

INSTRUCTION MANUAL



DRAKE
MODEL
WV-4

R.F. WATTMETER

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SECTION I
-----SPECIFICATIONS

- 1.1 DESCRIPTION: The DRAKE Model WV-4 meter is a through line wattmeter which accurately measures forward and reverse power. The RF coupler is removable so that it may conveniently be located at the output of the transmitter.
- 1.2 FREQUENCY COVERAGE: 20 - 200 MHz
- 1.3 LINE IMPEDANCE: 50 Ohms resistance
- 1.4 ACCURACY: Wattmeter accuracy is \pm (5% of reading + 1 watt) on 100 watt scale, and \pm (5% of reading + 10 watts) on 1000 watt scale throughout the range of 20 - 200 MHz.
- 1.5 VSWR INSERTION: Insertion of wattmeter in line changes VSWR no more than 1.05:1.
- 1.6 POWER CAPABILITY: 1000 watts RF continuous duty.
- 1.7 CONTROLS AND JACKS
- 1.7.1 FRONT PANEL: Range Selector Switch
- 1.7.2 REMOVABLE COUPLER: Two (2) S0-239 input and output connectors, Four (4) range calibration potentiometers, One (1) .5 - 5 pf piston trimmer null adjustment.

SECTION I

-----SPECIFICATIONS

1.8 DIMENSIONS

1.8.1 MAIN CABINET: 6" high, 3-11/16" wide,
4" cabinet depth, 5" overall length.

1.8.2 REMOVABLE COUPLER: 2-1/4" high,
3-1/2" wide, 2-1/2" deep.

1.9 SEMICONDUCTORS: Two (2) 1N695 power
meter rectifiers.

2.1

INSTALLATION INSTRUCTIONS: The WV-4 Wattmeter should be installed between the output of the transmitter (or amplifier) and the antenna. Ordinary PL-259 coax connectors will correctly fit the SO-239 receptacles on the sensing element. (Type "N" connectors are available for this unit). The sensing element is completely removable for station convenience. It can be removed by unscrewing the four machine screws on the bottom of the cabinet that hold it in place. In this manner the sensing element can be installed behind the operating table so that bulky coax need not be brought up. About 3 feet of cable connects the sensing element to the meter thus allowing a wide range of installation positions.

SECTION III

-----OPERATION

- 3.1 VSWR MEASUREMENTS: VSWR measurements may be easily made using the nomograph supplied with the WV-4 Wattmeter. The nomograph may conveniently be stored in the gap between the main chassis and the outer case of the wattmeter.
- 3.2 POWER MEASUREMENTS: In order to make full use of the WV-4, it should be explained just what is being indicated on the meter. There are three different types of power to be considered: forward, reflected, and radiated. In the "Forward" position, the WV-4 is reading the sum of the radiated and the reflected power; while in the "Reverse" position, it is reading reflected power. This would stand to reason if you would imagine a "bundle" of power going "forward", some of it would be "radiated" and some of it would be reflected back thus going in the "reverse" direction. Radiated power can thus be found by subtracting the "reverse" power reading from the "forward" power reading.

4.1 SERVICE: The WV-4 was designed to keep maintenance to a minimum. Since the WV-4 is basically a passive device and does not use any tubes, it should provide years of service with proper care. If any problems arise that cannot be easily corrected, we suggest that you either return your unit to your dealer, or write our Service Department describing your problem in detail. Include full information concerning external connections, control settings, type of antenna use, etc. Do not return equipment to the factory without proper authorization.

4.2 DIODE REPLACEMENT: Should for some reason either or both of the 1N695 diode rectifiers are damaged, they should be replaced with this type only. Diodes with different characteristics may seriously impair the accuracy of the wattmeter.

4.3 ALIGNMENT PROCEDURE:

Note: The internal coupler adjustments were preset at the factory. Since these controls set the accuracy and null points their adjustment is quite critical. No attempt should be made to disturb the settings unless precision laboratory equipment is available.

The following equipment will be necessary:

1. A 50 ohm dummy load with an SWR of no more than 1.05:1 at 30 MHz capable of handling 500 watts.

2. An accurate RF voltmeter such as the HP410B or Boonton 91CA.
3. A transmitter with variable output to 500 watts at 30 MHz.
4. A short piece (3") of 50 ohm coax such as RG8U or double male PLR59 connector.
5. One insulated alignment tool.

Remove the coupler from the wattmeter and carefully remove the screws and cover from the coupler exposing the printed circuit board.

4.3.1 NULL ADJUSTMENT: With the transmitter and dummy load connected to the respective jacks on the coupler, and WV-4 range switch in the 100 W reverse position, apply about 100 watts to the load. If any reflected power is visible, using the insulated alignment tool inserted through the hole in the side of the coupler, adjust the piston trimmer for minimum reflected power. If the load is purely resistive this will be essentially zero. This correctly adjusts the 50 ohm reference level and no further adjustment of the piston trimmer will be required.

4.3.2 FORWARD POWER ADJUSTMENT: Remove the power from the load, switch the WV-4 range switch to the 100 watts forward. With the

RF voltmeter connected across the dummy load, apply power until exactly 50 volts RMS are across the load. Adjust the miniature calibration pot on the outside of the board (near the brown wire) so the WV-4 reads exactly 50 watts. The 100 watt forward position of the WV-4 is now calibrated and care should be taken not to disturb its potentiometer setting.

Switch the WV-4 range switch to the 1000 watts forward position. Increase the power of the transmitter until 158.1 volts RMS is across the dummy load. Adjust the 1000 watt calibration potentiometer (near the green wire) until the WV-4 reads exactly 500 watts. Remove the power from the load. The 1000 watt forward range is now correctly adjusted and care should be taken not to disturb the setting.

- 4.3.3 REVERSE POWER ADJUSTMENTS: Disconnect the dummy load from the coupler. With the range switch in the 100 watts forward position apply enough power to the coupler for the WV-4 to read 50 watts.

Note: The transmitter is operating without a load when calibrating the reverse ranges. Although very little power is required for calibration, it is important the transmitter tank circuit be resonated to avoid damage to the final amplifiers.

SECTION IV

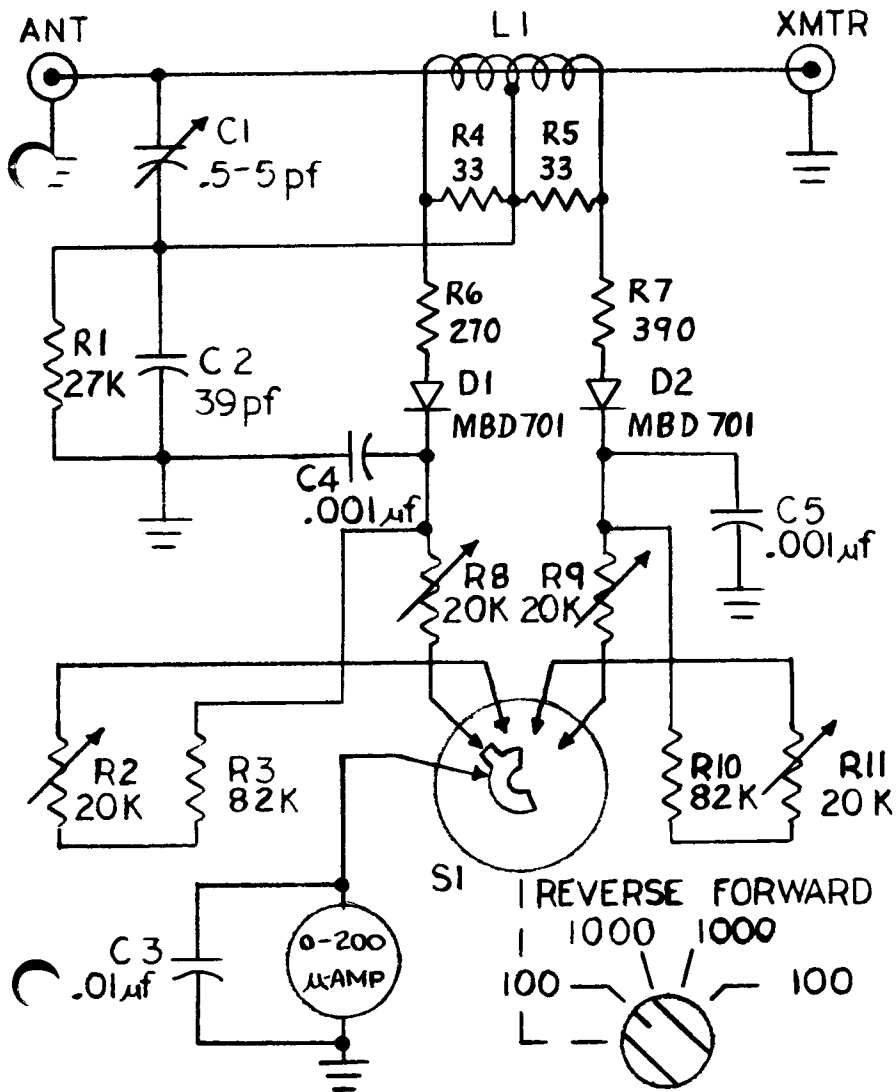
-----SERVICING

Leave the transmitter on no longer than is required to make the adjustments.

Switch the WV-4 Range switch to the 100 watts reverse position and adjust the 100 watt reverse calibration potentiometer (near the red wire) until the WV-4 reads 50 watts. Remove the power from the coupler. The 100 watts reverse range is now calibrated and care should be taken not to disturb the setting.

Switch the WV-4 Range switch to the 1000 watts forward position and apply enough power to the coupler for the wattmeter to read 500 watts. Switch the WV-4 Range switch to the 1000 watts forward position and adjust the 1000 watts reverse calibration potentiometer (near the white wire) until the WV-4 reads 500 watts. Remove the power from the coupler.

This completes the calibration of the wattmeter, and the coupler cover should be carefully replaced.



SCHEMATIC DIAGRAM
 MODEL WV-4 WATTMETER

STANDARD WARRANTY

R. L. Drake Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use, and service discloses such defect, provided the unit is delivered by the owner to us or to our authorized radio dealer or wholesaler from whom purchased, intact, for our examination, with all transportation charges prepaid to our factory, within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgement that it is thus defective. Should a malfunction be suspected, write in detail to our Service Department for suggestions concerning the operation, repair or return of your unit if it should prove necessary.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside our factory, nor in cases where the serial number thereof has been removed, defaced or changed, nor to units used with accessories not manufactured or recommended by us.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products.

The R. L. Drake Company reserves the right to make any improvements to its products which it may deem desirable without obligating itself to install such improvements in its previously manufactured products.

