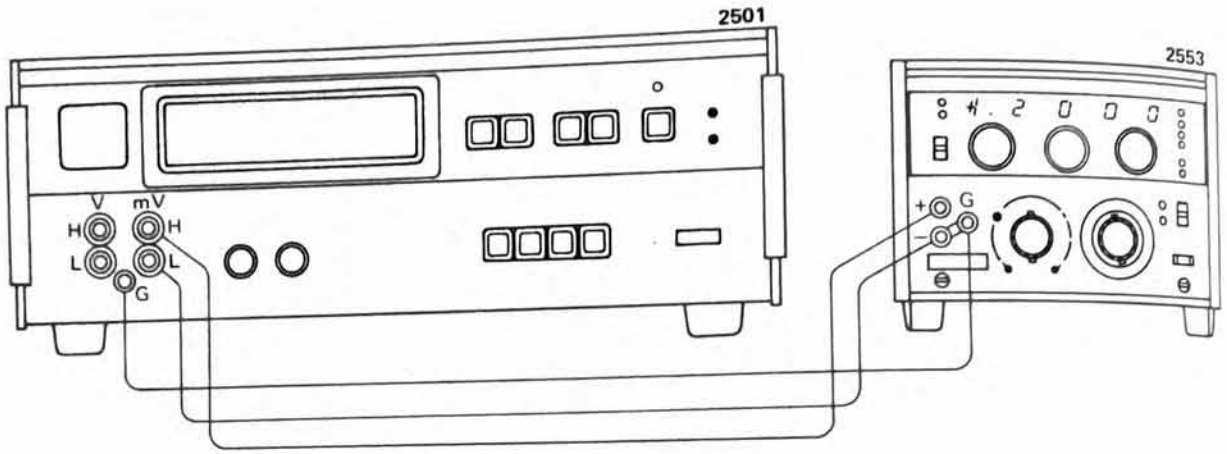


Figure 2-4. Setup for Accuracy Inspection of DC mV Output Corresponding to Thermo-emf.

Table 2-3.

Range	Setting	mV output	Accuracy	Temperature Recalculated
PR	+000.0 °C +1600.0 °C	+000.000 mV +18.735 mV	±14 μV	±2.68 °C
CA	+000.0 °C +1200.0 °C	+000.000 mV +48.828 mV	±15 μV	±0.40 °C
CRC	+000.0 °C +700.0 °C	+000.000 mV +53.110 mV	±15 μV	±0.25 °C
IC	–200.0 °C +000.0 °C +600.0 °C	–7.8905 mV +000.000 mV +33.096 mV	±15.5 μV } ±18 μV	±0.69 °C ±0.37 °C
CC	–200.0 °C +000.0 °C +200.0 °C	–5.603 mV +000.000 mV +9.286 mV	±6 μV } ±7.8 μV	±0.35 °C ±0.16 °C

F. Divided Output Accuracy Inspection

a) Connect this instrument and Type 2501 as shown in Figure 2-2, and set the range and output of this instrument to 10 V and 12 V, respectively.

b) Set the m- and n-dials of the output divider to 15.

c) According to Table 2-4, successively change n-dial settings, and take readings on the Type 2501 at each setting. From the readings, check if the accuracy of the divided output conforms to the specification.

Table 2-4.

m	n	Divided Output	Accuracy
15	15	12.000 V	±3 mV*
	14	11.2000 V	
	13	10.4000 V	
	12	9.6000 V	
	11	8.8000 V	
	10	8.0000 V	
	9	7.2000 V	
	8	6.4000 V	
	7	5.6000 V	
	6	4.8000 V	
	5	4.0000 V	
	4	3.2000 V	
	3	2.4000 V	
	2	1.6000 V	
	1	0.8000 V	
	0	0.0000 V	

* Divided output accuracy
= ± (output accuracy + divider accuracy)
= ± (0.02 % of range + 1 displayed LSD)
= ± (2 mV + 1 mV)
= ±3 mV

2.4.2 Accuracy Inspection of Reference Junction Temperature Detection

A. Instruments for Inspection

- DC Voltage Standard :
  YEW Type 2552
  Accuracy; ±0.005 % of setting

B. Inspection Conditions

- Temperature and humidity :
  23 ± 3 °C, 75 % RH max.
- Power source :
  Rated line voltage, 50/60 Hz
- Inspection setup : As specified below

C. Inspection Procedure

a) See Figure 2-5. Using the Type 2552, apply between the pins A (COM side) and F (– side) of the R.J. INPUT connector on the rear panel of this instrument voltages corresponding to the base-emitter voltages V_{BE} at 0 °C and 50 °C of the temperature probe given in Table 2-5.

b) Read the temperature displays on this instrument and, from the readings, check if the reference junction compensation conforms to the specified accuracy.

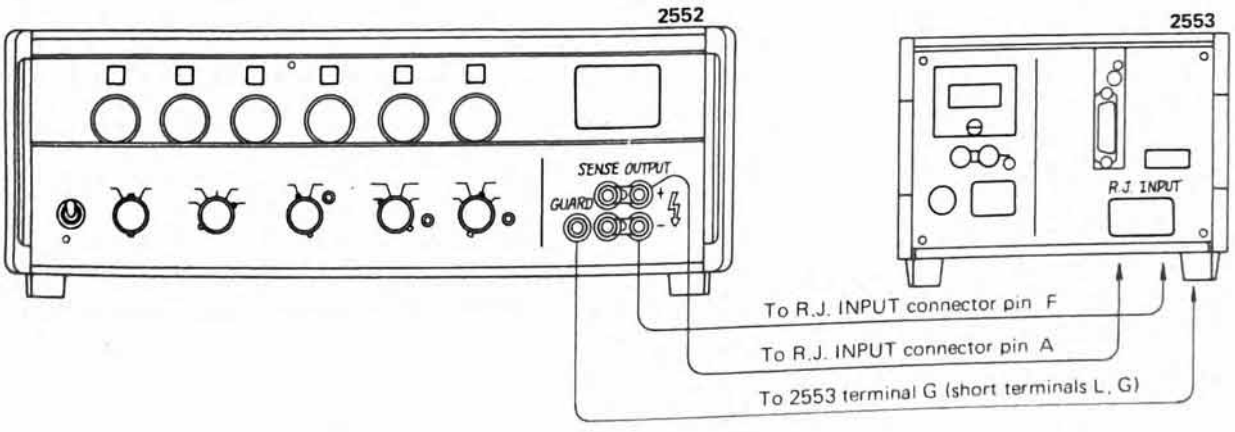


Figure 2-5. Setup for Accuracy Inspection of Reference Junction Temperature Detection.

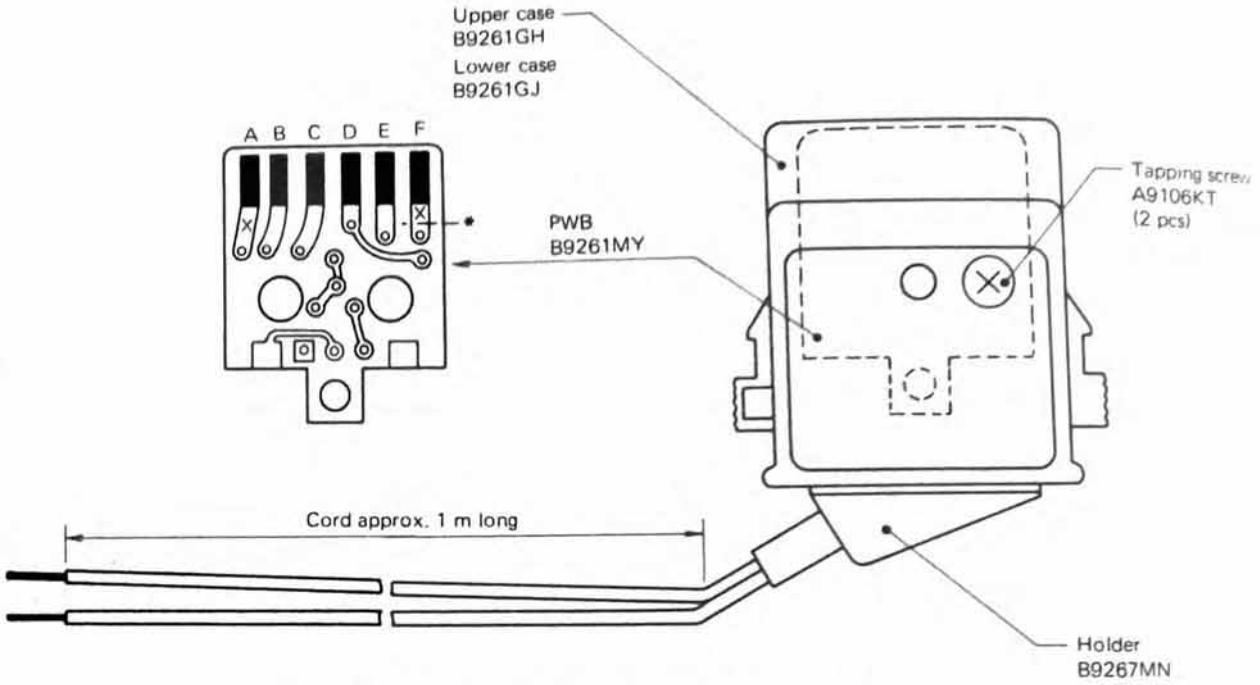
Table 2-5.

Range	Type 2552 Output Setting	Type 2553 Display	Accuracy
R.J. TEMP	–623.29 mV	+000.0 °C	±0.1 °C
	–506.05 mV	+050.0 °C	

REFERENCE

For a structural reason, the R.J. INPUT connector is mounted on a position recessed from the rear panel. In this inspection, therefore, you might find difficulty in applying the output of the Type 2552 to the connector terminals.

To solve this inconvenience, it is recommended to build a jig for inspection as illustrated below using parts for temperature probe.



* Cut PWB patterns at dotted line and solder cord cores to X.
R.J. INPUT connector
A: COM side
F: – side

2.4.3 Inspection of Limiter Operation

A. Instruments for Inspection

- Digital Voltmeter : YEW Type 2501
- Fixed resistor : 50 Ω ±1 %, 2 W min.
- Rheostat : 2 kΩ, 0.2 W min.

B. Inspection Conditions

- Temperature and humidity :
  23 ± 5 °C, 75 % RH max.
- Power source :
  Rated line voltage, 50/60 Hz
- Ranges :
  Current limiter operation; 10 V range
  Voltage limiter operation; 10 mA range

C. Inspection of Current Limiter Operation

a) Connect this instrument and Type 2501 as shown in Figure 2-2, and set the range and output of this instrument to 10 V.

b) Throw the OUTPUT switch to ON. The OUTPUT ON lamp will come on. By the Type 2501, confirm that a voltage of 10 V appears on the output terminals.

c) Connect the resistor of 50 Ω between the output terminals of this instrument. Confirm that the OUTPUT OFF lamp lights this time and that the output voltage disappears.

d) Remove the resistor of 50 Ω connected between the output terminals, and throw the OUTPUT switch to ON. Confirm that the ON lamp lights and that a voltage of 10 V reappears between the output terminals.

e) From the above, it can be inspected whether the current limiter of this instrument operates normally at a current output of approximately 200 mA.

D. Inspection of Voltage Limiter Operation

a) Connect this instrument and Type 2501 as shown in Figure 2-2, and set the range and output of this instrument to 10 V.

b) Set the rheostat of 2 kΩ to approximately the middle of its variable range, and connect it between the output terminals of this instrument.

c) Throw the OUTPUT switch to ON. Confirm that the ON lamp lights and that the Type 2501 reads about 10 V.

d) Gradually increase the resistance of the rheostat until the voltage limiter trips. The trip can be discerned by the fact that the OFF lamp lights and that the Type 2501 reads almost zero.

e) Note the reading on the Type 2501 immediately before the voltage limiter trips. It should be comprised between 15 and 18 V.

f) Return the rheostat to approximately the middle of its variable range, and throw the OUTPUT switch to ON. The ON lamp will light again. From the display on the Type 2501, ascertain that an output appears again.

g) By the above, whether the voltage limiter operates normally or not can be inspected.

2.4.4 Inspection of Polarity Switching

A. Instrument for Inspection

- Digital Voltmeter : YEW Type 2501

B. Procedure

a) Connect this instrument and Type 2501 as shown in Figure 2-2, and set the range and output of this instrument to 10 V.

b) Throw the OUTPUT switch to ON, and change the polarity switch to (+) and (−) alternately.

c) From the polarity displays on the Type 2501 at this time, ascertain that the output polarity of this instrument changes properly.

2.4.5 Line Regulation Inspection

A. Instruments for Inspection

- Digital Voltmeter :
  YEW Type 2501
  Accuracy; V ranges . . . ±0.005 %
- Portable AC Ammeter :
  YEW Type 2013-18
  Class; 0.5
- AC voltage regulator :
  Variable beyond rated line voltage ±10 %

B. Inspection Conditions

- Temperature and humidity :
  23 ± 5 °C, 75 % RH max.
- Power source :
  Rated line voltage ±10 %, 50/60 Hz
- Range : 100 mV

C. Procedure

a) Connect this instrument and Type 2501 as shown in Figure 2-2, and set the range and output of this instrument to 100 mV and 120 mV, respectively.

b) Using the ac voltage regulator and ac voltmeter, adjust the voltage supplied to this instrument to the rated line voltage, and record the reading on the Type 2501 at this time.

c) Set the voltage supplied to this instrument to the rated line voltage −10 % and +10 %, and record the readings on the Type 2501 in both cases.

d) Compare the values measured in b) and c) above. Their difference should be within ±0.02 % of the set range or within 20 μV.

2.4.6 Insulation Resistance Inspection

A. Instrument for Inspection

- Insulation Resistance Tester :
  YEW Type 3213-13 (500 V/100 MΩ)

B. Inspection Conditions

- Temperature and humidity :
  23 ± 5 °C, 75 % RH max.
- Applied voltage : 500 V dc

C. Procedure

a) Disengage the power plug of this instrument from the power line, and turn on the POWER switch.

b) Ascertain that the output terminal (–) and GUARD terminal are securely short-circuited by the shorting link.

c) Ascertain that the terminal ⏚ and CIRCUIT COMMON terminal are securely short-circuited by the shorting link.

d) Using the Type 3213-13, measure the insulation resistance between a conductor of the power cord and the ⏚ terminal. The value should be higher than 100 MΩ.

e) Measure the insulation resistance between the GUARD terminal and ⏚ terminal. The value should be higher than 100 MΩ.

2.4.7 Dielectric Strength Inspection

A. Instrument for Inspection

- Dielectric strength tester :
  Variable between 0 and 1500 V ac, provided with current limiter

B. Inspection Conditions

- Temperature and humidity :
  23 ± 5 °C, 75 % RH max.
- Applied voltages : See below

C. Procedure

a) Refer to 2.4.6 C. a), b) and c) above.

b) Set the current limiter of the dielectric strength tester to 10 mA.

c) Using the dielectric strength tester, apply a nearly sinusoidal wave of 1500 V, 50/60 Hz between a conductor of the power cord and the ⏚ terminal for one minute. This instrument should remain normal.

d) Apply a nearly sinusoidal wave of 100 V, 50/60 Hz between the ⏚ terminal and GUARD terminal for one minute. This instrument should remain normal.

2.5 Inspection (special)

NOTE

The following inspections need not be carried out every time the Type 2553 is inspected but only when a problem has occurred on a relevant item or when the inspection is expressly requested by the user.

2.5.1 Ripple and Noise Inspection

A. Instruments for Inspection

- Oscilloscope :
  TEKTRONIX Model 548B with Model 3A3 plugin or equivalent having sensitivity better than 100 μV/cm
- Insulation transformer
- Metal film resistor : 100 Ω ± 1 %, 2 W
  1 kΩ ± 1 %, 1/4 W
  10 kΩ ± 1 %, 1/4 W

B. Inspection Conditions

- Temperature and humidity :
  23 ± 5 °C, 75 % RH max.
- Power source :
  Rated line voltage, 50/60 Hz
- Inspection setup : As specified below

C. Ripple and Noise Inspection at Voltage Output

a) Connect this instrument, insulating transformer and oscilloscope with its frequency bandwidth set at 100 Hz, as shown in Figure 2-6.

b) Set the range and output of this instrument to 1 V and 1.0000 V, respectively.

c) Throw the OUTPUT switch of this instrument to ON and, using the oscilloscope, measure the ripple and noise in the output. Ascertain that the ripple or noise is less than 200 μV p-p or within ±0.01 % of range.

d) Proceed in the same way for the 100 mV and 10 V ranges.

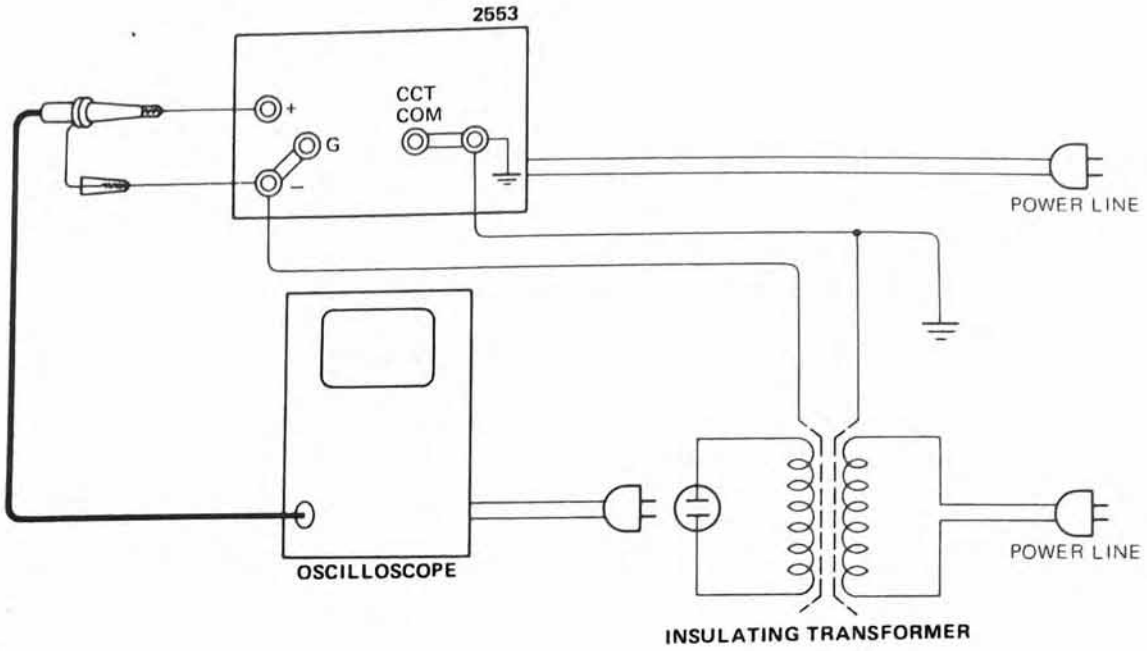


Figure 2-6. Setup for Ripple and Noise Inspection at Voltage Output.

D. Ripple and Noise Inspection at Current Output

a) Connect this instrument, insulating transformer and oscilloscope with its frequency bandwidth set at 100 Hz, and connect the resistor of 10 kΩ between the output terminals of this instrument.

b) Set the range and output of this instrument to 1 mA and 1.0000 mA, respectively.

c) Throw the OUTPUT switch of this instrument to ON and, using the oscilloscope, measure the ripple and noise in the voltage developed across the load resistor of 10 kΩ. Ascertain that the

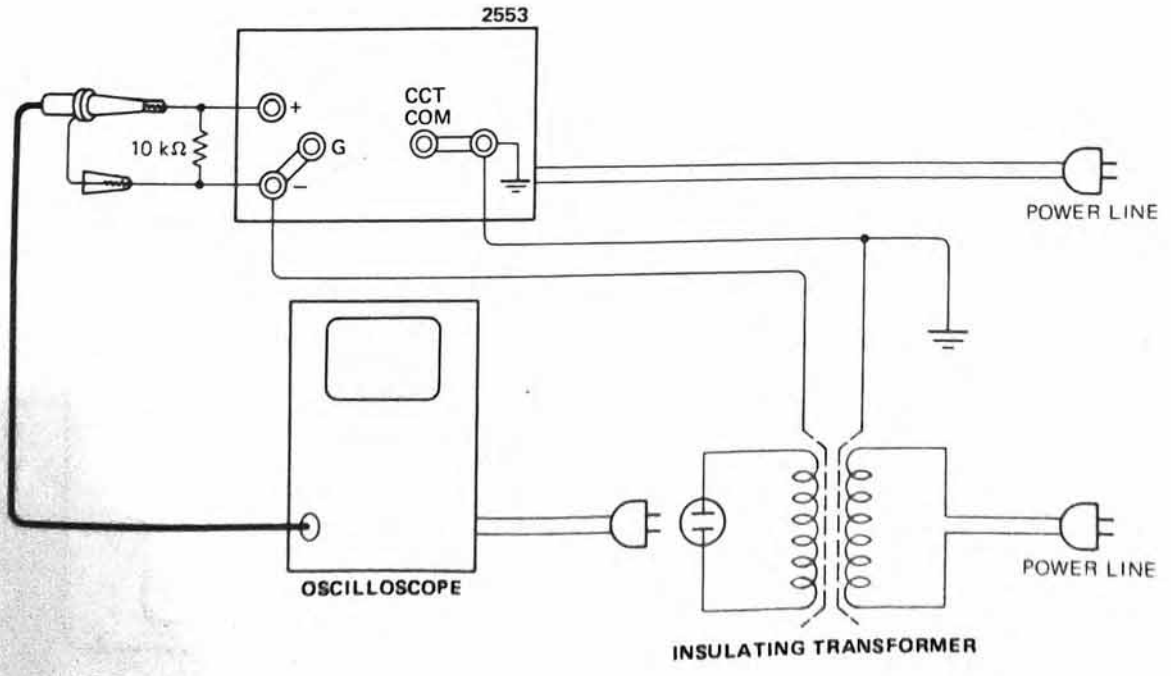


Figure 2-7. Setup for Ripple and Noise Inspection at Current Output.

ripple or noise is 10 mV p-p (1 μA p-p in terms of current) or within ±0.05 % of range.

d) Repeat the same procedure for the 10 mA and 100 mA ranges replacing the load resistor with 1 kΩ and 100 Ω, respectively, and the specified accuracy changed to read within ±0.01 % of range.

2.5.2 Inspection of Common Mode Rejection Ratio

A. Instruments for Inspection

- AC Voltage/Current Standard :
  YEW Tyep 2858/2558
  Accuracy; ±0.1 % of rated value
- DC Voltage Standard :
  YEW Type 2552
  Accuracy; ±0.005 % of setting
- Digital Voltmeter :
  YEW Type 2501
  Accuracy; V ranges .... ±0.005 %
  mV ranges ... ±0.01 %
- Standard Resistor :
  YEW Type 2792 (1 kΩ)
  Tolerance; ±0.005 %
- Oscilloscope:
  Having sensitivity better than 100 μV/cm

B. Inspection Conditions

- Temperature and humidity :
  23 ± 5 °C, 75 % RH max.
- Power soruce :
  Rated line voltage, 50/60 Hz
- Inspection setup : As specified below

C. DC CMRR Inspection as Voltage Standard

a) Connect this instrument, Type 2501 and Type 2552 as shown in Figure 2-8.

b) Set the range and output of this instrument to 1 V and 1.0000 V, respectively.

c) By the Type 2501, read the output voltage of this instrument when the dc common mode voltage is zero.

d) By the Type 2552, apply a dc common mode voltage of 100 V between the two points illustrated below, and read the output voltage of this instrument by the Type 2501.

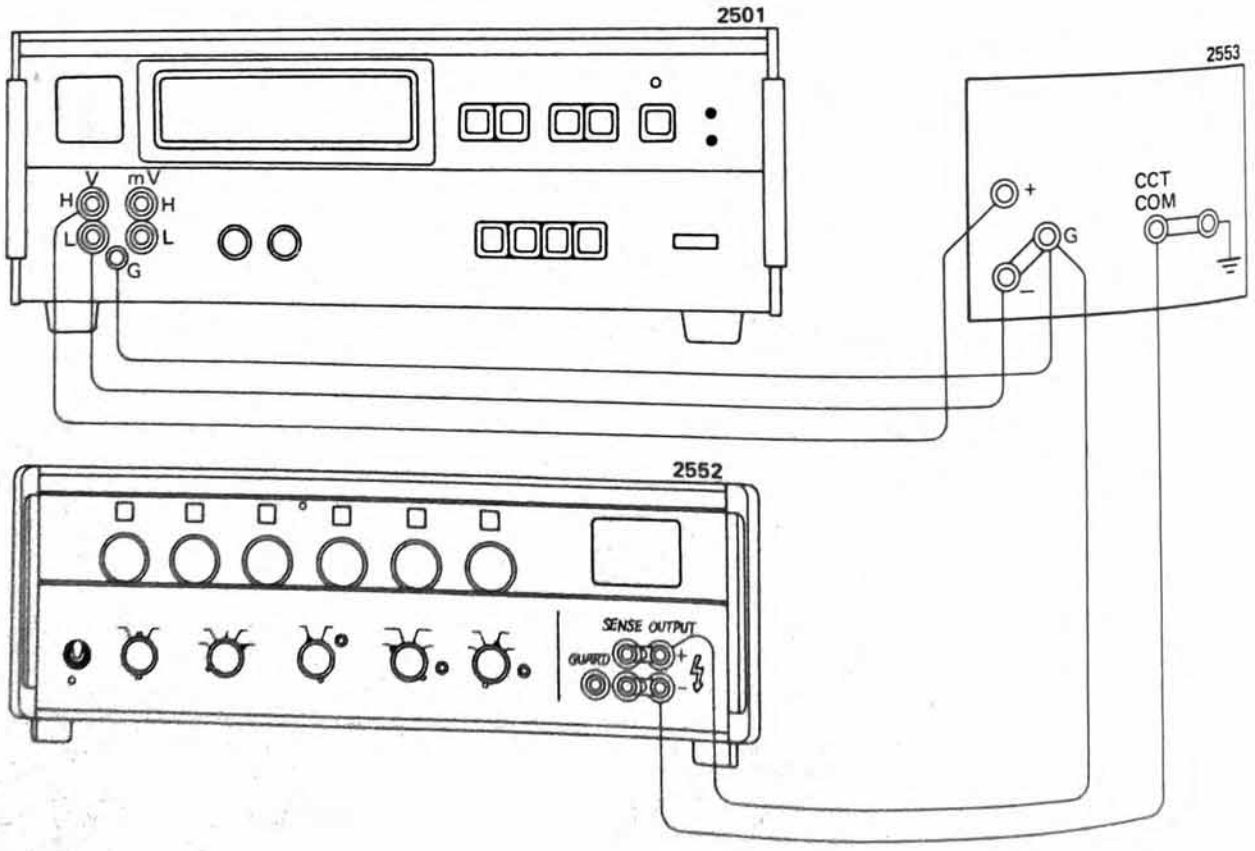


Figure 2-8. Setup for DC CMRR Inspection as Voltage Standard.

e) Compare the values measured in c) and d) above. Their difference should be within 100 μV. It denotes that the dc common mode rejection ratio of this instrument is better than 120 dB.

D. AC CMRR Inspection as Voltage Standard

a) Connect this instrument, oscilloscope and Type 2858 as shown in Figure 2-9.

b) Set the range and output of this instrument to 1 V and 1.0000 V, respectively.

c) Set the oscilloscope sensitivity and mode to 100 μV/div and AC, respectively.

d) Set the oscillation frequency of the Type 2858 equal to the line frequency, apply an ac common mode voltage of 200 V p-p (71 V rms) between the two points illustrated below, and measure the peak-to-peak value of the line frequency component in the output voltage of this instrument. Ascertain that it is less than 200 μV p-p.

e) When it is less than 200 μV p-p it denotes that the ac common mode rejection ratio of this instrument is better than 120 dB.

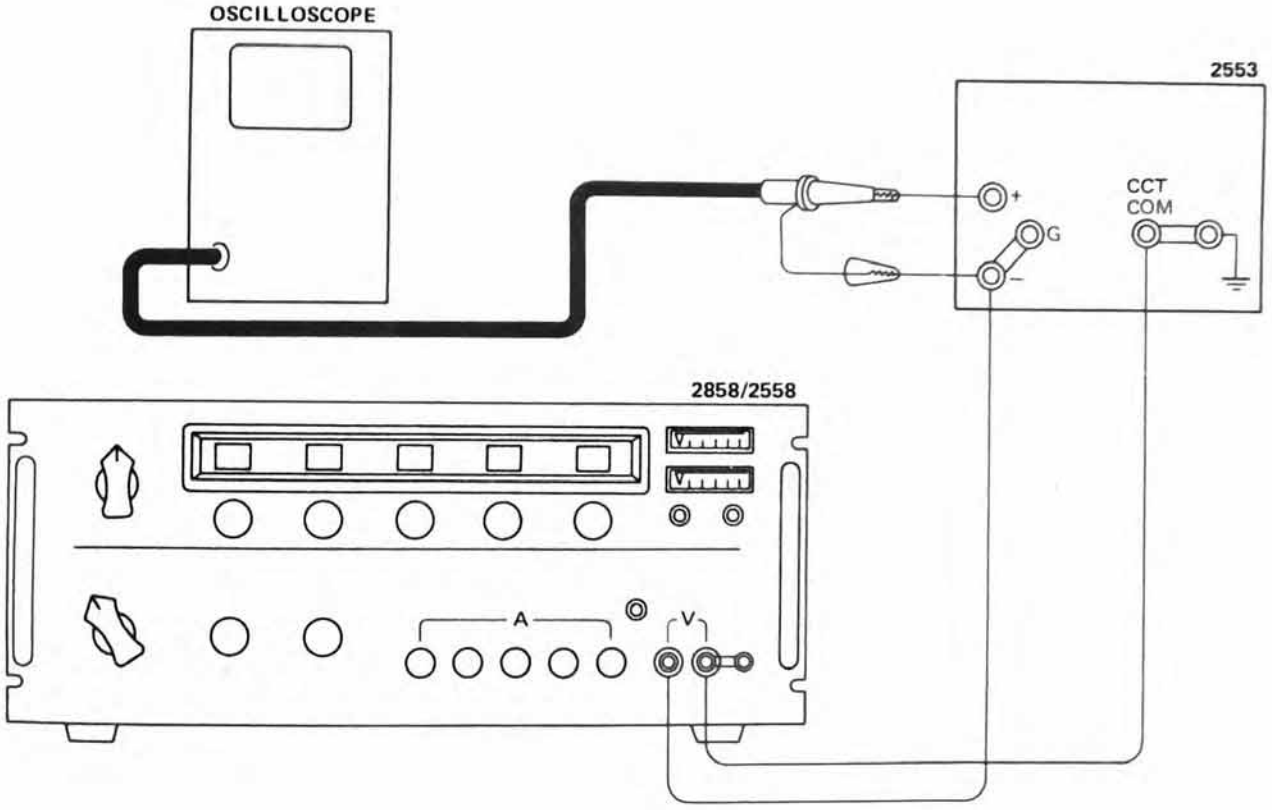


Figure 2-9. Setup for AC CMRR Inspection as Voltage Standard.

E. DC CMRR Inspection as Current Standard

a) Connect this instrument, Type 2501, Type 2792 (1 kΩ) and Type 2552 as shown in Figure 2-10.

b) Set the range and output of this instrument to 1 mA and 1.0000 mA, respectively.

c) By the Type 2501, read the voltage drop across the Type 2792 (1 kΩ) when the dc common mode voltage is zero.

d) By the Type 2552, apply a dc common mode voltage of 100 V between the two points illustrated below, and measure the voltage drop across the Type 2792 at this time.

e) Compare the values measured in c) and d) above. Their difference should be within 10 mV. It denotes that the dc common mode rejection ratio of this instrument is smaller than 0.1 μA/V.

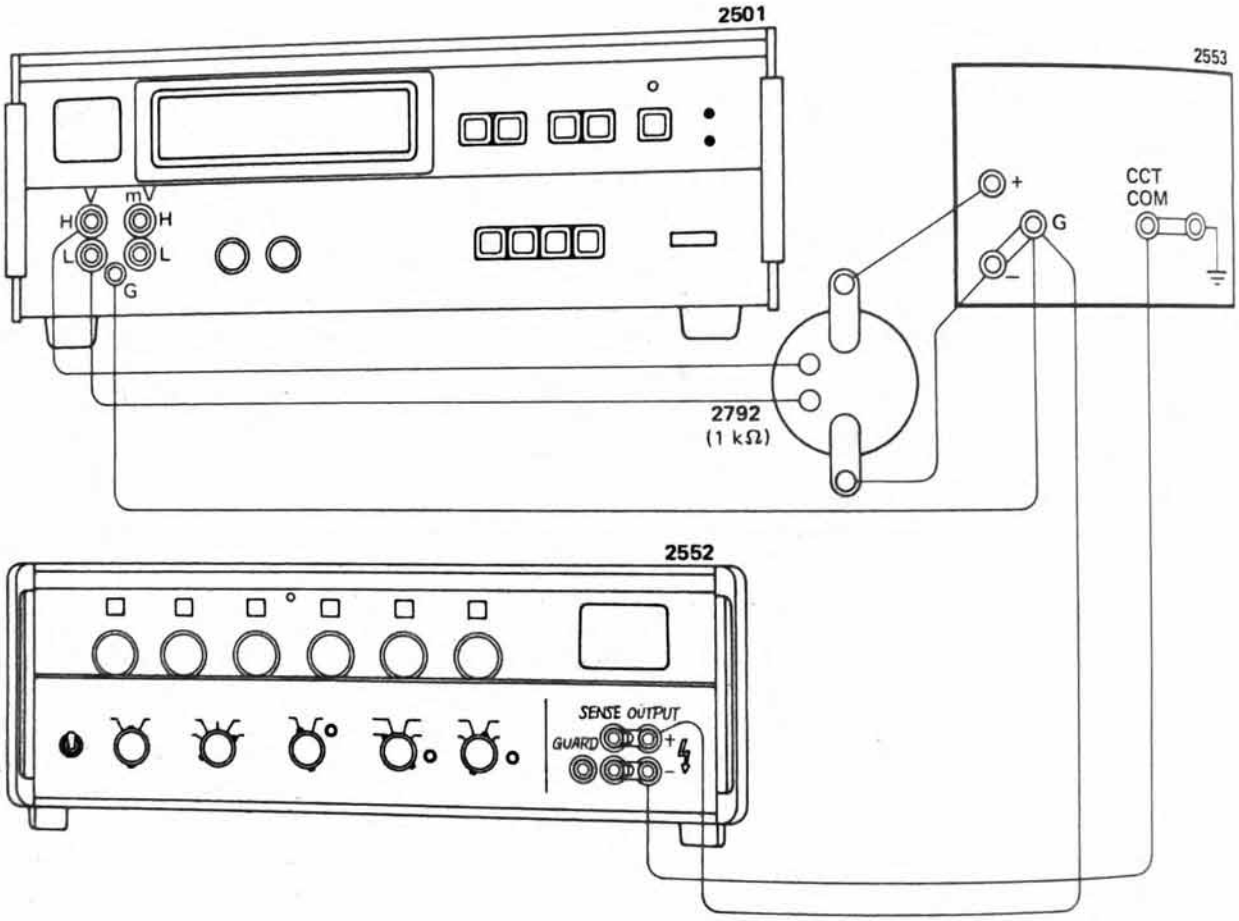


Figure 2-10. Setup for DC CMRR Inspection as Current Standard.

F. AC CMRR Inspection as Current Standard

a) Connect this instrument, oscilloscope, Type 2792 (1 kΩ) and Type 2858 as shown in Figure 2-11.

b) Set the range and output of this instrument to 1 mA and 1.0000 mA, respectively.

c) Set the oscilloscope sensitivity to 5 mV/div, and the Type 2858 oscillation frequency to the line frequency.

d) Apply an ac common mode voltage of 200 V p-p (71 V rms) between the two points illustrated below, and measure the peak-to-peak value of the line frequency component in the voltage drop across the Type 2792. Ascertain that the value is less than 20 mV p-p.

e) When the value is less than 20 mV p-p it denotes that the ac common mode rejection ratio of this instrument is smaller than 0.1 μA/V.

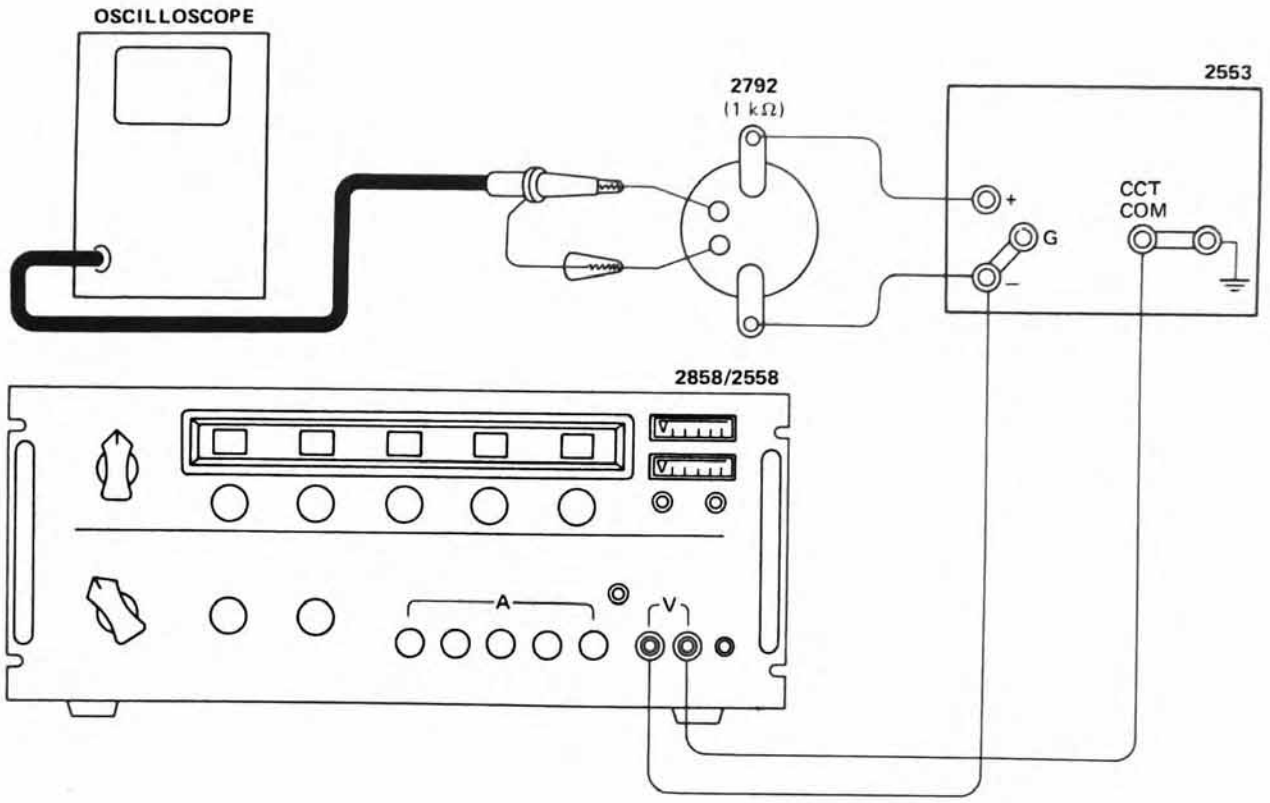


Figure 2-11. Setup for AC CMRR Inspection as Current Standard.

3. TROUBLESHOOTING

3.1 Introduction

This chapter comprises a troubleshooting flowchart as a guide to "locate the malfunction of this instrument", display check by an incorporated test program with a GP-IB card installed, and S.A. (Signature Analysis) newly adopted this time for locating malfunctions of CPU card assemblies which worry us routinely.

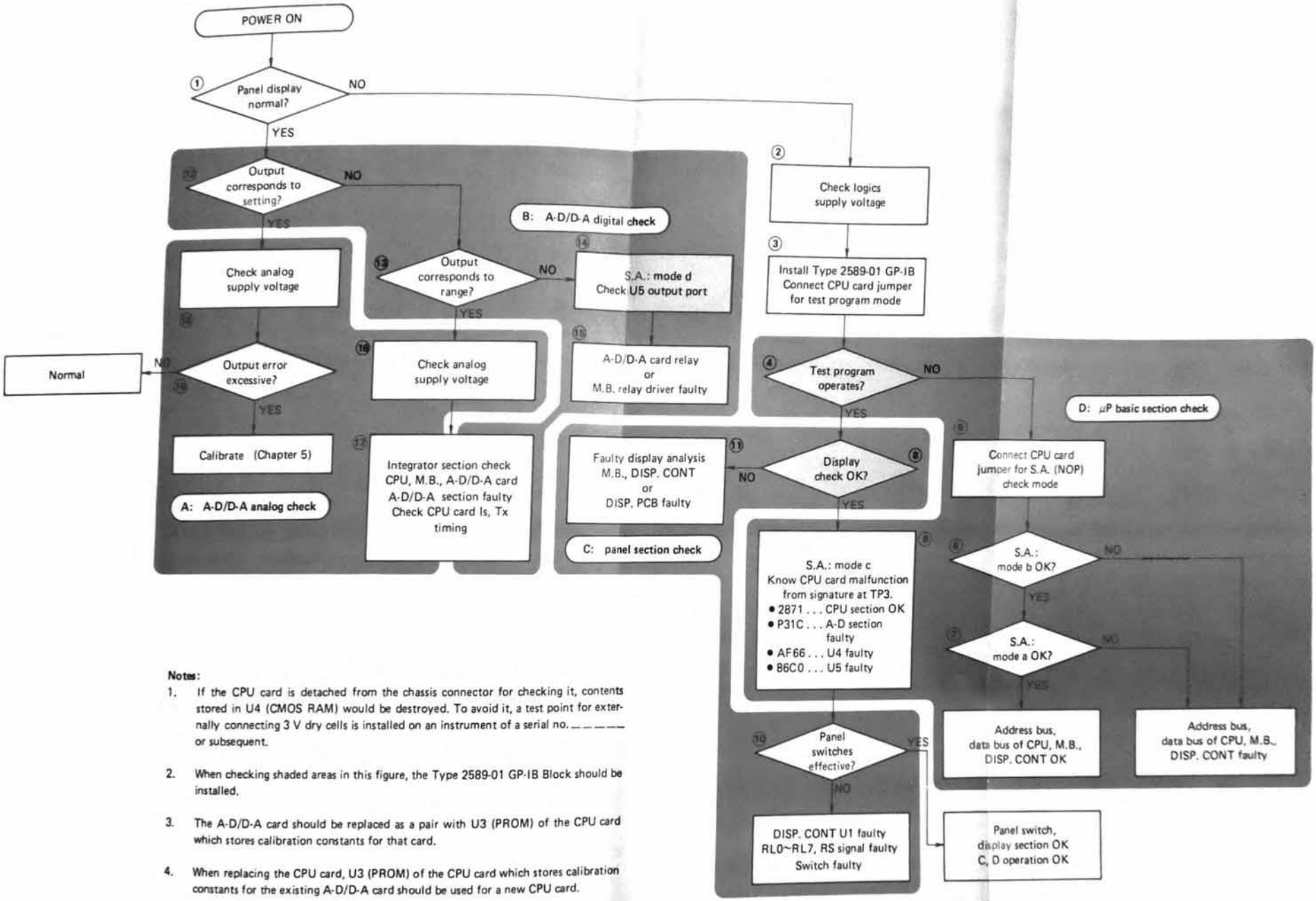
3.2 Instruments for Servicing

- Oscilloscope
- Signature Analyzer : hp Model 5004A
- Digital Voltmeter : YEW Type 2501
- GP-IB Block : YEW Type 2589-01
- Extension card : B9268WR

3.3 Flowchart

Figure 3-1 is a troubleshooting flowchart for this instrument. According to the chart, get a rough idea of "where in the instrument the malfunction lies".

The troubleshooting is roughly divided for four sections A: A-D/D-A analog section, B: A-D/D-A digital section, C: panel section and D: microprocessor (μP) basic section (see Figures 3-2 ~ 5).



Notes:

1. If the CPU card is detached from the chassis connector for checking it, contents stored in U4 (CMOS RAM) would be destroyed. To avoid it, a test point for externally connecting 3 V dry cells is installed on an instrument of a serial no. _____ or subsequent.
2. When checking shaded areas in this figure, the Type 2589-01 GP-IB Block should be installed.
3. The A-D/D-A card should be replaced as a pair with U3 (PROM) of the CPU card which stores calibration constants for that card.
4. When replacing the CPU card, U3 (PROM) of the CPU card which stores calibration constants for the existing A-D/D-A card should be used for a new CPU card.
5. After analog parts of the A-D/D-A card are replaced, calibration should be performed. For calibration, see Chapter 5.

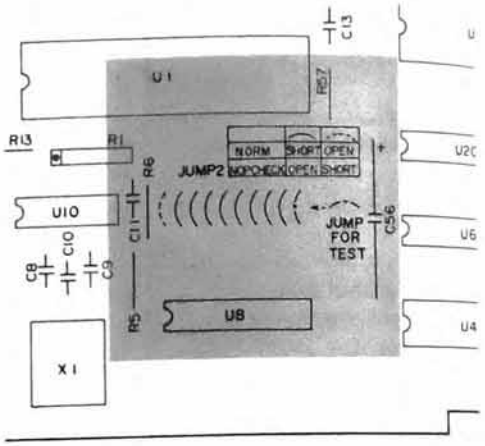
Figure 3-1. Troubleshooting Flowchart.

3.4 Troubleshooting Procedure

<table>
<tr><th>Classif.</th><th>No.</th><th>Item</th><th>Check Point</th><th>Remarks</th></tr>
<tr><td></td><td>1</td><td>Panel display normal?</td><td>1.1 Panel display changed according to switch setting?
• Range change ⟶ point location, unit
• X n/m-dials ⟶ X n/m-lamp lit when m ≠ n
• Setting dials ⟶ display increases and decreases at each digit?
OK ⟶ to 12
No response at all to all setting switches ⟶ to 2
Response abnormal to certain switches ⟶ to 5</td><td>Set value display:
10 V, 1 V, 100 mV, 10 mV
100 mA, 10 mA, 1 mA
PR, CA, CRC, CC, IC
R.J. TEMP
} . . . . . direct reading
Type 2563: direct reading when Voltage Unit range is selected
Type 2564: 1.0000/rated value, without unit</td></tr>
<tr><td></td><td>2</td><td>Check logics supply voltage</td><td>2.1 Check +5 V, +6.2 V (for photocoupler, relay)
OK ⟶ to 3</td><td>Measure voltage between pins of mother board connector: CN101
<table><tr><th>Rated Value</th><th>Permissible Range</th><th>Test Point</th></tr><tr><td>5 V</td><td>4.8 ~ 5.2 V</td><td>③, ④ – ①, ②</td></tr><tr><td>6.2 V</td><td>6.0 ~ 6.7 V</td><td>⑤, ⑥ – ①, ②</td></tr></table></td></tr>
<tr><td></td><td>3</td><td>Install GP-IB Block
Set test program mode</td><td>3.1 Designate test program mode
Short-circuit position marked ⟨*⟩ of CPU card assembly: B9268WD ⟶ to 4</td><td>Execution of test program destroys calibration constant information in CMOS RAM</td></tr>
<tr><td>D</td><td>4</td><td>Test program operates?
GP-IB Block</td><td>4.1 After turning on power, perform display test of LEDs, LED numerical indicators
Illuminating order . . . . illumination increments about every second
<table><tr><th></th><th colspan="2">Numerical Indicators</th><th rowspan="2">Other LEDs</th></tr><tr><th></th><th>Polarity</th><th>Numeric</th></tr><tr><td>Turn on power →</td><td>−</td><td>1 7 6 5 4</td><td>OUTPUT-ON</td></tr><tr><td></td><td>+</td><td>1 7 6 5 4</td><td>INT. R.J.</td></tr><tr><td></td><td>+</td><td>1 7 6 5 4</td><td>REMOTE</td></tr><tr><td></td><td>+</td><td>1 7 6 5 4</td><td>mV</td></tr><tr><td></td><td>+</td><td>1 7 6 5 4</td><td>V</td></tr><tr><td></td><td>+</td><td>1 7 6 5 4</td><td>mA</td></tr><tr><td></td><td>+</td><td>1 7 6 5 4</td><td>°C</td></tr><tr><td></td><td>+</td><td>1 7 6 5 4</td><td>X n/m</td></tr><tr><td>*1</td><td>+</td><td>1.7.6.5.4</td><td>X n/m</td></tr></table>Display increments ⟶ to 8
Display does not increment ⟶ to 5</td><td>After display test is performed, display of *1 is maintained.

Only check here if display increments, disregarding whether certain LEDs or numerical indicators do not light or light unduly.</td></tr>
</table>

(Cont'd)

Classif.	No.	Item	Check Point	Remarks
D	5	Designate NOP*1 check	5.1 Designate CPU card jumpers as follows: • Symbol ⌒*⌒ ... short-circuit • Symbol ⌒*2⌒ ... open-circuit • Symbol ⌒ ... short-circuit → to **6**	*1 NOP: NO OPERATION CHECK *2 Cut 8 jumper patterns wired on parts side taking care not to damage other patterns 
D	6	S.A. mode b OK? S.A.	Before S.A. check, ascertain 5 MHz at pin 1 of CPU card U1 6.1 Set signature analyzer (Mode b: address bus*1 check) • Mode b OK with CPU + DISP. CONT + GP-IB → to **7** • Mode b NG with CPU + DISP. CONT + GP-IB → to **6.2** 6.2 Mode b check removing GP-IB Block (2589-01), DISP. CONT (B9268WS) • Mode b OK with CPU only → GP-IB A12 ~ A15, CS1 faulty or DISP. CONT CS4 faulty • Mode b NG even with CPU only → CPU A12 ~ A15, CS0 ~ CS5 faulty or mother board CS0 ~ CS5 faulty	*1 Address bus: should be on U1 pins 21 ~ 28 (A8 ~ A15) Signature table (mode b) • CPU card

5004A Gating Lead	CPU Card Test Point	5004A Switch Setting
START	TP7 (A15)	⌐
STOP	TP7 (A15)	⌐
CLOCK	TP5 ($\overline{\text{MEMR}}$)	⌐
GND	COM	

Signal Name	Check Point					Signature
A12	U1-25	U7-15			56R	b-HAP7
A13	U1-26	U7-14			55R	b-3C96
A14	U1-27	U7-13			54R	b-3827
A15	U1-28	U7-12			53R	b-755P
$\overline{\text{=0XXX}}$	U7-1	U2-20, 21	U11-13		31R	b-CA11
$\overline{\text{=2XXX}}$	U7-3	U5-7	U11-4			b-A3UH
$\overline{\text{=3XXX}}$	U7-4		U11-5			b-AA6A
$\overline{\text{=4XXX}}$	U7-5				29R	b-A711
$\overline{\text{=5XXX}}$	U7-6	U3-13, 14	U11-12	U4-19	32R	b-54F5
$\overline{\text{=7XXX}}$	U7-9				30R	b-826U
			U11-3	U8-19		b-PPH5
			U11-6	U5-8		b-0997
+5 V						b-0001

Connector terminal no. ↑ Mode ↑

(Cont'd)

Classif.	No.	Item	Check Point	Remarks
D	6	**S.A. mode b OK?** [S.A.]	6.3 Faulty signal line • Certain signals display same S.A. pattern ⟶ signal lines short-circuited, bridged • Perform check by successively tracing back signal line	• Display Control card
D	7	**S.A. mode a OK?** [S.A.]	7.1 Set signature analyzer (Mode a: data bus check)	Signature table (mode a) Note 1: Signature in column marked *1 is applied to CPU card whose U2 is μPD2332C-71 Note 2: Signature in column marked *2 is applied to CPU card whose U2 is μPD2332C-207

Display Control card

Signal Name	Check Point		Signature
$\overline{\#4XXX}$	29	U1-22	b-A711
	↑ Connector terminal no.		↑ Mode

5004A Gating Lead	CPU Card Test Point	5004A Switch Setting
START	TP6 ($\overline{\#0XXXX}$)	⌐
STOP	TP6 ($\overline{\#0XXXX}$)	⌐
CLOCK	TP5 ($\overline{MEMR}$)	⌐
GND	COM	

Mode a OK ⟶ to 8

Mode a NG ⟶ mode a check removing GP-IB Block, DISP. CONT

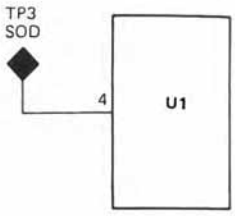
- Mode a OK with CPU card only ⟶ GP-IB Block, DISP. CONT AD0 ~ AD7 faulty
- Mode a NG even with CPU card only ⟶ CPU card, mother board AD0 ~ AD7, A0 ~ A7 faulty

CPU card

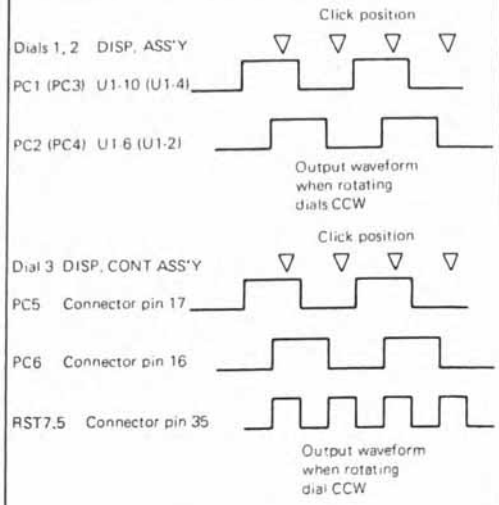
Signal Name	Check Point					*1 Signature	*2 Signature
A8	U1-21	U2-23			60R	a-5H21	a-5H21
A9	U1-22	U2-22			59R	a-19H6	a-19H6
A10	U1-23	U2-19			58R	1-HP66	a-HP66
A11	U1-24	U2-18			57R	a-7A70	a-7A70
A0	U6-2	U2-8	U3-5	U4-4	34L	a-7P25	a-7P25
A1	U6-5	U2-7	U3-6	U4-3	33L	a-2A1F	a-2A1F
A2	U6-6	U2-6	U3-7	U4-2	32L	a-A206	a-A206
A3	U6-9	U2-5	U3-4	U4-1	31L	a-C133	a-C133
A4	U6-12	U2-4	U3-3	U4-21	30L	a-8P3U	a-8P3U
A5	U6-15	U2-3	U3-2	U4-5	29L	a-3319	a-3319
A6	U6-16	U2-2	U3-1	U4-6	28L	a-7C47	a-7C47
A7	U6-19	U2-1	U3-15	U4-7	27L	a-C25F	a-C25F
D0	U2-9	U8-18	U3-12			a-59A8	a-PA07
D1	U2-10	U8-16	U3-11			a-F1H4	a-13C3
D2	U2-11	U8-14	U3-10			a-FHP2	a-6U2U
D3	U2-13	U8-12	U3-9			a-2C9H	a-6686
D4	U2-14	U8-2	U4-10			a-7778	a-966U
D5	U2-15	U8-4	U4-12			a-CUF0	a-2P42
D6	U2-16	U8-6	U4-14			a-2UC9	a-9211
D7	U2-17	U8-8	U4-16			a-1CCC	a-9F80
AD0	U8-17	U5-12			52R	a-59A8	a-PA07
AD1	U8-15	U5-13			51R	a-F1H4	a-13C3
AD2	U8-13	U5-14			50R	a-FHP2	a-6U2U
AD3	U8-11	U5-15			49R	a-2C9H	a-6686
AD4	U8-3	U5-16	U4-9		48R	a-7778	a-966U
AD5	U8-5	U5-17	U4-11		47R	a-CUF0	a-2P42
AD6	U8-7	U5-18	U4-13		46R	a-2UC9	a-9211
AD7	U8-9	U5-19	U4-15		45R	a-1CCC	a-9F80
+5 V						a-826P	a-826P
						↑ Connector terminal no.	↑ Mode

Display Control Card

Signal Name	Check Point		*1 Signature	*2 Signature
AD0	52	U1-12	a-59A8	a-PA07
AD1	51	U1-13	a-F1H4	a-13C3
AD2	50	U1-14	a-FHP2	a-6U2U
AD3	49	U1-15	a-2C9H	a-6686
AD4	48	U1-16	a-7778	a-966U
AD5	47	U1-17	a-CUF0	a-2P42
AD6	46	U1-18	a-2UC9	a-9211
AD7	45	U1-19	a-1CCC	a-9F80
A8	60	U1-21	a-5H21	a-5H21
	↑ Connector terminal no.		↑ Mode	

<table>
<tr><th>Classif.</th><th>No.</th><th>Item</th><th>Check Point</th><th>Remarks</th></tr>
<tr><td>C</td><td>8</td><td>Display check OK?
GP-IB Block</td><td>8.1 In conditions in 4 above, display of LEDs and numerical indicators perfect?
YES ——→ to 11
NO ——→ to 9</td><td></td></tr>
<tr><td>D</td><td>9</td><td>S.A. mode c OK?
S.A.</td><td>9.1 Set signature analyzer
(Mode c: check A-D section, RAM section)
• Install GP-IB Block, DISP. CONT
<table>
<tr><th>5004A Gating Lead</th><th>CPU Card Test Point</th><th>5004A Switch Setting</th></tr>
<tr><td>START</td><td>TP3 (SOD)</td><td>⌐</td></tr>
<tr><td>STOP</td><td>TP3 (SOD)</td><td>¬</td></tr>
<tr><td>CLOCK</td><td>TP5 (MEMR)</td><td>⌐</td></tr>
<tr><td>GND</td><td>COM</td><td></td></tr>
<tr><td>2553
X n/m-dials</td><td colspan="2">m = n = 1</td></tr>
</table>
9.2 Judge signature
Signature at TP3
2871 ——→ CPU section OK ——→ to 10
P31C ——→ A-D section faulty
AF66 ——→ CPU card U4 faulty
86C0 ——→ CPU card U5 faulty
Others ——→ S.A. test program does not operate ——→ to 4
• Test program is automatically started after turning on power (after display check)</td><td>Here check RAMs (RANDOM ACCESS MEMORIES: U4, U5) with S.A. pattern generated by test program
<table>
<tr><th>Signature</th><th>Judgement</th></tr>
<tr><td>2871</td><td>CPU normal</td></tr>
<tr><td>P31C</td><td>A-D section faulty</td></tr>
<tr><td>AF66</td><td>U4 faulty</td></tr>
<tr><td>86C0</td><td>U5 faulty</td></tr>
</table>

</td></tr>
<tr><td>C</td><td>10</td><td>Panel switches effective?</td><td>10.1 Change jumper designation on CPU card
• Symbol ⌒ . . . open-circuit
• Symbol ⌒ . . . short-circuit
• Symbol ⌒ . . . open-circuit
10.2 Perform operation according to program of Type 2553 by turning on power
10.3 Check if panel switches (X n/m, range, polarity, OUTPUT ON/OFF) are effective
OK ——→ to 10.4
All ineffective ——→ DISP. CONT or U1, U2 faulty
Certain switches ineffective ——→ U1 or RL0 ~ RL7 signal lines, row designation signal line faulty</td><td>Information of input address map.
Panel switch is read by time sharing as follows from RL0 ~ RL7 lines of DISP. CONT U1:
<table>
<tr><th>ROW</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th></tr>
<tr><td>RL7</td><td>OUT. ON</td><td>+</td><td rowspan="4">m-dial
d
c
b
a</td><td rowspan="4">Range dial
d
c
b
a</td><td>1000 V</td><td></td><td>DEV</td></tr>
<tr><td>RL6</td><td>OUT. OFF</td><td>–</td><td>500 V</td><td>SWEEP 35 s</td><td></td></tr>
<tr><td>RL5</td><td>Dial 1</td><td>ENT</td><td>100 V</td><td>⌐</td><td></td></tr>
<tr><td>RL4</td><td>Dial 1</td><td></td><td></td><td>¬</td><td></td></tr>
<tr><td>RL3</td><td>Dial 2</td><td></td><td rowspan="4">n-dial
d
c
b
a</td><td></td><td></td><td></td><td>PRINT</td></tr>
<tr><td>RL2</td><td>Dial 2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>RL1</td><td></td><td>NORM</td><td></td><td></td><td></td><td></td></tr>
<tr><td>RL0</td><td>Dial 3</td><td>GP-IB IN</td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
</table>

(Cont'd)

Classif.	No.	Item	Check Point	Remarks
C	10	**Panel switches effective?**	10.4 When dials 1 ~ 3 are abnormal, observe output signals by oscilloscope when rotating dials	Notes: 1. ROW addresses 1 ~ 7 correspond to outputs of U2 pins 2 ~ 9 (pin 8: COM) (dynamically read at all times). Information of switches designated by ROW addresses is read through RL0 ~ RL7.
				2. At ROW addresses 5 ~ 7, information of switches in Type 2563 Voltage Unit in usage as Type 2560 DC Calibration Set is read 3. ENT, NORM, GP-IB IN information is read from CPU card, GP-IB Block 4. m, n, range dial output codes are as shown below:

	CCW	CW
Q1 U6-5	H	L
Q2 U6-9	L	H

Q1, Q2 are rotating direction discriminating signals for dial 3. Output is as shown in table above when rotating by 2 clicks or more in same direction.

OK ⟶ to **12**

m	n	Range	Output Code d	c	b	a
	0	Type 2564	0	0	0	0
1	1	100 mA	0	0	0	1
2	2	10 mA	0	0	1	1
3	3	1 mA	0	0	1	0
4	4	R.J. TEMP	0	1	1	0
5	5	PR	0	1	1	1
6	6	CA	0	1	0	1
7	7	CRC	0	1	0	0
8	8	IC	1	1	0	0
9	9	CC	1	1	0	1
10	10	10 mV	1	1	1	1
11	11	100 mV	1	1	1	0
12	12	1 V	1	0	1	0
13	13	10 V	1	0	1	1
14	14	Type 2563	1	0	0	1
15	15		1	0	0	0

	RL0 ~ RL7 Level	Switch
"1"	+5 V	Open
"0"	0 V	Short

C	11	**Faulty display analysis**	11.1 Certain digits faulty ⟶ RS0 ~ RS2 faulty Check DISP. CONT RS0 ~ RS2	Display is 8-digit dynamic type. Row designation signal is common to switch read row signal of 10 above.

RS2	L L L L H H H H
RS1	L L H H L L H H
RS0	L H L H L H L H
ROW No.	0 1 2 3 4 5 6 7

RS0 ~ RS2 repeat operation in above table at all times

Certain display pattern faulty ⟶ PA0 ~ PA3, PB0 ~ PB3 faulty

OK ⟶ to **9**

Dynamic Display Map

	ROW 0	1	2	3	4	5	6	7
PA3								
PA2	+	+	OUTPUT ON	EXT R.J.	REMOTE	+	−	
PA1	mV	V	mA	°C	n/m	SWEEP		
PA0	•	•	•	•	•	•		
PB3						d		
PB2			Output set value			c	Deviation display	
PB1	1	2	0	0	0	b	0	0 0
PB0						a		

Note: LEDs of ROW addresses 5 ~ 7 are mounted on Type 2563 Voltage Unit

(Cont'd)

Classif.	No.	Item	Check Point	Remarks
B	12	Output corresponds to setting?	12.1 Accuracy should be within ±7 % YES ——→ to **18** NO ——→ to **13**	
B	13	Output corresponds to range?	13.1 Notice output order (absolute value does not matter) (Ex.) When 10000 is set, (1 V range output) ≈ 1/10 (10 V range output)? YES ——→ to **16** NO ——→ to **14**	
B	14	S.A. check mode d OK? S.A. GP-IB Block	14.1 Set signature analyzer (Mode d: relay drive signal check) 14.2 Change jumper designation on CPU card • Symbol ⌒ ... short-circuit This test program is automatically started after turning on power and display check • Also check if correct signature is obtained at Q206, Q207 input on mother board OK ——→ to **15**	Signature table (mode d) • CPU card
B	15	Relay operation check	15.1 Remove short-circuit at ⌒ on CPU card 15.2 Turn on power and check if relay on A-D/D-A card operates properly by range changeover Anomaly of relay operation • Faulty relay driver section on mother board, A-D/D-A card • Relay contact faulty OK ——→ to **16**	Except RL7, relay contact operation is visible on A-D/D-A card (employed relays are housed in transparent plastic case)

5004A Gating Lead	CPU Card Test Point	5004A Switch Setting
START	TP3 (SOD)	⌐
STOP	TP3 (SOD)	¬
CLOCK	TP5 (MEMR)	⌐
GND	COM	
2553 X n/m-dials	m = 1, n = 0	

Signal Name	Check Point				Signature
PA0	U5-21	U12-1			d-6CHA
PA1	U5-22	U12-10			d-UHAC
PA2	U5-23	U12-9			d-338P
PA3	U5-24	U12-11	U17-9, 10		d-U720
PA4	U5-25	U17-5			d-62U0
PA5	U5-26	U16-5		17R	d-H8P0
PA6	U5-27	U16-4		18R	d-9AP6
PA7	U5-28			16R	d-F393
PB0	U5-29			13R	d-1336
PB1	U5-30			14R	d-07FF
PB2	U5-31	U16-10		7R	d-U980
PB3	U5-32			12R	d-3014
PB4	U5-33			9R	d-0282
PB5	U5-34			10R	d-504H
PB6	U5-35	U11-9		25R	d-09CH
PB7	U5-36	U11-10		26R	d-37A6

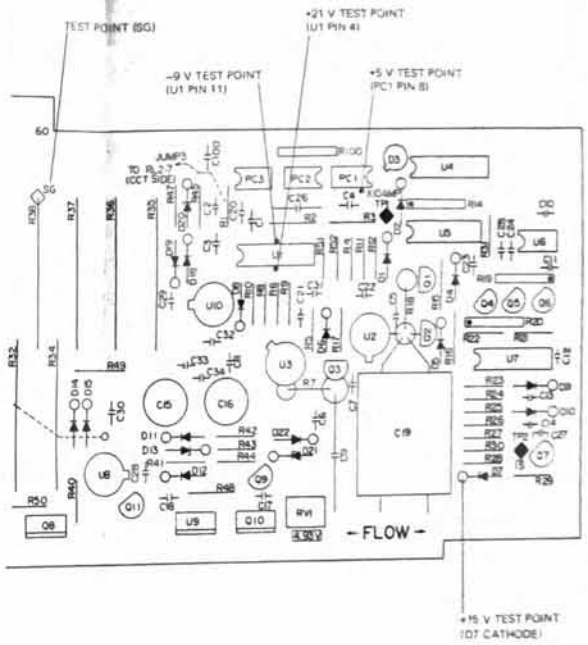
Connector terminal no. ↑ Mode ↑

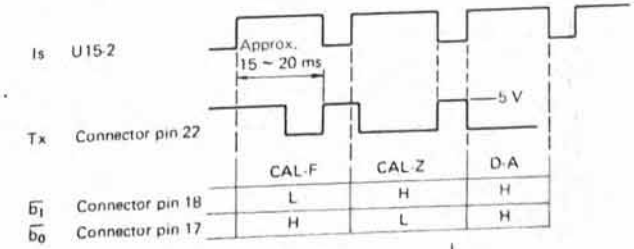
RELAYS TABLE

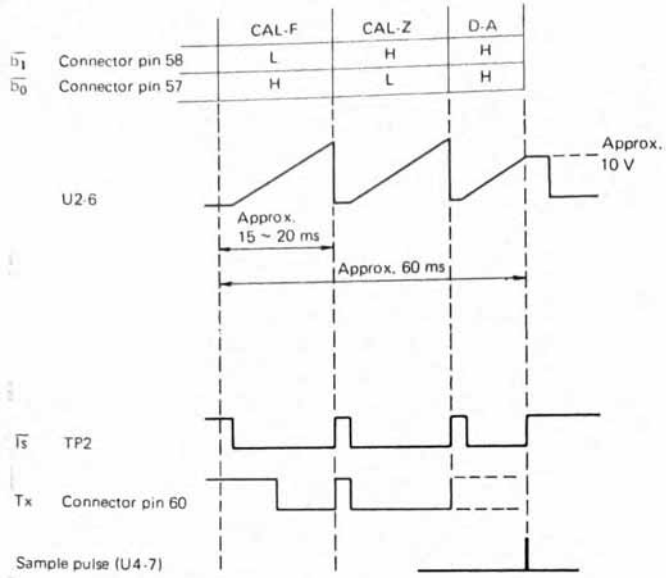
(O MAKE, X BREAK, – DON'T CARE)

RANGE	RL1	RL2	RL3	RL4	RL5	RL6	RL7
10 V	O	O	–	X	X	–	O
1 V	O	O	–	X	X	–	X
100 mV	X	X	–	O	X	–	O
10 mV	X	X	–	X	O	–	O
50 mV (TMP)	X	X	–	O	X	–	X
100 mA	X	O	–	O	X	–	O
10 mA	X	O	–	X	O	–	O
1 mA	X	O	–	X	X	–	O
STAND BY/OUTPUT ON	–	–	–	–	–	X/O	–
+/–	–	–	X/O	–	–	–	–

(Cont'd)

<table>
<tr><th>Classif.</th><th>No.</th><th>Item</th><th>Check Point</th><th>Remarks</th></tr>
<tr><td>A</td><td>16</td><td>Check analog supply voltage</td><td>16.1 Check analog power supply on A-D/D-A card
<table><tr><th>Rated Value</th><th>Permissible Range</th><th>Test Point</th></tr><tr><td>21 V</td><td>20.2 ~ 22.2 V</td><td>U1 pin 4 – SG</td></tr><tr><td>15 V</td><td>13.8 ~ 15.6 V</td><td>D7 cathode – SG</td></tr><tr><td>5 V</td><td>4.8 ~ 5.4 V</td><td>PC1 pin 8 – SG</td></tr><tr><td>–9 V</td><td>–8.9 ~ –9.7 V</td><td>U1 pin 11 – SG</td></tr></table>OK ⟶ to 17</td><td> 
</td></tr>
<tr><td>A
B</td><td>17</td><td>Integrator section check</td><td>17.1 Check A-D, D-A sections (Is, Tx sections) on CPU, M.B., A-D/D-A cards

A-D/D-A drive waveforms at normal operation (CPU card OUT-GUARD section)
• 1 V output at 1 V range
• CPU card
 
</td><td>A-D/D-A card repeats A-D, D-A operations at all times</td></tr>
</table>

Classif.	No.	Item	Check Point	Remarks
A B	17	**Integrator section check**	• Analog section waveforms A-D/D-A operation cycle (10 V output at 10 V range) • A-D/D-A card  OK ⟶ to **19**	
A	18	**Check analog supply voltage**	18.1 Check analog power supply on A-D/D-A card ⟶ see **16**	
A	19	**Output error excessive?**	19.1 After part of A-D/D-A card is replaced, calibration is necessary ⟶ see Section **5. CALIBRATION** 19.2 Replace A-D/D-A card as a set together with FUSE ROM (U3) on CPU card	FUSE ROM contains calibration constant information according to memorized analog characteristics of each A-D/D-A card

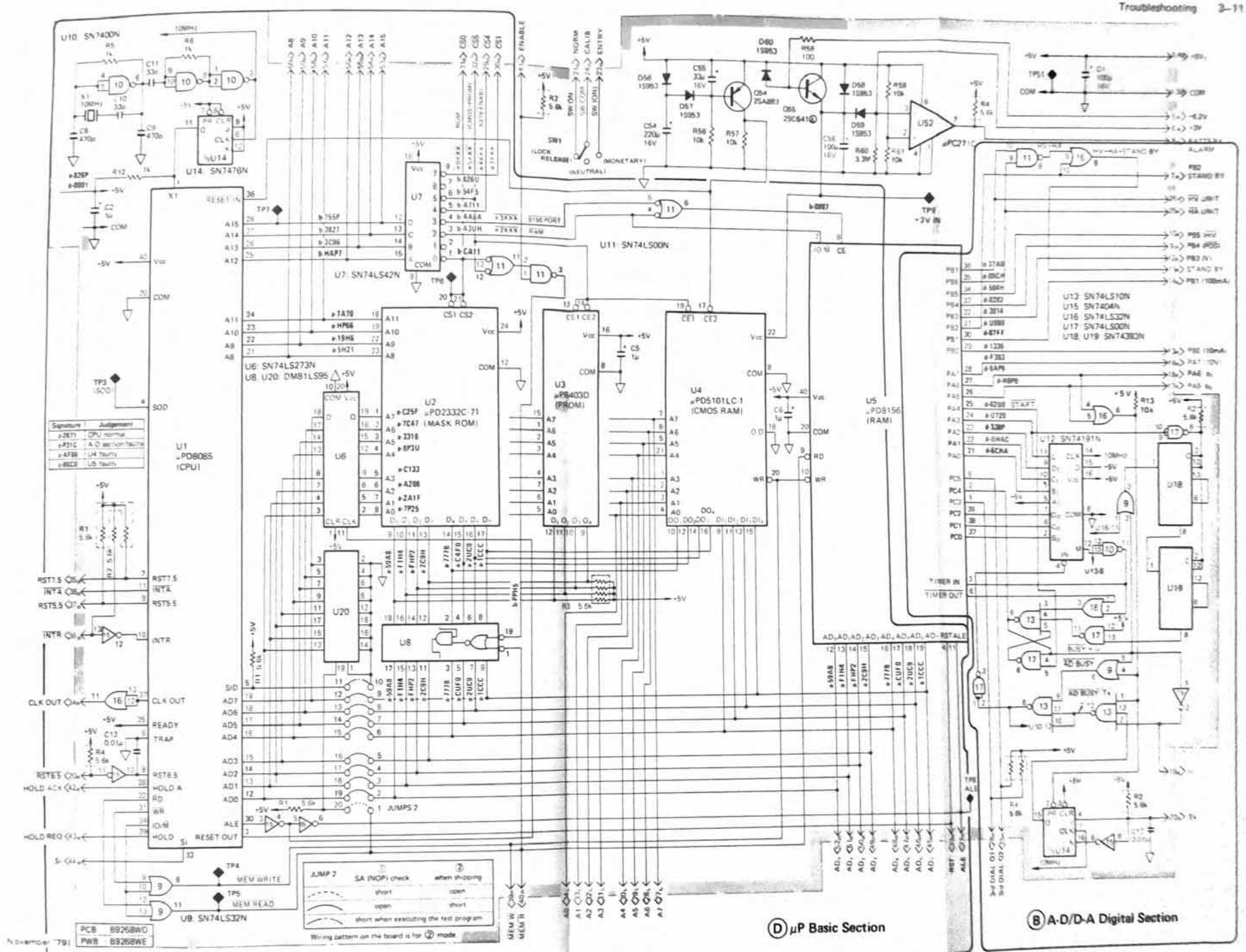


Figure 3-2a. CPU Card Ass'y Sectional Diagram (1).

Note 1: Signatures shown in this figure are applied to instruments of serial no. _____ or preceding. Make sure code of employed U2 is μPD2332C-71.

Note 2: Alphabet followed by signature denotes S.A. mode.

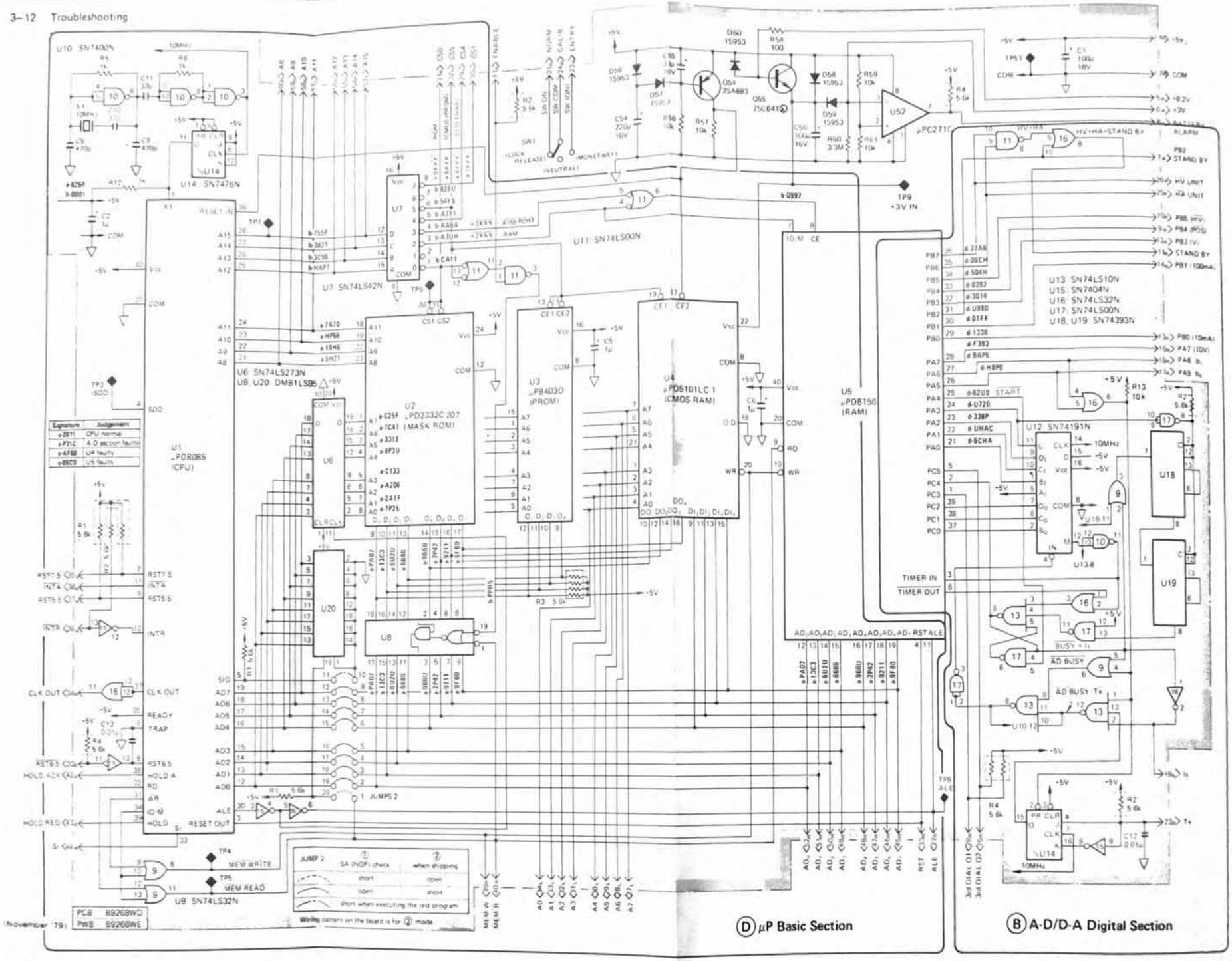
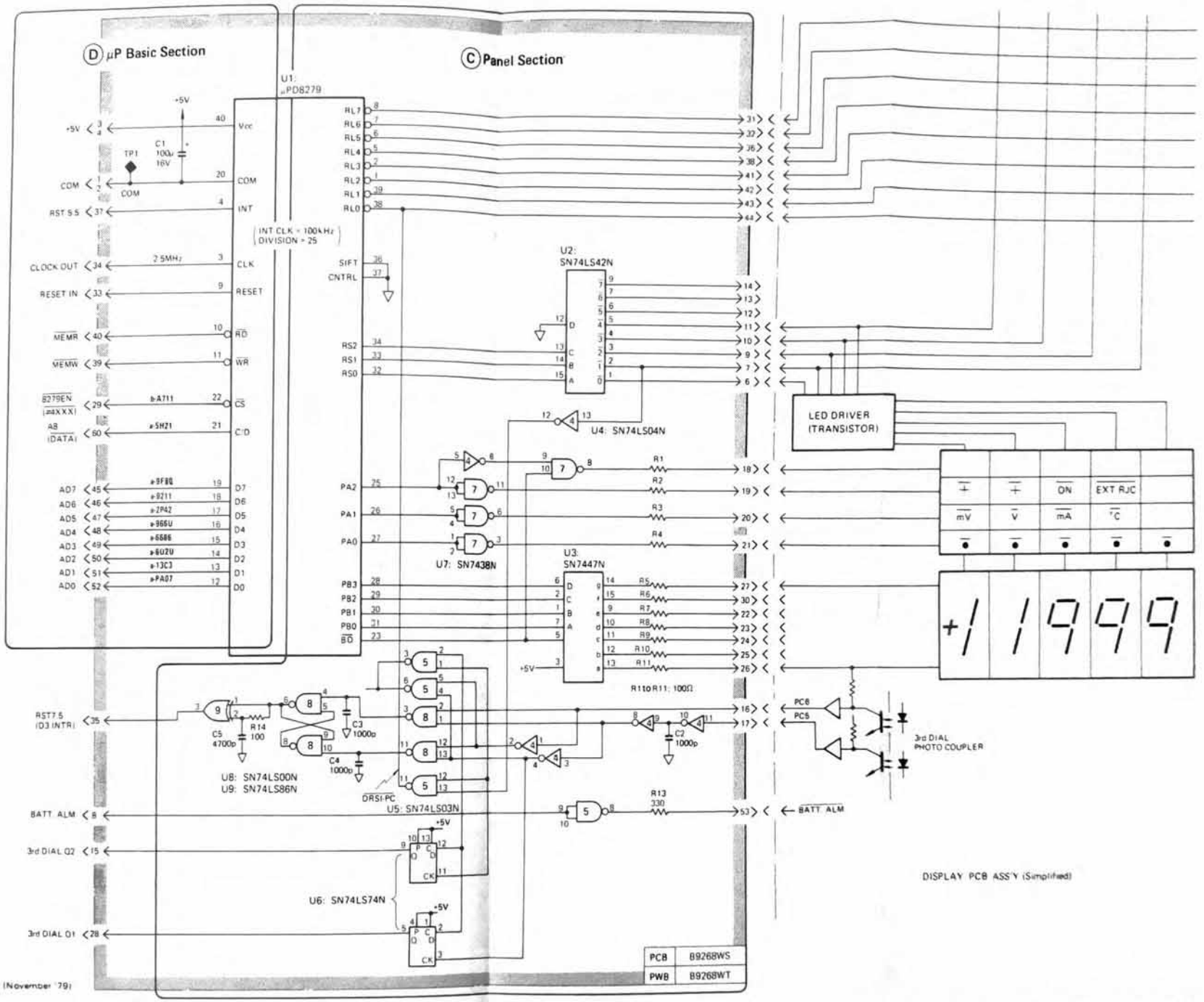


Figure 3-2b. CPU Card Ass'y Sectional Diagram (2).

Note 1: Signatures shown in this figure are applied to instruments of serial no. _____ or subsequent. Make sure code of employed U2 is μPD2332C-207.

Note 2: Alphabet followed by signature denotes S.A. mode



DISPLAY PCB ASS'Y (Simplified)

Note 1: Signatures shown in this figure are applied to instruments of serial no. _____ or subsequent.

Note 2: Alphabet followed by signature denotes S.A. mode.

Figure 3-3b. Display Control Ass'y Sectional Diagram (2).

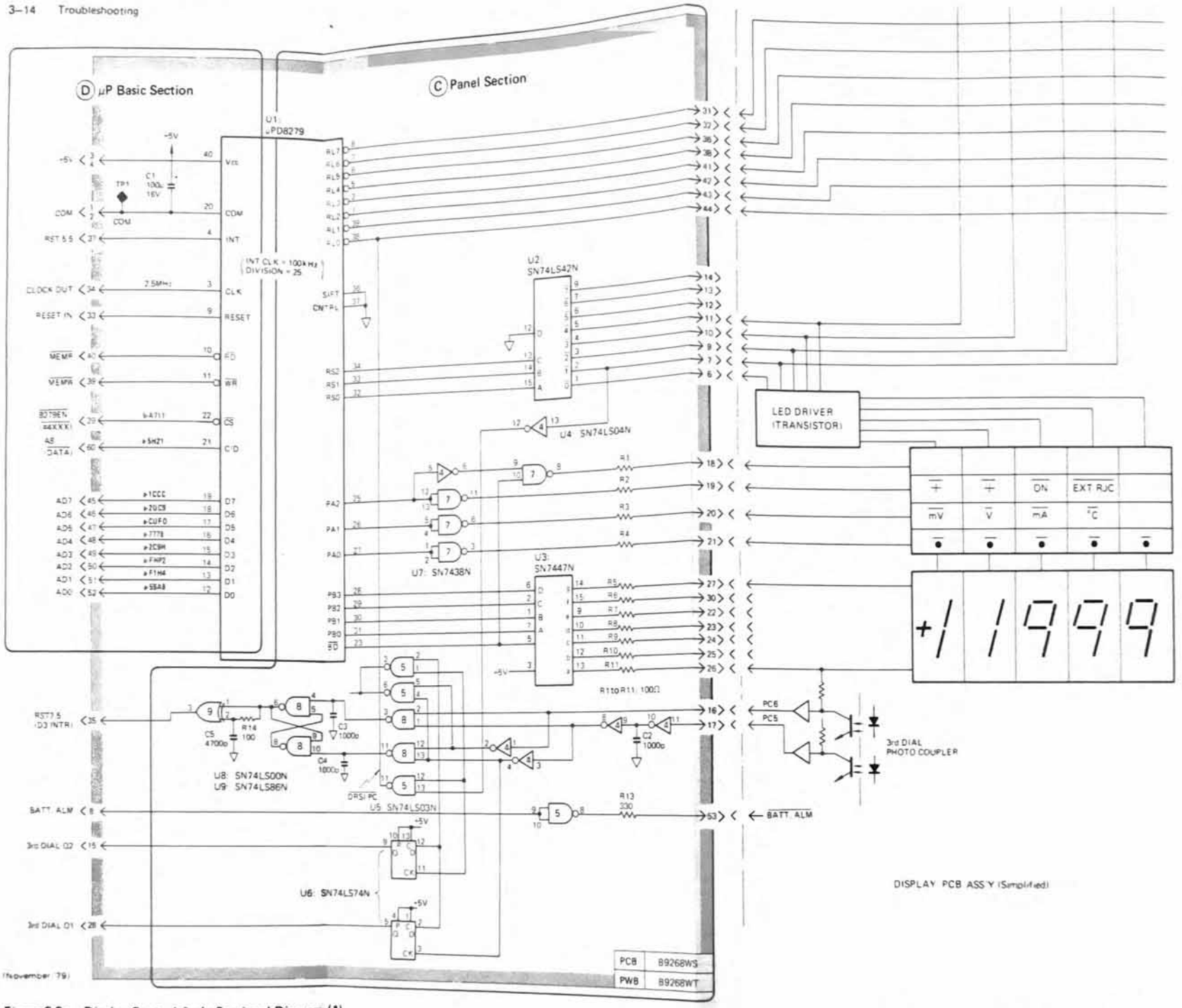
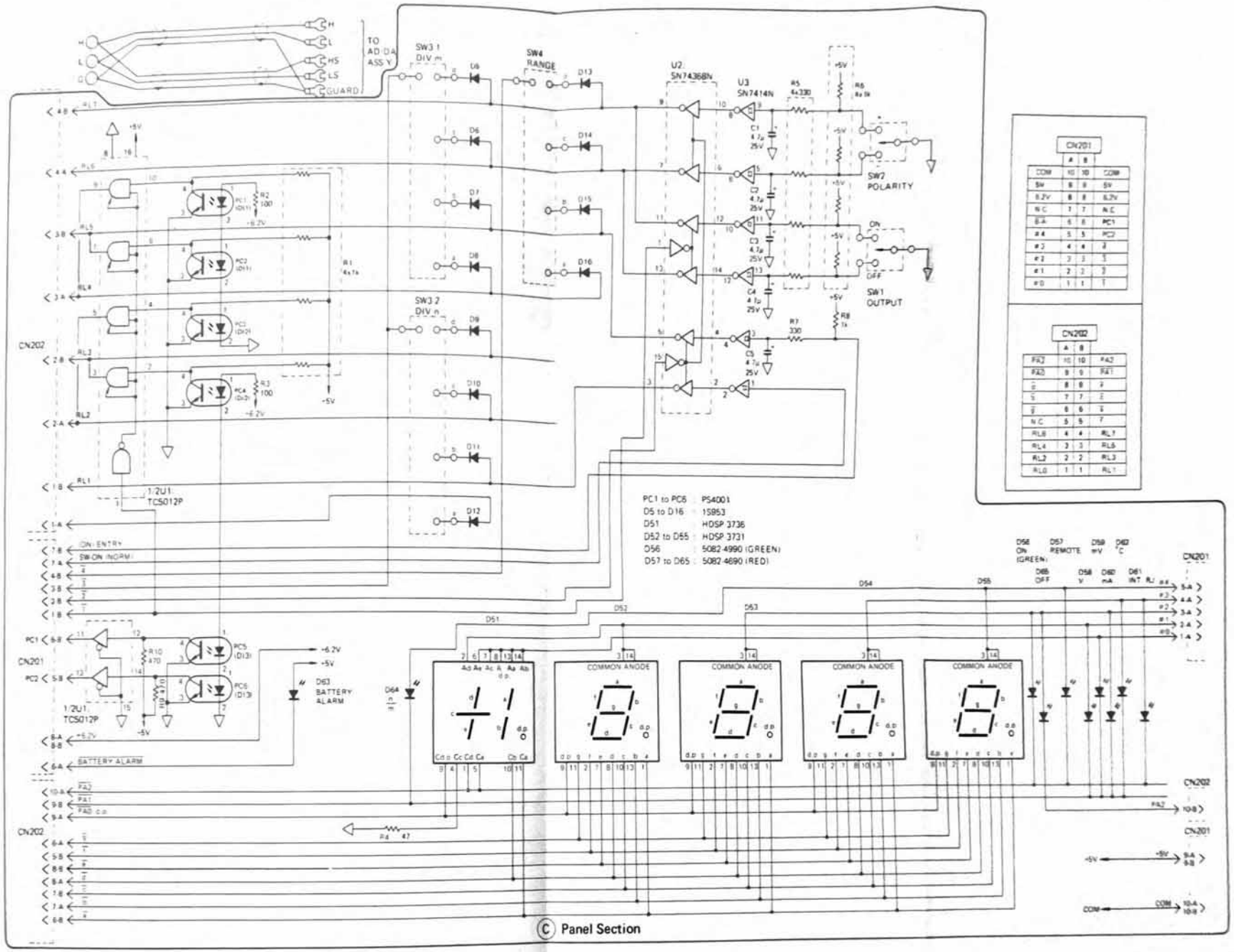


Figure 3-3a. Display Control Ass'y Sectional Diagram (1).

Note 1: Signatures shown in this figure are applied to instruments of serial no. _ _ _ _ _ or preceding.
Note 2: Alphabet followed by signature denotes S.A. mode.



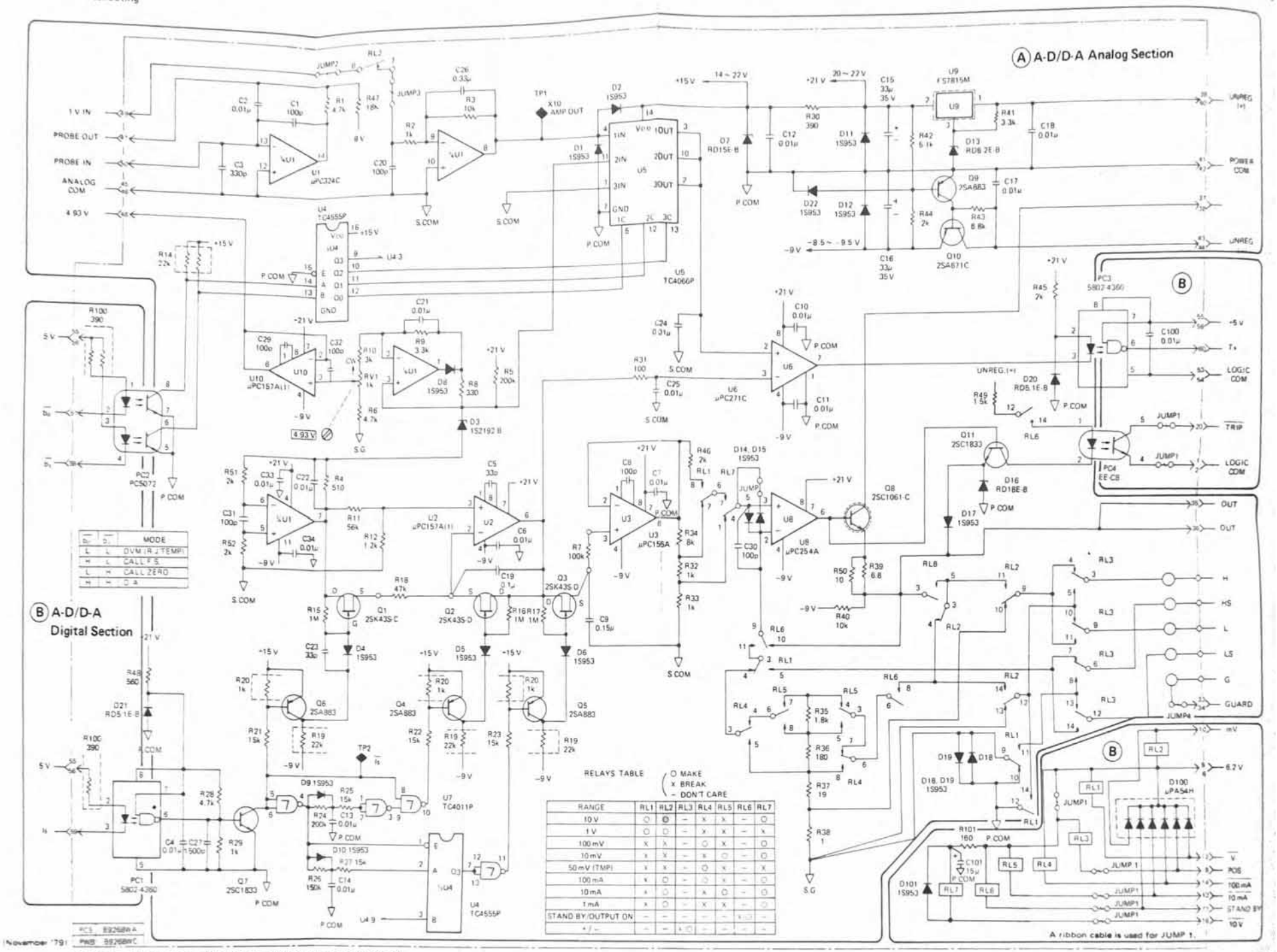
CN201	A	B	
COM	10	10	COM
SW	9	9	SW
6.2V	8	8	6.2V
N.C	7	7	N.C
E-A	6	6	PC1
#4	5	5	PC2
#3	4	4	3
#2	3	3	2
#1	2	2	1
#0	1	1	0

CN202	A	B	
PA2	10	10	PA2
PA0	9	9	PA1
D	8	8	P
C	7	7	E
B	6	6	S
N.C	5	5	T
RL8	4	4	RL7
RL4	3	3	RL6
RL2	2	2	RL3
RL0	1	1	RL1

PCB	89268WJ
PWB	89268WL

(November '79)

Figure 3-4. Display PCB Ass'y Sectional Diagram.



Note: This schematic diagram applies to revised PWB numbers 99268WC-02~06.

Figure 3-5. A-D/D-A PCB Ass'y Sectional Diagram.

SM 2553-1E

4. ADJUSTMENT

4.1 Introduction

On this instrument, compensation corresponding to zero and span adjustments for each range is digitally stored in the incorporated FUSE ROM type nonvolatile memory as calibration constants (CAL. CONST.), thereby minimizing troublesome adjustments.

Therefore, self-calibration is available with a simple operation as described in "5. CALIBRATION". The only adjustment necessary on this instrument is the following:

4.2 Reference Voltage Adjustment

4.2.1 Instrument for Adjustment (following or equivalent)

- Digital Voltmeter :
  YEW Type 2501
  Accuracy; V ranges . . . . . ±0.005 %

4.2.2 Adjustment Conditions

- Temperature and humidity:
  23 ± 3 °C, 75 % RH max.
- Power source :
  Rated line voltage, 50/60 Hz

4.2.3 Adjustment Procedure

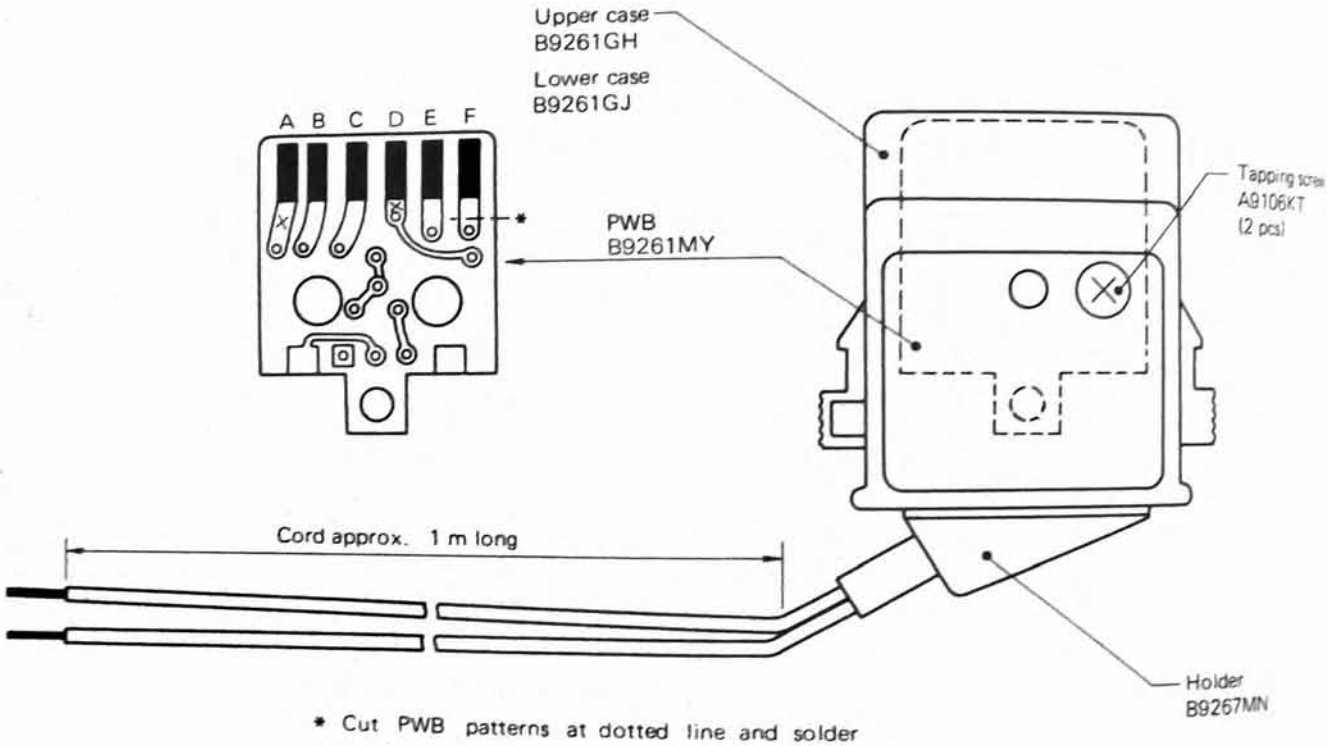
Connect the Type 2501 between pins A and D of the R.J. INPUT connector on the rear panel of this instrument, and adjust the rheostat RV1 mounted on the A-D/D-A PCB Assembly: B9268 WA so that the Type 2501 reads 4.930 ± 0.001 V.

REFERENCE

For a structural reason, the R.J. INPUT connector is mounted on a position recessed from the rear panel. In this adjustment, therefore, you might find difficulty in engaging the input cord of the Type 2501 to the connector terminals.

To solve this inconvenience, it is recommended to build a jig for adjustment as illustrated below using parts for temperature probe.

When the jig for inspection stated in "2. INSPECTION" has already been built, it may be used commonly for inspection and adjustment by adding a cord to the terminal D.



* Cut PWB patterns at dotted line and solder cord cores to X.

R. J. INPUT CONNECTOR

A: – side
D: + side

5. CALIBRATION

5.1 Introduction

As described in the previous chapter, this instrument is factory delivered with calibration constants (CAL. CONST.) stored in the FUSE ROM type memory. In addition to it, calibration constants can be written in the CMOS RAM incorporated in this instrument on the user side.

Calibration constants can be written in the CMOS RAM at a calibration resolution of 0.01 % and a calibration accuracy of 0.04 to 0.05 % provided that sufficiently controlled standard instruments are used for calibration.

When a better calibration is necessary, entrust the operation to YEW, the service station or sales agent.

Because this CMOS RAM is backed by the 3 V dry cells housed in the rear of this instrument, written information will not be destroyed even when the commercial frequency is turned off but, if the dry cell voltage drops to a certain level, the information would be destroyed. When the user desires to store calibration constants in the CMOS RAM, therefore, dry cells should be installed in position and they should be replaced with new ones within one year.

CAUTION

When the dry cells are replaced or when the CPU card is extracted from the connector, backup by the dry cells would be lost for the moment, thereby destroying the information written in the CMOS RAM. It is, therefore, advisable to replace the dry cells immediately before a calibration.

The instrument of a serial no._____or subsequent is equipped with a test point TP9 for externally connecting dry cells on the CPU card. By connecting 3 V dry cells and a reverse current preventive diode between the said TP9 and COM, the stored information can be protected when replacing the incorporated dry cells or extracting the CPU card.

5.2 Replacement of Dry Cells

After turning off the POWER switch of this instrument, remove the CAL. BAT. lid on the rear panel, and replace the dry cells (2 pcs SUM-3N).

CAUTION

1) Replace the dry cells with the commercial frequency turned off.
2) When it is absolutely necessary to replace them in an energized state, observe the following for safety's sake:
   a) Detach the leads from the output terminals.
   b) Interconnect the CIRCUIT COMMON terminal and ⏚ terminal on the rear panel.
   c) Connect the ⏚ terminal to ground.

5.3 Calibration

Calibrate this instrument using the following instruments or equivalent instruments the accuracy of which is warranted by periodical inspections at a testing organ where traceability to the national standards is available.

5.3.1 Instruments for Calibration

- Digital Voltmeter :
  YEW Type 2501
  Accuracy; V ranges . . . . . ±0.005 %
  mV ranges . . . . . ±0.01 %
- Standard Resistors :
  YEW Type 2792
  1 pc each 10 Ω, 1 kΩ
  Tolerance . . . . . ±0.005 %
- DC Voltage Standard :
  YEW Type 2552
  Accuracy . . . . . ±0.005 %

5.3.2 Calibration Conditions

- Temperature and humidity :
  23 ± 1 °C, 75 % RH max.
- Power source :
  Rated line voltage, 50/60 Hz
- Calibration setup :
  As specified below

CAUTION

Calibration is performed according to the procedures described in 5.3.3 to 5.3.6. In calibration, be sufficiently careful about the following:

1) Control and maintenance of accuracy of standard instruments on user side
2) Ambient conditions at calibration
3) Operating conditions at warmup
4) Period during which internal instrument is drawn out at calibration and during which instrument is calibrated

5.3.3 Calibration of Voltage Ranges

A. Preparation

a) With the instrument installed in the case, set the range, level and output divider to 1 V, 1 V and n/m = 1, respectively, and allow approximately four hour warmup.

b) After a four hour warmup, remove two screws from the bottom rear and loosen two lock screws on the front panel by rotating them counterclockwise. With the instrument kept energized, draw out the internal instrument from the case until the mode selector on the CPU card can be operated as shown in Figure 5-1.

CAUTION

Because the instrument is energized, take sufficient safety precautions.

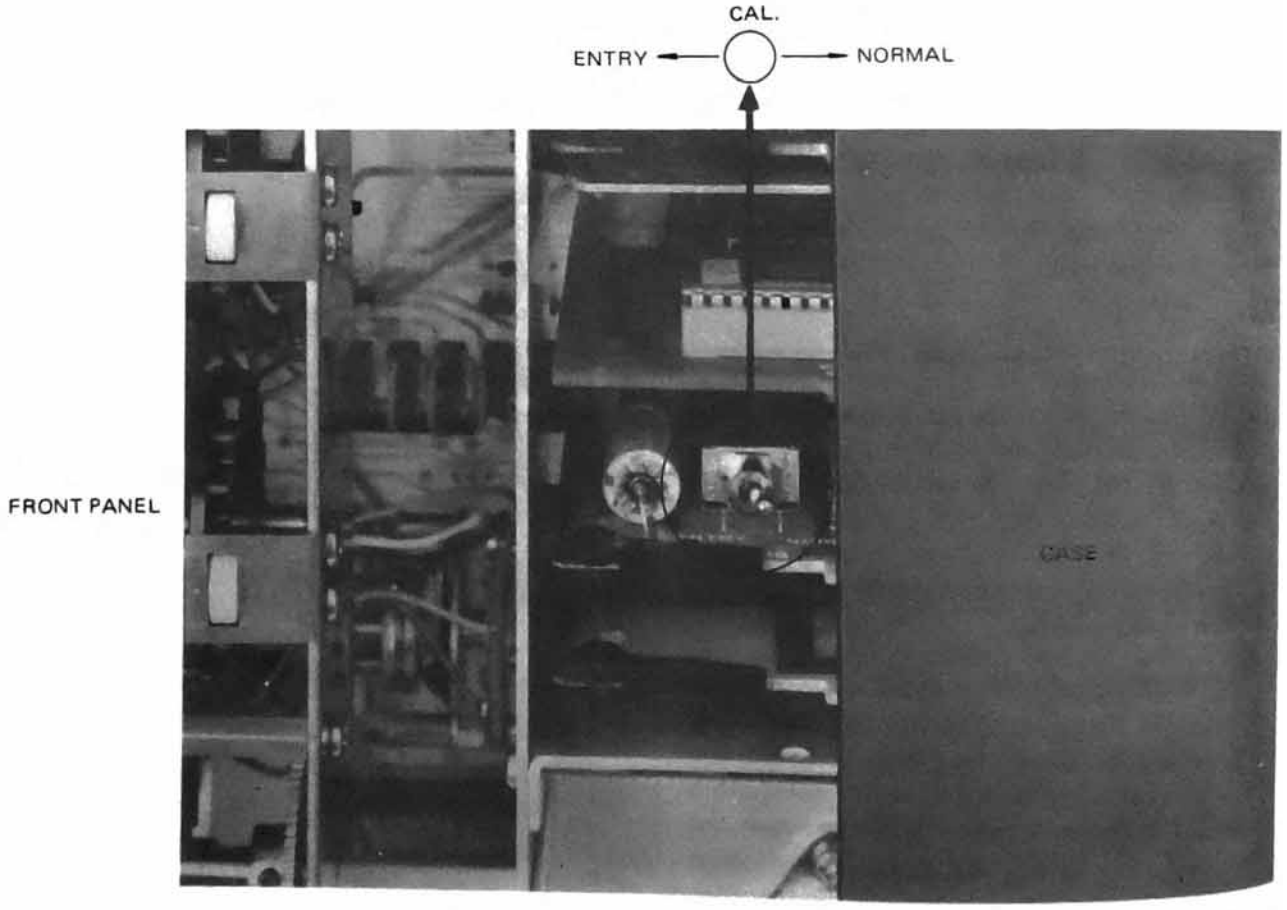


Figure 5-1. Mode Selector on CPU Card.

c) Connect the Type 2501 between the output terminals of this instrument as shown in Figure 5-2.

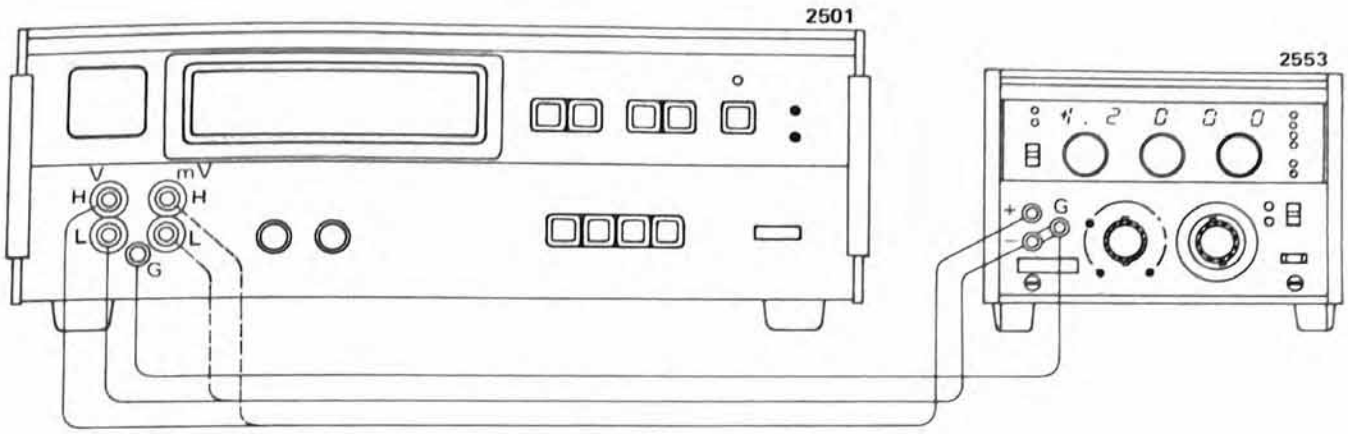


Figure 5-2. Setup for Voltage Range Calibration.

B. Rated Value Calibration

a) Set the mode selector SW1 on the CPU card shown in Figure 5-1 to CAL.

b) Select a range to be calibrated and turn on the OUTPUT switch.

c) Operate the setting dial so that the Type 2501 reads the rated output level of this instrument.

d) As soon as the Type 2501 reads the rated value, throw SW1 to ENTRY.
Thus the calibration constant corresponding to the setting is stored in CMOS RAM and, at the same time, the display on this instrument changes to the rated value, thereby completing the calibration of the rated value.

e) Ascertain that the readings on this instrument and Type 2501 match the rated value of the range.

C. Zero Calibration

a) Operate the setting dials of this instrument so that the Type 2501 reads zero.

b) As soon as the Type 2501 reads zero, throw SW1 to ENTRY. Thus the calibration constant corresponding to the setting is stored in CMOS RAM and, at the same time, the display on this instrument changes from the set value to zero, thereby completing the zero calibration.

c) Ascertain that the readings on this instrument and Type 2501 are zero.

D. Calibration on Other Voltage Ranges

For other voltage ranges to be calibrated, repeat calibration of rated values and zeroes in the same procedure as stated above.

REFERENCE

1) On ranges for which calibration constants are not written in the CMOS RAM, those in the FUSE ROM are effective. In other words, only necessary ranges have to be calibrated.
2) Whether a calibration constant stored in the CMOS RAM by a calibration is proper or not is judged when it is read out. When it is abnormal, it is disregarded and a calibration constant written in the FUSE ROM when the instrument is factory delivered is reat out. In other cases, calibration constants written in the CMOS RAM by the calibration are reat out when delivering outputs.

5.3.4 Calibration of Current Ranges

A current range is calibrated in the same procedure as for a voltage range by measuring the voltage drop across the Type 2792 in the setup as shown in Figure 5-3.

As for the Type 2792, 10 Ω is used for calibrating the 100 mA range, and 1 kΩ is used for the 10 mA and 1 mA ranges, respectively.

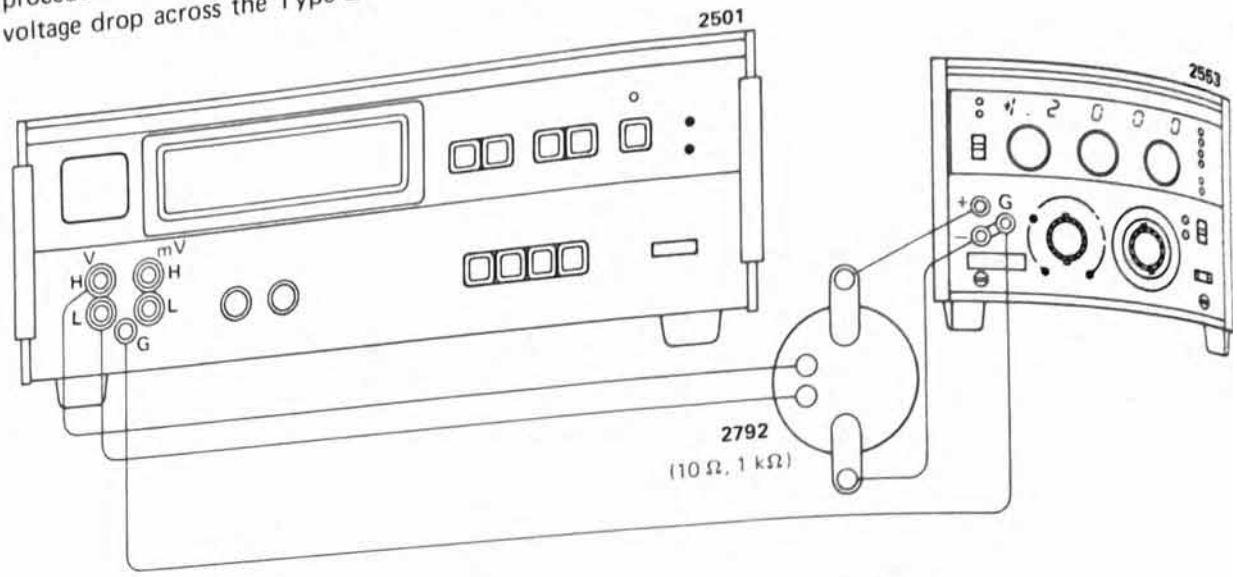


Figure 5-3. Setup for Calibration of Current Ranges.

5.3.5 Calibration of Temperature Setting – mV Generating Ranges

A. CC Range

The CC range is automatically calibrated by a calibration of the 10 mV range.

B. PR, CA, CRC and IC Ranges

For these four ranges excluding the CC range, the instrument has in its interior a 50 mV output range. For calibrating these four ranges, therefore, the incorporated 50 mV range has only to b calibrated.

a) Set the range selector on the front panel to PR Note that calibration is unavailable on anothe range.

b) Set SW1 to CAL.

c) Connect this instrument and Type 2501 a shown in Figure 5-4, and proceed to a calibra tion in the same procedure as for a voltag range.

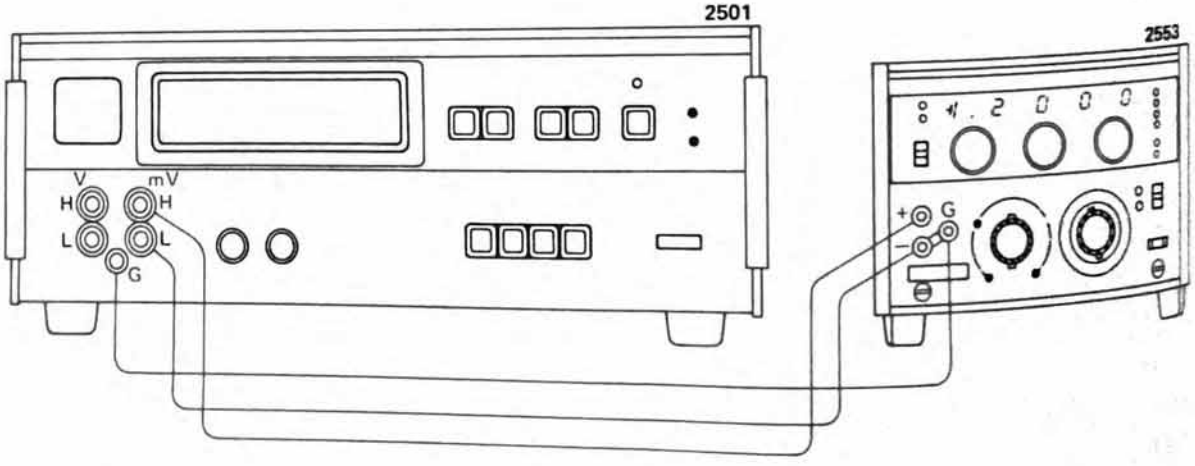


Figure 5-4. Setup for Calibration of Temperature Setting – mV Generating Ranges.

d) Set the dials to 1000.0 and turn ON the OUTPUT switch. Then 50 mV will appear across the output terminals.

e) Operate the setting dials of this instrument so that the Type 2501 reads 50.000 mV. As soon as 50.000 mV is obtained, throw SW1 to ENTRY.

f) Operate the setting dials so that the Type 2501 reads 0.000 mV, and throw SW1 to ENTRY.

5.3.6 Calibration of R.J. TEMP RANGE

On the R.J. TEMP range, the reference junction temperature is measured by way of the Type 2578-25 Temperature Probe (option), and the voltage corresponding to the emf of the thermocouple for the temperature is automatically added as an offset.

This range is calibrated in the following procedure.

A. Calibration Procedure

a) Set the range selector of this instrument to R.J. TEMP.

b) Set the mode selector on the CPU card to CAL.

c) As shown in Figure 5-5, connect the calibration jig (described in "REFERENCE" in 2.4.2) to the R.J. INPUT connector on the rear panel of this instrument, and apply a DC voltage of −1 V between the terminal F (− side) and A (COM side) of the connector.

d) At this state, throw SW1 to ENTRY. Ascertain that this instrument reads −1000.0.

e) Set the output of the Type 2552 to −10 mV and throw SW1 to ENTRY. Ascertain that this instrument reads −0010.0.

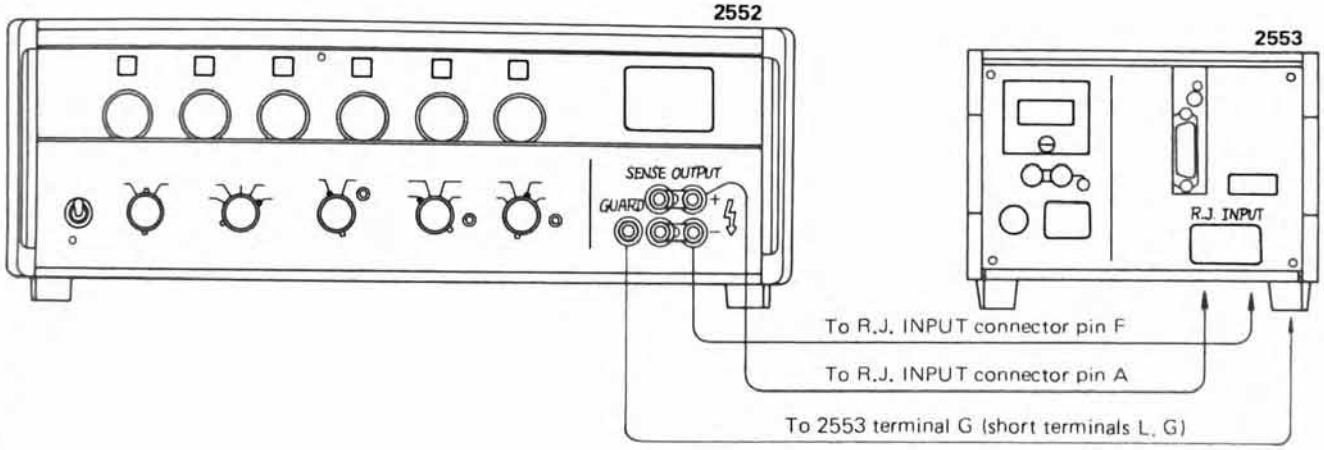


Figure 5-5. Setup for Calibration of R.J. TEMP Range.

Among the different calibrations stated above, calibrate only necessary ranges. Thus this instrument has been calibrated.

CAUTION

In order to reduce influence by temperature rise in the instrument, make it a rule to finish the calibration of a necessary range within half an hour.

5.3.7 Procedure after Completion of Calibration

- After completion of calibration, set the mode selector SW1 on the CPU card to NORMAL.
- Install the instrument into the case.

6. SCHEMATIC DIAGRAMS AND COMPONENT LOCATION DIAGRAMS

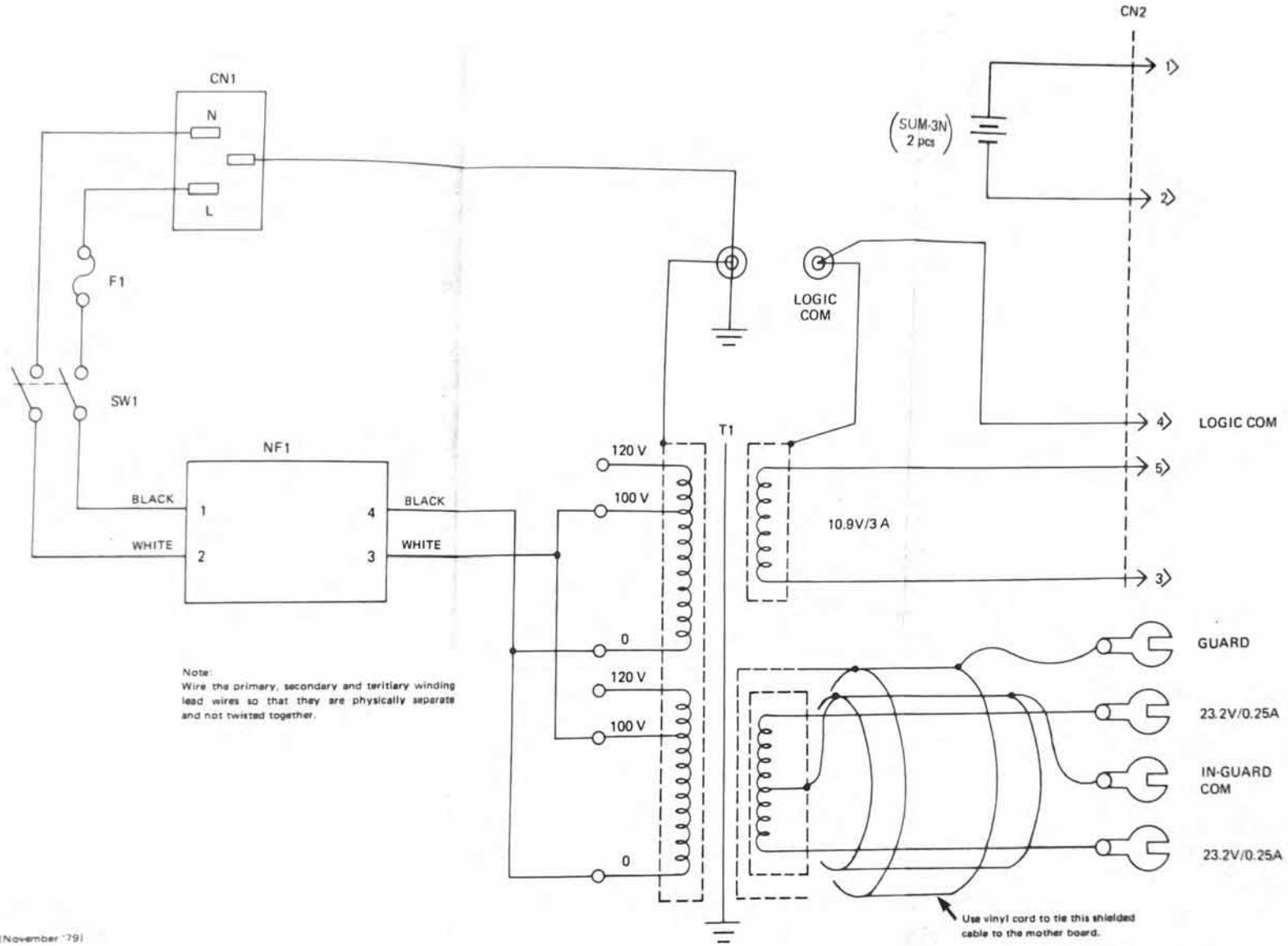
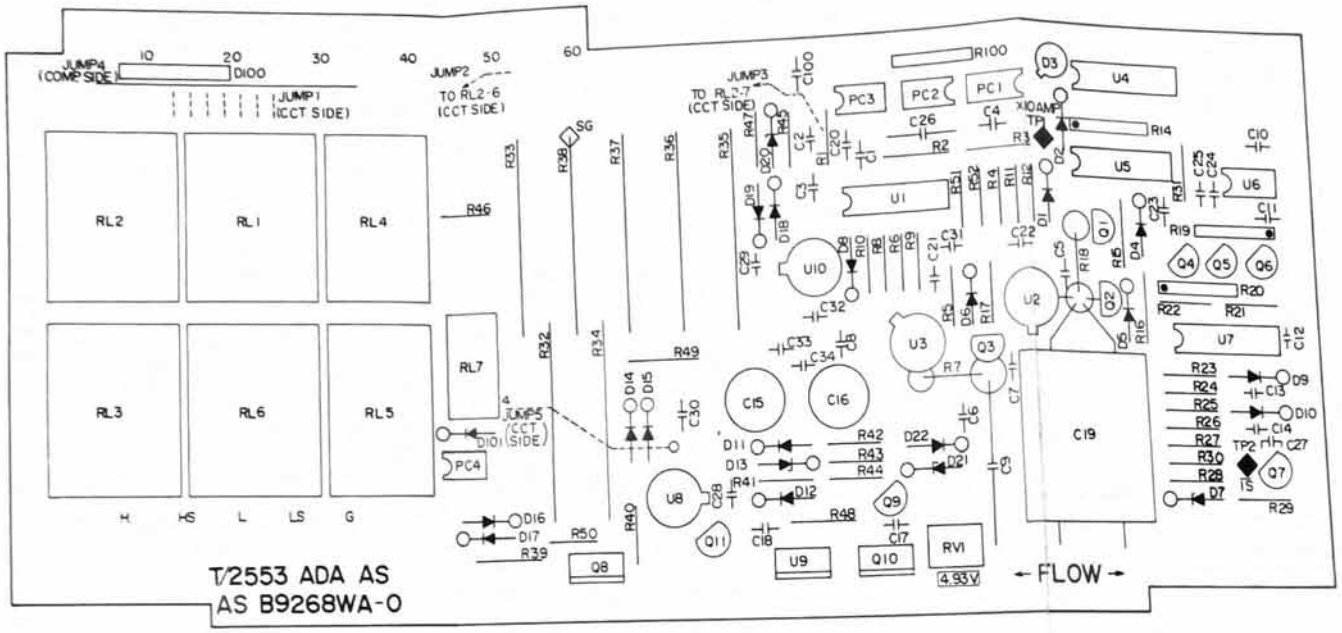


Figure 6-1. Power Supply Ass'y: B9268DA Schematic Diagram.



(November '79)

Figure 6-2a. A-D/D-A PCB Ass'y: B9268WA Component Location Diagram.

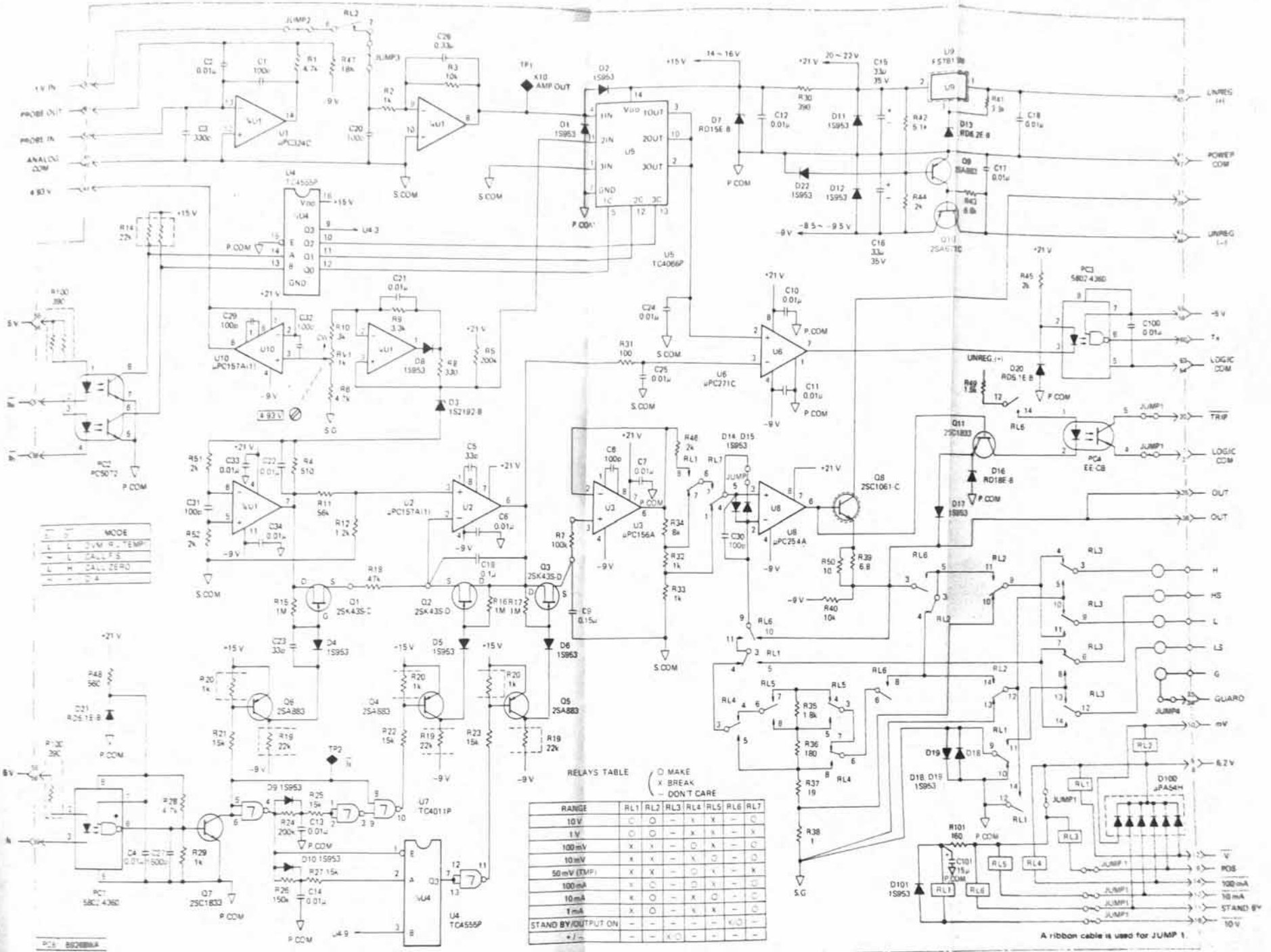
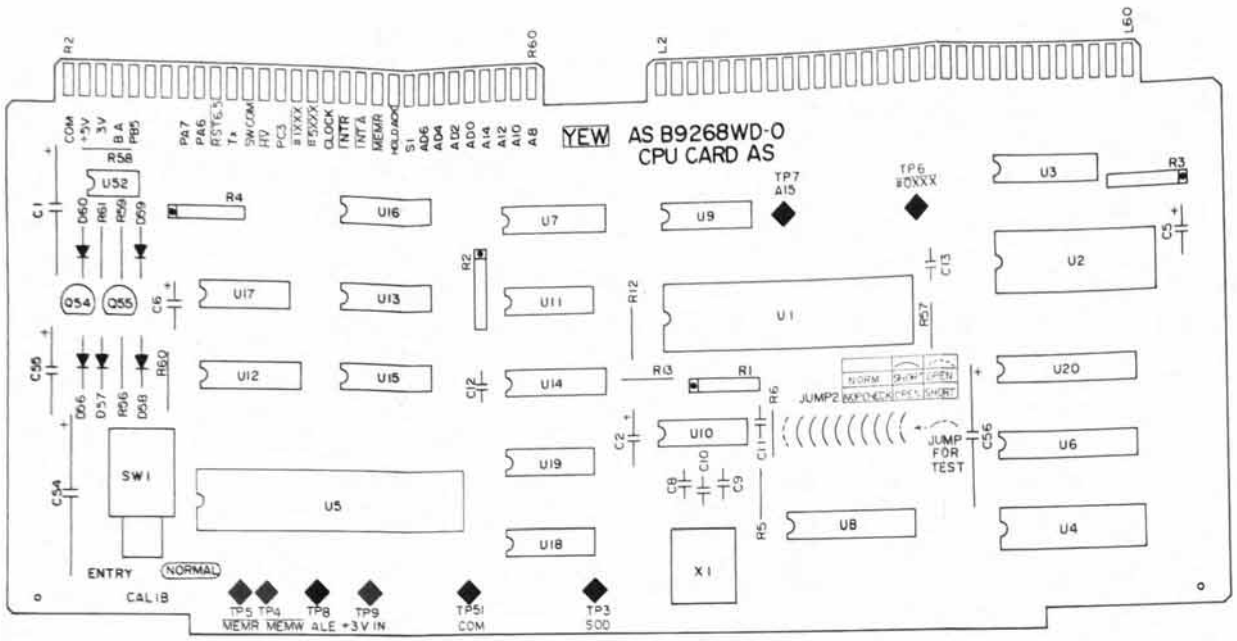


Figure 6-2b. A-D/D-A PCB Ass'y: B9268WA Schematic Diagram.

SM 2553-16

Note This schematic diagram applies to revised PWB numbers B9268WC-02~06.



(November '79)

Figure 6-3a. CPU Card Ass'y: B9268WD Component Location Diagram.

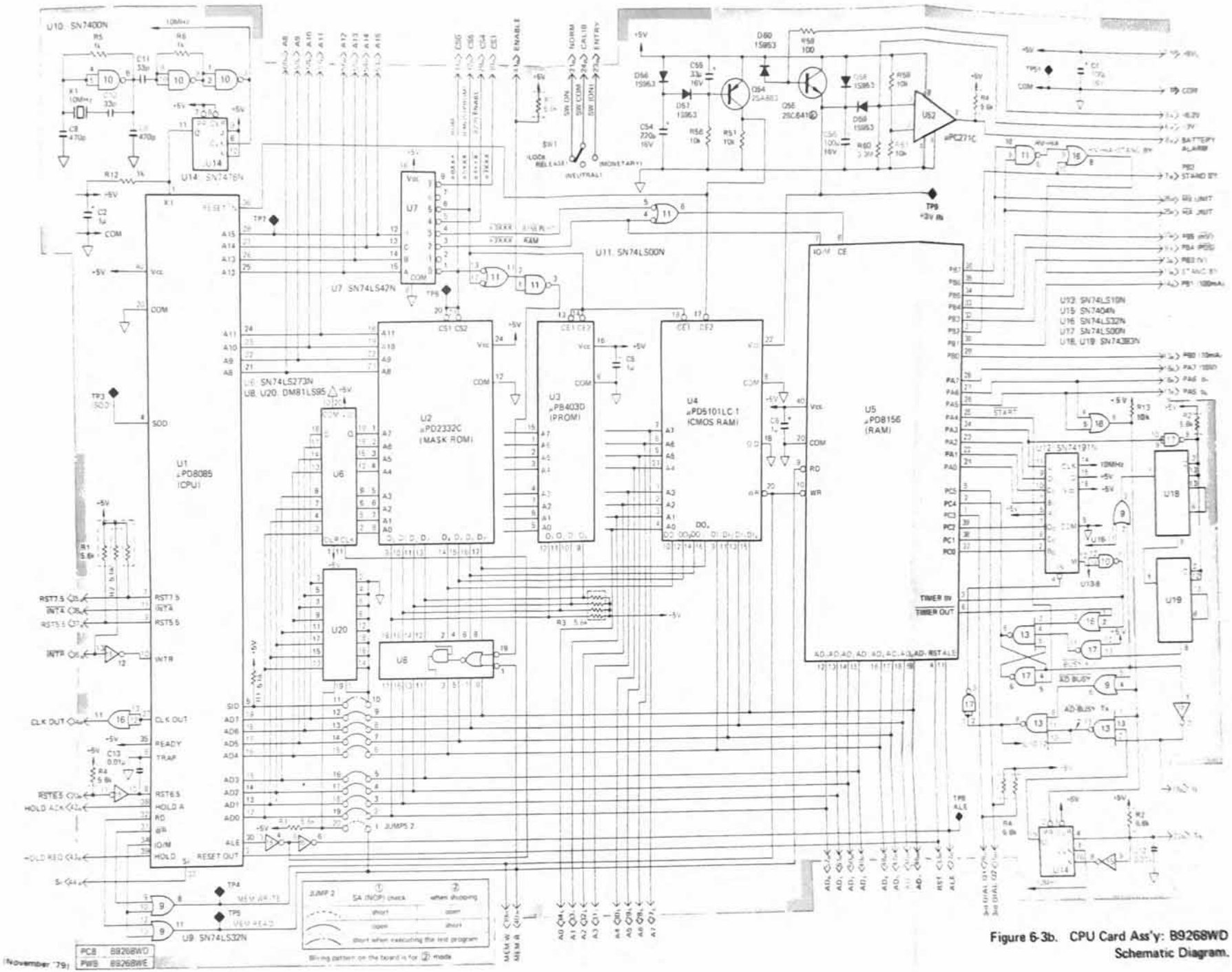
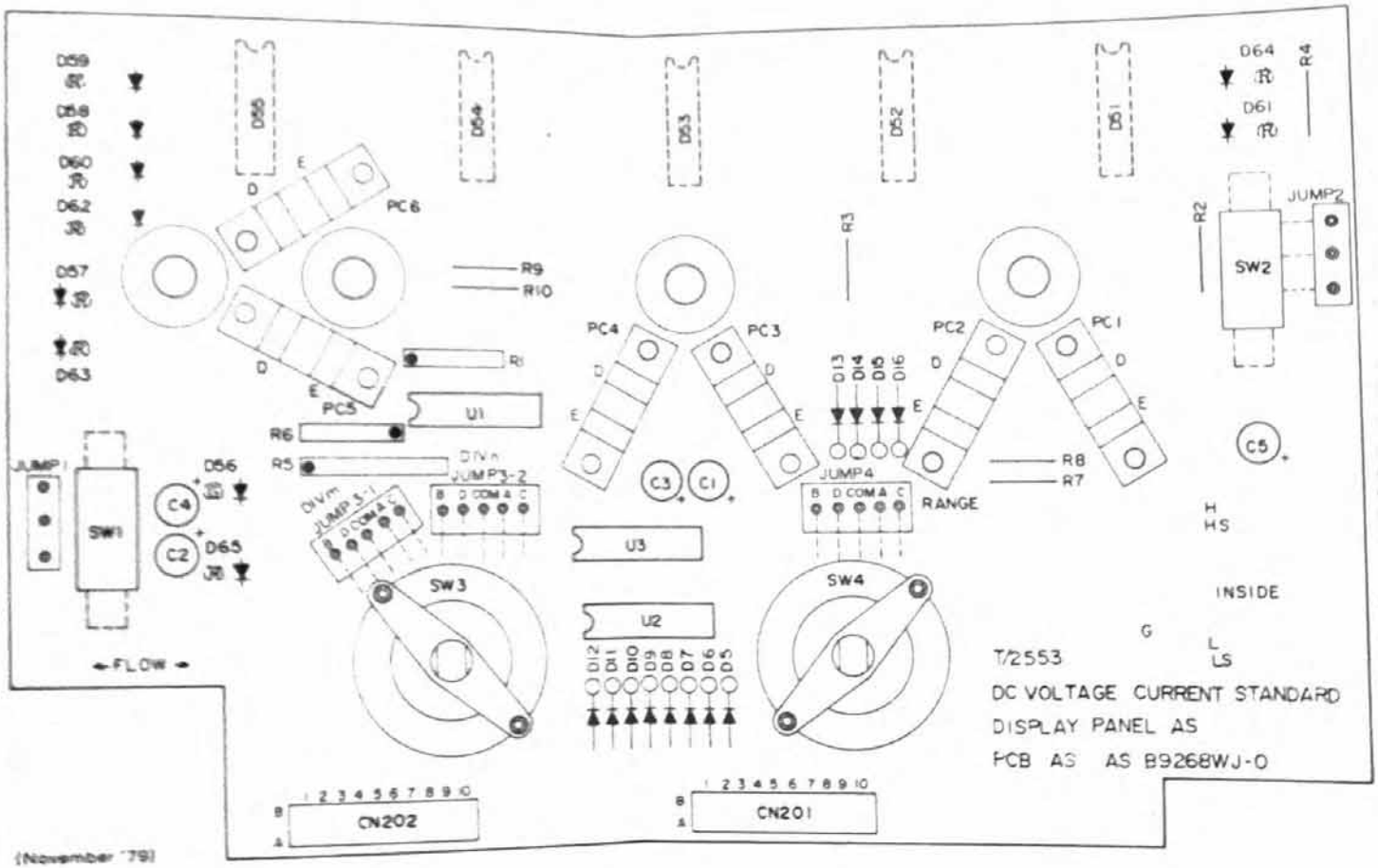


Figure 6-3b. CPU Card Ass'y: B9268WD Schematic Diagram.


D59
D58
D60
D62
D57
D63
D55
D54
D53
D52
D51
D64
D61
R4
R2
R3
JUMP2
SW2
PC6
PC5
PC4
PC3
PC2
PC1
R9
R10
R6
R5
U1
D13
D14
D15
D16
R8
R7
C5
C3
C1
JUMP4
RANGE
JUMP1
SW1
C4
C2
D56
D65
JUMP3-2
JUMP3-1
U3
U2
SW3
SW4
D12
D11
D10
D9
D8
D7
D6
D5
H
HS
INSIDE
G
L
LS
←FLOW→
T/2553
DC VOLTAGE CURRENT STANDARD
DISPLAY PANEL AS
PCB AS AS B9268WJ-0
CN202
CN201
(November '79)

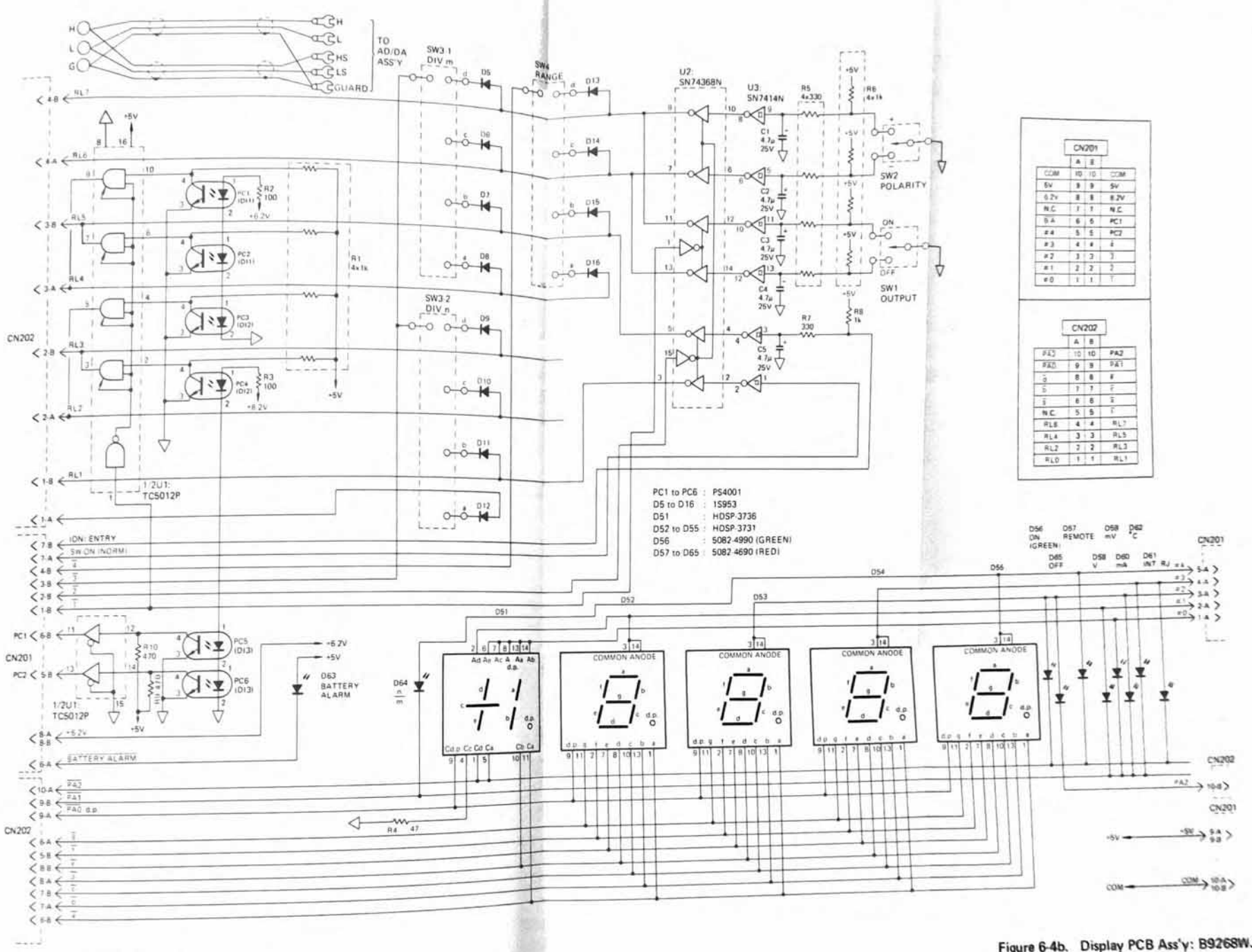
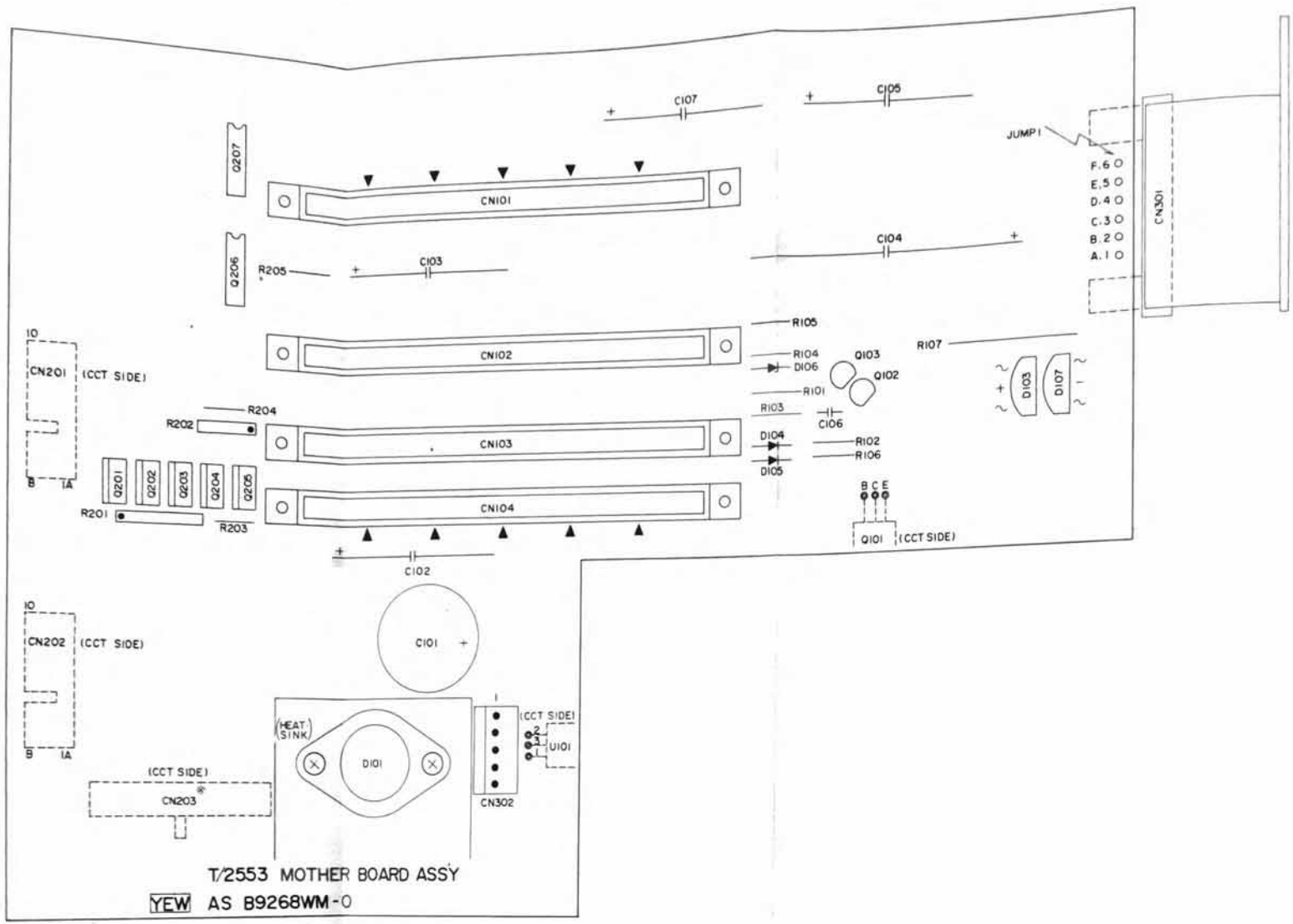


Figure 6-4b. Display PCB Ass'y: B9268WJ Schematic Diagram.



The connector CN203 is not used when using the Type 2553 alone, but for the Type 2560 DC Calibration Set (the Type 2553 is included) the CN203 must be used.

(November '79)

Figure 6-5a. Mother Board PCB Ass'y: B9268WM Component Location Diagram.

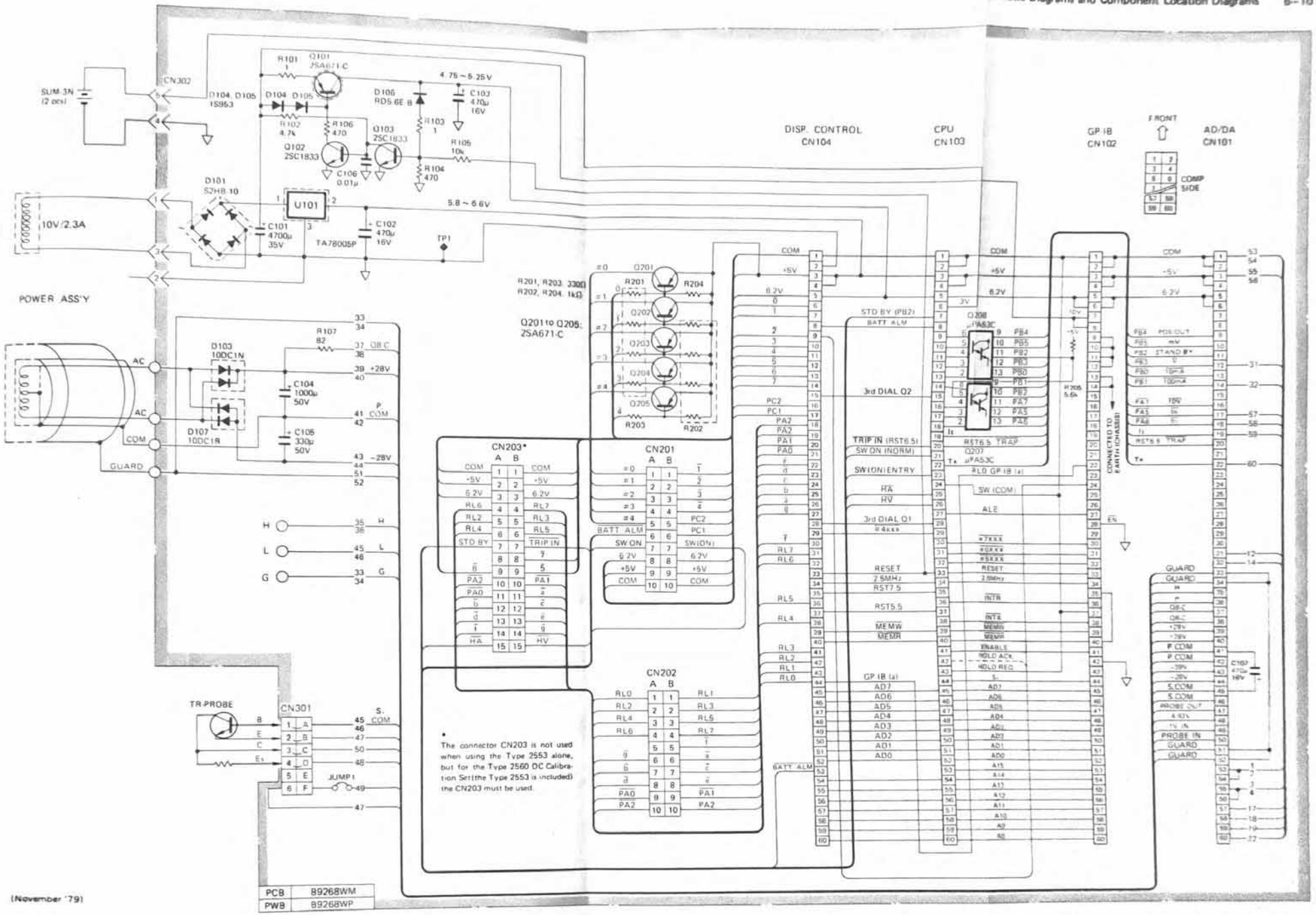
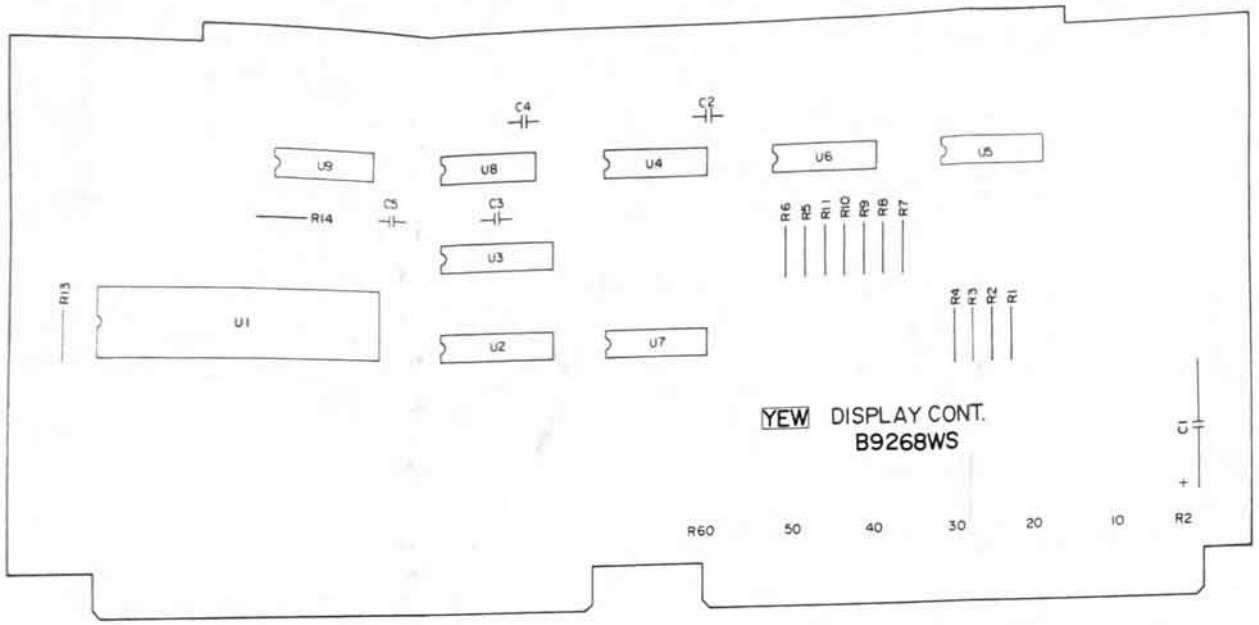


Figure 6-5b. Mother Board PCB Ass'y: B9268WM Schematic Diagram.



(November '79)

Figure 6-6a. Display Control Ass'y: B9268WS
Component Location Diagram.

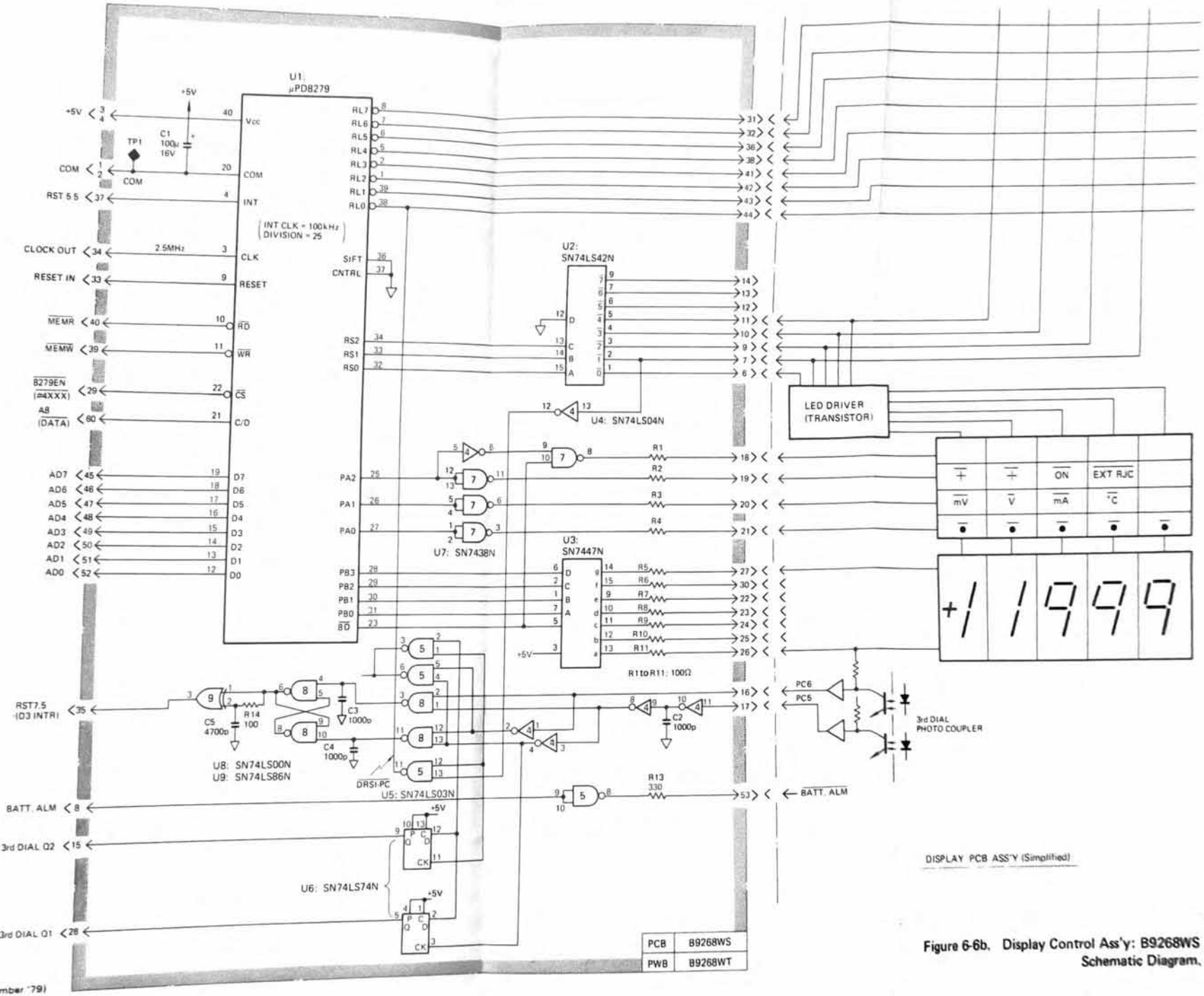


Figure 6-6b. Display Control Ass'y: B9268WS Schematic Diagram.

7. PARTS LISTS AND STRUCTURAL DIAGRAMS

Parts Lists:

Structural Diagrams:

INDEX

List of abbreviations

ac = alternating current
Ag = silver (ed)
Al = aluminum
amp = amplifier
ass'y = assembly
Au = gold
car flm = carbon film
cap = capacitor
cct = circuit
cer = ceramic
coef = coefficient
com = common
comp = composition
conn = connector
dc = direct current
dia = diameter
elect = electrolytic
FET = field effect transistor
flm = film
fxd = fixed
Ge = germanium
gnd = ground
IC = integrated circuit
JIS = Japanese Industrial Standard
L = inductor
met = metal (lized)
mfr = manufacturer
Ne = neon
nom val = nominal value
OSC = oscillator
pwb = printed wiring board
pcb = printed circuit board
plstc = plastic
polye = polyester
polys = polystyrene
pot = potentiometer
prec = precision (temperature coefficient, long term stability, and/or tolerance)
res = resistor
rng = range
rtry = rotary
Se = selenium
sect = section(s)
Si = silicon
sub-ass'y = sub-assembly
sw = switch
sys = system
sply = supply
Ta = tantalum
temp = temperature
trim = trimmer
TSTR = transistor
trans = transformer
var = variable
ww = wire wound
YEW spec = special specification of Yokogawa Electric Works, Ltd. - YEW.

† = Request the item marked with † to YEW.
†† = Replace the item marked with †† as a complete part set even when one of its parts is damaged. Request the complete part set to YEW.
††† = Replace the item marked with ††† as an assembly even when a part of it is damaged. Request the assembly to YEW.
†††† = Optimum value selected at factory, average value shown (part may be omitted).

Example

Conn : multi = multi connector
Cap : fxd Al elect = Fixed aluminum electrolytic capacitor
Cap : fxd met polye flm = Fixed metallized polyester film capacitor
PCB Ass'y or PCB Assy = Printed circuit board assembly
Res : fxd car flm = Fixed carbon film resistor
Res : var ww = Wirewound variable resistor
Temp coef = Temperature coefficient

7-1. Type 2553 DC Voltage/Current Standard: B9268AA.

(November '79)

Item	Part No.	Part Name and Description			Remarks
	B9268BA	Main ass'y			see Par. 7-2, Fig. 7-1
	B9552DG	Case			
	B9268AX	Accessory ass'y			
	A9009WD	Power supply cord ass'y			
	A9005WD	Power supply cord ass'y		8120-1378	UL Standard for U.S.A } select
	A9011WD	Power supply cord ass'y		CEE 8120-1692	VDE standard for Europe } select
	A9041KF	Fuse: 1A	(2 pcs)	MF61NR 250V 1A AC05	for 100/120V line } select
	A9040KF	Fuse: 0.5A	(2 pcs)	MF61NR 250V 0.5A AC05	for 200/220/240V line } select
	B9268AH	Instruction Manual			JAP. } select
	B9268AJ	Instruction Manual			ENG. } select
	A9024ED	Battery	(2 pcs)	SUM-3N	

7-2. Main Ass'y: B9268BA.

(November '79)

Item	Part No.	Part Name and Description			Remarks
	B9268BG	Knob ass'y			
	B9268BK	Knob ass'y			
	B9268BP	Front panel ass'y			see Par. 7-3, Fig. 7-2
	B9268CA	Chassis ass'y			see Par. 7-4, Fig. 7-1
	B9268FZ	FUSE ROM ass'y			see Par. 7-12, U3
	B9268BD	Spacer	(2 pcs)		
	B9268BE	Rod			
	A9011KU	Knob cap	(5 pcs)	040-502	
	A9039KU	Knob		023-542	
	A9049KU	Knob	(3 pcs)	020-542	
	A9071KU	Knob		042-600	
	A9146ZH	Shorting bar	(2 pcs)		
	A9551ZJ	Nameplate			
	Y9306EB	Screw	(7 pcs)		
	Y9306SK	Screw	(2 pcs)		

7-3. Front Panel Ass'y: B9268BP.

(November '79)

Item	Part No.	Part Name and Description			Remarks
	B9268BS	Panel			
	B9268BT	Panel ass'y			
	B9268BV	Bracket ass'y			
	B9268BX	Bracket ass'y			
	A9020ZB	Panel lock ass'y	(2 pcs)	CD03	
	Y9204FS	Screw			
	Y9306EB	Screw	(2 pcs)		
	Y9301BB	Nut	(2 pcs)		

7-4. Chassis Ass'y: B9268CA.

(November '79)

Item	Part No.	Part Name and Description			Remarks
	B9268DA	Power supply ass'y			see Par. 7-5, Fig. 7-3, Fig. 6-1
	B9268DQ	Display ass'y			see Par. 7-6, Fig. 7-4
	B9268FA	Mother board ass'y			see Par. 7-8, Fig. 7-5
	B9268FF	A-D/D-A card ass'y			see Par. 7-10, Fig. 7-6
	B9268WD	CPU card ass'y			see Par. 7-12, Fig. 6-3
	B9268WS	Display control ass'y			see Par. 7-13, Fig. 6-6
	B9268CD	Cover ass'y			
	B9268CH	Bracket ass'y			
	B9268CK	Bracket ass'y			
	B9268CP	Bracket			
	B9268CS	Bracket ass'y			
	B9268CX	Rear panel			
	A9007KY	Clamp		CV-100	
	A9013YC	Bracket	(7 pcs)	PG02-00	
	A9034YC	Block	(6 pcs)		
	A9036YC	Panel			
	Y9305LB	Screw	(11 pcs)		
	Y9306EB	Screw	(16 pcs)		
	Y9308LB	Screw	(10 pcs)		

7-5. Power Supply Ass'y: B9268DA.

(November '79)

Item	Part No.	Part Name and Description			Remarks
CN1	A9172KC	Conn: receptacle		EAC-301	
CN2	A9312KP	Conn: jack		2139-05	
	A9250KP	Pin contact	(5 pcs)	2478TL	
F1	A9041KF	Fuse: 1A		MF61NR 250V 1A AC05	for 100/120V line
F1	A9040KF	Fuse: 0.5A		MF61NR 250V 0.5A AC05	for 200/220/240V line
	A9020KF	Fuseholder		S-N1301	
NF1	A9003EF	Noise filter		ZGB2203-02	
SW1	A9119SP	Sw: push button		NE-15J-2 EENo19	
T1	B9268FY	Trans:power			
	A9025ED	Battery holder		TYPE 32-4 UM3 X 2	
	A9383KP	Tip	(4 pcs)	171505-1	

7-5. Power Supply Ass'y: B9268DA (continued).

Item	Part No.	Part Name and Description		Remarks
	B9268DC	Bracket		
	B9268DD	Bracket		
	B9268DE	Lever		
	B9268DH	Bracket ass'y		
	B9254ME	Plate ass'y	(2 pcs)	
	A9007ZH	Terminal ass'y	TM01-B	
	A9013ZH	Terminal ass'y	TM03	
	A9146ZH	Terminal		
	A9054ZG	Knob		
	A9300ET	Retainer ring		
	Y9308LB	Screw	(10 pcs)	
	Y9310EB	Screw	(4 pcs)	
	Y9301BB	Nut	(2 pcs)	

7-6. Display Ass'y: B9268DQ.

(November '79)

Item	Part No.	Part Name and Description		Remarks
	B9268DS	Boss	(4 pcs)	
	B9268DT	Shaft	(3 pcs)	
	B9268DU	Shaft		
	B9268DV	Bracket	(3 pcs)	
	B9268DW	Rod	(4 pcs)	
	B9268DX	Rod	(2 pcs)	
	B9268DY	Bracket		
	B9268DZ	Plate		
	B9268EA	Gear		
	B9268EK	Gear ass'y		
	B9268EN	Spring ass'y	(2 pcs)	
	B9268ET	Spring ass'y		
	B9268WJ	Display PCB ass'y		see Par. 7-7, Fig. 6-4
	A9008ZH	Terminal ass'y	TM01-A	
	A9009ZH	Terminal ass'y	TM02-R	
	A9011ZH	Terminal ass'y	TM02-B	
	B9413CW	Spacer	(3 pcs)	
	Y9304SK	Screw	(10 pcs)	
	Y9306LB	Screw	(19 pcs)	

7-7. Display PCB Ass'y: B9268WJ.

(November '79)

Item	Part No.	Part Name and Description					Remarks
R1, R6	A9019RL	Res: module	1kΩ	±10%	1/8W	RK1/8B4 1kΩk	4 elements
R2, R3	A9653RM	Res: fxd met flm	100Ω	±1%	1/4W	ERO-25CKF 1000	
R4	A9645RM	Res: fxd met flm	47Ω	±1%	1/4W	ERO-25CKF 47R0	
R5	A9047RL	Res: module	330Ω	±10%	1/8W	RK1/8B4S 330ΩK	4 elements
R7	A9665RM	Res: fxd met flm	330Ω	±1%	1/4W	ERO-25CKF 3300	
R8	A9677RM	Res: fxd met flm	1kΩ	±1%	1/4W	ERO-25CKF 1001	
R9, R10	A9669RM	Res: fxd met flm	470Ω	±1%	1/4W	ERO-25CKF 4700	
C1 to C5	A9037CA	Cap: fxd Al elect	4.7μF		25V	ECE-A25V4R7L	
D5 to D16	A9248HD	Diode: Si				1S953	
D17 to D50		not assigned					
D51	A9053HP	Diode: LED				HDSP-3736	
D52 to D55	A9052HP	Diode: LED				HDSP-3731	
D56	A9054HP	Diode: LED				5082-4990	green
D57 to D65	A9049HP	Diode: LED				5082-4690	red
U1	A9142LM	IC: digital				TC5012P	
U2	A9232LB	IC: digital				SN74368N	
U3	A9193LB	IC: digital				SN7414N	
PC1 to PC6	A9070HL	Photocoupler				PS4001	
SW1, SW2	A9108SS	SW: toggle				M-2018N	lever: black
SW3	A9344SR	Sw: rtry				RS620Ndl 1-1-15 20° 1-1-16 20°	
SW4	A9343SR	SW: rtry				RS620N 1-1-15 20°	
CN201, CN202	A9147KP	Conn				PS-20PA-D4T1-A1	
	B9268WL	PWB					
	A9383KP	Terminal	(5 pcs)			171505-1	
	A9017WC	Wire:shield	(0.7 m)				2 core
	B9268EB	Spacer	(2 pcs)				
	Y9903YA	Spacer	(10 pcs)				
	Y9906YA	Spacer	(2 pcs)				
	Y9208KB	Screw	(4 pcs)				
	Y9231BB	Nut	(4 pcs)				

7-8. Mother Board Ass'y: B9268FA.

(November '79)

Item	Part No.	Part Name and Description		Remarks
	B9268WM	Mother board PCB ass'y		see Par. 7-9, Fig. 6-5
	B9268FB	Plate ass'y		
	A9034YC	Block		
	Y9306LB	Screw	(5 pcs)	
	Y9308LB	Screw	(2 pcs)	
	Y9310LB	Screw	(4 pcs)	
	Y9301WB	Washer	(2 pcs)	

7-9. Mother Board PCB Ass'y: B9268WM.

(November '79)

Item	Part No.	Part Name and Description					Remarks
R101, R103	A9211RK	Res: fxd met flm	1Ω	±5%	1/2W	ERX-12AVJ 1.0Ω	
R102	A9693RM	Res: fxd met flm	4.7kΩ	±1%	1/4W	ERO-25CKF 4701	
R104, R106	A9669RM	Res: fxd met flm	470Ω	±1%	1/4W	ERO-25CKF 4700	
R105	A9701RM	Res: fxd met flm	10kΩ	±1%	1/4W	ERO-25CKF 1002	
R107	A9280RK	Res: fxd met flm	82Ω	±5%	2W	ERG-2AVJ 820	
R201	A9047RL	Res: module	330Ω	±10%	1/8W	RK1/8B4S 330ΩK	4 elements
R202	A9019RL	Res: module	1kΩ	±10%	1/8W	RK1/8B4 1kΩK	4 elements
R203	A9665RM	Res: fxd met flm	330Ω	±1%	1/4W	ERO-25CKF 3300	
R204	A9677RM	Res: fxd met flm	1kΩ	±1%	1/4W	ERO-25CKF 1001	
R205	A9695RM	Res: fxd met flm	5.6kΩ	±1%	1/4W	ERO-25CKF 5101	
C101	A9261CA	Cap: fxd Al elect	4700μF		35V	35VP-4700	
C102, C103, C107	A9102CA	Cap: fxd Al elect	470μF		16V	SL16T-470	
C104	A9140CA	Cap: fxd Al elect	1000μF		50V	SL50T-1000	
C105	A9138CA	Cap: fxd Al elect	330μF		50V	SL50T-330	
C106	A9221CY	Cap: fxd polye flm	0.01μF	±10%	100V	501N1003-103K	
D101	A9037HL	Diode: module				S2HB-10	
D102		not assigned					
D103	A9007HL	Diode: module				10DC1N	
D104, D105	A9248HD	Diode: Si				1S953	
D106	A9300HD	Diode: zener				RD5.6E-B	
D107	A9008HL	Diode: module				10DC1R	
Q101	A9045HQ	TSTR: Si PNP				2SA671C	
Q102, Q103	A9340HQ	TSTR: Si NPN				2SC1833	
Q201 to Q205	A9045HQ	TSTR: Si PNP				2SA671C	
Q206, Q207	A9067HL	TSTR: module				μPA53C	
U101	A9129LA	IC: +5V voltage reg.				TA78005P	
CN101 to CN104	A9401KP	Conn				PBRS-60-2T2B	
CN201, CN202	A9173KP	Conn				PS-20SD-D4T1-1	
CN203		not assigned					see Fig. 6-5b
CN301	A9224KP	Conn				225J-20621-188 (115)	
CN302	A9311KP	Conn				5082-05A	
	B9268WN	PWB ass'y					
	B9261BZ	Case					
	B9268FD	Fin					
	A9017KY	Clamp				CV-150	
	Y9720YA	Spacer	(2 pcs)				
	Y9312LB	Screw	(2 pcs)				

7-10. A-D/D-A Card Ass'y: B9268FF.

(November '79)

Item	Part No.	Part Name and Description		Remarks
	B9268FH	Bracket		
	B9268FJ	Plate	(4 pcs)	
	B9268FK	Screw		
	B9268FL	Bracket		
	B9268WA	AD/DA PCB ass'y		see Par. 7-11, Fig. 6-2
	A9034YC	Rod	(2 pcs)	
	Y9203KB	Screw	(4 pcs)	
	Y9304LB	Screw	(4 pcs)	
	Y9306LB	Screw	(3 pcs)	

7-11. A-D/D-A PCB Ass'y: B9268WA.

(November '79)

Item	Part No.	Part Name and Description					Remarks
R1, R6, R28	A9693RM	Res: fxd met flm	4.7kΩ	±1%	1/4W	ERO-25CKF 4701	
R2	A9886RN	Res: fxd met flm	1kΩ	±0.5%	1/8W	RN60E 1kΩD	±25 ppm/°C
R3	A9434RP	Res: fxd met flm	10kΩ	±0.5%	1/8W	RN60E 10kΩD	±25 ppm/°C
R4	A9670RM	Res: fxd met flm	510Ω	±1%	1/4W	ERO-25CKF 5100	
R5, R24	A9732RM	Res: fxd met flm	200kΩ	±1%	1/4W	ERO-25CKF 2003	
R7	A9725RM	Res: fxd met flm	100kΩ	±1%	1/4W	ERO-25CKF 1003	
R8	A9665RM	Res: fxd met flm	330Ω	±1%	1/4W	ERO-25CKF 3300	
R9, R41	A9689RM	Res: fxd met flm	3.3kΩ	±1%	1/4W	ERO-25CKF 3301	
R10	A9688RM	Res: fxd met flm	3kΩ	±1%	1/4W	ERO-25CKF 3001	
R11	A9719RM	Res: fxd met flm	56kΩ	±1%	1/4W	ERO-25CKF 5602	
R12	A9679RM	Res: fxd met flm	1.2kΩ	±1%	1/4W	ERO-25CKF 1201	
R13		not assigned					
R14, R19	A9041RL	Res: module	22kΩ	±10%	1/8W	RK1/8B4 22kΩK	4 elements
R15 to R17	A9870RM	Res: fxd met flm	1MΩ	±1%	1/2W	ERO-50CKF 1004	
R18	A9717RM	Res: fxd met flm	47kΩ	±1%	1/4W	ERO-25CKF 4702	
R20	A9019RL	Res: module	1kΩ	±10%	1/8W	RK1/8B4 1kΩK	4 elements
R21 to R23, R25, R27	A9705RM	Res: fxd met flm	15kΩ	±1%	1/4W	ERO-25CKF 1502	
R26	A9729RM	Res: fxd met flm	150kΩ	±1%	1/4W	ERO-25CKF 1503	
R29	A9677RM	Res: fxd met flm	1kΩ	±1%	1/4W	ERO-25CKF 1001	
R30	A9667RM	Res: fxd met flm	390Ω	±1%	1/4W	ERO-25CKF 3900	
R31	A9653RM	Res: fxe met flm	100Ω	±1%	1/4W	ERO-25CKF 1000	
R32, R33	A9919YA	Res: fxd ww	1kΩ	±0.1%		BV-11 1kΩ	
R34	A9917YA	Res: fxd ww	8kΩ	±0.1%		BV-11 8kΩ	
R35	A9918YA	Res: fxd ww	1.8kΩ	±0.1%		BV-11 1.8kΩ	
R36	A9920YA	Res: fxd ww	180Ω	±0.1%		BV-11 180Ω	
R37	A9210RQ	Res: fxd met flm	19Ω	±0.1%	1W	RN75R 19ΩB	
R38	A9921YA	Res: fxd ww	1Ω	±0.1%		BV-11 1Ω	
R39	A9219RK	Res: fxd met flm	6.8Ω	±5%	1/2W	ERX-12AVJ 6.8Ω	
R40	A9701RM	Res: fxd met flm	10kΩ	±1%	1/4W	ERO-25CKF 1002	
R42	A9694RM	Res: fxd met flm	5.1kΩ	±1%	1/4W	ERO-25CKF 5101	
R43	A9697RM	Res: fxd met flm	6.8kΩ	±1%	1/4W	ERO-25CKF 6801	

7-11. A-D/D-A PCB Ass'y: B9268WA (continued).

Item	Part No.	Part Name and Description					Remarks
R44 to R46, R51, R52	A9684RM	Res: fxd met flm	2kΩ	±1%	1/4W	ERO-25CKF 2001	
R47	A9707RM	Res: fxd met flm	18kΩ	±1%	1/4W	ERO-25CKF 1802	
R48	A9792RM	Res: fxd met flm	560Ω	±1%	1/2W	ERO-50CKF 5600	
R49	A9802RM	Res: fxd met flm	1.5kΩ	±1%	1/2W	ERO-50CKF 1501	
R50	A9629RM	Res: fxd met flm	10Ω	±1%	1/4W	ERO-25CKF 10R0	
R100	A9082RL	Res: module	390Ω	±5%	1/8W	RK1/8B4 390ΩJ	4 elements
R101	A9658RM	Res: fxd met flm	160Ω	±1%	1/4W	ERO-25CKF 1600	
RV1	A9585RV	Res: var cermet	1kΩ	±20%	1/2W	RJ-6S 1kΩ	
C1, C8, C20, C29 to C32	A9025CN	Cap: fxd mica	100pF	±10%	100V	DM05C 101K1	
C2, C12 to C14, C17, C18, C21, C22, C24, C25	A9221CY	Cap: fxd polye flm	0.01μF	±10%	100V	501N1003-103K	
C3	A9032CN	Cap: fxd mica	330pF	±10%	100V	DM05C 331K1	
C4, C6, C7, C10, C11, C33, C34	A9003CC	Cap: fxd cer	0.01μF		50V	BLD-1H 103ZA	
C5, C23	A9019CN	Cap: fxd mica	33pF	±10%	100V	DM05C 330K1	
C9	A9235CY	Cap: fxd polye flm	1.5μF	±10%	100V	ECQ-E 1155KZ	
C15, C16	A9186CA	Cap: fxd Al elect	33μF		35V	ECE-A35V33L	
C19	A9048CS	Cap: fxd polys flm	0.1μF	±1%	50V	CQ28L-1H-1002-D02	
C26	A9232CY	Cap: fxd polye flm	0.33μF	±10%	100V	ECQ-E 1334KZ	
C27	A9065CY	Cap: fxd polye flm	1500pF	±10%	100V	501N1003-152K1	
C100	A9003CC	Cap: fxd cer	0.01μF		50V	BLD-1H 103ZA	
C101	A9144CT	Cap: fxd Ta elect	15μF	±20%	20V	111N2002-156M	
D1, D2, D4 to D6, D8 to D12, D14, D15, D17 to D19, D22	A9248HD	Diode: Si				1S953	
D3	A9101HD	Diode: zener				1S2192-B	
D7	A9310HD	Diode: zener				RD15E-B	
D13	A9301HD	Diode: zener				RD6.2E-B	
D16	A9312HD	Diode: zener				RD18E-B	
D20, D21	A9230HD	Diode: zener				RD5.1E-B	
D100	A9084HL	Diode: module				μPA54H	
D101	A9248HD	Diode: Si				1S953	
Q1 to Q3	A9187HQ	TSTR: FET				2SK43S-D	
Q4 to Q6, Q9	A9338HQ	TSTR: Si PNP				2SA883	
Q7, Q11	A9340HQ	TSTR: Si NPN				2SC1833	
Q8	A9287HQ	TSTR: Si NPN				2SC1061-C	
Q10	A9045HQ	TSTR: Si PNP				2SA671-C	
PC1, PC3	A9086HL	Photocoupler				5082-4360	
PC2	A9072HL	Photocoupler				PC5072	
PC4	A9057HL	Photocoupler				EE-CB	
U1	A9077LA	IC: OP amp				μPC324C	
U2, U10	A9092LA	IC: OP amp				μPC157A(1)	
U3	A9036LA	IC: OP amp				μPC156A	

7-11. A-D/D-A PCB Ass'y: B9268WA (continued).

Item	Part No.	Part Name and Description		Remarks
U4	A9148LM	IC: digital	TC4555P	
U5	A9072LM	IC: digital	TC4066P	
U6	A9085LA	IC: OP amp	μPC271C	
U7	A9030LM	IC: digital	TC4011P	
U8	A9042LA	IC: OP amp	μPC 254A	
U9	A9073LA	IC: +15V voltage reg.	FS7815M	
RL1 to RL3, RL6	A9175MR	Relay	MR24-5S	
RL4, RL5	A9182MR	Relay	MR22-5S	
RL7	A9024MR	Relay	NR5V-SD	
	B9268WB	PWB ass'y		
	A9050KP	Feedthrough (3 pcs)	FT-E-12	
	A9051KP	Feedthrough	FT-E-15	
	A9030YC	Test point (2 pcs)	PA-02	
	A9012YC	Lever (2 pcs)		
	Y9706PS	Spring pin (2 pcs)		

7-12. CPU Card Ass'y: B9268WD.

(November '79)

Item	Part No.	Part Name and Description					Remarks
R1 to R4	A9021RL	Res: module	5.6kΩ	±10%	1/8W	RK1/8B4 5.6kΩK	4 elements
R5, R6, R12	A9677RM	Res: fxd met flm	1kΩ	±1%	1/4W	ERO-25CKF 1001	
R7 to R11		not assigned					
R13	A9701RM	Res: fxd met flm	10kΩ	±1%	1/4W	ERO-25CKF 1002	
R14 to R55		not assigned					
R56, R57 R59, R61	A9701RM	Res: fxd met flm	10kΩ	±1%	1/4W	ERO-25CKF 1002	
R58	A9653RM	Res: fxd met flm	100Ω	±1%	1/4W	ERO-25CKF 1000	
R60	A9193RK	Res: fxd met flm	3.3MΩ	±5%	0.3W	RG08V2F 3.3MΩJ	
C1	A9097CA	Cap: fxd Al elect	100μF		16V	ECE-B16V100LU	
C2, C5, C6	A9217CA	Cap: fxd Al elect	1μF		35V	CA92C-1C-1R000-R56	
C3, C4, C7		not assigned					
C8, C9	A9068CN	Cap: fxd mica	470pF	±10%	100V	DM15C 471K1	
C10, C11	A9019CN	Cap: fxd mica	33pF	±10%	100V	DM05C 330K1	
C12, C13	A9221CY	Cap: fxd polye flm	0.01μF	±10%	100V	501N1003-103K	
C14 to C53		not assigned					
C54	A9098CA	Cap: fxd Al elect	220μF		16V	ECE-B16V220L	
C55	A9093CA	Cap: fxd Al elect	33μF		16V	ECE-B16V33L	
C56	A9097CA	Cap: fxd Al elect	100μF		16V	ECE-B16V100LU	
D1 to D55		not assigned					
D56 to D60	A9248HD	Diode: Si				1S953	
Q1 to Q53		not assigned					
Q54	A9338HQ	TSTR: Si PNP				2SA883	
Q55	A9121HQ	TSTR: Si NPN				2SC641Ⓚ	
U1	A9143LM	IC: digital					
U2*	B9268FX	IC: digital				μPD8085	CPU
U2*	B9268FW	IC: digital				μPD2332C-71	MASK ROM
U3	B9268FZ	IC: digital				μPD2332C-207	MASK ROM
U4	A9147LM	IC: digital				μPB403D	PROM (programmed)
U5	A9144LM	IC: digital				μPD5101LC-1	RAM
						μPD8156	RAM

7-12. CPU Card Ass'y: B9268WD (continued).

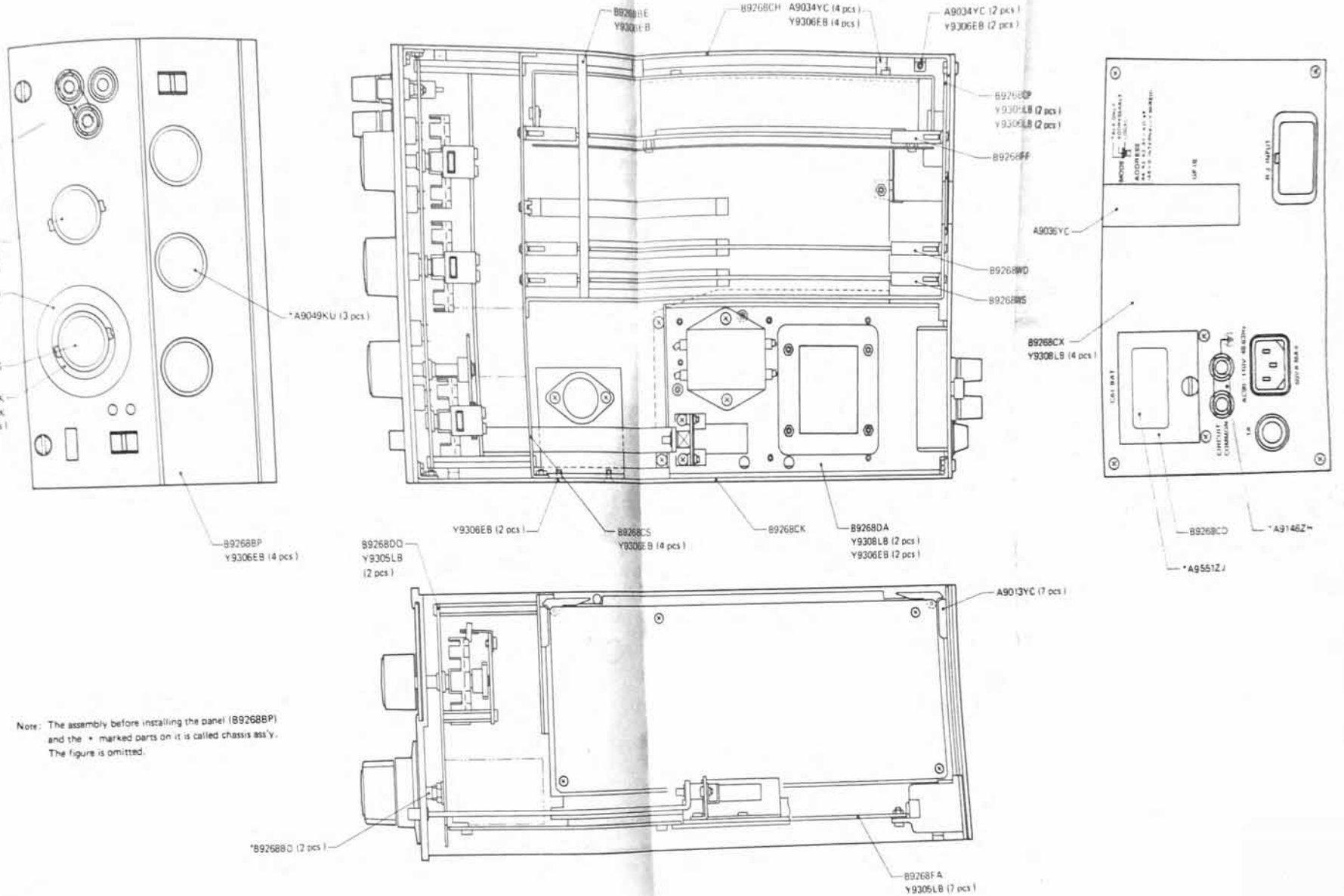
Item	Part No.	Part Name and Description				Remarks
U6	A9328LB	IC: digital			SN74LS273N	
U7	A9175LB	IC: digital			SN74LS42N	
U8, U20	A9313LB	IC: digital			DM81LS95	
U9, U16	A9148LB	IC: digital			SN74LS32N	
U10	A9014LB	IC: digital			SN7400N	
U11, U17	A9120LB	IC: digital			SN74LS00N	
U12	A9062LB	IC: digital			SN74191N	
U13	A9122LB	IC: digital			SN74LS10N	
U14	A9041LB	IC: digital			SN7476N	
U15	A9018LB	IC: digital			SN7404N	
U18, U19	A9231LB	IC: digital			SN74393N	
U21 to U51		not assigned				
U52	A9085LA	IC: OP amp			μPC271C	
	A9030KH	IC socket			821-20011-164	for U3
	A9099KP	IC socket			DICA-24A-T1	for U2
SW1	A9109SS	SW: toggle			8G1054	
X1	A9047EX	Quartz resonator			HC18U 10MHz	
	B9268WE	PWB				
	A9030YC	Test point	(8 pcs)		PA-02	
	A9012YC	Lever	(2 pcs)			
	Y9706PS	Spring pin	(2 pcs)			

*U2: μPD2332C-71: B9268FX is used on instrument of serial no._____or before, or μPD2332C-207: B9268FW on serial no._____ or subsequent.

7-13. Display Control Ass'y: B9268WS.

(November '79)

Item	Part No.	Part Name and Description				Remarks
R1 to R11, R14	A9653RM	Res: fxd met flm	100Ω	±1%	1/4W ERO-25CKF 1000	
R12		not assigned				
R13	A9665RM	Res: fxd met flm	330Ω	±1%	1/4W ERO-25CKF 3300	
C1	A9097CA	Cap: fxd Al elect	100μF		16V ECE-B16V100LU	
C2 to C4	A9064CY	Cap: fxd polye flm	1000pF	±10%	100V 501N1003-102K1	
C5	A9222CY	Cap: fxd polye flm	4700pF	±10%	100V 501N1003-472K1	
U1	A9145LM	IC: digital			μPD8279	
U2	A9175LB	IC: digital			SN74LS42N	
U3	A9111LB	IC: digital			SN7447N	
U4	A9121LB	IC: digital			SN74LS04N	
U5	A9145LB	IC: digital			SN74LS03N	
U6	A9149LB	IC: digital			SN74LS74N	
U7	A9110LB	IC: digital			SN7438N	
U8	A9120LB	IC: digital			SN74LS00N	
U9	A9132LB	IC: digital			SN74LS86N	
	B9268WT	PWB				
	A9030YC	Test point			PA-02	
	A9012YC	Lever	(2 pcs)			
	Y9706PS	Spring pin	(2 pcs)			



Note: The assembly before installing the panel (B9268BP) and the * marked parts on it is called chassis ass'y. The figure is omitted.

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Figure 7-1. Main Ass'y: B9268BA (SCALE: 1/2)

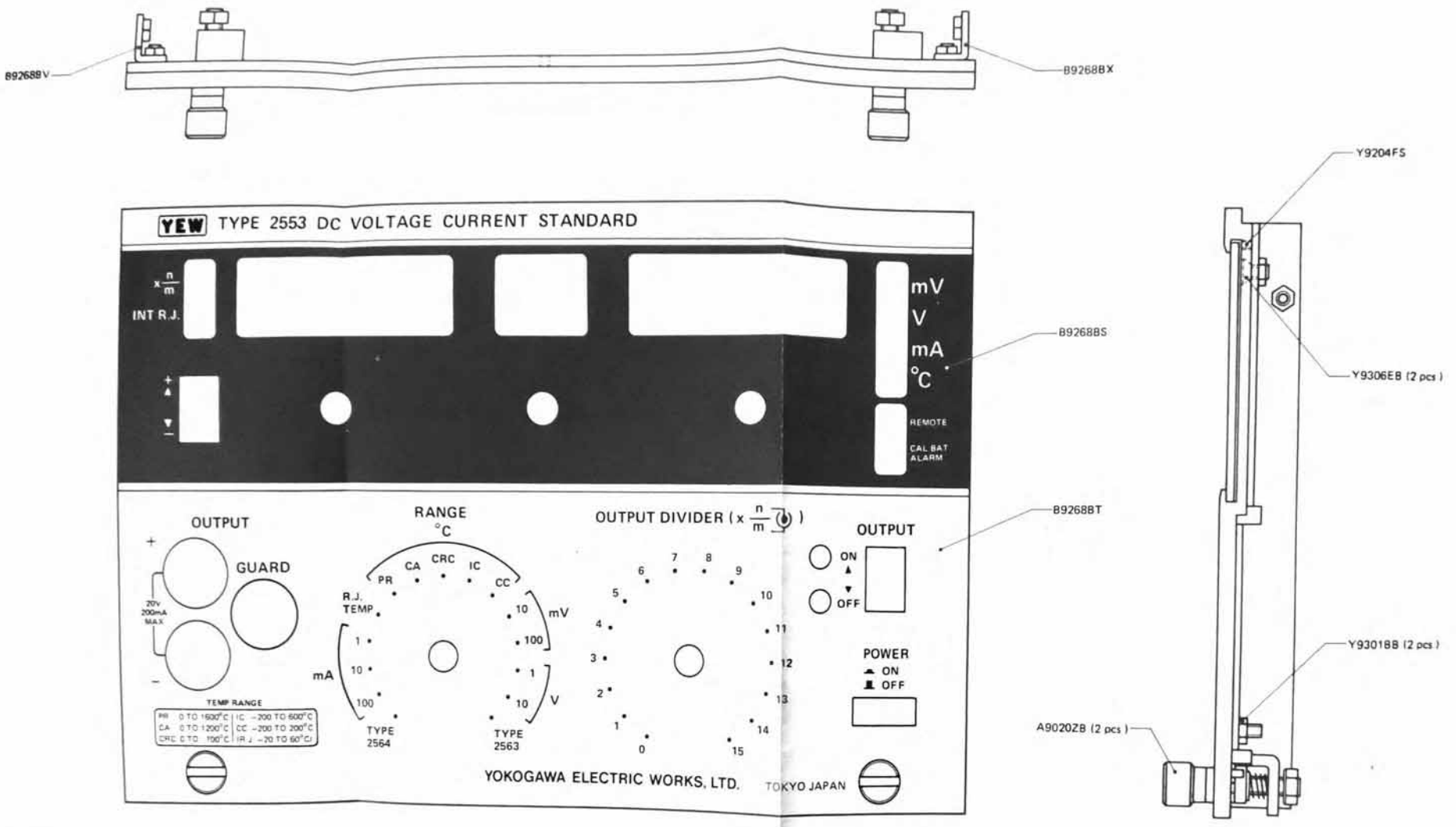

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Figure 7-2. Front Panel Ass'y: B9268BP.

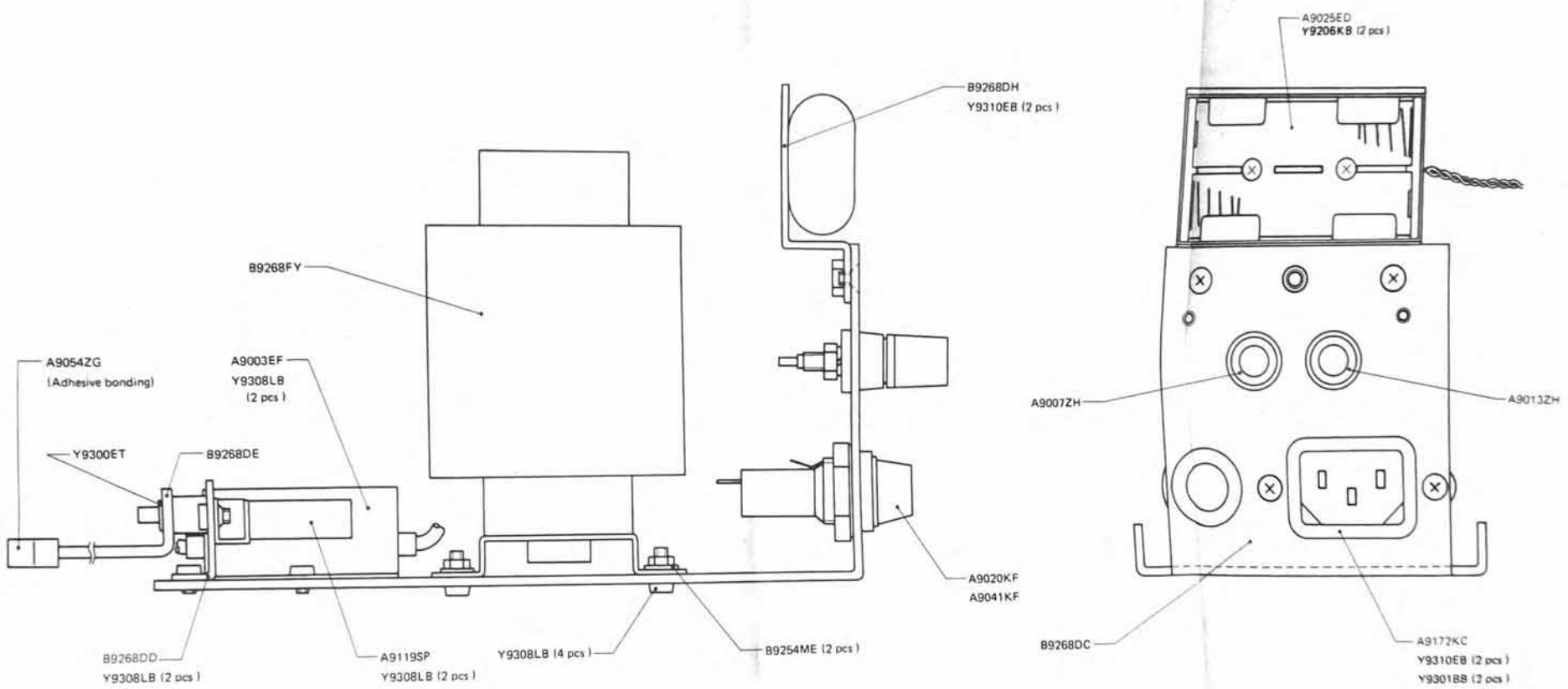

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Figure 7-3. Power Supply Ass'y: B9268DA.

Notes
1. Apply lubricant to the bearings.
2. * marked parts belong to the display PCB ass'y (B9268WJ).

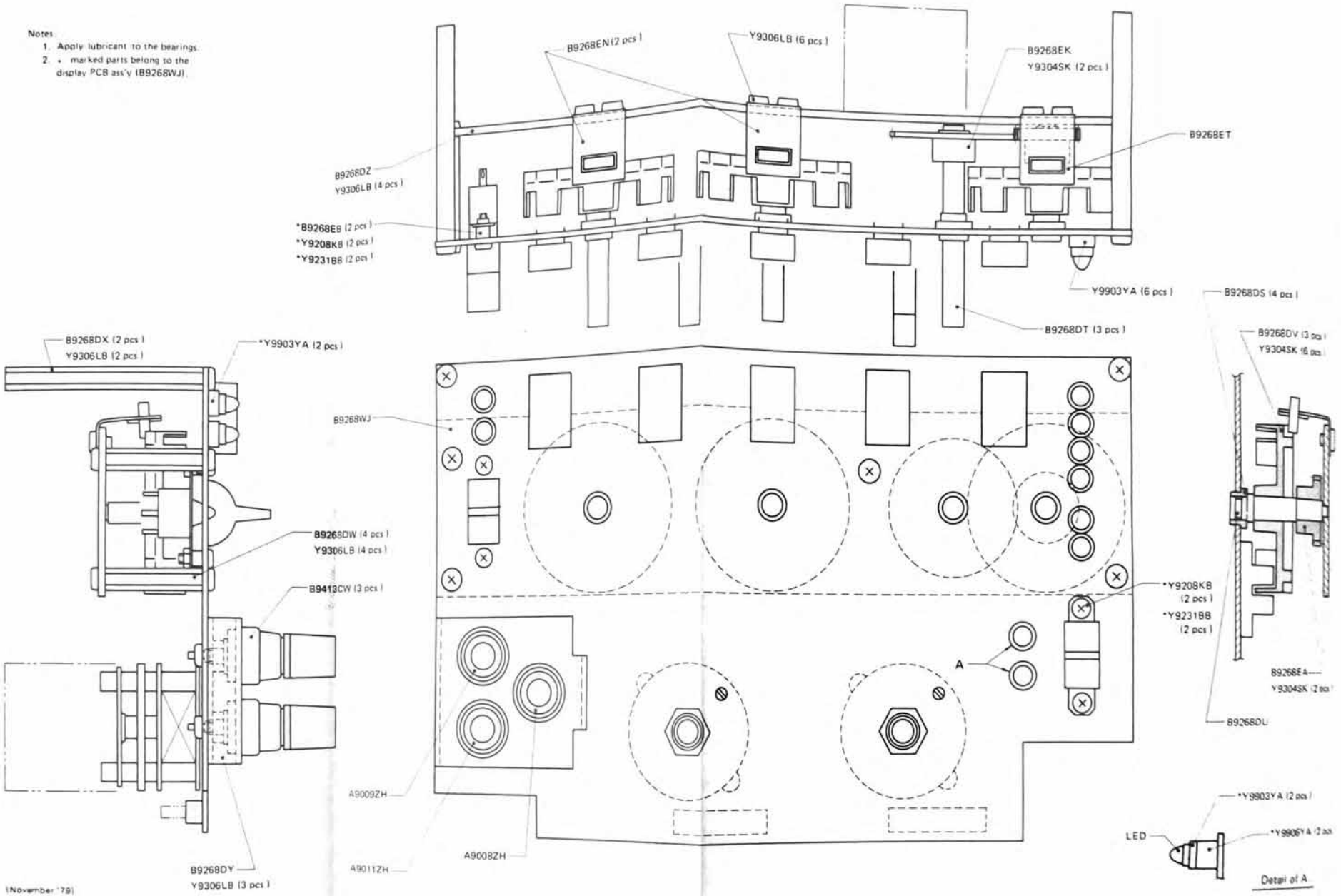

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Figure 7-4. Display Ass'y: B9268DQ.

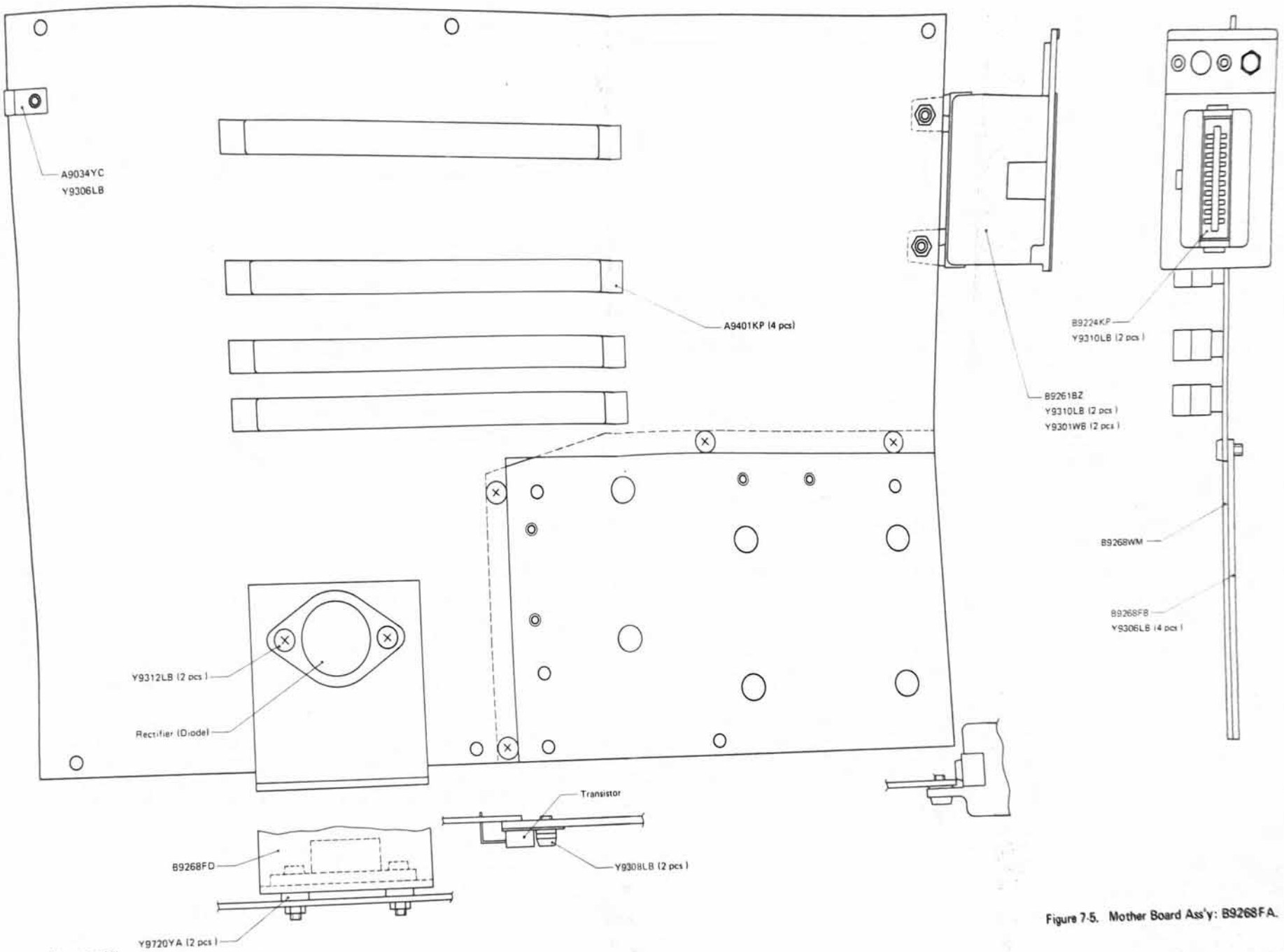

Figure 7-5. Mother Board Ass'y: B9268FA.

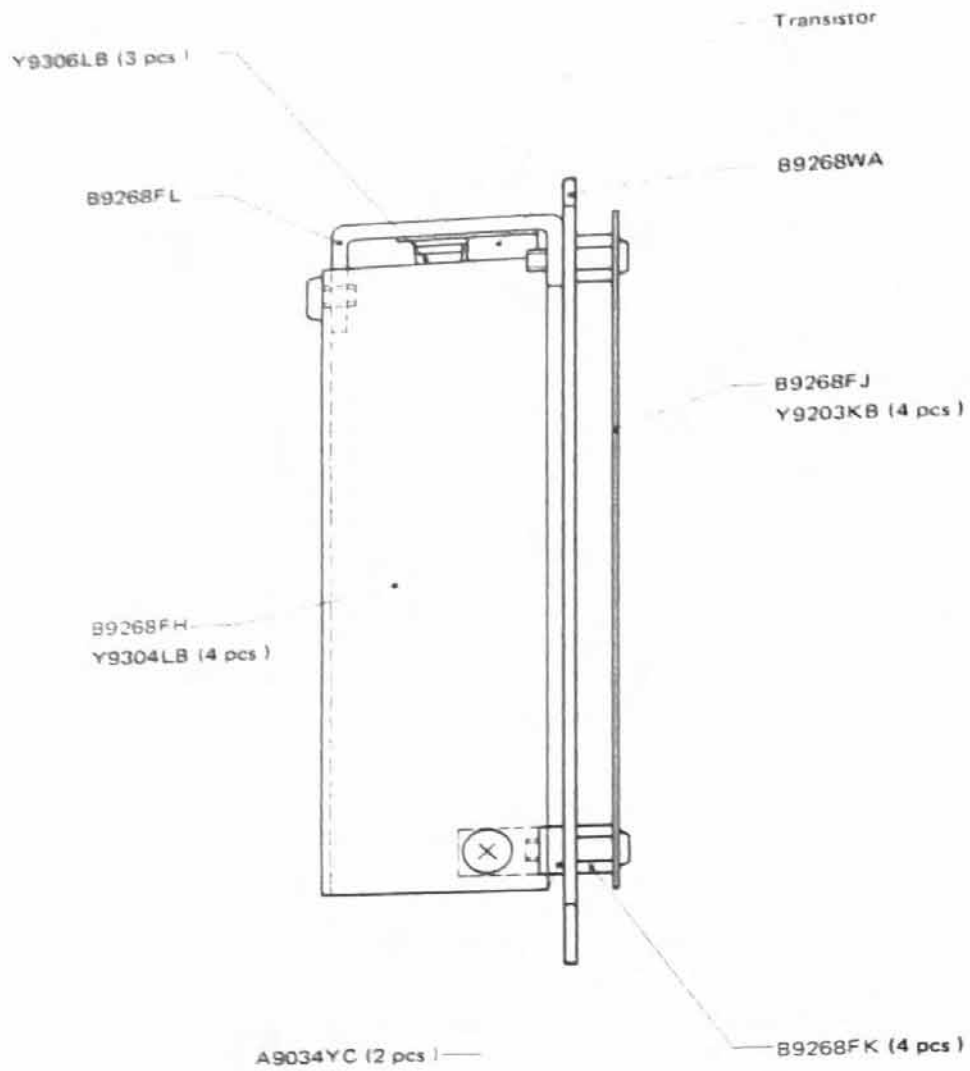

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Figure 7-6. A-D/D-A Card Ass'y: B9268FF.

Service Manual

Option

Type 2578-25

TEMPERATURE PROBE

YOKOGAWA ELECTRIC WORKS

SM 2578-25-1E

CONTENTS

1. SCHEMATIC DIAGRAM

Par.	Description	Ass'y No.	Figure No.	Page
1	Temperature Probe Ass'y Schematic Diagram	B9268HP	1-1	1–1

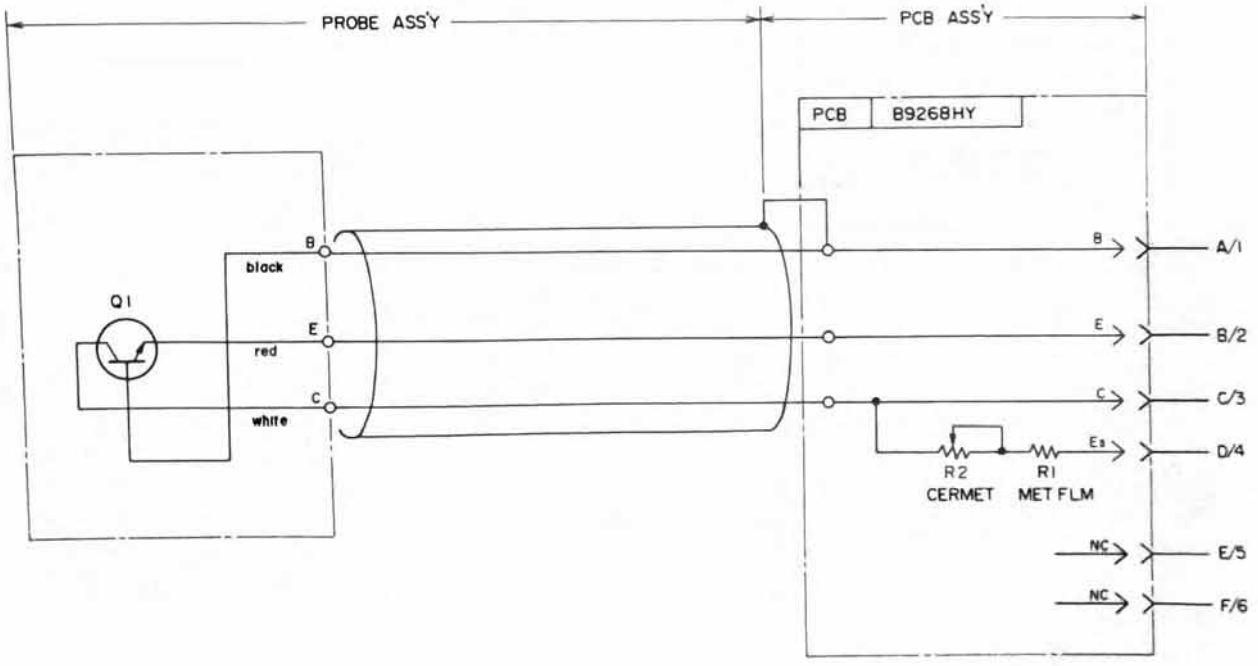

Figure 1-1. Temperature Probe Ass'y: B9268HP Schematic Diagram.

2. PARTS LISTS AND STRUCTURAL DIAGRAM

Parts Lists:

Structural Diagram:

INDEX

List of abbreviations

ac = alternating current
Ag = silver (ed)
Al = aluminum
amp = amplifier
ass'y = assembly
Au = gold

car flm = carbon film
cap = capacitor
cct = circuit
cer = ceramic
coef = coefficient
com = common
comp = composition
conn = connector

dc = direct current
dia = diameter

elect = electrolytic

FET = field effect transistor
flm = film
fxd = fixed

Ge = germanium
gnd = ground

IC = integrated circuit

JIS = Japanese Industrial Standard

L = inductor

met = metal (lized)
mfr = manufacturer

Ne = neon
nom val = nominal value

OSC = oscillator

pwb = printed wiring board
pcb = printed circuit board
plstc = plastic
polye = polyester
polys = polystyrene
pot = potentiometer
prec = precision (temperature coefficient, long term stability, and/or tolerance)

res = resistor
rng = range
rtry = rotary

Se = selenium
sect = section(s)
Si = silicon
sub-ass'y = sub-assembly
sw = switch
sys = system
sply = supply

Ta = tantalum
temp = temperature
trim = trimmer
TSTR = transistor
trans = transformer

var = variable

ww = wire wound

YEW spec = special specification of Yokogawa Electric Works, Ltd. - YEW.

† = Request the item marked with † to YEW.
†† = Replace the item marked with †† as a complete part set even when one of its parts is damaged. Request the complete part set to YEW.
††† = Replace the item marked with ††† as an assembly even when a part of it is damaged. Request the assembly to YEW.
†††† = Optimum value selected at factory, average value shown (part may be omitted).

Example

Conn : multi = multi connector
Cap : fxd Al elect = Fixed aluminum electrolytic capacitor
Cap : fxd met polye flm = Fixed metallized polyester film capacitor
PCB Ass'y = Printed circuit board assembly
Res : fxd car flm = Fixed carbon film resistor
Res : var ww = Wirewound variable resistor
Temp coef = Temperature coefficient

2-1. Type 2578-25 Temperature Probe: B9268HA.

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Item	Part No.	Part Name and Description	Remarks
	B9268HP	Temperature probe ass'y	see Par. 2.2, Fig. 2.1
	Y9401TP	Tip (5 pcs)	accessory

2-2. Temperature Probe Ass'y: B9268HP.

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Item	Part No.	Part Name and Description	Remarks
	B9268HQ	Nameplate	
	B9268HR	Probe ass'y	supplied as set
	B9268HY	PCB ass'y	
	B9261GH	Case	
	B9261GJ	Case	
	B9267MN	Cable holder	
	B9261GP	Pipe	
	A9341ZJ	Nameplate	
	A9106KT	Screw: tapping (2 pcs)	
	A9213XK	Adhesive Cemedine High Super	

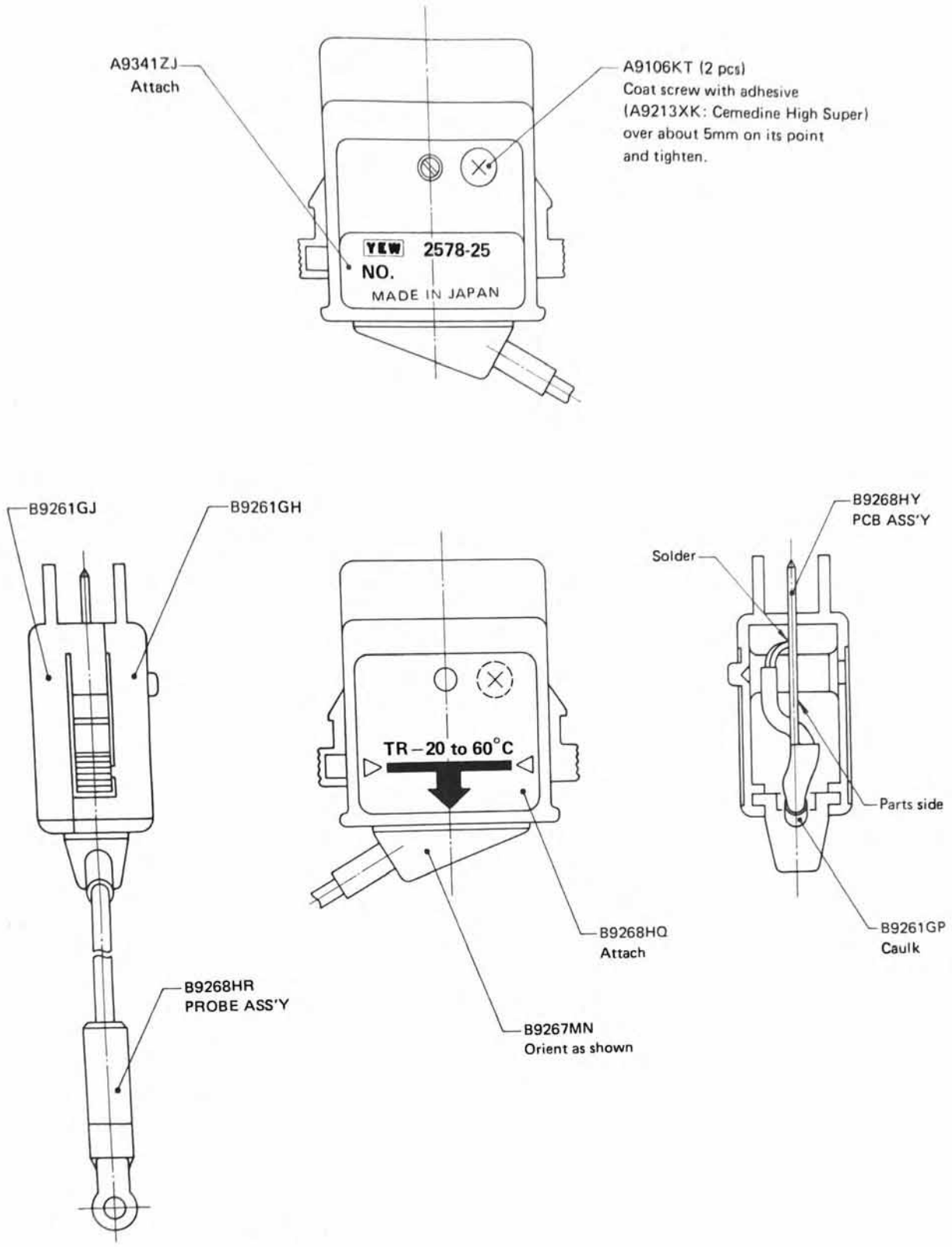

Figure 2-1. Temperature Probe Ass'y: B9268HP.