PROJECTED

GRATICULE

016-0204-00 115 V
016-0234-00 234 V

Original

Instruction Manual

402

TEKTRONIX®

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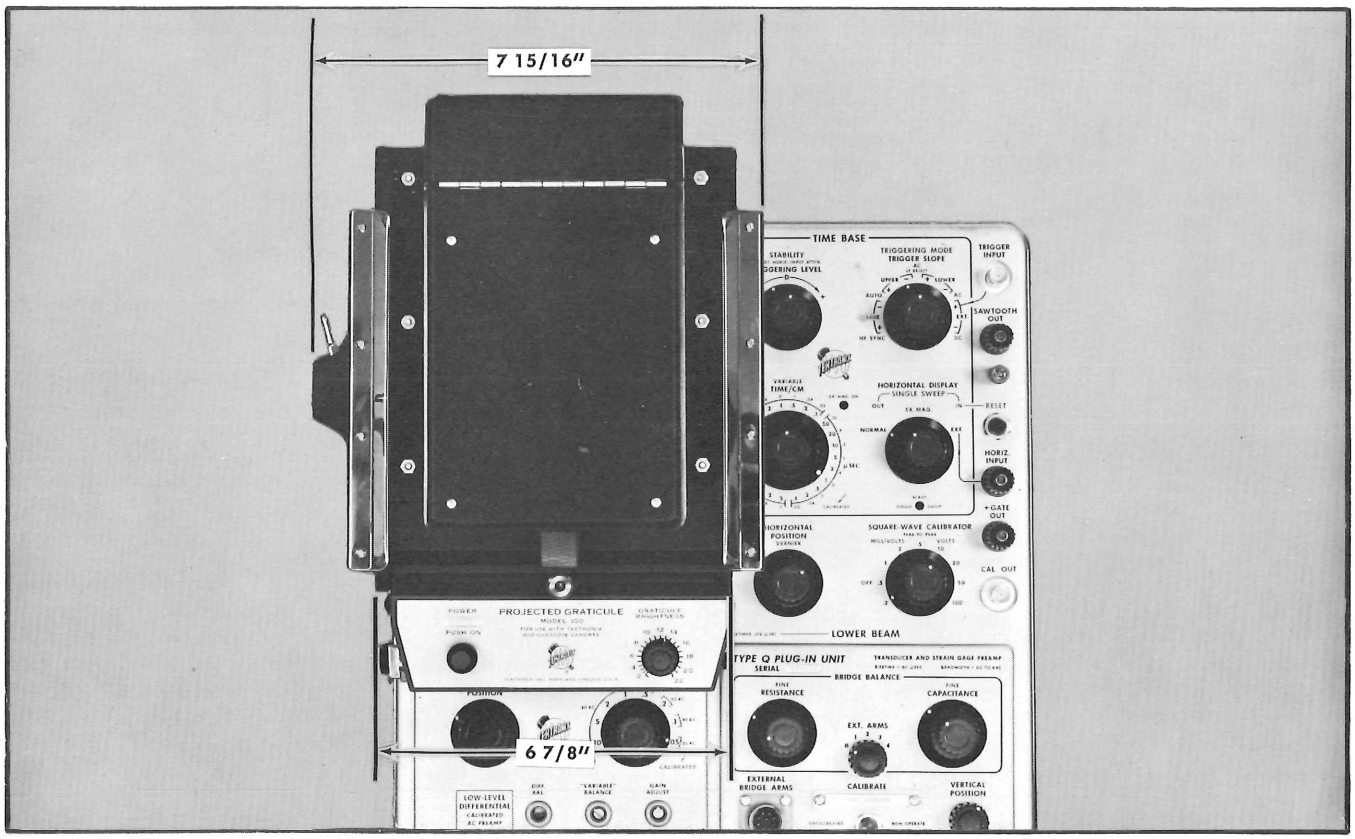
070-402 1063


POWER
PUSH ON
PROJECTED
ICULE
MODEL
FOR USE WITH TEKTRONIX
OSCILLOSCOPE CAMERAS
TEKTRONIX
TEKTRONIX, INC., PORTLAND, OREGON, U.S.A.
GRATICULE
BRIGHTNESS
2
4
6
8
10
12
14
16
18

Characteristics—Projected Graticule



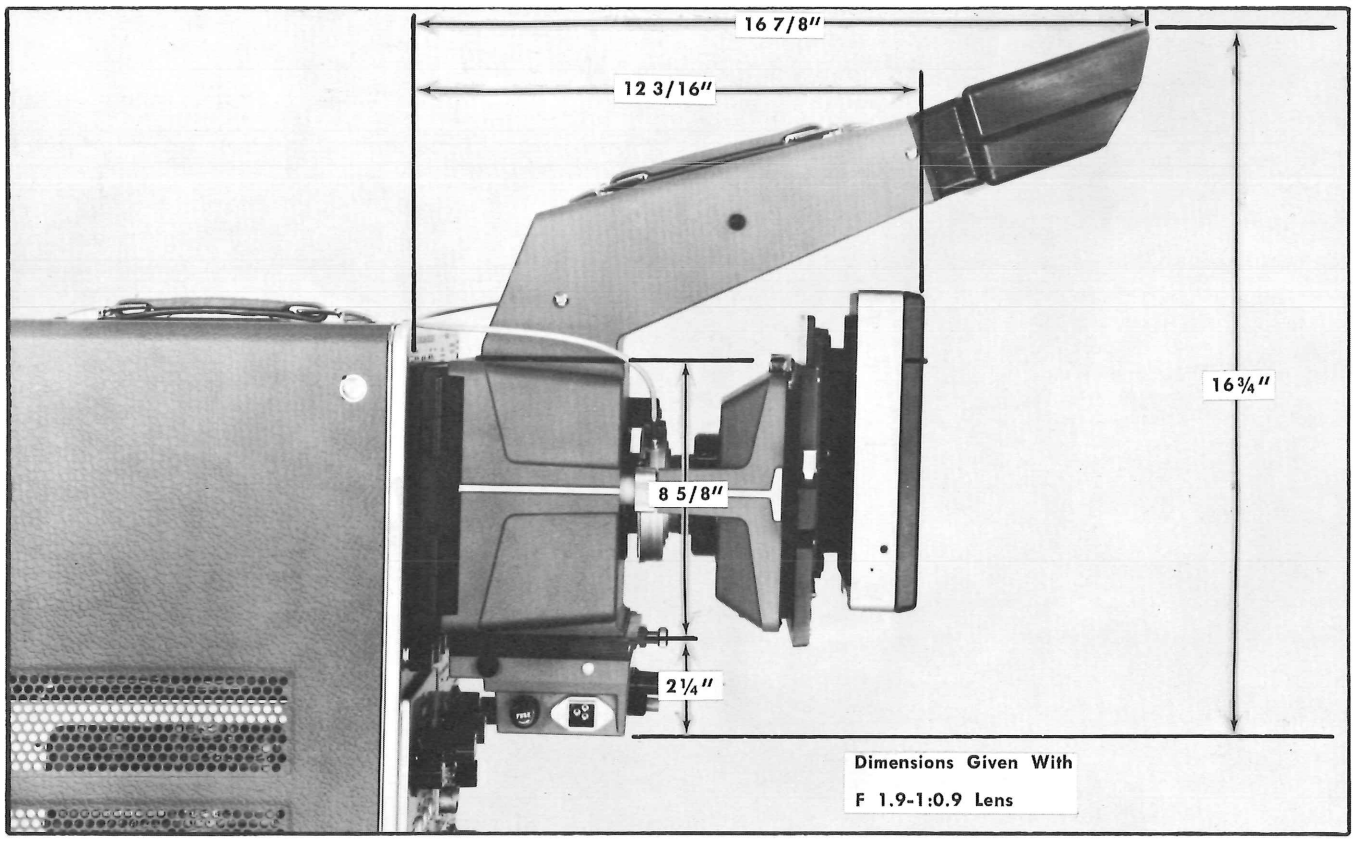


Fig. 1-1. Mounting Dimensions.

Section 1
Characteristics

General

The Projected Graticule is an optical device which is designed to display a non-parallax graticule in the same plane as that of the CRT phosphor. The device makes use of the beam-splitting mirror in the C-12 to produce a virtual image of a special photographic graticule illuminated by a light box and located under the Main Frame.

The Projected Graticule is designed so the Graticule Film may be changed quickly. The Graticule Film used may be one purchased from Tektronix or one made by you. See the Optional Accessories list for additional types of Graticule Films.

Additional Graticule Slides are available in amber, green, or blue. By using amber, green, or blue colored Graticule Slides to match colors of graticule lines and trace, it is easier to balance the light intensity of the trace to that of the graticule lines for good exposures.

Some of the Graticule Films available for the Projected Graticule have clear strips above and below the graticule image. These clear strips permit you to write data about the waveform on a strip of translucent paper and insert it along with the Graticule Film into the Graticule Slide. Clamps in the Graticule Slide will hold the strip of translucent paper in place over the clear spaces. The exposure made will show both the waveform and data written on the translucent strip of paper.

External Voltage Output

An output of 6 volts ac at .08 amps is available from the phone jack on the right side of the unit.

Power Requirements

Line voltage—normally 117 volts, 50-60 cycles. Can be obtained for 234 volt, 50-60 cycle operation.

Power—nominally 5 watts at 117 volts, 60 cycle line.

Fuse—1/10 amp slow-blowing type for 117 volts. 1/16 amp slow-blowing type for 234 volts.

Mechanical Characteristics

Finish—photoetched, anodized front panel.

The die cast Power Supply box is finished in blue vinyl, with black trim.

Dimensions—See Figure 1-1.

Weight—4½ pounds.

Accessories Included:

1—Power cord 161-015

1—3 to 2 wire adapter 103-013

1—Graticule Film, 4 x 10 cm with write-in area and short minor lines 331-117

1—Graticule Film, 6 x 10 cm with write-in area and short minor lines 331-111

1—Graticule Film, 8 x 10 without write-in area, but with full minor lines 331-119

1—Graticule Mask, 4 x 10 mc 331-118

1—Graticule Mask, 6 x 10 cm 331-116

1—Instruction manual

Optional Accessories

Graticule Slide:

Amber window 122-669

Blue window 122-667

Green window 122-668

CLEAR 122-659

Graticule Film:

4 x 10 cm with write-in area and full minor lines 331-120

4 x 10 cm Risetime Graticule with short minor lines 331-121

4 x 10 cm Risetime Graticule with full minor lines 331-122

6 x 10 cm with write-in area and full minor lines 331-123

6 x 10 cm Risetime Graticule with short minor lines 331-124

6 x 10 cm Risetime Graticule with full minor lines 331-125

8 x 10 cm without write-in area, but with short minor lines 331-126

10 x 10 division (570 type) with write-in area and short minor lines 331-127

10 x 10 division (570 type) with write-in area and full minor lines 331-128

525 type without write-in area 331-130

555 type with write-in area and short minor lines 331-131

Graticule Mask:

10 x 10 division (570 type) 331-129

Section 2

Operating Instructions

Mounting the Projected Graticule on the Main Frame

In mounting the Projected Graticule on a C12 remove the Camera Back, Rear Casting and Lens as a unit. Turn the Main Frame on its side and remove the plate on the bottom of the Main Frame by unscrewing the two rubber feet and two screws. Pull the plate away from the Main Frame making sure to remove the gasket with the plate. Save the plate and two rubber feet for later use.

Remove the Projected Graticule from its shipping package and pull the Graticule Slide out of it. Turn the Knurled Nut found between and above the POWER PUSH ON and GRATICULE BRIGHTNESS Controls, counterclockwise until you are able to slide the Main Frame bracket forward and off the remaining part of the Projected Graticule. Place the Main Frame bracket over the hole in the bottom of the Main Frame, so that the Knurled Nut is facing the rear of the camera assembly, and the felt on the bracket is against the Main Frame.

Insert four screws for the Projected Graticule into the Main Frame bracket and screw the bracket tightly against the Main Frame. Slide the remaining part of the Projected Graticule back onto the Main Frame bracket and turn the Knurled Nut clockwise until the nut is snug. Do not tighten the Knurled Nut excessively.

The bottom part of the Projected Graticule (Power Supply and Light Pipe) should be installed or removed when the Main Frame is not mounted on an instrument.

Reinstall the Camera Back, Rear Casting and Lens unit onto the Main Frame. Install the proper Graticule Film into the Graticule Slide and install the slide in the Projected Graticule.

Mounting the Main Frame

Refer to the manual furnished with the Main Frame for the mounting procedure. However, before mounting the camera Bezel onto the oscilloscope the removal of the external graticule should be considered. If the external graticule is left in place, the external graticule lines may show up on the picture taken as shadows cutting the trace. On the other hand, if the graticule is removed first the waveform alignment must be done through the viewing tunnel of the Main Frame since there won't be any reference lines when the Main Frame is swung away from the oscilloscope.

CAUTION

If the external graticule is removed an implosion shield should be installed in front of the CRT. Failure to install this shield may result in serious injury to operating personnel.

In either case above, the SCALE ILLUM Control must be turned to extinguish the graticule lamps.

The remaining parts of the camera are mounted as explained in the manual furnished with the Main Frame.

Graticule Slide

Hold the Graticule Slide so that the outside end (end with long bar) is in your left hand and the clips of the slide are on top. Take the Graticule Film in your right hand with the dull side up and the notch in the upper left corner. Insert the Graticule Film in the clips near the outside end of the Graticule Slide. Buckle the Graticule Film in the middle by pushing on the right end of the graticule with your thumb. Allow the graticule to slide flat again while guiding it under the spring clamps near the inside end of the holder. Push the Graticule Film toward the right bottom corner of the Graticule Slide until it is snugly in the corner. If no write-in area is to show in the pictures, the Graticule Mask should be installed on top of the Graticule Film. The Graticule Mask is installed in the Graticule Slide in the same manner as the Graticule Film.

With the proper graticule in the slide, insert the slide (noting that the side so marked should be down) into the Projected Graticule with the spring clamps on top.

To add data onto your pictures, first remove the Graticule Mask, then add the data on translucent paper or with a grease pencil directly on the film. If translucent paper is to be used, it should be cut into a strip the same width as the clear window in the Graticule Film. Onto this strip of paper write the data that is to appear on the picture. Take the strip of paper and turn it over so that the writing is toward the Graticule Film. With the paper in this position insert each end of it under a spring clamp on the Graticule Slide.

To apply data with a grease pencil it is necessary to turn the Graticule Slide over so that the Graticule Film is on the bottom. On the plastic surface over the clear windows in the Graticule Film write the data from left to right, making sure that the outside end of the Graticule Slide is on your left. The top write-in area will be the top of the picture. Turn the Graticule Slide back over and insert it into the Projected Graticule.

Graticule Slides are available in amber, blue or green plastic. The colored holders have the effect of producing a colored graticule. Among the uses for a colored slide are:

1. To make the graticule color nearer in color to the phosphor for exposure determination.
2. To make the graticule color contrast more sharply with the trace for clarity.
3. To color code pictures for easier identification when color film is used.

Graticule Vertical Positioning

The graticule image of the Projected Graticule can be positioned to move the image on the CRT up and down about .100 inch from a mechanical center position on the face of the CRT. This positioning is accomplished by turning the Knurled Nut on the Projected Graticule (the same nut that was used to secure the bottom part of the Projected Graticule to the Main Frame). This adjustment is

very useful for aligning the graticule with the useable vertical scan area of the CRT.

Operation of Front Panel Control

To illuminate the Projected Graticule it is necessary to first connect the power cord to the unit and then to a source of proper line voltage. With power applied to the unit push the button marked POWER PUSH ON. The red button on the switch should now glow red. Turn the GRATICULE BRIGHTNESS Control clockwise while observing the graticule image through the viewing system of the Main Frame. The scale of the GRATICULE BRIGHTNESS Control is calibrated in photographic steps.

Other Uses for Projected Graticule

Making Custom Graticules, Waveforms, etc. It is possible to display custom graticules, check points or custom waveforms using the Projected Graticule.

A picture of the graticule, waveform or check points is taken from an oscilloscope or drawing. The image on the picture must be the same size as you wish to display on the CRT. If the graticule or waveform is taken with an oscilloscope camera, the camera should be equipped with a 1:1 object to image ratio lens.

Polaroid prints must first be coated on the image side and allowed to dry. The one-hundred series of colored Polaroid film will not work for this application since it is on a plastic base. If a conventional print is to be used it is best to use one with a glossy finish.

Take the conventional or Polaroid paper print and rub light machine oil on the back side (side without the image), with a paper towel, cotton pad, etc. After the oil has been rubbed completely over the backside of the image area, coat the back of the print with a Polaroid print coater, or plastic spray. Do not use a print coater to coat the image side of a Polaroid print after it has been used to coat over the oil.

Cut the paper print to fit in place of the Graticule film. The Graticule Film can be used as a template to do this. The paper print must now be inserted into the Graticule Slide face down (image against plastic window in the slide.) The slide is then installed and the Projected Graticule used in the normal manner.

Prefogging with Projected Graticule. The Projected Graticule can be used as a light source to effect prefogging of films for cases where extremely high writing rate is required. Data on the exact control settings for the Projected Graticule and camera lens for the various films are available from your local Tektronix Field Engineer or Representative.

Power Requirements

Unless otherwise indicated, this instrument is connected for 117 volt operation. To connect the instrument for 234 volt operation, remove the red and blue transformer leads from the power connector and switch respectively. Solder the red and blue leads together, and insulate the connection.

To convert the instrument from 234 volts to 117 volts disconnect the red lead from the blue lead. Connect the red lead to the power connector along with the yellow lead. The blue lead is connected to the switch along with the black lead.

Table 1-1 shows lead connections for 117 and 234 volt operation.

TABLE 1-1

Wire Color	117 Volt Connections	234 Volt Connections
Black	Connects to switch	Connects to switch
Blue	Connects to wire above and switch	Connects to red lead
Yellow	Connects power connector	Connects to power connector
Red	Connects to wire above and power connectors	Connects to blue lead

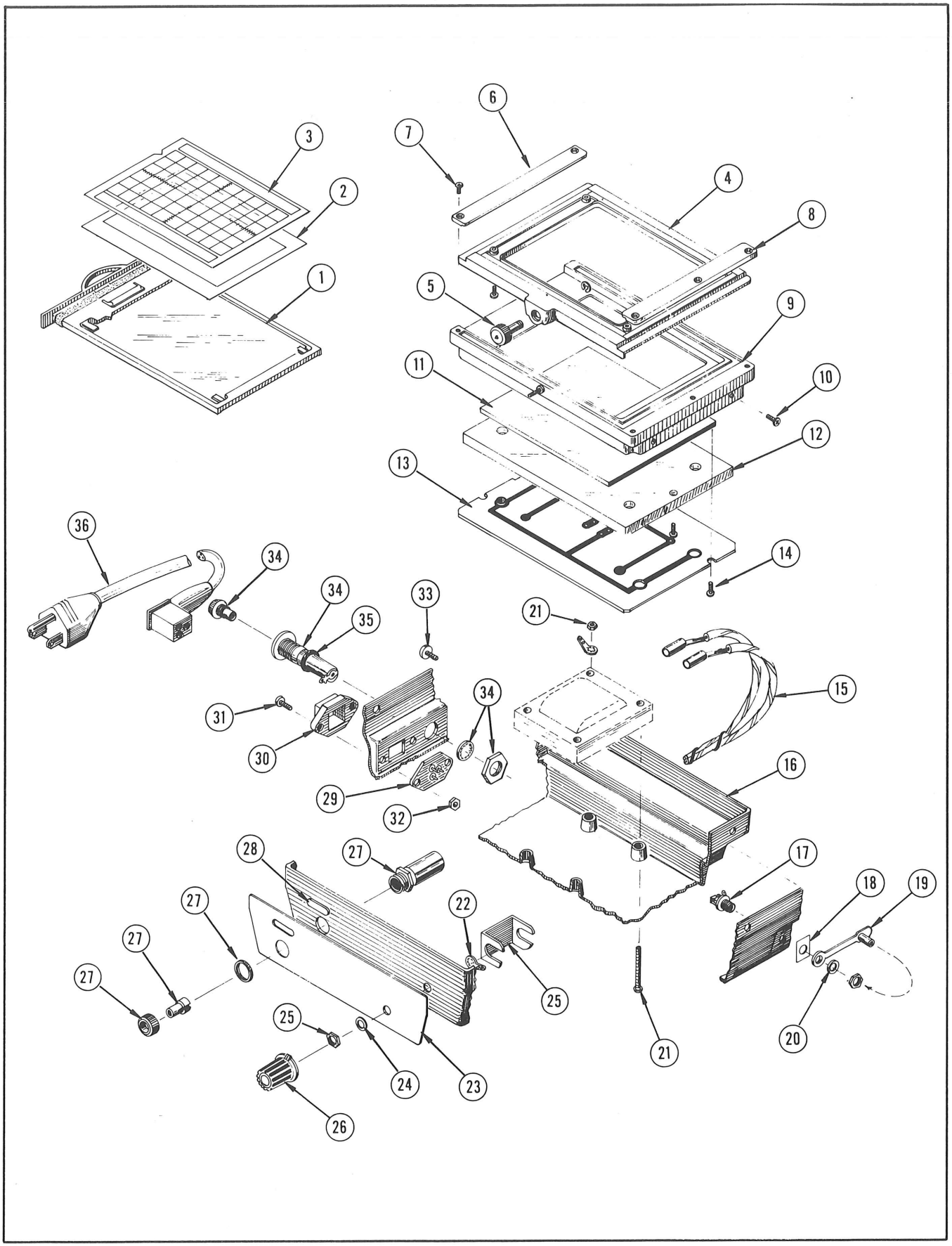
Section 3

Parts List and Diagram

ELECTRICAL PARTS LIST

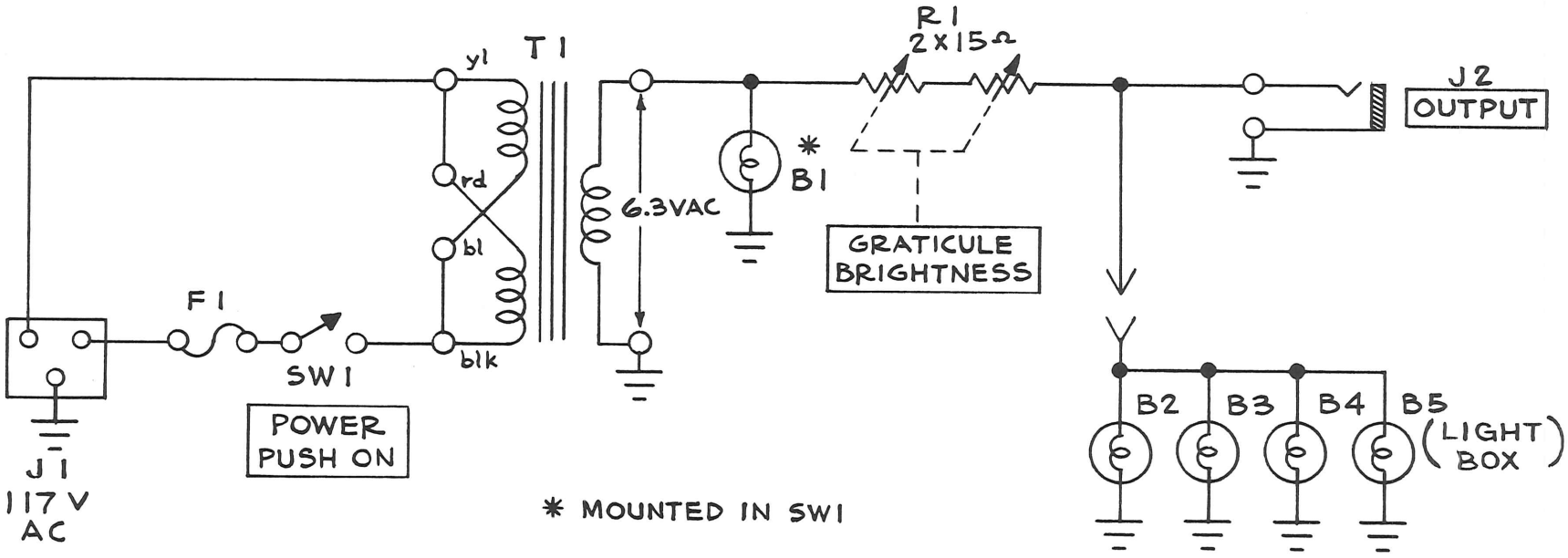
Ckt. No.	Tektronix Part No.	Description	S/N Range
		Bulbs	
B1	150-036	Miniature Type #345 Pilot Light	
B2	150-029	Miniature Type #349 Light Graticule	
B3	150-029	Miniature Type #349 Light Graticule	
B4	150-029	Miniature Type #349 Light Graticule	
B5	150-029	Miniature Type #349 Light Graticule	
		Fuses	
F1	159-048	1/10 Amp Type AGC Slo-Blo 117 v oper 50 and 60 cycles	
F1	159-051	1/16 Amp Type AGC Slo-Blo 234 v oper 50 and 60 cycles	
		Resistors	
R1	311-427	2 x 15 Ω 12.5 w Var WW GRATICULE BRIGHTNESS	
		Switches	
	Unwired		
SW1	260-581	Push Button POWER PUSH ON	
		Transformers	
T1	120-328	Power	

EXPLODED VIEW



EXPLODED VIEW

REF. NO.	PART NO.	SERIAL NO. EFF.	SERIAL NO. DISC.	QTY.	DESCRIPTION
	016-204			.	PROJECTED GRATICULE Includes:
1	122-659			1	GRATICULE SLIDE, assembly CLEAR
2	331-116			1	MASK, graticule, 6 x 10 cm
	331-118			1	MASK, graticule, 4 x 10 cm
3	331-111			1	FILM, graticule, 6 x 10 cm
	331-117			1	FILM, graticule, 4 x 10 cm
4	122-643			1	ADAPTER Includes:
5	122-644			1	NUT, adjustment
	.....			.	Mounting Hardware: (not included)
	354-219			1	RETAINER
6	122-647			1	SPRING, slide
	.....			.	Mounting Hardware: (not included)
7	213-078			2	SCREW, 4-24 x 3/8 inch FHS, phillips
8	122-661			1	SPRING, slide
	.....			.	Mounting Hardware: (not included)
	213-078			3	SCREW, 4-24 x 3/8 inch FHS, phillips
9	122-646			1	HOUSING, slide
10	211-565			4	SCREW, 6-32 x 1/4 inch Truss HS, phillips
11	122-649			1	DIFFUSER, light
12	122-650			1	LIGHT PIPE
13	122-654			1	BOARD, lamp mounting assembly
	.....			.	Mounting Hardware: (not included)
14	211-079			4	SCREW, 2-56 x 3/16 inch PHS
15	179-819			1	CABLE, harness
16	122-656			1	BOX, control
17	136-094			1	SOCKET, with nut
18	334-869			1	TAG, counter output
19	122-660			1	PLUG, counter jack
20	210-940			1	WASHER, steel, 1/4 inch ID x 3/8 inch OD
21	.....			.	Transformer Mounting Hardware:
	211-585			4	SCREW, 6-32 x 1 inch PHS
	210-006			3	LOCKWASHER, #6 internal
	210-202			1	LUG, solder, #6
	210-407			4	NUT, hex brass, 6-32 x 1/4 inch
22	210-223			1	LUG, solder, 1/4 inch
23	333-778			1	PANEL, front
24	210-940			1	WASHER, 1/4 inch ID x 3/8 inch OD
25	.....			.	Nuts and bracket serviced with Rheostat
26	366-225			1	KNOB, graticule brightness
	.....			.	Mounting Hardware:
	213-020			1	SCREW, set, 6-32 x 1/8 inch HHS
27	260-581			1	SWITCH assembly Includes:
	.....			1	SWITCH
	.....			1	NUT
	.....			1	LENS
	.....			1	NUT
28	334-829			1	INSERT, (blank)
29	136-144			1	SOCKET, 3 pin
30	380-047			1	HOUSING, socket
	.....			.	Mounting Hardware: (not included)
31	211-512			2	SCREW, 6-32 x 1/2 inch FHS phillips
32	210-457			2	NUT, 6-32 with lockwasher
33	348-048			1	FOOT, rubber
34	352-070			1	HOLDER, fuse assembly
	.....			.	Consisting of:
	.....			1	CAP, fuse holder
	.....			1	NUT
	.....			1	LOCKWASHER
35	210-873			1	WASHER, rubber
36	161-015			1	CORD, power, 3 pin



PROJECTED GRATICULE

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