TU-5 PULSER

Tektronix Part No. 015-038

General Information

The TU-5 is a tunnel-diode which provides a fast-rise pulse for adjusting the transient response of high-frequency plug-in units such as the Tektronix Types 82 and 86.

The TU-5 must be driven by a +100-volt square pulse such as the 1-kc amplitude calibrator signal available from most Tektronix oscilloscopes. (The amplitude calibrator in the Type 560-Series, Type 647, and Type RM647 Oscilloscopes will not switch the TU-5.) A Tektronix Type 105 Square-Wave Generator may be used to drive the TU-5 if an adapter (see Fig. 1) is used. The adapter converts the negative pulse output from the Type 105 to the positive pulse required to drive the TU-5. The Type 105 should be used only at repetition rates of 1 kc and higher. Higher repetition rates will provide a brighter crt display when fast sweep rates are used.

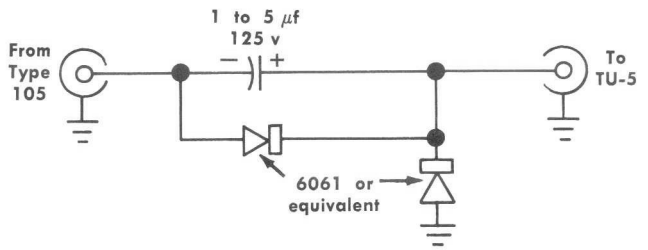


Fig. 1. Adapter for using a Type 105 to drive a TU-5.

Characteristics

Output Signal Risetime: 1.5 nanoseconds or less into 50 ohms.

Output Voltage: At least 200 millivolts into 50 ohms.

Input Voltage Required: +100-volt square wave capable of supplying 10 milliamps.

Connecting the TU-5 to the Plug-In Unit

Whenever possible, use the connection method shown in Fig. 2. Connect the termination as close as possible to the input of the plug-in to reduce undesirable reactances and provide a clean step-function at the input to the plug-in unit.

Turn off the oscilloscope Amplitude Calibrator while connecting the TU-5 to or disconnecting the TU-5 from the BNC cable. The 100 volts from the calibrator could cause a slight shock.

Setting the TU-5 Bias

The knob on the TU-5 sets the bias on the tunnel diode. The bias should be set each time the TU-5 is used. Set the bias as follows:

1. With the TU-5 and termination connected as shown in Fig. 2, set the bias control fully counterclockwise and the oscilloscope Amplitude Calibrator for a 100-volt output.

2. Set the oscilloscope vertical sensitivity at 0.1 volts/div. and the sweep rate at 0.2 millisecond/div.

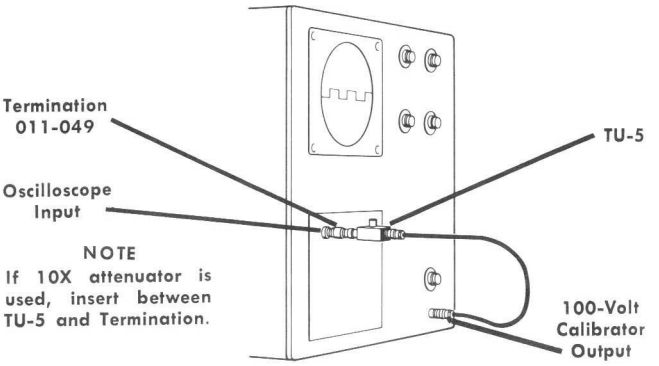


Fig. 2. Proper connection of the TU-5 and Termination to the oscilloscope Input and Calibrator.

3. Set the time-base triggering controls for a stable display. With the bias control set fully counterclockwise, the tunnel diode will not switch due to insufficient current. However, there will be about a 50-mv waveform on the crt. This is the calibrator signal feeding through the TU-5 and not the fast-rise output signal that occurs when the tunnel diode is switching.

4. Slowly turn the bias control clockwise until the waveform amplitude suddenly increases to about 2 divisions (see Fig. 3). This point is the proper bias setting.

Output Waveforms

Figs. 3 and 4 show typical output signals from the TU-5 at various sweep rates. The small intensified portion at the base of each pulse shown in Fig. 3 is the relatively slow rising portion of the calibrator signal just before the tunnel diode switches.

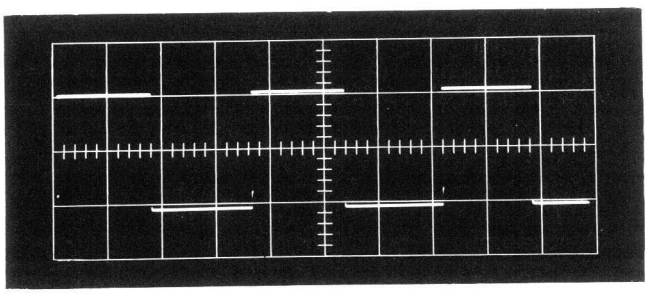


Fig. 3. Sweep rate 0.2 millisecond/div.

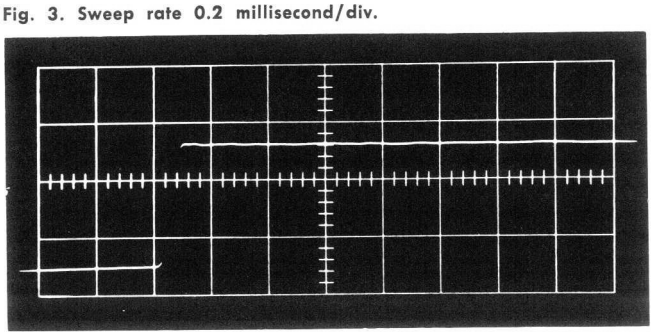
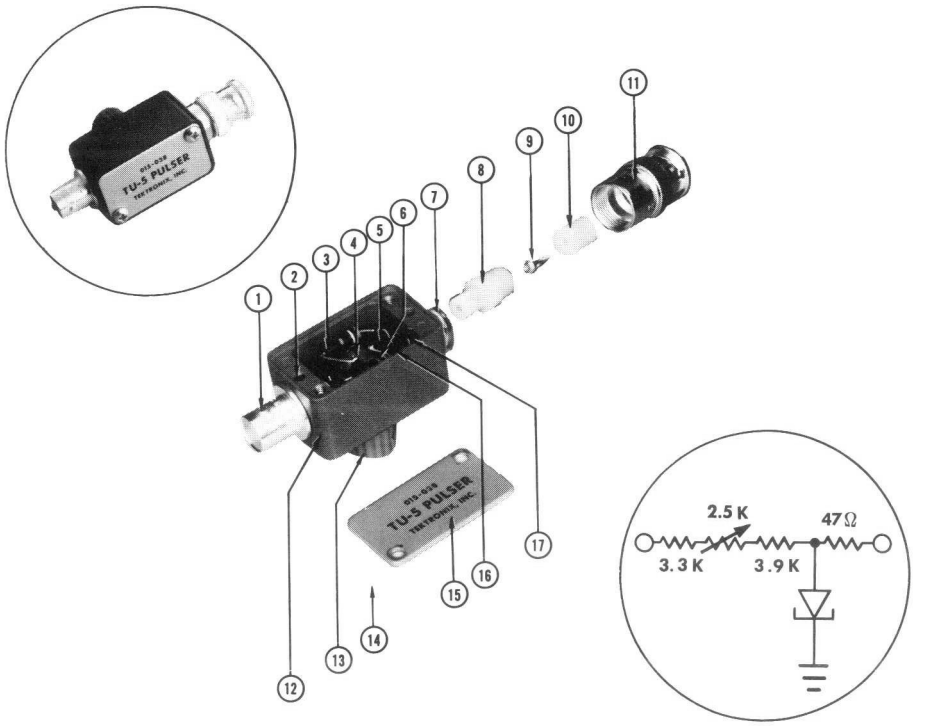


Fig. 4. Sweep rate 20 nanoseconds/div.

PARTS LIST



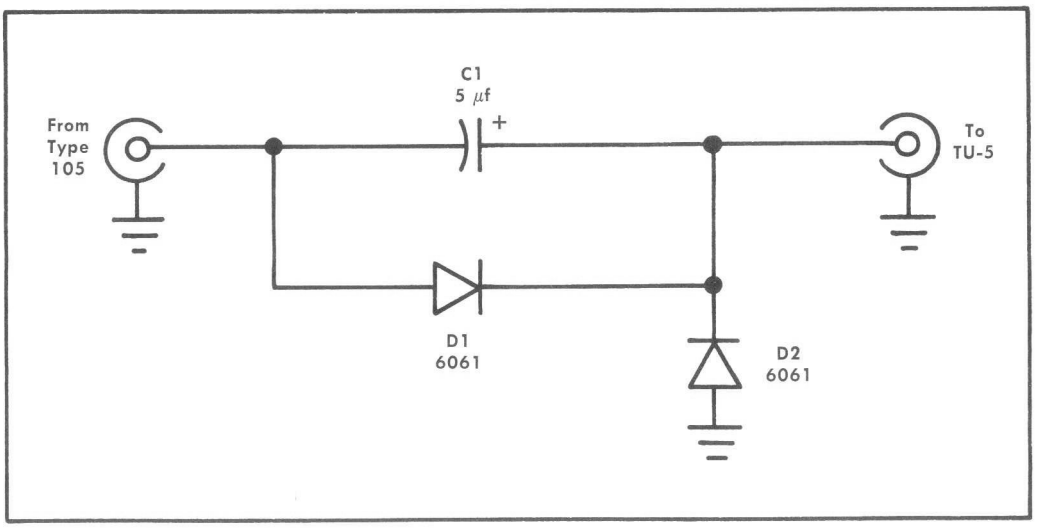
REF. NO.	PART NO.	SERIAL NO. EFF.	SERIAL NO. DISC.	QTY.	DESCRIPTION
1	131-126			1	Connector, coax, chassis mt.
	210-962			1	Washer, bevel, grey
2	213-075			2	Screw, set 4-40 x 3/32 inch
3	301-392			1	Resistor, 3.9 K, 1/2 W, 5%
4	311-443			1	Resistor, 2500 Ω var. 20%
5	152-102			1	Diode, tunnel, STD 615 10 ma
6	301-332			1	Resistor, 3.3 K 1/2 W, 5%
7	132-081			1	Nut
8	166-217			1	Tube, spacer, insulator
9	214-109			1	Pin, probe contact, male
10	358-072			1	Bushing, insulator
11	134-044			1	Plug, probe
12	202-095			1	Box, standardizer
13	366-203			1	Knob, gray
					Includes:
	213-004			1	Screw, set, 6-32 x 3/16 inch HHS
	210-046			1	Lockwasher, internal tooth
	210-583			1	Nut, hex, 5/16 inch brass 1/4-32
14	213-035			2	Screw, 4-40 x 1/4 inch PHS
15	200-427			1	Cover, pulser box
16	316-470			1	Resistor, 47 Ω, 1/4 W, 10%
17	210-223			1	Lug, solder (not shown)

TU-5/105 ADAPTER
(Part No. 013-0075-00)

The Tektronix TU-5/105 Adapter allows the Tektronix Type 105 Square-Wave Generator to drive the TU-5 Pulser. The TU-5 requires an input signal which is always above ground. The Adapter shifts the Type 105 output level from below ground to above ground. The TU-5 can be used at any frequency within the limits of the Type 105, above 1 kc. The higher output frequencies provide a brighter crt display when fast sweep rates are used.

Circuit Description

Capacitor C1 removes the dc component from the Type 105 output waveform. Diode D2 clamps the waveform so that only a positive output waveform appears at the adapter output. Diode D1 provides reverse-polarity voltage protection for capacitor C1.



Schematic of TU-5/105 Adapter