

WIZARDS WORKSHOP

TEKTRONIX INTERNAL USE ONLY

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All service questions from Europe, Middle
East, and Africa should be addressed to the
Tektronix Europe B.V. Service Group in the
Netherlands.

COMBINATION

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92-515

MICHAEL A MIHALIK
COMBINATION WIZARD

Tektronix
COMMITTED TO EXCELLENCE

COMPANY CONFIDENTIAL

PERSONNEL CHANGES AND PROMOTIONS

NEW HIRES

LARRY WHITFIELD - RALEIGH

Larry has joined the Raleigh service team as an ETI. He comes to Tek with an associates degree from Wayne Community College.

Welcome Larry!

DAVE FULLER - IRVINE

Dave has joined the field as Field Service Specialist. He has prior field service experience, most recently with D.M.F. Computers where he maintained computer products and peripheral devices.

Welcome Dave!

PATTY MCTIERNAN - IRVINE

Patty comes to Tek as a Field Service Specialist after recently graduating from Control Data Institute in Anaheim, CA.

Welcome Patty!

DICK STEINER - DALLAS

Dick comes to Tek as a Product Maintenance Instructor of IDD products at the Dallas office. He previously was an instructor of computer-generated graphics at Redifusion Systems, Inc.

Welcome Dick!

PROMOTIONS

Congratulations to the following people on their promotions!

OVE JAKOBSEN - ET II, Huntsville

SARA HONAN - FSS I, Huntsville

GEORGE MICHAEL - SANTA CLARA

George has accepted the position of Region Service Support Manager. He has 12 years experience at Tek as a T&M Service Center Supervisor in Concord and as District Service Manager in Santa Clara.

Congratulations and welcome back George!

GENERAL

MANUALS AND EIS DOCUMENTS IDENTIFICATION

Since manuals maintenance does not exist as a central function, it is difficult for some people to determine where to find information concerning a particular product manual or where to send manual corrections. Beginning now, product manuals and Engineering Instrument Specification (EIS) documents will be identified by a Product Group Code; the Product Group Code is used to identify the division that is responsible for the product. Product Group Codes for each division are listed in the Accounts Directory; each cost center should have a copy of this document. The Product Group Code will be located beneath the manual part number on the title page of the manual and it is used as a prefix to the Specification number on the title page of the EIS.

For example:

| | |
|--------|---------------------------------|
| Manual | 070-2149-00 Product Group 35 |
| EIS | Specification 35-101 |

Referring to the Accounts Directory, Product Group 35 is DCA, which is a product group within DAD.

The following people may be contacted concerning a product manual for a particular division:

COMM

FDI, TDR, and 1500 Series- DeWayne McGaa, Ext. 1859 BDR; Del Sta 58-788.

Television- Brad Webb, Ext. 1355 BDR; Del Sta 58-594.

DAD

DAD Manuals Maintenance- Tom Gibbons, Ext. 1809 WR; Del Sta 92-267.

ID

ID Manuals Maintenance- Dick Griffin, Ext. 2186 BDR; Del Sta 76-165.

IDD

IDD Manual Maintenance- Cookie Johnson, Ext. 3291 WI; Del Sta 63-003.

Submitted by--
Tom Gibbons
92-267 Ext. 1809 WR

TRAINING MATERIALS

Some significant new training materials have become available for your use. Please contact the training distribution group, 54-031, if you wish these materials or from personnel indicated.

Concepts training for Service Technician

Flow Charting - Beginning into Programming.

4050 Operation/Programming - Learn how to write 405X Basic Programs.

GPIOB - Excellent for understanding GPIOB concepts.

Microprocessor - A must for learning microprocessor concepts.

Fred VanderMuellen - AMPAC
Nico Lagendijk - Tek Europe B.V.
Sharon Philbrick - Service Training Publications X8078

Submitted by--
Dick Hornicak

FAILURE CODE REPORTING

Failure codes are required for every product reported on Service Records.

Failure codes are recorded on component lines; but even where there are no parts to report, a failure code is required. Codes are available to indicate adjustments and other activities where a part is not necessarily replaced.

Because so many products are serviced, a computer is needed to organize and evaluate service information. Failure codes make it easier to identify reliability problems.

--Bill Duerden
56-037 Ext. 8938 MR

FUNCTIONS OF SERVICE ADMINISTRATIVE
SUPPORT PART II

This is the second and last part of the article explaining the functions of Service Administrative Support. Last issue contained an overview of the entire department and a more detailed look at the Service Maintenance Agreement subgroup. Following are explanations of the other three areas, Service Publications, Service Systems and Service Information.

A number of technical, pricing, administrative and operational guideline publications originate in this department. Depending on the publication, our department performs the composing, editing, printing coordination and/or distribution.

The Wizards Workshop is published bi-weekly in three editions - one focusing on Instrumentation, one on IDD/Systems and one on a combination of the two. The Wizard includes such information as instructions for servicing an instrument, tips for maintenance and guidelines for replacing circuits. Publications stemming from the Wizards Workshop are:

1. Service Teknotes which contains material of interest to customers who service their own Tek instruments.
2. Service Organization Bulletin which provides rapid distribution of important, timely articles that may or may not end up in the ensuing issue of the Wizard.
3. The Master Index which lists articles chronologically and by product. Maintenance Notes consists of articles from the Wizard, arranged for easy reference in the field.

Service Pricing Bulletins update the SQI (Service Quote Information book).

Exchange Assembly Listings list customer charges for module repair and return module exchange.

Service Information Report (SIR) publishes budget analyses comparing the east and west regions.

The Service Equipment Manual, formerly the Capitol Planning Manual, informs the field offices about the equipment they need to maintain various Tek products. The New Product Summary lists all products to be introduced next year but which are, as yet, unannounced. The summary indicates the impact on a service area and the date the product will be available.

The Field Reference Manual (FRM) contains procedures and policies for sales and service functions. Our department has responsibility for updating information in the 700 Series sections for the Service organization.

Key staff members involved with editing, writing and/or distributing these publications are Sharon Huetson, Janet Hemenway, Deirdre Mitchell and Joanie Stewart.

(ARTICLE CONTINUED ON THE NEXT PAGE)

FUNCTIONS OF SERVICE ADMINISTRATIVE
SUPPORT PART II (cont.)

The Service Management Library is a new creation which will provide answers for field service policy and procedure questions. Presently, information is so widely dispersed that finding answers is often difficult or impossible. As yet, we do not know all the reference books to be included but have started with three: the Service Operation Manual, Date Reference Manual and Service Personnel Manual. Deirdre Mitchell has responsibility for compiling, writing and maintaining the Management Library.

Service Systems furnishes data processing assistance for Service Administrative Support as well as other Service groups when needed. The two programmer/analysts, Wayne Bridges and Angel Morss,

and lead person, Bill Bagley, maintain the staff computer facility and provide data for information and analysis. They also define Service organization requirements for the Service Information Systems Program, a program which eventually will link all field offices together with Beaverton in a nationwide computer network.

Service Information, maintained by John Brandes, develops processes and procedures to meet information needs in Field Service and provides management with financial analysis, strategic planning analysis, organizational performance reports and product support requirements. John also gathers special information and analysis to satisfy service program needs.

--Deirdre Mitchell
56-037 Ext. 8917 MR

DAS9100 MAINTENANCE NOTES

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 July 17, 1981.

ORIGINATOR: Pat Wolfram, Performance Assurance Engineer

CONFIGURATION/APPLICATIONS

Always transport the DAS9109 mainframe with the board cover (P/N 200-2658-01) installed. It will stabilize the boards and protect them from physical abuse during shipment.

When configuring acquisition cards, the card with the fastest acquisition rate must be inserted in the right-most slot (slot 6) with the next fastest next to him, and so on.

It takes approximately 3.0 minutes to format a DC100 tape for DAS usage. Do not interrupt this formatting process by powering the DAS unit down or ejecting the tape. If this occurs, the tape won't be recognized by a DAS as a "DAS" tape. The tape must then be bulk erased (by a strong electromagnetic field) and reformatted.

If trying to acquire data with a 91A08 when pins 1 and 2 of J615 are shorted, the DAS will display "Waiting for Stop Store" and won't trigger. It is possible that some 91A08s reached the Field with a jumper installed that shorts these two pins. For correct operation, the jumper must be removed. W545 on the 91A08 card should have been shipped from the Factory with Pins 2 and 3 shorted. This allows triggering on either glitches or trigger words. Shorting Pins 1 and 2 or leaving all three pins open will require an occurrence of the

trigger word and a glitch for a trigger.

W823 on the Main Power supply board is normally open. If you close it with a jumper, it causes the duty cycle of the switching power supply to reduce to almost a spike (you can monitor this waveform at TP225). This allows you to troubleshoot the logical portions of this circuitry without the presence of high current which could damage some circuitry.

MANUAL INFORMATION

Operators

Page 12-21, Line 2020 of the 4051 program should read:

2020 WBYTE @ D1 + 32:B

Service

The current values given for the power supplies on the main power supply schematic are maximum values, not nominal.

TROUBLESHOOTING

When using the diagnostics to isolate a failure be aware that the most significant failures are listed first. Fixing the failure listed first may cure all succeeding failures.

A firmware version of 1.05 or higher is required for proper operation of strobes in the 91P32. U597 on the A6 controller board must be a 160-1525-02 to obtain this level of firmware. Any DAS returned for service should be updated to the 1.05 firmware level.

To test the basic operation (kernel) of the controller board, you must force the microprocessor to execute a NOP instruction. This can be done

(ARTICLE CONTINUED ON THE NEXT PAGE)

DAS9100 MAINTENANCE NOTES (cont.)

by forcing all of the data bits into a "LO" state (Hex 00). This is easily done by replacing A6U555 (Data bus buffer) with an 100 ohm single-in-line resistor pack (P/N 307-0675-00). This resistor pack is included in the service maintenance kit. It is stored on the main extender board, lower right corner (component side). NOTE: Pin one (1) of the resistor pack must be inserted into pin ten (10) of the socket that held A6U555.

If a key on the keyboard is depressed on power up, a controller failure will occur with a keycode displayed at the far right of the display. This keycode should represent the depressed or shorted key. However, a "3F" may intermittently be displayed. When this happens, you can obtain the correct keycode by shorting the "RESET pin (J80-1 on the A1 interconnect board) to ground.

If either the RS232, GPIB, or Video Out connectors on the A19A2 I/O connector board require replacement, I recommend replacing the entire I/O connector board (670-6751-00). This is because of the excessive time required to unsolder all of the pins on each connector to replace any one of them.

C538 on the A6 controller board was changed from a 10uF (P/N 290-0536-00) to a 100uF (290-0755-00) capacitor at serial number B010181. This change helps cure intermittent power up failures. See Wizard's Workshop Issue 11-18, Sept. 25, 1981, page 31. for details.

If any single component in the transformer driving circuitry should short or fail, I recommend replacing all four (4) of the associated components. This is because the excess stress placed on the remaining components weakens them considerably. These components are Q205, Q215, CR308, and CR315 on the A2 main power supply board.

When cleaning the DAS9109 mainframe, be sure to remove the DC100 tape drive unit. The read/write head and the tape drive motor are very susceptible to contamination if exposed to soap and water.

When troubleshooting the overvoltage protection circuitry on the main and +5 volt power supplies, be sure to remove all of the cards and disconnect the monitor, keyboard, and tape drive cable connections.

Capacitors C125 and C305 on the A25 capacitor bracket board can be easily reversed. Be sure of the correct polarity before insertion.

Caution, the +5 volt power module extender board (670-7101-00 in the service maintenance kit, 067-0980-00) can possibly be inserted backwards. Be sure that the pin pattern on the top of the extender board matches the pin pattern on the interconnect board.

Caution, when inserting the A2 main power supply board into its extender, be sure that all pins are in their correct sockets. It can easily be inserted "off" by one pin.

Caution, the CRT connectors (J421 and J422) can be inserted backwards and destroy circuitry. Be sure of their polarity.

PARTS INFORMATION

There is an alteration that needs to be made to the top cover to make its removal easier. Refer to Wizard's Workshop 11-18, Sept. 25, 1981, Page 33 for details.

U228, U325, U225, U328, U321, U221, U318, and U218 (P/N 155-0215-00 in the preliminary parts list) on the 91A08 card must have propagation delay times of 4.5 to 6.0ns to enable acquisition speeds of 100 MHz. Order P/N 155-0215-47 to obtain the parts with these specifications.

(ARTICLE CONTINUED ON THE NEXT PAGE)

DAS9100 MAINTENANCE NOTES (cont.)

U345 (P/N 156-0478-02) on the 91A32 card can cause keyboard lockouts and "garbage" to appear on the display. This seems only to occur when using the "National" brand of I.C. with an 8611 code date.

U225 and U325 (P/N 156-0883-00), Code dated 7803, on the A10 trigger-time base board, have been showing high failure rates.

Some U605's (P/N 156-1557-00) on the 91A08 card had the manufacturer's nomenclature printed on both sides, thus giving two "Pin 1" designations. Be on the lookout for these and reject them as necessary.

TIME REPORTING

It is important that repair/cal time be reported against the individual products and not against DAS configurations. For example:

DAS 9109 -Mainframe
91A32 - Data Acquisition Module
91P16 - Pattern Generator Module

are products and should be entered on the Service Record.

DAS 9100
DAS 9101
DAS 9103

are DAS configurations and should not appear on the service record.

--Pat Wolfram
92-236 Ext. 1582

S-3200 - D70 OFFSET, SKEWING IMPROVEMENTS

REFERENCE MODIFICATION M4266Z

Resistor and capacitor changes will improve the adjustment ranges for D70 Sector Cards. These changes will increase the adjustment range for skewing force phases, compare phases, and buffer offsets.

Installation of this mod to the D70 Pin Electronics Card 670-5347-02 will change the board revision level to 670-5347-03. The D70 Sector Card Assembly 672-0687-03 changes to 672-0687-04. The 670-5347-03 and 672-0687-04 are direct replacements for the 670-5347-02 and 672-0687-03 respectively.

Change Information: D70 Pin Electronics Card

C410, C411:

10pf, 5%, 200v (283-0175-00) replaced by 15pf, 20%, 50v (283-0069-00)

C412, C413:

10pf, 5%, 200v (283-0175-00) replaced by 18pf, 5%, 50v (283-0159-00)

R444:

75K ohm, 1%, 0.125w (321-0373-00) replaced by 59 ohm, 1%, 0.125w (321-0363-00)

R453:

150K ohm, 1%, 0.125w (321-0306-00) replaced by 4.99K ohm, 1%, 0.125w (321-0260-00)

--Ron Lang
92-236, Ext. 1015

EXCHANGE & REPAIR/RETURN ASSEMBLIES

The FDI Manufacturing Area has requested that when returning defective assemblies to Beaverton that more specific information be provided. Examples:

--Inoperative - What is inoperative?
All bands? All Modes?

--Defective - What is defective? Is the problem due to Gain, Tracking, Intermittent, Dead, Temperature Sensitive, Loads down, Shorted, or what?

--Intermittent - What's Intermittent?
All bands? All Modes?

(ARTICLE CONTINUED ON THE NEXT PAGE)

EXCHANGE & REPAIR/RETURN ASSEMBLIES

(cont.)

--Temperature Sensitive - What's indication? Which Mode or Band?

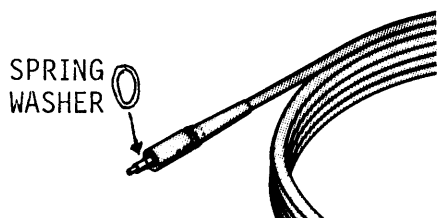
Just as you would want specific information on an instrument failure from a user, Manufacturing needs specific failure information to expedite repairs on returned assemblies. This information would also insure that the assemblies are repaired for the problems which they were originally rejected for. Please be sure that paperwork returned with each assembly has this information; your cooperation would be appreciated.

--Rich Andrusco
53/108, Ext. 8694

P6120 INTERMITTENT GROUND

Some intermittent ground problems have been experienced in Manufacturing. A new spring washer, P/N 210-1377-00, has been added to the probe cable assembly to correct the problem. All P6120 cables can be retrofitted by simply slipping the washer onto the cable bushing at the compensator box end only.

The spring washers are small and can easily be lost when removing the compensator box from the cable assembly. I recommend that all Service Centers stock a small quantity of these spring washers.



--Eilene Dickey
53/108, Ext. 8692

49X/634 -- NEW CRT MOUNTING SCHEME PRECAUTIONS

The 492/P, 496/P, and 634 are using a new method of mounting the CRT. This method is based on having four wedges

epoxied to the CRT funnel and the use of four plastic blocks, mounted to the instrument's front casting, to engage these wedges. The position of the plastic blocks can be adjusted by tightening their mounting screws.

TO INSTALL A CRT THE PROCEDURE LISTED BELOW MUST BE FOLLOWED TO INSURE PROPER INSTALLATION.

STEP ONE: Place the instrument on it's rear panel.

STEP TWO: Insure that the four CRT mounting blocks, on the front casting, are in place. DO NOT ENGAGE MORE THAN TWO THREADS TO HOLD BLOCKS IN PLACE.

STEP THREE: Place the CRT into the instrument, seating the CRT wedges into the mounting blocks.

STEP FOUR: Put the bezel casting and the implosion shield in place, "BE SURE THAT THERE IS ADEQUATE CLEARANCE BETWEEN THE CRT FACEPLATE AND THE BEZEL CASTING, THE BEZEL CASTING MUST BOTTOM IN THE INSTRUMENTS FRONT CASTING."

"WARNING!"

IT IS VERY IMPORTANT THAT THE FOUR MOUNTING BLOCKS HOLDING THE CRT ARE LOOSE ENOUGH SO THE BEZEL RETAINING SCREWS CAN BE COMPLETELY TIGHTENED WITHOUT THE BEZEL COMING IN CONTACT WITH THE CRT FACEPLATE, IF THEY MAKE CONTACT, DAMAGE TO THE CRT AND/OR FRONT CASTING WILL OCCUR.

STEP FIVE: Tighten the CRT mounting block screws, using a torque screwdriver, a little at a time in a crisscrossing pattern (i.e. Upper Left to Bottom Right, Upper Right to Bottom Left, etc.) to assure even pressure. DO NOT EXCEED 8-10 IN/LBS OF TORQUE.

(ARTICLE CONTINUED ON THE NEXT PAGE)

49X/634 -- NEW CRT MOUNTING SCHEME
PRECAUTIONS (cont.)

While tightening the screws, make sure that the CRT stays centered in the mounting blocks.

"CAUTION!"

THE FINAL TORQUE FOR THE FOUR MOUNTING BLOCK SCREWS MUST NOT EXCEED 8-10 IN/LBS.

When this procedure is followed a very rugged mounting system exists. CRT's have been subjected to 150g shocks without failure.

When this installation procedure is not followed, the faceplate can be chipped, or in extreme cases, it will crack. These failures will not necessarily happen during installation, in most cases it will occur in the field due to a minor shock to the instrument. There have been a number of field failure reports that seem to indicate failures due to incorrectly installed CRT's. The most common reported failures have been "Cracked Faceplate" and/or "Gassey". One "Gassey" CRT, returned from the field, was found to actually have a cracked faceplate which was not visible to the naked eye.

--Submitted by
Delmer Snyder

--Inserted by
Rich Andrusco
53-108 Ext. 8694

607A FLOOD GUN WIRES SHORT TO GROUND

The flood gun wires on the 607A CRT may short to the mu-metal shield. This will ground the collimation or target leads (pins 1 and 7 of P1000) and possibly damage R1046 or the +175V supply. To prevent this problem, manufacturing has been applying a four inch length of common black electrical tape to the inside of the mu-metal shield in the vicinity of the electrode terminals on the CRT.

The tape, however, has not satisfied the need. Reports continue of leads 1 and 7

shorting to ground. To solve the problem, a polyester insulator, part number 342-0127-00 may be used. This 3.0" X 1.7" X .010" insulator has an adhesive back for easy application.

Mu-metal shields (337-2081-00) shipped from Customer Service stock lack both the tape and the above mentioned insulator. It is therefore necessary that the insulator be applied when installing a new mu-metal shield.

--George Kusiowski
63-503 ext. 3928 (WI)

620 INTERMITTENT SPOT SHIFT

The 620 monitor has shown intermittent diagonal spot or display shift. The problem lies in the P100 connection between the power supply board and the deflection/z-axis board. The pins on the power supply are too long and the top six pins may contact a run on the deflection/z-axis board.

Manufacturing is presently using diagonal cutters to shorten the P100 pins by 1/8 inch (3mm). Engineering has proposed a modification to correct the problem.

Any 620 products returned for service should be checked for P100 pin length and if necessary the pins should be shortened as described above.

--George Kusiowski
63/503, ext. 3928 (WI)

834RDA UPDATE

Affected Serial Numbers: List contained in the article.

Reference: 834 RDA Instruction Manual,
P/N 061-2502-01
Mod #M43837
Mod #M44127

An update has been initiated to correct failures caused "PRINT ROM" and "CLEAR"

(ARTICLE CONTINUED ON THE NEXT PAGE)

834RDA UPDATE (cont.)

instructions. These failures are due to stack overflows and excessive message lengths and will cause "834 Malfunction" to occur.

834RDA's with the following serial numbers need only change UØ from 160-1176-00 to 160-1176-01 to complete this update. This new part should be installed upon customer request or when the ROMpack is returned for servicing.

| | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|
| 8010101 | 8010114 | 8010133 | 8010141 | 8010149 | 8010159 | 8010177 |
| 8010102 | 8010117 | 8010135 | 8010143 | 8010150 | 8010161 | 8010178 |
| 8010106 | 8010120 | 8010137 | 8010144 | 8010151 | 8010162 | 8010179 |
| 8010107 | 8010122 | 8010138 | 8010146 | 8010152 | 8010166 | 8010180 |
| 8010112 | 8010124 | 8010139 | 8010147 | 8010154 | 8010169 | 8010181 |
| 8010113 | 8010126 | 8010140 | 8010148 | 8010155 | 8010170 | 8010182 |
| | | | | 8010156 | 8010176 | 8010183 |

34RDA's with serial numbers serial numbers below B010170 (excluding the ones listed above require a kit (050-1541-01) to complete this update. This kit should also be installed upon customer request or when the ROM pack is returned for servicing.

--Pat Wolfram
92-236 Ext. 1582

834RØ3 UPDATE

Affected Serial Numbers: List contained in the article.

Reference: 834RØ3 Instruction Manual,
P/N 070-3699-00
Mod #M43832
Mod #M44127

An update to the 834RØ3 has been initiated which will allow a user to specify a custom bert pattern, provide commonality in 834 ROM packs, and to correct failures caused by "CLEAR:" instructions. At this time, a "CLEAR:" instruction used with excessive message lengths may cause an "834 Malfunction" to occur.

834RØ3's with the following serial numbers need only change UØ from 160-1176-00 to 160-1176-01 to complete this update. This new part should be installed upon customer request or when the ROMpack is returned for servicing.

B020344
B020346
B020347

B020349
B020353
B020357 through B020442

834RØ3's with serial numbers below B020358 (excluding the ones listed above) require a kit (050-1540-01) to complete this update. This kit should also be installed upon customer request or when the ROMpack is returned for servicing.

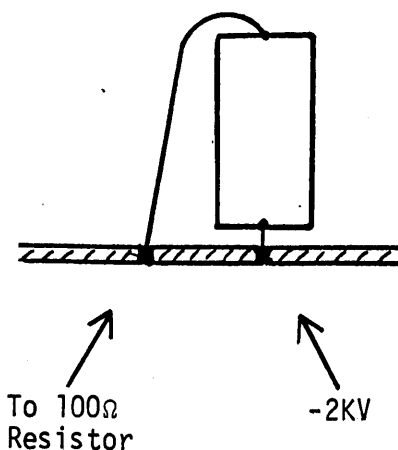
--Pat Wolfram
92-236 Ext. 1582

2213, 2215 INTENSITY MODULATION REDUCED

Reference: 2213, S/N B010100 -
Approximately B012000
2215, S/N B010100 -
Approximately B012700
PICN #37

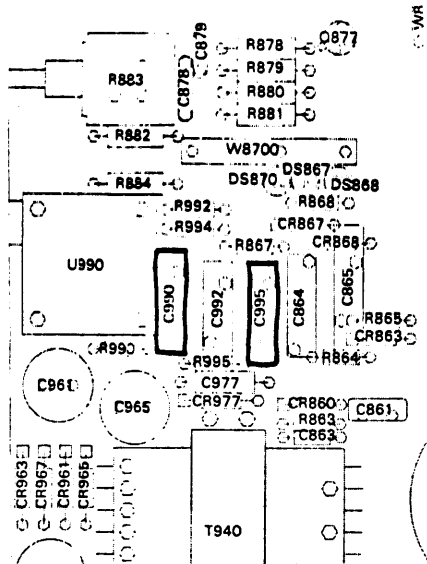
In the listed serial number ranges, capacitors A10C990 and A10C995 in the CRT cathode circuit must be changed to reduce ripple on the cathode and the resulting intensity modulation on the display. The new part number for both capacitors is 285-1184-00. Both will be mounted on end, with the bottom connection to the -2KV (close to the board) and the long lead from the top to the 100Ω resistor junction (R990 or R995).

PARTIAL, FIGURE 9 - 8

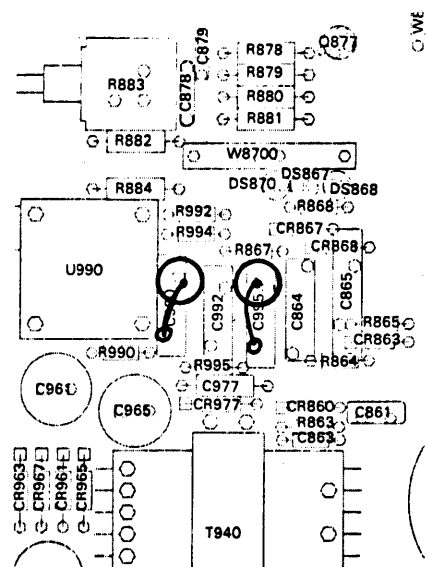


(ARTICLE CONTINUED ON THE NEXT PAGE)

(cont.)



BEFORE



AFTER

--Roy Lindley
53/108, Ext. 8687

2213, 2215 TRACE OFF SCREEN OR INTERMITTENT

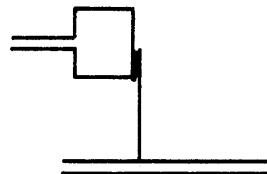
R148 and R248 on the Attenuator/Sweep board, A12, are grounded at one end by a wire strap that solders to the case of the variable Volts/Division pot.

If the ground wire has an intermittent connection or breaks loose when the instrument is struck or dropped, the trace will be erratic or off screen.

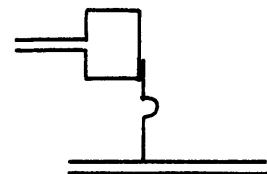
To remove the stress on this connection, the stiff wire can be replaced with a more flexible wire so that a small loop can be placed in the wire. The loop will take up the stress and not damage the solder connections.

The parts now being used by Manufacturing have a ground strap attached to the pot at the left bottom corner.

Thanks to Brent Daley of Albuquerque for
this suggestion.



BEFORE



AFTER

--Roy Lindley
53/108, Ext. 8687

2215, DTP MINIMUM SETTING

The DTP dial, R658, should read 0.4 at the minimum delay setting. Use this setting when replacing or readjusting the DTP dial.

Thanks to Bob Funk of Woodbridge for his input.

--Roy Lindley
53/108, Ext. 8687

2337 SERVICE MAINTENANCE INFORMATION

Manual Part Numbers - 070-4117-00
Operator's
070-4118-00
Service

Reference - 2335, 2336 Maintenance
Information, WIZARD Issue 11-8, 11-10

The 2337 is a 100 MHz instrument which incorporates the features of the 2335 and 2336 with a $3\frac{1}{2}$ LCD digital multimeter located in the front cover.

The DMM features DC volts in ranges of 2v (auto range to 200mv), 200v (auto range to 20v), and 500v. AC coupled RMS volts ranges are 2v (auto range to 200mv), 200v (auto range to 20v), and 350v. Resistance measurement uses ranges of $2K\Omega$ (auto range to 200Ω), $200K\Omega$ (auto range to $20K\Omega$) and $20M\Omega$ (auto range to $2M\Omega$).

The DMM operation centers around A32U10 which is a dual-slope, $3\frac{1}{2}$ digit A/D converter. The clock frequency of about 48KHz going to U10 is determined by R12 and C12.

Selectable Components

There are three selectable components:

A10R50 - If the Channel 1 Position Control does not meet the specified range, remove A10R50.

Values for A10R50: $1.5K\Omega$ or resistor removed.

A10R122 - Channel 2 Position --same as Channel 1.

Values for A10R122: $1.5K\Omega$ or resistor removed.

A23R11 - Selected during manufacturing for best front-corner transient response of the Trigger View display with the A Trigger Source switch set to Ext: 10.

Values for A23R11: 43Ω , 51Ω , 62Ω , 75Ω , or 91Ω .

Cleaning & Servicing the DMM Circuit Board Assembly

If the DMM board must be serviced, handle the board carefully to prevent damage to the board and its switch assembly. Wear rubber gloves to prevent skin-oil contamination when working on the board. Also, to ensure accuracy and stability of the DMM, clean the solder residues using the following procedure located on Page 6-5 of the Maintenance Section of the manual.

1. Disassemble the board assemblies and the RANGE/FUNCTION Switch (if applicable).
2. Wash the repaired board(s) using a solution of 5% Kelite and 95% water.
3. Rinse the board(s) with clean water.
4. Wash the board(s) in an isopropyl alcohol bath and let them air dry.
5. Reassemble the board assemblies and the RANGE/FUNCTION switch (if applicable).

RANGE/FUNCTION Switch - The disassembly and assembly procedures are located on Page 6-29 of the Maintenance Section of the manual.

P/N for DMM Lead Assemblies

| | |
|-------------|------------|
| 195-1584-00 | Black Lead |
| 195-1585-00 | Red Lead |

Training

There will not be formal training classes for the 2337.

Management should ensure and allocate 8 hours for the appropriate technicians to study the manual, especially the Maintenance, Theory of Operation and Troubleshooting sections.

Recommended Inventory

| | | |
|---------|-----------------|---|
| A32U10 | P/N 156-1483-00 | 1 |
| A32U115 | P/N 156-0503-02 | 1 |
| A34U34 | P/N 156-1457-00 | 1 |

--Mike Laurens
53/108, Ext. 8688

463X: HARD COPY UNITS - MAINTENANCE OF DC MOTORS

HOW LONG SHOULD IT RUN?

The specification on the motor, P/N 147-0039-01, is 2,000 hours minimum, but life is dependent on application--speed, loading, and environment. You should get one year's operation (2,000 hours) on a motor in a 4631, 4632, or 4634--on the original set of brushes. This assumes "average" usage. Brush replacements should extend the motor's life up to 6,000 hours, under ideal loading conditions. Life expectancy of 4633A motors is less because of higher motor speeds and typically heavy usage. You can determine the age of a motor from the 2-letter date code on the vendor's label. It gives month and year of manufacture. "A" equals January, "B" equals February...and "L" equals December. The year may be decoded as follows:

| | | |
|---|---|------|
| Q | - | 1977 |
| R | - | 1978 |
| S | - | 1979 |
| T | - | 1980 |
| U | - | 1981 |

NOTE: A motor will not last long if operated under excessive load. A puddle of oil under the motor may indicate that the gearhead has overheated, with consequent bearing and gear damage.

HOW TO MAXIMIZE MOTOR LIFE

1. Measure the motor current - every time you work on the paper transport system. Be sure to check it when you replace the processor, as a tight or sticky belt can "do in" a motor. This should be the last thing you do before replacing the covers. Remove the red lead from the top motor brush connector and connect a DC current meter in series. Acceptable readings are:

| | |
|----------|------------------------------------|
| Idle --- | 1.9A maximum (.7-1.3A typical) |
| Run ---- | 2.4A maximum (1-1.8A typical) |
| Cut ---- | 2.6A maximum (1.2-2.0A typical) |

Measure 4633A current at 25mm/sec paper speed. The above figures are not a product specification, but should help you keep the unit running reliably. Lower than maximum current readings are strongly preferred.

2. Do not overtighten the chain and belt. Pull all the chain slack to the top section of the chain. When you release it, it should have 1/16" - 1/8" (1.6 - 3.2mm) free play at right angles to the direction of travel. This looseness will not degrade performance. The positive drive (cogged) belt is adjusted by loosening and sliding the motor bracket frontward or rearward. It should be just tight enough to take out the "slack". Excessive tension overloads the motor and causes wear to the gearhead and driveroller clutch.
3. Check the motor brushes (next to gearhead) regularly. Bad or worn brushes will damage the commutator.
4. Check a "suspect" motor's current with no load (remove belt and chain). Replacement is recommended if the current exceeds 0.7A DC.
5. Assure that local key operators are trained. Incorrect paper loading with a subsequent paper jam can overload a motor, despite the current limit circuitry. In the 4633A at 100mm/sec paper speed, the sudden stop due to a misaligned cutter actuator will strip the phenolic gear in the gearhead.

(ARTICLE CONTINUED ON THE NEXT PAGE)

463X: HARD COPY UNITS - MAINTENANCE OF DC MOTORS (cont.)

The only replaceable parts for the motor are the brushes. The gearhead is not repairable because of tight gearlash tolerances. A phenolic gear from one motor should never be placed in another motor.

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

463X: HARD COPY UNITS - MOTOR BRUSHES UPDATE

Reference: Wizards Workshop article
by George Kusiowski,
issue 11-4, dated March
6, 1981, p. 17.

The motor vendor has made some changes since the previous article was written. The motor and tach brushes are now equal in hardness, and the brush material is identical in color -- dark gray. The brush springs are different: The motor brush, P/N 118-0072-02, has a copper colored spring; the tach brush, 118-0072-01, has a black colored spring and slightly higher spring tension.

A new brush is 9/16 inches (1.43 cm) long. Brushes should be replaced when worn to one half new length. A suggested guideline is to replace them at 5/16 inches (0.80 cm) or less. Only motor brushes, P/N 118-0072-02, should require replacement. Tach brushes should last the life of the motor.

New brushes should be broken in if time and circumstances allow. Unload the motor (remove cog belt and chain), disconnect one of the tach leads, and run the motor for two hours. A reminder: The motor brushes are next to the gear head;

the tach brushes are toward the rear of the hard copy unit.

(See related article this issue.)

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

7600 SERIES/26XX COMPATIBILITY

Most 26XX plug-ins (26G3) require A14 on the mainframe main interface to be grounded. Before using the 2600/7000 Series adapter (013-0115-00), check the mainframe interface to ensure that A14 is grounded. 7600 Series will not work because of A14 being ungrounded.

Thanks to Doug Allen of the Chicago Service Center for his input. This information could save time for others in the future.

--Dick Freshour
53/108, Ext. 8691

067-0916-00 VIDEO AMPLITUDE CALIBRATOR (VAC) & 067-1011-00 DIGITAL SWEEP GENERATOR

Over the past several months I have received several inquiries pertaining to color signals, their specs, and how two new test fixtures, the 067-0916-00 VAC and the 067-1011-00 Digital Sweeper, fit into the picture. This article is intended to touch upon several of these points, and also to stand as the "reference article" for several new changes that will be published in the WIZARD'S WORKSHOP as they become finalized. The changes are mostly in the form of calibration procedure changes, and will be addressed separately.

Some Background--

Several years ago, there were a few interesting developments in electronics occurring almost simultaneously. In the early '60's, color television was a coming technology and transistors were

(ARTICLE CONTINUED ON THE NEXT PAGE)

making faint inroads into the limited areas of this science. With all of its collective wisdom, the FCC (and several industry leaders) decided that standardization of signals may indeed prove beneficial. One of several fallouts of this process was the "EIA Standard for Encoded Color Bar Signals", RS-189, a portion of which is shown in Figure 1.

This new signal standard provided not only luminance, chrominance and color phase information (the color bars themselves), but also quadrature information (the -I and Q signals). Of particular note here are the accuracies prescribed in this

early document. Referring to Figure 1, one notices only nominal values listed for the various chrominance and luminance figures, and Note 5 gives tolerances of 2.5 IRE in amplitudes and 2.5° in phase (roughly 1.8% and .7% respectively). These figures were probably arrived at with due regard to the transmitter/receiver systems capabilities of the era.

Early in the '70's, Tektronix, using some of the recent advances in semiconductor technology, released the first of a series of generators, the 140, designed to provide high quality, stable test signals for the various world systems. The 140, 144, and 146 Test Signal generators were all designed for NTSC systems, and conformed to RS-189 as of their date of manufacture.

(ARTICLE CONTINUED ON THE NEXT PAGE)

FIGURE 1
RS-189

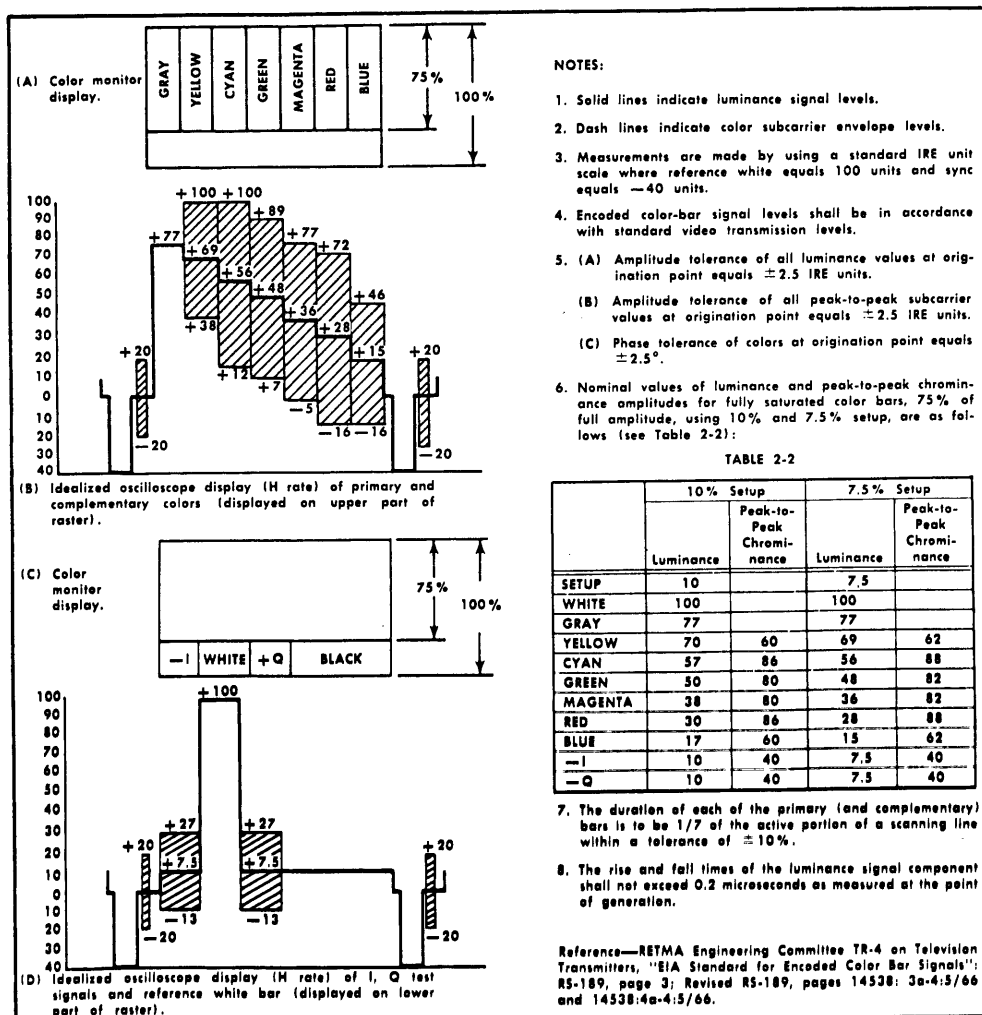


Fig. 1 Illustrations with notes showing the characteristics of a split field color bar signal using a 7.5% setup. Table 2-2 compares the amplitude of the color bars for 10% and 7.5% setup.

FIGURE 2

| | LUMINANCE | | CHROMA (P-P) | | PHASE | |
|-----------------|-----------|--------|--------------|--------|--------|------|
| | Calc. | Nom. | Calc. | Nom. | Calc. | Nom. |
| Reference Black | 7.50 | 7.5 | ϕ | ϕ | -- | -- |
| Reference White | 100.00 | 100.00 | ϕ | ϕ | -- | -- |
| Gray | 76.88 | 77.0 | ϕ | ϕ | -- | -- |
| Yellow | 69.24 | 69.0 | 62.19 | 62 | 167.1° | 167° |
| Cyan | 56.06 | 56.0 | 88.21 | 88 | 283.4° | 283° |
| Green | 48.43 | 48.0 | 82.37 | 82 | 240.8° | 241° |
| Magenta | 35.94 | 36.0 | 82.37 | 82 | 60.8° | 61° |
| Red | 28.31 | 28.0 | 88.21 | 88 | 103.4° | 103° |
| Blue | 15.13 | 15.0 | 62.19 | 62 | 347.1° | 347° |
| - I | -- | 7.5 | -- | 40 | | 303° |
| + Q | -- | 7.5 | -- | 40 | | 33° |

NOTES:

1. Waveform monitor measurements are made using a standard IRE scale.

2. A-Amplitude tolerance of all luminance values at origination point shall be ± 1 IRE scale unit of calculated value given in table following.

B-Peak-to-peak amplitude tolerances of all subcarrier values at origination point shall be ± 1 IRE scale unit with respect to the calculated values given in table following. (See also Note 6.)

C-Phase tolerance of color subcarrier, measured relative to color sync burst =

$\pm 1^\circ$ of calculated value given in table following.

Note: The above tolerances do not include tolerances involved in the measurement process.

3. Calculated and nominal values of luminance and P-P chrominance amplitudes for 100% saturated color bars of 75% amplitude with 7.5% setup are as follows (chrominance and luminance in IRE units). These values are calculated from the equations given in FCC Rules, §73.682(20).

(ARTICLE CONTINUED ON THE NEXT PAGE)

FIGURE 2A

$$\begin{aligned}
 1- \quad E_M &= E_Y' + [E_Q' \sin(\omega t + 33^\circ) + E_I' \cos(\omega t + 33^\circ)] \\
 2- \quad E_Q' &= 0.41 (E_B' - E_Y') + 0.48 (E_R' - E_Y') \\
 3- \quad E_I' &= -0.27 (E_B' - E_Y') + 0.74 (E_R' - E_Y') \\
 4- \quad E_Y' &= 0.30 E_R' + 0.59 E_G' + 0.11 E_B'
 \end{aligned}$$

The introduction of RS-189A in July of 1976 did not change the fundamentals of the color bar test signals used, however, in referring to Figure 2 and Note 2, one notices tolerances becoming increasingly tighter, the amplitudes spec'd to 1 IRE and phase to 1°. Some small changes in chroma phase occur as a result of increased accuracies and will be addressed later.

Of particular interest, however, is Note 3 of Figure 2. It refers to equations given in FCC Rules, 73.682(20). See Figure 2A. New generator lines introduced after 1976, in particular the TSG-7 and the 1900, will have their specifications for luminance and chrominance levels calculated from these equations and listed in millivolt levels, with the possible exception of some very early TSG-1 manuals. These old TSG-1 manuals may reflect values derived from the table in Figure 2. These values contained some rounding error and should be dealt with accordingly. However, this does not mean that older 140 Series generators must be discarded and replaced. We now have the capability of adjusting to RS-189A quickly, easily and accurately.

Past calibration techniques that were considered to be sufficiently accurate will no longer be adequate. These consisted of various combinations of 529 or 1480 waveform monitors, 547/1A5 Oscilloscopes, Chopped Voltage references, filters, notches, multiturn potentiometers, and others. These had a multitude of drawbacks, including impedance mismatches, frequency response errors, conversion tables, equipment tolerances, long term accuracy and drift, and eventually repair/parts problems and lack of traceability. Errors in amplitude measurements with a waveform monitor having a 46dB common mode rejection ratio, a 2% frequency response error and multichrominance amplitudes. These are outside even the specs of older instruments.

With recent introduction of the TSG-7, we have specified the use of a 1480 Mod W5F and 067-0916-00 for amplitude calibration. With these two units, worst case errors

will be 0.1125% for luminance amplitudes and 0.7225% for chrominance amplitudes. With the availability of this new equipment, we will no longer specify the older calibration methods in new cal procedures (chopped voltage reference, 1A5, etc.). The new units will provide sufficient accuracy to exceed the instrument specifications and thereby exceed RS-189A accuracy requirements.

The 067-0916-00 is not limited to NTSC. It has levels for the four major world standards--at the touch of a button. In addition to preset levels for major color bar signals used, the VAC (067-0916-00) has a set of lever switches that allows selection of any voltage between 0 and 999.9mV for comparisons/adjustments at a 0.1mV increment and with an accuracy of 0.05%. The major features provided as presets are:

1. 4 Color Systems
 - a. NTSC
 - b. PAL
 - c. PAL-M
 - d. SECAM
2. Color Bar Luminance Levels
 - a. PAL as %
 - b. NTSC as IRE
3. Color Bar Chrominance Levels
4. Full/Reduced Amplitude Bars
5. Set-up
6. Chrominance R-Y and B-Y

Figure 3 gives an example hook-up to adjust a Waveform monitor's internal calibrator. Figure 4 gives an example hook-up to adjust luminance levels in a generator under test. Due to the presence of harmonics on the signal coming from a generator and their possible effects on the signal (Figure 5), an example hook-up in Figure 6 shows the insertion of a sub-carrier harmonic rejection filter in the signal path coming from the generator under test when making chrominance measurements. To allow for the insertion loss of this filter, a 0.6% attenuator is placed in the path of the VAC signal.

(ARTICLE CONTINUED ON THE NEXT PAGE)

067-0916-00 VIDEO AMPLITUDE CALIBRATOR (VAC) & 067-1011-00 DIGITAL SWEEP GENERATOR (cont.)

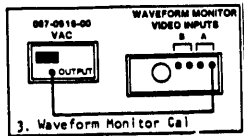


FIGURE 3

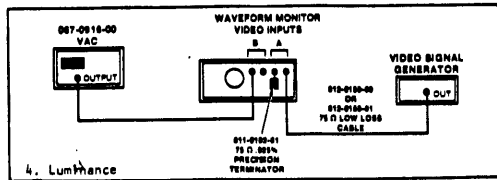


FIGURE 4

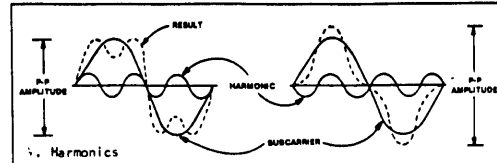


FIGURE 5

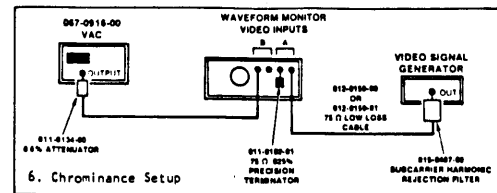


FIGURE 6

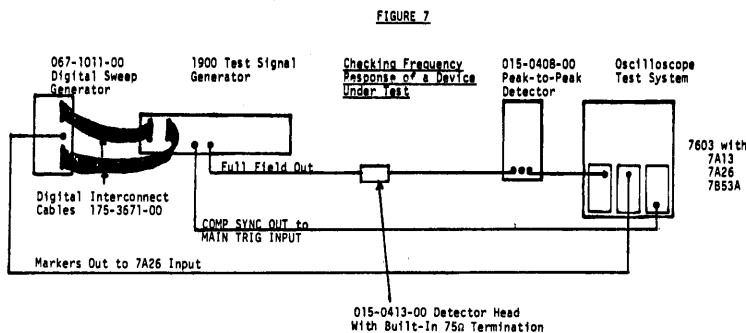
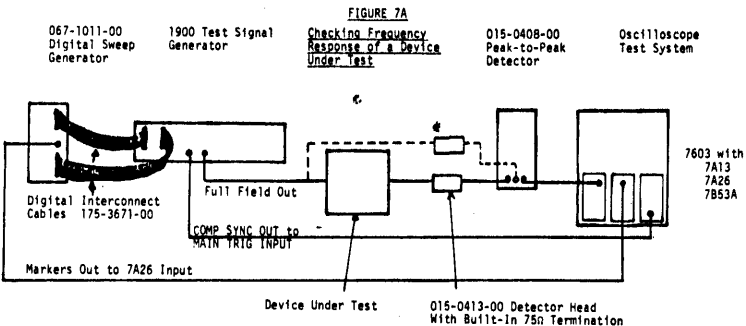
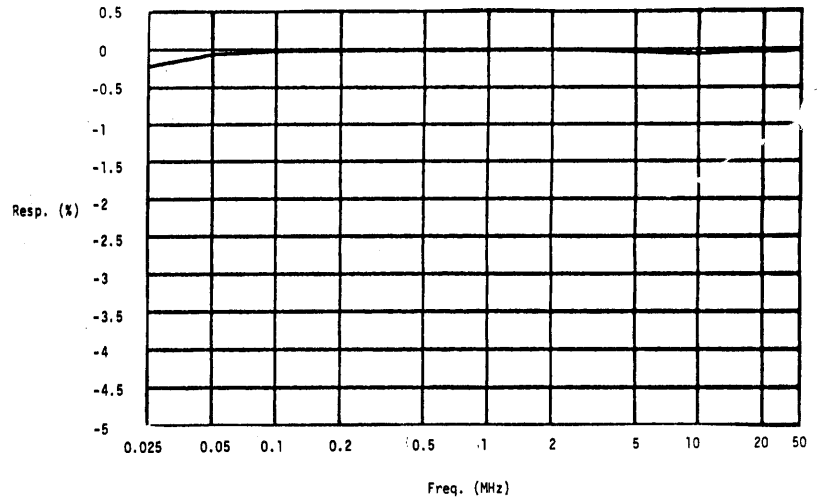


FIGURE 7A



* Note the possible use of an additional 015-0413-00 Detector Head in a differential mode, allowing one to eliminate external signal anomalies.

FIGURE 7B
DETECTOR FREQUENCY RESPONSE (0.9VPP)



Beside the obvious needs for the better accuracies that the VAC can provide, there will be a substantial savings in calibration/QC time realizable. Early production line experience has indicated approximately 20-25% time savings realizable over the older chopped voltage reference methods when calibrating contemporary equipment (1410/TSG 1, etc.).

The 067-1011-00 (available Winter 1981) Digital Sweep Generator, when combined with a Tektronix 1900 Test Signal Generator, 015-0408-00 Peak-to-Peak Detector, and a 015-0413-00 Detector Head, will now provide the television services a precisely defined frequency response standard heretofor virtually unachievable at reasonable costs. The 067-1011-00, when used in conjunction with a 1900, provides a digitally derived sine wave sweep throughout the video baseband (55.93kHz to 7.159MHz). Due to the digital signal generation used in the 1900, this will set chrominance to luminance gain on other signals (color bars, modulated pulse, etc.) accurately without further adjustments.

The 015-0408-00 (available Winter 1981) Peak-to-Peak Detector System is designed primarily for setting base band frequency response. The frequency response of a 1900 may be calibrated using an equipment set up similar to Figure 7. The 1900 can then be used as an accurate transfer standard in the calibration of waveform monitors, vectorscopes, and other devices.

(ARTICLE CONTINUED ON THE NEXT PAGE)

067-0916-00 VIDEO AMPLITUDE CALIBRATOR (VAC) & 067-1011-00 DIGITAL SWEEP GENERATOR (cont.)

The 015-0413-00 (available Winter 1981) Detector Head provides 75 ohm termination and is used with the Peak-to-Peak Detector right at the signal source, connecting to the Peak-to-Peak Detector with a length of low loss coaxial cable. The detector amplifier provides not only a high impedance load for the detector head, but also corrections for offset and gain errors not commonly found in other commercially available detectors. By using both inverting and non-inverting inputs, the detector can be used to make differential measurements from the input to the output of an instrument, thereby eliminating any errors in the source generator. Figure 7A illustrates a typical setup for frequency response measurement.

Figure 7B illustrates a typical frequency response curve of a sample detector head. These devices will not be serviceable by the user, will be verifiable by returning to the Tektronix Standards Lab through Factory Service, and will be shipped to the user with a reference response graph included. Frequency response measurements will be specified for the following accuracies:

| | |
|----------------|-----|
| 50kHz to 5MHz | .2% |
| 100kHz to 5MHz | .1% |

Application notes for the use of these devices are being formulated and are expected to give the customer detailed insight into what is now possible with regards to traceability and precision calibration.

Some More About Color--

Some of you have had questions as to the apparent change in color vector locations with reference to the 520A vector graticule. Using the mV levels specified by RS-189 and conformed to by the 140 Series generators, Figure 8 gives a breakdown of the color component levels and their resultant color phase relationships.

FIGURE 8

| COLOR | CHROMA | RS-189 -- 140 Series | | | | PHASE | NOMINAL P-P |
|---------|--------|----------------------|-------|-------|--------|--------------|-------------|
| | | R - Y | B - Y | IRE* | PHASE | | |
| | P-PmV | P-PmV | P-PmV | CALC. | ANGLE | CHROMA (IRE) | |
| Yellow | 445.09 | 95.6 | 434.7 | 62.34 | 167.6° | 62 | |
| Cyan | 625.89 | 608.5 | 146.5 | 87.66 | 283.6° | 88 | |
| Green | 588.32 | 512.9 | 288.2 | 82.40 | 240.7° | 82 | |
| Magenta | 588.32 | 512.9 | 288.2 | 82.40 | 60.7° | 82 | |
| Red | 625.89 | 608.5 | 146.5 | 87.66 | 103.5° | 88 | |
| Blue | 445.09 | 95.6 | 434.7 | 62.34 | 347.6° | 62 | |

*100 IRE = 714mV

Figure 8A gives the corresponding values for RS-189A. These are the numbers used in the TSG-1, TSG-7, 1900 and VAC.

FIGURE 8A

| COLOR | CHROMA | RS-189A -- 1410 Series, 75% Amplitude, 7.5% Setup | | | | PHASE | NOMINAL P-P |
|---------|--------|---|-------|-------|--------|--------------|-------------|
| | | R - Y | B - Y | IRE* | PHASE | | |
| | P-PmV | P-PmV | P-PmV | CALC. | ANGLE | CHROMA (IRE) | |
| Yellow | 444.2 | 98.9 | 433.0 | 62.22 | 167.1° | 62 | |
| Cyan | 630.1 | 612.9 | 146.3 | 88.25 | 283.4° | 88 | |
| Green | 588.5 | 513.9 | 286.8 | 82.42 | 240.8° | 82 | |
| Magenta | 588.5 | 513.9 | 286.8 | 82.42 | 60.8° | 82 | |
| Red | 630.1 | 612.9 | 146.3 | 88.25 | 103.4° | 88 | |
| Blue | 444.2 | 98.9 | 433.1 | 62.22 | 347.1° | 62 | |

*100 IRE = 714mV

Figure 9 gives the difference in amplitude and degrees between the old and new standards.

FIGURE 9

| COLOR | CHROMA | RS-189 vs RS-189A | | | | PHASE | NOMINAL P-P |
|---------|--------|-------------------|-------|-------|-------|--------------|-------------|
| | | R - Y | B - Y | IRE* | PHASE | | |
| | P-PmV | P-PmV | P-PmV | CALC. | ANGLE | CHROMA (IRE) | |
| Yellow | .89 | 3.3 | 1.6 | .14 | 0.5° | 0 | |
| Cyan | 4.21 | 4.4 | .2 | .59 | 0.14° | 0 | |
| Green | .18 | 1.0 | 1.4 | .02 | 0.13° | 0 | |
| Magenta | .18 | 1.0 | 1.4 | .02 | 0.13° | 0 | |
| Red | 4.21 | 4.4 | .2 | .59 | 0.14° | 0 | |
| Blue | .89 | 3.3 | 1.6 | .14 | 0.5° | 0 | |

*100 IRE = 714mV

These numbers relate directly to a vector display such as the 520A. Figure 10, A-F, illustrates the calculated location of each point within its associated box in the pattern. Each color has both old and new vector values illustrated, along with the design dimensions of the actual CRT presentation in a 520A. (Figure 10 on following page.)

The 520A CRT graticule will probably not be changed due to the small differences involved, oftentimes less than a trace width.

Instruction manual changes are being implemented to take advantage of the VAC's capabilities, immediately, the 067-1011-00 when it becomes available. The TSG-7 presently specifies the VAC, and several other instruments have Instruction Manual changes in progress. These changes will be published in WIZARD'S WORKSHOP articles as they become available. The 1900 final Service Manual will specify an 067-1011-00.

New instruction manuals are going to specify the VAC and a 1480 Mod W5F

(ARTICLE CONTINUED ON THE NEXT PAGE)

067-0916-00 VIDEO AMPLITUDE CALIBRATOR
(VAC) & 067-1011-00 DIGITAL SWEEP
GENERATOR (cont.)

(and an 067-1011-00 where appropriate). To continue to insure or increase our calibration accuracies, these are becoming "must have" items. They will provide not only the accuracy, but also reliability, repeatability, cost savings, flexibility, less down time for the bench, and are usable in traceability programs.

As new instruments achieve PSR (Product Shipment Release), information will be provided to allow the unit to be put on a traceability program, starting with the TSG-7 and the VAC. This information should include such things as "Before and After" data, NBS numbers, serial numbers of calibration units, dates, etc. Older instruments will have information sheets provided as time permits or where a definite need arises. Figure 11 illustrates the steps being established for traceability programs. Additional "paths" are expected and will be promulgated as appropriate.

The VAC is available now. It comes with the Subcarrier Harmonic Rejection Filter (015-0407-00), 0.6% attenuator (011-0134-00), and precision terminator (011-0102-01). The 067-1011-00 should be available in the autumn of 1981. It includes an 015-0413-00 Detector Head will also be orderable separately.

Other measurement/calibration needs are being addressed and acted upon as appropriate. The word will be out when they're available.

To insure continued accuracy and to provide for traceability requirements, it is necessary for Service Centers to get their 1485's, VAC's, Digital Sweepers and other test equipment on calibration cycles. Before and After data sheets will be published for these in future WIZARD articles as soon as they are developed.

FIGURE 10

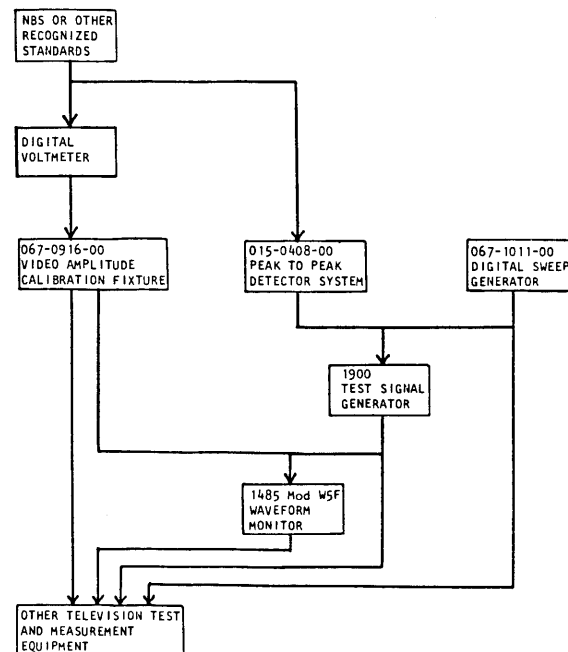
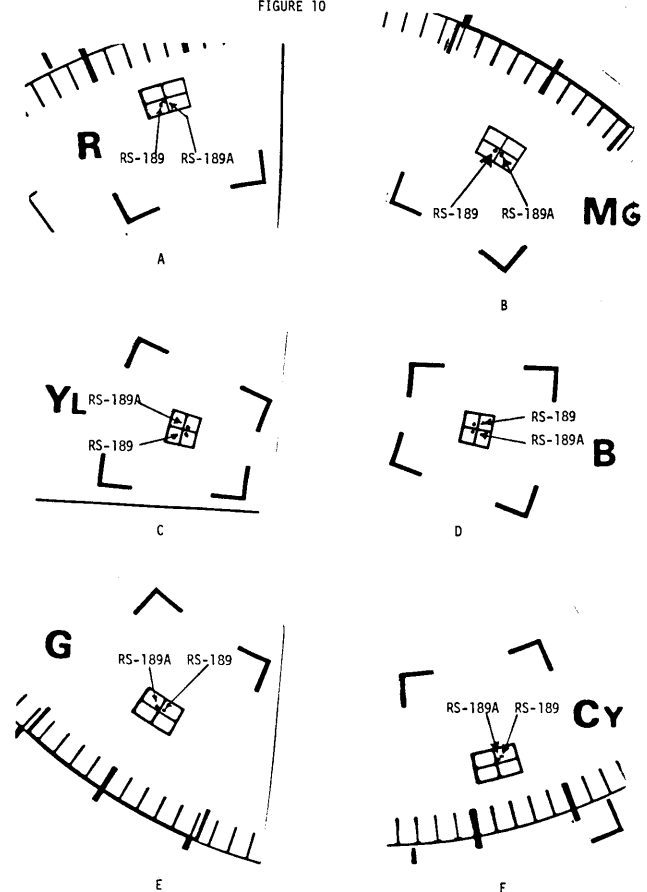


FIGURE 11: ESTABLISHING NBS TRACEABILITY OF TELEVISION SIGNAL AMPLITUDE AND FREQUENCY RESPONSE MEASUREMENTS

--Bill Bean
53-108 Ext.8695

**MICROLAB 1 AND MICROLAB PERSONALITY CARD
PART NUMBERS**

The purpose of this article is to update a previous part number list. Due to the extent of the changes the entire list will be reproduced.

| | |
|---------------------------------------|-------------|
| Microlab 1 (120v, North American) | 067-0892-00 |
| Microlab 1 (220v, Universal European) | 067-0892-01 |
| Microlab 1 (240v, U.K.) | 067-0892-02 |
| Microlab 1 (240v, Australian) | 067-0892-03 |
| Microlab 1 (240v, North American) | 067-0892-04 |

Standard Accessories

| | |
|---------------------------------|-------------|
| Instruction Manual | 070-2827-01 |
| Cassette Cable Assembly (Red) | 175-5100-00 |
| Cassette Cable Assembly (Black) | 175-5101-00 |

(Also included will be one of the following power cords depending upon the location.)

| | |
|-----------------------------------|-------------|
| Power Cord (120v, North American) | 161-0066-00 |
| Power Cord (240v, European) | 161-0066-09 |
| Power Cord (240v, U.K.) | 161-0066-10 |
| Power Cord (240v, Australian) | 161-0066-11 |
| Power Cord (240v, North American) | 161-0066-12 |

Optional Accessories

| | |
|---------------------------|-------------|
| Personality Extender Card | 067-0910-00 |
| Rs-232 Cable | 012-0630-01 |
| Buss Expansion Cable | 015-0393-00 |

Personality Card and Personality Card Accessories Part Numbers

| | |
|---|-------------|
| 1802 Personality Card | 018-0144-00 |
| Standard Accessories | |
| 1802 Personality Card Supplement to Microlab Instruction Manual | 070-2866-01 |
| F8 Personality Card | 018-0145-00 |
| Standard Accessories | |
| F8 Personality Card Supplement | 070-2864-01 |
| 6800/6802/6808 Personality Card | 018-0151-00 |
| Standard Accessories | |
| 6800/6802/6808 Personality Card Supplement | 070-2939-01 |
| 8085 Personality Card | 018-0146-00 |
| Standard Accessories | |
| 8085 Personality Card Supplement | 070-2860-00 |
| Z80 Personality Card | 018-0156-00 |
| Standard Accessories | |
| Z80 Personality Card Supplement | 070-2861-00 |
| Z8000 Personality Card | 018-0171-00 |
| Standard Accessories | |
| Z8000 Personality Card Supplement | 070-2863-00 |
| 6809 Personality Card | 018-0157-00 |
| Standard Accessories | |
| 6809 Personality Card Supplement | 070-3984-00 |

The remaining personality cards support microcomputers that require software to be loaded from a floppy disc. The floppy disc may be for an 8002A or an 8550. For clarity, the remaining personality cards will be listed first for the 8002A and then for the 8550. The only difference between the two are the media.

8002A Support

| | |
|---------------------------------------|-------------|
| 3870 Personality Card | 018-0147-00 |
| Standard Accessories | |
| 3870/3872 Software | 062-4125-00 |
| 3870/3872 Personality Card Supplement | 070-2862-01 |
| 6500/1 Personality Card | 018-0153-00 |
| Standard Accessories | |
| 6500/1 Software | 062-4452-00 |
| 6500/1 Personality Card Supplement | 070-2941-01 |
| MCS48 Personality Card | 018-0152-00 |
| Standard Accessories | |
| MCS48 Software | 062-4662-00 |
| MCS48 Personality Card Supplement | 070-2937-01 |

8550 Support

| | |
|---------------------------------------|-------------|
| 3870 Personality Card | 018-0147-01 |
| Standard Accessories | |
| 3870/3872 Software | 062-5409-00 |
| 3870/3872 Personality Card Supplement | 070-2862-01 |
| MCS48 Personality Card | 018-0152-01 |
| Standard Accessories | |
| MCS48 Software | 062-5411-00 |
| MCS48 Personality Card Supplement | 070-2937-01 |

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

PG506 MAINBOARD REPLACEMENT

Serial Numbers Affected: All instruments below B04000.

The new main board assembly, P/N 672-0455-02, is not a direct replacement and requires kit #050-0764-04 for installation. If your instrument does not have relay circuit board, P/N 670-4328-01,

(ARTICLE CONTINUED ON THE NEXT PAGE)

PG506 MAINBOARD REPLACEMENT (cont.)

installed, then you will also need to order Kit #040-0774-01.

The microfiche did not originally reference the 050 kit and corrections have been sent. Thanks to Jim Mauck in Rockville for this information.

--Terry Turner
92-236, Ext. 1288

528A WW, WX INTERMITTENT LOSS OF EXTERNAL SYNC

Reference: 528A Manual P/N 070-3802-00

Some 528A WW and WX units have been turned in for service for an intermittent loss of external sync. Two possible failure modes exist here.

1. Wires and pins on the relay (K380) socket may be touching.
2. C593 (on the relay socket) may be touching the CRT shield.

In both cases, good wire/parts dressing away from contact should be appropriate.

If the wires going to the socket continue to give problems, some lengths of heat-shrink tubing will help.

Service Support needs to know the frequency of problems concerning wire and pin contact. Contact Bill Bean with your information.

--Bill Bean
53/103, Ext. 8695

528 REMOTE PLUG

Reference: 528 Manual P/N 070-0800-00

The remote plug (136-0099-00), shipped as a standard accessory with this product, has proven to be too loose in the relay socket. This was due to the pins being too small.

Where a plug is necessary, use a 136-0099-01. It is properly sized and is currently being used in the 528A.

--Bill Bean
53/108, Ext. 8695

607A FLOOD GUN WIRES SHORT TO GROUND

The flood gun wires on the 607A CRT may short to the mu-metal shield. This will ground the collimation or target leads (pins 1 and 7 of P1000) and possibly damage R1046 or the +175V supply. To prevent this problem, manufacturing has been applying a four inch length of common black electrical tape to the inside of the mu-metal shield in the vicinity of the electrode terminals on the CRT.

The tape, however, has not satisfied the need. Reports continue of leads 1 and 7 shorting to ground. To solve the problem, a polyester insulator, part number 342-0127-00 may be used. This 3.0" X 1.7" X .010" insulator has an adhesive back for easy application.

Mu-metal shields (337-2081-00) shipped from Customer Service stock lack both the tape and the above mentioned insulator. It is therefore necessary that the insulator be applied when installing a new mu-metal shield.

--George Kusiowski
63-503 ext. 3928 (WI)

620 INTERMITTENT SPOT SHIFT

The 620 monitor has shown intermittent diagonal spot or display shift. The problem lies in the P100 connection between the power supply board and the deflection/z-axis board. The pins on the power supply are too long and the top six pins may contact a run on the deflection/z-axis board.

Manufacturing is presently using diagonal cutters to shorten the P100 pins by 1/8 inch (3mm). Engineering has pro-

(ARTICLE CONTINUED ON THE NEXT PAGE)

620 INTERMITTENT SPOT SHIFT (cont.)

posed a modification to correct the problem.

Any 620 products returned for service should be checked for P100 pin length and if necessary the pins should be shortened as described above.

--George Kusiowski
63/503, ext. 3928 (WI)

7854, GPIB, IEEE-488, CONNECTOR
MOUNTING IMPROVEMENT

Reference: 7854 Instruction Manual
P/N 070-2874-01
Corporate Mod M42456

The rivet-type post spacers used to attach the connector to the mounting plate, Figure 2-94 in M.P.L., are being replaced with threaded stud-type spacers secured with nuts. A field modification kit has been set-up to provide parts and instructions for installation. Its P/N is 040-1011-00 and should be installed in any instrument where the posts are loose or missing, or if it is known, more than one cable is being connected to the G.P.I.B. connector.

--John Eaton
53/108, Ext. 8698

