

Chapter 15

LOCALLY MANUFACTURED TEST EQUIPMENT

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Introduction

1. In some Units it may be convenient to build test rigs of a permanent nature for the regular servicing of the ILS airborne equipment and this chapter contains information on suitable circuits which may be employed. The lists of Reference numbers are included for convenience of users but no authority is hereby given for the demanding of such spares as are indicated. In some cases, the spares listed in the tables may not be readily available and in these circumstances the lists given will serve as a guide to the selection of suitable alternative parts.

2. The construction of the test rigs will depend to a great extent upon local conditions such as bench space, work load, etc. as well as on the availability of the spares. In all the rigs, safety must be con-

sidered in the design of the HT sections of the test equipment, and adequate insulation must be provided at all high voltage points. Many of the tests called for in the repair instruction chapters of this Volume demand repeated checks of the input voltages to the ILS units under test; this necessitates the careful placing of the HT voltmeters of the test rigs for ease of reading.

3. In certain of the test rigs described in this chapter, built-in switched test meters are shown. These may be conveniently replaced in some instances, by bench meters with loose leads (suitably marked + and -) such as the test set Type 7626. The alignment procedures in this Volume were written around the bench type testmeters and the alignment procedures must be suitably adapted where built-in testmeters are used.

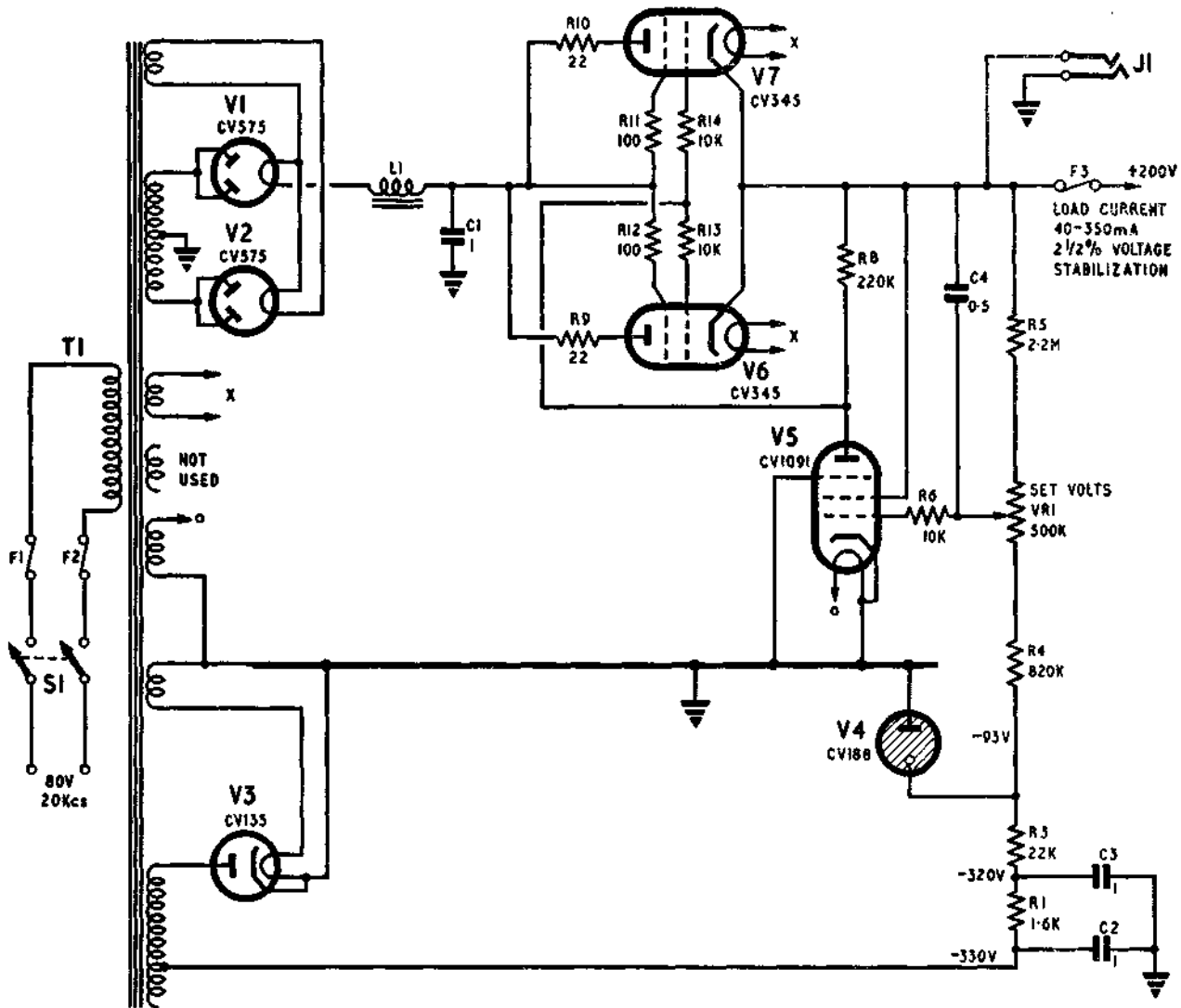


Fig. 1. Power unit for test rigs

Test rig power unit

4. The circuit for this is shown in fig. 1. This power unit may be used in any of the ILS test rigs for the supply of HT at 200 volts. In certain applications one power unit will serve for two or more test rigs owing to the low or infrequent current demands of the ILS units in certain tests. Thus it may not be necessary to provide one power unit for each test rig. The power unit is designed to provide 200 volts at from 40 to 350 mA load with a stabilization factor of $2\frac{1}{2}$ per cent output voltage for the stated load current variation. Adjustment of the output voltage is provided for in VR1. The input supply for the unit is 80V at a frequency of 2 kc/s.

5. The power unit uses a pair of series stabilizer valves in the HT positive lead after a choke-input filter. The control voltage for the series valves is derived from the HT output line and applied through the DC amplifier valve V5. The reference voltage for the DC amplifier is stabilized by the voltage reference tube V4. Adjustment of the output voltage may be made over the range 150-250V approximately by adjustment of the control VR1. At extremes of this range, however,

the stabilization is impaired, the provision of this control is of use in certain tests to be performed on the ILS units. The control VR1 should thus be brought out to the front panel of the unit, or as an extension control if the power unit is to be installed in an inaccessible position.

Receiver unit Type 117

6. The circuit of the test panel for this unit is shown in fig. 2. Meter M1 is the test panel voltmeter included to read the value of HT and LT voltage. The resistor VR1 is to be set up so that the meter M1 records the HT voltage accurately, this is done with an external meter of known accuracy to check the actual voltage then by adjustment of VR1 to produce a corresponding reading in M1. The switch S1 controls HT, S2 is the meter LT-HT changeover switch and S3 is the LT switch.

7. The three meters M2, M3 and M4 are the testmeters required for current measurements on the receiver unit Type 117; each of the "live" leads is to be terminated in a clip suitable for connection to the test points 3MP1-4. The polarity reversing switches SW6 and SW7 are included to facilitate use of the meters M2 and M4 in certain

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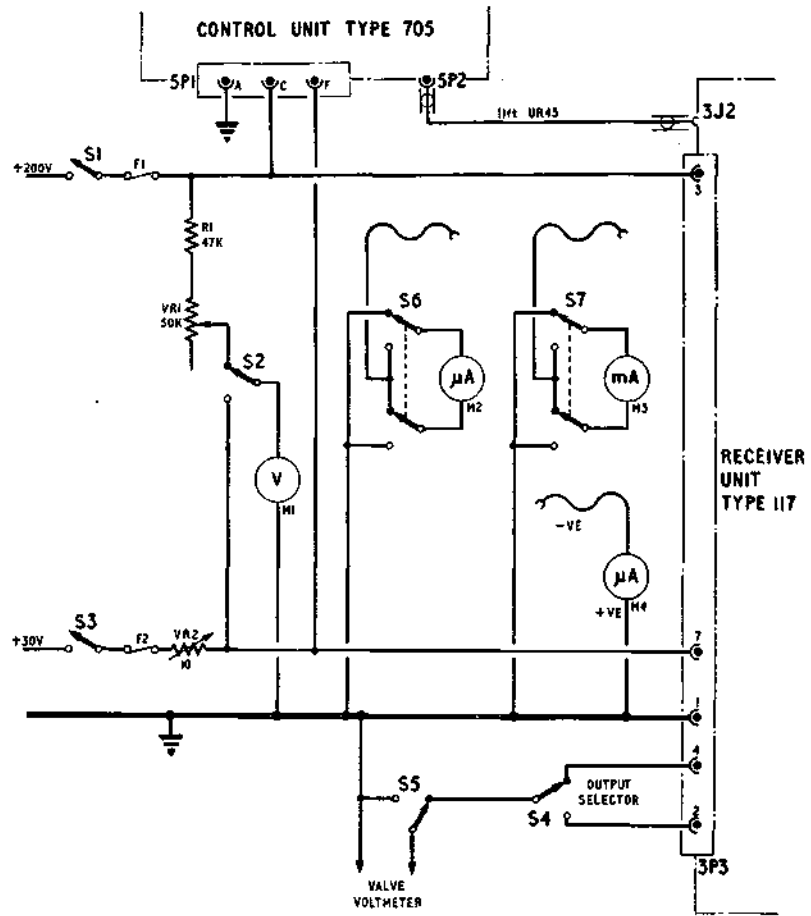


Fig. 2. Receiver unit Type 117 test rig

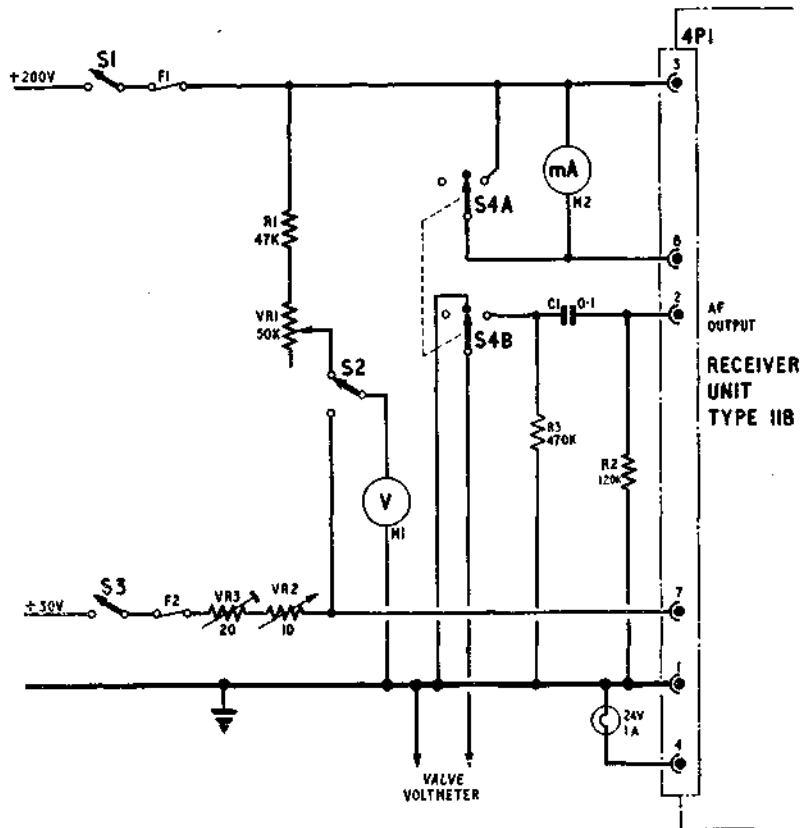


Fig. 3. Receiver unit Type 118 test rig

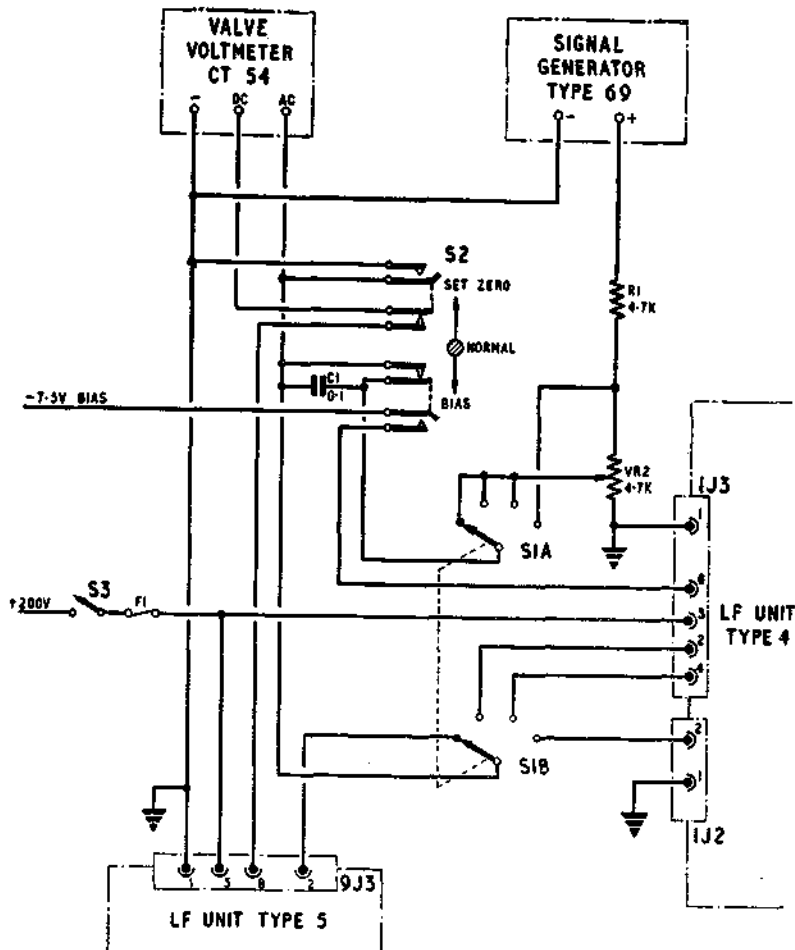


Fig. 4. LF units test rig

tests. On the receiver unit all four meter points are common to chassis but the test polarity is positive in some instances and negative in others. The reversing switches eliminate reversal of connecting leads from the test meters. S5 is provided to short-circuit the input to the valve voltmeter, and disconnect it from the output of S4, when adjusting the zero setting.

Receiver unit Type 118

8. The circuit of the test panel for this unit is shown in fig. 3. Meter M1 is the test panel voltmeter included to read the value of HT and LT voltage. The resistor VR1 is to be set up so that the meter M1 records the HT voltage accurately, this is done with an external meter of known accuracy to check the actual voltage then by adjustment of VR1 to produce a corresponding reading in M1. The switch S1 controls HT, S2 is the meter LT-HT changeover switch and S3 is the LT switch.

9. The switch section S4B provides a short-circuit for the input terminals of the valve voltmeter when the zero setting of the meter is to be adjusted. Section S4A provides a short-circuit for the internal current meter M2, when this meter is not in use. The meter M2 is for measuring the anode current of the relay-operating valve in the receiver unit.

10. The resistor R2 provides a load for the receiver unit output, C1 isolates the DC component of this

output and R3 terminates the circuit for the valve voltmeter. The 24-volt lamp gives indication of the operation of the relay in the receiver unit.

LF units Types 4 and 5 (fig. 4)

11. This test rig is suitable for the testing of either the LF unit Type 4 or the LF unit Type 5. When used with the LF unit Type 4, two connecting plugs from the test rig make the necessary electrical connections to the sockets 1J2 and 1J3 on the unit. The LF unit Type 5 test uses only one connecting plug which makes contact with the socket 9J3 of the unit.

12. The signal input to the LF units in some tests must be a mixture of two frequencies, 90 and 150 c/s, at an amplitude of 1 volt each. The signal generator Type 69 is not adjustable to this level so an additional level control is fitted to the test rig. This is the control VR1 in the circuit of fig. 4. The switch S1 selects the input point of the LF unit at which the input is to be applied. Position 1 of the switch S1 is for the marker input to the LF unit Type 4. Position 2 is for localizer audio in to the LF unit Type 4 and position 3 is for ILS tones in to the LF unit Type 4 and position 4 of the switch is for ILS tones in to the LF unit Type 5. The switch S2 is for set-zero checking to the valve voltmeter and for checking the external bias supply called for in certain tests.

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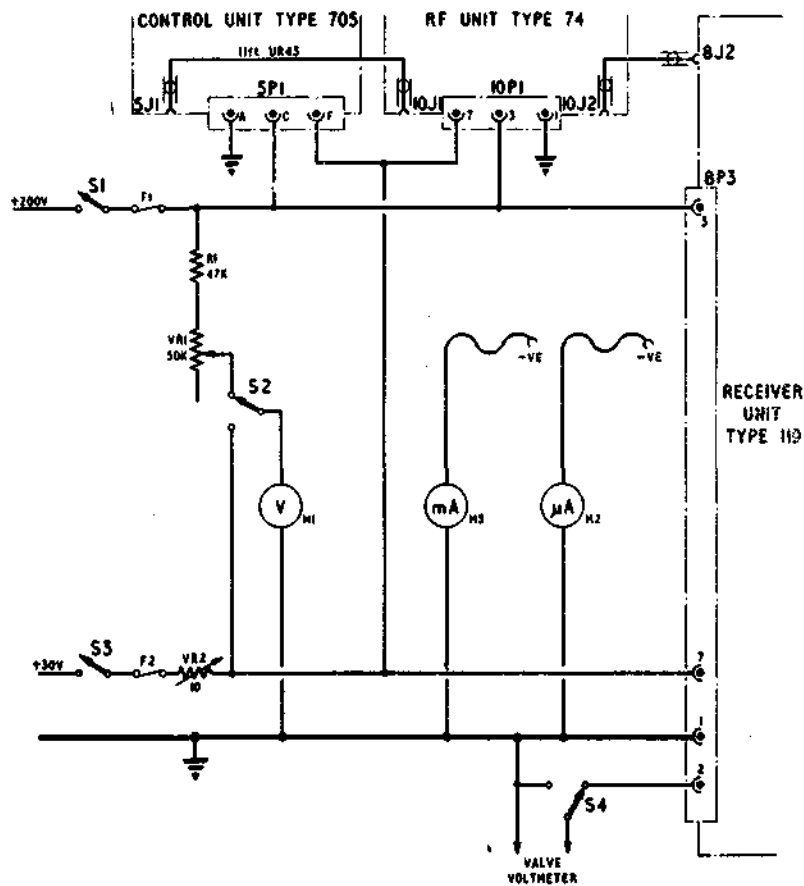


Fig. 5. Receiver unit Type 119 test rig

Receiver unit Type 119 (fig. 5)

13. The circuit of the test panel for this unit is shown in fig. 5. Meter M1 is the test panel voltmeter included to read the value of HT and LT voltage. The resistor VR1 is to be set up so that the meter M1 records the HT voltage accurately, this is done with an external meter of known accuracy to check the actual voltage, then by adjustment of VR1 to produce a corresponding reading in M1. The switch S1 controls HT, S2 is the meter LT-HT changeover switch and S3 is the LT switch.

14. The meters M2 and M3 are for current measurements at the test points 8MP1, 8MP2 and 8MP3 of the receiver unit. Switch S4 is for short-circuiting the input terminals of the valve voltmeter during zero adjustment.

Control unit and RF unit Type 74 (fig. 6)

15. The circuit of the test panel for these units is shown in fig. 6. Meter M1 is the test panel voltmeter included to read the value of HT and LT voltage. The resistor VR1 is to be set up so that the meter M1 records the HT voltage accurately, this is done with an external meter of known accuracy to check the actual voltage then by adjustment of VR1 to produce a corresponding reading

in M1. The switch S1 controls HT, S2 is the meter LT-HT changeover switch and S3 is the LT switch.

16. The meters M2 and M3 are for use in current measurements at the test points 10MP1, 10MP2 and 10MP3 of the RF unit Type 74. The switch S4 is for use when testing the control unit Type 705 and making measurements of the RF output voltage from the points 5J1 and 5P2.

Power unit Type 797 (fig. 7)

17. The circuit of the test panel for this unit is shown in fig. 7. Meter M1 is the test panel voltmeter included to read the value of HT and LT voltage. The resistor VR1 is to be set up so that the meter M1 records the HT voltage accurately, this is done with an external meter of known accuracy to check the actual voltage then by adjustment of VR1 to produce a corresponding reading in M1. The switch S1 controls the input supply to the power unit, and S2 is the meter LT-HT changeover switch.

18. The resistor R4 is the dummy load for the HT supply. C1 is the DC isolating capacitor used when checking the AC ripple voltage from the rotary transformer; this voltage is measured by a multimeter Type 1 connected externally via the jack J1.

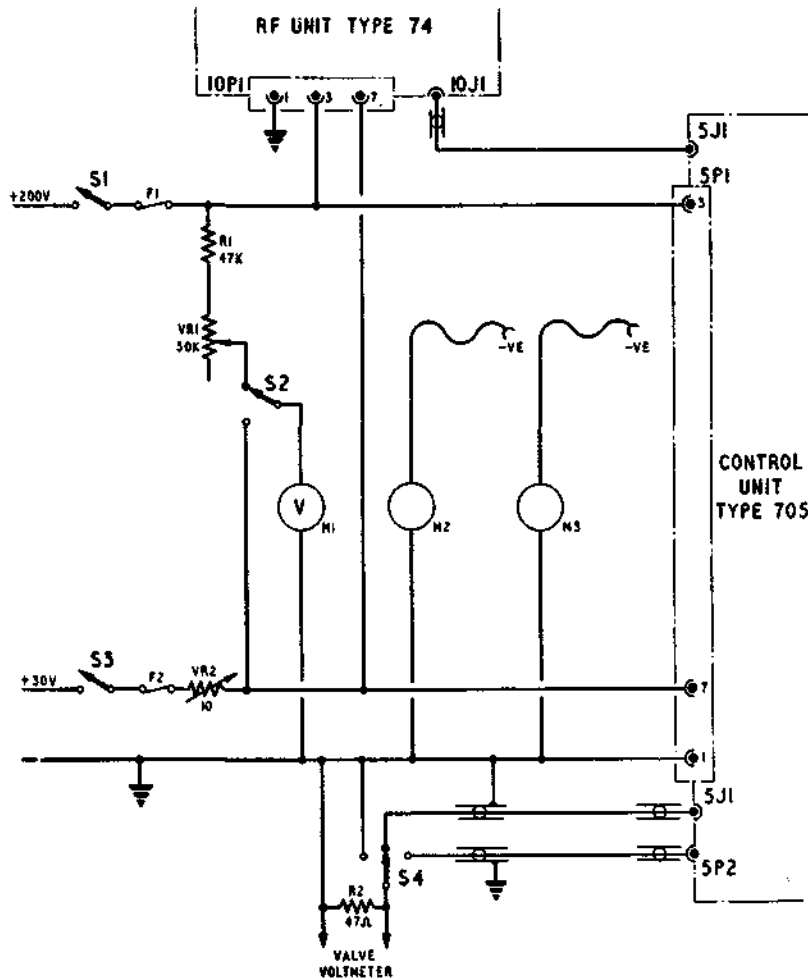


Fig. 6. Control unit and RF unit Type 74 test rig

TABLE I
Component Ref. No. (fig. 1)

Item	Value	Ref. No.
R1	1.6K	10W/Z24418
R3	22K	10W/Z212172
R4	820K	10W/Z223156
R5	2.2M	10W/Z223206
R6	10K	10W/Z222132
R8	220K	10W/Z223080
R9, R10	22 ohm	10W/Z221029
R11, R12	100 ohm	10W/Z221100
R13, R14	10K	10W/Z222132
VR1	500K	10W/8731
C1	1 μ Fd	10C/13047
C2, C3	1 μ Fd	10C/Z116313
C4	0.5 μ Fd	10C/Z115147
J1		10H/694
L1		10C/17824
T1		10KB/6963
F1, F2	3 Amp.	10H/238
F3		10H/95
V1, V2		CV575
V3		CV135
V4		CV188
V5		CV1091
V6, V7		CV345
S1	DPDT	10FB/1211

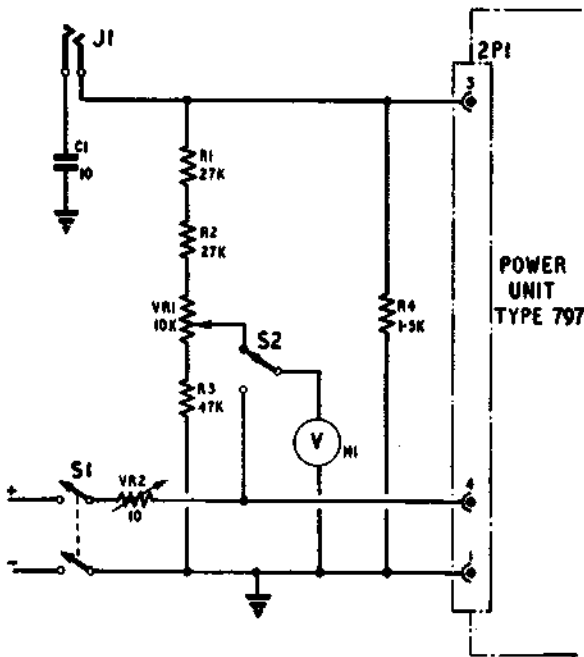


Fig. 7. Power unit Type 797 test rig

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TABLE 2
Component Ref. No. (fig. 2)

Item	Value	Ref. No.
R1	47K	10WZ/222218
VR1	50K	10W/18826
VR2	10 ohm	10W/18076
S1, 2, 3, 5	SPDT	10F/1211
S4	SPDT	10FB/1522
S6, 7	DPDT	10FB/1211
M1	0-40V	5U/1693
M2	0-200 μ A	5Q/25013
M3	0-2 mA	5Q/2284
M4	0-50 μ A	5Q/2516
F1	150 mA	10H/95
F2	5A	10H/11718

TABLE 3
Component Ref. No. (fig. 3)

Item	Value	Ref. No.
R1	47K	10WZ/222218
R2	120K	10WZ/223050
R3	470K	10WZ/213312
VR1	50K	10W/18826
VR2	10 ohm	10W/18076
VR3	20 ohm	10W/1026
C1	0.1 μ F	10C/19442
M1	0-40V	5Q/1693
M2	0-10 mA	5Q/24984
S4	DP-3 pos	10FB/1522
S1, 2, 3	SPDT	10F/1211
F1	150 mA	10H/95
F2	5A	10H/11718

TABLE 4
Component Ref. No. (fig. 4)

Item	Value	Ref. No.
R1	4.7K	
VR2	4.7K	10W/15354
C1	0.1 μ F	10Z/115096
S1	DP 4 pos	10FB/1522
S2	4-pole MB	10F/550
S3	SPDT	10F/1211
F1	150 mA	10H/95
IJ3, 9J3		10H/18629
IJ2		10H/18806

TABLE 5
Component Ref. No. (fig. 5)

Item	Value	Ref. No.
R1	47K	10WZ/222218
VR1	50K	10W/18826
VR2	10 ohms	10W/18076
F1	150 mA	10H/95
F2	5A	10H/11718
M1	0-40V	5Q/1693
M2	0-200 μ A	5Q/25013
M3	0-2 mA	5Q/2284
S1, 2, 3	SPDT	10F/1211
SW4	SPDT	10FB/1522

TABLE 6
Component Ref. No. (fig. 6)

Item	Value	Ref. No.
R1	47K	10WZ/222218
VR1	50K	10W/18826
VR2	10 ohm	10W/18076
M1	0-40V	5Q/1693
M2	0-200 μ A	5Q/25013
M3	0-2 mA	5Q/2284
S1, 2, 3	SPDT	10F/1211
S4	SP 3 pos.	10FB/11718

TABLE 7
Component Ref. No. (fig. 7)

Item	Value	Ref. No.
R1	27K	10WZ/222184
R2	27K	10WZ/222184
R3	47K	10WZ/222218
R4	1.5K	10WZ/24026
VR1	10K	10W/8926
VR2	10 ohm	10W/18076
C1	10 μ F	10C/276
M1	0-40V	5Q/1693
S1	DPST	10H/10685
S2	SPDT	10F/1211
J1		10H/694

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