



PERFORMANCE

CHECK OUT

TYPE 3B1

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TYPE 3B1

PERFORMANCE CHECK-OUT PROCEDURE

Introduction

This is a functional check on the performance of the external controls on the instrument. Failure to meet the characteristics outlined will require internal checks and/or adjustment.

Equipment Required

- 1 — Test oscilloscope. Tektronix Type 561A, 564 or 567.
- 1 — Amplifier unit. Tektronix Type 3A1, 3A6 or equivalent.
- 1 — Time-mark generator. Tektronix Type 180A or equivalent.
- 1 — Constant amplitude signal generator (5 MC - 10 MC) Tektronix Type 190B or equivalent.
- 1 — 50 Ω BNC coaxial cable. Tektronix Part No. 012-057.
- 1 — 50 Ω UHF coaxial cable. Tektronix Part No. 012-001.
- 2 — UHF to BNC adapters. Tektronix Part No. 103-032.
- 2 — 18" patch cords with two-way banana plugs. Tektronix Part No. 012-031 or 012-039.
- 1 — 10:1 coaxial attenuator. Tektronix Part No. 011-059.

All equipment listed must perform within its specifications. If there is any doubt about the performance of the test equipment it should be calibrated before use.

If the equipment recommended for this procedure is not available equivalent test equipment must be substituted. The user will have to determine proper control settings, adapters, etc. for the substitute equipment.

PRELIMINARY

Words written in capital or upper case letters refer to front-panel control labels or TEKTRONIX instrument names.

Plug the TYPE 3B1 TIME BASE unit in the right hand compartment and the amplifier unit in the left hand compartment of the test oscilloscope. Preset the controls as follows; then plug the oscilloscope into a suitable power source and allow 10 to 15 minute warm up time.

Type 3B1

MODE	NORM
TIME/DIV	2 mSEC
DELAY TIME RANGE	2 mSEC
VARIABLE control	CALIB (Clockwise to detent)
DELAY TIME and VERNIER	Counterclockwise
DELAYED SWEEP TRIGGERING	
LEVEL	Clockwise
SLOPE	+ (plus)
COUPLING	AC
SOURCE	INT

NORMAL SWEEP TRIGGERING

LEVEL	Clockwise
SLOPE	+ (plus)
COUPLING	AUTO
SOURCE	INT

Test Oscilloscope

FOCUS and INTENSITY controls	For a well defined trace with normal intensity.
SCALE ILLUM	10
CRT GROUND STRAP	In place
CRT CATHODE SELECTOR switch	CHOPPED BLANKING
CALIBRATOR	.5 VOLTS

Amplifier unit

POSITION control (CH 1 and 2)	Centered
VOLTS/DIV (CH 1 and 2)	2
VARIABLE controls (CH 1 and 2)	CALIB (Full clockwise to detent)
AC-DC-GND switch (CH 1 and 2)	DC
MODE switch	ALTER

PROCEDURE

1. Alternate mode operation

This check is required when using dual trace amplifier units. Use the CH 1 and CH 2 POSITION controls to place the two traces 2 major divisions apart. Trace must alternate at all sweep rates. Check for two alternating traces at the following TIME/DIV settings.

TIME/DIV

2 μ SEC	2 mSEC
20 μ SEC	20 mSEC
.2 mSEC	.1 SEC

Set the amplifier unit MODE switch to CH 1.

2. Normal Sweep Triggering

Connect the patchcords from the NORMAL SWEEP EXT TRIG jack to the CH 1 input of the amplifier then to the CALIBRATOR of the test oscilloscope. See Fig. 1.

Adjust the NORMAL SWEEP LEVEL control for a stable display.

Adjust the VOLTS/DIV and VARIABLE control on the amplifier unit for 1 minor division signal. (The LEVEL control may have to be readjusted as the VOLTS/DIV control is changed.)

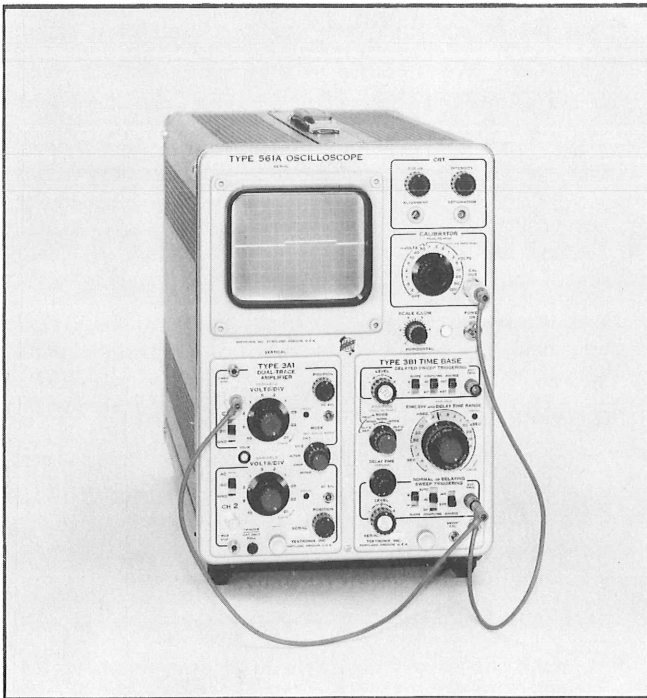


Fig. 1. The TYPE 3B1 TIME BASE in the TYPE 561A OSCILLOSCOPE showing the patchcord connections with typical display.

a. Change the NORMAL SWEEP SLOPE switch to —(minus) and check for change in polarity of the display.

b. To check the SWEEP COUPLING switch:

Set the COUPLING switch to AC.

Position the trace with the amplifier POSITION control to the top of the graticule.

Adjust the SWEEP LEVEL control for a stable display.

Change the SLOPE switch to +(plus) and check for polarity change.

Set the COUPLING switch to DC and readjust the LEVEL control for a stable display.

Change the SLOPE switch to —(minus) and check for a polarity change in the display.

Set the COUPLING switch to AUTO.

Position the trace to the bottom of the graticule with the amplifier POSITION control.

Set the COUPLING switch to DC and readjust the LEVEL control for a stable display.

Change the SLOPE switch to +(plus) and check for a polarity change in the display.

c. To check SWEEP SOURCE switch:

Set the COUPLING switch to AC.

Set the SOURCE switch to EXT.

Position the trace to the center of the graticule and adjust the SWEEP LEVEL control for a stable display.

The .5 VOLT signal from the CALIBRATOR must trigger the sweep.

Pull the SWEEP LEVEL control out. (This places an attenuator in the external trigger circuit.) Trace should disappear.

Change the CALIBRATOR to 5 VOLTS. Trace should reappear.

Change the SLOPE switch to —(minus) and check for a polarity change in the display.

Push the LEVEL control in. Return CALIBRATOR to .5 VOLTS. Set the SOURCE switch to INT and disconnect the patchcords.

d. To check Trigger Frequency:

Use TYPE 3A1 AMPLIFIER unit or its equivalent, such as TYPE 3A6, for this check.

Set the TYPE 3B1 TIME/DIV and DELAY TIME RANGE to 0.5 μ SEC.

Apply a 5 MC signal from the constant amplitude signal generator to CH 1 input of the TYPE 3A1 AMPLIFIER.

Pull the TRIGGER CH 1 ONLY switch out.

Adjust the signal generator output attenuator and the TYPE 3A1 VOLTS/DIV switch for 1 minor division signal.

CAUTION

Do not adjust the VARIABLE VOLTS/DIV control to obtain the specified amplitude.

Adjust the SWEEP LEVEL control and check for a stable display.

Change the signal generator to 10 MC.

Set the attenuator and the VOLTS/DIV switch for 1/2 major division signal.

Check again for a stable display when the SWEEP LEVEL control is adjusted.

Push the TRIGGER CH 1 ONLY switch in. Set the TYPE 3B1 TIME/DIV and DELAY TIME RANGE switch to 2 mSEC. Set the NORMAL SWEEP SOURCE switch to AUTO. Disconnect the signal generator.

3. Delayed Sweep Triggering

Turn the TYPE 3B1 MODE switch counterclockwise to TRIG DLY'D SWP.

Connect the patchcords from the DELAYED SWEEP EXT TRIG jack to CH 1 input of the amplifier, then to the CALIBRATOR of the test oscilloscope.

Check that the settings of the DELAYED SWEEP TRIGGERING circuit are as called out in the preliminary settings.

Adjust the SWEEP LEVEL control for a stable display.

Check the DELAYED SWEEP TRIGGERING by the procedure outlined for the NORMAL SWEEP check, with the exception of setting the coupling switch to AUTO. (Item 2b) there is no AUTO coupling in the Delayed position.

Set the DELAYED SWEEP SOURCE switch to INT, the COUPLING switch to AC and the SLOPE switch to +(plus).

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4. SWEEP CALIBRATION range

The SWEEP CAL screwdriver adjustment has been factory adjusted. Oscilloscopes have different deflection sensitivities, therefore this control may require adjustment.

Set the TYPE 3B1 MODE switch to NORM.

Apply a 1 mSEC signal, through a 50 Ω coaxial cable and a 10:1 attenuator, from the time-mark generator to the CH 1 input of the amplifier unit.

Set the VOLTS/DIV switch on the amplifier to .05.

Set the TYPE 3B1 TIME/DIV and DELAY TIME RANGE to 1 mSEC.

Check for 1 time mark for every major division. (Make all timing measurements over the center 8 major divisions of the graticule.)

5. NORMAL and DELAYED SWEEP length (10.2 to 10.8 major divisions)

a. NORMAL SWEEP

Move the display to the left with the TYPE 3B1 POSITION control so the 2nd time mark is on the far left graticule line.

The right end of the sweep must be within 1 to 4 major divisions of the farthest right vertical graticule mark.

b. DELAYED SWEEP

Change the MODE switch to TRIG DLY'D SWP.

Turn the TIME/DIV switch to 2 mSEC and the DELAY TIME RANGE to 1 mSEC.

Adjust the DELAYED SWEEP LEVEL control for a stable display.

Check the sweep as in 5a for specified length.

6. Variable Time/Div Range

An uncalibrated control which is variable from 1 to 2.5 times the normal or delayed sweep time range.

Set the MODE switch to NORM.

Set the TIME/DIV and DELAY TIME RANGE to 0.1 mSEC.

Check for 2 time mark signals in the graticule area.

Turn VARIABLE control full counterclockwise — the UNCAL neon light should come on.

Check for 4 or more time marks within the graticule area.

Turn the VARIABLE control to the CALIB position.

Return the TIME/DIV and DELAY TIME RANGE to 1 mSEC.

7. 5X MAG accuracy ($\pm 3\%$ accuracy)

Set the time mark generator for both 100 μ SEC and 1 mSEC time marks.

Adjust the NORMAL SWEEP LEVEL control for a stable display.

Pull the 5X MAG switch out and position one large time mark on the center vertical graticule line.

Check for 1 large time mark per every 5 major divisions and 2 small time marks per every major division. With the 2nd major time mark on the center vertical graticule line, the 1st and 3rd large time mark must be within .75 minor division of the 1st and 10th graticule line.

Check the sweep linearity. With the TYPE 3B1 POSITION control check the display from the first large time mark to the last for deviation.

The linearity must be within $\pm 1\%$. Deviation no greater than $\pm 1/2$ minor division.

8. Sweep Magnifier Register

Position the first large time mark on the center vertical graticule line.

Push the 5X MAG switch in and note the amount of shift.

Time mark should shift less than 1 major division.

9. POSITION control range

This control must have sufficient range to position the display .2 major divisions to the right or left of the center vertical graticule line.

Rotate the POSITION control full clockwise and note the position of the display.

Rotate the POSITION control full counterclockwise and note the position of the display.

10. NORMAL and DELAYED SWEEP TIME

The calibrated sweep range for both normal and delayed sweeps is .5 μ sec/div. to 1 sec/div. in 20 steps; accuracy is within 3%. An uncalibrated continuous control for both sweeps has a range of 1 to 2.5 times the setting of the sweep range switch.

Set the MODE switch to NORM.

Set the TIME/DIV and DELAY TIME RANGE switch to 50 μ SEC.

a. Set the time-mark generator for 50 μ SEC time marks.

Adjust the NORMAL SWEEP LEVEL control for a stable display.

Check for 1 time mark at each major division from the 2nd to the 9th division.

b. Set the MODE switch to TRIG DLY'D SWP and adjust the DELAYED SWEEP LEVEL control for a stable display.

Check for 1 time mark at each major division between the 2nd and 9th division.

Make the above checks at each setting shown in Table 1. Notice the TIME/DIV and the DELAY TIME RANGE switch have the same setting for each check.

TABLE 1

TIME/DIV and DELAYED TIME RANGE	TIME-MARK GENERATOR	MARKS/DIV
.5 μ SEC	1 μ SEC	1 mark/2 major div
1 μ SEC	1 μ SEC	1 mark/major div
2 μ SEC	1 μ SEC	2 marks/major div
5 μ SEC	5 μ SEC	1 mark/major div
10 μ SEC	10 μ SEC	1 mark/major div
20 μ SEC	10 μ SEC	2 marks/major div
50 μ SEC	50 μ SEC	1 mark/major div
.1 mSEC	100 μ SEC	1 mark/major div
.2 mSEC	100 μ SEC	2 marks/major div
.5 mSEC	500 μ SEC	1 mark/major div
1 mSEC	1 mSEC	1 mark/major div
2 mSEC	1 mSEC	2 marks/major div
5 mSEC	5 mSEC	1 mark/major div
10 mSEC	10 mSEC	1 mark/major div
20 mSEC	10 mSEC	2 marks/major div
50 mSEC	50 mSEC	1 mark/major div
.1 SEC	100 mSEC	1 mark/major div
.2 SEC	100 mSEC	2 marks/major div
.5 SEC	500 mSEC	1 mark/major div
1 SEC	1 SEC	1 mark/major div

Return the TIME/DIV and DELAY TIME RANGE to 1 mSEC and set the time-mark generator for 1 mSEC markers.

11. DELAY TIME and VERNIER Range (.75 major divisions or less to 10 major divisions or more)

Set the TYPE 3B1 MODE switch to INTEN. Turn the DELAY TIME and VERNIER controls counterclockwise. Adjust the INTENSITY of the test scope so the beginning of the trace is visible. Adjust the NORMAL SWEEP LEVEL control for a stable trace.

The intensified portion must start within .75 major divisions of the first time mark.

Turn the DELAY TIME and VERNIER controls full clockwise.

The start of the intensified portion should move past the 10th major graticule.

Return the DELAY TIME and VERNIER controls to center.

12. TRIGGER INTENSIFICATION

Turn the MODE switch to TRIG INTEN.

Check to see that the intensified portion of the display turns off and on as the DELAYED SWEEP LEVEL control is varied.

The length of the intensified portion will vary as the DELAY TIME and VERNIER controls are rotated.

13. DELAY TIME Jitter (Less than 1 part in 20,000 of the maximum available delay interval)

Set the MODE switch to INTEN. (Clockwise from the NORM position.)

Set the TIME/DIV switch to 1 mSEC.

Pull the knob and set the DELAY TIME RANGE to 1 μ SEC.

Position the intensified spot, with the DELAY TIME control, on the top of the 10th large time mark. (9 CM mark on GRATICULE)

Turn the MODE switch clockwise to DLY'D SWP and position the rising portion of the time mark within the graticule area by means of the DELAY TIME control.

Check the amount of horizontal jitter.

Jitter must be less than .5 major divisions.

Repeat the procedure with the intensified spot over the 2nd large time mark.

Jitter should be less than .5 major divisions.

