



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. *

TEKTRONIX INTERNAL USE ONLY

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PERSONNEL CHANGES

Boston has announced the promotion of Gerry Hamrick to ET-11. Gerry was a test and measurement technician with the U.S. Army before coming aboard Tektronix in June 1978. Gerry has been a valued team member on the second shift in the Boston F.O.

Gerry's product profile is impressive; he has worked on 14 of the 20 product groups serviced by Tek-Boston. He has maintained an average of 38 units per AP from AP 001 through 013. In addition to being a highly qualified trainer on the second shift, Gerry is a Quality Control Inspector on the Boston Q.C. team. Gerry is presently studying and working on video products to qualify for the video courses in AP107 and AP113.

Congratulations to Gerry and keep up the good work!

Congratulations to Peer Wincentz on his new position of Operations Manager for Tektronix Denmark. Previously Peer was the Scandanavian Service Manager in the Scandanavian operation center.

For his new role, Peer has responsibility for all sales and service in Denmark. Peer reports to Bjorn Bladh, Scandanavian Operations Manager, located in Stockholm.

Congratulations Peer!

Bob Wolfe, Boston Systems Supervisor, has announced that Don Masselli (MDL - Detroit) graduated Summa Cum Laude June 1st from Lawrence Institute of Technology with a Bachelor of Science in Math with a Computer Science option.

Please join us in congratulating Don for this fine accomplishment.

--Editor

GENERAL

FIELD PRODUCT UPDATES

The following statement reflects Service's attitude with respect to charging customers for field installed product updates. Also included are a page of examples and a matrix for your use.

Products being introduced today, especially firmware-based products, frequently require updating in the field by the Tektronix Service Organization or by customers. Most of the updates are the result of firmware or software revisions. Some updates are developed to improve reliability or product safety.

When firmware updates are installed, Service will support only the current version of "firmware." We will charge the customer for parts, labor and appropriate travel expenses when installing product update kits (040-050).

However, when the product is covered by warranty, maintenance agreement, or rental agreement, there will be no charge to the customer. In addition, there will be no charge to the customer for mandatory safety mods or corporate mods (045/046 kits) developed as a result of a specific product function or parameter failing to meet published specifications.

Before a no-charge update program is developed and implemented, it will be jointly approved by Business Unit and Service management. In the U.S., expenses will be identified to service activity code 18. International expenses will be charged back to the appropriate Business Unit via procedures developed by International Finance.

--Stan Kouba
Corporate Service Manager

(continued on the following page)

FIELD PRODUCT UPDATES (CONTINUED)

EXAMPLES:

- A. Safety problem is discovered on a product. An 045 or 046 kit is set up and a Service Update Program is developed.

Method of Resolving in Field: Refer to Column "A" of the Field Service Update Matrix.

- B. A product has a reliability problem or a change in vendor has caused a component or assembly to change. An 040 or 050 kit is developed. A Wizard Workshop and a Service Teknote article is published.

Method of Resolving in Field: Refer to Column "B" on the Field Service Update Matrix.

- C. Product "A" & "B" are advertised and sold as being compatible. However, a firmware problem has precluded compatibility. A 045 or 046 Kit is set up and a Service Update Plan is developed.

Method of Resolving in Field: Refer to Column "A" in the Field Service Update Matrix.

- D. Product "A" has been in the field for a number of years with a variety of updates. Product "B" is introduced and advertised to be compatible with Product "A"; however, it is only compatible with the current revision of Product "A."

Method of Resolving in Field: Product "A" is brought up to the current revision level similar to the guidelines established in Column "B" on the Field Service Update Matrix.

- E. A limited number of customers are experiencing operational problems with their product that can be corrected with a revision. The revision is an 040 or 050 Kit. Product Engineering instrument Specifications does not change. A Wizard Workshop article is written.

Method of Resolving in Field: Refer to Column "B" on the Field Service Update Matrix.

- F. A limited number of customers wish to have additional or different capabilities in their product.

Method of Resolving in Field: A customer mod or option is developed for the customer.

(continued on the following page)

FIELD PRODUCT UPDATES (CONTINUED)

FIELD SERVICE UPDATE MATRIX

<u>Customer Type</u>	A 045/046 Kits Service Update Programs, i.e., Safety	B 040/050 Kits
1. Warranty, Rental, Maintenance Agreements Demo Pool Products	No charge to customer. Service goes on-site or customer brings product in-house for updating.	Same as 1-A on an as needed basis.
2. End-User Non-Warranty	Same as 1-A plus custo- mer is charged for any previous updates re- quired to make current update work.	Customer is charged for update. Sales may choose to customer accommodate update.
3. OEM Customer	No charge for parts or units sent to designated OEM depots.	Customer orders and in- stalls kit.
4. International Subsidiary	Charged affiliate base price. Customer not charged for update. In- ternational Service costs are charged back to the Business Unit.	Orders and installs kit as needed. Customer is charged.
5. Factory Service Module Exchange Center	All stock, including field inventories, are updated.	Stock is updated. Field inventories are updated as stock cycles through center.
6. Factory Service Customer Repair & Return Center	Assemblies are updated at no charge to customer.	Updated when requested by customer or when update is the only method of repair.
7. Customer Distribution Group Inventory	All inventories are up- dated.	Inventories are updated as directed by mod.

PRODUCT SAFETY

The following is a listing of the individuals responsible for answering product safety and liability questions. Please contact the appropriate person when safety questions arise.

Instruments Category or Location	Individual	Extension	Delivery Station
200	Wally House	7374	58-290
300	Jim Averill	1632	92-835
400	Bob Epling	7374	58-290
800			
2000			
TM500	George Clark	1563	92-835
	Orv Olson	1633	92-835
4000 Series	Bob Crawford	3231	63-419
	Lynn Holt	3158	63-419
5000	Vaughn Weidel	5046	39-156
7000			
8000			
Micro-Processing Development Aid			
TV & Spectrum Analyzer	Don Hanson	7728	58-290
Medical	Henry Jones	3959	63-419
Grass Valley Group	Heiner Schwede		
International	Bob Randall		EMC
Tek Australia	Peter Neech		
Product Safety Liability Policies and Procedures	Pete Perkins	256	41-400

Submitted by--
Dick Griffin
41-400, Ext. 253 TC

Inserted by--
Editor

SERVICE GROUPS MOVE

The following service organization groups are relocating into one central location at our Merlo Road site. Listed below are the new delivery stations and phone numbers for your use.

Stan Kouba, Corporate Service Manager and staff. Del. Station 56-069 Effective (7-25)

Stan Kouba	Ext. 8945
Ken Parker	Ext. 8943
Bob Wruble	Ext. 8944
Isabel Van Lom	Ext. 8942
Karen Mortimer (Temp.sec.)	Ext. 8941

Service Administrative Support Del. Station 56-037 (7-25)

Bill Duerden, Manager	Ext. 8938
John Brandes, Service Organization MIS	Ext. 8936
Sharon Huetson, Service Publications	Ext. 8939
Jeanne Harris, Service Publications	Ext. 8940
Jean Hickok, Maintenance Agreement Administration	Ext. 8935
Cheri Teel, Maintenance Agreement Administration	Ext. 8935

*U. S. Service Accounting Del. Station 56-063 (7-25)

Jim Ross, Manager	Ext. 8652
Al Stickel, Sr. Accountant	Ext. 8937
Don Taylor, Sr. Accountant	Ext. 8651
Leslie Walt, Accountant	Ext. 8655
Cindy Burch, Clerk	Ext. 8654
Rose Evers, Clerk	Ext. 8653

(continued on the following page)

SERVICE GROUP MOVES (CONTINUED)

Factory Services

Del.Station 56-103 (7-14)

Central telephone number for Factory Services is 642-8600 or they may be reached through the 644-0161 number and ask for ext. 8600 (Merlo).

Also please note the mailing address for Factory Services remains the same:

Tektronix Industrial Park
Attn: Factory Service
Beaverton, Oregon 97077

Managers

Jon Andersen	x8627
Linda Anthony	x8640
Dave Arnold	x8641
James Baker	x8639
Jim Bevens	x8606
Barney Brooks	x8629
Jim Frame	x8657
Roger Holmen	x8637
Ed Ohlmann	x8609
Ron Powell	x8928

Clerical Support

Judy Bruce	x8649
Pat Doerrie	x8648
Sheila Erickson	x8643
Goldie Greco	x8600
Anita Gregg	x8642
Cathy Johanson	x8600
JoLynn Lords	x8645
Renee Stampley	x8646
Kimberly Thompson	x8638
Lessie Williams	x8647

Stock

Thelma Bergerson	x8625
Genevieve Christensen	x8623
Dennis Clark	x8623

Shipping & Receiving

Clint Cooper	x8626
Everette Hedricks	x8626
David Webber	x8626
Gene Woodworth	x8625

George Chang	x8926
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Module Repair

Donald Bartley	x8633
Roberta Bousquest	x8627
Steve Bowdoin	x8631
Al Butler	x8628
Dick Butler	x8617
Pam Clayton	x8627
Dave Cumlander	x8631
Tom Elliot	x8632
Judy Enstrom	x8627
Allan Gardner	x8634
Doeke Gerbracht	x8615
Louanne Hedlund	x8627
Dave Heidel	x8626
Ron Kersey	x8636
Eng Lim	x8632
Chuck McCausland	x8634
Mike Meyer	x8636
Wally Michalski	x8632
Philip Ngu	x8634
Mike O'Leary	x8636
Paul Petty	x8632
Jim Parker	x8633
Carolyn Rogers	x8620
Al Schmitt	x8615
Gary Schultz	x8628
Larry Sohn	x8634
Norm Solwold	x8627
Tim Spiro	x8631
Bonnie Stewart	x8627
John Stillmaker	x8619
Agnes Whitman	x8627
Duane Whittum	x8617
King Wick	x8633
Jim Wihlborg	x8633

Exchange Center

Donna Beck	x8921
Karen Bier	x8921
Dan Clark	x8930
Bonnie Coleman	x8930
Cathy Draper	x8931
Eileen Farmer	x8925
Deana Furrow	x8925
Betty Glasnapp	x8925
Loretta Lang	x8923
Claudia Tellis	x8923

4016/GMA125 CRT PACKAGING

A number of 4016/GMA 125 CRTs have been returned to Beaverton packed with the faceplate pointed to the top of the box. Most CRTs received that way have the electron gun broken off. Until a new package is available which will have the CRT on its side, please pack all CRTs with the faceplate down toward the bottom of the box.

Written by--
Vern Isaac
CRT Reliability

Inserted by--
Editor
56-037, Ext. 8939 Merlo

LABORATORY INSTRUMENT DIVISION

TM500

AF501 CIRCUIT IMPROVEMENT

When the AF501 is in amplifier mode and high gain positions, oscillations occur because of:

1. Inadequate shielding of the trigger out cable near the amplifier front end from switching noise in the +15V Supply.
2. Improper biasing of the comparator.

If a customer complains of these problems, 040 kit #040-0956-00 should be added. All new instruments from S/N B022150 will contain this Mod which changes the main board assembly from 670-3628-02 to 670-3628-03.

--Terry Turner
92-236, Ext. 1288

INTERMITTENT RELAYS IN DM501A AND DM502A

Manufacturing has discovered that P/N 148-0126-00, E.A.C. Relays, Date Codes 8016 and 8017 have exhibited intermittent closure. These date codes have been purged from CMS stock. Check your stock for these date codes and reorder as necessary.

--Terry Turner
92-236, Ext. 1288

COMMUNICATIONS DIVISION

TELEVISION PRODUCTS

1430, 1440, 1441, 1460, 1461 -- MISSING FIBER WASHER ON POWER SUPPLY BOARD

Reference:	1430 Manual, 070-1455-00	1460 Manual, 070-1803-00
	1440 " 070-1498-02	1461 " 070-1929-00
	1441 " 070-1499-00	

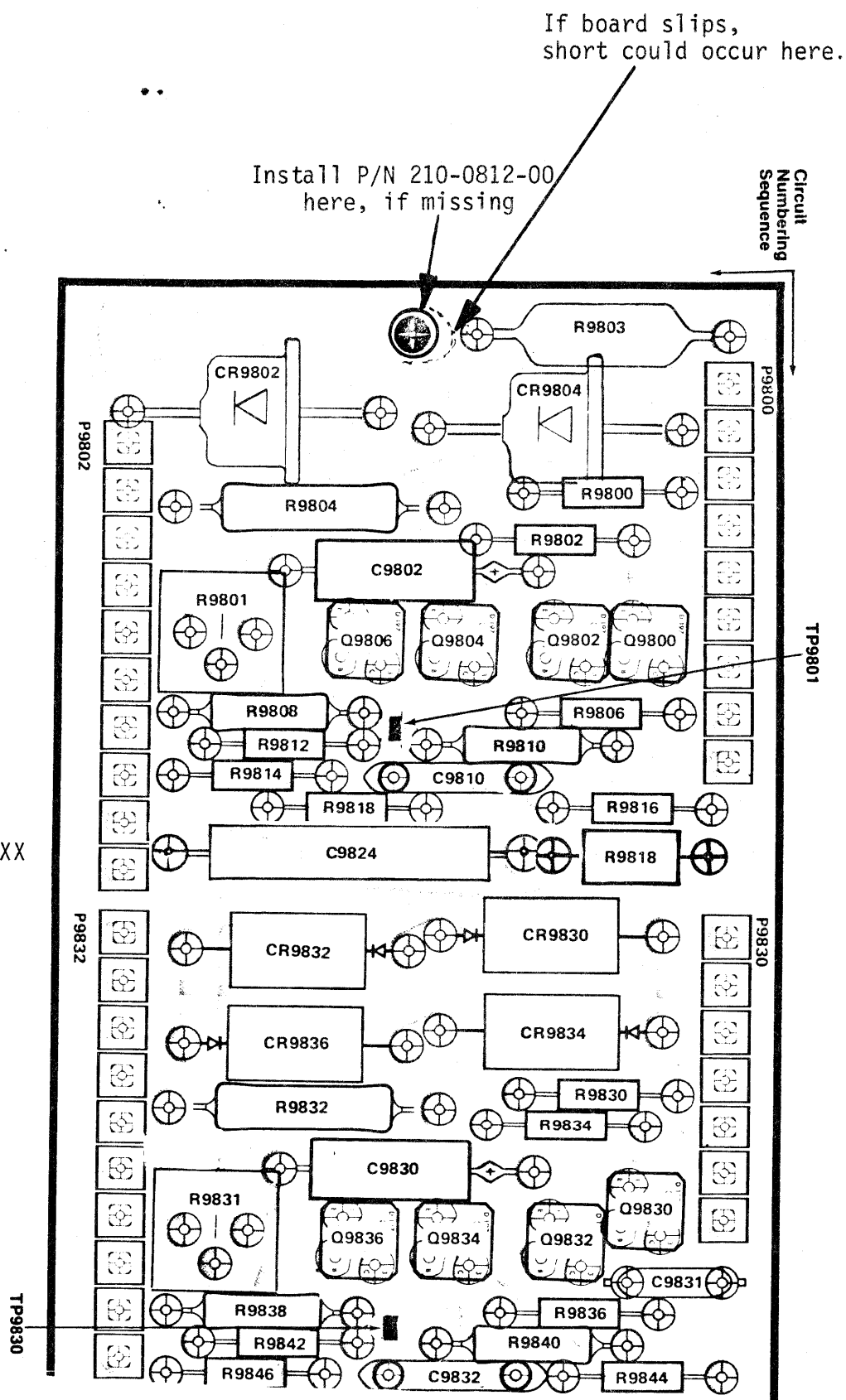
The Manufacturing line had been installing a fiber washer (P/N 210-0812-00) under the metal washer on the board mounting screw that is near R9803 (see following board layout of power supply board, 670-1473-XX). This washer was to prevent R9803 from being shorted to ground due to close spacing of the circuit board pads. An unknown number of instruments have been shipped without this washer. It is possible that any slippage of the circuit board could cause R9803 to contact the mounting screw. When R9803 is grounded, the +5 volt supply will increase to approximately 9 volts. The power supply is normally not damaged, but other components in the instrument may be.

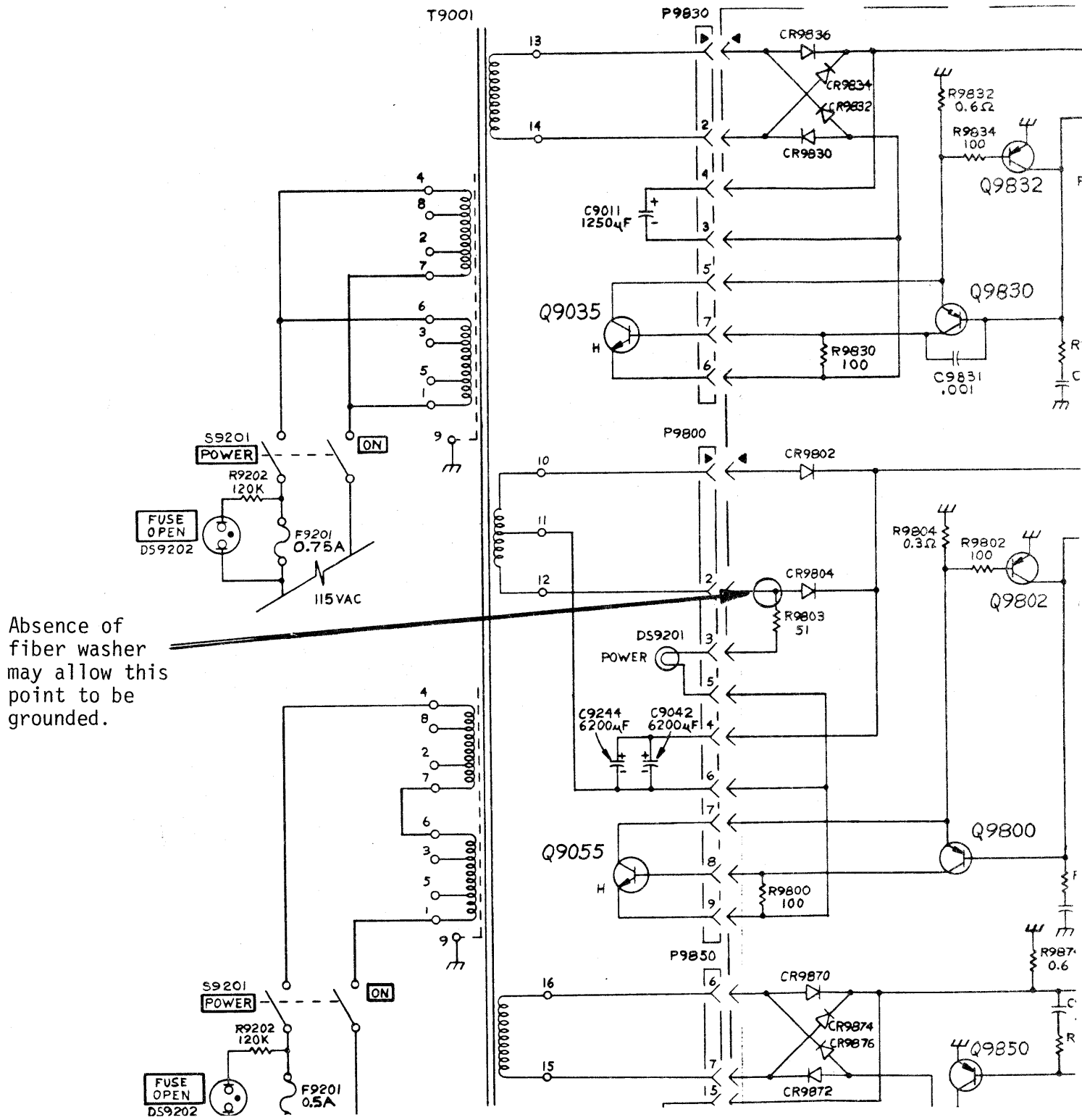
Please check all 1430, 1440, 1441, 1460, and 1461 instruments that come in for service and insure that the fiber washer is installed and that the power supply mounting screws have remained tight.

--Steve Schmelzer
58-511, Ext. 6507

(THE DIAGRAMS TO COMPLETE THIS ARTICLE ARE ON PAGE 11 and 12)

670-1473-XX





147A/148/148M/149A UNRELIABLE CAPACITOR, P/N 283-0192-00

The 0.47 μ F, 3 V ceramic capacitors are experiencing a high failure rate. Symptoms exhibited are intermittent loss of chroma or low chrome amplitude.

The part is used in the following locations:

<u>Instrument</u>	<u>Circuit Number</u>	<u>Part Number</u>	<u>Change To</u>
147A/149A	C5245	283-0192-00	283-0202-00
147A/149A	C5435	283-0192-00	283-0202-00
148/148M	C5244	283-0192-00	283-0202-00
148/148M	C5434	283-0192-00	283-0202-00

Please check any units within the serial number range that come in for service for these parts and replace. Not all units within the serial number range have an 283-0192-00 installed. The 283-0192-00 is a 3 V rated capacitor, and the new part is rated at 50 V so it is easy to determine if the capacitor should be replaced.

Affected serial numbers:

147A	B162576 - B162585
149A	B112558 - B112560
148	B092332 - B092423
148M	B030212 - B030214

Instruments prior to the starting serial number also used the 283-0192-00, but these are from a lot that have caused no problems and should not be replaced unless failed. In the future, use only P/N 283-0202-00 to replace failed parts.

--Steve Schmelzer
58-511, Ext. 6507

147A/149A TEMPORARY CHANGE OF PART NUMBER FOR POWER LAMP ASSEMBLY

Reference: 147A/149A Manual 070-2029-00

Because of a temporary supply problem with the power lamp assembly (P/N 136-0079-00) a number of new 147A/149A generators will be shipped with power lamp assembly P/N 150-0134-00. As soon as the problem with P/N 136-0079-00 is resolved the manufacturing line will use P/N 136-0079-00 again. There are no electrical or mechanical problems with P/N 136-0079-00 and any power lamp that must be replaced should be replaced with the same part number. Should any of the 147A/149A that have P/N 150-0134-00 installed come in for service with a power lamp failure, replace it with P/N 136-0079-00.

Starting Serial Numbers: 147A - B162575
149A - B112548

Ending serial numbers will be supplied when available.

--Steve Schmelzer
58/511, Ext. 6507

528 - PART NUMBER CHANGE FOR HORIZONTAL OUTPUT TRANSISTOR

Ref: 528 Manual, P/N 070-0800-00

Failures of the 151-0253-01 in the 528 have increased substantially in the past few weeks. Symptoms are sweep non-linearity and loss of sweep. The part number is being changed to 151-0169-01. However, until the 151-0169-01 is available in quantity, Manufacturing will use pre-tested 151-0169-00, so you may see some instruments with -00 parts. All field failures should be replaced using P/N 151-0169-01.

New part number installed by Manufacturing at B293960.

--Steve Schmelzer
58-511, Ext. 6507

INFORMATION DISPLAY DIVISION

OPTION 10 PRINTER INTERFACE CRC

In the June 27, 1980 Wizard Workshop Issue 10-13, page 29 title "4052/4054 Version 4.2 Firmware", there is a CRC of F578 given for Option 10 Printer Interface U100, 160-0342-01. This CRC is not correct for all versions of U100. Early 4052 Option 10's used a PROM for U100. Current Option 10's use a ROM. Each has its own unique CRC as follows.

Option 10, 4052 U100 (160-0342-01) PROM F578
Option 10, 4052 U100 (160-0342-01) ROM EE2F

--Darrell McGiverin
63/503, ext. 3786

4014/4014-1/4015/4015-1: SDRC ANIMATION BUFFER WITH TEKTRONIX OPTION 40

Tektronix has agreed to support the following procedure involving the 4014-1 and 4015-1 Option 40 with ROMs supplied by Structural Dynamics Research Corporation (SDRC).

The SDRC Animation Buffer requires the replacement of the four ROMs in the standard Tektronix Option 40 processor board with ROMs supplied by SDRC.

Tektronix will support the following procedure:

- 1) A customer places an order for a 4014/4014-1, 4015/4015-1 Tektronix terminal with Options 1 and/or 2, 40 and 27. (Options 40 and 27 added to an existing terminal would also apply.)
- 2) Customer orders the Animation Buffer from SDRC.
- 3) SDRC ships ROMs and documentation to customer.
- 4) Tektronix ships and installs terminal and/or options and verifies standard Tektronix operations.
- 5) Customer removes four Tektronix ROMs following SDRC procedures and replaces with SDRC ROMs. Customer retains Tektronix ROMs that were removed.
- *6) In case of malfunction, SDRC will ship a duplicate set of ROMs to customers to determine if the problem is the firmware. If trouble persists, customer will re-install Tektronix ROMs and contact Tektronix Field Service, who then can service the terminal.

(continued on following page)

4014/4014-1/4015/4015-1: SDRC ANIMATION BUFFER WITH TEKTRONIX OPTION 40 (Continued)

The 4014/4014-1 and 4015/4015-1 shall be honored under Standard End-User Warranty #1, Section 5 of the Tektronix Warranty Policy. However, if a customer should call a Tektronix technician to repair a terminal and the problem is the result of the SDRC ROMs, then that customer may be charged for the service call since the SDRC ROMs cannot be honored by Tektronix Warranty.

Any questions concerning these procedures can be addressed to me.

--Kent Barnard
63-503, Ext. 3598

4661 STEP DRIVE BOARD'S CABLE KEYED WRONG

The seven pin harmonica connector (J0) on both the X and Y Step Drive boards, 670-3412-XX, has pin one (1) incorrectly keyed. If pin one of the ribbon cable is matched to pin one of the Step Drive board it will result in component damage to the same board. In particular, Q5 and R34 may be expected to fail. The correct way to install this cable is to reverse it. Connect pin one (brown wire) of the ribbon cable to pin 7 of the connector J0 (opposite the key marking on the board).

The 4661 is no longer in production status so this applies to every 4661 that was made. This is for information purposes only, as no steps will be taken to change these instruments.

--Larry North
63/503, ext. 3926

4663 SET UP FOR 4662 EMULATION

For your information software developed for the 4662 is compatible with the 4663, however, the correct parameter selections should be used. The Initial Command/Response Format must be selected as follows:

 GPIB - Format #5 or 6 (depending on the output terminator desired)

 SERIAL - Format #3

NOTE: It is normal for the draw point lamp on the 4663 to light when some of the above formats are selected.

If continuous mode is used be sure to make allowances for the difference between the physical plot sizes. To plot an identical "B Size" plot in "C Size" will require more time due to the increase of plotting area.

--Larry North
63/503, ext. 3926

LABORATORY INSTRUMENT DIVISION

MICROCOMPUTER DEVELOPMENT PRODUCTS

LP8200 RIBBON CABLE ORDERABLE

The ribbon cable that connects the DEC LA180 buffered serial interface to the Logic Board is now orderable. The DEC Part Number BC08S-2 is now orderable under Tek Part Number 118-0882-00.

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

1802 MICROPROCESSOR ADDRESSING PROBLEM

An 1802 microprocessor addressing problem that was documented in Wizard Issue 9-17, September 7, 1979, has surface in a different form.

Recently, a problem was reported to us by Don Masselli at the Detroit Field Office describing an 1802 addressing problem. After executing an XRI instruction at address 0101H, the following fetch accessed address 0003H instead of 0103H. It was found that by reducing the +12V power supply of the 8002A the failure disappeared.

As with my previous Wizard, the problem traced back to the 1802 microprocessor itself. It seems that a high VCC or VDD supply voltage on the 1802 degenerates the microprocessor with time until addressing failures appear.

Presently, the 1802 Microprocessor derives its operating voltages (VCC and VDD) from both the 8002A system and the User's Prototype. VDD always comes from the 8002A +12V power supply. VCC derives from the 8002A +5V in Mode 0 operation. In Mode 1 or 2, VCC is developed by tracking the User's Prototype voltage.

RCA has reduced the voltage specifications of VCC and VDD from +12V to +10.5V. Now, in order to follow the new specifications, a modification is being developed for the mobil processor board to lower VDD voltage to +10.5V. Concurrently, a modification is being developed to lower the output voltage (VCC) of Microlab to conform to the new specifications. User prototypes should also conform to new specifications as well.

At this time the only documented instruction types that fail are the XRI and LDI instructions. Should a failure of this nature be suspected try to isolate to the section of code using breakpoints. If the problem is the XRI or LDI instruction, the only fix at this time is to replace the microprocessor. Should another instruction fail, please contact me at Service Support.

Finally, be aware of the User's Prototype operating voltage (VCC) and clock frequency. The latest CDP1802D specifications indicate a maximum of +10.5V for VCC and VDD along with a maximum clock frequency of 5 MHz.

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

8002A, B PHASE MICROLAB RESTRICTION

Several differences exist between the Bphase Microlab and the production microlab. One major difference is that the Bphase Microlab does not contain the breakpoint circuitry used in the production model. This difference was of little concern on the early personality cards because the firmware didn't utilize the breakpoint circuitry.

The Z80 personality card and all future personality cards will utilize firmware that depends on the breakpoint for proper operation. The self test and processor test features of these personality cards will not function properly or function at all in a Bphase microlab. A production model microlab must be used with the Z80 personality card and all future personality cards to ensure proper operation. The production microlab will operate properly with the current personality cards.

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

8002A DAIB PART NUMBER CHANGE

The Data Acquisition Board Kit 670-5208-00, part of 8002A option 46, included mechanical parts unique to the 8002A. The manner in which the bill of material was structured didn't allow the circuit board assembly to be ordered without the unique mechanical parts. To allow use of the circuit board assembly in a new instrument, the bill of material was restructured, removing all mechanical components from the data acquisition board kit 670-5208-00. A new part number has been set up for the data acquisition board kit including the mechanical parts unique to the 8002A. The new part number for the data acquisition board kit is 672-0928-00. When ordering this board from board exchange the 672-0928-00 part number must be used.

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

8002A, TEKDOS DISC FULL ERROR

Tekdos version 3.1 has a problem that can occur when using a disc that has a small amount of free disc space. The problem usually occurs after running the assembler or linker. Tekdos will sometimes hang after running a program which uses up all of the remaining free disc space. The problem only occurs if the program which used up the disc space has two or more disc output files open and issues an ABORT SVC to terminate. An ABORT SVC will force a CLOSE on all the channels from the highest open channel number to the lowest.

If an End-of-Device ABORT close error occurs on a channel, Tekdos incorrectly attempts to terminate the close and will go on to the next open channel. The first close remains active and will now complete using information from the second channel close request. When the first close request actually completes it will post the second close request complete. At this time it is possible for disc blocks actually allocated to the second file to become part of the first file closed.

(continued)

8002A, TEKDOS DISC FULL ERROR (continued)

The first close request is left pending until the next disc request comes in. At this point any subsequent command which causes the activation of the file manager will cause the system to hang attempting to complete the pending close request with invalid information. This can be caused by entering any console command which forces the system to do a disc access.

The solution to this problem is to keep the system from terminating an ABORT Close request prematurely when an End-of-Device error occurs. The following patch will correct the problem. The following patch has been evaluated and will be a corporate modification in the near future.

Patch: FETCH TEKDOS/Ø
 Patch 2972 06CD
 Patch 1E72 0043
 MODULE TEKDOS/Ø 80 3FFF 100 TEKDOS V3.1C

I would like to thank the people in the field for taking the time to report this problem and also thank Bob Nestor for providing the information contained in this article.

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

8048 EMULATOR, OPERATION OF PORT 2

The intent of this article is to provide a basic understanding of the 8048 Emulator Port 2 operation.

Port 2 can operate as though it were two separate four bit ports. The upper nibble of Port 2 will always function as a bi-directional I/O port. However, the lower nibble of Port 2 can perform three different functions. A brief description of the three functions as they relate to the 8048 Emulator will be given below.

1. When S-1010-1 on driver/receiver board A is in the OFF position (external memory disabled), Port 2 will function as an 8-bit bi-directional I/O port. The one exception occurs when the expander port is accessed and will be described under the third function of Port 2.

Note: Due to the fact that open collector devices are used for the outputs, the bits of Port 2 must be initialized to a high or 1 state before being used as inputs.

(continued on following page)

8048 EMULATOR, OPERATION OF PORT 2 (CONTINUED)

2. When S1010-1 is in the ON position (external memory enabled), the lower nibble of Port 2 will contain valid I/O information during the rising edge of ALE. The lower nibble of Port 2 will output address information that is valid during the falling edge of ALE. The address information output on the lower nibble of Port 2 during a program memory access consists of address bits A8 through A11 of the 8048 program counter. The address information from Port 2 will be output regardless of the state of EA (external access input). The address and I/O information output on the low nibble of Port 2 must be latched for use by the user.

3. When the 8048 expander port is used the lower nibble of Port 2 acts as a four bit buss. The 8048 expander port is used with the 8243 I/O Expander. The rising and falling edges of the PROG line determine the type of exchange that takes place. A high to low transition signifies that address and control information is available on the low nibble of Port 2. A low to high transition of the PROG line signifies that data is available on the low nibble of Port 2. The expander port information will be output on the low nibble of Port 2 whenever an instruction is used that accesses the expander port, regardless of the position of S1010-1.

The mode and mapping have no effect on the operation of Port 2. When the DBUS buffers are enabled and the direction they are enabled in is determined by the mode and mapping.

There is one obvious difference between the operation of the 8048 Emulator and the operation of the 8048 microcomputer Port 2.

The low nibble of Port 2 on the 8048 microcomputer doesn't unlatch the I/O information during an internal program memory fetch, EA low. The low nibble of Port 2 on the 8048 prototype control probe unlatches the I/O information during a program memory fetch whenever S1010-1 is in the ON position. In this instance the state of EA only enables and disables the PSEN control line.

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

SEMICONDUCTOR TEST SYSTEMS

CORRECTION TO MAINTENANCE AGREEMENT PRICE LIST

In the S-3200 Series Maintenance Agreement Price List for August, 1979, the part number and monthly charge for the SB-4 are incorrect. The SB-4 signal buffer should be part numbered 013-0175-00. For Maintenance Agreement pricing contact me at Ext. 1287 Walker Road.

--Jim Stubbs
92-236, Ext. 1287

ENHANCEMENT TO THE SECTOR CARD TEST FIXTURE (067-0745-00)

This modification enables testing of D70 and D80 Sector Cards. It allows the LOOP and LOAD functions of the Sector Card Test Fixture to generate 4104 bits of data instead of 1032 bits.

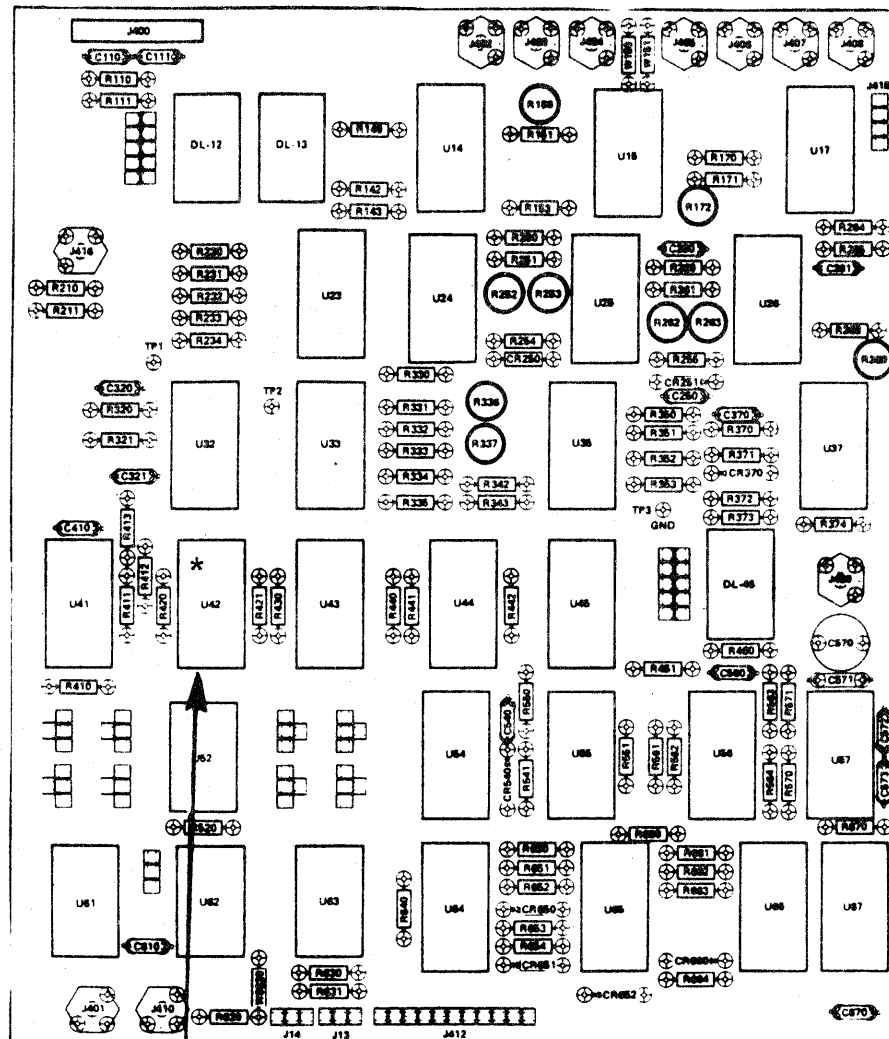
On the clock card, remove U42, the MC10136 (156-0641-00). Add the new 4K Pattern Circuit, Assembly 670-6196-00, to the clock circuit, Assembly 670-4191-02. The clock card part number changes from 670-4191-02 to 670-4191-03 when this piggy-back pattern circuit board is added.

The new 670-6196-00 consists of the following:

<u>CKT. NO.</u>	<u>QUANTITY</u>	<u>PART NUMBER</u>	<u>DESCRIPTION</u>
U40/U42	2	156-0641-00	Microckt., Dgtl. MC10136 16 Dip, Cer Pkg
C400	1	283-0177-00	Cap. Fxd. Cer., Di., 1 μ F +80 -20%, 25V
	1	131-1782-00	Conn., Rcpt., Elec. Rt., Angle, 12 Fem. 0.045 Sq. Pin, Tin Plated
R400	1	315-0511-00	Res. 510 Ω 1/4W 5%

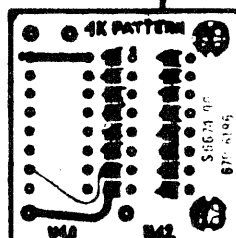
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ENHANCEMENT TO THE SECTOR CARD TEST FIXTURE (067-0745-00) (continued)



Clock Circuit

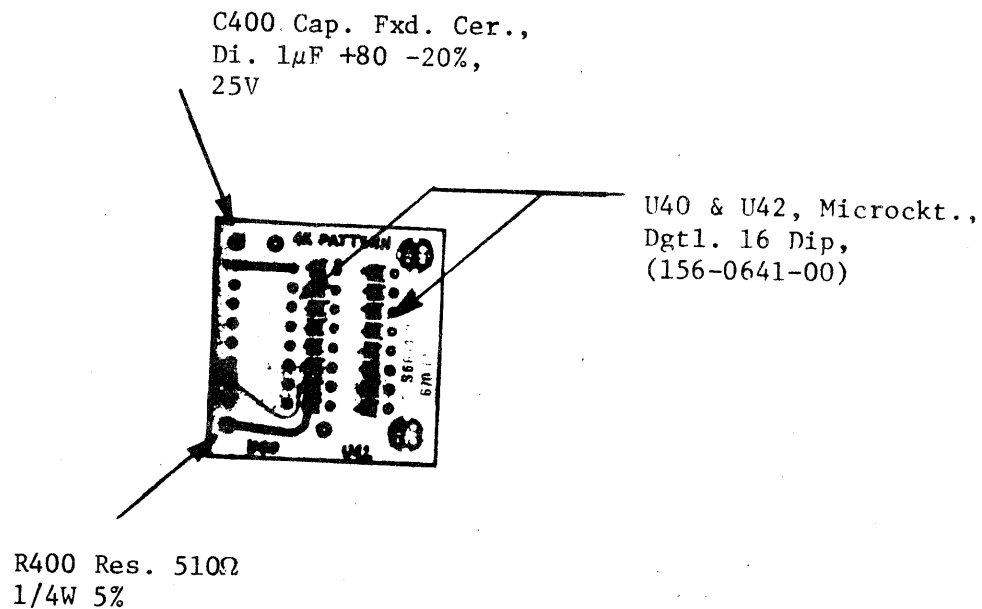
Assembly 670-4191-03.



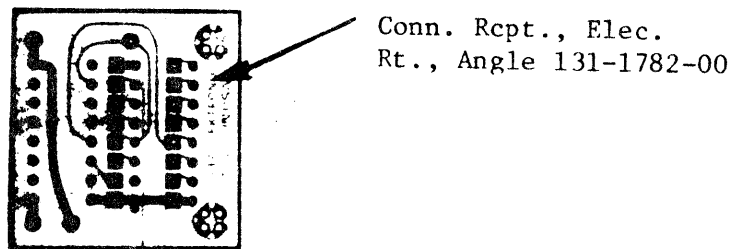
Insert 4K Pattern Circuit
670-6196-00 into socket located at U42.

Assembly

ENHANCEMENT TO THE SECTOR CARD TEST FIXTURE (067-0745-00) (continued)



FRONT VIEW OF CIRCUIT BOARD



BACK VIEW OF CIRCUIT BOARD

The new 4K Pattern Circuit Board
670-6196-00.

Assembly



Assembly 670-4191-02.

GENERALPRODUCT RESPONSIBILITY LIST FOR IDD SERVICE SUPPORT

Product	Description	Technical Questions	Service Plan
		Repair/Troubleshoot Perf. Assur. Eng.	Business Ser. Prog. Spec.
	Major Business Units:		
	Terminals & Displays	Marty DeVall	Dennis McGary
	Terminals & Displays	Marty DeVall	Kent Barnard
	Copiers, Plotters & Image Forming Systems	Ed Sawicki	Steve Prunty
	Graphic Computing Systems	Frank Lees	Del Moore
	Graphic Computing Systems	Frank Lees	Dan Harris
	OEM Products & OEM Accounts	All P.A.E.'s	Steve Ross
	Coordinator for Technical Support, Modified Products & Major Accounts	All P.A.E.'s	Dick Schilling
	Coordinator for Operations, International & New Product Introduction	All P.A.E.'s	Jim Tiano
	Diagnostician	Duane Moore	
	Data Communications	Frank Lees	
	Remote Diagnostics	Marty DeVall	
	Internal Diagnostics	Ed Sawicki	
E31	Low Cost Tek 31	Factory Service	Steve Ross
FEM181	4081 & Peripherals and S/W Pkg.	Bill Hatch	Dennis McGary
GMA101A	19" Storage Display Monitor	Dennis Painter	Steve Ross
GMA102A	19" Storage Display Monitor	Dennis Painter	Steve Ross
GMA125	25" Storage Display Monitor	Dennis Painter	Steve Ross
MEG121	Mechanical Engineering Work St.	Bill Hatch	Dennis McGary
MEG121/131	Opt. 35 Function Keyboard	Bill Hatch	Dennis McGary
MEG121/131	Opt. 36 25" Display	Bill Hatch	Dennis McGary
MEG121/4904	Opt. 10 Reader/Punch I/F	Bill Hatch	Dennis McGary
MEG121/4904	Opt. 11 Reader/Punch I/F for 4081	Bill Hatch	Dennis McGary
MEG121/4904	Opt. 30 Remex Tape Reader	Bill Hatch	Dennis McGary
MEG121/4904	Opt. 31 Remex Paper Tape Punch	Bill Hatch	Dennis McGary
MEG131	Mechanical Engineering Development Station (includes PDP 11/34)	Bill Hatch	Dennis McGary
RE4012	Ruggedized Mil Spec Rack Mt. 4012	Dennis Painter	Kent Barnard
SURVEY 31	Surveying Calculator	Factory Service	Steve Ross
T4002	11" CRT Storage Terminal	Factory Service	Kent Barnard
Tek 21	Low Cost Calculator (Desk Top)	Factory Service	Steve Ross
Tek 31	Desk Top Calculator	Factory Service	Steve Ross
152	Tek 31 Interface	Factory Service	Steve Ross
153	Tek 31 Interface to TM503	Factory Service	Steve Ross
154	Tek 31 Interface	Factory Service	Steve Ross
3110	Tek 31 & 4010 Terminal	Factory Service	Steve Ross

PRODUCT RESPONSIBILITY LIST FOR IDD SERVICE SUPPORT (cont)

Product	Description	Technical Questions	Service Plan
		Repair/Troubleshoot Perf. Assur. Eng.	Business Ser. Prog. Spec.
3153	Tek 31 & 153 Interface	Factory Service	Steve Ross
4002	11" Storage Terminal	Factory Service	Kent Barnard
4006	11" Storage Terminal-Low Cost	Dennis Painter	Kent Barnard
4010	11" Storage Terminal-Pedestal	Factory Service	Kent Barnard
4012	11" Storage Terminal-Pedestal	Factory Service	Kent Barnard
4013	4012 with APL Character Set	Factory Service	Kent Barnard
4014	19" DVST Terminal	Factory Service	Kent Barnard
4015	19" DVST Terminal & APL Character Set	Factory Service	Kend Barnard
4016	25" Storage Terminal-Pedestal	Dennis Painter	Kent Barnard
4023	Raster Scan Terminal	Factory Service	Kent Barnard
4024	Raster Scan Terminal	Marty DeVall	Kent Barnard
4025	Raster Scan Terminal	Marty DeVall	Kent Barnard
4027	Color Raster Scan Terminal	Marty DeVall	Kent Barnard
4051	11" CRT Graphic Computing System	Darrell McGiverin	Del Moore
4051C01	Sync. Interface	Darrell McGiverin	Del Moore
4051E01	ROM Expander Back Pack	Darrell McGiverin	Del Moore
4051R01	Matrix Function ROM Pack	Darrell McGiverin	Del Moore
4051R05	Binary Program Loader ROM Pack	Darrell McGiverin	Del Moore
4051R06	Editor ROM Pack	Darrell McGiverin	Del Moore
4051R07	Signal Processing ROM Pack #1	Darrell McGiverin	Del Moore
4052	Graphic Computing System	Darrell McGiverin	Del Moore
4052R06	Editor ROM Pack	Darrell McGiverin	Del Moore
4052R07	Signal Processing ROM Pack #1	Darrell McGiverin	Del Moore
4054	Graphic Computing System	Darrell McGiverin	Del Moore
4081	Mini-Computer System	Bill Hatch	Dennis McGary
4501	Scan Converter	Factory Service	Steve Prunty
4551	Light Pen for Video Terminal	Factory Service	Steve Prunty
4601	Hard Copy (611 and 4002)	Factory Service	Steve Prunty
4602	Video Hard Copy	Factory Service	Steve Prunty
4610	Hard Copy to 4010 Family	Factory Service	Steve Prunty
4620	Digital Video Hard Copy	Factory Service	Steve Prunty
4623	Video Hard Copy	Factory Service	Steve Prunty
4631	Hard Copy to 4010 Family	Factory Service	Steve Prunty
4632	Video Hard Copy	Factory Service	Steve Prunty
4633	Continuous Recorder	George Kusiowski	Steve Ross
4633A	Continuous Recorder	George Kusiowski	Steve Ross
4634	Image Forming Module	George Kusiowski	Steve Ross
4641	Line Printer (DEC LA180)	Larry North	Steve Prunty
4642	Line Printer (Centronics)	Larry North	Steve Prunty
4661	Plotter "B" Size	Factory Service	Steve Prunty
4662	Plotter "B" Size	Larry North	Steve Prunty
4663	Plotter "C" Size	Larry North	Steve Prunty
4701	8 Channel Analog Mux	Factory Service	Kent Barnard
4801	Interface for T4002	Factory Service	Kent Barnard
4802	Interface for T4002	Factory Service	Kent Barnard
4803	Interface for T4002	Factory Service	Kent Barnard
4804	Interface for T4002	Factory Service	Kent Barnard
4901	Interface for 4002A	Factory Service	Kent Barnard
4902	Interface for 4002A	Factory Service	Kent Barnard
4903	Interface for 4002A	Factory Service	Kent Barnard

Product	Description	Technical Questions Repair/Troubleshoot Perf. Assur. Eng.	Service Plan Business Ser. Prog. Spec.
4905	Mass Storage Module	Bill Hatch	Dennis McGary
4907	Floppy Disc Storage Module	Darrell McGiverin	Dan Harris
4911	Remex Reader Punch for 4010 Family	Factory Service	Kent Barnard
4912	Cassette Recorder (Digital)(Sykes) for 4010 Family	Factory Service	Kent Barnard
4921	Single Floppy Disc to 4010 Family	Factory Service	Kent Barnard
4922	Dual F.D. to 4010 Family	Factory Service	Kent Barnard
4923	Cassette Tape RS-232, 401X Bus	Darrell McGiverin	Dan Harris
4924	Cassette Tape GPIB	Darrell McGiverin	Dan Harris
4931	Modem for 4010 Family	Frank Lees	Kent Barnard
4951	Joy Stick for 4002A	Factory Service	Kent Barnard
4952	Joy Stick for 4010 Family and 4051	Larry North	Kent Barnard
4953	Summagraphics Graphic Tablet 11" x 11"	Marty DeVall	Kent Barnard
4954	Summagraphics Graphic Tablet 40" x 30"	Marty DeVall	Kent Barnard
4956	Summagraphics Graphic Tablet GPIB Interface to 4051 20" x 20"	Marty DeVall	Kent Barnard
602	8 x 10 cm Display Monitor	Factory Service	Kent Barnard
603	10.2 x 12.7 cm Storage Display Monitor	Factory Service	Kent Barnard
603A	10.2 x 12.7 cm Storage Display Monitor	George Kusiowski	Kent Barnard
604	10.2 x 12.7 cm Display Monitor	Factory Service	Kent Barnard
604A	10.2 x 12.7 cm Display Monitor	George Kusiowski	Kent Barnard
605	7.2 x 9 cm Storage Display Monitor	Factory Service	Kent Barnard
606	8 x 10 cm Display Monitor	Factory Service	Kent Barnard
606A	8 x 10 cm High Resolution Display Mon.	George Kusiowski	Kent Barnard
606B	8 x 10 cm High Resolution Display Mon.	George Kusiowski	Kent Barnard
607	7.2 x 9 cm Variable Persistence Display Monitor	Factory Service	Kent Barnard
607A	7.2 x 9 cm Variable Persistence Display Monitor	George Kusiowski	Kent Barnard
608	9.8 x 12.2 cm High Brightness Dis. Mon.	George Kusiowski	Kent Barnard
611	11" Display	Factory Service	Steve Ross
613	11" High Contrast Display	Factory Service	Steve Ross
618	19" Storage Display	Dennis Painter	Steve Ross
619	19" Storage Display	Dennis Painter	Steve Ross
620	10 x 12 cm Display Monitor	George Kusiowski	Kent Barnard
624	9.8 x 12.2 cm Display Monitor	George Kusiowski	Kent Barnard
634	9 x 12 cm Raster Scan Display Monitor	George Kusiowski	Kent Barnard

PRODUCT RESPONSIBILITY LIST FOR WALKER ROAD SERVICE SUPPORT

STS PRODUCTS

<u>Product</u>	<u>Description</u>	<u>Performance Assurance Eng.</u>	<u>Service Program Specialist</u>
S-3000	Series Test Systems	STS Staff	Roger Lee
S-3100	Series Test Systems	STS Staff	Roger Lee
S-3200	Series Test Systems	Craig Wasson/Ron Lang Jim Stubbs	Roger Lee
S-3455	Test System	Joe Lipska	Roger Lee

BST PRODUCTS

<u>Product</u>	<u>Description</u>	<u>Performance Assurance Eng.</u>	<u>Service Program Specialist</u>
172	Programmable Test Fixture	Factory Service	Doug Comstock
176	High Current Fixture	Factory Service	Doug Comstock
177	Standard Test Fixture	Factory Service	Doug Comstock
178	Linear IC Test Fixture	Factory Service	Doug Comstock
576	Curve Tracer	Factory Service	Doug Comstock
577D1	Storage Curve Tracer	Factory Service	Doug Comstock
577D2	Nonstorage Curve Tracer	Factory Service	Doug Comstock

MICROPROCESSOR DEVELOPMENT PRODUCTS

<u>Product</u>	<u>Description</u>	<u>Performance Assurance Engineer</u>	<u>Service Program Specialist</u>
8001/8002	Microprocessor Development Lab	Brad Griffin/Kevin King	Vern Johnson
CT8101	Printer/Terminal	Brad Griffin/Kevin King	Vern Johnson
CT8100	TEK 4023-CRT Terminal	Brad Griffin/Kevin King	Vern Johnson
LP8200	DEC Line Printer	Brad Griffin/Kevin King	Vern Johnson

PRODUCT RESPONSIBILITY LIST FOR WR SERVICE SUPPORT (cont)SIGNAL PROCESSING SYSTEMS PRODUCTS

<u>Product</u>	<u>Description</u>	<u>Performance Assurance Eng.</u>	<u>Service Program Specialist</u>
P7001	Digitizer	Randy Newton	Dean Hager
P7912	Digitizer	Factory Service	Dean Hager
R7912R	Digitizer	Factory Service	Dean Hager
7912AD	Digitizer	Randy Newton	Dean Hager
7A16P	Programmable Vertical Plug-in	Randy Newton	Dean Hager
7B90P	Programmable Horizontal Plug-in	Randy Newton	Dean Hager
CP4165	Controller	Randy Newton	Dean Hager
1350	DDC	Factory Service	Dean Hager
016-03797-00TV MUX (Custom)		Randy Newton	Dean Hager
021-XXXX-XX	Interfaces	Randy Newton	Dean Hager
CP112	DEC Floppy	Randy Newton	Dean Hager
CP115	Data Systems Floppy	Randy Newton	Dean Hager
WP1000	Series - DPO System	Randy Newton	Dean Hager
WP2000	Series - Transient Digitizer System	Randy Newton	Dean Hager
WP11000AC	Custom Product	Randy Newton	Dean Hager
WP1000AF	Mod Product	Randy Newton	Dean Hager
All previous WPXXX			

LOGIC DEVELOPMENT PRODUCTS

<u>Product</u>	<u>Description</u>	<u>Performance Assurance Eng.</u>	<u>Service Program Specialist</u>
7D01	Logic Analyzer	Rich Andrusco	Doug Comstock
7D01-DF1	Logic Analyzer	Rich Andrusco	Doug Comstock
7D02	Logic Analyzer	Rich Andrusco	Doug Comstock
DF1	Logic Analyzer	Rich Andrusco	Doug Comstock
DF2	Logic Analyzer	Rich Andrusco	Doug Comstock
DL2	Logic Analyzer	Rich Andrusco	Doug Comstock
DL502	Logic Analyzer	Rich Andrusco	Doug Comstock
7D11	Logic Analyzer	Rich Andrusco	Doug Comstock
7D10	Logic Analyzer	Rich Andrusco	Doug Comstock
7D11	Logic Analyzer	Rich Andrusco	Doug Comstock
LA501	Logic Analyzer	Factory Service	Doug Comstock
WR501	Logic Analyzer	Rich Andrusco	Doug Comstock

DIGITAL SERVICE INSTRUMENTS

<u>Product</u>	<u>Description</u>	<u>Performance Assurance Eng.</u>	<u>Service Program Specialist</u>
821	Word Recognizer	Factory Service	Doug Comstock
832	Data Comm Tester	Rich Andrusco	Doug Comstock
833	Data Comm Tester	Rich Andrusco	Doug Comstock
834	Programmable Data Comm Tester	Rich Andrusco	Doug Comstock
851	Digital Tester	Rich Andrusco	Doug Comstock

TM500 PRODUCTS

<u>Product</u>	<u>Description</u>	<u>Performance Assurance Eng.</u>	<u>Service Program Specialist</u>
DD501	Digital Delay	Terry Turner	Frank Tucker
TM500	Digital Multimeters (DM)	Terry Turner	Frank Tucker
MR501	X-Y Display Monitor	Terry Turner	Frank Tucker
TM500	Power Supplies (PS)	Terry Turner	Frank Tucker
RG501	Ramp Generator	Terry Turner	Frank Tucker
SG502	RC Oscillator	Terry Turner	Frank Tucker
TM500	Sine-wave Generators (SG)	Terry Turner	Frank Tucker
TG501	Time Mark Generators (FG)	Terry Turner	Frank Tucker
TM500	Oscilloscopes (SC)	Terry Turner	Frank Tucker
TM500	Power Modules	Terry Turner	Frank Tucker
TM500	Pulse Generators (PG)	Terry Turner	Frank Tucker

¹Except AM503 and AM511 (Building 58 Service Support)

Other products not covered: DL502 and LA501,W (Rich Andrusco, Doug Comstock)
SW503 and TR501,502 (Building 58 Service Support)

TELEQUIPMENT PRODUCTS

All Service related calls should be referred to Tom Herd
of Teleequipment.

PRODUCT RESPONSIBILITY LIST FOR WR SERVICE SUPPORT (cont)SAMPLING

<u>Product</u>	<u>Description</u>	<u>Performance Assurance Eng.</u>	<u>Service Program Specialist</u>
S Series	Sampling Head	Factory Service	Dean Hager
S50	Pulse Head	Factory Service	Dean Hager
S51,S52	Trigger Count Down	Factory Service	Dean Hager
S53	Trigger Recognizer	Factory Service	Dean Hager
S54	Pulse Head	Factory Service	Dean Hager
284	Pulse Generator	Factory Service	Dean Hager
5S14	Two Channel Sampler	Factory Service	Dean Hager
7K Series	Sampling	Factory Service	Dean Hager

T & M SERVICE SUPPORT
PRODUCT RESPONSIBILITY LIST

Beaverton, D/S 58-511

<u>PRODUCT</u>	<u>DESCRIPTION</u>	<u>PAE</u>	<u>SPS</u>
A6701	Word Recognizer	Dave McKinney	Gary Ellsworth
AM503	Current Probe Amplifier	Dave McKinney	Gary Ellsworth
AM511	CATV Preamplifier	Factory Service	Tom Peters
AN/USM-281C	Ruggedized Oscilloscope	Lynn Sperley/ John Eaton	Dick Freshour
C-28	Oscilloscope Camera	Dave McKinney	Gary Ellsworth
C-30 Series	Oscilloscope Camera	Dave McKinney	Gary Ellsworth
C-50 Series	Oscilloscope Camera	Dave McKinney	Gary Ellsworth
C-5C	Oscilloscope Camera	Dave McKinney	Gary Ellsworth
CT-1,2,3,5	Current Transformer	Dave McKinney	Gary Ellsworth
DM40,DM43	Digital Multimeter	Factory Service	Roy Lindley
DM44	Digital Multimeter	Mike Laurens	Roy Lindley
J16	Digital Photometer	Dave McKinney	Gary Ellsworth
J65XX	J16 Probe	Dave McKinney	Gary Ellsworth
L1,L2,L3	Spectrum Analyzer Plug-In	Rich Kuhns	Tom Peters
M1	Multi-Functi-n Module	Factory Service	Dick Freshour
M2	Sample/Hold Module	Sperley/Eaton	Dick Freshour
M3	RMS Volts Module	Factory Service	Dick Freshour
P6XXX	Probe	Dave McKinney	Gary Ellsworth
Scope Cart	Model 3, Model 200 Series	Dave McKinney	Gary Ellsworth
SPG 1,2	1410 Module	Steve Schmelzer	Tom Peters
SW503	Sweep Generator	Factory Service	Tom Peters
TDC,TDC1,TDC2	Television Down Converter	Rich Kuhns	Tom Peters
TR501	Tracking Generator	Factory Service	Tom Peters
TR502	Tracking Generator	Rich Kuhns	Tom Peters
TSG 1,2,3,5,6	1410 Module	Steve Schmelzer	Tom Peters
TSP 1	1410 Module	Steve Schmelzer	Tom Peters
T912,T921, T922, T922R, T932A, T935A	Oscilloscope	Mike Laurens	Roy Lindley
5A13N	Differ. Comparator Analyzer	Sperley/Eaton	Dick Freshour
5A14N	1-MHz Four-Trace Amplifier	Sperley/Eaton	Dick Freshour

PRODUCT RESPONSIBILITY LIST FOR T&M SERVICE SUPPORT (cont)

<u>PRODUCT</u>	<u>DESCRIPTION</u>	<u>PAE</u>	<u>SPS</u>
5A15N	2-MHz Amplifier	Lynn Sperley/ John Eaton	Dick Freshour
5A18N	2-MHz Dual Trace Amplifier	Sperley/Eaton	Dick Freshour
5A19N	Differential Amplifier	Sperley/Eaton	Dick Freshour
5A20N	Differential Amplifier	Factory Service	Dick Freshour
5A21N	Dif. Amp/Current Probe Input	Sperley/Eaton	Dick Freshour
5A22N	Differential Amplifier	Sperley/Eaton	Dick Freshour
5A23N	1.5 MHz Amplifier	Factory Service	Dick Freshour
5A24N	Single Trace Amplifier	Sperley/Eaton	Dick Freshour
5A26	Dual Differential Amplifier	Sperley/Eaton	Dick Freshour
5A38	Dual Trace Amplifier	Sperley/Eaton	Dick Freshour
5A45	60 MHz Amplifier	Sperley/Eaton	Dick Freshour
5A48	Dual Trace Amplifier	Sperley/Eaton	Dick Freshour
5B10N,5B12N	Dual Delayed Time Base	Sperley/Eaton	Dick Freshour
5B13N	Time Base	Factory Service	Dick Freshour
5B25N	Time Base	Sperley/Eaton	Dick Freshour
5B31	Digital Delayed Time Base	Factory Service	Dick Freshour
5B40	Time Base	Sperley/Eaton	Dick Freshour
5B42	Delaying Time Base	Sperley Eaton	Dick Freshour
5B44	Dual Time Base	Factory Service	Dick Freshour
5CT1N	Curve Tracer	Factory Service	Doug Comstock
5L4N	Spectrum Analyzer	Factory Service	Dick Freshour
7A11	Single Trace Amplifier	Sperley/Eaton	Dick Freshour
7A12	Dual Trace Amplifier	Factory Service	Dick Freshour
7A13	Differ. Comparator Amplifier	Sperley/Eaton	Dick Freshour
7A14	Current Probe Amplifier	Factory Service	Dick Freshour
7A15, 7A15AN	Single Trace Amplifier	Factory Service	Dick Freshour
7A15A	Single Trace Amplifier	Sperley/Eaton	Dick Freshour
7A15AN Opt 11	Single Trace Amplifier	Sperley/Eaton	Dick Freshour
7A16A	Single Trace Amplifier	Sperley/Eaton	Dick Freshour
7A17	Single Trace Amplifier	Factory Service	Dick Freshour
7A18	Dual Trace Amplifier	Sperley/Eaton	Dick Freshour
7A18N,7A18- 950A	Dual Trace Amplifier	Factory Service	Dick Freshour
7A19	Single Trace Amplifier	Sperley/Eaton	Dick Freshour
7A21N	Direct Access Unit	Factory Service	Dick Freshour
7A22	Differential Amplifier	Sperley/Eaton	Dick Freshour

PRODUCT RESPONSIBILITY LIST FOR T&M SERVICE SUPPORT (cont)

<u>PRODUCT</u>	<u>DESCRIPTION</u>	<u>PAE</u>	<u>SPS</u>
7A24	Dual Trace Amplifier	Lynn Sperley/ John Eaton	Dick Freshour
7A26	Dual Trace Amplifier	Sperley/Eaton	Dick Freshour
7A29	Single Trace Amplifier	Sperley/Eaton	Dick Freshour
7B10	Time Base	Sperley/Eaton	Dick Freshour
7B15	Delaying Time Base	Sperley/Eaton	Dick Freshour
7B50	Time Base	Factory Service	Dick Freshour
7B50A	Time Base	Sperley/Eaton	Dick Freshour
7B51,7B52	Time Base	Factory Service	Dick Freshour
7B53A	Dual Time Base	Sperley/Eaton	Dick Freshour
7B53AN,7B53N	Dual Time Base	Factory Service	Dick Freshour
7B70,7B71	Time Base	Factory Service	Dick Freshour
7B80	Time Base	Sperley/Eaton	Dick Freshour
7B85	Delaying Time Base	Sperley/Eaton	Dick Freshour
7B87	Time Base	Sperley/Eaton	Dick Freshour
7B92	Dual Time Base	Factory Service	Dick Freshour
7B92A	Dual Time Base	Sperley/Eaton	Dick Freshour
7CT1N	Curve Tracer	Factory Service	Doug Comstock
7D10	Digital Events Delay	Factory Service	Dick Freshour
7D11	Digital Delay	Sperley/Eaton	Dick Freshour
7D12	A/D Converter	Sperley/Eaton	Dick Freshour
7D13	Digital Multimeter	Factory Service	Dick Freshour
7D13A	Digital Multimeter	Sperley/Eaton	Dick Freshour
7D14	Digital Counter	Factory Service	Dick Freshour
7D15	Universal Counter/Timer	Sperley/Eaton	Dick Freshour
7L5 to 7L18	Spectrum Analyzer	Rich Kuhns	Tom Peters
7M11	Dual Delay Line	Factory Service	Dick Freshour
7M13	Readout Unit	Sperley/Eaton	Dick Freshour
140,141	TV Generator	Factory Service	Tom Peters
144,145,146	TV Generator	Factory Service	Tom Peters
147A,149A	TV Generator	Steve Schmelzer	Tom Peters
305	Oscilloscope	Mike Laurens	Roy Lindley
308	Data Analyzer	Rich Andrusco	Doug Comstock
314	Oscilloscope	Mike Laurens	Roy Lindley
321,321A	Oscilloscope	Factory Service	None
323,324,326	Oscilloscope	Factory Service	Roy Lindley
335	Oscilloscope	Mike Laurens	Roy Lindley

PRODUCT RESPONSIBILITY LIST FOR T&M SERVICE SUPPORT (cont)

<u>PRODUCT</u>	<u>DESCRIPTION</u>	<u>PAE</u>	<u>SPS</u>
400	Medical Recorder	Dave McKinney	Gary Ellsworth
401	Medical Monitor	Dave McKinney	Gary Ellsworth
408,410	Medical Monitor	Dave McKinney	Gary Ellsworth
412,413,414	Medical Monitor	Dave McKinney	Gary Ellsworth
432	Oscilloscope	Factory Service	Roy Lindley
434	Oscilloscope	Mike Laurens	Roy Lindley
442	Oscilloscope	Mike Laurens	Roy Lindley
455	Oscilloscope	Mike Laurens	Roy Lindley
464	Oscilloscope	Mike Laurens	Roy Lindley
465/R	Oscilloscope	Factory Service	Roy Lindley
465B	Oscilloscope	Mike Laurens	Roy Lindley
465M	Oscilloscope	Mike Laurens	Roy Lindley
466	Oscilloscope	Mike Laurens	Roy Lindley
468	Digital Storage	Mike Laurens	Roy Lindley
475/A	Oscilloscope	Mike Laurens	Roy Lindley
485	Oscilloscope	Mike Laurens	Roy Lindley
491	Spectrum Analyzer	Factory Service	Tom Peters
492/P	Spectrum Analyzer	Rich Kuhns	Tom Peters
520A	Vectorscope	Factory Service	Tom Peters
524	Television Monitor	Factory Service	Tom Peters
526,527	Vectorscope	Factory Service	Tom Peters
632	TV Color Monitor	Factory Service	Tom Peters
650A Series	TV Color Monitor	Factory Service	Tom Peters
651A	TV Color Monitor	Factory Service	Tom Peters
653A	TV Color Monitor	Factory Service	Tom Peters
655A	TV Color Monitor	Factory Service	Tom Peters
656A	TV Color Monitor	Factory Service	Tom Peters
1105,1106	Power Supply	Mike Laurens	Roy Lindley
1401,1401A	Spectrum Analyzer	Factory Service	None
1405	Sideband Analyzer	Rich Kuhns	Tom Peters
1410,1411,1412	TV Generator	Steve Schmelzer	Tom Peters
1420	Vectorscope	Factory Service	Tom Peters
1450,1450-1, 1450-2	Television Demodulator	Rich Kuhns	Tom Peters
1501	Cable Tester	Factory Service	Tom Peters
1502,1503	Cable Tester	Rich Kuhns	Tom Peters

PRODUCT RESPONSIBILITY LIST FOR T&M SERVICE SUPPORT (cont)

<u>PRODUCT</u>	<u>DESCRIPTION</u>	<u>PAE</u>	<u>SPS</u>
1900	Television Generator	Steve Schmelzer	Tom Peters
1980	Television Measurement Set	Steve Schmelzer	Tom Peters
5030	Oscilloscope	Factory Service	Dick Freshour
5031	Oscilloscope	Factory Service	Dick Freshour
5110,R5110	Single Beam Oscilloscope	Lynn Sperley/ John Eaton	Dick Freshour
5111,R5111	Single Beam Storage Oscill.	Sperley/Eaton	Dick Freshour
5112,R5112	Dual Beam Oscilloscope	Factory Service	Dick Freshour
5113,R5113	Dual Beam Storage Oscilloscope	Sperley/Eaton	Dick Freshour
5115,R5115	Single Beam Storage Oscill.	Sperley/Eaton	Dick Freshour
5223,R5223	Digitizing Oscilloscope	Sperley/Eaton	Dick Freshour
5440,R5440	Single Beam Oscilloscope	Sperley/Eaton	Dick Freshour
5441,R5441	Variable Persistence Storage Oscilloscope	Sperley/Eaton	Dick Freshour
5444,R5444	Dual Beam Oscilloscope	Factory Service	Dick Freshour
7104	1 GHz Real Time Oscilloscope	Sperley/Eaton	Dick Freshour
7313,R7313	Bistable Storage Oscilloscope	Factory Service	Dick Freshour
7403N	Oscilloscope	Factory Service	Dick Freshour
R7403,708P	Oscilloscope	Factory Service	Dick Freshour
7503,7504,7514	Oscilloscope	Factory Service	Dick Freshour
7603,R7603	Oscilloscope	Sperley/Eaton	Dick Freshour
7613,R7613	Variable Persistence Storage Oscilloscope	Sperley/Eaton	Dick Freshour
7623,R7623	Transfer Storage Oscilloscope	Factory Service	Dick Freshour
7623A,R7623A	Multimode Storage Oscilloscope	Sperley/Eaton	Dick Freshour
7633,7633A	Multimode Storage Oscilloscope	Sperley/Eaton	Dick Freshour
7704	Oscilloscope	Factory Service	Dick Freshour
R7704	Oscilloscope	Sperley/Eaton	Dick Freshour
7704A	Oscilloscope	Sperley/Eaton	Dick Freshour
7834	Fast Storage Oscilloscope	Sperley/Eaton	Dick Freshour
7844,R7844	Dual Beam Oscilloscope	Sperley/Eaton	Dick Freshour
7854	Waveform Processing Oscill.	Sperley/Eaton	Dick Freshour
R7903	Oscilloscope	Sperley/Eaton	Dick Freshour
7904	Oscilloscope	Sperley/Eaton	Dick Freshour

MICHAEL A MIHALIK
COMBINATION WIZARDS

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