



INSTRUCTION MANUAL



MODEL **WV-4** R F WATTMETER

**DRAKE**

LIMITED WARRANTY

R. L. DRAKE COMPANY warrants to the original purchaser that this product shall be free from defects in material (except tubes and RF output transistors) or workmanship for ninety (90) days from the date of original purchase.

During the warranty period the R. L. DRAKE COMPANY or an authorized Drake service facility will provide free of charge both parts (except tubes and RF output transistors) and labor necessary to correct defects in material or workmanship.

To obtain such warranty service, the original purchaser must:

- (1) Complete and send in the Warranty Registration Card.*
- (2) Notify R. L. DRAKE COMPANY or its nearest authorized service facility, as soon as possible after discovery of a possible defect, of:*
 - (a) The model number and serial number, if any;*
 - (b) The identity of the seller and the approximate date of purchase;*
 - (c) A detailed description of the problem, including details on the electrical connection to associated equipment and the list of such equipment.*
- (3) Deliver the product to the R. L. DRAKE COMPANY or the nearest authorized service facility, or ship the same in its original container or equivalent, fully insured and shipping charges prepaid.*

Correct maintenance, repair and use are important to obtain proper performance from this product. Therefore, carefully read the Instruction Manual. This warranty does not apply to any defect that R. L. DRAKE COMPANY determines is due to:

- (1) Improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specifications of the original parts.*
- (2) Misuse, abuse, neglect or improper installation.*
- (3) Accidental or intentional damage.*

All implied warranties, if any, terminate ninety (90) days from the date of the original purchase.

The foregoing constitutes R. L. DRAKE COMPANY'S entire obligation with respect to this product, and the original purchaser and any user or owner shall have no other remedy and no claim for incidental or consequential damages. Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation and exclusion may not apply to you.

This warranty gives specific legal rights and you may also have other rights which vary from state to state.

R. L. DRAKE COMPANY
540 Richard Street • Miamisburg, Ohio 45342

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TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
I. SPECIFICATIONS	1
II. INSTALLATION	3
III. OPERATION	4
IV. SERVICING	5
 <u>ILLUSTRATIONS AND TABLES</u>	 <u>PAGE</u>
SCHEMATIC DIAGRAM	9

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) TYPE N 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) 5082-2800 power
meter rectifiers.

SECTION II
-----INSTALLATION

- 2.1 INSTALLATION INSTRUCTIONS: The WV-4 Wattmeter should be installed between the output of the transmitter (or amplifier) and the antenna. 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 5082-2800 diode rectifiers become damaged, they should be replaced with this type only. Diodes with different characteristics will 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 50 MHz capable of handling 700 watts.

2. An accurate RF voltmeter such as the HP410B or Boonton 91CA.
3. A transmitter with variable output to 700 watts at 50 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

SECTION IV

SERVICING

RF voltmeter connected across the dummy load, apply power until exactly 59.16 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 70 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 187.0 volts RMS is across the dummy load. Adjust the 1000 watt calibration potentiometer (near the green wire) until the WV-4 reads exactly 700 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.

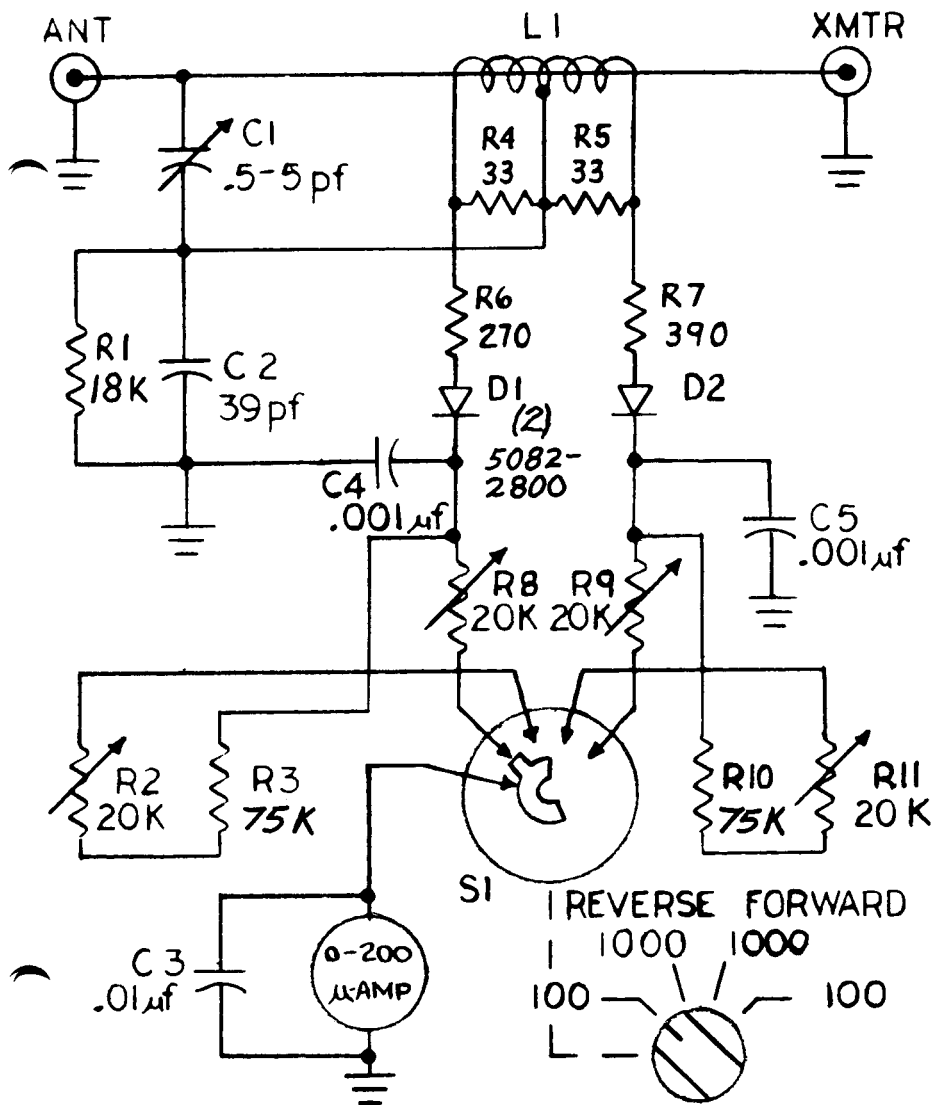
- 4.3.3. REVERSE POWER ADJUSTMENTS: Reverse connections to the two coax connectors on the coupler so that the 50 ohm dummy load is connected to the connector marked XMTR and the transmitter is connected to the connector marked LOAD. Set the range switch to 100 watts REVERSE and apply power until the RF voltmeter connected across the 50 ohm load reads 59.16 volts RMS. Adjust the calibration pot connected to the red wire until the WV-4 indicates 70 watts.

SECTION IV

-----SERVICING

Turn the range switch to 1000 watts REVERSE. Increase the power until the voltage across the load is 187.0 volts RMS. Adjust the calibration pot connected to the white wire until the WV-4 indicates 700 watts.

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



SCHMATIC DIAGRAM
MODEL WV-4 WATTMETER

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DRAKE AMATEUR PRODUCTS

- R-4C** *Receiver, covers the 160 meter through 10 meter amateur bands and up to fifteen additional 500 kHz ranges. It has 8-pole crystal filter selectivity with passband tuning and transceives with the T-4XC with excellent sensitivity.*
- T-4XC** *Transmitter, covers the 160 through 10 meter amateur bands and most other frequencies between 1.5 and 30 MHz. It has 8-pole crystal filters for sideband selection. It may be used to transceive with the R-4C.*
- TR-4C** *Transceiver, 300 Watt high frequency single-sideband unit covers the 80 meter through 10 meter amateur bands. Includes AM and CW modes, a linear, permeability-tuned VFO and two 8-pole crystal lattice filters.*
- L-4B** *Linear Amplifier, built for continuous duty at full capacity. 2000 Watts PEP on SSB. 1000 Watts on AM, CW and RTTY. Covers the 80 meter through 10 meter bands.*
- C-4** *Station Console, matches Drake's T-4XC, R-4C and TR-4C.*
- MN-4** *Antenna Matching Network, matches 50 Ohm transmitter output to coax antenna feedline with VSWR up to 5:1. An integral Wattmeter reads forward power in Watts and VSWR directly. 200 Watts continuous duty output.*
- MN-2000** *Antenna Matching Network. Same as MN-4 except: 1000 Watts continuous duty output (2000 Watts PEP) and 3 antenna connectors switch-selectable from front panel.*
- W-4** *Wattmeter, reads forward and reflected power directly in Watts (VSWR from nomograph). Range: 200 and 2000 Watts full scale, 1.8 to 54 MHz.*
- WV-4** *Wattmeter, reads forward and reflected power directly in Watts (VSWR from nomograph). Range: 100 and 1000 Watts full scale, 20 to 200 MHz.*
- TR-22C** *Transceiver, 2 meter VHF-FM, portable. Twelve channels, self-contained batteries and attached microphone.*
- RCS-4** *Remote Coax Switch, provides remote selection of up to five antennas, using only one main feedline. Allows grounding of unused antennas. Motor driven switches controlled from station located console.*
- SSR-1** *General Coverage Receiver, 0.5-30 MHz continuous. All solid state.*

For information on any of our products, please feel free to write our Sales Department, 540 Richard Street, Miamisburg, Ohio 45342 or call direct, 513-866-2421.

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