



Wizards Workshop

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

TEKTRONIX INTERNAL USE ONLY

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PERSONNEL CHANGES

NEW HIRES

The following new faces have been added to the Service Training Group.

CINDY FROST - Secretary - Replacing Leslie Kasinger	X. 8842 Merlo
BARBARA FISHER - Word Processing	X. 8064 Merlo
KEN FLETCHER - Product Maintenance Instructor I	X. 8850 Merlo
LYNN LENT - Training Publications	X. 8078 Merlo
ROD PAULEY - Product Maintenance Instructor I	X. Santa Clara
JOHN SPINDLER - Product Maintenance Instructor I	X. Dallas

Welcome Aboard!

WES CLEMM - Boston

Wes comes to Tek after serving in the U.S. Navy. He obtained experience in repair and maintenance of navigational flight computers and was responsible for the operation and maintenance of communications and navigation equipment aboard Patrol Air Craft.

Welcome Wes!

DON "MARK" BENNETT - Boston

Mark comes to Tek from the U.S. Navy where he performed calibration and repair of a wide variety of test equipment including DVM's, oscilloscopes, counters, generators, HF, VHF and UHF transmitters and receivers.

Welcome Don!

DAVID THOMPSON - Denver

David comes to Tek from Inland Container Corp. where he was working in the Quality Control section.

Welcome David!

JOE WYSOCKI - Long Island ETI

Joe has a degree in Electrical Technology and has 2 years experience as an Electrical Bench Test Technician.

Welcome Joe!

GENERAL

EUROPEAN FAILURE REPORTING

Some Beaverton Copies of the Product & Component Failure Cards are being sent without a delivery station and this creates extra work for the TEK Mail Dept. Please include delivery station 53-114 with your Beaverton address.

--Brenda Humes
Reliability Information Services
53-114, Ext. 8004 MR

GSA CONTRACT - REPAIR SERVICE AND RENTAL MAINTENANCE

GSA contract number GS-00C-02630 expired on September 30, 1981. This contract, Section A, covered ADP equipment (4000 series and WP series).

Contract Administration is negotiating a new contract with GSA, but the contract has not been awarded as of this date. It is expected that there will be an award during October, 1981.

An interim agreement has been reached to cover the period from October 1, 1981 through December 31, 1981.

During this period, or until the FY 82 contract is awarded, Tektronix will continue to maintain rental equipment for the GSA customers.

With regard to 132.15 and 132.16, REPAIR SERVICE AND REPAIR PARTS, no provisions have been made in the interim agreement for repair service on a time and material basis. Use commercial rates (labor, parts, zone charges) until the FY 82 contract is awarded.

If service was quoted or performed prior to October 1, 1981, and not invoiced, check with the ordering agency before issuing an invoice to see if they will be in a position to pay under GS-00C-02630. If not, invoice the customer on a commercial basis.

--Isabel Van Lom
Contract Support

151-0423-00 DEFECTIVE DATE CODES - "PURGE"

These transistors, P/N 151-0423-00, with Date Codes of L95, L96, L97, L99, L9X and K9X were found to have excessive "Beta" degradation after burn-in.

Please check all stock areas and purge all of the above Date Codes. Send all parts to Don Stalp, Delivery Station 78-092, with reference to MQR #B-139; reorder as necessary.

--Rich Andrusco
53/108, Ext. 8694

151-1115-00 MIXED STOCK - "PURGE"

Some parts under P/N 151-1115-00 were found to be missing markings. All parts must be marked "National SFE93007" or "151-1115-00".

Please check all stock areas and purge any parts found to be missing markings; send reject parts to Don Stalp, Delivery Station 78-092, reference MQR #B-28, reorder as necessary.

--Rich Andrusco
53/108, Ext. 8694

155-0025-00 DEFECTIVE

This readout character generator with code number 022 510 has been reported defective. Examples returned from the Santa Clara Service Center and removed from CMS stock were examined and found to be encapsulated in reverse.

Thanks to Russ Lett in Santa Clara for this input.

--Lynn Sperley
53/108, Ext. 8690

156-0385-00 DEFECTIVE DATE CODE - "PURGE"

The 156-0385-00 IC is a "T.I." Hex Inverter which has a minimum spec of 2.7V for V_{OH} . It has been found that T.I. Date Code 8048B will fail at temperatures of 65° or higher, the V_{OH} will drop to less than 2.7V.

Please check all stock areas and purge all T.I. parts, P/N 156-0385-00, with Date Code 8048B. Return defective parts to Don Stalp, Delivery Station 78-092, Reference MQR #A-57; reorder as necessary.

--Rich Andrusco
53/108, Ext. 8694

156-0662-01 DEFECTIVE DATE CODE - "PURGE"

Some devices, P/N 156-0662-01, were found to contain the wrong internal mask. The devices affected are Motorola parts with Date Code 7950.

Please check all stock areas under P/N 156-0662-01 and purge all Motorola devices with Date Code 7950. Send defective devices to Jim Heisler, Delivery Station 78/092, with Reference MQR #Y-83. Reorder as necessary.

--Rich Andrusco
53/108, Ext. 8694

283-0617-00 MISMARKED STOCK - "PURGE"

These parts are specified as a Fixed Mica Capacitor, 4,700pf, 10%. But some parts in stock were found to be marked as 47,000pf.

Please check all stock areas of P/N 283-0617-00 and purge all mismarked stock. Return reject stock to Delivery Station 78-092 with reference to MQR #A-122. Reorder as necessary.

--Rich Andrusco
53/108, Ext. 8694

283-0693-00 MIXED STOCK - "PURGE"

This part, P/N 283-0693-00, is specified as a 500V Mica Capacitor but some stock was found to be marked 300V or 400V.

Please check all stock areas under P/N 283-0693-00 and purge all parts marked less than 500 volts; reorder as necessary.

--Rich Andrusco
53/108, Ext. 8694

CALIBRATION OF RC NORMALIZERS

RC normalizers are used during the calibration of an oscilloscope's vertical input circuits. Their purpose is to simulate a scope probe allowing a zero impedance node to occur at the input BNC connector. A vertical attenuator properly adjusted while using a signal driven through a normalizer would be balanced to the approximate center of a probe's adjustment range. Using a normalizer not specified to an input capacitance, could result in the inability to properly adjust the probe.

Normalizers are comprised of a one megaohm precision resistor, fixed and variable capacitors, and stray capacitance. Verifying the accuracy of a normalizer is made difficult by the complicated summation of the capacitance making an L-C meter impossible to use. The Standards Lab has developed a fixture that utilizes impedance summing between a normalizer, a certified RC standard, and a special RC fixture connected to a 7A13. This fixture does allow proper calibration, though Certification to NBS is not possible at this date. Once a normalizer is calibrated it should not need verification for at least one year.

Service Centers can verify their normalizers by using one calibrated at the Standards Lab for the reference. Use a normalizer, recently calibrated by the Standards Lab, to set up a reference signal of $10\mu\text{S}/\text{div}$ and at least 20 vertical divisions. Use as much vertical as possible without causing severe distortion. Replace the reference normalizer with one being tested. Adjust the normalizer's variable capacitor for a waveform that closely matches the reference. It is helpful to trace the reference waveform on the CRT faceplate with a marking pen. Use removable fluid only. If a DC shift occurs when normalizers are exchanged, measure the one megaohm resistor for accuracy within the tolerance indicated on the resistor body.

--Tom Fox
53/108, Ext. 8697

SOLUTION FOR TEMPERATURE BATHS

RE: TEMPERATURE BATHS AND PROBES, Issue 11-7, Page 14

The referenced article lists a solution of ethylene-glycol and water as the fluid to be used in temperature baths. NESLAB recently stated that this solution should not be used near 100°C because the rapid evaporation of water increases the ethylene-glycol strength. Temperature probes will be damaged if the solution becomes too strong. NESLAB recommends a silicone bath fluid with a viscosity of <50 centistokes. Dow Corning 200, 20 centistokes silicone is recommended as the direct replacement.

Contact a local distributor or call Dow in Michigan at 1-800-248-2345 (517-636-1000 in Michigan) for purchasing information.

Thanks to Doug Williams, Seattle, for this information.

--Tom Fox
53/108, Ext. 8697

ADMINISTRATIVE SUPPORT

SERVICE RECORD/TDS REPORTING

The latest change to Section 700G "Service Center Time Distribution Sheets" of the FRM (Field Reference Manual) became effective August 14, 1981.

PLEASE NOTE PAGE 11 in regard to ACTIVITY CODE 02, Warranty Repairs:

Identifies repair labor and parts for customer-owned products that are covered by a Tektronix warranty as listed in the Tektronix Warranty Policies book. Refer to codes 05, 10, 12 and 23 for demo, Teknet, rental and Pool 9 repairs.

--Bill Duerden
56-037, Ext. 8938 MR

INFORMATION DISPLAY DIVISION

600 SERIAL NUMBER RELOCATION

Certain 600 series products have used plastic inserts to identify the product serial number. These printed inserts will no longer be available. They are being replaced by serial number tags. The location of the tags will be as follows:

602	Rear Panel
603A	Inside Access Door
604A	Inside Access Door
606A	Inside Access Door
607A	Inside Access Door

This article is for your information only.

-- George Kusiowski
63-503 Ext. 3928 WI

LABORATORY INSTRUMENT DIVISION

TM500

FG502-VCF SPECIFICATIONS NOT BEING MET

REFERENCE: FG502 Manual, P/N 070-1706-01, Foldout 1
A1 Function Generator Board
Mod #43938
Affected Serial Numbers: B050739 & Below

The VCF section has not been performing to specification (Vin 1:10, Fo 1:1000). Mod # 43938 corrects this situation. R125 is changed from 10kohm, 1%, 1/8W (P/N 321-0289-00) to 9.41Kohm, 1%, 1/8W (P/N 321-0632-00).

--Stan Uffner
92-236, Ext. 1564

TM500 REAR INTERFACE DATA BOOK CORRECTION

The part number for the latest version of the TM500 Rear Interface Data Book is 070-2088-03. The number printed in the previous WIZARD was incorrect. Our apologies for any inconvenience.

--Editor

7000 SERIES

7854, VERTICAL OUTPUT I.C. MOUNTING HARDWARE

Serial Numbers: B031100 and Below
Reference: 7854 Instruction Manual P/N 070-2874-01
Mechanical Parts List - Figure 4

Manufacturing has been adding a flat washer between the output I.C. mounting stud and the inside of the heatsink, Figure 4-82, on the M.P.L. This washer should be removed from all instruments with the above mentioned serial numbers. The washer is causing the I.C. to operate at higher temperatures. When the washer is removed the operating temperature will decrease and could cause vertical aberrations to change. So check all instruments that come in for service, remove the washer if present, and check vertical aberrations.

--John Eaton
53/108, Ext. 8689

COMMUNICATIONS DIVISION

SPECTRUM ANALYZERS

L1 MANUAL ERROR FOR K108, K118, K128, K138 PART NUMBERS

The L1 manual, P/N 070-1957-00, lists K108, K118, K128 and K138 as 148-0074-04 parts. This is incorrect; the part number for the relays should be 148-0107-04.

--Rich Kuhns
53/108, Ext. 8693

492 A30A1 U6043 REPLACEMENT KIT P/N 050-1482-00

Serial Numbers: B010100 - B010559

An 050-1482-00 replacement kit has been set-up to replace A30A1 U6043, the Opto Isolator in the 492. The Opto Isolator, P/N 156-1384-01, and several resistors are required to replace A30A1 U6043, P/N 156-1384-00, which is no longer available.

--Rich Kuhns
53/108, Ext. 8693

492 OPT 1, 2 OR 3 SENSITIVITY IMPROVEMENT KIT (P/N 040-1007-00)

Serial Numbers: B010100 to B020249

An 040-1007-00 up-date kit has been set-up to improve sensitivity in the 492. The modification kit contains the parts and instructions to add electrical shields to the A62 Log and Video Amplifier circuit board and the A51 Phase Lock Control circuit board.

Use of the new electrical shields necessitates replacing the A50 and A51 circuit board holders to provide mounting for the new shields.

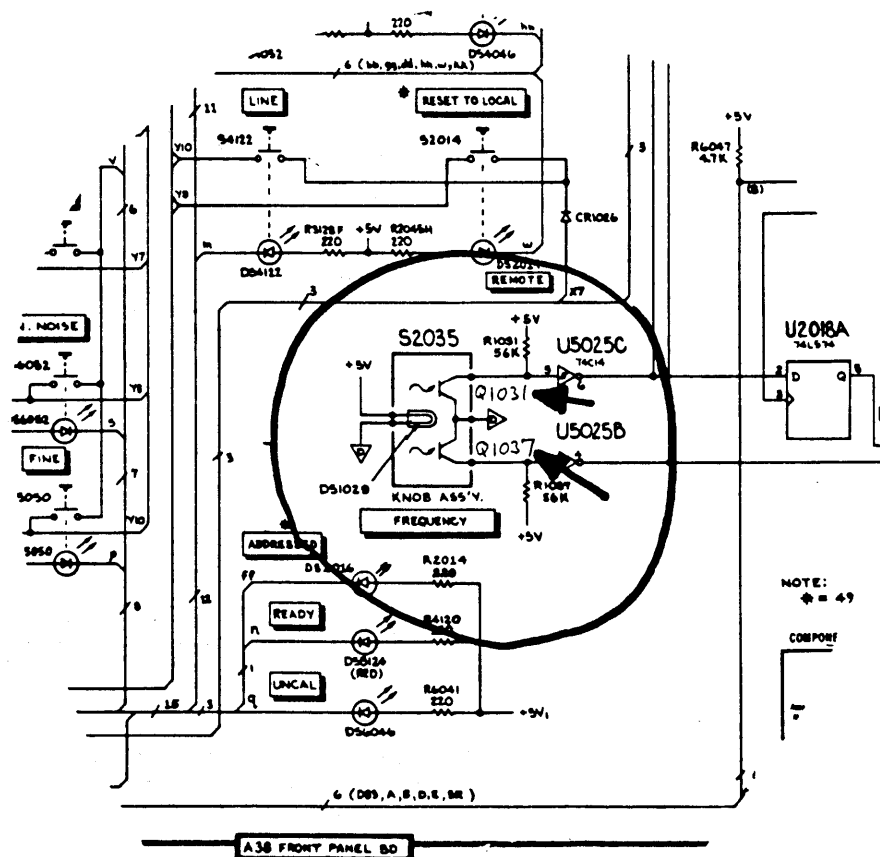
At the same time, a grounding plate is added between the A50 Phase Lock Synthesizer and the A51 Phase Lock Control circuit board.

--Rich Kuhns
53/108, Ext. 8693

492/P CENTER FREQUENCY KNOB (A38 S2035) REPLACEMENT PARTS

Due to the high replacement cost of (A38 S2035) the Center Frequency Knob for the 492/P, some of the internal parts were made replaceable. Refer to the figure below for the parts list and schematic locations.

492/492P	<div style="border: 1px solid black; padding: 2px; display: inline-block;">30</div>	A38	} DS 1029 150-0093-01 Q 1037 151-0629-00 Q 1031 151-0629-00
496/496P	<div style="border: 1px solid black; padding: 2px; display: inline-block;">38</div>	A48	



--Rich Kuhns
53/108, Ext. 8693

492/P FAN UPDATE KIT (040-1005-00)

Serial Numbers: B010100 to B010501

An 040-1005-00 update kit has been set-up to replace the fan in the 492/P. The modification kit contains the parts and instructions to change the rigid fan mount to a shock mounted assembly. Changing to a shock mounted assembly reduces the side bands from $\approx -30\text{dbc}$ to $\approx -60\text{dbc}$.

--Rich Kuhns
53/108, Ext. 8693

492/P OPT. 3 VARIABLE RESOLUTION MODULE REPLACEMENT KIT (050-1466-00)

Serial Numbers: B010100 to B019999

An 050-1466-00 modification kit has been set-up to replace the Variable Resolution Module in the 492/P Option 3 Spectrum Analyzer. The kit contains the new Variable Resolution Module, P/N 644-0163-05, which replaces the old Variable Resolution Module, P/N 644-0163-01, which is no longer available.

The new redesigned Variable Resolution Module requires a new calibration procedure which is included in this kit.

--Rich Kuhns
53/108, Ext. 8693

492/P VARIABLE RESOLUTION MODULE REPLACEMENT KIT (P/N 050-1467-00)

Serial Numbers: B010100 to B019999

An 050-1467-00 replacement kit has been set-up to replace the Variable Resolution Module in the 492/P. The Variable Resolution Module, P/N 644-0163-00, was replaced by a New Variable Resolution Module, P/N 644-0163-04. The new, redesigned Variable Resolution module requires a new calibration procedure which is included in the kit.

--Rich Kuhns
53/108, Ext. 8693

Sensitivity: The sensitivity, averaged noise level, specification is -85dBm @ 1MHz resolution bandwidth. The peak noise level is approximately 10dB above averaged level for a peak noise display level of -75dBm @ 1MHz resolution. Many instruments have up to 10dB of safety with the majority at 5dB better than spec. Thus, peak noise level at 1MHz resolution is -75dBm to -85dBm with -80dBm as the most likely number.

Front End Linearity: The specification indicates -30dBm as the optimum linear response input level with -20dBm permitted. Measurements on broadband impulsive signals indicates that operation is fairly linear up to an input level after the attenuator of -5dBm. The front-end will saturate around 0dBm and will show significant non-linearity above -5dBm.

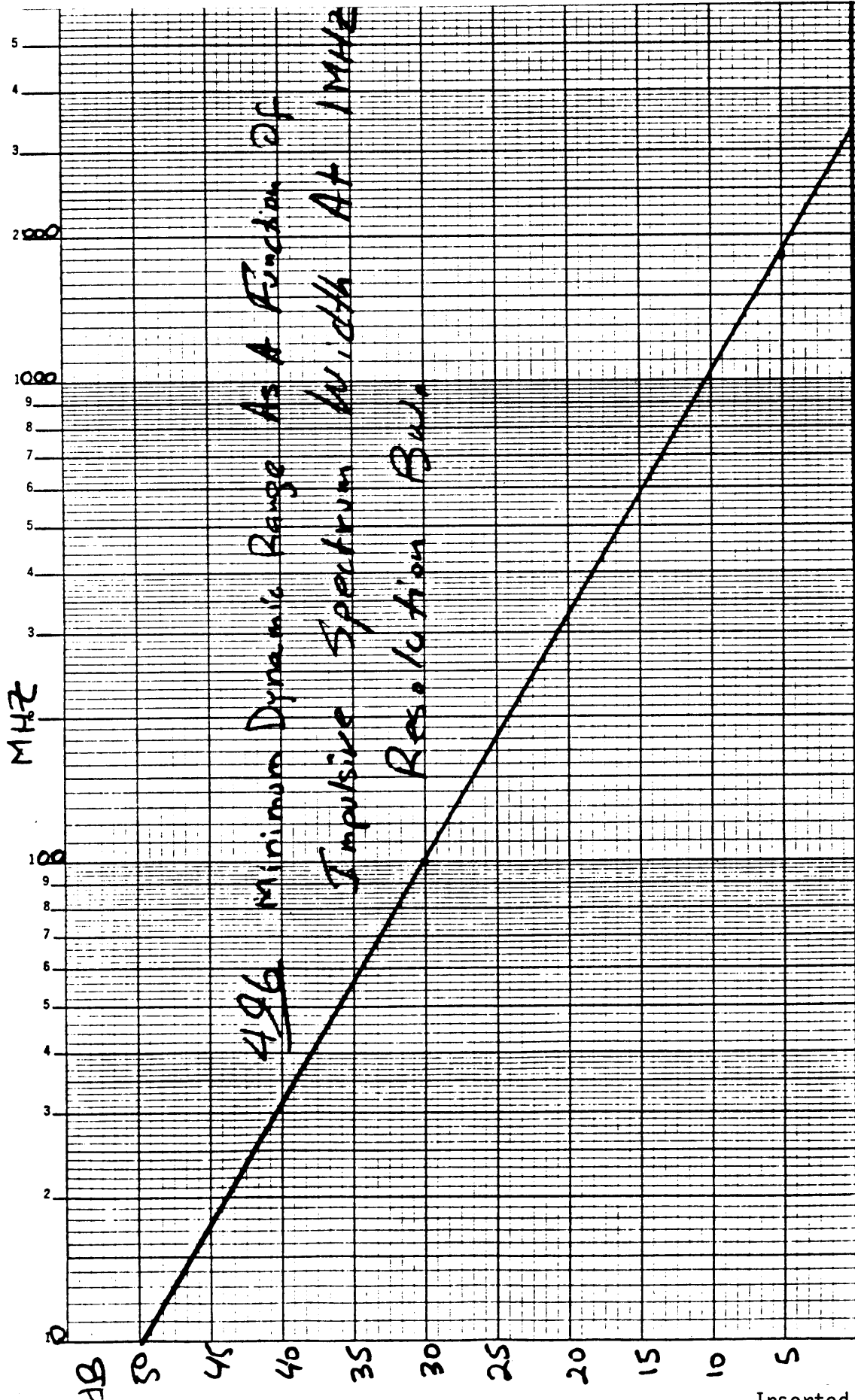
Broadband Interference: Greatest sensitivity for impulse inputs is obtained at the widest resolution bandwidth, namely 1MHz. The worst overdrive case is when the input spectrum covers the full input frequency filter bandwidth of 1800MHz. Thus, the input voltage level is greater than the display level in the ratio of 1800:1 or $20 \log 1800 = 65\text{dB}$. Given a maximum input level of -5dBm, and the fact that peak rather than average detection must be used, we have a worst case dynamic range of 5 to 15dB with 10dB most likely. In the more realistic case of about 100MHz interference spectrum width the worst dynamic range is 30dB. The attached graph shows the worst sensitivity case dynamic range as a function of interference spectrum frequency occupancy.

Measurement Restrictions: The 496 has a dc coupled mixer thus an external dc block may be needed for applications where some dc level is involved. Also some impulse sources, such as mechanical impulse generators, need a good impedance termination. This calls for the use of some front-end attenuation with a consequent reduction of signal level into the mixer.

Aside from the above, one has to apply the usual precautions when dealing with impulse signals such as avoiding both digital or video averaging and using the pulse stretcher. Switching the min attenuator setting between 10dB and 20dB (dynamic range permitting) and checking for no signal level change is a convenient way of checking for front-end overdrive.

(ARTICLE CONTINUED ON THE NEXT PAGE)

K-E SEMI-LOGARITHMIC 359-72
 KEUFFEL & ESSER CO. MADE IN U.S.A.
 3 CYCLES X 84 DIVISIONS



--Submitted by
 Morris Engelson

--Inserted by
 Rich Kuhns
 53/108, Ext. 8693

7L5 DIGITAL STORAGE IMPROVEMENT KIT (P/N 040-0872-02)

Serial Numbers: B010100 to B069999

An 040-0872-02 update kit has been set-up to replace the 040-0872-00 update kit. This modification kit contains parts and instructions to install a new Digital Storage circuit board (A4700, 670-5671-02). The new board replaces both the Digital Averaging (A4000, 670-3929-00) and Digital Storage (A4500, 670-3928-04) circuit boards. Increased reliability and the added feature of the B-(SAVE A) function, are provided by the new digital storage board.

--Rich Kuhns
53/108, Ext. 8693

7L5 U4702 REPLACEMENT KIT (050-1500-00)

Serial Numbers: B070000 to B092499

An 050-1500-00 parts replacement kit has been set-up to replace U4702. U4702, P/N 156-0570-00, and several other components are required to eliminate the need to select U4702 for proper operation of the "B save A" function.

--Rich Kuhns
53/108, Ext. 8693

TELEVISION PRODUCTS

SPOT-OF-GOLD & C-95 SOCKET REWORK FOR TV PRODUCTS

Currently, Spot-of-Gold and C-95 Socket Rework Programs are being handled on a case-by-case basis by the TV Business Unit. In order to expedite repairs and allow the continuation of the program as presently operated, an instrument that is returned to Beaverton for either rework must have documentation specifying C-95 Socket Rework or Spot-of-Gold Rework, as the case may be.

These programs are to be continued until further notice as they are presently defined. DO NOT confuse the above programs with the Manufacturing Repair and Return Program, which serves a separate purpose. The MR&R program has a separate set of guidelines which must be adhered to if it is to function smoothly.

Please contact me if you have problems with delays, long ESC's, etc.

--Bill Bean
53-108, Ext. 8695

A recent inquiry from the field, as well as several past rumors, connected with removing the 7788 vertical output tubes is answered below. This is a response to a customer's questions concerning an article published in Broadcast Engineering, December 1978, that deals with removal of the tubes and their subsequent replacement with transistors. Text of the letter follows.

Several problems are possible, but I'll touch upon what are probably the two more significant problems.

First is the problem of transistor mounting. Field experience has shown that the quality of workmanship used to modify an instrument from a magazine article will run from zero to infinity. If not properly mounted for heat considerations, these transistors are going to be troublesome. Doing a job over is oftentimes more expensive than doing it right the first time. But, assuming everything was installed cleanly, the main compromise to the instrument's characteristics will be in its step response. The principal factor here is the device's output capacitance of 10-15pf as compared to 3-4pf for the 7788 tube. The owner of a newly modified instrument, such as this, can't expect T/2 or T or probably even 2T response to make specifications. As this is at tube center (vertically). The loading changes experienced when one shifts the signal off axis, along with vertical magnification, will only serve to lessen what has now been modified to be a substandard 529.

We realize that parts support for the older instruments gets more expensive as years pass, but we can't officially sanction mods to our products done by our customer. We have no way to support the variations that might occur. On the other hand, we cannot stop anyone from modifying his own instrument. But the customer must realize that a substantial effort went into designing an instrument that meets its operating specs over a wide range of operating conditions. Unless he has the expertise to make all of the same decisions that were made at the time of design (or better ones), chances are very good that something is going to be compromised. And, last of all, the customer can't expect Tektronix to be obligated to service a modified unit. He has, legal and otherwise, voided his warranty, if any, and you and I have no idea of what parts, schematics, etc. may be involved. And, if he causes injury or damage to anything or anyone, we don't want to be liable.

In short, the 529 tube removal mod will function on a reduced scale, but we cannot recommend or service it for a variety of technical and legal reasons.

--Bill Bean
53/108, Ext. 8695

1420 INTENSITY FLUCTUATION

Several people in the field have called in recently concerning intensity variation in the 1420 Series Waveform Monitors. Three items have been shown to be the majority of faults.

- A) Insure that the CRT socket pins are tight. Loose heater pins can cause a corresponding loss of emission.
- B) There is a cable running from the Intensity and Focus controls on the front panel to a location on the rear of the ECB that may bring it in close proximity to the HV transformer (T3510). Dress this cable as far from the HV transformer as possible to prevent stray magnetic coupling and the resulting intensity modulation.
- C) The HV Oscillator transistor, Q430 (151-0140-00) has shown some vendor related problems. If this transistor is a Solitron device, it is suspect. Replace with an RCA device of the same part number.

Thanks to Jerry Brown and others for bringing this to our attention.

--Bill Bean
53/108, Ext. 8695

1421/1422 EXTERNAL SUBCARRIER LIGHT

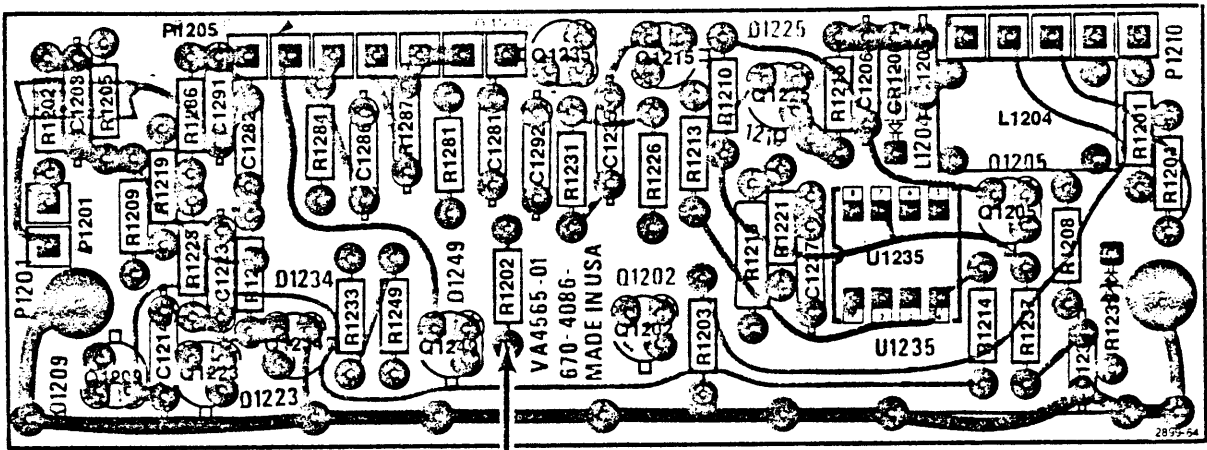
A few instances have been observed where the External Subcarrier light will not turn completely off when S241 is placed in either NTSC position and the INT/EXT SUB switch is set to the EXT position.

To insure complete turn-off, change R1207 to a 10K (315-0103-00) resistor. Note that the circuit number in the electrical Parts List doesn't match the schematic and board lay-outs. The circuit number on the schematic and board layout should be R1207, not R1202.

Manual correction requests have been submitted.

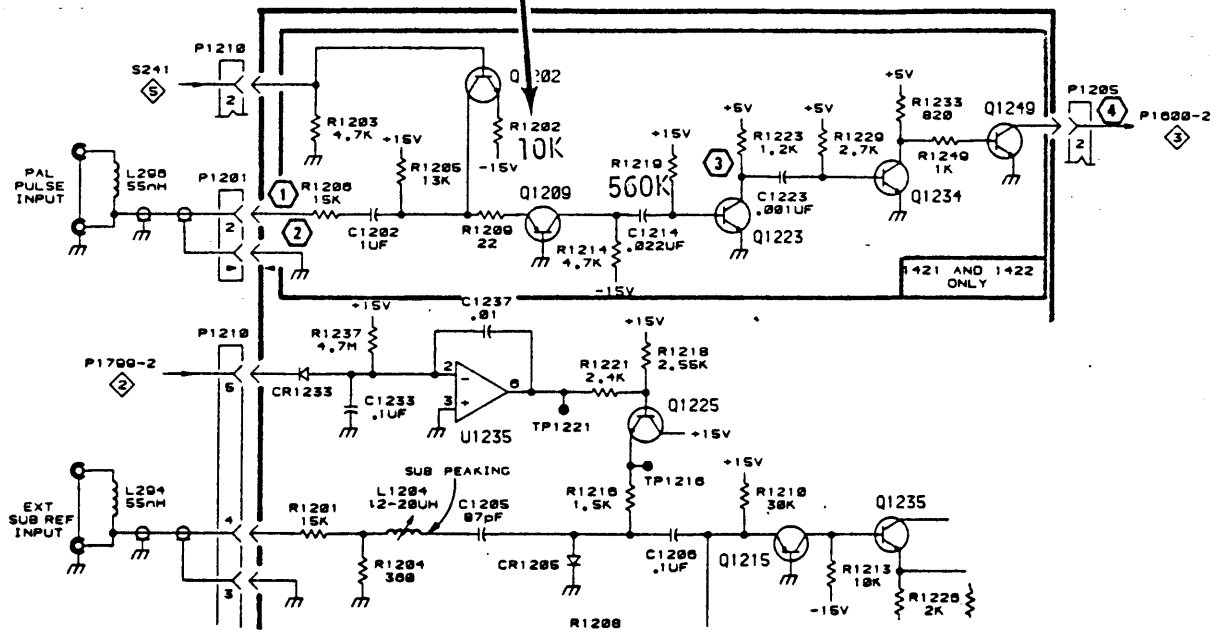
Reference Mod #M42515

(ARTICLE CONTINUED ON THE NEXT PAGE)



A5 EXT SUB REF BOARD

Correct Circuit Number to R1207 315-0622-00 6.2K
315-0103-00 10K



--Bill Bean
53/108, Ext. 8695

1900 SIGNAL MATRIX

The following matrices are provided as troubleshooting/parts replacement aids in the servicing of the 1900. All of the PROM's for generating the various signals are contained on the Sync & Memory board (A9) in the SIG 0 through SIG 8 and V SYNC SOCKETS.

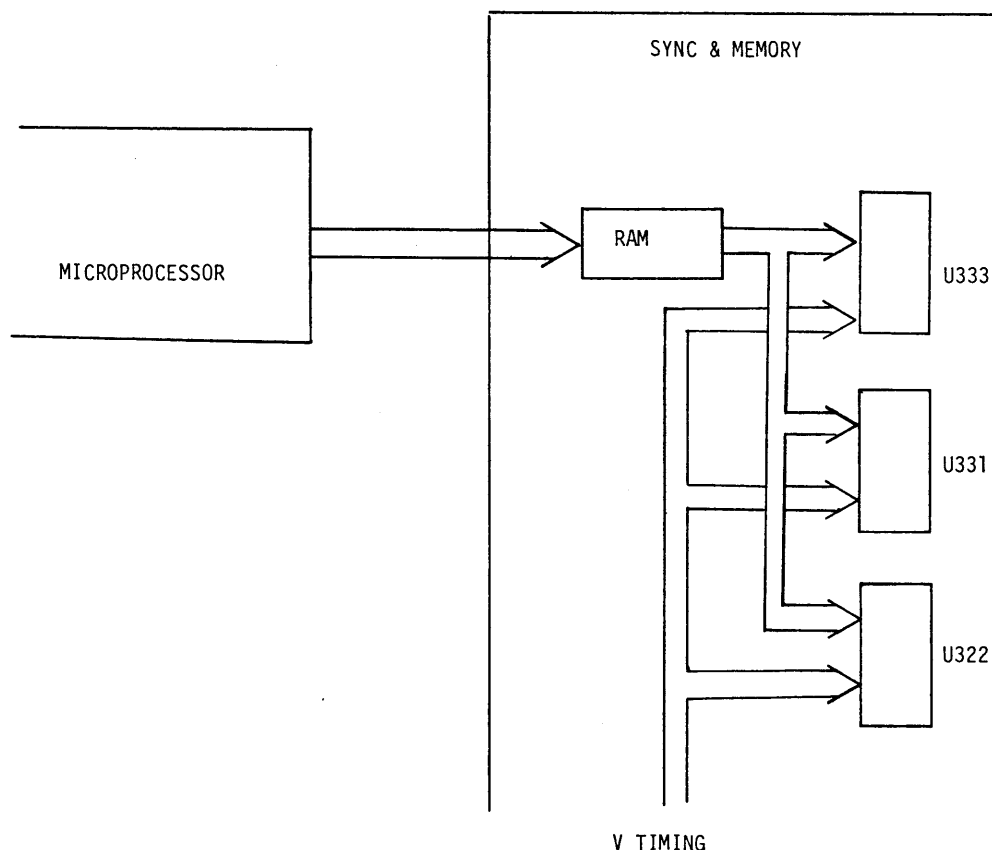
The signal output is determined by a unique code that is put out by the microprocessor according to which front panel switch is momentarily depressed. (Refer to Figure 1.) This code is put into RAM on the SYNC & MEMORY board and used to control three proms which, in turn, do the actual signal selection, and mixing in the case of split field signals, in real time (U322, U311, U333). U333 decodes the front panel code with V timing to select split or full field operation. U331 selects which portion of the various signal proms to read from, but is disabled during variable APL. U322 is enabled during variable APL, and selects signal proms similar to U331.

The signals reside in ROM and are installed and selected according to the following tables.

Figure 2 lists the signals used in each of the various instruments along with a part number list for each signal set. The location is also detailed.

Additional information is available in the 1900 Service Manual (061-2281-00, Interim) or 070-XXXX-00 when available, and the 1900 Operator's Manual (070-3443-00).

FIGURE 1



(ARTICLE CONTINUED ON THE NEXT PAGE)

FIGURE 2

Part Numbers (160- -00)	Signal Set (PROM) Names	Transmitter Std.	Studio Test Opt. 1	NTC 7 Opt. 2	Special #1 Opt. 3
0500 - 0504	V SYNC	V SYNC	V SYNC	V SYNC	V SYNC
0510 - 0514	MOD RAMP	SIG 5	SIG 5	SIG 5	SIG 5
0505 - 0509	VIRS	SIG 3	SIG 3	SIG 3	SIG 3
0640 - 0644	EIA BARS		SIG 6	SIG 6	SIG 6
0630 - 0634	-I,W,Q,B/PLUGE		SIG 7	SIG 7	SIG 7
0625 - 0629	REV. BARS		SIG 8	SIG 8	SIG 8
0635 - 0639	¹ FSW/C	SIG 4	SIG 4	SIG 4	SIG 4
0515 - 0519	² COMP I	SIG 2	SIG 2		
0655 - 0659	³ COMP II			SIG 2	SIG 2
0525 - 0529	⁴ MB/YBAR	SIG Ø	SIG Ø		
0520 - 0524	COLOR BARS	SIG 1	SIG 1		
0535 - 0539	MOD PED	SIG 7			
0530 - 0534	⁵ STRC/SINX	SIG 8			
0615 - 0619	⁶ MPI	SIG 6			SIG 1
0645 - 0649	⁷ MPII			SIG 1	
0660 - 0664	⁸ COMB I			SIG Ø	
0665 - 0669	⁹ COMB II				SIG Ø

- 1 - FSW/C is field square wave/window/convergence
- 2 - COMP I is FCC Composite
- 3 - COMP II is NTC 7 Composite
- 4 - MB/YBAR is Multiburst and Y Bars
- 5 - STRC/SINX is Staircase and SINX/X
- 6 - MPI is reduced amplitude multipulse
- 7 - MPII is full amplitude multipulse
- 8 - COMB I is the NTC 7 combination
- 9 - COMB II is the Canadian Combination

Figure 3 (following page) is a matrix detailing the signal mixtures used to arrive at a complete test signal (as listed on the front panel).

(ARTICLE CONTINUED ON THE NEXT PAGE)

FRONT PANEL MATRIX

<u>Signal Names</u>	<u>Std.</u>	<u>Opt. 1</u>	<u>Opt. 2</u>	<u>Opt. 3</u>	<u>Remarks</u>
VIRS	VIRS	VIRS	VIRS	VIRS	
FIELD SQUARE WAVE	FSW/C	FSW/C	FSW/C	FSW/C	Field Square Wave portion only
WINDOW	FSW/C	FSW/C	FSW/C	FSW/C	Window portion only
CONVERGENCE	FSW/C	FSW/C	FSW/C	FSW/C	Convergence portion only
MOD RAMP	MOD RAMP	MOD RAMP	MOD RAMP	MOD RAMP	
MULTIBURST	MB/YBAR	MB/YBAR			Multiburst portion only
MULTIPULSE	MPI		MPII	MPI	
COLOR BARS	COLOR BARS	COLOR BARS			
COMPOSITE	COMP I	COMPI	COMP II	COMP II	
MOD PED	MOD PED				
STAIRCASE	STRC/SINX				Staircase portion only
SINX/X	STRC/SINX				SINX portion only
COMBINATION			COMB I	COMB II	
BARS/Y	{ COLOR BAR MB/YBAR				First 181 active lines Last 60 lines
EIA BARS	{ EIA BARS -I,W,Q,B/ PLUGE	{ EIA BARS -I,W,Q,B/ PLUGE	{ EIA BARS -I,W,Q,B/ PLUGE		First 181 active lines Last 60 lines -I,W,Q,B portion only
SMPTE BARS	{ EIA BARS REV BARS -I,W,Q,B/ PLUGE	{ EIA BARS REV BARS -I,W,Q,B/ PLUGE	{ EIA BARS REV BARS -I,W,Q,B/ PLUGE		First 161 active lines Next 20 lines Last 60 lines
COMBINATION/ COMPOSITE		{ COMB I COMP II	{ COMB II COMP II		First half Second half First half Second half
MATRIX	{ MB/YBARS COMP I EIA BARS REV BARS MOD RAMP				First $\frac{1}{4}$ Second $\frac{1}{4}$ 40 lines 20 lines Last $\frac{1}{4}$
MATRIX		{ MOD RAMP EIA BARS REV BARS MP II			First $\frac{1}{4}$ Second $\frac{1}{4}$ Third $\frac{1}{4}$ Last $\frac{1}{4}$
MATRIX			{ MOD RAMP EIA BARS REV BARS MP I		First $\frac{1}{4}$ Second $\frac{1}{4}$ Third $\frac{1}{4}$ Last $\frac{1}{4}$

--Bill Bean
53/108, Ext.8695

SERVICE INSTRUMENT DIVISION

ACCESSORIES

A6901 MAINTENANCE INFORMATION

Description

The A6901 Ground Isolation Monitor is an indirect grounding device. It is connected between the mains and the oscilloscope. When activated, it disconnects the scope's protective grounding system and monitors the voltage and current on the isolated ground. If this voltage exceeds 40 volts peak and a preselected current (0.5ma, 3.5ma, or 5.0ma), the A6901 disconnects the power to the scope, sounds an audible alarm, and re-connects the scope's protective ground.

The A6901 can be used with any grounded oscilloscope. It also tests ground continuity of the system it is operated in and will not activate if the system ground is inadequate.

Test Equipment

Standard bench test equipment plus a PG505, AM501, and an 016-0597-00 is needed to repair and verify the A6901.

Service Locations

The A6901 can be serviced only at these six U.S. locations plus major International locations where sales justify.

Boston
Rockville

Chicago
Dallas

Irvine
Factory Service

Repair and Calibration

The A6901 manual is currently available, P/N 061-2555-00.

Engineering evaluations show that A1Q460 and Q466, P/N 151-0508-00 and A1Q454 and Q464, P/N 151-0539-00 are higher risk components as used in the circuitry.

The relay, A1K270 (P/N 148-0137-00), will not be enclosed in the first 150 instruments shipped. Caution must be taken to clean any solder flux from on or near this relay. A pipe cleaner and Isopropyl Alcohol is recommended; if a cotton swab is used, care must be taken not to leave traces of cotton fibers. The contact on the relay can be cleaned by soaking plain white paper in Isopropyl Alcohol and then carefully pulling it in between the contacts.

All A6901 units must be performance checked before being returned to a customer.

--Eilene Dickey
53/108, Ext. 8692

C5C OPTION 4 MAINTENANCE INFORMATION

The C5C, Opt. 4 was designed especially for use with the new 2200 Series Scopes. It is basically a C5C with a flash and a 400 Series adapter. Option 4 contains no new parts.

The C5C manual, P/N 070-2824-00, has an insert covering Option 4.

--Eilene Dickey
53/108, Ext. 8692

P6052 PROBE EXCHANGE

The P6052 should be removed from the probe exchange list. It became obsolete December 31, 1980, and Factory Service can no longer obtain repair parts. All P6052's sent in after October 15, 1981 will not be returned.

--Eilene Dickey
53/108, Ext. 8692

LOGIC ANALYZERS

DAS9100 SERIES - FAILURE REPORTING PROCEDURE

DAS failures should be reported against the serialized modules such as 9109, 9119, 91A32, 91P16, and 91P32. Failures to the controller board, trigger board and power supplies must be reported against the mainframe 9109 or 9119. Do not report failures against configuration numbers such as DAS9100, DAS9103, etc. Improper failure reporting will result in false reliability information.

--Gary Ellsworth
92-236, Ext. 1611

PM104 - MISSING PART NUMBER IN MANUAL

REFERENCE: PM104 Instruction Manual, Part Number 070-2916-00

There is currently no part number listed in the manual for CR2030 on the A04 Probe Plug Board. That part number should be 152-0322-00, Semiconductor Device: Silicon, 15V, Hot Carrier.

--Pat Wolfram
92-236, Ext. 1582

PORTABLES

2213, SWEEP START ABERRATION REDUCED

Reference: 2213, S/N B010100 - B012250
PICN #35

To reduce an aberration located approximately 100 nseconds from the start of the trace, three parts values are changed. The "glitch" is most noticeable when in Channel 2 mode with AC coupling. Change the following parts to these new values:

A11R645	6.8K	P/N 315-0682-00
A11R646	10K	P/N 315-0103-00
A11W635	1K (R556)	P/N 315-0102-00

(Wire strap replaced by resistor)

--Roy Lindley
53/108, Ext. 8687

2213, 2215, A19 CURRENT LIMIT BOARD MODIFIED

Reference: PICN #27

The circuitry on the Current Limit Board was modified to prevent the current limit from initiating prematurely. All 2213 units were reworked by Manufacturing but some 2215 units may have been shipped prior to the rework. Check all 2215's below S/N B010500 to ensure the following components are the value listed below:

A19 R937	0.2 Ω	P/N 308-0843-00
A19 VR933	75V Zener	P/N 152-0286-00
A19 R935	280 Ω	P/N 321-0140-00
A19 R936	374 Ω	P/N 321-0152-00

All units must have this modification if not present. It is essential for units operating on 200 volts or greater line voltage.

The Electrical Parts List for A19 can be found in the Change Information section at the back of early manuals.

--Roy Lindley
53/108, Ext. 8687

2215, 50 KHz B TRIGGER OPERATION

Reference: 2215, S/N B010100 - B012000
PICN #34

To ensure that the B triggers will meet the minimum signal amplitude specification at 50KHz, zener diode A13VR584 was changed at approximately serial number B012000 to a tighter tolerance part, P/N 152-0662-00. Any 2215 with marginal B triggers with 0.4 divisions of signal should replace VR584 with this new part.

--Roy Lindley
53/108, Ext. 8687

2215, REDUCED TRACE NOISE IN CHOP MODE

Reference: 2215, S/N B010100 - B012000
PICN #34

To reduce Z Axis overshoot which causes chop noise and trace blooming at high intensity levels, A10R854 is changed to an 18 Ω resistor, P/N 315-0180-00. The original 27 Ω resistor was changed to a wire strap, W854 in most units by Manufacturing. For best performance the 18 Ω value should be used.

--Roy Lindley
53/108, Ext. 8687

INFORMATION DISPLAY DIVISION

IDD CUSTOM MODIFIED PRODUCT SERVICE SUPPORT

From time to time I receive information about problems associated with providing service for IDD Custom Modified Products. In general, there are several key items to remember before attempting to service a IDD Custom Modified Product or covering a IDD Custom Modified Product under Maintenance Agreement.

1. IDD Custom Modified Products carry the same long term support as standard IDD products.
2. IDD Custom Modified parts, boards, assemblies may have longer delivery times because they typically are not stocked and are built only upon demand.
3. IDD Custom Modified parts, boards, assemblies require a Request For Quote before an order can be placed.
4. IDD Custom Modified parts, boards, assemblies cannot be returned to stock.
5. Not all IDD Custom Modified boards or assemblies are on the Exchange Program or Repair & Return Program.
6. Although all IDD Custom Modified Products, boards, assemblies may be returned to the factory for repair, Factory Service does not do the repair work for all IDD Custom Modified Products, boards, assemblies. Many are forwarded to IDD Manufacturing for the actual repair.

All of these key items have an impact on the availability of IDD Custom Modified Replacement parts, boards, assemblies, which in turn affects response/turnaround times. There are a couple of things which can be done to minimize delays.

1. When writing a Maintenance Agreement, check to see if the IDD Custom Modified part of the product is supported by Board Exchange. If not, consider additional turnaround times to order a replacement or repair and return time. Consider stocking the board at the Service Center and consider the associated cost.
2. If the customer doesn't want a Maintenance Agreement, advise him/her to purchase backup spares in accordance with their individual requirements, i.e., downtime.

When in doubt or if you need assistance, contact Service Support for additional information or check the IDD Modified section of the SQI.

--Jim Tiano
63/503, ext. 3701

600 SERIAL NUMBER RELOCATION

Certain 600 series products have used plastic inserts to identify the product serial number. These printed inserts will no longer be available. They are being replaced by serial number tags. The location of the tags will be as follows:

602	Rear Panel
603A	Inside Access Door
604A	Inside Access Door
606A	Inside Access Door
607A	Inside Access Door

This article is for your information only.

--George Kusiowski
63-503 Ext. 3928 WI

4014 OPTION 5/4907 CALIBRATION TEST FIXTURE

Reference: 4014/14-1, 4015/15-1 Service Manual 070-2303-00
4907 Service Manual 070-2405-00
4014, 4015, 4016-1 Option 5 Instruction Manual 070-2668-01

There is now available a test fixture that allows on-site calibration of a 4907 when attached to a 4014, 4015 or 4016-1 via the Option 5 GPIB Interface. The test fixture part number is 067-1062-99 and consists of a programmed 2708 EPROM and a manual.

The EPROM when used for calibration of the 4907 resides in socket U1 of the Option 40 processor circuit card (670-5511-0X). This test fixture can be used with any version of Option 40, 41, 5 firmware. Excellent operating instructions are provided in the accompanying manual.

Thanks go to Van Freeman of the Raleigh Field Office for his input which made us aware of the need for this test fixture.

--Dennis Painter
63/503, ext. 3597

4016-1, GMA125 CRT; BONDED GLASS IMPLOSION SHIELD

Reference: 4016-1 Manual, 070-2661-00
GMA125 Manual, 070-2618-00
Modification M39234

Recently all 25 inch CRT products have been modified to replace the polycarbonate implosion shield. The reason for this change is to eliminate distorted light reflections from the CRT face.

To accomplish this, a glass shield has been bonded onto the face of the CRT's in place of the polycarbonate shield.

With the additional thickness of the bonded glass shield, the CRT had to be moved back $\frac{3}{8}$ of an inch to the rear causing the CRT JEDEC headers to be very close to the mu-metal shield wall. This could cause an electrical shorting problem unless additional space and insulation are provided. Therefore, the mu-metal shield was modified to add dimples to allow for new insulator heads that were designed to insulate the JEDEC headers.

Due to the contacting surface of the Rimband being covered with tape and epoxy as a result of bonding on the glass implosion shield, the present hardcopy filter ground clips were not functional. Also because of a redesign of the corner brackets, the brackets would not permit the ground clips to be located as before. As a result the ground clips were redesigned and are now mounted under the corner brackets in each corner. This arrangement is not obscured and permits easy assembly of the new ground clips.

Inner Filter Brackets previously had corner tabs which caused undue stress to crack the corners of the Light Filter. These brackets were redesigned to eliminate the tabs.

Outer Filter Brackets remain the same except for the type of foam tape being applied to the tabs. This same foam tape is also being placed on the glass implosion shield in the same positions as the tape on the Outer Filter Bracket so as to line up and better cushion the Light Filter.

(ARTICLE CONTINUED ON THE NEXT PAGE)

Serial Number Breaks and Replacement Part Numbers

<u>Instrument</u>	<u>Starting S/N</u>	<u>For Replacements Use</u>	
		<u>Before Starting S/N</u>	<u>After Starting S/N</u>
4016-1	B040780	050-1331-12	154-0807-02
GMA125	B030396	050-1331-12	154-0807-02
GMA125 Opt 30	B030396	050-1331-13	154-0808-02
MEG121 Opt 36	B010102	050-1331-12	154-0807-02
M121F36	B010102	050-1331-12	154-0807-02

One exception to the above: If a product below the Starting Serial Number already has a CRT with the glass implosion shield then replace it with the appropriate 154 number.

Mechanical Parts List (MPL)

The manuals will be updated. In the meantime, please see the attached exploded views.

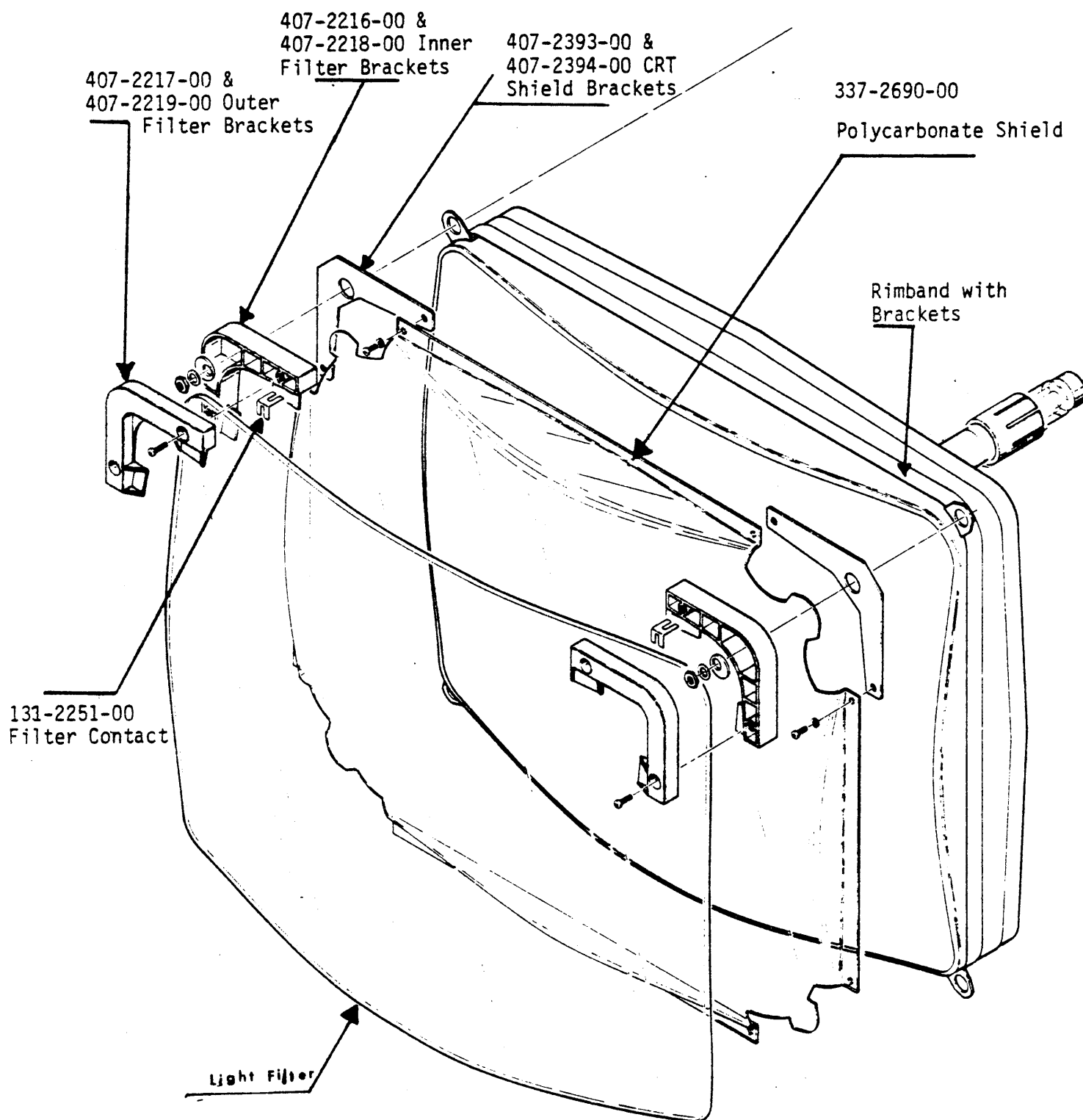
Exploded Views

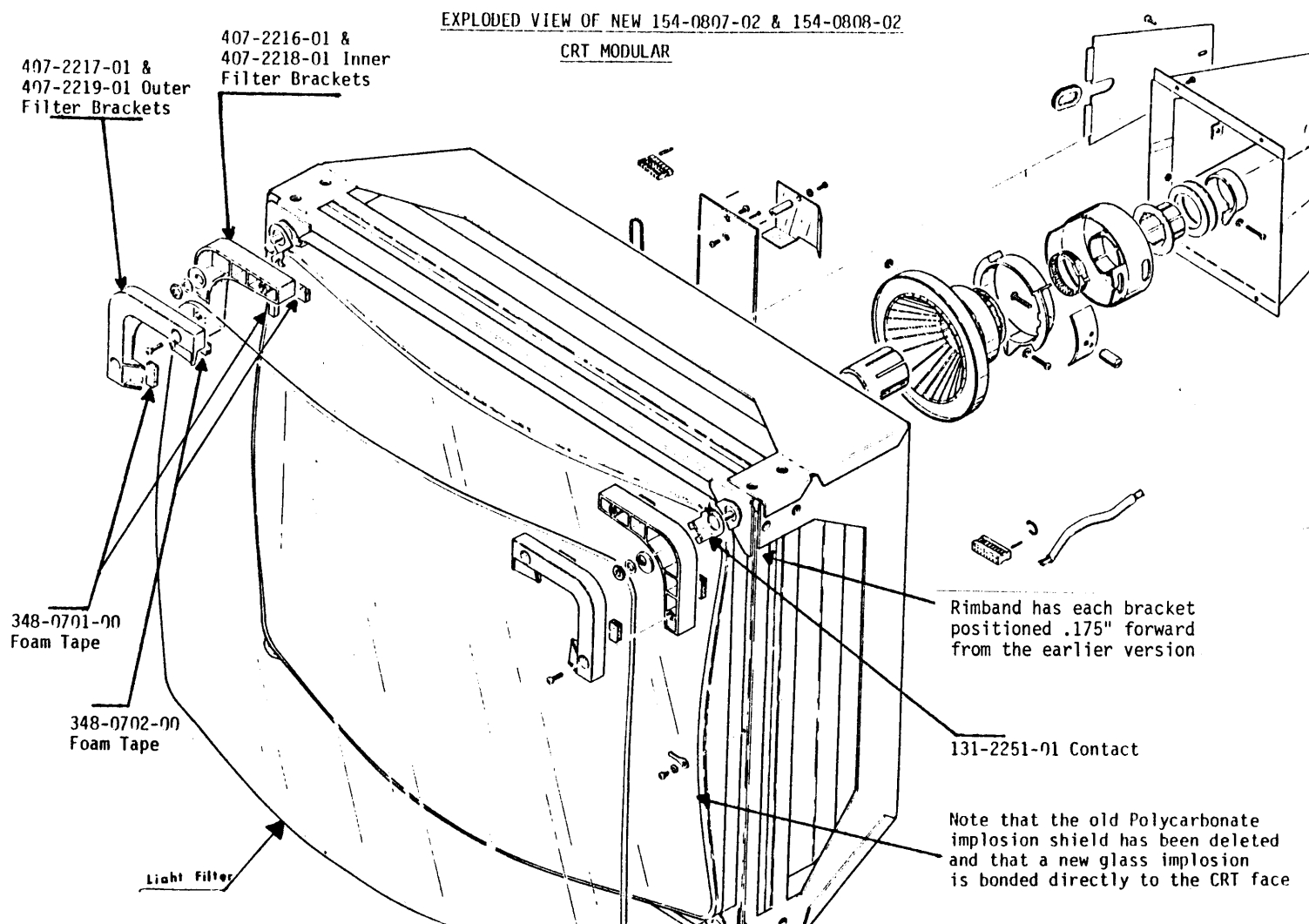
The attached exploded views show both the old and new versions. Note the part numbers and part names. Also note the placement of parts, especially the rubber cushions for the Light Filter. Notice that the brackets have a long and short edge. Be sure to orient them correctly when installing a new CRT module. The long edges should be in a horizontal direction.

(ARTICLE CONTINUED ON THE NEXT PAGE)

EXPLODED VIEW OF OLD 154-0807-01 & 154-0808-01

CRT MODULAR





--Dennis Painter
63/503, ext. 3597

4112 DEMO UPGRADE

Recently, instructions and material for upgrading demo 4112s to saleable status were sent to the field. All 4112 demo units with serial numbers should now have the upgrade completed. The following information requires no action but is being printed to document the changes made.

DEMO UPGRADE INSTRUCTIONS FOR 4112

I. PROCESSOR BOARD (670-6496-XX)(672-0949-XX)

Reason: Bad Batch of USARTs.

Check U301 (USART) on the processor board for lot date. Lot dates of 8039 and lower are bad and U301 will need to be replaced. See Note 1. The part number, if needed, is 156-1460-00.

II. RAM/ROM (670-6940-XX / 672-0950-XX)

Reference: PICN 98, 128

Reason: 8202 causes intermittent soft RAM errors.

A. If the board has an 8202 and U193 does not have a piggyback IC, it is a 672-0950-00.

1. Remove and replace U473 (8202) with an 8202A. See Note 1.
2. Remove U193 (74S74). See Note 1.
3. Insert R192 and R193 (131-0566-00, 0 ohm resistors) as in Figure 1.
4. Roll the 670 from -00 to -02 . Add 672-0950-02 sticker.

B. If the board has an 8202 and U193 has a piggyback IC, it is a 672-0950-01.

1. Remove and replace U473 (8202) with an 8202A. See Note 1.
2. Remove U193 (74S74) and piggyback (74S04). See Note 1.

(ARTICLE CONTINUED ON THE NEXT PAGE)

3. Insert R192 and R193 (131-0566-00, 0 ohm resistors) as in Figure 1.
4. Roll the 670 from -00 to -02. Add 672-0950-02 sticker.

NOTE 1

To remove the IC: First clip all leads and remove the body. Then use a soldering iron and solder sucker to remove the pins and excess solder.

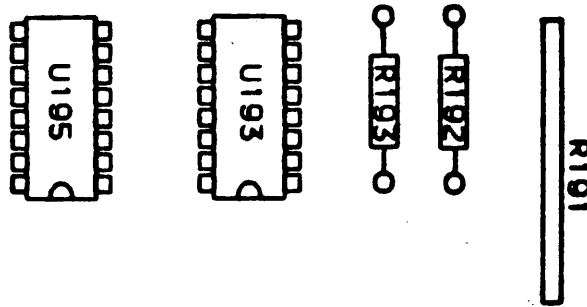


FIGURE 1
Component Locations

III. RAM CONTROLLER (670-6669-XX)

Reference: PICN 99, 129

Reason: 8202 causes intermittent soft RAM errors.

- A. If U535 does not have a piggyback IC.
 1. Remove and replace U451 (8202) with an 8202A. See Note 1.
 2. Remove U535 (74S74). See Note 1.
 3. Insert R538 and R539 (131-0566-00, 0 ohm resistors) as shown in Figure 2.
 4. Roll 670-6669-00 to 670-6669-02 and skip step B.
- B. If U535 has a piggyback IC.
 1. Remove and replace U451 (8202) with an 8202A. See Note 1.
 2. Remove U535 (74S74) and piggyback (74S04).

(ARTICLE CONTINUED ON THE NEXT PAGE)

3. Insert R538 and R539 (131-0566-00, 0 ohm resistors) as shown in Figure 2.
4. Roll 670-6669-01 to 670-6669-02.

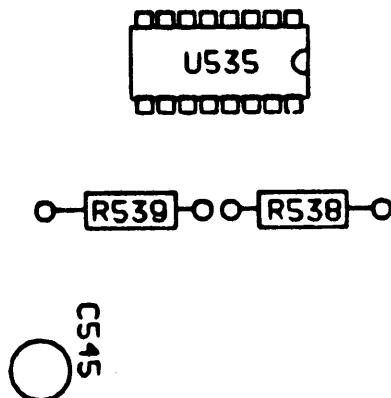


FIGURE 2
Component Locations

IV. MOTHER BOARD (670-6471-01)

Reference: PICN 53

Reason: For compatibility with future product, the connection between pin 30 of J32 and pin 30 of J34 was deleted.

1. Open card cage and remove any cards that are installed in J30, J32 and J34, which are 44 pin connectors on the Raster Bus.
2. Insert an extender board in J34.
3. Connect an ohm meter to pin 30 of the extender board. Use the other lead to verify which run between J32 and J34 must be cut. It is the 13th run from the top and is a narrow run between two wider runs. See Figure 3.
4. Cut the run with a sharp knife being careful not to damage any other runs.
5. Check for an open between pins 30 of J32 and J34.
6. Reinstall the cards removed from the card cage and close up instrument.

(ARTICLE CONTINUED ON THE NEXT PAGE)

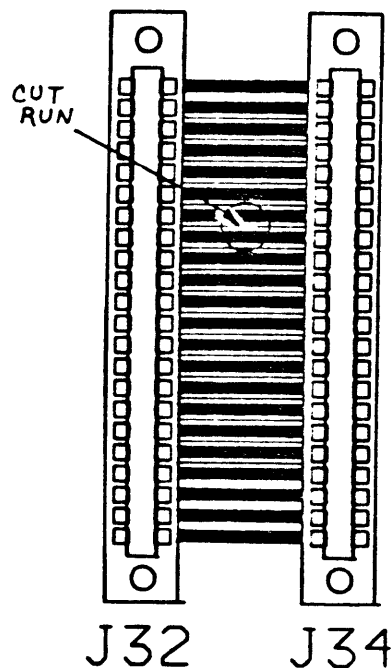


Figure 3
Edge Connectors With Runs between J32 and J34

V. VIDEO CONTROLLER (670-6475-00)

Reference: PICN 54

Reason: To eliminate a 5V ripple that sometimes creates a waterfall effect on the screen.

1. Replace C114 with a 0.22uf capacitor (283-0423-00).
2. Cut the run between Q29 collector and Q26 collector on back side of board. See Figure 4.
3. Add the 3-terminal +5V regulator, U117, (156-0991-00) to the front side of the board, as in Figure 5.
 - a. pin 1 to C114
 - b. pin 2 to R115
4. Add the 0.1uf (C117) capacitor between pin one of U121 and pin 3 of the 5V regulator (U117) just installed.
5. From the junction of pin 3 of U117 and C117 run a mod wire to the bottom of the board to C642. Run the mod wire under the grounded stiffener bar to help hold it close to the board.

(ARTICLE CONTINUED ON THE NEXT PAGE)

6. Completion of the Mod will be to roll the board number to -01.

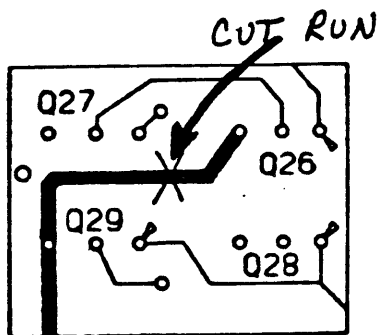


Figure 4
Location Of Cut Run On Back Of Board

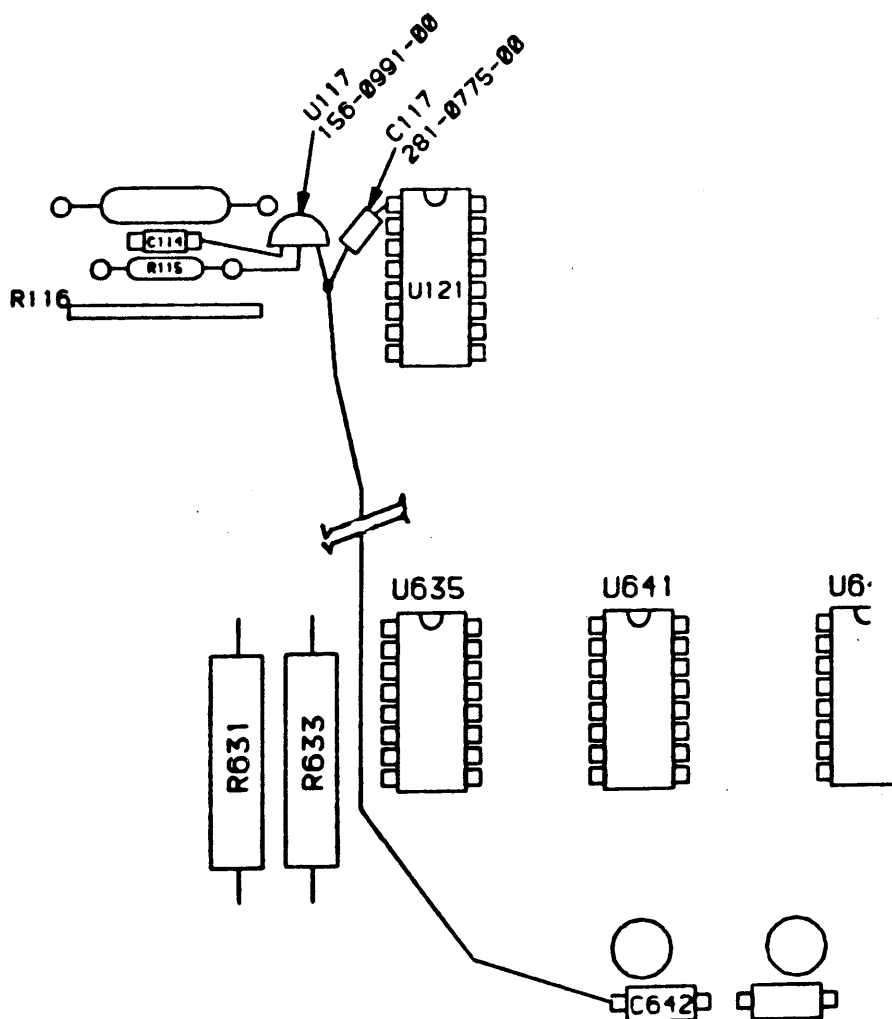


Figure 5
Location Of Components On Front Of Board

--Bill Hatch
63-503, ext. 3787 (WI)

The power supply board had several changes just before warehouse release that were not on the original schematics. If you order a new service manual, most (but not all) of these changes will be included.

There are three levels of the power supply board. Following is a description of the changes for each part number suffix:

672-0789-00 (all power supply boards have these mods)

1. R193 and R195 changed to 75 ohm, p/n 315-0750-00, to increase encoder LED current.
2. CR151 p/n 152-0322-00 was added to the back of the the board. See Figure 1.
3. Encoder detect and pulse shaping circuit was changed extensively with a hand-add. See Figure 2.

New parts --

<u>Circuit No.</u>	<u>Part Number</u>	<u>Description</u>
C191 (TP'd)	281-0772-00	Capacitor, 4700pf
Q191 (TP'd)	151-0188-00	Transistor, 2N3906
R186 (TP'd)	321-0437-00	Resistor, 348K
R189	315-0103-00	Resistor, 10K
R191	321-0251-00	Resistor, 4.02K
R19X	315-0393-00	Resistor, 39K
R196 (TP'd)	321-0510-00	Resistor, 2M
R197 (TP'd)	315-0103-00	Resistor, 10K
R199	131-0566-00	Link, 0-ohm
R399	131-0566-00	Link, 0-ohm

Note: TP'd refers to fact that parts are hand soldered onto other components.

672-0789-01

Effective Serial Numbers

4611 -- B011423

4612 -- B010725

1. R195 was changed to 150 ohm, p/n 315-0151-00; R193 was changed from a fixed resistor to a 2K pot, 311-1918-00, hand-add. See Figure 3.
2. New adjustment procedure for R193:
 - a. Turn on the hard copy unit and allow to warm up (copy light steady).
 - b. Connect a voltmeter between ground and the collector of Q191 (junction of R197 which is a 10K resistor, and C191 which is a 4700 pF capacitor).

(ARTICLE CONTINUED ON THE NEXT PAGE)

- c. Push COPY button.
- d. Adjust R193 for reading of $-7.5V = .5V$ while the printer is running.

672-0789-02

Effective Serial Numbers

4611 -- B011865

4612 -- B010944

1. A new circuit board layout was done to incorporate the parts that were hand added to the -00 suffix board.
2. C198 was added to the encoder detect circuit.
3. Several circuit number changes -- R195 becomes R194, etc. Latest 4611 Service Manual (Revised June, 1981) has new circuit board layout and schematic.
4. This relayout of the board was initiated before R193 was changed to a pot. Therefore, the pot is still a hand-add part, and the June, 1981, manual schematic does not show this change.

Schematic A2-1 Power Supply Board

CHANGE AS SHOWN:

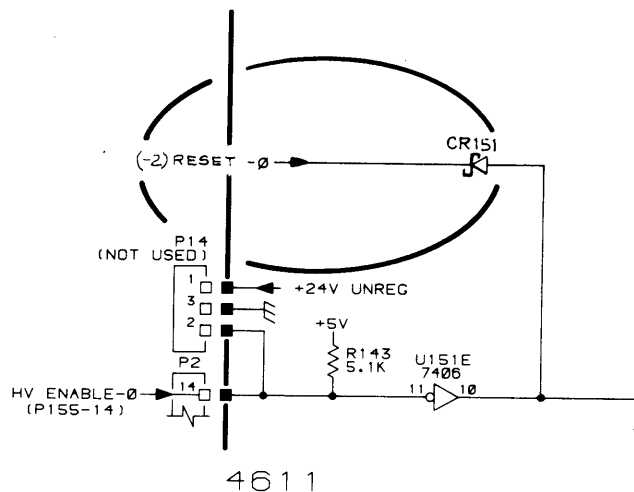


Figure 1. Power Supply Schematic, Sheet 1 (partial)

(ARTICLE CONTINUED ON THE NEXT PAGE)

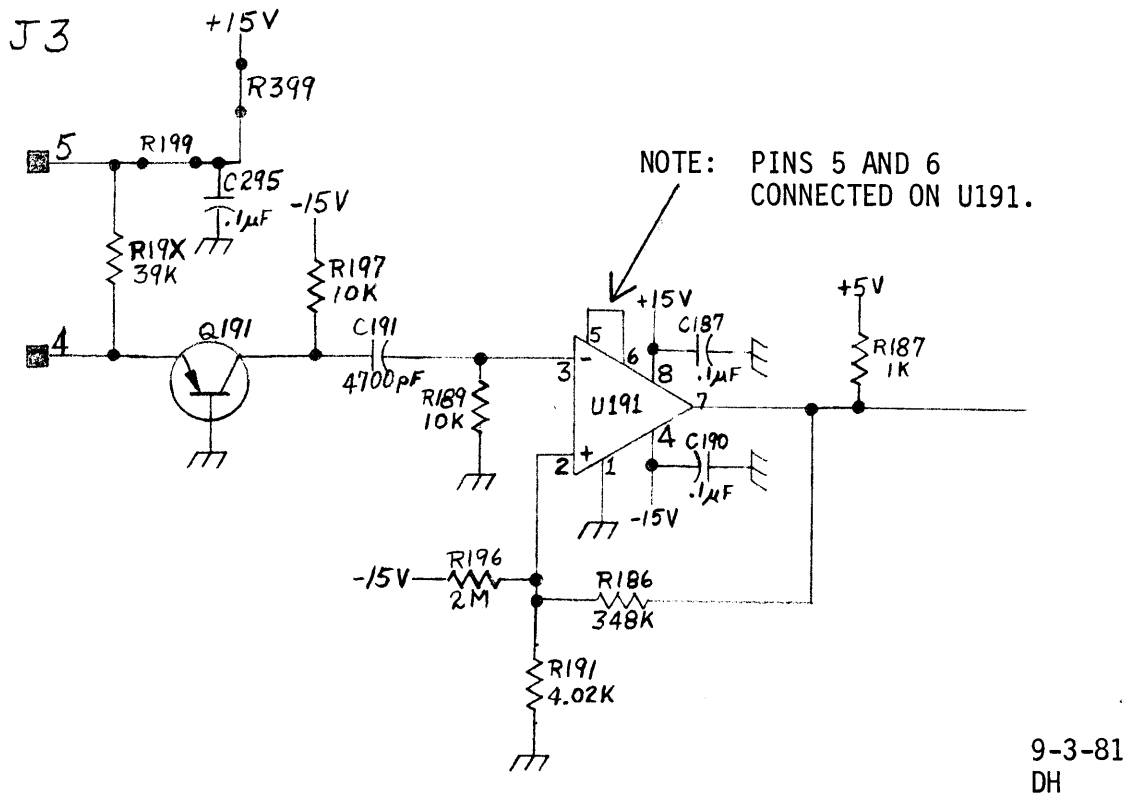


Figure 2. Power Supply Schematic, Sheet 2 (partial)

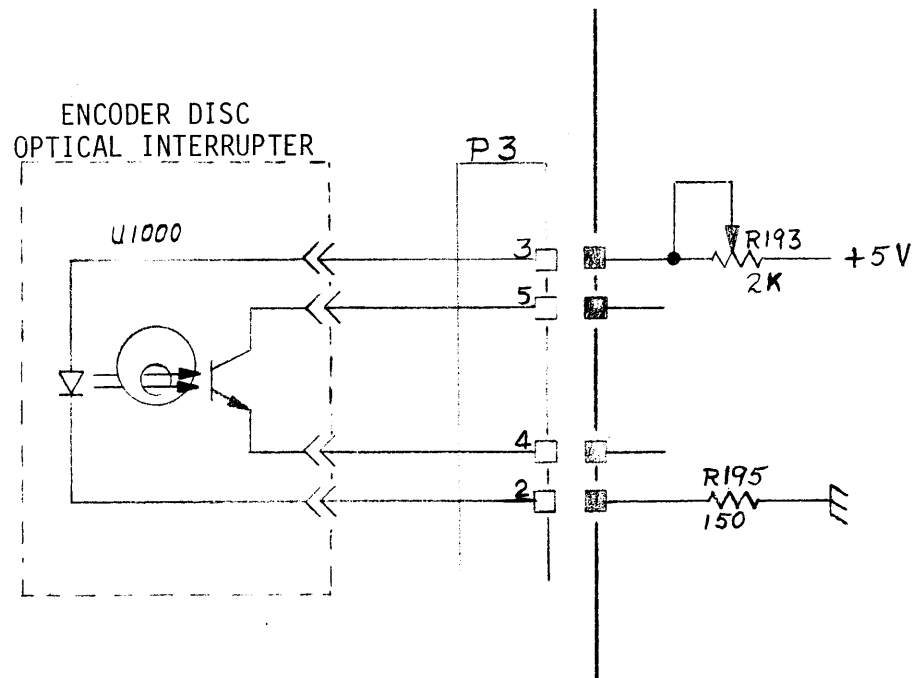


Figure 3. Power Supply Schematic, Sheet 2 (partial)

-- Dan Harris
63-503 ext. 3313 (WI)

4663 VERSION 5 FIRMWARE RELEASE & ASSOCIATED CHANGES

For the past year we have been supporting two levels of 4663's. The Version 2 product, and the Version 4 product that contained major mechanical changes plus revised firmware. With the introduction of the 4663 Version 5 Firmware, major changes to our support programs are being implemented. For your information, the changes are summarized below.

-- 4663 Update Program #1023

The update program was using one 046 style kit which required the return of unused and reusable parts. This is changing to three (3) 045 kits which do not require the return of any unused or reusable parts. See Update Program #1023 Change Report #14 for more details.

-- Customer Service

For a period of time, Customer Service was supplying parts for the 4663 Version 2 and Version 4 products. This will change in that the only parts Customer Service will supply in the future are the mechanical parts introduced with Version 3 product and the Version 5 firmware devices.

-- Board Exchange (Beaverton)

Board Exchange has also supported the Version 2 and Version 4 4663's. With the introduction of the Version 5 4663, Board Exchange will convert all their exchange material to the Version 5 level. When this conversion is complete, the only boards on the exchange list will be at Version 5 levels. The end result is the following assembly levels will be removed from the exchange list.

ROM Overlay - removed from list totally, the board is not required for Version 5.

ROM Patch "B" - Remove suffix level -02 & -05, add Version 5 level -06.

68 "B" Processor - Remove suffix levels -02 & -05, add Version 5 level -06.

RS232 Interface - Remove suffix levels -02 & -05, add Version 5 level -06.

GPIO Interface - Remove suffix levels -03 & -05, add Version 5 level -06.

Vector Generator - Remove suffix level -02, leave Version 5 level -03.

--Steve Prunty
63-503 Ext. 3593 (WI)

4663 VERSION 5 FIRMWARE (STARTING S/N B06 & ABOVE)

The intent of this article is to inform the reader of the differences between previously built 4663s and the Version 5 products. This article also provides information regarding compatibility for all F/W levels. The information is given to provide history to the reader as it relates to Version 5 firmware.

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

Production of 4663s with Version 5 (V5) firmware (F/W) has started. Customers can receive the V-5 F/W level at no charge under update program #1023. Version 5 is the only F/W level that is supported from Customer Service and Board Exchange. Table I identifies all new parts and part numbers associated with Version 5. As always, there is no inter-mixing of F/W levels allowed in the 4663; i.e., if one F/W device is changed to a higher level, all other appropriate F/W devices must also change to match that same level.

TABLE I

New Version 5 Circuit Boards

<u>Part Number</u>	<u>Description</u>
670-5503-06	GPIB Interface, V-5
670-6420-06	Processor
670-6114-04	ROM Patch
670-5579-06	RS-232 Interface, V-5

New Version 5 F/W Devices

GPIB INTERFACE

<u>Part Number</u>	<u>Description</u>
160-0309-03	PROM 1G, V-5, U171
(160-0308-XX not used)	

PROCESSOR

<u>Part Number</u>	<u>Description</u>
160-0238-02	PROM 4, U281
160-0239-03	PROM 5, U291
160-0241-02	PROM 7, U175
160-0242-02	PROM 8, U181
160-0280-02	PROM 9, U191

OPTION 31 AND 32

<u>Part Number</u>	<u>Description</u>
160-0185-03	Option 31A, U481
160-0395-04	Option 31B, U475
160-0182-01	Option 32A, U591
160-0183-01	Option 32B, U581

(ARTICLE CONTINUED ON THE NEXT PAGE)

ROM PATCH

<u>Part Number</u>	<u>Description</u>
160-0273-04	PROM 1, V-5
160-0274-03	PROM 0, V-5
160-0281-04	FPLA 0, V-5
160-0282-04	FPLA 1, V-5

RS-232 INTERFACE

<u>Part Number</u>	<u>Description</u>
160-0307-03 (160-0306-XX not used)	PROM 1R, V-5, U181

Version 5 Service Tips

1. Whenever going on a 4663 service call take a current copy of the parts list along to prevent problems that could occur if wrong level parts are used on a product.
2. Table II contains circuit boards that can be used for a Version 2 through 5 4663, provided that the firmware devices located on that board are also changed to maintain the correct system firmware levels.

TABLE II

<u>Part Number</u>	<u>Level</u>		<u>Description</u>
	<u>F/W</u>	<u>1-2</u> <u>3-5</u>	
670-6420-	XX	04	Processor
670-6114-	XX	03	ROM Patch
670-5237-	02	03	Vector Generator

(NOTE: XX in the level column indicates that any of the V-5 and below F/W levels are compatible with all the various suffix level editions of that board.)

3. The circuit boards listed in Table III are downward compatible only. They can be used as direct replacement assemblies for V-5 and below products. If used, the ROM overlay board's firmware devices and jumper straps must first be changed to match the firmware configuration on the processor board.

(ARTICLE CONTINUED ON THE NEXT PAGE)

TABLE III

<u>Part Number</u>	<u>Description</u>
670-5236-03	Motor Pen Drive Board
670-6275-03	ROM Overlay Board

4. The circuit boards listed in Table IV are upward compatible only. They can be used in a Version 5 product, but cannot be used with any of the earlier F/W versions (1 through 4).

TABLE IV

<u>Part Number</u>	<u>Description</u>
670-5503-06	GPIO Interface, V-5
670-5579-06	RS-232 Interface, V-5

5. Table V 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 V

4663 Firmware Compatibility Table

<u>Circuit Board</u>	<u>Socket Location</u>	<u>I/C Part #</u> <u>160-XXXX-XX</u>	<u>V1</u>	<u>V2</u>	<u>V3 & 4</u>	<u>V5</u>
ROM Overlay *6 670-6275-XX	U435 (9H)	-0290	-00	-00	-00	Not Used
	U440 (9L)	-0289	-00	-00	-00	Not Used
	U445 (8H)	-0292	-00	-00	-01	Not Used
	U450 (8L)	-0291	-00	-00	-01	Not Used
	U455 (7H)	-0294	-00	-00	-01	Not Used
	U460 (7L)	-0293	-00	-00	-01	Not Used
	U465 (6H)	-0296	-00	-00	-00	-00
	U470 (6L)	-0295	-00	-00	-00	-00
	U535 (5H)	-0298	-00	-00	-01	Not Used
	U540 (5L)	-0297	-00	-00	-01	Not Used
	U545 (4H)	-0300	-00	-00	-00	Not Used
	U550 (4L)	-0299	-00	-00	-00	Not Used
	U555 (3H)	-0302	-00	-00	-00	-00
<u>Circuit Board</u>	<u>Location</u>	<u>160-XXXX-XX</u>	<u>V1</u>	<u>V2</u>	<u>V3 & 4</u>	<u>V5</u>
	U560 (3L)	-0301	-00	-00	-00	-00
	U565 (2H)	-0304	-00	-00	-00	-00
	U570 (2L)	-0303	-00	-00	-00	-00
	U575 (0)	-0305	-00	-00	-00	-00

(ARTICLE CONTINUED ON THE NEXT PAGE)

4663 VERSION 5 FIRMWARE (STARTING S/N B06 & ABOVE) (continued)

ROM Patch

670-6114-XX	U315 (P/Ns -0273 & -0274 *1	N/A	0273-01	0273-02	-04*5
	U325 are listed to right)	0273-00	0274-00	0274-01	-03*5
	U335 -0281	-00	-01	-02	-04*5
	U345 -0282	-00	-01	-02	-04*5

Vector Generator

670-5237-XX	U310	-0272	-00	-00	-01	-01
	U510	-0276	-00	-00	-01	-01
	U540 *2	-0277	-00	-00	-01	-01

Processor (ROM6)	U171 *3	-0240	-00	-00	-00	-00
670-5121-XX (ROM7)	U175	-0241	-00	-00	Not Used	-02
670-6420-XX (ROM8)	U181	-0242	-01	-01	Not Used	-02
(ROM9)	U191	-0280	-01	-01	-01	-02
(ROM2)	U271	-0236	-00	-00	-00	-00
(ROM3)	U275	-0237	-01	-01	-01	-01
(ROM4)	U281	-0238	-01	-01	-01	-02
(ROM5)	U291	-0239	-00	-00	Not Used	-03
(ROM0)	U491	-0243	-00	-00	-00	-00
(OPT31)	U475	-0395	-01	-02	-03	-04
	U481	-0185	-01	-02	-02	-03
(OPT32)	U571	-0724	Not Used	-00	-00	-00
	U575	-0184	Not Used	-00	-00	-00
	U581	-0183	Not Used	-00	-00	-01
	U591	-0182	Not Used	-00	-00	-01

RS-232

Interface

670-5579-XX

				V3	V4	
U171 (RL)	-0306	-00	-00	-01	-02	N/A
U181 (RH)	-0307	-00	-00	-01	-01	-03

GPIO

Interface

670-5503-XX *4

U171	EV2.XX	N/A	N/A	N/A	N/A	N/A
-----or-----						
U171 (GL)	-0309	-00	-00	-01	-02	-03
U181 (GH)	-0308	-00	-00	-01	-02	N/A
-----or-----						
U171 (GL)	EV2.XXL	N/A	N/A	N/A	N/A	N/A
U181 (GH)	EV2.XXH	N/A	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 mislabeled 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.

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- *3 -- In the 4663 there are ten (10) F/W devices designated as ROM 0 through ROM 9. One of these ROMs (ROM #1) is located on the interface board while the remaining ROMs are located on the processor board. The group of nine (9) located on the processor, ROM 0 and ROMs 2-9, are referred to as the main system ROMs.

The main system ROMs, located on the Processor Board, have never had a suffix level change on F/W Versions 1 through 4. Some of the ROMs may have been removed from the Processor and replaced with ROMs on the overlay board. However, ROMs on the Processor have not changed suffix levels until Version 5, at which time they rolled to a -02 level.

If any of the suffix levels on the Processor ROMs do not match the 00 or 01 levels indicated in Table V, the F/W device is probably mislabeled. This is true for -00 and -01 level devices only. Whenever one of the main system ROMs change suffix level it will roll to a -02 or higher, so for all intents and purposes, a -00 and -01 main system ROM can be considered as the same part.

- *4 -- Versions 3 and above 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 -- Note that the ROM Patch F/W devices suffix's rolled from -01 and -02 levels, in Version 3 & 4, to -03 and -04 levels in Version 5.
 - *6 -- An incompatibility exists between the 670-6275-01 level of the ROM Overlay Board and the "B" Processor Circuit Board, P/N 670-6420-XX. The earlier style processor board, P/N 670-5121-XX, works with all versions of the ROM Overlay circuit board.
6. For V-5, both the RS-232 and GPIB interfaces have had their ROM addressing lines changed to facilitate using one 32K ROM in place of the previously used two 16K ROMs.
 7. The ROM Overlay should be used only when required for substitution of missing main system ROM on the Processor. Since V-5 changes the main system ROM on the Processor itself, the ROM Overlay board is no longer needed and should be removed whenever possible.

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

<u>Issue</u>	<u>Title</u>
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
10-20	4663 Version 3 & 4 Firmware and Associated Hardware

--Larry North
63-503, Ext. 3926 (WI)

LABORATORY INSTRUMENT DIVISION

SEMICONDUCTOR TEST SYSTEMS

1803, 1804: J50 UNDERSOCKET REQUIRES CONNECTOR KEYS

There is still a high incidence of damage to circuit boards and socket connectors from repeated removal and improper insertion of Socket Cards. The J50 connector (131-1645-00) may be damaged if socket cards are not properly aligned. The sockets should have connector keys (214-1772-00) to prevent plugging the Socket Cards in backwards.

It is not uncommon for socket cards, specifically wired for various devices, to be changed several times a day. Excessive force or improper alignment can break the J50 connector. The connector keys may become bent resulting in damage to the undersocket connector, the socket card or to the keys themselves. This is minor compared to the damage which could result from changing socket cards with the power switch on.

To replace the connector keys, gently insert the new key, using needle nose pliers, between the connector pins corresponding to the key slots of the socket card. The connector keys should fit securely in the J50 connector. Connectors have been broken by attempts to install oversize keys. It appears these keys are not all uniform. Oversize keys should be discarded.

If the connector is cracked or has bent, worn, or otherwise unuseable pins, it should be replaced (order Part Number 131-1645-00). Replacement of this connector requires careful soldering. To prevent inducing problems due to contamination or solder shorts, work should not be done over the test station. Remove the board before attempting to change the connector.

--Jim Stubbs
92-236, Ext. 1287

Phil Snow, Spectrum Analyzer Engineering, has developed a simple procedure for testing the 492 Spectrum Analyzer input mixer with a Tektronix 576 Curve Tracer. This test is very useful when you suspect that the mixer has been damaged by excessive input power.

The method consists essentially of applying forward and reverse current/voltage tests to the mixer's diodes. Although the mixer normally deals with microwave frequencies, these simple dc tests are sufficient to determine whether the diodes are in working order.

Making the Connections

The first step in the procedure is to open the connection (P120/J123) between the AT12 attenuator and the A12 first converter (see figure 1). Second, open the connection (P150) between the 4.5 GHz low-

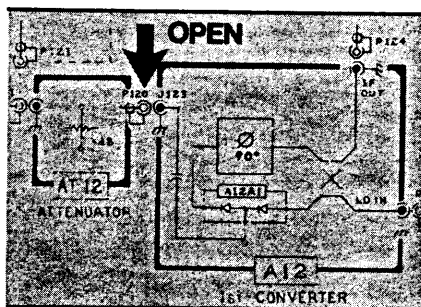


Figure 1. First step details.

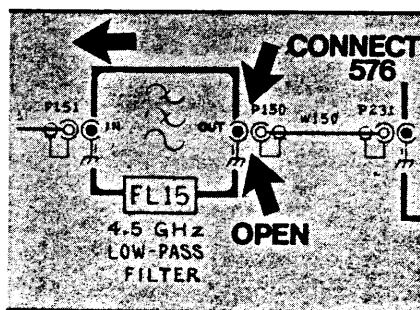


Figure 2. Second step details.

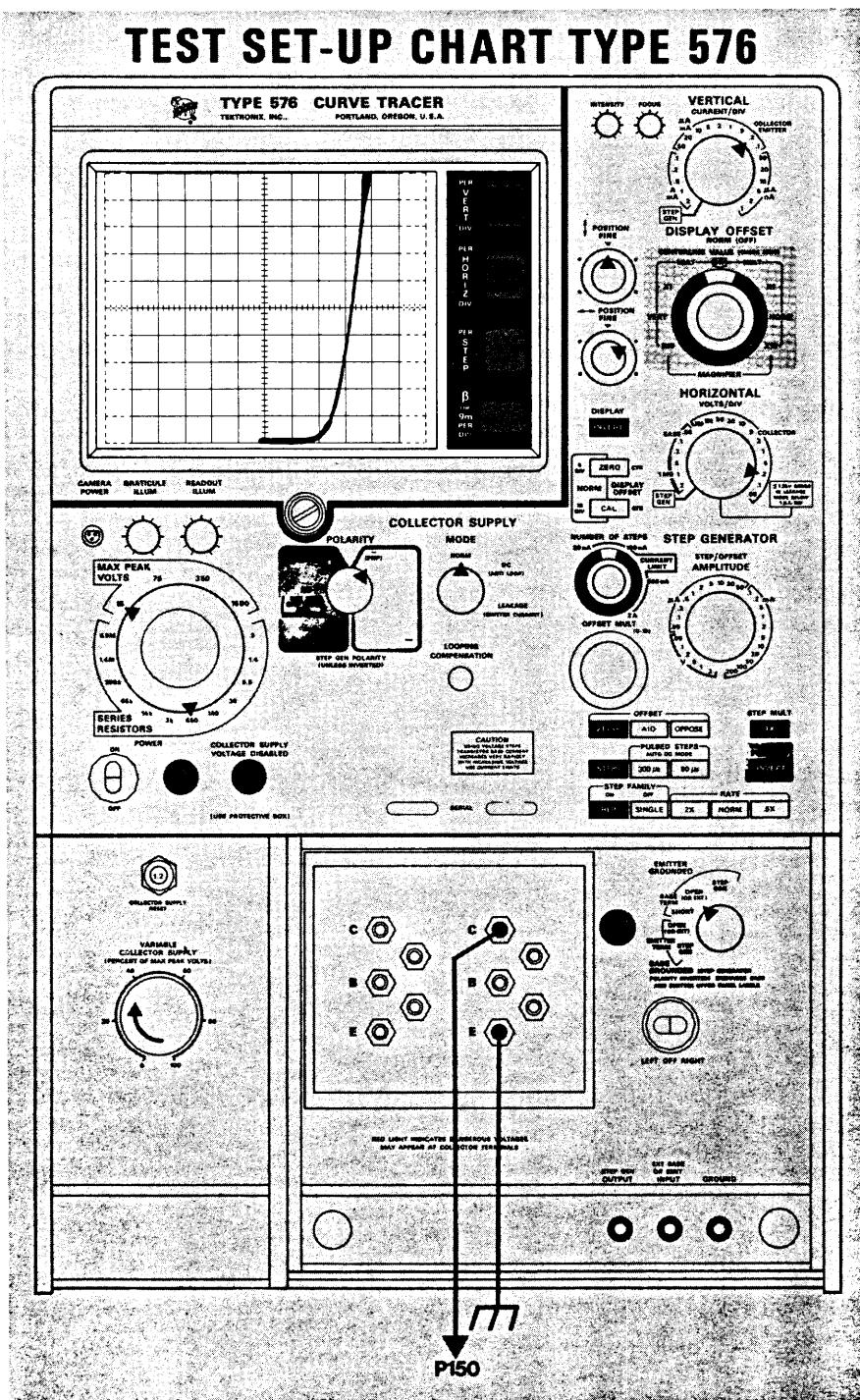
pass filter (FL15) and the 829 MHz IF strip (figure 2).

Next, connect the male end of a 3-mm, 2-nsec delay cable (015-1005-00) to P150. At the female end, attach a BNC-to-banana plug adapter (103-0035-00). Lead one black and one red banana-plug-to-banana-plug patch cord (012-0039-00) and (012-0031-00) from the adapter to the 576 Curve Tracer. Plug the red cord into terminal C and the black cord into terminal E, as shown in figure 3. The red cord carries the test current, while the black cord provides an external ground through the cable shield. The required accessories can be found on page 232 of the 1980 catalog.

Both the forward and reverse current characteristics of the mixer diodes are checked.

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TEST SET-UP CHART TYPE 576



Forward Current Test

To check the forward characteristics, set the curve tracer controls as follows:

VERTICAL	200 μ A/div.
HORIZONTAL	200 mV/div.
DISPLAY OFFSET	OFF
DISPLAY INVERT	IN
STEP GENERATOR	Not Used
COLLECTOR SUPPLY	
MODE	NORM
POLARITY	NEG (Inverted)
MAX PEAK VOLTS	16
SERIES GROUND	650
EMITTER GROUND	EXT

The complete setup and a typical display waveform are shown in figure 3. The forward voltage (V_f) should reach 0.6 to 0.7 volts. A V_f of 0.3 to 0.4 volts would indicate that one of the mixer's series-connected diodes was shorted. If both are shorted, the display will be a straight vertical line.

Figure 3. Forward current test setup and display.

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Reverse Breakdown Test

For the reverse breakdown test, set the curve tracer controls as follows:

VERTICAL	5V/div.
HORIZONTAL	2 μ A/div.
OFFSET	OFF
DISPLAY INVERT	IN
STEP GENERATOR	Not Used
COLLECTOR SUPPLY	
MODE	NORM
POLARITY	POS (Inverted)
MAX PEAK VOLTS	15
SERIES RESISTORS	650
EMITTER GROUND	EXTERNAL

The complete setup and a typical normal display waveform are shown in figure 4. Reverse breakdown (V_r) should occur at about 10 μ A, and should exceed 8 volts. A lower V_r indicates that at least one of the two diodes is faulty. ■

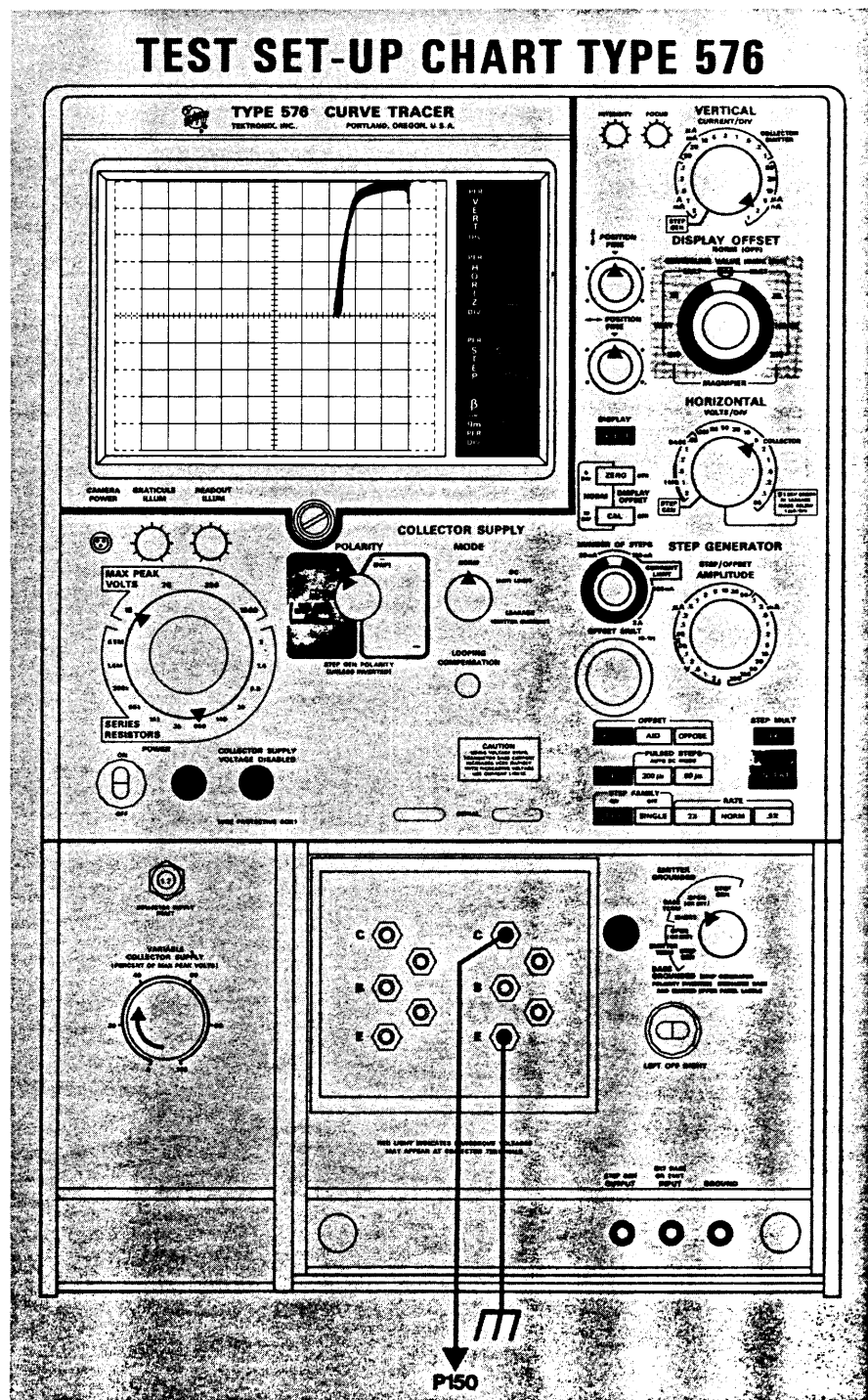


Figure 4. Reverse breakdown test and display.

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--Inserted by Rich Kuhns
53/108, Ext. 8693

4114 OPTION 31 - SERVICE MAINTENANCE INFORMATION

INTENT: Provide supplementary or additional maintenance information not available in the Service Implementation Plan or Service Manual. Reference should be made to the published Service Implementation Plan, dated May 13, 1981, and the 4114 Service Maintenance Information, dated May 6, 1981.

ORIGINATOR: Marty DeVall, Performance Assurance Engineer
63-503, ext. 3927 (WI)

I. DESCRIPTION

The 4114 Option 31 consists of a 19 inch DVST Color Enhanced Refresh Display Module which replaces the Standard 4114 Display Module. The color refresh is accomplished by using a mixture of red and green phosphors on the CRT. In refresh mode, the writing beam excites both red and green phosphors, resulting in an orange trace. In storage mode, the writing beam also excites both red and green phosphors causing a momentary orange glow, then a stored green trace on the screen.

All circuit boards in the Option 31 except the hard copy board are different from those used in the Standard 4114 Display. There are modifications in process that will eventually make all circuit boards except the Deflection Amp and Double Erase Storage compatible between the standard and Option 31 display. Below is a list of the present differences.

<u>Description</u>	<u>Standard</u>	<u>Option 31</u>	<u>Change Required</u>
Power Supply Board	670-4798-03	670-4798-04	Hand Mod
Double Erase Storage	672-0795-04	672-0795-06	Not compatible
Deflection Amp	672-0901-01	672-0998-00	Not Compatible
H.V. and Z-Axis	672-0662-04*	672-1000-01	New Circuit Bd
Hard Copy	670-3097-01	670-3097-01	No Change

* This board will be shipped in the standard display until all old boards are used in the manufacturing line.

II. SERVICE MANUAL

The Option 31 Service Manual, P/N 061-2511-00, has been available for approximately 4 weeks. There are changes to the storage, high voltage and low voltage circuit boards which are included in all customer Option 31 products, but are not reflected in the first printing of the service manual. The manual change information is available and is being sent out through normal distribution. If you have not received the change information, please contact Service Support.

(ARTICLE CONTINUED ON THE NEXT PAGE)

III. FIELD INSTALLATION

Option 31 Color Enhanced Refresh is not offered as a field installable option.

IV. SERVICE IMPLEMENTATION PLAN UPDATE

A. Maintenance Agreement Price

	<u>Schedule A</u>	<u>Schedule B</u>
4114 Option 31	10	N/A

B. Board Exchange, Repair & Return, PPRL Prices

Part Number	Description	Exchange Price	R&R Price	PPRL
670-4798-04	Display Power Supply Bd	100	80	250
672-0795-06	Double Erase Storage	125	100	390
672-0998-00	Deflection Amp	195	155	675
672-1000-01	H.V. and Z-Axis	155	125	550
670-3097-01	Hard Copy	90	72	225

V. PLANNED MAINTENANCE

The planned maintenance for the Option 31 Display will be the same as the Standard 4114 DVST Display requirements. See the Planned Maintenance section in the 4114 Service Maintenance Information.

VI. FAULT ISOLATION/CALIBRATION TECHNIQUES

There are only minor electrical changes to circuitry used in the Option 31 Display. The present fault isolation methods used in the GMA series 4054 Display and the 4114 Display can be used in the 4114 Option 31.

The basic calibration techniques used in 19 inch DVST products also apply to Option 31. The main difference being the average storage voltages may run higher than standard 19 inch DVST CRTs. There is also one procedural change from the 4114 standard calibration procedure. The refresh beam width of a line is adjusted to equal the width of a stored

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4114 OPTION 31 - SERVICE MAINTENANCE INFORMATION (continued)

line. This is done by the defocus pot on the new High Voltage board. In Option 31 the refresh information is always in a defocus mode selected by a new jumper added in the defocus circuitry on the High Voltage board. The calibration procedure can be found in the 4114 Option 31 Service Manual.

The luminance of the Color Write-Thru 19" DVST CRTs will vary from tube to tube. The basic criteria, for acceptable CRT luminance, is the stored and refresh data must be readable and usable.

--Marty DeVall
63-503, ext. 3927

92-515

MICHAEL A MIHALIK

COMBO WIZARD