Output

Calibrated output levels from –127 dBm to +10 dBm are provided. A choice of ten output level unit combinations can be obtained on the front panel. The RF output level can be set to a resolution of 0.1 dB over the entire output voltage range. Protection against the accidental application of up to 50 W of reverse power is provided by a fast responding relay trip. Full protection is also provided when the instrument is switched off.

An RF level offset capability allows the output level to be varied relative to the indicated value to compensate for external cable losses or to ensure that all instruments in a particular area give identical results.

Modulation

Amplitude, frequency and phase modulation can be provided from internal or external sources. AM depth can be set in 0.5% steps up to 99.5%, FM deviation up to 999 kHz and phase modulation up to 9.99 radians. An auxiliary modulation input allows dual modulation to be applied for receiver testing.

An internal modulation oscillator provides switch selected frequencies of 400 Hz, 1 kHz and 5 kHz.

Front panel

All data and units selected are visible on a single liquid crystal display. Data is entered on a keyboard that has been designed to be simple and logical to use. Carrier frequency, modulation and RF level functions may be incremented or decremented using the ↑ (UP) and ↓ (DOWN) keys. Non–volatile store and recall facilities are also provided using an electrically alterable read only memory that does not require a battery back–up system. A front panel cover for protecting the instrument in transit is available as an accessory.

Second function mode of operation

This enables a number of auxiliary functions such as setting the GPIB address, selection of alternative RF level calibration units, access to various calibration routines and an aid to diagnostic fault finding via the internal instrument bus.

PERFORMANCE DATA

Carrier frequency

Range:	10 kHz to 1.01 GHz.
Displayed resolution:	10 Hz up to 100 MHz. 100 Hz above 100 MHz. 1 kHz above 1000 MHz.
Selection:	By keyboard entry.
Accuracy:	Equal to the frequency standard accuracy – see under Frequency standard.
Display:	7 digit LCD – see under Keyboard and displays.

RF output

Output level range:	-127 dBm to +10 dBm. (0.1 μV to 447 mV PD). (When AM is selected the maximum output power reduces linearly with AM depth to +4 dBm (224 mV PD) at maximum depth).
Selection:	By keyboard entry - units may be μV, mV, EMF or PD; or dB relative to 1 μV, 1 mV, EMF or PD; or dBm. Conversion between dB and voltage units may be achieved by pressing the appropriate unit key (dB or V, mV, μV).
Output impedance:	50 Ω, Type N female socket to MIL 39012/3D.
VSWR:	<1.5:1 for all output levels.
Reverse power protection:	An electronic trip protects the generator output against reverse power of up to 50 W from a 50 Ω source and 25 W from a source with a VSWR up to 5:1 from DC to 1.01 GHz. For safety the output socket is automatically disconnected from the attenuator when the AC power is off. The trip may be reset from the front panel (or via the GPIB).
Output level flatness:	Better than ±1 dB from 10 kHz to 1.01 GHz for all output levels.
Output level accuracy:	±1 dB from 10 kHz to 1.01 GHz and levels above -10 dBm. ±2 dB from 10 kHz to 1.01 GHz and levels below -10 dBm.
Displayed resolution:	0.1 dB or better.
Display:	4 digit LCD - see under Keyboard and displays.

Spurious signals

Harmonically related signals:	Better than -25 dBc for all carrier frequencies.
Sub-harmonics:	None for carrier frequencies below 500 MHz. -25 dBc for carrier frequencies above 500 MHz.
Non-harmonically related signals :	At offsets of 3 kHz or greater from the carrier:- <-70 dBc for carrier frequencies of 62.5 MHz and above. <-60 dB for carrier frequencies below 62.5 MHz.

Residual FM:
(FM off)

<7 Hz RMS (10 Hz equivalent peak) deviation in a 300 Hz to 3 kHz bandwidth at 499 MHz and improving by nominally 6 dB per octave with reducing carrier frequency down to 62.5 MHz. <3.5 Hz RMS (5 Hz equivalent peak) below 62.5 MHz.

RF leakage:

<0.5 µV PD generated in a 50 Ω load by a 2 turn 25 mm loop, 25 mm or more from the case of the generator with the output level set to less than –10 dBm and the output terminated in a 50 Ω sealed load.

Frequency modulation

Range:

Peak deviation from 0 Hz to 999 kHz depending on carrier frequency:

Frequency range	Available deviation
10 kHz to 125 MHz	0 to 125 kHz
125 to 250 MHz	0 to 250 kHz
250 to 500 MHz	0 to 500 kHz
500 to 1010 MHz	0 to 999 kHz

Displayed resolution:

10 Hz for deviations up to 9.99 kHz.
100 Hz for deviations from 10 kHz to 99.9 kHz.

Selection:

By keyboard entry. Internal modulation (see Modulation Oscillator) or external modulation input may be selected.

Deviation accuracy:

±5% of deviation ±20 Hz at 1 kHz modulating frequency excluding residual FM.

Frequency response:

±1.5 dB from 50 Hz to 80 kHz relative to 1 kHz, using external modulation.

With ALC off the low frequency response is extended to 10 Hz with a peak deviation value limited to the lower of the value given in the table above or [0.047 x Modulation Freq. (in Hz) x {Carrier Freq. (in MHz) + 160 (if Carrier Freq. is below 62.5 MHz)}] kHz.

With ALC off can also be used for 10 Hz square wave switching with a peak deviation value limited to the lower of the value given in the table above or 0.6 times the value obtained by the formula above.

Distortion:

<3% total harmonic distortion at 1 kHz modulation frequency and maximum deviation for any carrier above 250 kHz.

External modulation accuracy: With modulation ALC on, the deviation is calibrated for input levels between 0.9 V and 1.1 V RMS. A HI or LO message is indicated in the modulation display if the level is outside the range of the ALC. With modulation ALC off, the deviation is calibrated for an input level of 1 V PD.

Input impedance is 100 kΩ nominal.

Display: 3 digit LCD – see under Keyboard and display.

Phase modulation

Range: Peak deviation from 0 to 9.99 radians.

Displayed resolution: 0.01 radian.

Selection: By keyboard entry. Internal modulation (see Modulation Oscillator) or external modulation may be selected.

Deviation accuracy: ±5% of deviation at 1 kHz modulating frequency excluding residual phase modulation.

Frequency response: ±1 dB from 10 Hz to 10 kHz relative to 1 kHz using external modulation input and ALC off.
±1 dB from 50 Hz to 10 kHz relative to 1 kHz using external modulation input and ALC on.

Distortion: <5% total harmonic distortion at 1 kHz modulating frequency and maximum deviation at any carrier frequency above 250 kHz.

External modulation accuracy: With modulation ALC on the deviation is calibrated for input levels between 0.9 and 1.1 V RMS. A HI or LO message is indicated in the modulation display if the level is outside the range of the ALC. With modulation ALC off the deviation is calibrated for an input of 1 V PD.

Input impedance is 100 kΩ nominal.

Display: 3 digit LCD – see under Keyboard and display.

Amplitude modulation

Range: 0 to 99.5%.

Resolution: 0.5%.

Selection: By keyboard entry. Internal modulation (see Modulation Oscillator) or external modulation may be selected.

Accuracy:	Better than ±(4% of depth setting +1%) for 1 kHz modulating frequency and depths up to 80%.
Frequency response:	±3 dB from 20 Hz to 50 kHz relative to 1 kHz at 80% depth using external modulation input, ALC on and DC coupled with ALC off.
Envelope distortion:	<5% total harmonic distortion at 1 kHz modulation frequency for depths up to 80%.
External modulation:	With the modulation ALC on the modulation depth is calibrated for input levels between 0.9 and 1.1 V RMS. A HI or LO message is indicated in the modulation display if the level is outside the range of the ALC. With the modulation ALC off the modulation depth is calibrated for an input of 1 V PD. Input impedance is nominally 100 kΩ DC coupled.
Display:	3 digit LCD – see under Keyboard and display.

Modulation oscillator

Frequencies:	400 Hz, 1 kHz and 5 kHz selected sequentially by repetitive pressing of the INT MOD FREQ key.
Accuracy:	±5%.
Distortion:	<1% total harmonic distortion.

Frequency standard

Internal standard:	10 MHz crystal oscillator.
Accuracy:	Better than ±0.01% at 20°C.
Temperature stability:	Better than 0.001%/°C over the temperature range 0 to 50°C.
Warm up time:	Within ±0.01% of final frequency after 5 minutes from switch on at ambient 20°C.

Auxiliary inputs and outputs

Modulation input/output:	A front panel BNC socket provides an output from the modulation oscillator when internal modulation is selected and becomes the external modulation input when external modulation is selected.
Internal modulation oscillator output:	1 V ±10% EMF from a nominal 600 Ω source impedance.

Internal modulation oscillator frequency:	400 Hz, 1 kHz or 5 kHz (see Modulation Oscillator).
Internal modulation oscillator distortion:	Less than 1% total harmonic distortion.
External modulation input:	Input level nominally 1 V into 100 kΩ – see under Frequency modulation and Amplitude modulation.
Auxiliary modulation input:	Sensitivity nominally 20% of the modulation depth/deviation set for a 1 V PD input. Input impedance 600 Ω nominal.
External frequency standard input:	A rear panel BNC socket accepts a 10 MHz signal of at least 1 V (max. 2 V) RMS into a 100 Ω nominal impedance. A 5 MHz or 1 MHz signal can be accepted by changing an internal link.
Alternative outputs:	A blanked hole is provided so that the user can fit the RF output socket to the rear panel for system use etc.

Keyboard and display

Main and secondary keyboard functions:	These are described in Chap. 3, Operation. All instrument settings are controlled by the front panel keyboard.
Display:	Liquid crystal display provides simultaneous readout of carrier frequency, modulation and RF level.
Carrier frequency:	7-digit with annunciators to show frequency units, external frequency standard, GPIB service requests, remote operation selection and instrument addressed.
Modulation:	3-digit with annunciators to show modulation units, AM, FM, ΦM, modulation off and external modulation selected.
RF level:	4-digit with annunciators to show RF level units, RF output off, reverse power trip operated.
Modulation oscillator frequency:	3 LEDs show the currently selected modulation frequency.

GPIB interface:

A GPIB interface is fitted.
All functions except the SUPPLY ON switch are remotely programmable.

Capabilities:

Complies with the following subsets as defined in IEEE 488 – 1978 and IEC Publication 625-1: SH1, AH1, T6, TE0, L4, LE0, SR1, RL1, PP0, DC1, DT0, C0, E1.

Conditions of storage and transport

Temperature: –40°C to +70°C.

Humidity: Up to 90% relative humidity.

Altitude: Up to 2500 m (pressurized freight at 27 kPa differential i.e 3.9 lbf/in²).

Rated range of use:
(Temperature over which the full specification is met)

0 to 55°C.

Safety:

Complies with IEC Publication 348.

Radio frequency interference:

Conforms to the requirements of EEC Directive 76/889 as to limits of RF interference.

Power requirements

Voltage ranges: 94 to 121 V, 103 to 132 V, 188 to 242 V and 206 to 264 V.

Frequency: 45 to 440 Hz.

Consumption: 50 VA max.

Dimensions and Weight

Height:	152 mm (6 in)	
Width:	256 mm (10 in)	
Depth:	367 mm (14.5 in)	(Excluding handle projection)
Weight:	7.5 kg (16.5 lb)	