

INSTRUCTION BOOK FOR

BIRD

SERIES 6730

TERMALINE[®]

WATTMETERS

LIMITED WARRANTY

We are proud of the high quality of our product and we warrant to the original purchaser that each new instrument of our manufacture will for a period of one year after original shipment be free from defects in material and workmanship under normal and proper operating conditions and that properly used during such period it will perform in accordance with our applicable specifications.

Our obligation and the purchaser's exclusive remedy for any defect or failure to meet specifications shall be limited, at our option, to repair or replacement, or if we determine said defect or failure to be so defective as to preclude remedying by repair or replacement, the purchaser's sole and exclusive remedy shall be limited to refund of the purchase price. We shall have no obligation if defects result from improper use, operation above rated capacities, repairs not made by us, or misapplication of the equipment. Our warranty does not extend to the failure of semiconductor devices and batteries, or to equipment and parts made by others except to the extent of the original manufacturer's warranty to us. No other warranty is expressed or implied. Bird Electronic Corporation is not liable for consequential damages.

Warranty returns must be first authorized by the factory office and are to be shipped prepaid.

MODELS COVERED IN THIS INSTRUCTION BOOK

6732	6734-030
6734	6736-030
6736	6737-030
6737	6735-300

I N S T R U C T I O N B O O K .

F O R

S E R I E S 6 7 3 0

T E R M A L I N E® W A T T M E T E R S

30303 Aurora Road, Cleveland, Ohio 44139-2794

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SAFETY PRECAUTIONS

The following are general safety precautions that are not necessarily related to any specific part of procedures 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.

```
*****
*                                     *
*                               W A R N I N G                               *
*                                     *
* Before applying RF power to the Models 6735-300 or                       *
* 6736 be sure to remove the shipping plug, P/N 2450-049                   *
* located near or on top of the radiator. Replace the                       *
* shipping plug the supplied breather vent plug,                           *
* P/N 2450-094. This is important as internal pressure                     *
* build-up, caused by expansion of the heated dielectric                  *
* coolant, could cause damage to the equipment and                         *
* injury to the operator.                                                  *
*****
```

```
*****
*                                     *
*                               C A U T I O N                               *
*                                     *
* Model 6735-300 is rated for 1200W operation for a max-                   *
* imum of 1/2 hour only. For continuous operation, the                     *
* maximum wattage should be restricted to 1000W. It is                     *
* recommended that if frequent use above 1000W is con-                   *
* templated, the instrument be equipped with the thermo-                 *
* switch assembly.                                                         *
*****
```

```
*****
*                                     *
*                               W A R N I N G                               *
*                                     *
* When the unit is used in the upper range of its power                   *
* capacity, the radiator will become hot - care should                     *
* be used in touching the equipment.                                       *
*****
```

Continued

SAFETY PRECAUTIONS

```
*****  
*                               W A R N I N G                               *  
*                               *                                           *  
* Do not attempt to operate the TERMALINE® Wattmeter for *  
* prolonged periods at higher than rated load levels. *  
* Damage to the equipment and injury to operator may *  
* result. *  
*****
```

```
*****  
*                               W A R N I N G                               *  
*                               *                                           *  
* Never attempt to disconnect the equipment from the *  
* transmission line while RF power is being applied. *  
* Leaking RF energy is a potential health hazard. *  
*****
```

```
*****  
*                               C A U T I O N                               *  
*                               *                                           *  
* Do not replace coolant with anything but the specified *  
* fluid. The inner shell of the resistor housing is *  
* contoured to the dielectric properties of this fluid. *  
* The use of any other type of coolant will affect the *  
* electrical performance of the load. *  
*****
```

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SERIES 6730 TERMALINE® WATTMETERS

INTRODUCTION

PURPOSE AND FUNCTION

A Series 6730 TERMALINE® Wattmeter is a portable direct reading absorption wattmeter that both measures and dissipates RF power. It is a self-contained unit that requires no outside power source or additional equipment, except for Models 6737 and 6737-030 which must have auxiliary water cooling. The load portion forms an accurate, dependable and practically non-reflective 50 ohm termination for the adjustment, standby and testing of transmitters under nonradiating conditions.

PERFORMANCE CHARACTERISTICS AND CAPABILITIES

These TERMALINE® Wattmeters can safely measure and absorb their maximum rated RF power. The low frequency units will measure power to within $\pm 5\%$ of full scale over the frequency band of 2 to 32MHz. The rest of their frequency range permits power measurement to $\pm 10\%$ of full scale. The high frequency units measure to $\pm 5\%$ of full scale from 25 to 512MHz and $\pm 10\%$ of full scale from 512 to 1000MHz. Each meter has three switch selectable scales and is housed separately from the load.

DIMENSIONS AND WEIGHT

The dimensions of the individual loads are given in the Specifications, see Page vii. The meter housings are 5-9/16"W x 6-1/2"H x 4-3/8"L (141 x 165 x 111mm). The total weight for each wattmeter is also give in the Specifications. The shipping weights will run approximately 20% higher.

POWER AND UTILITY REQUIREMENTS

The Series 6730 TERMALINE® Wattmeters require no external source of electrical power, other than the RF input power, for operation. The Models 6730 and 6737-030 do however, depend on a supplemental water supply for cooling.

ENVIRONMENTAL REQUIREMENTS

These wattmeters should be operated in a dust and vibration free environment. The ambient temperature range should remain between -40°C and $+45^{\circ}\text{C}$ (-40°F and $+113^{\circ}\text{F}$) for proper operation. Allow at least 6" (150mm) of clearance around the units to permit an unimpeded access of convection air currents for adequate heat dissipation.

ITEMS FURNISHED

Each wattmeter, with the exception of the low frequency Models 6734-030, 6736-030 and 6737-030 is furnished with a spare crystal diode assembly stored behind the "spare diode" cap on the lower left front of the meter face.

Because of their markedly different shape there is no way of storing a crystal assembly in the "spare diode" compartment of a low frequency model. Therefore, they are not supplied with a spare. Models 6734-030, 6736-030 and 6737-030 are equipped; however, with a different type of line section, P/N 6734-034. This line section can also be ordered as an option to convert Models 6734, 6736 or 6737 into the low frequency (-030) versions. The load portion of all models is factory prefilled with the proper amount of coolant. Model 6735-300 can be equipped with an overtemperature thermostitch, P/N 2450-056, if desired. This instruction book is the only additional item and is furnished with all models.

ITEMS REQUIRED

A matching connector to the wattmeter is needed on the coaxial transmission line. Water cooled Models 6737 and 6737-030 must also have a conveniently located water supply and a drain.

TOOLS AND TEST EQUIPMENT

Only simple tools such as screwdrivers will be necessary for disassembly of this equipment. A resistance bridge or ohmmeter with an accuracy of 1%, or better at 50 ohms is useful for checking the resistance value of the RF section assembly.

SPECIFICATIONS FOR 6730 SERIES TERMALINE® WATTMETERS

Impedance.....	50 ohms nominal
VSWR	
Models 6734-030, 6736-030, 6737-030.....	1.10:1.00 max. dc:35MHz
Models 6732, 6734, 6735-300, 6736, 6737..	1.15:1.00 max. dc:1000MHz
Accuracy	
Models 6734-030, 6736-030, 6737-030.....	±5% of FS 2-32MHz ±10% of FS 1.5-2 & 32-35MHz
Models 6732, 6734, 6735-300, 6737.....	±5% of FS 25-512MHz ±10% of FS 512-1000MHz
Ambient Temperature.....	-40°C to +45°C (-40°F to +113°F)
Cooling Method	
All Models.....	Oil dielectric & air convec- tion currents---
Models 6737 & 6737-030.....	---plus supplemental water cooling
Operating Position	
All Models (except 6737 & 6737-030).....	Horizontal
Models 6737 & 6737-030.....	Vertical - connector down with water
Finish.....	Light navy grey baked enamel (MIL-E-15090)

SPECIFICATIONS FOR 6730 SERIES TERMINALINE® WATTMETERS

MODEL	MAX PWR	WATTS SCALE	FREQ MHZ	CONN	OVERALL DIMENSIONS INCHES	WEIGHT LBS/KG	LOAD	METER
6732	250	10/50/250	25-1000	N-F	12-5/8"L x 8-1/2"H x 5-15/16"W (321 x 216 x 151mm)	16/7.2	8141	6735-002-4
6734	500	25/100/500	25-1000	N-F	19-15/16"L x 8-1/2"H x 5-15/16"W (506 x 216 x 151mm)	27/12.2	8201	6735-002-1
6734-030	500	25/100/500	1.5-35	N-F	19-15/16"L x 8-1/2"H x 5-15/16"W (506 x 216 x 151mm)	27.5/12.4	8201	6735-002-7
6735-300	1200*	120/600/1200	25-1000	LC-F	26-1/8"L x 17-3/16"H x 7-1/8"W (664 x 437 x 181mm)	63/28.4	8830-300	6735-002-2
6736	1000	50/250/1000	25-1000	LC-F	21"L x 8-1/2"H x 5-15/16"W (533 x 216 x 151mm)	30/13.5	8251	6735-002-5
6736-030	1000	50/250/1000	1.5-35	LC-F	21"L x 8-1/2"H x 5-15/16"W (533 x 216 x 151mm)	30.5/13.7	8251	6735-002-8
6737	200/500/ 2500**	100/500/2500	25-1000	LC-F	20-13/16"L x 8-1/2"H x 5-15/16"W (529 x 216 x 151mm)	33/14.9	8230	6735-002-3
6737-030	200/500/ 2500**	100/500/2500	1.5-35	LC-F	20-13/16"L x 8-1/2"H x 5-15/16"W (529 x 216 x 151mm)	33.5/15.1	8230	6735-002-9

*For 1/2 hour only, for continuous operation: 1000W.

** 200 Watts vertical position, no water flow.

500 Watts horizontal position.

2500 Watts vertical position, water flowing.

SECTION I - INSTALLATION

1-1. GENERAL

1-2. Operate the load portion in the horizontal position only, with the handle or vent plug on top. The only exceptions are the Models 6737 and 6737-030. When horizontally mounted and without supplemental water cooling, these loads will safely dissipate a maximum of 500 watts. Vertically mounted and without supplemental water cooling, they will dissipate 200 watts. Vertically mounted, with the RF connector down and with water cooling, they will dissipate up to 2500 watts continuously.

1-3. The front and rear fins are made extra thick and bent outward 90° to form mounting flanges. In each model, the mounting flanges have 9/32" (7mm) holes near the corners to form a rectangle with the holes centered on the corners. The dimensions of the rectangle are given below:

MOUNTING LOCATION RECTANGLE

	Width	Length
6732	5-1/8" (130.2mm)	7-15/32" (189.7mm)
6734/-030	5-1/8" (130.2mm)	2-17/32" (318.3mm)
6735-300	4-1/2" (114.3mm)	20-23/32" (526.3mm)
6736/-030	5-1/8" (130.2mm)	15" (381mm)
6737/-030	5-1/8" (130.2mm)	12-17/32" (318.3mm)

* W A R N I N G *
* *
* Before applying RF power to the Models 6735-300 or *
* 6736 be sure to remove the shipping plug, P/N 2450-049 *
* located near or on top of the radiator. Replace the *
* shipping plug the supplied breather vent plug, *
* P/N 2450-094. This is important as internal pressure *
* build-up, caused by expansion of the heated dielectric *
* coolant, could cause damage to the equipment and *
* injury to the operator. *

1-4. Models 6735-300, 6736 and 6736-030 are supplied with special spring loaded vent plugs that are designed to open when the pressure developed by the heated coolant rises by more than a few pounds above atmospheric pressure. By this means, the pressure is relieved while at the same time foreign materials are prevented from entering the tank and contaminating the dielectric coolant. When these loads leave the factory, the vent opening is sealed with a shipping plug which is attached to the vent plug by a length of beaded chain. Before putting the load into operation, be sure to remove the shipping plug and replace it with the vent plug. Retain the shipping plug with its O-Ring for future use should it become necessary to transport the load again.

1-5. Models 6734-030, 6736-030 and 6737-303 utilize a special low frequency line section, P/N 6734-034, which can also be ordered as an accessory to Models 6734, 6736 and 6737. To mount the 6734-034 in place, first remove the existing line section. Do this by unscrewing the dc cable from the voltmeter block. Next remove the four screws from the corners of the flange that is bolted to the face of the load portion. If the low frequency line section is not already equipped with its own "QC" connector, then remove the connector from the existing line section. Do this by loosening the four screws from the corners of the mounting flange and pull the connector straight out. Install it on the low frequency line section by carefully inserting the pin on the back end of the connector into the hole on the face of the line section. Then press the connector into place. Return the four mounting screws to fasten the connector in position. Now remount the line section onto the load and fasten it in place with its four mounting screws. Finally, reattach the dc cable from the meter to the voltmeter block.

1-6. On the Model 6735-300, and overtemperature thermoswitch, P/N 2450-056, is available as an accessory. If ordered as part of the original equipment it is factory installed.

a. If ordered subsequently it must be field installed; proceed as follows:

1. Stand the unit on its back end with the connector end up. In this position there is no danger of coolant spillage.
2. Use a 9/16 allen wrench to remove the socket plug on the front face of the radiator. Do this carefully to avoid damaging the threads in the plug hole.
3. With equal care replace the plug with the thermoswitch. Use an acceptable pipe sealing compound, "Loctite with teflon" or equivalent, sparingly on the threads. Do not use ordinary plumbers pipe dope; it will contaminate the coolant! Observe closely for coolant leaks.

b. To connect the thermoswitch, proceed as follows:

1. Unscrew the larger knurled ring nut (A) at the lower end of the coupling jack assembly and pull it off from the thermoswitch jack (B). Unscrew the small knurled cover fitting (C) from the base plug (D) of the connector to release the base.
2. Thread the interlock wires through the clamp (E), with washers (F) inside, and with its threaded fitting in place. Service the interlock wire with short tips, use spaghetti sleeves over wire ends if needed. Then securely solder the interlock leads to the lugs (G) of the connector base. Note - Be sure that the larger captive clamping nut (A) is in place over the base plug (D) with the knurled end outward (towards the face).
3. Screw on the cover ring (C) first, then fasten the cable clamp (E) in place and tighten the two yoke screws (H) on the cable. Push the plug back on the thermoswitch and tighten the

captive knurled connecting ring. Do not attempt to operate the equipment without interlocking it with the transmitter or RF source.

Figure 1-1. Thermoswitch.

1-7. Locate the load portion to provide at least six inches of free space around and above the unit. Place the load so that the shortest possible cable length connects it to the transmitting equipment.

SECTION II - THEORY OF OPERATION

2-1. GENERAL

2-2. The TERMALINE® Wattmeter circuit is basically a voltage capacitive divider with one of the capacitors being a probe whose distance from the center conductor determines its capacitive value. This probe spacing is adjusted at the factory in the calibration procedure to produce the required value and is then locked in place. The small voltage developed across the fixed capacitor is rectified by a diode. A simple RC filter eliminates any RF present and the rectified dc current is fed to the meter, see Figure 2-1 or 2-2.

2-3. The wattmeter measures three separate power ranges by selectively switching in various values of resistance in series with the meter. One of the two resistors in each range is adjustable and is set and sealed at the factory during the calibration procedure. These resistors are mounted on the back of the meter itself and the range selector switch is located on the front panel of the meter housing.

2-4. The spare crystal that is supplied with Models 6732, 6734, 6735-300, 6736 and 6737 is individually selected to match the characteristics of the installed crystal so that instrument calibration is not affected by substituting one for the other.

2-5. Mechanically, the wattmeter section consists of a 50 ohm line section mounted on the load. In the case of Models 6732, 6734, 6735-300, 6736 and 6737, a socket is used to hold the voltmeter cartridge that contains the crystal diode. The meter cable is screwed directly on top of the voltmeter cartridge to complete the assembly. The Models 6734-030, 6736-030 and 6737-030 utilize a line section with an attached voltmeter block. The meter cable attaches directly on top of the voltmeter block.

2-6. The TERMALINE® load consists essentially of a carbon film resistor on a ceramic substrate immersed in a dielectric coolant. The resistor, individually selected for its accuracy, is enclosed in a special exponentially tapered housing. This provides a linear reduction in surge impedance directly proportional to the distance along the resistor. When surrounded by the dielectric coolant, the characteristic impedance is therefore; 50 ohms at the front (connector) end, 25 ohms at the mid-point to compensate for the resistance already passed over, and zero ohms at the rear where the resistor joins the housing, forming the return conductor of the coaxial circuit. This produces a uniform, practically reflectionless line termination over the stated frequencies of the load resistor.

 * CAUTION *
 *
 * Model 6735-300 is rated for 1200W operation for a max- *
 * imum of 1/2 hour only. For continuous operation, the *
 * maximum wattage should be restricted to 1000W. It is *
 * recommended that if frequent use above 1000W is con- *
 * templated, the instrument be equipped with the thermo- *
 * switch assembly. *

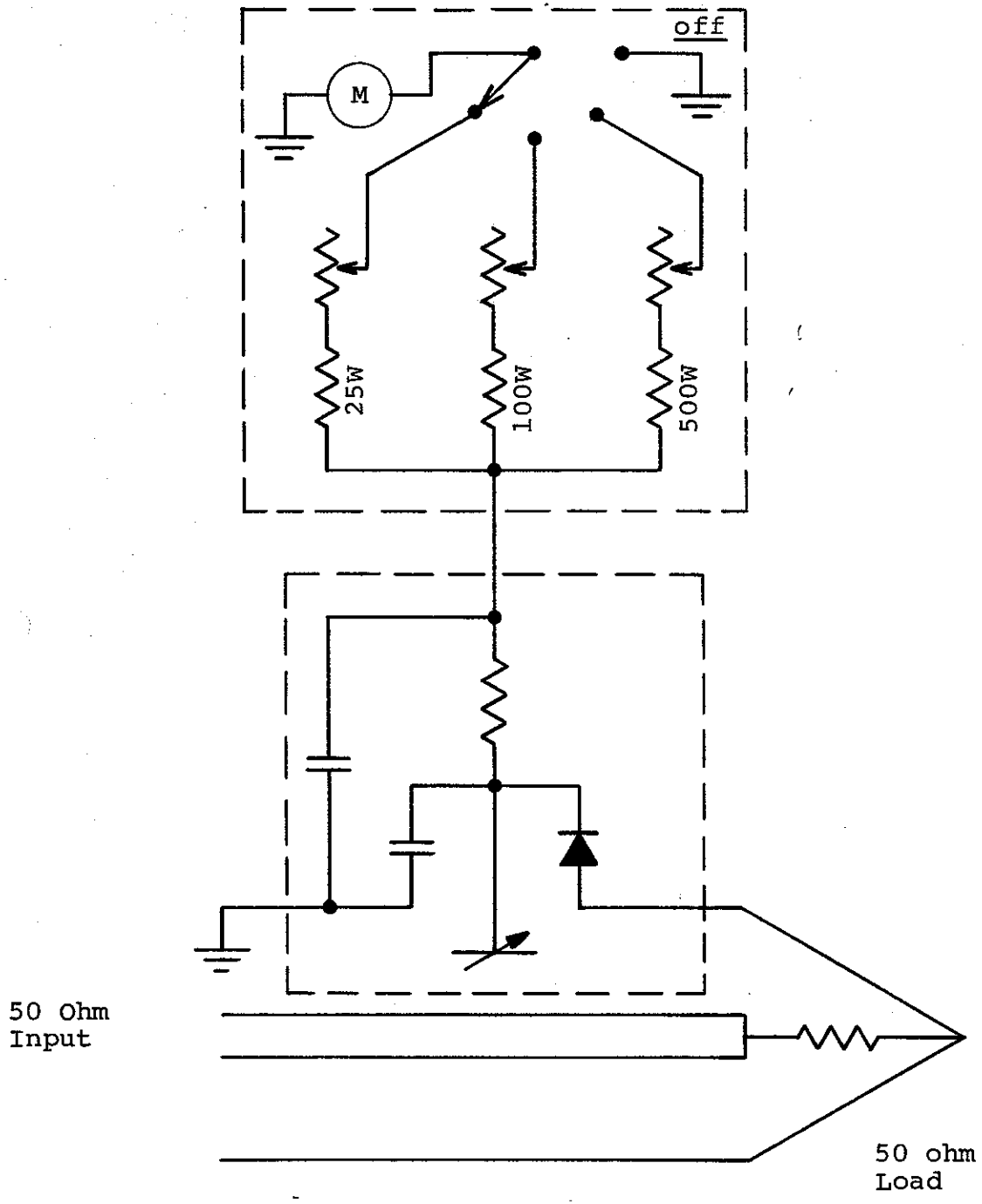
2-7. As an optional item, the Model 6735-300 load portion can be provided with a thermostwitch assembly, P/N 2450-056. When installed in the radiator, it will prevent possible damage occurring from accidental transmitter power overload or equipment malfunction. Being normally closed, the thermostwitch opens at a maximum safe temperature of +155° C (+311°F). Connected in series with the transmitter interlock, it cuts off transmitter power if the load coolant temperature exceeds this value. The assembly consists of thermostwitch body, P/N 2450-040, with coupling jack, P/N 2450-018, attached.

2-8. COOLING

2-9. The dielectric coolant is chosen for its desirable dielectric and thermal characteristics. Cooling of the load is accomplished by natural fluid and air convection currents. The dielectric coolant carries the electrically generated heat from the resistor to the walls of the cylindrical cooling tank. This tank is encased in a set of radiating fins, constructed from heavy gauge aluminum alloy, and firmly pressed onto the cylinder. The heat from the dielectric oil is transferred to the surrounding air by the fins. The Model 6732 uses 0.35 gallon (1.3 liter) of coolant. The Model 6734/-030 uses 0.9 gallon (3.4 liter) of coolant. The Model 6735-300 uses 2.9 gallons (11 liter), the Model 6736/-030 uses 1.1 gallons (4.1 liter), and the Model 6737/-030 uses 0.9 gallon (3.4 liter) of coolant.

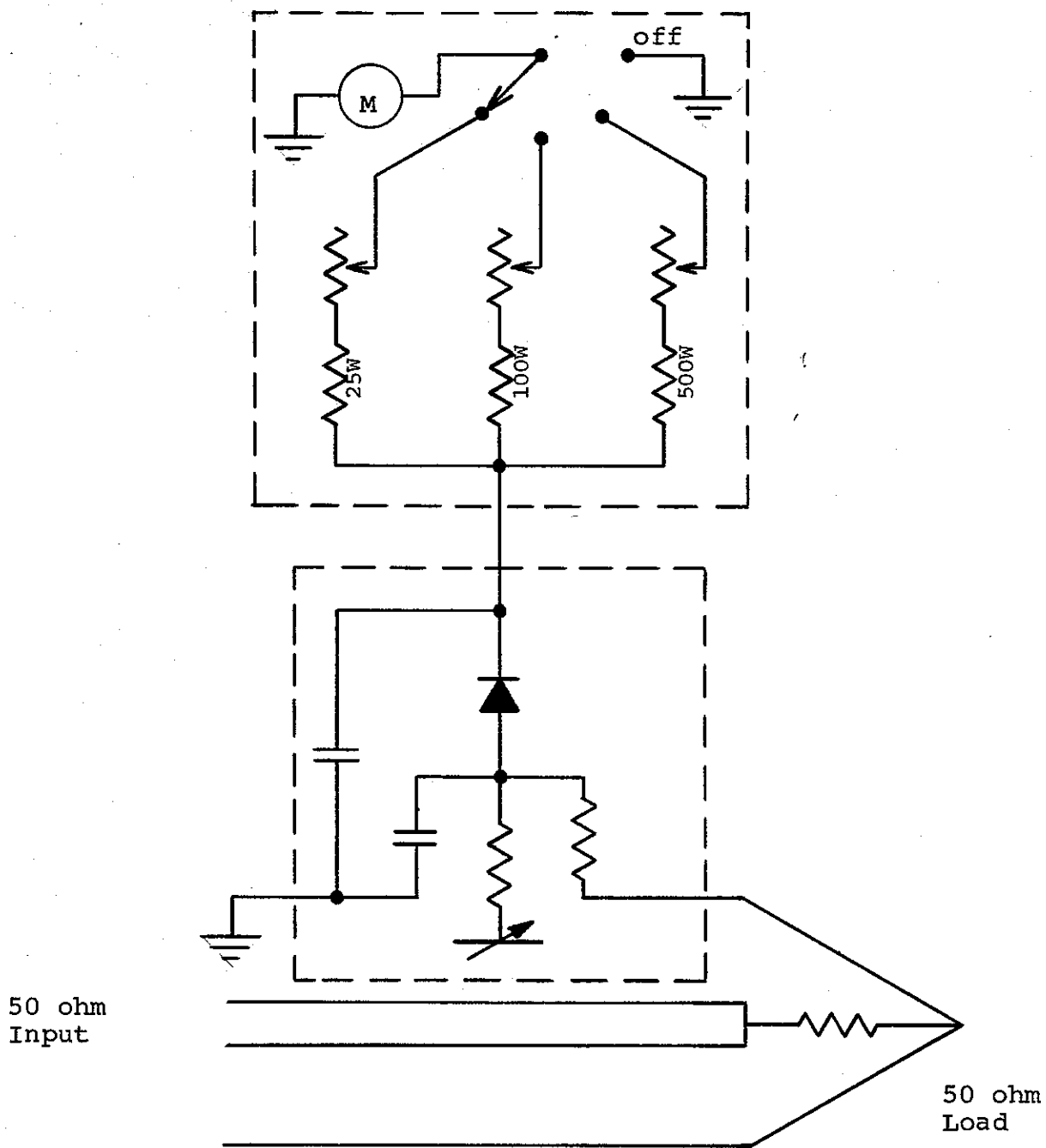
2-10. Expansion of the coolant, caused by the rise in its temperature, is allowed for by means of a synthetic rubber diaphragm (not visible) in the rear cover dome of the load for the Models 6732, 6734, 6734-030, 6737 and 6737-030. In addition, Models 6737 and 6737-030 are equipped with a cooling coil for circulating water that will remove most of the generated heat from the dielectric coolant. Models 6735-300, 6737 and 6736-030 have a spring loaded vent plug rather than a diaphragm for relieving the excess pressure caused by the coolant expansion.

Figure 2-1. Schematic Diagram for Models 6734-030, 6736-030, 6737-030.



Note - Power ranges shown are for Model 6734-030.

Figure 2-2. Schematic Diagram for Models 6732/34/35/36/37.



Note - Power ranges shown are for Model 6734.

SECTION III - OPERATING INSTRUCTIONS

3-1. USE AND FUNCTION OF CONTROLS

3-2. The only operating control is the range selector switch on the lower right hand face of the meter unit.

3-3. INITIAL ADJUSTMENTS AND CONTROL SETTINGS

3-4. No adjustment or control settings are required.

3-5. START-UP

3-6. Connect the load to the transmitting equipment under test with 50 ohm coaxial cable (RG-8A/U, RG-9/U, RG-213/U or equal) equipped with a Male N type plug (UG-21E/U or equal) which mates with the RF input connector of the load for Models 6732, 6734 and 6734-030. For Models 6735-300, 6736, 6736-060, 6737 and 6737-030 use a cable equipped with a Male LC type plug. After the transmitter has been connected to the load, proceed according to the transmitter manufacturer's instructions. When reconnecting the antenna, it may become necessary to slightly readjust the transmitter due to possible differences in VSWR between the load and the antenna system.

3-7. NORMAL OPERATION

3-8. Each TERMALINE® Wattmeter will continuously measure and safely dissipate RF power up to its maximum rating. To operate, set the range selector switch to the desired power range and turn on the RF power source. The RF power absorbed by the load portion will be displayed on the meter. Read the power level from the scale that matches the range set by the range selector switch. For Models 6737 and 6737-030 set the water rate to at least 1/2 gallon/minute (2 liter/minute).

3-9. OPERATION UNDER EMERGENCY, ADVERSE OR ABNORMAL CONDITIONS

```
*****
*                               W A R N I N G                               *
*                               *                                           *
* When the unit is used in the upper range of its power *
* capacity, the radiator will become hot - care should *
* be used in touching the equipment. *
*****
```

```
*****
*                               W A R N I N G                               *
*                               *                                           *
* Do not attempt to operate the TERMALINE® Wattmeter for *
* prolonged periods at higher than rated load levels. *
* Damage to the equipment and injury to operator may *
* result. *
*****
```

3-10. The loads of the Series 6700 TERMALINE® Wattmeters will withstand a temporary overload of up to 20% above their nominal maximum rating. The overload should be applied for no more than five to ten minutes. Allow at least a half-hour of cooling thereafter before subjecting the unit to another overload. For Models 6737 and 6737-030, increase the water flow rate for extra protection. In any case, do not allow the water to reach the boiling point. If it does, the RF power must be immediately decreased and/or the water flow rate increased.

3-11. It should be understood that, although the load portion can accept a limited overload, the meter is restricted to the amount of overranging acceptable. Disconnect the meter lead from the voltmeter to avoid damage.

3-12. SHUTDOWN

3-13. It is not possible to cut off the flow of RF power into the load except by turning off the transmitter or RF source. Turning the range selector switch to OFF merely deactivates the meter without affecting the load.

3-14. EMERGENCY SHUTDOWN

```
*****  
*                               W A R N I N G                               *  
*                               *                                           *  
* Never attempt to disconnect the equipment from the *  
* transmission line while RF power is being applied. *  
* Leaking RF energy is a potential health hazard. *  
*****
```

3-15. Turn off the source of RF power.

SECTION IV - MAINTENANCE

4-1. TROUBLESHOOTING

<u>PROBLEM</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
Leaking of Coolant Oil Around Clamping Band or Radiator Housing	Clamping bands not tight	Tighten slightly with a screwdriver.
	Faulty O-Ring (front)	Replace per Paragraph 4-21 thru 4-23.
	Faulty diaphragm (rear)	Replace per Paragraphs 4-16, 4-18 and 4-19.
Excessive Overheating of the Radiator	Transmitter power too high	Reduce transmitter power.
	Coolant oil level too low	Add more coolant oil to the radiator per Paragraph 4-16 thru 4-19.
	Over accumulation of dirt on cooling fins	Clean the fins off.
	Faulty RF section assembly	Replace per Paragraph 4-21 thru 4-23.
High or Low dc Resistance Values Per Paragraph 4-10	Faulty RF connector	Replace per Paragraph 4-14.
	Loose RF connector	Tighten with a screwdriver.
	Faulty RF section assembly	Replace per Paragraph 4-21 thru 4-23.
	Coolant oil level too low	Add more coolant oil to the radiator per Paragraph 4-16 thru 4-19.
Incorrect Power Reading	Bad silicon diode	Replace per Paragraph 4-29 thru 4-31.
	Loose meter cable	Tighten cable connector.

4-2. CLEANING

4-3. The outside surface of these wattmeters should be wiped free of dust and dirt when necessary. The principle maintenance required by the operator will be to periodically wipe the accumulated dust and lint off of the radiator fins. Excessive collection of dust and lint on the cooling fins will interfere with the efficient dissipation of heat. If the teflon insulator or metallic contact surfaces of the connector should become dirty or grimy, wipe them off with a soft cloth. Use a contact cleaner that is self-drying and nonresidue forming to clean the inaccessible internal parts.

4-4. If any portions of the radiator are corroded or rusted, clean the areas with a fine flint sandpaper, and then touch them up with grey enamel.

4-5. INSPECTION

4-6. With the rugged and simple construction of the TERMALINE® Wattmeters, periodic inspection will be necessary only at about six month intervals. Inspection should include the items listed below:

a. Oil Leakage - Check for coolant oil seepage around the radiator tank, particularly at the front and back around the underside of the clamping band. If leakage is observed, see Paragraph 4-1, and check tightness of the clamping screw and the fasteners around the front cylinder.

b. Inspect the load for completeness and general condition of the equipment.

c. A Troubleshooting Chart, see Paragraph 4-1, lists the commonly encountered problems, their possible causes and remedies. Use this chart as a guide when analyzing symptoms.

4-7. PREVENTIVE MAINTENANCE

4-8. Due to the basic simplicity of construction, the major requirement for preventive maintenance is to keep the equipment clean, particularly the radiator fins. It is important to maintain the heat transfer efficiency of the cooling fins. Also, occasionally check the coolant level in the radiator tank.

4-9. CALIBRATION

4-10 DC Resistance - Check the condition of the load resistor by accurate measurement of the dc resistance between the inner and outer conductors of the RF input connector. Use a resistance bridge or any ohmmeter with an accuracy of 1% or better at 50 ohms for this measurement. The measured resistance should be a nominal 50 ohms and it should not deviate by more than ± 2 ohms from this value.

4-11. Checking the wattmeter accuracy consists mainly of comparing its reading with the readings of similar wattmeters. If other wattmeters are not conveniently available then return the instrument to the factory for

recalibration. Special calibration and calibration data can be provided at an additional cost. Consult the factory for details.

4-12. DISASSEMBLY

4-13. There are no special techniques required for the repair or replacement of components in these TERMALINE® Wattmeters. A screwdriver and a small wrench are the only tools needed. The paragraphs below outline component removal.

4-14. RF Connector - The connector is a "Quick-Change" design which permits easy interchange with the use of only a screwdriver. This process does not interfere with the essential coaxial continuity of the load resistor RF input or the coolant oil seal. For replacement, proceed as follows:

- a. Remove the four #8-32 x 5/16 round head machine screws from the corners of the RF connector.
- b. Pull the connector straight out of its socket.
- c. Install the connector per Paragraph 4-21.

4-15. Diaphragm and Coolant Oil - Remove the diaphragm to replace or examine the coolant oil. For replacement of the diaphragm and coolant oil proceed as follows:

```
*****
*                               C A U T I O N                               *
*                               *                                           *
* Do not replace coolant with anything but the specified *
* fluid. The inner shell of the resistor housing is *
* contoured to the dielectric properties of this fluid. *
* The use of any other type of coolant will affect the *
* electrical performance of the load. *
*****
```

4-16. Models 6732, 6734, 6734-030, 6737 and 6737-030 -

- a. Stand the load vertically, with the back end up.
- b. Loosen the clamp screw until the clamp band is released.
- c. Remove the diaphragm cover and lift the diaphragm from the back end of the radiator tank. Inspect the diaphragm. If it is no longer soft and pliable or shows signs of surface cracks it should be replaced.
- d. The coolant oil level should be about one inch below the top of the radiator cylinder. The coolant should be a clear to a light yellow color, if not, it may be contaminated and should be replaced.

4-17. Model 6735-300 (No Diaphragm) -

a. Place the unit on its back, connector up, by lifting the radiator front. Do it carefully keeping the topside always facing up. The vent hole is so positioned on the topside that when the unit is upended in this manner, the coolant level will remain just below the vent hole and not spill out. Loosen the #10-32 x 1-1/2 screw on the clamping band. Remove the clamping band and lift the load resistor assembly out of the tank. Allow the excess coolant to drip back into the tank before laying the assembly aside.

b. At ambient room temperature, the coolant level should be 4-3/4" (120mm) below the top surface of the load resistor assembly mounting ring. The tank is factory filled to this level with 2.9 gallons (11 liters) of a specially selected dielectric fluid (p/N 5-030). The level of the fluid should remain constant, even after prolonged usage, under normal operating conditions.

4-18. Models 6736 and 6736-030 -

a. To check the coolant level, remove the vent plug from the top rear surface of the expansion tank. Unscrew the plug with a 3/4 wrench. The coolant level at room temperature should be no more than 1/8" above the bottom surface of the expansion tank. This can be verified by carefully lifting up the load by its front end and noting the presence of coolant on the bottom surface. The unit is factory filled to the proper level with 1.1 gallons (4.2 liter) of a specially selected dielectric fluid, P/N 5-1070.

b. To replace the diaphragm, stand the load on its front end with the connector facing down, if the coolant hasn't been drained previously. Unscrew the four #10-32 truss head screws at the corners of the guard cover, P/N 2430-078, and remove the guard box. Unscrew the tube nut from the tank nozzle and pull it free. Remove the clamp screw from the bottom of the V-band clamp, the same type as on the front side, and remove the clamp. The rear cover, including the attached escape tube with its captive nut, P/N 2430-088, and the diaphragm seal, P/N 2430-089, can now be easily removed. Inspect the diaphragm seal. If it is not still soft, pliable and free from surface cracks or other signs of deterioration, replace it (P/N 2430-015). At this point, if the coolant P/N 5-1070, shows signs of contaminations; e.e., is not a crystal clear white color, replace it also.

4-19. RF Load Resistor Assembly - To replace load resistor assembly, proceed as follows:

a. Models 6732, 6734, 6734-030, 6737 and 6737-030 -

1. Stand the load vertically, connector end up, and brace it to avoid tipping it over.

2. Loosen the clamp screw until the clamping band is released.

3. Hold the load assembly by the RF connector and pull the assembly slowly out of the radiator tank allowing the excess coolant to drain back into the radiator.

4. Inspect the O-Ring seal which is located just inside the mounting flange of the radiator assembly. Do not reuse the O-Ring if it is no longer soft and pliable or shows signs of surface cracks.

5. Replace it with P/N 5-230 for Model 6732 and P/N 8110-039 for Models 6734, 6734-030, 6737 and 6737-030.

b. Model 6735-300 -

1. To remove the load resistor assembly, proceed as in Paragraph 4-17. When removing the load resistor, inspect the O-Ring seal. It should be free of twists and positioned evenly all around the beveled flange of the resistor housing. The O-Ring should still be soft and pliable and show no signs of surface cracks. If it has deteriorated, replace it with P/N 8110-039.

c. Models 6736 and 6736-030 -

1. Replace the vent plug, P/N 2450-094, with the shipping plug, P/N 2450-049. Make sure to use the O-Ring seal to avoid leakage.

2. Stand the unit on its back end, with the connector up, and brace it if necessary to prevent it from tipping over.

3. Loosen the #10-32 x 1-1/2 screw on the clamping band and remove the clamping band.

4. Grasping the RF connector, slowly lift the load resistor assembly out of the radiator tank allowing the excess coolant to drip back in.

5. Inspect the O-Ring seal to be sure it is free of twists and positioned evenly around the beveled flange of the resistor housing. If the O-Ring is not soft and pliable or shows signs of surface cracks, replace it with P/N 5-230.

4-20. REASSEMBLY

4-21. RF Connector - To install a new connector, reverse the procedures in Paragraph 4-14. Be sure that the projecting center pin on the connector is carefully engaged and properly seated within the mating socket of the load resistor input before pressing it home.

4-22. Diaphragm and coolant oil for Models 6732, 6734, 6734-030, 6737 and 6737-030. To reassemble the load after inspecting the diaphragm and coolant oil, see Paragraph 4-16 and proceed as follows:

a. Put the diaphragm back in place on the radiator tank.

b. Press the cuplike swelling in the center of the diaphragm down into the tank to remove the trapped air bubble. To allow the air to escape, pry the diaphragm away from the edge of the tank. Through the same opening add more oil, if necessary, until the oil level is flush with the top of the tank.

c. Replace the diaphragm cover and the clamping band. Retighten the clamping screw.

4-23. For Model 6735-300 - To reassemble, see paragraph 4-17, replace the load assembly and the clamping band and tighten the clamping screw. Carefully lower the load back onto its feet.

4-24. For Model 6736 and 6736-030 - To reassemble, reverse the procedure in Paragraph 4-18.

4-25. RF Load Resistor Assembly -

a. Models 6732, 6734, 6734-030, 6737 and 6737-030 - To reassemble, reverse the procedures in subparagraph 4-19a.

b. Model 6735-300 - To reassemble, reverse the procedure in Subparagraph 4-19b.

c. Models 6736 and 6736-030 - To reassemble, reverse the procedure in Subparagraph 4-19c.

4-26. REPAIRS

4-27. Models 6732, 6734, 6735-300, 6736 and 6737 -

4-28. Replacement of Diode - To replace the diode proceed as follows:

a. Unscrew the dc cable plug from the voltmeter block.

b. Remove the diode which sits loosely in the socket.

c. Unscrew the black plastic cap from the socket on the front panel of the meter (marked "Spare Diode").

d. Remove the spare diode.

e. Insert the spare diode in the socket of the voltmeter block.

f. Reattach the dc cable plug to the voltmeter block, screwing it firmly in place.

g. Restore the black plastic cap to the "spare diode" socket.

4-29. Models 6734-030, 6736-030 and 6737-030 - The diode for these models will not fit into the "spare diode" socket and must therefore be ordered separately. To install, follow the procedure in Paragraph 4-28, but omit steps c., d. and g.

4-30. Repairs beyond what are covered in this instruction book will require return of the equipment to Bird Electronic Corporation for service. Please consult the factory.

SECTION V - PREPARATION FOR SHIPMENT

5-1. LOAD PORTION

5-2. Wrap the RF connector with padding and tape the padding securely in place. Pack and brace the load in a suitable shipping container, a corrugated paper box should suffice. It is not necessary to remove the dielectric coolant before shipping. However, for Models 6735-300, 6736 and 6736-030 replace the vent plug with the shipping plug, see Paragraph 1-4.

5-3. METER PORTION

5-4. Disconnect the dc cable from the voltmeter block and then wrap the meter with padding and tape securely in place. The meter can then be shipped in the same container as the load portion.

5-5. LOW FREQUENCY LINE SECTION

5-6. If the low frequency line section is part of the equipment as an extra accessory, wrap and tape it securely in padding before putting it in the container with the load and meter.

SECTION VI - STORAGE

6-1. GENERAL

6-2. No special preparations for storage are necessary other than to cover the equipment to keep out dust and dirt. Store these units in a dry and dust-free environment where the ambient temperature will remain within the -40°C to +45°C (-40°F to +113°F) working range of the loads.

SECTION VII - REPLACEMENT PARTS LIST

7-1. SERIES 6730

ITEM	QUANTITY	DESCRIPTION	PART NUMBER
1	1	Switch, Rotary	6735-008
2	1	"QC" Connector	*See Below
3	1	Assembly, DC Cable	6735-011
4	1	Cable Clamp	2-249
5	1	DC Connector Shorting Plug	6733-054
6	1	Range Switching Knob	4110-016

*Available QC Type Connectors

N-Female*	4240-062	LT-Female	4240-018
(*Standard For Models 6732/34/34-030)		LT-Male	4240-012
N-Male	4240-063	C-Female	4240-100
HN-Female	4240-268	C-Male	4240-110
HN-Male	4240-278	UHF-Female (SO-239)	4240-050
LC-Female*	4240-031	UHF-Male (PL-259)	4240-179
(*Standard For Models 6735-300, 6736/36-030/37/37-030)			
LC-Male	4240-025	7/8" EIA Air Line	4240-002

7-2. MODELS 6732/34/35-300/36/37

7	1	Voltmeter Cartridge Assembly	6733-009
8	1	Diode	5-1180
9	1	Spare Crystal Cap	6733-025

7-3. MODELS 6734-030/36-030/37-030

10	1	Voltmeter Assembly	6734-036
11	1	Diode	5-1291
12	1	Sensistor	5-595-2

7-4. MODEL 6732

13	1	Meter	2000-066
14	1	Radiator, Cooling	2440-015
15	1	RF Section Assembly	8141-002
16	0.35 gallon (1.3 liters)	Coolant (DC-200)	5-1070-2 (1 Gallon Container)
17	1	Clamp Band Assembly	2430-043
18	1	O-Ring Seal	5-230
19	1	Diaphragm	2430-015
20	1	Diaphragm Cover	2430-148
21	1	Handle, Radiator	2400-017

Continued

7-5. MODELS 6734/-030

ITEM	QUANTITY	DESCRIPTION	PART NUMBER
22	1	Meter	2000-064
23	1	Radiator Assembly	2430-050
24	1	RF Section Assembly	8205-002
25	0.9 gallon (3.4 liters)	Coolant (Dialectric)	5-030-3 (1 Gallon Container)
26	1	Diaphragm	2430-015
27	1	Diaphragm Cover	2430-148
28	1	Clamp Band	2430-055
29	1	O-Ring Seal	8110-039
30	1	Nut, Acorn	8110-171
31	1	Handle, Radiator	2430-028

7-6. MODEL 6735-300

32	1	Meter	2000-063
33	1	RF Load Resistor	8205-002
34	1	O-Ring, RF Section	8110-039
35	1	Clamping Band Assembly	2430-055
36	1	Vent Plug, Breather	2450-094
37	1	Plug, Shipping	2450-049
38	2	O-Ring, Vent and Shipping Plugs	5-504
39	1	Thermoswitch Assembly, Overttemperature	2450-056
40	2.9 gallons (11 liters)	Coolant (Dialectric)	5-030-3 (1 Gallon Container)
41	1	Radiator Assembly	2450-301

7-7. MODEL 6736/-030

42	1	Meter	2000-067
43	1	RF Section Assembly	8890-050
44	1	O-Ring, RF Section	5-230
45	1	Guard, Diaphragm Cover	2430-088
46	1	Seal, Diaphragm	2430-089
47	2	Clamping Band Assembly	2430-055
48	1.1 gallons (4.1 liters)	Coolant (Dialectric)	5-1070-2 (1 Gallon Container)
49	1	Vent Plug, Breather	2450-094
50	1	Plug, Shipping	2450-049
51	2	O-Ring, Vent and Shipping Plugs	5-504
52	1	Radiator	2430-123
53	1	Expansion Tank (part of radiator)	2430-080
54	1	Handle, Radiator	2430-028
55	1	Chain Assembly	8180-094

7-8. MODELS 6737/-030

56	1	Meter	2000-065
57	1	Radiator Assembly	2430-050

Continued

7-8. MODELS 6737/-030

ITEM	QUANTITY	DESCRIPTION	PART NUMBER
58	1	RF Section Assembly	8230-002-2
59	0.9 gallon (3.4 liters)	Coolant (Dialectric)	5-030-3 (1 Gallon Container)
60	1	Diaphragm	2430-015
61	1	Diaphragm Cover	2430-148
62	2	Clamp Band Assembly	2430-055
63	1	O-Ring RF Assembly	8110-039
64	1	Handle, Radiator	2430-028