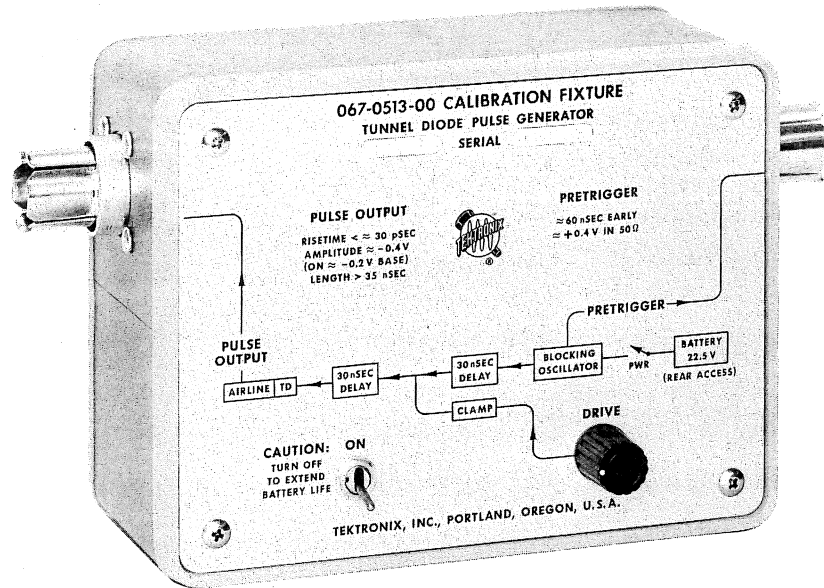


067-0513-00 CALIBRATION FIXTURE

Tunnel Diode Pulse Generator



The T.D. Pulse Generator is battery powered and is used for checking step function response of all Tektronix sampling systems. It can be used with a minimum of correction due to pulse source risetime limitations.

The repetition rate varies from about 50 kHz to 150 kHz depending on battery condition. A pretrigger (60 to 70 ns early) permits operation in conjunction with any of the Tektronix sampling systems.

The pulser contains a transistor blocking oscillator, an adjustable diode drive clamp, a delay cable and a 100 mA, 6 pF, tunnel diode mounted in a special coaxial air-line environment. The free-running blocking oscillator generates a 50 ns pulse with adequate amplitude to drive the clamp, tunnel diode and pretrigger. The diode clamp, 30 ns from the blocking oscillator, flattens the negative-going pulse at a level just sufficient to switch the 100 mA tunnel diode which is another 30 ns past the clamp. This device draws about 1.5 mA. It is difficult to predict battery life but approx. 1 month can be expected with average use. New batteries may be ordered on a standard order form.

SPECIFICATIONS AND CALIBRATION PROCEDURE

Equipment Required:

- 1 - Sampling Plug-In (1S1, 4S1, or 3S76) and scope.
 - 1 - Type 575 curve tracer.
 - 1 - Triplet VOM or equivalent.
 - 1 - General Radio Coaxial connector tool kit 874TOK, p/n 003-0038-00.
1. Inspect pulser for wiring errors, unsoldered joints, shorted coaxial cable connections and loose hardware. Separate wrap-around from pulser and unplug both cables.
 2. Measure resistance to ground from secondary side of power switch (SW129). Resistance should be about 10 to 20 K Ω using Triplet 630 Meter. (common is negative)
 3. Install batteries, plug (+) end to ground and insert transistors; 151-0083-00 in Q100 socket and 2N1304 in Q123.
 4. Connect VOM to battery terminal and ground. Meter should indicate about 22.5 volts. Turn power switch to ON, meter reading with fresh batteries should show 0.5 to 1 V drop.
 5. Connect PRETRIGGER cable from wrap-around housing to pretrigger connector on chassis. Connect a GR cable from PRETRIGGER GR connector on housing to input of sampling plug-in. Pretrigger signal, as viewed on sampling scope, should have a risetime of 1.0 ns or less for 0 to 200 mV amplitude. Total pulse amplitude should be 400 mV. 151-0083-00 transistors will have to be selected to meet these specs. The 151-0083-00 is selected for at least 21 volts of avalanche.

6. With the tunnel diode correctly installed and checked (see separate tunnel diode installation procedure) in the airline, plug it into the input of the sampling plug-in.
7. Position the pulser assembly so the cable for the tunnel diode drive will plug on to the LR119 isolation network which will then plug on to the coaxial connector on the side of the airline.
8. With power switch ON, advance DRIVE control clockwise and trigger sampler until a negative step is viewed on the sampling scope. Decrease DRIVE until tunnel diode just fires and is stable, and foot of negative step is the flattest. Check for the following specs: risetime, equal to the sampler plug-in; fast-pulse step amplitude, 400 mV; pulse-base amplitude (foot), 200 mV 100 mV; pulse length, 35 ns.
9. Turn off pulser power and disconnect pulser from sampling scope. Assemble pulser in wrap-around housing being careful not to get internal cables between airline and coiled delay line cable. Connect pretrigger internal cable to chassis-mounted connector and tunnel-diode drive cable to right-angle connector of isolation network which is connected to side of airline. Install bottom cover plate and secure by attaching feet.
10. Using two 2 ns cables into each channel of the sampling plug-in, display both the PULSE OUTPUT and the PRETRIGGER signals on a dual trace. Trigger on the plus polarity of the PRETRIGGER signal and measure the time difference. If the 1S1 is the sampling plug-in used, a dual trace display is not possible; but by using two 2X GR attenuators on the two pulse outputs and connecting through the two 2 ns cables into a GR "Tee", the "Tee" output can be displayed on a single trace. In either case, trigger positive on the plus (+)

step of the PRETRIGGER pulse and identify the PRETRIGGER pulse from the negative step of the PULSE OUTPUT. With the sampling timing at 10 ns/cm and the pulser DRIVE fully clockwise, check that the time difference is 55 ns or greater. (55 ns) The PRETRIGGER pulse should be on the left (early) side of the display.

Specifications:

Pulse Output

Risetime: 30 ps (Not checked)

Amplitude: - 0.4 V

Duration: 35 ns

Pretrigger

Amplitude: + 0.4 V into 50 Ω approx. 60 ns early.

Recommendations:

To be used for risetime checks on TEKTRONIX sampling systems.

Tunnel Diode Installation Procedure.**A. To remove diode:**

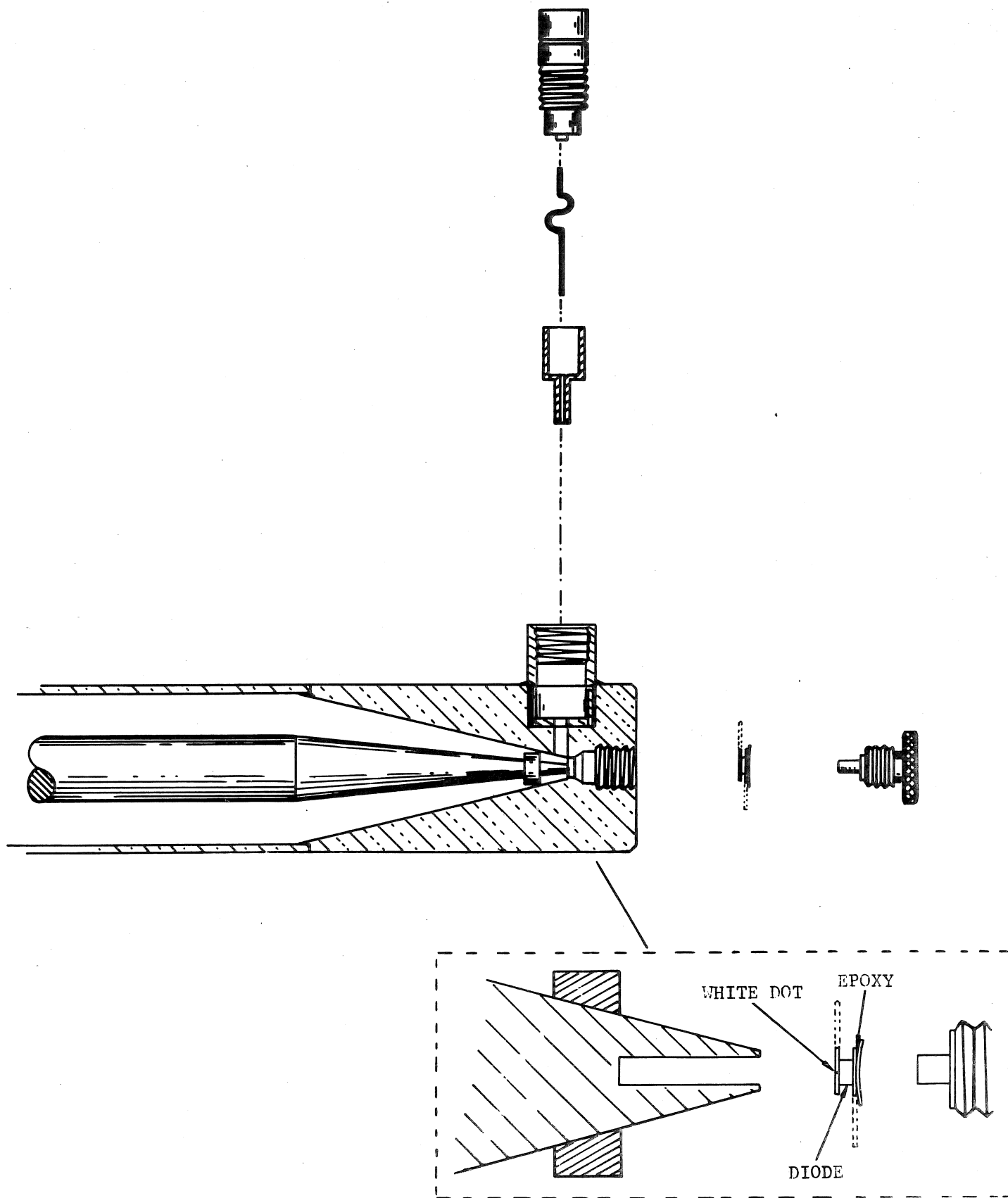
1. Remove airline completely from wrap-around by unscrewing knurled retaining nut.
2. Remove locking nut and unscrew small coaxial connector where the LR isolation network plugs on. Remove connector and spring contact. Tweezers may be necessary to get spring contact out.
3. Unscrew and remove knurled clamp nut at end of airline. Diode removed at this time.
4. Using the GR tools, loosen the coupling nut at the output end of the airline. Unscrew by hand.
5. Remove the outer transition GR conductor along with the insulator bead, inner conductor and airline center conductor. Do not lose delrin center-conductor spacer.

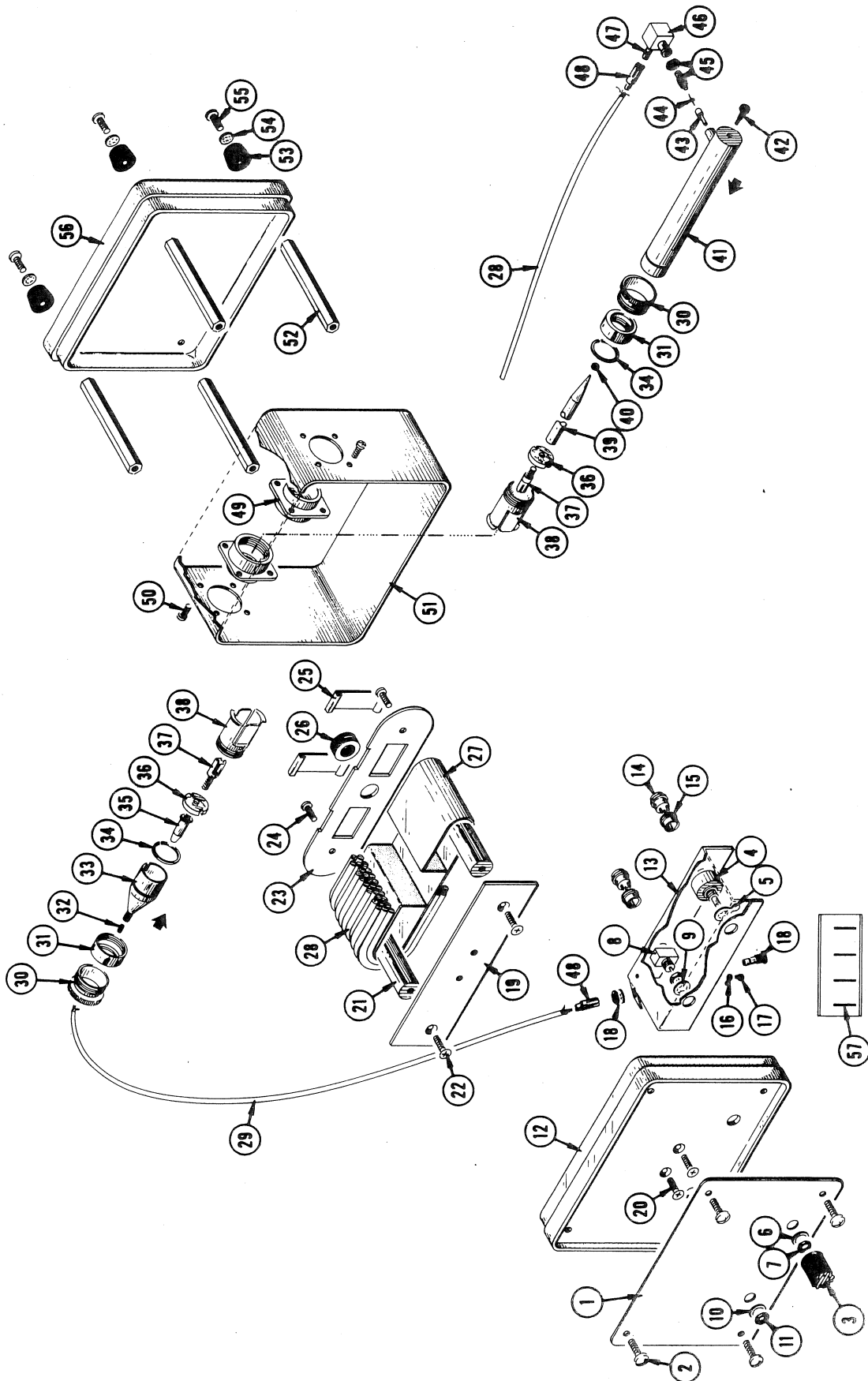
B. To install diode:

1. First prepare new diode according to diagram.
2. Be sure center conductor and GR inner conductor are tight to GR insulator bead. Replace bead if crazed and tighten with GR inner conductor wrench. Insert bead into outer transition piece. Slip on center conductor spacer on taper. Install in housing.
(See A-4 above)
3. Install center conductor assembly into housing, lining up slot on airline housing with GR transition piece. Tighten coupling nut on outer transition piece. Use GR tools.
4. Insert tunnel diode in threaded hole, disc side out, so knurled clamp nut will make the electrical connection to the disc on the diode.

5. Install knurled clamp nut; finger tight only.
6. Check electrical diode connections with the Type 575. Set 575 up for 100 mA TD check and connect airline center conductor to negative and airline housing to positive.
7. Install spring contact into small coaxial connector with the long end out. Insert long end of spring contact into small hole on side of airline and screw small connector into place on airline finger tight. Check electrical connection as in step 7 only connect negative to center conductor of small coaxial connector. Tighten connector more if connection is not made.
8. Install lock nut on small coaxial connector and reinstall airline in wrap-around housing.

TUNNEL DIODE INSTALLATION DIAGRAM





MECHANICAL PARTS LIST-067-0513-00

FIG. & INDEX NO.	TEKTRONIX PART NO.	SERIAL/MODEL EFF DISC	Q T Y	DESCRIPTION
1	E333-0928-00		1	PANEL, front
	- - - - -		-	mounting hardware: (not included w/panel)
2	211-0071-00		4	SCREW, 4-40 x 3/8 inch, PHS
3	366-0153-00		1	KNOB, charcoal--DRIVE
	- - - - -		-	knob includes:
	213-0004-00		1	SCREW, set, 6-32 x 3/16 inch, HSS
4	- - - - -		1	RESISTOR, variable
	- - - - -		-	mounting hardware: (not included w/resistor)
5	210-0223-00		1	LUG, solder, 1/4 ID x 7/16 inch OD, SE
6	210-0940-00		1	WASHER, flat, 1/4 ID x 3/8 inch OD
7	210-0562-00		1	NUT, hex., 1/4-32 x 1/16 inch
8	260-0643-00		1	SWITCH, toggle--ON
	- - - - -		-	mounting hardware: (not included w/switch)
9	210-0046-00		1	LOCKWASHER, internal, 1/4 ID x 0.400 inch OD
10	210-0940-00		1	WASHER, flat, 1/4 ID x 3/8 inch OD
11	210-0562-00		1	NUT, hex., 1/4-32 x 1/16 inch
12	E200-0277-01		1	COVER, top
13	E441-0673-00		1	CHASSIS
14	136-0181-00		2	SOCKET, transistor, 3 pin
	- - - - -		-	mounting hardware for each: (not included
	- - - - -		-	w/socket)
15	354-0234-00		1	RING, socket mounting
16	210-0259-00		3	LUG, solder, #2
	- - - - -		-	mounting hardware for each: (not included
	- - - - -		-	w/lug)
17	213-0055-00		1	SCREW, thread forming, 2-32 x 3/16 inch, PHS
18	131-0156-00		1	CONNECTOR, coaxial, male, w/mounting hardware
19	E386-1046-00		1	PLATE, top, delay-line
	- - - - -		-	mounting hardware: (not included w/plate)
20	213-0123-00		2	SCREW, 6-32 x 3/8 inch, 100° csk, FHS

FIG. & INDEX NO.	TEKTRONIX PART NO.	SERIAL/MODEL EFF DISC	Q T Y	DESCRIPTION
21	E129-0087-00		2	POST, delay-line
	- - - - -		-	mounting hardware for each: (not included
	- - - - -		-	w/post)
22	213-0123-00		1	SCREW, 6-32 x 3/8 inch, 100° csk, PHS
23	E386-1047-00		1	PLATE, bottom, delay-line
	- - - - -		-	mounting hardware: (not included w/plate)
24	211-0507-00		2	SCREW, 6-32 x 5/16 inch, PHS
25	E344-0128-00		2	CLIP, battery
26	348-0005-00		1	GROMMET, rubber, 1/2 inch diameter
27	E276-0110-00		1	BUSHING, insulator
28	175-0068-00		FT	CABLE, coaxial, 20 feet (2 lengths)
29	175-0068-00		FT	CABLE, coaxial, 9 1/2 inches
30	132-0016-00		2	NUT, retaining
31	132-0001-00		2	NUT, coupling
32	166-0221-00		1	TUBE, 1/4 inch long
33	132-0026-00		1	TRANSITION, outer
34	132-0007-00		2	RING, snap
35	132-0027-00		1	TRANSITION, inner
36	132-0028-00		2	INSULATOR, plastic
37	132-0029-00		2	CONDUCTOR, inner
38	132-0002-00		2	CONDUCTOR, outer
39	E214-0685-00		1	CONDUCTOR, inner
40	E358-0295-00		1	BUSHING, insulator
41	E205-0061-00		1	SHELL ASSEMBLY
42	E213-0145-00		1	SCREW, thumb
43	E358-0297-00		1	BUSHING, form, delay-line
44	E214-0686-00		1	CONTACT, electrical
45	E131-0156-02		1	CONNECTOR, coaxial, male, w/mounting hardware
46	131-0394-00		1	CONNECTOR, right angle
47	E131-0370-00		1	CONNECTOR, coaxial
48	131-0155-00		2	CONNECTOR, coaxial
49	132-0040-00		2	ADAPTER, panel
	- - - - -		-	mounting hardware for each: (not included
	- - - - -		-	w/adapter)
50	211-0007-00		4	SCREW, 4-40 x 3/16 inch, PHS

FIG. & INDEX NO.	TEKTRONIX PART NO.	SERIAL/MODEL EFF DISC	Q T Y	DESCRIPTION
51	E380-0098-00		1	HOUSING, wrap-around
52	E129-0086-00		4	POST, hex., spacer
53	348-0037-00		4	FOOT, rubber
	- - - - -		-	mounting hardware for each: (not included
	- - - - -		-	w/foot)
54	210-0004-00		1	LOCKWASHER, internal, #4
55	211-0014-00		1	SCREW, 4-40 x 1/2 inch, PHS
56	E200-0277-02		1	COVER, bottom
57	124-0158-00		4	STRIP, ceramic, 7/16 inch h, w/7 notches
	- - - - -		-	each strip includes:
	355-0082-00		2	STUD, plastic
	- - - - -		-	mounting hardware for each: (not included
	- - - - -		-	w/strip)
	361-0007-00		2	SPACER, plastic, 5/32 inch long

ELECTRICAL PARTS LIST - 067-0513-00

Values are fixed unless marked Variable.

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff Disc	Description		
Batteries					
B128	006-0506-00		22.5 V		
B129	006-0506-00		22.5 V		
Capacitors					
Tolerance $\pm 20\%$ unless otherwise indicated.					
C100	281-0524-00		150 pF	Cer	500 V
C102	283-0026-00		0.2 μ F	Cer	25 V
C104	283-0065-00		0.001 μ F	Cer	100 V 5%
C105	283-0065-00		0.001 μ F	Cer	100 V 5%
C112	283-0003-00		0.01 μ F	Cer	150 V
C114	283-0003-00		0.01 μ F	Cer	150 V
C128	283-0590-00		7.5 pF	Mica	500 V 5%
C129	283-0590-00		7.5 pF	Mica	500 V 5%
Diodes					
D107	152-0008-00		Germanium		
D112	*152-0115-00		GaAs	Tek made	
D114	*152-0115-00		GaAs	Tek made	
D119	E 152-0254-01		Tunnel w/disc assembly		

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Description
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Inductor

LR119	E*108-0364-00			0.1 μ H (wound on a 47 Ω resistor)
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Transistors

Q100	*151-0083-00		Germanium	Selected from 2N964
Q123	151-0069-00		Germanium	2N1304

Resistors

Resistors are fixed, composition, $\pm 10\%$ unless otherwise indicated.

R101	316-0684-00		680 k Ω	1/4 W	
R102	315-0510-00		51 Ω	1/4 W	5%
R104	315-0102-00		1 k Ω	1/4 W	5%
R107	315-0510-00		51 Ω	1/4 W	5%
R109	315-0102-00		1 k Ω	1/4 W	5%
R112	315-0510-00		51 Ω	1/4 W	5%
R114	315-0510-00		51 Ω	1/4 W	5%
R120	E 311-0160-00		50 k Ω , Var		
R121	315-0223-00		22 k Ω	1/4 W	5%
R122	316-0124-00		120 k Ω	1/4 W	
R124	315-0102-00		1 k Ω	1/4 W	5%
R125	315-0102-00		1 k Ω	1/4 W	5%

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff Disc	Description
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Switch

	Unwired		
SW129	260-0643-00	Toggle	ON

Transformers

T100	*120-0247-00	Toroid, 5 turns, bifilar	
T110	*120-0264-00	Toroid, 3 turns, bifilar	

