



601L

Broadband Power Amplifier



HIGH RF VOLTAGES MAY BE PRESENT AT THE OUTPUT OF THIS UNIT. All operating personnel should use extreme caution in handling these voltages and be thoroughly familiar with this manual.

Do not attempt to operate this unit prior to reading this manual.

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Warranty

Electronics & Innovation Ltd., (hereafter E&I) warrants for the period of three years from the date of original delivery, each unit to be free of defects in materials and workmanship. For the period of 36 months E&I will, at its option, repair or replace defective parts so as to render the unit fully operational such that it performs according to the original specifications; free of charge to the original purchaser.

Should warranty service be required, the unit must be returned to E&I, freight cost to be borne by the owner. If, in our opinion, the unit has been damaged by use outside the limits prescribed in this manual or by accident, then the warranty shall not be honored. In such a case E&I will provide an estimate for repair, assuming repair is possible and provide a quote at standard service rates.

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Chapter 1 Introduction

The Model 601L is a general purpose broadband amplifier capable of more than 1W of linear power output when driven by any laboratory signal or sweep generator from 0.8 to 1000 MHz

An ultra linear Class A design, the 601L will "boost" the output of any signal source by at least a flat 40 dB (± 2.5 dB) and provide its full forward output power into any load impedance (from an open to a short circuit). Its output is a faithful reproduction of the input waveform for AM, FM, SSB, CATV, pulse and other complex modulations. Specified only over the 0.5 to 1000 MHz frequency range, full power output is typically 2 watts in saturation.

The use of RF bipolar transistors with microstrip circuitry ensures that the 603L is both a reliable and rugged source of RF power. An integral power supply and cooling system permit operation over a wide range of temperature and AC line conditions.

1.2 INSTRUMENTATION IDENTIFICATION

Each amplifier is identified by a serial number tag on the back panel of the unit. Both the model number and the serial number should be quoted to identify a specific unit.

1.3 SPECIFICATIONS

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Physical and electrical specifications are listed in Table 1 below:

Frequency Coverage	0.8 – 1000 MHz
Gain	40 dB nominal
Gain Variation	+/- 2.5 dB
Maximum Power Output	1 Watts (min)
Harmonic Distortion	-17 dBc @ 1.0 Watts Pout
Input / Output Impedance	50 Ω
Input VSWR	1.5:1 Maximum
Output VSWR	2:1 Maximum
Stability	Unconditionally stable into all passive loads
Power Requirement	100/240 VAC +/-10% 50–60 Hz, 45 W. Max
Size and Weight	3.4 x 6.2 x 10.5 inches, 7 lbs
	8.8 x 15.7 x 26.6 cm, 3.2 Kg
Operating Temperature	0 ⁰ to 45 ⁰ C.
Protection	Units will withstand 13 dB overdrive
Output Connectors	BNC, Standard, SMA and N-type optional

Chapter 2 Operation

2.1 INTRODUCTION

The E&I 601L RF amplifier is used to increase the RF output level of signal sources in the 0.5 to 1000 MHz range. No tuning or any other form of adjustment is required.

The 601L produces rated power output at its output connector, regardless of load impedance. Any power reflected due to output load mismatch is absorbed in the amplifier. Therefore, although the output impedance is 50 Ω (typical RF Output VSWR: 2:1), the amplifier will work into any load impedance.

2.3 Mains Voltage

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The supply voltage is automatically selected from 100 TO 240 VAC 47 – 63 Hz

2.4 Mains Fuse Rating

The mains fuse FI is located on the rear panel. The replacement part number details are:

1.6A Slow Blow E&I Part No: F977-ND. The 1.6A rating is correct for both 115 and 230 VAC

2.5 Mains Lead Connection

The unit comes supplied with a 6 foot mains cord.

2.6 Operation

Proceed as follows:

- Ensure input voltage is not excessive
- The IV RMS indicated maximum input voltage is 5 times the level of the input signal required to achieve maximum output. Input voltages in excess of 2V peak may permanently damage the instrument.
- Connect the input signal via a 50 Ω coaxial lead and BNC plug to the input connector.
- Connect the output via a 50 Ω coaxial lead and BNC plug to the load.

Chapter 3 Technical Information

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3.1 Performance Checks

To determine the amplifier's performance carry out the following procedure.

3.1.1 Initial Check

The following check can be made whenever the condition of the unit is in question.

- (i) Connect power supply. Switch on power and observe that the switch illuminates.
- (ii) Connect the output of the 601L amplifier to 20 dB attenuator.
- (iii) Connect a calorimetric power meter (HP434 or equivalent) to the output of the attenuator.
- (iv) Connect a sweep generator (Wavetek 2001 or similar) capable of sweeping the frequency range 1 to 300MHz to the input connector, *ensure that the output power of the generator is initially set to minimum.*
- (v) Adjust the output level of the sweep generator to -10dBm.
- (vi) Adjust the input CW signal to any frequency between 0.5 and 1000MHz for 1W output.

If you can not attain RF power, verify that:

- (a) The mains fuse is correctly selected and not blown
- (b) The switch is illuminated.

If the mains fuse is not blown but you are still unable to get any RF power, either return the unit to E&I for repair or proceed to chapter 4.

3.2 Measurement of Gain

Equipment required:

- (a) Two power meters; HP 434 or equivalent
- (b) Sweep/Signal Generator
- (c) 20 dB Coupler
- (d) Attenuator, 20 dB

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Connect the equipment as shown in Figure 2, then proceed as follows:

- (a) Increase power from the signal generator to attain an output power measurement of 1 watt as indicated on the output power meter.
- (b) Measure input power and calculate gain. Gain should be a nominal 40 dB
- (c) Vary the frequency of the sweep generator across the band from 500 KHz to 1000 MHz. Note that the variation of gain is within +/- 2.5 dB

3.3 Measurement of Harmonics

Equipment required:

- (a) Sweep/Signal generator
- (b) Attenuator, 20 dB
- (c) Power Meter - HP434A
- (d) Spectrum Analyzer

Connect the equipment as shown in Figure 3 then proceed as follows:

- (d) Adjust the sweep/Signal generator at a CW center frequency of 0.5 MHz for an indicated output of 1.0W on the power meter.
- (e) Using the spectrum analyzer, check that the level of harmonics are less than -17 dB with respect to the carrier.
- (f) Vary the frequency of the generator from 500 KHz to 1000 MHz, the harmonics should remain at -17dBc or below.

Chapter 4 Maintenance

4.1 Introduction

The E&I 601L RF amplifier requires no periodic maintenance. The instrument is unconditionally stable and is fail safe under all load conditions. Damages can only be externally caused by an input signal in excess of the specified IV RMS maximum.

This chapter therefore, deals only with certain fundamental procedures for fault location and with the subsequent re-alignment procedures.

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Performance limits quoted are for guidance only and should not be taken for guaranteed performance specifications unless they are also quoted in Figure 1.

4.2 Packing for Reshipment

In the event of the equipment being returned for servicing it should be packaged in the original shipping carton and packing material. If this is not available wrap the instrument in heavy paper or plastic and place in a rigid outer box of wood, fiberboard or very strong corrugated cardboard. Use ample soft packing to prevent movement. Provide additional support for projecting parts to relieve these of unnecessary shock. Close the carton securely and seal with durable tape. Mark the shipping container FRAGILE to ensure careful handling.

4.3 Access and Layout

NB: Removal of the cover voids the warranty!

The E&I Model 601L amplifier is housed in an aluminum chassis. A block diagram schematic is illustrated in figure 4. The cover can be removed by releasing the 6 M3 screws on the side of the unit.

The rear panel supports the mains fuse holder, AC line cord and the cooling fan.

4.4 Power supply

The power supply is mounted vertically on the left hand side of the amplifier. This unit has no serviceable parts.

4.5 The Amplifier Module

The power amplifier module is mounted on the Chassis. To remove this module, the it must be demounted from the chassis. To demount the module de-solder a wire from the power supply module. Remove the coaxial cables connecting the RF input and output to the front panel connectors. Remove the three M4 nuts holding the module to the chassis base and then lift straight up.

Chapter 5 Safety:

Do not attempt to operate this unit with the cover removed. High AC and DC voltages are present. The cover prevents against electrical shock due to AC line voltages, high DC and RF fields. Further the cover provides part of the cooling

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system design. Components, specifically on the RF driver board are prone to over-heat and eventual failure if the unit is operated without the cover in place.

Ensure that the load is connected to the output prior to connecting the RF input to the unit. This will prevent high voltages being present and exposed at the output connector.

Only use the AC cord provided or equivalent.

Ensure that the mains outlet is properly grounded.

Figure 1

Gain Measurement

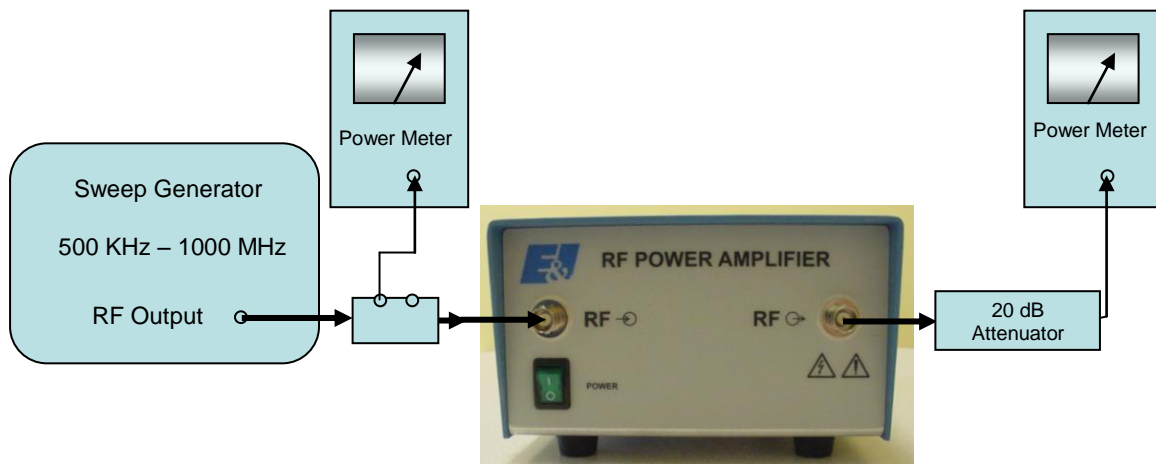


Figure 2

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Harmonic Measurement

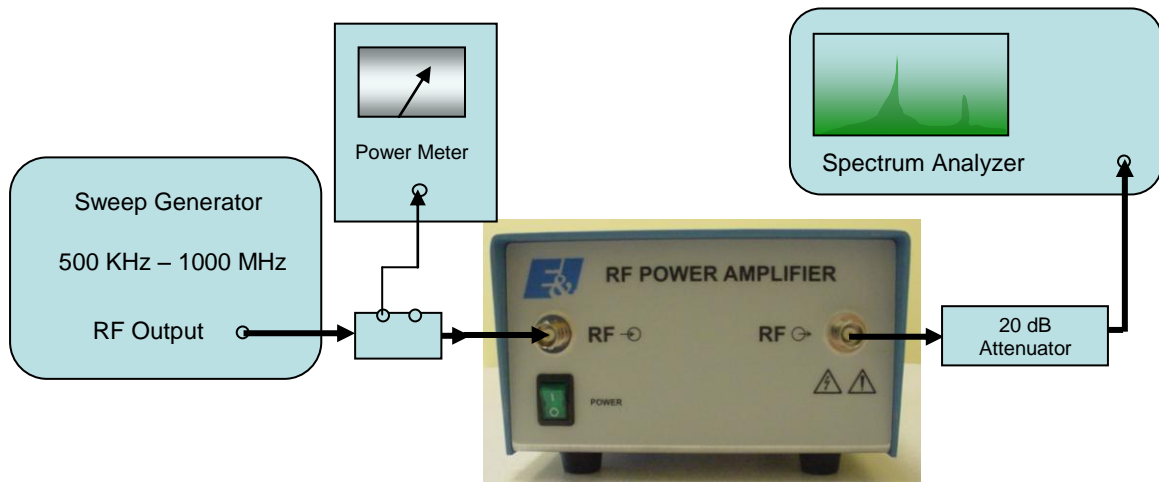
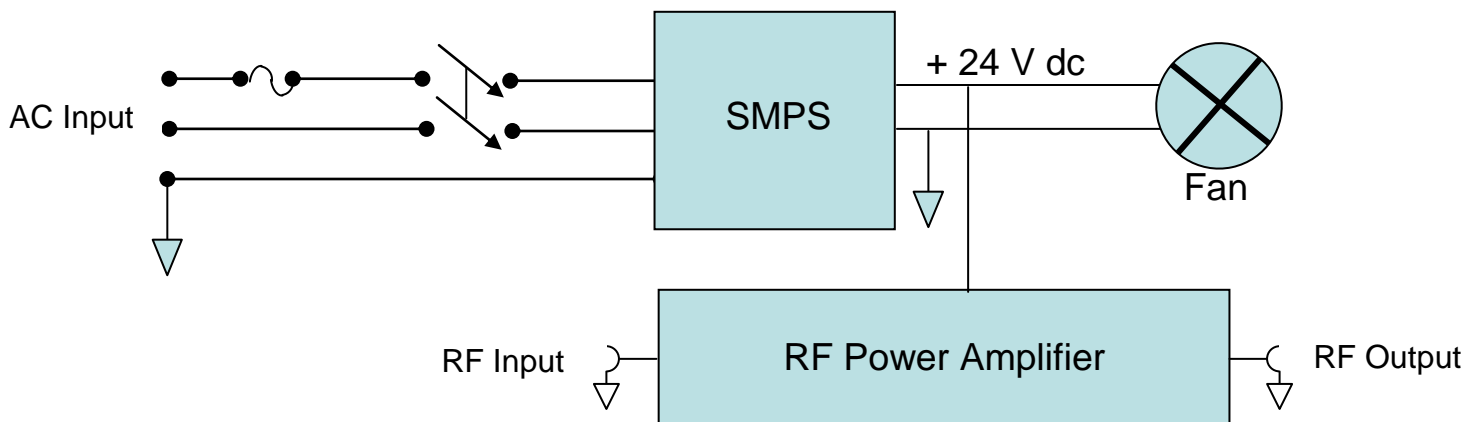


Figure 3

Block Diagram



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