DRAKE

INSTRUCTION MANUAL

MODEL W-4

RF Wattmeter

R. L. DRAKE COMPANY Miamisburg, Ohio U. S. A.

GENERAL

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

SPECIFICATIONS

FREQUENCY COVERAGE. 1.8 - 54 MHz.

LINE IMPEDANCE. 50 Ohms resistance.

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 MHz.

VSWR INSERTION. Insertion of wattmeter in line changes VSWR no more than 1.05:1.

POWER CAPABILITY. 2000 Watts RF continuous duty.

CONTROLS AND JACKS

FRONT PANEL. Range Selector Switch.

REMOVABLE COUPLER. Two input and output connectors (SO 239). Four range calibration potentiometers. One .5 to 5 pf piston trimmer null adjustment.

DIMENSIONS

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

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

INSTALLATION

UNPACKING.

Carefully remove the unit from the shipping carton, and examine it for evidence of damage. If any damage is discovered, immediately notify the transportation company that delivered the unit. Be sure to keep the shipping carton and packing material, as the transportation company will want to examine them if there is a damage claim. Keep the carton and packing material even if no shipping damage occurs. Having the original carton available makes packing the unit much easier should it ever be necessary to store it or return it to the factory for service.

NOTE

Fill out the enclosed registration card and return it to the factory immediately to insure registration and validation of the warranty.

The W-4 Wattmeter should be installed between the output of the transmitter (or amplifier) and the antenna. Ordinary PL-259 coax connectors will couple correctly with 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. Approximately 3 feet of cable connects the sensing element to the meter allowing a wide range of installation positions.

OPERATION

VSWR MEASUREMENTS. VSWR measurements may be made easily using the nomograph supplied with the W 4 Wattmeter. The nomograph may be stored conveniently in the gap between the main chassis and the outer case of the Wattmeter.

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 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.

MAINTENANCE

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 solved easily, we suggest that you either return your unit to your dealer, or write directly to R. L. Drake Service Department describing your problem in detail. Include full information concerning external connections, control settings, type of antenna used, etc. Do not return equipment to the factory without proper authorization. Address your request for authorization to:

R. L. Drake Company
540 Richard Street
Miamisburg, Ohio 45342
ATTN: Customer Service Department

Telephone: (Area Code 513) 866-3211
Code-A-Phone Service after
1630 Hours E.S.T.

Telex No. 288-017

DIODE REPLACEMENT. Should either or both of the 1N295 diode rectifiers malfunction, they should be replaced only with the same type. Diodes with different characteristics may seriously impair the accuracy of the Wattmeter.

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 is necessary for alignment:

a. A 50 Ohm dummy load with an SWR of no more than 1.05:1 at 14 MHz capable of handling 1 kW.

b. An accurate RF voltmeter such as the HP410B or Boonton 91CA.

c. A transmitter with variable output to 1 kW at 14.00 MHz. All adjustments are made at 14.00 MHz.

d. A short piece (3 inches) of 50 Ohm coax such as RG/8U or double male PLR59 connector.

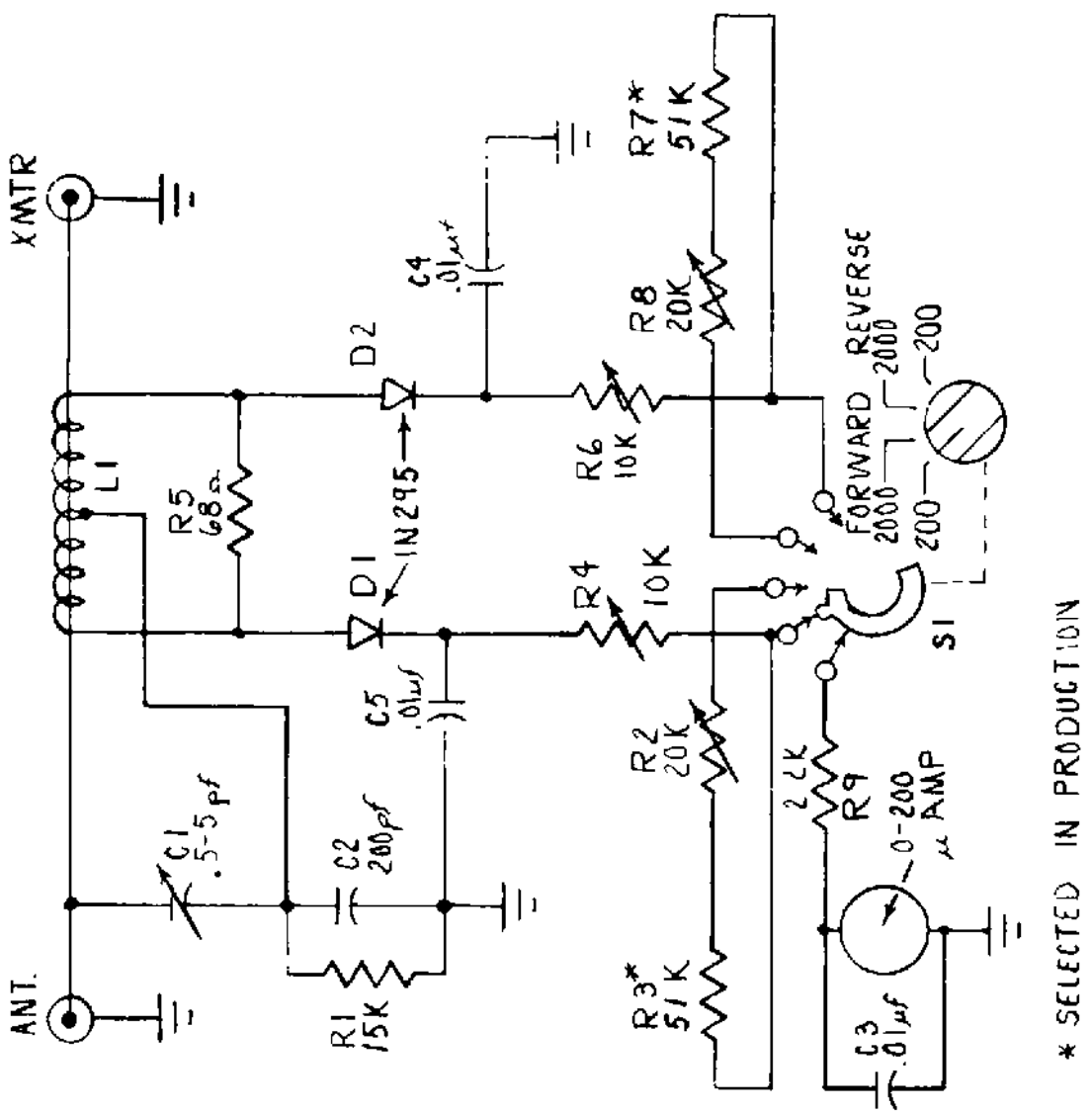
e. One insulated alignment tool.

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

NULL ADJUSTMENT. With the transmitter and dummy load connected to the respective jacks on the coupler, and W 4 range switch in the 200 Watt REVERSE position, apply 200 Watts minimum 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.

FORWARD POWER ADJUSTMENT. Remove the power from the load, switch the W 4 range switch to 200 Watts FORWARD. With the RF voltmeter connected across the dummy load, apply power until voltage across the load is exactly 70.7 Volts RMS. Adjust the calibration pot connected to the brown wire until the W–4 indicates exactly 100 Watts. The 200 Watts FORWARD position of the W–4 is now calibrated and care should be taken not to disturb its potentiometer setting. Switch the W–4 range switch to the 2000 Watts FORWARD position. Increase the power until the voltage across the dummy load is exactly 224 Volts RMS. Adjust the calibration pot connected to the green wire until the W–4 indicates exactly 1000 Watts. Remove the power from the load. The 2000 Watts FORWARD range is now correctly adjusted and care should be taken not to disturb the setting.

REVERSE POWER ADJUSTMENT. Reverse connections to the 2 coax connectors on the coupler. Remove power from the load and turn the Range Switch on the W 4 to 200 Watts REVERSE. With the RF voltmeter connected across the dummy load. apply power until the voltage across the load is exactly 70.7 Volts RMS. Adjust the calibration pot connected to the red wire until the W–4 indicates 100 Watts. Turn the Range Switch on the W 4 to 2000 Watts REVERSE. Increase power until the voltage across the load is exactly 224 Volts RMS. Adjust the calibration pot connected to the white wire until the W–4 indicates 1000 Watts. Remove power from the coupler. Replace the cover carefully.


XMTR
ANT.
L1
R5
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C1
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C2
200pf
R1
15K
D1
1N295
D2
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.01μf
C5
.01μf
R4
10K
R6
10K
R7*
51K
R8
20K
R2
20K
R3*
51K
2.2K
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C3
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REVERSE
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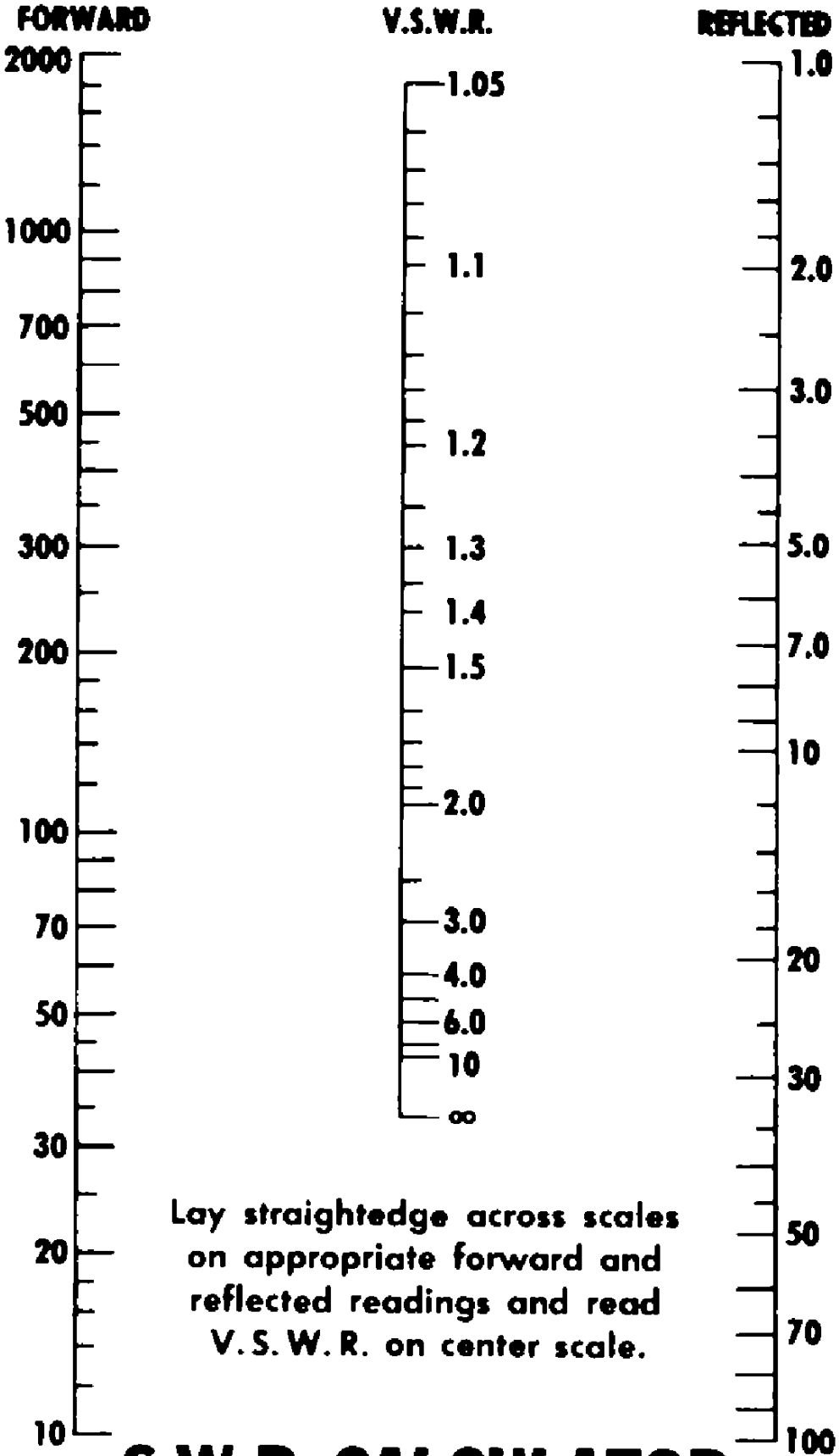

S.W.R. CALCULATOR

FOR

R. L. DRAKE MODEL **W-4** WATTMETER