RF POWER SENSORS
6900 Series

Printed in the UK

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PREFACE

SYMBOLS IN THE MANUAL

The meaning of symbols used in this manual is as follows:-

(1) Sequence of steps in a procedure.

• List of topics or items

CAPS Capitals are used to identify names of controls and panel markings.

[ ] Square brackets are used to distinguish push-button keys.

PRECAUTIONS

VARNINGS, CAUTIONS and NOTES

These terms have specific meanings in this manual:

WARNINGS contain information to prevent personal injury.
CAUTIONS contain information to prevent damage to the equipment.
Notes contain important general information.

IAZARD SYMBOLS

The meaning of symbols that appear on the equipment is as follows:-

Symbol	Nature of hazard
	General hazards
	Dismantling may cause irreparable damage to this unit
	Static sensitive component

;ENERAL CONDITIONS OF USE

This product is designed and tested to comply with the requirements of IEC/EN61010-1 ;afety requirements for electronic measuring apparatus', for Class III hand-held equipment ıd is for use in a pollution degree 2 environment. The equipment is designed to operate from ı installation Category I supply.

Equipment should be protected from the ingress of liquids and precipitation such as in, snow, etc. When moving the instrument from a cold to a hot environment, it is important allow the temperature of the instrument to stabilise before it is connected to the supply to 'oid condensation forming. The instrument must only be operated within the environmental ınditions specified in Chapter 1 'Performance Data' in the Operating/Instruction manual.

This product is not approved for use in hazardous atmospheres or medical applications. the equipment is to be used in a safety-related application, e.g. avionics or military ɔplications, the suitability of the product must be assessed and approved for use by a ɔmpetent person.

WARNING - ELECTRICAL HAZARDS

C supply voltage

This equipment conforms with IEC safety Class III, meaning that for continued safety it ust only be connected to supplies and signal sources which conform to 'Separated Extra-Low ɔltage' (SELV and SELV-E) voltage and insulation requirements. No hazardous voltages are ıerated internally. See under 'Performance Data' in Chapter 1 for the maximum permitted ıltage levels that can be applied.

WARNING - TOXIC HAZARD

Some of the components used in this equipment may include resins and other materials which give off toxic fumes if incinerated. Take appropriate precautions, therefore, in the disposal of these items.

WARNING - TEMPERATURE HAZARD

When a 6930 Series sensor is used for measuring high powers the device has a high operating surface temperature.

CAUTION - STATIC SENSITIVE COMPONENTS

This equipment contains static-sensitive components which may be damaged by handling.

CAUTION - PRECISION CONNECTOR

All IFR Power Sensors are fitted with precision connectors. Good connector care is essential to maintain the performance of the Power Sensor. The following guidelines must always be adhered to when making connections:

- The connector interfaces must be clean and free of any mechanical damage.
- The connector should be measured with a connector gauge to ensure they are within mechanical tolerance.
- Connections should be made by rotating the outer locking nut only, NEVER the body of the device.
- Always use a torque spanner with 3.5 mm and 2.92 mm connectors.
- The Warranty does not cover connector damage due to mis-use or normal wear and tear.

Chapter 1
GENERAL INFORMATION

CONTENTS

FEATURES

The 6900 Series of RF Power Sensors is used with IFR 6960 Series RF Power Meter, the 6970 RF Power Meter, the CPM 20 and CPM 46 Counter Power Meter and the 6200 Series of Microwave Test Sets. Note, however, that the 6930 Series of sensors can be used with the 6960A and 6960B RF Power Meters, but cannot be used with the 6960 RF Power Meter. The sensors provide the meter with a chopped DC analogue of the RF power, and collectively they cover a power range from –70 dBm to +44 dBm (0.1 nW to 25 W) at frequencies from 30 kHz to 46 GHz.

Each sensor has an individual label showing a graph of 'calibration factor', and values of '50 MHz reference calibration factor' and 'linearity factor'. The calibration factor appropriate to the measurement frequency and the linearity factor may be entered into the instrument to enhance accuracy. The 6200 Series of Microwave Test Sets allow entry and storage of all the calibration data supplied with the sensors.

A 'calibration record' giving linearity factor and calibration data to two decimal places is also provided with each sensor.

VSWR and uncertainty values are low across the entire frequency range of the sensor.

Each sensor has a multi-way output connector for connection to the power meter via the sensor cable that is supplied with the meter. The sensor provides high level signals to the power meter so that the possibility of significant RF interference during measurements is negligible. A high damage level threshold minimizes the possibility of damage to the RF unit. Damaged units are, however, field replaceable in most cases (see Chapter 5).

Its small, light, rugged construction allows the sensor to be used confidently in bench or field applications without the need for any mechanical support.

PERFORMANCE DATA

The specifications for the sensors are shown on the following pages.

	6910	6911	6912
POWER RANGE	-30 dBm to +20 dBm (1 µW to 100 mW)	-30 dBm to +20 dBm (1 µW to 100 mW)	-30 dBm to +20 dBm (1 µW to 100 mW)
MAX RF INPUT	+25 dBm (300 mW) CW +42 dBm (15 W) peak for 2 µs	+25 dBm (300 mW) CW +42 dBm (15 W) peak for 2 µs	+25 dBm (300 mW) CW +42 dBm (15 W) peak for 2 µs
FREQUENCY RANGE	10 MHz - 20 GHz	10 MHz - 20 GHz	30 kHz - 4.2 GHz
VSWR	1.25 10 MHz - 30 MHz 1.1 30 MHz - 2 GHz 1.18 2 GHz - 16 GHz 1.28 16 GHz - 18 GHz 1.4 typical 18 GHz - 20 GHz	1.25 10 MHz - 30 MHz 1.1 30 MHz - 2 GHz 1.18 2 GHz - 16 GHz 1.28 16 GHz - 18 GHz 1.4 typical 18 GHz - 20 GHz	1.6 30 kHz - 100 kHz 1.2 100 kHz - 300 kHz 1.1 300 kHz - 4.2 GHz
DRIFT	10 µW (typical, 1 hr after 24 hr warm-up at constant temperature)	10 µW (typical, 1 hr after 24 hr warm-up at constant temperature)	10 µW (typical, 1 hr after 24 hr warm-up at constant temperature)
LINEARITY FACTOR	Provided with sensor	Provided with sensor	Provided with sensor
Accuracy	±0.5% at 25°C between +10 and +20 dBm Improves by a factor of 10 for each lower range	±0.5% at 25°C between +10 and +20 dBm Improves by a factor of 10 for each lower range	±0.5% at 25°C between +10 and +20 dBm Improves by a factor of 10 for each lower range
CALIBRATION FACTOR			
Accuracy	Uncertainty provided with sensor	Uncertainty provided with sensor	Uncertainty provided with sensor
Resolution	0.01%	0.01%	0.01%
RF CONNECTOR	Precision N-type, male, 50 Ω	APC-7, 50 Ω	Precision N-type, male, 50 Ω
SIZE & WEIGHT	87 mm long, 33.5 mm dia. 140 g	87 mm long, 33.5 mm dia. 140 g	87 mm long, 33.5 mm dia. 140 g

	6913	6914	6914S
POWER RANGE	-30 dBm to +20 dBm (1 µW to 100 mW)	-30 dBm to +20 dBm (1 µW to 100 mW)	-30 dBm to +20 dBm (1 µW to 100 mW)
MAX RF INPUT	+25 dBm (300 mW) CW +42 dBm (15 W) peak for 2 µs	+25 dBm (300 mW) CW +42 dBm (15 W) peak for 2 µs	+25 dBm (300 mW) CW +42 dBm (15 W) peak for 2 µs
FREQUENCY RANGE	10 MHz - 26.5 GHz	10 MHz - 40 GHz	10 MHz - 46 GHz
VSWR	1.4 10 MHz - 40 MHz 1.15 40 MHz - 100 MHz 1.1 100 MHz - 2 GHz 1.15 2 GHz - 12.4 GHz 1.2 12.4 GHz - 18 GHz 1.25 18 GHz - 26.5 GHz	1.58 10 MHz - 40 MHz 1.15 40 MHz - 100 MHz 1.1 100 MHz - 2 GHz 1.15 2 GHz - 12.4 GHz 1.2 12.4 GHz - 18 GHz 1.43 18 GHz - 40 GHz (1.55 for version –002)	1.58 10 MHz - 40 MHz 1.15 40 MHz - 100 MHz 1.1 100 MHz - 2 GHz 1.15 2 GHz - 12.4 GHz 1.43 12.4 GHz - 33 GHz 2.3 33 GHz - 40 GHz 3.6 40 GHz - 46 GHz
DRIFT	10 µW (typical, 1 hr after 24 hr warm-up at constant temperature)	10 µW (typical, 1 hr after 24 hr warm-up at constant temperature)	10 µW (typical, 1 hr after 24 hr warm-up at constant temperature)
LINEARITY FACTOR	Provided with sensor	Provided with sensor	Provided with sensor
Accuracy	±0.5% at 25°C between +10 and +20 dBm Improves by a factor of 10 for each lower range	±0.5% at 100 mW, decreasing by 0.005% per mW	±0.5% at 100 mW, decreasing by 0.005% per mW
CALIBRATION FACTOR			
Accuracy	Uncertainty provided with sensor	Uncertainty provided with sensor	Uncertainty provided with sensor
Resolution	0.01%	0.01%	0.01%
RF CONNECTOR	MPC 3.5 mm, male, 50 Ω	MPC 2.92 mm, male, 50 Ω	MPC 2.92 mm, male, 50 Ω
SIZE & WEIGHT	80 mm long, 33.5 mm dia. 140 g	88.5 mm long, 33.5 mm dia. 140 g	88.5 mm long, 33.5 mm dia. 140 g

	6919	6920	6923
POWER RANGE	-30 dBm to +20 dBm (1 µW to 100 mW)	-70 dBm to -20 dBm* (0.1 nW to 10 µW)	-70 dBm to -20 dBm** (0.1 nW to 10 µW)
MAX RF INPUT	+25 dBm (300 mW) CW +42 dBm (15 W) peak for 2 µs	+26 dBm (400 mW) CW +30 dBm (1 W) peak for 2 µs	+26 dBm (400 mW) CW +30 dBm (1 W) peak for 2 µs
FREQUENCY RANGE	30 kHz - 3 GHz	10 MHz - 20 GHz	10 MHz - 26.5 GHz
VSWR	1.4 30 kHz - 100 kHz 1.15 100 kHz - 300 kHz 1.1 300 kHz - 2 GHz 1.2 typical 2 GHz - 3 GHz	1.4 - 1.2 10 MHz - 40 MHz 1.2 40 MHz - 10 GHz 1.35 10 GHz - 18 GHz 1.4 typical 18 GHz - 20 GHz	1.4 10 MHz - 40 MHz 1.15 40 MHz - 100 MHz 1.12 100 MHz - 2 GHz 1.17 2 GHz - 8 GHz 1.3 8 GHz - 18 GHz 1.5 18 GHz - 26.5 GHz
DRIFT	10 µW (typical, 1 hr after 24 hr warm-up at constant temperature)	20 pW (typical, 1 hr after 24 hr warm-up at constant temperature)	20 pW (typical, 1 hr after 24 hr warm-up at constant temperature)
LINEARITY FACTOR	Provided with sensor	Provided with sensor	Provided with sensor
Accuracy	±0.5% at 25°C between +10 and +20 dBm Improves by a factor of 10 for each lower range	±1% at 25°C between -30 and -20 dBm Improves by a factor of 10 for each lower range	±1% at 25°C between -30 and -20 dBm Improves by a factor of 10 for each lower range
CALIBRATION FACTOR			
Accuracy	Uncertainty provided with sensor	Uncertainty provided with sensor	Uncertainty provided with sensor
Resolution	0.01%	0.01%	0.01%
RF CONNECTOR	Precision N-type, male, 75 Ω	Precision N-type, male, 50 Ω	MPC 3.5 mm, male, 50 Ω
SIZE & WEIGHT	89 mm long, 33.5 mm dia. 140 g	104 mm long, 33.5 mm dia. 180 g	87 mm long, 33.5 mm dia. 180 g

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*Lower limit is -65 dBm when used with 6200 series MTS, and -60 dBm when used with the CPM 20/CPM 46

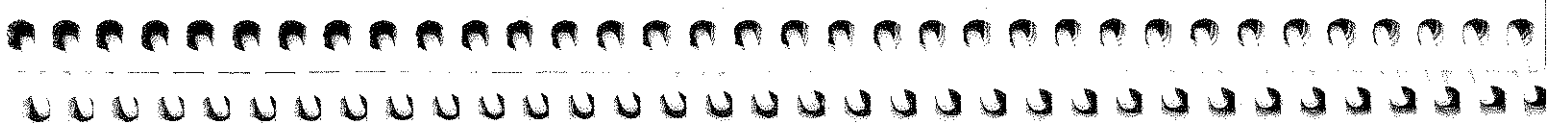
**Lower limit is –65 dBm when used with 6970, -60 dBm when used with the CPM 20/CPM 46 and –50 dBm when used with 6200 series MTS

46882-150K

	6924	6924S	6930
POWER RANGE	-70 dBm to -20 dBm* (0.1 nW to 10 µW)	-70 dBm to -20 dBm* (0.1 nW to 10 µW)	-15 dBm to +35 dBm (30 µW to 3 W)
MAX RF INPUT	+26 dBm (400 mW) CW +30 dBm (1 W) peak for 2 µs	+26 dBm (400 mW) CW +30 dBm (1 W) peak for 2 µs	+37 dBm (5 W) CW +50 dBm (100 W) peak for 2 µs
FREQUENCY RANGE	10 MHz - 40 GHz	10 MHz - 46 GHz	10 MHz - 18 GHz
VSWR	1.58 10 MHz - 40 MHz 1.15 40 MHz - 100 MHz 1.12 100 MHz - 2 GHz 1.33 2 GHz - 18 GHz 1.5 18 GHz - 33 GHz 1.95 33 GHz - 40 GHz 1.97 26.5 GHz - 40 GHz (-002 version)	1.58 10 MHz - 40 MHz 1.15 40 MHz - 100 MHz 1.12 100 MHz - 2 GHz 1.33 2 GHz - 18 GHz 1.5 18 GHz - 33 GHz 1.95 33 GHz - 40 GHz 3.6 40 GHz - 46 GHz	1.1 10 MHz - 2 GHz 1.18 2 GHz - 16 GHz 1.28 16 GHz - 18 GHz
DRIFT	20 pW (typical, 1 hr after 24 hr warm-up at constant temperature)	20 pW (typical, 1 hr after 24 hr warm-up at constant temperature)	10 µW (typical, 1 hr after 24 hr warm-up at constant temperature)
LINEARITY FACTOR	Provided with sensor	Provided with sensor	Provided with sensor
Accuracy	±1% between -30 and -20 dBm at 23°C	±1% between -30 and -20 dBm at 23°C	-2.5% to +3.5% with 6950 -1% to +5% between +25 and +35 dBm Improves by a factor of 10 for each lower range
CALIBRATION FACTOR			
Accuracy	Uncertainty provided with sensor	Uncertainty provided with sensor	Uncertainty provided with sensor
Resolution	0.01%	0.01%	0.01%
RF CONNECTOR	MPC 2.92 mm, male, 50 Ω	MPC 2.92 mm, male, 50 Ω	Precision N-type, male, 50 Ω
SIZE & WEIGHT	88.5 mm long, 33.5 mm dia. 150 g	88.5 mm long, 33.5 mm dia. 150 g	93 mm long, 33.5 mm dia. 190 g

*Lower limit is -65 dBm when used with 6970, -60 dBm when used with the CPM 20/CPM 46 and –50 dBm when used with 6200 series MTS

	6932	6934	6934S
POWER RANGE	-15 dBm to +35 dBm (30 µW to 3 W)	-15 dBm to +30 dBm (30 µW to 1 W)	-15 dBm to +30 dBm (30 µW to 1 W)
MAX RF INPUT	+37 dBm (5 W) CW +50 dBm (100 W) peak for 2 µs	+33 dBm (2 W) CW +45 dBm (32 W) peak for 2 µs	+33 dBm (2 W) CW +45 dBm (32 W) peak for 2 µs
FREQUENCY RANGE	30 kHz - 4.2 GHz	10 MHz - 40 GHz	10 MHz - 46 GHz
VSWR	1.1 30 kHz - 4.2 GHz	1.12 10 MHz - 40 MHz 1.12 40 MHz - 100 MHz 1.1 100 MHz - 2 GHz 1.15 2 GHz - 12.4 GHz 1.2 12.4 GHz - 18 GHz 1.25 18 GHz - 26.5 GHz 1.43 26.5 GHz - 40 GHz (1.55 for version –002)	1.12 10 MHz - 40 MHz 1.12 40 MHz - 100 MHz 1.1 100 MHz - 2 GHz 1.15 2 GHz - 12.4 GHz 1.2 12.4 GHz - 18 GHz 1.25 18 GHz - 26.5 GHz 1.43 26.5 GHz - 40 GHz 2.3 40 GHz 46 GHz
DRIFT	10 µW (typical, 1 hr after 24 hr warm-up at constant temperature)	10 µW (typical, 1 hr after 24 hr warm-up at constant temperature)	10 µW (typical, 1 hr after 24 hr warm-up at constant temperature)
LINEARITY FACTOR	Provided with sensor	Provided with sensor	Provided with sensor
Accuracy	-1% to +5% between +25 and +35 dBm. Improves by a factor of 10 for each lower range	-1% to +5% between +25 and +30 dBm, less on other ranges.	-1% to +5% between +25 and +30 dBm, less on other ranges.
CALIBRATION FACTOR			
Accuracy	Uncertainty provided with sensor	Uncertainty provided with sensor	Uncertainty provided with sensor
Resolution	0.01%	0.01%	0.01%
RF CONNECTOR	Precision N-type, male, 50 Ω	MPC 2.92 mm, male, 50 Ω	MPC 2.92 mm, male, 50 Ω
SIZE & WEIGHT	93 mm long, 33.5 mm dia. 190 g	87 mm long, 33.5 mm dia. 150 g	87 mm long, 33.5 mm dia. 150 g



	6930 (option 002)	6932 (option 002)
POWER RANGE	-5 dBm to +44 dBm (300 µW to 25 W)	-5 dBm to +44 dBm (300 µW to 25 W)
MAX RF INPUT	+45 dBm (30 W) CW +60 dBm (1 kW) peak for 2 µs	+45 dBm (30 W) CW +60 dBm (1 kW) peak for 2 µs
FREQUENCY RANGE	10 MHz - 18 GHz	30 kHz - 4.2 GHz
VSWR	1.2 10 MHz - 8 GHz 1.25 8 GHz - 12.4 GHz 1.35 12.4 GHz - 18 GHz	1.2 30 kHz - 4.2 GHz
DRIFT	10 µW (typical, 1 hr after 24 hr warm-up at constant temperature)	10 µW (typical, 1 hr after 24 hr warm-up at constant temperature)
LINEARITY FACTOR	Provided with sensor	Provided with sensor
Accuracy	–2% to +6% between +35 & +44 dBm. Improves by a factor of 10 for each lower range.	–2% to +6% between +35 & +44 dBm. Improves by a factor of 10 for each lower range.
CALIBRATION FACTOR		
Accuracy	Uncertainty provided with sensor	Uncertainty provided with sensor
Resolution	0.01%	0.01%
RF CONNECTOR	Precision N-type, male, 50 Ω	Precision N-type, male, 50 Ω
SIZE & WEIGHT	228 mm long, 64 mm dia. 533 g	228 mm long, 64 mm dia. 533 g

Operating environment

This equipment is designed to comply with the requirements of HD401 / IEC348, for Class III Hand-Held equipment and is for use in a pollution degree 2 environment. The equipment is designed to operate from an installation category 1 supply.

Electro-magnetic compatibility

Conforms with the protection requirements of the EEC council directive 89/336/EEC.

Complies with the limits specified in:
EN55011 Class B CISPR 11
EN50082-1 IEC 801-2, 3, 4

Safety

Conforms with the requirements of HD 401 / IEC 348

Normal range of operation

0°C to 55°C.

Condition of storage and transport

Temperature	-40°C to +70°C.
Humidity	95% @ 35°C
Altitude	Up to 2500 m.

SUPPLIED ACCESSORIES

Part No.

6913, 6914, 6914S

N-type male / SMA female adapter (to connect to 0 dBm power reference) 23443-822K

6919

75 Ω to 50 Ω adapter (to connect to 0 dBm power reference) 23443-842W

6920

30 dB precision attenuator - for use in calibration
Attenuation: 30 dB ±0.05 dB at 50 MHz at 25°C 06920-023P

6923, 6924, 6924S

30 dB precision attenuator - for use in calibration
Attenuation: 30 dB ±0.05 dB at 50 MHz at 25°C 06920-023P

N-type male / SMA female adapter to connect to 0 dBm power reference 23443-822K

6934

N-type male / SMA female adapter 23443-822K

The 40 GHz and 46 GHz power sensors are supplied with accessories as above (001 versions). The 002 versions also include a waveguide 22 transformer and calibration table. A 002 version is not available for the 6914S, 6924S and 6934S.

The 6930 option 002 and 6932 option 002 are supplied with a high power attenuator to enable power levels up to 25 W to be measured.

OPTIONAL ACCESSORIES

The following items are required when using the 6920 and 6930 series sensors with the 6950 RF Power Meter. They are available from the Service Unit (address on rear cover of this manual).

6920 Series

Range scale (-65 to -20 dBm) for attaching magnetically to the 6950 range control. 06920-008L

6930 Series (not including option 002)

Range scale (-10 to +35 dBm) for attaching magnetically to the 6950 range control. 41179-028M

EC Declaration of Conformity

Certificate Ref. No.

EEA00015

The undersigned, representing:

Manufacturer :	**IFR Ltd.**
Address:	**Longacres House, Norton Green Road, Stevenage, Hertfordshire, U.K. SG1 2BA**

Herewith declares that the product:

Equipment Description:	RF Power Sensors
Model No.	6910, 6911, 6912, 6913, 6914, 6919, 6920, 6923, 6924, 6930, 6932, 6934 and 6914S, 6924S and 6934S.

is in conformity with the following EC directive(s) (including all applicable amendments)

Reference No.	Title:
73/23/EEC	Low Voltage Directive
89/336/EEC	EMC Directive

and that the standards and/or technical specifications referenced below have been applied:

Safety:	EMC:	
EN61010-1	EN55011:1991 Class B	
	EN50082-1:1992	

IFR Stevenage (Place) 13th May 1998 (Date)

Alan Smithies. (Signature)

Alan Smithies - Product Liability Manager

Chapter 2
INSTALLATION

UNPACKING AND REPACKING

Retain the packing materials and the packing instruction note (if included) in case it i necessary to reship the sensor.

If the sensor is to be returned for servicing attach a label indicating the servic required, type number, serial number and your return address.

If the original container or materials are not available use a strong double-wall carto packed with shock absorbing material around all sides of the sensor to hold it firmly.

Chapter 3
OPERATION

CONTENTS

PREPARATION FOR USE

Note...

The 6930 Series power sensors cannot be used with the 6960 RF Power Meter.

The 6930 Series option 002 sensors can only be used with the 6970 RF Power meter and CPM 20/CPM 46 Counter Power Meters.

Before making measurements, the power meter must be matched to the individual characteristics of the sensor. This entails the following procedures:

- Zeroing the meter.
- Calibration, that is, entering the sensor's calibration factor and linearity factor.

Note...

If the sensor has been stored at a temperature different from that of the measurement environment, allow sufficient time for thermal equilibrium to be established before zeroing or calibration. Avoid rapid temperature changes while operating.

WARNING

When using 6930 Series sensors, dissipation of the applied power can cause the sensor to have a high surface temperature. Take care when handling.

When using 6930 Series option 002 sensors, extra care is required because of very high surface temperatures.

CAUTION - EXCESSIVE TORQUE

Avoid applying excessive torque when tightening RF connectors or damage may occur. Finger-tight is usually sufficient, especially for type N connectors. If a torque wrench is used for 3.5 mm and 2.92 mm connectors, set it to break at 1 Nm (8 lb in).

:AUTION - AVOIDANCE OF MEASUREMENT ERRORS

To prevent stray radiation being detected and displayed on the power meter, the sensor should be properly terminated in 50 Ω (75 Ω for the 6919).

Before zeroing and operating the power meter, sufficient time should be allowed for the sensor to take up the ambient temperature of the measuring environment. Rapid temperature changes should be avoided while operating.

These precautions are particularly important when making low level power measurements using the 6920 series Power Sensors.

VITH 6950 POWER METER

:eroing

(1) Connect the sensor to the SENSOR INPUT socket of the power meter using the sensor cable supplied with the power meter.

(2) With no power applied to the sensor, select the most sensitive range by turning the RANGE switch fully counter-clockwise.

(3) Adjust the ZERO control for zero reading on the meter, using the special tool provided with the power meter.

int...

It may be helpful in setting zero to adjust the RESPONSE TIME control on the rear panel to reduce noise. You may also find it easier to set zero first on a less sensitive range, as slight adjustments of the ZERO control have considerable effect on the most sensitive range.

:alibration

(1) Connect the sensor to the POWER REFERENCE output of the power meter.

For	6913/6914/6914S/6934	use N-type to SMA adapter
	6919	use the 75 Ω to 50 Ω adapter
	6920	use the 30 dB pad
	6923/6924	use the 30 dB pad and N-type to SMA adapter

(2) Attach the appropriate magnetic range scale to the skirt of the RANGE switch if required and set the switch to 0 dBm. The range scales are optional accessories (see page 1-9).

(3) Set the CAL FACTOR control to the value of the **reference calibration factor** given on the sensor label. Some sensors, e.g. the 6910, do not have this information on the label; in these cases the default value of 100% is assumed.

(4) On the rear panel, switch POWER REF to ON and the LIN F : 6%/8% switch to the setting which is nearest to the value of the **linearity factor** shown on the sensor label or its calibration data chart. (If the LIN F switch positions on your 6950 are designated 75 Ω and 50 Ω, these should be interpreted as 6% (75 Ω) and 8% (50 Ω) and the switch set accordingly as above.)

(5) Adjust the GAIN control for full-scale meter reading.

(6) Switch POWER REF off and disconnect the sensor from the POWER REFERENCE socket.

(7) Determine the **calibration factor** for the measurement frequency, whether from the graph on the sensor label or from its calibration data chart. Set the CAL FACTOR control to the same value.

The power meter can now be used for measuring RF power. For full instructions and uncertainty calculations, refer to the power meter Operating Manual, Chapter 3.

Linearity Factor Correction for 6920 Series Sensors

The linearity factor of 6920 Series sensors can vary from unit to unit. Since the 6950 has two preset linearity factor correction values, measurement errors will result when using 6920 Series sensors with a linearity factor that is significantly different from this value, and when the power level is above -30 dBm. If necessary, the displayed reading can be corrected to give a more accurate power measurement figure, as follows:

At -20 dBm, corrected reading = Displayed reading + Correction Factor
where Correction Factor = Sensor Lin Factor – 8%

For each 3 dB decrease in power level, this correction figure should be halved. At -30 dBm or lower the error will be negligible and the above correction is not necessary.

WITH 6960 SERIES POWER METER

Zeroing

(1) Connect the sensor to the SENSOR INPUT of the power meter, using the sensor cable supplied with the power meter.

(2) With no power applied to the sensor, press [AUTO ZERO]. Five dashes appear on the display, representing the power meter's five ranges. When the last of these disappears, all five ranges have been zeroed. This takes approximately 25 seconds.

Calibration

(1) Determine the **linearity factor**, either from the label on the sensor or from its calibration data chart. Press [LINEARITY FACTOR] and enter this value in the power meter.

(2) Connect the sensor to the POWER REFERENCE output of the power meter.

For 6913/6914/6934	use N-type to SMA adapter
6919	use the 75 Ω to 50 Ω adapter
6920	use the 30 dB pad
6923/6924	use the 30 dB pad and N-type to SMA adapter

(3) Press [CAL FACTOR] and enter the value of the **reference calibration factor** given on the sensor label. Some sensors, e.g. the 6910, do not have this information on the label; in these cases the default value of 100% is assumed.

(4) Press [AUTO CAL]. Note that the POWER REFERENCE LED comes on and 'CAL' is displayed. The auto cal routine takes approximately 10 seconds for most sensors, the 6930 Series requiring about 45 seconds.

(5) When calibration is completed, you can check that it has been successful by pressing [POWER REF]. This switches the power reference signal on, and 0 dBm (1 mW) should be displayed.

(6) Press [POWER REF] again to switch off the power reference signal and disconnect the sensor from the POWER REFERENCE socket.

(7) Determine the **calibration factor** for the measurement frequency, either from the graph on the sensor label or from its calibration chart. Press [CAL FACTOR] and enter this value in the power meter.

The power meter can now be used for measuring RF power. For full instructions and uncertainty calculations, refer to the power meter Operating Manual, Chapter 3.

WITH 6970 POWER METER

Sensor Selection

(1) Press [ON/ENTER] to activate the instrument.

(2) Connect the sensor to the SENSOR INPUT of the power meter, using the sensor cable supplied with the power meter.

(3) Press [SENSOR] to display the list of possible sensor types. The 6930 Series option 002 are listed as Hi 6930 and Hi 6932. Press [ON/ENTER] to select sensor type.

Zeroing

(1) With no power applied to the sensor, press [SHIFT] [ZERO]. The display will be cleared and the peaking meter bar will progress across the display during the zeroing sequence. On completion the instrument will be restored to normal operation.

Calibration

(1) Determine the **linearity factor**, either from the label on the sensor or from its calibration data chart. Press [LIN FACTOR] and enter this value in the power meter.

Note...

For the best measurement accuracy, the sensor should be calibrated against the optional integral power reference, immediately following a sensor zero, as described in steps (2) to (5). An external power reference may be used if the power reference option is not fitted.

(2) Connect the sensor to the POWER REF output of the power meter

For 6913/6914/6914S/6934	use N-type to SMA adapter
6919	use the 75 Ω to 50 Ω adapter
6920	use the 30 dB pad
6923/6924	use the 30 dB pad and N-type to SMA adapter

Remove the 10 dB pad from the sensor before connection to POWER REF for 6930 Series option 002.

(3) Press [CAL FACTOR] and enter the value of the **reference calibration factor** given on the sensor label. Some sensors, e.g. the 6910, do not have this information on the label; in these cases the default value of 100% is assumed.

(4) When calibration is completed, you can check that it has been successful by pressing [SHIFT] [PWR. REF]. This switches the power reference signal on, and 0 dBm (1 mW) should be displayed.

(5) Press [SHIFT] [PWR. REF] again to switch off the power reference signal and disconnect the sensor from the POWER REF output.

For 6930 Series option 002 sensors connect the supplied 10 dB attenuator.

(6) Determine the **calibration factor** for the measurement frequency, either from the graph on the sensor label or from its calibration chart. Press [CAL FACTOR] and enter this value in the power meter.

The power meter can now be used for measuring RF power. For full instructions and uncertainty calculations, refer to the power meter Operating Manual, Chapter 3.

WITH CPM 20 / CPM 46 COUNTER POWER METER

Note...

Soft key titles are indicated by italics in square brackets.

(1) Press the power on/off key to activate the instrument.

(2) Connect the appropriate sensor to the SENSOR INPUT of the CPM, using the sensor cable supplied with the instrument.

(3) Press [SENSOR CAL] *[Lin Factor]* and enter the sensor **linearity factor**. This figure can be obtained from the label on the sensor or from the calibration data chart.

(4) While still within the Sensor Cal menu, press *[50 MHz CF]* and enter the sensor **reference calibration factor** (given on the sensor label).

(5) Connect the sensor to the POWER REFERENCE output of the CPM.

For 6920 Series sensors connect the supplied 30 dB attenuator between the power reference output and the sensor during calibration.

For 6930 Series Option 002 sensors the supplied 10 dB attenuator must be removed before connection to the power reference output and then reconnected to the sensor before subsequent measurements.

While within the Sensor Cal menu, press *[Cal]* to calibrate the sensor. The CPM performs a sensor zero followed by calibration. To check for a successful calibration, switch on the power reference with the sensor still connected; 0 dB (1 mW) should be displayed.

(6) Determine the calibration factor for the measurement frequency, either from the graph on the sensor label or from its calibration chart. Press [POWER METER] *[Cal Factor]* and enter this value.

The CPM can now be used for measuring RF power. However, when using 6920 Series sensors, perform an additional sensor zero by pressing [SENSOR CAL] *[Zero]* with no RF applied to the sensor.

For full instructions, refer to Chapter 3 of the CPM Operating Manual.

WITH 6200 SERIES OF MICROWAVE TEST SETS

For calibration instructions, refer to Chapter 3 of the 6200 Operating Manual.