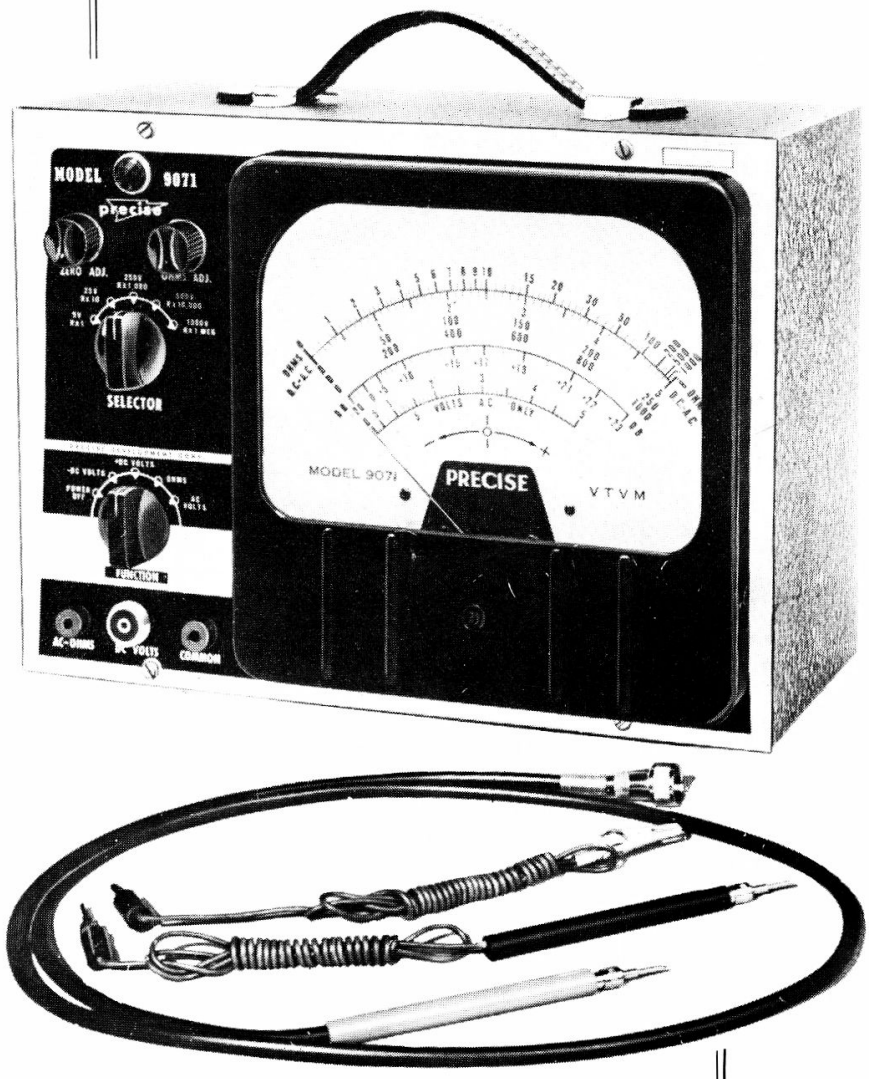
MODEL 9071 VTVM



precise

PRECISE DEVELOPMENT CORP.
Oceanside, L. I., N. Y.

C B-9071-3-2641

GENERAL DESCRIPTION

Your Model 907 Vacuum Tube Voltmeter is another example of 'an engineered product' by PRECISE.

This instrument was initially designed to permit rapid and accurate measurements in electronic circuits. It is flexible both electrically and mechanically.

Each component, from the Amphenol connector on the front panel to the Precision CERAMIC and WIREWOUND resistors used internally, was carefully selected for accuracy and durability. The circuit has been time-tested and proved; thereby, assuring the operator of quality and stability.

SPECIFICATIONS:

Electrical:	Power	11 watts
	Voltage	105-125 volts
	Line Frequency	60 cycles
	DC Impedance	25 Megohms
	AC Impedance	3.5 Megohms (approx.)
	Battery	1.5 volts (flashlight)
	Ranges	DC from .1 to 1,000 volts
		AC from .25 to 1,000 volts
		Ohms from .2 to 1,000,000,000
		DB from -20 to +55 db
	Tubes	1 - 6AL5
		1 - 6SN7
		1 - 6X5
		1 - OA2
Mechanical:	Height	8 inches
	Width	11 inches
	Depth	5 inches
	Weight	10 pounds
	Panel	Slate grey, etched, raised numerals, aluminum
	Cabinet	Steel, wrinkle grey, baked finish
	Handle	Genuine leather
	Meter	7½ inches square

O P E R A T I O N

POWER ON: Insert the line cord and rotate the FUNCTION switch to any position, other than the POWER OFF. This will automatically turn on the instrument. Always allow an initial 'warm-up' period before any adjustments are made.

DC VOLTAGE MEASUREMENTS:

(1) All DC measurements are made with the Red DC VOLTS test prod and the COMMON alligator lead.

(2) Rotate the FUNCTION switch to - or +DC, as required.

(3) Rotate the SELECTOR switch to the voltage range required.

(4) Short the COMMON and DC VOLTS leads together and adjust the ZERO ADJUST for '0' on the left side of the meter scale. Note: There may be a tendency for the meter to go off it's zero position when the leads are no longer shorted. This is due to the high sensitivity of the instrument and should be of little concern, since it will still read correctly when connected across a circuit.

(5) Connect the COMMON and DC VOLTS leads to the circuit being measured. Note: The COMMON lead is usually clipped to the ground side.

(6) All DC voltage measurements are then read on the lower portion of the top meter scale.

AC VOLTAGE MEASUREMENTS:

(1) All AC voltage measurements are made with the Black OHMS-AC test prod and the COMMON alligator clip.

(2) Rotate the FUNCTION switch to the AC-VOLTS position.

(3) Rotate the SELECTOR switch to the voltage range required.

(4) Short the COMMON and AC leads together and adjust the ZERO ADJUST for '0' on the left side of the meter scale.

(5) All AC measurements, except those of the 5 Volt range, are read on the lower portion of the top meter scale, marked A.C. When the 5 Volt range is used, measurements are read on the 5 VOLTS A.C. ONLY scale of the meter.

RESISTANCE MEASUREMENTS:

(1) All resistance measurements are made with the OHMS-AC and COMMON leads.

(2) Rotate the FUNCTION switch to the OHMS position.

(3) Rotate the SELECTOR switch to the resistance multiplier desired

RESISTANCE MEASUREMENTS (cont'd):

(4) Short the OHMS and COMMON leads together and adjust the ZERO ADJUST knob for '0' on the top of the meter scale.

(5) Remove the short across the test leads and adjust the OHMS ADJUST knob for '∞' on the OHMS scale.

(6) Place the test leads across the part to be measured and multiply the reading on the OHMS meter scale by the multiplier shown on the SELECTOR switch. Caution: Whenever OHMS measurements are being made, make certain that no voltage is applied to the part being tested.

DECIBLES:

(1) Proceed as described in AC VOLTS except for the following:
(a) All measurements are made on the DB meter scale.
(b) For each AC setting on the SELECTOR switch, the following chart should be used for determining the number of DB to be added to that read:

AC RANGE	ADD THE FOLLOWING DB
25	+0
250	+20
500	+26
1000	+32

As an example: If the meter read +21 db and the 250 volt range were used- the true reading would be: +21 +20 = +41 db. The 5 VOLT AC Range is not used on DB measurements.

FM ALIGNMENT SCALE:

(1) Proceed as in DC, except that the meter is ZERO ADJUSTED to the '0' shown on the bottom of the scale. Note: Use the +DC range on the FUNCTION switch, if the -DC range is used the polarities indicated on the scale are reversed.

C I R C U I T D E S C R I P T I O N

DC CIRCUIT:

In the DC position of the FUNCTION switch, the DC voltage being measured is directed as follows:

(1) The voltage is applied to the DC lead.

(2) The FUNCTION DECADE, composed of Precision Resistors, drops the voltage to the proper ratio.

(3) The output voltage is applied to the CATHODE-FOLLOWER DC AMPLIFIER and then to one side of the DC meter.

(4) The BALANCE BRIDGE AMPLIFIER is connected to the other side of the meter and, by bridge action, stabilizes and insures reading accuracy.

DC CIRCUIT (cont'd):

(5) The -DC and +DC CALIBRATION POTENTIOMETERS adjust the meter to the proper reading by setting the upper portion of the scale- the lower portion was set by the ZERO ADJUST.

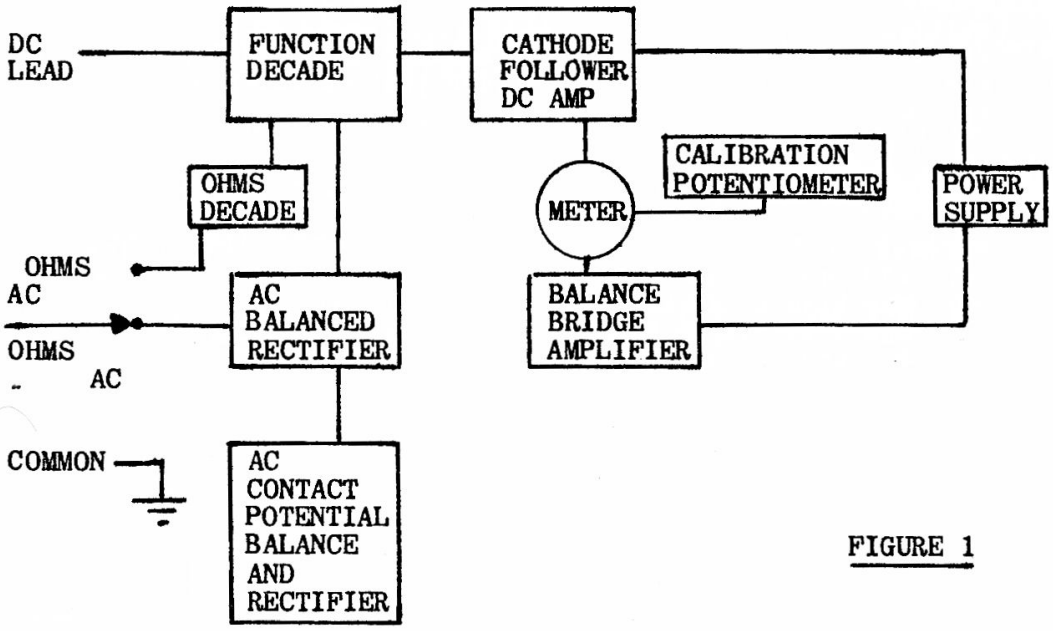


FIGURE 1

AC CIRCUIT:

(1) In the AC position of the FUNCTION switch, the AC voltage follows a similar pattern to that shown in DC, except that it is sent to the AC BALANCED RECTIFIER where it is connected to the DC circuit. The contact potential is balanced in order to keep Zero Adjust and to maintain accuracy.

DB CIRCUIT:

(1) The DB circuit operates in the same manner as that described under AC CIRCUIT.

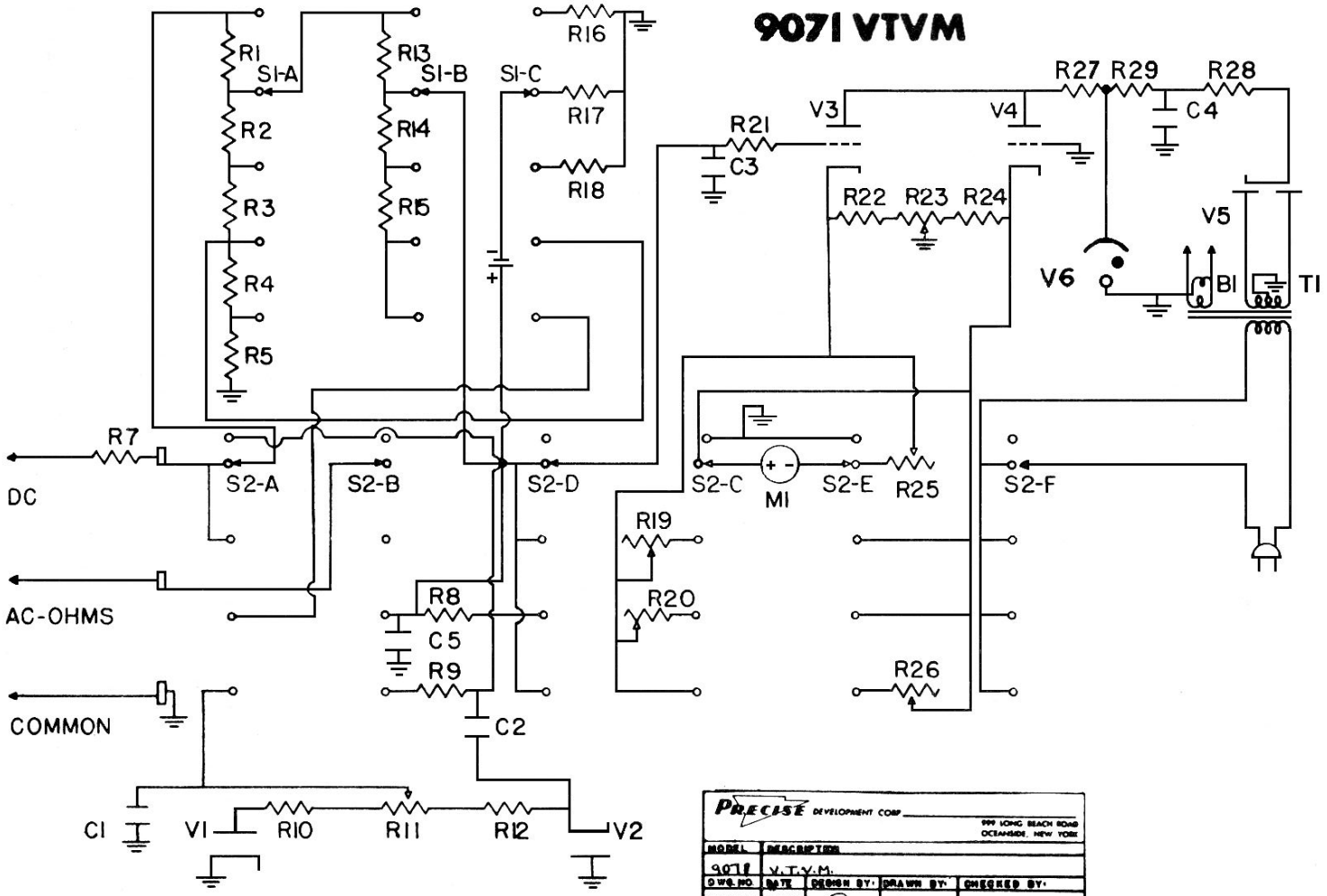
OHMS CIRCUIT:

(1) In the OHMS Circuit the battery voltage is applied to the Precision Ceramic resistors of the OHM'S decade. The series voltage drop across the unknown resistance is then measured by the CATHODE FOLLOWER DC AMPLIFIER as described under DC VOLTS.

WARRANTY

All merchandise is warranted to be free from defects in material and workmanship, and is fully protected by the standard RMA guarantee.

9071 VTVM



PRECISE DEVELOPMENT CORP.				999 LONG BEACH ROAD OCEANSIDE, NEW YORK
MODEL	DESCRIPTION			
9071	V.T.V.M.			
DWG. NO.	DATE	DESIGN BY:	DRAWN BY:	CHECKED BY:
909-8-IN	8-1-51	[illegible]	A.A.S.	B.S.M.
REVISIONS:		SUPERCEDES DWG. NO.		

DESCRIPTION	PART #
8M ohm Res.*	R-1
1.8M ohm Res.*	R-2
.1M " " *	R-3
50K " " *	R-4, R-5
15M " "	R-7
5.6M Res.	R-8
820K ohm Res.	R-9
1.5M " "	R-10
2M ohm potentiometer	R-11
1.5M ohm Res.	R-12
3.9M " "	R-13
1.5M " "	R-14
100K " "	R-15
10 ohm Res.*	R-16
100 " " *	R-17
10K " " *	R-18
2K ohm potentiometer	R-19
" " " "	R-20
1.2M ohm Res.	R-21
470 " "	R-22
2K ohm Potentiometer	R-23
470 ohm Res.	R-24
2K ohm potentiometer	R-25
" " " "	R-26
4.7K ohm Res., 1 watt	R-27
10K ohm Res., 1 watt	R-28
4.7K ohm Res., 1 watt	R-29
3 Pole-5p Switch (1 wafer)	S-1
6 Pole-5p Switch (2 wafer)	S-2
Power Transformer	T-1
6AL5 Tube	V1, V2
6SN7 "	V3, V4
6X5 "	V-5
OA2 "	V-6
.01 ufd Cond.	C-1, C-2, C-5
.0015 ufd Cond.	C-3
24 ufd Cond.	C-4

PRELIMINARY MECHANICAL ASSEMBLY:

You have now completed the wiring of your instrument. Before proceeding, carefully recheck all connections for the possibility of shorts between wires, unsoldered terminals, loose solder particles, rosin between lugs and shorted contacts. Make certain that all nuts are tight. Secure knobs to switch, and potentiometer shafts on the front panel. When aligning knobs, both switches should be in their maximum counter-clockwise position. The knob pointer should be in the 'OFF' position of the FUNCTION switch, and in the '5V' position of the SELECTOR switch. Insert tubes in sockets as indicated in diagram 9. Temporarily connect meter lugs to meter terminals. Do not mount instrument in cabinet as yet. Lug from S2E R connects to the right terminal of the meter (as viewed from rear) and lug from S2C R connects to the left terminal.

ELECTRICAL TEST:

If an ohmmeter is available, connect it between 8 of the 6X5 and ground. The reading should be at least 50,000 ohms. If less, recheck circuit carefully before inserting line cord. Adjust the mechanical Zero Adjust (located in the center of the meter case) to zero, on the left side of the scale, before power is turned on.

ELECTRICAL CALIBRATION:

Insert each one of the test leads tightly into their proper jacks. Insert line cord and turn power on by rotating the FUNCTION selector to the -DC position. Turn the SELECTOR switch to the '5V' position. Note: The pilot light and tubes should light immediately. If they do not, turn power off and recheck circuit for the possibility of a short or open circuit. Allow set an initial warm-up period of about a half hour.

-DC CALIBRATION: Short the COMMON and DC PROBE leads together; adjust the ZERO ADJUST potentiometer for a zero reading on the left side of the meter scale. On low voltage ranges, a change in zero setting may be observed when the leads are unshorted. This should not be of concern as it is due to the extreme sensitivity of the meter. Connect three 1½ volt batteries in series, thus giving an open circuit voltage of 4.68 volts. (The open circuit voltage of a flashlight battery is 1.56 volts.) Connect the COMMON lead to the plus side of the batteries and the DC PROBE lead to the negative side. Adjust the -DC CALIBRATION potentiometer (located on the chassis) for 4.68 volts on the top DC scale of the meter. See Diagram 9.

+DC CALIBRATION: Repeat as in -DC CALIBRATION except that the FUNCTION switch is rotated to the +DC position; the leads to the battery are reversed and the +DC CALIBRATION potentiometer is adjusted.

OHMS CALIBRATION: The ohmmeter is automatically calibrated and it operates as indicated in the following instruction book.

AC CALIBRATION: Rotate the FUNCTION switch to the AC VOLTS and the SELECTOR switch to the '5' range. Short the AC and COMMON leads together and adjust the AC ZERO potentiometer (located on chassis) for a zero reading on the left side of the meter scale. A standard AC meter should actually be used during this calibration. But for accuracies as normally encountered, the following may be used: rotate the SELECTOR switch to the 250 volt range and connect the COMMON lead to one side of the 110 volt AC power line and the AC-OHMS lead to the other side. (Note: Since the COMMON lead is connected to the panel of the meter, and this lead is being connected to one

AC CALIBRATION (cont'd)

side of the AC line, be very careful not to ground yourself during this adjustment. Use one hand and make sure you are standing on a dry surface). Adjust the AC CALIBRATION potentiometer for 110 volts on the 250 volt range (near center reading).

FINAL CALIBRATION: Vacuum tubes have what is technically called an 'aging characteristic'. The tube ages rapidly at the first and then tapers off to a balanced or equilibrium condition. Before aging has taken place, the meter may have a tendency to lose its zero adjust or readings may be a bit non-linear. A true calibration occurs after the tubes have been used over a period of a few months. It is suggested, therefore, that a final calibration be made several months after the instrument has been in use. At that time the CALIBRATION and ZERO potentiometers should be re-adjusted and finally sealed by sealing wax or a touch of varnish between the shaft and screw assembly.

MOUNTING HANDLE:

Secure the handle to the cabinet by using the handle brackets, screws and palnuts.

MOUNTING PANEL AND CHASSIS TO CABINET:

Thread line cord through hole in rear of cabinet. Slide set into cabinet and secure by means of a self-tapping screw at the rear of the chassis. Secure panel to cabinet by using 4 self-tapping screws. Note: Attach screws, but do not tighten until all have been started. Be very careful to use a large screw driver which will not slip. If screws thread at an angle, they will straighten as the screw is tightened.

SERVICING:

In the event of difficulty recheck the wiring carefully. Most troubles may be immediately traced to wiring mistakes, rosin joints, rosin between contacts or shorts.

FACTORY REPAIR:

If a question should arise, write to our Engineering Department listing all possible readings, etc. which may aid in analyzing the problem. Your letter will be answered promptly. Your instrument may, if you so desire, be returned to the factory for final repair and calibration at a service charge of $5.50. This does not include the cost of parts that may have been damaged due to misuse. BE SURE TO INCLUDE TEST LEADS IF YOU RETURN YOUR UNIT FOR FACTORY CALIBRATION. If the instrument is to be returned to us, pack carefully in at least two cartons insulated by paper or excelsior between them. Ship EXPRESS PREPAID. We do not suggest the use of MAIL. The instrument will be returned to you EXPRESS COLLECT. Please make certain that all parts are secured tightly in place so that vibration during transit will not cause damage.

COMPLETE ASSEMBLY **REAR VIEW**