

PERFORMANCE DATA

Frequency

Range:	0.01 GHz to 26.5 GHz.
Resolution:	500 kHz in all modes. 10 kHz in CW vernier mode, manually (rotary control) and with GPIB control.
Display resolution:	100 kHz in all modes.
Accuracy at cal. temp	
F1 and CW:	± 10 MHz max., ± 3 MHz typical at 23°C $\pm 5^\circ\text{C}$. ± 15 MHz otherwise at cal. temp.
CF, F2, sweep modes at 100 ms sweep or slower:	± 30 MHz, ± 20 MHz typical.

Stability

With temperature: ± 1 MHz per $^\circ\text{C}$ typical.
Total shift of no more than 60 MHz over
0–50 $^\circ\text{C}$ range.

With 10% supply
voltage change: 10 kHz.

With 10 dB power level
change: ± 300 kHz over calibrated power range.

With 3:1 load VSWR
at +10 dBm output
(+7 dBm for 18–26.5 GHz)

10 MHz to 2 GHz:	± 10 kHz typical, ± 100 kHz max.
2 GHz to 8 GHz:	± 50 kHz typical, ± 500 kHz max.
8 GHz to 12 GHz:	± 250 kHz typical, ± 500 kHz max.
12 GHz to 20 GHz:	± 50 kHz typical, ± 500 kHz max.
20 GHz to 26.5 GHz:	± 500 kHz max.

With time at constant temp.
after 1 hour warm up: ± 100 kHz max.

Residual FM
(in 10 Hz to 10 kHz bandwidth
CW mode with filter on)

10 MHz to 2 GHz:	8 kHz peak typical, 10 kHz peak max.
2 GHz to 8 GHz:	6 kHz peak typical, 10 kHz peak max.
8 GHz to 12 GHz:	7.5 kHz peak typical, 10 kHz peak max.
12 GHz to 20 GHz:	10 kHz peak max.
20 GHz to 26.5 GHz:	10 kHz peak typical, 15 kHz peak max.

Residual AM

Measured at +10 dBm: -50 dBc (in 100 kHz bandwidth).

Frequency sweep characteristics

Sweep time: Selectable between 10 ms and 33.5 s full band.
Add 5 ms if the sweep crosses the bandswitch at 2 GHz.

Resolution: 1 ms.

Settable resolution: 3 digits.

Sweep resolution: 500 kHz for any span.

RF markers:

Up to 5 markers, independently adjustable and fully calibrated over the full sweep range, any one of which can be designated 'Reference marker'.

Accuracy: ± 20 MHz typical, ± 30 MHz max. at cal. temp.

Resolution: 0.025% of current sweep (4096 points).

Marker output: TTL compatible output pulse for reference marker on rear panel auxiliary connector.

Marker sweep: RF output is swept between the designated reference marker and the stop marker, both of which can be any of the five available markers.

Marker display: All marker frequencies can be displayed simultaneously. Delta marker shows the frequency difference between the reference marker and the stop marker.

Marker type: Amplitude, minimum depth 5 dB.

Spurious signals

Harmonics

10 MHz to <2 GHz: -30 dBc.

2 GHz to <8 GHz: -40 dBc typical, -35 dBc worst case under all load conditions.

8 GHz to 26.5 GHz: -40 dBc.

Sidebands and sub-harmonics

10 MHz to <2 GHz: -40 dBc

2 GHz to 26.5 GHz: -60 dBc

Output power

Maximum levelled power at $23 \pm 5^\circ\text{C}$.

10 MHz to <18 GHz:	>10 dBm.
18 to 26.5 GHz:	>7 dBm.

Power level accuracy, including flatness, measured at 0 dBm and at calibration temperature (in range 0 to 50°C)

Internally levelled:

10 MHz to <2 GHz:	± 0.5 dB.
2 GHz to <26.5 GHz:	± 0.4 dB.

Externally levelled: Only dependent on coupler and detector used.

Power linearity: ± 0.1 dB typical, >0.2 dB max. over calibrated power range.

External levelling input: Detector of either polarity or power meter (0 to -1 V or $+1$ V).

Calibrated power range: -5 dBm to $+10$ dBm (0.01 to <18 GHz).
 -5 dBm to $+7$ dBm (18 to 26.5 GHz).

Dynamic range: 25 dB below maximum power output.

Displayed range: -15 to $+20$ dBm (31 μW to 100 mW).

Resolution over calibrated power range: 0.01 dB or 100 μW .

Power stability with temperature

10 MHz to 2 GHz:	0.05 dB/ $^\circ\text{C}$.
2 GHz to 26.5 GHz	
0 to 20°C :	0.10 dB/ $^\circ\text{C}$, typically 0.09 dB/ $^\circ\text{C}$.
20 to 30°C :	0.08 dB/ $^\circ\text{C}$, typically 0.07 dB/ $^\circ\text{C}$.
30 to 50°C :	0.06 dB/ $^\circ\text{C}$, typically 0.05 dB/ $^\circ\text{C}$.

Power sweep characteristics at cal. temp.

Displayed units: Power levels can be displayed in dBm or linear units (mW/ μW).

Power sweep range: P1 & P2 are independently adjustable and calibrated over the range -5 to $+10$ dBm (-5 to $+7$ dBm from 18 to 26.5 GHz).

Displayed range: -15 to $+20$ dBm (31 μW to 100 mW).

Accuracy

10 MHz to <2 GHz:	± 0.5 dB at 0 dBm and at cal. temp.
2 GHz to <26.5 GHz:	± 0.4 dB at 0 dBm and at cal. temp.

Linearity:	0.1 dB typical, 0.2 dB max.
Sweep time:	Selectable between 10 ms and 33.5 s.
Resolution:	1 ms.
Displayed resolution:	3 digits.

Power slope characteristics

Slope range:	0 dB/GHz to 20 dB/GHz power over calibrated range.
--------------	--

Accuracy

10 MHz to <2 GHz:	± 0.5 dB over calibrated power range.
2 GHz to <26.5 GHz:	± 0.4 dB over calibrated power range.

Linearity:	0.1 dB typical, 0.2 dB max.
Time:	As for frequency sweep.

Modulation

Internal square wave AM

Frequency range:	1.0 to 100 kHz.
Frequency accuracy:	$\pm 0.05\%$.
Frequency resolution:	0.1 kHz up to 32.5 kHz. 1 kHz from 32.5 to 100 kHz.

Depth

10 MHz to <2 GHz:	-55 dBc.
2 GHz to <12.5 GHz:	-60 dBc.
12.5 GHz to 26.5 GHz:	-45 dBc.

Rise and fall time (10% to 90%):	0.5 μ s.
-------------------------------------	--------------

External pulse AM

Frequency response:	DC to 100 kHz.
Depth:	As internal square wave AM.
Rise and fall time (10% to 90%):	As internal square wave AM.

External AM

Frequency response:	DC to 100 kHz.
Input impedance:	10 k Ω nominally.
Dynamic range:	25 dB.

External FM

Deviation:	50 MHz peak to peak. 25 MHz peak to peak at 1 MHz rate.
Sensitivity:	-6 MHz (± 1 MHz) per volt.
Input impedance:	10 k Ω nominally.

General

Display:	Contrast of liquid crystal display can be adjusted for viewing angle convenience.
RF blanking:	RF can be blanked or present during sweep retrace using STATUS 1 functions and can be blanked or present during parameter alteration using a PROG key function.
Counter trigger:	Provides a TTL drive for counter trigger and hold on F1, F2, CF and reference marker. Use connector no. 06310-176F for connection to the 2442 26.5 GHz microwave counter.
Stop sweep:	Holds up sweep with TTL drive (e.g. from counter until valid count obtained).
Non-volatile memories:	Up to 20 complete test set-ups may be stored for up to 10 years including those on 6500 when connected on the private GPIB. Memories and default settings may be reviewed with RF power off.
Start up mode:	Any memory or preset default or power down settings may be chosen for power up conditions.
Alternate sweep:	Allows operation to toggle between current setting and any memory with RF on.
Footswitch:	Use of optional accessory 06313-006T connected to the rear panel FOOTSWITCH BNC connector allows the user to operate the fourth softkey whilst leaving both hands free. This can be used in alternate sweep in a scalar analysis system when making adjustments to the device under test.

Digital sweep interface:

Provides a means by which the RF output is swept over a range of discrete values, with each individual step being controlled by a digital signal. The SYSTEM GPIB interface is the only connection required. Sweep conditions are set up in advance using a number of GPIB commands. Thereafter Group Executive Trigger (GET) is sent over the GPIB to the sweeper to step to the next position. This has advantages in fast ATE applications where it is required to step the RF output faster than can be achieved by sending new, explicit values of frequency or power over the GPIB.

Clocks/calendar:

Selection of DATE allows the user to set/display the current date in the format HH:MM:SS DD:MMM:YYYY. If a 6500 and digital plotter are connected to the private GPIB the date may be plotted in the bottom right-hand corner of the scalar analysis plot. User resettable elapsed time in hours and overall operating hours (factory set) can be displayed.

Programmed display & operation:

Up to 6 user defined non-volatile display & control configurations can be created using PROG key & subsequent instructions. These can be amended versions of existing settings to change soft key controls, or to add new information such as time to a display or to create new display & control configurations.

Calibration

Standard:

Calibration stores provide primary and two user calibrations held in non-volatile memory. Access is via a unique key sequence supplied with each instrument. Calibration (frequency and power) takes approximately 21 minutes with minimal operator interaction. Power sensor calibration data is held on non-volatile memory.

Limited:

In addition to the standard calibration facility which operates over the full frequency range of the sweeper, it is also possible to perform a power calibration over a limited frequency range. This allows the user to calibrate the sweeper at the output of frequency selective devices (e.g. amplifiers or filters). Two additional calibration stores are provided for this. Greater flexibility allows the user to perform a power calibration independently of a frequency calibration.

Self test:	Stored data in memory is checked at switch on or by user selection of TEST.
Output connector:	Type MPC 3.5*, 50 Ω (fem.)
Output VSWR	
10 MHz to <2 GHz:	2.0:1 max.
2 GHz to <12 GHz:	1.25:1 typical. 1.5:1 max.
12 GHz to <20 GHz:	1.4:1 typical, 1.7:1 max.
20 GHz to 26.5 GHz:	1.7:1 max.
Auxiliary outputs	
1V/GHz accuracy:	± 0.3 V 10 MHz to <2 GHz. $\pm 10\%$ 2 GHz to 26.5 GHz.
Sweep out:	0 to 10V ± 2 mV.
GPIB interface:	System and private buses. All functions except supply switch are remotely programmable.

Capabilities

SYSTEM:	Complies with sub-sets SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0 and E2 as defined by IEEE 488-1978 and IEC 625-1.
PRIVATE:	Controller function provided for connection of 6500 Automatic Amplitude Analyzer, 2442 26.5 GHz microwave counter, 6960/6960A RF power meter and digital plotter. INIT key provides bus initialisation at any time.

Environmental

Safety:	Complies with IEC 348.
Rated range of use:	0 to 50°C.
Conditions of storage and transport	
Temperature:	-40 to +70°C.
Humidity:	Up to 90% RH.
Altitude:	Up to 2500 m (pressurized freight at 27 kPa differential, i.e. 3.9 lbf/ in ²).

* Marconi Precision Connector 3.5 mates non-destructively with SMA and similar connectors.

Power requirements

Voltage ranges (switchable):	105 to 120 V AC. 210 to 240 V AC.
Frequency range:	45 to 400 Hz.
Consumption:	300 W typical, 580 VA max.
Radio frequency interference:	Conforms to the requirements of EEC Directive 76/889.

Dimensions and weight
(excluding handles and feet)

Height:	133 mm (5.2 in).
Width:	433 mm (17.1 in).
Depth:	485 mm (19.1 in).
Weight:	15 kg (33 lb).

VERSIONS

56313-900	10 MHz to 26.5 GHz Programmable Sweep Generator.
56313-621	10 MHz to 26.5 GHz Programmable Sweep Generator with RF output and EXT LEVEL input on rear panel. (Requires factory or distributor fitting and recalibration).

SUPPLIED ACCESSORIES

Part no.	
43129-071D	AC supply lead.
46881-852A	Operating Manual (H 6313 Vol. 1).
46881-853Z	GPIB Operating Manual (H 6313 Vol. 1A).
23411-063B	4.0 A time lag fuse for 115 V mains application (2 off).

OPTIONAL ACCESSORIES

43129-189U	GPIB lead assembly.
46883-408K	GPIB adapter, IEEE male to IEC female.
43126-012S	BNC connection cable, 50 X, 1.5 m.
54311-094M	Adapter N(male) to SMA(fem).
54351-022X	Cable N(male) to N(male), 0.5 m, flexible.
54351-023M	Cable SMA(fem) to SMA(fem), 0.5 m, flexible.
46881-854H	Service manual, H 6313 Vol. 2.
06310-176F	Cable/connector, D type, to 2442 Counter.
46883-506M	Rack mounting kit.
46662-086S	Carrying case.
06313-006T	Footswitch.

ASSOCIATED EQUIPMENT FOR USER AND LIMITED CALIBRATION

6960A or 6960	RF Power Meter (with GPIB).
6913	10 MHz - 26.5 GHz RF Power Sensor.
2442	26.5 GHz Microwave Counter.