

OPERATING NOTE

VHF ATTENUATORS

355C

355D

355E

355F

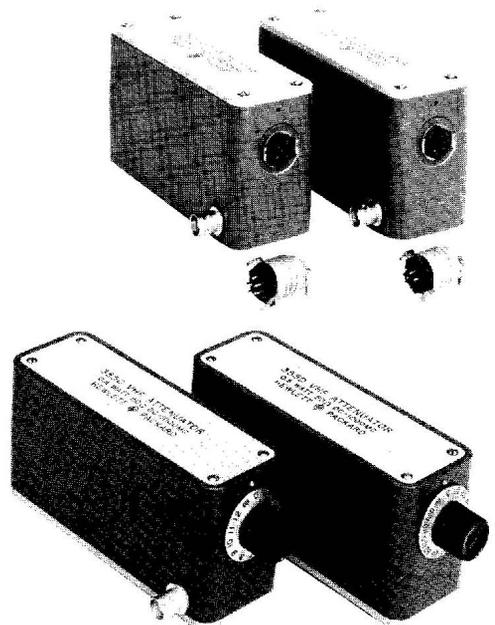


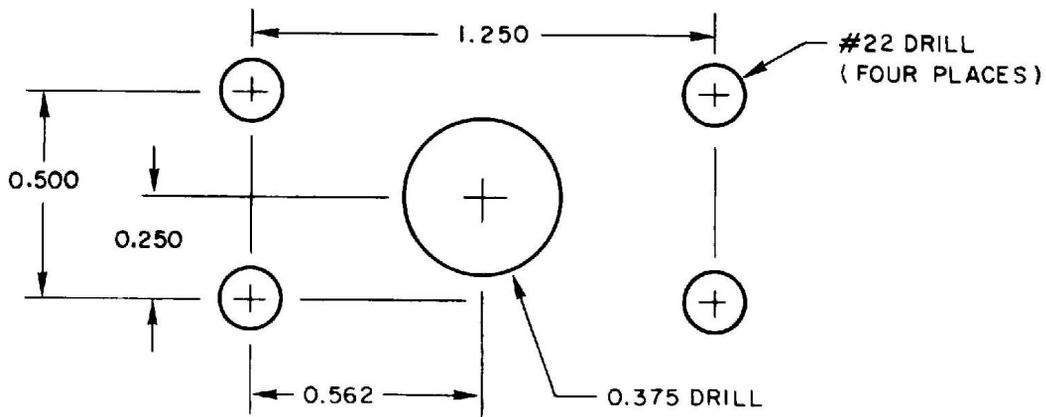
Table 2. Model 355C/D/E/F Options

Model 355C/D

- Option 001 - Type "N" input and output connectors.
- Option 003 - Modifies the 355C/D to provide panel mounting capability by incorporating the following changes:
 1. The attenuator shaft is 3/16" longer, thereby allowing the instrument shaft to protrude through a 3/16" panel.
 2. Four 6-32 holes are drilled and tapped in the instrument casting to allow the instrument to be mounted to a panel.
 3. A 1 3/4" dial is added.

NOTE

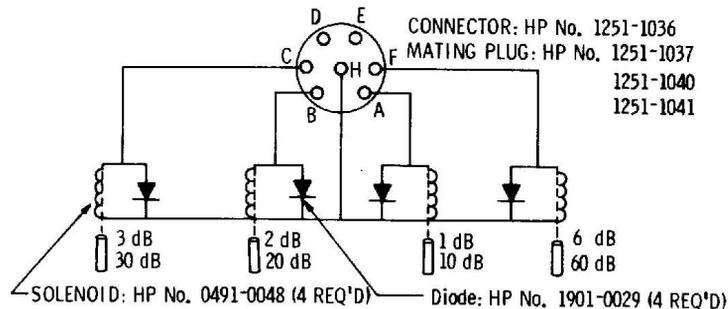
Panel drilling detail for mounting Option 003 is as follows:



- Option 005 - Type TNC input and output connectors.

Model 355E/F

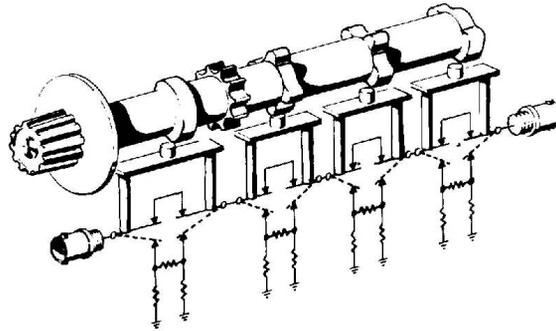
- Option 007 - Adds transistor driver protection circuitry as follows:



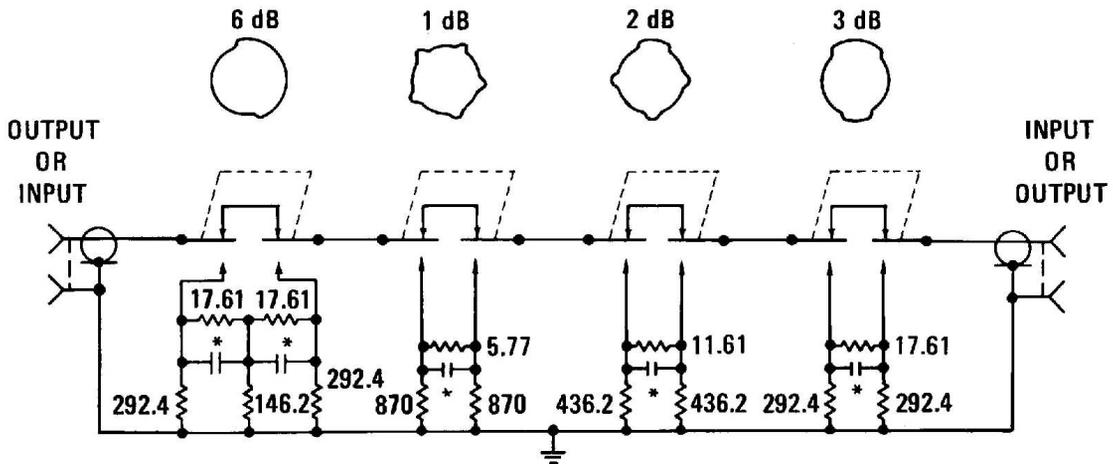
NOTE

Pin H must be positive with respect to the other pins.

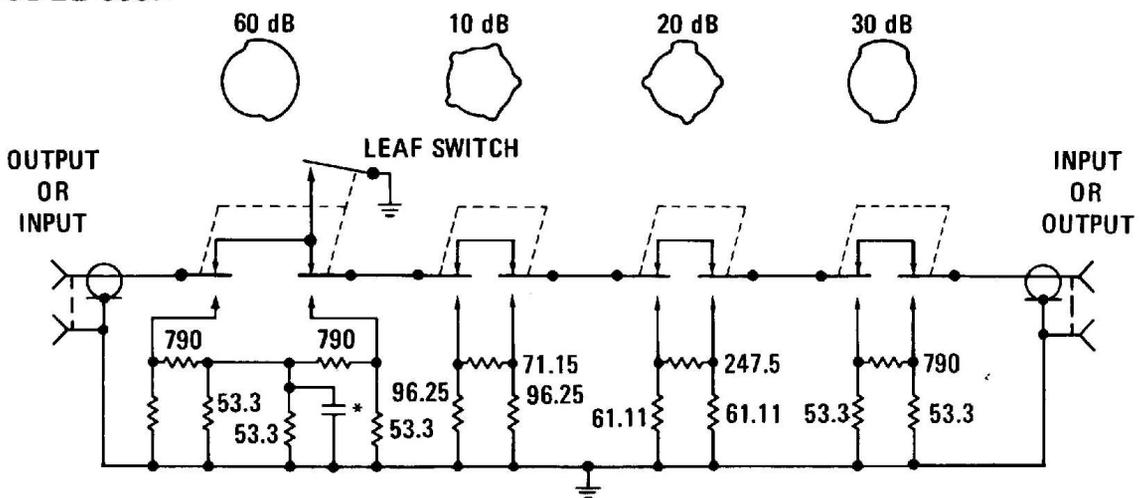
MODELS 355C AND 355D



MODEL 355C



MODEL 355D

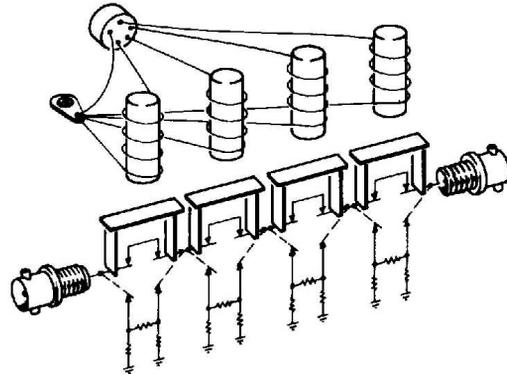


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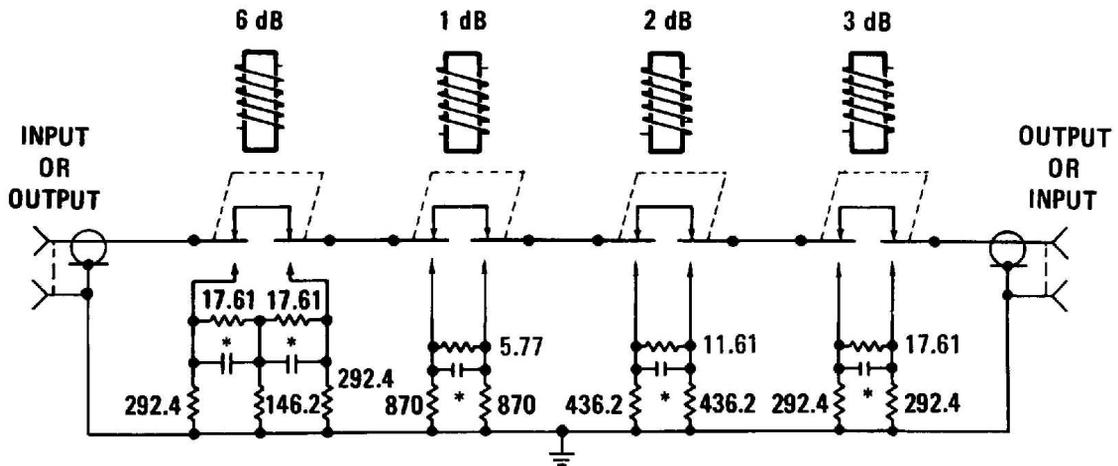
1. Microswitches shown in 0 dB position.
2. Resistances in ohms ($\pm 1/2\%$).
3. Capacitance values factory-adjusted.
4. *Asterisk denotes factory selected value.

Figure 1. Schematic Diagrams, Models 355C and 355D

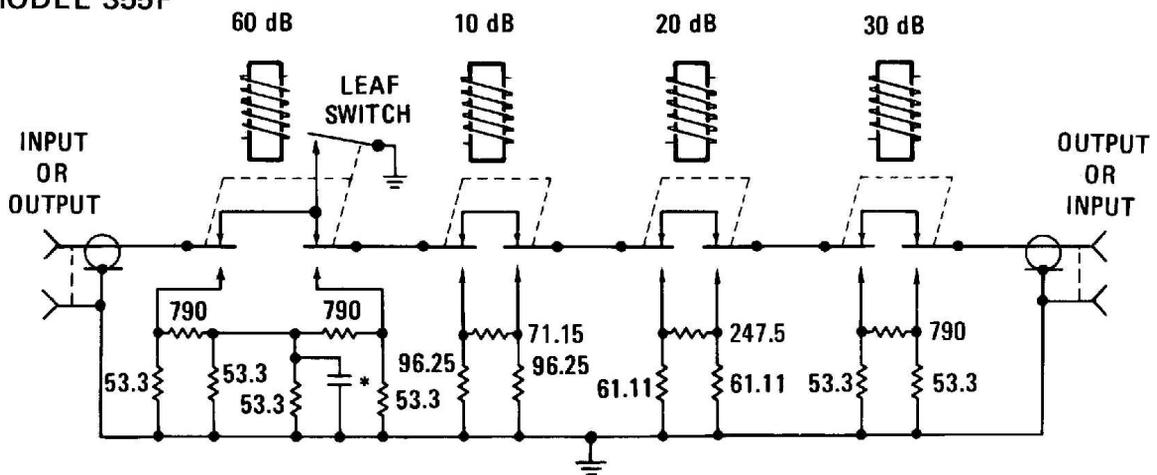
MODELS 355E AND 355F



MODEL 355E



MODEL 355F



NOTES

1. Microswitches shown in 0 dB position.
2. Resistances in ohms ($\pm 1/2\%$).
3. Capacitance values factory-adjusted.
4. *Asterisk denotes factory selected value.

Figure 2. Schematic Diagrams, Models 355E and 355F

short is placed across the connector, inviting damage to either the microswitch or the signal source. If the signal source is capable of delivering more than 10 amperes, use the rear connector for the input. This pads the momentary short with 50 dB of isolation.

Up to 132 dB attenuation in 1 dB steps is available by connecting the Model 355C/E to the Model 355D/F. The connector location on the 355D/F is the mirror image of the connector location on the 355C/E, which permits the two attenuators to be mounted side by side with a short connection between them. A standard UG-491A/U male-to-male BNC adapter or an HP 803A-16E Cable Assembly may be used to connect the two units.

Note

The HP 803A-16E Cable Assembly, a solid (low leakage) coaxial cable, is recommended over flexible coaxial cable.

The Model 355C/D may be operated by remote control since it is switched by rotating one shaft.

CIRCUIT

The schematic for the Model 355C/D is shown in Figure 1 and that of the Model 355E/F in Figure 2. With the exception of the solenoids, the Model 355E/F is electrically identical to the Model 355C/D.

CAUTION

The solenoids in the 355E/F have been precisely adjusted at the factory. No attempt should be made to replace them except by factory approved service representatives. The operation of the attenuators will be unreliable if plungers are not kept with their proper solenoids. Do not interchange or "swap" them.

Lubrication

The cam shaft of the Model 355C/D should be lubricated occasionally with a light lubricant such as Lubriplate No. 105V. Lubrication once a year should be sufficient. The Model 355E/F requires no lubrication.

Resistance Measurements

If overload power has been applied and damage to the unit is suspected, make dc resistance measurements as follows: (A Wheatstone bridge or very accurate digital voltmeter is necessary for these measurements.)

- a. Terminate either connector with 50 ohms \pm 1%.
- b. Connect the measuring device to the other connector and measure the dc resistance at each step. Resistance measured should be close to 50 ohms.
- c. Reverse the connections to the attenuator and again measure the dc resistance at each setting of the dial. Resistance measured should be close to 50 ohms.
- d. If the reading on any step is not near 50 ohms the unit has been damaged.

Repair

CAUTION

The Model 355C/D/E/F attenuators are calibrated with the top and bottom covers installed. Removing either cover destroys the calibration and voids the instrument warranty.

The precision performance of the Model 355C/D/E/F is due in part to the fact that the instrument is held to tight electrical and mechanical tolerances during manufacture. To maintain the precision performance of the Model 355C/D/E/F it is recommended that it be returned to your nearest Hewlett-Packard Sales and Service Office for repair.

The following parts, however, are replaceable without removing any cover.

Replacing these parts is recommended if necessary. **355C**

- Glide (feet) 4 each HP 0403-0026
- Dial Assembly HP 355A-40G
- Dial Assembly (Option 003) HP 00355-00001

355D

- Glide (feet) 4 each HP 0403-0026
- Dial Assembly HP 355A-40H
- Dial Assembly (Option 003) HP 00355-00002

355E/F

- Glide (feet) 4 each HP 0403-0026
- Connector, 7 pin (male) HP 1251-1037

Test	Operation
1	SWR
2	RF Attenuation (355C/E only)
3	RF Attenuation (355D/F only)
4	RF Attenuation at 1 kHz
5	Residual Attenuation

Table 4. Test Equipment and Accessories Recommended

Instrument	Critical Specifications	Test	Model or Part No.
UHF Signal Generator	Frequency Range: 500 to 1000 MHz	1, 2, 3, 5	HP 612A
VHF Signal Generator	Output: 100 MHz	5	HP 608E/F
Sweep Generator	Frequency Range: 250 to 1000 MHz	1	HP 8690B/ 8699B
Oscilloscope	Vertical Deflection: 1 mV/cm Horizontal Deflection: 1 V/cm	1	HP 130C
SWR Meter	Bolometer bias provided ± 0.1 dB accuracy	2, 3, 4, 5	HP 415E
Oscillator	Frequency: 1 kHz Output Balance: 1%	3, 4	HP 200CD
Microwave Amplifier	Frequency Range: 800 to 1000 MHz Power: 1 watt out for 1 mW in at 800 MHz	3	HP 489A
Leveler Amplifier	Leveled Power Constant: ± 0.05 dB	3	HP 8404A
Power Meter	Measurement Capabilities: -5 mW Accepts Coaxial Mount	3	HP 432A
AC Voltmeter	Measure: 5 volts rms	4	HP 400E
Dual Directional Coupler	Range: 250 to 1000 MHz Directivity: 35 dB	1	HP 778D
Dual Directional Coupler	Range: 450 to 940 MHz (Adequate for detection at 1000 MHz)	3	HP 765D or HP 755D
Bolometer Mount	Input Impedance: 50 ohms Maximum SWR: 1.25	2, 3, 5	HP 476A
Low Pass Filter	Cut-off Frequency: 1200 MHz Residual Attenuation: Less than 3 dB	1, 2, 3, 5	HP 360B
Coaxial Thermistor Mount	Frequency Range: 800 to 1000 MHz SWR: Less than 1.3	3	HP 478A
Coaxial Termination Mount (2 needed)	Input Impedance: 50 ohms SWR: 1.5	1, 3	HP 908A

Table 4. Test Equipment and Accessories Recommended (Cont)

Instrument	Critical Specifications	Test	Model or Part No.
VHF Attenuator (2 needed)	Calibrated in 10 dB steps SWR: 1.5	1, 2, 4, 5 (one only for check No. 1)	HP 355C
VHF Attenuator	Calibrated in 10 dB steps SWR: 1.5	1, 3	HP 355D
Output Transformer	Impedance Match: 600 ohms to 50 ohms	4	HP 9120-0021
Crystal Detector (2 needed)	0.01 to 12.4 GHz	1	HP 423A
Power Supply	Output Voltage: 0 to 25 Vdc Output Current: 0 to 400 mA	1	HP 6216A
Accessories			
Number Required	Description	Type No. or HP Part No.	
2	Adapter — male BNC to male BNC	UG-491A/U	
2	Adapter — male N to male BNC	UG-1034U/N	
1	Adapter — female N to female N	UG-29B/U	
1	Adapter — female N to male BNC	UG-348A/U	
2	Adapter — male N to female BNC	UG-201A/U	
1	Adapter — male BNC to dual banana post	HP 10110A	
1	Resistor	(66.7 ohms) HP 0730-003	

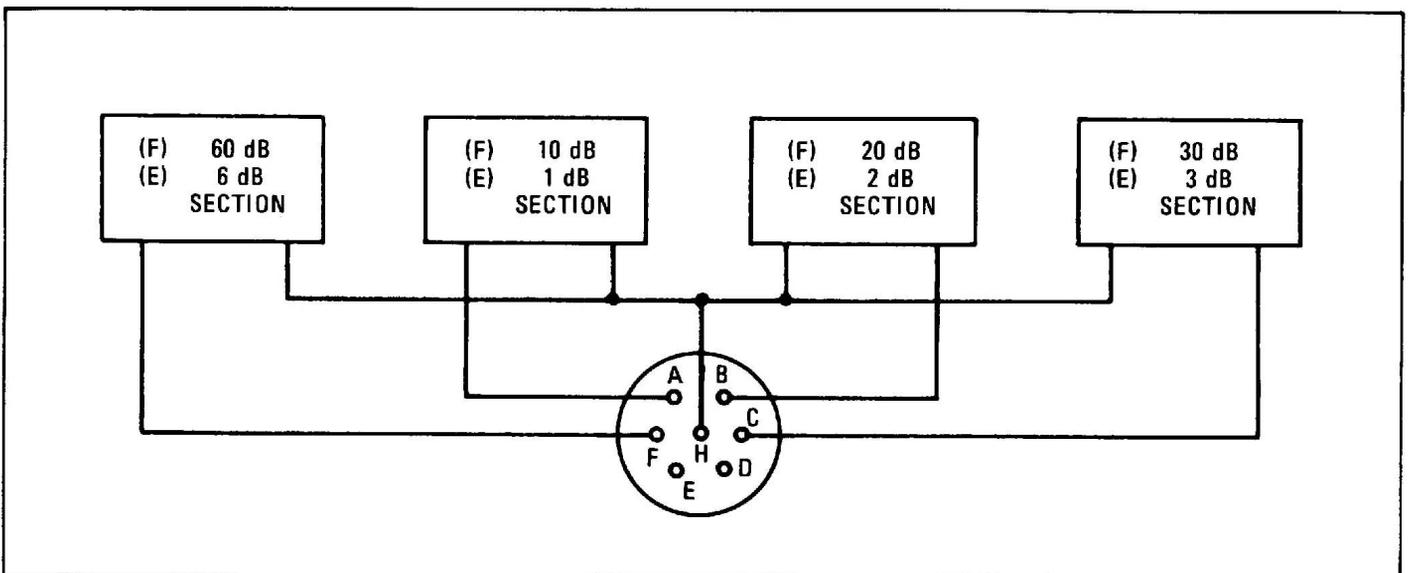


Figure 3. 355E/F Solenoid and Connector Wiring

Table 5. 355E/F Attenuation Program

To obtain attenuation settings given below, apply 18 volts dc between Pin H (common) and Pins:						
355E	355F	Pins		355E	355F	Pins
1 dB	10 dB	A		7 dB	70 dB	F, A
2 dB	20 dB	B		8 dB	80 dB	F, B
3 dB	30 dB	C		9 dB	90 dB	F, C
4 dB	40 dB	C, A		10 dB	100 dB	F, C, A
5 dB	50 dB	C, B		11 dB	110 dB	F, C, B
6 dB	60 dB	F		12 dB	120 dB	F, C, B, A

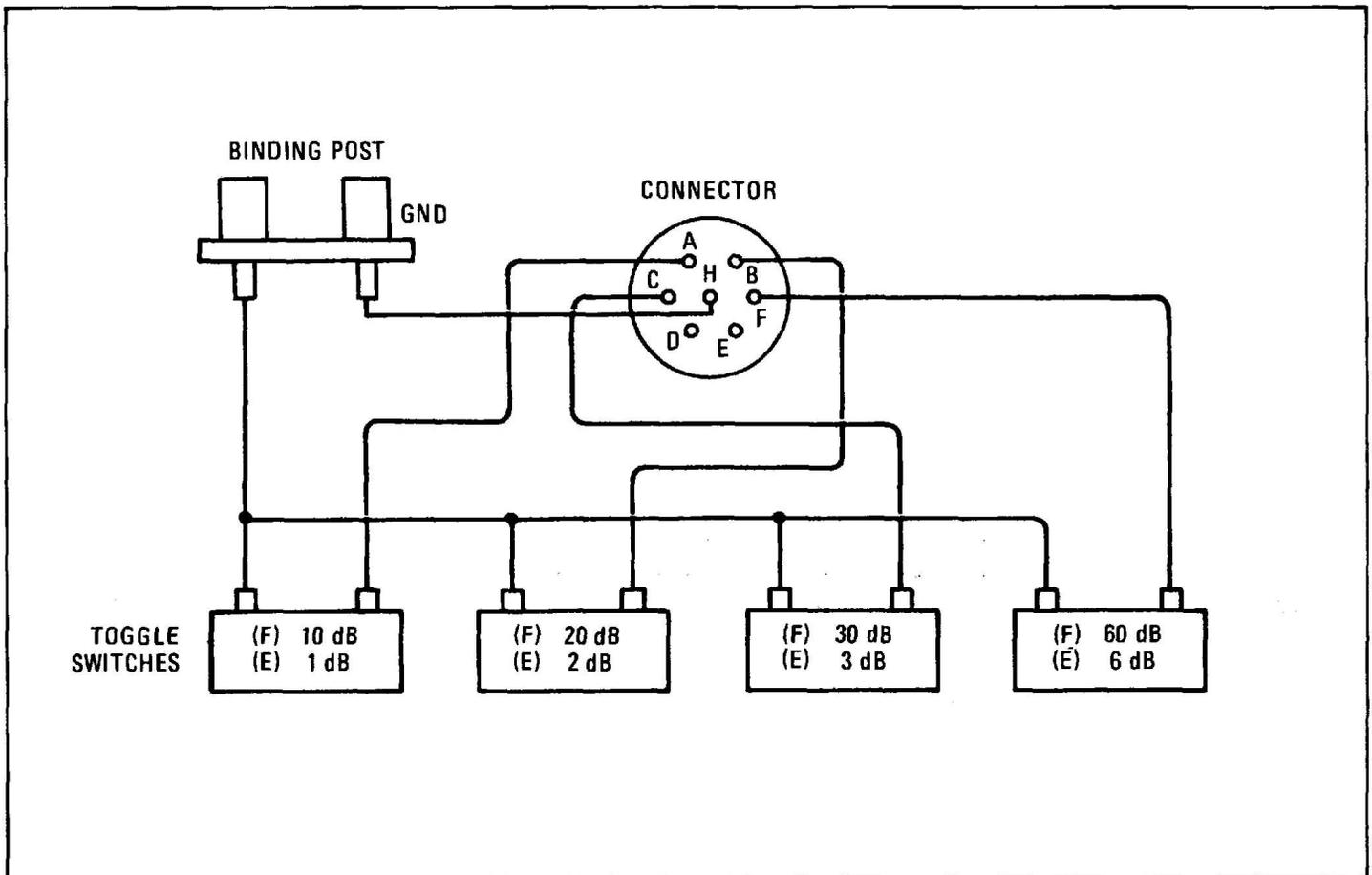


Figure 4. Model 355E/F Programming Switch Test Setup