# TYPE 132 PLUG-IN UNIT POWER SUPPLY

## 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

### TEST EQUIPMENT

The following instruments and equipment are needed for a complete calibration of Type 132:

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|---|---|
| 1 | Type 540 Series oscilloscope with Type B or Type L Plug-In |
| 1 | Type 105 Square-Wave Generator (or Type 50 TU) |
| 1 | Type 107 Square-Wave Generator (or Type 50 TU) |
| 2 | Standard Type K Plug-In Units |
| 1 | Type CA Plug-In |
| 1 | TU-2 Test Load |
| 1 | Simpson 262 DC Voltmeter or equivalent |
| 1 | Powerstat or Variac having at least 5 amp rating |
| 4 | B93R Terminating resistors |
| 1 | B52R Terminating resistor |
| 2 | 3' 93 Ω coaxial cables |
| 1 | 3' 52 Ω Coaxial cable |
| 2 | B52T10 10:1 attenuators |
| 1 | X2 probe |

1. PRELIMINARY INSPECTION:

   Check for unsoldered joints, rosin joints, wiring errors and proper lead dress.

   Check for correct fuse size: 3 amp fast-blo for 117 v, 1.5 amp fast-blo for 234 v.

2. CHECK POWER SUPPLY DC RESISTANCE TO GROUND:

   Install TU-2 Test Load in the unit to be calibrated.

   Place TU-2 at LOW LOAD.

   Measure DC resistances on each regulated supply. The approximate values of DC resistances are: -150 v, 15 k; +100 v, 500 Ω; +225 v, 20 k; and +350 v, 500 k.

   Check transformer terminal 1 and 4 to ground for infinite resistance.

3. CHECK POWER SUPPLY VOLTAGES:

   Adjust the powerstat for 117 VAC. Turn power on and allow at least two minutes for the unit to stabilize before making any adjustments.

   Adjust -150 v ADJ for -150 v.

   Check +100 v, +225 v and +350 v supply voltages (±2%).

   Check the elevated heater supply at transformer terminals 14 and 18 for +100 v.

Short transformer terminals B and C together and check for 14 VAC between terminals A and D. Remove the short jumper from terminals B and C.

4. CHECK POWER SUPPLY RIPPLE AND REGULATION:

Set up the test scope as follows:

1. TRIGGERING MODE at AUTO
2. TRIGGERING SLOPE at + LINE
3. TIME/CM at 5 msec
4. Vertical sensitivity at .005 VOLTS/CM

Using X2 probe, measure the ripple voltage on each regulated supply.

Check the ripple voltage on each supply under 105 VAC line voltage and HIGH LOAD.

Check the ripple voltage on each supply under 125 VAC line voltage and LOW LOAD.

The peak-to-peak ripple voltage on each supply should not exceed 10 mv under these line voltages and load conditions.

Re-adjust the line voltage to 117 VAC.

5. AMPLIFIER DC LEVEL ADJUSTMENT:

Replace TU-2 Test Load with a standard TYPE K Plug-In.

Set the TYPE K INPUT at DC, VOLTS/CM at .05 and VARIABLE at CALIBRATED.

Connect a B93R terminating resistor to each OUTPUT terminal of the unit.

Connect a DC voltmeter between +OUTPUT and - OUTPUT and set the VERTICAL POSITION of the plug-in for zero voltage.

Connect the voltmeter from +OUTPUT to ground and adjust DC LEVEL of the unit for zero voltage.

Check -OUTPUT to ground for zero voltage.

Remove the terminating resistors from both OUTPUT terminals.

6. AMPLIFIER GAIN ADJUSTMENT:

Install a standard TYPE K Plug-In in the test scope.

Set the test scope as follows:

1. TRIGGERING MODE at AC
2. TRIGGERING SLOPE at +INT.
3. TIME/CM at 50 µsec.
4. Plug-In INPUT at DC
5. Vertical sensitivity at .05 VOLTS/CM

Connect two B52T10 attenuators to the OUTPUT terminal of Type 105 (or connect one B52T10 to the SIGNAL OUTPUT terminal of Type 50 TU.)

Connect a 52 Ω coaxial cable to the B52T10 attenuator and then terminate the other end of the cable in a B52R terminating resistor.

Connect the output signal of Type 105 (or Type 50 TU) to the test scope.

Set FREQUENCY and RANGE controls of Type 105 (or Type 50 TU)for 10 kc.

Adjust OUTPUT AMPLITUDE of Type 105 (or AMPLITUDE of Type 50 TU)for 6 mm (30 mv) signal.

Remove Type 105 (or Type 50 TU) signal from the test scope and connect the signal to the unit under test.

Connect a 93 Ω coaxial cable to each OUTPUT terminal of the unit and then terminate the other ends of both cables in a 93 Ω terminating resistor.

Connect the + OUTPUT signal to the test scope. Set STABILITY and TRIGGERING LEVEL of the test scope for a stable disply.

Set GAIN ADJ at maximum clockwise position and check for maximum gain (at least 165 mv or gain of 5.5).

Adjust GAIN ADJ for 3 cm output signal (150 mv, gain of 5).

Interchange ± output terminal connections and check -OUTPUT for 3 cm output signal (150 mv, gain of 5).

DO NOT remove any connections and settings and continue to the next step.

7. FREQUENCY RESPONSE ADJUSTMENT:

Adjust HF COMP for a level-topped negative going output waveform.

Set FREQUENCY and RANGE of Type 105 (or Type 50 TU)for 250 cps and place TIME/CM of the test scope at 5 msec.

Adjust LF COMP for a level-topped negative going output waveform.

Due to the interaction between LF COMP and HF COMP, these adjustments must be repeated to obtain proper output waveform.

Check +OUTPUT for a level-topped positive going output waveform (250 cps and 10 kc).

Remove the input signal from the unit.

8. TRANSIENT RESPONSE ADJUSTMENT:

Connect a B52T10 attenuator to the OUTPUT of Type 107 (or FAST-RISE OUTPUT of Type 50 TU).

Connect a 52 Ω coaxial cable to the B52T10 attenuator and then terminate the other end of the cable in a B52R terminating resistor.

Connect the output signal of Type 107 (or Type 50 TU) to the unit.

Add a B93R terminating resistor to each OUTPUT terminal of the unit (cables terminated at both ends).

Set APPROXIMATE FREQUENCY control of Type 107 at mid-range (or FREQUENCY control of Type 50 TU at maximum).

Adjust APPROXIMATE AMPLITUDE of Type 107 (or AMPLITUDE of Type 50 TU) so that 3 cm (150 mv) output signal is observed on the test scope.

Place TIME/CM of the test scope at .1 µsec, and set STABILITY and TRIGGERING LEVEL for a stable display.

Adjust L430 and L440 for fastest possible risetime without appreciable overshoot and ringing.

Check -OUTPUT for proper transient response.

L430 and L440 must be adjusted so that the output waveforms at ±OUTPUT show similar transient response.

Remove one B93R terminating resistor from ±OUTPUT terminals and re-connect the cables terminated in B93R to ±OUTPUT (cables terminated at one end).

Re-adjust APPROXIMATE AMPLITUDE of Type 107 (or AMPLITUDE of Type 50 TU) for 3 cm (150 mv)output signal.

Check the risetime of both output waveforms.

9. CHECK PUSH-PULL OUTPUT:

Install Type CA Plug-In in the test scope. Set up as follows:

1. CHANNEL A and B at DC.
2. CHANNEL A and B Sensitivity at .1 VOLTS/CM.
3. CHANNEL A POLARITY at NORMAL.
4. CHANNEL B POLARITY at INVERTED.
5. MODE switch at ADDED ALGEBRAICALLY.

Connect +OUTPUT to CHANNEL A and -OUTPUT to CHANNEL B through the cables terminated in B93R terminating resistors.

Check for push-pull gain of 10.

Remove the input signal from the unit.

10. CHECK DUAL TRACE AND CHOPPED BLANKING.

Install Type CA Plug-In in the unit and Type K Plug-In in the test scope.

Set Type CA at ALTERNATE MODE.

Place ALT CHOP switch on rear panel of the unit at ALT and connect GATE IN on rear panel to +GATE of the test scope.

Connect +OUTPUT of the unit to the test scope through the 93 Ω cable terminated in a B93R terminating resistor.

Set STABILITY and TRIGGERING LEVEL of the test scope to clockwise position (free-run) and check for two traces on the test scope.

Remove CRT cathode ground strap on rear panel of the test scope.

Set ALT CHOP switch at CHOP and connect CHOPPED BLANKING to CRT cathode of the test scope.

Place Type CA at CHOPPED MODE.

Switching CRT CATHODE SELECTOR on rear panel of test scope, check for blanking of the switching portions of waveform at normal intensity.

# TYPE 132 PLUG-IN UNIT POWER SUPPLY

## T E S T  S P E C I F I C A T I O N S

1. POWER SUPPLY

   a. All regulated voltages must be within ± 2% of the nominal values.

   b. The peak-to-peak ripple voltage on all supplies must not exceed 10 mv at 117 vac, 105 vac and 125 vac line voltages.

   c. All regulated Supplies must be regulated between 104 vac and 125 vac line voltages.

   d. With TU-2 TEST LOAD, the approximate values of power supply resistances to ground are: - 150 v, 15 k; + 100 v, 500 Ω; +225 v, 20 k; and +350 v, 500 k.

2. AMPLIFIER

   With TYPE K plug-in and both ±OUTPUT terminated in 93 Ω terminating resistor, the amplifier must meet the following performance:

   a. The Single-ended voltage gain must be 5.

   b. The Single-ended voltage gain of ± OUTPUT must be within 2% when the amplifier is properly calibrated.

   c. The push-pull voltage gain must be 10.

   d. With GAIN ADJ set at maximum, the gain must be at least 10% more than the proper setting.

   e. The over-all bandwidth must not be more than 3 db down at 14 mc or the risetime must be faster than 25 nsec.

   f. Overshoot and ringing on ± OUTPUT waveforms must not be greater than a trace width.

   g. Noise and hum must not exceed 10 mv (2 mm at .05 VOLTS/CM).

   h. No appreciable microphonic effect should be observed from operation of front panel controls.

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