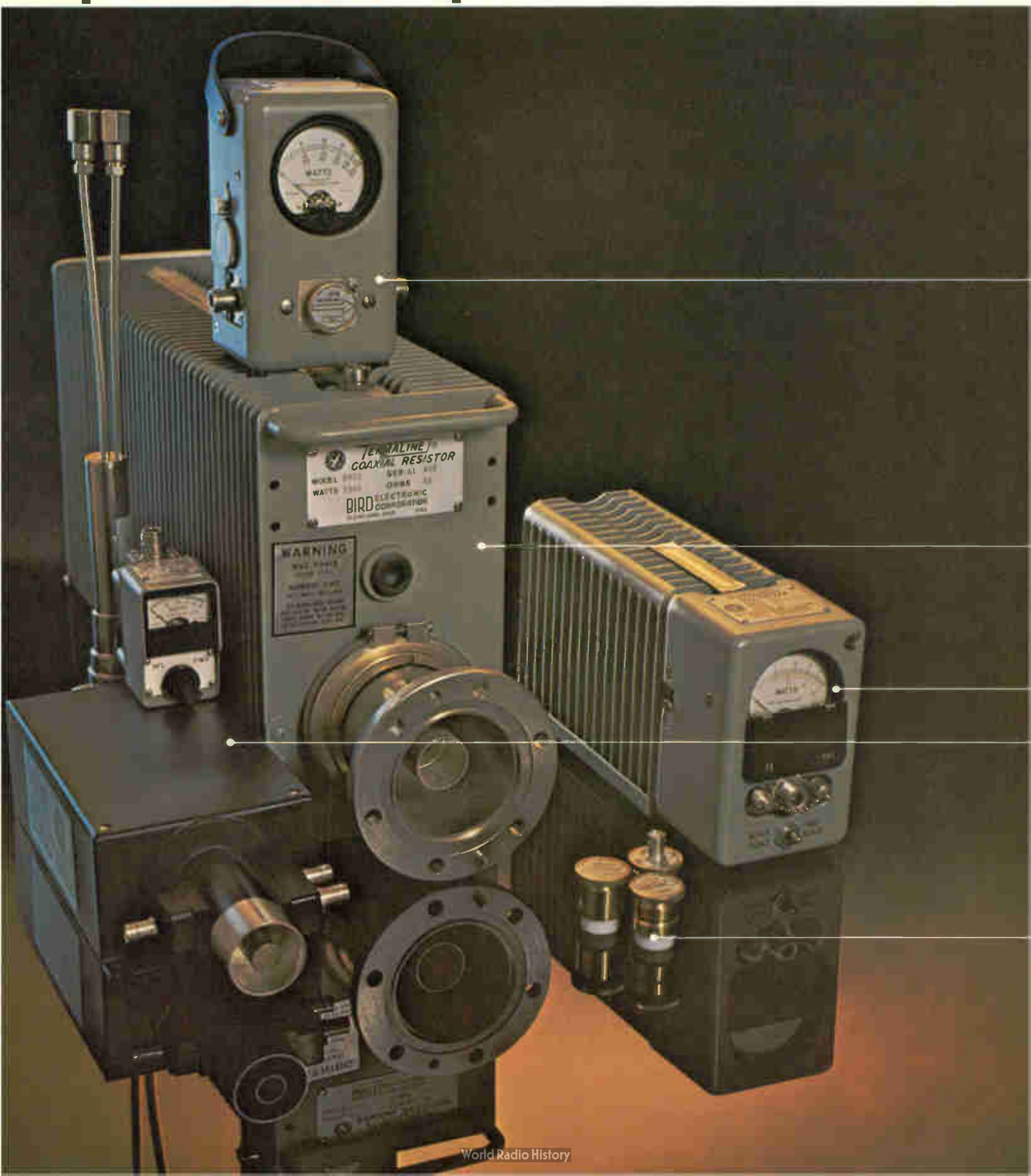
BIRD

Quality Instruments for RF Power Measurement

Catalog GC-77 A

product close-up



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BIRD

Important Note: All drawings in this catalog are dimensioned in both *inches* and **millimeters**. *Inches* are displayed in *Italics* and **millimeters** in **Bold** figures.

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IE2

Limited Warranty

BIRD ELECTRONIC CORPORATION
30303 Aurora Road, Solon, Ohio

We are proud of the high quality of our product and we warrant it 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 first be authorized by the factory office and are to be shipped prepaid.

General Terms, Conditions of Sale

TELEPHONE, TELEGRAPH AND CABLE ORDERS

Factory telephone. (216) 248-1200
Telex: 98-5298
Cable address: BIRDELEC

Eastern Sales Office (Pennsylvania)
Telephone: (717) 569-0467
TWX: 510-672-0531

Western Sales Office (California)
Telephone: (805) 646-7255
TWX: 910-336-4710

ADDRESS

All communications except when otherwise advised should be sent to the Bird Electronic Corporation, 30303 Aurora Road, Cleveland (Solon), Ohio 44139, or to the appropriate regional sales office.

ORDER BY NUMBER

Please order by model number or part number. Whenever possible, include name of the item, ranges or other significant specifications. Be sure to include in your order any accessories or special calibration required.

When modifications are desired to adapt an instrument for your special requirements, contact our Sales Department.

SHIPPING INSTRUCTIONS

Unless specific instructions accompany the order, we shall use our judgement and select the best method for your shipment. If requested, repair parts or other items needed quickly will be shipped by air.

Export shipments via air-freight save time, and in many cases are less expensive than surface modes.

MINIMUM BILLING

The minimum billing per order is $25.00

CONDITIONS OF SALE

Determination of price, terms and conditions of sale and final acceptance of orders are made only at our factory in Cleveland (Solon), Ohio.

PRICE CHANGES

All prices are subject to change without notice. Formal price quotations remain valid for 60 days.

TAXES

Applicable Federal, State or Local taxes that are in effect at the time of shipment will be added unless Certificate of Exemption is furnished by the purchaser.

SPECIFICATIONS

We reserve the right to discontinue any item without notice and to change physical and electrical specifications at any time without incurring any obligation to incorporate new features in instrument or parts previously sold. For instruments offered with the "QC" Connector feature, maximum VSWR values listed in the specifications are obtained with the connector type shown as "normally supplied."

Listed power ratings for aircooled terminations are valid to 5000 ft. For operation at higher elevations, please contact us for applicable derating factor.

SPECIAL DATA

Individual special performance data can be provided for most Bird products at a minimum charge of $40 per unit.

TERMS

All prices are F.O.B. Cleveland (Solon), Ohio. Terms net 30 days for established accounts. C.O.D. orders accepted.

Export Terms; See Overseas Representative listing overleaf

QUANTITY DISCOUNTS

Available on most equipment when 25 pieces or more of the same model are ordered. Please inquire.

CUSTOMER SERVICE

Bird maintains a complete repair and recalibration department at Solon. This department is set up to provide the best possible service of Bird equipment. Repairs will proceed as soon as the instrument is received with your authorization. Repair charges are kept at a minimum. If you require a firm quotation before repairs proceed, please advise and a quotation will be sent promptly. All instruments returned for repair-recalibration must be shipped prepaid and to the attention of the Customer Service Group.

Each instrument repaired is thoroughly checked and recalibrated to original specifications. The material used and work performed are warranted for 90 days with the exception of semi-conductor devices and batteries.

DISTRIBUTORS

Bird equipment is stocked throughout the United States and overseas. Inquire at Solon or the East/West Coast Sales Office for distributor located closest to you.

BIRD

Since its founding in 1942, Bird Electronic Corporation has pioneered the development of advanced instrumentation for the communications industry, and has steadily broadened its product line as well as expanded design and production facilities. It now owns a modern plant of about sixty-two thousand square feet in a suburban setting.

Bird is a highly specialized company, concentrating on coaxial power instruments, components and accessories. While our chosen field of specialization is narrow, we do serve it in depth. This singular dedication of time and talent has resulted in Bird TERMALINE and THRULINE becoming trademarks of confidence, and our wattmeters—known for their technical integrity—are now Standards of the Industry.

Bird product leadership and functional utility originate in its modern J.R. Bird Research and Engineering Center—shown below—where your needs and our ideas are matched.

In the production plant, milling, drilling and turning equipment is numeric controlled and most other processes, such as painting, sheet metal, engraving, finishing, aluminum brazing, silk screening etc. are all done in house. This close control over quality and increased automation enable Bird to produce reliable instruments at economic prices.

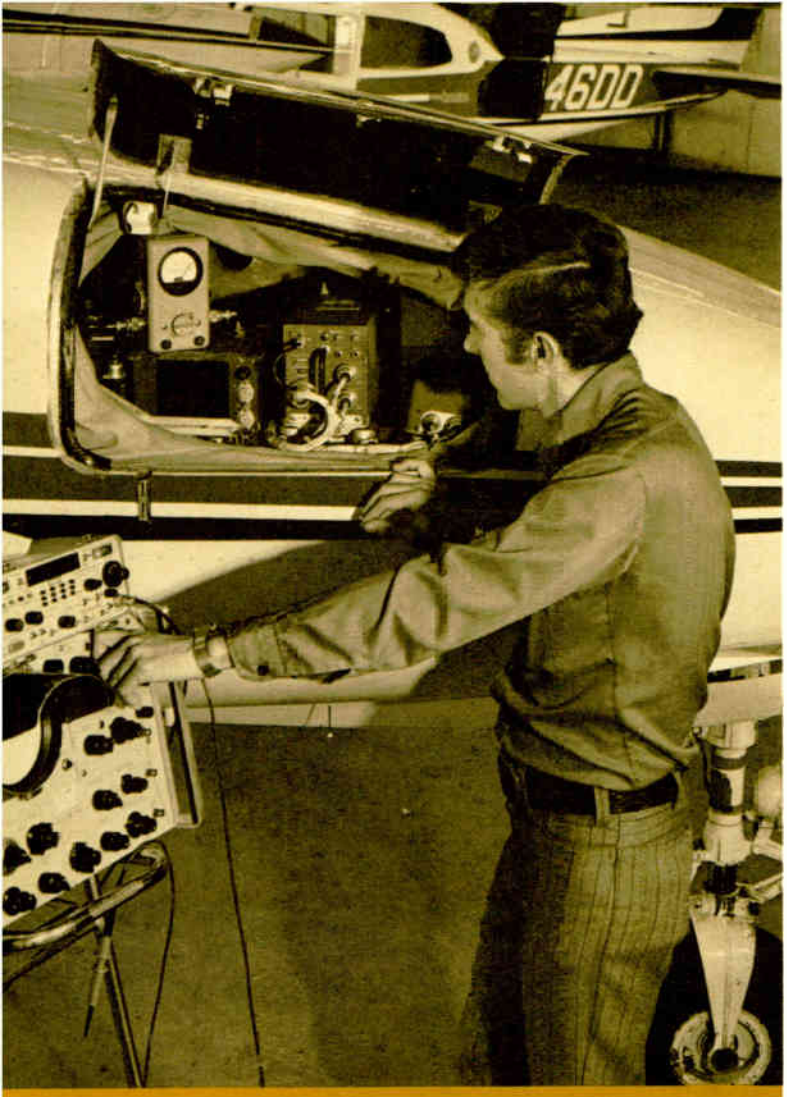
We are proud to have earned the President's E-Award for excellence in exports, based on the world-wide acceptance of our designs. Most of our products are universally compatible with line voltages, frequencies and different environmental conditions in other countries.

In this catalog, you will find nearly all our current models displayed in a new presentation designed to make equipment selection a pleasure. However, even this new publication will already be incomplete when it reaches you. Therefore, if you do not find exactly what you require, dial 216-248-1200 or the nearest office listed on the back cover.

Bruce Bird and I reaffirm our dedication to the communications industry, confident that the challenges of tomorrow are being met today.

John P. Hyland, *President*

Bruce Bird, *Executive Vice President*



THRULINE® RF Directional Wattmeters

Models for use with CW, AM, FM and TV

Peak models for pulsed, TV and SSB transmitters*

Monitor power with system in full operation

Flexible coverage: 0.1W to 250kW, 0.45 to 2300MHz

*All Peak-reading models are identified by these oscilloscope patterns.

There are basically two types of RF power meters, one for laboratory measurement of signal-generator (milliwatt) power-levels and the other for design, operation and measurement of communication systems from watts to hundreds of kilowatts, the field served by Bird. We have made wattmeters for coaxial transmissions of voice, television, data, aeronautical and space guidance, in short any type of intelligence encoded on a carrier from ½ to 4000 megahertz. The basic demands concerning communications power instruments have not changed since the first coax line: Since the communication often concerns emergencies (police, fire), life-dependent navigation (flight patterns, space guidance) or expensive investment in huge audiences (broadcasting), the test equipment must be an order more reliable than the transmitters, must be always ready and must be trusted.

The Bird THRULINE® Wattmeter model 43 was conceived in the '50s and is approaching the 90,000 mark. What design parameters carried the model 43 past tube, transistor and IC technology revolutions to become and remain the Industry Standard? Well, it is self-contained (no batteries, no line voltage) using microwatts of energy from the transmission it measures, the basic instrument is a meter with a precision reference line section which makes it both economical and permits built-in reference accuracy which does not diminish with age. The frequency and power level of each "Bird" is determined by a low cost Plug-In Element. Since most transmission facilities are assigned a frequency and power level, one or two Elements is all that is needed. If growth or expansion require other Plug-In Elements, say 10 years later, they fit right in and work with the same accuracy. The latest addition to expand flexibility are milliwatt elements.

THRULINE instruments can be left in the line for continuous monitoring of either the transmitter output power or the amount reflected by an antenna. These two quantities are actually the most important transmission parameters: Tuning for **minimum reflected power** results in a good match of the load (antenna) to the line, and adjusting the transmitter for **maximum forward power** into a matched antenna approaches ideal design goals. The net power delivered to the load under any VSWR condition is the difference between the two readings. These optimum system adjustments result in a low Voltage Sanding Wave Ratio. If actual VSWR data are required, they are easily obtained from the intersection of the forward and reflected power levels on nomographs furnished.

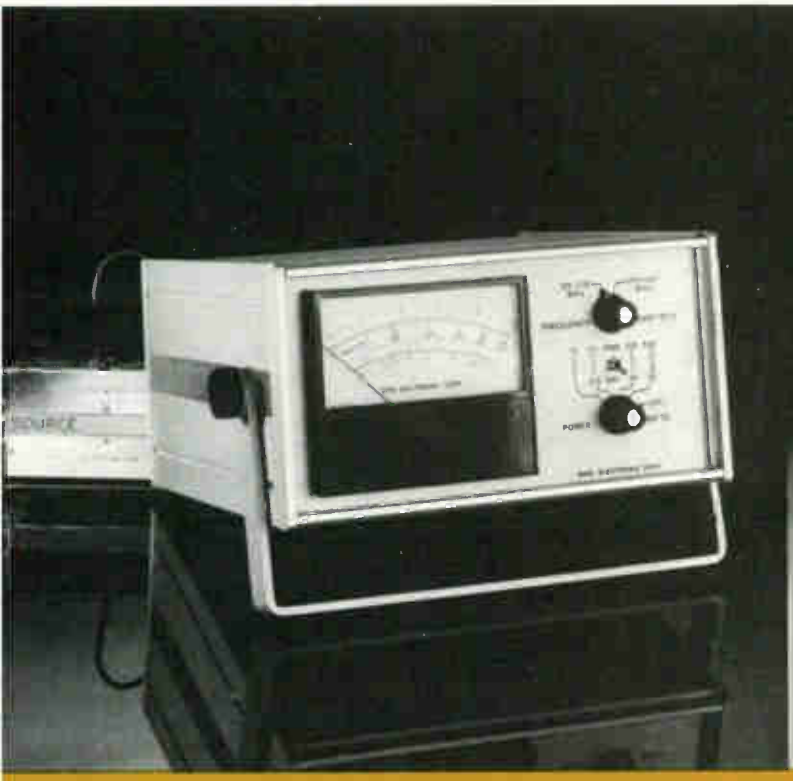
The accuracy of most THRULINE Wattmeters satisfies the ±5% of full scale requirements of the FCC for proof-of-performance measurements. We also offer a Lab Standard accurate within ±3% of reading and Peak-Envelope-Power instruments.

BIRD THRULINE® RF Directional Wattmeters

50 ohms nominal

model 4370

model 4371



BROAD-BAND-25 TO 520 MHz WIDE RANGE-.02 TO 500 WATTS

The model 4370 THRULINE Directional Wattmeter is a portable bench-type insertion instrument for measuring forward or reflected CW power. It is exceptionally suitable for service shops because its wide range and broad band coverage is accomplished conveniently by switches next to the readout: Two frequency bands, a choice of forward or reflected display, and eight power ranges.

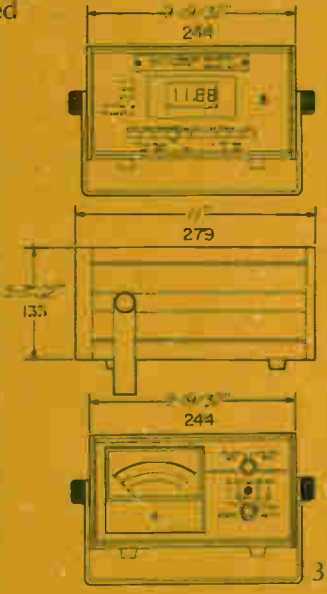
In operation, a precision machined 50-ohm reference line-section is inserted between the signal source and the antenna, load or other component under power test. Directional power sensors incorporated in this line-section produce dc signals proportional to both incident and reflected RF main-line power, for readout on scales calibrated in watts as well as dB. The readout unit and the line-section may be separated by as much as 3 feet for operational convenience.

DIGITAL READOUT IS IDEAL FOR PRODUCTION TESTING, CONTINUOUS SERVICE APPLICATIONS

Model 4371 is similar in coverage to the analog version on the left, except for the higher maximum power of 1000 watts achieved in six ranges. The 1 watt reflected power range of both models is also available for forward readings by reversing RF connections.

Model 4371 is the first High-Power Digital Wattmeter which the user can calibrate in the field to known RF power standards, eliminating weeks of transit for periodic certifications. It features 25% over-ranging and typical directivity of 30dB or more on reflected power ranges.

Model 4370		Model 4371
10, 25, 100, 500 watts	**Forward Power Ranges**	10, 100, 1000 watts
1, 2.5, 10, 50 watts	**Reflected Power Ranges**	1, 10, 100 watts
25-520 MHz	**Frequency Range**	25-520 MHz
QC Type (Female N normally supplied)	**Connectors**	QC Type (Female N normally supplied)
below 1.1 with N Conn. (50 ohms)	**Insertion VSWR**	below 1.1 with N Conn. (50 ohms)
Rich vinyl jute	**Finish**	Rich vinyl jute
7¼ lbs. (3¼ kg)	**Weight**	9½ lbs (4¼ kg)
± 5% of full scale	**Accuracy**	± 5% OFS (of range selected)
	Field Calibration	Instrument calibration from the front panel, RF calibration internally
	Power Requirements	105-125 V, 50-400 Hz (4 W)



BIRD THRULINE® RF Directional Wattmeters

50 ohms nominal

model 43

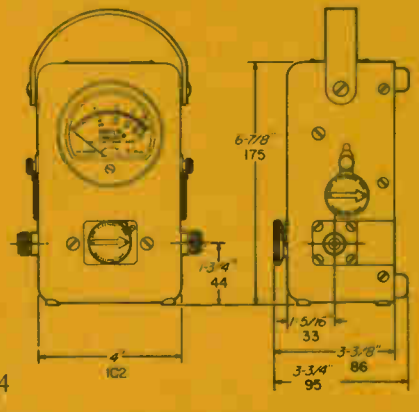
For easy VSWR data, two nomographs are included in every THRULINE manual. Read VSWR at the intersection of your Forward and Reverse Power meter indications. For Laminated Charts order P/N 4400-012.

100 mW TO 10,000 W RANGE

specifications

Power Rating see opposite page
Impedance 50 ohms nominal
Insertion VSWR
with N Connectors 1.05 max.
Finish Light Navy grey baked enamel (MIL-E-15090)
Weight 3 lbs. (1.4 kg)
Element Weight 3 oz. (85 g)
Accuracy ±5% of full scale

Optional Cases: Cowhide Carrying Case CC-1, Plug-In Element Carrying Case EC-1.



The Model 43 THRULINE Directional Wattmeter is a portable insertion type instrument for measuring forward or reflected CW power in coaxial transmission lines. It accurately measures RF power flow under any load condition.

Each Model 43 Wattmeter is made up of a line section and indicating meter contained in an aluminum case, QC-Type (Quick-Change) Connectors, and Plug-in Elements—which must be ordered separately. Additional elements may be purchased at any time. Parts may be replaced in the field (e.g. for meter replacement, order: Indicating Meter Part No. 2080-002).

LINE SECTION: The line section is a very precise 50-ohm coaxial air line for insertion into the transmission line between transmitter and antenna or load. Each line section has a socket into which a measuring element in the desired frequency band and full scale power range is inserted. Ends of the line section are equipped with QC-Type Connectors.

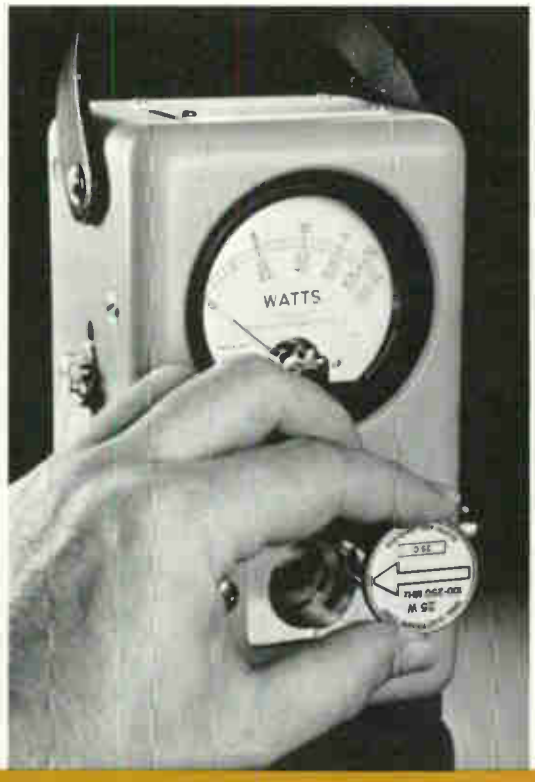
QUICK-CHANGE CONNECTORS: The Model 43 THRULINE Directional Wattmeter is normally supplied with two Female N Connectors. Other types of connectors available include: Male or Female BNC, TNC, UHF, C, SC, LC, N, HN, LT, General Radio Type 874 and 7/8" EIA Flanged. These Quick-Change QC Connectors are interchangeable in the field without affecting instrument calibration.

INDICATING METER: A shock-mounted 30-microampere meter with 3 expanded scales of 25, 50, and 100 to permit convenient direct reading of full scale power from 100 milliwatts to 10,000 watts.

MEASURING ELEMENT: The Plug-in Element is a self contained directional detector calibrated for direct indication of RF power.

REMOTE INSTALLATION: The RF line section may be removed from housing and inserted at any convenient point in the line. The meter may then be located where visibility is best, using the 32" of meter cable supplied within the Model 43, or by using additional lengths as required.

Plug-in Elements



Coupler Elements

For RF signal observation on a scope, for spectrum analysis or for frequency counting and control, use model 4274-025 wide range RF Sampler Element. This non-directional coupler delivers an unrectified signal at about —50dB ±2dB from 25-1000 MHz tapering down to —66dB at 2MHz. Main line power should not exceed 500W.

PLUG-IN ELEMENTS for use with Model 43 THRULINE Wattmeter. Select one or more elements to suit your frequency and power ranges. When ordering, specify catalog number and THRULINE model number.

Also for use with Models 3122, 4311, 4314, 4342, 4430, 4501, 4521, 4522, 4526, and 4527 THRULINE Wattmeters, 50 Ω Line Sections equipped with QC-Connectors or 7/8" EIA Flanges, and TERMALINE Wattmeter Model 6151.

Table 1
STANDARD ELEMENTS (CATALOG NUMBERS)

Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
5 watts	—	5A	5B	5C	5D	5E
10 watts	—	10A	10B	10C	10D	10E
25 watts	—	25A	25B	25C	25D	25E
50 watts	50H	50A	50B	50C	50D	50E
100 watts	100H	100A	100B	100C	100D	100E
250 watts	250H	250A	250B	250C	250D	250E
500 watts	500H	500A	500B	500C	500D	500E
1000 watts	1000H	1000A	1000B	1000C	1000D	1000E
2500 watts	2500H					
5000 watts	5000H					

Table 2 LOW-POWER ELEMENTS

1 watt	Cat. No.	2.5 watts	Cat. No.
60-80 MHz	060-1	60-80 MHz	060-2
80-95 MHz	080-1	80-95 MHz	080-2
95-125 MHz	095-1	95-150 MHz	095-2
110-160 MHz	110-1	150-250 MHz	150-2
150-250 MHz	150-1	200-300 MHz	200-2
200-300 MHz	200-1	250-450 MHz	250-2
275-450 MHz	275-1	400-850 MHz	400-2
425-850 MHz	425-1	800-950 MHz	800-2
800-950 MHz	800-1		

Table 3
HIGH-FREQUENCY ELEMENTS (CATALOG NUMBERS)

Power Range	Frequency Bands (MHz) 950-1260	1100-1800	1700-2200	2200-2300
1 watt	1J	1K	1L	1M
2.5 watts	2.5J	2.5K	2.5L	2.5M
5 watts	5J	5K	5L	5M
10 watts	10J	10K	10L	10M
25 watts	25J	25K	25L	25M
50 watts	50J			
100 watts	100J			
250 watts	250J			

Table 4
LOW-FREQUENCY ELEMENTS (CATALOG NUMBERS)

Power Range	Frequency Band .45 to 2.5 MHz
1000 watts	1000P
2500 watts	2500P
5000 watts	5000P
10000 watts	10000P

Table 6 MILLIWATT ELEMENTS

100 mW	Cat. No.	250 mW	Cat. No.	500 mW	Cat. No.
72-76 MHz	430-2	70 MHz	430-34	72-76 MHz	430-33
105-120 MHz	430-6	72-76 MHz	430-22	105-120 MHz	430-26
136 MHz	430-9	108-118 MHz	430-24	240-290 MHz	430-27
174 MHz	430-10	130-150 MHz	430-13	328-336 MHz	430-28
328-336 MHz	430-3	150-180 MHz	430-15	455-470 MHz	430-30
400 MHz	430-7	328-336 MHz	430-16		
470 MHz	430-8	1700-1750 MHz	430-17		

Model 43 Accessories

Directional Coupler Elements

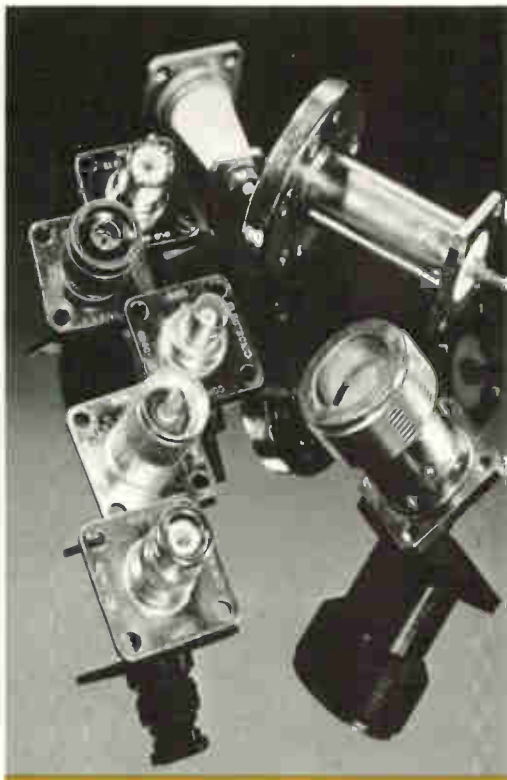
Series 4274 RF DIRECTIONAL COUPLER PLUG-IN ELEMENTS are used with model 43 (as well as 4311, 4342, 4511, 4521, 4522, 4526 and 3122) for sampling of the main line signal at a fixed attenuation level. The coupler produces at the female BNC Output connector a signal that is reduced from the main line power level by the amount of the NOMINAL COUPLING ± 1 dB (within the stated FREQUENCY BAND.

CATALOG NUMBER	FREQUENCY BAND	NOMINAL COUPLING	MAX. MAIN LINE POWER
400-50	50-100MHz	-40dB	1000W
400-75	75-150	-40dB	1000W
400-125	125-250	-40dB	1000W
400-225	225-450	-40dB	1000W
350-400	400-800	-35dB	500W
300-750	750-1250	-30dB	100W

CC-3 Carrying Case

This special carrying case provides space for a model 8080 25 watt TERMALINE Load Resistor in addition to 3 spare Plug-in Elements. With the normal space for 3 elements right in the model 43, this permits storage of 6 elements.

If space for a load resistor is not needed, order Carrying Case model CC-1 on the preceding pages. (Stores 6 Plug-in Elements plus 3 in the wattmeter).

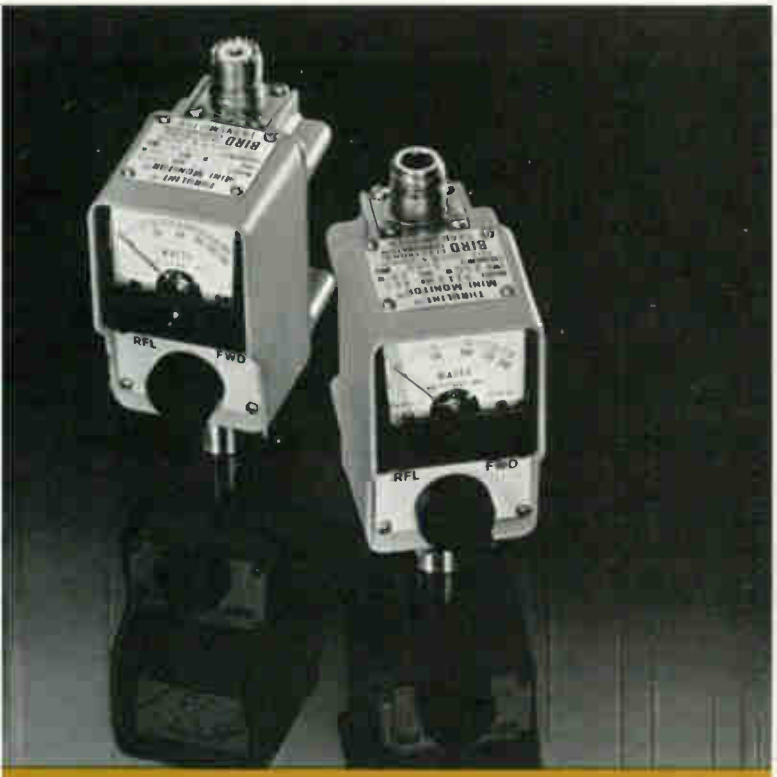


QC-Connectors

Model 43 is normally supplied with two female Quick-Change (QC) N connectors. When called for on the order, it can instead be supplied with two female QC-UHF Connectors (SO-239) at no extra cost, or with practically any type cable connectors and even ⅞" (and 1⅝") EIA flanges at additional cost.

Connectors can be changed in the field to accommodate diverse transmission systems without the use of performance-degrading adaptors. If such applications are frequent, keep spare types of QC Connectors on hand.

Mini-Monitor® 4111-18



Pocket-sized, rugged Wattmeters for service and maintenance of communication transmitters from 25 to 512 MHz.

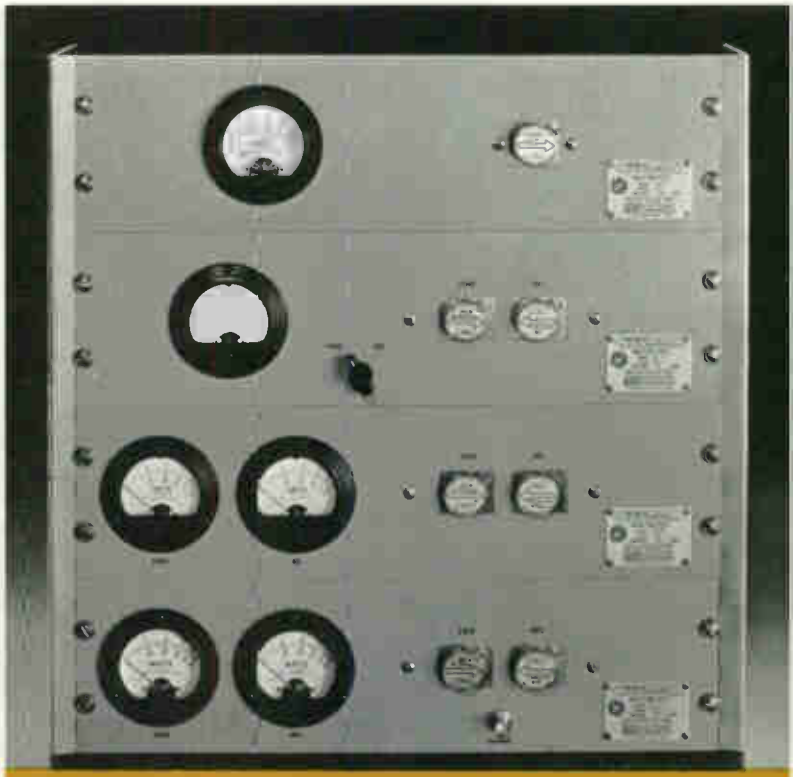
Each wattmeter is made up of a precisely machined section of 50-ohm line, two directional power detectors, and a meter calibrated in watts.

The sensing circuits face in opposite directions and the front-panel switch selects the direction of power flow to be indicated on the meter. With the transmitter connected on the meter side and the load near the switch, the "forward" position is the higher power range, while "reflected" selects the lower power range. In case this lower-power full-scale value is desired for increased resolution in the forward direction, simply reverse the RF cable connections to the wattmeter.

Model	4111	4112	4113	4114	4115	4118
Power Rating						
Forward (FWD)	150W	200W	1000W	50W	50W	150W
Reflected (RFL)	15W	**20W	100W	5W	5W	15W
Freq. Range MHz	25-175	2-30	2-30	400-512	100-225	400-512
Connectors	Model 4111 CHF/F (SO-239)* All others N/F*					
Insertion VSWR	1.3 max					
Finish	Light Navy grey baked enamel (MIL-E-15090)					
Accuracy	± 5% of full scale					
Weight	1 lb (½kg)					

*is supplied when no preference is specified. Carrying Case Model C-2
**20W range: ± 10%

4521•22•26•27

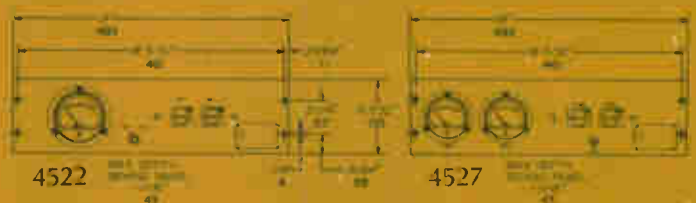


For permanent installations

Panel-mounted THRULINE Wattmeters Model 4521 (single socket) and 4522 (double socket) are designed for power measurement in CW and FM systems with cable or ⅞" EIA transmission lines. For forward or reflected power indication, the single Plug-in Element is rotated to the proper direction with Model 4521, while a switch selects either of two Elements with Model 4522. This double-socket wattmeter permits the use of a more sensitive Element (up to 1:10 ratio) for reflected power measurement. Model 4526 has two meters and no switch for simultaneous display of power indication in both directions. Select Elements from Table 1, 2, 3, 4 & 5 (see fold-out page).

Model 4527 is tailored for 2-way mobile applications from 2-512 MHz and has an RF sampling output (Female BNC) for frequency counting and analysis. Select Elements up to 1000 watts from 2-200 MHz, and up to 500 watts from 200-512 MHz on the fold-out page.

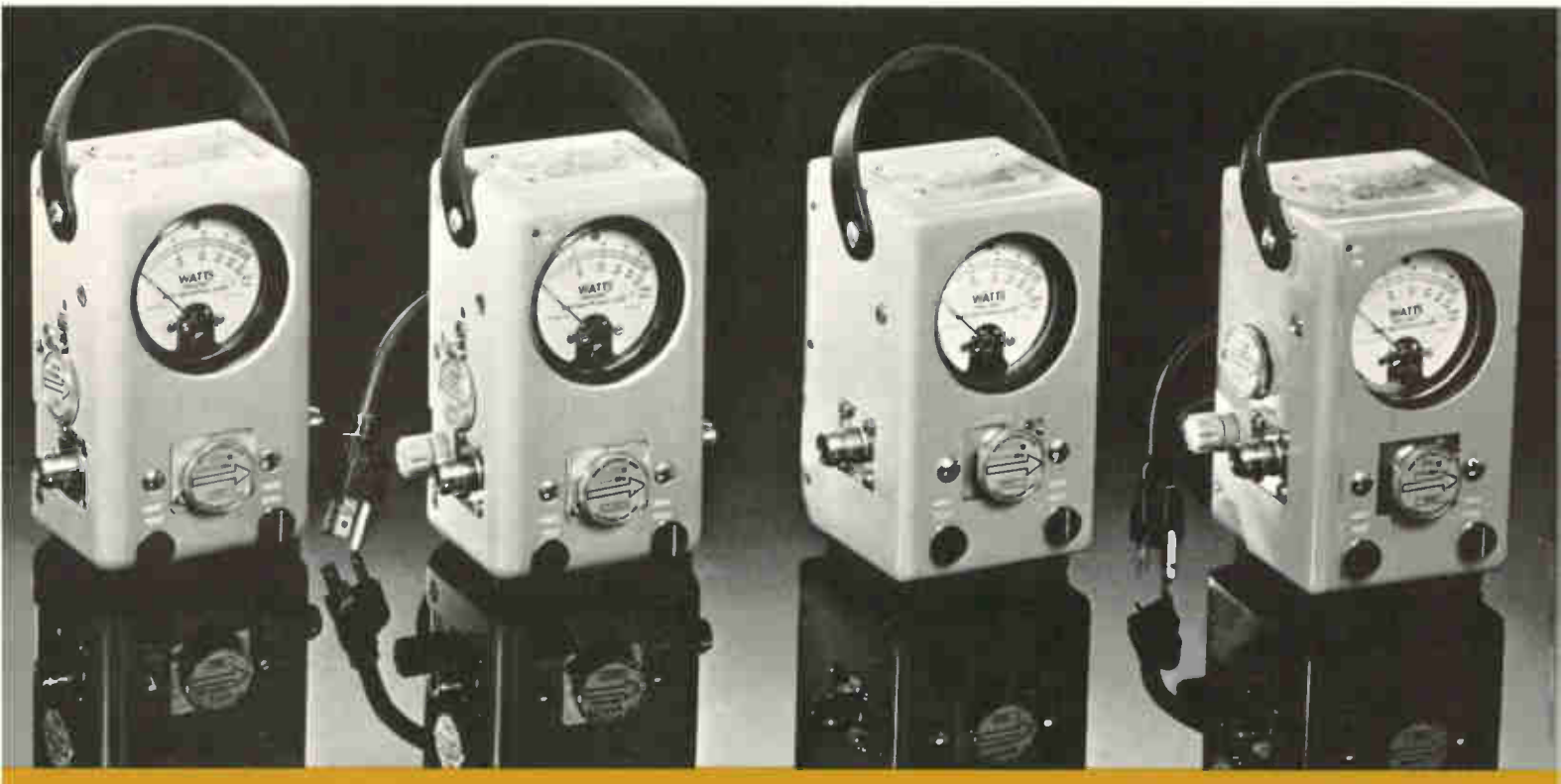
Power Rating ____ See Element Tables p. 47A
Insertion VSWR ____ 1.05 max
Connectors ____ QC Type (Female N normally supplied)
Accuracy ____ ± 5% of full scale
Finish ____ Light Navy grey baked enamel (MIL-E-15090)
RF Coupling (Model 4527) ____ Approx. −53 dB from 512 MHz down to 10 MHz, decreasing to −70 dB between 10 and 2 MHz



BIRD THRULINE® RF Directional Peak Wattmeters

50 ohms nominal

models 4311•14•15•16



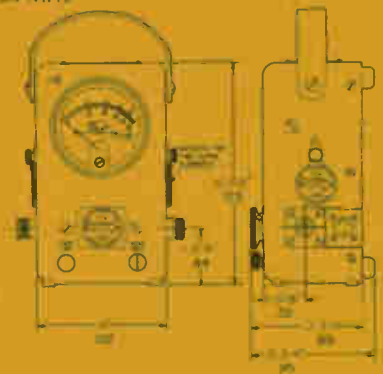
PEAK POWER, SSB

Power Rating ..... 10kW max., peak or CW
Insertion VSWR with N Connectors ..... 1.05 max.
Finish ..... Light Navy grey baked enamel (MIL-E-15090)
Weight ..... 4 lbs. (1.8 kg)
Element Weight ..... 3 oz. (85 g)
Accuracy ..... Average (CW) Mode: ±5% of full scale
Peak-Pulse or Envelope-Power Mode: ±8% of full scale

pulse parameters

Square Pulses:
Min. duty factor 1×10^{-4}
Min. repetition rate: 30 pps
Min. base pulse width (at 10% of height):
0.4 μsec: 100-2300 MHz
1.5 μsec: 26-99 MHz
15 μsec: 2-25 MHz

Gaussian Pulses:
Min. duty factor 3.5×10^{-4}
Min. repetition rate: 30 pps
3 μsec: 26-2300 MHz
15 μsec: 2-25 MHz



4314

THRULINE WATTMETER Models 4311, 4311-200, 4314, 4315 and 4316 are portable peak-reading instruments, designed specifically for the measurement of air navigational aids such as DME, ATC and other pulsed RF systems, e.g. telemetry, radar, television, command and control, and peak enevlope power (PEP) measurement of SSB or AM signals. Basically, this series samples forward or reflected power the same as the Model 43, and the descriptions of the LINE SECTION, INDICATING METER and QUICK-CHANGE CONNECTORS on page 4 are applicable.

These Wattmeters are new RF directional "multimeters", which measure practically any type of coaxial transmission-pulsed, AM, FM or CW. To read the peak power of pulses or peak envelope power, the "Peak Read" button is depressed and locked, which inserts a peak-reading servo amplifier between the sensing Element and the Meter. Switch out the amplifier and read CW or FM.

MODEL 4311 is battery powered and neither AC line voltage nor an oscilloscope are required for operation in either the peak or average power mode.

MODEL 4311-200, with an outboard battery charger, is for use in locations where the AC line voltage is 220-240 volts.

MODEL 4314 has a built-in battery charger and can, therefore, be operated as a portable or plugged-in as a bench instrument (104-126 volts at 45-420 Hz).

MODEL 4315 is a special high-power version similar in appearance and specifications to the Model 4311, except that it measures peak power only in two full-scale power ranges: 10kW (2-30 or 950-1260 MHz) and 25kW (2-30, 25-60, 50-125, 100-250, 200-500 or 400-100 MHz).

MODEL 4316 has a built-in battery charger.

Plug-in Elements

Interpreting Readings on Peak Wattmeters with CW, AM, SSB and Pulsed signals.

	TRANSMISSION TYPE and SCOPE PATTERN	FREQUENCY SPECTRUM (C=Carrier)	PEV_{rms} (arbitrary)	$PEP = PEV^2_{rms}/Z$	AVERAGE (Heating) POWER	4311 in PEAK MODE	4311 in CW MODE or Model 43
Table A CW	100V	C	$\frac{100}{\sqrt{2}}$ V	100W	100W	100W	100W
Table B AM 100% Mod.	200V	C	$\frac{200}{\sqrt{2}}$ V	400W	150W	400W	100W
Table C AM 73% Mod.	173V	C	$\frac{173}{\sqrt{2}}$ V	300W	127W	300W	100W
Table D SSB 1 tone	100V	(C)	$\frac{100}{\sqrt{2}}$ V	100W	100W	100W	100W
Table E SSB 2 tone	100V	(C)	$\frac{100}{\sqrt{2}}$ V	100W	50W	100W	40.5W
Table F SSB Voice	100V	(C)	$\frac{100}{\sqrt{2}}$ V	100W	–	100W	–
Table G TV Black Level	100V	C	$\frac{100}{\sqrt{2}}$ V	100W	60.1W	100W	59.6W
Table H Pulse	100V, 10% → 90%	C	$\frac{100}{\sqrt{2}}$ V	100W	10W	100W	–

PLUG-IN ELEMENTS for use with Models 4311, 4311-200 and 4314. All are for either CW or peak measurement except Table 5, which is for peak only. Select one or more elements to suit your frequency and power ranges. When ordering, specify catalog number listed in these tables and THRULINE model number.

In the table above, $Z_o = 50$ ohms. PEP is Peak Envelope Power, and PEV is Peak Envelope Voltage. The PEV of the Carrier (or suppressed Carrier) C was arbitrarily chosen at 100 volts in all examples. $PEV_{rms} = PEV/\sqrt{2}$.

For a detailed essay on this subject, write for "WATTS NEW FROM BIRD" vol. 4, no. 2.

Table 1
STANDARD ELEMENTS (CATALOG NUMBERS)

Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
5 watts	–	5A	5B	5C	5D	5E
10 watts	–	10A	10B	10C	10D	10E
25 watts	–	25A	25B	25C	25D	25E
50 watts	50H	50A	50B	50C	50D	50E
100 watts	100H	100A	100B	100C	100D	100E
250 watts	250H	250A	250B	250C	250D	250E
500 watts	500H	500A	500B	500C	500D	500E
1000 watts	1000H	1000A	1000B	1000C	1000D	1000E
2500 watts	2500H					
5000 watts	5000H					

Table 2 LOW-POWER ELEMENTS

1 watt	Cat. No.	2.5 watts	Cat. No.
60-80 MHz	060-1	60-80 MHz	060-2
80-95 MHz	080-1	80-95 MHz	080-2
95-125 MHZ	095-1	95-150 MHz	095-2
110-160 MHz	110-1	150-250 MHz	150-2
150-250 MHz	150-1	200-300 MHz	200-2
200-300 MHz	200-1	250-450 MHz	250-2
275-450 MHz	275-1	400-850 MHz	400-2
425-850 MHz	425-1	800-950 MHz	800-2
800-950 MHz	800-1		

Table 3
HIGH-FREQUENCY ELEMENTS (CATALOG NUMBERS)

Power Range	Frequency Bands (MHz) 950-1260	1100-1800	1700-2200	2200-2300
1 watt	1 J	1K	1L	1M
2.5 watts	2.5 J	2.5K	2.5L	2.5M
5 watts	5 J	5K	5L	5M
10 watts	10 J	10K	10L	10M
25 watts	25 J	25K	25L	25M
50 watts	50 J			
100 watts	100 J			
250 watts	250 J			

Table 4
LOW-FREQUENCY ELEMENTS (CATALOG NUMBERS)

Power Range	Frequency Band .45 to 2.5 MHz
1000 watts	1000P
2500 watts	2500P
5000 watts	5000P
10000 watts	10000P

Table 5 HIGH-POWER ELEMENTS (Peak only)

Power Range	Frequency Bands (MHz) 25-60	50-125	100-250	200-500	400-1000	950-1260
500 watts	–	–	–	–	–	500 J
1000 watts	–	–	–	–	–	1000 J
2500 watts	2500A	2500B	2500C	2500D	2500E	2500 J
5000 watts	5000A	5000B	5000C	5000D	5000E	5000 J
10000 watts	10000A	10000B	10000C	10000D	10000E	

Optional Cases: Cowhide Carrying Case CC-1, Plug-In Element Carrying Case EC-1.

BIRD THRULINE® RF Directional Wattmeters

50 ohms nominal

models 4320/4321

Peak Amplifier for adding peak power measurement capabilities to any CW (average power) THRULINE Wattmeter.

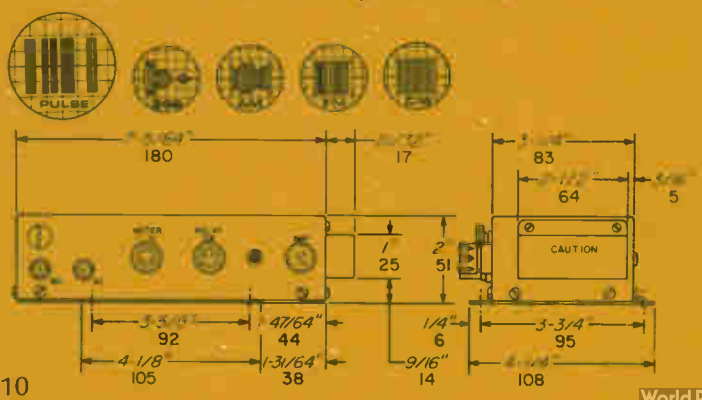
When inserted between the Line Section and the Meter of a THRULINE Wattmeter, the amplifier converts a CW-type Wattmeter to a peak-envelope-power instrument. It senses the maximum excursion of the demodulated RF envelope delivered by the Plug-in Element and then supplies an equal dc output voltage from its own power supply to the meter.

Two units are available. Model 4320 for cable, QC-Connector equipped and ⅞ EIA Wattmeters, and Model 4321 for the 1⅝", 3⅛" and 6⅛" Wattmeters used at broadcast stations and other high power installations. Order three connecting cables in lengths to suit your layout requirements. (Typical examples: 10 ft. (3m) of pulse cable is P/N 4320-053-8, 10 ft. of meter cable is P/N 4230-030-3 and 10 ft. of control cable is P/N 4230-031-3).

AC Supply: 115 volts 60-400 Hz (10 W).

Pulse Parameters: Identical to models 4311/4314 Wattmeters on preceding pages.

Power and Frequency Ranges are determined by the wattmeter with which the amplifier is used.



model 4342

3-in-1 Meter reads power and VSWR all at once

THRULINE model 4342 Dual Wattmeter–VSWR Monitor displays all three measurements at once on a single meter face. Forward and reflected power are indicated by individual pointers, and VSWR is monitored on a third scale from the intersection of the two power pointers. Without any adjustments or switching, the entire set of three transmission parameters is read out simultaneously.

Power and frequency range depend on two Plug-in Elements selected from tables on p. 47A. Choose two Elements with a 10-to-1 power ratio within your frequency range (e.g. one "50B" for forward and one "5B" for reflected power indication from 50-125 MHz, or a "10C" with a "110-1" for 100-160 MHz).

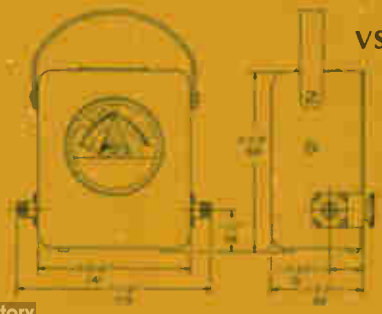
Power Rating & Frequency Range _____ see Element Tables page 47A

Insertion VSWR with N Connectors _____ 1.035 max. to point of measurement 1.07 max. overall

Connectors _____ QC Type (Female N normally supplied)

Accuracy of Power Measurement _____ ±5% of full scale, forward or reflected

VSWR Range (red scale) _____ 1.0/1 to 2.0/1

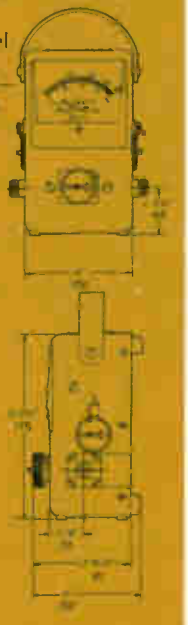


model 4330

MILLIWATTMETER

Power Rating ____ 200 mW and 800 mW
Insertion VSWR with N Connectors ____ 1.05 max.
Connectors ____ QC Type (Female N normally supplied)
Finish ____ Light Navy grey baked enamel (MIL-E-15090)
Weight ____ 3¼ lbs. (1.5 kg)
Accuracy ____ ±5% of full scale

Model 4330 is a dual range milliwatt version of the Model 43. Power ranges—currently 200mW and 800mW full scale—are switched on the Elements.



PLUG-IN ELEMENTS
usable only with model 4330

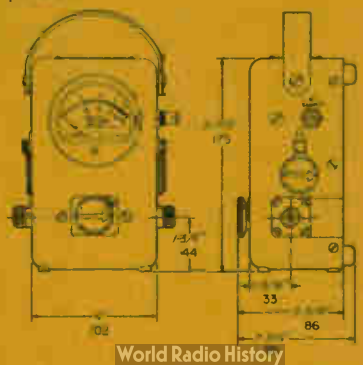
Catalog No.	Frequency Range-MHz
4330-060	60-80
4330-080	80-95
4330-095	95-125
4330-110	110-160
4330-150	150-250
4330-200	200-300
4330-275	275-450
4330-425	425-850
4330-800	800-950
4330-950	950-1260
4330-1100	1100-1800
4330-1700	1700-2200
4330-2200	2200-2300

model 4430

RF SAMPLING WATTMETER

Power Rating & Frequency Range 1000W max. 2-200MHz
500W max. 200-512MHz
Insertion VSWR ____ 1.05 max.
Connectors ____ QC Type Female N normally supplied (Female BNC RF output)
RF Coupling ____ Approx. —53dB from 512MHz down to 10MHz, decreasing to —70dB between 10 and 2MHz
Finish ____ Light Navy grey baked enamel (MIL-E-15090)
Weight ____ 3¼ lbs. (1.5 kg)
Accuracy ____ ±5% of full scale

Model 4430 is similar to the model 43 with the addition of an RF sampling output for frequency counting and analysis. Elements on p. 47A.



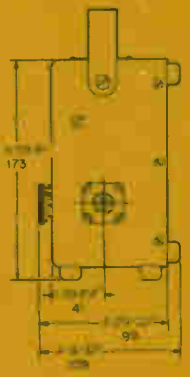
model 4305

HI-POWER WATTMETER

Power Rating ____ 50W-25kW
Insertion VSWR with N Connectors ____ 1.05 max.
Connectors ____ QC Type (Female N normally supplied)
Finish ____ Light Navy grey baked enamel (MIL-E-15090)
Weight ____ 3¼ lbs. (1.5 kg)
Accuracy ____ ±5% of full scale

PLUG-IN ELEMENTS
(usable only with model 4305)

Frequency (MHz)	Power	Catalog No.
45-125	25kW	25KP7
2-30	10kW	10KH7
25-60	2500W	2500A7
25-60	5000W	5000A7
50-125	2500W	2500B7
50-125	5000W	5000B7
100-250	2500W	2500C7
200-500	2500W	2500D7
400-1000	2500W	2500E7
1100-1800	50W	50K7
1100-1800	100W	100K7
1700-2200	50W	50L7
1700-2200	100W	100L7
2200-2300	50W	50M7
2200-2300	100W	100M7



BIRD THRULINE® RF Directional Wattmeters

50 ohms nominal

models 4372/3122/4511

MODEL 4372 CW Wattmeter
BROAD-BAND 25 TO 520 MHz
WIDE-RANGE 1 TO 500 WATTS

This is the rack version of model 4370 (see page 3). Forward or reflected modes of CW power in two frequency bands and eight power ranges are all conveniently selected by panel switches next to the readout. Meter scales are in watts as well as dB. A 5 ft. (1½m) cable allows the line section to be separated from the panel. Needs no Plug-in Elements.

MODEL 3122 CW Wattmeter/VSWR Monitor
3-IN-1 METER READS FORWARD AND REFLECTED POWER, AND VSWR ALL AT ONCE

Like the portable model 4342 (see page 10), this Dual Wattmeter/VSWR Monitor displays all three measurements at once on a single meter face: Forward and reflected power are indicated by individual pointers, and VSWR is monitored on a third scale from the intersection of the two power pointers.

Power and frequency range depend on two Plug-in Elements selected from tables 1, 2, 3, 4, & 6 on the fold-out page. Choose two Elements with a 10-to-1 power ratio within your frequency range.

MODEL 4511 Peak and CW Wattmeter
measures practically any type of coaxial transmission—pulsed, FM or CW, and peak envelope power (PEP) measurement of SSB or AM signals.

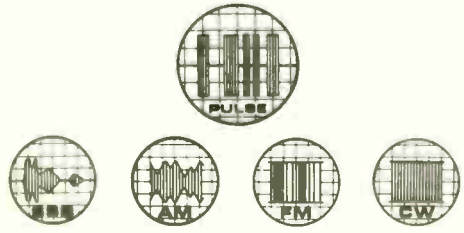
Power and frequency range depend on two Plug-in Elements selected from tables 1, 2, 3, 4, & 5 on the fold-out page.

pulse parameters

Square Pulses:	Gaussian Pulses:
Min. duty factor: 1×10^{-4}	Min. duty factor: 3.5×10^{-4}
Min. repetition rate: 30 pps	Min. repetition rate: 30 pps

Min. base pulse width (at 10% of height):

0.4 μsec. 100-2300 MHz	3 μsec. 26-2300 MHz
1.5 μsec. 26-99 MHz	15 μsec. 2-25 MHz
15 μsec. 2-25 MHz	



model 4372

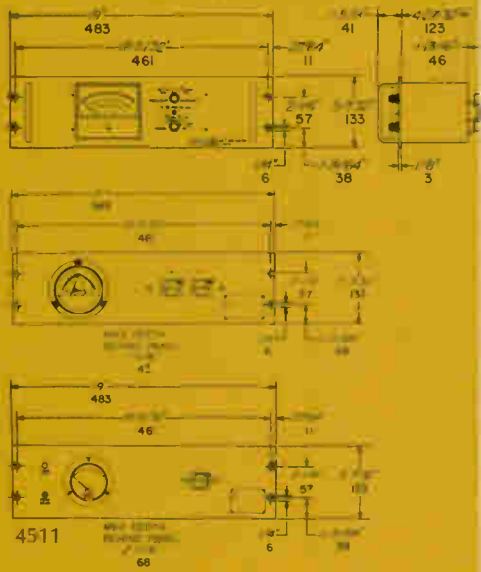
Forward Power Ranges ____ 10, 25, 100, 500 watts
Reflected Power Ranges ____ 1, 2.5, 10, 50 watts
Frequency Range ____ 25-520 MHz
Connectors ____ QC Type (Female N normally supplied)
Insertion VSWR ____ below 1.1 with N Conn.
Accuracy ____ ± 5% of full scale
Finish ____ Light Navy grey baked enamel (MIL-E-15090)

model 3122

Power Rating & Frequency Range ____ see text
Insertion VSWR to 1000 MHz with N Connectors ____ 1.035 max. to point of measurement. 1.07 max. overall
Accuracy of Power Measurement ____ ± 5% of full scale, forward or reflected
VSWR Range (red scale) ____ 1.0/1 to 2.0/1
Finish ____ Light Navy grey baked enamel (MIL-E-15090)

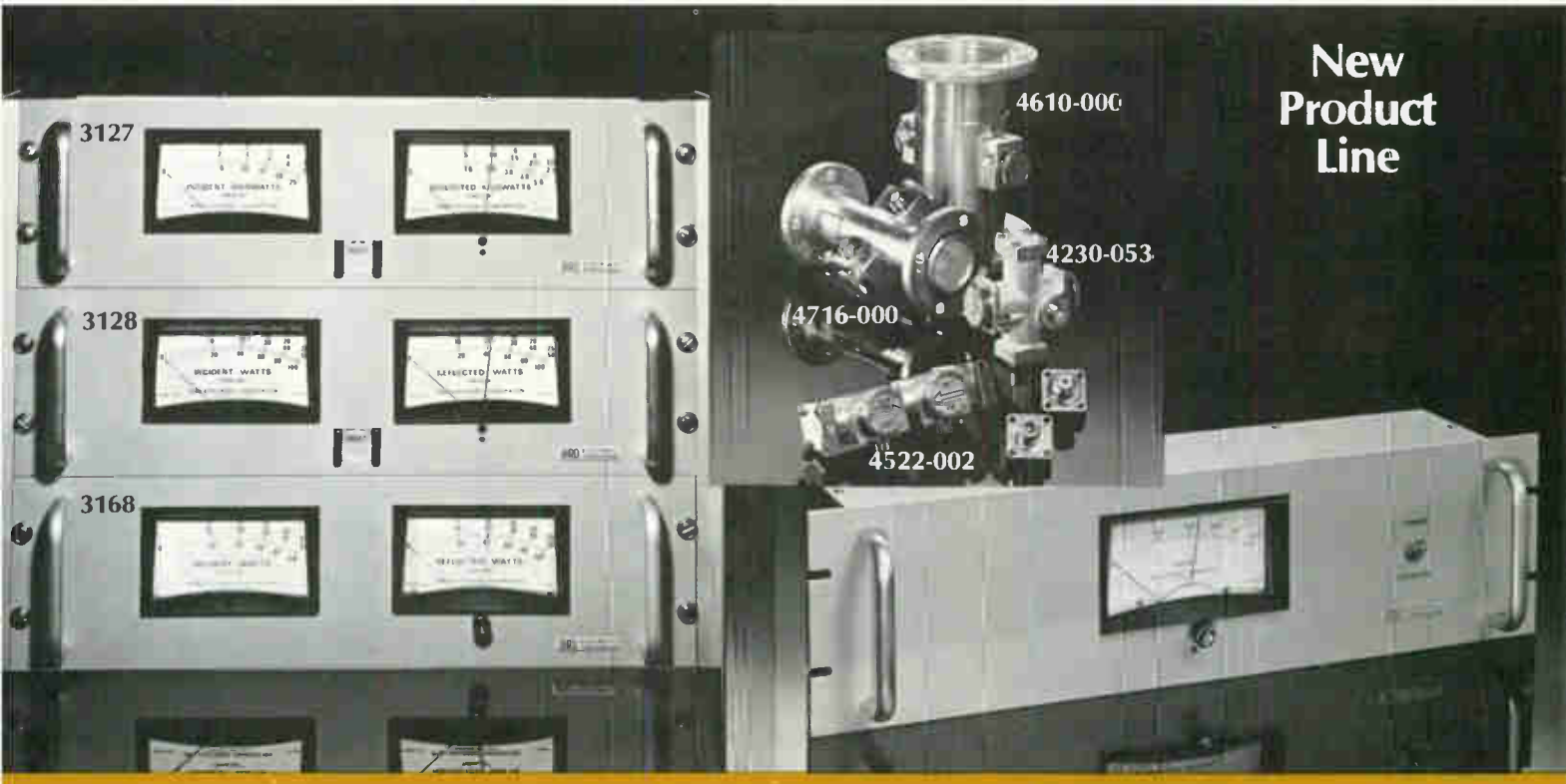
model 4511

Power Rating ____ 10kW max., peak or CW
Frequency Range ____ see text
Insertion VSWR with N Connectors ____ 1.05 max.
Finish ____ Light Navy grey baked enamel (MIL-E-15090)
Accuracy ____ Average (CW) Mode: ± 5% of full scale
Peak-Pulse or Envelope-Power Mode: ± 8% of full scale



BIRD WATTCHER® RF Power Monitor/Alarm

3127•28/3167•68 series 3160



Protect transmitters, line and antenna from damage due to high VSWR

Models 3127, 3128, 3167 and 3168 display accurate and simultaneous forward and reflected power levels on contemporary meter faces easily read from a distance, offering the engineer a continuous view of VSWR conditions and power output. For protection of transmitters, transmission line, antenna system, filters, diplexers, etc. from damage due to high standing waves, the control unit shuts down the transmitter when the reflected power exceeds a set level. Alarm signals indicating system malfunction may be remoted.

To order, select a line section from Table A to match your transmission line. Then choose two elements from a table appropriate for your line size (see fold-out page), one for the desired full scale incident power and a more sensitive one (typically 10:1) for reflected power. Add two 25 ft. (7½ m) cables P/N 4220-097-10.

	3127	3128	3167	3168
Transmission Medium	rigid line	cable	rigid line	cable
Power Levels	0.25-250kW	0.1W-10kW	0.25-25kW	0.1W-10kW
Meter Relay	Mechanical Contact		Fast-action solid-state	
Reset	Manual		Automatic	

SUPERSEDED

LINE SECTIONS (Table A)

for use with models 3127 & 3167

Part No.	Connectors
4715-000 ②	1⅝ EIA Flg 50Ω
4716-000 ②	1⅝ EIA Flg 50Ω
4610-000	3⅛ EIA Flg 50Ω
4802-000	3⅛ Unflg 50Ω
4905-000	6⅛ EIA Flg 50Ω
4931-000	6⅛ EIA Flg 75Ω

for use with models 3128 & 3168

Part No.	Connectors
4230-053	for QC
4522-002 ③	for QC
4502-000	⅞ EIA Flg 50Ω

② both element sockets on one side for panel mounting

③ 2-1000 MHz

④ 950-2200 MHz

For peak power applications, order models 4328 or 4321 Peak Amplifiers (p. 10).

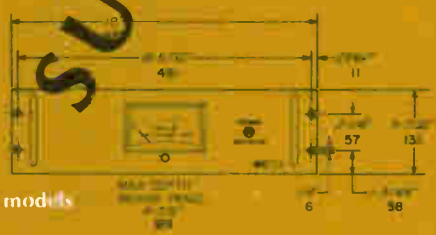
NEW: Power drop-off alarm for 2-way mobile networks, repeaters, etc.

Series 3160 are new fast-action WATTCHER Power Monitor/Alarm/Control units with any or all of the following functions:

1) Forward power indication (continuous)
2) Reflected power reading (by momentary switch)
3) Fast-action alarm and
4) Fast-action control if power drops below a set level (e.g. as per FCC requirements)

Versions under consideration will automatically switch over to back-up transmitter in case of malfunction, or send tone-encoded RF level information over a cable pair. Submit your quantity requirements with functions desired to the plant.

SUPERSEDED



BIRD THRULINE® RF Directional Wattmeters

model 4712

High-Power Rigid Line Series

BIRD THRULINE RF DIRECTIONAL WATTMETERS of the High Power Rigid Line Series are designed for measuring and monitoring RF power in rigid 50 or 51.5 ohm transmission lines. Each Wattmeter is made up of a line section, a measuring element, and indicating meter mounted in a convenient carrying case.

LINE SECTION: Sections of ⅞", 1⅝", 3⅛", 6⅛", or 9" air lines are available for insertion in the transmission line between transmitter and antenna or load resistor. Each line section has a socket into which the appropriate measuring element is inserted. Double-socket line sections for simultaneous measurement of forward and reflected power, or pressurized line sections are available on special order for Wattmeter packages.

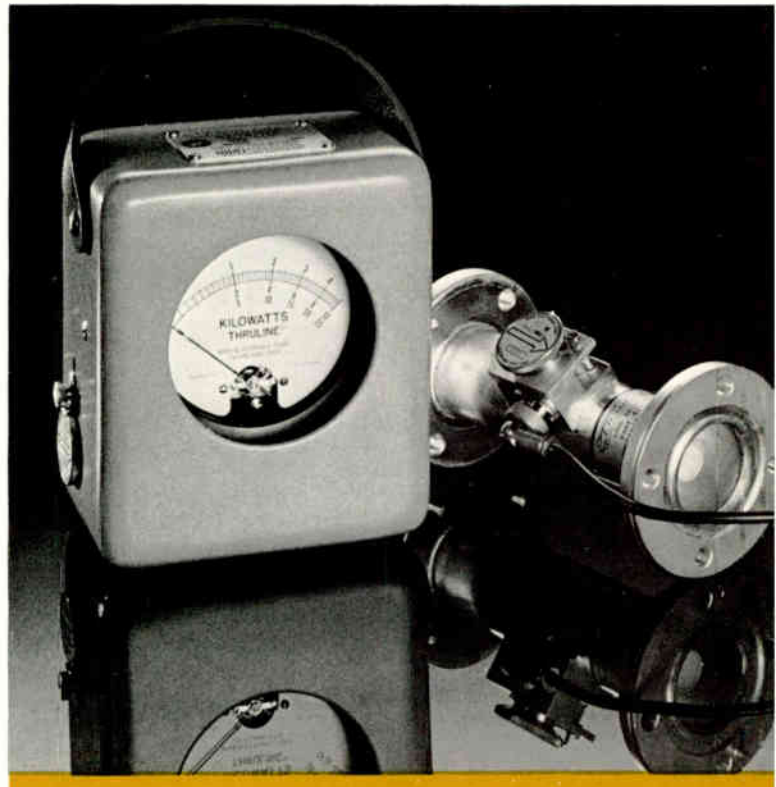
ELEMENT: Elements are calibrated for direct reading of RF power over a specific frequency range. Forward or reflected power is selected by the direction in which the element is turned. When ordering an element, specify frequency band, full scale power, and model number of wattmeter or line section in which the element is to be used. NOTE: Elements are not interchangeable between rigid line THRULINE Wattmeter models.

METER: The meter is a sensitive microammeter with three expanded scales of 5, 10 and 25 to permit convenient direct reading of full scale power from 250 watts to 250kW. It is shock mounted in a rugged cast aluminum case with a carrying strap. Sockets are provided on the side of the case for storing extra elements. A 10-foot (3 meters) shielded cable is provided to connect meter to line section. Other cable lengths can be supplied on request.

FINISH: Line Sections are bright silver plated, meter housings are finished in Light Navy Grey Baked Enamel (MIL-E-15090).

PEAK READING WATTMETERS: Any model on this page can be converted into a Peak AND CW reading wattmeter with the addition of a model 4321 peak amplifier (see page 10).

See supplement for additional models.



1-5/8" LINE

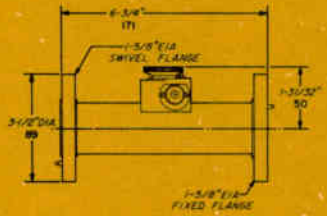
Impedance ____ 50 ohms nominal
Insertion VSWR ____ 1.05 max.
Connector ____ 1⅝" EIA Flanged
Weight ____ (line section) 3 lbs. (1¼ kg)
(meter) 5 lbs. (2¼ kg)
Accuracy ____ ±5% of full scale

METER: 4½" meter, shock mounted in aluminum carrying case with 10' (3m) shielded meter cable. Dimensions: (wxhxd) 5⅝" x 6½" x 3⅜" (141 x 165 x 85).

STANDARD ELEMENTS (CATALOG NUMBERS)*

Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
250 watts		250A1	250B1	250C1	250D1	250E1
500 watts		500A1	500B1	500C1	500D1	500E1
1000 watts	1000H1	1000A1	1000B1	1000C1	1000D1	1000E1
2500 watts	2500H1	2500A1	2500B1	2500C1	2500D1	2500E1
5000 watts	5000H1	5000A1	5000B1	5000C1	5000D1	5000E1
10 kW	10KH1	10KA1	10KB1			
25 kW	25KH1					

*When ordering, specify catalog number and line section model number.



BIRD High-Power Rigid Line Series

models 460/480/4805

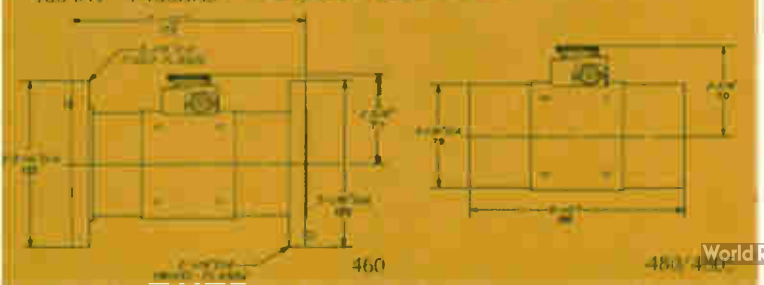
3-1/8" LINE

	Model 460	Model 480	Model 4805
Impedance	50 ohms nominal	51.5 ohms nominal	50 ohms nominal
Connector	3⅛" EIA Flg	3⅛" Unflg	3⅛" Unflg
Weight (line section)	7 lbs. (3 kg)	4 lbs. (2 kg)	4 lbs. (2 kg)
(meter)	5 lbs. (2¼ kg)		
Accuracy	± 5% of full scale		
Insertion VSWR	1.05 max		

METER: 4½" meter, shock mounted in aluminum carrying case with 10' (3m) shielded meter cable. Dimensions (wxhxd) 5⅝" x 6½" x 5⅜" (141 x 165 x 85).

STANDARD ELEMENTS (CATALOG NUMBERS)*

Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
1000 watts		1000A3	1000B3	1000C3	1000D3	1000E3
2500 watts		2500A3	2500B3	2500C3	2500D3	2500E3
5000 watts	5000H3	5000A3	5000B3	5000C3	5000D3	5000E3
10 kW	10KH3	10KA3	10KB3	10KC3	10KD3	10KE3
25 kW	25KH3	25KA3	25KB3	25KC3	25KD3	25KE3
50 kW	50KH3	*When ordering, specify catalog number and line section model number.				
100 kW	100KH3					



models 4902/4930

6-1/8" LINE

	Model 4902	Model 4930
Impedance	50 ohms nominal	75 ohms nominal
Weight (line section)	12½ lbs. (5¾ kg)	13 lbs. (6 kg)
(meter)	5 lbs. (2¼ kg)	5 lbs. (2¼ kg)
Accuracy	± 5% of full scale	± 5% of full scale
Connector	6⅛" EIA Flg	6⅛" EIA Flg
Insertion VSWR	1.05 max	1.05 max

OBSOLETE

METER: 4½" meter, shock mounted in aluminum carrying case with 10' (3m) shielded meter cable. Dimensions (wxhxd) 5⅝" x 6½" x 5⅜" (141 x 165 x 85).

STANDARD ELEMENTS (CATALOG NUMBERS)* FOR 4902

Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
2500 watts		2500A6	2500B6	2500C6	2500D6	2500E6
5000 watts		5000A6	5000B6	5000C6	5000D6	5000E6
10 kW		10KA6	10KB6	10KC6	10KD6	10KE6
25 kW	25KH6	25KA6	25KB6	25KC6	25KD6	25KE6
50 kW	50KH6	50KA6	50KB6	50KC6	50KD6	50KE6
100 kW	100KH6	*When ordering, specify catalog number and line section model number.				
250 kW	250KH6					

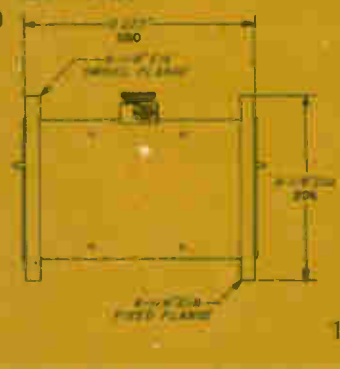
ELEMENTS FOR MODEL 4930

Power Range	Catalog No.
5kW	25-5KE6
10kW	25-10KE6
25kW	25-25KE6
50kW	25-50KE6

OBSOLETE

Model 4930 is the 75Ω version of Model 4902 designed primarily for UHF TV transmitters. When ordering, specify transmitter frequency (channel) between 470-890 MHz.

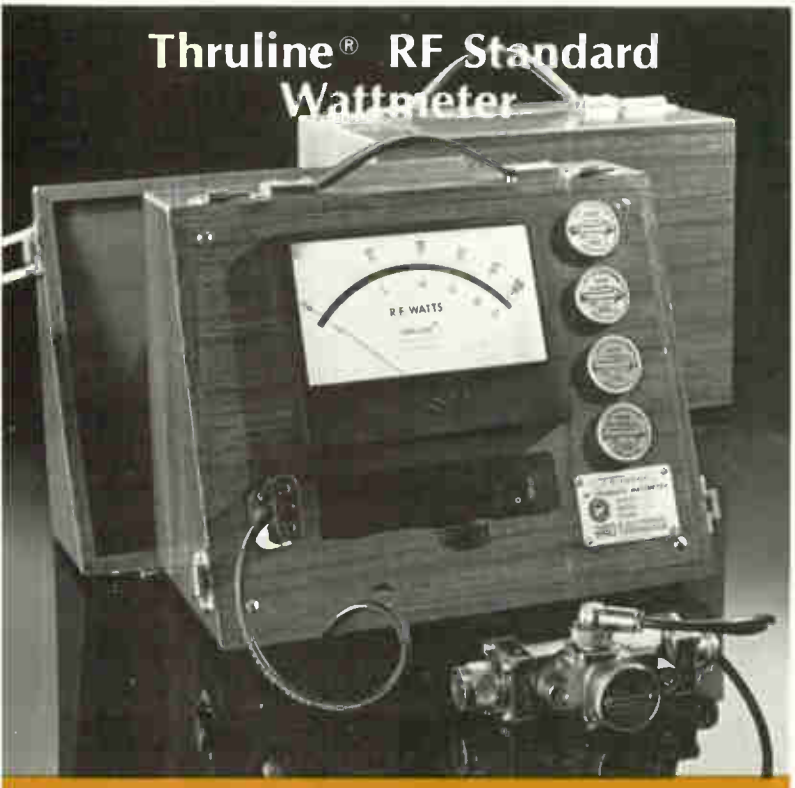
Supplied with one bullet: P/N 4930-021



BIRD Laboratory Standard RF Wattmeters

4340•41

Thruline® RF Standard Wattmeter



3% Insertion Standard for calibration from 2-1000 MHz to 100 watts

A time-saving, precision Laboratory Standard for maintenance and calibration of RF power instruments, as well as a stable, temperature compensated transfer standard.

The heart of this new Lab Standard is a set of five 100-watt Plug-In Elements covering a continuous frequency range from 2 to 1000 MHz. Each element is individually calibrated with its integral potentiometer against our Master Calibration System (traceable to the National Bureau of Standards), and is furnished with a signed certificate listing fifty points—ten power levels at five frequencies. These two hundred and fifty points are recorded on Certificates of Calibration on a conveniently located pull-out tray. The calibration potentiometers in each element are accessible in the field by removing the round nameplates, enabling facilities with calorimetric standards to perform periodic checks.

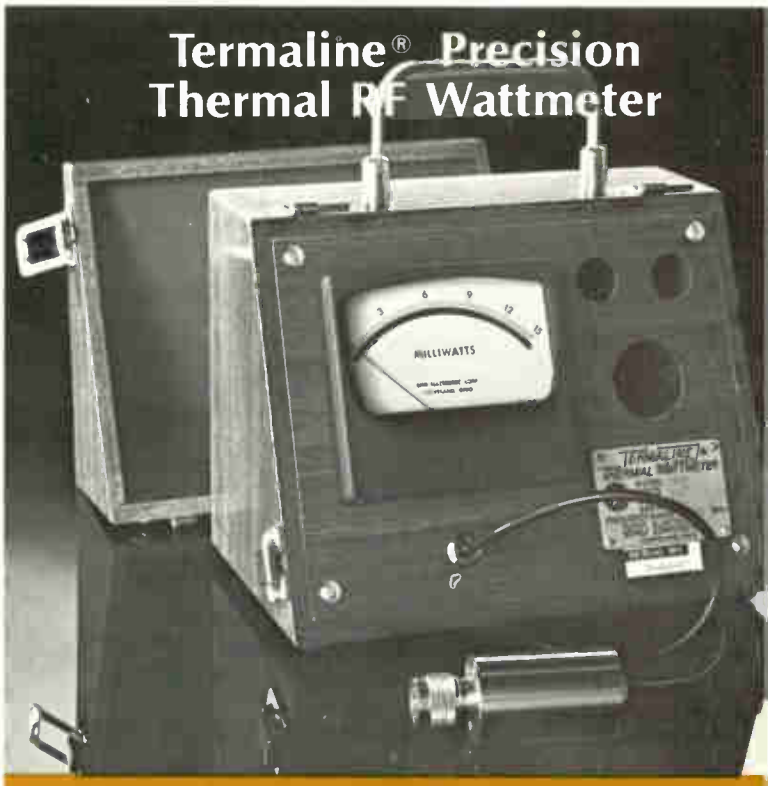
Stated accuracy applies when system VSWR on the load side is less than 1.2 to 1 with undesired signal components below −30 dB. Accuracy is guaranteed for one year when the potentiometer has not been reset.

Power Scale ____ 0-100 watts
Impedance ____ 50.0 ohms
Insertion VSWR with QC N Connectors ____ 1.05 max. dc to 1000 MHz
Frequency Ranges ____ 2-10, 10-30, 30-100, 100-500, 500-1000 MHz
(see page 47A)
Accuracy ____ ± 3% of full scale direct reading. ± 3% of reading at 25 frequencies (five per Element) and the 10 cardinal scale divisions.

For a custom instrument with one or more Plug-In Elements, order **model 4341** and remain ahead. Available measurement ranges 10W and 25W series now also standard.

model 6300

Termaline® Precision Thermal RF Wattmeter



2% DC to 500 MHz Transfer Standard to 15 milliwatts

This precision vacuum-thermocouple RF to DC transfer standard permits instant verification of any RF power measurement to 0.5 GHz with a transfer accuracy of ± 2% of reading. The thermocouple is an integral part of a resistive 50-ohm line termination with an incomparably low VSWR under 1.1 from dc to 500 MHz. (Thermistor Mount Power Meters have a typical VSWR of 1.3 down to 25 MHz, 1.6-1.75 to 10 MHz, and are not usable below that frequency.)

Having no amplifier, the wattmeter requires no power supply and no continuous "zero" adjustment. As only seven components are involved, calibration stability is excellent. The 15 mW power range can be extended to 1500 watts with the use of TENULINE® High-Power Attenuators.

Power Range ____ 0-15 milliwatts
Input VSWR with N(M) connector ____ 1.10 max. dc to 500 MHz

Summary of Uncertainties:

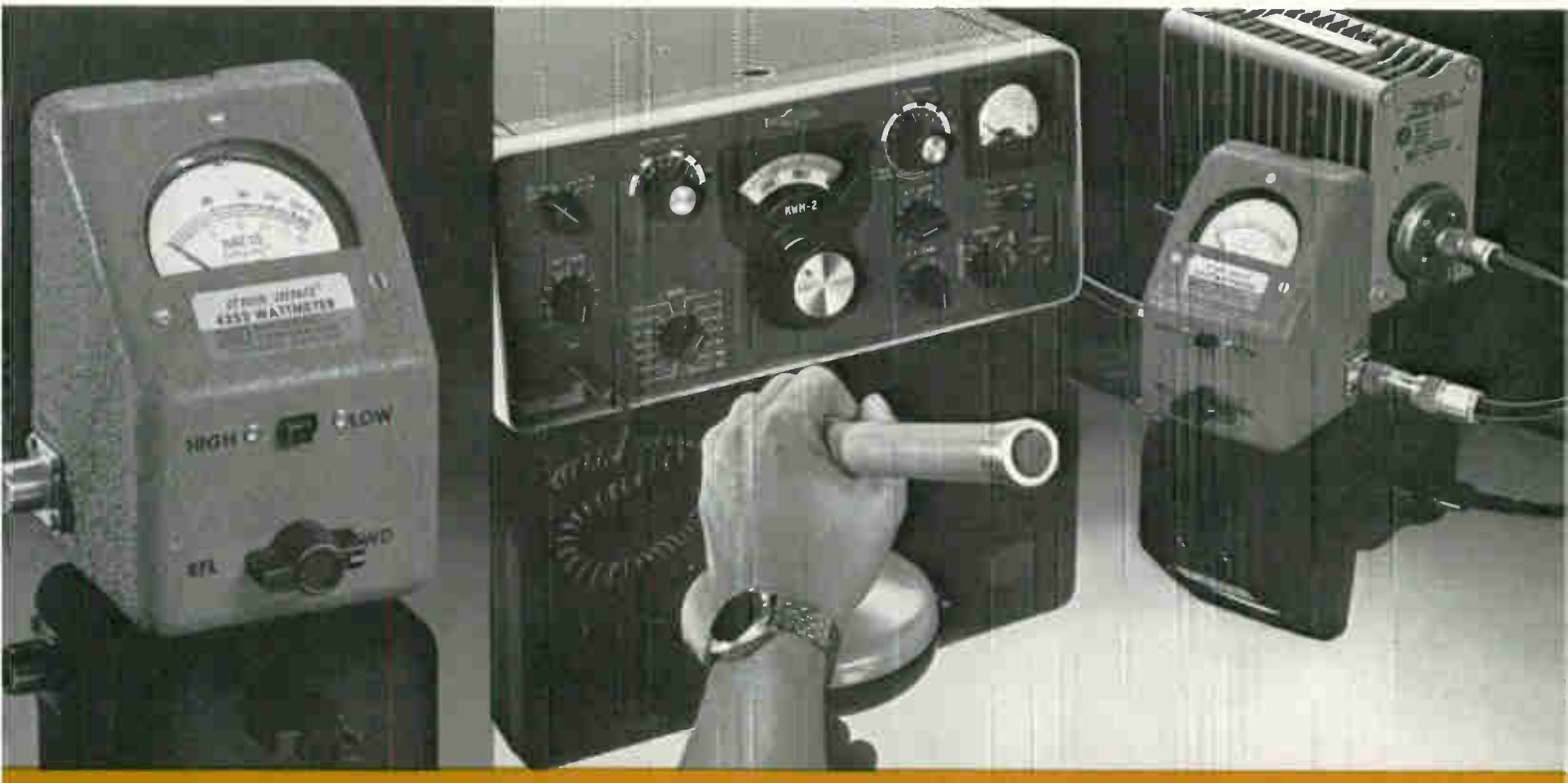
Frequency Response from 25 Hertz to 500 Megahertz and at dc ± 2% (This is the total maximum uncertainty of reading when the Model 6300 is used as a transfer standard from RF to dc or audio, or when it is used as a direct reading instrument at the four RF frequencies for which calibration is furnished.)

Add full scale uncertainty of ± 2% when making direct measurements without transfer or chart corrections.

Scale shape, dc and RF calibration chart at 30, 100, 300, 500 MHz furnished.

BIRD Amateur/CB/Marine Wattmeters

models 4350-4354



New economical RF Wattmeters for Radio Amateurs, CB and Marine Communications

- *For service and maintenance of Ham, CB and Marine transmitting equipment in the 1.8-30 MHz and 50-175 MHz range.*
- *For CW, SSB, AM, FM, RTTY and SSTV transmissions in 50-52 ohm coaxial cables.*
- *For adjusting antenna resonance and impedance matching networks, and for continuous monitoring of output power or antenna conditions during ON THE AIR operations.*

The 4350 series of HAM-MATE, CB-MATE and MARINE-MATE Wattmeters are a direct descendant of the model 43 THRULINE® Wattmeter—the professional standard of the industry—and will accurately measure RF power flow under any load condition.

One of the most important requirements of any insertion type RF wattmeter is its directivity, i.e. the ability to differentiate between power flowing in opposite directions in the transmission line. When adjusting an antenna to a 50-ohm line, an instrument with insufficient directivity is likely to indicate a perfect match when none exists. (The undesired pickup of forward current when reverse power is measured can easily cancel the desired reading, thus producing a false null). The new 4350 Series Wattmeters have directivity of 20 dB (100:1) minimum, an absolute must for meaningful reflected power (and VSWR) measurement.

Because of their low insertion VSWR coupled with high directivity, HAM-MATE wattmeters may be placed at any convenient point along the transmission line, and may be left permanently connected for continuous RF power monitoring. The difference between forward and reflected readings represents power radiated from the antenna and VSWR is obtained from a set of nomographs.

SUPERSEDED

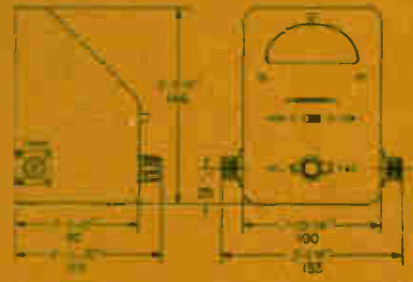
SUPERSEDED

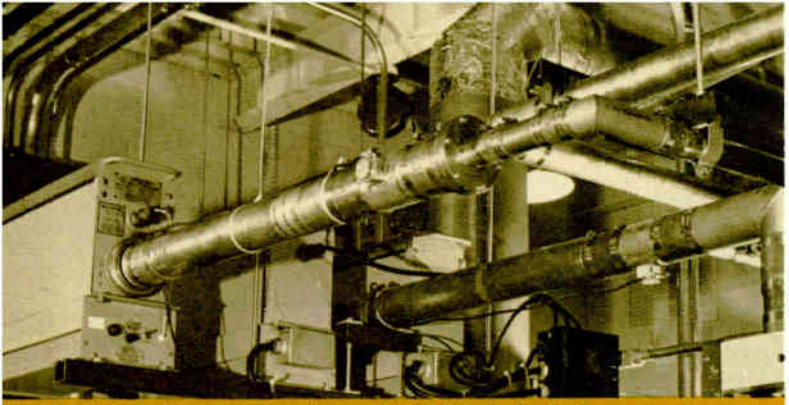
specifications

MODEL	Ham-Mate 4350	Ham-Mate® 4351	Ham-Mate 4352	CB-Mate® 4353	Marine-Mate™ 4354
Frequency Range	1.8-30 MHz	1.8-30 MHz	50-150 MHz	25-30 MHz	155-175 MHz
Forward Power Range	0-200/2000W	0-200/1000W	0-40/400W	0-2.5/10W	0-2.5/25W
Reflected Power Range	0-200/2000W	0-200/1000W	0-40/400W	0-2.5/10W	0-2.5/25W

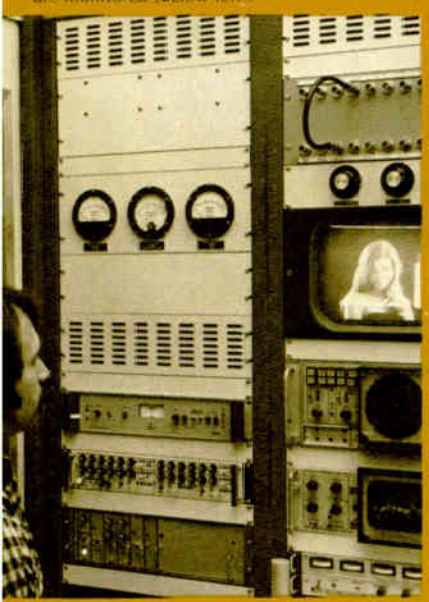
Impedance Z_0 ____ All Models 50 ohms*
Insertion VSWR All Models 1.1 to 1.0 max.
Accuracy ___ All Models ± 8% of Full Scale
Directivity ____ All Models 20 dB min.
Weight ____ All Models 1¾ lbs. (¾ kg)
Connectors—Input & Output All Models—both Female UHF (SO-239)

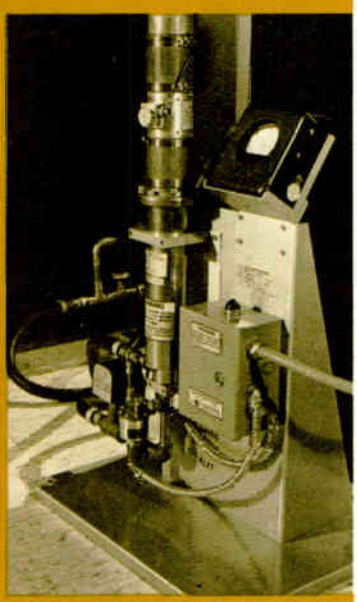
*May be used with 50-52 ohm cable.





This TT50FL dual transmitter installation at WKYC-TV is the first in the country. Shown above are three TERMALINE "Reject Loads" with their THRULINE Wattmeters. The 50kW Test Load Wattmeter below right is switched remotely (including water flow) from the studio 19 miles distant, where the reject power levels and main feed power are monitored (below left).





TERMALINE® RF Coaxial Load Resistors

For permanent installations or portable use in maintenance, testing and design of coaxial systems

Low VSWR: 1.1 max. dc to 1000 MHz on most models

Available with all standard RF connectors

Rugged non-radiating construction

Bird TERMALINE Load Resistors are used during adjustment, testing and alignment of transmitters in place of the antenna, as well as for permanent or stand-by termination of transmission line branches. Their low VSWR assures an excellent match and—at 1.1—the absorption of at least 99.75% of the RF energy generated.

Our traditional liquid-dielectric convection-cooled terminations, which have given trouble-free service as dummy antennas for nearly 35 years of service, are easily recognized by their light grey finish (8785 and 8787 excepted). These units have been updated with current developments in materials and coolants. Some are made available with forced air-cooling or built-in water coils to increase their power rating to as high as 7500 watts.

Power Ratings of Bird Loads, within their specified temperature range, are their full average power capacity in continuous operation. These ratings may be exceeded for short periods. (For sustained full rated power applications on models rated above 600 watts, the coolant should be changed at recommended intervals.) For operation at higher ambient temperatures, and for peak power capabilities, see foldout page.

The first three pages of Loads following the selection chart are convection-cooled dry dielectric (air) units that can be connected to a line in any position. Also included are two conduction-type MINILOAD® models 8071 and 8072, which use the equipment cabinet or panels as their heat sink. Their small size (e.g. ¾ cu. in.) permits mounting them on any convenient metal surface, eliminating the need for a large volume, ventilated compartment.

The current trend to remote dual-transmitter operation has lead to the development of "Reject Loads", i.e. stand-by terminations which absorb power only when needed in case one transmitter fails. They must be ready to function at once without using water or energy in their hopefully eternal stand-by mode. Models 8785, 8787 and the most recent 8890-510 series are ideal for this purpose. At 7½kW, they are used in 30kW FM or 50kW TV installations. For higher capacity, contact us.

BIRD TERMALINE® RF Coaxial Load Resistors

50 ohms nominal

selection

Bird TERMALINE RF Coaxial Load Resistors are listed below for your convenience in selecting a particular type according to power, model, connector, frequency and VSWR.

VSWR max. values within specified frequency ranges (with connectors normally supplied)

POWER RATING CW	MODEL NO.	CONNECTOR	Dielectric Medium	Cooling Method	DC–300 MHz	300–500 MHz	500–1000 MHz	1000–2000 MHz	2000–2500 MHz	2500–3000 MHz	3000–3500 MHz	3500–4000 MHz
2 watts	8010/1/5/6	(See page 20)	D	A		1.04		1.06		1.1		
5 watts	80 Series	(See page 20)	D	A		1.1				1.2		
10 watts	8052/3	N/F, N/M	D	A		1.1				1.2		
25 watts	8080	QC-N/M	D	A		1.1				1.25		
50 watts	8085	QC-N/M	D	A		1.1				1.25		
100 watts	8160	QC-N/M	D	A		1.1			1.2			
100 watts	8164	QC-N/F	D	A		1.1			1.2			
100 watts	8071	SMA/F	D	C		1.1		1.2				
150 watts	8166	QC-N/F	D	A		1.1			1.2			
300 watts	8072	SQC-N/F	D	C		1.1			1.25			
600 watts	8431	SQC-N/F	D	A		1.1			1.25			
20 watts	80A	N/F	L	A		1.1		1.2		1.3		
50 watts	8130	QC-N/F	L	A		1.1				1.2		
80 watts	81B	N/F	L	A		1.1				1.2		
150 watts	8135	QC-N/F	L	A		1.1				1.2		
250 watts	8141	QC-N/F	L	A		1.1			1.2			
300 watts	8143	QC-N/F	L	A		1.1	960		1.25			
500 watts	8201	QC-N/F	L	A		1.1			1.25			
500 watts	82A	QC-N/F	L	A		1.1			1.25		1.3	
600 watts	8401	QC-N/F	L	A		1.1				1.2		
1,000 watts	8251	QC-LC/F	L	A		1.1			1.25			
1,000 watts	8833	QC-LC/F	L	A		1.1			1.25			
2,500 watts	8230	QC-LC/F	L	W		1.1			1.25			
2,500 watts	8890 Series	(See page 27)	L	A		1.1		1.2				
5,000 watts			L	F								
5,000 watts	8785	3-1/8	L	A		1.1		1.25	1500			
7,500 watts	8787	3-1/8	L	A	1.1	220						
7,500 watts	8890-510	(See page 28)	L	W		1.1		1.2				
1,000 watts	8710 Series	(See page 31)	D	W		1.1				1.25		
5,000 watts	8720 Series	(See page 31)	D	W		1.1		1.2				
10,000 watts	8730 Series	(See page 31)	D	W		1.1		1.15	1400			
15,000 watts	8740 Series	(See page 32)	D	W	1.1		1.15	700				
25,000 watts	8750 Series	(See page 33)	D	W	1.1		1.15					
50,000 watts	8760 Series	(See page 33)	D	W	1.1		1.15	1300	1500			
15,000 watts	8542 UHF	3-1/8 EIA Flg	D	W		450	1.1		1.25			
25,000 watts	8552 UHF	3-1/8 EIA Flg	D	W			1.1		1.25			
50,000 watts	8562 UHF	3-1/8 EIA Flg	D	W			1.1		1.25			

Explanation of Symbols: A—Air Cooled, C—Conduction Cooled, D—Dry (Air), F—Forced Air Cooled, L—Liquid, W—Water Cooled.

BIRD TERMALINE® RF Coaxial Load Resistors

50 ohms nominal

models 8010-16

2 WATTS

DRY LOADS

Power Rating ____ 2 watts continuous duty

VSWR ____ 1.04 max. dc to 1000 MHz
1.06 max. 1000 to 2000 MHz
1.1 max. 2000 to 4000 MHz

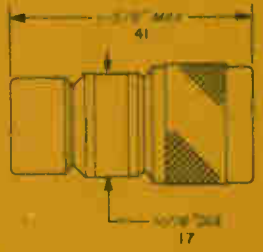
Ambient Air Temperature Range ____ −40° to +45°C

Input Connector ____ (8010) Female N
(8011) Male N
(8015) Male TNC
(8016) Female TNC

Weight ____ 1¾ oz. (50 g)

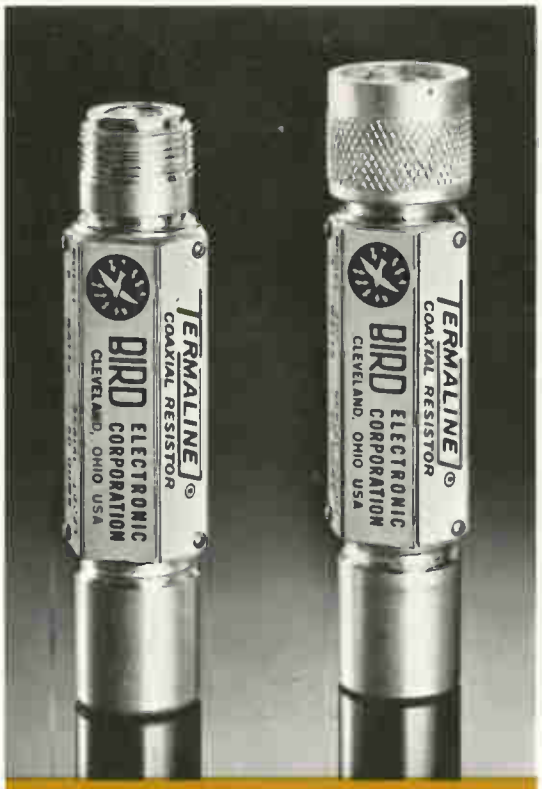
Operation Position ____ Any

Finish ____ Watts nickel plated



8011

series 80



5 WATTS

DRY LOADS

Power Rating ____ 5 watts continuous duty

VSWR ____ 1.1 max. dc to 1000 MHz
1.2 max. 1000 to 4000 MHz

Ambient Air Temperature Range ____ −40° to + 45°C

Input Connector ____ See below

Weight ____ 4 oz. (113 g)

Operating Position ____ Any

Finish ____ Silver plated

Model	Connector
80F	Female N
80M	Male N
80C	Female C
80CM	Male C
80BNCF	Female BNC
80BNCM	Male BNC
80TNCF	Female TNC
80TNCM	Male TNC
80SCF	Female SC
80SCM	Male SC

80F

80M

8052-53

10 WATTS

DRY LOADS

Power Rating ____ 10 watts continuous duty

VSWR ____ 1.1 max. dc to 1000 MHz
1.2 max. 1000 to 4000 MHz

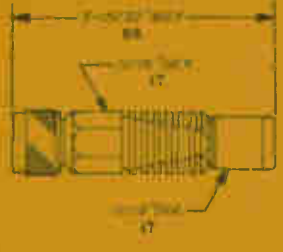
Ambient Air Temperature Range ____ −40° to +45°C

Input Connector
Female N (8052)
Male N (8053)

Weight ____ 4 oz. (0.1 kg)

Operating Position ____ Any

Finish ____ Lusterless black enamel (Fed. Spec. TT-E-527)

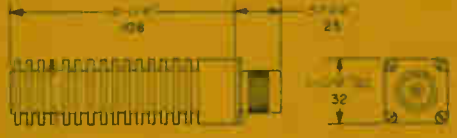


model 8080

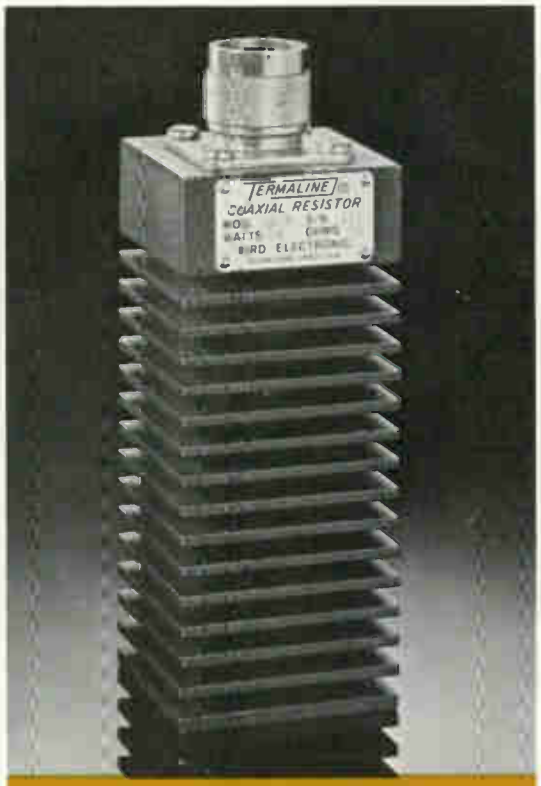
25 WATTS

DRY LOAD

Power Rating ____ 25 watts continuous duty
VSWR ____ 1.1 max. dc to 1000 MHz
1.25 max. 1000 to 3500 MHz
Ambient Air Temperature Range ____ −40° to +45°C.
Input Connector ____ QC Type (Male N normally supplied)
Weight ____ 9 oz. (¼ kg)
Operating Position ____ Any
Finish ____ Lusterless black enamel (Fed. Spec. TT-E-527)



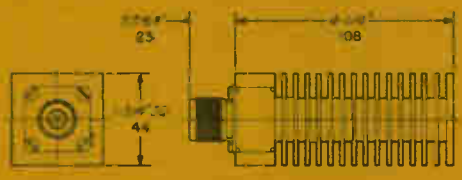
model 8085



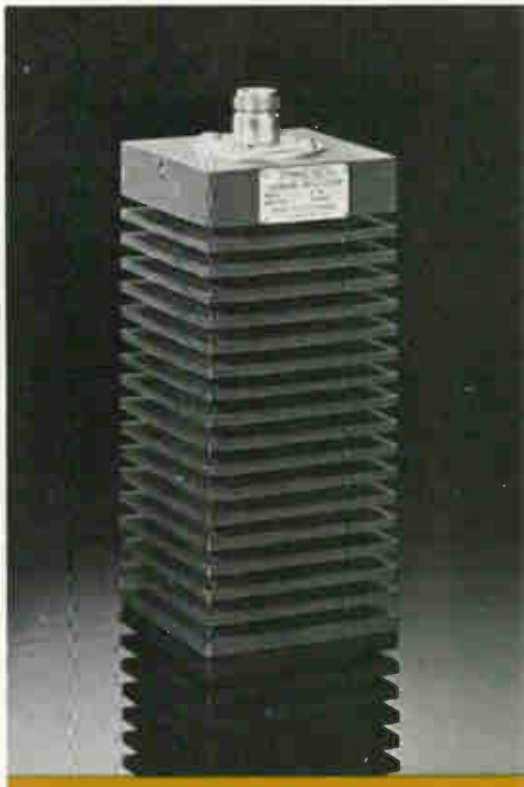
50 WATTS

DRY LOAD

Power Rating ____ 50 watts continuous duty
VSWR ____ 1.1 max. dc to 1000 MHz
1.25 max. 1000 to 3500 MHz
Ambient Air Temperature Range ____ −40° to +45°C.
Input Connector ____ QC Type (Male N normally supplied)
Weight ____ 15 oz. (0.4 kg)
Operating Position ____ Any
Finish ____ Lusterless black enamel (Fed. Spec. TT-E-527)



model 8164



100 WATTS

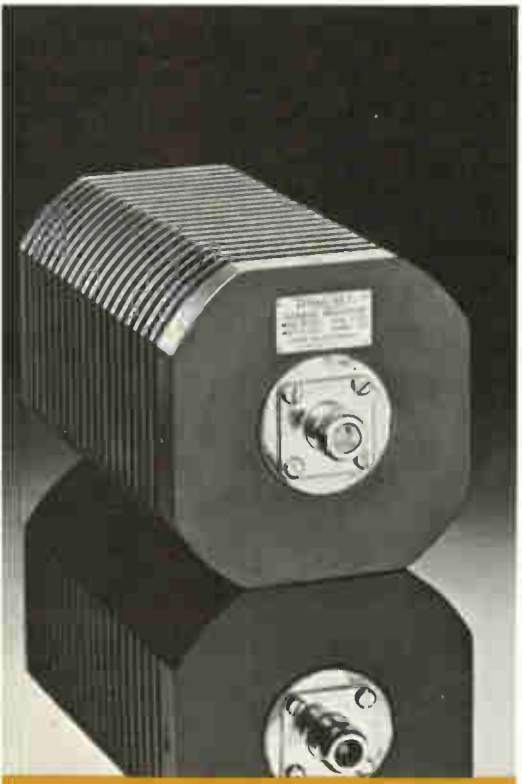
DRY LOAD

Power Rating ____ 100 watts continuous duty
VSWR ____ 1.1 max. dc to 1000 MHz
1.2 max. 1000 to 2500 MHz
Ambient Air Temperature Range ____ −40° to +45°C.
Input Connector ____ QC Type (Female N normally supplied)
Weight ____ 48 oz. (1.4 kg)
Operating Position ____ Any
Finish ____ Lusterless black enamel (Fed. Spec. TT-E-527)

BIRD TERMALINE® RF Coaxial Load Resistors

50 ohms nominal

model 8166



150 WATTS

DRY LOAD

Power Rating ____ 150 watts continuous duty

VSWR ____ 1.1 max. dc to 1000 MHz
1.2 max. 1000 to 2500 MHz

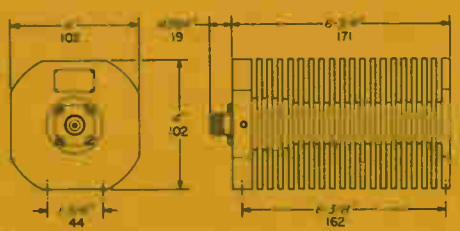
Ambient Air Temperature Range ____ −40° to +45°C.

Input Connector ____ QC Type (Female N normally supplied)

Weight ____ 96 oz. (2.7 kg)

Operating Position ____ Any

Finish ____ Lusterless black enamel (Fed. Spec. TT-E-527)



model 8431

600 WATTS

DRY LOAD

Power Rating ____ 600/500 watts* continuous duty

VSWR ____ 1.1 max. dc to 1000 MHz
1.25 max. 1000 to 2500 MHz

Ambient Air Temperature Range ____ −40° to +45°C.

Input Connector ____ SQC Type (Female N normally supplied)

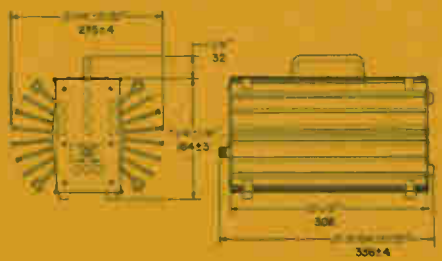
Weight ____ 13 lbs. (6 kg)

Operating Position ____ Any*

Finish ____ Lusterless black enamel (Fed. Spec. TT-E-527)

*Continuous Power Rating 600W in Vertical Position, 500W in Horizontal Position

SQC type Connectors, as used on models 8431, 8072 and all Minimonitor Thruline® Wattmeters, are available in: Male N, Female N, UHF, C, SC, BNC.



8071•72

100/300 W

CONDUCTION LOADS

Power Rating ____ (8071) 100 watts* (8072) 300 watts* continuous duty

VSWR
8071 { 1.1 max. dc to 1000 MHz; 1.2 max. 1000 to 2000 MHz
8072 { 1.1 max. dc to 1000 MHz; 1.25 max. 1000 to 2500 MHz

Ambient Air Temperature Range ____ −40° to + 45°C.

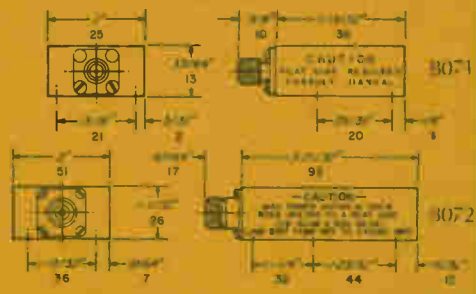
Input Connector (8071) Female SMA (8072) SQC Type (Female N normally supplied)

Weight ____ (8071) 1¼ oz. (35 g) (8072) 12 oz. (340 g)

Operating Position ____ Any

Finish ____ Lusterless black enamel (Fed. Spec. TT-E-527)

*When bolted to a ⅛" (3mm) plate (100 sq. in. or 650cm² for 8071 and 800 sq. in. or 5200cm² for 8072) or equivalent heat sink

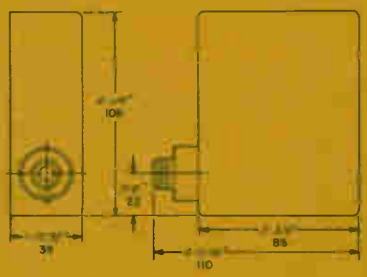


model 80A

20 WATTS

OIL DIELECTRIC

Power Rating ____ 20 watts continuous duty
VSWR ____ 1.1 max. dc to 1000 MHz
1.2 max. 1000 to 2000 MHz
1.3 max. 2000 to 3500 MHz
Ambient Air Temperature Range ____ −40° to +45°C.
Input Connector ____ Female N
Weight ____ 1 lb. (½ kg)
Operating Position ____ Horizontal as shown, or vertical with connector down
Finish ____ Grey wrinkle

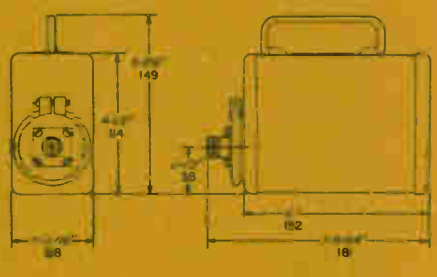


model 8130

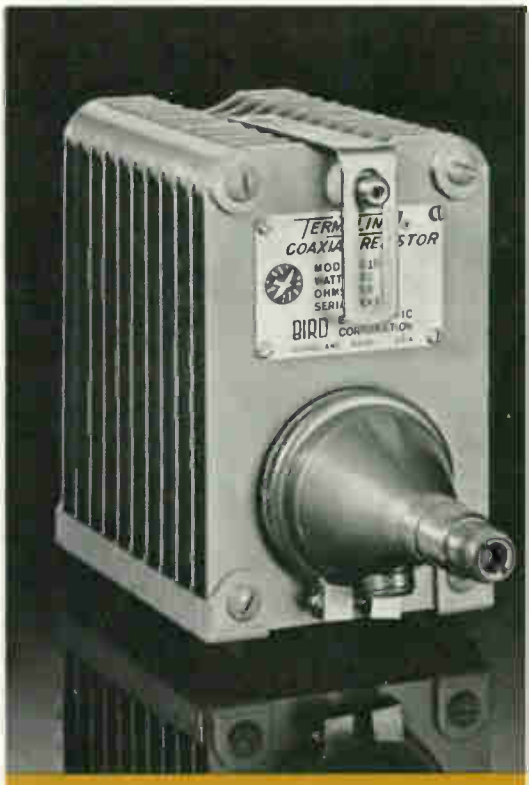
50 WATTS

OIL DIELECTRIC

Power Rating ____ 50 watts continuous duty
VSWR ____ 1.1 max. dc to 1000 MHz
1.2 max. 1000 to 4000 MHz
Ambient Air Temperature Range ____ −40° to +45°C.
Input Connector ____ QC Type (Female N normally supplied)
Weight ____ 4 lbs. (1.8 kg)
Operating Position ____ Horizontal, or vertical with the connector down
Finish ____ Grey wrinkle



model 81B

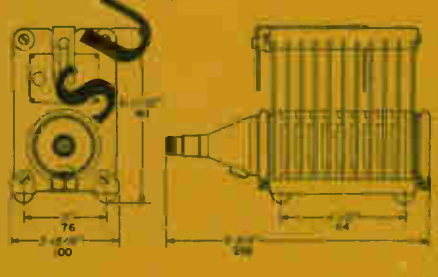


80 WATTS

OIL DIELECTRIC

Power Rating ____ 80 watts continuous duty
VSWR ____ 1.1 max. dc to 1000 MHz
1.2 max. 1000 to 4000 MHz
Ambient Air Temperature Range ____ −40° to +45°C.
Input Connector ____ Female N
Weight ____ 4 lbs. (1.8 kg)
Operating Position ____ Horizontal only
Finish ____ Light Navy grey baked enamel (MIL-E-15090)

SUPERSEDED



BIRD TERMALINE® RF Coaxial Load Resistors

50 ohms nominal

model 8135

150 WATTS

OIL DIELECTRIC

Power Rating ——— 150 watts continuous duty

VSWR ——— 1.1 max. dc to 1000 MHz
1.2 max. 1000 to 4000 MHz

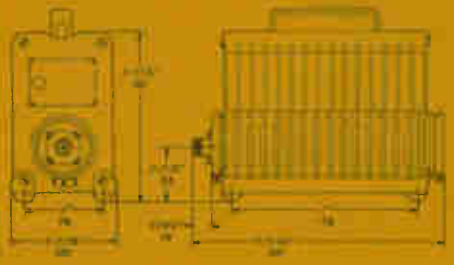
Ambient Air Temperature Range ——— −40° to +45°C

Input Connector ——— QC Type (Female N normally supplied)

Weight ——— 6 lbs. (2.7 kg)

Operating Position ——— Horizontal only

Finish ——— Light Navy grey baked enamel (MIL-E-15090)



model 8141

250 WATTS

OIL DIELECTRIC

Power Rating ——— 250 watts continuous duty

VSWR ——— 1.1 max. dc to 1000 MHz
1.2 max. 1000 to 2500 MHz

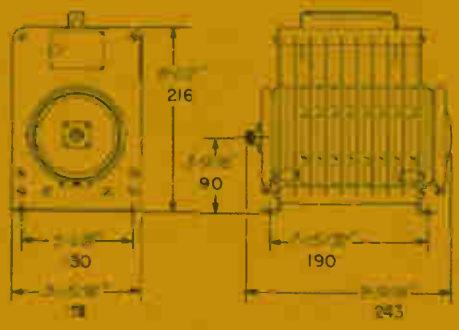
Ambient Air Temperature Range ——— −40° to + 45°C

Input Connector ——— QC Type (Female N normally supplied)

Weight ——— 10 lbs. (4.5 kg)

Operating Position ——— Horizontal only

Finish ——— Light Navy grey baked enamel (MIL-E-15090)



model 8143

300 WATTS

OIL DIELECTRIC

Power Rating ——— 300 watts continuous duty

VSWR ——— 1.1 max. dc to [illegible] MHz
1.25 max. 80[illegible] MHz

Ambient Air Temperature Range ——— −40° to +45°C

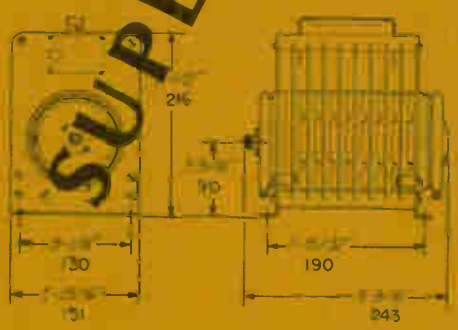
Input Connector ——— QC Type (Female N normally supplied)

Weight ——— [illegible] lbs. (4.5 kg)

Operating Position ——— Horizontal only

Finish ——— Light Navy grey baked enamel (MIL-E-15090)

SUPERSEDED



model 8201

500 WATTS

OIL DIELECTRIC

Power Rating ——— 500 watts continuous duty

VSWR ——— 1.1 max. dc to 1000 MHz
1.25 max. 1000 to 2500 MHz

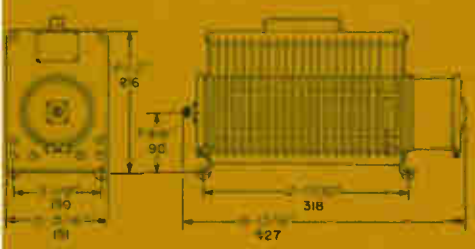
Ambient Air Temperature Range ——— −40° to +45°C.

Input Connector ——— QC Type (Female N normally supplied)

Weight ——— 21 lbs. (9.5 kg)

Operating Position — Horizontal only

Finish ——— Light Navy grey baked enamel (MIL-E-15090)



model 82A

500 WATTS

OIL DIELECTRIC

Power Rating ——— 500 watts continuous duty

VSWR ——— 1.1 max. dc to 1000 MHz
1.25 max. 1000 to 2500 MHz
1.3 max. 2500 to 3500 MHz

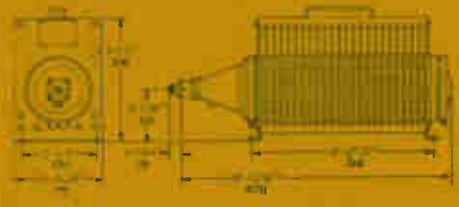
Ambient Air Temperature Range ——— −40° to +45°C.

Input Connector ——— QC Type (Female N normally supplied)

Weight ——— 21 lbs. (9.5 kg)

Operating Position — Horizontal only

Finish Light Navy grey baked enamel (MIL-E-15090)



model 8401

600 WATTS

OIL DIELECTRIC

Power Rating ——— 600 watts continuous duty

VSWR ——— 1.1 max. dc to 1000 MHz
1.2 max. 1000 to 3000 MHz

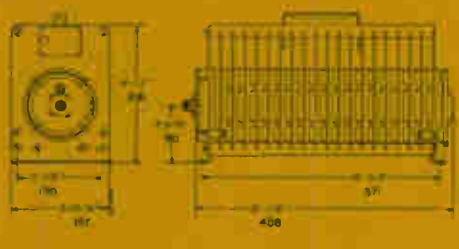
Ambient Air Temperature Range ——— −40° to +45°C.

Input Connector ——— QC Type (Female N normally supplied)

Weight ——— 20 lbs. (9 kg)

Operating Position — Horizontal only

Finish ——— Light Navy grey baked enamel (MIL-E-15090)



BIRD TERMALINE® RF Coaxial Load Resistors

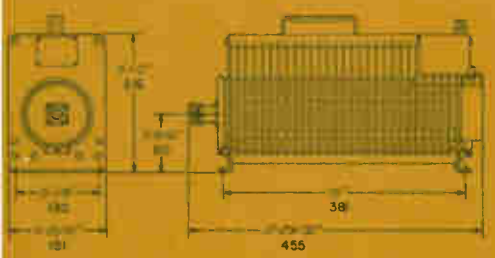
50 ohms nominal

model 8251

1 KILOWATT

OIL DIELECTRIC

Power Rating ____ 1000 watts continuous duty
VSWR ____ 1.1 max. dc to 1000 MHz
1.25 max. 1000 to 2500 MHz
Ambient Air Temperature Range ____ −40° to + 45°C.
Input Connector ____ QC Type (Female LC normally supplied)
Weight ____ 24 lbs. (11 kg)
Operating Position ____ Horizontal only
Finish ____ Light Navy grey baked enamel (MIL-E-15090)



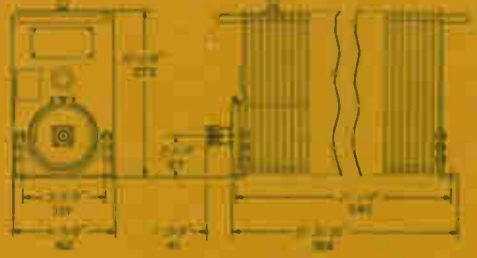
model 8833

1 KILOWATT

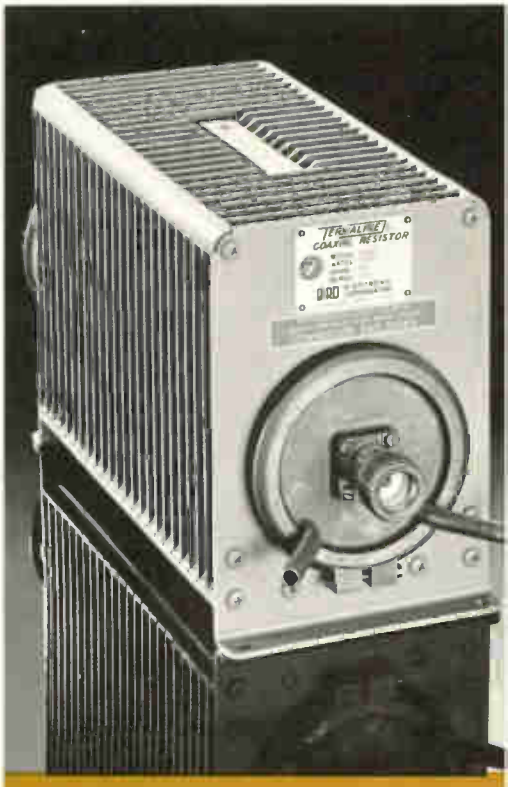
OIL DIELECTRIC

Power Rating ____ 1000 watts continuous duty
VSWR ____ 1.1 max. dc to 1000 MHz
1.25 max. 1000 to 2500 MHz
Ambient Air Temperature Range ____ −40° to + 45°C.
Input Connector ____ QC Type (Female LC normally supplied)
Weight ____ 33 lbs. (15 kg)
Operating Position ____ Horizontal only
Finish ____ Light Navy grey baked enamel (MIL-E-15090)

NOTE: Overload Thermoswitch P/N 2450056 is available.



model 8230

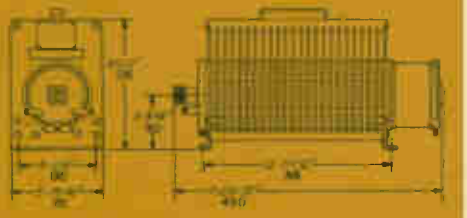


2-1/2 kW

OIL DIELECTRIC

Power Rating ____ 2500 watts continuous duty with water cooling
VSWR ____ 1.1 max. DC to 1000 MHz
1.25 max. 1000 to 2500 MHz
Ambient Air Temperature Range ____ −40° to + 45°C.
Input Connector ____ QC Type (Female LC normally supplied)
Weight ____ 27 lbs. (12 kg)
Water Connections ____ ⅜" tubing to accept flexible rubber hose
Flow Rate ____ ½ gpm (2 liters/min)
Operating Position ____ vertical with connector down (when water cooled)
Finish ____ Light Navy grey baked enamel (MIL-E-15090)

NOTE: Water cooling required above 200 watts continuous duty.



models 8890-8898

8890
on
BA-88

2500/5000 WATTS

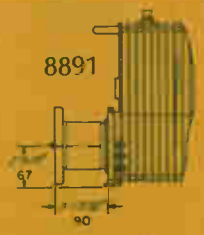
OIL DIELECTRIC

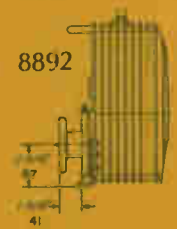
Power Rating ____ 2500 watts (5000 watts) continuous duty*
VSWR ____ 1.1 max. dc to 1000 MHz
1.25 max. 1000 to 2000 MHz
Ambient Air Temperature Range ____ −40° to +45°C
Operating Position ____ Horizontal only

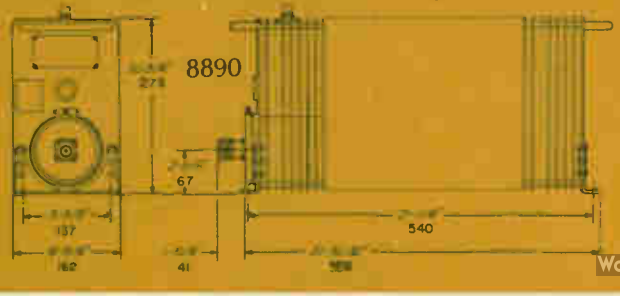
Overload Thermoswitch P/N 8890-008 is optional

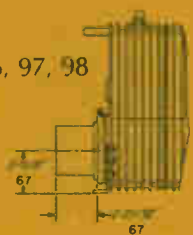
Input Connector	Weight	Model
QC-LC (F)	33 lbs (15 kg)	8890
1⅝ EIA Flg 50Ω	35 lbs (16 kg)	8892
1⅝ Unflg 50Ω	35 lbs (16 kg)	8895
3⅛ EIA Flg 50Ω	40 lbs (18 kg)	8891
3⅛ Unflg 51.5Ω	40 lbs (18 kg)	8896
3⅛ Unflg 50Ω (Flush Ctr. Cond.)	40 lbs (18 kg)	8897
3⅛ Unflg 50Ω (Recessed Ctr. Cond.)	40 lbs (18 kg)	8898

*Power capacity can be doubled through forced air cooling with BA-88 Blower Assembly on the right.







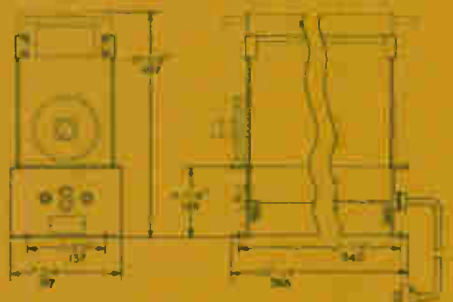


model BA-88

Blower Assembly

Forced air cooling doubles the rated capacity of the 8890 series Loads on this page from 2500 watts to 5000 watts (also doubles the ratings of TENULINE Attenuator model 8329 from 2kW to 4kW). With the blowers turned off but still attached, the original ratings are cut in half. Thermoswitches are recommended when using blower assembly.

Weight ____ 18 lbs (8 kg)
AC Power Required ____ 40 watts.
Specify 115 volts or 230 volts, 50/60 Hz.



BIRD TERMALINE® RF Coaxial Load Resistors

50 ohms nominal

series 8890-510

2-1/2kW/7-1/2kW

OIL DIELECTRIC

Power Rating ____ 2½kW (7½kW) continuous duty*
VSWR ____ 1.1 max. dc to 1000 MHz
1.25 max. 1000 to 2000 MHz
Ambient Air Temperature Range ____ -40° to +45°C
Operating Position ____ Horizontal only
Finish ____ Light Navy grey baked enamel (MIL-E-15090)

*Ideal for service as Reject Loads in dual transmitter operation, their continuous power rating is increased from 2½kW to 7½kW, as soon as the internal temperature rise starts the water flow (3 GPM-12 liters/min or more). *All units are equipped with a thermal switch-controlled water valve and an additional overload thermal switch. Water connections in the back are two fittings with 3/4-14 male pipe thread.

Input Connector	Weight	Model
QC-1C (F)	33 lbs (15 kg)	8890-510
1⅝ EIA Flg 50Ω	35 lbs (16 kg)	8892-510
1⅝ Unflg 50Ω	35 lbs (16 kg)	8895-510
1⅝ EIA Flg 50Ω	40 lbs (18 kg)	8891-510
3⅛ Unflg 51.5Ω	40 lbs (18 kg)	8896-510
7/8 Unflg 50Ω (Flush Ctr. Cond.)	40 lbs (18 kg)	8897-510
3⅛ Unflg 50Ω (Recessed Ctr. Cond.)	40 lbs (18 kg)	8898-510

SUPERSEDED

models 8785/8787

5 kW, 7-1/2 kW

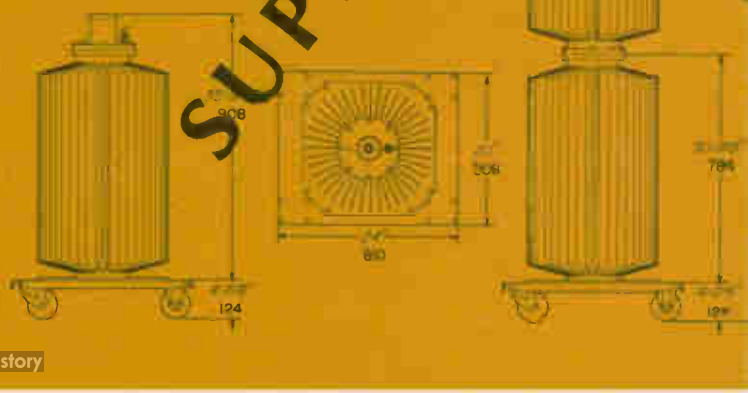
OIL DIELECTRIC

	Model 8785	Model 8787
Power Rating	5kW cont. duty	7½kW cont. duty
Input VSWR	1.1 max. dc to 1000 MHz, 1.25 max. 1000 to 1500 MHz	1.1 dc to 220 MHz
Weight	140 lbs. (63.5 kg)	205 lbs. (93 kg)

Ambient Air Temperature Range ____ -40° to + 45°C
Input Connector ____ 3⅛" Flg or Unflg, 50 or 51.5 ohms (Specify at time of order)
Operating Position ____ Vertical
Finish ____ Lusterless black enamel (Fed. Spec. TT-E-527)

NOTE: Higher power units in final development stages at press time. Please write for details.

SUPERSEDED



BIRD

MODULOAD® RF Load Resistors

50 ohms nominal

8632•3•4•6•7

The new Self-Cooling MODULOAD® RF Load Resistors operate continually in a few cubic feet of space (3 cu. ft. @ 10kW, 5 cu. ft. @ 20kW, 11 cu. ft. @ 40kW) under full rated RF power without the need for external cooling water. These line terminating systems are, therefore, ideal for locations where water supply is unreliable, expensive or simply not available. Self-contained, with integral heat exchanger and protective devices, the new coaxial load systems operate in 5° to 45°C ambients (—20°C to +20°C with 35% Ethylene Glycol antifreeze). 20kW and 40kW MODULOAD RF Load Resistors may be used at 25kW or 50kW respectively when they are operated in the following controlled environment: Air ambient temperatures of +5° to +30°C (—20°C to +10°C with 35% Ethylene Glycol antifreeze).

MODULOAD transmission line terminations are designed for CW, AM, FM, SSB, TV and pulsed systems. Off-the-air measurement of average or peak power dissipated in the dummy load during transmitter maintenance and adjustment can be measured by THRULINE® Insertion Wattmeters available as optional companion packages (the slanted meter shelf bracket shown on the 20kW MODULOAD is supplied free of charge, when the Wattmeter is ordered together with the Load).

NOTE: For "Reject Load" applications in parallel dual transmitter operation, we recommend TERMALINE® Load Resistor Models 8785, 8787 and series 8890-510.

Hi-Power RF Calorimeters

Use as a standard for checking and certifying high power wattmeters.

For measurement of total RF power under amplitude modulation conditions.

The 6010-6070 series of Hi-Power Calorimeters relates RF power measurement back to basic energy units. It provides highly accurate information on actual RF heating power dissipated in an RF load. Because of the relatively uncomplicated system design the high-efficiency of heat-transfer in the new Bird water-cooled Load Resistors and expanded-scale laboratory thermometers, the probable errors are kept within small known limits and the readout requires no special skill. Water quality requirements are not stability.

The Calorimeter can be operated as an accurate direct-reading device, as well as a low frequency substitution device. When used to compare dc or 60 Hz power with RF power, most error sources are eliminated and absolute accuracy approaches that of fine frequency power measurements.

Frequency and power ranges are identical to those of watercooled high-power TERMALINE loads on pages 31-33. Measurement uncertainties are kept to 3% at high power and 1½% at lower power.

Details on request

10kW

Power Rating ____ 10kW cont. duty

VSWR (max.) & Frequency Ranges _ 1.1 max. dc to 1000 MHz
1.15 max. 1000 to 1400 MHz

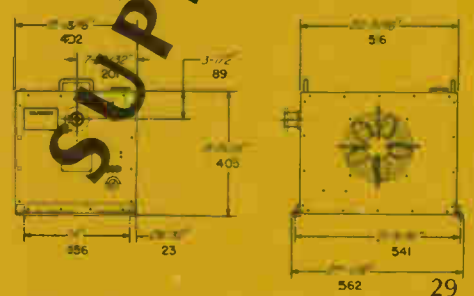
Input Connector & Impedance ____ (8632) 7/8 EIA
[illegible] 50 ohms
(8633) 3⅛ Unflg [illegible].5 ohms
(8634) 3⅛ Unflg 50 ohms
(8636) 1⅝ [illegible] Unflg 50 ohms
(8637) 1⅝ Unflg 50 ohms

Weight ____ [illegible]0 lbs. (50 kg)

NOTES: Peak Power Rating varies from 100kW @ 1 μs to [illegible] @ 10ms pulses (10,000 watts max. average power)

AC Power Req[illegible] 5⅛ amps @ 115 volts 60 Hz (4¾ amps @ 230 volts 50 Hz on special order)

Optional dolly P/N 6771-011



BIRD MODULOAD® RF Load Resistors

50 ohms nominal

models 8641•42•43•44

8644 on Dolly
with 4805 Wattmeter

20 KILOWATTS

Power Rating _____ 20kW cont. duty

VSWR (max.) & Frequency Ranges

8642, 8643, 8644 { 1.1 max. dc to 500 MHz
1.15 max. 500 to 700 MHz

8641 { 1.1 max. 450 to 1300 MHz*
1.25 max. 1300 to 1500 MHz

Input Connector & Impedance _ (8642) 3⅛ EIA Flg 50 ohms
(8643) [illegible] Unflg 51.5 ohms
(8644) 3⅛ Unflg 50 ohms
UHF (8641) 3⅛ EIA Flg 50 ohms

Weight _____ 155 lbs. (70 kg)

Finish _____ Light Navy Grey Baked Enamel (MIL-E-15090)

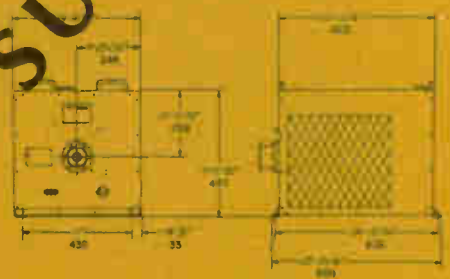
NOTES: Coupling kits and adapters to 1⅝" and 6⅛" line available. See ACCESSORIES section

Peak Power Rating varies from 2kW @ 1 µs to 20kW @ 10ms pulses (20,000 watts max. average power).

AC Power Required 11 amps @ 115 volts 60 Hz 5½ amps @ 230 volts 50 Hz on special order.

Optional Dolly P/N 6771-011

*Also 50Ω at dc-1000 Hz for continuity checks and substitution calorimetry.



SUPERSEDED

models 8651•52•53•54

40 KILOWATTS

Power Rating _____ 40kW cont. duty

VSWR (max.) & Frequency Ranges

8652, 8653, 8654 { 1.1 max. dc to 500 MHz
1.15 max. 500 to 700 MHz

8651 { 1.1 max. 450 to 1300 MHz*
1.25 max. 1300 to 1500 MHz

Input Connector & Impedance _____ (8652) 3⅛ EIA Flg 50 ohms
(8653) 3⅛ Unflg 51.5 ohms
(8654) 3⅛ Unflg 50 ohms
UHF (8651) 3⅛ EIA Flg 50 ohms

Weight _____ 275 lbs. (125 kg)

Finish _____ Light Navy Grey Baked Enamel (MIL-E-15090)

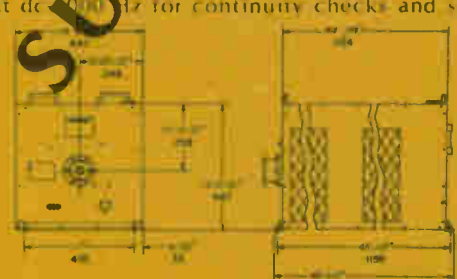
NOTES: Coupling kits and adapters to 1⅝" and 6⅛" line available. See ACCESSORIES section

Peak Power Rating varies from 4kW @ 1 µs to 40kW @ 10ms pulses (40,000 watts max. average power).

AC Power Required 14 amps @ 115 volts 60 Hz 7 amps @ 230 volts 50 Hz on special order.

Optional Dolly P/N 6772-011

*Also 50Ω at dc-1000 Hz for continuity checks and substitution calorimetry.



SUPERSEDED

BIRD TERMALINE® RF Coaxial Load Resistors

50 ohms nominal

Size and weight tell the story of the direct-water-cooled Load Resistors displayed in this section: Instead of constructing a transmission line to the load, the loads are simply connected to the line wherever needed.

The 1000-watt model 8710, for instance, weighs only 6 oz (170 grams)—only 1½ times the weight of our air-cooled 5 watt load. Frequently used as sever-loads, these non-magnetic miniature high power terminations can be mounted inside focusing coils or in any location where space is at an ultimate premium.

Even the 15kW to 50kW Loads are light enough to just bolt to the end of a line in any position, where they look like an 18-inch extension of a 3" transmission line. These high power loads (as well as the 10kW series) are furnished with automatic controls for interlocking with the transmitter to protect against water-flow failure.

At time of order, specify desired voltage of interlocking controls (115 or 230 Vac).

Direct water-cooled TERMALINE® Loads from 10kW to 50kW may be ordered mounted on a dolly (with or without a THRULINE Wattmeter) for easy floor maneuvering between transmitter checks.

series 8710

1 KILOWATT

WATER COOLED

Power Rating ____ 1000 watts continuous duty

VSWR ____ 1.1 max. dc to 1000 MHz
1.25 max. 1000 to 3500 MHz

Input Connector ____ See below

Weight ____ (8710, 8711) 5 oz. (142 g)
(8713) 14 oz. (400 g) with 18" (½m) tubing

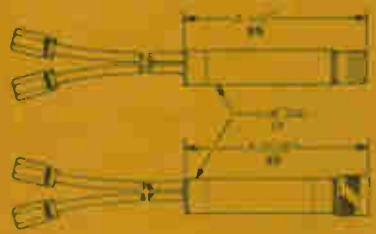
Water Connections ____ 3/16" copper tubing with ⅛" FPT nut and union

Flow Rate
8°-80°C: 1-3 gpm (3-3 liters/min)

Operating Position ____ Any

Finish ____ Bright silver plated

Model	Connector
8710	Female N
8710M	Male N
8711	Female C
8711M	Male C
8713	⅝ EIA flanged



model 8720

5 kW

WATER COOLED

Power Rating ____ 5000 watts continuous duty

VSWR (max.) & Frequency Ranges ____ 1.1 max. dc to 1000 MHz
1.2 max. 1000 to 2000 MHz

Input Connector ____ ⅝ EIA Flg

Weight ____ 2 lbs. (1 kg)

Water Connections ____ ¼" copper tubing with FPT nut

Flow Rate ____ 5°-80°C: 1-4 gpm (4-15 liters/min)

Operating Position ____ Any

Finish ____ Bright nickel plated

BIRD TERMALINE® RF Coaxial Load Resistors

50 ohms nominal

models 8732•36•37

10 KILOWATTS

WATER COOLED

Power Rating — 10 kW cont. duty

VSWR (max.) & Frequency Ranges — 1.1 max. dc to 1000 MHz; 1.15 max. 1000 to 1400 MHz

Input Connector & Impedance — (8732) 3⅛ EIA Flg 50 ohms; (8736) 1⅝ EIA Flg 50 ohms; (8737) 1⅝ Unflg 50 ohms

Weight — (8732) 6½ lbs. (3 kg); (8736) 6 lbs. (2.7 kg); (8737) 5¾ lbs. (2.6 kg)

Water Connections — ½" pipe thread or ¾" hose

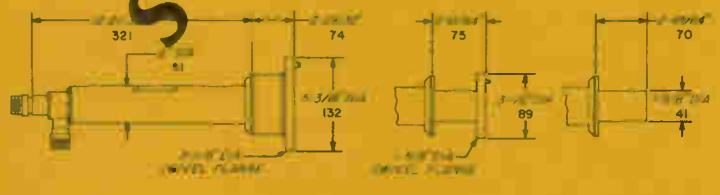
Flow Rate — 5°-60°C: 3.5-8.5 gpm (13-32 liters/min)

Operating Position — Any

Finish — Bright nickel plated

SUPERSEDED

8732 8736 8737



models 8742•43/8542

15 KILOWATTS

WATER COOLED

Power Rating — 15 kW cont. duty

VSWR (max.) & Frequency Ranges — 8742, 8743: 1.1 max. dc to 500 MHz; 1.15 max. 500 to 700 MHz. 8542: 1.1 max. 450 to 1300 MHz*; 1.25 max. 1300 to 1500 MHz

Input Connector & Impedance — (8742) 3⅛ EIA Flg 50 ohms; (8743) 3⅛ Unflg 51.5 ohms; UHF (8542) 3⅛ EIA Flg 50 ohms

Weight — 13½ lbs (6.1 kg); (8743) 13 lbs. (5.9 kg) Unflg

Water Connections — ½" pipe thread or ¾" hose

Flow Rate — 5°-60°C: 6-8 gpm (23-30 liters/min)

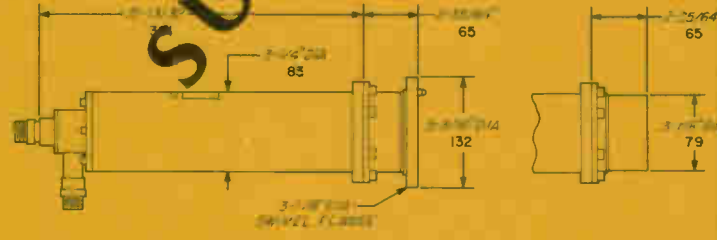
Operating Position — Any

Finish — Bright nickel plated

NOTES: Coupling kits and adapters to 1⅝" and 6⅛" line available. See ACCESSORIES section.

*Also 50Ω at dc-1000 MHz for continuity checks and substitution calorimetry

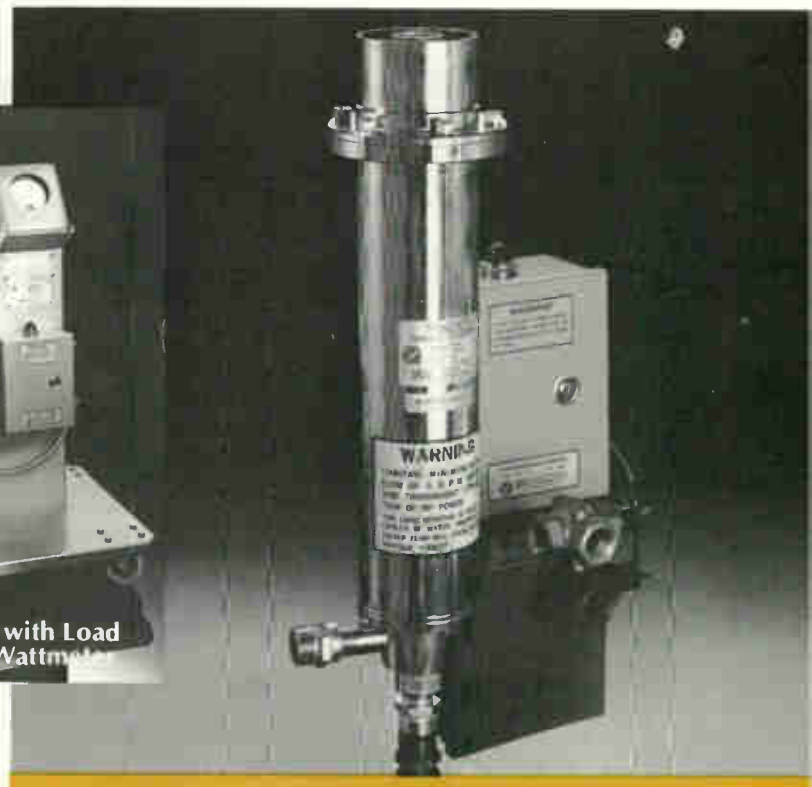
SUPERSEDED



8752•53•54/8552

models 8762/63/8562

6770 Dolly with Load and 4805 Wattmeter



25 KILOWATTS

WATER COOLED

Power Rating — 25 kW cont. duty

VSWR (max.) & Frequency Ranges

8752, 8753, 8754: 1.1 max. dc to 500 MHz; 1.15 max. 500 to 1700 MHz

8552: 1.1 max. 450 to 1300 MHz*; 1.25 max. 1300 to 1500 MHz

Input Connector & Impedance — (8752) 7/16 EIA Flg 50 ohms; (8753) 3⅛ Unflg 51.5 ohms; (8754) 3⅛ Unflg 50 ohms; UHF (8552) 7/16 EIA Flg 50 ohms

Weight — 13½ lbs. (6.1 kg) Flg; 13 lbs. (5.9 kg) Unflg

Water Connections — ¼" pipe thread or ¾" hose

Flow Rate — 5°-60°C: 6-8 gpm (23-30 liters/min)

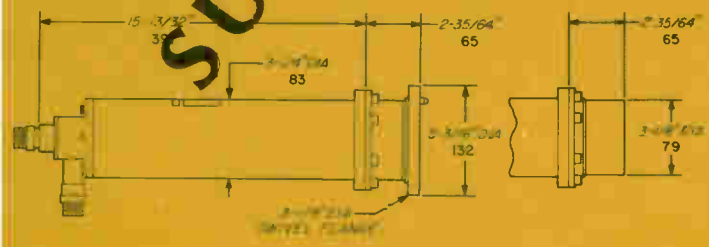
Operating Position — Any

Finish — Bright nickel plated

NOTES Coupling kits and adapters to 1⅝" and 6⅛" line available. See ACCESSORIES section.

*Also 50Ω at dc-1000 Hz for continuity checks and substitution calorimetry.

SUPERSEDED



50 KILOWATTS

WATER COOLED

Power Rating — 50 kW cont. duty

VSWR (max.) & Frequency Ranges

8762, 8763: 1.1 max. dc to 500 MHz; 1.15 max. 500 to 1700 MHz

8562: 1.1 max. 450 to 1300 MHz*; 1.25 max. 1300 to 1500 MHz

Input Connector & Impedance — (8762) 7/16 EIA Flg 50 ohms; (8763) 3⅛ Unflg 51.5 ohms; UHF (8562) 7/16 EIA Flg 50 ohms

Weight — 13½ lbs. (6.1 kg) Flg; 13 lbs. (5.9 kg) Unflg

Water Connections — ¼" pipe thread or ¾" hose

Flow Rate — 5°-60°C: 8-10 gpm (30-38 liters/min)

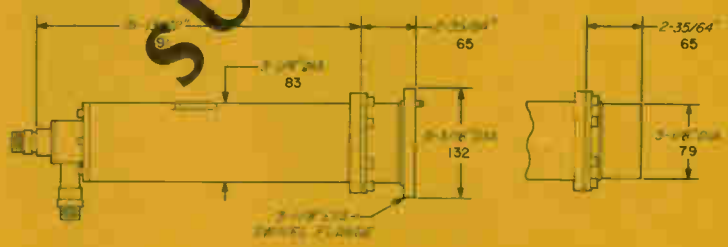
Operating Position — Any

Finish — Bright nickel plated

NOTES Coupling kits and adapters to 1⅝" and 6⅛" line available. See ACCESSORIES section.

*Also 50Ω at dc-1000 Hz for continuity checks and substitution calorimetry.

SUPERSEDED



BIRD TENULINE® RF Coaxial Attenuators

50 ohms nominal

8340•41 model 8343

TENULINE Attenuators are an indispensable tool in the design, production and maintenance stages of communications equipment. Applications include isolation from other components in a test set-up, power reduction for measurement and signal analysis with negligible intermodulation and harmonic generation, and as a comparison standard.

Until the introduction of the High-Power Attenuator, only reactive probes and directional couplers were available for scope signal observation, frequency checks and broad frequency analyses of transmitter output.

TENULINE® High-Power RF Attenuators have several advantages over directional couplers in applications such as Radio Frequency Interference, where a transmitter output must be analyzed for the presence and level of undesirable signal components. First of all, the attenuators are the proper termination for the transmitter and 99.9% of the output power is dissipated in them. No additional load resistors are needed when used as an attenuator, and the units are also self-sufficient when used as dummy loads. Where four individual couplers may be needed to span the range from 30 to 500 MHz, the High-Power Attenuator covers the entire range and below. Obviously the attenuation curve of one resistive device is more uniform than that of four resonant reactive devices.

The most important advantage, though, is the fact that the attenuation can be verified at 60 Hz or with direct current and Wheatstone Bridge measurements. TENULINE Attenuators are laboratory calibrated at six RF frequencies and at DC.

25 W, 40 W, 100 WATTS

Power Rating ① 8340—25 watts cont. duty
8341—② 40 watts cont. duty ①
8343—② 100 watts cont. duty

Input VSWR 1.1 max. dc to 500 MHz
1.15 max. 500 to 1000 MHz

Output VSWR 1.15 max. dc to 1000 MHz

Nominal Attenuation ② 8340-030, 8341-030, 8343-030: 3 dB
8340-060, 8341-060, 8343-060: 6 dB
8340-100, 8341-100, 8343-100: 10 dB
8340-200, 8341-200, 8343-200: 20 dB

Max. Frequency Deviation ± ½ dB dc to 500 MHz
± ¾ dB 500 to 1000 MHz

Ambient Air Temperature Range —40° to +45°C

Connectors QC Type (Female N normally supplied)

Operating Position Any

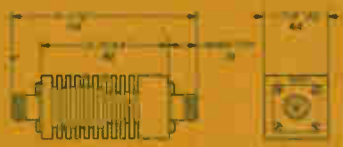
Finish Lusterless Black Enamel (Fed. Spec. TT-E-527)

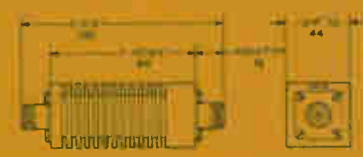
Weight 8340-, 8341-: 12½ to 15 oz (0.4 kg)
8343-: 44 oz (1¼ kg)

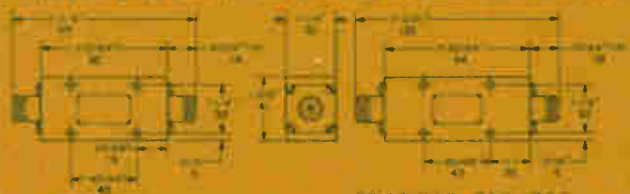
① When mounted on an Aluminum panel ¼" x 400 sq. in. (3 mm x ¼ m²), or equivalent heat sink.

② Add -030, -060, -100 or -200 to the model number for 3, 6, 10 or 20 dB attenuation respectively (e.g. to get a 100 watt 6 dB attenuator, order model 8343-060)

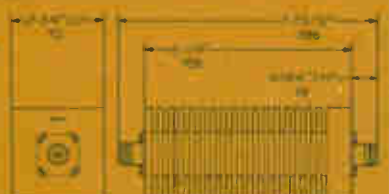

8340-200


8340-100

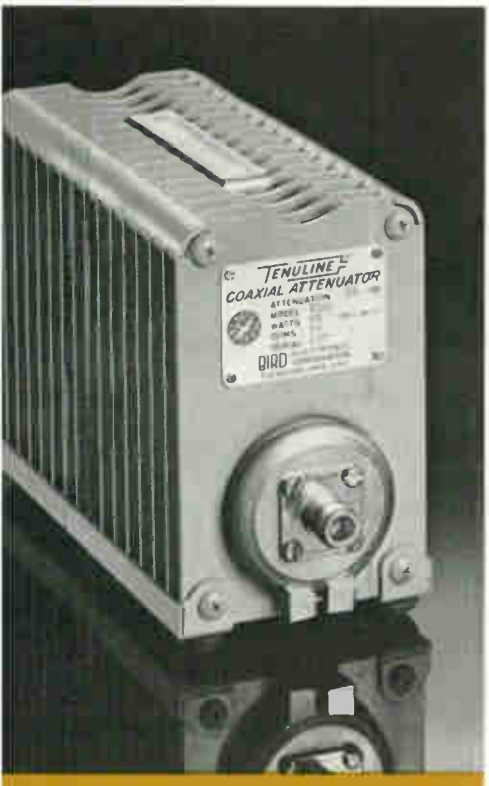

8340-030, -060


8341-100

8341-030, -060, -200

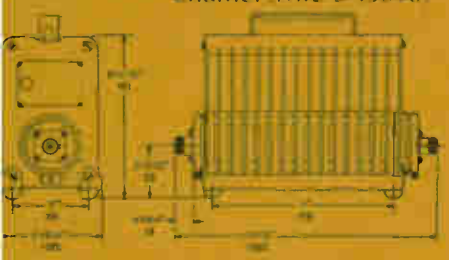

All 8343

model 8321



50 WATTS

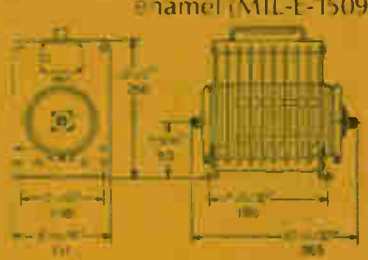
Power Rating ——— 50 watts continuous duty
Input VSWR 1.1 max. dc to 500 MHz
Nominal Attenuation ——— 30 dB
Max. Frequency Deviation ———
± ½ dB dc to 500 MHz
Calibration Frequencies 30, 100, 200, 300, 400, 500 MHz @ ± 0.2 dB
Special calibration to 1000 MHz available at time of order
Ambient Air Temperature Range ——— −40° to + 45°C.
Connectors ——— QC Type (Female N input and output normally supplied)
Weight ——— 6.5 lbs. (3 kg)
Operating Position ——— Horizontal only
Finish ——— Light Navy grey baked enamel (MIL-E-15090)



model 8323

100 WATTS

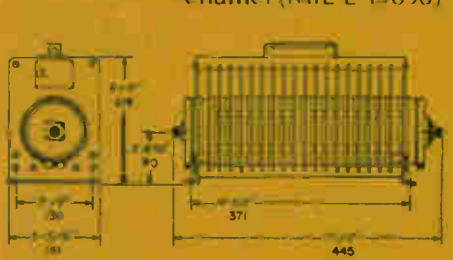
Power Rating ——— 100 watts continuous duty
Input VSWR 1.1 max. dc to 500 MHz
Nominal Attenuation ——— 30 dB
Max. Frequency Deviation ———
± ½ dB dc to 500 MHz
Calibration Frequencies 30, 100, 200, 300, 400, 500 MHz @ ± 0.2 dB
Special calibration to 1000 MHz available at time of order
Ambient Air Temperature Range ——— −40° to + 45°C.
Connectors ——— QC Type (Female N input and output normally supplied)
Weight ——— 11 lbs. (5 kg)
Operating Position ——— Horizontal only
Finish ——— Light Navy grey baked enamel (MIL-E-15090)



model 8322

200 WATTS

Power Rating ——— 200 watts continuous duty
Input VSWR 1.1 max. dc to 500 MHz
Nominal Attenuation ——— 30 dB
Max. Frequency Deviation ———
± ½ dB dc to 500 MHz
Calibration Frequencies 30, 100, 200, 300, 400, 500 MHz @ ± 0.2 dB
Special calibration to 1000 MHz available at time of order
Ambient Air Temperature Range ——— −40° to + 45° C.
Connectors ——— QC Type (Female N input and output normally supplied)
Weight ——— 19 lbs. (9 kg)
Operating Position ——— Horizontal only
Finish ——— Light Navy grey baked enamel (MIL-E-15090)



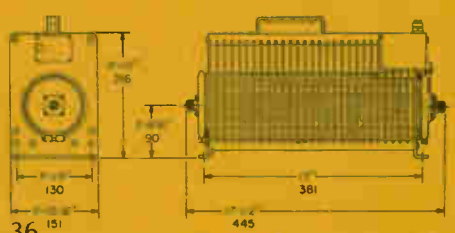
BIRD TENULINE® RF Coaxial Attenuators

50 ohms nominal

model 8325

500 WATTS

Power Rating ——— 500 watts continuous duty
Input VSWR ——— 1.1 max. dc to 500 MHz
Nominal Attenuation ——— 30 dB
Max. Frequency Deviation ±½ dB dc to 500 MHz
Calibration Frequencies ——— 30, 100, 200, 300, 400, 500 MHz @ ± 0.2 dB
Special calibration to 1000 MHz available at time of order
Ambient Air Temperature Range ——— −40° to + 45°C.
Connectors ——— QC Type (Female N input and output normally supplied)
Weight ——— 25 lbs. (11 kg)
Operating Position ——— Horizontal only
Finish ——— Light Navy grey baked enamel (MIL-E-15090)



model 8327

1 KILOWATT

Power Rating ——— 1000 watts continuous duty
Input VSWR ——— 1.1 max. dc to 500 MHz
Nominal Attenuation ——— 30 dB
Max. Frequency Deviation ±½ dB dc to 500 MHz
Calibration Frequencies ——— 30, 100, 200, 300, 400, 500 MHz @ ± 0.2 dB
Special calibration to 1000 MHz available at time of order
Ambient Air Temperature Range ——— −40° to + 45°C.
Connectors ——— QC Type (Female LC input, Female N output normally supplied)
Weight ——— 33 lbs. (45 kg)
Operating Position ——— Horizontal only
Finish ——— Light Navy grey baked enamel (MIL-E-15090)

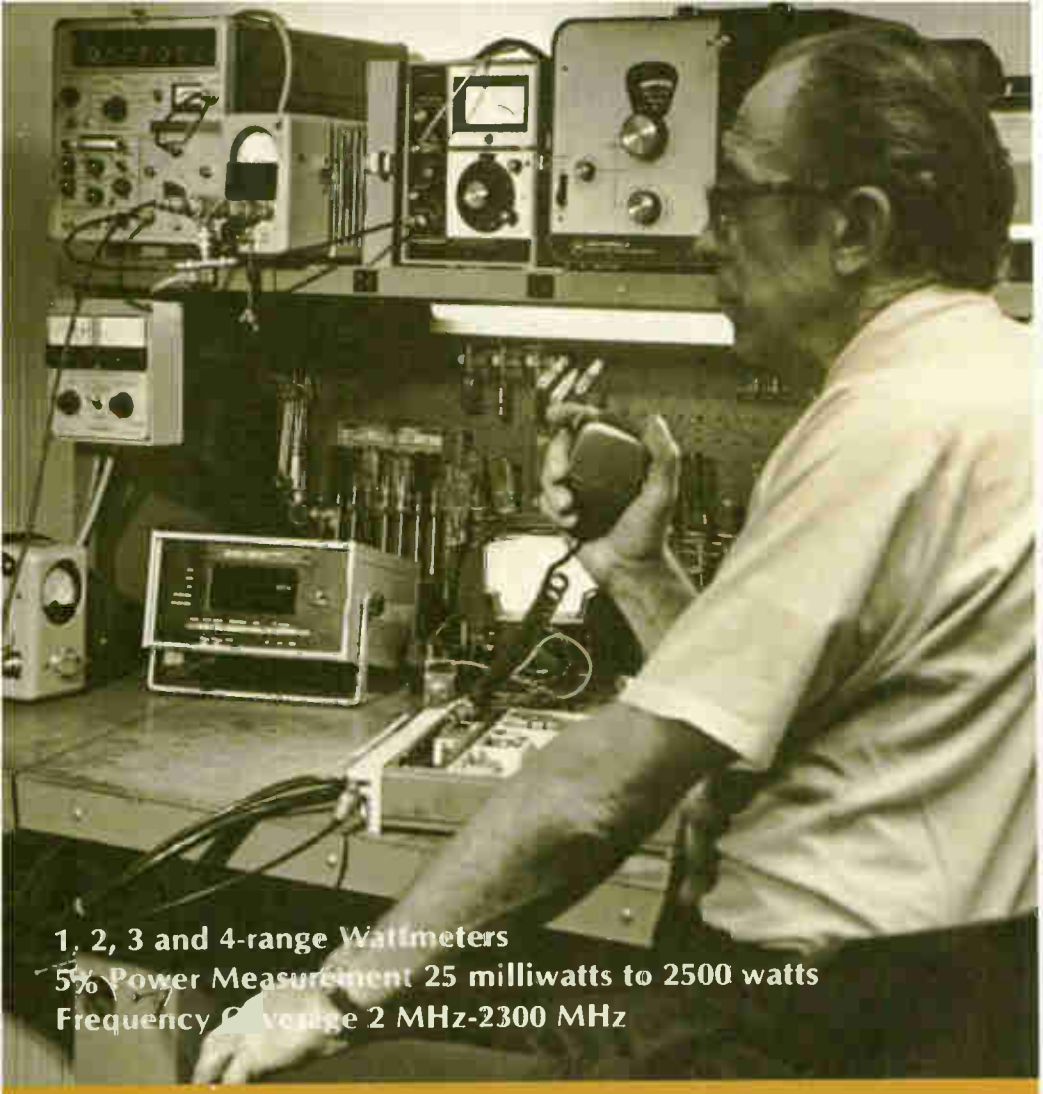
NOTE: Overload Thermoswitch P/N 2450-056 is available

model 8329

2 kW&4 kW

Power Rating* ——— 2000 watts continuous duty
Input VSWR ——— 1.1 max. dc to 500 MHz
Nominal Attenuation ——— 30 dB
Max. Frequency Deviation ± ½ dB dc to 500 MHz
Calibration Frequencies ——— 30, 100, 200, 300, 400, 500 MHz @ ± 0.2 dB
Special calibration to 1000 MHz available at time of order
Ambient Air Temperature Range ——— −40° to + 45°C.
Connectors ——— QC Type (Female LC input, Female N output normally supplied)
Weight ——— 33 lbs. (45 kg)
Operating Position ——— Horizontal only
Finish ——— Light Navy grey baked enamel (MIL-E-15090)

NOTES: Overload Thermoswitch P/N 8890-008 is available
*Power rating is increased to 4000 W when used with accessory blower Model BA-88 See page 27
Dimensions identical to model 8327 to the left



1, 2, 3 and 4-range Wattmeters
5% Power Measurement 25 milliwatts to 2500 watts
Frequency Coverage 2 MHz-2300 MHz

model 6254

TERMALINE® RF Absorption Wattmeters

BIRD TERMALINE® RF Absorption Wattmeters are direct-reading termination instruments for servicing and testing 50 ohm communications systems. Their individual frequency coverage is generally wider than that of a directional wattmeter, and an integral load resistor for the dissipation of line power during measurement offers the additional convenience of a single, compact package.

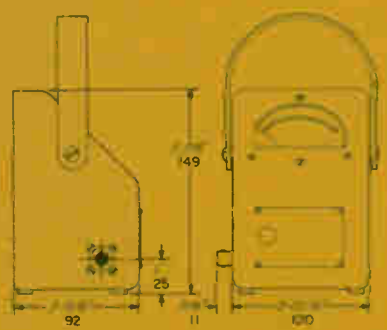
Model 6151 offers a "custom-made" flexibility in power scale and frequency range from 1 watt to 100 watts and from 2 to 2300 MHz. Full scale power is determined by the Element, e.g. selection of a 50B results in a 50 watt TERMALINE Model 6151, 50-125 MHz, which can also be used as a 150 watt termination from dc to 2300 MHz. Choose from Tables 1, 2 or 3 on the foldout page.

selection chart

POWER RATING	POWER SCALES	CALIBRATED FREQUENCY RANGE	MODEL
2 W	25 mW, 50 mW, 100 mW, 250 mW, 500 mW, 1 W, 2 W	30-500 MHz	6254
60 W	5 W, 10 W, 15 W, 20 W, 25 W, 50 W, 60 W	30-500 MHz	611
80 W	10 W, 20 W, 25 W, 40 W, 50 W, 80 W	30-500 MHz	612
80 W	10 W, 20 W, 25 W, 40 W, 50 W, 80 W	30-500 MHz	67
100 W	10 W, 20 W, 25 W, 40 W, 50 W, 100 W	2-2300 MHz	6151
150 W	15 W, 30 W, 50 W, 75 W, 150 W	25-1000 MHz	6154
150 W	15 W, 30 W, 50 W, 75 W, 150 W	2-30 MHz	6155
500 W	50 W, 100 W, 250 W, 500 W	30-500 MHz	67
1000W	100 W, 250 W, 500 W, 1000 W	2-30 MHz	694
1200W	120 W, 250 W, 500 W, 1000 W, 1200 W	30-500 MHz	6835
2500W	250 W, 500 W, 1000 W, 2500 W	30-500 MHz	67C

25mW-2 W

Power Rating ____ 2 watts
Power Scales ____ Choice of 0-25, 0-50, 0-100, 0-250, 0-500, 0-1000 milliwatts, or 2 watts
VSWR ____ 1.15 max. dc to 500 MHz
Frequency Range ____ 30 to 500 MHz
Input Connector ____ Female BNC
Weight ____ 2 lbs. (1 kg)
Accuracy ____ ±5% of full scale
Finish ____ Light Navy grey baked enamel (MIL-E-15090)



BIRD TERMALINE® RF Absorption Wattmeters

50 ohms nominal

611/612

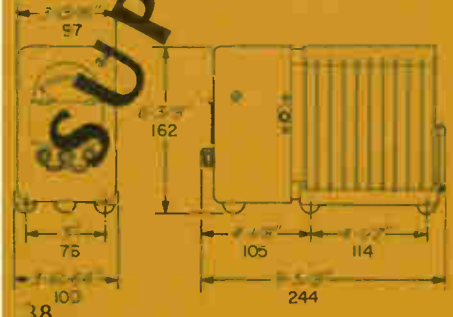
60/80 W

	model 611	612
Power Rating	60 watts	80 watts
Power Scales	0-15W 0-60W	0-20W 0-80W

VSWR ____ 1.1 max. dc to 500 MHz
Frequency Range ____ 30 to 500 MHz
Input Connector ____ Female N
Weight ____ 7 lbs. (3 kg)
Finish ____ Light Navy grey baked enamel (MIL-E-15090)
Accuracy ____ ±5% of full scale

Special calibration to 1000 MHz available at time of order.

Meter Housing can be detached from load for convenient reading with 3' cable. This is a feature of the Models 611, 612, 61, 6151, 6154 and 6155 TERMALINE Wattmeters.



SUPERSEDED

model 6151

100 WATTS

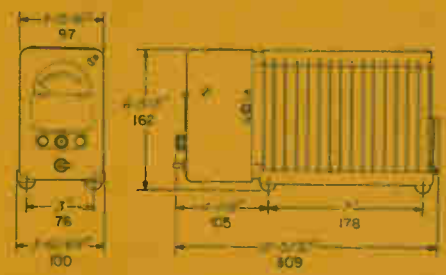
Power Rating ____ 100 watts
Power Scales ____ 0-1/0-2.5/0-5/0-10 0-25/0-50/0-100 watts
VSWR ____ 1.1 max. dc to 1000 MHz 1.25 max. 1000 to 2300 MHz
Frequency Range ____ select any Element from 2 to 2300 MHz and up to 100 watts from Tables 1, 2 or 3 listed with the Model 43 (p. 47A)
Input Connector ____ QC Type (Female N normally supplied)
Weight ____ 8 lbs. (3.6 kg)
Finish ____ Light Navy grey baked enamel (MIL-E-15090)
Accuracy ____ ±5% of full scale

Military Test Set
61S1A (AN/URM-167)
consists of:
1 ea. 6151
2 ea. P/N 433-7 Element 25 watts 1000-1800 MHz
2 ea. P/N 433-8 Element 25 watts 1800-2500 MHz
1 ea. Transit Case P/N 2742-001

model 6156

150 WATTS

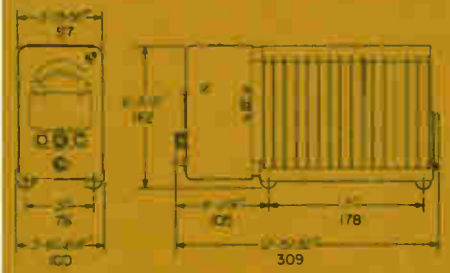
Power Rating ____ 150 watts
Power Scales ____ 0-5/0-15/0-50/ 0-150 watts
VSWR ____ 1.1 max. dc to 500 MHz
Frequency Range ____ 25 to 500 MHz
Input Connector ____ Female N
Weight ____ 8 lbs. (3.6 kg)
Finish ____ Light Navy grey baked enamel (MIL-E-15090)
Accuracy ____ ±5% of full scale 25-500 MHz



model 6154

150 WATTS

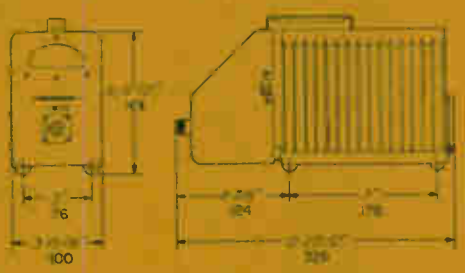
Power Rating ____ 150 watts
Power Scales ____ 0-5/0-15/0-50/ 0-150 watts
VSWR ____ 1.1 max. dc to 1000 MHz
Frequency Range ____ 25 to 1000 MHz
Input Connector ____ Female N
Weight ____ 8 lbs. (3.6 kg)
Finish ____ Light Navy grey baked enamel (MIL-E-15090)
Accuracy ____ ±5% of full scale 25-500 MHz
±10% of full scale 500-1000 MHz



model 6155

150 WATTS

Power Rating ____ 150 watts
Power Scales ____ 0-50/0-150 watts
VSWR ____ 1.1 max. dc to 30 MHz
Frequency Range ____ 2 to 30 MHz
Input Connector ____ QC Type (Female N normally supplied)
Weight ____ 8 lbs. (3.6 kg)
Finish ____ Light Navy grey baked enamel (MIL-E-15090)
Accuracy ____ ±5% of full scale

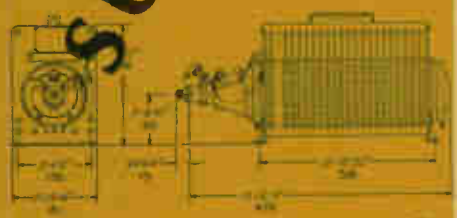


model 67

500 WATTS

Power Rating ____ 500 watts
Power Scales ____ 0-25/0-[illegible] 0-5[illegible] watts
VSWR ____ 1.1 max. dc to 50[illegible] MHz
Frequency Range ____ 30 t[illegible]00 MHz
Input Connector ____ QC Type (Female N normally supplied)
Weight ____ [illegible]s. (11 kg)
Finish ____ Light [illegible]ary grey baked enamel (MIL-E-15090)
Accuracy ____ [illegible]% of full scale
Special calibration to 10[illegible] MHz available at time of order
METER: 4½" meter, shock mounted in aluminum carrying case with 10' (3m) shielded meter cable
Dimensions: (w x h x d) 5⅝" x 6½" x 3⅞" (141 x 165

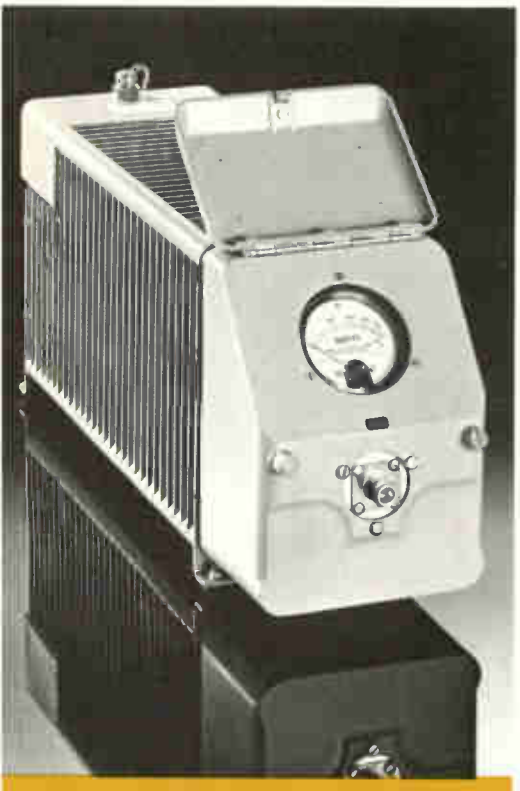
SUPERSEDED



BIRD TERMALINE® RF Absorption Wattmeters

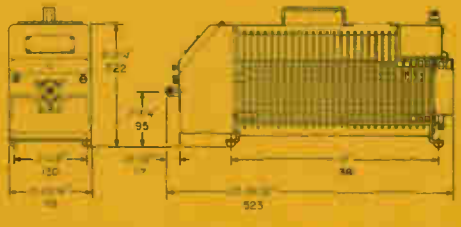
50 ohms nominal

model 694



1000 WATTS

Power Rating ——— 1000 watts
Power Scale ——— 0-1000 watts
VSWR ——— 1.1 max. dc to 30 MHz
Frequency Range ——— 2 to 30 MHz
Input Connector ——— QC Type
(Female N normally supplied)
Weight ——— 29 lbs. (13 kg)
Finish ——— Light Navy grey baked enamel (MIL-E-15090)
Accuracy ——— ± 5% of full scale

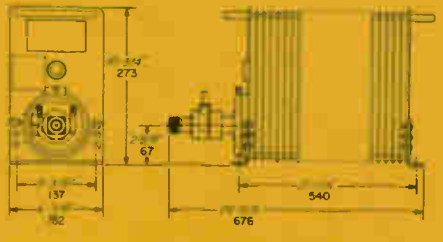


model 6835

1200 WATTS

SUPERSEDED

Power Rating ——— 1200 watts ½ hour; 1000 watts continuous duty
Power Scales ——— 0-120/0-600 /0-1200 watts
VSWR ——— 1.1 max. dc to 500 MHZ
Frequency Range ——— 30 to 500 MHz
Input Connector ——— QC Type
(Female LC normally supplied)
Weight ——— 40 lbs. (18 kg)
Finish ——— Light Navy grey baked enamel (MIL-E-15090)
Accuracy ——— ± 5% of full scale
NOTE: Overload thermoswitch P/N 2950-056 is available.
METER: 4½" meter, shock mounted in aluminum case with 10' (3m) shielded meter cable. Dimensions: (w x h x d) 5⅝" x 6½" x 3⅜" (141 x 165 x 85).

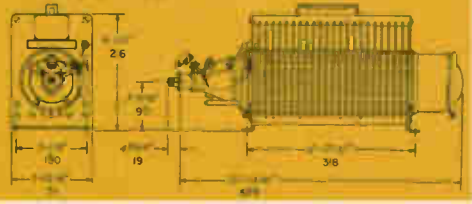


model 67C

2500 WATTS

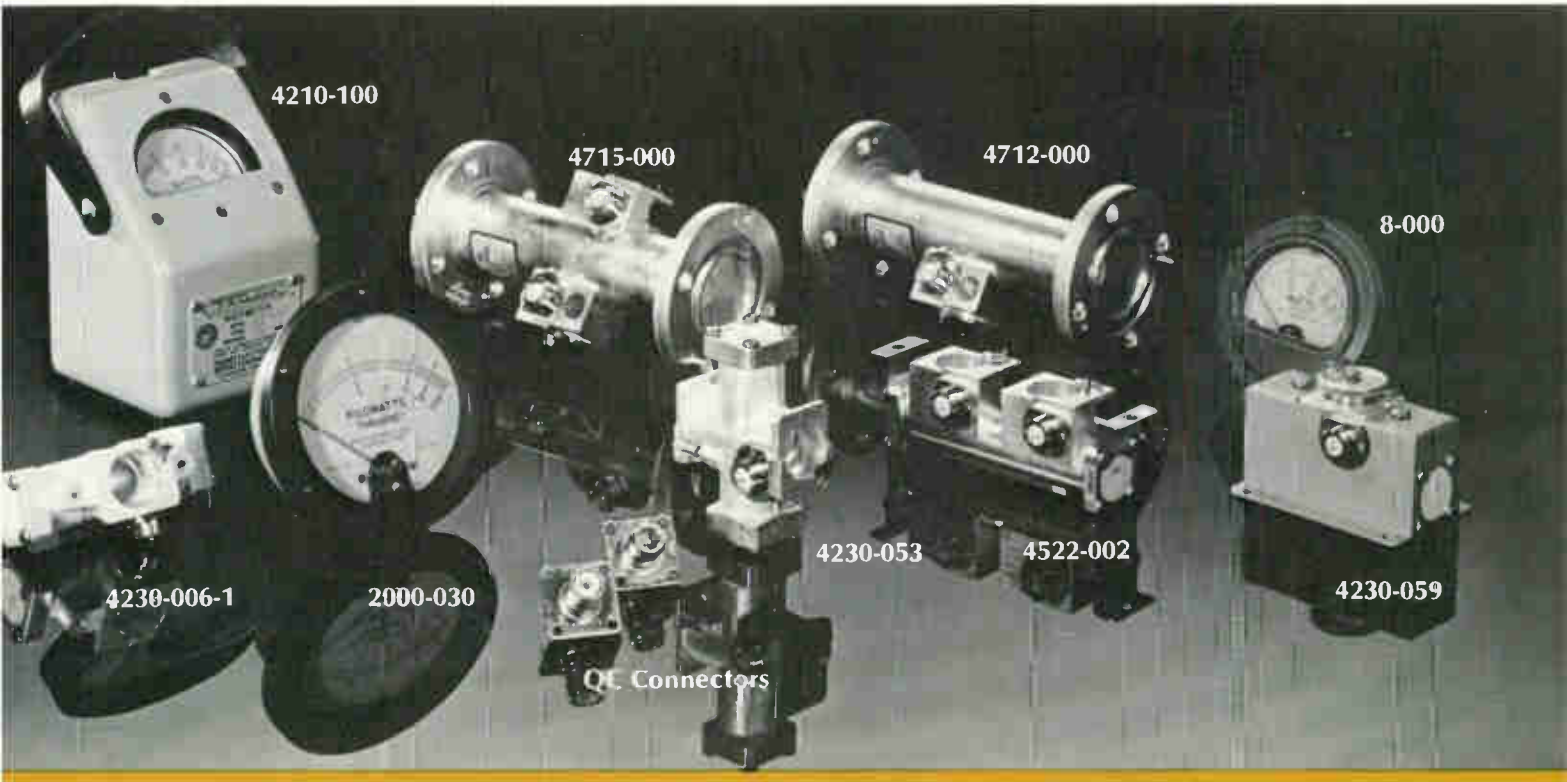
SUPERSEDED

Power Rating ——— 2500 watt with water cooling
Power Scales ——— 0-100/0-500/ 0-2500 watts
VSWR ——— 1.1 max. dc to 500 MHz
Frequency Range ——— 30 to 500 MHz
Input Connector ——— QC Type
(Female N normally supplied)
Weight ——— lbs. (13 kg)
Water Connection ——— ⅜" tubing to accept rubber hose
Flow Rate ——— gpm (2 liters/min)
Operating Position ——— Vertical — connector down above 200 watts when water cooled
Finish ——— ght Navy grey baked enamel (MIL-E-15090)
Accuracy ——— ± 5% of full scale
METER:
Dimensions identical to the meter on the left.
Special calibration to 1000 MHz available at time of order.



BIRD Accessories

Meters & Line Sections 50 ohms nominal



METERS

Bird Part No.	Size	Standard Scales	Meter Sensitivity Microamps
2080-002	3½" Round	25/50/100W	30
2080-005	3½" Square	25/50/100W	30
2150-015	3½" Rectangular	25/50/100W	30
2000-030	4½" Round	5/10/25kW	100
4210-100	In Housing	25/50/100W	30
6810-009-7	In Housing	5/10/25kW	100
8-000	Kit w/Cable	25/50/100W	30

NOTE: 100 microamp meters are used with line sections 7/8" and larger.

50 Ω LINE SECTIONS

51.5Ω or 75Ω LINE SECTIONS AVAILABLE ON SPECIAL ORDER

LINE SECTION PART NUMBERS Single Socket	Double Socket	Connector	Plug-In Elements on Fold-out Page
*4230-006-1	*4230-053	QC-Type	Tables 1-6
*4230-059	*4522-002	QC-Type	
4501-000	4502-000	7/8" EIA Flanged	
4712-000	4715-000	1⅝" EIA Flanged (2-1000MHz)	1⅝
4717-000	4716-000	1⅝" EIA Flanged (960-2200MHz)	Inquire
4600-000	4610-000	3⅛" EIA Flanged	3⅛
4805-000	4802-000	3⅛" Unflanged	3⅛
4902-000	4905-000	6⅛" EIA Flanged	6⅛ 50Ω
4910-000		4½" Flanged	Inquire
4930-000	4931-000	6⅛" EIA Flg 75Ω	6⅛ 75Ω

*Line Section supplied less connectors; specify QC-Type connectors when ordering. (see p. 42).

Portable THRULINE Wattmeters can be custom-assembled from component parts.

1. Triple scale case-mounted meters, i.e. Part No. 4210-100 with a 30μA movement (shown), or Part No. 6810-009-7 with a 100μA movement. Both read directly in watts.
2. Single or double socket Line Sections for either cable or rigid transmission lines. Line Sections for cables accept QC Quick-Change Connectors (see Index) to mate with any common RF connector without performance-degrading adapters. Several permanently installed Line Sections can be used with a single portable meter for maintenance checks at each station.
3. Reversible Plug-In Elements for power and frequency range selection. When ordering, specify the part number of the Line Section as well as the power and frequency range for each element needed.

For non-portable custom installations, choose from the precision panel meters listed. If your application requires other meter makes or styles, consult the factory.

BIRD Accessories

QC-Type (Quick Change) Connectors

FEMALE HN
4240-268

MALE N
4240-063

FEMALE N
4240-062

MALE UHF
4240-179

FEMALE UHF
4240-050

FEMALE LT
4240-018

MALE HN
4240-278

OPEN TERM.
#10-32 NUT
4240-080

1⅝" EIA SWIVEL
4240-208

1⅝" EIA-FIXED
4240-096

MALE LT
4240-012

FEMALE SC
4240-090

FEMALE LC
4240-031

GEN. RADIO
TYPE 874
4240-254

⅞" EIA
4240-002

MALE LC UG-156A/U
4240-138

FEMALE LC
UG-157B/U
4240-149

MALE LC
4240-025

FEMALE BNC
4240-125

MALE BNC
4240-132

MALE TNC
4240-160

FEMALE TNC
4240-156

MALE C
4240-110

FEMALE C
4240-100

FEMALE LC
BULKHEAD
4240-075

Many TERMALINE Load Resistors, Attenuators and Absorption Wattmeters, as well as THRULINE Wattmeters, are equipped with the patented QC-Type QUICK-CHANGE RF Connectors. These models may be ordered with the connector(s) most convenient for use with your equipment. Changes in connectors may be made in the field merely by removing four screws from the connector baseplate, substituting connectors, and replacing the screws. The change from one constant impedance connector to another may be done without affecting the electrical characteristics of the QC-equipped unit.

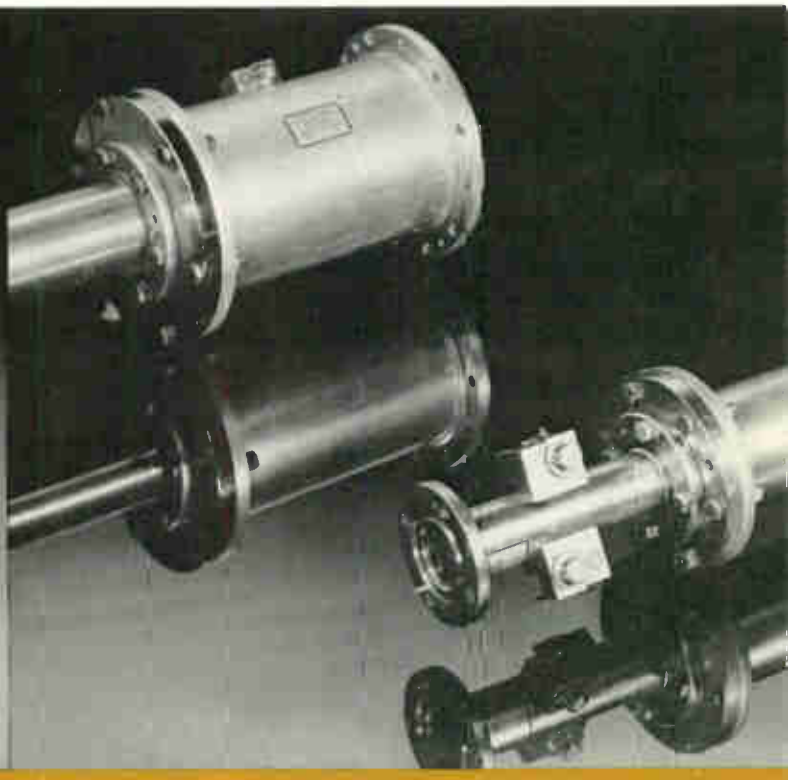
Specifications for each model list the connector type normally supplied when no other is specified. Maximum VSWR values shown in these specifications are obtained with the normally supplied connector.

QC-Type Connectors are also used on some RF Filters and Power Sensors, and on Line Sections.

We recommend ordering QC-Types likely to be required for inter-connection with your equipment in addition to the QC Connector mounted on the BIRD product, to avoid the use of performance-degrading adapters.

(Small QC Connectors—the SQC Series—are listed under model 8431 on page 22)

Adapters, Connectors, Kits



Bird Part Number	Description
4240-165	QC (F) to QC (F) for connecting any two QC-Type Connectors to form a "Between-Series" Adapter
4240-244	QC (F) to QC (M) Right Angle Adapter

RIGID LINE REDUCERS[1]

4240-201	⅞" EIA Flanged to QC-Type Connector
4240-260	1⅝" EIA Flanged to QC-Type Connector
4240-194	3⅛" EIA Flanged to QC-Type Connector
4240-187	3⅛" Unflanged (51.5-ohms) to Connector

STANDARD BETWEEN-SERIES ADAPTERS

	Description	Identification
5-793-2	Male N to Female UHF (SO-239)	UG-146A/U
5-792-2	Female N to Male UHF (PL-259)	UG-83B/U
5-798-1	Male N to Female BNC	UG-201A/U
3730-001	Male LC to Female N	UG-999A/U

COUPLING KITS

Bird Part Number	Description
4240-220	Complete kit for ⅞" EIA Flanged Line
4712-020	Complete kit for 1⅝" EIA Flanged Line
4600-020	Complete kit for 3⅛" EIA Flanged Line
4902-020	Complete kit for 6⅛" EIA Flanged Line
5-289	Coupling kit for 3⅛" Unflanged 51.5-ohm line, including sleeve clamp band, 51.5-ohm bullet, and 50 ohm adapter

[1] These versatile reducers for impedance measurements and other applications where it is desirable to keep reflections to a minimum, exhibit less than 1.05 insertion VSWR up to 1000 MHz.

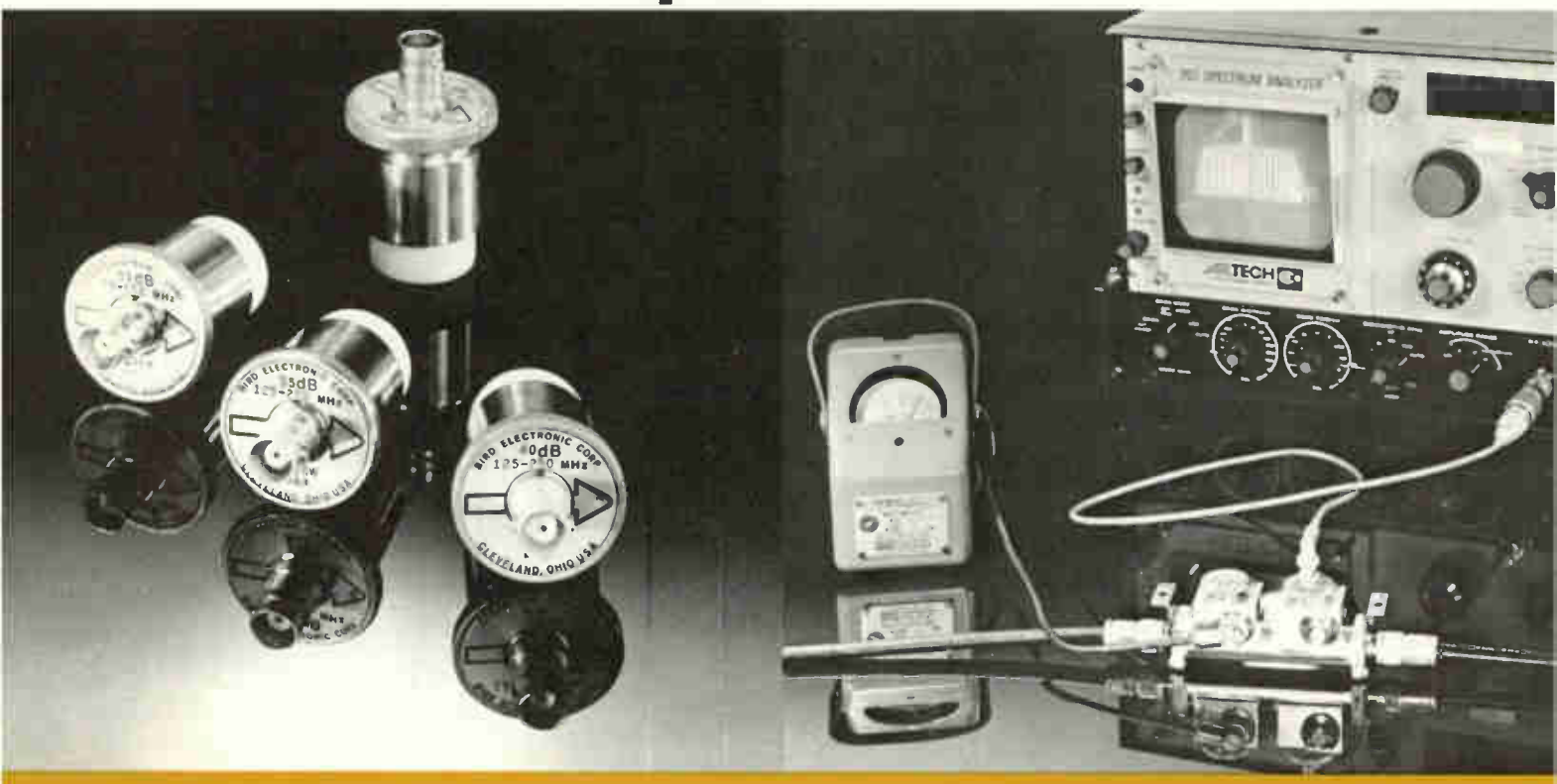
MISCELLANEOUS ADAPTERS AND CONNECTORS

8110-186	CA-8B Male Coplanar to Female N Connector (used on certain obsolete models)
4240-180	Male Coplanar to QC Receptacle, to be used with any QC Connector
7500-076	Standard BIRD Right Angle dc Connector Plug (mates with dc output connector used on BIRD equipment)
4712-015	1⅝" EIA Flanged to ⅞" EIA Flanged line (only ½" long)
4600-025	3⅛" EIA Flanged to 1⅝" EIA Flanged line (only ⅝" long)
4902-025	3⅛" EIA Flanged to 6⅛" EIA Flanged line (only ⅝" long)

The three Adapters between rigid transmission lines of different sizes listed above are unique for their compactness and ease of installation. Two of these Adapters are shown in the right photo, one connecting a 1⅝" double socket line section to a 3⅛" transmission line (P/N 4600-025), and the other adapting a 6⅛" single socket line section to a 3⅛" transmission line (P/N 4902-025). The Adapters are also displayed unassembled in the photo on the left.

BIRD Accessories

Directional Coupler Elements



For Signal Leveling, Frequency Control, Waveshape Monitoring, Local Oscillator or Marker Signal Injection, etc.

Series 4274 RF Directional Coupler Plug-in Elements are similar in design to the many power measuring Elements available for the various 50 ohm THRULINE Wattmeters. They extract a calibrated amount of power from the main line signal flowing in the direction of the arrow. This attenuated signal is NOT rectified (as in the standard measuring Elements), but is brought out through a female BNC connector on top of the Element. Even though the 4274 series Coupler Elements fit the standard sockets, there are no dc output tabs on the Element body since no dc is produced. There is an added convenience to this construction which has not received the deserved attention: Since the couplers are directional, rotating them between 0° and 180° varies the amount of coupling like a variable attenuator. Minimum attenuation of the main line signal is the NOMINAL COUPLING ±1dB shown for each unit within the stated FREQUENCY BAND.

Order by Catalog Number
as listed at right

553 — 125

- 553: dB nominal attenuation ±1dB
- 5: line size
- 125: lower frequency limit—MHz

CATALOG NUMBER	FREQUENCY BAND	NOMINAL COUPLING	MAX. MAIN LINE POWER	
400-50	50-100MHz	-40dB	1,000W	FOR QC-TYPE, CABLE, OR 7/8" EIA LINE*
400-75	75-150	-40dB	1,000W	
400-125	125-250	-40dB	1,000W	
400-225	225-450	-40dB	1,000W	
350-400	400-800	-35dB	500W	
300-750	750-1250	-30dB	100W	
501-50	50-100MHz	-50dB	10,000W	
501-75	75-150	-50dB	10,000W	FOR 1 5/8" EIA LINE
501-125	125-250	-50dB	10,000W	
501-225	225-450	-50dB	10,000W	
451-400	400-800	-45dB	5,000W	
401-750	750-1250	-40dB	1,000W	
553-50	50-100MHz	-55dB	25,000W	
553-75	75-150	-55dB	25,000W	FOR 3 1/8" EIA LINE
553-125	125-250	-55dB	25,000W	
553-225	225-450	-55dB	25,000W	
503-400	400-800	-50dB	15,000W	
503-750	750-1250	-50dB	10,000W	
606-50	50-100MHz	-60dB	50,000W	FOR 6 1/8" EIA LINE
606-75	75-150	-60dB	50,000W	
606-125	125-250	-60dB	50,000W	
606-225	225-450	-60dB	50,000W	
556-400	400-800	-55dB	25,000W	

*New, Wide-Range non-directional RF Sampler Element model 4274-025 covers 2—1000 MHz. Approximate signal-sample levels are -50dB ±2dB from 1000 MHz to 25 MHz, decreasing to -66dB at 2 MHz. Max. Main Line Power is 500 W.

BIRD Accessories
COAXWITCH® Coaxial Selector Switches
50 ohms nominal

description:
BIRD COAXWITCH Coaxial Selector Switches employ a unique rugged and reliable design which permits positive contact, low insertion VSWR and negligible cross talk between channels. The switching mechanism is 4½" of RG-87/U Teflon cable which is pulled away from the mating Male N connectors and rotated to the desired switch position. 75 ohm versions of all models shown available on special order.

installation:
BIRD Switches may be panel-mounted. All connectors are located on the rear of the housing and are parallel to the shaft of the switch. All connecting cables may be laced together without the use of right-angle adapters.

operation:
BIRD Switches have the valuable advantage that they cannot be operated accidentally, but must be operated by intentional sequential movement. The knob must be grasped, pulled out, rotated, and pushed in to make contact.

SWITCHING CONFIGURATIONS

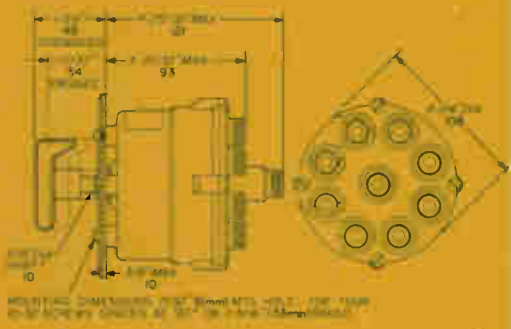
MODEL	7422	7441	7431	74	718	7181	72-2	72-R
POSITIONS	2	3	4	6	8	10	2	reversible
COAXIAL CIRCUITS	1	1	1	1	1	1	2	2

TYPICAL OPERATING VALUES

Frequency	VSWR	Insertion Loss	Maximum RF Power Rating at +65°C.
100 MHz	negligible	.02 dB	850 watts
1000 MHz	1.06 max.	.09 dB	200 watts
4000 MHz	1.30 max.	.22 dB	75 watts

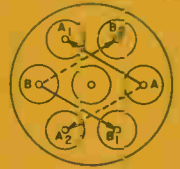
SPECIFICATIONS (all models)

Useful Frequency Range	dc to 10 GHz
Maximum RF Voltage	500 volts rms
Attenuation to Unused Channel	75 dB (cross talk)
Ambient Temperature Range	−60° to +65°C.
Weight	2½ lbs (approx.) (1 kg)

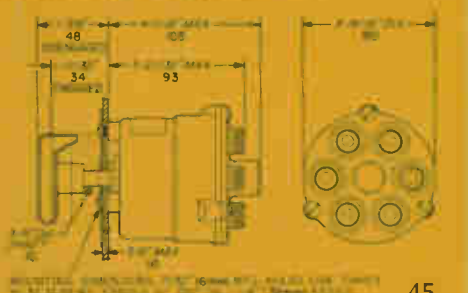


two-circuit, reversing switch
model 72-R

single-circuit, six-position
model 74



two-circuit, two-position
model 72-2



BIRD 75-ohm Equipment
TERMALINE® RF Coaxial Load Resistors

8040•41

5 WATTS

DRY LOADS

Power Rating ——— 5 watts continuous duty

VSWR ——— 1.1 max. dc to 1000 MHz
1.15 max. 1000 to 2000 MHz
1.2 max. 2000 to 4000 MHz

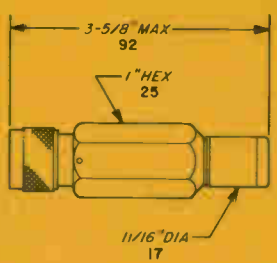
Ambient Air Temperature Range ——— −40° to +45°C.

Input Connector ——— (8040) Female N
(8041) Male N

Weight ——— (8040) 5¾ oz. (160 g)
(8041) 6¾ oz. (190 g)

Operating Position ——— Any

Finish ——— Lusterless black enamel (Fed. Spec. TT-E-527)



8087•88

25 WATTS

DRY LOADS

Power Rating ——— 25 watts continuous duty

VSWR ——— 1.1 max. dc to 1000 MHz
1.15 max. 1000 to 2000 MHz
1.25 max. 2000 to 3000 MHz

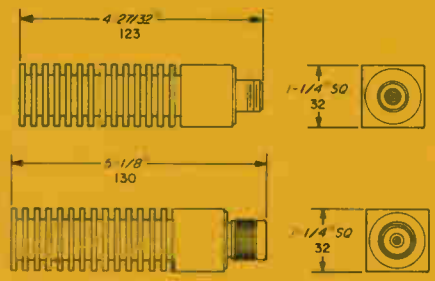
Ambient Air Temperature Range ——— −40° to + 45°C.

Input Connector ——— (8087) Female N
(8088) Male N

Weight ——— (8087) 7¾ oz. (220 g)
(8088) 8 oz. (227 g)

Operating Position ——— Any

Finish ——— Lusterless black enamel (Fed. Spec. TT-E-527)



model 8167

100 WATTS

DRY LOAD

Power Rating ——— 100 watts continuous duty

VSWR ——— 1.1 max. dc to 1000 MHz
1.15 max. 1000 to 1500 MHz
1.25 max. 1500 to 2500 MHz

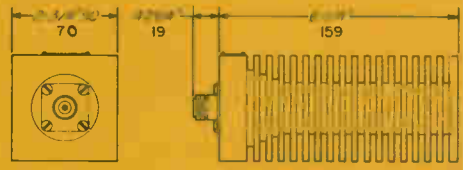
Ambient Air Temperature Range ——— −40° to +45°C.

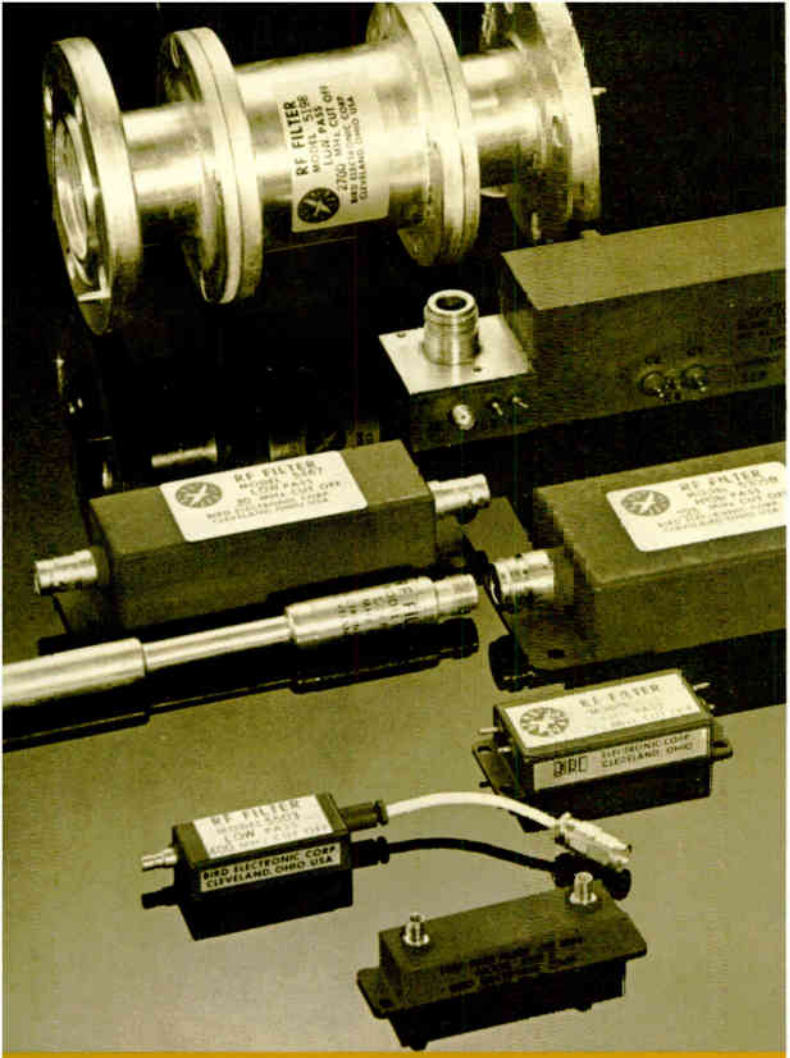
Input Connector ——— QC Type (Female N normally supplied)

Weight ——— 3 lbs. (1.4 kg)

Operating Position ——— Any

Finish ——— Lusterless black enamel (Fed. Spec. TT-E-527)





THRULINE® RF Power Sensors

Coaxial RF Filters

SENTRILINE® Filter Couplers

Ideally, coaxial filters are linear, lossless and passive frequency discriminating devices, equivalent to a tran mission line of 50 ohms impedance in the passband and t an open or short circuited line in the stopband. (Inciden power at stopband frequency is reflected back t the transmitter).

BIRD engineers have decades of experience in designin transmission line filters in the propinquity* of the idea A handful of examples with typical cardinal specification and transmission profiles on the following pages illustrate the diversity of our efforts. A wide selection of parameter permits the best electrical performance within a specifie physical envelope.

Listed on the Inquiry Forms in the back of this catalog i the design information required to meet your particula application. These parameters are interrelated and any on specification may be optimized. An engineer will b assigned to your inquiry to guide it through personal co sultations to an acceptable proposal and throughout th manufacturing phase.

The same knowledgable staff carries responsibility for th hundreds of models of RF Power Sensors, such as the fe pictured on the next page. These directional couplers wit dc or RF outputs are custom designed for incorporation i your transmitter or test equipment at the time o manufacture. THRULINE Power Sensors with one, tw three, four or five sampling ports on the 50-ohm block hav been used for relay operation for transmitter protectio feed back for output leveling, video scope display, percen modulation measurement, initial tuning with low-powe elements coupled with two higher power (10 times elements for operational indication, frequency checks, a well as for directional power measurement.

The selection of parameters includes the number of RF c dc output ports, type of RF and dc connectors, output vo tage, load resistance and, of course, frequency range. C you may prefer a space-saving combination of a Powe Sensor and a Filter—our SENTRILINE® Filter Coupler—an even add a fast-acting transmit/receive RF switch.

We hope that the inviting examples illustrated here wi motivate you to contact BIRD first when your design call for an RF filter, sensor or both.

*within a hair's breadth

BIRD 75-ohm Equipment
THRULINE® RF Directional Wattmeters

models 4307-4317

	Model 4307	Model 4317
ower Rating	25-5000 W max., CW	25-5000 W, peak or CW
ccuracy Average (CW) Mode:	± 5% of full scale	± 5% of full scale
Peak Pulse or Envelope Power Mode:		± 8% of full scale
/eight	3 lbs. (1.4 kg)	4 lbs. (1.8 kg)
lement Weight	3 oz. (85 g)	
nsertion VSWR with N Connectors	1.05 max.	
inish	Light Navy Grey Baked Enamel (MIL-E-15090)	

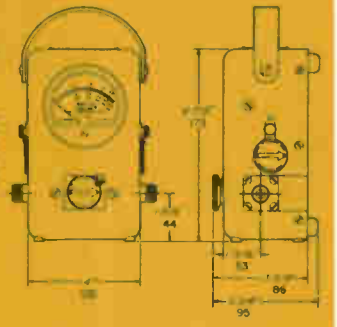
IODEL 4307 measures CW and is functionally the 75-ohm equivalent of the iodel 43, while model 4317 is the 75-ohm version of model 4311. As such, it ieasures practically any type of 75-ohm transmission—pulsed, FM or CW, and eak envelope power (PEP) of SSB or AM signals. Model 4317 operates on re-laceable batteries.

lements on this page are designed exclusively for models 4307 and 4317.

75Ω ELEMENTS (CATALOG NUMBERS)

ower ange	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
25 watts	—	75-25A	75-25B	75-25C	75-25D	75-25E
50 watts	—	75-50A	75-50B	75-50C	75-50D	75-50E
00 watts	75-100H	75-100A	75-100B	75-100C	75-100D	75-100E
50 watts	75-250H	75-250A	75-250B	75-250C	75-250D	75-250E
00 watts	75-500H	75-500A	75-500B	75-500C	75-500D	75-500E
00 watts	75-1000H					
00 watts	75-2500H					
00 watts	75-5000H					

Optional Cases Cowhide Carrying Case CC-1, Plug-in Element Carrying Case EC-1.



ulse parameters (model 4317)

Square Pulses:	Gaussian Pulses:
in. duty factor: 1×10^{-4}	Min. duty factor: 3.5×10^{-4}
in. repetition rate: 30 pps	Min. repetition rate: 30 pps

in. base pulse width (at 10% of height)

0.4 µsec. 100-2300 MHz	3 µsec. 26-2300 MHz
1.5 µsec. 26-99 MHz	15 µsec. 2-25 MHz
15 µsec. 2-25 MHz	

model 4930

6-1/8" LINE

Impedance 75 ohms nominal
Insertion VSWR 1.05 max.
Connector 6⅛" EIA flanged
Weight (line section) 13 lbs. (6 kg)
(meter) 5 lbs. [illegible] kg)
Accuracy ±5% of full scale

METER: 4½" meter, shock mounted in aluminum carrying case with 10' (3m) shielded meter cable

Dimensions (w x h x d) 5⅝" x 6½" x 3⅜" (141 x 165 x 85)

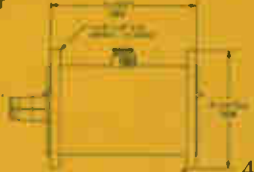
ELEMENTS FOR MODEL 4930

Power Range	Catalog No.
[illegible]kW	75-5KE6
10kW	75-10KE6
[illegible]kW	75-25KE6
50kW	75-50KE6

OBSOLETE

Model 4930 is the 75Ω version of Model 4902, designed primarily for UHF-TV transmitters. When ordering, specify transmitter frequency (channel) between 470-890MHz. Model 4931 is a double-socket unit for simultaneous or switched measurement of both forward and reflected power. Double-socket Line Section P/N 4931-000 is for use with Wattchek® RF Power Monitor/Alarm.

Supplied with one bullet: P/N 4930-021.



Plug-In Elements for THRULINE® Wattmeters

50 ohms nominal

cable-connector equipped

Table 1 STANDARD ELEMENTS (CATALOG NUMBERS)

Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
5 watts	—	5A	5B	5C	5D	5E
10 watts	—	10A	10B	10C	10D	10E
25 watts	—	25A	25B	25C	25D	25E
50 watts	50H	50A	50B	50C	50D	50E
100 watts	100H	100A	100B	100C	100D	100E
250 watts	250H	250A	250B	250C	250D	250E
500 watts	500H	500A	500B	500C	500D	500E
1000 watts	1000H	1000A	1000B	1000C	1000D	1000E
2500 watts	2500H					
5000 watts	5000H					

Table 2 LOW-POWER ELEMENTS

1 watt	Cat. No.	2.5 watts	Cat. No.
60-80 MHz	060-1	60-80 MHz	060-2
80-95 MHz	080-1	80-95 MHz	080-2
95-125 MHz	095-1	95-150 MHz	095-2
110-160 MHz	110-1	150-250 MHz	150-2
150-250 MHz	150-1	200-300 MHz	200-2
200-300 MHz	200-1	250-450 MHz	250-2
275-450 MHz	275-1	400-850 MHz	400-2
425-850 MHz	425-1	800-950 MHz	800-2
800-950 MHz	800-1		

Table 3 HIGH-FREQUENCY ELEMENTS (CATALOG NUMBERS)

Power Range	Frequency Bands (MHz) 950-1260	1100-1800	1700-2200	2200-2300
1 watt	1J	1K	1L	1M
2.5 watts	2.5J	2.5K	2.5L	2.5M
5 watts	5J	5K	5L	5M
10 watts	10J	10K	10L	10M
25 watts	25J	25K	25L	25M
50 watts	50J			
100 watts	100J			
250 watts	250J			

Table 4 LOW-FREQUENCY ELEMENTS (CATALOG NUMBERS)

Power Range	Frequency Band .45 to 2.5 MHz
1000 watts	1000P
2500 watts	2500P
5000 watts	5000P
10000 watts	10000P

Table 5 HIGH-POWER ELEMENTS (Peak only)

Power Range	Frequency Bands (MHz) 25-60	50-125	100-250	200-500	400-1000	950-1260
500 watts	—	—	—	—	—	500J
1000 watts	—	—	—	—	—	1000J
2500 watts	2500A	2500B	2500C	2500D	2500E	2500J
5000 watts	5000A	5000B	5000C	5000D	5000E	5000J
10000 watts	10000A	10000B	10000C	10000D	10000E	

Table 6 MILLIWATT ELEMENTS

100 mW	Cat. No.	250 mW	Cat. No.	500 mW	Cat. No.
72-76 MHz	430-2	70 MHz	430-34	72-76 MHz	430-33
108-118 MHz	430-6	72-76 MHz	430-22	105-120 MHz	430-36
136 MHz	430-9	108-118 MHz	430-24	240-290 MHz	430-27
174 MHz	430-10	130-150 MHz	430-13	329-328 MHz	430-28
328-336 MHz	430-3	150-180 MHz	430-15	455-470 MHz	430-30
400 MHz	430-7	328-336 MHz	430-16		
470 MHz	430-8	1700-1750 MHz	430-17		

rigid line series

1-5/8" LINE

STANDARD ELEMENTS (CATALOG NUMBERS)*

Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
250 watts		250A1	250B1	250C1	250D1	250E1
500 watts		500A1	500B1	500C1	500D1	500E1
1000 watts	1000H1	1000A1	1000B1	1000C1	1000D1	1000E1
2500 watts	2500H1	2500A1	2500B1	2500C1	2500D1	2500E1
5000 watts	5000H1	5000A1	5000B1	5000C1	5000D1	5000E1
10 kW	10KH1	10KA1	10KB1			
25 kW	25KH1	*When ordering, specify catalog number and line section model number.				

3-1/8" LINE

STANDARD ELEMENTS (CATALOG NUMBERS)*

Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
1000 watts		1000A3	1000B3	1000C3	1000D3	1000E3
2500 watts		2500A3	2500B3	2500C3	2500D3	2500E3
5000 watts	5000H3	5000A3	5000B3	5000C3	5000D3	5000E3
10 kW	10KH3	10KA3	10KB3	10KC3	10KD3	10KE3
25 kW	25KH3	25KA3	25KB3	25KC3	25KD3	25KE3
50 kW	50KH3	*When ordering, specify catalog number and line section model number.				
100 kW	100KH3					

6-1/8" LINE

50 ohms nominal

STANDARD ELEMENTS (CATALOG NUMBERS)*

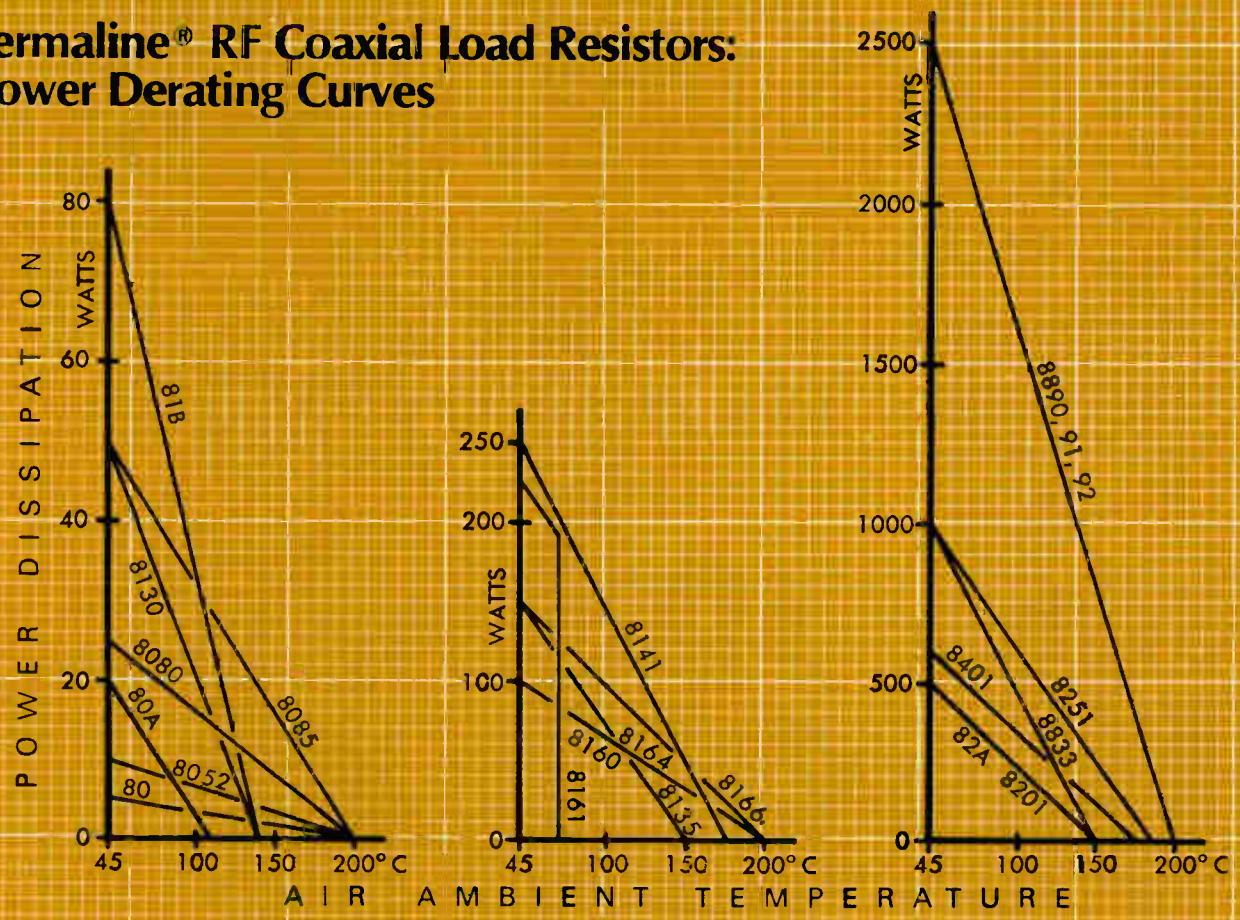
Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
2500 watts		2500A6	2500B6	2500C6	2500D6	2500E6
5000 watts		5000A6	5000B6	5000C6	5000D6	5000E6
10 kW		10KA6	10KB6	10KC6	10KD6	10KE6
25 kW	25KH6	25KA6	25KB6	25KC6	25KD6	25KE6
50 kW	50KH6	50KA6	50KB6	50KC6	50KD6	50KE6
100 kW	100KH6	*When ordering, specify catalog number and line section model number.				
250 kW	250KH6					

100 WATT REPLACEMENT ELEMENTS FOR LAB STANDARD MODEL 4340 (page 16)

Cat. No.	Frequency Range MHz
Q100A	2-10
Q100B	10-30
Q100C	30-100
Q100D	100-500
Q100E	500-1000

Tech Data

Termaline® RF Coaxial Load Resistors: Power Derating Curves



Typical Peak Power Ratings

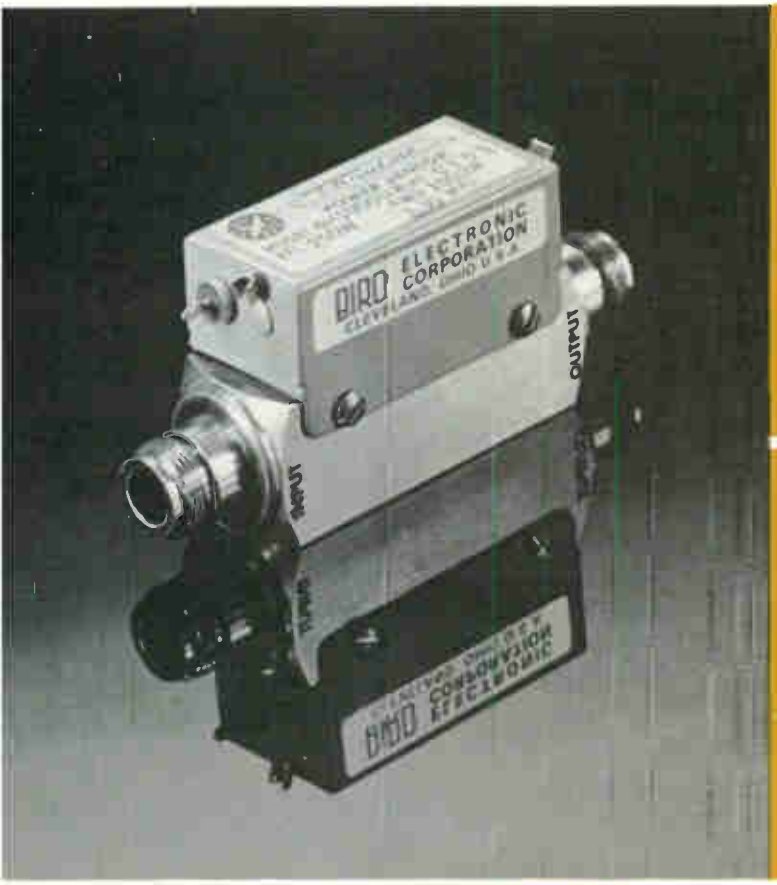
MODELS	AVG. POWER	PULSE WIDTH (MICROSECONDS) 1	10	100	1000	5000	10,000
DRY DIELECTRIC LOADS							
80M-80F	5W	4kW	3.1kW	2.2kW	1.4kW	0.8kW	0.5kW
8052-8053	10W	10kW	7.6kW	5.2kW	2.8kW	1.2kW	0.5kW
8080	25W	10kW	7.6kW	5.2kW	2.8kW	1.2kW	0.5kW
8160-8164	100W	35kW	26.5kW	18.2kW	10kW	4.0kW	1.5kW
LIQUID DIELECTRIC LOADS							
8130-81B-8135	50-80-150W	10kW	8.0kW	5.75kW	3.5kW	2.0kW	1.5kW
*8135	150W	35kW	26.5kW	18.2kW	10kW	4.0kW	1.5kW
8201	500W	200kW	150kW	105kW	57kW	25kW	10kW
8251	1000W	200kW	150kW	105kW	57kW	25kW	10kW
8890-8891-8892	2500W	200kW	150kW	105kW	57kW	25kW	10kW
DIRECT WATER COOLED LOADS							
8710-8714	1kW	10kW	7.75kW	5.5kW	3.2kW	1.75kW	1kW
8720-8723	5kW	35kW	27.5kW	20kW	12.5kW	7.0kW	5kW
8732-8736	10kW	100kW	77kW	56kW	32kW	16kW	10kW
8742-8743	15kW	250kW	185kW	125kW	70kW	30kW	15kW
8752-8753	25kW	250kW	190kW	135kW	75kW	40kW	25kW
8762-8763	50kW	250kW	197kW	145kW	97kW	65kW	50kW

*Special High Peak Power Resistor is used.
NOTE: Duty factor should be such that the average power rating of the load is never exceeded.

Fold-out

BIRD THRULINE® RF Power Sensors

50 ohms nominal



Model 4152B

Frequency Range: 60-150 MHz
Power Rating: 3.3kW FWD & RFL
VSWR: 1.1:1 max
Connectors: Input-C/F Output-LT/F
DC Connectors: TPS/F
DC Output: 1.5V@ 5k ohms

Model 4162D

Frequency Range: 220-405 MHz
Power Rating: 40 watts FWD & RFL
VSWR: 1.1:1 max
Connectors: Input-BNC/F Output-C/F
DC Connectors: Cannon #DE-9S
DC Output: 100 μA@ 5k ohms

If quantity requirements are such that a custom design is not justified, we recommend our field-proven stock design. Shown above and on Table A below, these STANDARD UNITS deliver dc currents proportional to forward and reflected power in the main line. These units work with any 1400 ohm load, but can also be used with our 30 micro-ampere meter P/N 2080-002 (page 41).

Table A

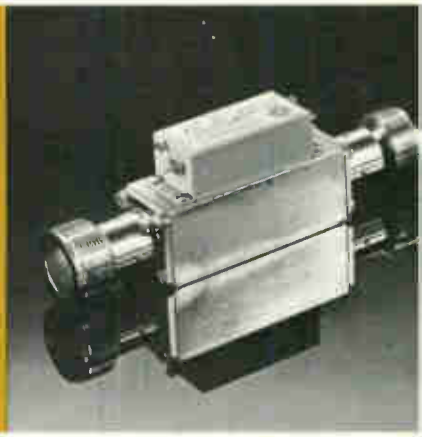
STANDARD UNITS (CATALOG NUMBERS)

Power Ranges (Fwd/Refl)	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
5/5W		4A5	4B5	4C5	4D5	4E5
10/10	4H10	4A10	4B10	4C10	4D10	4E10
25/10	4H25	4A25	4B25	4C25	4D25	4E25
50/10	4H50	4A50	4B50	4C50	4D50	4E50
100/25	4H100	4A100	4B100	4C100	4D100	4E100
250/50	4H250	4A250	4B250	4C250	4D250	4E250
500/100	4H500	4A500	4B500	4C500	4D500	4E500
1000/250	4H1000	4A1000	4B1000	4C1000	4D1000	4E1000

Supplied as follows:
RF Input ..... N (F)
DC Output ..... N (F)
DC Connector ..... Solder Lugs
Meter Sensitivity ..... 30 Microamperes
Resistance ..... 1400 ohms

Model 4168F

Frequency Range: 225-400 MHz
Power Rating: 2kW FWD 200 watts RFL
VSWR: 1.1:1 max
Connectors: Input and Output QC-LC/F
DC Connectors: DC By Pass
DC Output: 200 μA@ 520 ohms



Model 4163D

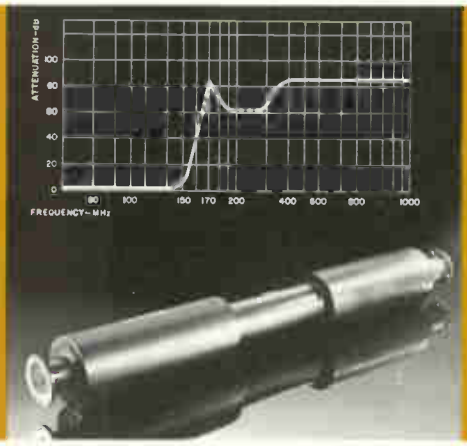
Frequency Range: 225-400 MHz
Power Rating: 10 watts FWD & RFL
VSWR: 1.1:1 max
Connectors: Input and Output MB/F
DC Connectors: DC By Pass
DC Output: 1.0V@ 5.1k ohms

BIRD Coaxial RF Filters and

50 ohms nominal

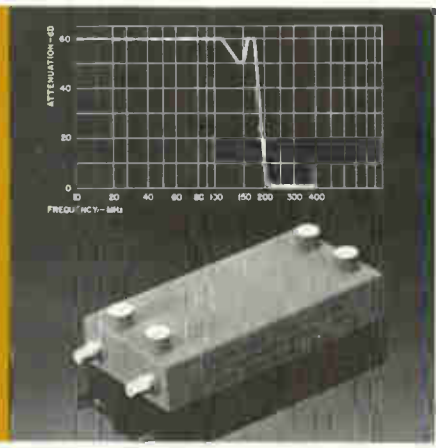
LOW-PASS FILTER Model 5179

Passband: 88-108 MHz
Stopband: 176-1000 MHz
Attenuation: 60dB
Power Rating: 50kW
Insertion Loss: 0.1dB max
VSWR: 1.15:1 max
Temperature Range:
−40°C to +50°C
Weight: 92 lbs (42kg)



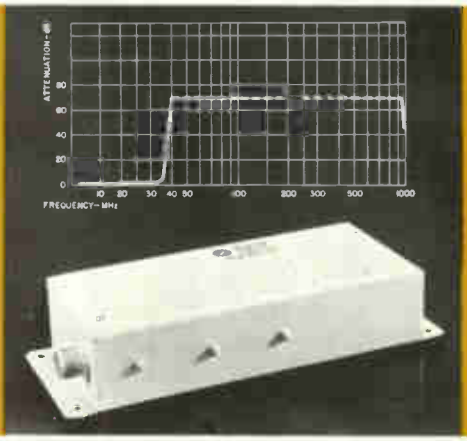
HIGH-PASS FILTER Model 5307

Passband: 225-400 MHz
Stopband: 10-170 MHz
Power Rating: 10 watts
Insertion Loss: 0.5dB max
VSWR: 1.4:1 max
Temperature Range:
−55°C to +125°C
Weight: 3 oz (85g)



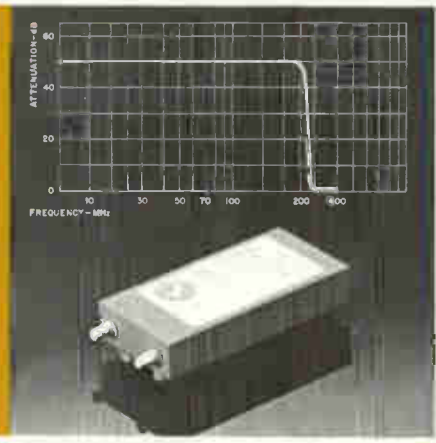
LOW-PASS FILTER Model 5315

Passband: 2-30 MHz
Stopband: 40-1000 MHz
Attenuation: 60dB
Power Rating: 1kW
Insertion Loss: 0.5dB max
VSWR: 1.3:1 max
Temperature Range:
−65°C to +85°C
Weight: 3½ lbs (1½ kg)



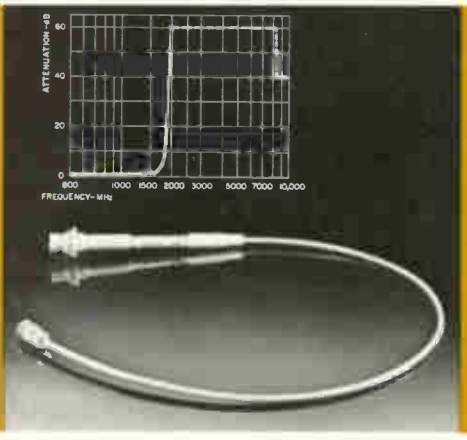
HIGH-PASS FILTER Model 5309

Passband: 310-400 MHz
Stopband: 10-270 MHz
Power Rating: 10 watts
Insertion Loss: 1dB max
VSWR: 1.50:1 max
Temperature Range:
−55°C to +105°C
Weight: 3 oz (85 g)



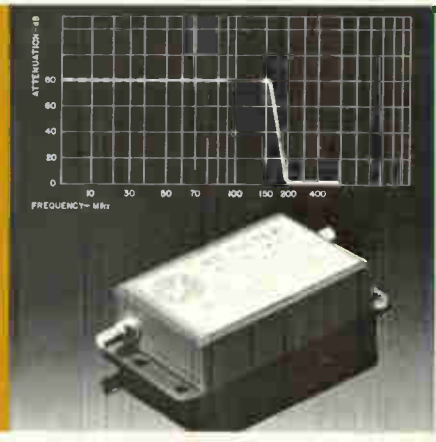
LOW-PASS FILTER Model 5181

Passband: 960-1220 MHz
Stopband: 2000-8000 MHz
Power Rating: 10 watts
Insertion Loss: 0.5dB max
VSWR: 1.4:1 max
Temperature Range:
−55°C to +105°C
Weight: 3½ oz (100g)



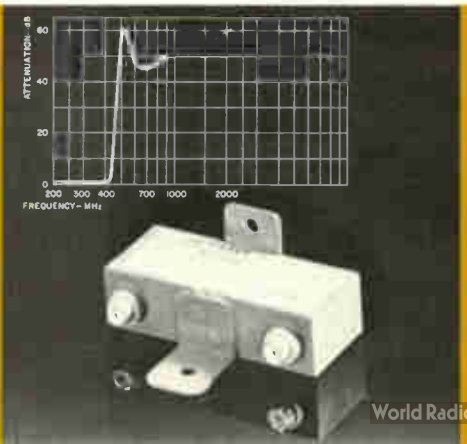
HIGH-PASS FILTER Model 5543

Passband: 225-400 MHz
Stopband: 10-160 MHz
Power Rating: 30 watts
Insertion Loss: 0.4dB max
VSWR: 1.4:1 max
Temperature Range:
−55°C to +105°C
Weight: 2 oz (57g)



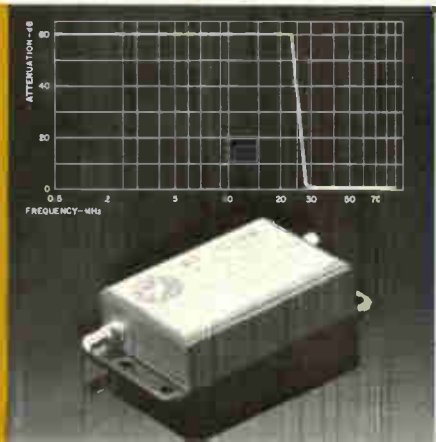
LOW-PASS FILTER Model 5412

Passband: 225-400 MHz
Stopband: 450-1200 MHz
Power Rating: 2.5 watts
Insertion Loss: 0.4dB max
VSWR: 1.3:1 max
Temperature Range:
−30°C to +100°C
Weight: 2 oz (57 g)



HIGH-PASS FILTER Model 5544

Passband: 30-76 MHz
Stopband: 2-25 MHz
Power Rating: 30 watts
Insertion Loss: 0.7dB max
VSWR: 1.4:1 max
Temperature Range:
−55°C to +105°C
Weight: 2 oz (57g)

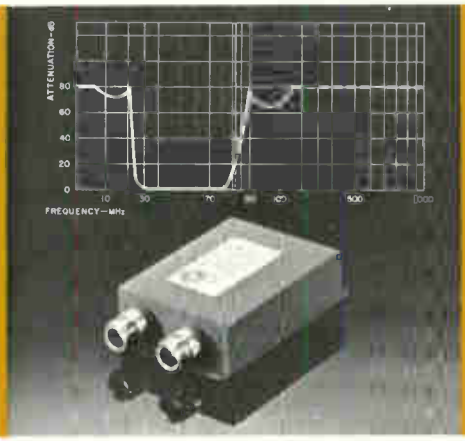


BIRD SENTRILINE® Filter Couplers

50 ohms nominal

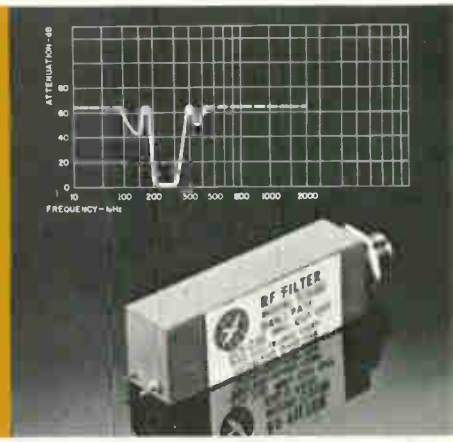
BAND-PASS FILTER Model 5359B

Passband: 70-76 MHz
Lower Stopband: 60dB min @ 0.5-20 MHz
Upper Stopband: 60dB min @ 96-1000 MHz
Power Rating: 50 watts
Insertion Loss: 0.75 dB max
VSWR: 1.5:1 max
Temperature Range: −55°C to + 105°C
Weight: 9.2 oz (261g)



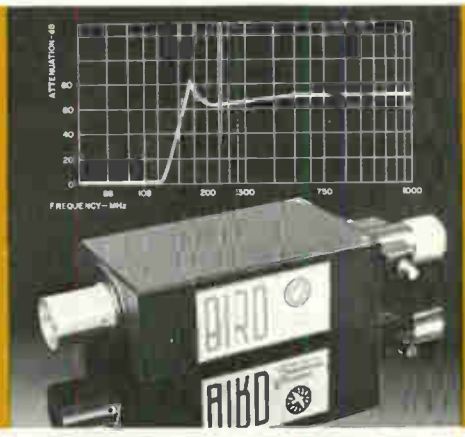
BAND-PASS FILTER Model 5368B

Passband: 226-238 MHz
Lower Stopband: 40dB min @ 10-180 MHz
Upper Stopband: 40dB min @ 0.282-4 GHz
Power Rating: 25 watts
Insertion Loss: 0.75 dB max
VSWR: 1.3:1 max
Temperature Range: −55°C to + 125°C
Weight: 3½ oz (100g)



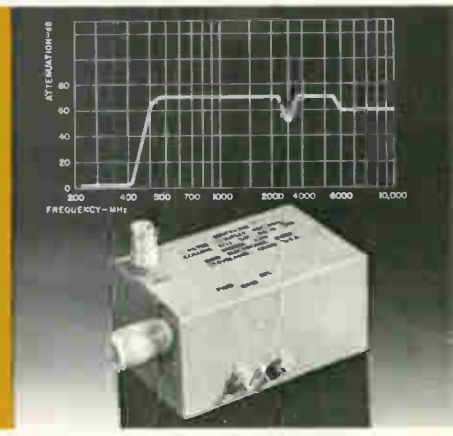
LOW-PASS FILTER/ COUPLER Model 3111

Passband: 88-108 MHz
Stopband: 176-1000 MHz
Power Rating: 5kW
Insertion Loss: 0.15dB max
VSWR: 1.15:1 max
Temperature Range: −55°C to + 85°C
Weight: 10½ lbs (5kg)



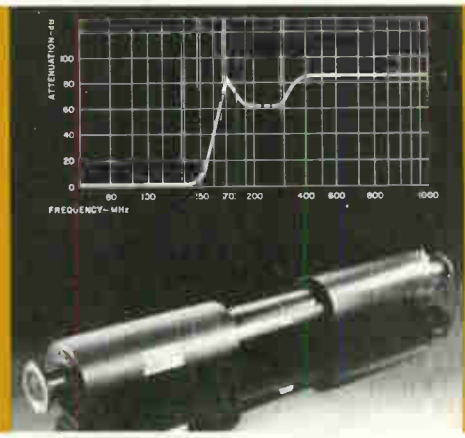
LOW-PASS FILTER/ COUPLER Model 3315

Passband: 225-400 MHz
Stopband: 450-10,000 MHz
Power Rating: 50 watts
Insertion Loss: 0.4dB max
VSWR: 1.38:1 max
Temperature Range: −55°C to + 105°C
Weight: 22 oz (3/4kg)



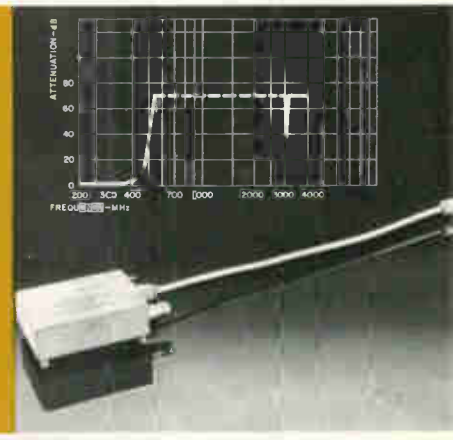
LOW-PASS FILTER/ COUPLER Model 3339

Passband: 88-108 MHz
Stopband: 176-1000 MHz
Power Rating: 50kW
Insertion Loss: 0.1dB max
VSWR: 1.15:1 max
Temperature Range: −40°C to + 85°C
Weight: 93 lbs (42kg)



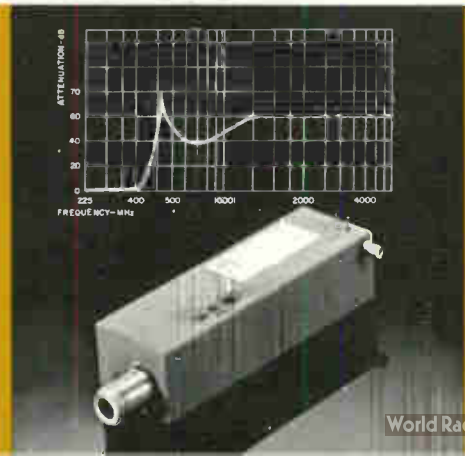
LOW-PASS FILTER/ COUPLER Model 3304

Passband: 290-315 MHz
Stopband: 560-2000 MHz
Power Rating: 150 watts
Insertion Loss: 0.35dB max
VSWR: 1.25:1 max
Temperature Range: −55°C to + 105°C
Weight: 1 lb (½kg)



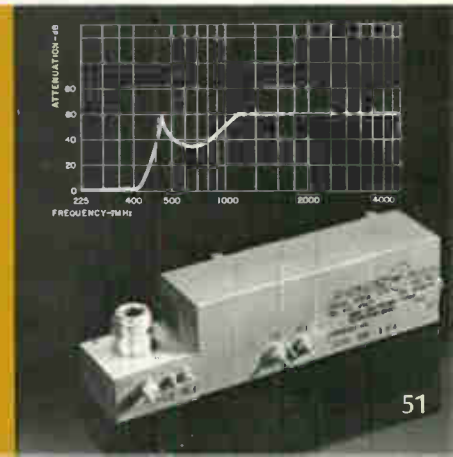
FILTER/COUPLER SWITCH Model 3335A

Passband: 225-400 MHz
Stopband: 450-4000 MHz
Power Rating: 100 watts
Insertion Loss
Transmitting: 0.7dB max
Receiving: 1dB max
VSWR Transmitting and Receiving: 1.35:1 max
Temperature Range: −55°C to + 105°C
Weight: 1 lb (½kg)



FILTER/COUPLER SWITCH Model 3328A

Passband: 225-400 MHz
Stopband: 450-1000 MHz
Power Rating: 100 watts
Insertion Loss
Transmitting: 1.0dB max
Receiving: 0.4dB max
VSWR Transmitting: 1.35:1 max
Receiving: 1.25:1 max
Temperature Range: −55°C to + 105°C
Weight: 1 lb (½kg)



Thruline Principle

The basic sensing circuit of a THRULINE Plug-in Element consists of the mutual inductance M between the loop and the center conductor and the voltage divider C and R. In Fig. 1, E is the voltage between outer and center conductor and I is the current. Elements can be rotated 180°, resulting in either a positive or a negative M (Fig. 2 and 3). The output voltage in this lumped-constant directional coupler is the sum of two samples:

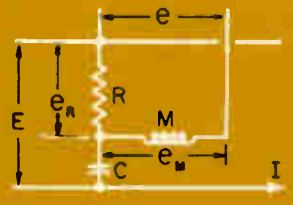


Fig. 1

e_R from the division of E by R and C, $e_R = \frac{RE}{X_c} = RE.\ j\omega C$

(if $R << X_c$), and e_M by induction $e_M = I.j\omega\ (\pm M)$.

The sum $e_R + e_M = j\omega(CRE \pm MI) = e$

Besides selecting R very much smaller than X_c, the components of the circuit are chosen so that $CR = M/Z_o$.

The output voltage is now $e = j\omega(EM/Z_o \pm MI) = j\omega M(E/Z_o \pm I)$.

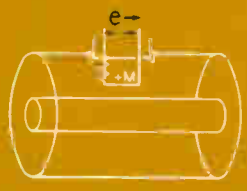


Fig. 2

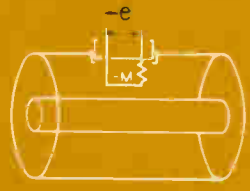


Fig 3

At any one point on a transmission line, the voltage E is the sum of the forward and reflected voltages $E_f + E_r$, and the current I is $E_f/Z_o - E_r/Z_o$ (Since the reflected wave travels in the opposite direction, $I_r = -E_r/Z_o$).

When the element is pointing toward the load, the output voltage is

$$e\rightarrow = j\omega M(E/Z_o + I) = j\omega M\left\{\frac{E_f + E_r}{Z_o} + \frac{E_f - E_r}{Z_o}\right\} =$$

$$= \boxed{\frac{j\omega M}{Z_o}(2E_r)}$$

and turning the element toward the source, it becomes. . .

$$e\leftarrow = j\omega M(E/Z_o - I) = j\omega M\left\{\frac{E_f + E_r}{Z_o} - \frac{E_f - E_r}{Z_o}\right\} =$$

$$= \boxed{\frac{j\omega M}{Z_o}(2E_r)}$$

We have now proved what we set out to show, namely that the RF output voltage from the sensing element is directional and proportional to the voltage in the line due to either the forward or the reflected wave. It is also directly proportional to ω, that is to frequency ($\omega = 2\pi f$). In order to make it frequency independent, we terminate e in a capacitive reactance which is inversely proportional to ω. The voltage across this capacitor is rectified, filtered and displayed on a meter calibrated in RF watts.

For additional details on THRULINE principles, write for "WATT'S NEW FROM BIRD" vol. 2 no. 2.

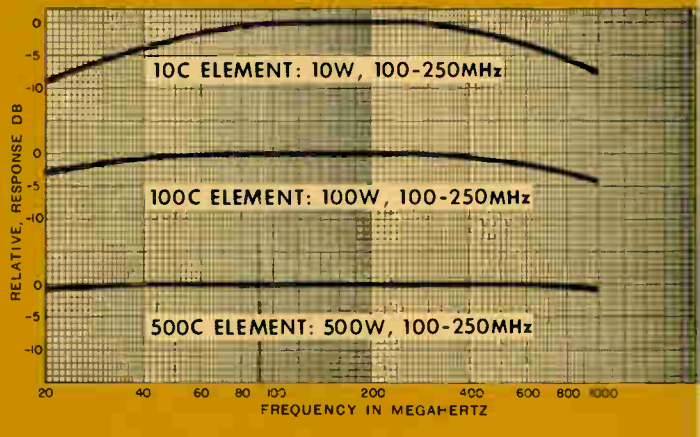


Fig. 4

FREQUENCY RESPONSE THRULINE ELEMENTS
100-250 MHz (C-Series)

Higher power Elements have flatter frequency characteristics than tighter coupled lower-power units. Beyond the stated frequency range, measurement results cannot be predicted.

order forms standard catalog equipment

DATE	F.O.B. SOLON, OHIO	SHIP VIA	PAYMENT TERMS SEE BELOW*	CUSTOMER ORDER No.

bill to:

ship to: (IF BLANK—SAME AS BILL TO)

delivery requirement:

ITEM	QUANTITY	MODEL/PART NO.	DESCRIPTION	UNIT PRICE	AMOUNT

* TERMS: Net 30 Days for established accounts, C.O.D (U.S.A. only) or Cash-in-Advance (CHECK ENCLOSED)
If you wish to establish open account terms with us, please supply three trade references.

TAX _____

total _____

BIRD **ELECTRONIC CORPORATION**
30303 Aurora Road
Cleveland (Solon), Ohio 44139

YOUR NAME _____

PHONE _____

DATE	F.O.B. SOLON, OHIO	SHIP VIA	PAYMENT TERMS SEE BELOW*	CUSTOMER ORDER No.

bill to:

ship to: (IF BLANK—SAME AS BILL TO)

delivery requirement:

ITEM	QUANTITY	MODEL/PART NO.	DESCRIPTION	UNIT PRICE	AMOUNT

* TERMS: Net 30 Days for established accounts, C.O.D. (U.S.A. only) or Cash-in-Advance (CHECK ENCLOSED)
If you wish to establish open account terms with us, please supply three trade references.

TAX _____

total _____

BIRD **ELECTRONIC CORPORATION**
30303 Aurora Road
Cleveland (Solon), Ohio 44139

YOUR NAME _____

PHONE _____

inquiry form filter, power sensor or filter coupler

Thruline® Power Sensors

Freq. Range _____
Type of Emission _____
% Modulation _____
Maximum Incident Power, Avg. _____ , Peak _____
Maximum Termination VSWR _____
Operating Temp. Range _____ to _____

Sensing Ports Required
FWD ☐ DC ☐ RF (at ____dB coupling) ☐ Both
RFL ☐ DC ☐ RF (at ____dB coupling) ☐ Both

Power Level (for maximum dc output)
FWD _____watts,
RFL _____watts,

DC Load Data
FWD _____ μA or Volts _____ ohms
RFL _____ μA or Volts _____ ohms

RF Input Conn. _____
RF Output Conn. _____
DC Connector _____

SENSOR FUNCTION

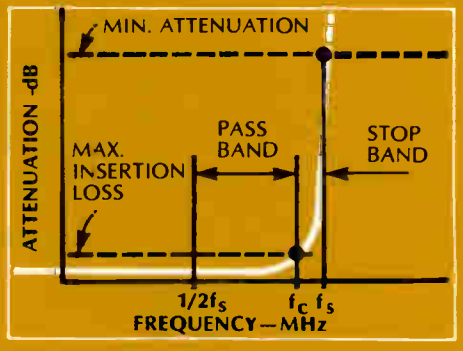
_____
_____
_____
_____
_____

coaxial RF filters

pass band
Frequency Range _____ MHz to ____ MHz
Max. Insertion Loss _____ dB
Max. Insertion VSWR _____
Max. Power _____ watts average
_____ watts peak
Type of Emission _____

stop band
Frequency Range _____ MHz to ____ MHz
Min. Attenuation _____ dB at _____ MHz
_____ dB at _____ MHz
_____ dB at _____ MHz
Operating Temperature Range: _____

mechanical
Max. Size _____ L _____ x W _____ x H
Connector Types _____ Input _____ Output



Check here ☐ if you want a filter and a power sensor combined in a single Sentriline® Filter Coupler.

Application ☐ Commercial ☐ Government ☐ Other

☐ **Please have your representative call.**

The above is the requisite information from which we can determine your requirements and offer a prompt response:

NAME _____ **TITLE** _____ **PHONE** _____

COMPANY _____ **STREET** _____

CITY _____ **STATE** _____ **ZIP** _____

order forms standard catalog equipment

DATE	F O B SOLON, OHIO	SHIP VIA	PAYMENT TERMS SEE BELOW*	CUSTOMER ORDER No.

bill to:

ship to: (IF BLANK—SAME AS BILL TO)

delivery requirement:

ITEM	QUANTITY	MODEL/PART NO.	DESCRIPTION	UNIT PRICE	AMOUNT

* TERMS: Net 30 Days for established accounts, C.O.D. (U.S.A. only) or Cash-in-Advance (CHECK ENCLOSED)
If you wish to establish open account terms with us, please supply three trade references.

TAX _____

total _____

BIRD **ELECTRONIC CORPORATION**
30303 Aurora Road
Cleveland (Solon), Ohio 44139

YOUR NAME _____

PHONE _____

DATE	F O B SOLON, OHIO	SHIP VIA	PAYMENT TERMS SEE BELOW*	CUSTOMER ORDER No.

bill to:

ship to: (IF BLANK—SAME AS BILL TO)

delivery requirement:

ITEM	QUANTITY	MODEL/PART NO.	DESCRIPTION	UNIT PRICE	AMOUNT

* TERMS: Net 30 Days for established accounts, C.O.D. (U.S.A. only) or Cash-in-Advance (CHECK ENCLOSED)
If you wish to establish open account terms with us, please supply three trade references.

TAX _____

total _____

BIRD **ELECTRONIC CORPORATION**
30303 Aurora Road
Cleveland (Solon), Ohio 44139

YOUR NAME _____

PHONE _____

inquiry form filter, power sensor or filter coupler

Thruline® Power Sensors

Freq. Range _____
Type of Emission _____
% Modulation _____
Maximum Incident Power, Avg. _____ , Peak _____
Maximum Termination VSWR _____
Operating Temp. Range _____ to _____

Sensing Ports Required
FWD ☐ DC ☐ RF (at ____dB coupling) ☐ Both
RFL ☐ DC ☐ RF (at ____dB coupling) ☐ Both

Power Level (for maximum dc output)
FWD _____watts,
RFL _____watts,

DC Load Data
FWD _____ μA or Volts _____ ohms
RFL _____ μA or Volts _____ ohms

RF Input Conn. _____
RF Output Conn. _____
DC Connector _____

SENSOR FUNCTION

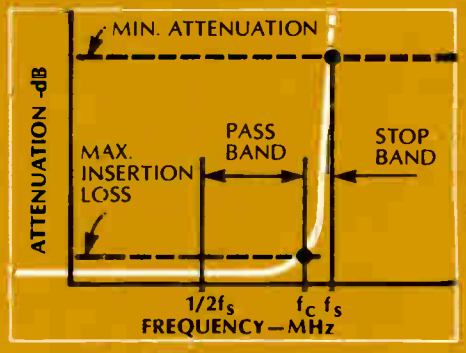
_____
_____
_____
_____
_____

coaxial RF filters

pass band
Frequency Range _____ MHz to _____ MHz
Max. Insertion Loss _____ dB
Max. Insertion VSWR _____
Max. Power _____ watts average
_____ watts peak
Type of Emission _____

stop band
Frequency Range _____ MHz to _____ MHz
Min. Attenuation _____ dB at _____ MHz
_____ dB at _____ MHz
_____ dB at _____ MHz
Operating Temperature Range: _____

mechanical
Max. Size _____ L _____ x W _____ x H
Connector Types _____ Input _____ Output



Check here ☐ if you want a filter and a power sensor combined in a single Sentriline® Filter Coupler.

Application ☐ Commercial ☐ Government ☐ Other

☐ **Please have your representative call.**

The above is the requisite information from which we can determine your requirements and offer a prompt response:

NAME _____ **TITLE** _____ **PHONE** _____

COMPANY _____ **STREET** _____

CITY _____ **STATE** _____ **ZIP** _____

ACCESSORIES (CONT.)

DOLLIES

PART NO.	DESCRIPTION	PAGE	PRICE
6771-011	For 10 & 25kW Moduloads	52	$275
6772-011	For 50kW Moduloads	52	315

COOLANTS (in 1 gallon can)

PART NO.	DESCRIPTION	PAGE	PRICE
5-030-3	Refined Mineral Oil	52	$23
5-1070-2	DC-200 Silicon	52	84
5-1134-3	Ethylene Glycol, Industrial Grade	52	30

THERMOSWITCHES

PART NO.	ACTION	PAGE	PRICE
2450-056	Opens @ 155°C	56	$120
2450-085	Closes @ 155°C	52	120
8329-028	Opens @ 200°C	56	120
8630-013	Opens @ 86°C	52	120
8640-066	Opens @ 77°C	52	120
8890-008	Opens @ 236°C	52	120
8890-017	Opens @ 226°C	52	120
8896-012	Closes @ 100°C	52	120

BATTERIES

PART NO.	VOLTS	TYPE	PAGE	PRICE
5-733-1	6	NiCd	36	$37

BATTERIES (CONT.)

PART NO.	VOLTS	TYPE	PAGE	PRICE
5-733-2	12	NiCd	36	$63
5-1230	1.25	NiCd	36	9
5-1375	9	Alkaline	36	4
5-1444	9	Lithium	36	94
5-1475	3	Li-Mn	36	3
5-1587	9	NiCd	36	15
5-1588	7.5	NiCd	36	Inq.

MISCELLANEOUS

PART NO.	DESCRIPTION	PAGE	PRICE
5-1242	4381/2/3/4 Power Supply-120V	36	$ 8
5-1257	4381/2/3/4 Power Supply-230V	36	21
3610-031	Dummy Plug	36	3

Bird Electronic Corporation Limited Warranty

All products manufactured by Seller are warranted to be free from defects in material and workmanship for a period of one (1) year, unless otherwise specified, from date of shipment and to conform to applicable specifications, drawings, blueprints and/or samples. Seller's sole obligation under these warranties shall be to issue credit, repair or replace any item or part thereof which is proved to be other than as warranted; no allowance shall be made for any labor charges of Buyer for replacement of parts, adjustment or repairs, or any other work, unless such charges are authorized in advance by Seller.

If Seller's products are claimed to be defective in material or workmanship or not to conform to specifications, drawings, blueprints and/or samples, Seller shall, upon prompt notice thereof, either examine the products where they are located or issue shipping instructions for return to Seller (transportation-charges prepaid by Buyer). In the event any of our products are proved to be other than as warranted, transportation costs (cheapest way) to and from Seller's plant, will be borne by Seller and reimbursement or credit will be made for amounts so expended by Buyer. Every such claim for breach of these warranties shall be deemed to be waived by Buyer unless made in writing within ten (10) days from the date of discovery of the defect.

The above warranties shall not extend to any products or parts thereof which have been subjected to any misuse or neglect, damaged by accident, rendered defective by reason of improper installation or by the performance of repairs or alterations outside of our plant, and shall not apply to any goods or parts thereof furnished by Buyer or acquired from others at Buyer's request and/or to Buyer's specifications. In addition, Seller's warranties do not extend to the failure of tubes, transistors, fuses and batteries, or to other equipment and parts manufactured by others except to the extent of the original manufacturer's warranty to Seller.

The obligations under the foregoing warranties are limited to the precise terms thereof. These warranties provide exclusive remedies, expressly in lieu of all other remedies including claims for special or consequential damages. SELLER NEITHER MAKES NOR ASSUMES ANY OTHER WARRANTY WHATSOEVER, WHETHER EXPRESS, STATUTORY, OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS, AND NO PERSON IS AUTHORIZED TO ASSUME FOR SELLER ANY OBLIGATION OR LIABILITY NOT STRICTLY IN ACCORDANCE WITH THE FOREGOING.

General Terms, Conditions of Sale

TELEPHONE, TELEGRAPH AND CABLE ORDERS

Factory Telephone: (216) 248-1200
Telex: 706898 Fax: (216) 248-5426
Cable address: BIRDELEC
D-U-N-S Number: 00-418-9957

Bird Electronic Corporation
30303 Aurora Road
Cleveland (Solon), Ohio 44139
Eastern Sales Office: (216) 248-1200
Western Sales Office (Ca.): (805) 646-7255

SHIPPING INSTRUCTIONS

Unless specific instructions accompany the order, we shall use our judgement and select the best method for your shipment.

MINIMUM BILLING

The minimum billing per order is $25.00.

CONDITIONS OF SALE

Determination of price, terms and conditions of sale and final acceptance of orders are made only at our factory in Cleveland (Solon), Ohio. Change orders subject to $20 administrative charge.

CUSTOMER SERVICE

Bird maintains a complete repair and calibration department. Equipment to be repaired should be shipped prepaid, attention CUSTOMER SERVICE. Repairs over $200 will be quoted for approval unless authorization to repair is received with the unit. Repaired items will meet original factory specifications.

Repairs are warranted for 90 days except for semi-conductor devices and batteries.

SPECIFICATIONS

We reserve the right to discontinue any item without notice and to change physical and electrical specifications at any time without incurring any obligation to incorporate new features in instrument or parts previously sold. For instruments offered with the "QC" Connector feature, maximum VSWR values listed in the specifications are obtained with the connector type shown as "normally supplied."

Listed power ratings for aircooled terminations are valid to 5000 ft. For operation at higher elevations, please contact us for applicable derating factor.

SPECIAL DATA

Individual special performance data can be provided for most Bird products at a minimum charge of $40 per unit.

QUANTITY DISCOUNTS

Available on most equipment when 25 pieces or more of the same model are ordered.

DISTRIBUTORS

Bird equipment is stocked throughout the United States and overseas. Inquire at Solon or the West Coast Sales Office for closest distributor.

PRICE CHANGES

All prices are subject to change without notice. Formal price quotations remain valid for 60 days.

TAXES

Applicable Federal, State or Local taxes that are in effect at the time of shipment will be added unless Certificate of Exemption is furnished by the purchaser.

TERMS

All prices are F.O.B. Cleveland (Solon), Ohio. Terms net 30 days for established accounts.

Export Terms: Please request Overseas Representatives listing.

U.S.A. Regional Offices: Our east and west coast offices will provide complete technical and sales service and visits at your facility as may be desired. Call these offices, or the factory for referral to a close-by distributor — for quick deliveries.

Eastern
Bird Electronic Corp.
30303 Aurora Road
Cleveland, OH 44139
Phone: 216-248-1200
TLX: 706898
FAX: 216-248-5426

Western
Bird Electronic Corp.
621 W. Ojai Ave., Suite F
P.O. Box 28
Ojai, CA 93023
Phone: 805-646-7255

The President of the United States Award for Excellence in Exports

BIRD
Electronic Corporation

Priced are subject to change without not

 Rev. 0

Litho in U.S.A.

Forced Air-Cooled, Air Dielectric

MODEL	CONNECTOR	POWER	PAGE	PRICE
8570A-115-6	3⅛ EIA Fl	15kW	51	$4635
8570A-230-5	3⅛ EIA Fl	15kW	51	4635
8571A-115-6	3⅛ Unfl	15kW	51	4635
8571A-230-5	3⅛ Unfl	15kW	51	4635
8572A-115-6	3⅛ EIA Fl	25kW	51	5355
8572A-230-5	3⅛ EIA Fl	25kW	51	5355
8573A-115-6	3⅛ Unfl	25kW	51	5355
8573A-230-5	3⅛ Unfl	25kW	51	5355
8574A-115-6	1⅝ EIA Fl	15kW	51	4840
8574A-230-5	1⅝ EIA Fl	15kW	51	4840

TENULINE® Attenuators

MODEL	POWER	dB	PAGE	PRICE
8302 Series①	2W	1, 2, 3, 6, 8, 10,14 or 20	53	$ 28
8303 Series②	5W	3, 6, 10, 20 or 30	54	59
8304 Series②	10W	3, 6, 10, 20 or 30	54	70
8305 Series②	15W	3, 6, 10, 20 or 30	54	83
8306 Series②	25W	3, 6, 10, 20 or 30	54	95
8307 Series②	50W	3,6,10or20	55	205
8308 Series②	75W	3, 6, 10, 20 or 30	55	240
8321	50W	30	55	390
8322	200W	30	56	610
8323	100W	30	55	465
8325	500W	30	56	825
8327-300 (was 8327)	1000W	30	56	1030
2450-056 Thermoswitch			56	120
8329-300 (was 8329)	2000W	30	56	1360
8329-028 Thermoswitch			56	120
BA-300-115, -230 Blower Increases 8329-300 to 4000W			56	540
8345-115 or -230	6000W	30	62	4100
8340③	25W	3,6,10or20	54	205
8341③	*40W	3,6,10or20	54	225
8343③	100W	3,6,10or20	55	445

*when bolted to heat sink

① add -0-, -020, -030, -060, -080, -100, -140, -200 for 1, 2, 3, 6, 8, 10, 14 or 20dB respectively

② add -030-N, -060-N, -100-N, -200-N, -300-N for 3, 6, 10, 20 or 30dB respectively (8307: no 30dB)

③ add -030, -060, -100, -200 for 3, 6, 10 or 20dB respectively

50 Ω Line Sections

PART NO.	ELEMENTS SOCKETS	CONNECTOR	PAGE	PRICE
4230-006-1	One	QC*	34	$ 85
4230-018	One	Two QC-N(F)		100
4230-053	Two	QC*	34	150
4230-058	One, w/Bracket	Two QC-NF & NM		105
4230-059	One, w/Bracket	QC*	34	88
4501-000	One	⅞ Fl	34	190
4502-000	Two	⅞ Fl	34	275
4522-002-1	Two, panel mtg	Two QC-N(F)	—	133
4522-002-2	Two, panel mtg	One QC-HN(F) + 1 N(F)	—	155
4522-002-3	Two, panel mtg	One QC-BNC(F) + 1 N(F)	—	139
4522-002-5	Two, panel mtg	QC*	34	118
4600-000	One	3⅛ Fl	34	385
4610-000	Two	3⅛ Fl	34	448
4616-000	Hi/Reg	3⅛ Fl	34	479
4617-000	Hi	3⅛ Fl	34	420
4641-000	One	4⅛ Fl	—	685
4642-000	Two	4⅛ Fl	—	770
4843-000	One	4⅛ Unfl	—	810
4844-000	Two	4⅛ Unfl	—	860
4712-000	One	1⅝ Fl	34	235
4713-000	One	51.5 Ω 1⅝ Fl	34	185
4715-000	Two	1⅝ Fl	34	300
4720-000	One	1⅝ Unfl	34	175
4720-025	One	1⅝ Unfl	34	175
4723-000	Two	1⅝ Unfl	34	268
4800-000	One	51.5 Ω 3⅛ Unfl	34	185
4801-000	One	Special 3⅛ Unfl	34	265
4801-100	Two	Special 3⅛ Unfl	34	290
4802-000	Two	3⅛ Unfl	34	310
4808-000	Hi	3⅛ Unfl	34	260
4808-010	Hi/Reg	3⅛ Unfl	34	350
4808-020	Hi	3⅛ Unfl	34	240
4810-000	Two	51.5 Ω 3⅛ Unfl	34	430
4805-000	One	3⅛ Unfl	34	227
4902-000	**One	6⅛ Fl	34	850
4905-000	**Two	6⅛ Fl	34	965
4907-000	**One	6⅛ Unfl	34	490
4909-000	**Two	6⅛ Unfl	34	610

*QC connectors not included **DC cable(s) included

Meters

PART NO.	TYPE	SCALES	PAGE	PRICE
2000-030	4½" round②	5/10/25kW	37	$118
2000-059	4½" round②	15/30/60kW	37	118
2000-068	4½" round②	8/80kW	37	118
2080-002	3½" round①	25/50/100W	37	58
2080-005	3½" square①	25/50/100W	37	59
2150-015	3½" rect.①	25/50/100W	37	130
2150-088	4½" rect.②	5/10/25kW	37	110
3127-035	4½" rect. on panel*②	5/10/25kW	16,37	235
3127-040	two 4½" rect. on panel*②	5/10/25kW	16,37	390
3127-055	4½" rect. + switch on panel*②	5/10/25kW	16,37	270
3127-070	4½" rect. on panel*②	15/30/60kW	16,37	260
3127-075	two 4½" rect. on panel*②	15/30/60kW	16,37	390
3127-080	4½" rect. + switch on panel*②	15/30/60kW	16,37	270
6810-005	**in housing②	8/80kW	37	265
6810-007	**in housing②	15/30/60kW	37	265
6810-009-7	**in housing②	5/10/25kW	37	265
6810-020	**in housing, w/FWD & RFL switch②	5/10/25kW	37	320
6810-030	**in housing, w/FWD & RFL switch②	15/30/60kW	37	320
6810-065	**in housing②	8/80kW	—	265
6810-400	**in housing②	2.5/5/10kW	—	265
6810-407	**in housing②	15/30/60kW	—	265
6810-415	**in housing②	3/5kW	—	265
8-000	Kit w/cable①	25/50/100kW	37	70

① 30μA ② 100μA

*25' DC cable(s) included **10' DC cable(s) included

Power Sensors

MODEL	PAGE	PRICE
Standard Units for 4A-4E Series	—	$200
4H Series	—	250

Coaxwitch® Coaxial Selector Switches

MODEL	FUNCTION	PAGE	PRICE
72-R	2P Reversing	57	$305
72-2	2P2T	57	320
74	1P6T	57	325
718	1P8T	57	350
7181	1P10T	57	410
7422	1P2T	57	255
7431	1P4T	57	285
7441	1P3T	57	275

Accessories

QUICK CHANGE CONNECTORS — QC

PART NO.	TYPE	PAGE	PRICE
4240-002	⅞ Swivel Fl EIA 50 Ω	35	$115
4240-012	LT(M)	35	110
4240-018	LT(F)	35	67
4240-025	LC(M)	35	72
4240-031	LC(F)	35	53
4240-050	UHF(F)	35	8
4240-062	N(F)	35	8
4240-063	N(M)	35	14
4240-075	LC(F) Bulkhead	35	105
4240-080	Open Terminal, 10-32 post	35	45
4240-090	SC(F)	35	30
4240-096	1⅜ Fixed Fl EIA 50 Ω	35	105
4240-100	C(F)	35	20
4240-110	C(M)	35	52
4240-125	BNC(F)	35	14
4240-132	BNC(M)	35	39
4240-138	LC(M) UG156A/U	35	145
4240-149	LC(F) UG157B/U	35	95
4240-156	TNC(F)	35	12
4240-160	TNC(M)	35	17
4240-179	UHF(M)	35	23
4240-208	1⅜ Swivel Fl EIA 50 Ω	35	130
4240-254	GR 874	35	56
4240-261	N(F) 75 Ω	—	24
4240-268	HN(F)	35	21
4240-278	HN(M)	35	39
4240-334	SMA(M)	35	59
4240-336	SMA(F)	35	39
4240-344	European 7/16 IEC Type 169-4	61	62
4240-346	UHF Miniature (Mini-UHF)(F)	35	31
4240-353	SC(M)	—	43
4100-014	SQC Small Pattern N(F)	36	12
4100-017	SQC Small Pattern UHF(F)	36	14
4100-015	SQC Small Pattern N(M)	36	19

QUICK CHANGE CONNECTORS (CONT.)

PART NO.	TYPE	PAGE	PRICE
4100-055	SQC Small Pattern TNC(F)	36	$22
4110-014	SQC Small Pattern BNC(F)	36	17

MISCELLANEOUS ADAPTORS, CONNECTORS

PART NO.	DESCRIPTION	PAGE	PRICE
5-793-2	N(M) to UHF(F), UG-146A/U	41	$ 17
4240-165	QC(F) to QC(F)	34, 36	26
4240-180	Copl. (M) to QC(F)	36	48
4240-187	3⅛ Unfl/51.5 Ω to QC(F)	36, 52	90
4240-194	3⅛ Fl to QC(F)	36, 52	162
4240-201	⅞ Fl to QC(F)	36, 52	98
4240-244	Rt. Angle QC	36, 52	81
4240-260	1⅝ Fl to QC(F)	36, 52	85
4240-400	Interseries Adapter Kit [N, N, UHF, BNC, TNC, (M,F)]	37	85
4240-401	Interseries Adapter Kit [N, UHF, BNC, TNC, SMA, (M,F)]	37	115
4600-025	3⅛ Fl to 1⅝ Fl EIA 50 Ω	36, 52	153
4712-015	1⅝ Fl to ⅞ Fl EIA 50 Ω	36, 52	125
4902-025	3⅛ Fl to 6⅛ Fl EIA 50 Ω	36, 52	300
7500-076	DC Conn. Plug	36, 52	7
8110-186	Copl. (M) to N(F)	36	43

COUPLING KITS

PART NO.	LINE TYPE	PAGE	PRICE
4240-220	⅞ EIA Fl/50 Ω	36, 52	$ 62
4600-020	3⅛ EIA Fl/50 Ω	36, 52	78
4712-020	1⅝ EIA Fl/50 Ω	36, 52	48
4902-020	6⅛ EAI Fl/50 Ω	36, 52	345
5-289	3⅛ Unfl/51.5 Ω*	36, 52	108
5-726	3⅛ Unfl/50 Ω	36, 52	113
5-1322	6⅛ Unfl/50 Ω	36, 52	260

*with adapter to 50 Ω

CABLE ASSEMBLIES
RG-58/U with DC Plug 7500-076 on one end for connecting Line Sections to Instruments

PART NO.	LGTH	OUTPUT CONNECTOR	PAGE	PRICE
3170-058-1	14"	BNC(M)	36	$ 19
3170-058-6	6'	BNC(M)	36	22
3170-058-2	15'	BNC(M)	36	24
3170-058-3	25'	BNC(M)	36	30
3171-010	25'	BNC(M)*	36	53
3170-058-4	40'	BNC(M)	36	39
3170-058-5	50'	BNC(M)	36	41
3170-058-7	80'	BNC(M)	36	78
3170-058-8	90'	BNC(M)	36	84
3170-058-9	100'	BNC(M)	36	92
4220-097-4	9"	Spade Lug	36	18
4220-097-8	12"	Spade Lug	36	18
4220-097-5	16"	Spade Lug	36	18
4220-097-21	25"	Spade Lug	36	26
4220-097-1	33"	Spade Lug	36	26
4220-097-2	39"	Spade Lug	36	27
4220-097-22	48"	Spade Lug	36	29
4220-097-6	56"	Spade Lug	36	30
4220-097-23	64"	Spade Lug	35	31
4220-097-7	10'	Spade Lug	36	38
6810-041-1	10'	Spade Lug*	36	41
4220-097-9	15'	Spade Lug	36	42
4220-097-10	25'	Spade Lug	36	43
4220-077-1	25'	Spade Lug*	36	47
4220-097-19	40'	Spade Lug	36	48
4220-097-17	50'	Spade Lug	36	55
4220-097-15	60'	Spade Lug	36	60
4220-097-14	65'	Spade Lug	36	65
4220-097-18	70'	Spade Lug	36	70
4220-097-13	75'	Spade Lug	36	76
4220-097-16	100'	Spade Lug	36	87
4220-097-20	225'	Spade Lug	36	108
7500-072-1	39'	DC Plug	36	27
7500-072-3	5'	DC Plug	36	33
7500-072-4	10'	DC Plug	36	33
6810-036-1	10'	DC Plug*	36	39
7500-072-2	25'	DC Plug	36	39
6810-036-2	25'	DC Plug*	36	45

*Use this cable if your Line Section is 6⅛"

For all other applications use the cable listed immediately preceeding it.

CARRYING CASES

MODEL	FOR STORAGE OF	PAGE	PRICE
CC-1	43-size Wattmeters + access.	36	$ 33
CC-2	Mini-Monitor	36	20
CC-3	43-size Wattmeters + access.	36	33
EC-1	12 Elements	36	24
4300-061	43-size Wattmeters + access.	36	43
4300-070	43-size Wattmeters + access.	36	128
4300-080	4381/2/3/4	36	103
4300-085	4391	36	103

Laboratory Standard RF Wattmeters

MODEL				PAGE	PRICE
4021 RF Power Sensor 1.8-32MHz				17	$750
4022 RF Power Sensor 25-1000MHz				17	750
MODEL	**DISPLAY**	**Batteries**	**Interface**	**PAGE**	**PRICE**
4420	Analog	No	No	17	$1395
4421-101	Digital	No	No	17	1775+
4421-102	Digital	NiCd	No	17	1840+
4421-103	Digital	Alkaline	No	17	1800+
4421-104	Digital	No	RS-232*	17	2085+
4421-105	Digital	NiCd	RS-232*	17	2150+
4421-106	Digital	Alkaline	RS-232*	17	2110+
4421-107	Digital	No	IEEE-488	17	2085+
4421-108	Digital	NiCd	IEEE-488	17	2150+
4421-109	Digital	Alkaline	IEEE-488	17	2110+
For field installation (4421- or 4421P only):					
4421-232 RS-232 Interface Card*				17	310
4421-488 IEEE-488 Interface Card				17	310
+All Digital Display models available in panel-mounted versions. Add "P" suffix to "4421" (e.g. 4421P-101)					+300
4029 Calibrator for Sensors				—	1750
*May require 4380-250 Null Modem Kit				—	47

WATTCHER® RF Power Monitor/Alarm

MODEL	PAGE	PRICE
3126 for rigid lines (15/30/60-scale meters)①②	25	$1030
3127 for rigid lines (5/10/25-scale meters)①②	25	950
3128 for cables (25/50/100-scale meters)①②	25	1000
3170 High Speed RF Monitoring System (25/50/100)②	24	1130
3171 High Speed RF Mon. Sys. (rigid lines) (5/10/25)①②	24	1080
3171-020 High Speed RF Mon. Sys. (rigid lines) (15/30/60)①②	24	1080
Elements for 3171, 3171-020	33	80+
+ H-Series ELEMENTS for 3171	33	92
① less line section	34	
② less elements	31, 33	
25' DC Cables included with WATTCHER (except 3170), other lengths optional. See CABLE ASSEMBLIES	36	—

Digital Hi-Power RF Calorimeter

MODEL	PAGE	PRICE
6080-115 (less TERMALINE® load)	29	$3785
6080-230 (less TERMALINE® load)	29	3925
6081-115 Panel (less TERMALINE® load)	29	4000
6081-230 Panel (less TERMALINE® load)	29	4035

MODULOAD® RF Calorimeter Load Systems

MODEL	CONNECTOR	POWER	PAGE	PRICE
8631-601	3⅛ EIA Fl	10kW	30	$8035
8631-602	3⅛ EIA Fl	10kW	30	8060
8635-601	1⅝ EIA Fl	10kW	30	8035
8635-602	1⅝ EIA Fl	10kW	30	8060
8638-601	3⅛ Unfl	10kW	30	8035
8638-602	3⅛ Unfl	10kW	30	8060
8645-601	3⅛ EIA Fl	25kW	30	10500
8645-602	3⅛ EIA Fl	25kW	30	10530
8646-601	3⅛ Unfl	25kW	30	10500
8646-602	3⅛ Unfl	25kW	30	10530
8655-601	3⅛ EIA Fl	50kW	30	12875
8655-602	3⅛ EIA Fl	50kW	30	12900
8656-601	3⅛ Unfl	50kW	30	12875
8656-602	3⅛ Unfl	50kW	30	12900

Above models' coolant is 100% water. For Glycol use, replace "0" in model number with "3" (e.g. 8635-601 becomes 8635-631). Same price.

LINE VOLTAGE SUFFIX: -601 115V 60Hz
-602 230V 50Hz

TERMALINE® RF Absorption Wattmeters

MODEL	POWER	PAGE	PRICE
6104 4-range	2/6/20/60W	39	$ 515
6151 Select range element*	100W	39	435
6154 4-range to 1000MHz	5/15/50/150W	40	535
6156 4-range to 512MHz	5/15/50/150W	40	515
6732A 3-range	10/50/250W	40	670
6734A 3-range	25/100/500W	40	780

TERMALINE® RF WATTMETERS (CONT.)

MODEL	POWER	PAGE	PRICE
6734A-030 3-range	25/100/500W	40	$865
6734-034 Low Freq. Line Section with Meter		41	515
6735-300 3-range	120/600/1200W	41	1235
6736 3-range	50/250/1000W	40	1190
6736-030 3-range	50/250/1000W	40	1270
6737 3-range	100/500/2500W	41	1190
6737-030 3-range	100/500/2500W	41	1270
8863-400 3⅛ Unfl	1500W	—	1330
8864-400 3⅛ Fl	1500W	—	1350
8891-400 3⅛ Fl	2500W	—	1515
8897-400 3⅛ Unfl	2500W	—	1460
8891-415 3⅛ Fl 115Vac	5000W	—	2175
8891-420 3⅛ Fl 230Vac	5000W	—	2175
8891-420A 3⅛ Fl 230Vac	3/5kW	—	2175
8897-415 3⅛ Fl 115Vac	5000W	—	2120
8897-420 3⅛ Fl 230Vac	5000W	—	2120
8926-400 3⅛ Fl	5000W	—	2435
8927-400 3⅛ Unfl	5000W	—	2420
8936-415 3⅛ Fl 115Vac	10kW	—	3420
8936-420 3⅛ Fl 230Vac	10kW	—	3455
8937-415 3⅛ Unfl 115Vac	10kW	—	3420
8937-420 3⅛ Unfl 230Vac	10kW	—	3450
Table 19 Elements for above W/M		—	100

NOTE 1 - Units with blowers are 50/60Hz and are listed with AC voltage. These units include thermoswitch for automatic blower control.
NOTE 2 - All units include over-temperature interlock switch.
NOTE 3 - Elements not included. Order separately from Table 19.
*not included

TERMALINE® RF Coaxial Load Resistors

MODEL	CONNECTOR	POWER	PAGE	PRICE
80BNCF, 80BNCM		5W	44	$ 70
80CF, 80CM		5W	44	70
80F, 80M		5W	44	57
80SCF, 80SCM		5W	44	70
80TNCF, 80TNCM		5W	44	70
8010, 8011 N(F), (M)		2W	44	57
8015, 8016 TNC(M), (F)		2W	44	57
8052, 8053 N(F), (M)		10W	44	70
8071-1 SMA(F) Heat sink rqd.		100W	45	195
8072-1 SQC-N(F) Heat sink rqd.		300W	46	270
8080 QC-N(M)		25W	44	80
8085 QC-N(M)		50W	45	110
8135 QC-N(F)		150W	46	175
8135A QC-N(F)		150W	60	215
8141 QC-N(F)		250W	46	265
8164 QC-N(F)		100W	45	205
8166 QC-N(F)		150W	45	240
8173 QC-N(F)		300W	46	405
8201 QC-N(F)		500W	46	325
8230 air/water cooled QC-LC(F)		0.2/2½kW	47	490
8251 QC-LC(F)		1kW	47	590
8360 Series N(M), BNC(M), TNC(M)		2W	44	40
8361 Series N(M), (F); BNC(M), (F); TNC(M), (F)		10W	44	55
8362 Series N(M), (F); BNC(M), (F); TNC(M), (F)		25W	45	82
8363 Series N(M), (F); BNC(M), (F); TNC(M), (F)		50W	45	115
8431 SQC-N(F)		600/500W	46	595
8401 QC-N(F)		600W	47	360

MODULOAD® Self-Cooled Load Systems

MODEL	CONNECTOR	POWER	PAGE	PRICE
8631-115	3⅛ EIA Fl	10kW	50	$4325
8631-230	3⅛ EIA Fl	10kW	50	4340
8635-115	1⅝ EIA Fl	10kW	50	4325
8635-230	1⅝ EIA Fl	10kW	50	4350
8638-115	3⅛ Unfl	10kW	50	4400
8638-230	3⅛ Unfl	10kW	50	4340
8645-115	3⅛ EIA Fl	25kW	50	5730
8645-230	3⅛ EIA Fl	25kW	50	5765
8646-115	3⅛ Unfl	25kW	50	5730
8646-230	3⅛ Unfl	25kW	50	5765
8655-115	3⅛ EIA Fl	50kW	51	8000
8655-230	3⅛ EIA Fl	50kW	51	8035
8656-115	3⅛ Unfl	50kW	51	8000
8656-230	3⅛ Unfl	50kW	51	8035
8690-060	6⅛ EIA Fl 230V 60Hz①	80kW	51	18530
8690-050	6⅛ EIA Fl 230V 50Hz①	80kW	51	18530
8691-060	6⅛ Unfl 230V 60Hz①	80kW	51	18530
8691-050	6⅛ Unfl 230V 50Hz①	80kW	51	18530

LINE VOLTAGE SUFFIX: -115: 115V 60Hz only
-230: 230V 50Hz only

①80kW units are three phase only

Water Cooled, Air Dielectric

MODEL	CONNECTOR	POWER	PAGE	PRICE
8710 N/M or F		1kW	49	$ 365
8711 C/M or F		1kW	49	410
8713 ⅞ EIA Fl/50 Ω		1kW	49	435
8720 1⅝ EIA Fl/50 Ω		5kW	49	680
8726 QC-LC(F)		5kW	49	650
8730 1⅝ EIA Fl Econoload®		10kW	49	815
8731 3⅛ EIA Fl Econoload		10kW	49	840
8738 3⅛ Unfl Econoload		10kW	49	840
8745 3⅛ EIA Fl Econoload		20kW	49	1190
8746 3⅛ Unfl Econoload		20kW	49	1190
8755 3⅛ EIA Fl Econoload		30kW	49	1650
8756 3⅛ Unfl Econoload		30kW	49	1650
8765 3⅛ EIA Fl Econoload		40kW	49	1865
8766 3⅛ Unfl Econoload		40kW	49	1865
8775 3⅛ EIA Fl Econoload		50kW	50	2110
8776 3⅛ Unfl Econoload		50kW	50	2110
8790 6⅛ EIA Fl Econoload		80kW	50	3245
8791 6⅛ Unfl Econoload		80kW	50	3245
For Econoload® Resistors mounted on a Dolly with Water Flow Switch, Control Box and Bracket (for optional Wattmeter), add -677 to Model No. plus -1 (115V 60Hz) or -2 (230V 50Hz) to specify voltage i.e., 8755-677-1 Add on price			52	814

Control Box Assembly

MODEL	POWER	PAGE	PRICE
8750-115 For Econoloads, 115 Volt, 60 Hz		52	$285
8750-230 For Econoloads, 230 Volt, 50 Hz		52	285
NOTE: These items previously listed as 8750-100			

Replacement Resistors — Econoloads, etc.

8570-032 (Forced Air Loads)	15kW	52	$ 75
8572-021 (Forced Air Loads)	25kW	52	75
8731-021-1	10kW	52	290
8755-027-3	30kW	52	360
8755-027-4	40kW	52	420
8755-027-5	50kW	52	430
8755-029-2	20kW	52	220
8790-035-1 Two Reqd.	80kW	52	515

Water Flow Switch — Econoloads

5-898-2	20kW	52	$135
5-898-3	30kW	52	135
5-898-4	40kW, 50kW	52	135
5-898-6	10kW	52	135
5-898-7	80kW	52	135

Wall-mounting Brackets

6770-120	10kW	52	$110
6770-125	20kW, 30kW, 40kW, 50kW	52	110
6770-130	80kW	52	110

Air Cooled, Liquid Dielectric

MODEL	CONNECTOR	POWER	PAGE	PRICE
8833-300 QC-LC(F)		1kW	47	$ 695
8860 QC-LC(F)		1500W	47	775
8861 1⅝ Unfl		1500W	47	785
8862 1⅝ EIA Fl		1500W	47	800
8863 3⅛ Unfl		1500W	47	845
8864 3⅛ EIA Fl		1500W	47	865
8890-300 QC-LC(F)		2½kW	48	900
8890-008 Thermoswitch			52	120
8891-300 3⅛ EIA Fl/50 Ω		2½kW	48	1030
8892-300 1⅝ EIA Fl/50 Ω		2½kW	48	925
8895-300 1⅝ Unfl/50 Ω (Recessed Ctr Cond)		2½kW	48	935
8896-300 3⅛ Unfl/51.5 Ω		2½kW	48	975
8897-300 3⅛ Unfl/50 Ω (Flush Ctr Cond)		2½kW	48	975
8898-300 3⅛ Unfl/50 Ω (Recessed Ctr Cond)		2½kW	48	990
BA-300-115, -230 Blower Increases any 8890-300 series to		5kW	48	540
8890-315 (115V) Load/Blower/ 2 Thermoswitch Assy		5kW	48	1840
8890-320 (230V) Load/Blower/ 2 Thermoswitch Assy		5kW	48	1840
8921 QC-LC(F)		5kW	48	1985
8922 1⅝ EIA Fl		5kW	48	2010
8926 3⅛ EIA Fl		5kW	58	2070
8927 3⅛ Unfl		5kW	48	2055
8931-115 QC-LC(F)		10kW	48	2985
8931-230 QC-LC(F)		10kW	48	3020
8932-115 1⅝ EIA Fl		10kW	48	3010
8932-230 1⅝ EIA Fl		10kW	48	3245
8936-115 3⅛ EIA Fl		10kW	48	3055
8936-230 3⅛ EIA Fl		10kW	48	3090
8937-115 3⅛ Unfl		10kW	48	3055
8937-230 3⅛ Unfl		10kW	48	3090

Price Schedule

JUNE 20, 1988

Electronic Corporation

30303 Aurora Road, Cleveland, (Solon), Ohio 44139

216-248-1200 • TLX: 706898 • Cable: BIRDELEC

FAX: 216-248-5426

THRULINE® RF Directional Wattmeters

for use with 50 Ω cables

MODEL	CONNECTORS	PAGE	PRICE
43 CW/Portable	50 Ω cable	4	$184
Elements (Table 1)	25-1000MHz	5, 31	52
Elements (Table 1)	50H thru 1000H	5, 31	64
Elements (Table 1)	2500H, 5000H	5, 31	92
Elements (Table 2)	Low power	5, 31	69
Elements (Table 3)	950-2300MHz	5, 31	108
Elements (Table 4)	0.45-2.5MHz	5, 31	108
Elements (Table 5)	Peak only	19, 31	113
Elements (Table 6)	Milliwatts	5, 31	98
CC-1 Carrying Case			33
CC-3 Carrying Case		5, 36	33
EC-1 Element Case		36	24
4030 Field Strength Element		12	105
4041 Field Strength Meter		12	160
4110-182 RF Test Set		27	510
4300-064 Mobile Service Test Set		27	556
Includes: 43, 4275-100, 8164, 4240-050(2), 4400-012 in 4300-061 Carrying Case			
4301 (Ruggedized Model 43)	50 Ω cable	—	438
4304A Wide Band		6	395
4305 Hi Power	50 Ω cable	11	510
Elements (4305)(Table 8)	0.45-2.5MHz	11, 32	113
Elements (4305)(Table 8)	2-1800MHz	11, 32	87
4308 Cellular			395
4314 pk/CW(AC/DC)	50 Ω cable	10	705
Use 43 Elements		31	
Additional Elements (4314) (Table 5)		31	113

RF Power Analyst® Series (less elements)

MODEL	CONNECTORS	PAGE	PRICE
4380A-232 RS-232 Interface Unit*		22	$1070
4380-250 Null Modem Kit			47
4380A-488 IEEE-488 Bus Interface Unit		21	1070
4380-600 Panel mtg. kit for above		21, 22	80
4381 Portable①	50 Ω cable	18	695
4381-832 Bus-compatible			
4381①	50 Ω cable	18	815
4382 Portable①②	1⅝, 3⅛ or 6⅛	22	640
4382-832 Bus-compatible			
4382①②	1⅝, 3⅛ or 6⅛	22	755
4383 Portable①②	50 Ω cable	18	640
4383-832 Bus-compatible			
4383①②	50 Ω cable	18	755
4384 Portable①②	1⅝, 3⅛ or 6⅛	22	670
4384-832 Bus-compatible			
4384①②	1⅝, 3⅛ or 6⅛	22	790
4300-080 Carrying Case for above		18, 36	105
4391 (AC/DC) Portable	50 Ω cable	20	855
4391-832 Bus-compatible			
4391	50 Ω cable	20	973
4300-085 Carrying Case (4391)		36	103
RF Power Analyst® Panel Wattmeters			
4385 Panel mounted 4381	50 Ω cable	18	$895
4385-832 Bus-compatible			
4385	50 Ω cable	18	1015
4386 Panel mounted 4382②	1⅝, 3⅛ or 6⅛	22	770
4386-832 Bus-compatible			
4386②	1⅝, 3⅛ or 6⅛	22	890
4387 Panel mounted 4383②	50 Ω cable	18	775
4387-832 Bus-compatible			
4387②	50 Ω cable	18	890
4388 Panel mounted 4384②	1⅝, 3⅛ or 6⅛	22	775
4388-832 Bus-compatible			
4388②	1⅝, 3⅛ or 6⅛	22	890
3170-058-3 25' DC cable, two rqd.		36	30
3171-010 25' DC cable for 6⅛", two rqd.		36	53
Use 43 Elements for 4381, 4383, 4385, 4387, 4391		19, 31	
Elements for 4382, 4384, 4386, 4388		23, 33	80+
DC Feed-in Element P/N **4381-050**		—	80
* May require 4380-250 Null Modem Kit			
① Charger included. Specify 115V or 230V		36	
② Less line section and DC cables		34, 36	
+ **H-series ELEMENTS** (2-30MHz) for all high-power Wattmeters		23, 33	92

THRULINE® WATTMETERS (CONT'D)

MODEL	CONNECTORS	PAGE	PRICE
4400-012 VSWR Chart			$ 5
4410A CW w/7-range Elements, DC portable	50 Ω cable	7	510
4410-P AC/DC Panel	50 Ω cable	7	800
4411 AC/DC Portable	50 Ω cable	7	670
4412 AC/DC NiCd Port.	50 Ω cable	7	820
4410-1 0.2-0.535MHz, 10-10000W (Table 12)		8, 32	180
4410-2 0.45-2.5MHz, 10-10000W (Table 12)		8, 32	180
4410-3 2-30MHz, 1-1000W (Table 11)		8, 32	155
4410-4 2-30MHz, 10-10000W (Table 12)		8, 32	155
4410-5 25-80MHz, 1-1000W (Table 11)		8, 32	130
4410-6 50-200MHz, 1-1000W (Table 11)		8, 32	130
4410-7 144-520MHz, 1-1000W (Table 11)		8, 32	130
4410-8 200-1000MHz, 1-1000W (Table 11)		8, 32	130
4410-10 25-80MHz, 100mW-100W (Table 10)		8, 32	130
4410-11 50-125MHz, 100mW-100W (Table 10)		8, 32	130
4410-12 100-250MHz, 100mW-100W (Table 10)		8, 32	130
4410-13 200-500MHz, 100mW-100W (Table 10)		8, 32	130
4410-14 400-1000MHz, 100mW-100W (Table 10)		8, 32	130
4410-20 30-50MHz, 10mW-10W (Table 9)		8, 32	130
4410-21 50-88MHz, 10mW-10W (Table 9)		8, 32	130
4410-22 100-152MHz, 10mW-10W (Table 9)		8, 32	130
4410-23 150-250MHz, 10mW-10W (Table 9)		8, 32	130
4410-24 225-400MHz, 10mW-10W (Table 9)		8, 32	130
4410-25 400-800MHz, 10mW-10W (Table 9)		8, 32	130
4410-26 800-900MHz, 10mW-10W (Table 9)		8, 32	130
4410-27 88-108MHz, 10mW-10W (Table 9)		8, 32	130
4410-070 Calibration Element		—	175
4410-025 Test Set		9	Inq.
4410-030 Test Set		9	Inq.
4430 43 w/RF Tap - 512MHz	50 Ω cable	10	285
4431 43 w/variable RF Tap	50 Ω cable	10	325
Use 43 Elements		5	
4450 Very Low Freq. Wattmeter		—	465
Thruline® Panel Wattmeters			
4521 3½" round meter	50 Ω cable	11	205
4522 3½" round + switch	50 Ω cable	11	285
4526 two 3½" round meters	50 Ω cable	11	345
4527 two 3½" round + Signal Sampler output	50 Ω cable	11	410
Use 43 Elements for 4521, 22, 26, 27		5	

for use with rigid coax lines:

MODEL	CONNECTORS	PAGE	PRICE
460	50 Ω 3⅛ EIA Fl	15	$650
Elements (460) Table 3⅛A		15, 33	80+
480	51.5 Ω 3⅛ Unfl	—	445
Elements (480) Table 3⅛A		15, 33	80+
4600-037	50 Ω 3⅛ EIA Fl	15	650
Elements (4600-037) Table 3⅛B		15, 33	80+
4610-200	50 Ω 3⅛ EIA Fl	15	760
Elements (4610-200) Table 3⅛A		15, 33	80+
4610-300	50 Ω 3⅛ EIA Fl	15	760
Elements (4610-300) Table 3⅛B		15, 33	80+
4641	50 Ω 4⅛ EIA Fl		950
Elements (4641) Table 4⅛A			80+
4641-037	50 Ω 4⅛ EIA Fl		950
Elements (4641-037) Table 4⅛B			80+
4641-080	50 Ω 4⅛ EIA Fl		950
Elements (4641-080) Table 4⅛C			80+
4642-200	50 Ω 4⅛ EIA Fl		1090
Elements (4642-200) Table 4⅛A			80+
4642-300	50 Ω 4⅛ EIA Fl		1090
Elements (4641-037) Table 4⅛B			80+
4712	50 Ω 1⅝ EIA Fl	15	570
Elements (4712) Table 1⅝A		15, 33	80+

THRULINE® WATTMETERS (CONT'D)

MODEL	CONNECTORS	PAGE	PRICE
4712-037	50 Ω 1⅝ EIA Fl	15	$500
Elements (4712-037) Table 1⅝B		15, 33	80+
4715-200	50 Ω 1⅝ EIA Fl	15	610
Elements (4715-200) Table 1⅝A		15, 33	80+
4715-300	50 Ω 1⅝ Fl	15	610
Elements (4715-300) Table 1⅝B		15, 33	80+
4720	50 Ω 1⅝ Unfl	15	435
Elements (4720) Table 1⅝A		15, 33	80+
4723-200	50 Ω 1⅝ Unfl	15	580
Elements (4723-200) Table 1⅝A		15, 33	80+
4802-200	50 Ω 3⅛ Unfl	15	625
Elements (4802-200) Table 3⅛A		15, 33	80+
4802-300	50 Ω 3⅛ Unfl	15	625
Elements (4802-300) Table 3⅛B		15, 33	80+
4805	50 Ω 3⅛ Unfl	15	490
Elements (4805) Table 3⅛A		15, 33	80+
4805-037	50 Ω 3⅛ Unfl	15	490
Elements (4805-037) Table 3⅛B		15, 33	80+
4843	50 Ω 4⅛ Unfl		640
Elements (4843) Table 4⅛A			80+
4843-037	50 Ω 4⅛ Unfl		640
Elements (4843-037) Table 4⅛B			80+
4843-080	50 Ω 4⅛ Unfl		640
Elements (4843-080) Table 4⅛C			80+
4844-200	50 Ω 4⅛ Unfl		790
Elements (4844-200) Table 4⅛A			80+
4844-300	50 Ω 4⅛ Unfl		790
Elements (4844-300) Table 4⅛B			80+
4902	50 Ω 6⅛ EIA Fl	15	1100
Elements (4902) Table 6⅛A		15, 33	80+
4902-037	50 Ω 6⅛ EIA Fl	15	1100
Elements (4902-037) Table 6⅛B		15, 33	80+
4905-200	50 Ω 6⅛ EIA Fl	15	1270
Elements (4905-200) Table 6⅛A		15, 33	80+
4905-300	50 Ω 6⅛ EIA Fl	15	1270
Elements (4905-300) Table 6⅛A		15, 33	80+
4907	50 Ω 6⅛ Unfl	15	750
Elements (4907) Table 6⅛A		15, 33	80+
4909-200	50 Ω 6⅛ Unfl	15	920
Elements (4909-200) Table 6⅛A		15, 33	80+
4902-080	50 Ω 6⅛ EIA Fl	15	1100
Elements (4902-080) Table 6⅛C		15, 33	80+
4907-080	50 Ω 6⅛ Unfl	15	750
Elements (4907-080) Table 6⅛C		15, 33	80+
+ **H-Series ELEMENTS** for all high-power Wattmeters above		15, 33	92

Directional Coupler Elements Couplers & Samplers

MODEL	PAGE	PRICE
Couplers for cable or ⅞ lines (Table 14)	32	$ 81
Couplers for 1⅝, 3⅛ or 6⅛ lines (Tables 15, 16, 17)	32	113
4266 HF Coupler, 1500 watts	—	310
4273 Variable RF Sampler	12	92*
4273-020, 4275-020 e/w N(M), N(F)	12	112
4273-025, 4275-025 e/w N(F), N(F)	12	107
4273-030, 4275-030 e/w UHF(M), UHF(F)	12	121
4273-035, 4275-035 e/w UHF(F), UHF(F)	12	107
4273-100 for installation on Bird equipment	12	103
4274-025 Wide Range RF Sampler	4, 32	65
4274-050 Wide Range RF Sampler Variable	62	75
4275 Variable RF Sampler	12	92*
4275-100 for installation on Bird equipment	12	103
4278-111-1 125- 250MHz 10dB	—	385
4278-111-2 125- 250MHz 20dB	—	385
4278-111-3 125- 250MHz 30dB	—	385
4278-211-1 250- 500MHz 10dB	—	305
4278-211-2 250- 500MHz 20dB	—	305
4278-211-3 250- 500MHz 30dB	—	305
4278-311-1 500-1000MHz 10dB	—	305
4278-311-2 500-1000MHz 20dB	—	305
4278-311-3 500-1000MHz 30dB	—	305
4278-411-1 1000-2000MHz 10dB	—	305
4278-411-2 1000-2000MHz 20dB	—	305
4278-411-3 1000-2000MHz 30dB	—	305
4278-XXX-X Calibration Data Per Unit	—	42
*QC connectors not included		

Page Numbers refer to General Catalog GC-86/GC-86A

New 80kW MODULOAD® RF Load Resistors

6⅛" with field-replaceable resistors!

Load may be separated from heat-exchanger and bolted directly to the line.

For CW, AM, FM, SSB and TV transmitters.

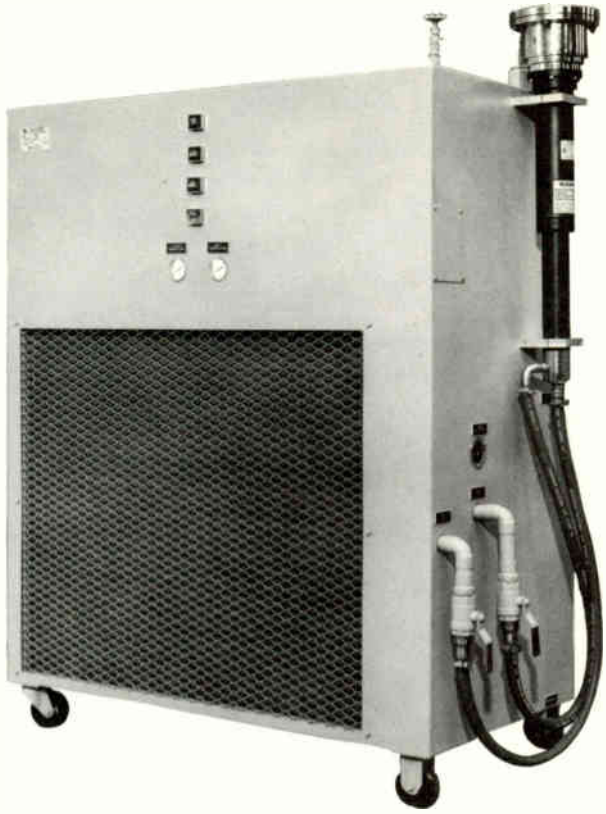
MODULOAD® self-cooling RF terminating systems, introduced by BIRD in the 60's, eliminate the need for external cooling water. They terminate a 50-ohm line with negligible VSWR during off-the-air tests and maintenance of high-power transmitters, in locations where water supply is unreliable, expensive or simply not available.

The new MODULOAD system series 8690-( ) is capable of 80,000 watts continuous dissipation in ambient temperatures from -20°C to +35°C (the coolant contains 35% industrial Ethylene Glycol to permit such a wide range). The choice of mounting the Load Resistor at a distance of up to 20 feet from the heat-exchanger cabinet offers unequalled flexibility: To avoid affecting transmitter room temperature drastically with 270,000 BTU/hour (enough to heat two houses), the heat exchanger and its hot air output may be placed in a more convenient location. The Load can be stored on a wall bracket, and bolted directly to the transmission line during tests. These unusually quiet-running models are available for operation from 230 volts/3 phase supply either at 50Hz or at 60Hz. The suffix indicating the applicable line frequency (-050, or -060) is part of each model's number.

Units are protected by electrical interlocks with a flow switch (for proper minimum flow rate), a thermoswitch (to sense high coolant temperature due to air flow obstruction or failure, high ambients, etc.) and a ½-second time delay before application of RF power. The normally open transmitter-interlock relay contacts are rated at 5 amps 115 volts resistive or inductive load. Airflow through the units must, of course, be unrestricted and a 3 ft. clearance should be allowed between walls and air intake. The air outlet may be ducted.

30303 Aurora Road Cleveland (Solon) Ohio 44139
216 • 248-1200 TLX: 98-5298 Cable: BIRDELEC

BIRD



model 8690-( )
80 KILOWATTS

FORCED AIR COOLED

Power Rating 80kW continuous duty
VSWR & Frequency Range 1.1 max. 1kHz to 800 MHz*
Input Connector 6-1/8" EIA Flanged
Weight (filled) 826 lbs. (375 kg)
Finish (Heat Exchanger) Light Navy Grey Baked Enamel (MIL-E-15090)
(RF Load) Lusterless Black Enamel (Fed. Spec. TT-E-527)
Ambient Air Temperature Range -20°C to +35°C
Dimensions (Heat Exchanger) 65-1/4" H x 27" D x 51" (1657 x 686 x 1295mm); 7-1/2" (190mm) clearance required for valves on top and load on side. Load Resistor may be wall- or line-mounted up to 20 ft. (6m) from cabinet.
AC Power Required 10 amps @ 230 volts/3 phase
Model 8690-050 " " " " " " 50Hz
Model 8690-060 " " " " " " 60Hz
Accessories (optional)
Replacement Resistor 8790-035 (Two)
Coupling Kit 4902-020 6-1/8" EIA Flanged

*Also 50 ohms at dc for continuity checks

Bulletin No. 8690-680 Litho in USA

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Our east and west coast offices will provide complete technical and sales service and visits at your facility as may be desired. Call these offices, or the factory for referral to a close-by distributor — for quick deliveries.

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