O P E R A T I N G T I P S

This amplifier has been pretuned to 1269.5 MHz. It is suggested that operation of this RF Deck be checked at this frequency before retuning to a new frequency.

Be sure to read OWNERS MANUAL thoroughly before placing this amplifier into service.

If a keyer is available, it is suggested that initial tune up be done using a continuous string of "dits". This will reduce plate dissipation during tuning.

Thermal detuning is a normal characteristic of some 7289 planar triodes. The degree of detuning is dependant on many factors. With experience, it should be possible to arrive at a tuning point which reduces this drift to a very insignificant value. Usually, overcoupling the amplifier (CW adj. of output loop) to the point which produces an approximate 10% reduction in output power will eliminate any objectional drift.

Most modern transceivers use an ALC network to limit output as a function load VSWR. The input reactance of this amplifier will vary as a function of tuning and input thermal drift. Therefore, power drift may be more a function of drive variation than of actual amplifier power drift. Generally, best performance will be obtained if the transceiver is operated with its power control set to maximum and RF Deck controls adjusted for maximum power output.

Put all power drift situations into proper perspective! A power drift of 200 Watts down to 150 Watts is only a power variation of 1.25dB.. Except for EME or other weak signal operations, this change will hardly be noticeable at the receiving station.

It is possible to drive this amplifier to over 300 Watts output. However, it was not designed to be operated at this level. It doesn't make sense to push it for less than 1/3 "S" unit gain!

If operation is limited to satellite use, RF switching relays will not be required. Just connect the RF Deck directly between the antenna and exciter. Also, the T/R jack may be left shorted.

73

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O W N E R 'S M A N U A L

H I - S P E C

H I G H P O W E R R F D E C K S

MODELS

13D100 23D200 33D200

C O N T E N T S

SECTION 1

S P E C I F I C A T I O N S

l Number	13D100	23D200	33D200
. Range (GHz)	2.3-2.45	1.24-1.3	.90-.93
Acceptance*	2 x 7289	2 x 7289	2 x 7289
ut (Watts, min.)	100	200	200
e (Watts, typ.)	16	10	10
ector (Input)	BNC	BNC	BNC
ector (Output)	N	N	N
ector (T/R)	Phono Jack	Phono Jack	Phono Jack
(HxWxD, in.)	6.8x6.4x10.8	6.8x6.4x10.8	6.8x6.4x10.8
ht (Approx.)	6#	6#	6#
r Requirements:	120Vac @ 1 Amp., 1100Vdc @ 600mA max.		
ng Requirement:	Hard to ground, 1Amp max. current		

* Most physically interchangeable tubes are useable but, may not perform as specified.

NOTE: Specifications subject to change without notice.

SECTION 2

F E A T U R E S

HI-SPEC's line of RF DECKs provide the user with an economical means of generating relatively high power levels in the 13cm, 23cm and 33cm Amateur Band frequency allocations. In terms of Dollars per Watt, they are absolutely unsurpassed.

Each unit is physically identical except for the specially designed cavity for the particular frequency range. Operation is simple and straight forward. Once pre-tuned, it is only a matter of touching up the Input and Output controls for maximum power as indicated on the built-in Power Meter. Since the tubes are operated in grounded grid service the amplifier is completely linear and thus is useable for ALL MODES of operation including ATV.**

The built-in directional coupler used for power metering may also be used to determine the load VSWR. This feature is invaluable in initial system setup.

An internally accessible switch allows the front panel meter to be used for measuring RF Power Output or Cathode Current during initial setup. This feature is especially nice if a power supply other than the optional HI-SPEC Model DPS-1 is used.

F E A T U R E S
(cont'd)

Cooling is supplied by a powerful -though relatively quiet- blower which draws air past all heat generating components and cavity input circuitry and exhausts it under pressure past the tubes' heat dissipating fins via a specially designed duct. This excess cooling capacity allows extended key down operation without overheating.

** Proper ATV use (mode A5) requires tuning for maximum undistorted Sync Pulse amplitude. An optional VIDEO DETECTOR output is available for 'scope monitoring.

SECTION 3

PREPARATIONS for USE

3.0 WARNING!... It is absolutely necessary for the user to become completely familiar with the functions and limitations of the RF DECK before placing it into operation. Failure to fully understand its operation could cause severe damage to the driving source.

*** ALSO ***

WARNING!... The power generated by this amplifier IS HAZARDOUS! Always operate into a proper load and NEVER stand within the near field range of the antenna when transmitting.....

3.1 KEYING

3.1.1 The RF DECK is essentially a cathode-keyed amplifier. Although the open circuit voltage across the T/R jack will not normally exceed 20Vdc, it should not be connected in parallel with other circuits. This is especially true if the keying circuit is solid state. Should an inter-electrode short develope in a tube, a severe voltage burst would appear across the keying circuit. It is therefor recommended that a dedicated contact pair be provided for keying. This is most easily done by interconnecting a small relay between the keying source and the RF DECK.

RF SWITCHING

Due to the very high cost of new RF power relays, it is not economically feasible to include them in the RF DECK. Such relays are usually obtainable from surplus houses or Hamfests, etc.. While the configuration of the relay is of no importance, its power handling limitations and VSWR for the frequency range must be seriously considered. For the input circuit, a small BNC relay would be more than adequate whereas a larger relay with type N connectors is recommended for the output circuit. Under NO circumstances should a relay with non-constant impedance connectors (such as UHF series) be used.

RF INTERCONNECTION

While most transceivers have a common connector for connection to the antenna, many of the transverters have separate RF Input and Output connectors. The latter scheme allows pre-amps and amplifiers to be simply "patched" into the circuit whereas the common port method requires the use of an additional relay. Typical interconnections are shown in Figures 1 & 2.

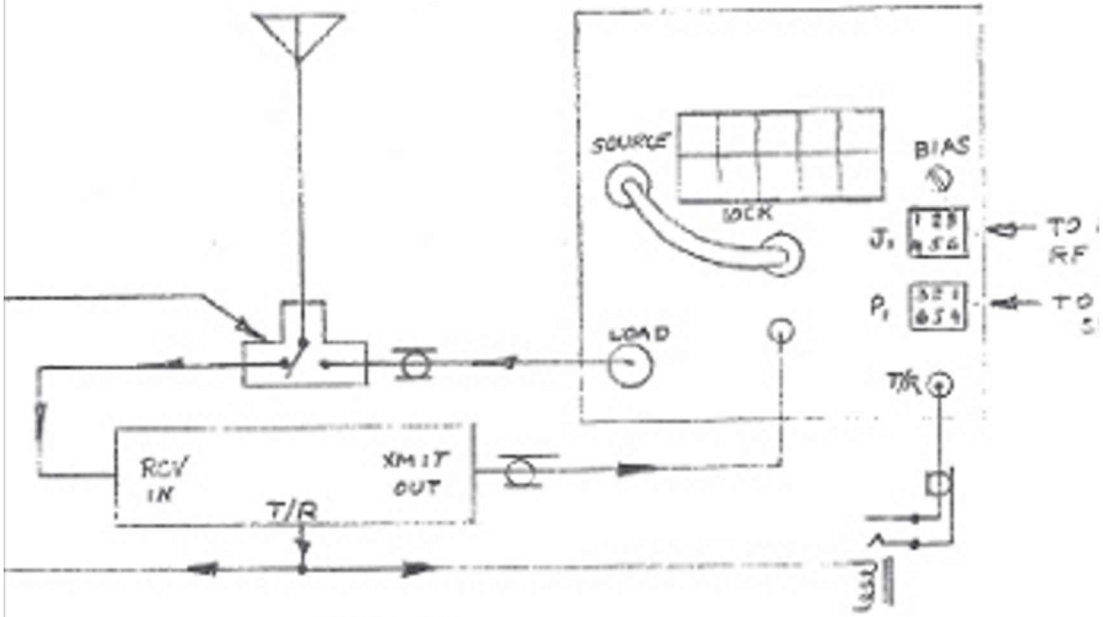


FIG. 1

TYPICAL TRANSVERTER INTERCONNECTION

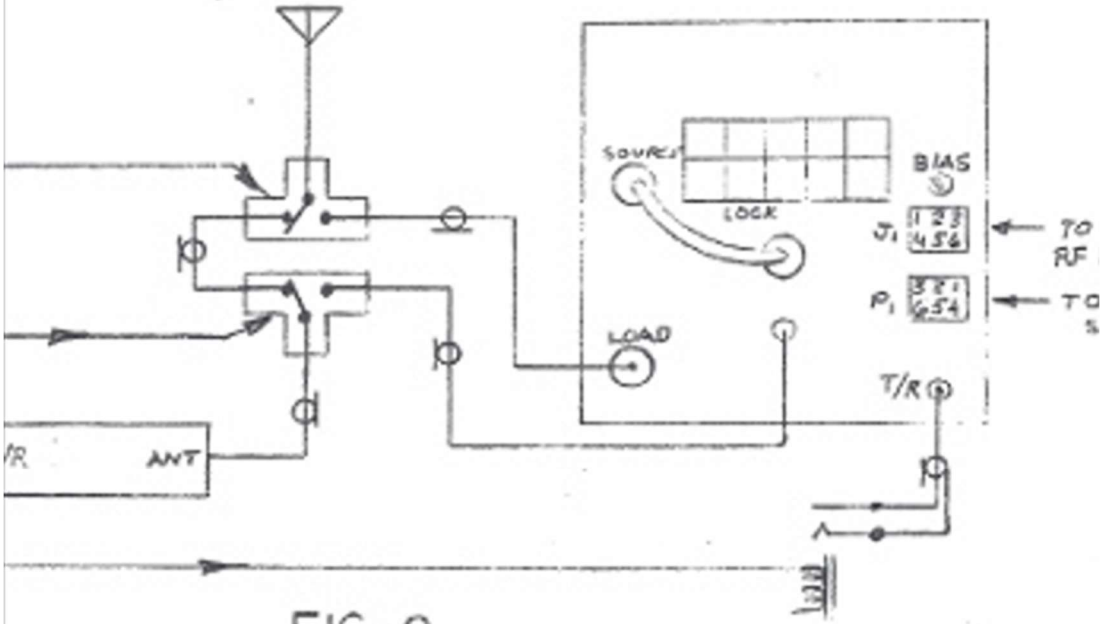


FIG. 2

TYPICAL TRANSCEIVER INTERCONNECTION

SECTION 3

4.1 FRONT PANEL

4.1.1 OUTPUT TUNING - Adjusts the resonance of the anode circuit.

4.1.2 INPUT TUNING - Adjusts the resonance of the cathode circuit.

4.1.3 POWER SWITCH - Turns on blower and filament voltage.

4.1.4 GREEN INDICATOR LAMP - Indicates presence of blower and filament voltage.

4.1.5 STANDBY/OPERATE SWITCH - Connects power to primary of external high voltage power supply.

4.1.6 RED INDICATOR LAMP - Indicates presence of line power to high voltage supply.

4.1.7 PANEL METER - Indicates RF output level or cathode current depending on internal switch selection.

4.2 REAR PANEL

4.2.1 INPUT CONNECTOR - Type BNC female which, when threaded in or out, varies the amount of input coupling capacity. Its position is made fast by the lock nut.

4.2.2 CAVITY OUTPUT CONNECTOR - Type N female (or BNC on the 13D100) which when rotated (or moved in or out) varies the coupling to the anode cavity.

CONTROLS, INDICATORS and CONNECTORS (cont'd)

4.2.3 LOCK LEVER - When operated toward the LOCK position inhibits the adjustment of the CAVITY OUTPUT CONNECTOR.

4.2.4 LOAD CONNECTOR - Type N female for connection to the antenna system under normal operating conditions.

4.2.5 SOURCE CONNECTOR - Type N female for connection to the CAVITY OUTPUT CONNECTOR under normal operating conditions. NOTE: The LOAD and SOURCE connectors are reversed when making VSWR measurements.

4.2.6 BIAS ADJUST - A potentiometer which permits setting the RF DECK's quiescent anode current.

4.2.7 T/R CONNECTOR - Type RCA phono jack which, when shorted, keys on the amplifier.

4.2.8 POWER INPUT CONNECTOR - A MOLEX pin connector which receives all system power from power supply.

4.2.9 POWER OUTPUT CONNECTOR - A MOLEX socket connector for distribution of system power to another RF DECK.

4.3 INTERNAL

4.3.1 METER SWITCH - A toggle switch located on the filament transformer bracket used to select either the WATTS or AMPERES metering function.

4.3.2 CALIBRATION ADJUST - A potentiometer located on the directional coupler used to calibrate the Wattmeter.

OPERATION

TUBE INSTALLATION/REMOVAL

Disconnect power source cable.

Remove cover retaining screws (8) and carefully lift off top cover.

Remove air cowling retainer clip and remove air cowling.

Insert/remove tubes by rotating and gently applying required axial pressure. DO NOT exert sideways pressure as distortion of finger contacts could result.

Carefully reinstall air cowling and retainer clip.

If using the matching DPS-1 power supply, reinstall cover.

BIAS ADJUSTMENT

Connect a proper load to the LOAD connector and connect power source.

With power supply plugged in, place the POWER switch to the ON position. Allow filaments to warm up at least 2 minutes before proceeding.

Turn BIAS ADJUST control fully counterclockwise (CCW).

If using other than DPS-1 supply, place METER SWITCH to the CURRENT (I) position.

5.2.5 Place STANDBY/OPERATE switch to OPERATE position.

5.2.6 Key T/R line to ground. (no RF drive!)

5.2.7 Adjust bias for a 50 to 100mA indication as observed on the DPS-1 or RF DECK meter as selected.
Note: If the bias current cannot be set up as described, defective tubes are probably the cause.

5.2.8 Unkey T/R line and place STANDBY/OPERATE switch to STANDBY position.

5.2.9 If necessary, place METER switch in POWER (P) position and replace cover.

5.3 TUNING and COUPLING ADJUSTMENT

5.3.1 Connect equipment as described in SECTION 3

5.3.2 Switch power to ON and after two minutes place STANDBY/OPERATE switch to OPERATE.

5.3.3 Key T/R line and apply a small amount of RF drive.

5.3.4 Tune INPUT TUNING for an increase in load current, but do not exceed 150mA.

5.3.5 Adjust OUTPUT TUNING for an increase in load current, but do not exceed 150mA. At this point there should also be a power output indication on the Wattmeter. If so, tune for maximum power output.

Place LOCK LEVER in the unlocked position.

Alternately rotate CAVITY OUTPUT CONNECTOR and OUTPUT TUNING for maximum output power. LOCK LEVER may be used lightly between adjustments.

Peak INPUT TUNING for maximum output.

Increase drive power and repeat steps 5.3.5 through 5.3.8 but do not drive beyond output saturation.

Tighten LOCK LEVER sufficiently to retain CAVITY OUTPUT CONNECTOR position.

NOTE: If RF DECK is to be used for ATV (A5) service, tune as above except, peak for maximum undistorted sync signal at the VIDEO connector (if so equipped) as observed on a good 'scope.

Unit is now ready for regular service.

**** NOTE ****

LONG TERM CONTINUOUS DUTY SERVICE

SHOULD BE

LIMITED TO 330mA ANODE CURRENT

5.4 INPUT VSWR ADJUSTMENT

5.4.1 Connect driver to RF DECK using a suitable VSWR indicating system. (EX.: BIRD "THRU-LINE")

5.4.2 Loosen INPUT CONNECTOR lock nut.

5.4.3 With amplifier adjusted and operational as described in SECTION 3, observe VSWR of input terminal.
NOTE: VSWR can be varied by minor adjustment of INPUT and OUTPUT tuning, but in all cases test must be made at maximum output setting.

5.4.4 Observe that input return loss is at least 10dB.

5.4.5 To adjust, alternately thread INPUT CONNECTOR in or out a little bit and retune while observing VSWR.

5.4.6 When an optimum setting has been found, tighten INPUT CONNECTOR lock nut.

**** NOTE ****

For practical purposes, ALL adjustments may be made for maximum power output irrespective of actual input VSWR, but may not yield the most stable operating characteristics.

LOAD VSWR MEASUREMENT

Tune RF DECK as described in SECTION 5.3 and record "forward (fwd)" Wattage.

Unkey and reverse SOURCE and LOAD connections.

Key RF DECK and record "reflected (ref)" Wattage.

Compute VSWR as:

$$VSWR = \frac{1 + \sqrt{(ref/fwd)}}{1 - \sqrt{(ref/fwd)}}$$

Return Loss (dB) = 10 log (ref/fwd)

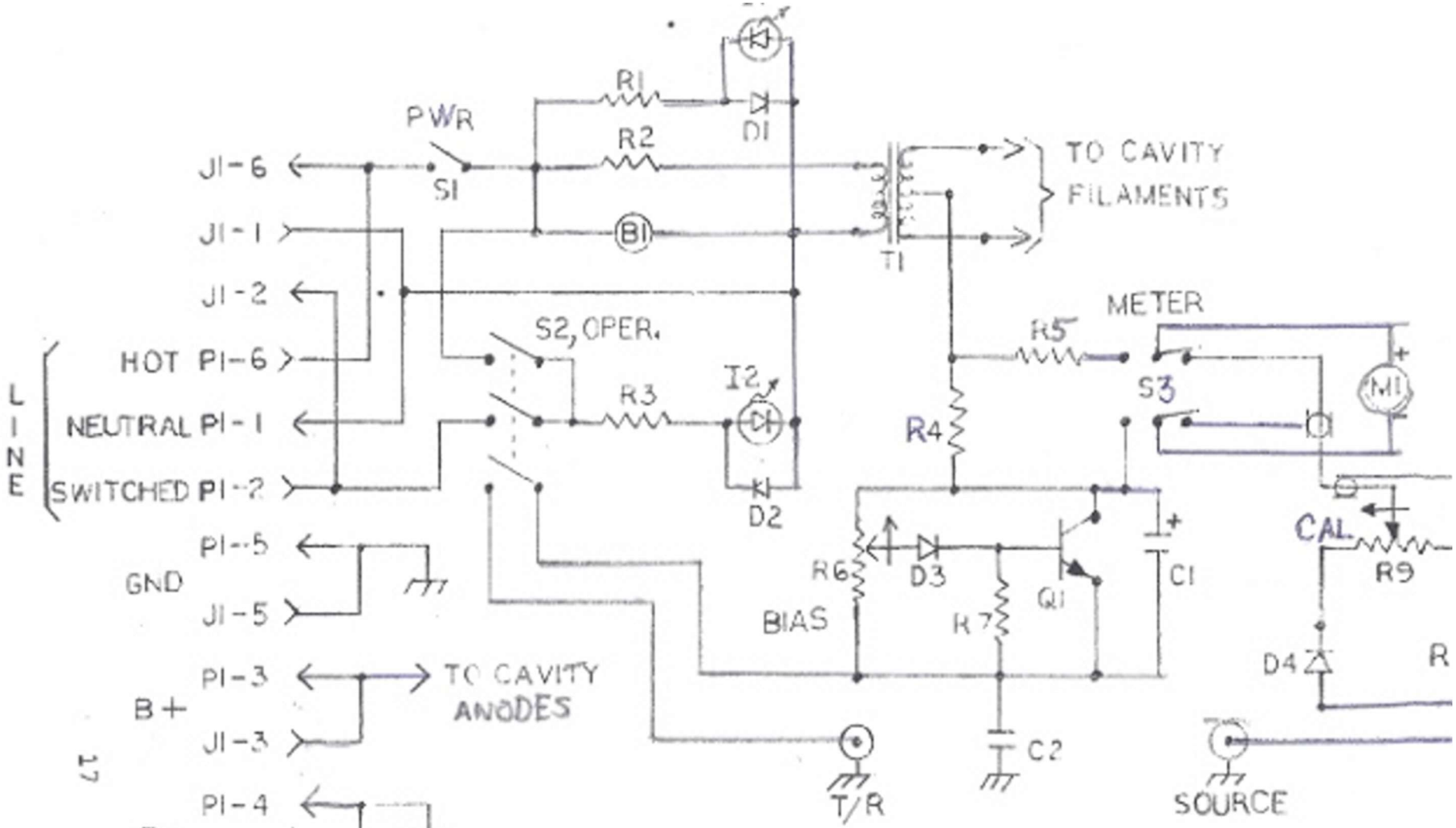
**** NOTE ****

The VSWR values thus calculated may depart from true values due to non-linearities, especially at the low end. What should be recognized is the desirability of having LOW values of reflected power. In no case should the LOAD reflected power exceed 10% of the forward power, which equals a VSWR of approximately 2:1 .

SECTION 6

IN CASE OF DIFFICULTY

SYMPTOM	PROBABLE CAUSE
System overloads when keyed; no drive.	1. Shorted tube. 2. Shorted bias transistor, Q1.
No current drawn when keyed.	1. No High Voltage. 2. Open T/R line. 3. Bias improperly set. 4. Open bias transistor, Q1. 5. Defective tubes.
Erratic power output.	1. Poor tube contact. (rotate tubes to burnish contacts).
Power output drifts excessively.	1. Improperly tuned. 2. Amplifier is overdriven. 3. Defectives tube(s).
Amplifier oscillates.	1. No load connected. 2. Improperly tuned. 3. Bias improperly adjusted.
Low output power.	1. Improperly tuned. 2. Poor tube(s). 3. Low high voltage.



B1 - Dayton 4C761 blower
C1 - 25mfd, 50V
C2 - .001mfd, 500V
D1,2,3 - 1N4001
D4 - HP5082
I1 - Green LED
I2 - Red LED
M1 - 0-1mA meter
Q1 - ECG186A
R1,3 - 3.3k, 5W
R2 - 100 Ohm, 5W
R4 - 1 Ohm, 2W
R5 -
R6 -
R7 -
R8 -
R9 -
T1 -

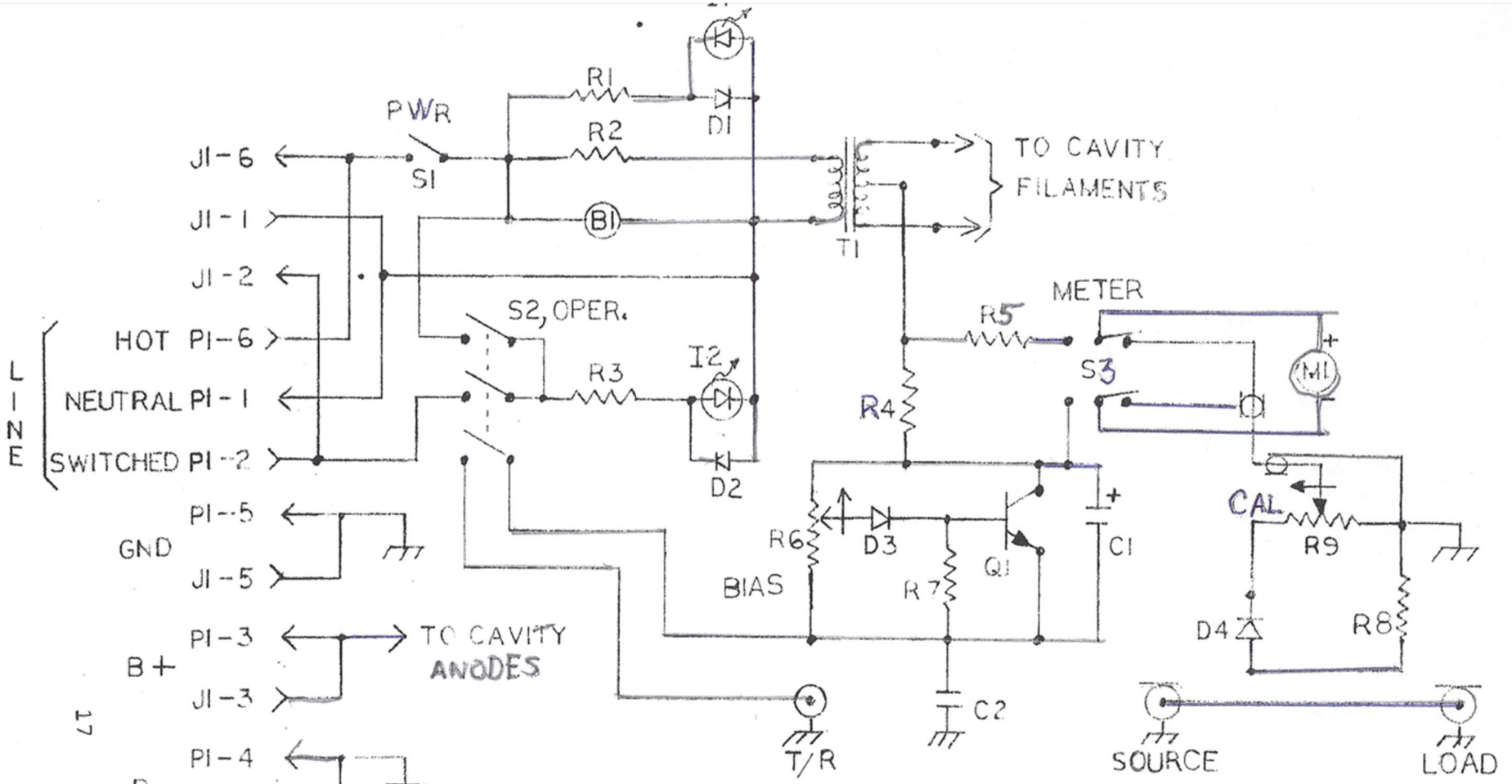
SECTION 7

SCHEMATIC DIAGRAM

SECTION 6

IN CASE OF DIFFICULTY

SYMPTOM	PROBABLE CAUSE
trips when activated.	1. Load drawing excess current. 2. Shorted rectifier. 3. Load incorrectly wired.
or lamp will not light.	1. Tripped breaker. 2. Open rectifier. 3. Defective indicator. 4. Defective transformer.
or lamp extinguishes oad conditions.	1. Defective filter capacitor. 2. Defective rectifier.



B1 - Dayton 4C761 blower
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D1,2,3 - 1N4001
D4 - HP5082
I1 - Green LED
I2 - Red LED
M1 - 0-1mA meter
Q1 - ECG186A
R1,3 - 3.3k, 5W
R2 - 100 Ohm, 5W
R4 - 1 Ohm, 2W
R5 - 1k, 1/4 W
R6 - 10k pot.
R7 - 10k, 1/4 W
R8 - 100 Ohm, 1
R9 - 5k pot.
T1 - 12.6Vct, 1

SECTION 7

SCHEMATIC DIAGRAM

REV. A


HI-SPEC
MODEL DPS-1
AMPERES
ON
HIGH VOLTAGE
POWER SUPPLY