NOTE REGARDING FACTORY CALIBRATION PROCEDURES AND TEST SPECIFICATIONS

Factory Calibration Procedures and Test Specifications are intended for use at the factory as a general guide for calibrators and quality control men. Most of the tolerances listed in these sheets are closer than advertised specifications. This is done purposely in order to insure that the instrument will meet or exceed advertised specifications when it reaches the customer.

These calibration procedures and test specifications should be used, therefore, as a guide only.

Some of the test equipment referred to in the calibration procedures is not available commercially; the Tektronix field engineer will be glad to suggest alternate approaches.

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TYPE R PLUG-IN UNIT

F A C T O R Y C A L I B R A T I O N P R O C E D U R E

The following instruments and equipment are needed:

1 TYPE 540-Series Oscilloscope

1 Test Scope (calibrated vertical)

1 Special Scope Input Adapter

1 52Ω TERMINATING RESISTOR (B52-R)

1 52-Ω cable

1 5-Ω Test Load

1 25-Ω Test Load

1 Flexible plug-in extension

1 Short plug-in extension

1 Grounded Emitter Transistor Board

The 540-Series oscilloscope should be set up as follows unless otherwise stated:

HORIZONTAL DISPLAY	INTERNAL SWEEP (Type 541) MAIN SWEEP NORMAL (Type 545)
TRIGGERING MODE	AC SLOW
TRIGGER SLOPE	-INT
STABILITY	full right (cw)
TIME/CM	1 μSEC
MULTIPLIER	1
TYPE 107	Use a 52-Ω cable, terminated with a TERMINATING RESISTOR (B52-R)

The "Vertical-System Electrical Center" of the 540-Series oscilloscope should be determined in the following manner:

Using a TEST LOAD UNIT, depress the PRESS TO SHORT INPUT button and observe the vertical level of the trace. If you use a Type 53/54 Plug-in unit, jumper between pins 1 and 3 on the 16-pin connector and observe the vertical level of the trace. This level will be referred to later in the calibration procedure.

PRECHECK

Make a careful visual inspection of the unit for proper wire dress and check controls for smooth mechanical operations. Make the following resistance to ground checks on the amphenol 16-pin connector:

AMPHENOL CONNECTOR PIN NUMBER	RESISTANCE TO GROUND IN Ω
1	9 K
2	0
3	9 K
4	Infinite
5	"
6	"
7	"
8	"
9	5 K
10	1.9 K
11	6.5 K
12	Infinite
13	"
14	"
15	75 Ω
16	Infinite

Bridge out the resistors on the SERIES RESISTOR switch and the COLLECTOR CURRENT MA/CM switch to insure that they are within ±2% of their rated values.

PRESET CONTROLS

COLLECTOR SOURCE VOLTS	NPN+, 15
COLLECTOR CURRENT MA/CM	.5 (200 Ω)
POSITION	mid-range
PULSE VOLTS	+, 10
PULSE VOLTS VARIABLE	full right (cw)
TRIGGER	SINGLE
BIAS VOLTS	0, X1
SERIES RESISTOR	50
GAIN ADJ. R5885	mid-range
PULSE VOLTS ADJ. R6859	full right (cw)

POSITION RANGE ADJ. R5870	mid-range
LR5804	slug above winding
LR5812	slug above winding
HF PEAKING	mid-scale

Plug R unit into the oscilloscope through flexible plug-in extension and quickly check the transistorized supplies. (Typical readings)

Check points	Knobs at preset location unless otherwise specified
Collector of V6837 to ground	COLLECTOR SOURCE VOLTS full left (ccw) -22 v full right (cw) -8.8 v
Floating chassis to collector of V6857	PULSE VOLTS VARIABLE full left (ccw) -4.2 v full right (cw) -10.8 v
Floating chassis to collector of V6877	-10.4 v

1. CHECK DC OUTPUT LEVEL
   Measure between pin 1 and ground, then between pin 3 and ground of the 16-pin amphenol plug (65-70 v).

2. CHECK MICROPHONICS
   Rap lightly with the palm of the hand on top of the plug-in to check microphonics.

3. ADJUST POSITION RANGE ADJ. (R5807)
   With the front panel POSITION control centered, adjust R5807 to position the trace on the "Vertical-System Electrical Center".

4. SET GAIN ADJUST (R5885)
   Connect 200 mv of CALIBRATOR signal to SCOPE INPUT. Depress PUSH TO CONNECT SCOPE INPUT TO THIS TERMINAL and adjust R5885 for 2 cm of vertical deflection.

5. CHECK COLLECTOR SOURCE VOLTS FOR TRACKING
   Connect voltmeter from C to ground and check COLLECTOR SOURCE VOLTS control for tracking with front panel indication from 1 to 15 volts on both -PNP and +NPN.

6. SET PULSE VOLTS ADJ. (R6859)
   Connect vertically-calibrated test scope to B and observe amplitude of pulses generated by the mercury pulser. Adjust R6859 for 10 volts of signal output. Note: BIAS VOLTS must be set for 0 volts across C5802 to insure accuracy of this adjustment.

7. CHECK PULSE VOLTS SWITCH STEPS

Switch PULSE VOLTS switch to 5 and check for 5 volts of signal amplitude. Check each step of this switch for indicated output within ±2%. Check VARIABLE PULSE VOLTS control to be smooth in operation and have a range from 1 to 2.5 times attenuation.

8. CHECK BIAS VOLTS

Connect meter across C5802 and position BIAS VOLTS control to obtain 0 volts reading. Index knob to 0 and tighten set screw. Check control for tracking with front panel indication throughout its range, on both X1 and X10.

9. CHECK REGULATION OF ALL POWER SUPPLIES

Set BIAS VOLTS at 0 and X1. Attach test probe and voltmeter to the output of the bias power supply. Connect the 5-Ω test load across C5802. Turn BIAS VOLTS slowly to the right (cw) and observe the voltage at which the power supply goes out of regulation (typically 3.3 v).

Turn PULSE VOLTS VARIABLE full left (ccw). Attach test probe to the output of the floating power supply. Connect the voltmeter and the 5-Ω test load across C5801. Turn PULSE VOLTS VARIABLE slowly to the right (cw) and observe the v oltage at which the power supply goes out of regulation (typically 4 v).

Turn COLLECTOR SOURCE VOLTS full left (ccw). Attach test probe and meter to the output of the collector power supply. Connect 5 and 25-Ω test loads in series across C6847. Turn COLLECTOR SOURCE VOLTS slowly to the right (cw) and check to see that power supply voltage remains the same and stays in regulation as COLLECTOR SOURCE VOLTS is varied throughout its range with load and without load.

10. ADJUST HF PEAKING (R6808)

Install TYPE R unit in plug-in compartment. Turn TRIGGER SLOPE to +INT. Apply square wave from 107 to SCOPE INPUT through special scope input adapter. Depress PUSH TO CONNECT SCOPE INPUT TO THIS TERMINAL. With TIME/CM at 1 μSEC X2, obtain a stable display through adjustment of TRIGGER LEVEL and STABILITY controls. Obtain approximately 3 cm of vertical deflection and adjust R6808 for optimum leading edge.

11. ADJUST PULSER HF COMPENSATIONS (L5804 and L5812)

Remove TYPE R plug-in from plug-in box and insert short extension. Re-install plug-in. Connect +TRIGGER cable to TRIGGER IN and turn TRIGGER SLOPE to +EXT. Turn COLLECTOR SOURCE VOLTS to PNP. Turn PULSE VOLTS to -, 5 volts and CALIBRATED. Turn BIAS VOLTS full right (cw) and X10. Turn COLLECTOR CURRENT MA/CM to .5 and SERIES RESISTOR to 50. Turn TIME/CM to .1 μSEC/CM and STABILITY full right (cw). Install grounded emitter transistor board using 2N544 transistor on the front of the R unit. Turn BIAS VOLTS slowly to the left (ccw) until approximately 3 cm of vertical deflection are obtained. Adjust STABILITY and TRIGGER LEVEL to obtain a stable display. Then adjust L5804 and L5812 for optimum square-wave presentation.

12. CHECK VERTICAL RISETIME

Remove plug-in extension. Re-install plug-in unit. Remove grounded emitter transistor board and jumper B to C. Connect +TRIGGER cable to TRIGGER IN and trigger as above. Turn PULSE VOLTS switch and VARIABLE PULSE VOLTS to obtain 2.5 cm of vertical deflection. Position this signal overlapping the two center horizontal graticule lines. Turn TIME/CM switch to .1 μSEC X5. Measure the distance between where the waveform intersects these graticule lines and convert to mμsec. This checks the risetime of the entire system; i.e., pulser, R unit vertical amplifier and the 540-Series oscilloscope. (Approximately 12 mμsec) Note: For accurate risetime measurements, check timing on the portion of the sweep used for these measurements with 50 mc sine waves from an accurate source.

13. CHECK SINGLE AND DOUBLE TRIGGER

Switch TRIGGER to double and observe both leading and falling portions of the pulser waveform. Note: It may be necessary to slightly readjust STABILITY and TRIGGERING LEVEL controls to obtain double triggering.