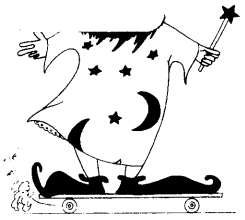
MICHAEL A MIHALIK

COMBINATION WIZARDS

Tektronix®
COMMITTED TO EXCELLENCE



COMBINATION EDITION

Wizards Workshop

****
* ALL SERVICE QUESTIONS FROM EUROPE, MIDDLE EAST, *
* AND AFRICA SHOULD BE ADDRESSED TO THE EUROPEAN *
* MARKETING CENTER SERVICE GROUP IN THE NETHERLANDS. *
****

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TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

600 SERIES

SERVICE INSTRUMENT DIVISION

ACCESSORIES

DATA COMMUNICATION ANALYZERS

PORTABLES

INFORMATION DISPLAY DIVISION

TABLE OF CONTENTS (CONTINUED)

LABORATORY INSTRUMENT DIVISION

MICROCOMPUTER DEVELOPMENT PRODUCTS

SEMICONDUCTOR TEST SYSTEMS

SIGNAL PROCESSING SYSTEMS

REFERENCE PULL-OUT

INFORMATION DISPLAY DIVISION

VIDEOTAPES AVAILABLE

1. ADVANCED LOGIC ANALYZER CONCEPTS

   Second tape in Logic Analyzer series. Builds on material presented in "General Purpose Logic Analyzers". Explains need for, use of, and applications of serial-logic analysis, microprocessor analysis, and signature analysis.

   Running time: 10 min. 068-0120-00

2. COMMUNICATING THE COMPENSATION DECISION

   Demonstrates and summarizes effective techniques for Tek managers to use in communication compensation decision to reports. (Intended for use as part of Zenger-Miller, Inc. "Supervision" training program.

   Running time: 5 min. Not For Sale
   Ref. No. 3.390

3. GENERAL PURPOSE LOGIC ANALYZER CONCEPTS

   An introductory program contrasting oscilloscopes, microprocessor development labs, and various types of logic analyzers. Examples include; types of displays, data acquisition, and triggering.

   Running time: 15 min. 068-0118-00

4. SAMPLING CONCEPTS

   Examines the fundamental reasons for using sampling oscilloscopes. Graphically details the concepts of random equivalent, sequential equivalent and real time sampling methods. Also examines their uses and limitations. (Copy of "Introduction to Sampling" booklet accompanies this videotape.)

   Running time: 11 min. 068-0102-00

5. SELECTING SLIDE-SOUND EQUIPMENT

   Informs Tektronix managers of appropriate playback-equipment choices for slide-sound programs. Shows typical equipment and set-ups. Describes and demonstrates 3 basic types of slide and slide-sound programs.

   Running time: 25 min. Not For Sale
   Ref. No. 19.125

6. SUPPORTING THE AREA REP ACTIVITY

   Emphasizes for Tek managers, the importance of their actively supporting Area Rep Activity. Suggests specific ways to offer support.

   Running time: 15 min. Not For Sale
   Ref. No. 19.890

(continued)

VIDEOTAPES AVAILABLE (CONTINUED)

7. THE WILSONVILLE CONNECTION

For area rep tours: Explanation of what is produced at Wilsonville, and how. Includes scenes that demonstrate the inter-relationships between Wilsonville, Beaverton and Vancouver sites. Concludes with demonstration of IDD products.

Running time: 16 min. Not For Sale
Ref. No. 23.350

8. THE 7D02 LOGIC ANALYZER

Reviews the major features of 7D02 Logic Analyzer and explains programming structure. Uses several test programs of increasing complexity to examine microprocessor demo aid. This videotape is intended for seminar application but also useful for individual study.

Running time: 34 min. Not For Sale
Ref. No. 27.009

9. 4633A/4634 MECHANICAL DISASSEMBLY AND REASSEMBLY (2 tapes)

Part 1 describes and demonstrates disassembly, preventive maintenance. Part 2 describes and demonstrates reassembly, mechanical adjustments.

Running time: 46 min. 068-0115-00

10. 5223 DIGITIZING OSCILLOSCOPE (OVERVIEW)

Introduces 5223. Describes features, controls, basic operations of 5223, (uses 5B25N, 5A22, 5A38, 5A45 plug-ins). Demonstrates pre-trigger and bi-slope triggering features; X-Y, Y-T, and Roll modes.

Submitted by--
Herb Doumitt

ADMINISTRATIVE SUPPORT

SERVICE RECORD/TIME DISTRIBUTION SHEETS

The Service Record and Time Distribution Sheet are the sources of data used in:

- Service Organization cost distributions and performance measurement;
- Contribution income and service pricing analysis; and,
- Product and component reliability analysis.

It is essential that the Time Distribution Sheet and the Service Record be legible, complete and accurate. This includes the Service Information System and Module Exchange Information copies of the Service Record. Please ensure usable data is forwarded to Beaverton. Errors in data entered into data bases are difficult to impossible to correct.

--Bill Duerden
56-037, Ext. 8938

CG551AP +5 VOLT SUPPLY LOADING

It is possible that CG551AP's below SN B010129 may have wires 3 and 4 reversed on connector A1P1330 on the front panel. This causes a loading down of the +5 Volt supply when the Remote Variable Head is connected. This was due to an error in the manufacturing QC procedure that has since been corrected.

--Terry Turner
92-236, Ext. 1288

SG503 MAINTENANCE NOTES

Out of Range At About 1 MHz -

Suspect U390 - Plessey brand biggest problems.

No Output and Flashing Display -

Suspect Oscillator circuits.

Display Does Not Vary With Output -

Suspect Auto Ranging Circuits - Q410, CR410, and Q420

No Display -

Verify that U432C-10 is Lo, a Hi will disable display.

No Display - Except In 50 kHz Position -

1. Check for Reference Clock signal at U460D-11.

2. If signal is okay suspect Auto Clock Enable circuits.

50 kHz Oscillator Has No Output -

Suspect C134 has leakage.

Certain Bands Are Defect -

Suspect Band Selection switch, selected coil, or selected capacitor.

One Band Flashes at Lo or High End of Band -

Adjust core in selected coil, especially 25-50 MHz and 10-25 MHz ranges.

Oscillator O.K. But No Output From Buffer Amplifier -

1. Suspect LR190 is open, if open you'll have -20 Volts on Q190 Collector.

2. If Q190 Collector is okay check for signal on cathode of CR225A. If signal is present suspect the Pk-Pk Detector is open or the Attenuators are bad.

To Determine If Your Oscillator Ckts. Or Leveling Ckts. are bad -

Remove Q300 and connect one end of a 2KΩ potentiometer to Q300's Emitter circuit and the wiper arm of the potentiometer to Q300's Collector circuit. If the oscillator breaks into oscillations where varying the potentiometer, your Leveling ckts. are bad.

(continued)

Leveling Circuit Defective -

1. Check for +.7 Volts at U280-2 and for @ 6 Volts at U280-6.
2. If +.7 Volts is not present check divider string R255 through R265.

+5 Volt Supply Bad -

1. Lift F620 and see if +5 Volts now reads @ +11.2 Volts
   A. If +11.2 Volts is present your problem is external to supply.
   B. If +11.2 Volts is absent your supply is bad.
2. If Q600 or Q620 is defective change both.

Readout Miscounts At Higher Frequencies -

Suspect U390, U350, or U400 devices or sockets.

Leveling Problems -

Suspect U225 and Q190.

Sinewave Flattens At Higher Frequencies -

Suspect Q190, CR200, CR202, VR200, and VR202.

Leveling Or Loading Problem On One Range Only -

Suspect selected coil on coil circuit board.

No Output On A Number Of Ranges -

Suspect plates of C100 are shorting together.

Sinewave Distorted, has Spikes, or Ringing -

Suspect Q160 is open.

Distorted Waveform At 50 MHz And Above -

Suspect C204, C208, and C212.

Clipped Waveforms (Positive, Negative, or Both) -

Suspect CR200, CR202, VR200, and VR202

(continued)

Peak to Peak Detector (U255) Checkout -

Using a DM501 on the 200 ohm range you should have 50 ohm in both directions across the signal path pins. When checking across the control pins you should have 50 ohm in one direction and ∞ in the reverse position.

Leveling Problems Across More Than One Range -

Suspect U225

Amplitude Potentiometer Has No Effect -

1. Suspect U225 is cracked, when using ohm meter it may check good.
2. Suspect CR216 and/or CR218 is open.
3. Suspect open cable between P230 and P265.
4. Suspect U280 or Q300 is open.

No Output -

1. Suspect L200 is shorting to shield.
2. Suspect 4.5 Volt supply is shorted to ground which will cause L630 to overheat.

50 kHz - 100 MHz Lo Band Oscillator, All Bands Not Operating Properly -

Suspect LR135 is broken, not the coil by the resistor.

Display Is Blank Except Left Hand Decimal Point -

Suspect Clock Oscillator and associated Dividers plus Enabling Gates.

Display Miscounts When Unit Is Hot -

1. Suspect Pre-scaler I.C.'s, U390 or U400, if over 1 MHz.
2. Suspect 7490 I.C.'s if below 1 MHz.

The Display Has One or More Digits Reading Zero With No Change In Frequency While Remaining Digits May Be Free-Running -

Suspect U430, U432, U435, U436, or U437

No Display -

Suspect Q290, Q296, or R475 is open.

Display Is All Zeros With No Variations -

Suspect L660 is open.

(continued)

Display Has One Or More Digits Blanked, But Not All, and Remaining Digits Normal -

Suspect U510, U520, and U530.

Binding Range Switch -

Coil circuit board or wafer switch on coil circuit board needs replacement.

Display at @130 - 160 MHz, Goes To All Zeros And Stays There -

Suspect U390 or U400, maybe heat sensitive.

Unit Normal Excpet In Refence Positions Where Display Free Runs -

Suspect defective cable between P280 and P290.

Replacing L110 -

If L110 requires replacement the old tuning slug should be used in the new coil. Otherwise, you may not be able to adjust the new coil to meet distortion and/or leveling in the 25 to 50 MHz Band.

Normal Tuning Slug Positions In Coils -

L116 Slug set to bottom resonance

L114 Slug set to top resonance

L112 Slug set to bottom

L110 Slug set to top

L100 Slug set to top

Submitted by--
Rich Andrusco

Inserted by--
Terry Turner
92-236, Ext. 1288

SG504 MAINTENANCE NOTES

Lo Band Harmonic Distortion - (Usually 3 dB or Higher)

Make sure pin diodes on R.F. Board are as close as possible to the board.

Signal Output Good and Level Light is Off - (at 650-695 MHz)

Suspect J39 is shorted.

Harmonic Distortion -

1. Make sure leads on Q70 and Q120 are straight and short.

2. Be sure C126 and C128 are centered on etched capacitors.

3. Suspect chip caps which are heat sensitive and tend to crack.

Reference Oscillator Out Of Specifications - (50 kHz or 6 MHz)

Suspect T200 or T205.

Adjusting for Harmonics -

Excessive Harmonic levels at Low End of Low Band can be helped by adjusting C125. Adjusting C125 would lower the harmonic level but it would reduce the upper frequency on the Low Band at which time unleveling would occur.

Adjustment Effects -

Spreading L125 decreases upper leveling frequency and decreases harmonics at low end.

Spreading L126 has ≃ equal effects - Increased harmonic level and increased upper leveling frequency. (Opposite effect of L125).

Spreading L128 has same effect as L126 but affects upper leveling frequency more.

Solution -

Adjust C125 to set 2nd Harmonic for ≃ -26dB, compress L125, spread L126 ≃ 1/16", spread L128 ≃ 1/8". Reset C125 to begin unleveling at first arrow past stop at upper end of dial. The worst the 2nd Harmonic should be now is -28dB.

L48 should always be completely compressed.

L45 may help harmonics by really playing with it.

Submitted by--
Rich Andrusco

Inserted by--
Terry Turner
92-236, Ext. 1288

SERVICE SUPPORT PRODUCT RESPONSIBILITY CHANGE (5000/7000 SERIES)

The 5000 and 7000 Series Performance Assurance Engineering responsibilities in Service Support have been changed. John Eaton has assumed the responsibility of 5000 mainframes and plug-ins. John's new extension is 5222. Lynn Sperley now has the responsibility of 7000 Series mainframes and plug-ins. Lynn's extension is 6902.

--Dick Freshour
58-511, Ext. 6810

5A18N, CHOPPED MODE OSCILLATIONS S/N B129148 & UP

Reference: Instruction Manual P/N 070-1137-00
Corporate Mod #M41063

Transistors supplied by Texas Instruments have a different Vbe and Beta from previously supplied parts and are causing the channel switch to be delayed. This causes the display in channel 2 chopped mode to appear as if one channel is oscillating. To cure this change R308 from 32.4K, P/N 321-0338-00 to a 30.9K, P/N 321-0336-00. This will increase base drive signal and insure positive switching. R308 is located on the Main Amplifier Circuit Board.

--John Eaton
58/511, Ext. 5222

5223, POSSIBLE POWER SUPPLY FAILURE B010145 & BELOW

Reference: 5223 Instruction Manual P/N 070-2932-00
L.V. Power Supply, Schematic 7

There have been some units in the line that have had C140 either opened or shorted. For this reason C140 is being changed from a 0.1µf, 50v, P/N 285-0808-00 to a 0.1µf, 100v, P/N 283-0167-00. This should be done on the above mentioned serial number units.

--John Eaton
58/511, Ext. 5222

650A SERIES/DEFECTIVE CAPACITORS, P/N 290-0521-00

Mallory capacitor, P/N 290-0521-00 (1300 microfarad, 150V), date codes 7926 and 7931, are defective. Failure modes exhibited are mechanical and/or electrical leakage.

Please check all stock and purge. Reorder as necessary.

Any 650A Series monitors (including 650A and 650HR) that come in for service should be checked for these date code parts. This part is used as C8310 in the low voltage power supply.

Thanks to Reliability Engineering for this information. Thanks also to Paul Hogan, Atlanta Service Center, and Dave Gillen, Rockville support staff, who provided some early failure information on these parts.

--Steve Schmelzer
58-511, Ext. 5927

650/650A/650HR SERIES EHT

A joint effort by TV Reliability Engineering and TV Manufacturing to address the current problems with EHT supplies has identified and corrected several process problems that were causing the majority of problems in the 650 Series EHT supplies. As a result, there should be a marked increase in the reliability of these units. Reliability Engineering feels it has corrected all current problems with the EHT.

The most recent problem of convergence drift occurred because of a slight change in the material and process used to passivate the thick film resistor in the encapsulated portion of the EHT. It is hoped that any failures of EHT's in the future will be only random failures that are associated with any electronic component. Your cooperation in prompt, accurate failure reporting is necessary to insure any future problem is quickly resolved.

--Steve Schmelzer
58-511, Ext. 5927

1900/SUBCARRIER OUT TO FULL-FIELD OUT BURST PHASE RELATIONSHIP MAY BE RANDOM

Reference: 1900 Manual P/N 061-2281-00 Schematic 13

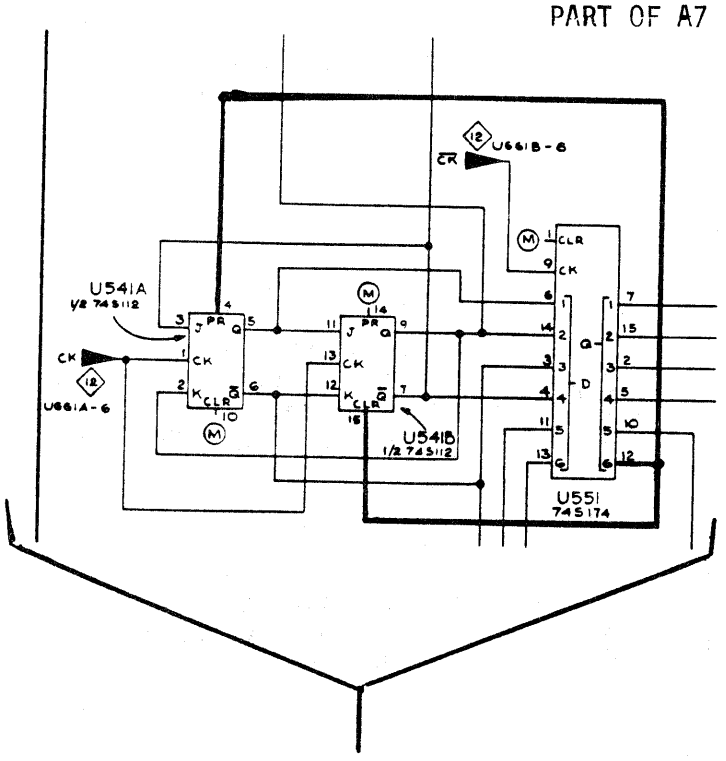
If A7U541 is not properly cleared the phase relationship between SUBCARRIER OUT and FULL FIELD OUT burst may be random. This failure can occur only in the non-gen locked mode. The solution is to remove the wire strap on the bottom of the A7 board that runs from A7U541 Pin 4 to A7U541 Pin 15 at Pin 15 and reconnect it to A7U541 Pin 14. Check that there is still a strap from A7U551 Pin 12 to A7U541 Pin 15. All units in the affected serial number range should have this change made as they come in for service. The changes to be made are outlined in the following drawings.

Thanks to John Judge, TV Engineering, for this information.

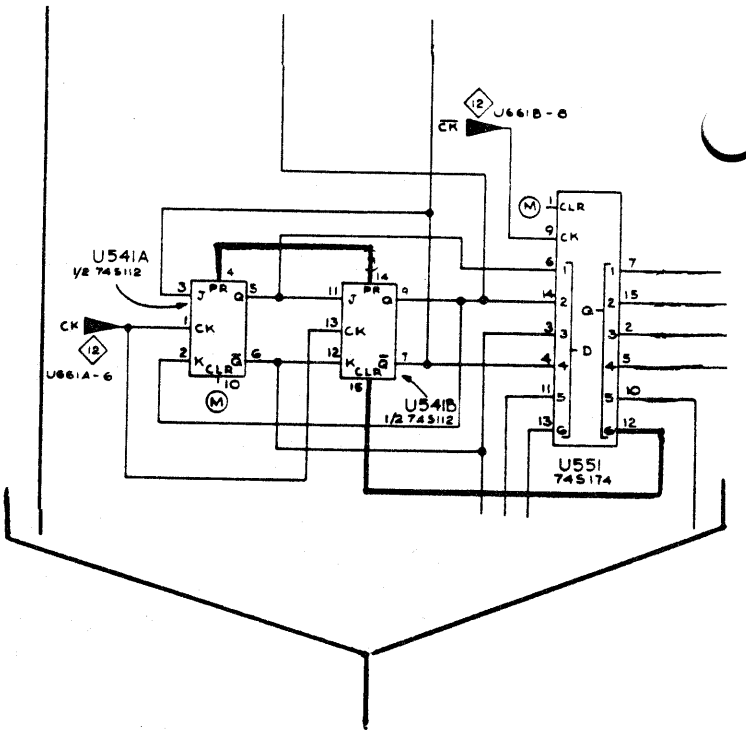
Affected Serial Numbers: 1900/R1900 B010100 - B010154

PART OF SCHEMATIC 13

PART OF A7 BOARD



PRESENT WIRING SCHEME



WIRING AFTER REQUIRED CHANGE

--Steve Schmelzer
58-511, Ext. 6507

606A, 607A, 608, 624, 634: OP AMP CHANGE

Some of the 600 series monitors have shown a high failure rate for the OP AMP part number 156-0067-00. The failures tend to be the specific circuit numbers shown in the table below.

To reduce this cause for failure, MOD #38757 replaces the 156-0067-00 component with a preconditioned 156-0067-01 for the circuit numbers given. The part numbers of the assemblies are not affected by this MOD.

Instrument	Assembly	Circuit Number
606A	670-4296-01 High Voltage	U740
607A	670-4515-00 High Voltage	U110
607A Opt. 8 & 18	670-4515-01 High Voltage	U110
608	670-5214-02 Low Voltage	U832
624	670-5214-04 Low Voltage	U832
624	670-5610-02 High Voltage	U905
634	670-5594-02 Yoke Driver	U350, 360
634 Opt. 15	670-6122-01 Yoke Driver	U350, 360
634	670-5593-01 High Voltage	U445
634 Opt. 15	670-6403-01 High Voltage	U445

This article is for your information only.

--George Kusiowski
63/530, ext. 3928

634 RELIABILITY & NOISE MODIFICATION #37777

Reference: 634 Monitors, Code 18 Service Plan; #1024
Service Organization Bulletin; March 10, 1980; Issue 7-80

To prevent damage to the 634 monitor in the event of a 15 kV arc, and to reduce the high voltage noise in the raster display, modification #37777 has been implemented. This modification is factory installed in all 634 monitors of serial numbers B020000 and up. Those instruments below this serial number are to be updated when brought in for repair using MOD kit 045-0015-00. This kit contains all components and instructions concerning the reliability aspects of the MOD. It does not, however, provide for complete installation of the MOD (see CRT Anode Lead below).

INTERFACE CIRCUIT BOARDS (VIDEO AMPLIFIERS), A6 & A9

The two interface circuit boards share some changes. On both boards, VR147 is replaced by a zener diode with better thermal characteristics. This improves display intensity stability when temperature changes (see figure 1). Both boards also have metal oxide varistors RV72, RV73 and RV92 added to limit power supply fluctuations in the event of a high voltage arc (see figure 2). Varistor RV92 is connected between pins 1 and 3 of J500. Varistors RV72 and RV73 are soldered in parallel across C72 and C73 respectively.

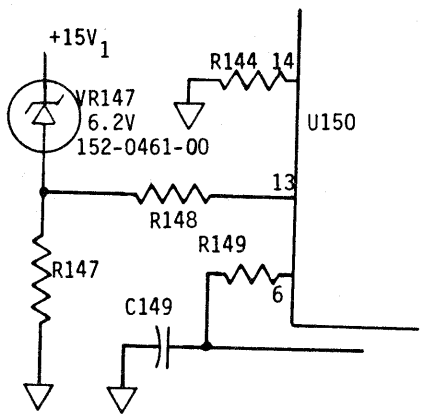


Figure 1: VR147 has been changed to improve brightness stability.

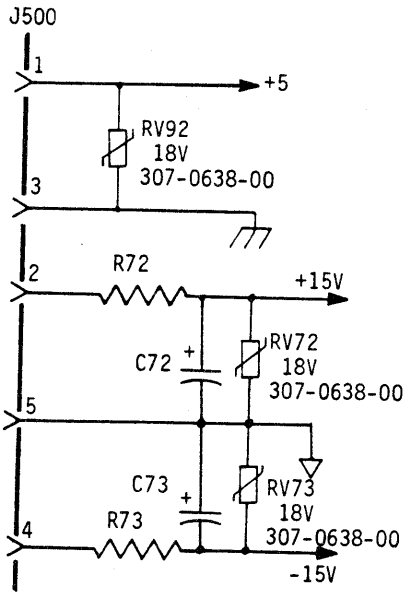


Figure 2: RV72, RV73 & RV92 are added to minimize supply variations if CRT arcs.

(continued)

The standard interface, A6, also has C193 added to the video output amplifier. This reduces the 45 kHz component in the -100 volt power supply. Pads and runs for the inclusion of C193 already exist on the A6 layout next to R188. Their location is shown in figure 3.

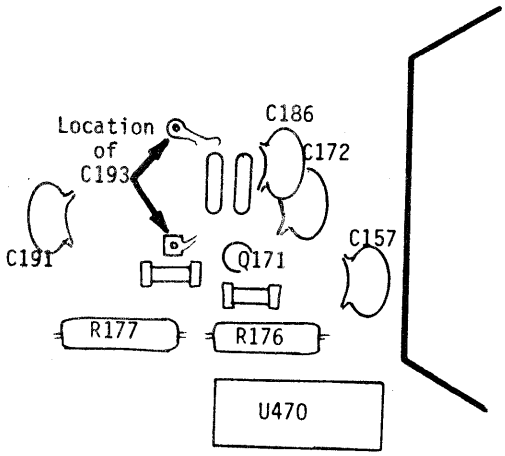


Figure 3: Location of C193 pads on A6 video board.

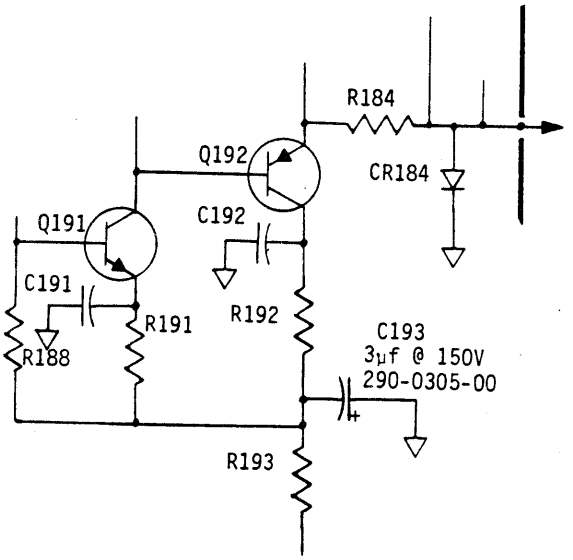


Figure 4: Partial schematic showing addition of C193 to A6 board.

With the inclusion of these changes, the part numbers of the A6 and A9 video interface boards roll from 670-5592-02 and 670-5965-00 to 670-5592-03 and 670-5965-01, respectively.

YOKE DRIVER BOARDS, A3 and A11

Identical changes are made to both yoke driver boards.

The ripple in the vertical driver has been reduced by adding capacitor C307 to the base circuit of Q317 and by rerouting one lead of C320. One lead of C307 is soldered to the node at R307, R308 and C308. The grounded lead of C320 is then lifted from its "dirty" ground and soldered to the unattached lead of C307. This remaining long lead is then dressed with sleeving and soldered to the "clean" ground at the anode of CR322 (see figure 5). Please note that mention of rerouting C320 was inadvertently omitted from the 045-0015-00 kit instructions.

(continued)

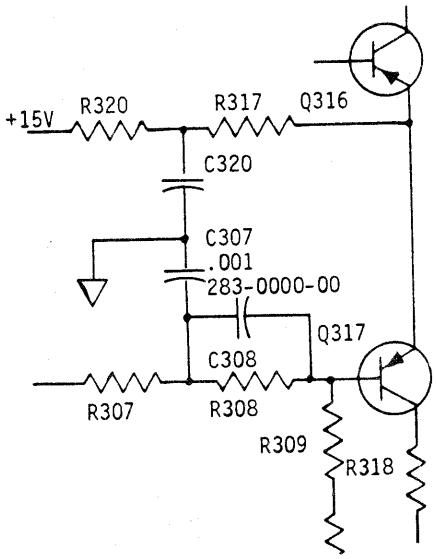


Figure 5: Rerouting of C320 and addition of C307 to yoke driver boards.

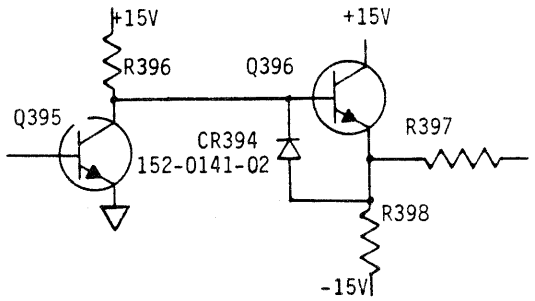


Figure 6: CR394 added to retrace blanking circuit.

To prevent damage to Q396 in the retrace blanking circuitry, CR394 is added to the back of the boards between the base and emitter of Q396 (see figure 6).

As a result of these changes, the part numbers of the standard and Option 15 yoke driver boards change from 670-5594-01 and 670-6122-00 to 670-5594-02 and 670-6122-01, respectively.

High Voltage Boards, A4 and A13

Identical changes are made to both high voltage boards.

The cutoff adjustment, R435 is relocated to the backside of the board. This helps to reduce noise pickup. To prevent the center lead of R435 from shorting against J400, the pins on P400 must be clipped to ½" in length. After clipping, file the ends of the pins lightly to deburr them.

Diode CR435 is changed from a 2 KV_r device to a 10 KV_r device to better withstand over-voltages due to arcing. Again, to reduce noise, CR435 is mounted on the back of the board.

Metal oxide varistors RV437 and RV454 are added to the back of the boards as well. They limit voltage spikes caused by arcing (see figure 7).

(continued)

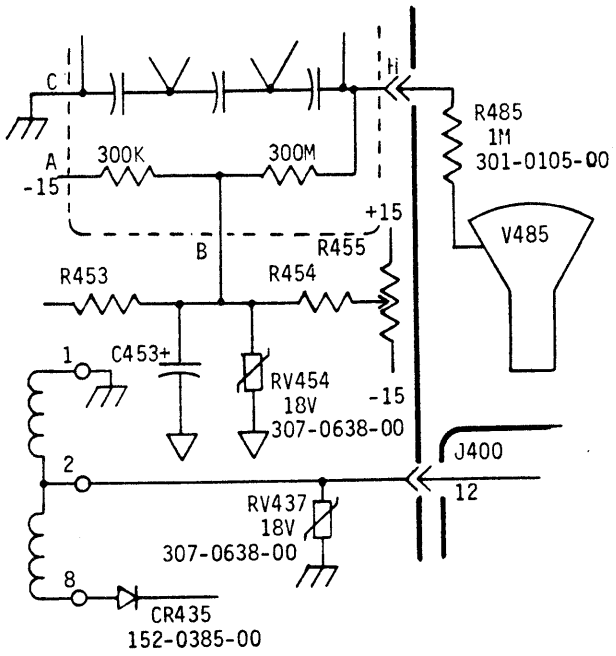


Figure 7: R435, CR435, VR437 & VR454 affected on high voltage board.

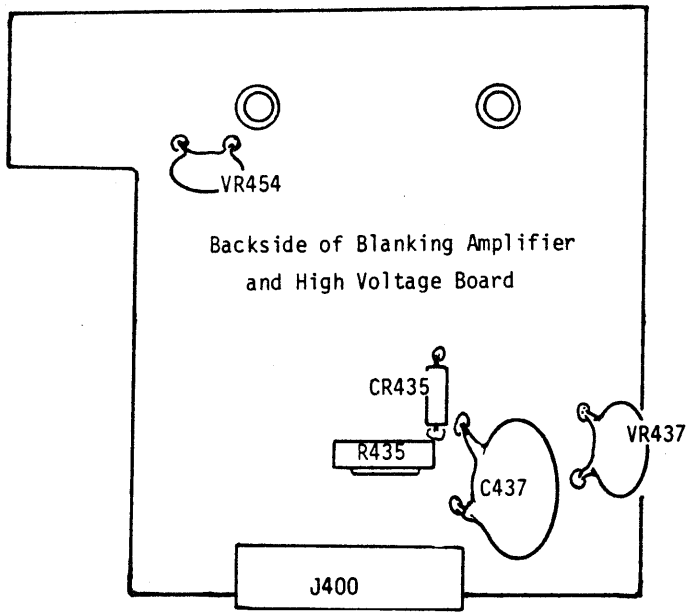


Figure 8: Locations of RV437 & RV454

(continued)

The value of C406 is increased for better decoupling of the +20 volt supply line and to better withstand the high surge current. However, the large size of C406 requires that the positioning of C406 & C407 be changed as shown in figure 9. The correct value for C406 is 180µf @ 40V. Please note this correction to the 045-0015-00 kit instructions.

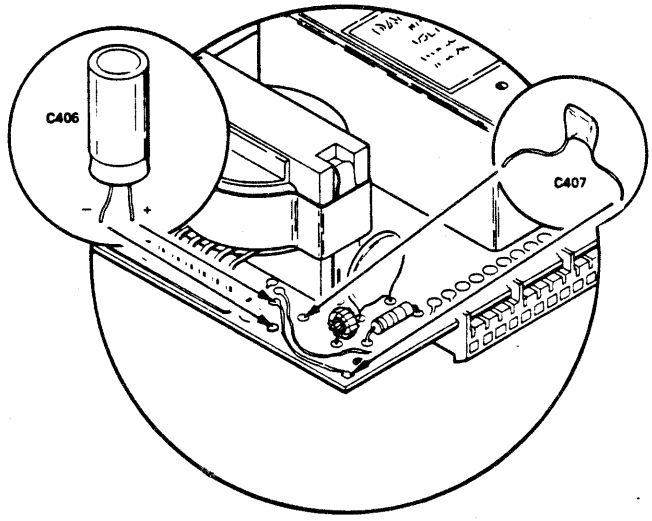


Figure 9: Repositioning of C406 & C407

With these changes the part numbers of the A4 & A13 high voltage boards roll from 670-5593-00 and 670-6403-00 to 670-5593-01 and 670-6403-01, respectively.

The above mentioned modifications are installable using kit 045-0015-00. A parts list for this kit follows.

Circuit No.	Old Value	New Value	New Part No.
C193	---------	3µf @ 150V	290-0305-00
C307	---------	.001µf	283-0000-00
C406	4µf @ 50V	180µf @ 40V	290-0798-00
CR394	---------	30V	152-0141-02
CR435	2KV	10KV	152-0385-00
RV72	---------	18V	307-0638-00
RV73	---------	18V	307-0638-00
RV92	---------	18V	307-0638-00
RV437	---------	130V	307-0415-00
RV454	---------	18V	307-0638-00
VR147	6.2V	6.2V	154-0461-00

CRT Anode Lead

A one megohm resistor, R485, has been spliced into the CRT anode lead to reduce noise in the raster display. This portion of modification #37777 is not included in field kit 045-0015-00. It can, however, be installed in instruments where high voltage noise appears to be a problem.

(continued)

First, the CRT anode lead is cut three and one half inches from the end that plugs into the high voltage multiplier, then the cut ends are stripped of ¼" of insulation. Next, the one megohm resistor (P/N 301-0105-00) is soldered onto the free wire (the part that attaches to the high voltage multiplier). A dab of silicone rubber sealant (P/N 006-1171-00) is put around the solder joint to prevent contamination or leakage. Now, a three inch section of silicone sleeving is dressed over the resistor and lead leaving the unsoldered end of the resistor protruding beyond the sleeving. This end of R485 is then soldered to the remaining part of the CRT anode lead. Another dab of silicone rubber sealant is applied and the sleeving is centered over the resistor. Finally, a two inch piece of heat shrink tubing (P/N 162-0532-00) is centered over the sleeve and shrunk into place to prevent the sleeve from sliding off.

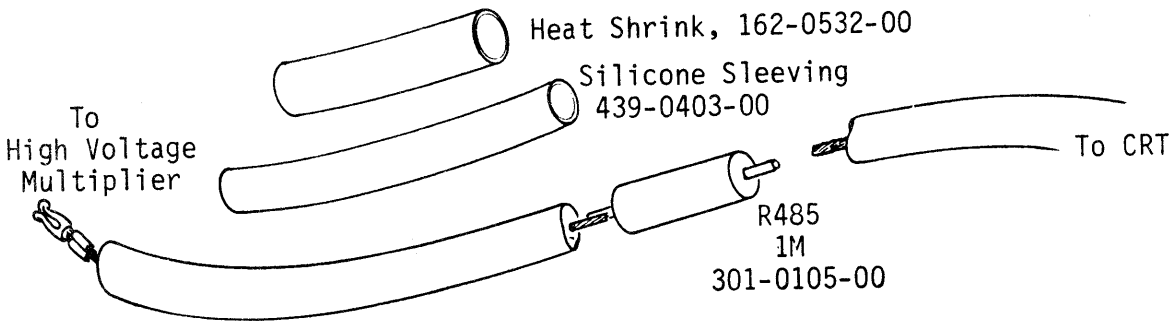


Figure 10: Installing R485 into the CRT anode lead

For a time, R485 was being installed on the CRT beneath the metal foil shielding. These CRTs were identifiable by a red mark painted onto the very end of the lead where it plugs into the multiplier. This practice was discontinued as the lead's strength at the R485 joint was impaired.

Finally.....

The above mentioned modifications, except the R485 addition, should be added to all 634 monitors below B020000 as they are routinely shipped to the service centers.

For proper ordering procedures refer to the March 10, 1980 issue of the Service Organization Bulletin (issue 7-10). Charge all parts and labor to activity code 18.

--George Kusiowski
63/503, ext. 3928

634: TORX TOOLS AVAILABLE

The 634 monitor uses eight T20 type torx-head screws in the frame assembly. To remove and replace these screws, the 003-0866-00 bit and a ¼" drive magnetic screwdriver handle are required. To date, the 003-0866-00 is the only part numbered tool available for use with these screws.

Smaller torx-head bits (type T10) are available under part numbers 003-0814-00 (one inch shank) and 003-0815-00 (two inch shank). A complete tool for this size is orderable under part number 003-0816-00. The T10 size has found application in television products.

--George Kusiowski
63/503, ext. 3928

SERVICE INSTRUMENT DIVISION

ACCESSORIES

J-16 REPLACEMENT KIT

References: Type 016-0539-00 Battery Packs (S/N B010100 to B049999)
Type 119-0375-00 Battery Chargers (S/N B010100 to B049999)

The parts replacement kit, P/N 050-0687-00, provides parts and instructions to replace the interconnect cable assembly on the battery charger*, and the mating connector on two battery packs with more reliable connectors.

*Parts Replacement Kit, P/N 050-0687-00, is for battery charger wires for 115 volts. For 230 volt battery chargers, use P/N 050-0688-00.

--Dave McKinney
58/511, Ext. 7072

DATA COMMUNICATION ANALYZERS

834 SELF TEST ADAPTER

When using the internal diagnostics or the diagnostic ROM pack (067-0986-00) for the 834, two tests, (EXT DATA and SVC - EXT DATA), require loopback at the RS232 port.

Since no fixture has been provided, one must be built using the instructions provided in the service manual (preliminary), pages 5-28 and 5-65. Use any male 24 PIN RS-232 connector such as a 131-2199-00 right angle or 131-0570-00 standard. Any questions, please call.

--Craig Wasson
92-236, Ext. 1564

PORTABLES

468 MANUALS AVAILABLE

The 468 manuals are now orderable. The part number for Volume I is 070-3515-00. The part number for Volume II is 070-3516-00.

--Mike Laurens
58-511, Ext. 7173

602 PHASING ADJUSTMENT

The phase setting as described in the 602 instruction manual (P/N 070-0799-00, page 5-7) may sometimes be difficult to attain. If this is the case, it may be necessary to "dress" the feedback capacitors, C20, C29, C70 and C79.

"Dressing the caps" consists of bending them toward or away from their associated parallel resistors, R20, R29, R70 and R79. This is done while observing the elipse on the CRT face to obtain minimal phase difference.

--George Kusiowski
63/503, ext. 3928

606A, 607A, 608, 624, 634: OP AMP CHANGE

Some of the 600 series monitors have shown a high failure rate for the OP AMP part number 156-0067-00. The failures tend to be the specific circuit numbers shown in the table below.

To reduce this cause for failure, MOD #38757 replaces the 156-0067-00 component with a preconditioned 156-0067-01 for the circuit numbers given. The part numbers of the assemblies are not affected by this MOD.

Instrument	Assembly	Circuit Number
606A	670-4296-01 High Voltage	U740
607A	670-4515-00 High Voltage	U110
607A Opt. 8 & 18	670-4515-01 High Voltage	U110
608	670-5214-02 Low Voltage	U832
624	670-5214-04 Low Voltage	U832
624	670-5610-02 High Voltage	U905
634	670-5594-02 Yoke Driver	U350, 360
634 Opt. 15	670-6122-01 Yoke Driver	U350, 360
634	670-5593-01 High Voltage	U445
634 Opt. 15	670-6403-01 High Voltage	U445

This article is for your information only.

--George Kusiowski
63/530, ext. 3928

634 RELIABILITY & NOISE MODIFICATION #37777

Reference: 634 Monitors, Code 18 Service Plan; #1024
Service Organization Bulletin; March 10, 1980; Issue 7-80

To prevent damage to the 634 monitor in the event of a 15 kV arc, and to reduce the high voltage noise in the raster display, modification #37777 has been implemented. This modification is factory installed in all 634 monitors of serial numbers B020000 and up. Those instruments below this serial number are to be updated when brought in for repair using MOD kit 045-0015-00. This kit contains all components and instructions concerning the reliability aspects of the MOD. It does not, however, provide for complete installation of the MOD (see CRT Anode Lead below).

INTERFACE CIRCUIT BOARDS (VIDEO AMPLIFIERS), A6 & A9

The two interface circuit boards share some changes. On both boards, VR147 is replaced by a zener diode with better thermal characteristics. This improves display intensity stability when temperature changes (see figure 1). Both boards also have metal oxide varistors RV72, RV73 and RV92 added to limit power supply fluctuations in the event of a high voltage arc (see figure 2). Varistor RV92 is connected between pins 1 and 3 of J500. Varistors RV72 and RV73 are soldered in parallel across C72 and C73 respectively.

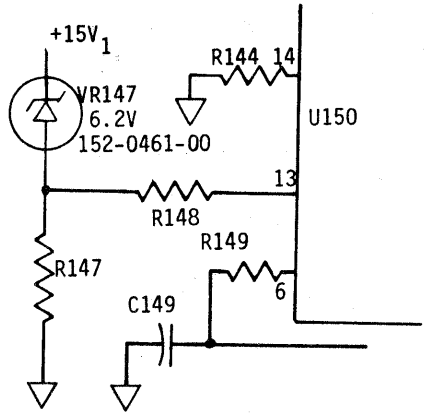


Figure 1: VR147 has been changed to improve brightness stability.

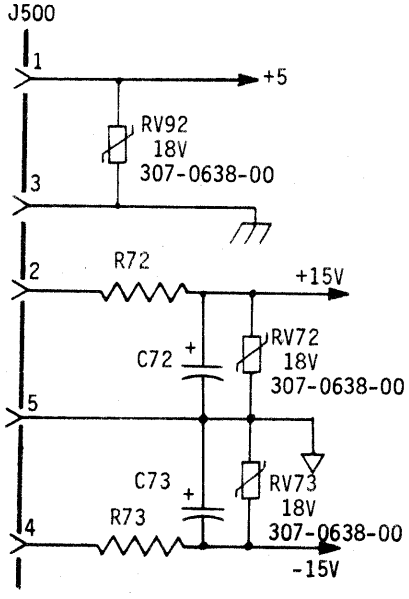


Figure 2: RV72, RV73 & RV92 are added to minimize supply variations if CRT arcs.

(continued)

The standard interface, A6, also has C193 added to the video output amplifier. This reduces the 45 kHz component in the -100 volt power supply. Pads and runs for the inclusion of C193 already exist on the A6 layout next to R188. Their location is shown in figure 3.

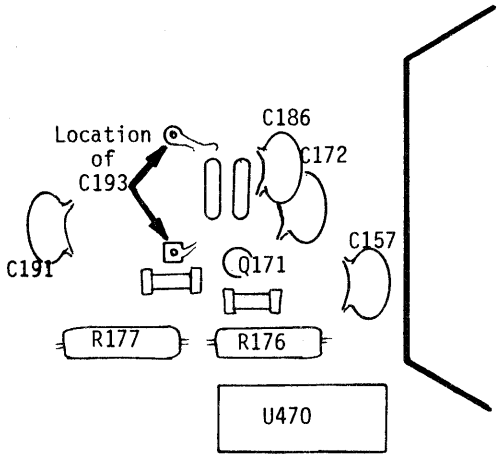


Figure 3: Location of C193 pads on A6 video board.

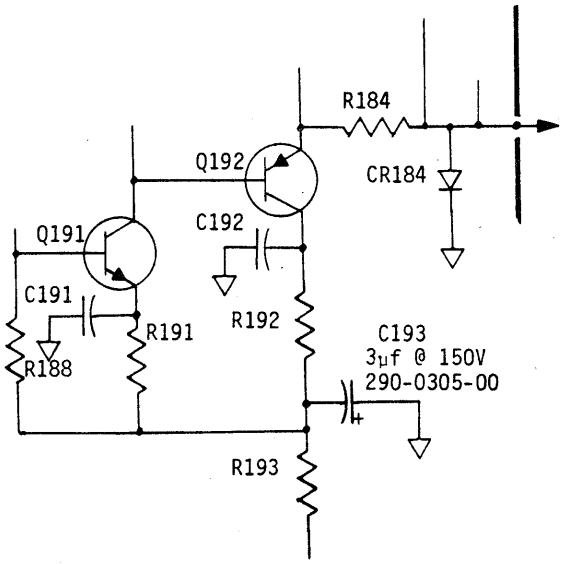


Figure 4: Partial schematic showing addition of C193 to A6 board.

With the inclusion of these changes, the part numbers of the A6 and A9 video interface boards roll from 670-5592-02 and 670-5965-00 to 670-5592-03 and 670-5965-01, respectively.

YOKE DRIVER BOARDS, A3 and A11

Identical changes are made to both yoke driver boards.

The ripple in the vertical driver has been reduced by adding capacitor C307 to the base circuit of Q317 and by rerouting one lead of C320. One lead of C307 is soldered to the node at R307, R308 and C308. The grounded lead of C320 is then lifted from its "dirty" ground and soldered to the unattached lead of C307. This remaining long lead is then dressed with sleeving and soldered to the "clean" ground at the anode of CR322 (see figure 5). Please note that mention of rerouting C320 was inadvertently omitted from the 045-0015-00 kit instructions.

(continued)

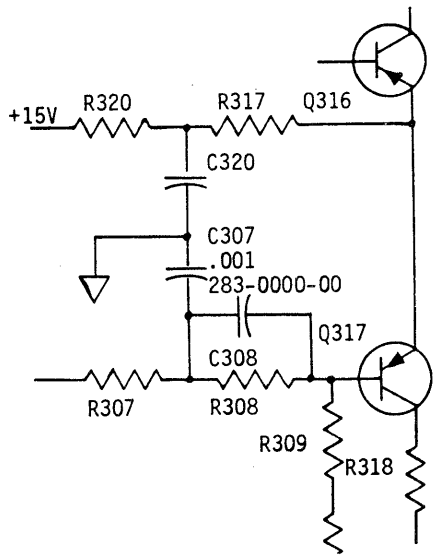


Figure 5: Rerouting of C320 and addition of C307 to yoke driver boards.

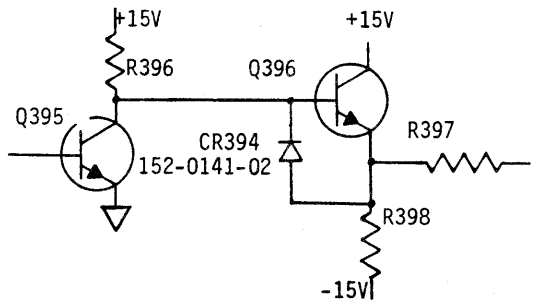


Figure 6: CR394 added to retrace blanking circuit.

To prevent damage to Q396 in the retrace blanking circuitry, CR394 is added to the back of the boards between the base and emitter of Q396 (see figure 6).

As a result of these changes, the part numbers of the standard and Option 15 yoke driver boards change from 670-5594-01 and 670-6122-00 to 670-5594-02 and 670-6122-01, respectively.

High Voltage Boards, A4 and A13

Identical changes are made to both high voltage boards.

The cutoff adjustment, R435 is relocated to the backside of the board. This helps to reduce noise pickup. To prevent the center lead of R435 from shorting against J400, the pins on P400 must be clipped to ½" in length. After clipping, file the ends of the pins lightly to deburr them.

Diode CR435 is changed from a 2 KV_r device to a 10 KV_r device to better withstand over-voltages due to arcing. Again, to reduce noise, CR435 is mounted on the back of the board.

Metal oxide varistors RV437 and RV454 are added to the back of the boards as well. They limit voltage spikes caused by arcing (see figure 7).

(continued)

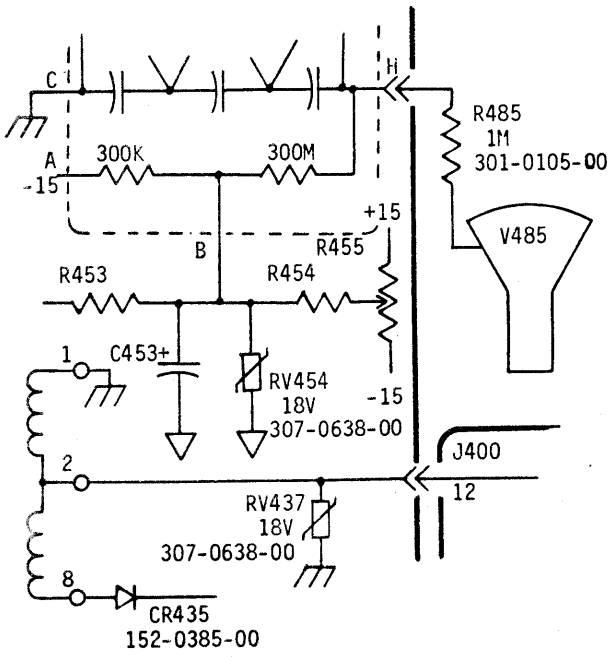


Figure 7: R435, CR435, VR437 & VR454 affected on high voltage board.

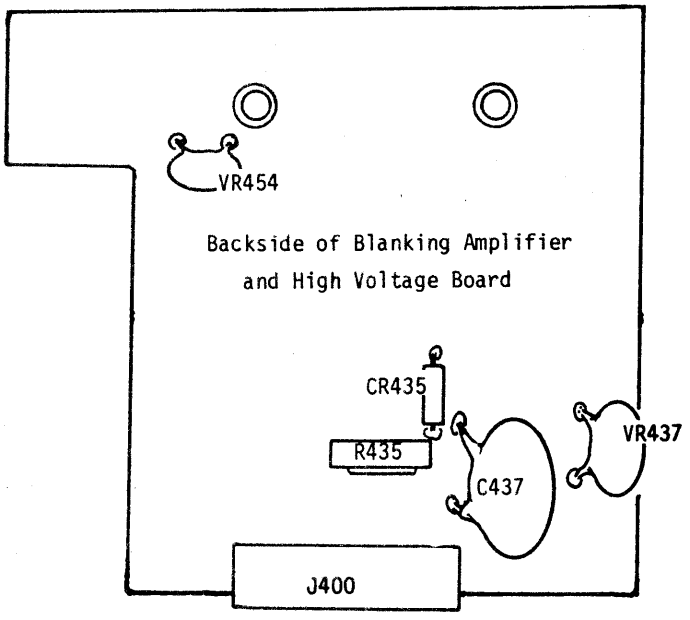


Figure 8: Locations of RV437 & RV454

(continued)

The value of C406 is increased for better decoupling of the +20 volt supply line and to better withstand the high surge current. However, the large size of C406 requires that the positioning of C406 & C407 be changed as shown in figure 9. The correct value for C406 is 180µf @ 40V. Please note this correction to the 045-0015-00 kit instructions.

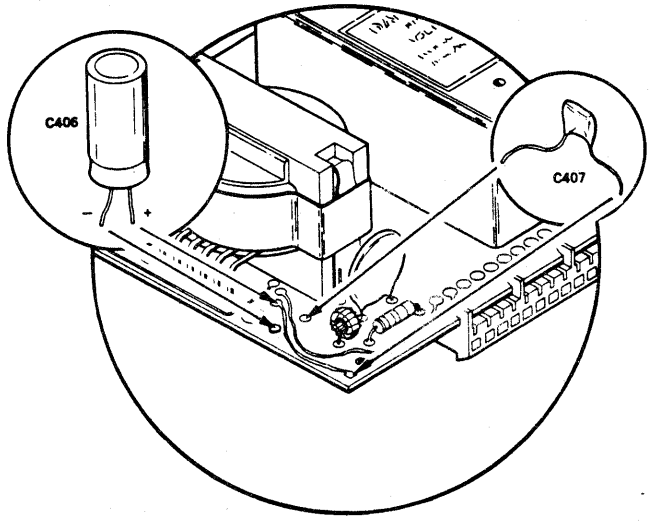


Figure 9: Repositioning of C406 & C407

With these changes the part numbers of the A4 & A13 high voltage boards roll from 670-5593-00 and 670-6403-00 to 670-5593-01 and 670-6403-01, respectively.

The above mentioned modifications are installable using kit 045-0015-00. A parts list for this kit follows.

Circuit No.	Old Value	New Value	New Part No.
C193	---------	3µf @ 150V	290-0305-00
C307	---------	.001µf	283-0000-00
C406	4µf @ 50V	180µf @ 40V	290-0798-00
CR394	---------	30V	152-0141-02
CR435	2KV	10KV	152-0385-00
RV72	---------	18V	307-0638-00
RV73	---------	18V	307-0638-00
RV92	---------	18V	307-0638-00
RV437	---------	130V	307-0415-00
RV454	---------	18V	307-0638-00
VR147	6.2V	6.2V	154-0461-00

CRT Anode Lead

A one megohm resistor, R485, has been spliced into the CRT anode lead to reduce noise in the raster display. This portion of modification #37777 is not included in field kit 045-0015-00. It can, however, be installed in instruments where high voltage noise appears to be a problem.

(continued)

First, the CRT anode lead is cut three and one half inches from the end that plugs into the high voltage multiplier, then the cut ends are stripped of ¼" of insulation. Next, the one megohm resistor (P/N 301-0105-00) is soldered onto the free wire (the part that attaches to the high voltage multiplier). A dab of silicone rubber sealant (P/N 006-1171-00) is put around the solder joint to prevent contamination or leakage. Now, a three inch section of silicone sleeving is dressed over the resistor and lead leaving the unsoldered end of the resistor protruding beyond the sleeving. This end of R485 is then soldered to the remaining part of the CRT anode lead. Another dab of silicone rubber sealant is applied and the sleeving is centered over the resistor. Finally, a two inch piece of heat shrink tubing (P/N 162-0532-00) is centered over the sleeve and shrunk into place to prevent the sleeve from sliding off.

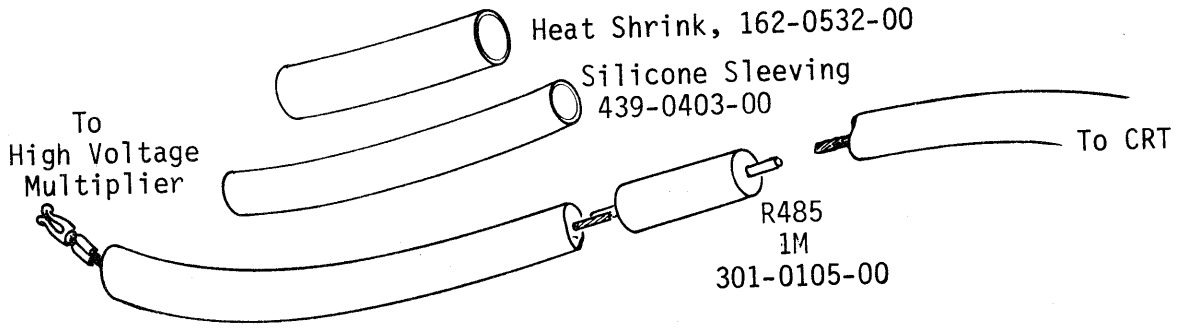


Figure 10: Installing R485 into the CRT anode lead

For a time, R485 was being installed on the CRT beneath the metal foil shielding. These CRTs were identifiable by a red mark painted onto the very end of the lead where it plugs into the multiplier. This practice was discontinued as the lead's strength at the R485 joint was impaired.

Finally.....

The above mentioned modifications, except the R485 addition, should be added to all 634 monitors below B020000 as they are routinely shipped to the service centers.

For proper ordering procedures refer to the March 10, 1980 issue of the Service Organization Bulletin (issue 7-10). Charge all parts and labor to activity code 18.

--George Kusiowski
63/503, ext. 3928

401X (OPTION 5): DELETING CODE 18

Reference: Service Update Plan #102 (March 4, 1980)
IOC "Status of 045-0014-00" (June 12, 1980)

As previously announced, the no charge 045-0014-00 kit that upgraded Option 5 in the 4014, 4015 and 4016 has now been deleted.

In it's place is a billable kit, 040-0990-00, that can be ordered through normal channels. This 040 kit is composed of identical parts, only the number has changed to delete the Code 18 program.

Any further questions may be directed to Dennis Painter, extension 3597, or myself.

--Kent Barnard
63/503, ext. 3598

401X TTY PORT INTERFACE "GLA" STRAP

The 401X TTY Port Interface has a strap labeled "GLA" (Graphic Look Ahead) on -07 and above cards. The "GLA" strap provides the option of controlling the Graphic Look Ahead function in the following ways:

ON - Enables the "GLA" function to allow the interface to place data on the terminal bus if the terminal is in Graph Mode, regardless of the condition of $\overline{\text{T BUSY}}$ (or $\overline{\text{C BUSY}}$ if the interface is in Aux Mode). This allows graphics coordinates to be loaded into the X & Y registers on TC2 while the terminal is busy drawing the previous vector. This is the normal setting for "GLA", older interfaces have this hardwired on the board.

OFF - Disables the "GLA" function.

OUT - Will allow the interface to place data on the terminal bus (Alphanumeric or graphic) regardless of the condition of $\overline{\text{T BUSY}}$ (or $\overline{\text{C BUSY}}$ if the interface is in Aux Mode). This may be desired in some dual interface applications.

--Frank Lees
63-503, ext. 3929 (W1)

401X TTY PORT INTERFACE TESTING WITH AN 832/833 OPT. 2

The 832/833 Option 2 can be used in simulate mode to test a 401X TTY Port Interface. The information below describes the necessary strap settings on the TTY Port Interface for 9600 baud operation with an 832/833. Strap settings not mentioned on the table should be set according to the information given in the TTY Port Interface Manual.

TTY Port Interface Strapping

Baud Shift	= OUT
16X	= IN
Clock	= Arm of clock to "OUT" of 16X
Max Baud	= 19
T DATA	= INVERT (T DATA must be in "INVERT" to work with the 832/3)
R DATA	= NORMAL (R DATA must be in "NORMAL" to work with the 832/3)

Other TTY Port straps should be set according to the service manual.

832/833

MODE	= SIMULATE
Baud Rate	= 9600
DUPLEX	= HALF
Protocol	= ASYNC

Other switches should be set as required.

Current Loop Adapter

INT/EXT	= EXT

Hookup

Terminal T DATA J261 Pin 2 to Current Loop Adapter R DATA Loop Black Lead.
Terminal R DATA J261 Pin 3 to Current Loop Adapter R DATA Loop Red Lead.

The 832/833 Send Buffer can now be used to send messages to the terminal display and the terminal keyboard can be used to input to the 832/833 Receive Buffer.

The maximum baud rate that can be used with the 832/833 is 9600 baud, if a lower baud rate is desired strap Baud Shift on the TTY Port Interface to "ON" and adjust R50 for 16X, the desired baud rate measured at TP1.

--Frank Lees
63-503, ext. 3929 (W1)

4054/618 DEFLECTION AMP BOARD (672-0783-02) MODIFICATION #M39710 & #M38624

Some 4054s demonstrate graphics break-up while operating in the refresh mode. There was a correction to the Deflection Amp of the 4054 only to solve the refresh graphics break-up (672-0782-02 level board & below). The modification number is #M39710 and the board level changed from -02 to -03 and was implemented in 4054s between serial numbers B010354 to approximately B010600 (refer to figure 1). The -03 level board is not compatible with the 618, and further evaluation of #M39710 proved that it did not correct all 4054s, therefore the implementation of this modification was dropped.

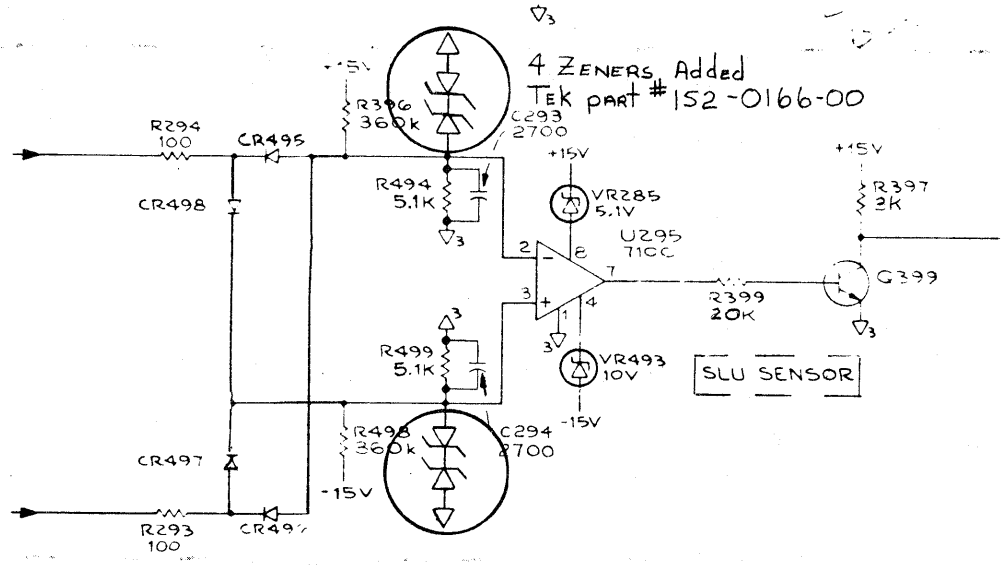


Figure 1 #M39710; Schematic 9-2 4054 Service Manual (070-2839-00) Deflection Amp; SLU Sensor Circuitry

Modification #M39710 has been superseded and replaced by modification #M38624. Change #M38624 addresses both the -02 and -03 level Deflection Amp for both the 618 and 4054. This change is being implemented in both the 618 and the 4054 Deflection Amp and rolls both the -02 and -03 level boards to a -04 level board. There is a kit available which includes the instructions for the implementation of #M38624 and the kit number is 040-0977-00. In addition to correcting the refresh graphics break-up this new modification solves the insufficient resolution of the hard copy gain trim due to extreme range of the variable resistors. (Figure 2)

(continued)

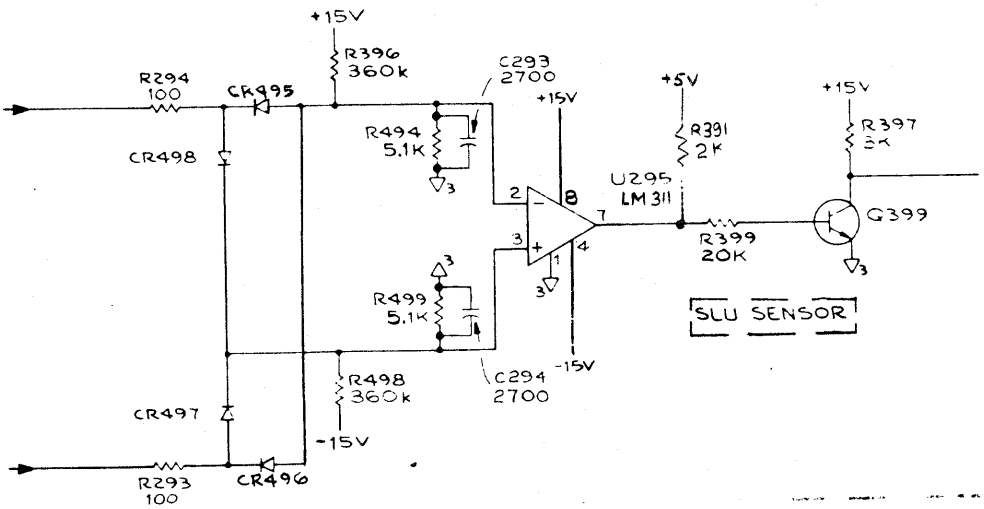


Figure 2 #M38624; Schematic 9-2 4054 Service Manual
Deflection Amp; SLU Sensor Circuitry

--Darrell McGiverin
63/503, ext. 3786

4663 TWO VOLUME SERVICE MANUAL AVAILABLE

There is, now available, a two-volume 4663 Service Manual which replaces the preliminary Service Manual P/N Ø61-1910-ØØ. The new Service Manual has two part numbers and should be ordered as a set:

VOLUME 1 is P/N Ø7Ø-2669-ØØ
VOLUME 2 is P/N Ø7Ø-3453-ØØ

--Larry North
63-503, Ext. 3926

4633A, 4634: CONVEYOR MODIFICATION #37411

The 640-0212-00 conveyor assembly used in the 4633A and the 4634 has been prone to early belt failure and paper jamming.

To correct these problems, mod 37411 replaces the old conveyor with the 640-0212-01 assembly. This new conveyor uses more durable belts and allows for belt tension adjustments.

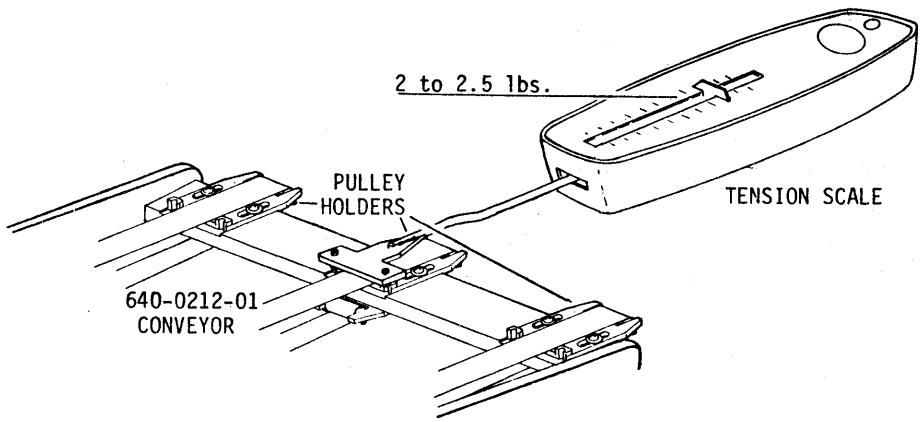
The -00 conveyor will no longer be supported. In the event of a failure, replace the entire -00 conveyor with the new -01 assembly.

The new conveyor will not normally need readjustment. However, in the event retentioning is needed, the following procedure may be used. The necessary tools are:

1 - #2 Pozidriv screw bit, P/N 003-0444-00
1 - ¼" drive handle, P/N 003-0293-00
1 - tension scale, P/N 003-0953-00

Proceed as follows:

1. Remove the eight screws securing the top cover and remove the top cover.
2. Power up the instrument and adjust the three upper pulley holders with the conveyor running.



a. Loosen the two screws securing one of the holders.
b. Engage the tensioning scale with the holder as shown in the figure.
c. While pulling at a tension of 2 to 2.5 pounds, tighten the two bracket mounting screws.
d. Check that the belt rides the center of the rollers and does not rub against the sides.
e. Repeat for the remaining two holders.

(continued)

3. When the upper belts of the conveyor are tensioned, power the instrument down. Remove the four screws securing the conveyor and lift it out of the instrument.

   NOTE: It may be desirable to secure the conveyor to a solid object at this time. This may be done with a C-clamp on a bench top.

4. Adjust the remaining three holders in a similar manner. Check the belt tracking by turning the conveyor by hand.
5. Reinstall the conveyor and power the instrument up. Check that the lower belts track correctly.
6. Replace the top cover and the eight holding screws. Adjustment is complete.

--George Kusiowski
63/503, ext. 3928

CT8101 PART NUMBERS

New part numbers are set up and orderable for both types and voltages of CT8101 Mother Boards and Drive Mechanisms. Below are the part numbers for the major assemblies.

Texas Instruments Part Number	Tektronix Part Number	Description
983841	118-0169-00	115 VAC Mother Board solenoid type
995660	118-0873-00	230 VAC Mother Board solenoid type
937300	118-0872-00	115 VAC Mother Board stepping motor type
937310	118-0871-00	230 VAC Mother Board stepping motor type
983811	118-0254-00	Drive Mechanism w/o printhead solenoid type
999257	118-0870-00	Drive Mechanism w/o printhead stepping motor type
984037	118-0253-00	Keyboard kit, limited ASCII
983829	118-0255-00	Printhead Assembly

Notes:

1. Model 743 CT8101 has a solenoid type paper advance and the Mother Board J252 has 2 pins.

2. Model 744 CT8101 has a stepping motor type paper advance and the Mother Board J252 has 5 pins.

3. The keyboard kit includes complete keyboard with bezel.

4. All above part numbers are on the exchange program except the printhead assembly.

--Brad Griffin, Kevin King
92-236, Ext. 1608, 1636

8002A FLEXIBLE DISC UNIT POWER SUPPLY PART NUMBER

The purpose of this Wizard is to inform the Field of a part number for the 8002A Flexible Disc Unit. The part numbers for the +5 and +24 Volt power supplies are not listed in the "8002A Microprocessor Lab Flexible Disc Unit Service Manual," Tek part number 070-2587-00. Both power supplies are replaced as a single assembly. The flexible disc power supply assembly part number is 118-0203-00.

For future reference this part number may be added to the Replaceable Electrical Parts List in the Flexible Disc Unit Service Manual.

We would like to thank Fred Chalfant for informing us of this omission.

--Kevin King, Brad Griffin
92-236, Ext. 1636, 1608

SEMICONDUCTOR TEST SYSTEMS

NEW SUPERBLOWER PRESSURE SWITCH

There is a new pressure switch available for the 1803, 1804, and 1805 tables. The previous pressure switch was made for higher current rating. Its contacts were "self-cleaning" at high current, but in the 1800 Series tables there is a low current at these contacts. Because of the lack of high current, the contacts sometimes become dirty. This dirty contact can cause intermittent connection at the switch. The result is a table that will intermittently turn off and on.

The new pressure switch is rated at a lower current and has gold contacts. This insures a good contact connection at the pressure switch. Its part number is 260-2038-00. If you have a pressure switch that is in need of replacement, order the new part number.

--Joe Lipska
92-236, Ext. 1634

SOFTWARE CHANGES AND PROBLEMS SOLVED FOR AP101

The following list includes all S-3200 software version changes for accounting period 101.

Internal use only: If you have any questions or need software updates, please call.

Inserted by --
Craig Wasson
94-816 Ext. 1564

(article continued on next two pages)

Program Name	Hardware Supported	Old Version	New Version	Problem Description	Problem Solution or Changes
DKARY.FNC	S-3200	VØ2.25	VØ2.26	The close array subroutine "CLARY" does not close the disk file. This problem was generated by VØ2.25 when another fix was made to CLARY. That fix inserted an instruction within a PIC (Position Independent Code) operation which made that operation ineffective thereby creating the observed problem.	The inserted code from the previous fix was moved to occur before the PIC operation.
	S-3200			If a program abort should occur (i.e. an 83 error; data logging file is full) when outputting data to a lun assigned to a file, that data becomes lost.	The response is correct. There are only two methods available to save information output to file through a lun. 1) data is saved when program terminates normally. 2) data is saved by executing the SAUTST subroutine. If any program abort occurs, only the data which was output on previous execution of the program or data output previous to the execution of SAUTST will be saved. The system software was designed to work this way. The assumption being that if a program aborts, the data is either invalid or incomplete so it must be discarded, and if any data was good prior to program completion the user would have executed a SAUTST to guarantee it was saved.

SOFTWARE CHANGE NOTICE SUMMARY SHEET

Hardware Supported	PROGRAM NAME	Old Version	New Version	Problem and Solution
S-3270	DCSCAL.EDT	V01.02	V01.03	Added IV & .IV reference supply checks. Located in Step 2.
S-3200	PRMSUB.FNC	V03.01	V03.02	Changed a routine which computed the addresses to be used for a DMA transfer.
S-3260	EMOD.EDT	V02.23	V02.24	Now supports 7 & 14 phase configurations.
S-3200	DKARY.FNC	V02.25	V02.26	Fixed so CLARY command chooses the disk array file.
S-3270	EHGEN.EDT	V01.01	V01.02	Modified width measurements from 10NS to 14NS.
S-3260	DELCAL.EDT	V01.02	V01.03	Changed the comparator phase programming.
S-3260	TIS1.EDT	V02.32	V02.33	Put 1843 function file back in along with the DC connects.
S-3260	T1140A.EDT	V02.31	V02.32	Put 1843 function file back in along with the DC connects.
S-3260	GATSKW.EDT	V02.30	V02.31	Added remote switch & statements to make test work with remotes.

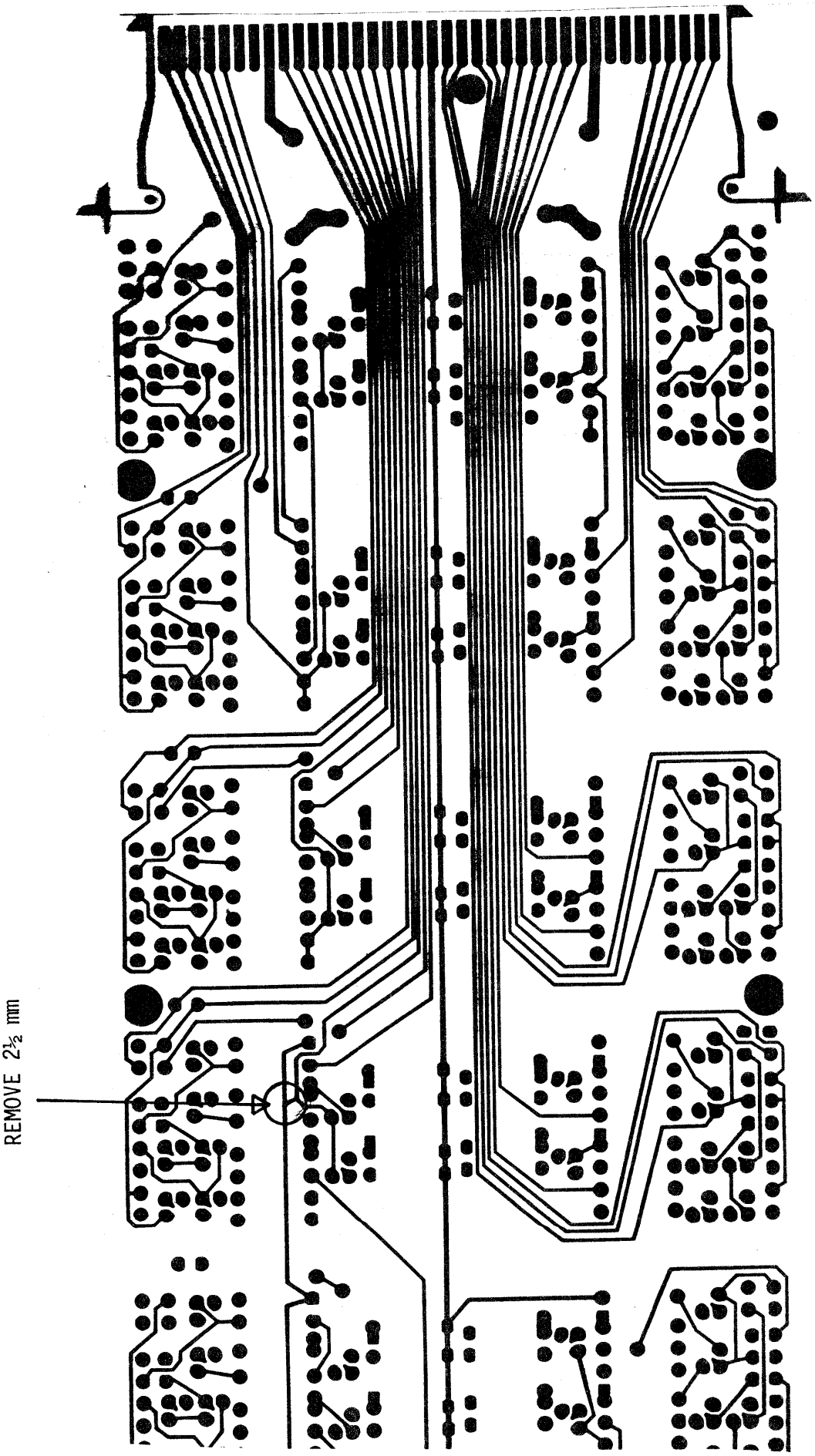
067-0919-99 BLANK PROGRAM MODULE

Some unprogrammed modules have been shipped which have a serious wiring error. This error may destroy channel 10 and the power source connected to channel 10. Inspect any 067-0919-99 Plug-ins in your area. Look for the board number. If it is PA6544-03 find the channel 10 area on the back of the board. Look for the run as shown in the diagram. Cut and remove the 2.5 mm error. The error was caused by a tape scrap.

Our thanks to Craig O'Hara, Transformer Manufacturing.

--Dean Hager
92-236, Ext. 1284

(DIAGRAM ON THE NEXT PAGE)


REMOVE 2½ mm
BACKSIDE
FRONT

SPS TEK BASIC SOFTWARE PATCH

The EDGE Command in TEK SPS Basic did not auto dimension the array as advertised. The following patch for EDGE.SPS corrects this deficiency.

PATCH TYPE: NON-RESIDENT

CORRECTS: EDGE.SPS
LENGTH: 27

NO RESIDENT PATCH AREA REQUIRED.

```
$ 1:  -2
$ 2:   0
$ 3:   20
$ 4:   254
$ 5:   20
$ 6:   1204
$ 7:   22
$ 8:   2
$ 9:   254
$ 10:   1204
$ 11:   21
$ 12:   473
$ 13:   23
$ 14:   1
$ 15:   4
$ 16:   21
$ 17:   8
$ 18:   23
$ 19:   4
$ 20:   8
$ 21:   7185
$ 22:   0
$ 23:   5001
$ 24:   21
$ 25:   117
$ 26:   30
$ 27:   15918
```

--Dean Hager
92-236, Ext. 1284

SPS TEK BASIC V02-02, V02XM-02 PATCHES

Three patches are required to fix SPS software when the squish command is used with RL01 disks. The first patch is for the DL driver and is common to both softwares. The second is for V02-02 only and the third is for V02XM-02 only.

1. The patch for the non-resident DL.SPS driver applies to both V02-02 and V02XM-02 non-resident drivers. It should be applied using PATCH.NRS as released with V02 (XM) software.

2. The patch for the resident monitor SPSDL.LDA for V02-02 applies only to V02-02.

3. The patch for the resident monitor SPSDL.LDA for V02XM-02 applies only to V02XM-02.

These resident monitor patches must be built with PATCH.BLD and the PATCH.FIX basic program must be edited to apply them. The SYSBLD command must be used to reserve the required Patch Area space.

(continued on next 3 pages)

SPS TEK BASIC V02-02, V02XM-02 PATCHES (CONTINUED)

PATCH TYPE: NON-RESIDENT

CORRECTS: DL.SPS

LENGTH: 36

NO RESIDENT PATCH AREA REQUIRED.

```
$ 1: -2                    PATCH TYPE IDENTIFIER
$ 2:  0                    RESIDENT PATCH AREA REQUIRED
$ 3:  21                   COPY
$ 4:  1                       NUMBER OF WORDS TO COPY
$ 5:  20                   COMPARE FOR .EQ.
$ 6:  3456                    VALUE TO COMPARE
$ 7:  22                   INSERT NEW VALUES
$ 8:  1                    NUMBER OF WORDS TO INSERT
$ 9:  3468                    NEW VALUE
$ 10:  21                  COPY
$ 11:  145                    NUMBER OF WORDS TO COPY
$ 12:  23                  REPLACE EXISTING VALUES
$ 13:  2                   NUMBER OF WORDS TO INSERT
$ 14:  2551                   NEW VALUE
$ 15:  3164                   NEW VALUE
$ 16:  21                  COPY
$ 17:  24                     NUMBER OF WORDS TO COPY
$ 18:  23                  REPLACE EXISTING VALUES
$ 19:  5                   NUMBER OF WORDS TO INSERT
$ 20:  4337                   NEW VALUE
$ 21:  24                     NEW VALUE
$ 22:  28099                  NEW VALUE
$ 23:  65190                  NEW VALUE
$ 24:  4337                   NEW VALUE
$ 25:  21                  COPY
$ 26:  1553                   NUMBER OF WORDS TO COPY
$ 27:  22                  INSERT NEW VALUES
$ 28:  6                   NUMBER OF WORDS TO INSERT
$ 29:  40055                  NEW VALUE
$ 30:  4                      NEW VALUE
$ 31:  65511                  NEW VALUE
$ 32:  7296                   NEW VALUE
$ 33:  65534                  NEW VALUE
$ 34:  135                    NEW VALUE
$ 35:  30                  PATCH TERMINATOR
$ 36:  295120              CHECKSUM

READY
$
```

PATCH NUMBER 1

(continued)

PATCH TYPE: RESIDENT

LENGTH: 35

PATCH AREA REQUIRED: 6 WORDS.

```
$  1: -1          PATCH TYPE IDENTIFIER
$  2:  6          RESIDENT PATCH AREA REQUIRED
$  3:  12         OFFSET FROM R5 MODE
$  4:  410           OFFSET
$  5:  1          COMPARE FOR .EQ.
$  6:  258           VALUE TO COMPARE
$  7:  13         DEFERRED FROM R5 MODE
$  8:  20            OFFSET FROM R5 TO ADDRESS
$  9:  0             OFFSET FROM DEFERRED ADDRESS
$  10:  1         COMPARE FOR .EQ.
$  11:  19524        VALUE TO COMPARE
$  12:  10         ABSOLUTE ADDRESS MODE
$  13:  17944      ADDRESS
$  14:  5          INSERT 1 WORD AND PATCH AREA ADDRESS
$  15:  2527          NEW VALUE
$  16:  4          INSERT INTO PATCH AREA
$  17:  6          NUMBER OF WORDS TO INSERT
$  18:  7296          NEW VALUE
$  19:  65534         NEW VALUE
$  20:  40031         NEW VALUE
$  21:  4             NEW VALUE
$  22:  21093         NEW VALUE
$  23:  135           NEW VALUE
$  24:  10         ABSOLUTE ADDRESS MODE
$  25:  17996      ADDRESS
$  26:  3          REPLACE
$  27:  1             NUMBER OF WORDS TO REPLACE
$  28:  4337          NEW VALUE
$  29:  10         ABSOLUTE ADDRESS MODE
$  30:  18004      ADDRESS
$  31:  3          REPLACE
$  32:  1             NUMBER OF WORDS TO REPLACE
$  33:  4337          NEW VALUE
$  34:  30         PATCH TERMINATOR
$  35:  219565     CHECKSUM

READY
$
```

PATCH NUMBER 2

PATCH TYPE: RESIDENT

LENGTH: 35

PATCH AREA REQUIRED: 6 WORDS.

```
$  1: -1          PATCH TYPE IDENTIFIER
$  2:  6          RESIDENT PATCH AREA REQUIRED
$  3:  12         OFFSET FROM R5 MODE
$  4:  434           OFFSET
$  5:  1          COMPARE FOR .EQ.
$  6:  510           VALUE TO COMPARE
$  7:  13         DEFERRED FROM R5 MODE
$  8:  20            OFFSET FROM R5 TO ADDRESS
$  9:  0             OFFSET FROM DEFERRED ADDRESS
$  10:  1         COMPARE FOR .EQ.
$  11:  19524        VALUE TO COMPARE
$  12:  10         ABSOLUTE ADDRESS MODE
$  13:  19046      ADDRESS
$  14:  5          INSERT 1 WORD AND PATCH AREA ADDRESS
$  15:  2527          NEW VALUE
$  16:  4          INSERT INTO PATCH AREA
$  17:  6          NUMBER OF WORDS TO INSERT
$  18:  7296          NEW VALUE
$  19:  65534         NEW VALUE
$  20:  40031         NEW VALUE
$  21:  4             NEW VALUE
$  22:  22195         NEW VALUE
$  23:  135           NEW VALUE
$  24:  10         ABSOLUTE ADDRESS MODE
$  25:  19098      ADDRESS
$  26:  3          REPLACE
$  27:  1             NUMBER OF WORDS TO REPLACE
$  28:  4337          NEW VALUE
$  29:  10         ABSOLUTE ADDRESS MODE
$  30:  19106      ADDRESS
$  31:  3          REPLACE
$  32:  1             NUMBER OF WORDS TO REPLACE
$  33:  4337          NEW VALUE
$  34:  30         PATCH TERMINATOR
$  35:  224249     CHECKSUM

READY
$
```

PATCH NUMBER 3

--Dean Hager
92-236, Ext. 1284

INFORMATION DISPLAY DIVISION

4663 VERSION 3 & 4 FIRMWARE AND ASSOCIATED HARDWARE (STARTING S/N B05 & ABOVE) - PULL OUT

The intent of this article is to inform the reader of major differences between previously built 4663's and current production products. Information regarding a 4663 Service Program Update will be forthcoming shortly.

The following information is not regarding the 4663 Service Update Program.

Production of 4663's with Version 3 & Version 4 (V3 & 4) firmware and its special associated hardware has started. Provided are two parts lists (Table 1 and 2). Table 1 shows parts currently used to support 4663's, i.e., products prior to Version 3 and Version 4. These parts will continue to be available through Customer Service and Board Exchange. Table 2 identifies all new parts and part numbers associated with the Version 3 & 4. None of the new Version 3 & 4 hardware or firmware parts can be used on an earlier version product. These unique parts can be ordered through Customer Service Group on a priority 1 status only. Do not order these new parts on a routine stock order basis until notified otherwise from Service Support. Version 3 & 4 exchange assemblies are available from Board Exchange on an as-needed basis. Board Exchange will not provide Version 3 & 4 assemblies for inclusion into maintenance kits.

TABLE 1

Existing 4663 Material Support Requirements

Part Numbers	
119-1154-01	Pen Holder Assembly
401-0400-00	X Axis Pulley
401-0407-00	Y Axis Pulley
670-6420-02	Processor Board
160-0241-00	ROM 7, Version 1-2
160-0273-01	PROM 1 Patch Board U315
160-0281-01	FPLA Ø Patch Board U335
160-0282-01	FPLA 1 Patch Board U345
160-0274-00	PROM Ø Patch Board U325
160-0395-02	Option 31-B PROM
160-0272-00	Vector Generator F/W, U310
160-0276-00	Vector Generator F/W, U510
160-0277-00	Vector Generator F/W, U540
160-0239-00	ROM 5, Version 1-2
160-0242-01	ROM 8, Version 1-2
160-0306-00	PROM, 1RL, Version 2 (RS232 I/F)
160-0307-00	PROM, 1RH, Version 2 (RS232 I/F)
160-0308-00	PROM, 1GH, Version 2 (GPIB I/F)
160-0309-00	PROM, 1GL, Version 2 (GPIB I/F)

TABLE 2

New Version 3 & 4 4663 Support Requirements

650-0235-01	Pen Holder Assembly
650-0246-01	Viscous Damper Assembly
670-5237-03	Vector Generator
670-5579-04	RS232 Interface, Version 3
670-5579-05	RS232 Interface, Version 4
670-6114-03	Rom Patch
670-5236-03	Motor Pen Drive
670-6275-03	Rom Overlay
670-5503-04	G.P.I.B. Interface, Version 3
670-5503-05	G.P.I.B. Interface, Version 4
670-6420-04	Processor

Capstans

401-0513-01	Y Axis, tested
401-0514-01	X Axis, tested
213-0885-00	Set Screw 6-32 X ¼" with nylon locking patch

New Hinge Assembly

214-3202-00	Hinge Collar
214-3201-00	Hinge
213-0006-00	Set Screw, 8-32 X .188
212-0649-00	8-32 X .750 Hex Head (.25) screw

Vector Generator Firmware

160-0272-01	Prom, V-3
160-0276-01	Prom, V-3
160-0277-01	Prom, V-3

RS 232 Firmware

160-0306-01	Prom, 1RL, V-3
160-0306-02	Prom, 1RL, V-4
160-0307-01	Prom, 1RH, V-3

ROM Patch Firmware

160-0273-02	PROM 1, V-3
160-0274-01	PROM Ø, V-3
160-0281-02	FPLA Ø, V-3
160-0282-02	FPLA 1, V-3

G.P.I.B. Interface

160-0308-01	PROM, 1GH, V-3
160-0309-01	PROM, 1GL, V-3
160-0308-02	PROM, 1GH, V-4
160-0309-02	PROM, 1GL, V-4

Rom Overlay Board Firmware

160-0291-01	Prom 8L, U450
160-0292-01	Prom 8H, U445
160-0293-01	Prom 7L, U460
160-0294-01	Prom 7H, U455
160-0297-01	Prom 5L, U540
160-0298-01	Prom 5H, U535

Option 31 Firmware

160-0395-03	Option 31B, V-3 (U475)

Version 3 & 4 Service Tips

1. During an interim period there will be two distinct types of 4663's. Whenever going on a 4663 service call take a copy of the parts list along to prevent problems that could occur if wrong level parts are used on a product.

2. Table 3 contains circuit boards that can be used for a Version 2, 3, or Version 4 4663 provided that the firmware related IC's located on that board are also changed to maintain the correct system firmware levels.

TABLE 3

Part Number	Level			Description
F/W	1-2	3	4	
670-5237-	02	03	03	Vector Generator
670-5579-	XX	04	05	RS232 Interface
670-6114-	XX	03	03	Rom Patch
670-5503-	XX	04	05	G.P.I.B. Interface
670-6420-	XX	04	04	Processor Board

(Note: XX in the level column indicates that any of the V-3 and below firmware levels are compatible with all the various level editions of that board.)

3. The following V3 & 4 circuit boards listed in Table 4, are downward compatible only. They can be used as direct replacement assemblies for V3.0 and below products. The ROM Overlay Board's firmware must first be changed to match the firmware level of the product it is to be installed in.

TABLE 4

Part Number	Description
670-5236-03	Motor Pen Drive Board
670-5236-04	Motor Pen Drive Board
670-6275-03	ROM Overlay Board

Any lower levels of the above circuit boards, even with a firmware change, cannot be used on a Version 3 or 4 product.

4. Table 5 lists all the applicable firmware part numbers found in the 4663, the circuit board the parts are located on, and the proper 2 digit suffix for each firmware level.

TABLE 5

4663 Firmware Compatibility Table

Circuit Board	Socket Location	I/C Part # 160-XXXX-XX	V1	V2	V3& 4
ROM Overlay 670-6275-XX	U435 (9H)	-0290	-00	-00	-00
	U440 (9L)	-0289	-00	-00	-00
	U445 (8H)	-0292	-00	-00	-01
	U450 (8L)	-0291	-00	-00	-01
NOTE:	U455 (7H)	-0294	-00	-00	-01
Incompatibilities	U460 (7L)	-0293	-00	-00	-01
exist between the	U465 (6H)	-0296	-00	-00	-00
670-6275-XX	U470 (6L)	-0295	-00	-00	-00
and the	U535 (5H)	-0298	-00	-00	-01
670-6420-XX	U540 (5L)	-0297	-00	-00	-01
Processor Board	U545 (4H)	-0300	-00	-00	-00
	U550 (4L)	-0299	-00	-00	-00
	U555 (3H)	-0302	-00	-00	-00
	U560 (3L)	-0301	-00	-00	-00
	U565 (2H)	-0304	-00	-00	-00
	U570 (2L)	-0303	-00	-00	-00
	U575 (Ø)	-0305	-00	-00	-00
ROM Patch 670-6114-XX	U315 (P/N's -0273 & -0274 *1		N/A	0273-01	0273-02
	U325 are listed to right)		0273-00	0274-00	0274-01
	U335	-0281	-00	-01	-02
	U345	-0282	-00	-01	-02

TABLE 5 (cont.)

Circuit Board	Socket Location	I/C Part # 160-XXXX-XX	V1	V2	V3 & 4
Vector Generator 670-5237-XX	U310	-0272	-00	-00	-01
	U510	-0276	-00	-00	-01
	U540 *2	-0277	-00	-00	-01
Processor(ROM6)	U171 *3	-0240	-00	-00	-00
670-5121-XX(ROM 7)	U175	-0241	-00	-00	Not Used
670-6420-XX(ROM 8)	U181	-0242	-01	-01	Not Used
(ROM 9)	U191	-0280	-01	-01	-01
(ROM 2)	U271	-0236	-00	-00	-00
(ROM 3)	U275	-0237	-01	-01	-01
(ROM 4)	U281	-0238	-01	-01	-01
(ROM 5)	U291	-0239	-00	-00	Not Used
(ROM 0)	U491	-0243	-00	-00	-00
(OPT 31)	U475	-0395	-01	-02	-03
	U481	-0185	-01	-02	-02
(OPT 32)	U571	-0724	Not Used	-00	-00
	U575	-0184	Not Used	-00	-00
	U581	-0183	Not Used	-00	-00
	U591	-0182	Not Used	-00	-00

					V3	V4
RS232 Interface 670-5579-XX	U171 (RL)	-0306	-00	-00	-01	-02
	U181 (RH)	-0307	-00	-00	-01	-01
GPIB Interface 670-5503-XX *4	U171	EV2.XX	N/A	N/A	N/A	
	or					
	U171 (GL)	-0309	-00	-00	-01	-02 *4
	U181 (GH)	-0308	-00	-00	-01	-02 *4
	or					
	U171 (GL)	EV2.XXL	N/A	N/A	N/A	N/A
	U181 (GH)	EV2.XXH	N/A	N/A	N/A	N/A

NOTES:

*1 -- Part number 160-0273-00 on previous page was shipped with the F/W device mis-labeled for Version 1; in Version 2 and above U315 is its correct location. For Version 1 there is no I/C used in location U315.

*2 -- The 160-0277-XX socket location was improperly marked on some labels as U546, instead of U540 where it is located when properly installed.

NOTES: (continued)

*3 -- The main system F/W devices located on the Processor Board have never changed suffix levels. On Version 3 and below products a ØØ level device may be marked with a Ø1 suffix, or a Ø1 may be marked with a ØØ suffix. If the suffix level of any of these nine F/W devices does not correctly match the chart, the F/W device is mis-labeled. All F/W, V1.Ø thru V3.Ø, consisted of "patching" the F/W by use of the ROM Patch B, ROM Overlay, or the Interface Boards.

*4 -- Versions 3 & 4 require the installation of an additional strap from HDI to 7 on the GPIB I/F Board. Engineering Versions (EV) devices, when installed, also require this additional strap. The EV parts contain GPIB interface firmware that was released to certain customers by marketing. Engineering firmware versions are not set up in the Customer Service system, hence, are not supportable.

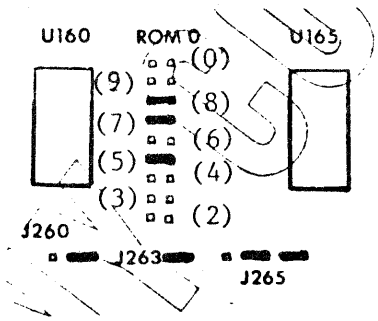
5. The only difference between Version 3 & Version 4 is the RS232, & GPIB Interface firmware.

6. The new ROM Overlay Board required for Version 3 & 4 firmware has the necessary sockets and the major timing modifications necessary to make it compatible with the B Processor (670-6420-XX). The strap settings remain unchanged between the levels:

J260	Pin	2 to 3
J263	Pin	1 to 2
J265	Pin	2 to 3 & 4 to 5

ROM straps to select the appropriate ROM's

Example:



NOTE: ROM numbers are in parentheses. The straps, as shown, select ROMs 5, 7, & 8. These are the ROMs used in V-3 & 4 F/W.

7. Verification tape and Diagnostic Test Fixture Bugs (Version 3 & 4)

A. Verification Tape 067-0857-99

1) A line is drawn across the plot during the "Device Commands" program (see item 1 on page eight). The cause of the line drawn is part of the commands at line #570 of file #2.

The line draw is a fault of the Verification Tape. The 4663 firmware is executing the received instructions correctly.

2) A line is drawn from the top of the page to the center of the Option 31 verification plot (see item 2 on the next page). The cause of the line draw is the code at line #2250 of file #8.

A determination has not been made as to where the fault is, i.e., 4663 firmware or the verification tape software.

B. Diagnostic Test Fixture 067-0859-00

1) Upon completion, the ROM Checksum Tests add three Hex locations when Option 32 is installed, see example provided. This is not consistent with the current documentation. (Reference Test Fixture Manual 070-2842-00, printing April, 1980, Page 3-32).

Example:

Options Installed	Completion Display
Standard Instrument	F9
Option 31 only	FB
Option 32 only	FC
Option 31 and 32	FE

2) Pen #2 solenoid may flicker once during the vector generator tests, one through and including number four.

A determination has not been made as to the source of the fault.

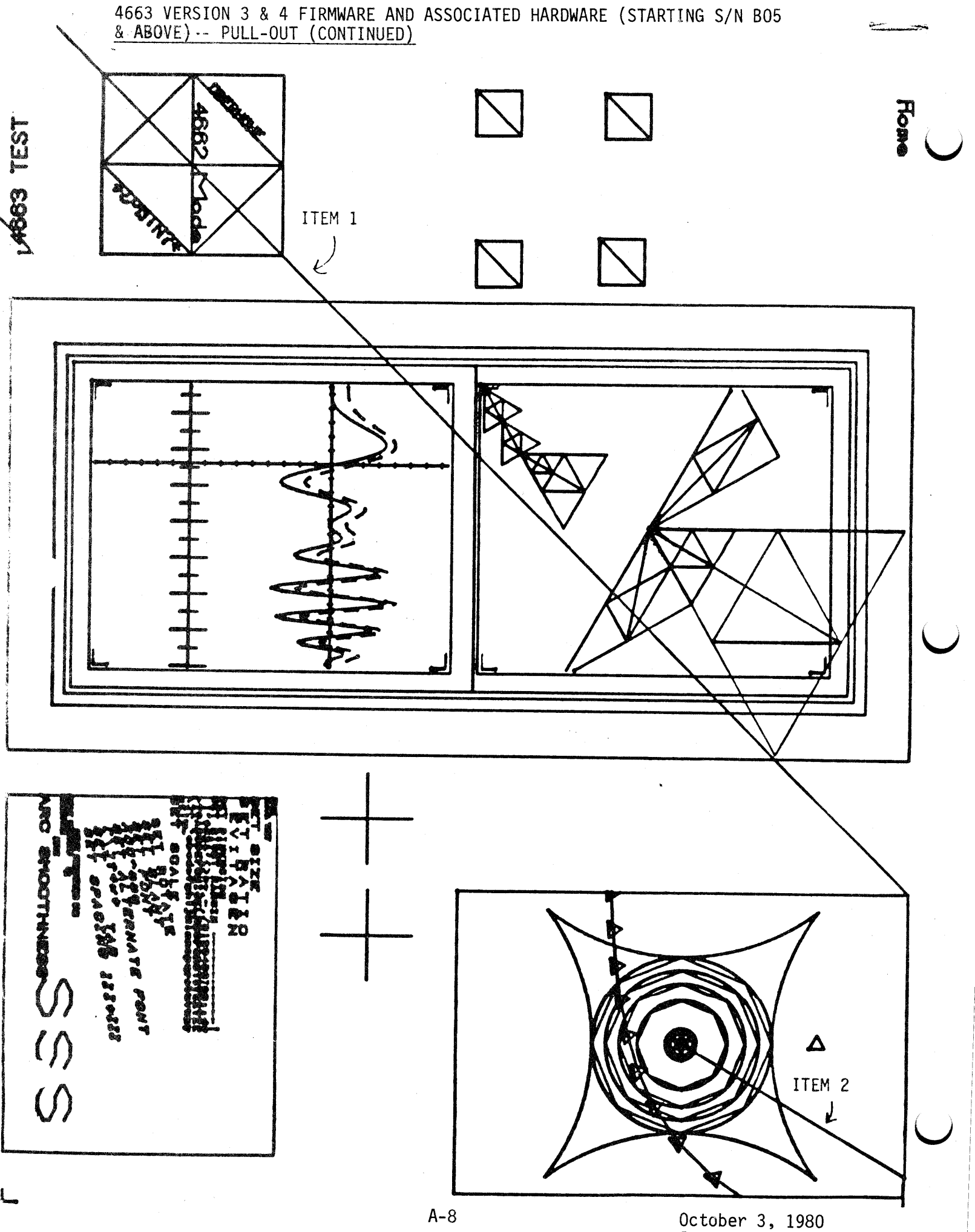
8. The new Motor Pen Drive Board has rolled to a -03 or -04 level due to a modification that allows for tighter pen current specifications which is necessary for the new pen lifters. The tighter specs of this new board are compatible with all Version 4 and below Pen Lifters.

9. To update a 4663 to Version 3 or 4 requires the removal & replacement of the Drive Motor Pulleys (capstains). The Drive Pulley Puller, P/N 003-0944-00, is a new tool that is available thru Customer Service to assist in the removal of these capstains. There is also a Cable Retainer, 003-0867-00, that holds the X or Y cables in place during cable re-stringing.

10. Wizard Articles previously published that may assist in further clarification of the 4663:

Issue	Title
9-13	4663 Plotter, ROM Overlay Board Strapping
9-19	4663 Firmware Logistics and Functions
9-24	4663 ROM Overlay Board EPROM Locations (corrects U# location errors contained in the above listed article in Issue 9-19)
10-1	4663 Diagnostic Test Fixture Firmware Update
10-7	4663 New "B" Processor Board
10-8	4663 Version 2 Firmware
10-17	4663 ROM Overlay Board Modification

--Larry North
63-503, Ext. 3926
8-19-80


4663 TEST
4662
ITEM 1
ITEM 2