

# **HIGH FREQUENCY SIGNAL GENERATOR 606A**

## **SERIAL PREFIX: 0960A**

*This manual applies directly to HP Model 606A High Frequency Signal Generators having serial prefix number 0960A.*

## **SERIAL PREFIXES NOT LISTED**

*For serial prefixes above 0960A, a "Manual Changes" sheet is included with this manual. For serial prefixes below 0960A, see Appendix I at the back of this manual.*

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**Manual Part No. 00606-90013  
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**HEWLETT  PACKARD**

Table 1-1. Specifications

**FREQUENCY RANGE:**

50 kHz to 65 MHz in 6 bands

50 - 170 kHz	1.76 - 6.0 MHz
165 - 560 kHz	5.8 - 19.2 MHz
530 - 1800 kHz	19.0 - 65.0 MHz

**FREQUENCY ACCURACY:** Within  $\pm 1\%$ **FREQUENCY CALIBRATOR:**

Crystal oscillator provides check points at 100-kHz (useful to 6 MHz) and 1-MHz intervals accurate within 0.01% from 0° to 50° C.

**RF OUTPUT LEVEL:**Continuously adjustable from 0.1  $\mu$ V to 3 volts into a 50-ohm resistive load. Calibration is in volts and dbm (0 dBm is 1 milliwatt).**OUTPUT ACCURACY:**Within  $\pm 1$  dB into 50-ohm resistive load**FREQUENCY RESPONSE:**Within  $\pm 1$  dB into 50 ohms resistive load over entire frequency range at any output level setting and below.**OUTPUT IMPEDANCE:**

50 ohms, SWR less than 1.2 on 0.3 volt attenuator range.

**SPURIOUS HARMONIC OUTPUT:** Less than 30 dB below the carrier.**LEAKAGE:**

Negligible; permits receiver sensitivity measurements down to at least 0.1 microvolt

**AMPLITUDE MODULATION:**Continuous adjustable from 0 to 100%. Indicated by a panel meter. Modulation level is constant within  $\pm 1/2$  dB regardless of carrier frequency and output level changes.**INTERNAL MODULATION:**0 to 100% sinusoidal modulation at 400 Hz  $\pm 5\%$  or 1000 Hz  $\pm 5\%$ **MODULATION BANDWIDTH:**DC to 20 kHz maximum, depends on carrier frequency,  $f_c$ , and percent modulation as shown in the following table:

Max. Mod. Frequency:

30% Mod.	70% Mod.	Squarewave Mod.
$\frac{0.06 f_c}{0.06 f_c}$	$\frac{0.02 f_c}{0.02 f_c}$	$\frac{0.003 f_c (3 \text{ kHz max.})}{0.003 f_c (3 \text{ kHz max.})}$

**EXTERNAL MODULATION:**

0 to 100% sinusoidal modulation dc to 20 kHz, 4.5 volts peak produces 100% modulation at modulating frequencies from dc to 20 kHz. Input impedance is approximately 600 ohms. May also be modulated by square waves and other complex signals.

**ENVELOPE DISTORTION:**

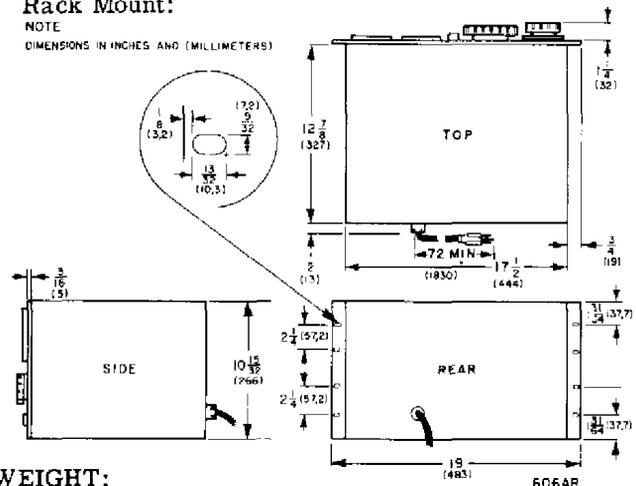
On the 1-volt and lower ranges, less than 1% at 30% modulation using internal 400 or 1000 Hz source, less than 3% from 0 to 70% modulation.

**MODULATION METER ACCURACY:**Within  $\pm 5\%$  of full scale (from 0 to 90% modulation) for modulation frequencies to 10 kHz; within 10% of full scale from 10 to 20 kHz.**INCIDENTAL FM:**On the 1-volt and lower ranges and 30% modulation: 25 parts in  $10^{-6}$ .**RESIDUAL FM:**Less than 1 part in  $10^{-6}$ .**RESIDUAL AM:**

Hum and noise sidebands are 70 dB below carrier down to thermal level of 50-ohm output system

**FREQUENCY DRIFT:**(Attenuator on 1 volt range and below) Less than 50 parts in  $10^6$  (or 5 cycles, whichever is greater) per 10 minute period after 2 hour warmup. Less than 10 minutes to restabilize after changing frequency.**POWER:**115 or 230 volts  $\pm 10\%$ , 50 to 1000 Hz, 135 watts**DIMENSIONS:**

Cabinet Mount: 20-3/4 in. wide, 12-1/2 in. high, 14-3/4 in. deep

**Rack Mount:**NOTE  
DIMENSIONS IN INCHES AND (MILLIMETERS)**WEIGHT:**Cabinet Mount: Net 46 lb, shipping 57 lb  
Rack Mount: Net 43 lb, shipping 58 lb**ACCESSORIES AVAILABLE:**

11507A Output Termination. Three positions, 50 ohms, for use into high impedance; 5 ohms (10:1 voltage division); IRE Standard Dummy Antenna (driven from 10:1 divider)

10503A Cables

10514A/B Double Balance Mixer

11509A Fuseholder, type N connectors. Protects output attenuator.

## SECTION II OPERATING INSTRUCTIONS

### 2-1. OUTPUT TERMINATION.

2-2. The Model 606A output level is calibrated only when terminated with a 50-ohm resistive load. For use into any other load the HP 11507A output termination is recommended (see paragraph 1-17).

2-3. A coaxial cable of 50 ohms nominal impedance with BNC male connectors is suitable for use with the Model 606A. Single braid shield types are suitable for use from maximum output to approximately -80 dbm (30 microvolts). Double braid or solid types are recommended for use over the entire attenuation range. A good general purpose cable is 3 feet of RG-55U (double braid shield) with UG-88C/U BNC connectors on each end. See figure 2-3, External Output Termination, for information concerning output cable termination.

2-4. The output jack on the HP 11507A has been provided as a BNC connector for maximum shielding. Clip-lead connection may be provided easily by inserting a UG-290U connector with soldered-on clip leads into the output jack of the Output Termination. Keep the length of the clip leads as short as possible.

### 2-5. SETTING THE CURSOR.

2-6. Set the cursor (movable index) with the CALIBRATE knob so that it is aligned with the line under the engraving reading FREQUENCY before setting the frequency. The FREQUENCY dial is calibrated only after this operation is performed.

### 2-7. OUTPUT ATTENUATOR.

#### CAUTION

Damage to output attenuator may be incurred if: 1) Output is shorted in the 3-volt range, 2) External voltage is applied to the attenuator output.

2-8. The output attenuator contains resistors which can be burned out by careless usage. If the output is shorted out in the 3-volt range or if voltage is fed into the attenuator accidentally, these resistors may be burned out or heated up so that they are no longer calibrated. This may occur while measuring the sensitivity of the receiver in a mobile transmitter-receiver installation when the transmit button is pushed accidentally. An attenuator fuse is available as an accessory when it is desired to use this generator under conditions where the attenuator may be burned out (see paragraph 1-21). The resistors in the attenuator are NOT field replaceable. Do not open the attenuator to check these resistors as placement of the resistors is critical. The attenuator may be removed from the instrument and returned separately to the factory for repair.

### 2-9. USE OF THE 3-VOLT RANGE.

2-10. The unusually high output range of 3 volts is useful for driving RF bridges or other equipment requiring a calibrated high-level high-frequency voltage. This useful range is obtained at the expense of operating the power amplifier stage near the overload point. You will obtain best life from these tubes by not leaving the generator on the 3 VOLT range any longer than necessary to make your measurement. Never leave it on this range while warming up or during standby operation.

### 2-11. EXTERNAL MODULATION.

2-12. Take care when using external modulation with direct coupling. The dc level of the signal will affect the average RF level. If only the ac component of the modulating signal is desired, switch the MODULATION SELECTOR to EXT. AC. Do not apply more than 10 volts dc or ac to the MODULATION jack. Overloading will shorten life of the MODULATION AMPLITUDE control.

### 2-13. EXTERNAL SYNCHRONIZATION SIGNAL.

2-14. When the Model 606A is modulated internally a signal is available at the MODULATION INPUT-OUTPUT jack for synchronization purposes. This signal is fed from the same oscillator which modulates the carrier. It is of approximately  $\pm 3V_{rms}$  amplitude from a high impedance source. Since the signal comes from a high impedance source use it only as a voltage source and do not attempt to draw current.

### 2-15. B+ FUSE.

2-16. The regulated B+ voltage is fused on the front panel. If excessive modulation is accidentally applied to the instrument the tuned circuits may flash over from excessive peak RF voltage. This will blow the B+ fuse. The instrument will have no output and the output level meter will be pinned to the left of zero. If this happens, the fuse must be replaced to restore operation.

### 2-17. MODULATION DATA.

2-18. Figure 2-1 shows the modulation limits for various types of modulation over the operating frequency range.

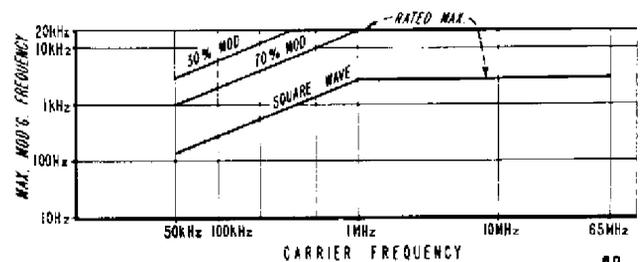


Figure 2-1. Modulating vs Carrier Frequency

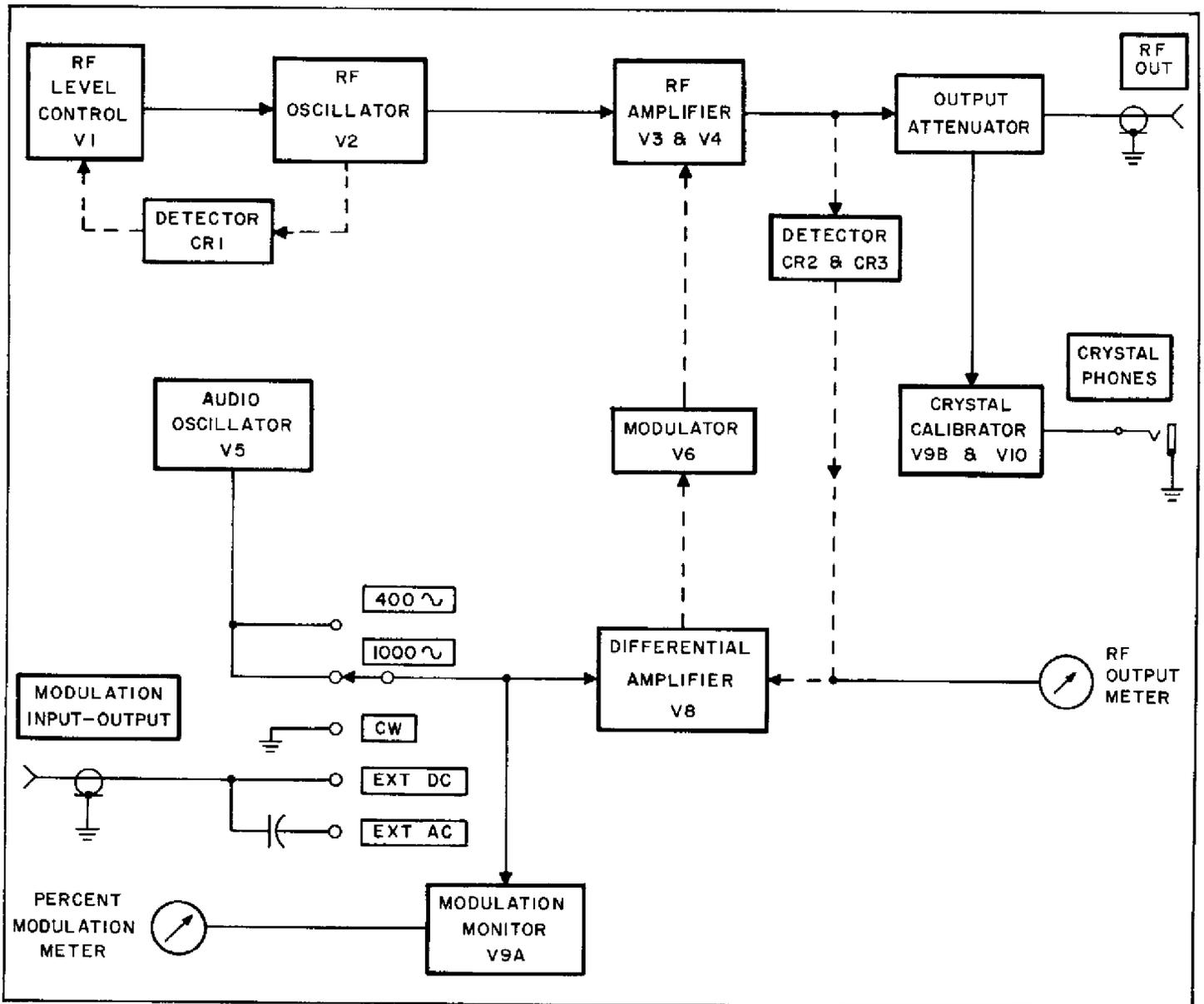


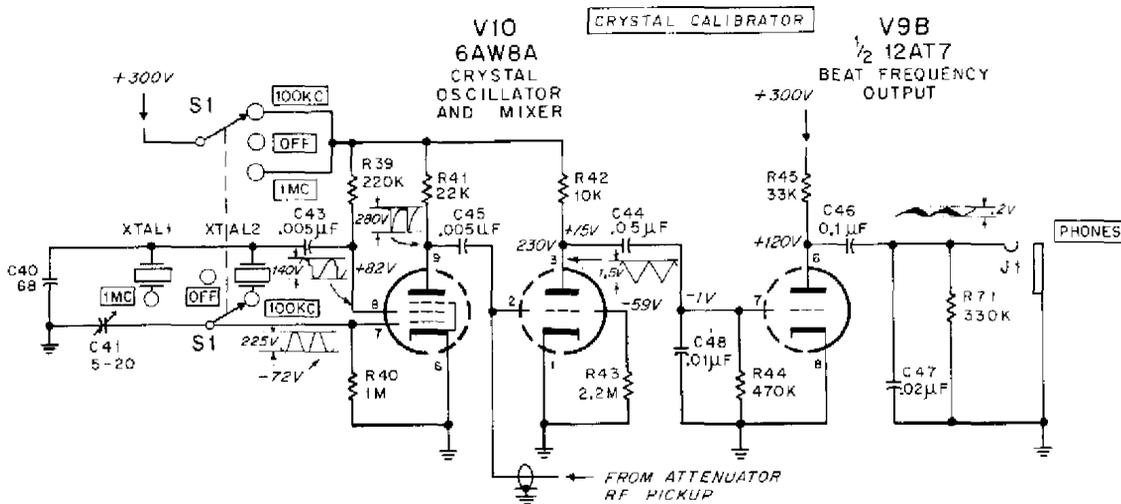
Figure 3-1. Model 606A Block Diagram

- CHANGE I:** S8: Delete. The transformer is wired for either 115- or 230-volts. To change connections:
- a. Remove rear cover of instrument.
  - b. Remove right-hand rectifier board (see Figure 4-1).
  - c. Change jumper arrangement on transformer terminal board:
    1. For 230-volt operation, connect the black-yellow wire to the black-green. Use one amp slow-blow fuse.
    2. For 115-volt operation, connect the black to the black-green, and the black-yellow to the black-red. Use two amp slow-blow fuse.

On schematic, delete switch S8 and connect wires directly.

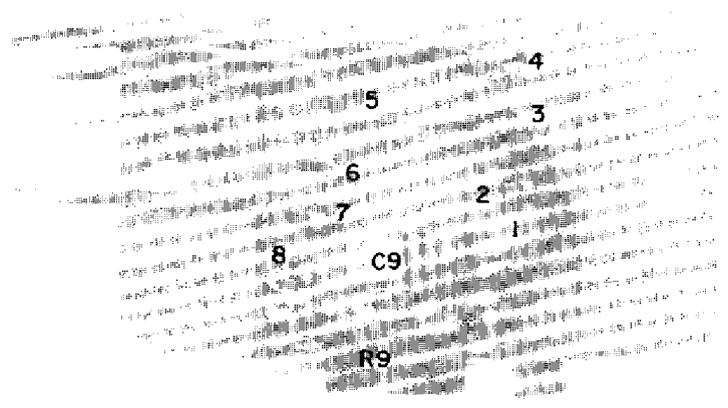
- CHANGE J:** C4, C5: Change HP Part No. to 0121-0027.  
 C14, C15: Change HP Part No. to 0121-0026.

- CHANGE K:** Figure 4-9:  
 Substitute the partial schematic below for the crystal calibrator part of Figure 4-9.

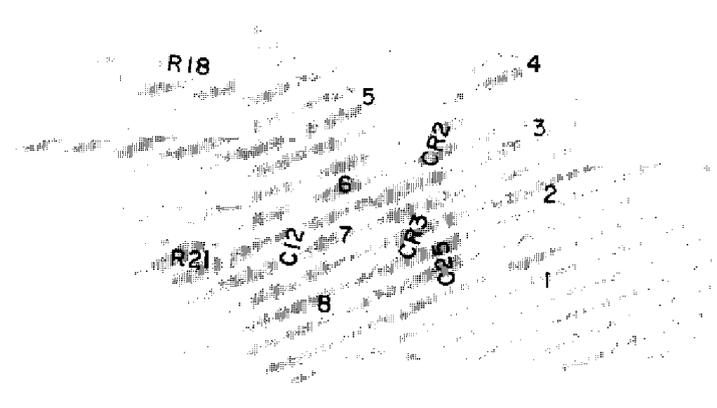


*Replacement Schematic for the Crystal Calibrator  
 (Part of Figure 4-9)*

- Table 5-1:**  
 Delete R136 and CR113.  
 Delete entire A4 Crystal Calibrator assembly.  
 Add the parts in the table below.

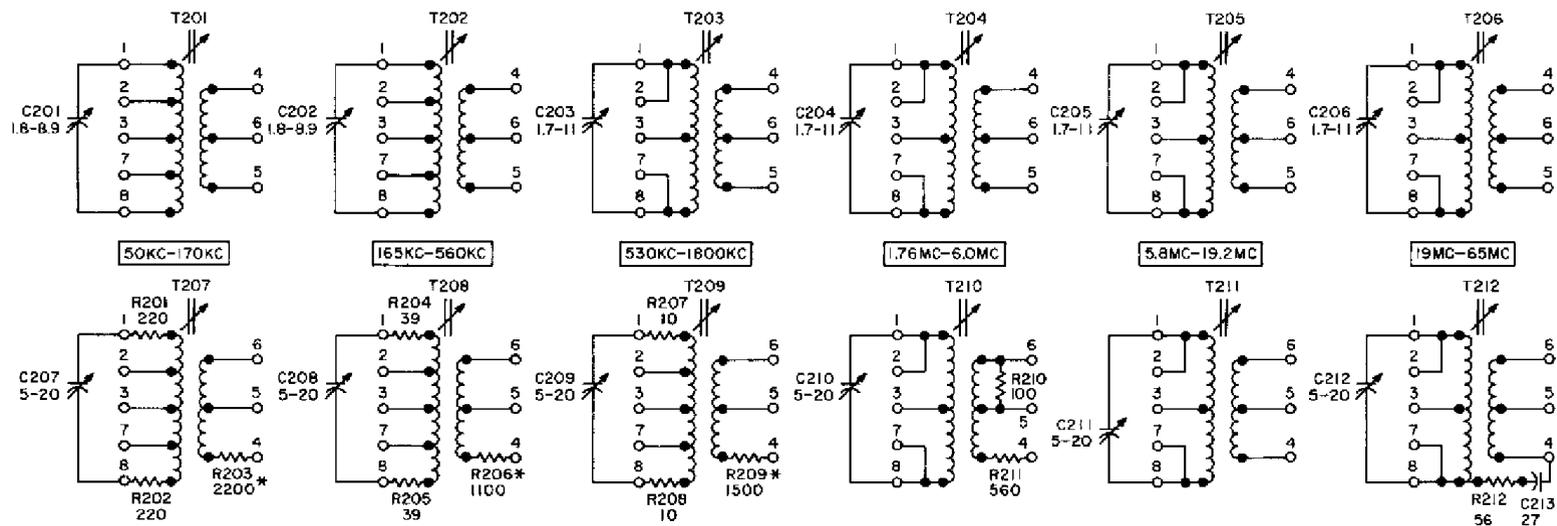


Oscillator Stator Block



Amplifier Stator Block

A2 OSCILLATOR TURRET ASSEMBLY



A3 AMPLIFIER TURRET ASSEMBLY

\* INDICATES FACTORY SELECTED PART, TYPICAL VALUE GIVEN.

Figure 4-8. Oscillator and Amplifier Turrets Schematic

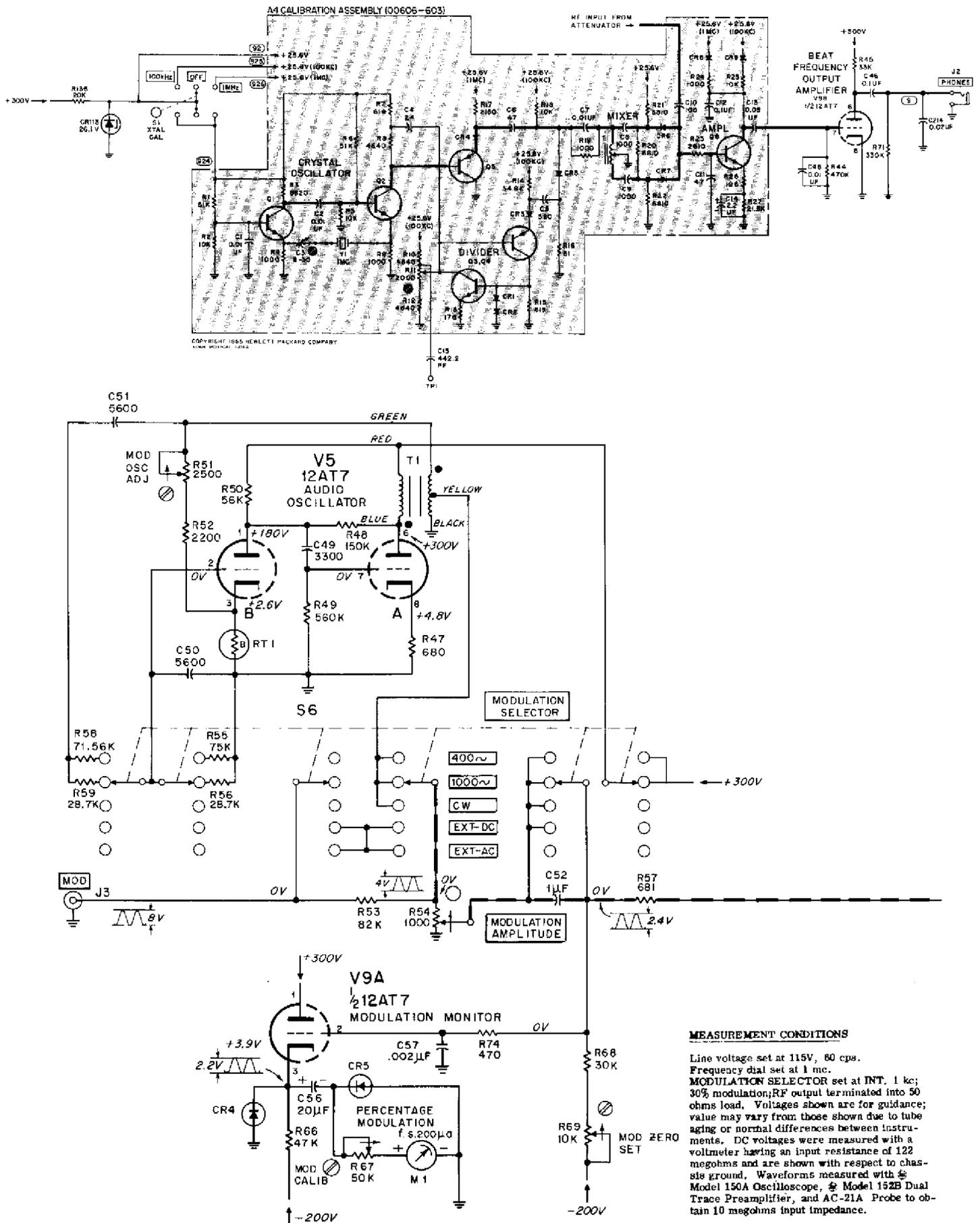


Figure 4-9. Signal Generator (Sheet 1 of 2)

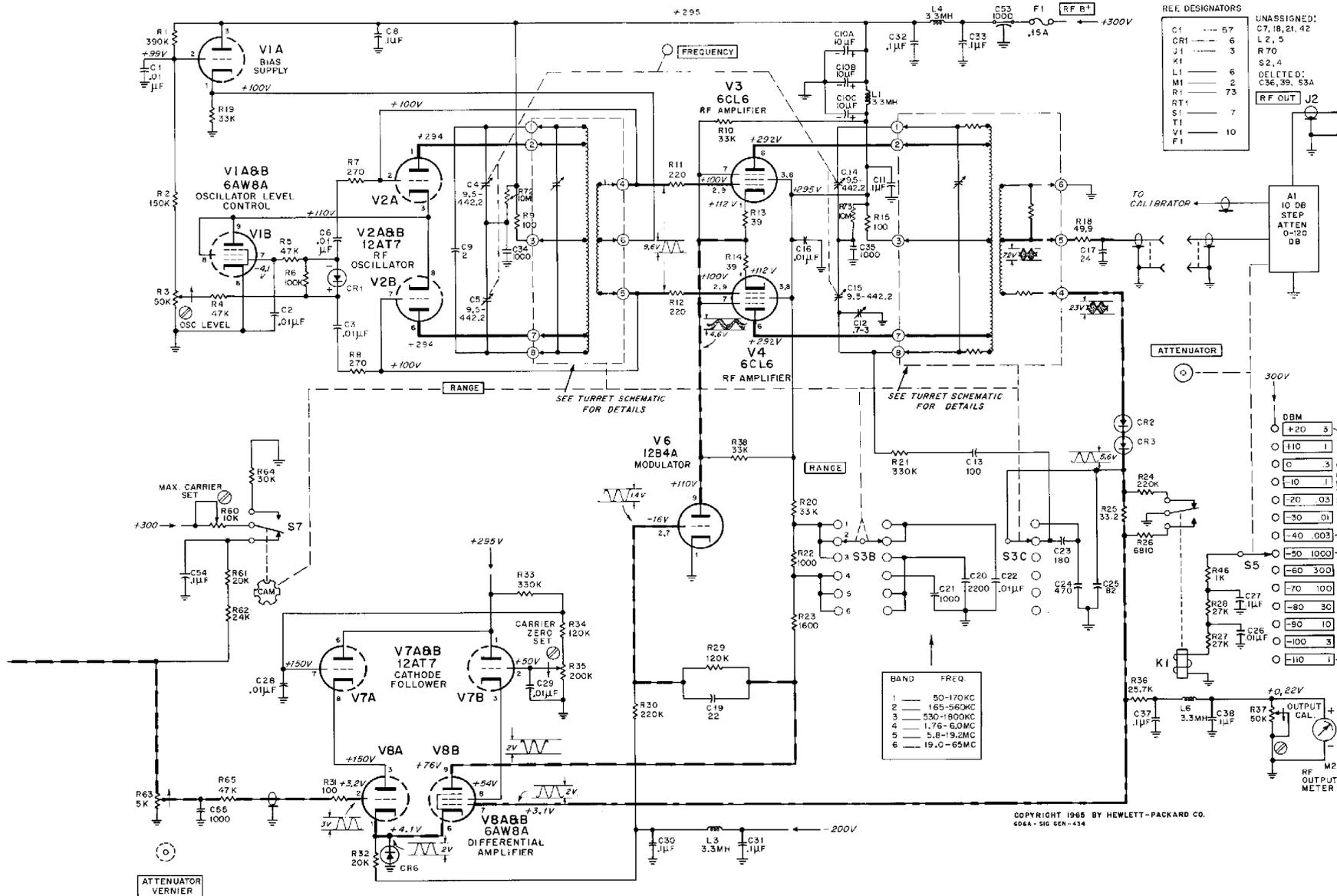


Figure 4-9. Signal Generator (Sheet 2 of 2)

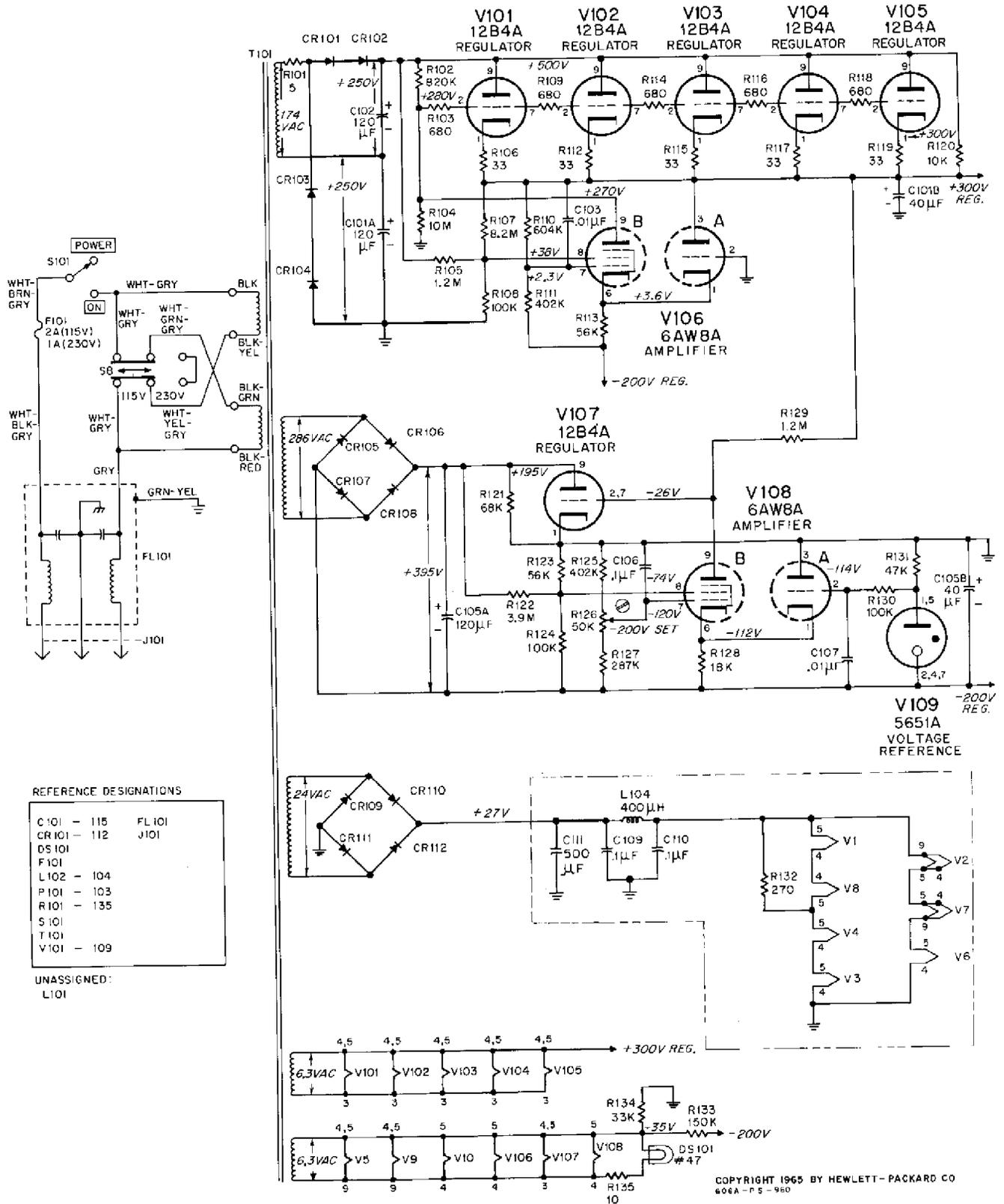


Figure 4-10. Power Supply