Chapter 1

GENERAL INFORMATION

CONTENTS

INTRODUCTION

1. This range of electronically tuned signal sources is a development of the previous range of electronically tuned sources manufactured by Marconi Instruments Microwave Products Division. These new A-series units use improved YIG oscillators to provide a compact, versatile electronically tuned signal source with a wide range of applications.

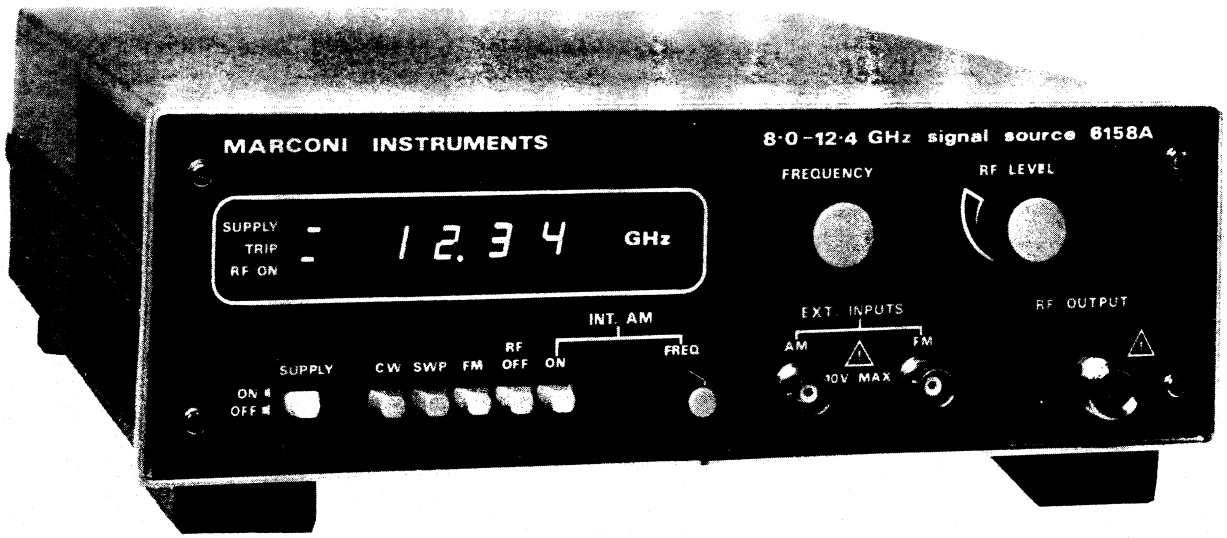

Fig.1 8.0 - 12.4 GHz AM-FM Signal Source type 6158A

2. A wide range of modulation facilities are provided and the 6150A Series may be operated in several modes by selecting the appropriate front panel push button switches and providing the necessary drive inputs.

CW	- Single frequency tuned using front panel knob. Low residual f.m. mode.
SWP	- Enables swept frequency when a 0 to +10V drive is applied (for full range) to the rear panel auxilliary or BNC sockets.
CW + SWP	- Enables slow sweeps (100Hz) or steps between frequencies with low residual f.m. using rear panel sockets and external drive.
FM	- Fast frequency modulation up to ±20MHz deviation for ±10V input to front panel BNC socket at up to 100kHz rate for -3dB response. This enables fine tuning or external locking about a centre frequency.
RF OFF	- RF output disabled.
INT AM ON	- Internal modulator switches RF amplitude at 1kHz rate adjustable ±200Hz with depth up to 18dB.

3. All AM functions are performed using a PIN modulator and so total AM depth specified is the summation of internal AM, external AM (if any) and front panel RF Level control. This is a 10 turn potentiometer allowing fine control of output power. An external levelling circuit may be used for swept frequency testing by incorporating a coupler, detector and the 6587 Levelling Amplifier. AM and FM functions are independent allowing full control of the 6150A Series.

4. The frequency display is by seven segment, 4 digit LED readout. Manual frequency control is via a multiturn potentiometer. A fifth LED provides an indication of mains on and RF on. A third segment lights to indicate power supply trip should the instrument be operated at an excess ambient temperature.

5. The rear panel auxiliary socket enables remote control of

* centre frequency
* output power
* 1kHz internal modulation
* RF on/off
* display blanking

These may be conveniently controlled via the IEEE-488 or IEC Interfaces by the 6140 GPIB Adaptor. A pin on the auxiliary socket also provides a dc output voltage (0 to 10V) proportional to centre frequency. This may be used to drive external recording devices such as X-Y pen recorders or display oscilloscopes.

6. The 6150A Series operates from either 110V or 240V mains supply via a changeover switch. The internal temperature rise is kept low for short warm up time and good stability. However should the instrument be inadvertently operated in an excessive ambient temperature a thermal trip operates in the power supply circuitry.

7. Typical uses of the 6150A Series include testing microwave components, antennas, radar receivers and systems. Used with the 6140 they provide compact, economical and versatile GPIB controlled microwave oscillators with the ability to generate both swept power and frequency. As a low harmonic oscillator the 6158A provides a convenient RF source for measurements with the 6500 Automatic Amplitude Analyser.

8. Accessories Supplied: Mains Lead
Handbook
Mating connector 'D' 15 way for
Auxiliary socket.

MODEL	6155A	6158A
FREQUENCY RANGE	1.0-2.0GHz	8.0-12.4GHz
RF POWER OUTPUT Minimum	15mW	10mW
FREQUENCY ACCURACY AT 20°C AND MAXIMUM RF POWER	±1%	±0.75%
FREQUENCY PULLING External Internal	±2MHz DUE TO 2:1 VSWR ±2MHz DUE TO 10dB CHANGE IN LEVEL CONTROL	±2MHz DUE TO 2:1 VSWR ±2MHz DUE TO 10dB CHANGE IN LEVEL CONTROL
FREQUENCY STABILITY Warm up time(1)(2) Temperature Coefficient(1)	< 15 min ±0.05%/°C (at 22°C nominal)	< 15 min ±0.01%/°C (at 22°C nominal)
SPECTRAL PURITY (1) (3) AT MAXIMUM RF POWER Residual f.m. Harmonic Content Spurious Output	< 35kHz rms -35dBc (5) -60dBc	< 35kHz rms -40dBc -60dBc
RF LEVEL CONTROL (Internal & External (4)	20dB	18dB
AMPLITUDE MODULATION Internal Depth (4) (1kHz ±200Hz min) External Depth (4) Rise and Fall Time	20dB 20dB For +10V or +50mA Input < 600ns	18dB 18dB For +10V or +50mA In < 600ns
FM CAPABILITY Deviation Maximum Rate (-3dB)	±20MHz for ±10V Input 100kHz	±20MHz for ±10V Input 100kHz
SWEEP CAPABILITY Input -3dB Bandwidth(1) Tuning Voltage Output	0 to +10V > 100 Hz 0 to +10V for full sweep, reduced for narrow band	0 to +10V > 100 Hz 0 to +10V for full sweep, reduced for narrow band
OUTPUT CONNECTOR	Precision Stainless Steel 'N' Type Female 50 ohm	Precision Stainless Steel 'N' Type Female 50 ohm
POWER REQUIREMENTS	100-125 or 200-250V, 50-60 Hz, 60VA	100-125 or 200-250V, 50-60 Hz, 60VA
DIMENSIONS AND WEIGHT	Height Width Depth Weight 98mm 270mm 254mm 6.1kg 3⅞ in 10½ in 10 in. 13½ lb	Height Width Depth Weigl 98mm 270mm 254mm 6.1k 3⅞ in 10½ in 10 in 13½
ENVIRONMENTAL: TEMPERATURE	10+35°C meets specification 0,+50°C operating -40,+70°C storage	10,+35°C meets specification 0, +50°C operating -40,+70°C storage

(1) Typical values
(2) To be within frequency accuracy
(3) In CW and FM modes
(4) AM depth is dependent on R.F. level control settings and external modulation input. As only one modulator is used for all AM functions it therefore has a summation capab
(5) Below 1.5GHz carrier frequency, this may rise to -15dBc.

Chapter 3

OPERATION

CONTENTS

OPERATING MODES

1. The 6150A series Signal Sources can be operated in the following modes:

   (a) As a CW source of microwave power

   (b) As a 1kHz $\pm$20% internally A.M.modulated square wave source

   (c) As an externally AM modulated source

   (d) As an externally FM modulated source

   (e) As an externally swept frequency source

   (f) Under GPIB control using Marconi Instruments type 6140 GPIB Adaptor

   All modulation facilities are independant and may be operated simultaneously with the proviso that total AM capability is limited to level shown in specifications.

CONTROLS AND CONNECTORS

2. Front Panel

   (1) MAINS SWITCH. Depress to turn instrument ON; depress again to turn instrument OFF. Supply indicator (9) (1st LED Segment) should light.

   (2) FUNCTION SWITCH

   (a) For Manual frequency control push CW button. CW and SWP buttons are inter linked but may be depressed together for slow sweeps at low f.m.

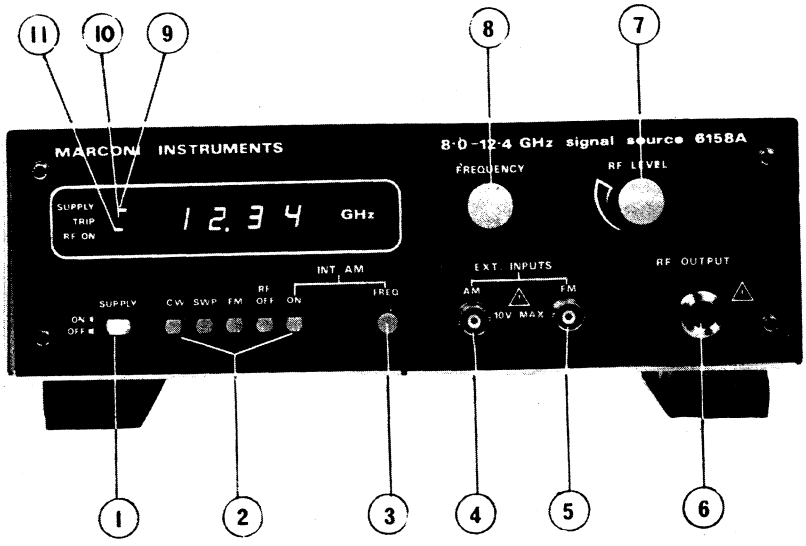

Fig.1 Front Panel

(b) For external sweep push SWP button (See Chapter 1 paragraph 3)

(c) For external FM push FM button (See Chapter 1 paragraph 3)

(d) For internal squarewave AM push INT AM ON button

(e) For complete switching-off of output push RF OFF, (3rd LED segment) (11) extinguished

(3) MODULATING FREQUENCY CONTROL. Sets the internal modulation frequency between 800Hz and 1200Hz.

(4) EXTERNAL AM INPUT. A 0 to +50mA input applied will produce attenuation, but refer to RF LEVEL control (7).

(5) EXTERNAL FM INPUT. A $\pm$10V input will produce $\pm$20MHz deviation; maximum rate (-3dB) 100 kHz.

(6) RF OUTPUT CONNECTOR. Precision Type N(f), 50 ohm.

(7) RF LEVEL CONTROL. This is at maximum range with minimum RF output when fully counter clockwise. AM depth is dependent on RF LEVEL control settings and external modulation input. Only one modulator is used for all AM functions and therefore it has a summation capability of 20dB 6155A or 18dB 6158A.

(8) FREQUENCY CONTROL. This multi-turn potentiometer, which allows very good frequency resettability, is used to set the RF output frequency in the CW mode of operation. Frequency is indicated on the LED Display.

(9) SUPPLY ON. 1st LED segment illuminated when mains applied and Supply switch (1) depressed.

(10) TRIP 2nd LED segment illuminated if power supply trip occurs.

(11) RF ON 3rd LED segment illuminated when RF output present at (6).