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.

TYPE D PLUG-IN UNIT
SN 101 - 16439
FACTORY CALIBRATION PROCEDURE

The following instruments and equipment are needed:

1 TYPE 540 Series Oscilloscope

1 TYPE 105 SQUARE-WAVE GENERATOR

1 INPUT CAPACITANCE STANDARDIZER (CS47)

1 52Ω TERMINATION RESISTOR (B52R)

1 52Ω cable

1 PLUG-IN EXTENSION (EP53)

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

HORIZONTAL DISPLAY	541 INTERNAL SWEEP 545 MAIN SWEEP NORMAL
TRIGGERING MODE	AUTOMATIC
TRIGGER SLOPE	-INT
STABILITY	PRESET
TIME/CM	1 MILLISEC
MULTIPLIER	1
TYPE 105	Use a 52Ω cable

"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 normal 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 16 pin connector:

PRECHECK (Continued)

AMPHENOL CONNECTOR PIN NUMBER	RESISTANCE TO GROUND IN Ω
1	11 K
2	0
3	11 K
4	Infinite
5	"
6	"
7	"
8	"
9	40 K
10	15 K
11	150 K
12	Infinite
13	"
14	"
15	120
16	Infinite

PRESET CONTROLS

MILLIVOLTS/CM	1
MV/CM MULTIPLIER	50
INPUT SELECTOR	A-B DC
VERTICAL POSITION	mid-range
DIFF. BAL.	mid-range
PREAMP BALANCE	mid-range
VAR. ATTEN. BAL.	mid-range
2ND STAGE PLATE BAL.	mid-range
VERT. POS. RANGE	mid-range
gain adjust R3664	full right (cw)
all other controls	mid-range

Plug D unit into scope using PLUG-IN EXTENSION (EP53).

1. CHECK DC OUTPUT LEVEL

   Measure between pin 1 and ground and pin 3 and ground of the 16 pin amphenol plug (65-70 v).

2. ADJUST VERT. POS. RANGE

   Connect a jumper across R3854 (7.3 K on MV/CM MULTIPLIER switch) and adjust VERT. POS. RANGE control to center the trace on graticule "Vertical System Electrical Center".

3. ADJUST 2ND STAGE PLATE BAL. AND VAR. ATTEN. BAL.

Connect a jumper between the grid, pin 1, of V3604 and the grid, pin 1 of V 3704. Adjust VAR. ATTEN. BAL. control so that the trace remains stationary on the screen as the VARIABLE MV/CM MULTIPLIER control is varied throughout its range. Now adjust 2ND STAGE PLATE BAL. so that the trace remains stationary as the MV/CM MULTIPLIER switch is varied between 1 and 2. These controls may interact slightly.

4. ADJUST PREAMP BALANCE AND DIFF. BAL.

Set up plug-in as follows:

MILLIVOLTS/CM	1
MV/CM MULTIPLIER	1
INPUT SELECTOR SWITCH	A-B DC

From the SQUARE-WAVE CALIBRATOR apply 10 volts to both INPUT A and INPUT B. Adjust the DIFF. BAL. control for minimum deflection while keeping the trace centered with the PREAMP BALANCE controls. If these controls are far out of adjustment it may be helpful to start with the MV/CM MULTIPLIER at 10 or 20.

5. SET MILLIVOLTS/CM SWITCH BALANCE ADJUSTMENTS

Set up plug-in as follows:

MV/CM MULTIPLIER	1
INPUT SELECTOR SWITCH	A-B DC

From SQUARE-WAVE CALIBRATOR apply signal to both INPUT A and INPUT B.

Adjust balance controls for minimum deflection:

MILLIVOLTS/CM SWITCH	SQUARE-WAVE CALIBRATOR	ADJUST FOR MINIMUM DEFLECTION
10	20 VOLTS	R3044
100	50 VOLTS	R3074
1000	100 VOLTS	R3154

6. CHECK INPUT SELECTOR SWITCH

Set up plug-in as follows:

MILLIVOLTS/CM	1
MV/CM MULTIPLIER	50

Check Input Selector Switch: Set Input Selector Switch to A DC and from the SQUARE-WAVE CALIBRATOR apply .2 volts to INPUT A. Position the base line of the calibrator waveform to the center graticule line. Now set input selector switch to A AC. The waveform should shift down so that the center graticule line is now approximately through the center of the display. Repeat the same procedure on "B" channel.

6. (Continued)

Check for gas: Turn MV/CM MULTIPLIER to 1 and rotate the input selector switch through all positions and observe vertical shift in trace (2 mm maximum).

7. ADJUST GAIN (R3664)

Set up plug-in as follows:

MILLIVOLTS/CM	1
MV/CM MULTIPLIER	50
INPUT SELECTOR SWITCH	A DC

From the SQUARE-WAVE CALIBRATOR apply .2 volts to INPUT A and adjust R3664 for 4 cm of deflection.

8. CHECK FOR MICROPHONICS

Rap lightly on the front panel of the plug-in unit and watch for excessive ringing type microphonics.

9. CHECK MV/CM MULTIPLIER SWITCH STEPS

Set up plug-in as follows:

MILLIVOLTS/CM	1
Input Selector Switch	A DC

From SQUARE-WAVE CALIBRATOR apply signal to INPUT A and check for proper deflection.

MV/CM MULTIPLIER SWITCH	SQUARE-WAVE CALIBRATOR	DEFLECTION
50	100 MILLIVOLTS	2 cm
20	50 MILLIVOLTS	2.5 cm
10	20 MILLIVOLTS	2 cm
5	20 MILLIVOLTS	4 cm
2	5 MILLIVOLTS	2.5 cm
1	2 MILLIVOLTS	2 cm

10. CHECK MILLIVOLTS/CM SWITCH STEPS

Set up plug-in as follows:

MV/CM MULTIPLIER	50
Input Selector Switch	A DC

From SQUARE-WAVE CALIBRATOR apply signal to INPUT A and check for proper deflection.

MILLIVOLTS/CM SWITCH	SQUARE-WAVE CALIBRATOR	DEFLECTION
1	.2 VOLTS	4 cm
10	2 VOLTS	4 cm
100	20 VOLTS	4 cm
1000	100 VOLTS	2 cm

11. ADJUST OUTPUT COMPENSATIONS

Set up plug-in as follows:

MILLIVOLTS/CM	1
MV/CM MULTIPLIER	50
Input Selector Switch	A DC

Reset scope controls:

TIME/CM	10 MICROSEC

From TYPE 105 apply 100 kc signal to INPUT A and set OUTPUT AMPLITUDE control for 3.5 cm of deflection. Adjust C3824 and C3874 for optimum flat top and square corner.

12. ADJUST INPUT CAPACITORS (shunt and neutralization)

Set up plug-in as follows:

MILLIVOLTS/CM	1
MV/CM MULTIPLIER	50
Input Selector Switch	A DC

Reset scope controls:

TIME/CM	1 MILLISEC

Terminate TYPE 105 cable with an INPUT CAPACITANCE STANDARDIZER (CS 47). From TYPE 105 apply 1 kc signal to INPUT A and set OUTPUT AMPLITUDE control for 3.5 cm of deflection. Adjust C3424 for flat top, now set Input Selector switch to A-B DC and adjust C3444 for flat top (neutralization). Repeat the same procedure on INPUT B using C3434 for input capacitor adjustment and C3414 for neutralization adjustment.

13. ADJUST MILLIVOLTS/CM SWITCH COMPENSATIONS (same set up as in Step 12)

Set up plug-in as follows:

MILLIVOLTS/CM	1
MV/CM MULTIPLIER	50
Input Selector Switch	A DC

From Type 105 apply 1 kc signal to INPUT A and adjust OUTPUT AMPLITUDE control for 3.5 cm of deflection.

MILLIVOLTS/CM SWITCH	ADJUST FOR FLAT TOP	ADJUST FOR MIN. OVERSHOOT
10	C3214	C3224
100	C3244	C3254
1000	C3274	C3284

13. (Continued)

Using INPUT B:

MILLIVOLTS/CM SWITCH	ADJUST FOR FLAT TOP	ADJUST FOR MIN. OVERSHOOT
10	C3014	C3024
100	C3044	C3054
1000	C3074	C3084

14. ADJUST HF DIFFERENTIAL BALANCE CAPACITOR C3394

Set up plug-in as follows:

MILLIVOLTS/CM	1
MV/CM MULTIPLIER	1
Input Selector Switch	A-B DC

From SQUARE-WAVE CALIBRATOR apply 10 volts to both INPUT A and INPUT B. Adjust C3394 for minimum spike on waveform.

NOTE REGARDING FACTORY CALIBRATION PROCEDURES AND TEST SPECIFICATIONS

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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.

1/16/61
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FACTORY CALIBRATION PROCEDURE

CONTENTS:

INTRODUCTION:

This isn't a field recalibration procedure as is the procedure in your instruction manual. This is a guide in calibrating brand-new instruments, just assembled instruments that have never been turned on before. Therefore it calls out many procedures and adjustments that are rarely required for subsequent recalibration.

Publication:
061-113
January 1964

Even though we wrote this procedure primarily for our own factory test department, it's valuable to others also if used with some caution:

For D units, sn 16440 and up, only.

1. **Special test equipment,** if mentioned, is not available from Tektronix unless it's listed also in our current catalog. This special equipment is used in our test department to speed calibration. Usually you can either duplicate its function with standard equipment in your facility, devise alternate approaches, or build the special test equipment yourself.

2. **Factory circuit specifications** are not guaranteed unless they also appear as catalog or instruction manual specifications. Factory circuit specs usually are tighter than advertised specs. This helps insure the instrument will meet or exceed advertised specs after shipment and during subsequent field recalibrations over several years of use. Your instrument may not meet factory circuit specs but should meet catalog or instruction manual specs.

3. **Presetting internal adjustments,** if mentioned, usually is unnecessary. This is helpful for "first-time" calibration only. If internal adjustments are preset, you'll have to perform a 100% recalibration. So don't preset them unless you're certain a "start-from-scratch" policy is the best.

In this procedure, all front panel controls for the instrument under test are in capital letters (SENSITIVITY) and internal adjustments are capitalized only (Gain Adj).

ABBREVIATIONS:

a	amp
ac	alternating current
approx	approximately
b	base
bulb	light, lamp, etc.
c	collector
ccw	counterclockwise or full counterclockwise
cer	ceramic
cm	centimeter
comp	composition (resistor)
cps	cycles per second
crt	cathode ray tube
cw	clockwise or full clockwise
db	decibel
dc	direct current
div	division
e	emitter
emc	electrolytic, metal cased (capacitor)
emt	electrolytic, metal tubular
fil	filament
freq	frequency
gmv	guaranteed minimum value (capacitor)
gnd	chassis ground
h	henry
hv	high voltage
inf	infinity
int	internal
k	kilo (10^3)
k	kilohm
m	milli (10^{-3})
ma	milliamp
max	maximum
mc	megacycle
meg	megohm
mh	millihenry
midr	midrange or centered
min	minimum
mm	millimeter
mpt	metalized, paper tubular (capacitor)
msec	millisecond
mt	mylar, tubular (capacitor)
mv	millivolt
μ	micro (10^{-6})
μf	microfarad
μh	microhenry
μsec	microsecond
n	nano (10^{-9})
nsec	nanosecond
Ω	ohm
p	pico (10^{-12})
pbt	paper, "bathtub" (capacitor)
pcc	paper covered can (capacitor
PF	PICOFARAD ($\mu\mu$f)
piv	peak inverse voltage
pmc	paper, metal cased (capacitor)
poly	polystyrene
pot	potentiometer
prec	precision (resistor)
pt	paper, tubular (capacitor)
ptm	paper, tubular molded (capacitor)
ptp	peak-to-peak
sec	second
sn	serial number
term	terminal
tub	tubular (capacitor)
unreg	unregulated
v	volt
var	variable
w	watt
WW	wire wound
x-former	transformer

FACTORY CIRCUIT SPECIFICATIONS

SPEC QUALIFICATION

Factory circuit specifications are qualified by the conditions specified in the main body of the calibration procedure. The numbers listed beside the specs correspond to the factory calibration procedure steps where the check or adjustment is made. Instruments may not meet factory circuit specs if calibration or check-out methods and test equipment differ substantially from those in this procedure.

NOT INTENDED FOR INCOMING INSPECTION

We initially calibrate the instrument to factory circuit specifications. These specs usually are tighter than advertised specs, thus helping to insure the instrument will meet or be within advertised specs after shipment and during subsequent recalibrations. Instruments that have left our factory may not meet factory circuit specs but should meet catalog or instruction manual specs.

1. EQUIPMENT REQUIRED

2. PRELIMINARY INSPECTION

3. D UNIT PRESETS

4. RESISTANCE CHECKS

5. SETUP

6. OUTPUT DC LEVEL

6a. 67.5 v: ±2.5 v, max.

7. VERT POS RANGE

7b. ±90°, max, from mid r.

8. VAR ATTEN BAL

8a. ±90°, max, from mid r.

9. 2ND STAGE PLATE BAL

9a. ±90°, max, from mid r.

10. PREAMP BALANCE

10a. PREAMP BALANCE and FINE balance must not be against stop after adjustment.

11. MICROPHONICS AND GRID CURRENT

11a. Micro: 2 mm, max; no ringing type.
11b. Grid Current: 2 mm, max.

12. DIFF BALL

12b. ±90°, max, from mid r (less than 2 mm deflection with 2 v input).
12c. Tube linearity with 5 v input: .5 cm, max.
12c. Tube linearity with 10 v input: 1 cm, max.
12d. AC balance, 20 v input: 1 cm, max.
12d. Distortion, 20 v input: 1 cm, max slant.

13. AC-DC

14. GAIN

14a. R3664 range: ±10%, min.
14b. VARIABLE mv/cm range: 2.5 to 1, min.

15. MILLIVOLTS/CM

15a. Error: ±2%, max.

16. MV/CM MULTIPLIER

16a. Error: ±2%, max.

17. OUTPUT COMPENSATION

18. INPUT CAPACITY

19. MILLIVOLTS/CM COMPENSATION

20. HF DIFFERENTIAL BALANCE

20b,c. Rejection ratio: 10,000 to 1, min.

21. THE END

CALIBRATION

NOTES

1. EQUIPMENT REQUIRED

a. Plug-in scope

1	530 series	Tektronix type scope

b. Test equipment

1	105	Tektronix type square-wave generator

1b. Equipment substitute

(1) TU-50 may be substituted for 105.

c. Test accessories

1	013-055	Plug-in extension
4	012-001	52 Ω cable, uhf connectors
2	103-032	Bnc male to uhf female adapter
1	103-026	Adapter, uhf T, male to 2 female
1	011-068	47 pf input time-constant standardizer, bnc connectors

d. Miscellaneous equipment

1	630	Triplett meter; 20,000 Ω/v dc
or	262	Simpson meter; 20,000 Ω/v dc
1	special	Standard calibrator

2. PRELIMINARY INSPECTION

a. General

Check for unsoldered joints, rosin joints, lead dress and long leads. Check for loose hardware and protruding parts. Check controls for smooth mechanical operation, proper indexing, and knob spacing from front panel.

b. Wiring

Examine wiring for no sharp bends in those wires which connect a point on the frame to the floating chassis.

3. D UNIT PRESETS

a. External controls

VERTICAL POSITION	midr
MILLIVOLTS/CM	1
MV/CM MULTIPLIER	50
VARIABLE mv/cm	CALIBRATED
PREAMP BALANCE	midr
FINE balance	midr
input selector	A-B DC
DIFF BAL	midr

b. Internal adjustments

All internal adjustments	midr

c. Leave controls and adjustments, for any step, as they were in the step preceding unless noted otherwise.

3b. Presetting internal adjustments

(1) Presetting internal adjustments is helpful for "first-time" calibration but is usually unnecessary for recalibration. If you preset, you'll have to perform a 100% recalibration. Don't preset them unless you're certain a "start-from-scratch" policy is the best.

4. RESISTANCE CHECKS

a. Check resistances to ground

use	Amphenol pin	approx resistance
output	1	10 k
gnd	2	0 Ω
output	3	10 k
not used	4 to 8	inf
-150 v	9	80 k
+100 v	10	17 k
+225 v	11	85 k
+350 v	12	inf
not used	13, 14	inf
+75 v fil	15	150 Ω
not used	16	inf

NOTES

5. SETUP

a. Plug-in scope presets

Trigger	-int, auto
Time/cm	.5 msec

b. Connect D

Use plug-in extension to connect D plug-in to plug-in scope. Turn power on.

6. OUTPUT DC LEVEL

a. Voltage at pins 1 and 3 +65 to +70 v

Check voltage between pin 1 of Amphenol connector and gnd: +65 to +70 v. Check voltage between pin 3 and gnd: +65 to +70 v.

7. VERT POS RANGE

a. Electrical center

Momentarily short Amphenol connector pins 1 and 3 together and note trace vertical position (electrical center).

b. Vert Pos Range (R3964)
±90°, max, from mid r

Place short across 7.3 k precision resistor (R3854) on MV/CM MULTIPLIER switch. Adjust Vert Pos Range to move trace to plug-in scope's electrical center. R3964 must be within ±90° of mid r after adjustment.

Remove short.

8. VAR ATTEN BAL

a. Var Atten Bal (R3704)
±90°, max, from mid r

Note wiper contacts on first 2 wafers of MV/CM MULTIPLIER switch (grid of V3604 and V3704). Short the two wipers together.

Rotate VARIABLE mv/cm back and forth while adjusting Var Atten Bal for no trace shift.

Move MV/CM MULTIPLIER to 1, one step at a time, while adjusting Var Atten Bal for no trace shift. R3704 must be within ±90° of mid r after adjustment.

Return MV/MULTIPLIER to 50.

8a. No trace on screen at 2 and 1.

(1) 2nd Stage Plate Bal is only preset now. Adjust it to bring trace on screen in order to complete Var Atten Bal adjustment.

9. 2ND STAGE PLATE BAL

a. 2nd Stage Plate Bal (R3814) ±90°, max, from mid r

Move MV/CM MULTIPLIER to 1, one step at a time, while adjusting 2nd Stage Plate Bal for no trace shift. R3814 must be within ±90° of mid r after adjustment.

Return MV/CM MULTIPLIER to 50.

Remove short.

10. PREAMP BALANCE

a. PREAMP BALANCE

Move MV/CM MULTIPLIER to 1, one step at a time, while adjusting PREAMP BALANCE and FINE balance for no trace shift.

PREAMP BALANCE and FINE balance must not be against stop after adjustment.

11. MICROPHONICS AND GRID CURRENT

a. Micro 2 mm, max; no ringing type

Short both inputs to ground. Rotate MILLIVOLTS/CM back and forth while noting microphonics: 2 mm, max; no ringing type.

b. Grid current 2 mm, max

Set MILLIVOLTS/CM to 1.

Change input selector to A DC. Note trace position. Change to A AC and note trace shift: 2 mm, max.

Repeat for -B.

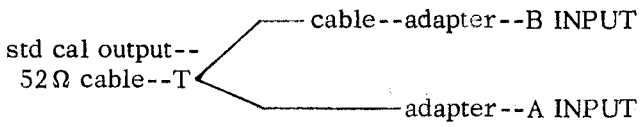
Remove grounds from inputs.

NOTES

12. DIFF BAL

a. Setup

Set input selector to A-B DC and MV/CM MULTIPLIER to 50.



Set standard calibrator to 2 volts.

b. DIFF BAL ±90°, max, from mid r

Move MV/CM MULTIPLIER from 50 to 1, one step at a time, while adjusting DIFF BAL for min deflection. After adjustment, DIFF BAL must be within ±90° of mid r and there must be less than 2 mm deflection.

DIFF BAL and PREAMP BALANCE interact. If trace moves off-screen while adjusting DIFF BAL, reposition with PREAMP BALANCE or FINE balance.

c. Tube linearity 5 v input: .5 cm, max
10 v input: 1 cm, max

Set standard calibrator to 5 volts. Note deflection: .5 cm, max.

Set standard calibrator to 10 volts. Note deflection: 1 cm, max.

d. AC balance 20 v input: 1 cm, max
distortion: 1 cm, max

With 10 v still applied, adjust DIFF BAL for zero deflection.

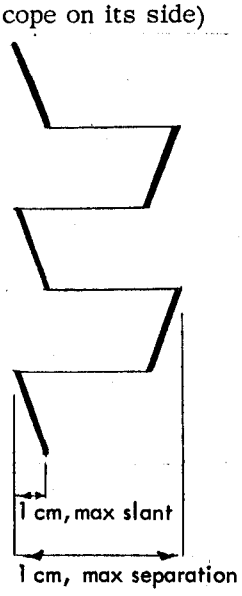
Set standard calibrator to 20 v and input selector to A-B AC. Note separation: 1 cm, max. Note waveform distortion or tilt: 1 cm, max, of slant to flat top of waveform.

Set input selector to A-B DC. Change standard calibrator to 2 volts. Readjust DIFF BAL for zero deflection.

12a. Known accurate +100 v

(1) A good source is the test scope:
(2) Connect the standard calibrator cal in connector to the test scope cal out connector.
(3) Connect the standard calibrator output to the test scope input.
(4) Remove the output section of the test scope amplitude calibrator's multivibrator and set the amplitude calibrator control to 100 volts.
(5) Connect an accurate voltmeter (John Fluke type 803 differential voltmeter) to the cal out connector and adjust the Cal Adj for exactly +100 v on the voltmeter.
(6) Remove the meter.

12d.



e. MILLIVOLTS/CM diff bal (sn 1393 up)

Adjust balance for zero deflection as follows:

MILLIVOLTS/CM	stand cal	adjust
10	20 v	R3044
100	50 v	R3074
1000	100 v	R3154

Return MILLIVOLTS/CM to 1 and MV/CM MULTIPLIER to 50.

Change stand cal to .1 v.

13. AC-DC

a. Waveform shift

Set input selector to A DC.

Move bottom of calibrator waveform to center graticule line with VERTICAL POSITION. Change input selector to A AC. Waveform must shift so it's approximately centered about center graticule line.

Repeat for -B.

Return to A DC.

14. GAIN

a. R3664 range: ±10%, min

Set R3664 ccw. Note deflection: 2.2 cm min. Change R3664 cw. Note deflection: 1.8 cm, max. Adjust R3664 for exactly 2 cm deflection.

b. VARIABLE mv/cm range: 2.5 to 1, min

Turn VARIABLE to max atten. Note deflection: .8 cm, max. Note any noise or open spots during rotation of VARIABLE. Return to CALIBRATED.

15. MILLIVOLTS/CM

a. MILLIVOLTS/CM accuracy

error: ±2%, max

MILLIVOLTS/CM	calibrator volts	deflection cm ±2%
1	.1	2*, ±.4 mm
10	1	2, ±.4 mm
100	10	2, ±.4 mm
1000	100	2, ±.4 mm

Set input selector to -B DC.

1000	100	2, ±.4 mm
100	10	2, ±.4 mm
10	1	2, ±.4 mm
1	.1	2, ±.4 mm

*Adjusted previously.

16. MV/CM MULTIPLIER

a. MV/CM MULTIPLIER accuracy

error: ±2%, max

MV/CM MULTIPLIER	standard calibrator	deflection cm ±2%
50	.1 v	2, ±.4 mm
20	50 mv	2.5, ±.5 mm
10	20 mv	2, ±.4 mm
5	10 mv	2, ±.4 mm
2	5 mv	2.5, ±.5 mm
1	2 mv	2, ±.4 mm

Return MV/CM MULTIPLIER to 50.

Remove calibrator signal.

NOTES

17. OUTPUT COMPENSATION

a. Setup

105--50 Ω term--52 Ω cable--uhf-bnc adapter--47 pf stand--INPUT A

or TU-50, 105 gen--special atten head--uhf-bnc adapter--47 pf stand--INPUT A

b. Prelim adjust C3424 at 1 KC

Adjust 105 for about 3.5 cm deflection of 1 kc signal. Adjust C3424, input capacitor, for best square wave.

c. 10 kc compensation

Set 105 to 10 kc. Adjust C3824, C3874 for best square wave (keep capacitors similar in mechanical setting).

Return 105 to 1 kc.

18. INPUT CAPACITY

a. Adjust shunt and neutralization

Keep 3.5 cm, 1 kc 105 signal and adjust for best square wave as follows:

signal applied to:	input selector	adjust
INPUT A	A DC	C3424
INPUT A	A-B DC	C3444
INPUT B	-B DC	C3434
INPUT B	A-B DC	C3414

Recheck A and -B DC for interaction. Repeat adjustments until all waveforms have a flat top.

19. MILLIVOLTS/CM COMPENSATION

a. A and -B attenuator

Set input selector to A DC.

Apply 3.5 cm, 1 kc 105 signal to INPUT A and adjust for best square wave as follows:

MILLIVOLTS/CM	adjust spike	adjust level
10	C3024	C3014
100	C3054	C3044
1000	C3084	C3074

Move signal to INPUT B and adjust as follows:

1000	C3284	C3274
100	C3254	C3244
10	C3224	C3214

Remove 105 signal.

20. HF DIFFERENTIAL BALANCE

a. Readjust DIFF BAL

Set MILLIVOLTS/CM to 1, MV/CM MULTIPLIER to 1, and input selector to A-B DC.

Apply 2 v standard calibrator signal to A and B INPUT.

Adjust DIFF BAL for zero deflection.

b. C3394 (sn 1846 up)
rejection ratio: 10,000 to 1, min

Adjust C3394 for min ptp spike amplitude: 1 mm, max.

c. Attenuator hf diff bal
rejection ratio: 10,000 to 1, min

MILLIVOLTS/CM	standard calibrator	adjust	spike max ptp
1	2 v	C3394	1 mm
10	20 v	C3224	2 cm
100	50 v	C3254	2 cm
1000	100 v	C3284	2 cm

21. THE END

SPECIAL TEST EQUIPMENT

Special test equipment, if mentioned, is not available from Tektronix unless it's listed also in our current catalog. This special equipment is used in our test department to speed calibration.

Usually you can either duplicate its function with standard equipment in your facility, devise alternate approaches, or build the special test equipment yourself.

USE OF STANDARD CALIBRATOR

The standard calibrator, when calibrated, is traceable to NBS and is used to guarantee tolerances of vertical amplifiers and calibrators of Tektronix oscilloscopes.

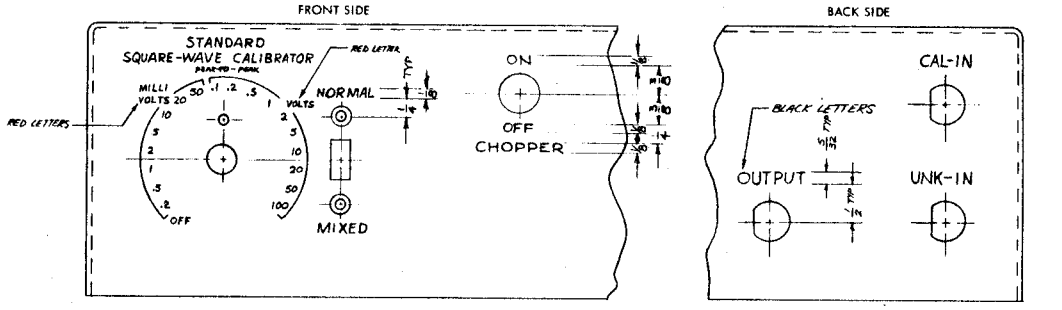
The circuit consists of a chopper and a divider network of 0.1% accurate resistors. The divider network provides a standard voltage output when loaded with 1 meg and when an accurate +100 v is applied to the input. The chopper allows the voltage output of the standard calibrator to switch between a known voltage and an unknown voltage. The difference between these voltages may then be determined by monitoring the output with an ac coupled scope.

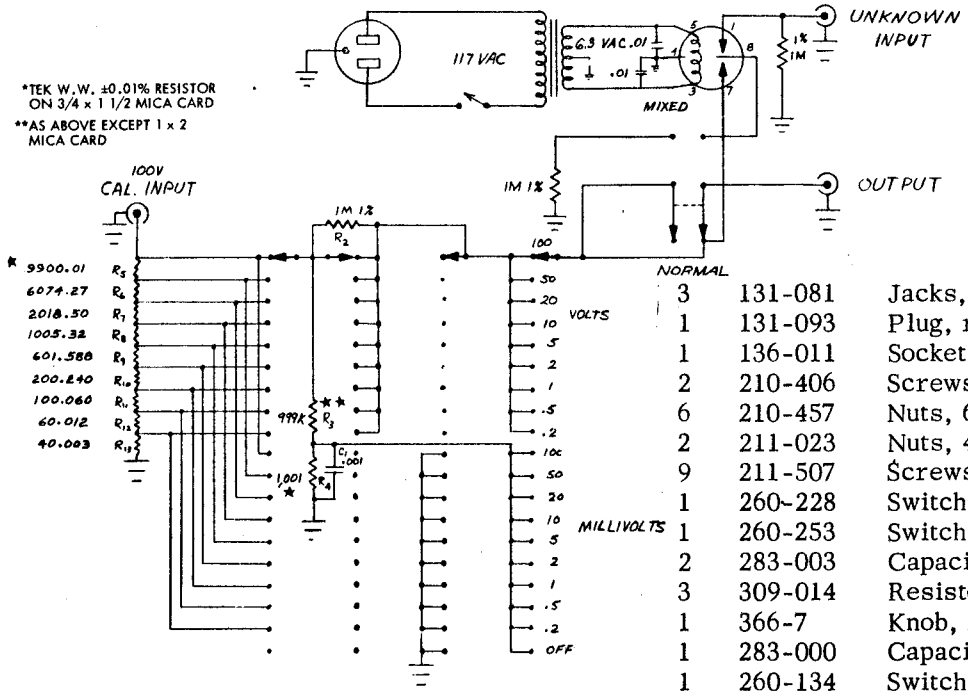
You must take the hum level of the standard calibrator into account when checking divider accuracy at low levels (.1 v and below). Measure the error introduced by hum level by turning both the standard calibrator and the calibrator of the scope under test to off. Observe the vertical displacement (hum level) and subtract this, when appreciable, from other readings.

Leave the standard calibrator in NORMAL when not in use.

STANDARD CALIBRATOR

Dwgs 600-B, 7-10-61 (front and rear panels); 601-B, 7-10-61 (schematic); 918-A, (parts).





3	131-081	Jacks, Amphenol
1	131-093	Plug, receptacle
1	136-011	Socket, octal
2	210-406	Screws, 4-40 1/4"
6	210-457	Nuts, 6-32 Kep
2	211-023	Nuts, 4-40
9	211-507	Screws, 6-32
1	260-228	Switch, dpdt slide
1	260-253	Switch, 19 pos., 3 sec. rotary
2	283-003	Capacitors, .01 μf 150 v disc type
3	309-014	Resistors, 1 meg 1/2 w 1% prec
1	366-7	Knob, large black
1	283-000	Capacitor, .001 μf 500 v disc type
1	260-134	Switch, spst toggle
11	--	Resistors, special Tek-made WW, ±.01% mica plate