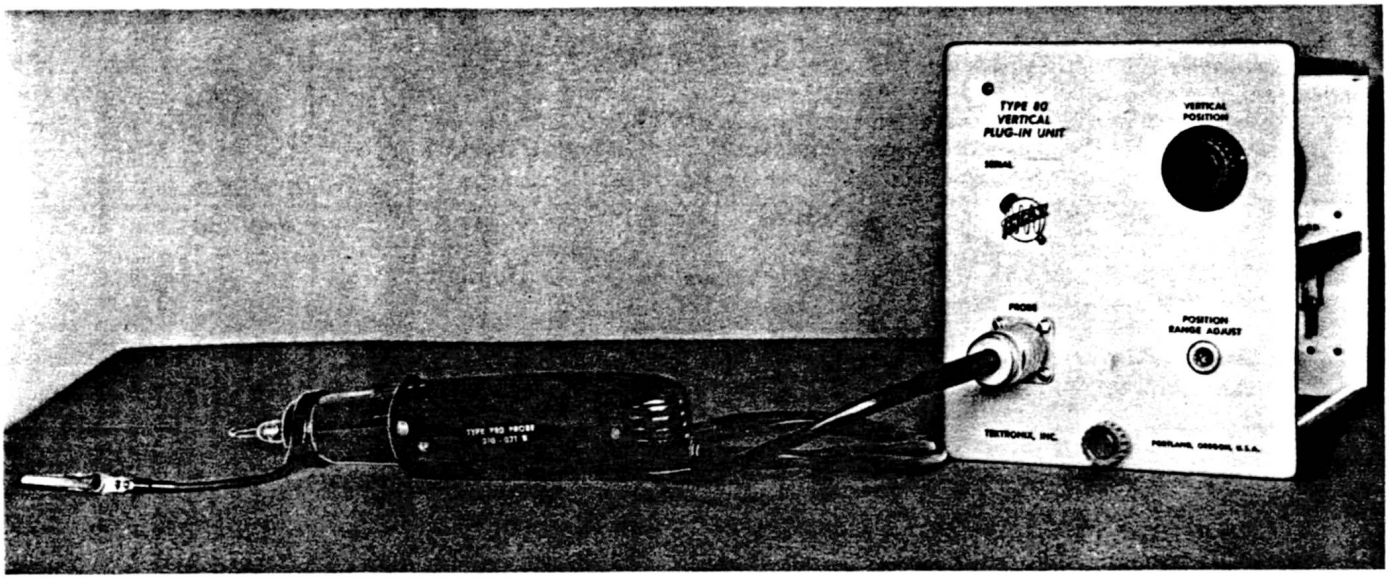
INSTRUCTION MANUAL

TYPE 80 PLUG-IN
and
TYPE P80 PROBE

S. W. Millikan Way ● P. O. Box 500 ● Beaverton, Oregon ● Phone MI 4-0161 ● Cables: Tektron

070-276



TYPE 80 PLUG-IN UNIT AND TYPE P80 PROBE

Operating Information-Type P80 Probe

General

The Type 80 Plug-In Unit and Type P80 probe are designed for operation with Tektronix 580-Series oscilloscopes. The Type P80 Probe provides the means for connecting a 580-series oscilloscope to the signal source. The probe can be connected to the signal source using one of the tips supplied. Or, if desired, special adaptors are available which allow direct connection of the probe to Type N, UHF, BNC, GR50 ohm and Tektronix 125 ohm connectors.

Characteristics

Risetime.....Typically 3.5 nanoseconds when the P80 and Type 80 are used with a Tektronix Type 581 or 585.

Bandpass.....dc to approximately 100 mc. (Approximately 3 db down at 100 mc when using a 25 ohm source.)

Typically, addition of attenuator heads causes no decrease in the risetime of the system.

Input Voltage

Maximum voltage with the AC-DC switch in the DC position is shown in the following table.

Maximum dc working voltage with the AC-DC switch in the AC position using the probe alone or with any attenuator is 150 V DC.

Input Signal Considerations

Input signals to the oscilloscope are connected to the input connector of the plug-in unit through the P80 probe. The gain of the vertical deflection system is accurately calibrated so that the vertical deflection factor at the input of the probe is 0.1 volts per centimeter when the probe is used with a Type 80 Plug-In Unit.

Attenuation of the input signal is accomplished by connecting an attenuator head onto the nose of the probe. Only a single attenuator head may be connected to the probe. If more attenuation is needed, Tektronix Standardized Attenuator Heads may be used. Two ratios of Standardized Head are available: X10 and X100.

To increase the attenuation using the Standardized head, determine which combination of Attenuator Head and Standardized Head will give the desired attenuation. Attach the Standardized Head to the P80 probe, then place the Attenuator head on the Standardized Head. Never place more than one Attenuator Head on the Standardized Head.

Table 7-1 lists the possible combinations of Standardized Heads and Attenuator Heads with other pertinent information.

The Input Selector switch on the body of the probe determines whether input waveforms are ac coupled or dc coupled to the oscilloscope input. AC coupling blocks the dc component of the input waveform and permits only the ac components to be applied to the oscilloscope. DC coupling permits both ac and dc components to be applied to the oscilloscope. AC coupling is used to eliminate large dc components which would cause the trace to be deflected off the screen. DC coupling should be used to prevent distortion of low frequency input waveforms.

Operating Information-Type 80 Plug-In Unit

The VERTICAL POSITION control sets the position of the trace on the associated oscilloscope. Rotating the control clockwise moves the trace up. The control has sufficient range to position the trace off both the top and bottom of the screen.

WARNING

Whenever the Type P80 Probe or the Type 80 Plug-In Unit is replaced or used in a different instrument the Probe, Plug-In and Scope should be readjusted. Use the following procedure:

Table 7-1

Maximum Voltage Ratings of P80 Probe, Attenuator Heads Standardized Heads, and Capacitive Coupler

Configurations	Max-Allowable DC Voltage	Voltage required for 4 cm deflection DC *	Max E in		
			AC_1 **	AC_2 ***	AC_3 ****
P80 Probe	100 V	.4 V	150 V		
2-1 Att.	200 V	.8 V	150 V		
5-1 Att.	350 V	2.0 V	150 V		
10-1 Att.	500 V	4.0 V	150 V		
20-1 Att.	700 V	8.0 V	150 V		
50-1 Att.	1000 V	20.0 V	150 V		
100-1 Att.	1500 V	40.0 V	150 V		
2-1 Att. X 10 Stand.	200 V	8.0 V		250 V	
5-1 Att. X 10 Stand.	350 V	20.0 V		250 V	
10-1 Att. X 10 Stand.	500 V	40.0 V		250 V	
20-1 Att. X 10 Stand.	700 V	80.0 V		250 V	
50-1 Att. X 10 Stand.	1000 V	200.0 V		250 V	
100-1 Att. X 10 Stand.	1500 V	400.0 V		250 V	
2-1 Att. X 100 Stand.	200 V	80.0 V		250 V	
5-1 Att. X 100 Stand.	350 V	200.0 V		250 V	
10-1 Att. X 100 Stand.	500 V	400.0 V		250 V	
20-1 Att. X 100 Stand.	700 V	700.0 V (3.5 cm)		250 V	
50-1 Att. X 100 Stand.	1000 V	1000.0 V (2.0 cm)		250 V	
100-1 Att. X 100 Stand.	1500 V	1500.0 V (1.5 cm)		250 V	
Capacitive Coupler					600 v

* DC—Max DC with head and probe DC coupled
** AC_1—Max DC with probe AC coupled
*** AC_2—Max DC with Standardized head AC coupled
**** AC_3—Max DC with Cap. Coupler

Input Capacitance and Resistance.

Typical values of the attenuators when attached to a probe or a standard attenuator head are shown in the following table.

Table 7-2

Attenuation	Input Capacitance	Input DC Resistance
2:1	7.8 pf.	200 k
5:1	3.3 pf.	500 k
10:1	2 pf.	1 megohm
20:1	1.4 pf.	2 megohms
50:1	3.7 pf.	5 megohms
100:1	1.4 pf.	10 megohms

Calibrating the Probe

1. Equipment

Tektronix Type 105 Square-Wave Generator or Equivalent.

Tektronix P-80—50 ohm Termination Adapter, Tektronix Part No. 013-033. Tektronix Alignment Tool Kit, Tektronix Part No. 003-007.

2. Terminate the OUTPUT of the Type 105 in the P-80—50 ohm Termination. Set the FREQUENCY of the Type 105 at 25 kc. Adjust the compensation of the Type P80 Probe for a flat-topped square wave.

3. To adjust the X10 or X100 Standards for the P80 Probe, carry out step 2 of this procedure. Next, put the 2:1 Attenuator Head on the probe. Reconnect to the Type 105 as in Step 2. Adjust the Attenuator Head Compensation for best response to the square wave.

Now, remove the 2:1 Attenuator Head. Put on the Standardized Head to be calibrated. Connect the 2:1 Attenuator Head in front of the Standardized Head. Reconnect to the Type 105 without the 50 Ω termination.

Adjust both compensations in the Standardized Head for the best response to the square wave.

Table 7-3

Input Capacitance of P80 Probe with Capacitive Coupler
P80 and coupler.....14 pf
100-1 Attenuator and coupler .....8 pf
50-1 Attenuator and coupler .....7.5 pf
20-1 Attenuator and coupler .....5.4 pf
10-1 Attenuator and coupler .....5.8 pf
5-1 Attenuator and coupler .....7 pf
2-1 Attenuator and coupler .....11 pf

Note: Use of a X100 or X10 Standardizer between probe and Attenuator Head will not change these values.

4. (This step may be omitted if only the probe is replaced or interchanged.) Set up the Type 105 for 250 kc output. Set the scope TIME/CM switch at 10 μsec and adjust L8085 (accessible from bottom of Type 80) so the top of the square wave is parallel with the graticule lines. Readjust the probe compensation if necessary.

5. Connect the probe to the scope CAL. OUT. connector, and set the AMPLITUDE CALIBRATOR to .2 volt. Set TIME/CM switch to 500 μsec, display the Calibrator signal and adjust the scope VERT. GAIN ADJ. (R1015) to provide 2 CM of vertical deflection.

Circuit Operation

The Type P80 Probe is an anode- cathode-follower circuit which applies a split phase signal to the plug-in unit. Input signals are applied to the grid of V8013 through protective resistor R8011. This signal is then split in phase and amplified by a factor of less than 1. The signals obtained from the plate and cathode of V8013 are applied through toroid transformer T8013 and the interconnecting plug to the vertical amplifier of the associated oscilloscope. The toroid is used to equalize the cathode and anode signals. The waveform from the plate of V8013 is dc coupled to the oscilloscope to extend the response to dc. The cathode waveform is ac coupled to the oscilloscope.

Two controls affect the vertical position of the trace on the oscilloscope. The VERTICAL POSITION control is normally used to position the trace. The control adjusts the cathode voltage of the probe tube. This directly determines the current drawn by the tube and indirectly determines the vertical position of the trace.

The POSITION RANGE ADJUST control is used to insure that the VERTICAL POSITION control is in the proper range. A voltage regulator circuit consisting of V8044 and V8053A supplies screen grid voltage for the probe tube. The output voltage of the regulator is set with the POSITION RANGE ADJUST control. By varying the screen voltage of the tube, the plate current can also be changed. This in turn allows the vertical position of the trace to be varied over a wide range.

A circuit consisting of L8085, R8085, C8085, and R8077 is used to maintain the proper terminating impedance for the coaxial cable from the cathode of the probe tube. The dc resistance of L8085 is 13 ohms making the impedance of L8085 and R8085 93 ohms to ground at dc. This provides the proper termination at low frequencies. At high frequencies the correct termination is provided by R8077 and C8085. The series combination of L8085 is effectively out of the circuit at high frequencies because of the reactance of L8085. At intermediate frequencies the proper termination is obtained by C8085 and R8077 being effectively in parallel with L8085 and R8085.

The circuits associated with V8053B provide the terminations for the grid line of the oscilloscope vertical amplifier. Resistors R8075 and R8077 provide the required 93-ohm terminations. Cathode follower V8053B sets the voltage of the grid lines at approximately 50 volts and provides the plate voltage for the probe through the vertical amplifier grid line. Without additional circuits plate current would flow through R8071 and R8075 to the probe. This current flow would produce a voltage drop which would cause the two grid lines to be at slightly different potentials. Resistors R8073, R8074, R8071, R8077, and R8078 are used to maintain the two grid lines at the same voltage. Current flowing through R8071 and R8075 due to this circuit is approximately equal but opposite in direction to the plate current that would flow from the probe. This effectively eliminates the voltage drop produced by the plate current and insures that the two grid lines are at the same potential.

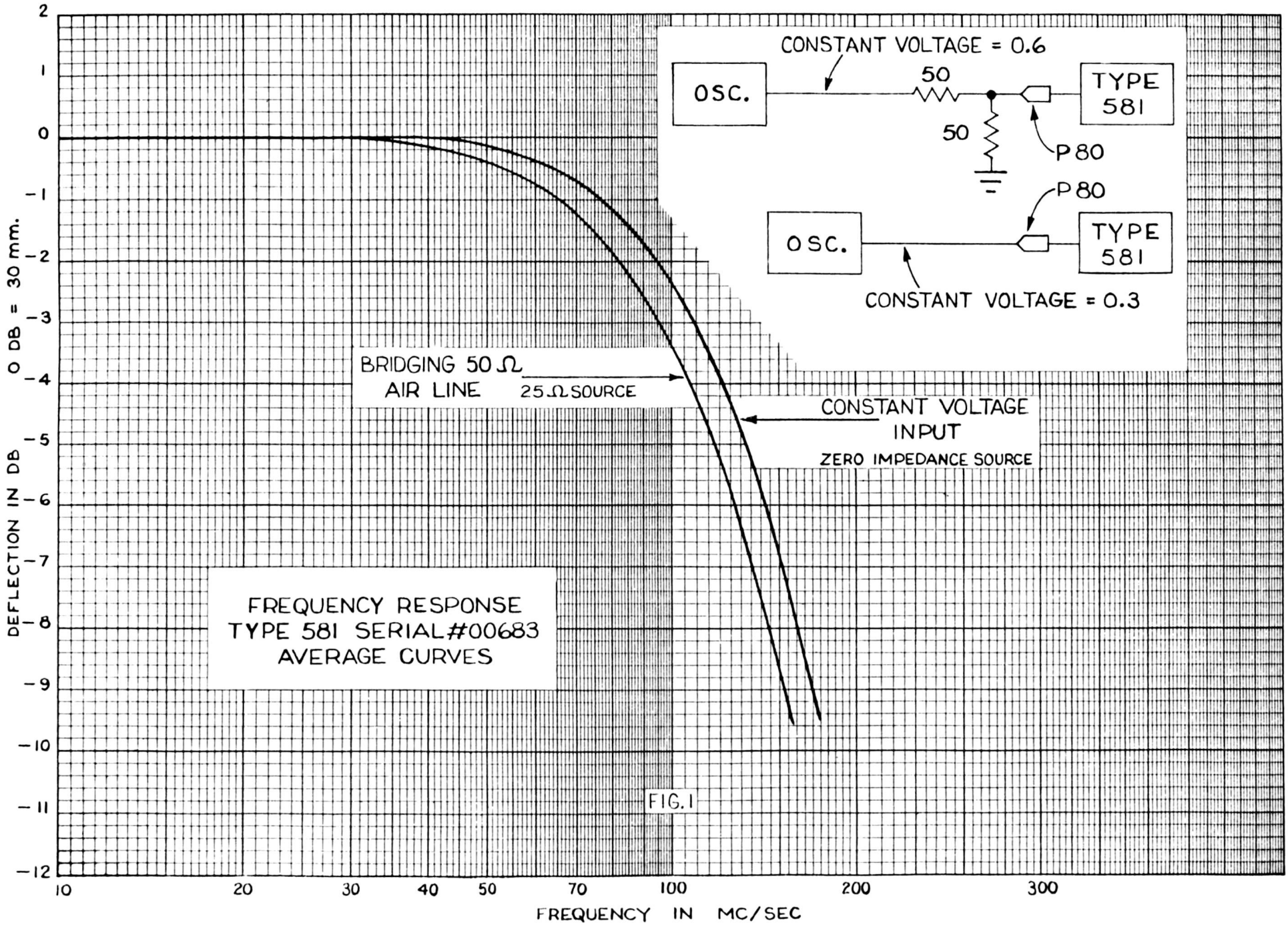

CONSTANT VOLTAGE = 0.6
OSC.
50
50
TYPE 581
P80
P80
OSC.
TYPE 581
CONSTANT VOLTAGE = 0.3
BRIDGING 50 Ω
AIR LINE
25 Ω SOURCE
CONSTANT VOLTAGE
INPUT
ZERO IMPEDANCE SOURCE
FREQUENCY RESPONSE
TYPE 581 SERIAL#00683
AVERAGE CURVES
0 DB = 30 mm.
DEFLECTION IN DB
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
10
20
30
40
50
70
100
200
300
FREQUENCY IN MC/SEC

FIG. 1

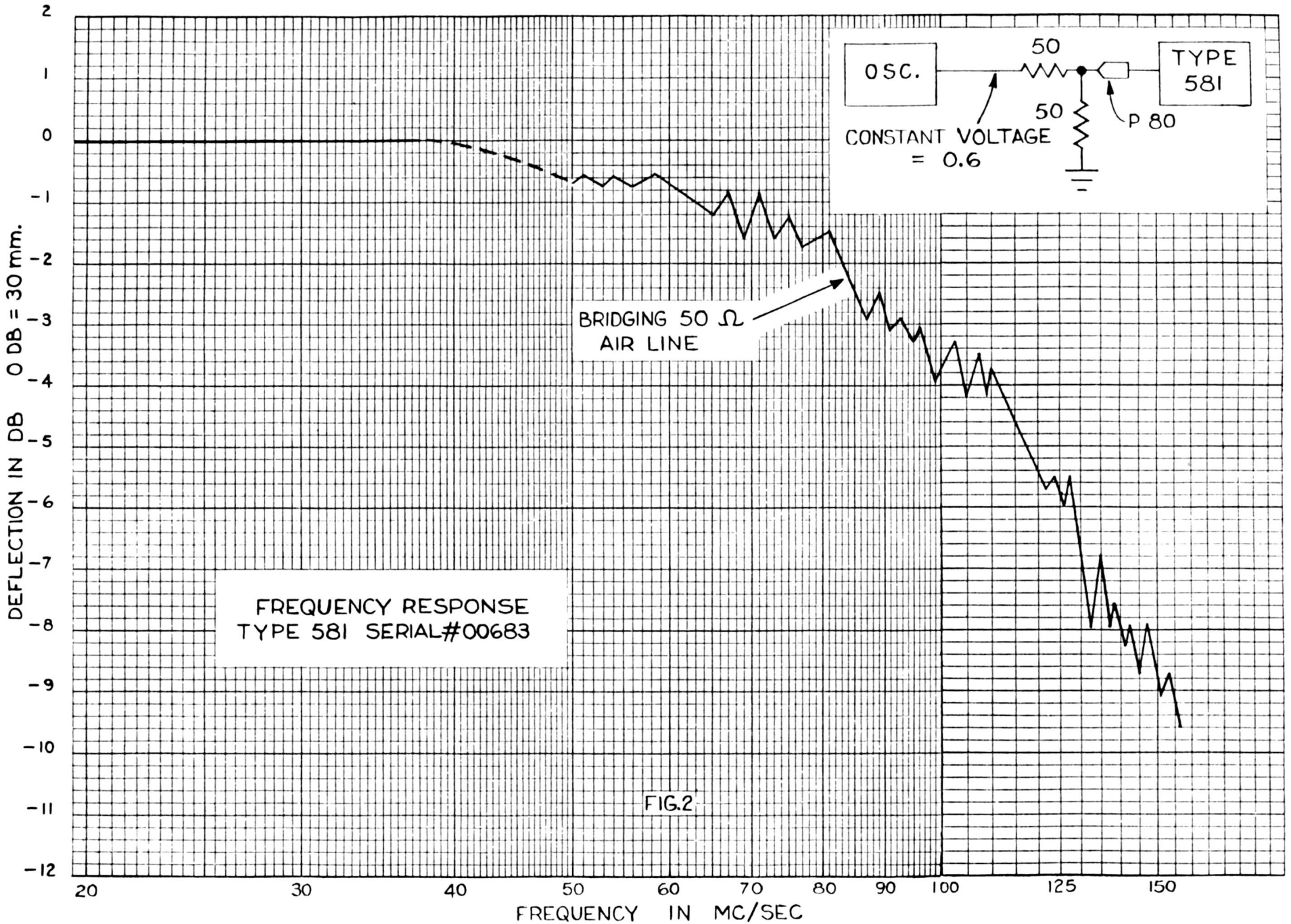
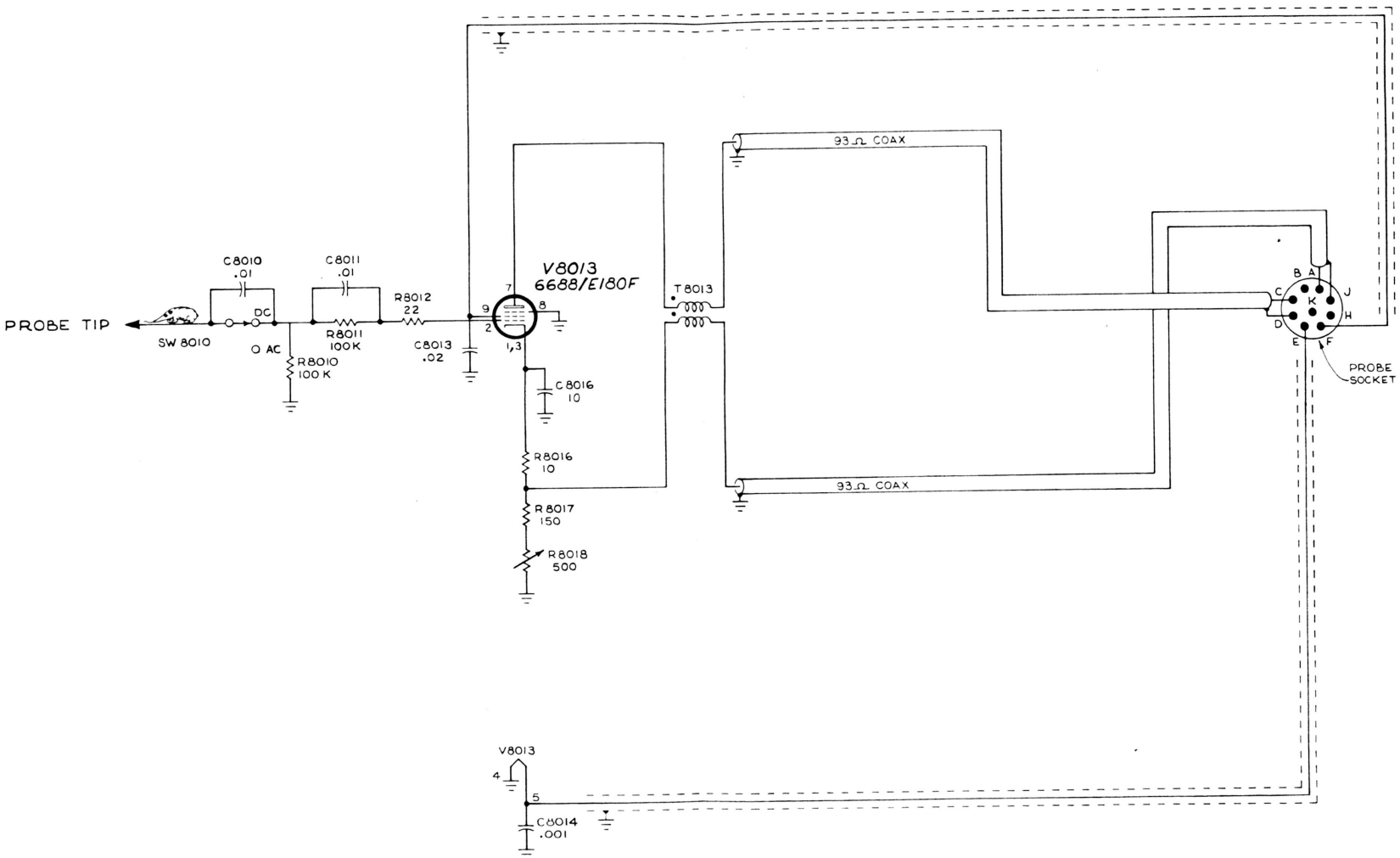

OSC.
50
50
TYPE 581
P 80
CONSTANT VOLTAGE = 0.6
BRIDGING 50 Ω AIR LINE
FREQUENCY RESPONSE
TYPE 581 SERIAL#00683
DEFLECTION IN DB 0 DB = 30 mm.
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
20
30
40
50
60
70
80
90
100
125
150
FREQUENCY IN MC/SEC

FIG.2



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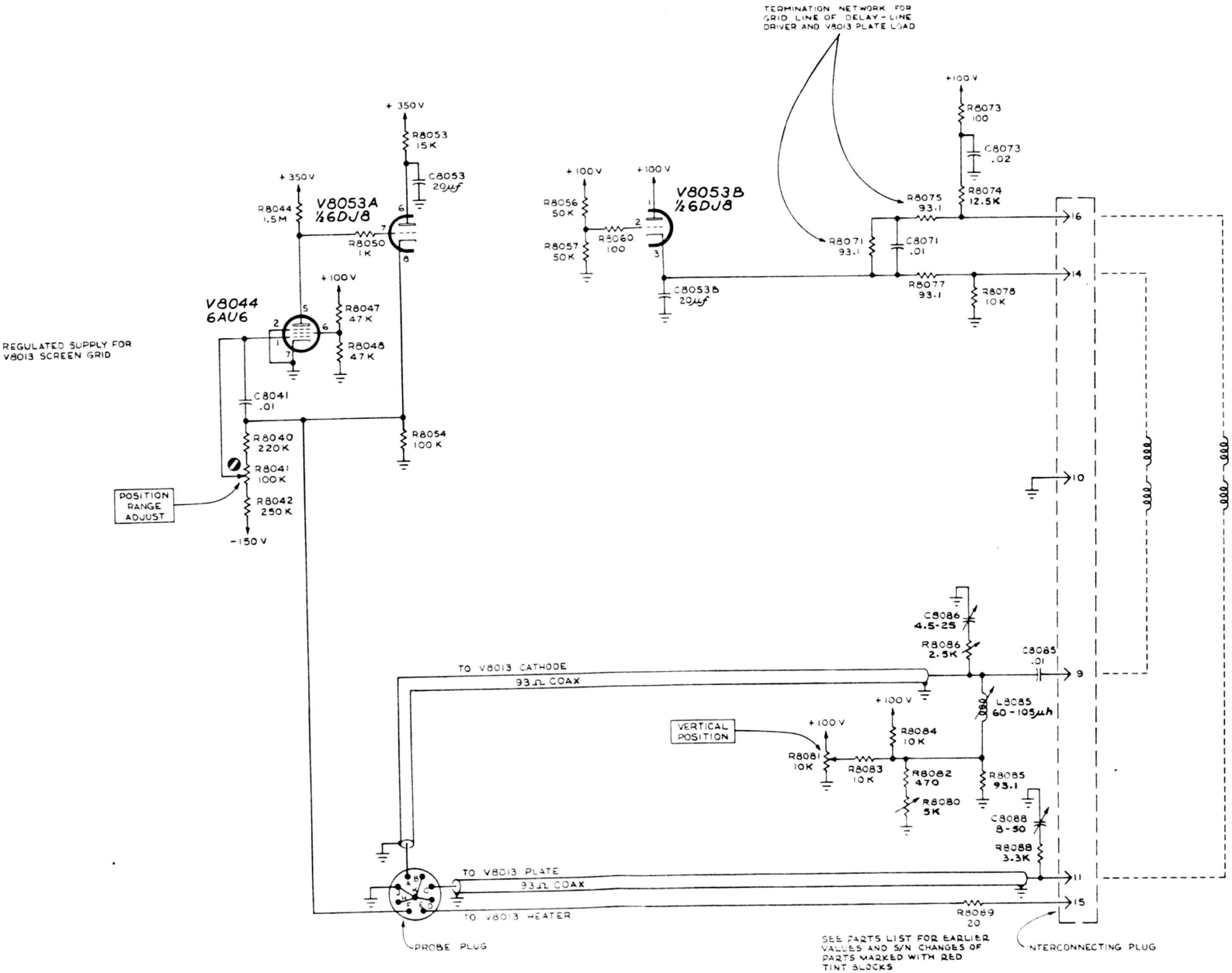
TYPE 80 PROBE



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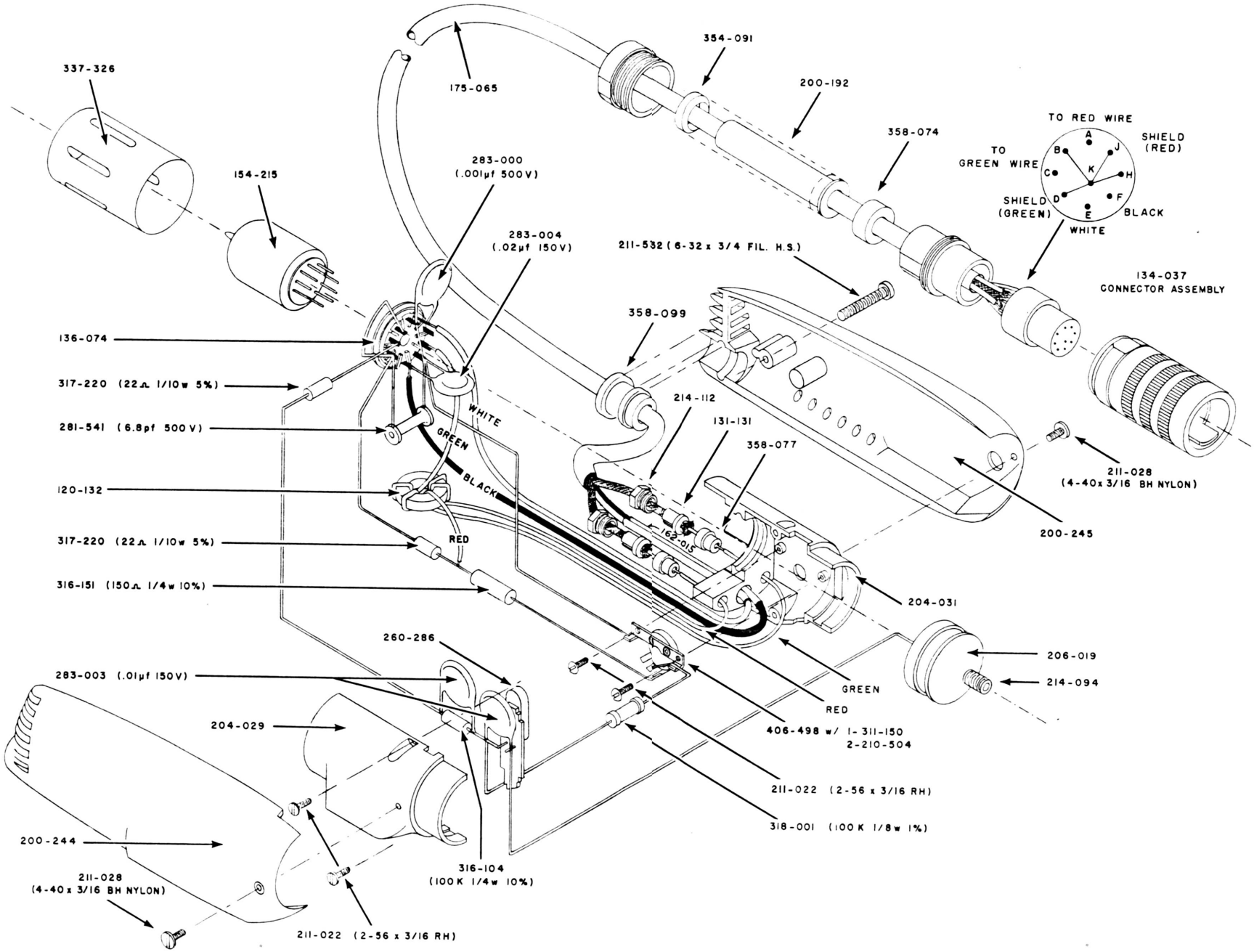
TYPE 80 PLUG-IN UNIT



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TYPE P-80 PARTS