The Best got Better

BIRD

This powerful RF Wattmeter does everything but talk!

This new generation RF Wattmeter with nine-mode system versatility reads...

Routine tests are quickly performed– determine defects in record time

...incident CW power in watts
reflected CW power in watts
incident peak envelope power in watts
reflected peak envelope power in watts
incident CW power in dBm
reflected CW power in dBm
and calculates SWR for you
calculates dB return loss for you
calculates percent modulation
lets you adjust for maximum or minimum signal levels and remembers your best results
won't run out of scale for at least 20% beyond nominal full-scale...

...and it will do all this with Plug-in Elements you may already own from other Bird Thruline® Wattmeters

BIRD 4381

0.45-2300 MHz / 0.1-10,000 watts

Model 4381 used in final checkout of linear amplifier production units at Henry Electronics Inc., Los Angeles

Introducing the first uniquely different RF wattmeter system for gaging and analyzing RF power since the trail-blazing THRULINE® model 43 came out of our lab 25 years ago: A new era in RF Power Measurement — a model 43 for the 80's — the THRULINE® Series 4380 Digital RF Power Analyst™

This Directional Wattmeter thinks for you, calculates parameter products that you used to look up on a graph or chart, reveals whether AM modulation is present and if so — how much, and makes your min/max power search a breeze.

1 To measure forward and reflected power, insert two Elements with a 10:1 power ratio (for better resolution of the lower reflected levels) and set the range switches to match. Push FWD/CW or RFL/CW to read in watts while you make adjustments to your equipment, or push SWR to find the optimum match.

2 A transmitter or signal source—rated at say 10, or 250 or 1000 watts nominally—is always designed with capacity to spare. As a matter of fact, some FCC rules *require* measurement at 110% of rated power. Model 4381 with 120% of over-range on each Plug-in Element lets you measure there without changing Elements AND does so with "up-scale" accuracy. Think of it: You get to use the same Plug-in Elements you probably already own from one of the more than 100,000 model 43 THRULINE® Wattmeters in the field; you get an additional 20% beyond full-scale power, and at much better accuracy than obtainable if you had to switch to the next higher-power Element and read it downscale.

3 Desired minimum levels (e.g. of reflected power or of SWR) are found easily through the Δ function, which displays a "greater than" or "less than" symbol in place of the last digit, indicating increasing or decreasing levels. Or run through equipment adjustments from one extreme to the other—even with your eyes closed—then push the MIN memory button to display the optimum achievable value, and tune your gear to match it. The same easy procedure is available for desired maximum levels, by use of the MAX memory button. This is even faster than tweaking with an analog display meter, since you need not pass the signal dip (or peak) several times to be certain you have reached the optimum condition: The memory shows exactly what MIN or MAX value to aim for.

4 The new RF Power Analyst™ indicates peak power—as well as CW—all with the same Elements. It is so sensitive that you can measure a 1% ripple of hum on a carrier by pushing % MOD, if you notice a difference in the PEP and CW readings. That feature alone is likely to solve some signal "mysteries". Model 4381 reads peak envelope power of signals with a 1% duty factor or more, and as narrow as 50 microseconds, in either forward or reflected direction.

5 There is more: By detecting peaks and valleys, AM modulation up to 99.9 percent is displayed with one button. For convenience in the lab or on the production line, three additional keyboard functions furnish CW in dBm—instead of watts—in both directions, and return loss in dB. Even if you do not normally make use of the read-out in dB-relative-to-a-milliwatt, these keys still offer a unique advantage: Elements used in this function can be over-ranged 6dB (400%), i.e. a 100 watt Element can be used for CW measurement up to 400 watts. Even though Plug-in Elements are low-cost to begin with, this feature may save you even more.

All these functions are now available in the new model 4381 RF Power Analyst™, a portable THRULINE instrument battery-powered for 8 hours between charge .

specifications

Power Range[1]	100mW to 10kW full scale using Bird Plug-in Elements. Accuracy not guaranteed with components not supplied by Bird.
Usable over-range	To 120% of scale on CW, PEP, SWR and return loss functions. To 400% of scale (PEP) on dBm and % modulation.
Frequency Range[1]	450kHz to 2.3 GHz
Sampling Rate	2 to 3 readings per second
Display	3½ digit, .3" LED—strobed
Accuracy	
Power Readings	±5% of full scale
SWR	±10% of reading
% Modulation	±5%[2]
Return Loss	±0.3dB to corresponding SWR value
Modulation Frequency[3]	30-10,000Hz
Impedance	50 ohms
Insertion SWR	1.05 max to 1000MHz (32.3dB return loss)
Weight	4.0 lbs. (1.8kg)
Battery Life	(Rechargeable) 8 hours approx.
A.C. Power	(Using Adapter) 115V, 50-60Hz 6W, 230V, 50-60Hz 6W

[1]Frequency band and power range is determined by Plug-in Element selected. See Bird Catalog for availability. Some modes require two Elements in a 10:1 power ratio.

[2]For CW power levels greater than one third of full scale, accuracy of the % modulation mode is ±5% from 0 to 90% and +10% from 90 to 100%.

[3]For pulse modulation the minimum parameters are: 50 micro-seconds pulse width, 100 pps repetition rate and 1% duty cycle.

Push a button—get a reading

No more blinking, scaling charts or guessing decimal points

SWR **VSWR: PUSH A BUTTON!**

FWD CW **Forward Power: PUSH A BUTTON!**

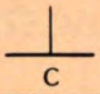
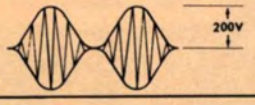
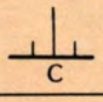
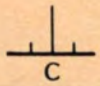
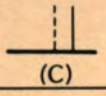
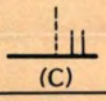
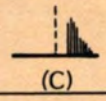
RFL CW **Reflected Power: PUSH A BUTTON!**

% MOD **% Modulation: PUSH A BUTTON!**

MIN **Tune Antenna: PUSH A BUTTON!**

MAX **Tune Transmitter: PUSH A BUTTON!**

and more...

TRANSMISSION TYPE and SCOPE PATTERN	FREQUENCY SPECTRUM (C: Carrier)	PEVrms (arbitrary)	PEP = PEV^2_{rms}/Z_o	AVERAGE (Heating) POWER	4381 CW MODE	4381 PEP MODE	4381 % MOD MODE	MODEL 43
Table A CW 		$\frac{100}{\sqrt{2}}$ V	100W	100W	100W	100W	0%	100W
Table B AM 100% Mod. 		$\frac{200}{\sqrt{2}}$ V	400W	150W	100W	400W	100%	100W
Table C AM 73% Mod. 		$\frac{173}{\sqrt{2}}$ V	300W	127W	100W	300W	73%	100W
Table D SSB 1 tone 		$\frac{100}{\sqrt{2}}$ V	100W	100W	100W	100W	0%	100W
Table E SSB 2 tone 		$\frac{100}{\sqrt{2}}$ V	100W	50W	25W	100W	100%	40.5W
Table F SSB Voice 		$\frac{100}{\sqrt{2}}$ V	100W	–	–	100W	–	–

Z_o = 50 ohms

PEV: Peak Envelope Voltage. Carrier (or suppressed carrier) PEV was arbitrarily chosen at 100 volts in all examples. $PEV_{rms} = PEV/\sqrt{2}$.

TABLE OF STANDARD PLUG-IN ELEMENTS

Frequency (MHz)	Power Ranges (watts)
0.45 - 2.5	1000, 2.5kW, 5kW, 10kW
2-30	50, 100, 250, 500, 1000, 2500, 5000
25-60, 50-125, 100-250, 200-500, 400-1000	5, 10, 25, 50, 100, 250, 500, 1000
60-80, 80-95, 95-125, 110-160, 150-250, 200-300, 275-450, 425-850, 800-950	1 watt
60-80, 80-95, 95-150, 150-250, 200-300, 250-450, 400-850, 800-950	2.5 watts
950-1260, 1100-1800, 1700-2200, 2200-2300	1, 2.5, 5, 10, 25
Pulse Mode only	
25-60, 50-125, 100-250, 200-500, 400-1000	2.5kW, 5kW, 10kW

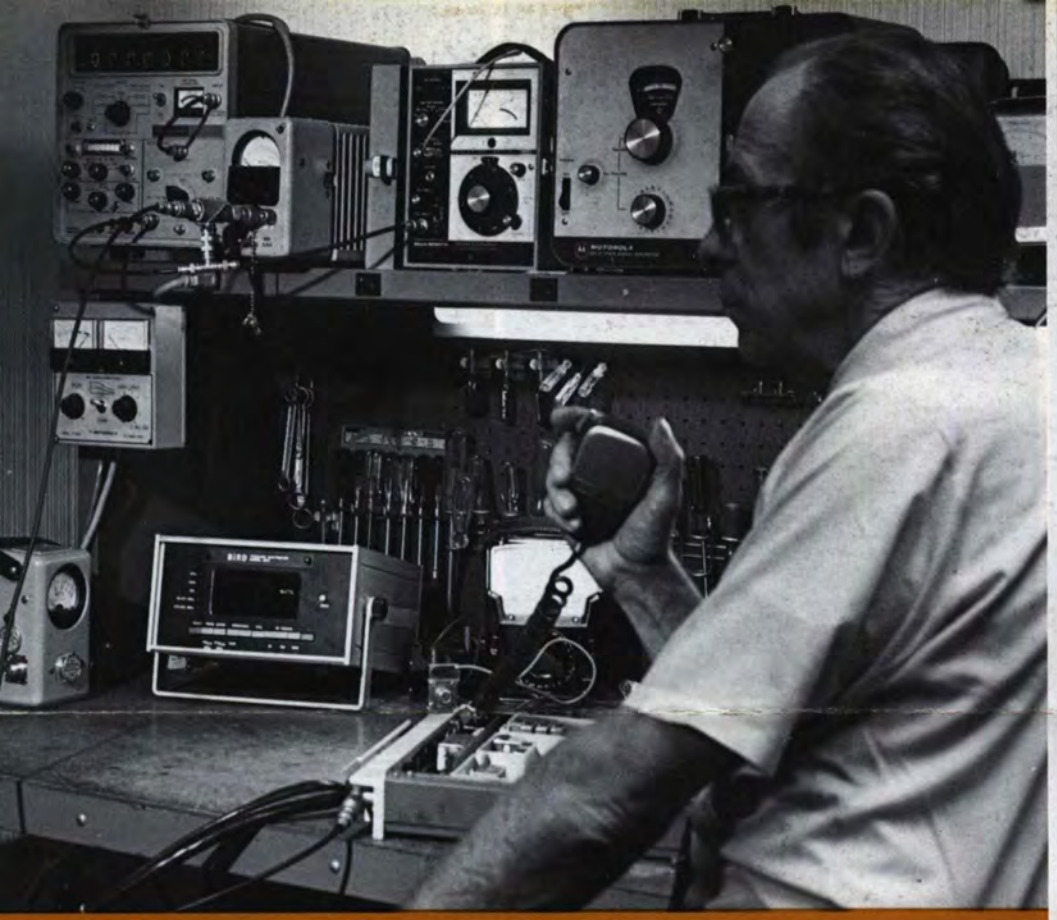
BIRD

Electronic Corporation

30303 Aurora Road, Cleveland (Solon) Ohio 44139
Phone: (216) 248-1200 Telex: 98-5298
EAST: Lanc.PA 717•569•0467
WEST: Ojai, CA 805•646•7255

Bulletin No. PA 4381- 1179

Litho in U.S.A.



6104

BIRD TERMALINE® RF Absorption Wattmeters

50 ohms nominal

A new-concept series of 250W to 2500W RF Absorption Wattmeters with convenience features suggested by you — the user — are joining our traditional 60W and 150W TERMALINE® models on which commercial customers and Armed Forces agencies have relied since the second world war.

Bird TERMALINE® RF Absorption Wattmeters are direct-reading termination instruments for servicing 50-ohm communications systems and maintaining them at peak operation. Frequency coverage of a TERMALINE® Wattmeter is generally wider than that of a directional wattmeter, and the integral load resistor – which dissipates the RF power during measurement – offers the additional convenience of a simple and compact package.

Each unit in the new series 6730 Wattmeters features three power ranges selected by switch. This flexibility without the need to transfer the crystal diode makes measurements easier and frees one hand for equipment fine tuning or trouble-shooting. These new TERMALINE® Wattmeters can also be checked and calibrated in the field to a known standard. Frequency coverage is broader both above 500 MHz and below 30 MHz, and the use of Schottky diodes increases long-term reliability.

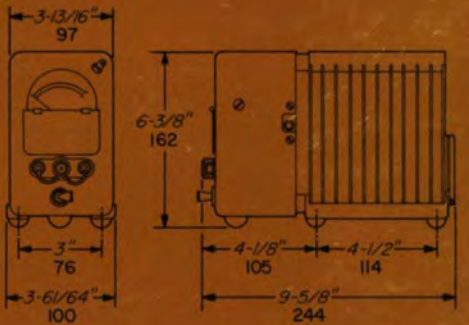
(continued on back cover)

MODEL	*FULL SCALE POWER RATING	CALIBRATED FREQUENCY RANGE	POWER SCALES IN WATTS: 2	5	6	10	15	20	25	50	60	100	120	150	250	500	600	1000	1200	2500
6104	60W	25-512 MHz									*									
6154	150W	25-1000 MHz												*						
6155	150W	2-30 MHz												*						
6156	150W	25-512 MHz												*						
6732	250W	25-1000 MHz													*					
6734	500W	25-1000 MHz														*				
6734-030	500W	1.5-35 MHz														*				
6736	1000W	25-1000 MHz																*		
6736-030	1000W	1.5-35 MHz																*		
6735	1200W	25-1000 MHz																	*	
6737	2500W	25-1000 MHz																		*
6737-030	2500W	1.5-35 MHz																		*

60 WATTS

Power Rating ____ 60 watts
Power Scales ____ 0-2/0-6/0-20/0-60 watts
VSWR ____ 1.1 max. dc to 512 MHz
Frequency Range ____ 25 to 512 MHz
Input Connector ____ Female N
Weight ____ 6½ lbs. (3 kg)
Finish ____ Light Navy green baked enamel (MIL-E-15090)
Accuracy ____ ±5% of full scale 25-512 MHz

Meter Housing can be detached from load for convenient reading with 3' cable.

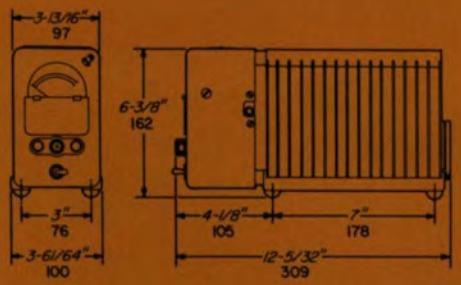


6154

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 25-512 MHz
±10% of full scale 512-1000 MHz

Meter Housing can be detached from load for convenient reading with 3' cable.

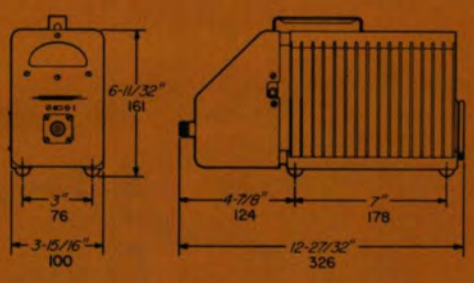


6155

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

Meter Housing can be detached from load for convenient reading with 3' cable.

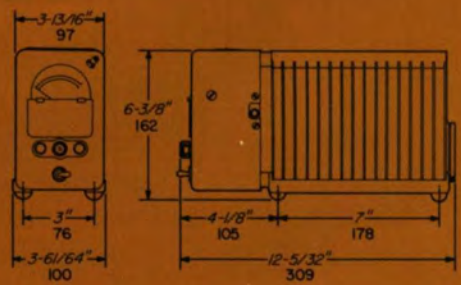


6156

150 WATTS

Power Rating ____ 150 watts
Power Scales ____ 0-5/0-15/0-50/ 0-150 watts
VSWR ____ 1.1 max. dc to 512 MHz
Frequency Range ____ 25 to 512 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 25-512 MHz

Meter Housing can be detached from load for convenient reading with 3' cable.

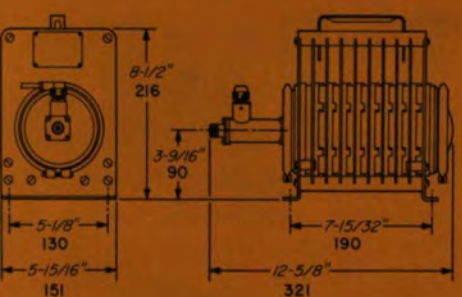


6732

250 WATTS

Power Rating _____ 250 watts
Power Scales _____ 0-10/0-50/ 0-250 watts
VSWR __ 1.15 max dc to 1000 MHz
Frequency Range _ 25 to 1000 MHz
Input Connector _____ QC Type (Female N normally supplied)
Weight _____ 16 lbs. (7¼ kg)
Finish _____ Light Navy grey baked enamel (MIL-E-15090)
Accuracy _____ ±5% of full scale 25-512 MHz
±10% of full scale 512-1000 MHz

METER: 4-1/2" meter, shock mounted in aluminum carrying case with 10' (3m) shielded meter cable. Dimensions: (w x h x d) 5-9/16" x 6-1/2" x 3-11/32" (141 x 165 x 85).



6734

500 WATTS

Power Rating _____ 500 watts
Power Scales _____ 0-25/0-100/ 0-500 watts
VSWR __ 1.15 max. dc to 1000 MHz
Input Connector _____ QC Type (Female N normally supplied)
Weight _____ 27 lbs. (12¼ kg)
Finish _____ Light Navy grey baked enamel (MIL-E-15090)

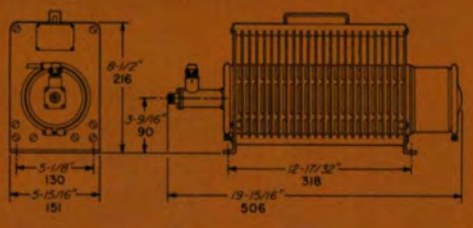
Model 6734

Frequency Range _ 25 to 1000 MHz
Accuracy _____ ± 5% of full scale 25-512 MHz
±10% of full scale 512-1000 MHz

Model 6734-030

Frequency Range ___ 1.5 to 35 MHz
Accuracy (percent of full scale) ____
± 5%: 2-32 MHz
± 10%: 1.5-2 MHz & 32-35 MHz

For meter dimensions see 6732.



6736

1000 W

Power Rating _____ 1000 watts
Power Scales _____ 0-50/0-250/ 0-1000 watts
VSWR __ 1.15 max. dc to 1000 MHz
Input Connector _____ QC Type (Female LC normally supplied)
Weight _____ 30 lbs. (13½ kg)
Finish _____ Light Navy grey baked enamel (MIL-E-15090)

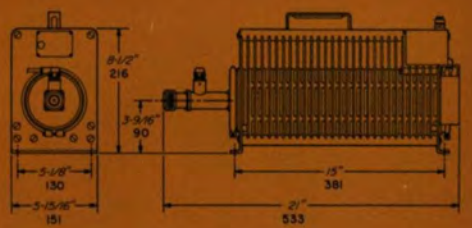
Model 6736

Frequency Range _ 25 to 1000 MHz
Accuracy _____ ± 5% of full scale 25-512 MHz
±10% of full scale 512-1000 MHz

Model 6736-030

Frequency Range ___ 1.5 to 35 MHz
Accuracy (percent of full scale) ____
± 5%: 2-32 MHz
± 10%: 1.5-2 MHz & 32-35 MHz

For meter dimensions see 6732.



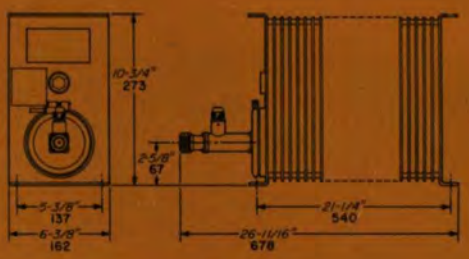
6735

1200 W

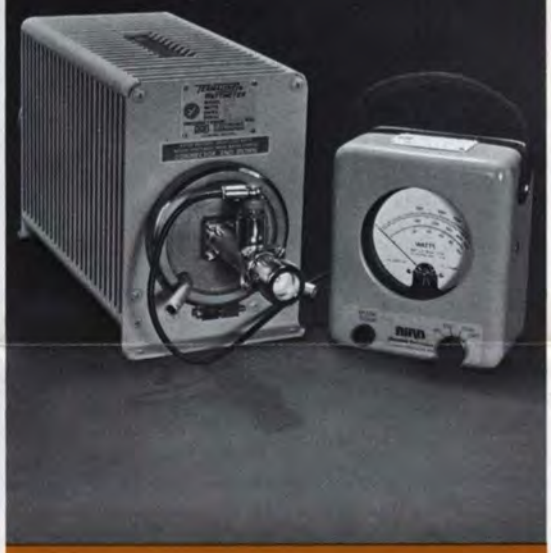
Power Rating — 1200 watts ½ hour; 1000 watts continuous duty
Power Scales — 0-120/0-600/ 0-1200 watts
VSWR — 1.15 max. dc to 1000 MHz
Frequency Range — 25 to 1000 MHz
Input Connector — QC Type (Female LC normally supplied)
Weight — 39 lbs. (17¾ kg)
Finish — Light Navy grey baked enamel (MIL-E-15090)
Accuracy — ±5% of full scale 25-512 MHz
±10% of full scale 512-1000 MHz

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

METER: 4-1/2" meter, shock mounted in aluminum carrying case with 10' (3m) shielded meter cable. Dimensions: (w x h x d) 5-9/16" x 6-1/2" x 3-11/32" (141 x 165 x 85).



6737



2500 W

Power Rating — 2500 watts with water cooling
Power Scales — 0-100/0-500/ 0-2500 watts
VSWR — 1.15 max. dc to 1000 MHz
Input Connector — QC Type (Female LC normally supplied)
Weight — 33 lbs. (15 kg)
Water Connections — ⅜" tubing to accept rubber hose
Flow Rate — ½ gpm (2 liters/min)
Operating Position — Vertical — connector down above 200 watts when water cooled
Finish — Light Navy grey baked enamel (MIL-E-15090)

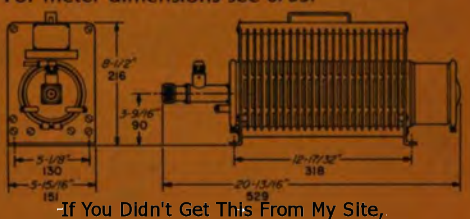
Model 6737

Frequency Range — 25 to 1000 MHz
Accuracy — ±5% of full scale 25-512 MHz
±10% of full scale 512-1000 MHz

Model 6737-030

Frequency Range — 1.5 to 35 MHz
Accuracy (percent of full scale) —
±5%: 2-32 MHz
±10%: 1.5-2 MHz & 32-35 MHz

For meter dimensions see 6735.



Options & Accessories

Extend the frequency coverage of TERMALINE Wattmeter models 6734, 6736 and 6737 down to 1.5 MHz. Optional Wattmeter Line Section P/N 6734-034 covers measurements from 2-32 MHz at ±5% of full scale and from 1.5-35 MHz at ±10% of full scale. Since Line Section and Meter are calibrated as a unit, P/N 6734-034 must either be ordered at the same time as the complete Wattmeter, or in the case of later acquisition, the original Line Section and Meter must be returned to the plant for matching with P/N 6734-034 (If calibration standards are available to the user, the matching can be done in the field).

Other accessories available are Quick-Change QC-Connectors, such as male or female N, UHF, HN, C, SC, BNC, TNC, LC, ⅞" and 1⅝" EIA Flanges. These can be interchanged in the field on Model 6155 and the new series 6730 Wattmeters. An Adapter from N to UHF (SO-239) is available for models 6104, 6154 and 6156 Wattmeters (Adapter No. UG-146A/U Bird P/N 5-793-2).

(Text continued from front page)

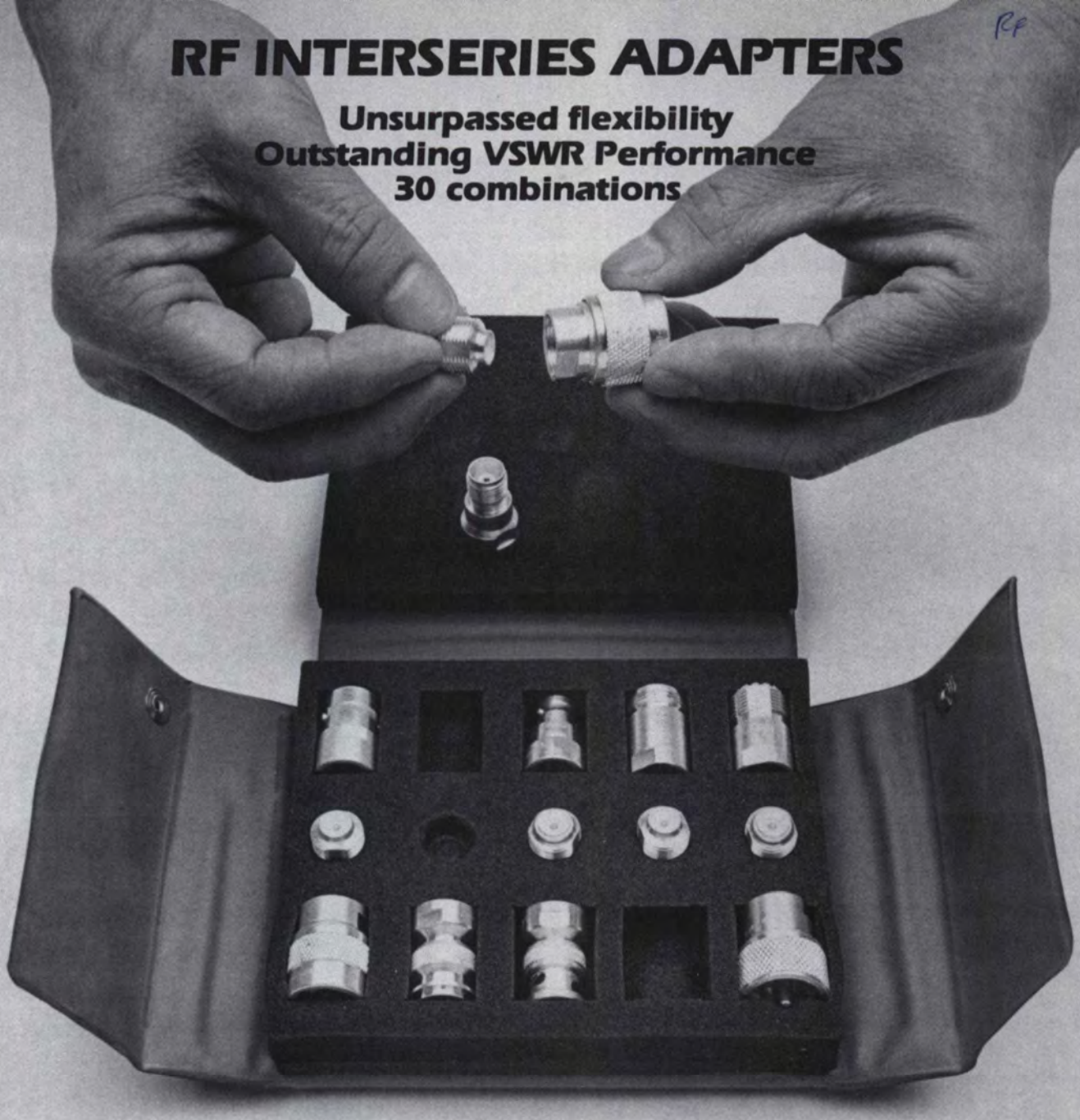
Wattmeter and load sections are joined with the patented Bird Quick-Change QC feature, which allows easy separation. The load resistor can then serve as an independent termination. An optional QC accessory line selection for extending frequency coverage down to 1.5 MHz is available for models 6734, 6736 and 6737 — resulting in an exceptionally flexible test instrument: A wattmeter providing measurement capacity from 1.5 MHz to 1000 MHz and a load resistor useable from DC to 2500 MHz.

BIRD
Electronic Corporation
30303 Aurora Road, Cleveland (Solon) Ohio 44139
Phone: (216) 248-1200 Telex: 98-5298

Bulletin TMWM-279 Litho in USA

RF INTERSERIES ADAPTERS

Unsurpassed flexibility
Outstanding VSWR Performance
30 combinations



KIT #4240-400

	N/f	N/m	UHF/f	UHF/m	BNC/f	BNC/m	TNC/f
N/f	X						
N/m	X	X					
UHF/f	X	X					
UHF/m	X	X	X				
BNC/f	X	X	X	X			
BNC/m	X	X	X	X	X		
TNC/f	X	X	X	X	X	X	
TNC/m	X	X	X	X	X	X	X

It is easy to assemble your compact, precision 50-ohm adapter to meet any of 30 different matching requirements between four coax connector series.

The four series included in this kit are N, UHF, BNC and TNC connectors, one male and one female each — except there are two male N and two female N. Also included are five couplers, so that five complete adapters can be assembled at any one time.

This permits 28 combinations between series or with male/female of the same series. The two additional N connectors also permit assembling adapters with male N/male N and female N/female N functions.

The low VSWR of the adapters is the result of precision machining and tight mating tolerances (the male N/female N combination, for example is below 1.05 to 1GHz and below 1.1 to 2.5GHz).

BIRD

Electronic Corporation

30303 Aurora Rd., Cleveland (Solon), Ohio 44139
216·248-1200 TLX: 706898 Bird Elec UD

WEST: Ojai, CA 805-646-7255

BIRD Accessories

BIRD Electronic Corporation
30303 Aurora Rd. Cleveland (Solon), Ohio 44139
216-248-1200 TLX 706898 Bird Elec UD
WEST: Ojai, CA 805-646-7255

QC-Type (Quick Change) Connectors


FEMALE HN
4240-268


MALE N
4240-063


FEMALE N
4240-062

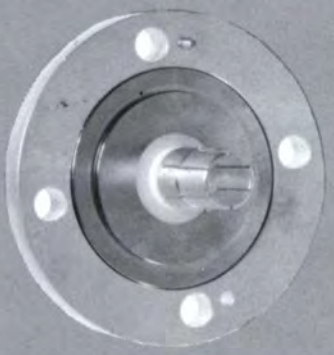

MALE UHF
4240-179

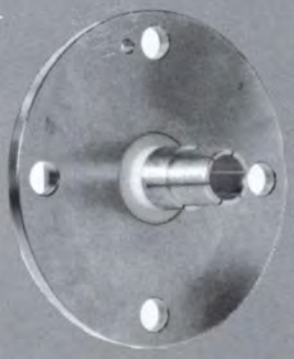

FEMALE UHF
4240-050


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

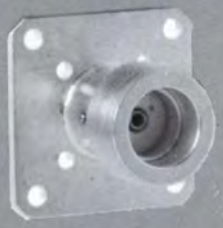

MALE BNC
4240-132


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.

Bulletin No. QC-84 Litho in U.S.A.

Digital Wide-range RF Calorimeter

50W to 1000W DC to 3500MHz

- **Measures RF power conveniently with precision**
- **Displays power directly without charts or calculations**
- **Ideal for instrument and RF output calibration**

Models 6090-115 and 6090-230 are new Digital RF Calorimeter/Load Resistors which combine convenience, speed and simplicity in accurate RF power measurement below 1000 watts with a self-cooled 50-ohm line termination. Its large digital display indicates power directly in watts.

Accurate measurements require no special skill and little time: connect the RF input cable to the built-in load at the rear, let the system run until coolant flow and temperature have stabilized, make two simple zero-display adjustments, apply RF power and read.

There is no need for interpretation of flow rates, temperature differentials or system constants. The outputs of two temperature sensors and a flow rate sensor are processed continuously with a direct reading uncertainty of ±3% of **indication.** For substantially reduced measurement uncertainties, models 6090- can be used as a low frequency substitution device, comparing RF power with known dc or 50/60Hz line power, which can be determined with traceability to NBS. Many factors that contribute to cumulative uncertainties, such as small variations in water properties and sensor data conversion at different temperatures, are self-cancelling in comparison calorimetry. We are performing for you, the user, a series of substitution measurements with 6090 Calorimeters which result in a correction factor furnished with each unit. This K factor permits reduction in half of uncertainties, to only ±1½% of indication, without the additional effort of substitution. The K factor can, of course, be user-verified in the field at any time, if desired.

SPECIFICATIONS:

Power Rating 50-1000 watts continuous duty
Impedance 50 ohms
Input Connector Female N
Frequency Range DC to 3500MHz
Measurement Uncertainty ± 1.5% with K factor
(% of **indication**) (100 to 1000 watts)
± 3% without K factor
(50 to 1000 watts)
VSWR 1.10 to 1 from DC to 1000MHz
1.25 to 1 from 1000 to 3500MHz
Ambient Temperature Range 10° C to 30° C
AC Power 115 volts, 60Hz, 2.4 amps
230 volts, 50Hz, 1.2 amps
Cooling Liquid .74 quarts (700 milliliters)
Dimensions 23⅜" L x 17¾" W x 7¼" H
Weight 36 lbs. with water
Stabilization Time 3 minutes
(from low power to full power)

BIRD
Electronic Corporation
30303 Aurora Rd Cleveland (Solon) Ohio 44139
216 · 248-1200 TLX: 98-5298 Cable: BIRDELEC

Bulletin No. 6090-483

Litho in U.S.A.

And you thought that your THRULINE® Wattmeter already did everything you needed . . .

NOW: A Field Strength Accessory Plug-in Element for THRULINE® Wattmeters

For a modest investment, the new model 4030 Relative Field Strength Element expands the usefulness of models 43, 4430 and 4431 Wattmeters to help you optimize the radiated signal of any transmitter from 2-1000MHz. Increase the reach of business or personal transceivers, extend the range of H.T.s by tuning, adjusting, positioning antennas for maximum meter indication on Bird THRULINE® Wattmeters.

Most field strength meters are built with resonant reactive networks which limit their utility — the 4030 Element employs a broadband non-reactive circuit plus modern RF Solid State Technology. To make measurements is simple, quick and convenient — and you are half-way there with your model 43 or other model THRULINE® Wattmeter with its precision sensitive and rugged meter. Just insert the new Element, and read.

The 4030 Elements consist of a flexible receiving antenna, a high pass filter network, and a variable gain RF amplifier/detector. The amplifier is turned on automatically when the Element is plugged in. The amplifier's DC out-

put drives the 30 microampere meter of the listed model THRULINE® Wattmeters to indicate the presence of an RF field at the receiving antenna. A GAIN control adjusts sensitivity of the device to various field intensities.

Typical model 4030 sensitivity with the gain control at maximum is a full scale meter deflection with one-watt of radiated power at 150MHz from a 2-meter H.T. at 8 feet distance.

Since the model 4030 responds to the field intensity at a particular location, it is easy to perform antenna-transmitter peaking simply by obtaining the maximum field intensity reading on the meter while optimizing antenna match.

Model 4030 Elements are also suitable for other in-line wattmeters equipped with 30 microampere analog meters, such as Bird's rackmounted THRULINE® models 4521, 4522, 4526 and 4527, as well as WATTCHER® Monitor model 3128.

SPECIFICATIONS:

Typical Sensitivity: A one watt CW source at 150MHz through a quarter wave antenna will cause full scale meter deflection at a distance of 8 feet.

Dynamic Range: 30dB minimum

Usable Frequency Range: 1MHz to 1000MHz

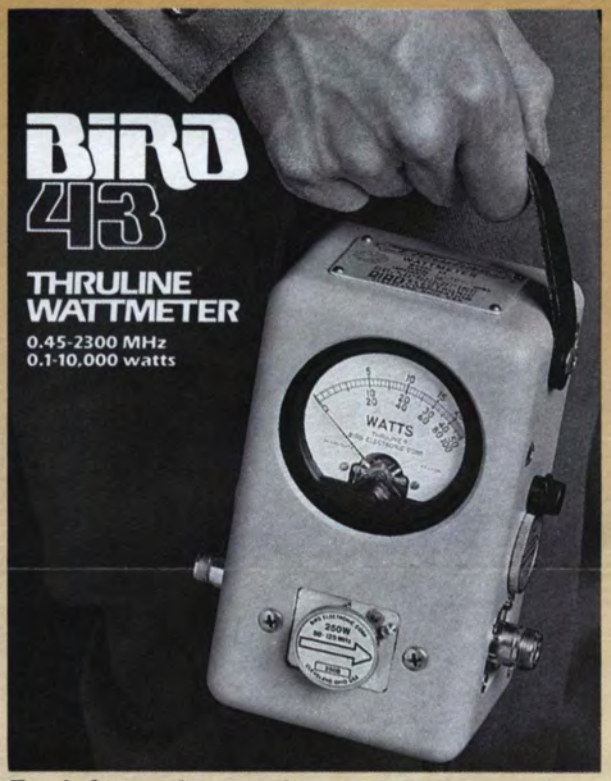
Output Characteristics: Compatible with 30 microampere meters

Battery Life: 100 hours minimum

Battery Complement: Three 3 volt lithium-manganese dioxide cells (Duracell DL2032 or equivalent)

Operating Temperature Range: 0° to +50° C

Weight: 3 oz. (including batteries)



For information on the model 43 THRULINE® Wattmeter ask for Bird Bulletin No. 43-83

BIRD

Electronic Corporation

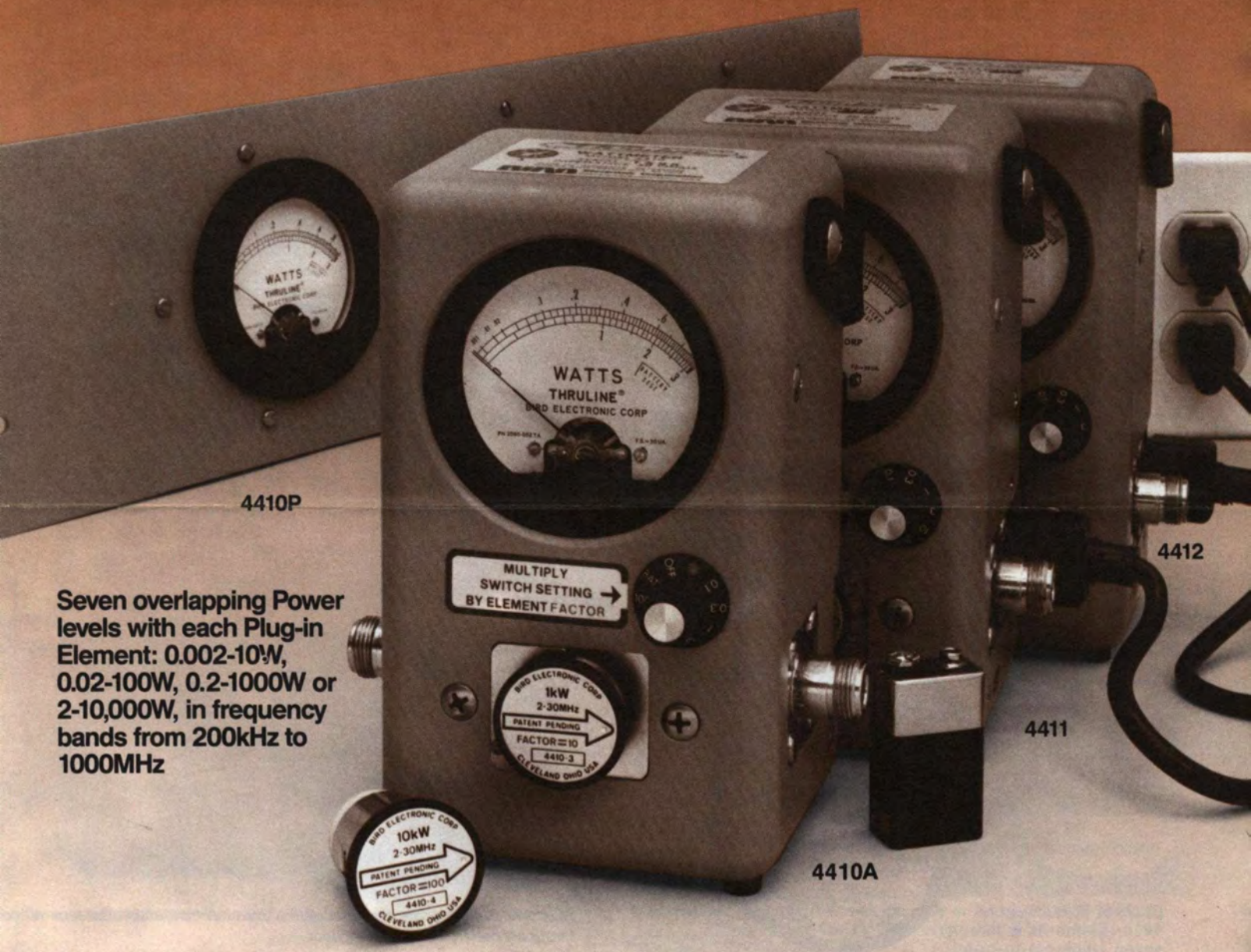
30303 Aurora Rd Cleveland (Solon) Ohio 44139
216 · 248-1200 TLX: 98-5298 Cable: BIRDELEC

Bulletin No. 4030A-683

Litho in USA

New THRULINE® RF Directional Wattmeters with superior sensitivity, 7-level 'Plug-ins', ±5% of READING accuracy

Series 4410
Frequency Ranges 0.2-1000MHz
Power Ranges 0.002*-10,000W



Seven overlapping Power levels with each Plug-in Element: 0.002-10W, 0.02-100W, 0.2-1000W or 2-10,000W, in frequency bands from 200kHz to 1000MHz

*on the 10mW scale

. . . and now there are 4 versions of this versatile NEW THRULINE® Wattmeter:

Model 4410A—battery-powered portable
Model 4411—115/230VAC 50/60 Hz **or** battery portable
Model 4410P—115/230VAC 50/60Hz **or** battery 19″ rack-mount
Model 4412—115/230VAC 50/60 Hz or rechargeable NiCd battery operation

You are probably familiar with our industry-standard model 43. The new series 4410 portables look a lot like the 43 and share its ruggedness and simplicity of use, but after that the similarities end. Inside the 4410 is an amplifier employing an inherently self-balancing measurement technique. A patented bridge circuit—with its four legs divided between the base and each of the proprietary Plug-in Elements—permits reading accuracies without equal in a directional wattmeter with a 5000-to-one dynamic element range, and unaffected by temperature extremes.*

BIRD 4410 series Plug-in Elements (Catalog Numbers)

Full-Scale Power and Frequency (MHz) Ranges of 4410 Elements

0-10, 30,100, 300 milliwatts, 1, 3, 10 watts		0-100, 300 milli-watts 1, 3, 10, 30, 100 watts		0-1, 3, 10, 30, 100, 300, 1000 watts		0-10, 30, 100, 300, 1000, 3000 10,000 watts	
MHz	P/N	MHz	P/N	MHz	P/N	MHz	P/N
30-50	4410-20	25-80	4410-10	2-30	4410-3	0.2-0.535	4410-1
50-88	4410-21	50-125	4410-11	25-80	4410-5	0.45-2.5	4410-2
100-152	4410-22	100-250	4410-12	50-200	4410-6	2-30	4410-4
150-250	4410-23	200-500	4410-13	144-520	4410-7		
225-400	4410-24	400-1000	4410-14	200-1000	4410-8		
400-800	4410-25						
800-900	4410-26						

Each of these special 4410- Elements is like seven elements-in-one.

AC-powered models are equipped with a Universal Instrumentation-type AC conn through a battery-compartment door.

BIRD

The 4410 series Elements are used just like those of the Industry-standard model 43. They plug into the wattmeter's element socket and are simply rotated for either forward or reflected measurements. Each Element, however, provides **seven** power ranges instead of one, covering 0.01/0.03/.1/.3/1/3/10 watts, 0.1/0.3/1/3/10/30/100 watts, 1/3/10/30/100/300/1000 watts or 10/30/100/300/1000/3000/10000 watts—with full rated accuracy of meter READING from 20% to 100% of each scale of the seven overlapping ranges, i.e. a 37dB (5000 to 1) power range! The desired range is instantly selectable by a rotary switch on the front of the wattmeter.

This switch also includes a convenient battery test position.

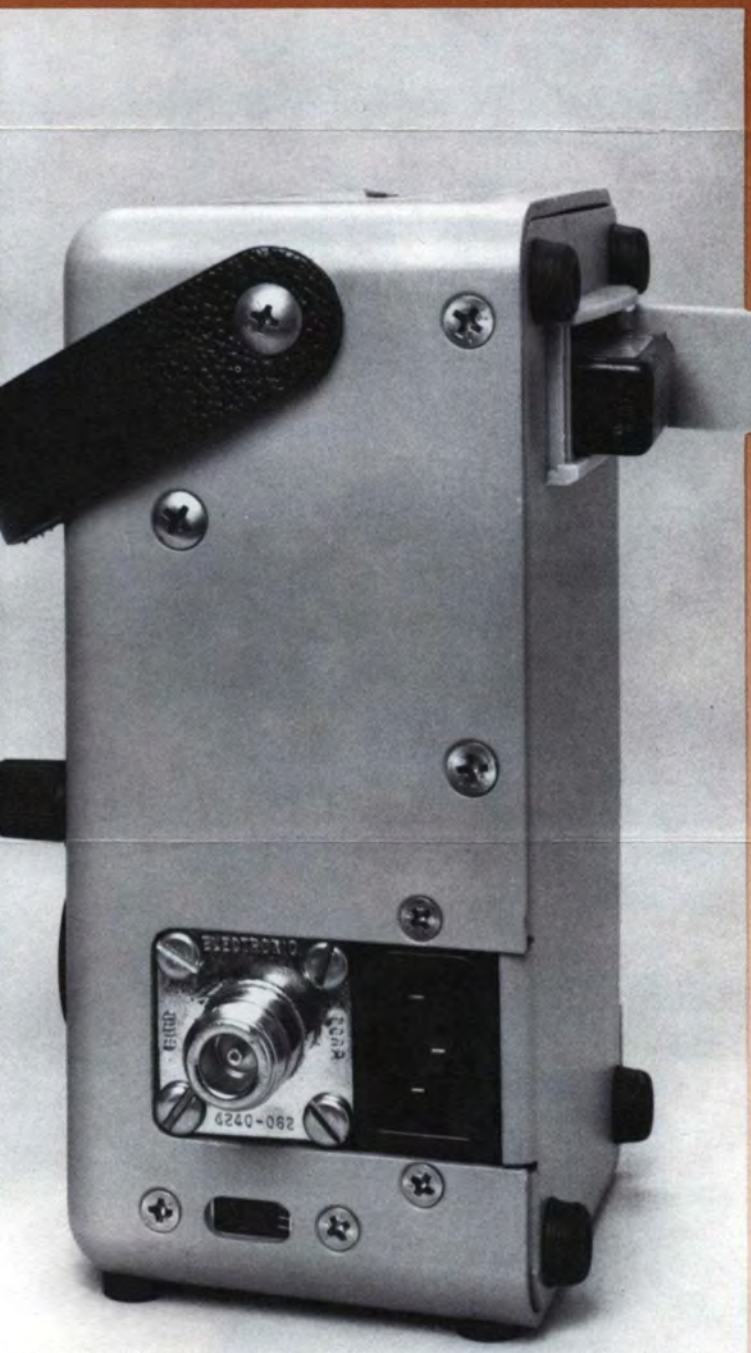
What can the 4410's incomparable dynamic range and accuracy do for you? We can't guess all the possible applications, but consider these:

1. Field-service use where a single handful of Elements will now cover unparalleled power and frequency ranges under wide environmental conditions—and anywhere else where dozens of Elements *used* to be required.

2. Laboratory work where high accuracies and power levels as low as 2 milliwatts are required.

3. Any application where accurate THRULINE® measurements at milliwatts, watts or kilowatts need to be performed simply, quickly and at minimum cost.

**See the specifications for temperature limits applicable to the lowest power Elements*



and an external 115/230V selector switch. Batteries are easily accessible

Specifications

Power Range[1] 0.01-10W, 0.1-100W, 1W-1000W or 10W-10,000W full scale in one single Plug-in Element. Any BIRD series 4410- Element may be used.

VSWR with N Connectors 1.05 max. (4410P: 1.07 max.)

Frequency Range[1] 200kHz to 1000MHz, CW or FM

Accuracy ±5% OF READING, for any reading above 20% of the power range selected, for FM or CW signals without AM. This accuracy is maintained for a full 37 dB dynamic range with each 4410 Element (except No. 4410-1 0.200-0.535 MHz, which is accurate to ±10% of reading).

Ambient Temperature Range Elements 4410-1 thru 8 and -10 thru 14 are temperature-compensated for rated accuracy from 0°C to 50°C (32° to 122°F), and 4410-20 thru 26 from 20°C to 30°C (68° to 86°F).

Over-range Protection To 120% of nominal full scale (i.e. 12W, 120W, 1200W, or 12,000W). No damage or degradation to the unit will result, regardless of the Range Selector Switch position.

Nominal Impedance 50 ohms

Battery Life 4410A, 4410P, 4411: One standard 9V alkaline "transistor" battery (NEDA No. 1604A supplied). 24 hour operation minimum. (A Lithium battery with a minimum of 180 hours operation is available. Order Part No. 5-1576). 4412: 7 hours minimum, rechargeable.

AC Power 4410P, 4411, 4412: 105-125/210-250VAC, 50/60Hz with integral selector switch.

Connectors[2] QC Type (Female N normally supplied).

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

Weight 4410A, 4411, 4412: 3⅓ lbs. (1.5kg), 4410P: 5 lbs. (2.3kg)

Nominal Size incl. connectors
4410A, 4411, 4412: 6⅞"×5⅛"×3⅝" (175×130×92mm)
4410P: 19"×5 7/32"×3 15/16" (483×133×100mm)

Optional Carrying Cases CC-1: For Wattmeter and 7 Elements. CC-3: For Wattmeter, 25W Load model 8080 and 4 Elements. EC-1: For 12 Elements.

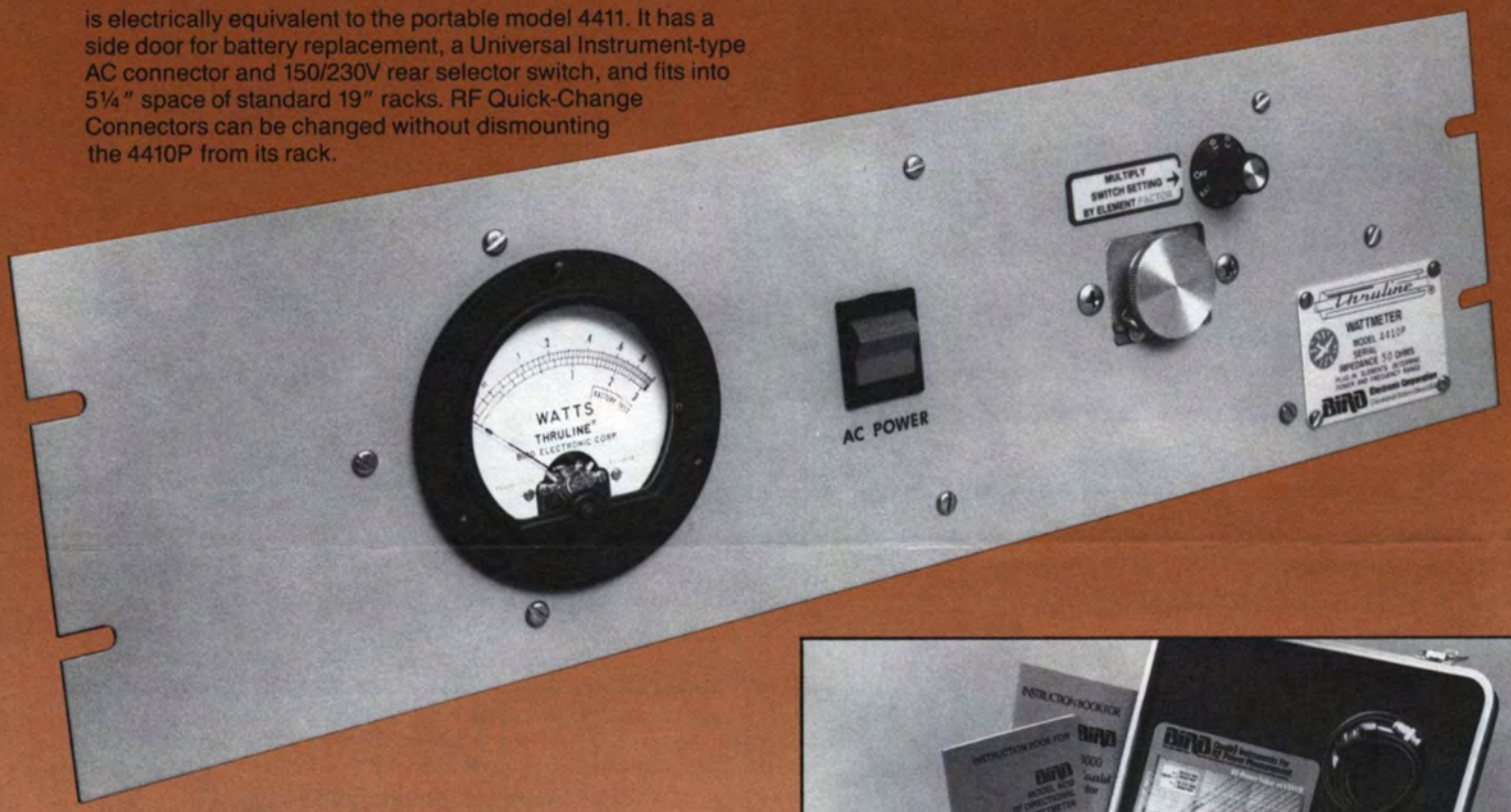
[1]*Frequency Band and Power Range is determined by Plug-in Element selected. Only 4410-series Elements can be used.*

[2]*Available BIRD QC-Quick Change connectors, which are interchangeable in the field, include male or female N, BNC, **TNC**, UHF, C, SC, LC, HN, LT and ⅞" EIA flange. Also SMA and new Mini-UHF.*

BIRD

Model 4410P panel-mounted Wattmeter

is electrically equivalent to the portable model 4411. It has a side door for battery replacement, a Universal Instrument-type AC connector and 150/230V rear selector switch, and fits into 5¼" space of standard 19" racks. RF Quick-Change Connectors can be changed without dismounting the 4410P from its rack.



Custom Test Sets Available

such as this all-in-one Test Set (4410-030), containing a 4410 series THRULINE® Wattmeter with four 1kW Elements covering 2 to 520 MHz, a 100W dry Load, a Variable RF Signal Sampler, a BNC to N adapter, 2 cable assemblies, spare Lithium battery, 2 manuals and a VSWR chart, all as currently supplied to the Armed Forces.

This Test Set (4410-025) provides storage and protection for a 4410 series Wattmeter with up to 6 Elements and Dust Plug, and is supplied with a laminated VSWR chart and manual (Elements No. 4410-3, -4, -5 and -6 are part of this specific Test Set. Also see "Optional Carrying Cases" on the preceding page).

A Test Set can be custom-tailored to your requirements. Please contact the plant.

BIRD
Electronic Corporation
30303 Aurora Rd., Cleveland (Solon), Ohio 44139
216 · 248-1200 TLX: 706898 Bird Elec UD
WEST: Ojai, CA 805-646-7255

Bulletin No. 4410-95 Litho in U.S.A.