INSTRUCTION MANUAL



DRAKE

MODEL

W-4

R F Wattmeter

Price of Manual $2.00

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1.1 DESCRIPTION: The DRAKE Model W-4 meter is a through line wattmeter which accurately measures forward and reverse power. The RF coupler is made removable so that it may conveniently be located at the output of the transmitter.

1.2 FREQUENCY COVERAGE: 1.8 - 54 MHz.

1.3 LINE IMPEDANCE: 50 Ohms resistance.

1.4 ACCURACY: Wattmeter accuracy is ± (5% of reading + 2 watts) on 200 watts scale, and ± (5% of reading + 20 watts) on 2000 watt scale throughout the range of 1.8 - 54 megahertz.

1.5 VSWR INSERTION: Insertion of wattmeter in line changes V.S.W.R. no more than 1.05:1.

1.6 POWER CAPABILITY: 2000 watts RF continuous duty.

1.7 CONTROLS AND JACKS

1.7.1 FRONT PANEL: Range Selector Switch

1.7.2 REMOVABLE COUPLER: Two (2) SO 239 input and output connectors
Four (4) range calibration potentiometers
One (1) .5-5 pf piston trimmer null adjustment.

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: 2-1/2" high, 3-3/8" wide, 2-3/4" deep.

1.9 SEMICONDUCTORS: Two (2) 1N295 power meter rectifiers.

2.1 INSTALLATION INSTRUCTIONS: The W-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. 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.

3.1 V.S.W.R. MEASUREMENTS: V.S.W.R. measurements may be easily made using the nomograph supplied with the W-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 W-4 it should be explained just what is being indicated on the meter. There are 3 different types of power to be considered; forward, reflected, and radiated. In the "forward" position, the W-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 will 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 W-4 was designed to keep maintenance to a minimum. Since the W-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 1N295 diode rectifiers are damaged, they should be replace only with this type. 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 for alignment.

1. A 50 ohm dummy load with an SWR of no more than 1.05:1 at 14 megehertz capable of handling 1 kw.

2. An accurate RF voltmeter such as the HP410B or Boontoon 91CA.

3. A transmitter with variable output to 1KW at 14.00 megahertz.

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 W-4 range switch in the 200 W reverse position, apply about 200 watts to the load. If any reflected power is visable, 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 W-4 range switch to the 200 watts forward. With the RF voltmeter connected across the dummy load, apply power until exactly 100 volts RMS are across the load. Adjust the miniature calibration pot on the outside of the board (near the brown wire) so the W-4 reads exactly 200 watts. The 200 watt forward position of the W-4 is now calibrated and care should be taken not to disturb it potentiometer setting.

Switch the W-4 range switch to the 2000 watts forward position. Increase the power of the transmitter until 224 volts RMS is across the dummy load. Adjust the 2000 watt calibration potentiometer (near the green wire) until the W-4 reads exactly 1000 watts. Remove the power from the load. The 2000 watt forward range is now correctly adjusted and care should be taken not to disturb the

setting.

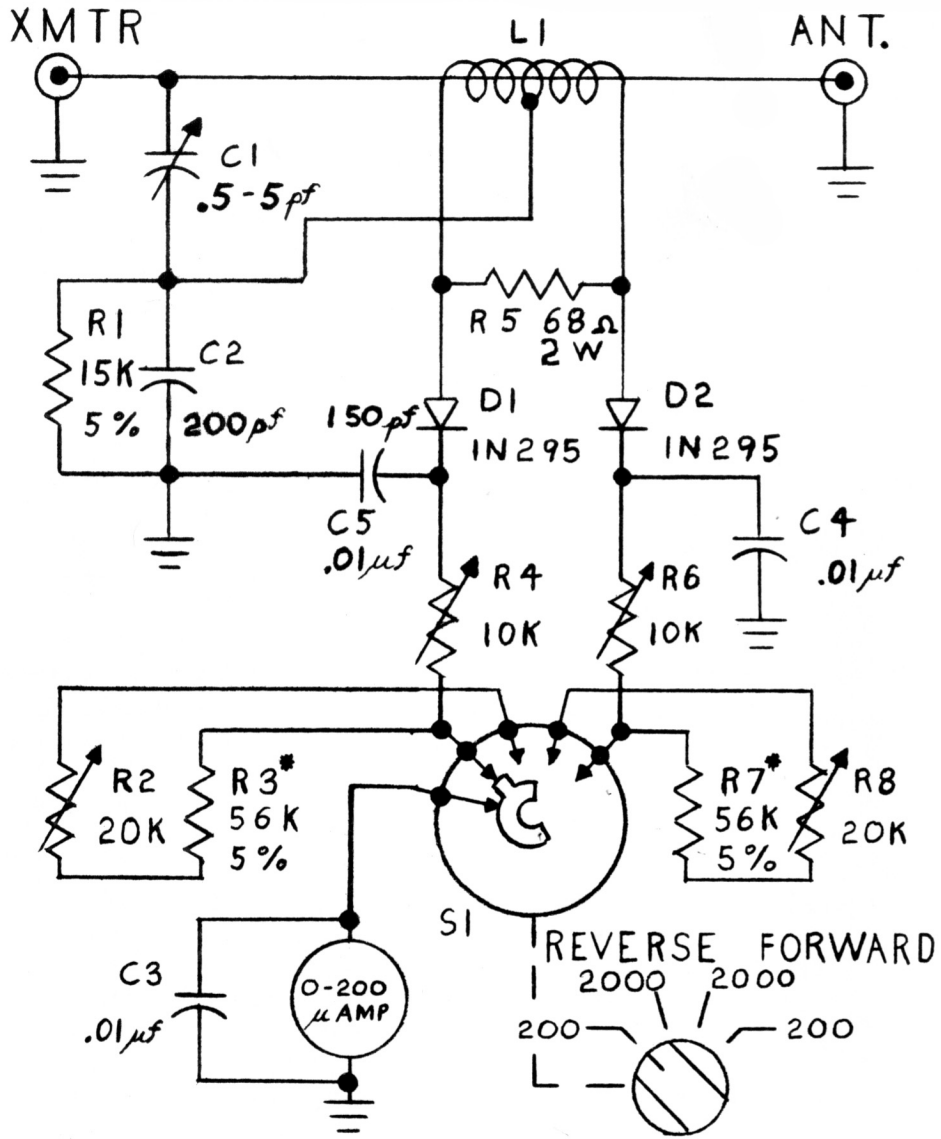
4.3.3 REVERSE POWER ADJUSTMENTS: Disconnect the dummy load from the coupler. With the range switch in the 200 watts forward position apply enough power to the coupler for the W-4 to read 100 watt.

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

Switch the W-4 Range switch to the 200 watts reverse position and adjust the 200 watt reverse calibration potentiometer (near the red wire) until the W-4 reads 100 watts. Remove the power from the coupler. The 200 watts reverse range is now calibrated and care should be taken not to disturb the setting.

Switch the W-4 Range switch to the 2000 watts forwardeposition and apply enough power to the coupler for the wattmeter to read 1000 watts. Switch the W-4 Range switch to the 2000 watts forward position and adjust the 2000 watts reverse calibration potentiometer (near the white wire) until the W-4 reads 1000 watts. Remove the power from the coupler.

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



*SELECTED IN PRODUCTION

SCHEMATIC DIAGRAM
MODEL W-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.

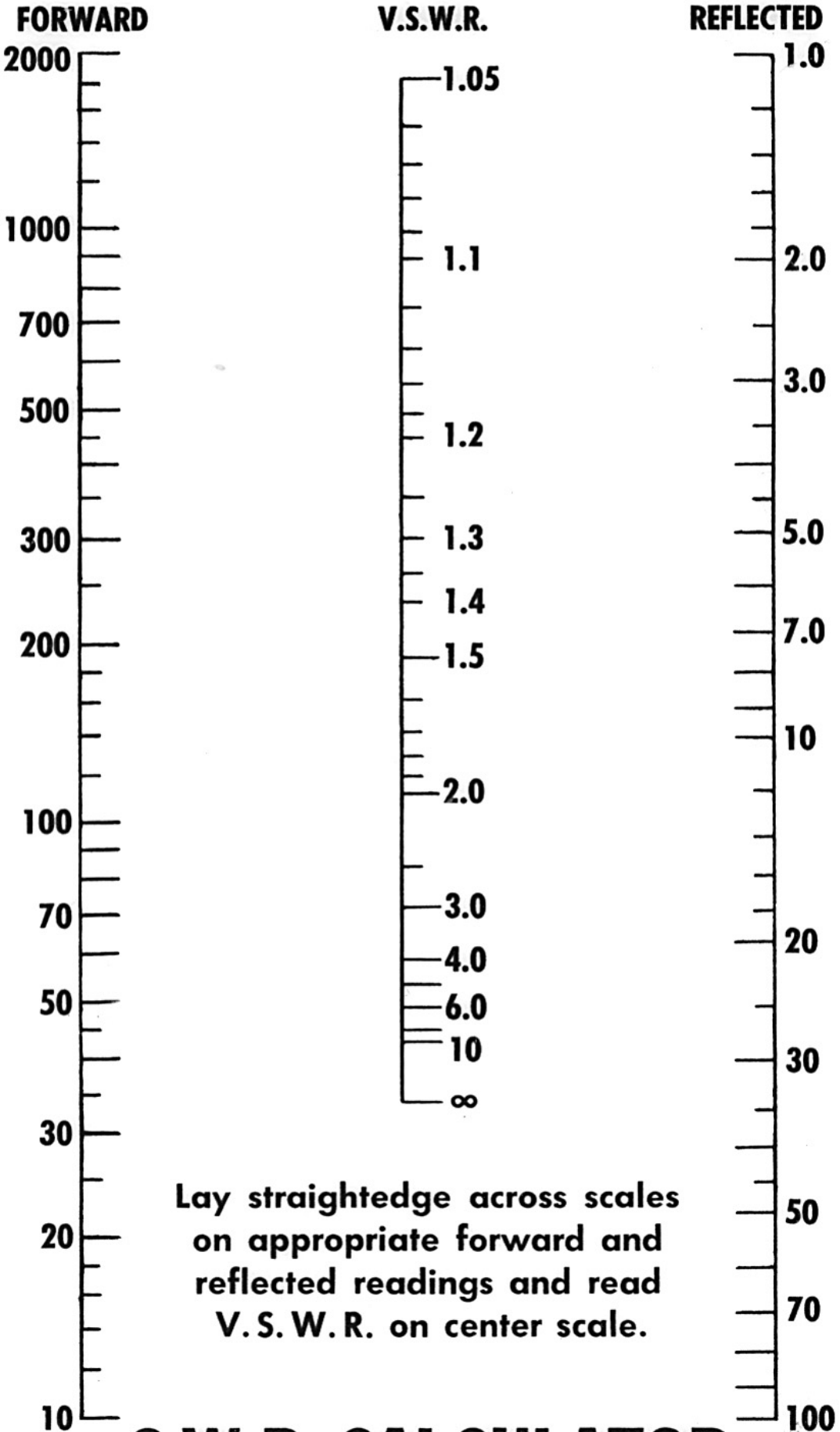
This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside our factory, 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.

R. L. DRAKE COMPANY MIAMISBURG, OHIO



S.W.R. CALCULATOR

FOR

R. L. DRAKE MODEL W-4 WATTMETER