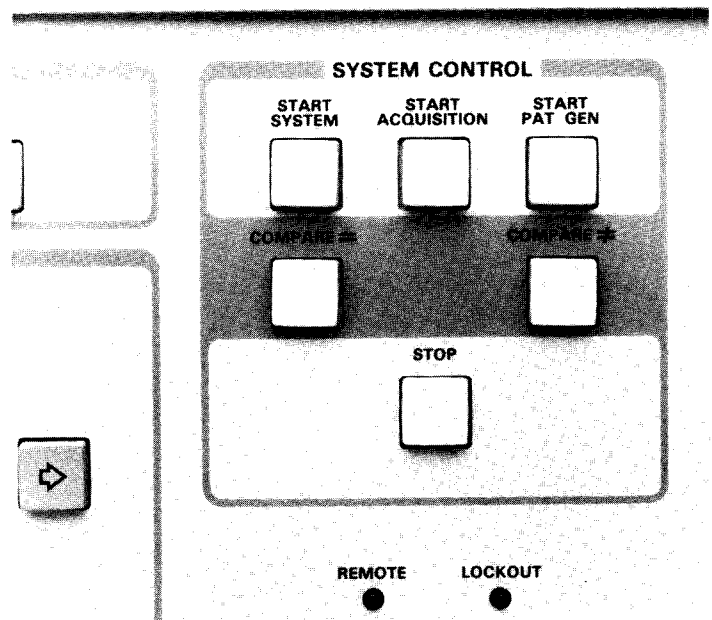


PC507  
492/P  
2215

# SERVICETEKNOTES



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) CM 119-0631-05, 4014/15 AFK REED SWITCH REPLACEMENT

Ref: CM 119-0631-05 Manual  
061-2609-00 4014/15 Service  
Manual 070-2303-00

The Reed switches used in the CM 119-0631-05 "Auxiliary Function Keyboard" are the same as those used in the 4014 keyboard. These Reed switches are Part Number 260-1507-00.

W<sup>2</sup> Issue 11-24

C50 SERIES GROUND LOOP PROBLEM

Reference: C51 - B094250 & Below  
C53 - B095480 & Below

) A ground loop problem has been discovered in the C50 Series cameras. This problem is only evident when using the camera in the Single Sweep Mode with the + Gate In connected and using a ground closure (SPST push button) to actuate the shutter through the Remote phone jack. The shutter will open correctly in this condition but will close automatically in 5 seconds. The correct sequence is for the shutter to remain open indefinitely, until a trigger occurs and then closes 5 seconds after the +Gate is received from the 7000 Series oscilloscope.

Cameras with serial numbers below those listed should be modified as needed.

1. Remove camera side cover and unplug the Shutter Control Board from the edge connector P10.
2. Remove the two screws that mount P10 to the camera frame.
3. Locate the black ground lead that runs from the remote jack to the ground lug that is directly above one end of P10.
4. Unsolder the lead from the ground lug and reconnect it to pin #7 of P10.

5. Install #20 gauge ground strap between pins #7 and #8.
6. Reassemble the camera.

W<sup>2</sup> Issue 12-1

DC503A - HIGH OR ERRATIC COUNTING WITH LOW FREQUENCY, SLOW-RISE INPUTS

Serial Numbers Affected: All

DC503As may exhibit a problem with low frequency, (approximately 1K Hz or less) slow rise (sine or ramp) waveforms in that the counter may appear unstable or count high.

The DC503A is specified at 20 mv RMS input sensitivity, and is typically much better. Any high frequency noise riding on the signal that goes through the 20 mv hysteresis window will trigger the counter, causing an unstable or erroneous display.

The problem normally appears with sine or sawtooth waveforms at frequencies of approximately 1K Hz or less and amplitudes of 200 mv or greater. When the X5 attenuator is selected or the signal is externally attenuated, the problem usually goes away.

W<sup>2</sup> Issue 11-23

DM44, U3165 A/D I.C. REPLACEMENT

Reference: Mod 41184, Schematic 1  
Input Attenuator

S/N: 464 & 466 B049020 & Below  
465B B043400 & Below  
475 B050840 & Below  
475A B047080 & Below  
475A, PG B050775 & Below

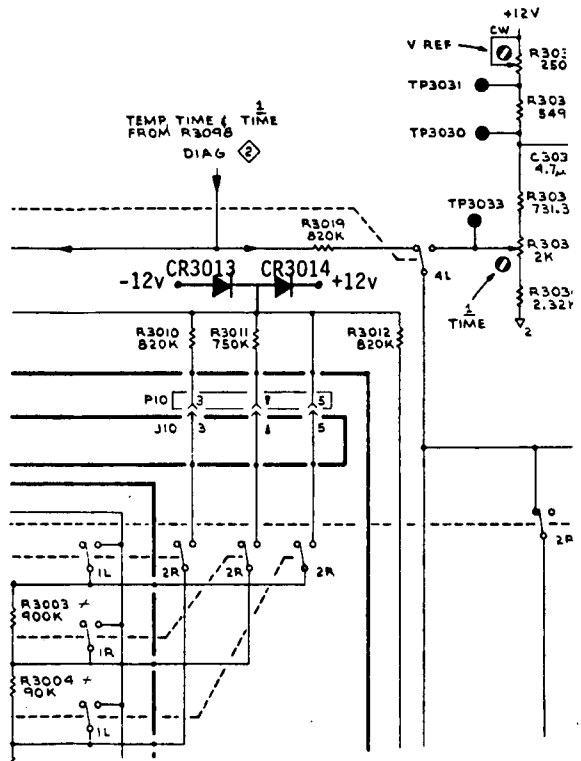
The old I.C., P/N 156-0477-00, used for the A/D processor, U3165, is no longer

(ARTICLE CONTINUED ON THE NEXT PAGE)

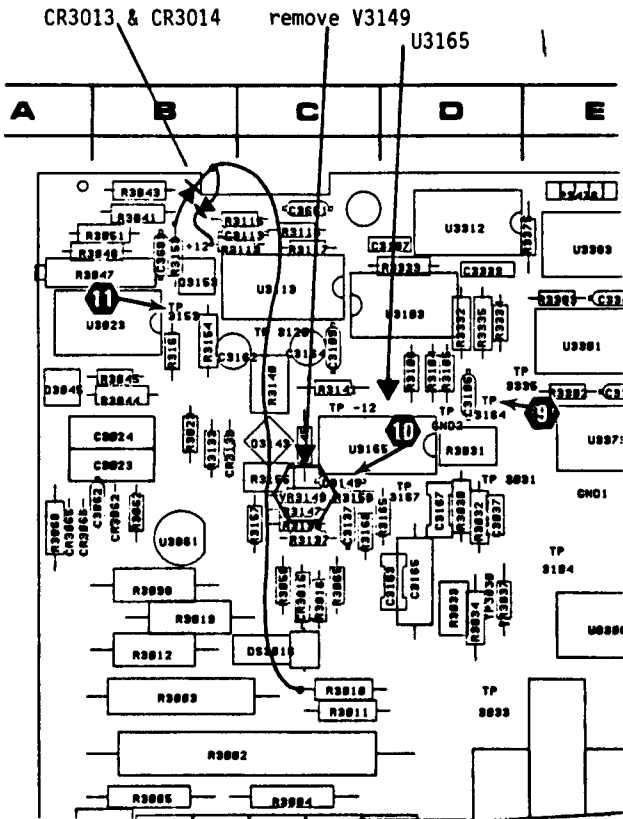
DM44, U3165 A/D I.C. REPLACEMENT (cont.)

available. A new I.C., P/N 156-1268-00, is now used for a replacement. The I.C. is not a direct replacement and the circuit must be modified as follows:

1. Remove VR3149
2. Add CR3013 & CR3014, P/N 152-0323-00, at location shown in the diagram. (CR3013 anode to R3153 [-12 volt supply], CR3014 cathode to R3113 [+12 volt supply], the two diodes are joined together and wired to R3010.)
3. Replace U3165.



W<sup>2</sup> Issue 12-1



GMA102A L.V.P.S. Q5008 MODIFICATION S42417

Early GMA102A Low Voltage Power Supplies (prior to serial number B060000) have shown a particular failure mode where R126, R127 and R129 overheat. Other components that typically fail as a result are CR681, Q101, R203, R210, R301, U221 and VR210. This failure occurs when the connector on the leads of Q5008 comes loose.

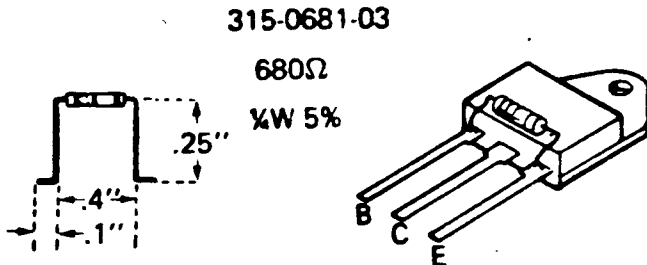
This type of failure is prevented by installing modification S42417 as follows:

- Remove R210 (680  $\Omega$ , 315-0681-03) and VR210 (120 v zener) from the 670-5105-04 power supply board. The board level changes to -07 as a result.
- Add another 680  $\Omega$ , 315-0681-03 resistor to Q5008 across the base-emitter junction (see figure). The leads of

(ARTICLE CONTINUED ON THE NEXT PAGE)

GMA102A L.V.P.S. Q5008 MODIFICATION  
S42417 (cont.)

R210 will be too short to use; the resistor must not obstruct connecting Q5008's socket.



Transistor/Resistor combination

This mod should be installed in any pre-B060000 GMA102A whenever convenient. Kit number 050-1479-00 is available for replacement of damaged boards. It contains:

- 1 670-5105-07 L.V.P.S. Board
- 1 315-0681-03 680 ohm resistor
- Instructions

W<sup>2</sup> Issue 12-1

PG507: DUAL TRACKING SUPPLY IMPROVEMENT

SERIAL NUMBER AFFECTED: Below B010320

REFERENCE: Instruction Manual,  
 Schematic 11

To prevent random failures in the dual tracking supply caused by underfusing, four 1 amp fuses were changed to 1.6 amp fuses as follows:

A14F1720, A14F1721, A14F1820,  
 A14F1821 change from P/N 159-0019-00  
 to 159-0003-00.

W<sup>2</sup> Issue 11-24

P6042 M-18, P/N 156-0014-00,  
NOW AVAILABLE

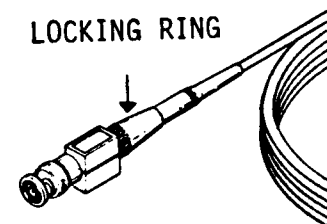
A new vendor has been located for the M-18 IC, P/N 156-0014-00. An adequate supply of parts is available and can be ordered through normal channels.

W<sup>2</sup> Issue 12-1

P6120 MAINTENANCE INFORMATION

Some confusion exists about how the P6120 compensation box should be removed from the cable assembly. It does not pull off as in previous types of modular probes. The locking ring must be unscrewed first, then the module can be pulled off, being careful not to lose the spring washer that fits over the cable bushing. (Early version probes that do not have a spring washer, P/N 210-1377-00, should have it installed.)

When replacing the comp box module, first place the locking ring over the cable bushing and then carefully (to avoid damaging the center conductor pin) push the module onto the cable assembly, then screw the locking ring down tight. The shoulder halfway up on the boot should fit against the back of the locking ring. If it does not, they should be carefully forced together until the comp box snaps into place. Retighten the locking ring.



W<sup>2</sup> Issue 11-24

SPG 2 BURST GAIN PHASE SHIFT

Reference: SPG1/2 Instruction Manual  
P/N 070-2104-00  
Mod 44524

Transistors from different vendors are showing widely varying response characteristics (151-0190-00). This part is used in Q665, Q666, Q718, Q719 and Q715

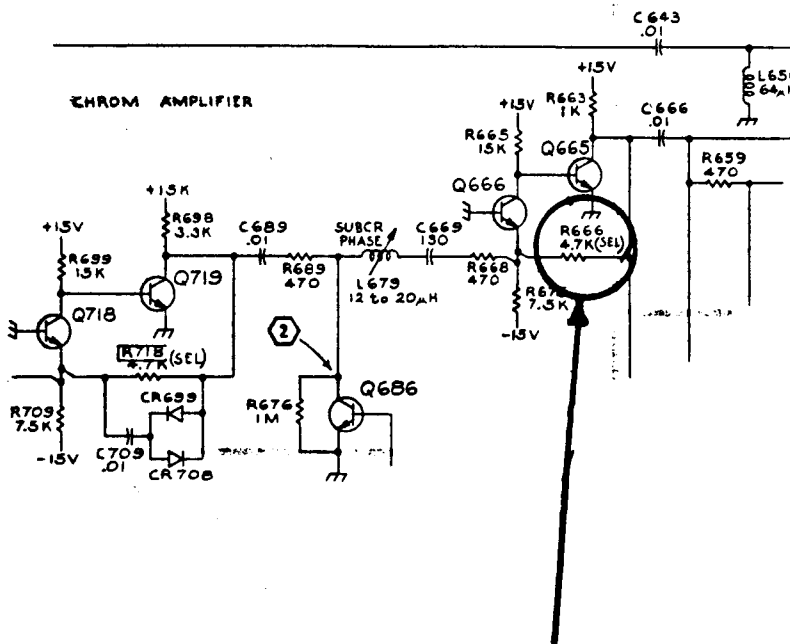
on the Subcarrier Lock Board, A23.

In the past these transistors have had to be hand selected to keep phase shift with a change in burst gain within specifications.

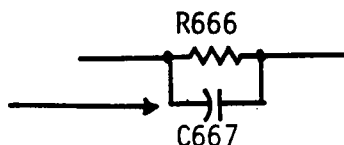
The addition of a test selectable capacitor (C667, 281-0670-00, nominally 1.8pf) will help avoid this selection routine.

Add C667 in parallel with R666 and select a value between 0 and 4.7pf to obtain minimum phase change with burst gain change, as necessary. See the illustration.

W<sup>2</sup> Issue 11-24



Add C667  
281-0670-00  
(Nominal 1.8pf)



TDC CABLE REPLACEMENT PARTS

Reference: TDC Instruction Manual  
P/N 070-2597-01

Two cable assemblies do not have part numbers listed in the manual. The following numbers are supplied as possible substitutes.

175-2409-00 VCU Signal (L.O. Return) from P43 to P82--Diagram 2v & 2u

175-2412-00 I.F. Out from P38 to Front Panel--Diagram 1v & 1u

W<sup>2</sup> Issue 11-24

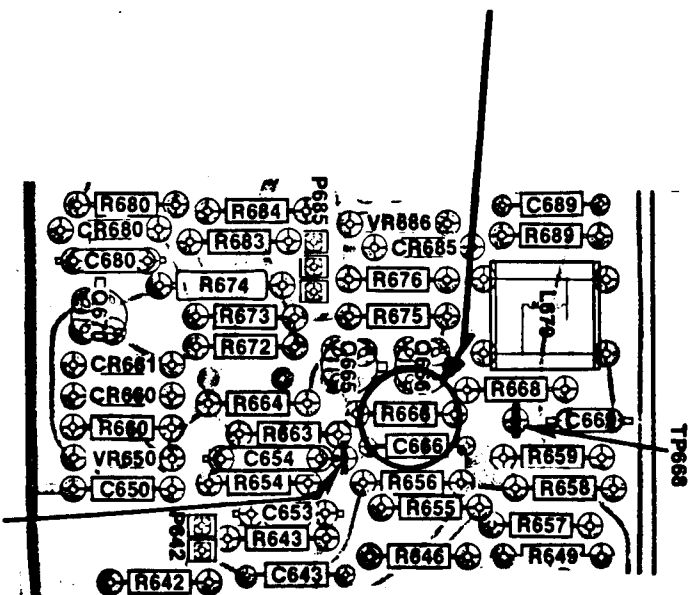
TM5006: HIGH LOAD RELIABILITY IMPROVED

SERIAL NUMBERS AFFECTED: Below B020200

Switching transistors, AA11Q1640 and A111650 were changed from P/N 151-0632-00 to 151-0679-00. The new devices prove to be more reliable at high load and high temperature situations. In addition, A11R1530 and A11R1460 were changed from 2.2 ohm, 2W, P/N 308-0686-00 to 1.8 ohm, 2W, P/N 308-0703-00.

Also, to improve the cooling to A11CR500 in the +8V supply, the insulator plate was changed from 386-0786-00 at S/N B020400.

W<sup>2</sup> Issue 11-24



TSG-3 CALIBRATION PROCEDURE

Reference: TSG-3 Instruction Manual  
P/N 070-2108-01

The TSG-3 calibration procedure has been amended to specify the use of the 067-0916-00 VAC. Manual changes are out and in microfiche now.

This new procedure is highly recommended on the basis of time savings, accuracy and repeatability. Please implement these changes ASAP.

More procedures have been written and will be in microfiche soon, including the following: 528A  
SPG 11/12  
TSG-1  
TSG-5 and others.

These all refer to the use of the 067-0916-00.

W<sup>2</sup> Issue 12-1

147A/149A HARMONIC MEASUREMENTS

Reference: 147A/149A Instruction Manual  
P/N 070-2029-00

Step 1, Page 3-25, starts the procedure for checking and adjusting the harmonics of the Multiburst Test Signal. It specifies that Multiburst harmonics be at least -40dB down or more from the fundamental. Theoretically, this is the desired spec of each individual frequency packet. However, we run into some trouble measuring, for instance, the second harmonic of 1.5MHz (147A) when it exists in conjunction with the first harmonic, or fundamental, of the 3.0MHz packet.

To do this correctly, one would need a convenient method of triggering a spectrum analyzer only for the duration of the packet of interest. This is possible using a 7854/496P combination by acquiring the signal on the 7854 and sending the desired portion of it through GPIB to the 496P for analysis.

Due to the expense of this sort of a set-up, most servicing people are offered an alternative.

With present equipment, look for the harmonics of the Multiburst package above 6MHz and insure that these are at least -40dB below the fundamental.

W<sup>2</sup> Issue 11-24

468 POOR STORAGE TRIGGERING AT 10μs/DIV OR FASTER

Reference: Schematic 14 Memory  
& 7 Trigger

Poor storage triggering will occur when P160, Memory board, or P483, Trigger board, are key'd incorrectly putting the hold-off signal (BHOF) to ground. The symptoms include: poor triggering at 10μs/div or faster the first .3 divisions of the display in post trigger will not look correct and erratic triggering in pretrigger (most noticeable at 1μs/div or faster).

NOTE: P483 is pulled when using the time base troubleshooting chart 4.2. The possibility exists that P483 may be miskey'd at this time.

W<sup>2</sup> Issue 11-23

492/P FM CAUSED BY THE SHAPER BIAS BOARD (A21)

492 Serial Number B020940  
492/P Serial Number B031240

The reference zener (A21, U2047) on the shaper bias board (A21) is contributing noise to the voltage regulators on that board. The varactor in turn translates this to an FM contribution. (NOTE: 2.4 microvolts on the varactor will cause a hertz of deviation.)

(ARTICLE CONTINUED ON THE NEXT PAGE)



### 492/P FM CAUSED BY THE SHAPER BIAS BOARD (A21) (cont.)

To reduce the FM, remove U2047, P/N 156-0783-00, and replace it with VR2047, P/N 152-0727-00, which is quieter. Three resistors will also require changing since the present zener is nominally 6.95V and the new zener is nominally 6.3V. Change R2044 from 6.98K $\Omega$  to 5.49K $\Omega$ , P/N 321-0264-00. Change R3037 from 5.76K $\Omega$ , to 4.99K $\Omega$ , P/N 321-0260-00. Change R2087 from 4.02K $\Omega$  to 3.57K $\Omega$ , P/N 321-0246-00. These parts are located on the (A21) Shaper Bias Board, P/N 670-5512-02, in the 492/P, the board part number will change to 670-5512-03 when the mod is implemented.

W<sup>2</sup> Issue 11-23

### 528 INTERMITTENT SWEEP & RGB

Reference: 528 Instruction Manual  
P/N 070-0800-00  
Mod S39811

Intermittent sweep and RGB operation has often been caused by poor electrical contact in relay K370.

A new part is available for this application. Use P/N 148-0027-02.

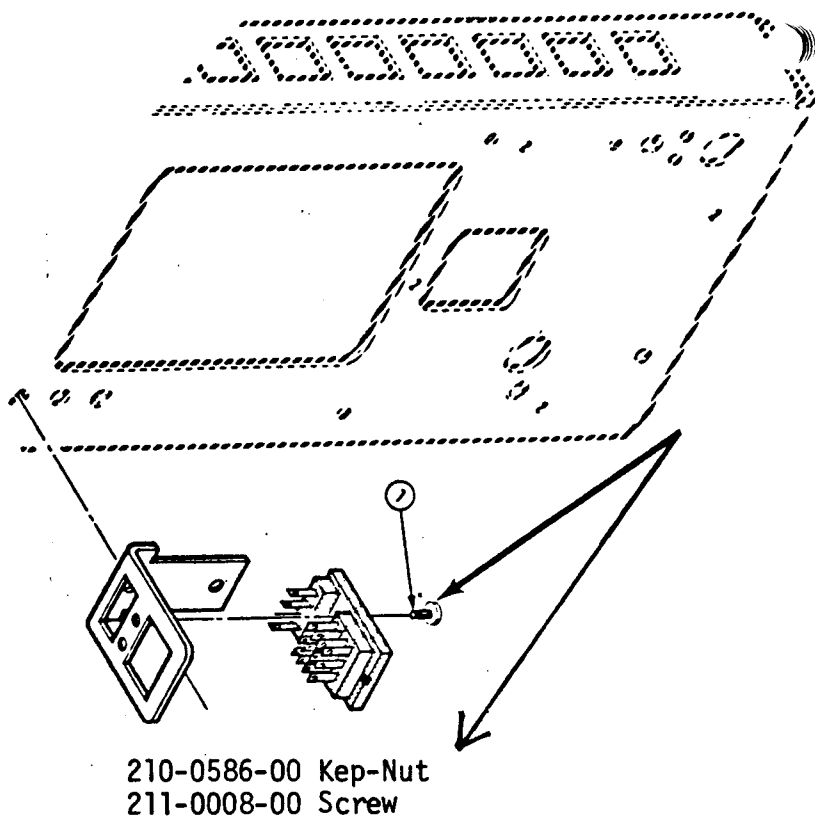
W<sup>2</sup> Issue 12-1

### 528AWW/528AWX LOOSE RELAY

Reference: 528AWW/528AWX Instruction Manual P/N 070-3802-00  
Mod M44823

The screw on the Relay Assembly is not long enough, thereby allowing the parts to loosen.

Replace the self-taping screw on the relay assembly with a 210-0586-00 Kep-Nut and 211-0008-00 screw whenever a unit is in for service (see diagram).



W<sup>2</sup> Issue 11-24

### 606A TRANSISTOR SPACER CHANGED; 39267

The heat sink on Q570 (low voltage power supply board in the 606A) had been known to short against the bottom panel on some of the earlier products. To prevent this, the spacer beneath Q570 has been replaced with one of a smaller size. The shorter spacer is 342-0324-00 and has been installed in 606A products starting B010332.

This article is for your information only.

W<sup>2</sup> Issue 12-1

### 606B DYNAMIC FOCUS BOARD CHANGE; 39039

The foil pattern and component layout for the dynamic focus board in the 606B has been changed. This was done to reduce solder bridges and to incorporate (ARTICLE CONTINUED ON THE NEXT PAGE)

606B DYNAMIC FOCUS BOARD CHANGE; 39039  
(cont.)

some hand-added components. In addition, a test point (TP298) for checking the stigmator 2 amplifier output was added. As a result, the board number changed from 670-6214-00 to 670-6214-01. This change was effective in 606B serial number B010872.

This article is for your information only.

W<sup>2</sup> Issue 12-1

620 OPTION 20/31 FUSE MODIFICATION  
39270

Fuse F225, unique to the 620 Option 20/31, fails readily without any malfunction in the product. To remedy this, Mod 39270 replaces the 1.25 amp fuse with a 1.5 amp component, part number 159-0160-00. The back panel CAUTION label is also changed to reflect the new fuse value. The part number of the new panel is 334-3710-01.

This change is effective in 620 serial number B011350. The fuse and label may be installed in earlier products to avoid needless service calls.

W<sup>2</sup> Issue 12-1

634 CRTS DELETED

The 154-0799-01 (reduced brightness) and 154-0800-00 (P4 phosphor) CRTs for the 634 monitor are no longer available. When replacement is necessary, the 154-0799-00 CRT should be used.

W<sup>2</sup> Issue 12-1

650 SERIES HORIZONTAL POSITIONING  
PROBLEMS

Reference: 650A Instruction Manual  
P/N 070-2234-00

Many horizontal positioning problems are typically cured by replacing transistors, IC's, and controls. However, don't overlook replacing C4160 and C4165 on the Horizontal Output board.

The symptom is the inability to position the picture properly in the raster. The picture will jump from position to position as the centering control (R7490) is rotated. The proper part is 290-0782-00.

W<sup>2</sup> Issue 11-24

834 - RESET NOT BEING MADE ON POWER-UP

Reference: 834 Instruction Manual,  
Part Number 070-3399-00 Fold 11,  
Power Supply, Modification #43986

Affected Serial Numbers - B041758  
and below

Indications - On power-up the instrument will not run the power-up test and the right-most fluorescent display will be on. Some instruments may begin power-up test but will not complete it and display "834 MALFUNCTION."

This problem has been traced to the slow rise-time of the +5 volt supply. When the reset pulse is sent from the 555 to the microprocessor the +5V supply may not be above the threshold required for reset, this causes the processor to lock up.

The situation may be corrected by decreasing the rise time of the +5V supply. This is accomplished by changing A4C253 on the Power Supply board to 1 microfarad (Tektronix Part Number 290-0778-00).

W<sup>2</sup> Issue 11-24

1420 SERIES SIGNAL LEVEL WITH GAIN CONTROL OUT OF DETENT

Reference: 1420 Series Manual  
P/N 070-2899-00  
Mod 45112

When the Gain control is switched out of the detent position, the uncalibrated signal of color burst must be at half amplitude or less. This has previously been accomplished in manufacturing by selecting CR1304 or CR1401.

To eliminate the need for selection, change R1503 to a 315-0561-00, 560 ohm 5% 0.25W resistor.

This change can be used when replacing CR1304 or CR1401 as necessary.

W<sup>2</sup> Issue 12-1

1430 NOISE PEDESTAL DELAY RANGE

Reference: 1430 Instruction Manual  
P/N 070-1455-00

When adjusting the noise pedestal (Step 5) for width and delay range, maximum delay should never allow the noise to go more than .5µsec into sync. Select C2151 to keep this from happening. Increasing C2151 one step up in value should give the desired results. Noise start and noise stop will have to be readjusted for 26µsec pedestal length.

W<sup>2</sup> Issue 12-1

1440 CLOSED LOOP OPERATION

Reference: 1440 Instruction Manual  
P/N 070-1498-00  
1440 I2R, I3B, I3C  
Instruction Manual Insert  
P/N 061-1448-00

The following is a list of programming jumpers that must be properly set for "closed loop" operation of the 1440's.

Also included are four changes necessary for "open loop" operation.

Closed Loop Operation

- P669 Pin 2 & 3  
P664 Pin 2 & 3 (for positive reference as used with the Tektronix 1450's)  
P540 Pin 1 & 2  
Located on the Insertion Control Board (Bottom Left)  
P4384 Align key on jumper with key on circuit board (side to side)  
Located on the Decoder board (Top middle)  
P5150 Pin 1 & 2 When PROC mode VIR is used  
Located on the Error Amp board (Top left)  
P634 (I3B, I3C) Used to select zero carrier reference pulse (Line 15 to 21)  
P3284(I2R) Reference Pulse (Line 15-21)  
Located on the Timing board (Top right)

Open Loop Operation

- P669 Pin 1 & 2  
P540 Pin 2 & 3  
P4384 Rotate 90°  
P5150 Pin 2 & 3

W<sup>2</sup> Issue 11-24

1470 INTERMITTENT GENLOCK

Reference 1470 Instruction Manual  
P/N 070-2096-00  
Mod 44785

During subcarrier lock, when a loss of internal lock occurs and the 1470 switches to the internal mode, the switching may not be complete, causing the Unlock light to blink.

R447 has been selected to correct this in the past. Changing R447 to a 9.1K 5% 0.25w (315-0912-00) resistor will help alleviate the selection requirements.

W<sup>2</sup> Issue 12-1

1470/1474 POWER SUPPLY OSCILLATIONS

Reference: 1470 Instruction Manual  
P/N 070-2096-00

1474 Instruction Manual  
P/N 070-2097-00  
Mod #44620

Under certain load conditions, the power supply tends to get unstable and oscillate. The following changes should eliminate this problem.

Change C1, C5 and C6 from 290-0135-00 to 290-0135-01 and remove C39. Install this change where necessary to correct faulty operation.

W<sup>2</sup> Issue 12-1

1480 SERIES MAG REGISTRATION

Reference 1480 Series Manual  
P/N 070-2338-00  
Mod #41012

A few people have inquired about an apparent change in timing when the Horizontal Magnification function is used. Previously, Q4410, Q4313, Q4312 and Q4311 were hand selected for proper operation.

To alleviate the need for hand selection and insure proper operation, use P/N 151-0190-08 in these areas.

W<sup>2</sup> Issue 12-1

1480 SERIES R6885 CHANGING VALUE

Mod #44526

Instances have been found where R6885, a 1K ohm 5% carbon film resistor, changes value when exposed to voltage in excess of 700V for any appreciable length of time. Replace this part with a 301-0102-03 1K 5% carbon composition resistor where failures are discovered.

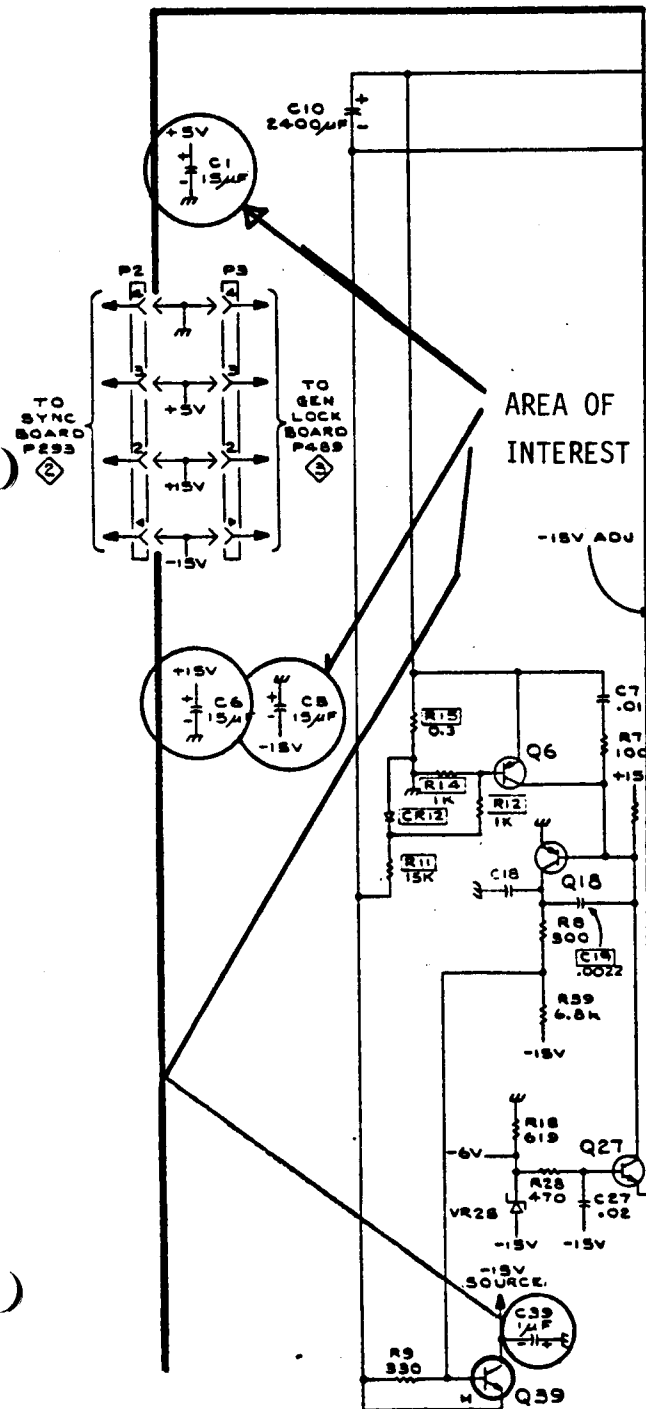
The resistor is located on the power supply assembly 670-3490-XX.

W<sup>2</sup> Issue 12-1

1502/1503 FRONT PANEL PLUG-IN SEAL REPLACEMENT (REVISION #1)

In the March 18, 1977 WIZARD WORKSHOP Issue 7-6, it was mentioned that four new part numbers were set-up to facilitate front panel and plug-in seal replacement. The WIZARD has generated some confusion on the procedure on installing these parts. The WIZARD should have read:

(ARTICLE CONTINUED ON THE NEXT PAGE)



1502/1503 FRONT PANEL PLUG-IN SEAL REPLACEMENT (REVISION #1) (cont.)

In order to better facilitate front panel and plug-in seal replacement, and to eliminate the need for special sealing tools, four new part numbers were generated.

P/N 333-1991-03 - 1502 Front panel (P/N 333-1991-00) with plug-in seal assembled.

P/N 333-2003-02 - 1503 Front panel (P/N 333-2003-00) with plug-in seal assembled.

P/N 333-2119-02 - 1502 Opt. 5 Front panel (P/N 333-2119-00) with plug-in seal assembled.

P/N 333-2123-02 - 1503 Opt. 5 Front panel (P/N 333-2123-00) with plug-in seal assembled.

W<sup>2</sup> Issue 11-23

1800 TEST STATION: FAULT DETECTOR MONITORING UPDATE

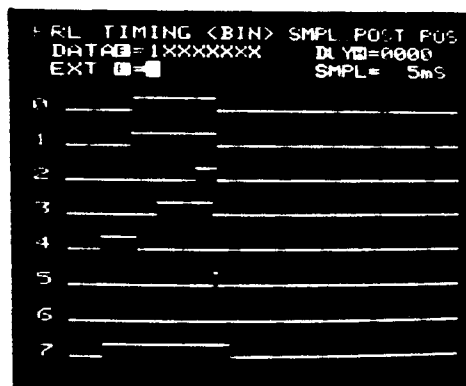
In the Wizard article written September 25, 1981, Issue 11-18, Page 60, there were two oversights. Both oversights were in the second paragraph. U32 is called out as one of the ICs to monitor. This is true for the 670-3782-00. For the later version of the signal sense card 670-3782-01, its IC is U33.

The second oversight is with data that is used by the DATA Trigger. The data should be entered as 1,X,X,X,X,X,X,X. The difference being the 1.

A clarification of the display follows. Figure 1 is a photo of the 308 after a fault was forced by shorting -15 volts to ground. In this case #4 (-15 Volt monitor) the leading edge is coincident with the leading edge of #7 (Power Status). The other pulses are a result of -15 volts being shorted.

The 308 is triggered on channel 7 when 180X Power Status goes high, so finding any signal that goes high at the same time will indicate the Power supply circuit at fault.

Components external to the power supply are usually at fault (i.e. sector card). This procedure is only going to help narrow it down to a power supply circuit.



W<sup>2</sup> Issue 11-23

1900 KEYSWITCH BOARD FAULT

Reference: 1900 Instruction Manual  
P/N 061-2281-00  
Mod M45063

A floating "clear" pin on the A13 Key-switch board can allow more than one LED to be on at one time. The LED's affected are DS121, DS124, DS127, DS131, DS134, DS137. This problem shows up more often when using the diagnostic PROM (067-0964-00) to test the instrument. To correct this fault, add a wire strap from PIN 1 to PIN 20 of A13U183. (See diagram below.)

NOTE: The manual schematic is in error. U183 is labeled as U188.

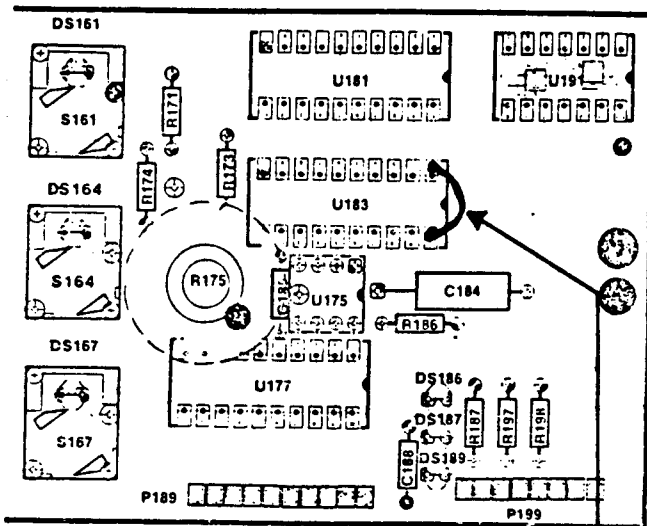
Install this wire strap whenever a 1900 is in for service.

Add wire strap to the back of the board from Pin 1 to Pin 20, U183.

(ARTICLE CONTINUED ON THE NEXT PAGE)

1900 KEYSWITCH BOARD FAULT (cont.)PARTIAL VIEW OF KEYSWITCH BOARD

670-5863-00

W<sup>2</sup> Issue 11-242213/2215 CORD WRAP & STORAGE POUCH OPTION

The cord wrap and storage pouch option P/N 016-0677-00 gives the customer a storage pouch. The cord wrap portion of this option is wrapping the power cord around the pouch as done with the 455 or 485. The manual does not explain this and customers have inquired as to the location of the cord wrap upon receiving this option.

W<sup>2</sup> Issue 12-12213/2215 RACKMOUNT

Rackmount kits are now available for the 2213 and 2215 portables. The part number is 016-0466-00.

W<sup>2</sup> Issue 11-242225/2336/2337 HIGH FREQUENCY VERTICAL ROLL OFFReference: CRT Circuit 9

High frequency roll off will occur due to dirty or corroded vertical deflection CRT pins. Cleaning can be accomplished by scrapping the pins very

carefully with an X-acto knife. Too much pressure on the pins will cause the CRT to crack at those points.

If A15, the vertical board, is removed to reach the pins, it is recommended to unsolder LR913 and LR915 from the board. This will prevent these leads from becoming bent and distorted.

W<sup>2</sup> Issue 11-232335/2336/2337 HORIZONTAL BOARD SHORTING TO CRT SHIELD

A new fiber insulator, P/N 342-0615-00, is installed between the horizontal amplifier board and the CRT shield to prevent the board from shorting to the shield. The insulator secures to the horizontal board using the same screws that hold the board in place. All instruments coming in for service should have this insulator installed.

W<sup>2</sup> Issue 12-14014/14-1, 4015/15-1 LVPS R483, R485, & R487 BURNING

References: 4014/14-1, 4015/15-1 Service Manual, 070-2303-00

Field Service has brought to my attention a potential problem with R483, R485, and R487 on the LVPS board 670-3089-0X. These 100K ohm, 2 watt resistors run hot and have been known to burn up.

The cause of this is directly related to the physical location (spacing) of the resistors. On the 670-3089-00 through -05 boards, because of the close spacing, the combined heat dissipated caused them to deteriorate and break down. When this occurs it can destroy the resistor and other power supply components.

The changes to the -06 level LVPS board was an attempt to alleviate the problem. On this board the resistors were spaced further apart. This fixed the majority (ARTICLE CONTINUED ON THE NEXT PAGE)

4014/14-1, 4015/15-1 LVPS R483, R485,  
& R487 BURNING (cont.)

of the problems; however, in a few cases the resistors continued to open. To fix this the vendor of this particular part was changed. An electrically compatible carbon film resistor (100K ohm, 2 W, 5%) by Corning has replaced the Allen-Bradley carbon composition resistor.

The Corning resistor has the same Tektronix part number as the Allen-Bradley, 305-0104-00, and is replacing all Allen-Bradley resistors of this part number. The Corning resistors are easily identified by their blue ceramic coating. They also have their name, "Corning", and their values printed on them.

These resistors are readily available. When replacing these resistors care should be taken to place them off of the board. They should be mounted halfway between the ECB and the protective plastic "high voltage" shield.

W<sup>2</sup> Issue 11-24

4052/4054 R09 REAL TIME CLOCK

The 4052/54 Real Time Clock has been exhibiting errors in keeping the correct time. The symptom is that after the clock has been running for approximately 2 hours or more without being read, the clock stops keeping time or runs at a very slow rate. But if the time is read within 2 hours the clock will continue to keep good time for approximately another 2 hours. Therefore, the Real Time Clock ROMpack needs to be read every 2 hours to operate correctly if run over 2 hours.

At this time there is no solution, but one is being worked on and will be published when available.

W<sup>2</sup> Issue 12-1

4054 RANDOM FAILURES

There have been instances with some 4054s having random failures. These failures occur more frequently with Op-

tion 30 installed. Some of the symptoms are as follows:

1. The 4054 may not recognize a ROM pack installed in the backpack.
2. The 4054 may lock-up while coming out of the Option 1 mode and back into BASIC.
3. The 4054 may lock-up while in the middle of a program routine.

Each time one of the above failures occur the 4054's power will have to be cycled in order to operate correctly again. In the case where the 4054 doesn't recognize a ROMpack installed in the backpack, the 4054's power may have to be cycled more than once to get a proper power-up. The source of these failures has been identified as being errors in the power-up sequence of the firmware. At this time there is no solution, but one will be published as soon as it is available.

W<sup>2</sup> Issue 12-1

4112/4114 VERIFYING THE AMOUNT OF MEMORY INSTALLED

In the 411X terminals the memory is used by the standard operating system and many of the options. As options are added such as Tablet, 3PPI, and Disk the amount of usable memory is reduced. By adding memory options user memory is increased. The final value is the amount of user memory. With the many combinations of options which affect the user memory, it would not be feasible to include a chart containing all possible values. It would probably be much too confusing, so another method will be used that will allow the operator to calculate the final value.

Determining the amount of user memory can be useful as an additional check to verify options are installed correctly. For example, a memory board residing in the cardcage, but not making edge connector contact, would appear to the terminal (ARTICLE CONTINUED ON THE NEXT PAGE)

4112/4114 VERIFYING THE AMOUNT OF MEMORY INSTALLED (cont.)

minal's firmware as not being installed. Comparing the user memory value reported by the terminal to the calculated user memory value will check for this condition.

The command "STA MEM" typed in set-up mode will return two numbers. The first is the amount of memory available to the user and the second is the largest contiguous memory space. Both number values returned are reported in the number of memory blocks. One block is equal to 16 bytes of RAM. Since the second number is not useful in determining the amount of memory installed, it will not be used. To obtain the proper value of user memory, do the following:

1. Power up or reset the terminal.
2. Enter "Adjustment Self Test" and reset the C-MOS RAM.
3. Enter set-up mode and type "STA MEM <CR>"
4. The reported user memory is the first number displayed.

Calculating user memory:

To calculate the amount of user memory, start with the base user memory value for the standard terminal with no options. Add or subtract the user memory values corresponding to the options installed.

USER MEMORY VALUES		
	4112	4114
Standard (no options)	667	849
Opt. 1 (Extend/Comm)	-4	-4
Opt.10 (3PPI)	-145	-146
Opt.13/15 (Tablet)	-74	-75
Opt.42 (Single Floppy)	-254	-255
Opt. 43 (Dual Floppy)	-NA-	-291
Opt.10 with Opt.13/14	+60	+60
Opt.10 with Opt.42/43	-1	+1

For MEMORY OPTIONS ADD 2048 FOR EACH ADDITIONAL RAM ARRAY BOARD (32K)

Example 1:

4112 with options 1, 10, 27, and 42

```

+667   Standard 4112
-   4   Extended Communications
-145   3PPI
-254   Single Floppy
-   1   Combination of Opt.10 and
        Opt.42.
+(4X2048) Additional 128K of RAM
-----
+8455   Memory Blocks Available
        to User.

```

Example 2:

4114 with options 1, 13, 28, 43

```

+849   Standard 4114
-   4   Extended Communications
-  75   Tablet
-291   Dual Floppys
+(8X2048) Additional 256K of RAM
-----
+16863 Memory Blocks Available
        to User

```

The 3PPI option shares user memory with the Tablet and Disk options. So when the options are combined, less individual user memory is used.

Memory values for the 4113 will be available upon receiving production 4113 E-PROM firmware.

W<sup>2</sup> Issue 12-1

4631: HARD COPY NOISE AND RAMP OSCILLATION MOD TO TIMING BOARDSymptoms

Hard copy image is noisy at the top, or weak at the bottom of the page. The "interrogate" scan line may be broken up (or a series of dots) at one end. The slow ramp may start one inch to the right of where it should start.

Cause & Contributing Factors

Load capacitance can cause the uA741 Op Amps--Slow and Fast Ramp Drivers--to oscillate. Usually this is due to long (ARTICLE CONTINUED ON THE NEXT PAGE)



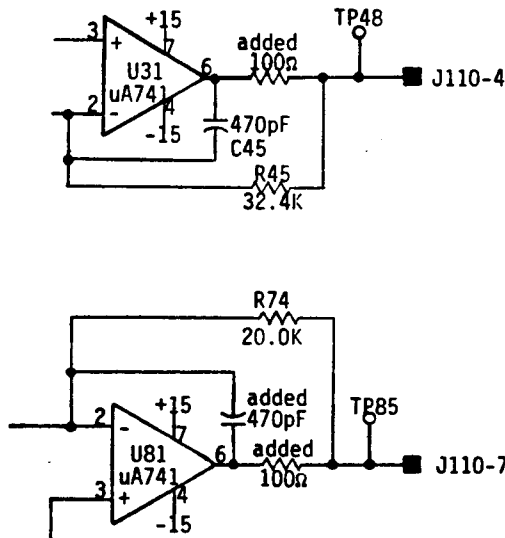
4631: HARD COPY NOISE AND RAMP OSCILLATION MOD TO TIMING BOARD (cont.)

hard copy cable length or the use of Option 2 Multiplexer with several long cables. NOTE: Total cable length on any 4631 should never exceed 200 feet (61 meters). The problem is more likely to appear when the 4631 is attached to GMA-series displays, 618, 4054, and 4016-1.

Modification

Units with serial number B187465 and above have the following mod installed:

Add 100 ohm resistors in series with the ramp outputs. Add a 470 pF capacitor from pin 6 (output) to pin 2 (inverting input) of U81. Note schematic corrections below.



Hand Add Instructions

1. Orient the board with edge connector toward you, component side up.
2. Lift pin 6 of U31. Lift the right end of C45 (on top of R45) and solder it to the lifted pin 6. Solder a 100 ohm, 1/4 w, 5% resistor, p.n. 315-0101-00, from the right end of R45 to the lifted pin 6, U31.
3. Lift pin 6 of U81. Solder a 470 pF capacitor, p.n. 281-0580-00 across

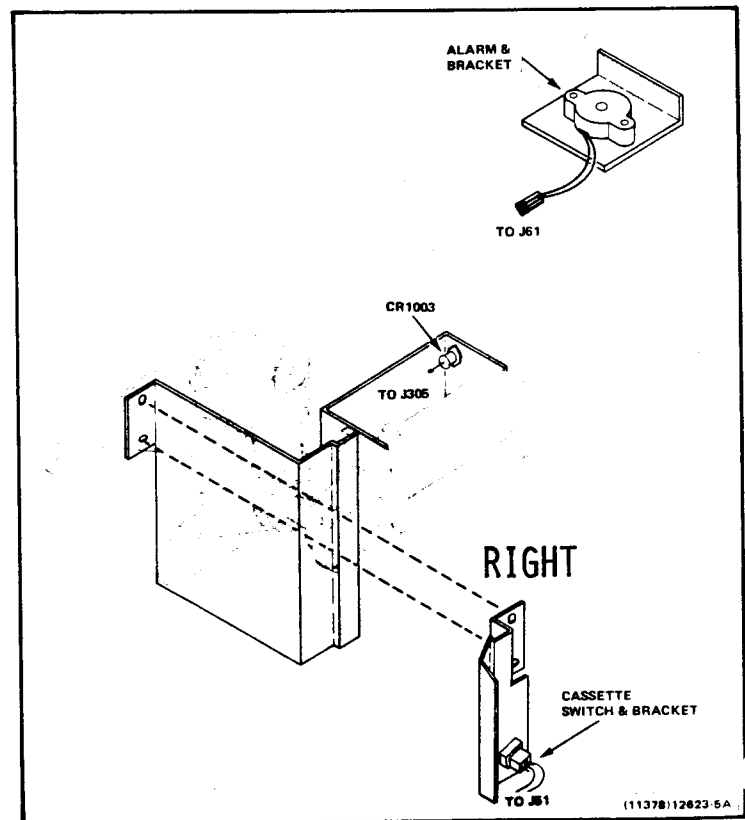
the top of U81 from pin 2 to the lifted pin 6. Solder a 100 ohm, 1/4w, 5% resistor, p.n. 315-0101-00, from lifted pin 6 to TP85.

4. Change the part number suffix of the board to 670-3661-09 or 670-5740-02.

W<sup>2</sup> Issue 11-24

4633AJE, 4633A MOD VA -- DETECTOR BOARD KIT MANUAL ERROR

An error in the installation instructions for the (jam) Detector Board Kit, CM020-0814-00, may confuse both Tektronix and OEM customer service personnel. On page 2-9, Figure 2-6 shows the cassette switch bracket mounted to the left of a flange from the front subpanel. The correct mounting location is on the right side of the flange. The figures below should clarify.



(ARTICLE CONTINUED ON THE NEXT PAGE)

4633AJE, 4633A MOD VA -- DETECTOR BOARD  
KIT MANUAL ERROR (cont.)

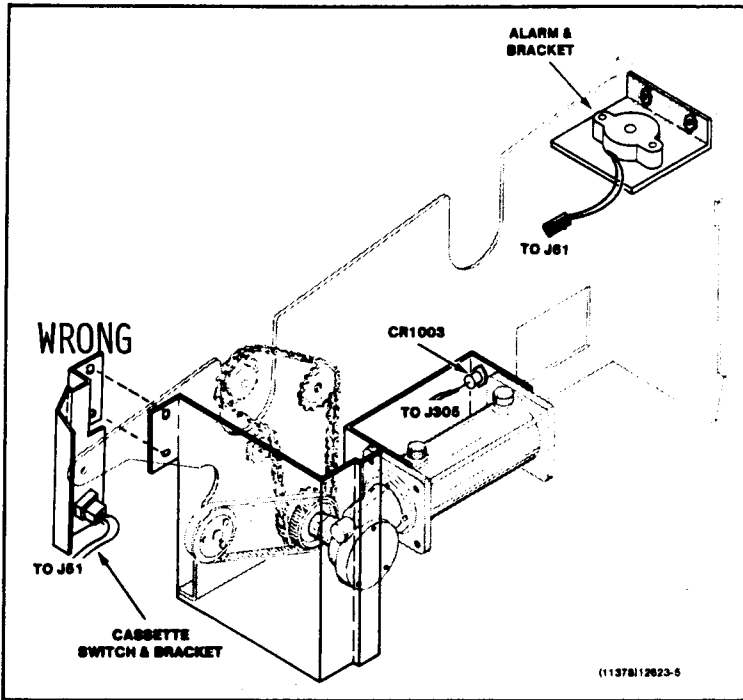


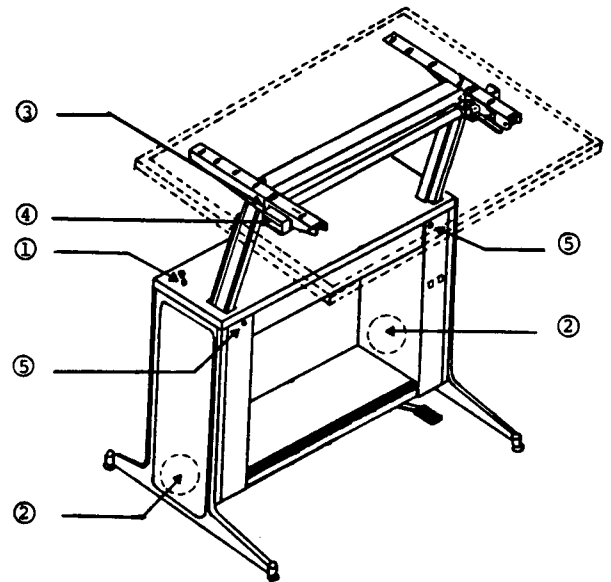
Figure 2-6. Attached Parts Location.

W<sup>2</sup> Issue 11-24

4954F32/4110F15/4081 TABLET PEDESTAL

The 4954F32 Tablet pedestal has 5 adjustments which can be made, and should be checked, during every installation. They are: Elevation Counterbalance Adjustment, Elevation Brake Adjustment, Tablet Surface Tilt Locking Adjustment, "Dial-a-Torque" Settings and Adjustments, and Column Roller Adjustment. All adjustments should be made after tablet surface has been installed.

Following are detailed adjustment procedures.



- ① Elevation Counterbalance Adjustment
- ② Elevation Brake Adjustment
- ③ Drawing Surface Tilt Locking Adjustment
- ④ "Dial-A-Torque" Settings and Adjustment
- ⑤ Column Roller Adjustment

Elevation Counterbalance Adjustment

Elevation is properly adjusted when the tablet surface rises slightly when the pedal is depressed. One simple adjustment of the elevating torsion spring provides an easy means to compensate for changes in the weight of the tablet surface or accessories.

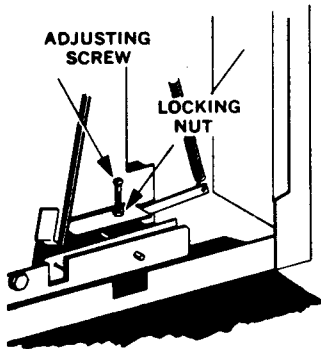
The elevation adjustment shaft is located under a plug button on top of the base directly behind the left hand column. A large screwdriver or a 5/16 inch hex socket wrench can be used for this adjustment. Turn clockwise to increase spring tension--counterclockwise to decrease spring tension.

The elevating mechanism is factory set at approximately 25 turns. Various surface sizes require additional turns. This can vary from approximately 50 turns to 115 turns.

(ARTICLE CONTINUED ON THE NEXT PAGE)

## 4954F32/4110F15/4081 TABLET PEDESTAL (cont.)

### Elevation Brake Adjustment



Elevation Brake Adjustment

If brake mechanism for tablet elevation does not release when brake pedal is depressed or if brake does not hold positively at desired elevation, it is possible that one or both brake mechanisms need adjustment. The brake mechanisms are located inside the end panels of the pedestal.

First, determine which brake mechanism needs adjustment. If the brake does not release, actuate the brake pedal and bear down on each end of tablet surface. The end that refuses to move needs adjustment.

Elevation brake slippage can be determined by bearing down on each end of tablet surface as above, but without actuating the brake pedal. The end that moves needs adjustment.

If it is determined that some adjustment is necessary, the leg-panel assembly must be removed for access to the brake adjustment mechanism. To remove the leg-panel assembly the end which needs adjusting must be raised off the floor and blocked up. From under the pedestal unit near the end, remove the two bolts holding the leg-panel assembly. This assembly will now slide down and away from the pedestal.

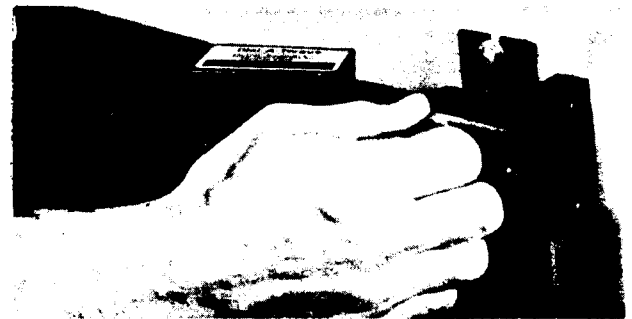
**Caution:** Only remove one leg-panel assembly at a time.

If the brake did not release when the foot pedal was activated, loosen the locking nut on the pre-determined side and tighten adjustment screw by turning clockwise. When the brake is adjusted properly, re-tighten the locking nut.

If the brake mechanism slipped when tested, loosen the locking nut on the pre-determined side and turn the adjusting screw counterclockwise to increase the brake tension. Re-tighten the locking nut after adjustment.

Replace the leg-panel assembly by inserting the guide pins located on the top of the leg, into receiving holes in the top of the pedestal unit. Re-install the two bolts and remove the blocks from under pedestal unit.

### Tablet Surface Tilt Locking Adjustment



Tilt Lock Adjustment

To increase or decrease the positive tilt lock control of the tablet surface, it is necessary to change the locking pressure on the tilt brake leaves.

In locked position, brake should be tight enough to hold board horizontally with about 25 to 50 lbs. of pressure applied to edge away from digitizer. Be sure when checking brake that tablet surface is elevated slightly above bumpers. Having brake set too tight may damage locking mechanism.

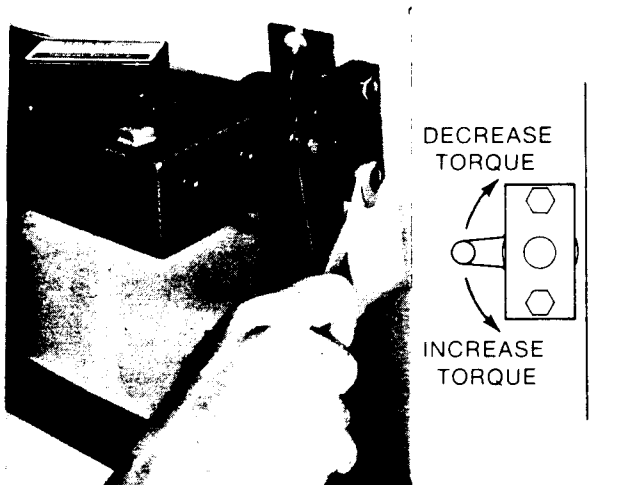
Before this adjustment is started tilt brake must be released and tablet surface must be in vertical position. After adjustment, surface may then be moved to near horizontal position to check tilt brake.

(ARTICLE CONTINUED ON THE NEXT PAGE)

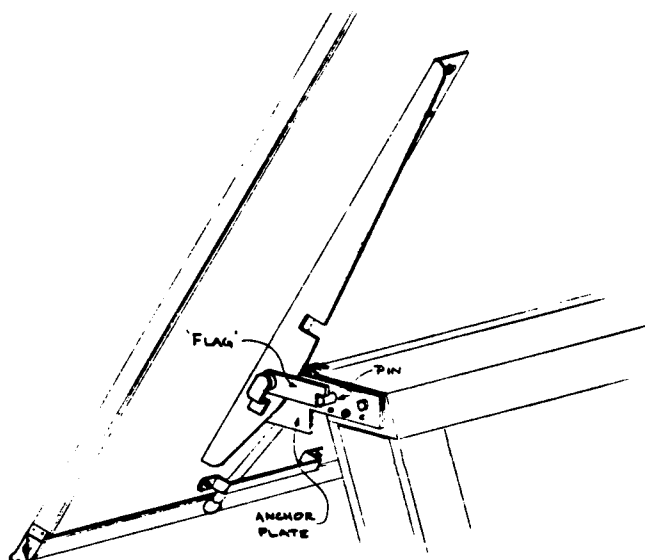
### 4954F32/4110F15/4081 TABLET PEDESTAL (cont.)

Tilt brake locking pressure can be changed by removing the "Dial-A-Torque" cover and loosening the two hex head cap screws. Using an Allen wrench, small rod or screw driver as a lever, turn the adjusting nut clockwise to increase tilt brake pressure or counterclockwise to decrease tilt brake pressure. Tighten the two hex head cap screws. In extreme adjustment cases, it may be necessary to loosen the screws on one of the tablet surface support arms.

#### "Dial-A-Torque" Settings and Adjustments



"Dial-A-Torque" Adjustment



'Flag' and 'Pin' Illustration

"Dial-A-Torque" provides protection from damage to a tablet surface when tilting surface from the vertical to 'operating' position.

The "Dial-A-Torque" adjustment should be set so that the 'flag' engages the 'pin' (see above illustration) when the tablet surface is in the 'operating' position.

To set or adjust the counterbalance, place the tablet surface in the vertical position. Remove the "Dial-A-Torque" cover by pulling straight off. Loosen the two hex head cap screws and set the control at the desired setting. Tighten the screws and replace cover.

#### Column Roller Adjustment

For maximum tablet surface stability, after installation of the surface, remove plugs and tighten screws fully. Then loosen slightly until column just moves freely.

#### Final Note

The base and tilt mechanism of the "Dial-A-Torque" table were designed to raise, support, and tilt up to a 200 pound load. The tilt mechanism can be adjusted to counterbalance any load from zero to 1800 inch pounds of torque. Any load above these specifications may damage the mechanisms.

W<sup>2</sup> Issue 12-1

#### 7B15 CALIBRATION PROCEDURE CORRECTION

Reference: 7B15 Instruction Manual  
P/N 070-2318-00

On Page 5-35, Step d is wrong. It should read as follows:

d. ADJUST-R335 (Delay Start) for a  $\Delta$  time readout of 0.019ms. Then, adjust R335 until the  $\Delta$  time readout just changes to 0.20ms.

W<sup>2</sup> Issue 11-24

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