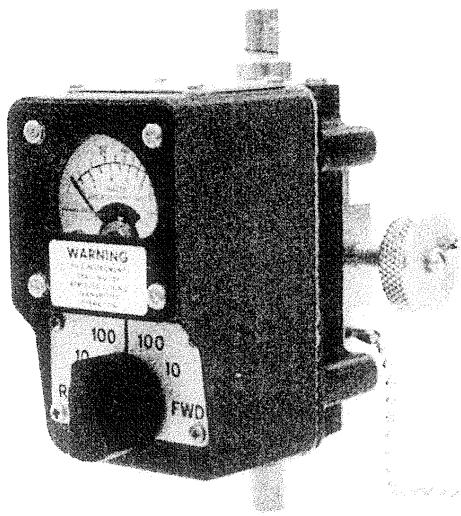
INSTRUCTION BOOK FOR

MODEL 4110-( )
RF TEST SET

Covers Models 4110-182/-105/-200/-300



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SAFETY PRECAUTIONS

The following are general safety precautions that are not necessarily related to any specific part or procedure and do not necessarily appear elsewhere in this publication.

Keep away from live circuits.

Operating personnel must at all times observe normal safety regulations. Do not attempt to replace parts or disconnect a RF transmission or any other high voltage line while power is applied. When working with high voltage always have someone present who is capable of rendering aid if necessary. Personnel working with or near high voltage should be familiar with modern methods of resuscitation.

The following will appear in the text of this publication and is shown here for emphasis.

CAUTION

Though the wattmeter is ruggedly constructed, rough handling, or severe impact can damage the delicate mechanism of the meter. Use reasonable care when handling the unit. Do not use the unit to test equipment which has a higher output than the rated power of the test set.

CAUTION

Do not attempt to remove the center conductor from the line section. Any attempt to remove it will ruin the assembly.

CAUTION

Do not place probes of VTVM or VOM across meter terminals.

CAUTION

Do not attempt to replace parts or components of the line section assembly. The electronic parts of this assembly are carefully selected and matched. Replacement of the parts with standard tolerance parts may disrupt the circuits and result in wrong meter Indications.

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MODELS 4110-( )
RF TEST SET

INTRODUCTION

DESCRIPTION

The 4110-( ) Wattmeter is a portable unit encased in a two section aluminum housing and includes a screw-type clamping device. The two sections of the test set case are secured together with screws. The front section houses the meter and switch. The back half is the line section and mounts the sensing elements and sensing circuit components. The sealed meter has two scales, one for each power range.

The line section (through which the RF power flows) is a precision casting with connectors provided at each end. The connectors are "Quick-Change" type, secured to the line section casting with four screws.

An element plate, which is part of the line section assembly, mounts on the line section with screws. The precise position relationship between the line and the sensing elements of the element plate must be maintained. This is preset at the factory.

PURPOSE AND FUNCTION

The 4110-( ) RF Test Set Assembly is comprised of a wattmeter, a cable assembly and a high-impact plastic carrying/storage case. This instruction book contains operation, maintenance, and repair instructions for the Bird Model 4110-( ) THRULINE® Radio Frequency Power Test Set. A parts list is also provided. This book is intended to be used by technicians who are responsible for the operation and maintenance of the test set.

PERFORMANCE CHARACTERISTICS AND CAPABILITIES

The Model 4110-( ) is a directional wattmeter that measures and monitors RF power and load match in 50-ohm impedance coaxial lines. It measures both forward and reflected RF power in two ranges between 0-5 to 0-100 watts, depending on the unit selected. The power range is chosen by use of a rotary switch located on the front panel. The test set has a rated frequency range that lies between 2 and 76MHz, depending on the unit selected. It is designed primarily for rugged field use on mobile, airborne, or pack-carried transmitters and transceivers.

SPECIFICATIONS FOR MODELS 4110-( ) RF TEST SET

Measuring Medium ..... CW RF power in 50 ohm coaxial systems

VSWR ..... 1.1:1 maximum

Connectors ..... Small Quick Change "SQC" type Female BNC normally supplied

RF Power Ranges

(Forward & Reflected	Low Range	High Range
Models 4110-182/-105	0-10	0-100
Model 4110-200	0-20	0-100
Model 4110-300	0-5	0-25

Frequency Range

Models 4110-182/-105 ..... 30-76MHz
Model 4110-200 ..... 2-30MHz
Model 4110-300 ..... 2-10MHz

Accuracy

25°C (77°F)
Models 4110-182/-105 ..... ±5% of full scale
Model 4110-200
100W range ..... ±5% of full scale
20W range ..... ±10% of full scale
Model 4110-300
25W range ..... ±5% of full scale
5W range ..... ±5% of full scale

-40°C to +60°C (-40°F to +140°F)
Models 4110-182/-105 ..... ±15% of full scale
Model 4110-200
100W range ..... ±15% of full scale
20W range ..... ±20% of full scale
Model 4110-300
25W range ..... ±15% of full scale
5W range ..... ±20% of full scale

Insertion Loss ..... 0.2 dB maximum

Continued

Dimensions

Models 4110-182/-200/-300 ..... 4-11/16"H x 2"W x 4"D (119.1 x 51 x 102mm)

Model 4110-105 ..... 4-23/32"H x 2"W x 4"D (120 x 51 x 102mm)

Weight ..... 22 oz. (.6kg)

Finish

Model 4110-182/-200/-300 ..... Olive drab semigloss enamel

Model 4110-105 ..... Navy grey enamel

The various Bird model THRULINE® Wattmeter test sets consist of the following:

Model 4110-182

1. P/N 4110-185 THRULINE® RF Wattmeter
2. P/N 4110-167-1 RF cable assembly
3. P/N 4110-122-2 Plastic carrying case, high impact
4. P/N 920-4110 Instruction book

Model 4110-105

1. P/N 4110-125 THRULINE® RF Wattmeter
2. P/N 4110-067-1 RF cable assembly
3. P/N 4110-122-1 Plastic carrying case, high impact

Model 4110-200

1. P/N 4110-201 THRULINE® RF Wattmeter
2. P/N 4110-067-1 RF cable assembly
3. P/N 4110-122-2 Plastic carrying case, high impact

Model 4110-300

1. P/N 4110-301 THRULINE® RF Wattmeter
2. P/N 4110-067-1 RF cable assembly
3. P/N 4110-122-2 Plastic carrying case, high impact

SECTION I - INSTALLATION

1-1. GENERAL

1-2. Install the test set as follows:

a. Position the test set so that the groove in the clamping device engages the handle of the transmitter rack as shown in Figure 1-1. Choose the left or right rack handle as necessary to assure that the test set cable will reach the antenna output jack of the transmitter rack. Tighten the clamping screw on the clamping device to secure the test set to the rack.

> **CAUTION**
>
> Though the test set is ruggedly constructed, rough handling, or severe impact can damage the delicate mechanism of the meter. Use reasonable care when handling the unit. Do not use the unit to test equipment which has a higher output than the rated power of the test set.

b. Disconnect the antenna cable from the transmitter antenna output jack. Connect the transmitter-side RF line connector of the 4110-( ) to the antenna output jack of the transmitter.

c. Connect the antenna cable that was disconnected from the transmitter to the load-side RF connector (Female BNC) at the bottom of the test set.

1-3. DETERMINING AVERAGE LOAD POWER

1-4. The Model 4110-( ) RF Wattmeter facilitates easy measurement and monitoring of transmitter output power. With the test set connected to the transmitter as directed in paragraph 1-2, proceed as follows:

a. With the selector switch in the higher power FWD position, check the indication on the top scale of the meter. If the transmitter output, as indicated by the meter, is less than the low power range, rotate and hold the selector switch in the low power FWD position to make the reading. The meter reading observed is the forward power output of the transmitter. When released, the spring-loaded switch will return to the high power FWD position.

b. With the selector switch in the higher power RFL position, check the indication on the top scale of the meter. If the meter indicates less than the low power reflected range, rotate and hold the selector switch in the low power position to make the reading. The meter reading achieved is the reflected power. When released, the switch will return to the high power RFL position.

c. To determine the power dissipated in the load, subtract the reflected power from the forward power reading as follows:

Watts Dissipated = Watts (Forward) - Watts (Reflected)

d. The significance of the reflected power depends upon the load. Where appreciable power is reflected, as with an antenna, the subtraction of reflected power is necessary to obtain the actual radiated or dissipated power value. However, this step may be unnecessary if the load is known to be a good termination. In this case the reflected power will be negligible.

1-5. DETERMINING VSWR (VOLTAGE STANDING WAVE RATIO)

1-6. VSWR is an expression of the ratio of power accepted to power rejected by a load. VSWR is sometimes useful in antenna matching and similar exercises dealing with RF circuits. The forward power to reflected power ratio (VSWR) readings can be easily determined with the use of the VSWR nomographs (Figures 7-2 and 7-3) as follows:

a. Measure the forward and reflected power levels.

b. Refer to the appropriate graph and note where the forward power reading and the reflected power reading intersect. The intersection will lie between two diagonal lines that are labeled with their VSWR values. Interpolate to get an accurate VSWR value.

FIGURE 1-1. BIRD MODEL 4110-( ) RF WATTMETER CONNECTED TO A TYPICAL TRANSMITTER PANEL.

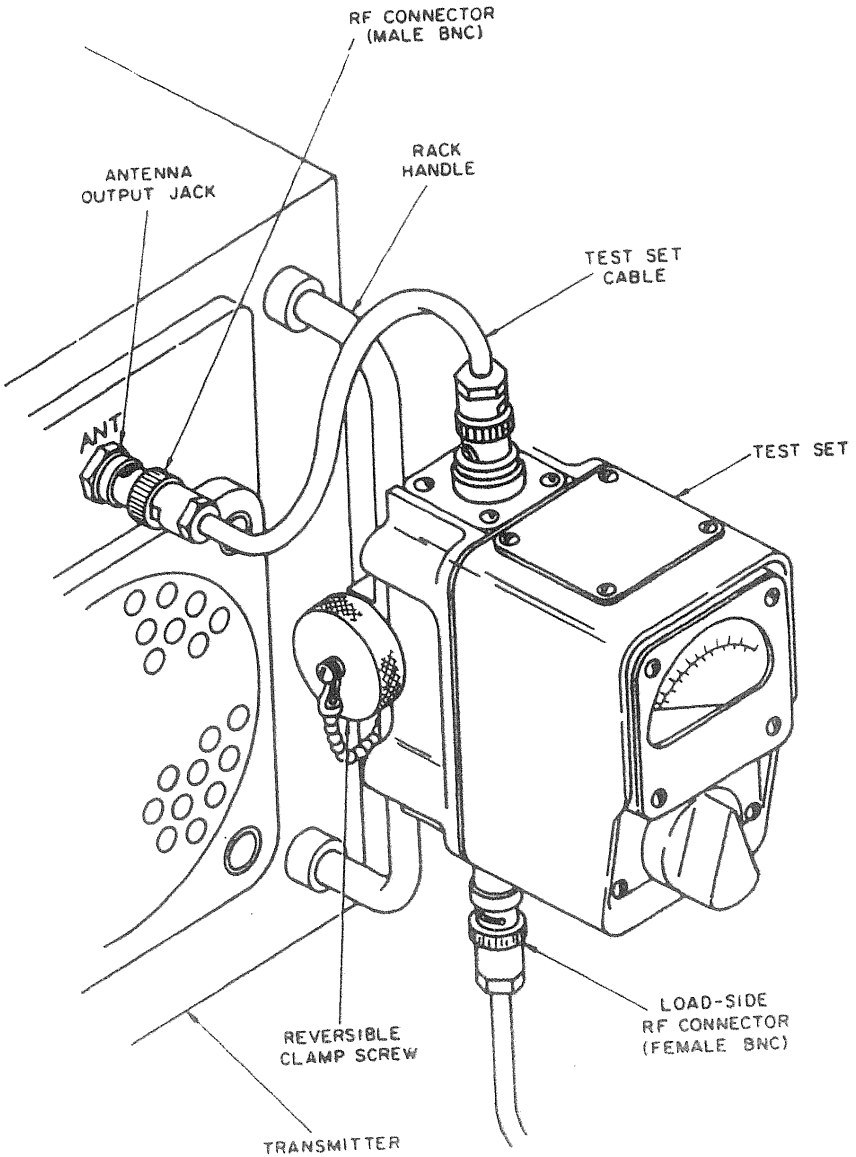
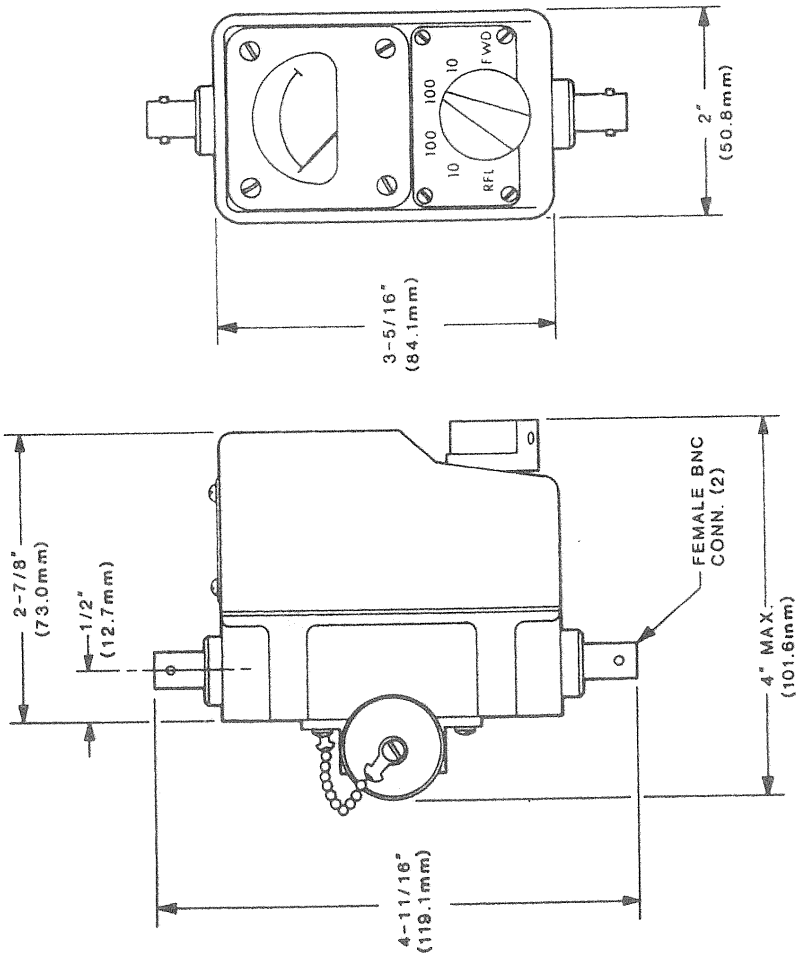


FIGURE 1-2. OUTLINE DRAWING.



SECTION II - THEORY OF OPERATION

2-1. GENERAL

2-2. In the traveling wave concept, standing waves are produced by interference between the forward and reflected waves. However, they do not affect the readings of the test set, since the test set senses the forward and reflected traveling waves separately. After the forward and reflected power levels have been ascertained, the VSWR can easily be determined by use of the graphs (Figures 7-2 and 7-3).

2-3. The line section contains two separate sensing units, see Figure 2-1). One of these units is for the forward power and the other the reflected power.

2-4. When the test set is connected into the system, transmitter output is directed through the test set line section to the antenna or dummy load. The line section is a short, uniform section of air line that will not impair the impedance of the RF coaxial line into which it is inserted. The RF waves traveling through the line section produce energy in the coupling circuits of each sensing unit by both inductance and capacitance. Inductor L2 and capacitor C8 sense forward power, while inductor L1 and capacitor C7 sense reflected power. Whether the meter displays the forward or the reflected power is determined by the position of switch S1.

2-5. The output of each coupling circuit is applied to a resistive and capacitive network which has been carefully balanced to its associated coupler. Each sensing unit provides a current output that causes the pointer pointer of the microammeter M1 to deflect in proportion to the RF power applied to the line section, provided the frequency of the transmission is within the rated range of test set.

2-6. Each sensing unit has two separate power ranges. The high range, depending on the model, will deflect the meter to read 100 watts or 200 watts when these power levels are applied to the transmitter end of the line section. The other forward range will deflect the meter to read 5 watts, 10 watts, or 20 watts full scale, depending on the model, when these power levels are applied to the transmitter end of the line section. The same two ranges are provided for both the forward and reflected directions.

2-7. To compensate for changes in ambient temperature, a temperature correction circuit is included in models that are temperature sensitive. This consists of thermistor R10 and a fixed resistor R9 connected in series across the meter. The fixed resistor is matched to the thermistor to provide the temperature correction required.

2-8. TRAVELING WAVE VIEWPOINT

2-9. The best way to visualize the THRULINE® principle is from traveling wave theory on transmission lines, which demonstrates that voltages, currents, standing waves, etc., on any uniform line section are the result of two traveling waves:

a. The forward wave travels (and power flows) from the source to the load, and has RF voltage E_f and current If in phase, with $E_f/I_f = Z_0$.

b. A reflected wave originates by reflection at the load; travels (and power flows) from the load back to the source and also has an RF voltage Er and current Ir in phase, with $E_r/I_r = Z_0$.

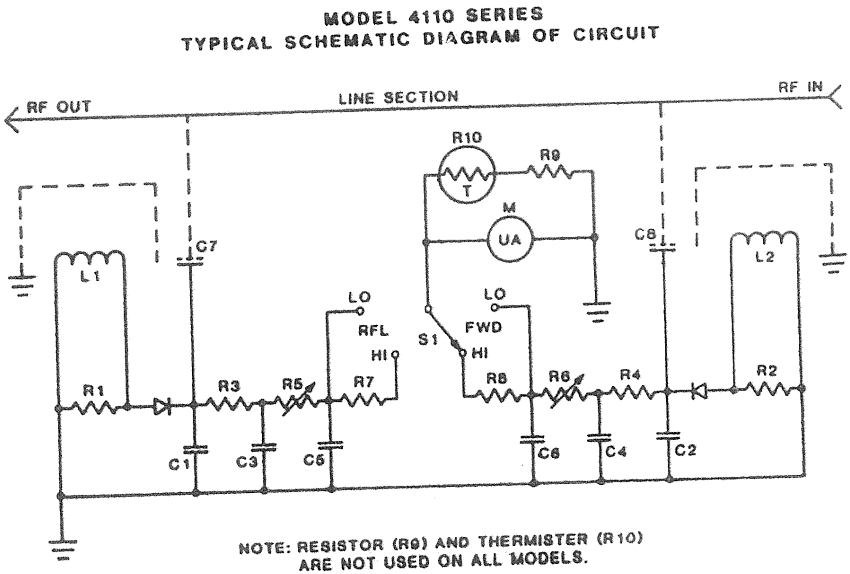
c. Note that each component wave is mathematically simple, and is completely described by a single figure for power, for instance:

$$W_f = \text{Watts Forward} = E_{f2}/Z_0 = I_{f2}Z_0 = E_f I_f$$

$$W_r = \text{Watts Reflected} = E_{r2}/Z_0 = I_{r2}Z_0 = E_r I_r$$

2-10. Z_0 is the characteristic impedance of the uniform line, and simplifies matters by being a pure resistance, usually 50 ohms, for useful lines. The main RF circuit of the test set is a short piece of uniform air-type line section, whose Z_0 is a very accurate 50 ohms.

FIGURE 2-1. MODEL 4110-( ) RF WATTMETER SCHEMATIC DIAGRAM.



SECTION III - OPERATING INSTRUCTIONS

3-1. CONTROLS AND INSTRUMENTS

3-2. The location, purpose, and use of the operating controls and instruments are given in Table 3-1.

Table 3-1. High Power Controls and Instruments.

NAME	PURPOSE AND USE
Meter	Indicates power sensed by the instrument. Contains two scales proportional to the setting of the selector switch. The outer scale corresponds to the high power switch setting. The inner scale corresponds to the low power switch setting.
Selector switch	Determines the level and direction of power sensed by the wattmeter. When the switch pointer is to the left of the black centerline, toward RFL, the meter will indicate reflected power. When the switch pointer is to the right of the centerline, toward FWD, the meter will indicate forward power. If the switch pointer, for example, is in the 100 position, the wattmeter will indicate in the 0-100 watt range, and if the switch pointer is moved to and held in the 10 position, the wattmeter will indicate in the 0-10 watt range.
Clamping screw	Clamps the wattmeter to the rack handle of the screw transmitter.

SECTION IV - MAINTENANCE

4-1. **GENERAL**

4-2. Maintenance of the Model 4110-( ) Radio Frequency Power Test Set is normally limited to cleaning.

4-3. **CLEANING**

4-4. Clean the test set as follows:

a. Clean the exterior of the test set and the meter glass with a clean cloth, dampened with a mild detergent solution.

b. Check the inside of the connectors for dirt and contamination. Clean reachable portions of the connectors with a cotton swab stick. Blow out dirt if necessary with clean, dry, low pressure compressed air. Check the ends of the line section for dirt and contamination after the removal of the cable assembly and the "QC" connector.

CAUTION

Do not attempt to remove the center conductor from the line section. Any attempt to remove it will ruin the assembly.

SECTION V - TROUBLESHOOTING

5-1. TEST EQUIPMENT REQUIRED

a. Transmitters with variable outputs to 100 watts that cover a frequency range from 2 to 76MHz.

b. Bird Model 43 THRULINE® RF Directional Wattmeter equipped with plug-in elements for individual models as listed below:

1. Models 4110-182/-105, 30 to 76MHz -

10W	25-60MHz	(10A)
100W	25-60MHz	(100A)
10W	50-125MHz	(10B)
100W	50-125MHz	(100B)

2. Model 4110-200, 2 to 30MHz -

50W	2-30MHz	(50H)
100W	2-30MHz	(100H)

3. Model 4110-300, 2 to 10MHz -

50W	2-30MHz	(50H)

c. Bird TERMALINE® Coaxial Load Resistor, Model 8164 or equivalent.

d. Vacuum tube volt meter or volt ohm meter (VTVM or VOM).

5-2. OPERATION CHECK

5-3. If a malfunction is suspected in the operation of the Model 4110-( ) Radio Frequency Power Test Set, check the unit as follows:

a. Connect the equipment as shown in Figure 5-1.

b. Adjust transmitter power output equal to 4/5 of the unit's low range.

c. Place switch of Model 4110-( ) in the low power FWD position and compare reading of the test set with that of the Model 43 THRULINE® Wattmeter. The reading obtained should be within ±10% of each other.

d. Apply transmitter power output equal to 4/5 of the unit's high power range.

e. Repeat step 5-3c. with the switch in the high power FWD position.

f. To check reflected power ranges, reverse the Model 4110-( ) cable connections.

g. Repeat steps 5-3b. and 5-3c. with the switch in the low power RFL position.

h. Repeat steps 5-3d. and 5-3e. with the switch in the high power RFL position.

5-4. If the readings obtained in the above procedure have an accumulative error of greater than ±10%, refer to the troubleshooting paragraphs below.

5-5. TROUBLESHOOTING PROCEDURES

5-6. Localize the cause of malfunction by visual inspection or by using the Troubleshooting Chart.

5-7. Isolate the trouble as follows:

a. Check continuity of line section assembly with cable assembly disconnected from it. If defective, replace per paragraphs 6-3.

b. Remove line section assembly from meter housing as described in paragraph 6-7 and disconnect leads from switch and meter. Using a VTVM or VOM, check continuity of switch contacts and leads. Replace switch or leads as described in paragraphs 6-7 and wiring diagram of Figure 5-2.

CAUTION

Do not place probes of VTVM or VOM across meter terminals.

c. Intermittent problems may be due to dirty or poor connections. Check leads for good solder joints and clean connectors as described in paragraph 4-3.

d. Note: The line sections assembly and meter are not field repairable. They must be replaced in their entirety, or returned to the factory for repair.

5-8. TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
No Meter Indication	No RF power applied to test set	Check transmitter and cables.
	Selector switch in wrong position	Change switch position.
No Meter Indication	Open or short in test set circuits (see Figure 2-1)	Replace defective components as directed in Section VI.
	Line section assembly component burnout in test set	Replace line section.
	Meter burned out or damaged	Replace meter.
Intermittent or Inconsistent Meter Readings	Faulty antenna or dummy load	Replace antenna or load.
	Faulty connectors or transmission line	Replace connector or transmission line.
	Sticky or defective meter	Replace meter.
High VSWR or High Percent of Reflected Power	Defective load or RF connectors	Replace load or connectors.
	Shorted or open transmission line	Replace if necessary.
	Foreign material in RF connectors	Clean.
	Selector switch in wrong position	Change switch position.

5-9. If trouble occurs in the test set, consult Troubleshooting Chart, for a list of probable causes and suggested remedies to correct the trouble.

5-10. WIRING DIAGRAM

5-11. Refer to the wiring diagram, Figure 5-2, for information regarding the connection of electrical leads and electronic components in the test set.

FIGURE 5-1. TEST SETUP.

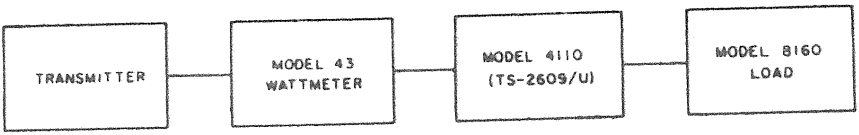
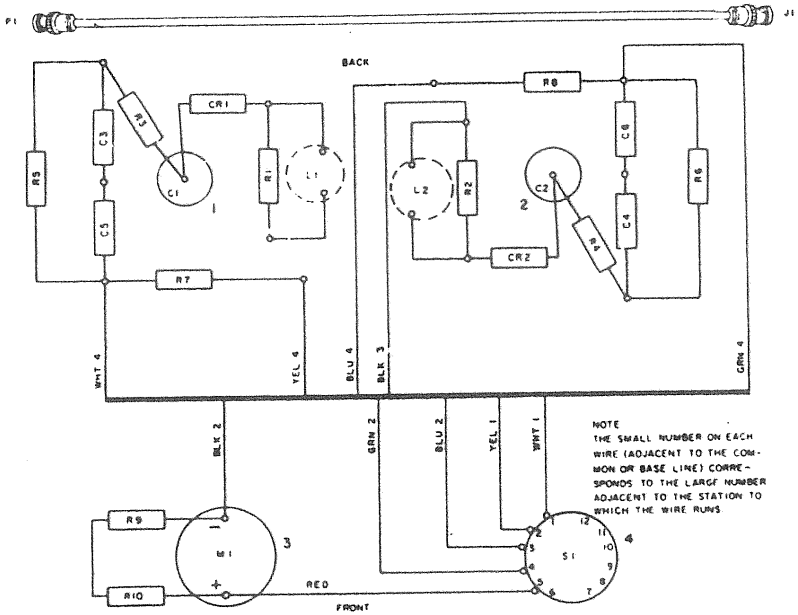


FIGURE 5-2. WIRING DIAGRAM.



SECTION VI - REPAIR

6-1. GENERAL

6-2. Repair of the Model 4110-( ) Radio Frequency Power Test Set is usually limited to soldering loose wires and replacement of damaged parts. Refer to Figure 7-1 for an exploded view of the test set.

> **CAUTION**
>
> Do not attempt to replace parts or components of the line section assembly. The electronic parts of this assembly are carefully selected and matched. Replacement of the parts with standard tolerance parts may disrupt the circuits and result in wrong meter indications.

6-3. LINE SECTION REPLACEMENT

6-4. If the line section assembly [11] is faulty, replace the assembly as follows:

a. Remove the four screws [24] that secure each of the connectors [23] to the line section; remove the connectors.

b. Remove the four screws that secure the clamping block [18] and chain [21] to the line section [11]; remove the clamping block and chain.

c. Remove the four screws [17] that secure the line section [11] to the case [6]. Carefully separate the parts, taking care not to break the connections between the line section assembly and switch [9]. Carefully unsolder the wires from the line section terminals. Remove the line section assembly and gasket [10] from the case.

d. Position a new gasket [10] on the case, threading the wires from the case through the gasket opening. Solder the wires from the case to the line section as shown in the wiring diagram in Figure 5-2.

e. Position the line section [11] on the case [6], taking care not to pinch the interconnecting wires between the case and line section assembly. Secure the four screws [17].

f. Position the clamping block [18] and chain [21] on the line section; secure with four screws.

g. Position the connector [23] on the bottom of the line section; secure with four screws [24].

h. Position the connector [23] on top of the line section; secure with four screws [24].

6-5. METER REPLACEMENT

6-6. Replace a defective meter as follows:

a. Remove the four screws [17, Figure 7-1] that secure the line section assembly to the case [6]; separate the parts carefully to prevent breaking the wires that connect line section components to the case components.

b. Unsolder the leads from the rear of the meter [3]. The thermistor assembly [4] is provided with the new meter, and does not have to be removed from the meter to be replaced.

c. Remove the four screws [1] that secure the meter plate [2] and meter [3] to the case [6]. Remove the meter plate. Push on the rear of the meter to dislodge it from the case. Remove the gasket [5] from the meter.

d. Install the new gasket [5] on the new meter [3]. Position the assembled meter and gasket and meter plate [2] on the case [6]; secure with four screws [1].

e. Solder the leads to the terminals at the rear of the meter. Refer to the wiring diagram in Figure 5-2 for proper wire connections.

f. Position the line section assembly [11] on the case, taking care not to pinch the interconnecting wires between the parts; secure with four screws [17].

6-7. SWITCH REPLACEMENT

6-8. Replace a defective switch as follows:

a. Remove the four screws [17, Figure 7-1] that secure the line section assembly [11] to the case [6]; separate the parts carefully to prevent breaking the wires that connect the line section components to the case components.

b. Unsolder the leads from the terminals of the switch [9].

c. Use an Allen wrench to loosen the setscrew [30] in the knob [29]; pull the knob from the switch shaft.

d. Remove the nut [27] and lockwasher [26] that secure the switch [9] to the case; remove the switch from the rear of the case.

e. If the switch plate [25] is damaged and requires replacement, remove the four screws [28] that secure it to the case and remove the plate.

f. If necessary, position a new switch plate [25] on the case; secure with four screws [28].

g. Position the switch [9] on the case so that the shaft extends through the hole in the case; secure with a nut [27] and lockwasher [26].

h. Position the knob [29] on the switch [9] so that the setscrew is aligned with the flat on the switch shaft. Tighten the setscrew with an Allen wrench.

i. Solder the leads to the terminals of the switch. Refer to the wiring diagram in Figure 5-2.

j. Position the line section assembly [11] on the case [6], taking care not to pinch the interconnecting wires between the parts.

SECTION VII - REPLACEMENT PARTS LIST

7-1. GENERAL

7-2. This section lists the replaceable parts for the Bird Model 4110-182/-105/-200/-300 THRULINE® Radio Frequency Power Test Set. Refer to the exploded view in Figure 7-1 for parts identification (following Parts List pages).

7-3. MODEL 4110-182

ITEM	QTY	DRW REF NO.	DESCRIPTION	PART NO.
1	4	1	Machine Screw, #4-40 x 9/16	Standard
	1		Meter Assembly (Includes Items 2 - 4)	4110-004
2	1	2	Meter Plate	
3	1	3	Meter (Includes Item 2)	2080-013
4	1	4	Thermistor Assembly	4110-045
5	1	5	Meter Gasket	5-559
6	1	6	Case	4110-135-2
7	4	7	Machine Screw, #2-56 x 3/16	Standard
8	1	8	Identification Plate	4110-024
	1		Switch Assembly (Includes Item 9)	4110-044
9	1	9	Switch, Rotary (Includes Items 26 & 27)	5-454
10	1	10	Gasket, Line Section Assembly	4110-057
11	1	11	Line Section Assembly	4110-002
12	4	17	Machine Screw, #6-32 x 5/16	Standard
13	1	18	Block, Clamping	4110-035
	1		Screw Assembly, Clamping (Includes Items 19 - 21	4110-046
14	1	19	Thumbscrew	4110-034
15	1	20	Machine Screw, #6-32 x 1/4	Standard
16	1	21	Chain	7500-083
17	4	22	Machine Screw, #6-32 x 1/4	Standard
18	2	23	Connector	4110-014
19	8	24	Machine Screw, #4-40 x 1/4	Standard
20	1	25	Switch Plate	4110-036
21	1	26	Lockwasher	Standard
22	1	27	Nut	Standard
23	4	28	Machine Screw, #2-56 x 3/16	Standard
24	1	29	Knob (Includes Item 30)	4110-016
25	1	30	Setscrew	Standard
26	1	31	Cable Assembly - 2 Male BNC	4110-067-1
27	1	32	Transit Case Assembly	4110-122-2

7-4. MODEL 4110-105

ITEM	QTY	DRW REF NO.	DESCRIPTION	PART NO.
1	4	1	Machine Screw, #4-40 x 9/16	Standard
	1		Meter Assembly (Includes Items 2 - 4)	4110-004
2	1	2	Meter Plate	2080-013
3	1	3	Meter (Includes Item 2)	4110-045
4	1	4	Thermistor Assembly	5-559
5	1	5	Meter Gasket	4110-134-2
6	1	6	Meter Case Assembly	Standard
7	4	7	Machine Screw, #2-56 x 3/16	4110-024
8	1	8	Identification Plate	4110-044
	1		Switch Assembly (Includes Item 9)	5-454
9	1	9	Switch, Rotary (Includes Items 26 & 27)	4110-057
10	1	10	Gasket, Line Section Assembly	4110-002
11	1	11	Line Section Assembly	Standard
12	4	17	Machine Screw, #6-32 x 5/16	4110-035
13	1	18	Block, Clamping	4110-046
	1		Screw Assembly, Clamping (Includes Items 19 - 21	4110-034
14	1	19	Thumbscrew	Standard
15	1	20	Machine Screw, #6-32 x 1/4	7500-083
16	1	21	Chain	Standard
17	4	22	Machine Screw, #6-32 x 1/4	4110-014
18	2	23	Connector	Standard
19	8	24	Machine Screw, #4-40 x 1/4	4110-036
20	1	25	Switch Plate	Standard
21	1	26	Lockwasher	Standard
22	1	27	Nut	Standard
23	4	28	Machine Screw, #2-56 x 3/16	4110-016
24	1	29	Knob (Includes Item 30)	Standard
25	1	30	Setscrew	4110-067-1
26	1	31	Cable Assembly - 2 Male BNC	4110-122-2
27	1	32	Transit Case Assembly	

7-5. MODEL 4110-200

ITEM	QTY	DRW REF NO.	DESCRIPTION	PART NO.
1	4	1	Machine Screw, #4-40 x 9/16	Standard
2	1	2	Meter Plate	
3	1	3	Meter (Includes Item 2)	2080-033
4	1	5	Meter Gasket	5-559
5	1	6	Case	4110-135-2
6	4	7	Machine Screw, #2-56 x 3/16	Standard
7	1	8	Identification Plate	4110-024
8	1	9	Switch Assembly (Includes Items 26 & 27)	4110-007
9	1	10	Gasket, Line Section Assembly	4110-057
10	1	11	Line Section Assembly	4110-204
11	4	17	Machine Screw, #6-32 x 5/16	Standard
12	1	18	Block, Clamping	4110-035
	1		Screw Assembly, Clamping (Includes Items 19 - 21	4110-046
13	1	19	Thumbscrew	4110-034
14	1	20	Machine Screw, #6-32 x 1/4	Standard
15	1	21	Chain	7500-083
16	4	22	Machine Screw, #6-32 x 1/4	Standard
17	2	23	Connector	4110-014
18	8	24	Machine Screw, #4-40 x 1/4	Standard
19	1	25	Switch Plate	4110-059
20	1	26	Lockwasher	Standard
21	1	27	Nut	Standard
22	4	28	Machine Screw, #2-56 x 3/16	Standard
23	1	29	Knob (Includes Item 30)	4110-016
24	1	30	Set screw	Standard
25	1	31	Cable Assembly - 2 Male BNC	4110-067-1
26	1	32	Transit Case Assembly	4110-122-2

7-6. MODEL 4110-300

ITEM	QTY	DRW REF NO.	DESCRIPTION	PART NO.
1	4	1	Machine Screw, #4-40 x 9/16	Standard
2	1	2	Meter Plate	2080-036
3	1	3	Meter (Includes Item 2)	5-559
4	1	5	Meter Gasket	4110-135-2
5	1	6	Case	Standard
6	4	7	Machine Screw, #2-56 x 3/16	4110-024
7	1	8	Identification Plate	4110-044
	1		Switch Assembly (Includes Item 9)	5-454
8	1	9	Switch, Rotary (Includes Items 26 & 27)	4110-057
9	1	10	Gasket, Line Section Assembly	4110-304
10	1	11	Line Section Assembly	Standard
11	4	17	Machine Screw, #6-32 x 5/16	4110-035
12	1	18	Block, Clamping	4110-046
	1		Screw Assembly, Clamping (Includes Items 19 - 21	4110-034
13	1	19	Thumbscrew	Standard
14	1	20	Machine Screw, #6-32 x 1/4	7500-083
15	1	21	Chain	Standard
16	4	22	Machine Screw, #6-32 x 1/4	4110-014
17	2	23	Connector	Standard
18	8	24	Machine Screw, #4-40 x 1/4	4110-310
19	1	25	Switch Plate	Standard
20	1	26	Lockwasher	Standard
21	1	27	Nut	Standard
22	4	28	Machine Screw, #2-56 x 3/16	4110-016
23	1	29	Knob (Includes Item 30)	Standard
24	1	30	Set screw	4110-067-1
25	1	31	Cable Assembly - 2 Male BNC	4110-122-2
26	1	32	Transit Case Assembly	

FIGURE 7-1. 4110-182 RF TEST SET EXPLODED VIEW.

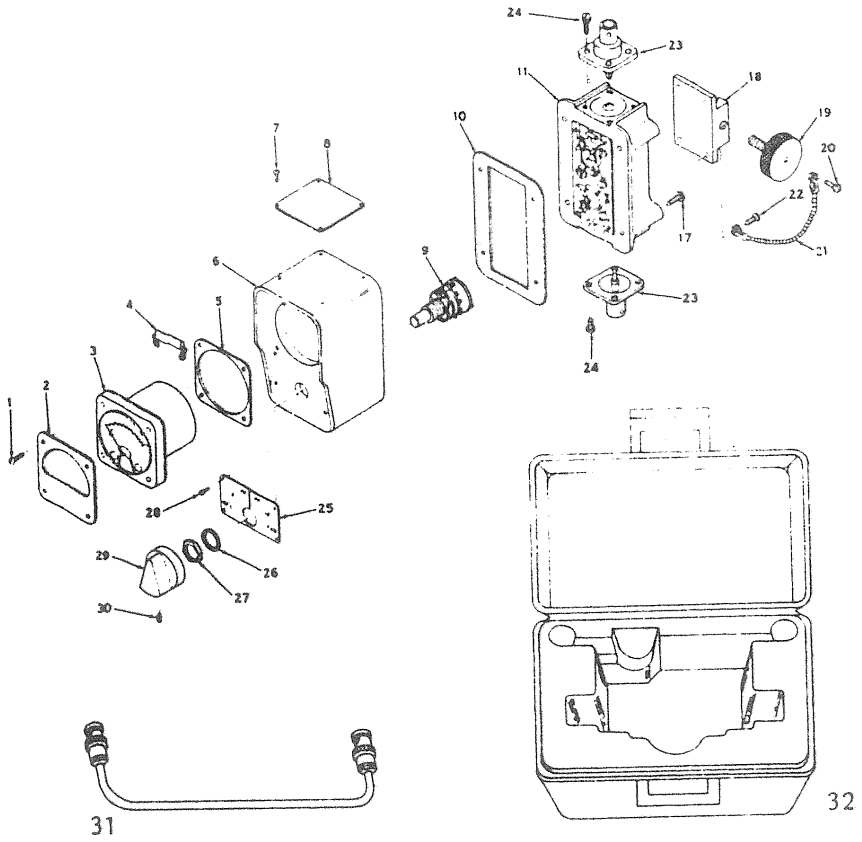


FIGURE 7-2. VSWR CONVERSION NOMOGRAPH.

Using the vertical and horizontal scales, locate the intersection of forward and reverse power values. The diagonal lines passing closest to this point indicate VSWR.

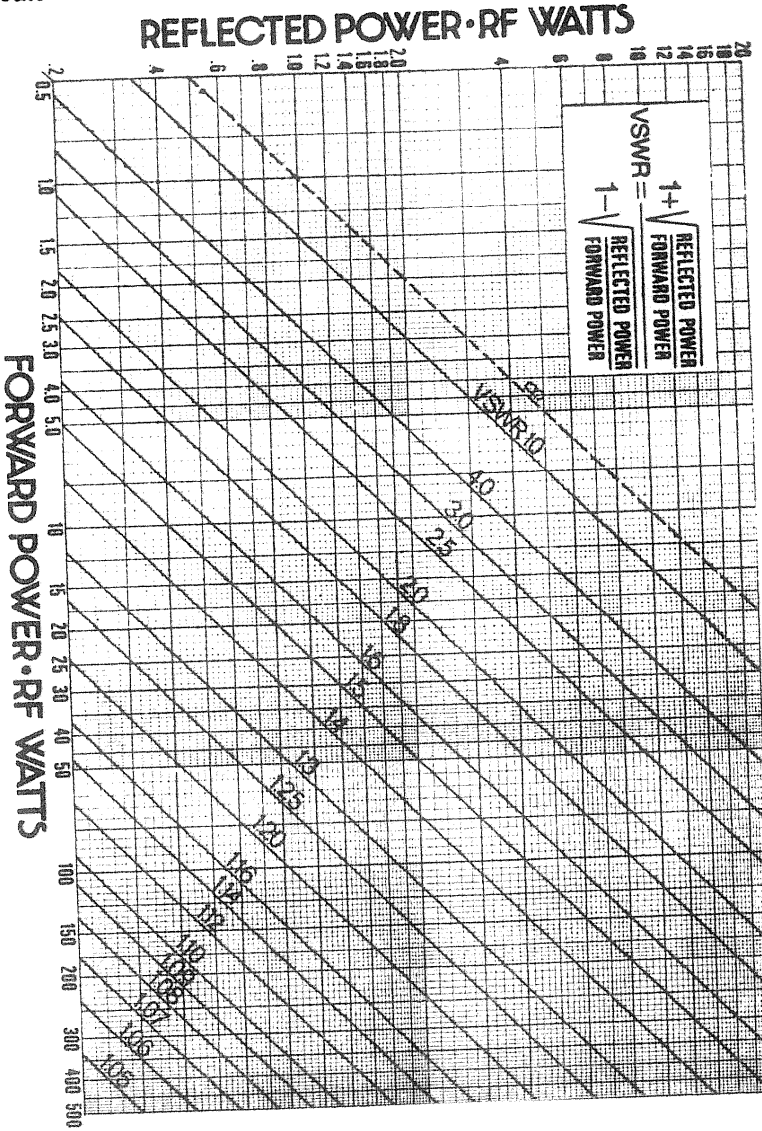


FIGURE 7-3. VSWR CONVERSION NOMOGRAPH.