IVOR ZENER DIODE SELECTOR · WORKING INSTRUCTIONS

caution

DO NOT, when using instrument as a selector,

connect to voltage source

without suitable series resistance.

TAKE CARE, therefore, when using as a voltmeter.

and OBSERVE POLARITY

ZERO ADJUSTMENT: If necessary, set the pointer to zero using the slotted adjuster below the scaleplate.

NOTE: For greater accuracy use the instrument face upwards.

The zener diodes used in the Selector are all standard components, a popular range of 1 watt zener diodes type 1Z which are readily available from the International Rectifier Co. (Great Britain).

ZENER DIODE SELECTOR

INTRODUCTION

With the increasing use of zener diodes as a means of stabilising electronic circuits, it has become necessary for the circuit designer to have a rapid and convenient means of determining the correct zener diode for any particular application. Avo Ltd. have co-operated with the International Rectifier Co. to provide this in a form which is ideally suited for use in development laboratories, prototype workshops, colleges, etc.

PURPOSE

The zener diode selector facilitates the design and testing of zener voltage stabilisers for up to 27V d.c., and requiring a maximum dissipation of 1 watt (at 25°c) in the zener.

DESCRIPTION

The instrument, supplied complete with prods and clips in an attractive grey plastic case, enables the designer to select by means of a rotary switch any one of 11 zener diodes, covering the following nominal voltages:-

3.9, 4.7, 5.6, 6.8, 8.2, 10, 12, 15, 18, 22 or 27 volts.

Two ranges are provided for measurement of voltage and current (10V, 300mA and 30V, 100mA). The meter may be used either in circuit with a selected zener diode to measure its voltage and dissipation, or independently (zener diodes out of circuit) to measure voltage or current in an external circuit.

DESIGN OF ZENER STABILISERS

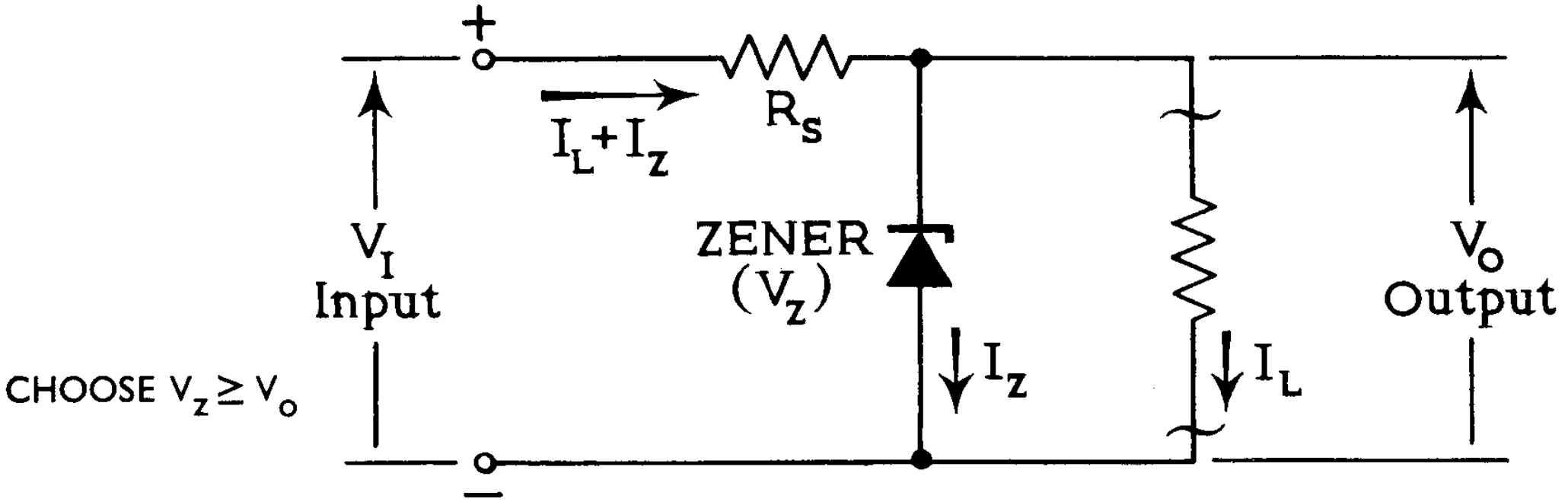


Fig. 1

BASIC CIRCUIT OF ZENER STABILISER

To ascertain the value of R_S.

Determine max. and min. input voltage.

Determine max. and min. output currents.

NOW:
$$R_{S\ max} = \frac{V_{I\ min} - V_O}{K \times I_{L\ min}}$$

AND
$$WR_S = \frac{(V_{I\ max} - V_O)^2}{R_S}$$

where WR_S is wattage dissipated in R_S

Check: $V \geq V_O + 1$

OR (Preferably higher)

Check whether I_Z min. $= 0$ (i.e. Load open circuit).

$K = 1.1$

OR

$K = 1.2$ if $V_O \leq 5.6$

Check that the wattage rating of R_S is greater than WR_S

The above has given R_s, for the minimum current drain from power supply.

Improved stability may be obtained* by operating the zener at a higher current.

* Especially when $V_Z \leq 5.6V$

Max. Current Drain

$$= \frac{V_{I\ max} - V_O}{R_s}$$

Wattage dissipated in ZENER:

$$W_Z = V_L \left(\frac{V_{I\ max} - V_O}{R_S} - I_{L\ min} \right)$$

From the Graph (Fig. 2) check that the wattage rating of the ZENER at working temperature is higher than W_Z.

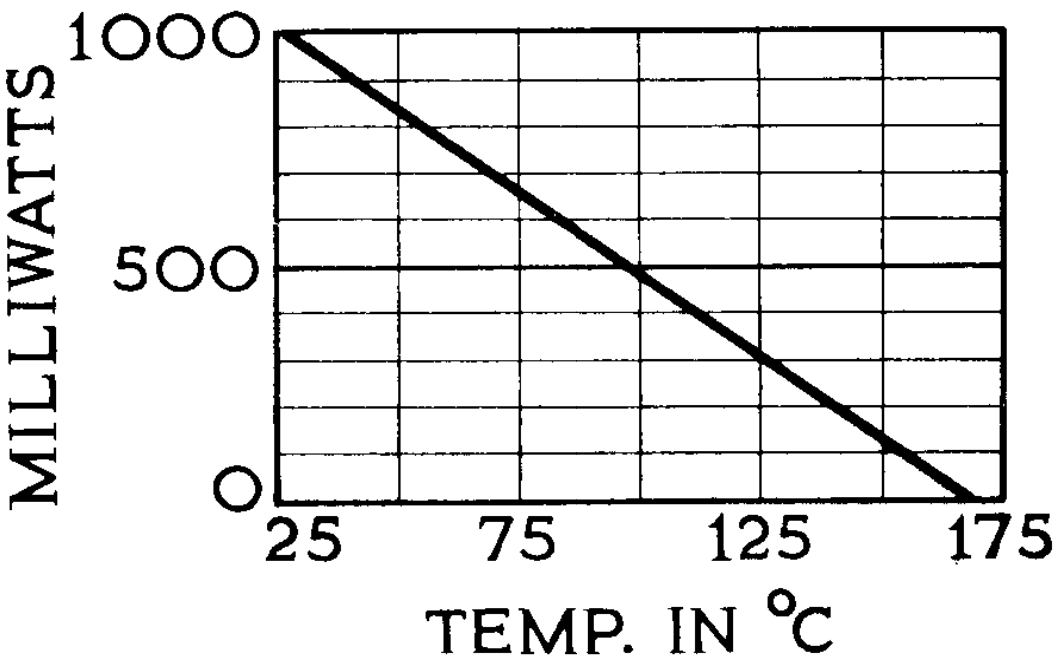


Fig. 2

The Zener Diodes used in this instrument are mounted on a heat sink and will dissipate 1 watt at 25°C.

IF the zener is under-run,

AND a higher current drain can be tolerated, choose a lower value of R_S and recalculate WR_S, W_Z and maximum current drain.

W_Z is considerably less than wattage rating of zener.

USE OF THE INSTRUMENT

WITH INSTRUMENT SET TO

d.c. VOLTS RANGE

CONNECT AS SHOWN IN FIG. 3.

SET V_I TO A MINIMUM.

DO NOT PRESS BUTTON.

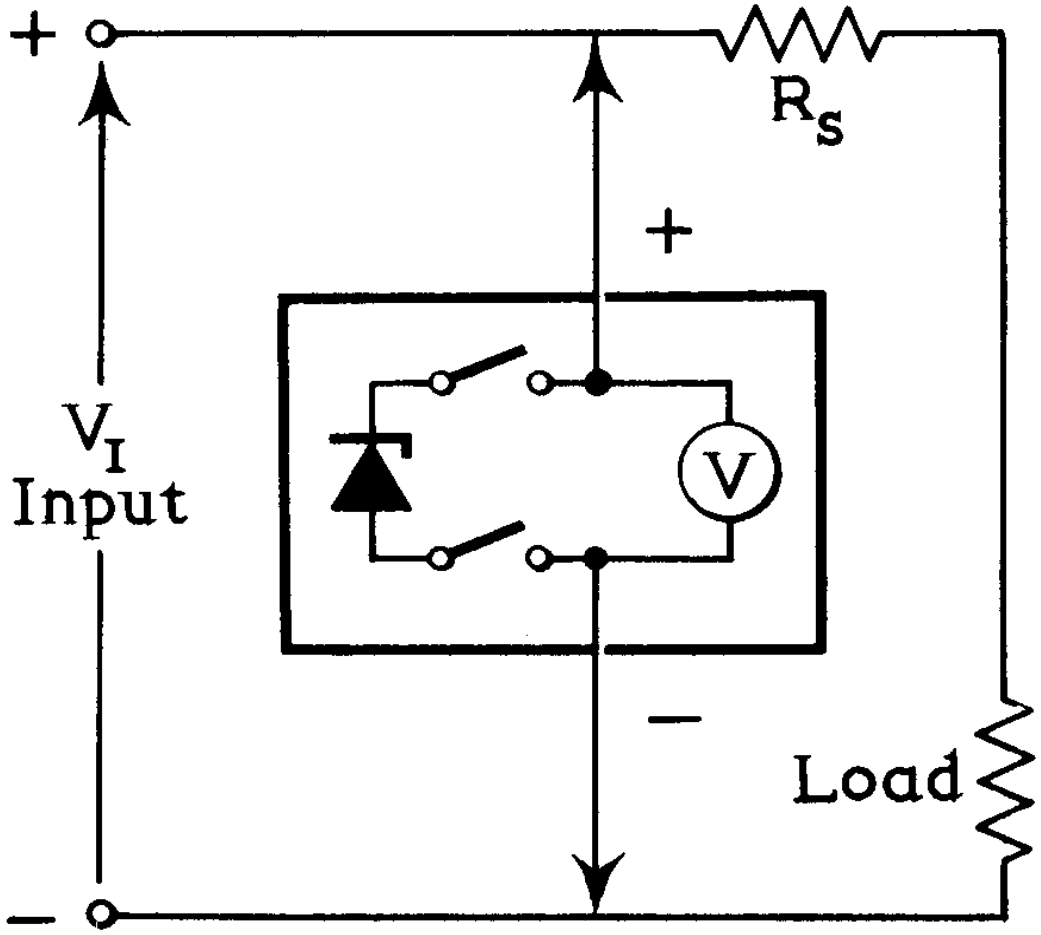


Fig. 3

Connect as shown (Fig. 4);

Switch to an appropriate zener voltage and note meter reading.

Repeat the instructions given on page 9, but setting V_I to a maximum.

Connect again as shown (Fig. 4);

Switch to the zener previously selected and note meter reading.

(The foregoing determines the effect of varying loads).

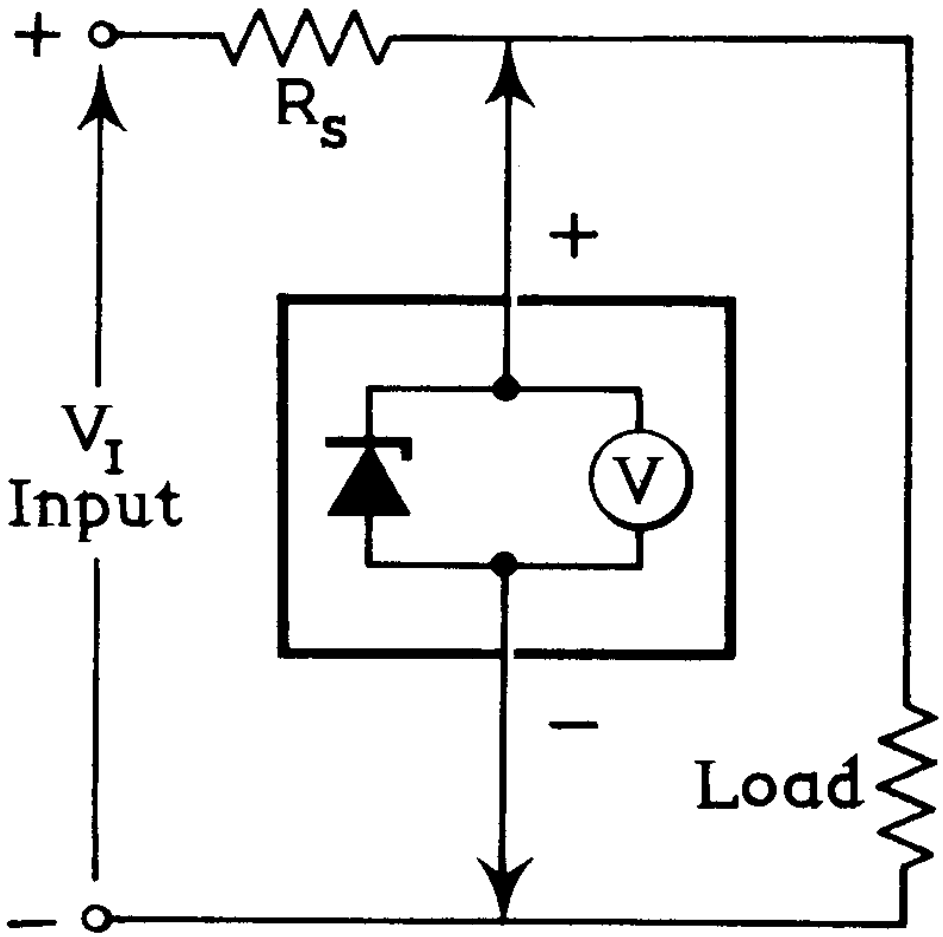


Fig. 4

With the instrument connected as shown in Fig. 4, press button; internal circuit is now modified. (See Fig 5); the meter now indicates current flowing in the zener.

When set to 0-10 voltage range the current range is 0-300mA.

When set to 0-30 voltage range the current range is 0-100mA.

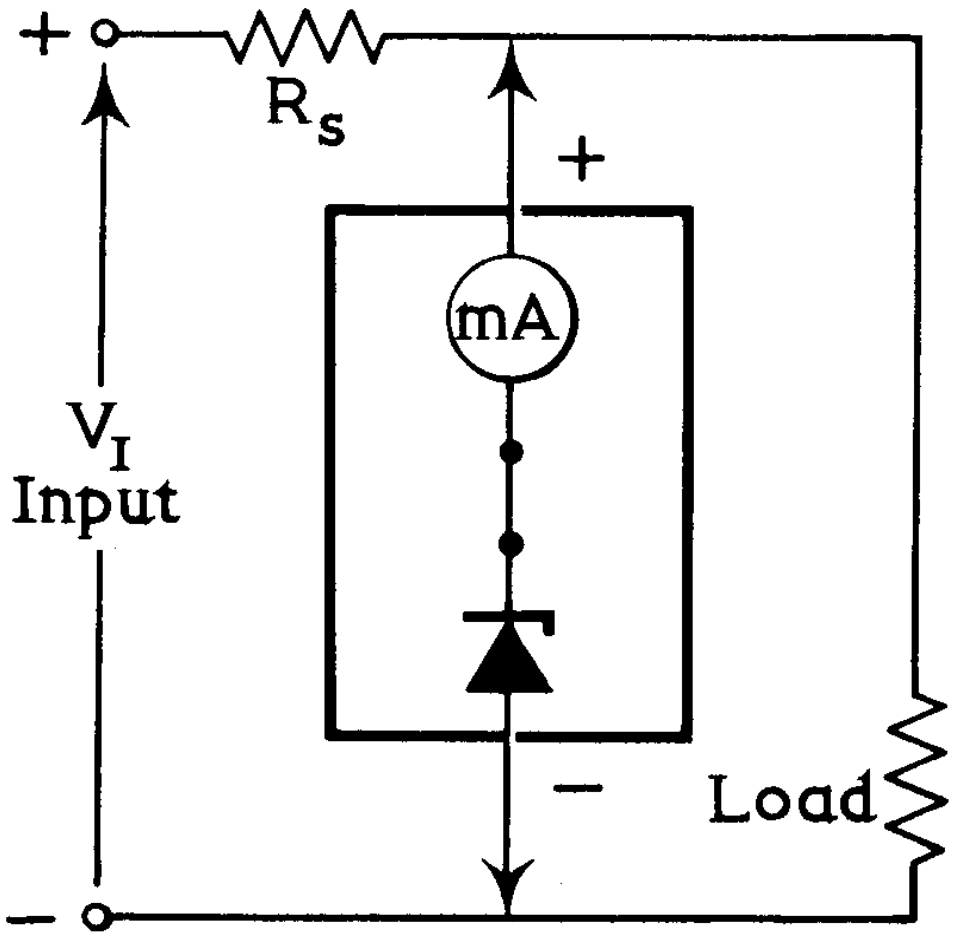


Fig. 5

SCHEDULE OF SPARE PARTS

Complete Station for Zener Diode Selector

Item	Part No.	Description
1	50103-K	Instrument Main Assembly
2	40767-2	P.V.C. Case
3	11588-C	Prod Assy. (Red)
4	11588-D	Prod Assy. (Black)
5	21126-C	Meter Lead (Red)
6	21126-D	Meter Lead (Black)
7	11029-A	Crocodile Clips (2 off)
8	10072-356	Instruction Book

Instrument Main Assembly - 50103-K

Item	Part No.	Description	Circuit Ref:
1	21125-K	Front Panel Assy.	
2	15305-1	Window Glass	
3	15306-3	Zero Adjuster	
4	15307-1	Washer (shaped) for item 4	
5	15308-1	Retainer for item 4	
6	11155-C	Knob press to read mA	
7	16594-A	Contact Plate Assy. for Range Switch	
8	21128-5	Switch Knob	
9	12422-3	Click Ball	
10	43584-A	Switch Ring	
11	21134-5	Selector Switch Plate Printed Circuit	SB1/3
12	15315-1	Range Switch Cam	
13	21135-5	Case	
14	21500-A	Resistor 0.33Ω	R3
15		Resistor 0.66Ω	R4

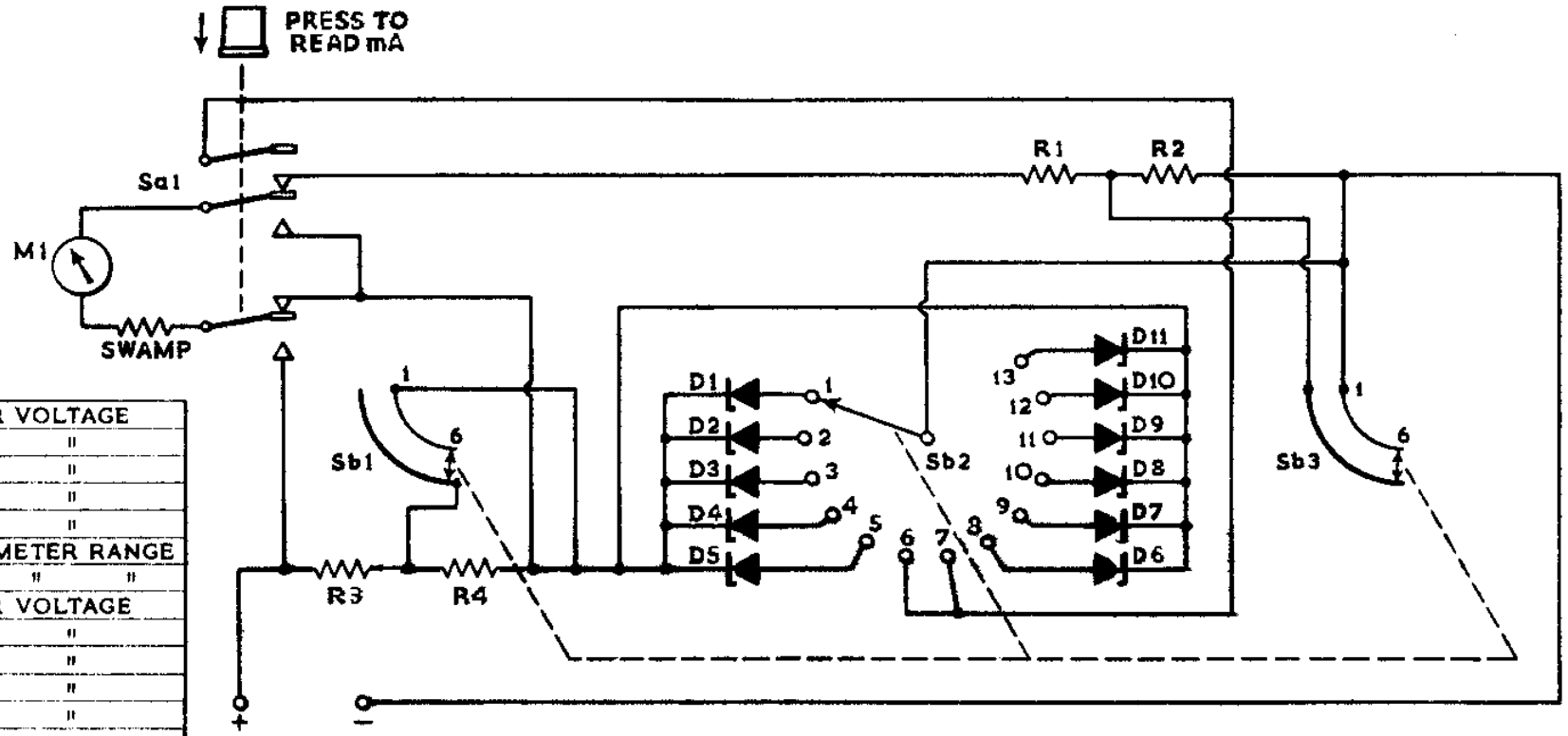
Movement Assembly - 40629-G

Item	Part No.	Description
1	40628-1	Movement Case
2	15323-A	Swamp Assy.
3	21124-A	Moving Coil Assy.
4	12927-2	End Stop (2 off)
5	10197-2	Locknut Top Jewel Screw
6	10069-1	Spring Washer for above
7	10190-1	Insulator Bush for Bottom Jewel Screw
8	10188-2	Locknut for Bottom Jewel Screw
9	10184-A	Sprung Jewel Screw Assy. (2 off)
10	15726-1	Pointer Stop Plate
11	10191-4	Bottom Zero Adjuster
12	15302-18	Scaleplate
13	15299-2	Zero Adjuster Plate Top
14	10158-4	Pivots (2 off)
15	10075-16	Hairsprings (2 off)

Diode Support Switch Assy. - 40903-A

Item	Part No.	Description	Circuit Ref:
1	40903/B	Leaf Contact Switch Assy.	SA1
2	15581-16	Zener Diode Intl.Rect.Type 1Z 6.8	D4
3	15581-27	Zener Diode Intl.Rect.Type 1Z 3.9	D1
4	15581-28	Zener Diode Intl.Rect.Type 1Z 4.7	D2
5	15581-29	Zener Diode Intl.Rect.Type 1Z 5.6	D3
6	15581-30	Zener Diode Intl.Rect.Type 1Z 8.2	D5
7	15581-31	Zener Diode Intl.Rect.Type 1Z 10	D6
8	15581-32	Zener Diode Intl.Rect.Type 1Z 12	D7
9	15581-33	Zener Diode Intl.Rect.Type 1Z 15	D8
10	15581-34	Zener Diode Intl.Rect.Type 1Z 18	D9
11	15581-35	Zener Diode Intl.Rect.Type 1Z 22	D10
12	15581-36	Zener Diode Intl.Rect.Type 1Z 27	D11
13	16591-1	Diode Retainer	
14	12049-921	333kΩ Resistor H.S.C.	R2
15	1249-917	165kΩ Resistor H.S.C.	R1
16	21500/B	Whole Resistor Board	

CIRCUIT DIAGRAM



1	3·9V ZENER VOLTAGE
2	4·7V " "
3	5·6V " "
4	6·8V " "
5	8·2V " "
6	10V/300mA METER RANGE
7	30V/100mA " "
8	27 V ZENER VOLTAGE
9	22 V " "
10	18 V " "
11	15 V " "
12	12 V " "
13	10 V " "

Fig. 6

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