TEKTRONIX®

C5A CAMERA WITH OPTIONS

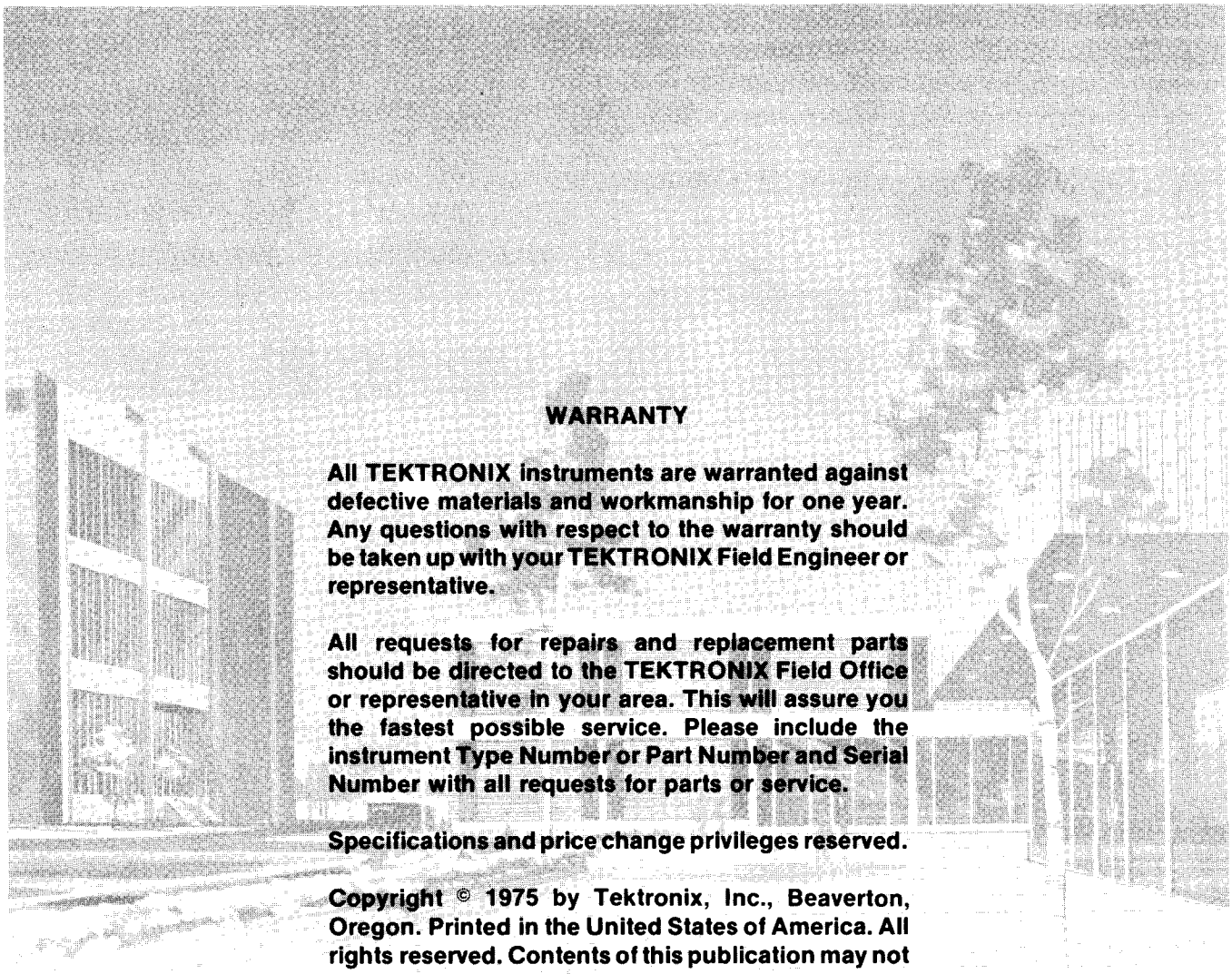
INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97077

Serial Number 2143

070-1995-00

First Printing, DEC 1975



WARRANTY

All TEKTRONIX instruments are warranted against defective materials and workmanship for one year. Any questions with respect to the warranty should be taken up with your TEKTRONIX Field Engineer or representative.

All requests for repairs and replacement parts should be directed to the TEKTRONIX Field Office or representative in your area. This will assure you the fastest possible service. Please include the instrument Type Number or Part Number and Serial Number with all requests for parts or service.

Specifications and price change privileges reserved.

U.S.A. and foreign TEKTRONIX products covered by U.S. and foreign patents and/or patents pending.

TEKTRONIX is a registered trademark of Tektronix, Inc.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

The C-5A Camera.

GENERAL INFORMATION

DESCRIPTION

The C-5A is a light-weight, fixed-focus, trace-recording camera. It features a battery operated Graticule Flash Unit and an unlimited capability for mounting adapter options. Interchangeable lens and spacer sections provide magnification factors of 0.67 or 0.85. With these factors, photographs on instruments with either an 8 X 10 centimeter or 4 X 5 inch display cover the entire usable area of the film surface.

Table 1-1 shows the relationship of Tektronix instrument types to the magnification factor for the C-5A Camera. The magnification factor listed gives the largest possible photo image when using the C-5A.

The C-5A film back is a Polaroid[1] type CB101, which is permanently attached to the rear camera section. The camera's major sections are high-impact resistant, injection-molded plastic. The fastening devices, light-sealing interfaces, and the lens-shutter housing are molded in place.

The Graticule Flash Unit is mounted on the top of the camera mounting adapter. The unit contains a crt viewing door, which can be opened to observe the instrument display without removing the camera. On cameras without a flash unit (Options 1 and 2), there is a crt viewing door in the adapter's top opening to provide the same viewing capability.

SAFETY SUMMARY

Maintenance instructions for the Graticule Flash Unit are intended for use by qualified personnel only. To avoid electric shock, do not attempt any servicing of the Graticule Flash Unit unless qualified.

TABLE 1-1
Relationship of Instrument Type to Magnification Factor

Tektronix Instrument Type	Magnification Factor	Camera
400-Series with 8 X 10 centimeter graticule[1]	0.85	Option 2
577	0.67	STD or Option 1
577 (Option 10) 602	0.85	
603 604	0.67	
605	0.85	
5100-Series 5403/D40 5444	0.67	
5403/D41 7313	0.85	
7403 7603 (except Option 4)	0.67	
7603 (Option 4) 7613 7623 7633 7704A (except Option 4) R7704A (except Option 4) 7844/R7844 7903 (except Option 4) 7904 (except Option 4)	0.85	
T900-Series	0 .85	Option 3
[1] Also includes 464/466.		

[1] Registered trademark, Polaroid Corporation.

SPECIFICATIONS

The specifications in Table 1-2 apply over an ambient temperature range of 0° to +50° C unless otherwise specified. When needed, the minimum time to allow for temperature stabilization of the camera is 10 minutes.

TABLE 1-2
Specifications

Characteristics	Performance Requirement
LENS	
Maximum Relative Aperture	Fixed by the shutter.
Focal Length	60 mm, nominal.
Magnification (object image)	1 to 0.67 or 1 to 0.85 within 10%. Changed by positioning the lens mounting section in one of two possible positions.
Geometric Distortion	1% or less.
Resolving Power	6 lines per millimeter or better.
SHUTTER	
Speed Range (0° to +40° C)	1/5, 1/10, and 1/25 second nominal; time (T); and bulb (B).
Relative Aperture	Fixed f/16 within 10%.
GRATICULE FLASH UNIT	
Flash Recycle Time	6 seconds, nominal.
Flash Tube Life	At least 50,000 flashes.
Flash Input Energy	Adjustable from 0.2 joules to 0.86 joules.
Batteries	
Type	Alkaline, AA cells.
Number of Cells	2.
Nominal Cell Voltage	1.5 volts.
Typical Battery Life	Approximately 1200 flashes or more if the flash unit is turned off between flashes (equivalent to 150 eight exposure film packs).
ENVIRONMENTAL	
Temperature	
Operating	0° to +40° C(+32° to +104° F)
Nonoperating	−40° to +55°C (−40° to +131° F) (with film removed).

TABLE 1-2 (CONT.)
Specifications

Characteristics	Performance Requirement
Altitude	
Operating	To 15,000 feet.
Nonoperating	To at least 50,000 feet.
Vibration	15 minutes along each of the three major axes;a total displacement of 0.010 inch p-p with frequency varied from 10 to 55 to 10 Hz in one-minute sweeps. Hold for three minutes at each resonant point, or if none, at 55 Hz.
Shock	1 shock at 15 g's, one-half sine, two milliseconds duration in each direction along each major axis. Total of 6 shocks.
Transportation	Qualified under National Safe Transit Committee test procedure 1A.
PHYSICAL	
Length, Width, & Height	See Dimensional Drawing (Fig. 1-1).
Weight	About 1 kg (2.2 lbs).

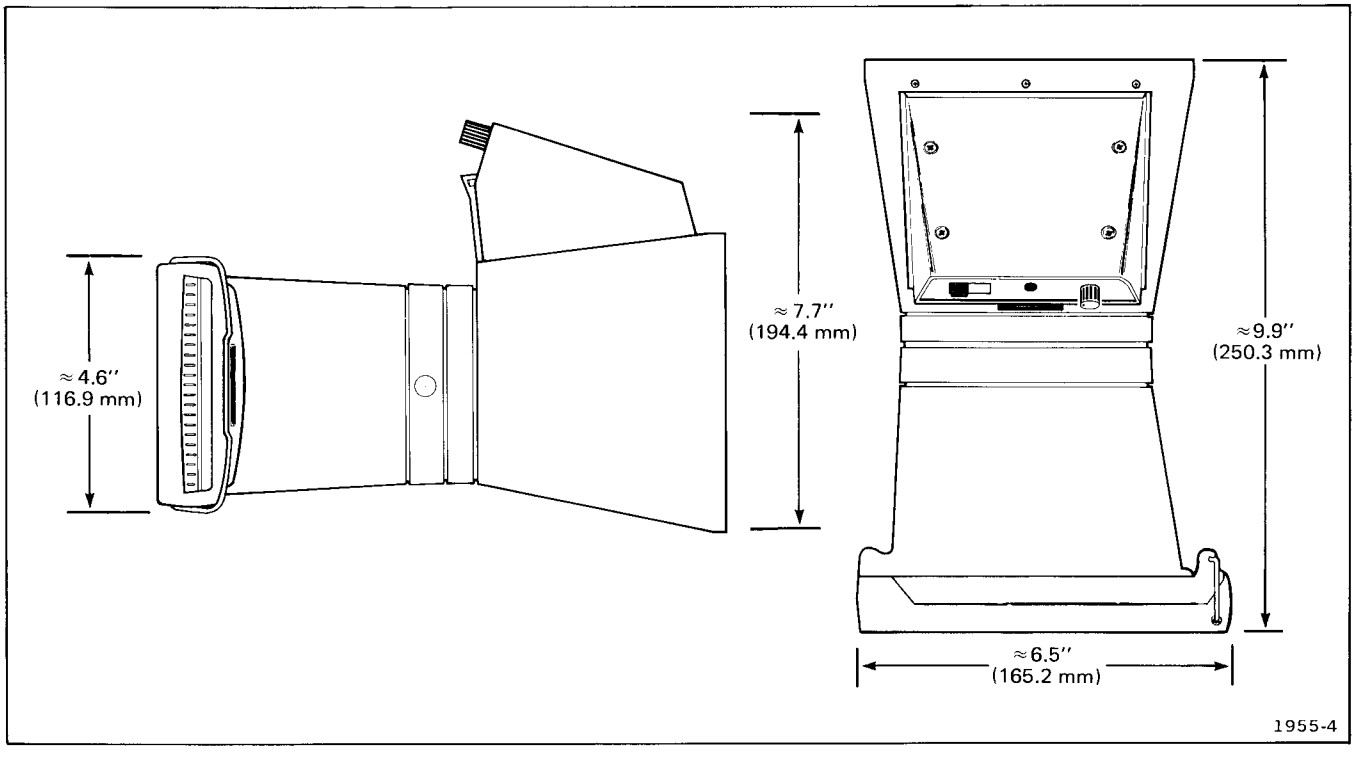


Fig. 1-1. C-5A dimensional drawing.

OPERATING INSTRUCTIONS

FUNCTIONS OF CONTROLS AND INDICATORS

Camera (Fig. 2-1)

(1) **Speed Selector (mounted on the lens section).** Controls the time that the shutter admits light to the optical system. The speeds are Time (T); Bulb (B); and 1/5, 1/10, and 1/25 second.

(2) **SHUTTER Button.** Actuates the shutter, which admits light to the optical system. In the Bulb (B) position of the Speed Selector, the shutter is opened when the button is pushed, and closed when released. In the Time (T) position of the Speed Selector, the shutter is opened by pushing and releasing the button once, and closed by pushing and releasing it a second time.

(3) **Lens-Shutter Housing.** See description of Magnification Spacer.

(4) **Magnification Spacer.** The positions of the Lens-Shutter Housing and Magnification Spacer determines the magnification factor of the camera. When the Magnification Spacer is farthest from the camera back, as shown in Fig. 2-1, the factor is 0.67. When the spacer is between the camera back and the Lens-Shutter Housing, the factor is 0.85.

(5) **Camera-Mounting Adapter.** Used to mount the camera on the instrument to be photographed.

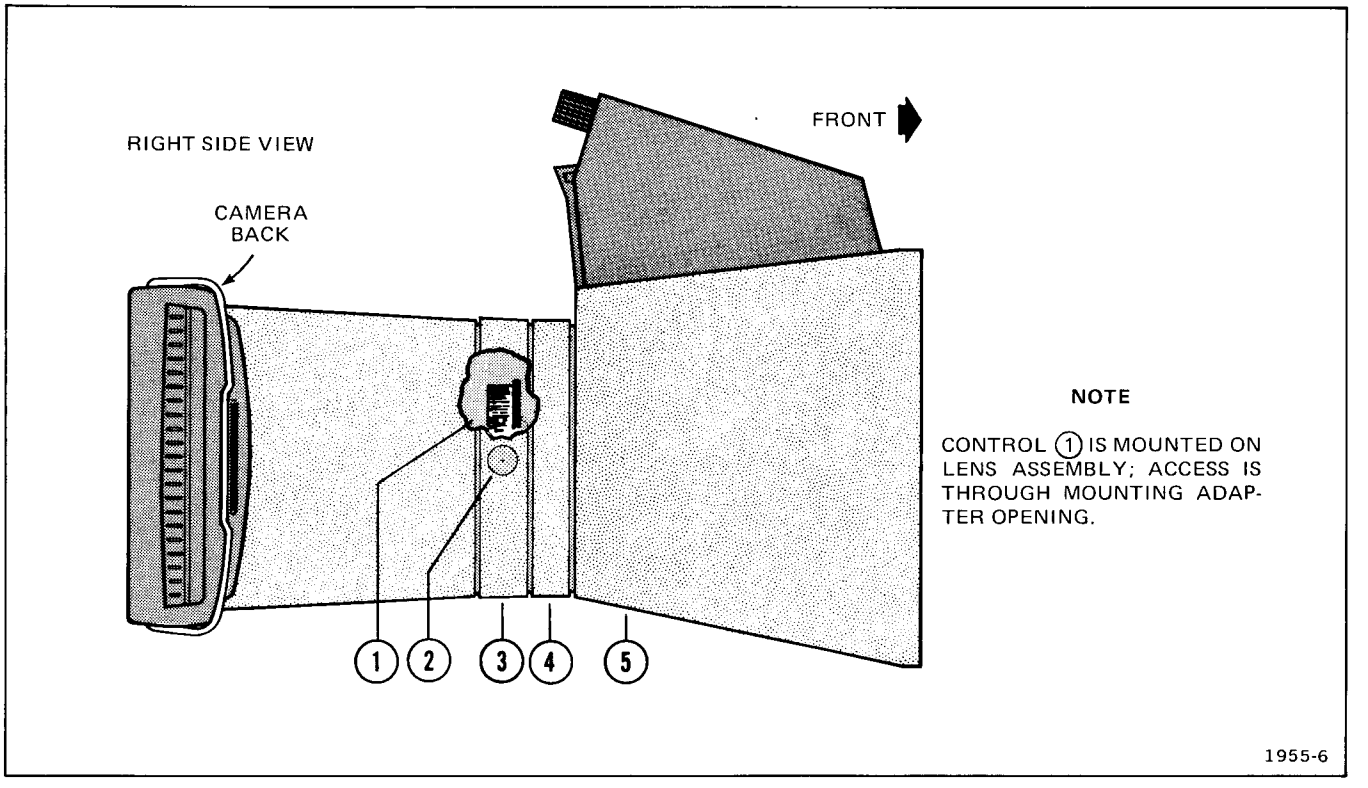


Fig. 2-1. Camera control locations.

Graticule Flash Unit (Fig. 2-2)

(1) **FLASH.** Turns the unit on and off.

(2) **Crt Viewing Door.** Provides an opening to view the display to be photographed without removing the flash unit.

(3) **Ready Indicator (LED).** Indicates when the unit is ready for operation. When the LED is blinking, the unit is ready. When the LED is on steady, the unit is recycling. If the LED does not begin blinking within 6 to 7 seconds after the unit is turned on, the batteries may be weak.

(4) **FLASH INTENSITY.** Varies the flash tube light output by adjusting the charge level on the flash storage capacitor.

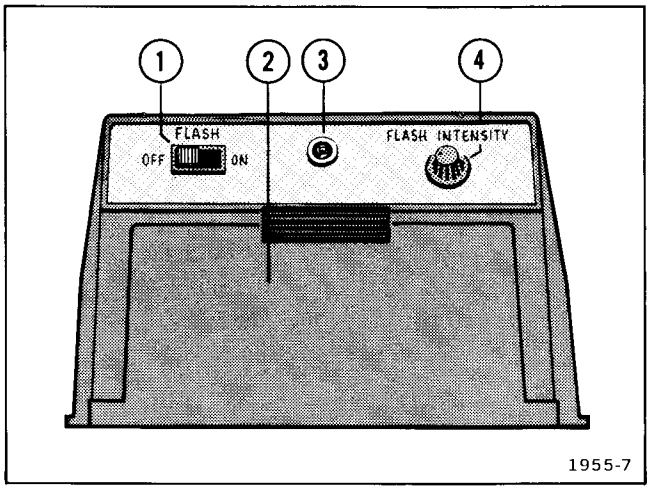


Fig. 2-2. Flash unit control and indicator locations.

OPERATING THE CAMERA SYSTEM

The following procedures tell how to operate the C-5A Camera and the Graticule Flash Unit. The procedures are written in a sequence that assumes the camera system is newly received. As such, the procedure may be used for basic familiarization, or training of new users.

Preparing the Camera

1. Check the positioning of the lens-shutter housing and magnification spacer for the correct magnification factor for the instrument being photographed:

   a. Table 1-1 lists the magnification factor used with various instruments.

   b. Figure 2-1 and its text identify the correct position for the lens-shutter housing and magnification spacer sections.

   c. Procedures for changing the magnification factor are contained in this section.

2. Load the camera with film, prepare the camera for the first picture and read about advancing and developing the film (see Film Pack Camera Back, in this section).

Film Exposure Using Incremental Shutter Speeds

The C-5A does not have a built in exposure aid, but with a little practice the operator can readily judge the correct display intensity and camera exposure time. Proceed as follows:

NOTE

In the following procedure, the pictures will not have a graticule unless instrument graticule illumination is used. Use of the Graticule Flash Unit is covered later.

1. Obtain the display to be photographed and set its intensity to a fairly bright level.

2. Set the Speed Selector to 1/10 second.

3. Mount the camera on the instrument (see Mounting the Camera, in this section).

4. Press and release the SHUTTER button.

5. Advance and develop the film.

If the picture is overexposed, either reduce the display intensity or set the Speed Selector to 1/25 second. If the picture is underexposed, either increase the display intensity or set the Speed Selector to 1/5 second. If it is still underexposed, take the picture in the Time (T) or Bulb (B) position of the Speed Selector (see the next procedure).

Film Exposure Using Time (T) and Bulb (B) Settings

NOTE

In the following procedure, the pictures will not have a graticule unless instrument graticule illumination is used. Use of the Graticule Flash Unit is covered later.

1. Obtain the display to be photographed and set its intensity to a medium-bright level.

2. Set the Speed Selector to Time (T) or Bulb (B).

3. Mount the Camera (see Mounting the Camera, in this section).

4. For Time (T) mode, press and release the SHUTTER Button, wait the desired exposure time, and then press and release the SHUTTER Button again. For Bulb (B) mode, press the SHUTTER Button and hold it depressed for the desired exposure time, then release it.

5. Advance and develop the film.

If the picture is overexposed or underexposed, vary either the display intensity or the exposure time until the desired exposure is obtained.

Using the Graticule Flash Unit

1. Install the batteries in the camera.

NOTE

The batteries are packaged separately and must be installed before using the unit. Refer to the Maintenance section for installation procedures.

2. Set the FLASH INTENSITY control (Fig. 2-2) to mid-range (may require further adjustment for the best graticule contrast on photographs).

3. Turn the unit on and wait until the Ready Indicator LED begins blinking. If the LED does not start blinking within 6 to 7 seconds, the batteries may be weak or the unit faulty.

4. Open the crt viewing door (Fig. 2-2) and obtain the desired display on the instrument. If the instrument has graticule illumination, turn it off. Close the crt viewing door.

5. When the Ready Indicator LED (Fig. 2-2) begins blinking, take the picture, then advance and develop the film.

6. Turn the unit off.

NOTE

Failure to turn the unit off when not in use, may shorten battery life due to circuit leakage current.

CHANGING THE MAGNIFICATION FACTOR

The magnification factor of the C-5A is determined by the position of the lens-shutter housing in relation to the magnification spacer. When the spacer is farthest from the camera back, the factor is 0.67. When the spacer is between the camera back and the lens, the factor is 0.85. To change the factor, proceed as follows:

1. Perform steps 1, 2, and 3 of the Camera Sections disassembly procedure (see Component Removal and Replacement in the Maintenance section).

2. Lift the camera mounting adapter off the camera and lay it aside.

3. Lift the lens-shutter housing and magnification spacer off the camera and reinstall them in the order for the desired magnification factor.

4. Reinstall the camera mounting adapter and four screws holding the sections together.

5. Plug in the battery-shutter sync plug.

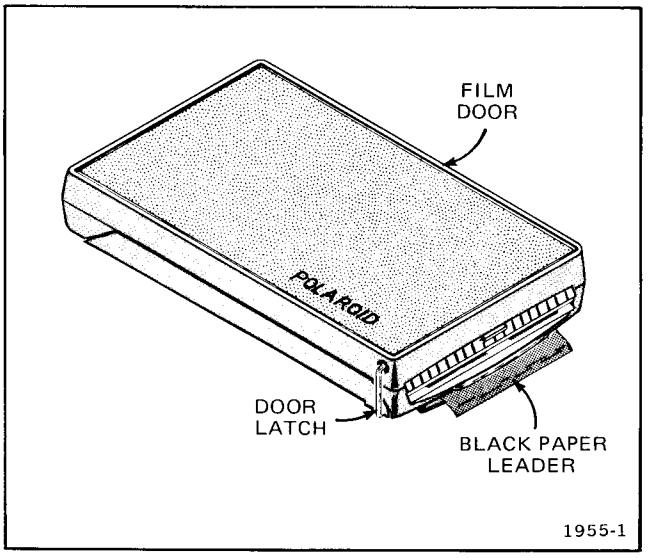


Fig. 2-3. Pack film back.

FILM PACK CAMERA BACK

The following procedures tell how to load the film pack, advance and develop the film, and protect the prints.

Loading the Film Pack

1. To open the camera back, swing the door latch away from the camera back (Fig. 2-3) and open the film door.

2. To remove an empty film container, lift up on the film pack tab and pull to the right (Fig. 2-4).

NOTE

For the camera to operate properly, the processing rollers in the film back must be kept clean. Check the rollers each time film is inserted. Instructions for removal of the rollers are inside the film door. If the instructions are missing refer to the Maintenance section. Clean the rollers with a damp cloth.

3. Open the film box and carefully remove the foil-wrapped film pack. Save the instruction sheet and print coater, if there is one. Remove the film from the foil. Be sure to handle the film by the edges only.

4. Insert the film pack into the film plane as shown in Fig. 2-4. Then push the film pack to the left and down

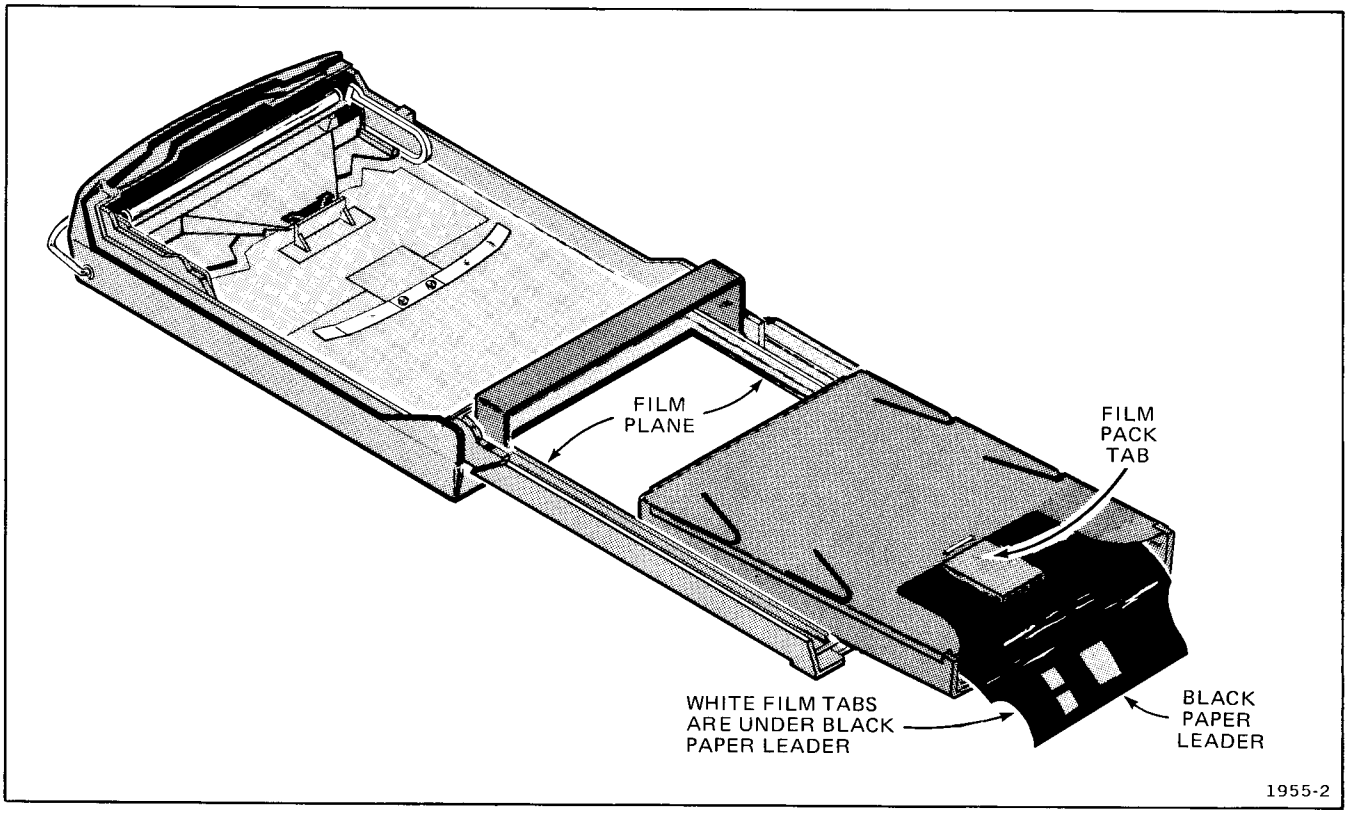


Fig. 2-4. Installing the film pack.

into the film plane until it snaps into place. Be sure that the indicated side of the film pack is facing toward the lens; the black paper leader is hanging over the right end of the camera back (Fig. 2-4); and the white film tabs are not caught between the film pack and film plane.

5. Close the film door and hold it closed. Then swing the door latch into place until it snaps into the locked position.

6. While holding the camera back, pull the black paper leader all the way out. This will expose a white tab (Fig. 2-5) and the camera back is now ready for the first picture. As pictures are taken, the number of the negative ready for exposure is indicated by the number on the white tab.

NOTE

Only a white tab should be showing when a picture is taken. If a yellow tab is showing, pull it out and develop the film to determine if the picture is good (see instructions under Advancing and Developing the Film).

Advancing and Developing the Film

1. After taking the picture, pull the white tab, (Fig. 2-5) all the way out. This does three things: First, it positions the positive and negative sheets together; second, it causes the yellow tab (marked PULL) to pop out; and third, it causes another white tab to appear.

NOTE

If a yellow tab does not appear when the white tab is pulled, do the following in dim light: 1) Carefully open the film back without moving the film pack. 2) Hold the film pack in place and carefully remove the yellow tab that failed to pop out. Discard the yellow tab film. 3) Close the film back.

2. Pull the yellow tab (Fig. 2-5) completely out in one smooth, fairly rapid motion (pull about as hard and rapidly as you might pull a window shade; not slowly and hesitantly). This causes the positive and negative sheets to be pulled between and through the processing rollers, which spreads the developing solution between the two sheets and starts the development process.

3. Wait the recommended development time (about 15 to 20 seconds for type 107 film used at ambient temperatures of 70° F or above). Development times vary for different ambient temperatures; therefore, refer to the film instruction sheet for complete information.

4. When the development time is up, peel the print away from the negative rapidly. Do not let the print fall back on the damp negative.

CAUTION

Many developing solutions contain a caustic substance which may cause chemical burns. If you accidentally get the solution on your skin, wipe it off immediately and wash the area thoroughly as soon as possible. Be extremely careful to keep the solution away from the eyes and mouth.

Coating the Print

Prints should be coated as soon as possible after separating them from the negative. Use six to eight overlapping strokes to apply the print coater along the entire length of the print, including edges, borders, and corners. For the last two or three pictures in each film pack, press the coater down hard against a non-image surface for a moment to release extra liquid; then spread the liquid smoothly across the print as before.

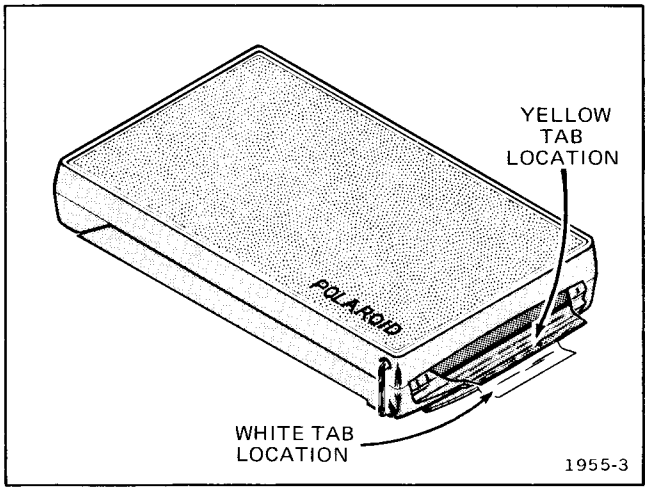


Fig. 2-5. Location of positive and negative sheet tabs.

MOUNTING THE CAMERA

Mounting the Standard and Option 1 Camera

CAUTION

To prevent the camera from falling free and being damaged, DO NOT let go of the camera until it is securely attached to the instrument.

To mount the camera, set the inside front lip of the camera-mounting adapter down into the groove on the top of the instrument bezel. Then, let the bottom of the adapter swing down until it rests tightly against the bezel.

To remove the camera, swing the bottom part of the camera-mounting adapter out and away from the instrument bezel. Then, lift the camera up and away from the groove on the top of the bezel.

Mounting the Option 2 Camera

Use the mounting procedures for the Standard and Option 1 camera.

Mounting the Option 3 Camera

CAUTION

To prevent the camera from falling free and being damaged, DO NOT let go of the camera until it is securely attached to the oscilloscope.

To mount the camera, set the top lip of the camera-mounting adapter up into the groove on the underside of the top part of the oscilloscope bezel. Then, let the adapter swing down into the bezel. When the bottom part of the adapter touches the instrument, let the adapter drop vertically down into the small notch in the topside of the bottom part of the bezel.

To remove the camera, lift the mounting adapter up until the bottom lip is clear of the oscilloscope bezel. Swing the bottom of the adapter out and away from the bezel. Then pull the camera down and away from the groove on the underside of the top part of the bezel.

MOUNTING THE GRATICULE FLASH UNIT

Refer to Component Removal and Replacement, in the Maintenance section.

STORING THE CAMERA

To prevent chemical or corrosion damage when storing the camera for long periods of time, clean the processing rollers and remove the batteries and film. Also to keep dust from accumulating in or on the camera, it should be covered or stored in a relative dust free area.

PHOTOGRAPHIC TECHNIQUES

Film Selection

The C-5A is designed for use with Type 107, ASA 3000 speed film. Other film types will fit in the C-5A; however, their slower ASA ratings would require the constant use of the bulb (B) or time (T) shutter modes when photographing average brightness displays.

Print Contrast

A slightly longer development time generally provides greater print contrast. Shorter development times decrease print contrast, but may improve waveform details not otherwise visible.

Film Storage

Refer to the manufacturers instruction sheet for information on film storage.

THEORY OF OPERATION

This section of the manual contains a description of the electronic circuitry used in the Graticule Flash Unit. Each circuit is described using the schematic diagram in Fig. 7-2 located on a pullout page at the rear of the manual.

The Graticule Flash Unit circuitry is contained on one printed-circuit board and has four main circuit functions—Converter, Charging and Intensity Control, Ready Indicator, and Trigger.

CONVERTER

Transistor Q14 and transformer T20 form a blocking oscillator that operates as a flyback type of dc-to-dc converter. From a three-volt battery supply, the converter produces a charging voltage of up to 500 volts.

When power is applied to the flash unit, Q14 is biased on by R17 and the resistor network R12, R14, R15 and R16. Current flow through pins 1 and 6 of T20 creates a magnetic field, which induces a positive feedback voltage through pin 2 to Q14. Current through Q14 continues to increase until the core of T20 saturates. At that point, the feedback voltage ceases. Current through Q14 starts to decrease and the magnetic field of T20 begins to collapse. As the field collapses, a negative-feedback voltage at pin 2 of T20 turns off Q14. When Q14 turns off, a high flyback voltage is induced in all windings of T20. High voltage at pin 7 is rectified by CR22 for the charging circuit, and at pin 1 by CR12 for the Intensity Control circuit. To protect Q14, high voltage at pin 2 is shunted to ground by CR14.

The blocking-oscillator cycle of the converter is repeated until stopped by the Intensity Control circuit. Once stopped, the cycle starts again only when a charge voltage is needed (after a flash, or when needed by the Intensity Control circuit).

With power applied, C30 charges to the supply voltage through R25 and R30. This charge is used later in triggering the flash. Charging current through R25 causes a negative gate voltage on Q25, which has no effect.

CHARGING AND INTENSITY CONTROL

The high voltage rectified by CR22 charges C23 and C26. The charge level on C26 (between 250 and 400 volts) determines the flash intensity of V25. This level is determined by the length of time the Converter operates and is controlled by the Intensity Control circuit.

As the high voltage, rectified by CR12 charges C12, a voltage begins to build up across R15 and appears at pin 4 of U10A. When the voltage at pin 4 equals the voltage at pin 5, which is set by CR9 to about 0.6 volts, U10A conducts. This effectively grounds the base of Q14, turning it off. With Q14 off, C12 discharges a small amount and Q14 turns on again. This cycle continually repeats, which maintains a constant charge on C12 until the unit is triggered. Capacitors C12 and C26 are charged proportionally; therefore, any control of C12 changes the charge on C26. The maximum charging voltage for C26 is limited to about 475 volts by the setting of R15. When R15 is set, R12 can adjust the charge voltage on C26 between about 250 and 475 volts.

READY INDICATOR

The Ready Indicator consists of an astable multivibrator U10B and light-emitting diode CR10. The circuit operates on the same voltage levels as the Intensity Control circuit; therefore, it indicates when the flash unit is ready for operation.

When power is applied, there is no voltage on pin 7 of U10B, and pin 6 is held to about +0.6 volts by CR9. This turns on U10B, which effectively grounds its output and turns on the LED CR10.

As C12 charges, the voltage on pin 7 reaches, or exceeds, the voltage on pin 6, which turns off U10B. With U10B off, its output equals the supply voltage and CR10 turns off. Capacitor C3 starts to charge toward the supply voltage, and its charging current through R3 holds the voltage at pin 7 higher than pin 6. This keeps U10B off and CR10 off. As C3 becomes charged, current through R3 decreases and the voltage at pin 7 falls below pin 6. This causes U10B and CR10 to turn on again. With U10B on, C3 discharges through R3. When C3 is discharged (determined by the time constant of C3 and R3) the cycle repeats.

Cycling of U10B and CR10 occurs only when the voltages on pins 6 and 7 are equal, or pin 7 is slightly higher. The cycling rate is set by C3 and R3 to about 1 cycle every four seconds. Since the cycling condition exists only when C12 and C26 are fully charged, the blinking LED indicates a ready condition.

TRIGGER

Assume that C23 and C26 are charged to the charging voltage, C30 is charged to the supply voltage (battery), and the LED is blinking to indicate that the flash unit is ready to operate.

When the shutter is actuated, a short circuit is applied across the shutter-sync terminals. This causes C30 to discharge through R25, which applies a positive gate to Q25. This gate turns on Q25, which discharges C23 through the primary of T25, a high-turns-ratio transformer. The output of T25 is a 4 to 6 kilovolt pulse, which triggers V25. This causes C26 to discharge through V25 creating a flash.

Capacitors C12, C23, and C26 discharge during the flash time, which readies the unit for recharging. As soon as the momentary short circuit across the shutter sync terminals is removed and the flash is terminated, C30 begins to recharge through R25.

As a safety factor, whenever the unit is turned off, S15 connects R22, across C26 to discharge any potential that may be on C26.

MAINTENANCE

WARNING

Maintenance instructions for the Graticule Flash unit are intended for use by qualified personnel only. To avoid electric shock do not attempt any servicing on the Graticule Flash Unit unless qualified.

GENERAL CARE OF THE CAMERA SYSTEM

The C-5A Camera and Graticule Flash Unit are designed to provide long, trouble-free service if given the same care as other precision optical devices. The various mechanisms should be handled with care to prevent damage.

CLEANING

Lens

When cleaning the lens, be careful not to scratch it. Remove loose dust with a soft camel-hair brush. Use a high-quality lens tissue to remove fingerprints and other smudges.

CAUTION

DO NOT attempt to disassemble the lens assembly. It is adjusted and sealed at the factory and should not collect dust internally. If the lens is disassembled and then reassembled, the magnification factor may be altered.

Camera Back

Clean the stainless steel processing rollers whenever they have film developing solution on them. Use a damp cloth. Instructions for removing the rollers are inside the camera back door. If these instructions are missing or worn, the rollers can be removed by lifting the rear of the roller assembly (end farthest from rollers) up and out of the camera back. To replace the assembly, set the rollers down into the camera back. Then gently push the rear of the roller assembly down into the camera back until the small plastic retaining latch on the roller assembly catches and holds the rollers in place.

Molded Plastic Surfaces

Clean the plastic surfaces with a cloth or swab dampened with warm water, and if necessary a mild soap solution.

CORRECTIVE MAINTENANCE

TEKTRONIX FIELD SERVICE

Tektronix, Inc. maintains repair and recalibration facilities at its local Field Service Centers and the Factory Service Center. For further information or assistance contact your local Tektronix Field Office, or representative.

OBTAINING REPLACEMENT PARTS

Standard Parts

All electrical and mechanical part replacements can be obtained through your local Tektronix Field Office or representative. However, many of the standard electronic components can be obtained locally in less time than is required to order them from Tektronix, Inc. Before purchasing or ordering replacement parts, check the parts list for value, tolerance, rating, and description.

Special Parts

In addition to the standard electronic components, some special components are used. These components are manufactured or selected by Tektronix, Inc. to meet specific performance requirements, or are manufactured for Tektronix, Inc. in accordance with our specifications. These special components are indicated in the parts list by the Tektronix, Inc. manufacturer code (80009) listed in the Mfr. Code column. Most of the mechanical parts used in this instrument, except miscellaneous hardware, have been manufactured by Tektronix, Inc. Order all special parts directly from your local Tektronix Field Office or representative.

Ordering Parts

When ordering replacement parts from Tektronix, Inc., it is imperative that all of the following information be included in the order to ensure receiving the proper parts.

1. Instrument type (include mod or option numbers).

2. Instrument serial number.

3. The complete description line from the parts list (Circuit No., Tektronix Part No., Serial/Model No., etc).

ADJUSTMENT OF GRATICULE FLASH UNIT CHARGING VOLTAGE

The Graticule Flash Unit charging voltage is set at the factory and should not need to be reset unless the unit has been repaired. This adjustment requires a high resistance dc voltmeter (e.g., Triplett 630-NA). To adjust the charging voltage, proceed as follows:

1. Remove the Flash circuit board (see procedure under Component Removal and Replacement in this section).

WARNING

Potentially dangerous high voltages exist on the Flash circuit board when it is operating. DO NOT touch any components when making adjustments.

2. Connect a high resistance dc voltmeter across C26 (observe meter polarity) and set meter for at least a 500 V dc reading.

3. Set R15, Voltage Set, fully counterclockwise and R12, FLASH INTENSITY, fully clockwise.

4. Connect the battery and turn the unit on.

5. Adjust R15, Voltage Set, for a +400 V dc reading on the voltmeter.

6. Momentarily short circuit the shutter sync terminal to cause the unit to flash.

7. Check that the voltage recharges to +400 V dc.

8. Turn the unit off, disconnect the battery, and reinstall the Flash circuit board.

COMPONENT REMOVAL AND REPLACEMENT

When removing, replacing, disassembling, or reassembling components, refer to the Exploded View drawing in the Replaceable Mechanical Parts section. Mechanical disassembly requires a small cross-point type screwdriver with about a six-inch shank and a #1 point.

Camera Sections

REMOVAL. To remove the camera sections, proceed as follows:

1. Set the camera on its back with the mounting-adapter opening facing upward.

2. Unplug the battery-shutter sync plug (visible inside the camera).

CAUTION

After removing the screws in the next step, there is nothing holding the camera sections together. Be careful that the sections do not fall and become damaged.

3. Remove the four screws holding the camera sections together (located inside the camera mounting adapter).

4. Each section may now be lifted up and away from the camera.

REPLACEMENT. To replace the camera sections, reverse the order of the removal instructions.

Batteries

The batteries are mounted on the lens-shutter housing and are replaced as follows:

1. Perform steps 1, 2, and 3 of the Camera Sections disassembly procedure.

2. Lift the camera mounting adapter off the camera and lay it aside.

3. If the batteries are exposed, go to the next step. If not, lift the magnification spacer off the camera and lay it aside.

4. Replace the batteries.

5. Reassemble the camera sections in the reverse order of removal and replace the four screws that hold the sections together.

6. Plug in the battery-shutter sync plug.

Graticule Flash Unit

REMOVAL. To remove the Graticule Flash Unit, proceed as follows:

1. Hold the camera with the mounting adapter opening facing upward.

2. Unplug the battery-shutter sync plug (visible inside the camera).

3. Set the camera on its bottom in the same position as when mounted for photographs.

CAUTION

After removing the screws in the next step, the Graticule Flash Unit can fall free. Therefore, while removing the screws, support the flash unit with your hand.

4. Remove the three screws from the top front part of the camera-mounting adapter (part closest to the opening).

5. Remove the Graticule Flash Unit by letting the front part (where screws were inserted) drop down inside the mounting adapter, and as the top clears the adapter, pull the unit out through the adapter's front opening.

REPLACEMENT. To replace the Graticule Flash Unit, proceed as follows:

1. Set the Graticule Flash Unit (crt viewing door end first) into the camera-mounting adapter's front opening.

2. Tilt the rear of the flash unit up (crt viewing door end), and set its lip onto the adapter's top opening. Then push the flash unit up into the opening.

3. Install the three holding screws.

4. Plug in the battery-shutter sync plug.

Flash Circuit Board

REMOVAL. To remove the Flash circuit board, proceed as follows:

1. Set the camera on its bottom (same position as mounted for photographs).

2. Unplug the battery-shutter sync plug (visible inside camera).

3. Pull off the FLASH INTENSITY knob.

CAUTION

After removing the screws in the next step, the circuit board can fall free. Therefore, support it with your hand when removing the screws.

4. Remove the four screws on the top of the flash unit.

5. Remove the circuit board by letting the end opposite the FLASH INTENSITY control drop down into your hand. Then carefully pull the circuit board down and out of the flash unit housing.

REPLACEMENT. To replace the Flash circuit board, proceed as follows:

1. Set the circuit board into the camera-mounting adapter front opening (controls end first).

2. Tilt the controls end of the circuit board up and guide it into the holes in the flash unit housing.

3. Push the circuit board up into the flash unit housing and install the four holding screws.

4. Push the FLASH INTENSITY knob onto the control shaft.

5. Plug in the battery-shutter sync plug.

TROUBLESHOOTING

WARNING

Potentially dangerous high voltages exist on the Flash circuit board when it is operating. DO NOT touch components while troubleshooting.

Troubleshooting Aids

TROUBLESHOOTING CHART. Fig. 7-1 (located on the pullout page at the rear of the manual) is a guide for locating a defective circuit or part. If only a defective circuit is located, the trouble may be further pinpointed with voltage and waveform measurements shown on the schematic.

SCHEMATIC DIAGRAM. A complete circuit diagram is contained in Fig. 7-2 on the pullout page at the rear of the manual.

Troubleshooting Equipment

The following equipment should be sufficient for troubleshooting:

1. Multimeter
   DESCRIPTION: 20,000 ohms per volt; dc range to at least 550 V; resistance measurement to at least five megohms.
   EXAMPLE: Triplett Model 630-NA or Simpson Model 262.

2. General Purpose Oscilloscope
   DESCRIPTION: Bandwidth and Time Base to display a 10 kHz to 30 kHz waveform.
   EXAMPLE: Tektronix T900-Series or 200-Series.

REPACKAGING FOR SHIPMENT

If the camera system is to be shipped to a Tektronix Service Center for service or repair, attach a tag showing: owner (with address) and the name of an individual at your firm that can be contacted, complete instrument serial number and a description of the service required.

Save and re-use the package in which your instrument was shipped. If the original packaging is unfit for use or not available, repackage the instrument as follows:

1. Obtain a corrugated cardboard carton having inside dimensions of no less than six inches more than the instrument dimensions; this will allow for cushioning. Refer to Table 4-1 for carton test strength requirements.

TABLE 4-1
Shipping Carton Test Strength

Gross Weight	Carton Test Strength
0-4.5 kg (0-10 lbs)	90 kg (200 lbs)
4.5-13.5 kg (10-30 lbs)	124 kg (275 lbs)
13.5-54 kg (30-120 lbs)	169 kg (375 lbs)
54-63 kg (120-140 lbs)	225 kg (500 lbs)
63-72 kg (140-160 lbs)	270 kg (600 lbs)

2. Surround the instrument with polyethylene sheeting to protect the finish of the instrument.

3. Cushion the instrument on all sides by tightly packing dunnage or urethane foam between carton and instrument, allowing three inches on all sides.

4. Seal carton with shipping tape or industrial stapler.

INSTRUMENT OPTIONS

Your camera may be equipped with an option. The available options and brief description of each is given below. Refer to Table 5-1 for the location of option information.

For the latest information on available options, see your Tektronix Catalog or contact your Tektronix representative.

OPTION 1

The same camera as the basic C-5A except without the Graticule Flash Unit.

OPTION 2

This camera fits 400-Series Tektronix instruments with an 8 X 10 centimeter graticule and does not include the Graticule Flash Unit. Also fits 464 and 466.

OPTION 3

This camera fits T900-Series Tektronix instruments and includes the Graticule Flash Unit.

TABLE 5-1
Option Information Locator

Instrument Option	Manual Section	Location of Information
Option 1 (Provides the Standard C-5A Camera except without the Graticule Flash Unit)	1 General Information	Description Table 1-1 contains information on the relationship of Tektronix instrument types used with the Standard and Option 1 cameras.
	2 Operating Instructions	Mounting the Standard and Option 1 Camera Contains information for mounting and removing the Standard and Option 1 cameras.
	6 Instrument Options	Instrument Options Introductory page includes a brief description of the Option 1 camera.
Option 2 (Provides the C-5A Camera for 400-Series Tektronix Instruments that have an 8 X 10 cm graticule. Also includes 464/466)	1 General Information	Description Table 1-1 contains information on the relationship of Tektronix instrument types used with the Option 2 camera.
	2 Operating Instructions	Mounting the Option 2 Camera Contains information for mounting and removing the Option 2 camera.
	6 Instrument Options	Instrument Options Introductory page includes a brief description of the Option 2 camera.
	7 Replaceable Mechanical Parts	Mechanical Parts List and Exploded View Drawing Parts for Option 2 are footnoted in the mechanical parts list and on the exploded view drawing.
Option 3 (Provides the C-5A Camera for T900-Series Tektronix instruments)	1 General Information	Description Table 1-1 contains information on the relationship of Tektronix instrument types used with the Option 3 camera.
	2 Operating Instructions	Mounting the Option 3 Camera Contains information for mounting and removing the Option 3 camera.
	6 Instrument Options	Instrument Options Introductory page includes a brief description of the Option 3 camera.
	7 Replaceable Mechanical Parts	Mechanical Parts List and Exploded View Drawing Parts for Option 3 are footnoted in the mechanical parts list and on the exploded view drawing.

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000	Part first added at this serial number
00X	Part removed after this serial number

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

ACTR	ACTUATOR	PLSTC	PLASTIC
ASSY	ASSEMBLY	QTZ	QUARTZ
CAP	CAPACITOR	RECP	RECEPTACLE
CER	CERAMIC	RES	RESISTOR
CKT	CIRCUIT	RF	RADIO FREQUENCY
COMP	COMPOSITION	SEL	SELECTED
CONN	CONNECTOR	SEMICOND	SEMICONDUCTOR
ELCTLT	ELECTROLYTIC	SENS	SENSITIVE
ELEC	ELECTRICAL	VAR	VARIABLE
INCAND	INCANDESCENT	WW	WIREWOUND
LED	LIGHT EMITTING DIODE	XFMR	TRANSFORMER
NONWIR	NON WIREWOUND	XTAL	CRYSTAL

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
0000Z	MURA CORP.	50 S SERVICE ROAD	JERICHO, NY 11753
01121	ALLEN-BRADLEY CO.	1201 2ND ST. SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P. O. BOX 5012	DALLAS, TX 75222
04713	MOTOROLA, INC., SEMICONDUCTOR PRODUCTS DIV.	5005 E. MCDOWELL RD.	PHOENIX, AZ 85036
07910	TELEDYNE SEMICONDUCTOR	12515 CHADRON AVE.	HAWTHORNE, CA 90250
14936	GENERAL INSTRUMENT CORP., SEMICONDUCTOR PRODUCTS GROUP	600 W. JOHN ST.	HICKSVILLE, NY 11802
16898	VOLTARC TUBES INC.	102 LINWOOD AVENUE	FAIRFIELD, CT 06430
28480	HEWLETT-PACKARD CO., CORPORATE HQ.	1501 PAGE MILL RD.	PALO ALTO, CA 94304
56289	SPRAGUE ELECTRIC CO.		NORTH ADAMS, MA 01247
61637	UNION CARBIDE CORP.	270 PARK AVENUE	NEW YORK, NY 10017
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
79727	C-W INDUSTRIES	550 DAVISVILLE RD.	WARMINSTER, PA 18974
80009	TEKTRONIX, INC.	P. O. BOX 500	BEAVERTON, OR 97077

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
BT15[1]	146-0025-00			BATTERY,DRY:1.5V F CELL	61637	E-91
CR9	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR10	150-1001-00			LAMP,LED:RED,2V,100MA	28480	5082-4403
CR12	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR14	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR22	152-0586-00			SEMICOND DEVICE:600V,500MA	14936	RMP5060
C3	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131N075651104M
C12	283-0212-00			CAP.,FXD,CER DI:2UF,20%,50V	72982	8141050651205M
C17	290-0167-00			CAP.,FXD,ELCTLT:10UF,20%,15V	56289	150D106X0015B2
C18	290-0114-00			CAP.,FXD,ELCTLT:47UF,20%,6V	56289	150D476X0006B2
C23	285-1106-00			CAP.,FXD,PLSTC:0.022UF,600V	14752	23081F223
C26	285-0981-00			CAP.,FXD,ELCTLT:2UF,10%,400V	56289	630P148
C30	290-0246-00			CAP.,FXD,ELCTLT:3.3UF,10%,15V	56289	162D335X9015CD2
Q14	151-0478-00			TRANSISTOR:SILICON,NPN	01295	TIP31A
Q25	151-0527-00			TRANSISTOR:SILICON	04713	2N6241
R1	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R3	315-0514-00			RES.,FXD,CMPSN:510K OHM,5%,0.25W	01121	CB5145
R5	315-0514-00			RES.,FXD,CMPSN:510K OHM,5%,0.25W	01121	CB5145
R7	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R9	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R10	301-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.50W	01121	EB2715
R12	311-1846-00			RES.,VAR,NONWIR:100K OHM,0.5W	01121	W-8350
R14	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R15	311-1560-00			RES.,VAR,NONWIR:5K OHM,5%,0.50W	73138	91A-50000M
R16	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R17	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R19	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R22	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R23	315-0475-00			RES.,FXD,CMPSN:4.7M OHM,5%,0.25W	01121	CB4755
R25	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R30	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
S15	260-0723-00			SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
T20	120-1037-00			XFMR,FLYBACK:POT CORE	80009	120-1037-00
T25	120-1032-00			XFMR,PWR,STU:PHOT FLASH	16898	TR-01S
U10A,B	156-0411-00			MICROCIRCUIT,DI:QUAD-COMP,SGL SUPPLY	04713	MC3302P
V125	150-0179-00			LAMP,PHOTOFLASH:LINEAR	0000Z	MFT3534CP

[1]Quantity of two per instrument.

DIAGRAMS

Symbols and Reference Designators

Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF). Values less than one are in microfarads (μF).

Resistors = Ohms (Ω).

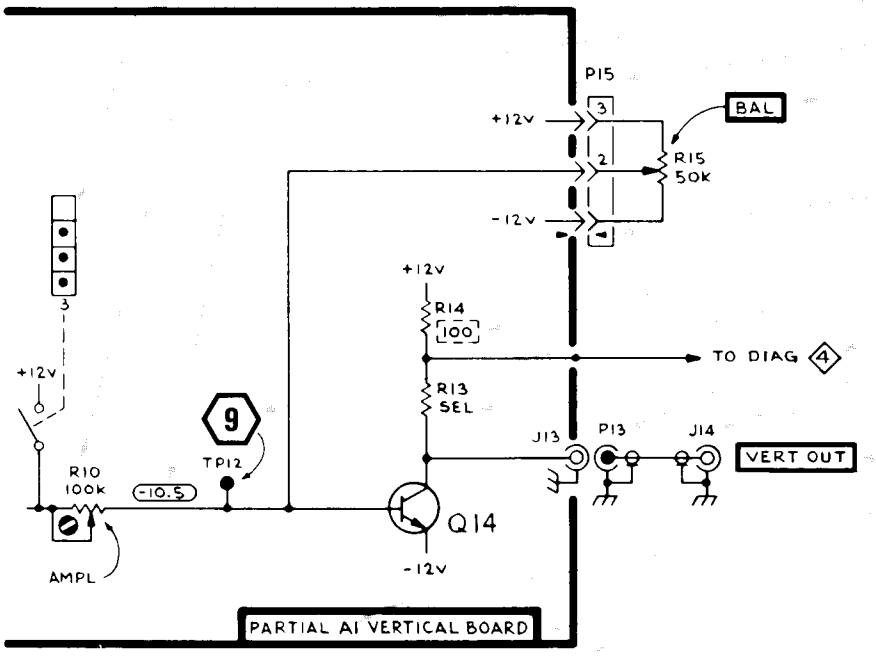
Symbols used on the diagrams are based on ANSI Standard Y32.2-1970.

Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The following prefix letters are used as reference designators to identify components or assemblies on the diagrams.

A	Assembly, separable or repairable (circuit board, etc.)	H	Heat dissipating device (heat sink, heat radiator, etc.)	RT	Thermistor
AT	Attenuator, fixed or variable	HR	Heater	S	Switch
B	Motor	HY	Hybrid circuit	T	Transformer
BT	Battery	J	Connector, stationary portion	TC	Thermocouple
C	Capacitor, fixed or variable	K	Relay	TP	Test point
CB	Circuit breaker	L	Inductor, fixed or variable	U	Assembly, inseparable or non-repairable (integrated circuit, etc.)
CR	Diode, signal or rectifier	LR	Inductor/resistor combination	V	Electron tube
DL	Delay line	M	Meter	VR	Voltage regulator (zener diode, etc.)
DS	Indicating device (lamp)	P	Connector, movable portion	Y	Crystal
E	Spark Gap	Q	Transistor or silicon-controlled rectifier	Z	Phase shifter
F	Fuse				
FL	Filter	R	Resistor, fixed or variable		

The following special symbols are used on the diagrams:



VERTICAL AMPLIFIER 2 CMO 1274

Cam Switch Closure Chart

Internal Screwdriver Adjustment

Test Voltage

Plug to E.C. Board

Panel Adjustment

Plug Index

Modified Component—See Parts List

Refer to Waveform

Refer to Diagram Number

SEL Value Selected at Factory

Coaxial Connector

Panel Connector

Assembly Number

Board Name

Etched Circuit Board Outlined in Black

Schematic Name and Number

VOLTAGE AND WAVEFORM CONDITIONS

WARNING

Potentially dangerous high voltages exist on the Flash circuit board when it is operating. DO NOT touch connections or components when the unit is operating. Disconnect the batteries and discharge C23 and C26 before replacing circuit board parts.

Common Measurement Conditions

All measurements are between the test point and ground.

Do the following before making voltage or waveform measurements:

(1) Connect a 2 MΩ resistor across C26.

(2) Set the Flash Intensity control fully clockwise.

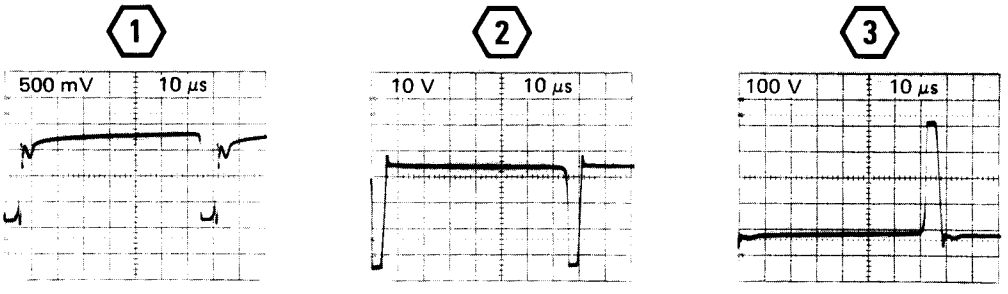
(3) Set R15 for a charge voltage of +400 Vdc.

Voltage Conditions

Voltage measurements may vary as much as 20%.

Waveform Conditions

Test oscilloscope is dc coupled and internally triggered. Vertical deflection and sweep ranges are shown on the waveforms.



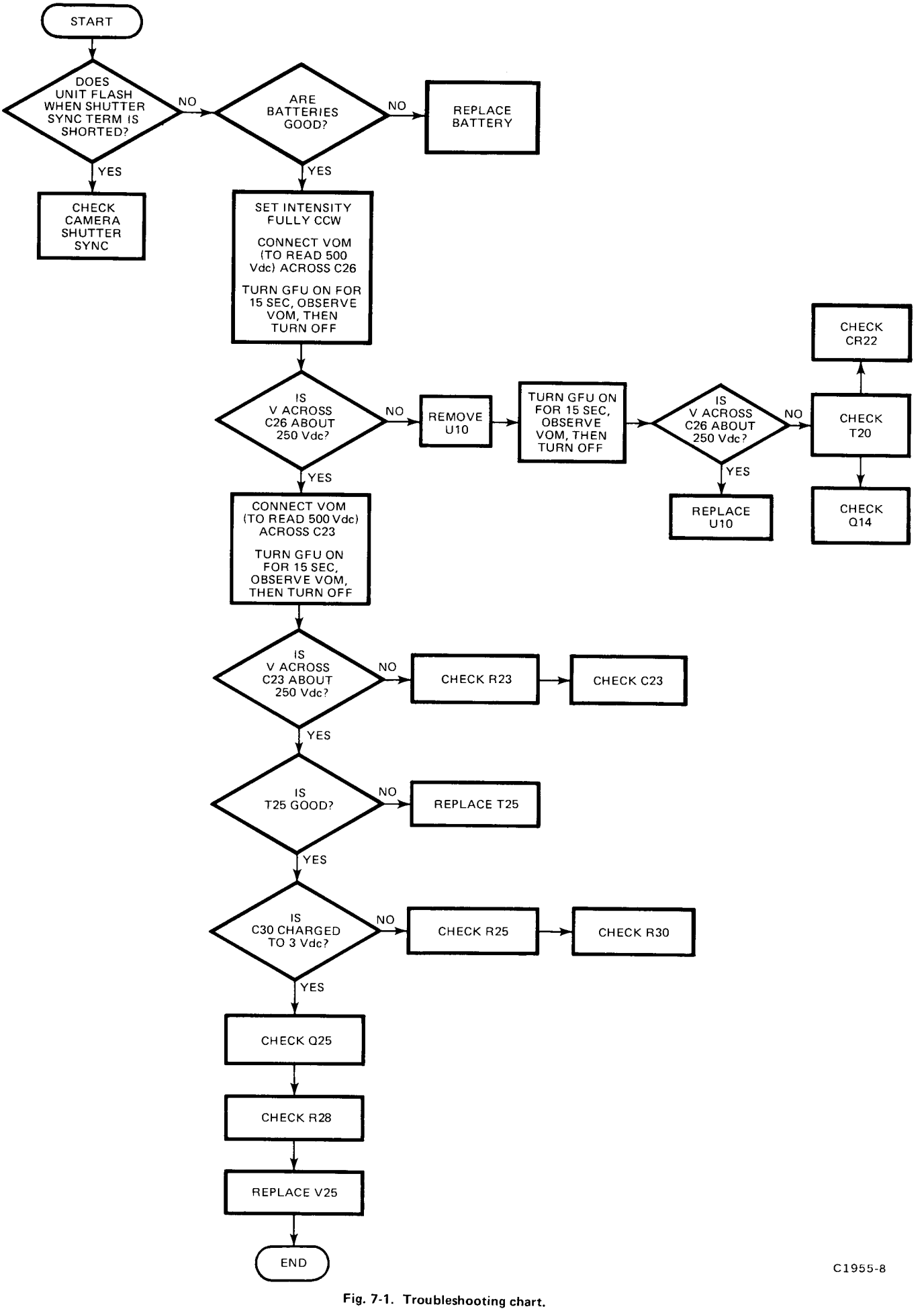
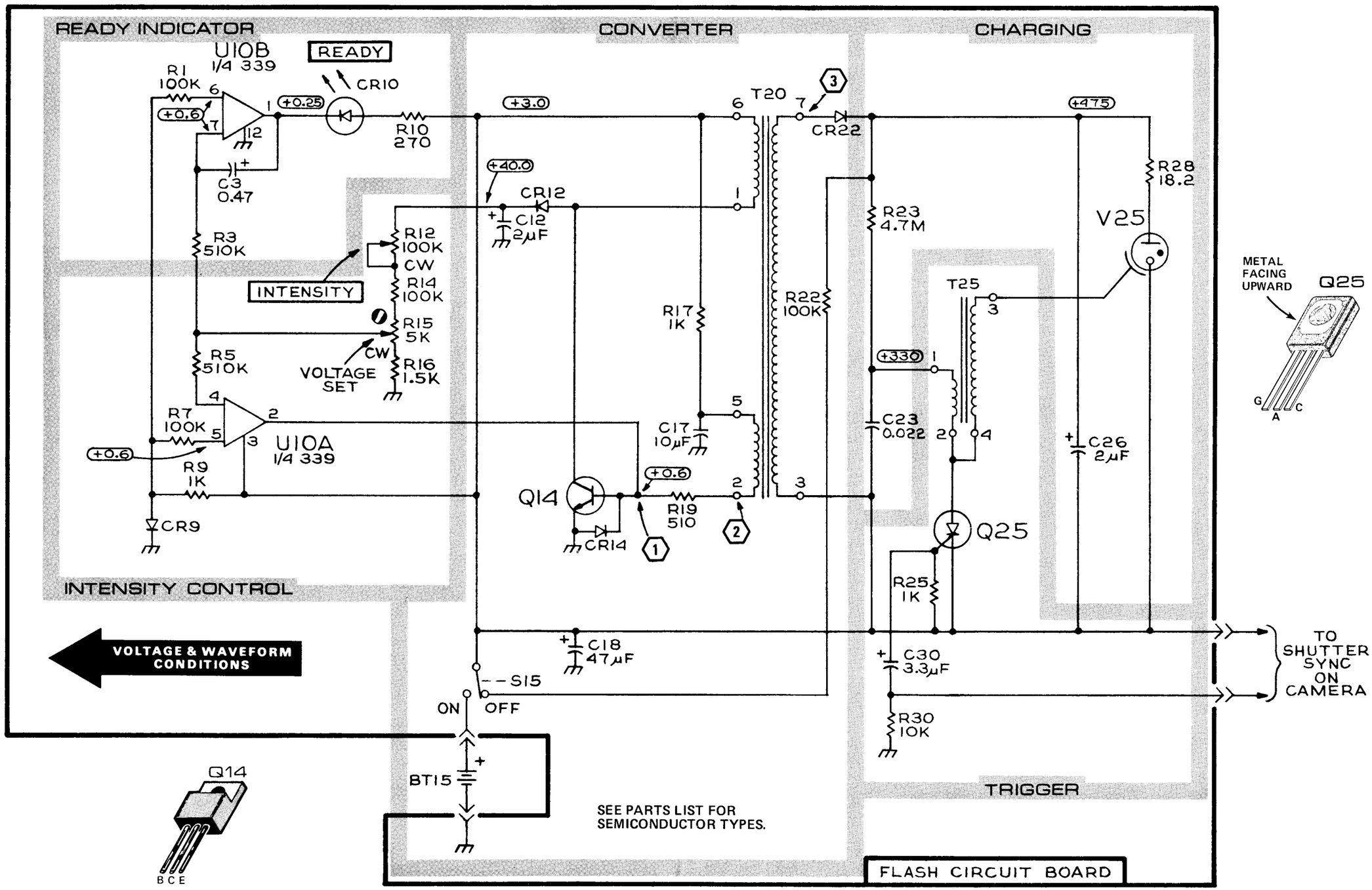


Fig. 7-1. Troubleshooting chart.



REV. A, MARCH 1976
C1955-9

FIG. 7-2. GRATICULE FLASH UNIT SCHEMATIC DIAGRAM

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000	Part first added at this serial number
00X	Part removed after this serial number

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

1 2 3 4 5 Name & Description

Assembly and/or Component
Attaching parts for Assembly and/or Component
\- - - * - - -
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
\- - - * - - -
Parts of Detail Part
Attaching parts for Parts of Detail Part
\- - - * - - -

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol - - - * - - - indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

"	INCH
#	NUMBER SIZE
ACTR	ACTUATOR
ADPTR	ADAPTER
ALIGN	ALIGNMENT
AL	ALUMINUM
ASSEM	ASSEMBLED
ASSY	ASSEMBLY
ATTEN	ATTENUATOR
AWG	AMERICAN WIRE GAGE
BD	BOARD
BRKT	BRACKET
BRS	BRASS
BRZ	BRONZE
BSHG	BUSHING
CAB	CABINET
CAP	CAPACITOR
CER	CERAMIC
CHAS	CHASSIS
CKT	CIRCUIT
COMP	COMPOSITION
CONN	CONNECTOR
COV	COVER
CPLG	COUPLING
CRT	CATHODE RAY TUBE
DEG	DEGREE
DWR	DRAWER
ELCTRN	ELECTRON
ELEC	ELECTRICAL
ELCTLT	ELECTROLYTIC
ELEM	ELEMENT
EPL	ELECTRICAL PARTS LIST
EQPT	EQUIPMENT
EXT	EXTERNAL
FIL	FILLISTER HEAD
FLEX	FLEXIBLE
FLH	FLAT HEAD
FLTR	FILTER
FR	FRAME or FRONT
FSTNR	FASTENER
FT	FOOT
FXD	FIXED
GSKT	GASKET
HDL	HANDLE
HEX	HEXAGON
HEX HD	HEXAGONAL HEAD
HEX SOC	HEXAGONAL SOCKET
HLCPS	HELICAL COMPRESSION
HLEXT	HELICAL EXTENSION
HV	HIGH VOLTAGE
IC	INTEGRATED CIRCUIT
ID	INSIDE DIAMETER
IDENT	IDENTIFICATION
IMPLR	IMPELLER
IN	INCH
INCAND	INCANDESCENT
INSUL	INSULATOR
INTL	INTERNAL
LPHLDR	LAMPHOLDER
MACH	MACHINE
MECH	MECHANICAL
MTG	MOUNTING
NIP	NIPPLE
NON WIRE	NOT WIRE WOUND
OBD	ORDER BY DESCRIPTION
OD	OUTSIDE DIAMETER
OVH	OVAL HEAD
PH BRZ	PHOSPHOR BRONZE
PL	PLAIN or PLATE
PLSTC	PLASTIC
PN	PART NUMBER
PNH	PAN HEAD
PWR	POWER
RCPT	RECEPTACLE
RES	RESISTOR
RGD	RIGID
RLF	RELIEF
RTNR	RETAINER
SCH	SOCKET HEAD
SCOPE	OSCILLOSCOPE
SCR	SCREW
SE	SINGLE END
SECT	SECTION
SEMICOND	SEMICONDUCTOR
SHLD	SHIELD
SHLDR	SHOULDERED
SKT	SOCKET
SL	SLIDE
SLFLKG	SELF-LOCKING
SLVG	SLEEVING
SPR	SPRING
SQ	SQUARE
SST	STAINLESS STEEL
STL	STEEL
SW	SWITCH
T	TUBE
TERM	TERMINAL
THD	THREAD
THK	THICK
TNSN	TENSION
TPG	TAPPING
TRH	TRUSS HEAD
V	VOLTAGE
VAR	VARIABLE
W/	WITH
WSHR	WASHER
XFMR	TRANSFORMER
XSTR	TRANSISTOR

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

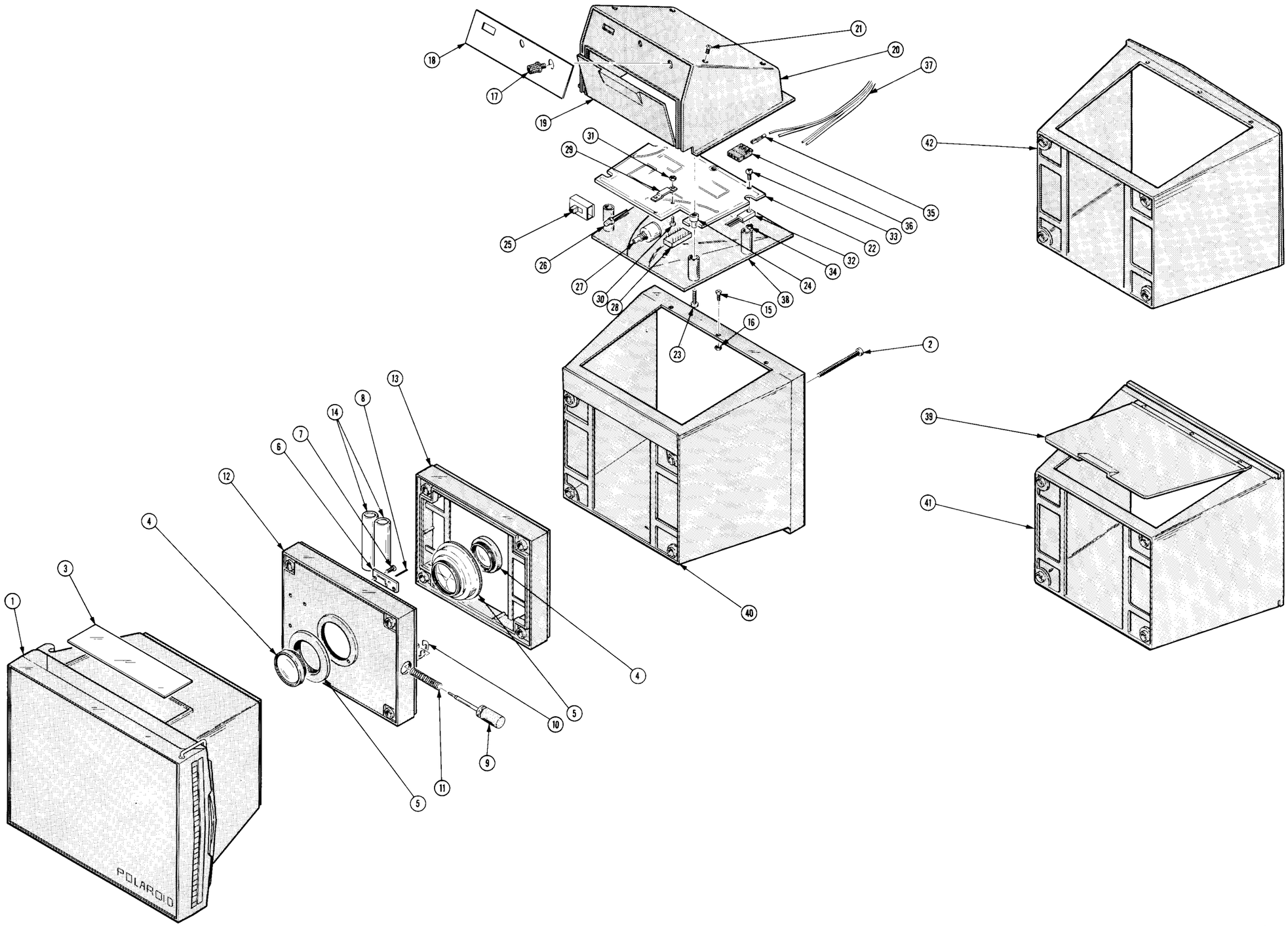
MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
00779	AMP, INC.	P. O. BOX 3608	HARRISBURG, PA 17105
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P. O. BOX 5012	DALLAS, TX 75222
08261	SPECTRA-STRIP CORP.	7100 LAMPSON AVE.	GARDEN GROVE, CA 92642
30181	ILEX OPTICAL COMPANY	690 PORTLAND AVENUE	ROCHESTER, NY 14621
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
77250	PHEOLL MANUFACTURING CO., DIVISION OF ALLIED PRODUCTS CORP.	5700 W. ROOSEVELT RD.	CHICAGO, IL 60650
79136	WALDES, KOHINOOR, INC.	47-16 AUSTEL PLACE	LONG ISLAND CITY, NY 11101
80009	TEKTRONIX, INC.	P. O. BOX 500	BEAVERTON, OR 97077
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
91260	CONNER SPRING AND MFG. CO.	1729 JUNCTION AVE.	SAN JOSE, CA 95112

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
8-1-1	426-1294-01			1	FRAME,LT SHIELD:W/CAMERA BACK	80009	426-1294-01
					(ATTACHING PARTS)		
-2	211-0553-00			4	SCREW,MACHINE:6-32 X 1.5 INCH,PNH STL	83385	OBD
					- - - * - - -		
	----- -----			-	. FRAME ASSEMBLY INCLUDES:		
-3	334-2707-00			1	. PLATE IDENT:MARKED C5A	80009	334-2707-00
	380-0470-01			1	HOUSING LENS:W/LENS AND SHUTTER ASSY	80009	380-0470-01
	122-0960-00			1	. LENS,CAMERA:	80009	122-0960-00
-4	122-0965-00			2	. . LENS,CAMERA:	30181	16102
-5	122-0963-00			1	. . SHUTTER,PHOTO:	30181	15055
-6	670-4345-00			1	. CKT BOARD ASSY:CONNECTOR	80009	670-4345-00
					(ATTACHING PARTS)		
-7	213-0088-00			2	. SCR,TPG,THD CTG:4-24 X 0.25 INCH,PNH STL	83385	OBD
					- - - * - - -		
	----- -----			-	. . CKT BOARD ASSEMBLY INCLUDES:		
-8	136-0338-01			4	. . SOCKET,PIN TERM:FOR 0.026 DIA PIN	00779	1-332075-7
-9	366-1668-01			1	. PUSHBUTTON:GRAY,SHUTTER ACTR,W/SHAFT	80009	366-1668-01
					(ATTACHING PARTS)		
-10	354-0299-00			1	. RING,RETAINING:	79136	5133-25S-MD
					- - - * - - -		
-11	214-2402-00			1	. SPRING,HLCPS:0.24 OD X 1.125 INCH L	91260	OBD
-12	380-0470-02			1	. HOUSING,LENS:W/CLIPS	80009	380-0470-02
-13	361-0771-00			1	SPACER,MGF:LENS/SHUTTER	80009	361-0771-00
-14	----- -----			2	BATTERY,DRY:1.5V,F CELL,(SEE BT15 EPL)		
	016-0363-00[1]			1	FLASH UNIT:C5A	80009	016-0363-00
					(ATTACHING PARTS)		
-15	211-0088-00			3	SCREW,MACHINE:2-56 X 0.281"82 DEG,FLH STL	77250	OBD
-16	210-0405-00			3	NUT,PLAIN,HEX.:2-56 X 0.188 INCH,BRS	73743	2X12157-402
					- - - * - - -		
	----- -----			-	. FLASH UNIT INCLUDES:		
-17	366-1035-00			1	. KNOB:WITH SPRING AND SKIRT	80009	366-1035-00
-18	334-2708-00			1	. MARKER,IDENT:MARKED ON/OFF,BRIGHT/DIM	80009	334-2708-00
-19	200-1932-00			1	. DOOR,CRT VIEW:W/FLASH	80009	200-1932-00
-20	380-0469-00			1	. HOUSING,FLASH:C5A	80009	380-0469-00
					(ATTACHING PARTS)		
-21	211-0119-00			4	. SCREW,MACHINE:4-40X0.25" 100 DEG,FLH,STL	83385	OBD
					- - - * - - -		
-22	670-4294-00			1	. CIRCUIT BD ASSY:FLASH	80009	670-4294-00
					(ATTACHING PARTS)		
-23	211-0014-00			4	. SCREW,MACHINE:4-40 X 0.50 INCH,PNH STL	83385	OBD
-24	129-0599-00			4	. SPACER,POST:0.312 OD X 0.422 INCH LONG	80009	129-0599-00
					- - - * - - -		
	----- -----			-	. . CKT BOARD ASSEMBLY INCLUDES:		
-25	----- -----			1	. . SWITCH,SLIDE:(SEE S15 EPL)		
-26	----- -----			1	. . LAMP,LED:(SEE CR10 EPL)		
-27	----- -----			1	. . RESISTOR,VAR:(SEE R12 EPL)		
-28	136-0269-02			1	. . SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C931402
-29	343-0316-00			1	. . CLAMP,CABLE:	80009	343-0316-00
					(ATTACHING PARTS)		
-30	211-0007-00			2	. . SCREW,MACHINE:4-40 X 0.188 INCH,PNH STL	83385	OBD
-31	210-0551-00			2	. . NUT,PLAIN,HEX.:4-40 X 0.25 INCH,STL	83385	OBD
					- - - * - - -		
-32	----- -----			2	. . TRANSISTOR:(SEE Q14,Q25 EPL)		
					(ATTACHING PARTS FOR EACH)		
-33	211-0008-00			1	. . SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-34	210-0406-00			1	. . NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
					- - - * - - -		
-35	131-0965-00			4	. . CONTACT,ELEC:0.25" SQ,22-26 AWG WIRE	80009	131-0965-00
-36	352-0163-00			1	. . CONN BODY,PL,EL:5 WIRE BLACK	80009	352-0163-00
-37	175-0827-00			FT	. . WIRE,ELECTRICAL:4 WIRE RIBBON	08261	TEK-175-0827-00
-38	378-0846-01			1	. . REFLECTOR,LIGHT:	80009	378-0846-01
	378-0846-00			1	. . . REFLECTOR,LIGHT:FLASH TUBE	80009	378-0846-00
	334-2770-00			1	. . . MARKER,IDENT:CAUTION	80009	334-2770-00

[1]Standard and Option 3 Camera only.

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
8-1-39	200-1933-00[1]			1		DOOR,CRT VIEW:W/O FLASH	80009	200-1933-00
						(ATTACHING PARTS)		
	211-0088-00			3		SCREW,MACHINE:2-56 X 0.281"82 DEG,FLH STL	77250	OBD
	210-0405-00			3		NUT,PLAIN,HEX.:2-56 X 0.188 INCH,BRS	73743	2X12157-402
						- - - * - - -		
-40	016-0357-00[2]			1		ADAPTER HOOD:C5A	80009	016-0357-00
-41	016-0359-00[3]			1		ADAPTER HOOD:C5A OPTION 2	80009	016-0359-00
-42	016-0358-00[4]			1		ADAPTER HOOD:C5A OPTION 3	80009	016-0358-00

[1]Option 1 and 2 Camera only.
[2]Standard and Option 1 Camera only.
[3]Option 2 Camera only.
[4]Option 3 Camera only.



C5A CAMERA

FIG. 8-1 EXPLODED

TEKTRONIX®
committed to technical excellence

MANUAL CHANGE INFORMATION

PRODUCT C-5A Camera
070-1995-00

CHANGE REFERENCE C3/276
DATE Feb. 5, 1976

CHANGE:	DESCRIPTION

TEXT CHANGE

Inside Front-cover Page, Lower left corner

CHANGE Instrument Manual Number TO READ: 070-1995-00

ELECTRICAL PARTS LIST CHANGE

Section 6, Replaceable Electrical Parts, Page 6-3

CHANGE C3 Part No. and Description TO READ:

C3 283-0203-00 CAP., FXD, CER DI: 0.47 µF, 20%, 50 V

MECHANICAL PARTS LIST CHANGE

Section 8, Replaceable Mechanical Parts, Page 8-3

CHANGE Fig. & Index Nos. 8-1-15 and -16 TO READ AS FOLLOWS:

Fig. & Index No.	Tektronix Part No.	Qty	Name & Description
-15	211-0177-00	3	SCREW, MACHINE: 4-40 X 0.312", PNH STL (STD, OPT 1 & 2 ONLY)
-15	211-0088-00	3	SCREW, MACHINE: 2-56 X 0.281" 82 DEG, FLH STL (OPT 3 ONLY)
-16	210-0551-00	3	NUT, PLAIN, HEX.: 4-40 X 0.250 inch, BRS (STD, OPY 1 & 2 ONLY)
-16	210-0405-00	3	NUT, PLAIN, HEX.: 2-56 X 0.188 INCH, BRS (OPT 3 ONLY)

TEKTRONIX®
committed to technical excellence

MANUAL CHANGE INFORMATION

PRODUCT C-5A CAMERA
EFF SN B020650-up

CHANGE REFERENCE M25,046
DATE 4-9-76

CHANGE:	DESCRIPTION

070-1995-00

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

CHANGE TO:

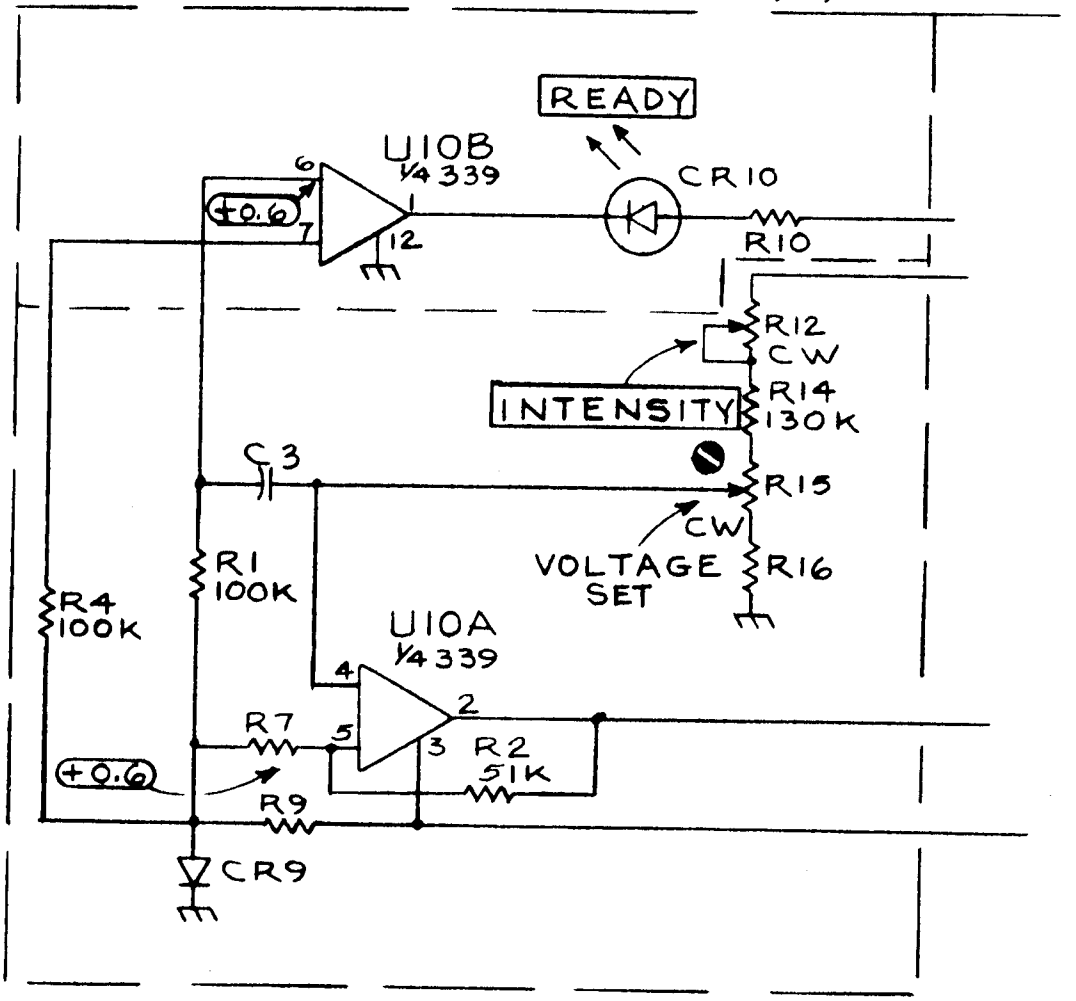
R14	321-0396-00	RES.,FXD,FILM:130K OHM,1%,0.125W

REMOVE:

R3	315-0514-00	RES.,FXD,CMPSN:510K OHM,5%,0.25W
R5	315-0514-00	RES.,FXD,CMPSN:510K OHM,5%,0.25W

ADD:

R2	315-0513-00	RES.,FXD,CMPSN:51K OHM,5%,0.25W
R4	315-0104-00	RES.,FXD,CMPSN:100K OHM,5%,0.25W



TEKTRONIX®
committed to technical excellence

MANUAL CHANGE INFORMATION

PRODUCT C-5A Camera
EFF SN B020650

CHANGE REFERENCE M25,046
DATE 5-11-76 ADDENDUM

CHANGE:	DESCRIPTION

070-1995-00

TEXT CORRECTION

Page 3-1 THEORY OF OPERATION

Column 1 CHARGING AND INTENSITY CONTROL, Line 2

CHANGE TO READ:

The charge level on C26 (between 250 and 450 volts)

Page 4-2 CORRECTIVE MAINTENANCE

Column 2 ADJUSTMENT OF GRATICULE FLASH UNIT CHARGING VOLTAGE

Step 5 CHANGE TO READ:

5. Adjust R15, Voltage Set, for a +450 V dc reading on the voltmeter.

Step 7 CHANGE TO READ:

7. Check that the voltage recharges to +450 V dc.

Page 7-2 Common Measurement Conditions

Step (3) CHANGE TO READ:

(3) Set R15 for a charge voltage of +450 V dc.

CAMERA BACK ASSEMBLY, PACK FILM
(Part No. 122-0752-00)

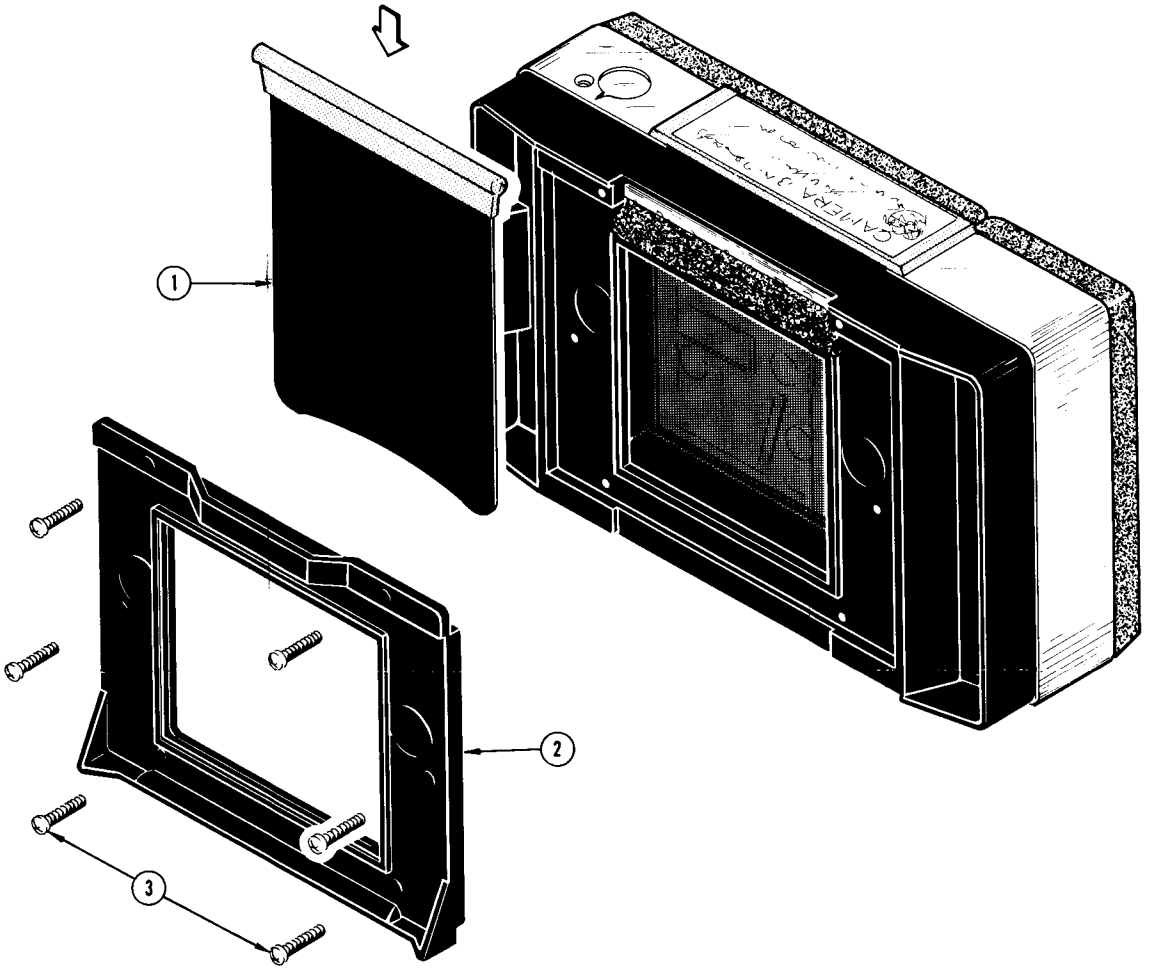


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Serial/Model No. Disc	Qty	Description
	122-0752-00			1	CAMERA BACK ASSEMBLY, Pack Film
	- - - - - -			-	assembly includes:
1	122-0751-00			1	DARK SLIDE ASSEMBLY
2	122-0750-00			1	GUIDE, dark slide
	- - - - - -			-	mounting hardware: (not included w/guide)
3	213-0082-00			6	SCREW, thread cutting, 4-40 x 1/2 inch, PHS
	387-0893-00			1	PLATE, focus (not shown)

DATA SHEET
NO. 062-0966-00
DATE NOV. 1968(R)