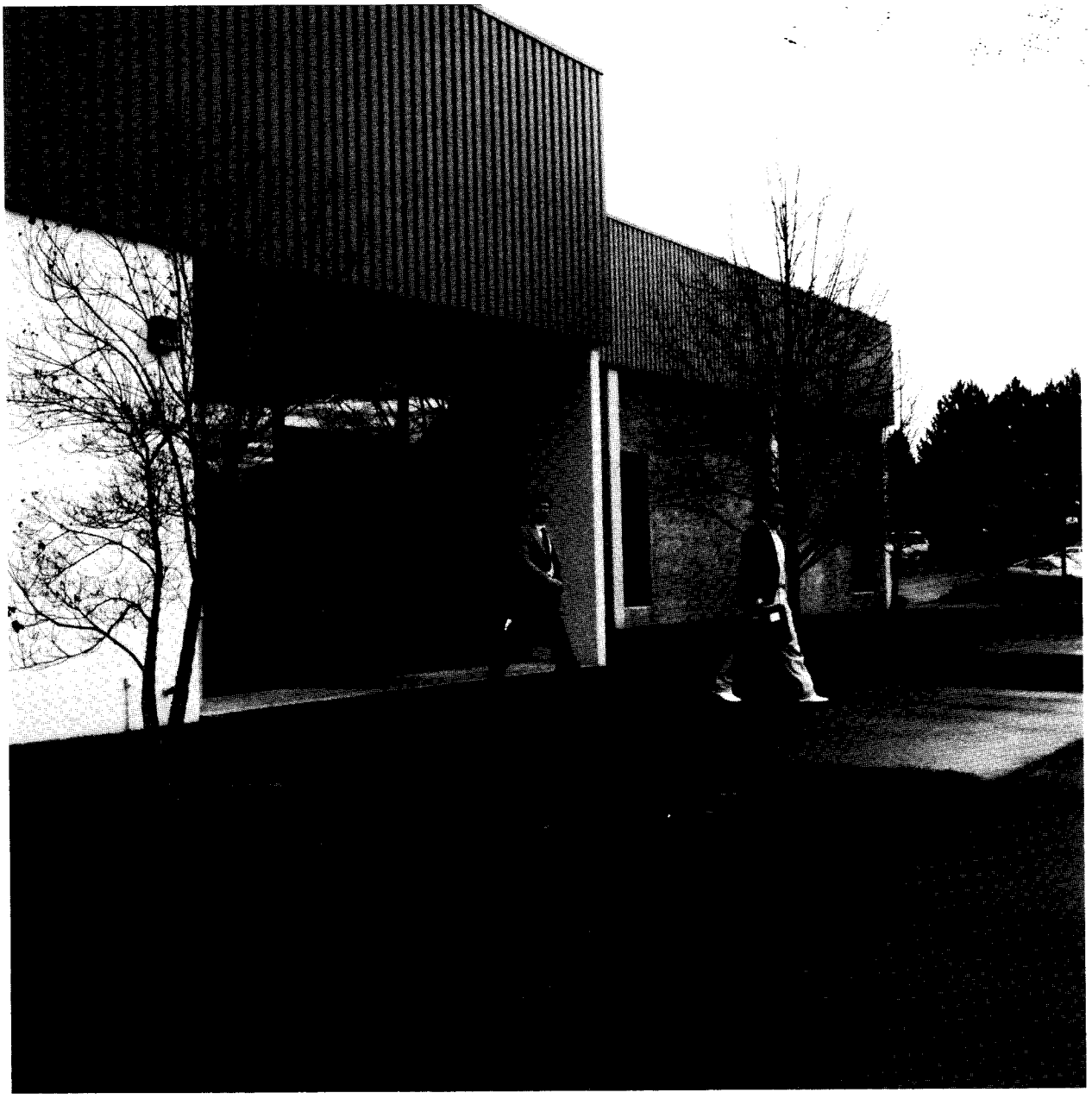
TEK CUSTOMER PRODUCT SERVICING INFORMATION

August 1988, Issue 52

SERVICETEKNOTES

TEKTRONIX—EVER SEARCHING FOR NEW AND BETTER PRODUCTS TO SERVE YOUR NEEDS!



CG5001

Building 94, where *SERVICETEKNOTES* originates—Corporate Service Training Center at Walker Road Industrial Park, Beaverton

Published by Tektronix Service Operations Support

Tektronix®
COMMITTED TO EXCELLENCE

TO OUR CUSTOMERS

The Tektronix Service Organization firmly supports a policy of assuring continued utility of products sold by Tektronix.

This publication is meant to provide technical information to the customer who has elected to maintain his own Tektronix products. It contains product servicing information and is written for the technician. The notation at the bottom of each article (W2 Issue: XX-X) signifies that the article has previously been published in a publication known as *WIZARDS' WORKSHOP*.

Articles are submitted primarily by Corporate Service Support & Planning personnel thoroughly familiar with the products they support.

SERVICETEKNOTES also encourages you, the customer, to submit articles for publication. If you have knowledge of a technique, procedure or idea that enables you to service your Tektronix product more effectively, write it up so others may benefit from your experience.

Articles for publication should be submitted directly to:

TEKTRONIX, INC.,
SERVICETEKNOTES, Editor
P.O. Box 4600, M/S 94-925
Beaverton, Oregon 97076 - 9958

The Editor and staff of *SERVICETEKNOTES* provide the material in this publication as a service to users of Tektronix products. While we have tried to be diligent in assuring the accuracy of the material which we have printed, we cannot guarantee its accuracy. Neither *SERVICETEKNOTES*, its editor and staff, Tektronix, Inc., nor its representatives assume any responsibility for the use of the material printed in this publication; nor can we assume any responsibility for any errors or for the resulting effects of any errors.

SERVICETEKNOTES is distributed by Service Operations Support free of charge to customers who maintain their own Tektronix equipment. A customer may ask to be added to the distribution list by applying through his local Tektronix Sales Engineer. Please send all pertinent mailing information to *SERVICETEKNOTES* , M/S 94-925, Beaverton.

TABLE OF CONTENTS

MAG Latch: Relay Screw Changed 1

AVC20: Parts Improvement 1

CG5001: Wrong Part May Have Been Installed 2

ECO170A: Oscillations and Fault Lights 2

S3200: DC Subsystem Amplifier Performance Improvement 3

S3295: Dual Pin Card Driver Aberration Verification Test Released 4

S3295: Dual Pin Card I/O Probe Adapter Fixtures Modified 5

S3295: Force/Compare Memory Board Timing Improved 5

S3295: Pattern Procesor Timing Controller Board Improvement 6

TSG6/TSG16P: IC Socket Added 7

TSG170A/SPG170A/TSG300: Incorrect Part Installed 8

TSG170A/SPG170A/ECO170A/TSG300/TSG271/SPG271:
Power Supply Reliability Improvement 8

TSG170A/SPG170A/TSG300/TSG271/SPG271:
SYNC Lock Jitter Improvement 9

TSG300: Finished Instruction Manual Available 9

TSG300: Signal Set Change 9

WFM300: CRT Change 10

WFM300: Variable Gain Range Improvement 10

110S: Test Selectable Part Change 11

118AS/118F01: IC Timing Problem 11

148: Transistor Heat Sink on Modulator Board 11

465: Support Extended 11

(Over)

TABLE OF CONTENTS

650/A/HR/Series: Component Selection Necessary When Q4090 is Replaced 12

751: Interim Service Manual Available 12

1410R/TSP1, 1411R/TSP11, 1412R/TSP21: Capacitor Change Required With a New Type of IC 12

1420 Series: Transistor Part Number 12

1480 Series: Rear Panel Changed and Hardware Added to Volts Full Scale Switch 13

1481R MOD W5C: Updated Manual Insert Available 13

1710B Series: Input Compensation Drift Improvements 13

1710B/1720/1730 Series, WFM300, 1705/760: Power Switch Cable Assembly Changed to Avoid Binding 14

1720 Series: Microprocessor Change/Improvement 14

1720 Series: Sporadic Noise During Phase Shifter Rotation 15

1720 Series: Washer Added to Phase Shifter 15

1730 Series: Adjustment Difficulties Due to Transistor Vendors 15

1730 Series: Bandwidth Adjustment Improvement 15

1740: Option 7 Transistor Change 16

1740/1750 Series: Vertical Frequency Response Adjustment 16

1750 Series: Coil Heat Dissipation Reduced 17

1750 Series: Power Supply Improvements 17

1750 Series: SCH Display/Measurement Improvement 18

1980: Change to SYNC IC Circuit 18

2210: Service Manual Available 19

(Over)

TABLE OF CONTENTS

2210/2225: Vertical Balance Offset Between X1/X10 Gain 19

2220/2221/2230: Insufficient Horizontal Position Range in Store Mode or Horizontal Offset Between Store and Nonstore Mode 19

2225: CRT Socket and Wire Assembly Part Number 20

2245A/2246A: DC Volt Readout Incorrect in Channel Two 20

2245/2245A/2246/2246A: Horizontal Readout Jitter Minimized 20

2245/2245A/2246/2246A: Line of Dots at Center Screen 21

2630: Service Manual 21

4120 Option 30/4100F30: 16-Inch Display's Deflection Board Modification and Part Number Change 21

7612D: New Plug-In Guide Available 22

MAG LATCH: RELAY SCREW CHANGED

REF: Mod #66632

CG5001	B064433
CG551AP	B064433
DC5010	B052265
DC510	B052238
DC5009	B064023
DC509	B064003
DP501	B010826
FG5010	B052311

The mounting screw for the 148-0128-03 Mag Latch relay has been changed to Tek part number 213-1028-00. The new screw is longer than the screw it replaces. The longer length allows for more secure fastening of the relay without stripping out the plastic housing. This screw is a direct replacement for all screws previously used to mount the relay. The products listed at the beginning of this article have the new screw installed at the factory starting at the serial numbers listed above.

This screw requires a TORX screwdriver for installation. A TORX head bit to fit magnetic screwdriver handles is available as Tek part number 003-1413-00. It is recommended the screw be tightened to 1.25 inch pounds of torque.

W2 Issue: 18-14

AVC20: PARTS IMPROVEMENT

REF: AVC20 INSTRUCTION MANUAL, P/N 070-5979-00

MODIFICATION NO. M66715

Due to increased reliability of parts from our vendor, A1U520 has been changed to P/N 156-0577-00.

Use the new part number on an "as fails" basis.

Mod 66715 will be installed in new instruments form the factory starting with Serial Number B010744.

W2 Issue: 18-13

CG5001: WRONG PART MAY HAVE BEEN INSTALLED

REF: CG5001, SN B064400 to B064420, A9Q3063

We discovered that a wrong part may have been installed in a limited number of CG5001's. With this wrong part installed, the CG5001 will function normally, except that the CMOS RAM battery will fail after a few months. The affected CG5001's are believed to all be in the serial number range of B064400 to B064420.

If you receive a CG5001 with a failed battery, or if you service a CG5001 in this serial number range, be sure to inspect A9Q3063. This transistor should be NPN, Tektronix part number 151-0190-00. A few PNP parts, marked either 151-0188-00 or 2N3906 were inadvertently installed. The PNP part creates a discharge path for the battery while the CG5001 is turned off, substantially reducing battery life.

W2 Issue: 18-11

ECO170A: OSCILLATIONS AND FAULT LIGHTS

REF: ECO170A Instruction Manual
P/N: 070-6113-00

Mod #67095

The ECO170 has received modifications to address two problems.

- A possibility of oscillations in the pulse outputs
- A Fault Light that comes on after repeated operation of the Fault Clear button when 3 video inputs are used.

The first problem has been addressed by adding three 4.7 pF compensation capacitors, P/N 283-0140-00, to the back of the board as follows:

- C587 is added between U587 pin 2 and the ground end of C584
- C687 is added between U687 pin 2 and the ground end of C684
- C787 is added between U787 pin 2 and the ground end of C784.

The second problem was addressed by a software change in A2U210. The new part number for this IC is 160-4339-02.

Both changes are to be installed on an as required basis to address the stated symptoms.

Mod 67095 is being installed in new ECO170A's from the factory starting with S/N B010272.

W2 Issue: 18-15

S3200: DC SUBSYSTEM AMPLIFIER PERFORMANCE IMPROVEMENT

REF: MOD #47277, *Wizards' Workshop*, Issue: 12-22

MOD.#66798

MANUALS:

1804 VOL.2, P/N 070-3331-02
1804V/S3220 VOL.2, ADDENDUM 061-2808-00
1805 VOL.2, P/N 070-3338-00
1807 VOL.2, P/N 070-4134-00
1809V VOL.2 PARTS, P/N 061-2849-00
1809V VOL.3 DIAGRAMS, P/N 061-2848-00

AFFECTED CIRCUIT BOARDS:

MODS #47277 AND #66798
1804, 670-2826-06/07
1804V/S3220/5 670-7140-00/01
1805, 670-5479-02/03/04
1807, 670-2826-06/07
1809V, 670-8668-00

Note: Mod #52884 changed DC Sub Amp. 670-5479-03 to 04 by removing sockets at U13, Q131, and Q140. Also, a disk insulator P/N 386-1130-00 is added for Q140.

Mod #47277 was done on 670-2826-06, 670-5479-02, and 670-7140-00 to reduce oscillations. This mod should be installed to bring the boards to the latest revision level prior to installation of mod #66798. Refer to the Wizards Workshop, issue 12-22, page 10, for instructions and part numbers pertaining to mod #47277.

Mod #66798 is being done on the DC Sub-System Amplifier boards for couple of good reasons. First, the GFC relay, K1050S1, driven by the coil K1050, does not close reliably.
The coil, 108-0355-00 does not provide sufficient drive to consistently close the reed switch. The replacement coil is P/N 108-0966-01. The original reed switch P/N 260-0722-00, will still be used. This coil and reed switch replacement should be done if the board is repaired for any reason.

The second part of Mod #66798 is for replacement of U250, the Burr-Brown module P/N 156-0370-00, which is no longer available from the vendor. Additionally, the Burr-Brown module did not supply enough output voltage with relation to input current on the 100 mA range. The replacement for U250 is a plug in ECB P/N 671-0525-00. It includes an AD382KH OP Amp P/N 156-3280-00. The ECB is simply inserted in place of U250. The offset adjustment, R140 will no longer be functional, and may be removed from the Amplifier board if desired. After the mod the offset adjustment will be on the ECB and will be labeled RV10.

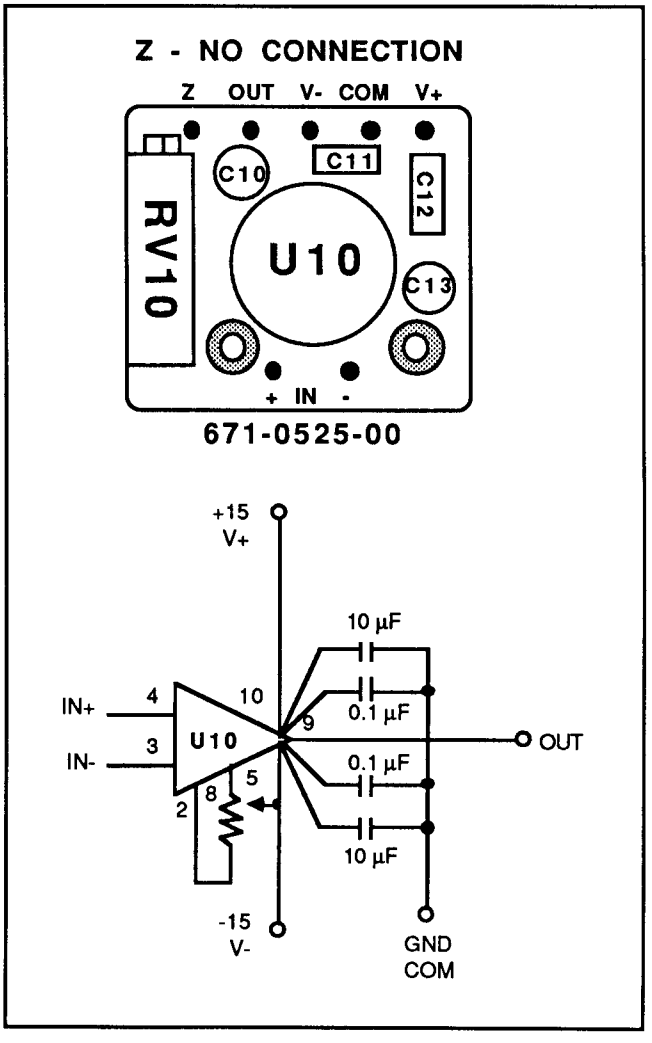


Figure 1

(Article continued on the next page)

S3200: DC SUBSYSTEM AMPLIFIER PERFORMANCE IMPROVEMENT (Continued)

U10	156-3280-00	AD382KH
C10	290-0536-00	10 µF 25 V
C11	283-0421-00	0.1 µF 50 V
C12	283-0421-00	0.1 µF 50 V
C13	290-0536-00	10 µF 25 V
RV10	311-1319-00	10K 15 Turn

After the modifications the part numbers will be:

670-2826-08
670-5479-05
670-7140-02
670-8668-01

Part number revision stickers are available from CMS by ordering:

006-2154-00 for -01
006-2155-00 for -02
006-2158-00 for -05
006-2161-00 for -08

W2 Issue: 18-13

S3295: DUAL PIN CARD DRIVER ABERRATION VERIFICATION TEST RELEASED

REF: S3295 VERIFY MANUAL
P/N 070-5776-00

A new program, DRIVER.TEK VERSION V02.09 (D100.TSK), has been released. The VERIFY program has been implemented for the two types of 50 Ω Dual Pin Cards only. They are P/N 672-1088-33 and P/N 672-0198-01.

The new program will be put in the software library and provided with the next release of TEKTEST, which is TEKTEST V version 3.02. It is also compatible with TEKTEST V versions 2.05A, 3.00 and 3.01. The DRIVER program can be obtained by request. Also, a new version of VERIFY.PPA is required for the DRIVER program. VERIFY.PPA is to be assembled to VERIFY.PPL which is used by DRIVER.

A new version of the Dual Pin Card I/O Probe Adapter will be required for the DRIVER VERIFY Program. Both 50 Ω Dual Pin Cards will use 067-1333-00. The fixtures are available from Customer Material Services.

W2 Issue: 18-13

S3295: DUAL PIN CARD I/O PROBE ADAPTER FIXTURES MODIFIED

REF: MOD #63574
RECAL MANUAL
P/N 070-5666-01

The I/O probe adapter fixtures used for calibration of the Dual Pin Cards have been modified. The modification allows for a better representation of the wave-form at the I/O pins of the Dual Pin Cards. The modification improves both the terminated and unterminated side of the fixtures. The delay cables at the probe inputs are of optimum length to reduce signal reflections. The new fixtures replace the old fixtures as defined below.

067-1333-00 REPLACES
067-0148-00 FOR PIN CARD
672-1088-33

067-1333-00 REPLACES
067-148-00 FOR PIN CARD
672-0198-01

067-1334-00 REPLACES
067-0147-00 FOR PIN CARD
672-1267-10

067-1335-00 REPLACES
67-0147-00 FOR PIN CARD
672-0109-31

Please order replacement fixtures as appropriate for the type Pin Cards you are using, according to the new part numbers shown above.

The new fixtures will be available from Customer Material Services.

W2 Issue: 18-13

S3295: FORCE/COMPARE MEMORY BOARD TIMING IMPROVED

REF: Pattern Processor Manual
P/N 061-2853-00
Pattern Expander Type I
Manual P/N 061-2852-00
Pattern Expander Type II
Manual P/N 061-2851-00

MOD #66881

In the Pattern Processor and Pattern Expander, the Force and Compare Memory Board is being modified to correct a timing problem.

Data from stage two of the pipeline is available too early and is causing timing problems in the following stage.

Symptoms of the timing problem might be F600, (PP1V12.TEK), VERDICT failures. The data being sent to the pin cards is decoded as the slot number in the Test Station. The timing condition causes this data to be corrupted. The symptom is related to the card ID but the problem is not related to the card ID circuit.

The solution is to delay the CLOCK2 signal by 2 to 3 nano seconds. A 100 pF capacitor is added to the clock path that drives U162 and U163.

Modification Procedure:

Add a 100 pF capacitor, P/N 281-0765-00, C361, on top of and parallel with the existing R361.

The Force/Compare Memory Board part number changes from 670-6774-01 to 670-6774-02.

W2 Issue: 18-13

S3295: PATTERN PROCESSOR TIMING CONTROLLER BOARD IMPROVEMENT

REF: Pattern Processor Manual
P/N: 061-2853-00
Wizards' Workshop article (Issue 18-1), S3295 Phantom Cycle Documentation Change

MOD #66880

The Timing Controller Board P/N 670-7881-01 is being modified to correct the situation of having an incorrect number of Shift Clock pulses at the Test Station when PHANTOM statements are used in the Pattern Program.

The timing of the signals applied to the AND gate, U451 pins 14 and 15, were incorrect and the PHANTOM pulse was allowed to pass through and generate an erroneous SHIFT THE SR SIGNAL. /ENABLE CLOCK 8 was late; and is retimed by this modification. The present circuit clocks PHANTOM REQ 7, applied to D3 of U352 and generates, among other signals, the /ENABLE CLOCK 8 used by U451. The modified circuit generates a replica of /ENABLE CLOCK 8 that occurs earlier and is only used to drive U451. This is accomplished by adding a 10H131 flip-flop with a shorter setup time and prop delay than U352, and by clocking it earlier. The added circuit uses a tapped delay line to control the timing of the clock signal to the new IC. The tap chosen is early enough to correct the timing but not too early to miss the PHANTOM REQ 7 signal.

MOD PROCEDURE

Parts List:

1 119-1381-00 Delay line DL422
1 156-1639-00 10H131 IC U353
3 315-0101-00 RES 100 Ω, 5%
R353,422,450
2 feet 175-1975-01 26 AWG wire
6.5 in. 175-2054-05 30 AWG wire

(Article continued in the next column)

Notes:

All directions assume the operator is facing the component side of the board, with the edge connector down and the 388- number up.

All connections are made on the top surface of the board unless otherwise noted.

All connections are made with insulated wire P/N 175-2054-05 unless otherwise noted.

U422 is a spare location and does not exist. It is used as a reference location to position other components.

1. Cut the run attached to resistor pack R362, pin 4. Pin one of the resistor pack is marked with a dot on the ECB.

2. Cut pin 19 of U362. Cut the lead of the IC only. Do not cut the run from the board. The pin will be left disconnected.

3. On the back of the board, connect the pads that correspond to U362, pins 19 and 20. No connection is made to pin 19 of the IC, only to that pad on the board.

4. Cut pin 14 of U451 as close to the board as possible. Gently bend the pin to be horizontal. Wires will be attached to the IC pin.

5. Install the new delay line, DL422, P/N 119-1381-00 in the row of holes next to U422. Position pin 1 of the delay line to be adjacent to pin 8 of U422 and pin 7 to be adjacent to pin 2 of U422.

6. On the back of the board, install the new R422 from pin 1 of the delay line to -2V (R434 pin 1).

7. On the back of the board install wire strap from pin 7 of the delay line to GND (at lower end of C421).

(Article continued on the next page)

S3295: PATTERN PROCESSOR TIMING CONTROLLER BOARD IMPROVEMENT (Continued)

8. On the back of the board install twist pair wire P/N 175-1975-01 from U672 pin 11 (white wire) and pin 7 (black) to the delay line, DL422 pin 6 (white) and pin 7 (black).

9. On the back of the board connect DL422 pin 3 to U421 pin 11.

10. The new IC U353 must be modified before installation. Cut off pins 2, 3,4, 5, 6, 7, 9, 12, 15. Bend pins 1,11,13,14 to be horizontal. Remaining pins, 8, 10, and 16 are in normal position.

11. Position U353 on top of U352. Make sure the remaining pin of U353 line up with the like-numbered pins of U352. Solder the three pins.

12. Connect U351 pin 16, U353 pin 1, U353 pin 16, and U352 pin 16.

13. Connect U352 pin 1 to U353 pin 13.

14. Connect U353 pin 14 to U451 pin 14.

15. Connect the new R450 from U451 pin 14 to -2V at the lower end of C462.

16. Connect the new R353 from U353 pin 11 to -2V at the upper end of R363.

17. Connect twist pair wire from U421 pin 7 (white) and pin 1 (black) to U353 pin 11 (white) and pin 16 (black)

18. Change the suffix label on the board part number from -01 to -02.

This modification is to be installed *As Required*, or when the board is returned to the Module Repair Center.

W2 Issue: 18-13

TSG6/TSG16: IC SOCKET ADDED

REF: TSG6 INSTRUCTION MANUAL, P/N 070-2528-00
TSG16 INSTRUCTION MANUAL, P/N 070-2649-00

MODIFICATION NO. 66637

In order to ease troubleshooting and calibration efforts, an IC socket (P/N 136-0728-00) was added to the circuit board at position U447.

This socket may be added to instruments being repaired when U447 is replaced, and will be installed in new instruments from the factory starting with S/N B012299 (TSG6) and B011946 (TSG16).

W2 Issue: 18-13

TSG170A/SPG170A/TSG300: INCORRECT PART INSTALLED

REF: TSG170A INSTRUCTION MANUAL
P/N 070-5680-00
SPG170A INSTRUCTION MANUAL
P/N 070-5965-00
TSG300 INSTRUCTION MANUAL
P/N 070-5722-00

A few of the listed instruments may have left the factory with a 15K ohm resistor installed where a 1.5K ohm resistor should be.

The circuit locations of interest are A2-1R335 (TSG170A), A2-1R307 (SPG170A), and A2-1R683 (TSG300).

Under most operational uses, the installation of the 15K resistor may not be noticed. However, there may be several varieties of microprocessor fault symptoms that may show up. These are hard to predict, so we are recommending that any of the listed instruments with an odd processor fault should be inspected for the correct resistor and changed where necessary.

This situation was corrected at the factory starting with S/N B031425 (TSG170A), B010500 (SPG170A), and B020667 (TSG300).

W2 Issue: 18-13

TSG170A/SPG170A/ECO170A/TSG300/TSG271/SPG271: POWER SUPPLY RELIABILITY IMPROVEMENT

REF: TSG170A INSTRUCTION MANUAL
P/N 070-5680-00
SPG170A INSTRUCTION MANUAL
P/N 070-5965-00
ECO170A INSTRUCTION MANUAL
P/N 070-6113-00
TSG300 INSTRUCTION MANUAL
P/N 070-5722-00
TSG271 INTERIM MANUAL
P/N 061-3457-00
SPG271 INTERIM MANUAL
P/N 061-3546-00

MODIFICATION NO. 66731

Modification No. 66731 has been installed in the listed instruments to alleviate parts supply problems and associated reliability concerns with some alternate devices.

A4CR360 has been changed to P/N 152-0905-00. In addition, a voltage snubbing circuit consisting of a series RC network has been added across pins 1 and 3 of A4CR460. This network is made up of a 0.01 μF capacitor (P/N 283-0079-00) and a 10 Ω resistor (P/N 315-0100-00).

This change is available as a kit (P/N 050-2391-00) and is recommended for installation in any of the listed instruments that is returned for service.

Modification 66731 is being installed in new instruments from the factory starting with the following serial numbers:

TSG170A	B031362
SPG170A	B010474
ECO170A	B010262
TSG300	B020636
TSG271	B020387
SPG271	B010170

W2 Issue: 18-12

TSG170A/SPG170A/TSG300/TSG271/ SPG271: SYNC LOCK JITTER IMPROVEMENT

REF: TSG170A INSTRUCTION MANUAL
P/N 070-5680-00
SPG170A INSTRUCTION MANUAL
P/N 070-5965-00
TSG300 INSTRUCTION MANUAL
P/N 070-5722-00
TSG271 INTERIM MANUAL
P/N 061-3457-00
SPG271 INTERIM MANUAL
P/N 061-3546-00

MODIFICATION NO. M66646

To decrease sync lock jitter in the listed instruments, the gain of the overall phase lock loop circuitry has been halved.

This change can be installed in current instruments by changing A2-1R174 from 39K ohms to 20K ohms (P/N 315-0203-00).

Mod 66646 will be installed in new instruments from the factory starting with the following serial numbers:

TSG170A	B030316
SPG170A	B010460
TSG300	B020620
TSG271	B020393
SPG271	B010175

W2 Issue: 18-12

TSG300: FINISHED INSTRUCTION MANUAL AVAILABLE

REF: TSG300 INSTRUCTION MANUAL
P/N 070-5722-00

The finished version of the TSG300 Instruction Manual is now available by ordering the part number listed above.

Those of you that returned the pull-out card that was included in the Interim Manual should have already received your complimentary copy of the new document.

W2 Issue: 18-12

TSG300: SIGNAL SET CHANGE

REF: TSG300 Instruction Manual,
P/N: 070-5722-00

Mod: #67133

A reduced amplitude BOWTIE signal (50% amplitude) has been added to the TSG300 signal set to meet the requirements of the Sony BVW-40 BetaCam recorder.

This change affects 19 signal PROM's, which must be changed as a set.

A request to add this new signal to an older TSG300 can be best addressed by ordering kit 020-1584-03. This kit should only be installed where needed, or upon failure of one of the affected components.

Modification 67133 is being installed in new TSG300's from the factory starting with S/N B020687.

W2 Issue: 18-15

WFM300: CRT CHANGE

REF: WFM300 Instruction Manual
P/N: 070-6039-00

Mod: #65923

In order to comply with customer requests, the CRT that will be installed in a new WFM300 Opt. 10 or Opt. 12 is now P/N 154-0937-00.

This new CRT will be recognized by its internal graticule which is in IRE units for the vertical scale divisions. The part being removed, P/N 154-0909-01, had a vertical scale that used -0.3 to +0.8 volts as the scale factor.

When replacing a CRT due to failure, do not use P/N 154-0937-00 to replace P/N 154-0909-01, unless you have consulted with the end user.

The new CRT will be installed in new instruments from the factory starting with S/N B010847.

W2 Issue: 18-15

WFM300: VARIABLE GAIN RANGE IMPROVEMENT

REF: WFM300 INSTRUCTION MANUAL, P/N 070-6039-00

MODIFICATION NO. 66871

In order to improve Variable Vertical Gain range, the following changes have been made in the WFM300:

- A3R379 was changed form 16.5 KΩ to 15 KΩ, P/N 321-0306-00
- A3R479 was changed from 5 KΩ to 10 KΩ, P/N 311-2235-00
- A3R478 was changed form 20 KΩ to 24.3 KΩ, P/N 321-0326-00

These changes can be made on an "as required" basis, and will be installed in new instruments from the factory starting with S/N B010845.

W2 Issue: 18-13

110S: TEST SELECTABLE PART CHANGE

REF: 110S Service Manual,
P/N: 070-4423-01

Mod: 66824

The nominal value of A1A1C306 has been changed from 20 pF to 27 pF.

The selection criteria, as listed in the Service Manual, does not change with this MOD.

W2 Issue: 18-15

118AS/118F01: IC TIMING PROBLEM

REF: 118AS SERVICE MANUAL,
P/N 070-5114-00

MODIFICATION #66814

The 118AS Manufacturing people have observed a few instances of internal diagnostic failures that were caused by circuit propagation delay. These failures were subsequently traced to certain 74LS153 IC's.

In an effort to overcome the majority of these types of failures, A2U489 has been changed to a 74F153 type; P/N 156-1662-00. There may still be propagation delay related errors in a few of the new IC's that are at their spec limits, but the chances are considered acceptable.

U489 should be replaced with the new part upon failure.

Mod #66814 is being implemented in new instruments from the factory starting with S/N B030355 (118AS) and B020329 (118F01).

W2 Issue: 18-13

148: TRANSISTOR HEAT SINK ON MODULATOR BOARD

REF: 148 INSTRUCTION MANUAL
P/N 070-1266-00

There is a chance that a few 148's may have been shipped with a transistor heat sink attached to the wrong transistors.

On the Modulator board (A6), there should be a heat sink on Q6758 and Q6858. If one is not there, it may have been attached to Q6786 and Q6877, and needs to be relocated.

Some of the symptoms that the misplaced heat sink may cause are excessive gain and DC drift in the Multiburst signal.

Inspect and correct where necessary.

W2 Issue: 18-12

465: SUPPORT EXTENDED

Support for the 465 will be extended through 1992. Support for this product was previously to end in 1989.

Service Marketing is determining what kinds of service will be offered on the 465 after 1989 in the U.S.

We are also looking at whether to extend support for the 465DM40, 465DM43, 465DM44, and 465 custom options.

W2 Issue: 18-12

650/A/HR/SERIES: COMPONENT SELECTION NECESSARY WHEN Q4090 IS REPLACED

REF: 650HR INSTRUCTION MANUAL
P/N 070-2646-02

When Q4090 is changed due to failure, a resistor value may need to be changed due to different vendor's parts characteristics.

If Q4090 is replaced, check for 75 volts or greater at the emitter of Q4770. Current instruments are operating normally when this voltage is 75-80 volts.

If the voltage is too low, R4779 may need to be a different value. At this time, well over 90% of the selection requirements in this area are addressed by putting a 750 ohm 5 watt resistor (P/N 308-0067-00) in parallel with R4779. There are two extra holes provided in the Deflection Heat Sink board that will simplify this operation greatly.

W2 Issue: 18-12

751: INTERIM SERVICE MANUAL AVAILABLE

REF: MODIFICATION NO. 66708

The 751 Interim Service Manual can be obtained by ordering P/N 061-3584-00.

W2 Issue: 18-13

1410R/TSP1, 1411R/TSP11, 1412R/TSP21: CAPACITOR CHANGE REQUIRED WITH A NEW TYPE OF IC

REF: TSP11 INSTRUCTION MANUAL
P/N 070-2621-00
TSP11 INSTRUCTION MANUAL
P/N 070-2664-00
TSP21 INSTRUCTION MANUAL
P/N 070-4569-00

The channel switch IC's within the TSP Series of switchers have been changed to a new vendor. The new part number is 234-0408-20.

Whenever the old IC (P/N 155-0022-00) is replaced with the new part, some of the selectable capacitors associated with each of these IC's may need to be changed to a new value. The new nominal value will be 13 pF (P/N 281-0657-00), and the affected capacitors on the A36 switcher board are C373, C402, C404, C434, C444 and C463.

The new value will be found in new instruments from the factory starting with serial number B021913 (TSP1), B021629 (TSP11) and B010133 (TSP21).

W2 Issue: 18-12

1420 SERIES: TRANSISTOR PART NUMBER

REF: 1420 SERIES INSTRUCTION MANUAL, P/N 070-2899-00

The part number for R1403 (Schematic 1) was inadvertently omitted from the Electrical Parts List.

R1402, a 2.5 kΩ pot, is part number 311-1226-00.

W2 Issue: 18-16

1480 SERIES: REAR PANEL CHANGED AND HARDWARE ADDED TO VOLTS FULL SCALE SWITCH

REF: 1480 SERIES INSTRUCTION MANUAL, P/N 070-2338-00

MOD #63486

Mod #63486 has been implemented in the 1480 Series to address two problems.

- Display being affected when Volts Full Scale switch is just touched
- Intermittent grounding of the rear panel connectors.

The first problem has been addressed by adding ground lugs (P/N 210-0259-00 and 210-0223-00) to the pot shaft and switch support, and then connecting the lugs with a small length of wire.

The second problem has been addressed by using new rear panels that are not painted. 1480R Series rear panels will now be P/N 386-3090-01, and 1480C Series will be P/N 386-3082-04.

MOD #63486 should be installed as required to address the stated symptoms, and will be installed in new instruments from the factory starting with S/N B094706 (1480 Series) and B0106588 (1480R Series).

W2 Issue: 18-16

1481R MOD W5C: UPDATED MANUAL INSERT AVAILABLE

REF: 1481R Mod W5C MANUAL INSERT P/N 061-1754-00

The 1481R Mod W5C Manual Insert has been updated to provide current part numbers and an illustration of the components of this modification. The new insert can be obtained by ordering the listed part number (above).

This modification provides the pieces necessary to make a 148XR into a "Portable" instrument by adding a handle and feet.

W2 Issue: 18-12

1710B SERIES: INPUT COMPENSA-TION DRIFT IMPROVEMENTS

REF: 1710B INSTRUCTION MANUAL, P/N 070-5522-00

MODIFICATION NO. 66903

To improve Input Compensation drift problems, A3C298 and A3C598 have been changed from 1-5 pF caps to 1.2-4 pF caps, P/N 281-0302-00.

These capacitors can be changed as required, and will be installed in new instruments from the factory starting with S/N B021677 (1710B) and S/N B020309 (1711B).

W2 Issue: 18-13

1710B/1720/1730 SERIES, WFM300, 1705, 760: POWER SWITCH CABLE ASSEMBLY CHANGED TO AVOID BINDING

REF: 1710B SERIES INSTRUCTION MANUAL
P/N 070-5522-00
1720 SERIES INSTRUCTION MANUAL
P/N 070-5846-00
1730 SERIES INSTRUCTION MANUAL
P/N 070-4474-02
WFM300 INSTRUCTION MANUAL
P/N 070-6039-00
1705 INSTRUCTION MANUAL
P/N 070-6355-00
760 INSTRUCTION MANUAL
P/N 070-5992-00

MOD NO. M65226

In order to alleviate an occasional binding that has occurred when the power switch is engaged, the part has been modified. The new part number to order is 260-2274-01.

Upon installation of the new switch, the rear switch cover, part number 200-2735-00, is no longer necessary and can be discarded.

Install the new switch on an "as fails" basis.

The new part will be installed in new instruments from the factory starting with the following serial numbers.

1710B	B021694
1711B	B020309
1720	B014371
1721	B011274
1730	B024973
1731	B021421
1735	B010228
WFM300	B010908
1705	B020362
760	B020761

W2 Issue: 18-12

1720 SERIES: MICROPROCESSOR CHANGE/IMPROVEMENT

REF: 1720 SERIES INSTRUCTION MANUAL
P/N 070-5846-00

MOD NO. M65754

Due to the increased availability of reliable microprocessors from our vendors, modification 65754, as implemented in the 1720 series, changes the microprocessor, A3U613, to new part number 160-4202-01.

Since this new microprocessor contains its own operating software, some supporting circuitry within the 1720's will no longer be necessary. Therefore, when the processor is replaced in earlier serial number instruments, the technician will receive a kit, P/N 050-2297-01, with instructions that will detail which parts to remove.

Install the new kit in previously unmodified instruments on an "as fails" basis.

Mod 65754 will be installed in new instruments from the factory starting with serial number B013863 (1720) and B011124 (1721).

W2 Issue: 18-12

1720 SERIES: SPORADIC NOISE DURING PHASE SHIFTER ROTATION

REF: 1720 SERIES INSTRUCTION MANUAL
P/N 070-5846-00

MOD NO. M66581

Some sporadic trace noise noticed during rotation of the 1720's phase shifter has been isolated to Electro-Static Discharge.

To alleviate this noise, a filter cap (A3C333) was added in parallel with A3R333. The new capacitor is 0.1 µF, P/N 283-0024-00.

Install this change on an "as required" basis.

This mod will be present in new units from the factory starting with S/N B014089 (1720) and B011176 (1721).

W2 Issue: 18-12

1720 SERIES: WASHER ADDED TO PHASE SHIFTER

REF: 1720 SERIES INSTRUCTION MANUAL,
P/N 070-5846-00

MODIFICATION NO. 66981

In order to move the Phase Shifter knob closer to the front panel, a washer, P/N 210-0519-00, has been added to the phase shifter's shaft behind the front panel.

This change can be made for appearance reasons. The operation of the instrument is not otherwise affected.

The new washer will be installed in new instruments from the factory starting with S/N B014315 (1720) and B011261 (1721).

W2 Issue: 18-13

1730 SERIES: ADJUSTMENT DIFFICULTIES DUE TO TRANSISTOR VENDORS

REF: 1730 SERIES INSTRUCTION MANUAL
P/N 070-4474-02

MOD NO. M65984

Some difficulties in adjusting the bandwidth of the 1730's has been traced to differences in vendors of P/N 151-0188-00.

To address the problem, A3C693, which is a test selectable part, may need to be changed to one of the following values:

22 pF (P/N 281-0759-00)
with Motorola A3Q793

16.8 pF (P/N 283-0663-00)
with Fairchild A3Q793

W2 Issue: 18-12

1730 SERIES: BANDWIDTH ADJUSTMENT IMPROVEMENT

REF: 1730 SERIES INSTRUCTION MANUAL, P/N 070-4474-02

MODIFICATION NO. 67030

In order to make Bandwidth and Pulse to Bar Ratio adjustments easier to achieve, two capacitors, P/N 281-0775-00 have been added to 1730 series instruments. These new parts are added one each, in parallel with A3VR297 and A3VR497.

This change can be added, as required, to any instrument returned for service, and will be installed in new instruments from the factory starting with S/N B024953 (1730), B021423 (1731) B021416 (1731 BT), and B010227 (1735).

W2 Issue: 18-13

1740: OPTION 7 TRANSISTOR CHANGE

REF: 1740 Instruction Manual
P/N: 070-4473-01

Mod: #66050

Transistor A6Q210, in the 1740 Option 7, is being changed to P/N 151-0439-00. The previous part, P/N 151-0615-00, is no longer available from our vendor.

Use P/N 151-0615-00 upon failure of A6Q210.

This change is being made in new instruments from the factory starting with S/N B0226058 (1740), B022159 (1741), and B020523 (1742).

W2 Issue: 18-15

1740/1750 SERIES: VERTICAL FREQUENCY RESPONSE ADJUSTMENT

REF: 1740 SERIES INSTRUCTION MANUAL, P/N 070-4473-01
1750 SERIES INSTRUCTION MANUAL, P/N 070-5664-00

MOD NO. M66633

Under some conditions of signal input where amplitudes are 700 mV or more, one of the amplifiers in the Vertical section will slew rate limit at about 8 MHz. This causes some difficulty in measuring and adjusting frequency response.

To alleviate this condition, the following changes have been made:

- A3C657 (1740 series) and A3C865 (1750 series) have been changed from 40 pF to 16.8 pF capacitors (P/N 283-0663-01).
- A3C458 (1740 series) and A3C859 (1750 series) have been added in parallel with A3R458 and A3R859 respectively. The new capacitors are 4.7 pF (P/N 281-0893-00).

This change should be made as required to address adjustment problems, and will be installed in new instruments from the factory starting with the following serial numbers:

1740	B025811
1741	B022072
1742	B020519
1750	B032598
1751	B031314

W2 Issue: 18-12

1750 SERIES: COIL HEAT DISSIPATION REDUCED

REF: 1750 SERIES INSTRUCTION MANUAL, P/N 070-5664-00

MODIFICATION NO. 66910

In order to reduce the heat being dissipated by A6L362, A6C347 is being changed from 850 pF to 390 pF (P/N 283-0698-00).

Install this change whenever a 1750 is serviced for a power supply failure.

Mod 66910 is being installed in new instruments from the factory starting with Serial Number B032602 (1750) and B031319 (1751).

This new capacitor will be added to heat sink kit 045-0146-00 as soon as possible. Use shelf parts to augment the kits until kits are delivered with the new part.

W2 Issue: 18-12

1750 SERIES: POWER SUPPLY IMPROVEMENTS

REF: 1750 SERIES INSTRUCTION MANUAL, P/N 070-5664-00

MODIFICATION NO. 66872

In order to increase reliability at operational extremes, and to reduce power consumption, Mod 66872 makes the following changes in the 1750 Series Low Volts power supplies.

- A6R739 and A6R638 are changed from 4.7 K ohm resistors to 1.1 K ohm resistors (P/N 315-0112-00).
- A6CR236, and A6CR440 are changed to new P/N 152-0863-00.
- A6R633 is removed.
- A11DS2 and A11DS5 are removed.

These changes can be installed "as required".

Mod 66872 will be installed in new instruments from the factory starting with Serial Number B032602 (1750) and B031319 (1751).

These parts are in the process of being added to the heat sink kit (P/N 045-0146-00). Please use any stocks of this kit that you may have and add the pieces required from shelf stock.

New kits, complete with required parts, will be on their way to the warehouse as soon as possible.

W2 Issue: 18-12

1750 SERIES: SCH DISPLAY AND MEASUREMENT IMPROVEMENT

REF: 1750 SERIES INSTRUCTION MANUAL, P/N 070-5664-00

MODIFICATION NO. M66634

Modification No. M66634 has been implemented in 1750 series instruments to address the following conditions:

- The inability to always be able to set the SCH dot to the compass rose due to component variability.
- A change in SCH with variation in APL, sometimes exhibited as a smeared or bouncing SCH dot.

The first condition has been addressed by changing A9R527 from 10 K Ω to 7.5 K Ω (P/N 315-0752-00), and A9R130 from 5 K Ω to 10 K Ω (P/N 311-1245-00).

The second condition has been addressed by removing A4R200 and A4R316, and by adding a series RC network in parallel with A4R701. The series network consists of a 120 pF capacitor (P/N 281-0776-00) and a 59 K Ω resistor (P/N 322-3363-00). This network is connected "teepee" fashion such that the capacitor is connected to the +15 volt end and the resistor is connected to the A4Q615 end of A4R701.

These changes should be made to 1750 series instruments on an "as required" basis to address the stated problems.

Mod 66634 will be installed in new instruments from the factory starting with serial number B032617 (1750) and B031336 (1751).

W2 Issue: 18-12

1980: CHANGE TO SYNC IC CIRCUIT

REF: 1980 SERVICE MANUAL, P/N 070-2921-00

MODIFICATION NO. 66773

Modification No. 66773 has been implemented in the 1980 Video Data Converter board in order to obtain more predictable operation from a variety of Sync Separator IC's.

Some of the symptoms observed before the change were a missed vertical sync pulse and/or a zero carrier pulse appearing on the wrong video line.

The change involves A24A1 circuit components as follows:

VDC Assembly, P/N 672-1138-XX
A24A1R013 changes from 62K Ω to 47K Ω (P/N 315-0473-00)
A24A1C009 changes from 0.1 µF to 0.22 µF (P/N 283-0339-00)

VDC Assembly, P/N 672-0777-XX
A24A1R011 becomes 47K Ω as above
A24A1C011 becomes 0.22 µF as above

Mod No. 66773 is being installed in new 1980's from the factory starting with S/N B040431.

W2 Issue: 18-13

2210: SERVICE MANUAL AVAILABLE

REF: 070-6848-00

The 2210 Service Manual is now available. To receive copies order:

Tektronix P/N 070-6848-00.

W2 Issue: 18-16

2210/2225: VERTICAL BALANCE OFFSET BETWEEN X1/X10 GAIN

2210 Mod #66625 S/N 200787
2225 Mod #66628 S/N 213614

A balance offset between X1 and X10 vertical gain can occur when a negative voltage of 6 volts or greater is applied to either vertical channel with the Volts/Div switch is set to 5 mV/Div. Also a slight reduction in gain may occur.

The first transistor's base/emitter junction, connected by pins 2 and 3 in A2U30/U80, has a reverse voltage rating of 5 volts. When this specification is exceeded, the transistor junction zeners, causing permanent damage to the transistor.

To correct this, manufacturing has added a protection diode to both channels, A2CR18 and A2CR68 (P/N 152-0141-02). These diodes are installed on the back of the attenuator board with the cathode connected to the end of R14 (R64 in Ch 2) going to U30 pin 2 (U80 in Ch 2) and the anode connected to the end of R23 (R73 in Ch 2) going to pin 3.

W2 Issue: 18-13

2220/2221/2230: INSUFFICIENT HORIZONTAL POSITION RANGE IN STORE MODE OR HORIZONTAL OFFSET BETWEEN STORE AND NONSTORE MODE

Ref: *Wizards' Workshop* , Issue: 16-16
Mod #62009, #64163

S/N: 2220 B010367-B020342
2230 B012339-B022102

The *Wizards'* article printed in Issue: 16-16, titled: 2220/2230 X10 MAG HORIZONTAL TRACE SHIFT AND JITTER CORRECTED explains how A4R746 was changed to prevent an horizontal shift when switching between store and nonstore. Mod #62009 added a variable resistor (A11A2R6430) to the Vector Generator board to adjust for this shift. At the same time A11A2R6429 was changed to 24.3 KΩ. The Tektronix P/N for these components are as follows:

A11A2R6430	311-2238-00
A11A2R6429	321-0326-00

S/N: 2220 B020343 - B020519
2230 B022103 - B023780

Mod #64163 made A4R746 selectable, nominal value being 237 Ω (321-0133-00). The selectable values are 200 Ω (321-0126-00) and 255 Ω (321-0136-00). This was made selectable to give R6430 enough adjustment range.

All of these modifications were implemented in the 2221 at B010100.

The adjustment procedure is found in all three manuals (microfiche) in the vertical section. It is listed as Horizontal Position Registration.

W2 Issue: 18-13

2225: CRT SOCKET AND WIRE ASSEMBLY PART NUMBER

Ref: Manual P/N 070-6299-00, Figure 2-7

The part number for the CRT socket assembly is not printed in the Service Manual. The part number is 198-5589-01. Correct your manual to show this information.

W2 Issue: 18-13

2245A/2246A: DC VOLT READOUT INCORRECT IN CHANNEL TWO

MOD: #66837

2245A S/N: B010950
2246A S/N: B011785

The B trigger IC A10U431, can oscillate causing problems with DC volt measurements in channel two. This can be observed when making a DC measurement in channel two with the channel two trigger source selected. Switching the trigger source to channel one will cause the scope readout to change by approximately 10 counts.

To correct this, lift pin 5 and 7 of U431, add R401 in series with pin 5 and R402 in series with pin 7. Both resistors are 100 ohms, Tektronix P/N 313-1101-00.

This mod should be added to every instrument that comes in for service.

W2 Issue: 18-11

2245/2245A/2246/2246A: HORIZONTAL READOUT JITTER MINIMIZED

Ref: 151-1211-00

The readout may display horizontal jitter synchronizing with the sweep speed. In the worse case situation, the jitter may be as much as 0.1 divisions.

The horizontal output FETs, A10Q802 and A10Q805, can be one of the causes. The suspect parts will not have "**N2**" marked on the case after the vendor part number.

Customer Service stock has been checked and corrected to ensure your parts orders will not be filled with undesirable parts.

W2 Issue: 18-16

2245/2245A/2246/2246A: LINE OF DOTS AT CENTER SCREEN

MOD: #66836

2245A S/N B010933
2246A S/N B011758

When the instrument is warm and readout is on, a line of dots at center screen can be produced. This is due to violation of set up time requirements for the PAL. To correct this, perform the following mod.

2245A/2246A ONLY

Lift pin 4 of A16U2400 out of the socket. Solder a wire from pin 4 of A16U2400 to pin 3 of A16U2417.

2245/2246/22461Y ONLY

Lift pin 4 of A16U2400 out of the socket. Solder a wire from this pin to A16U2417 pin 3. Lift pins 1 and 2 of A16U2417, solder a wire between pins 1 and 2 of A16U2417 and A16U2409 pin 3.

W2 Issue: 18-11

2630: SERVICE MANUAL

The 2630 Service Manual is now available. Order Tektronix part number 070-7239-00.

W2 Issue: 18-16

4120 OPTION 30/4100F30: 16-INCH DISPLAY'S DEFLECTION BOARD MODIFICATION AND PART NUMBER CHANGE

Ref: CSG Mod #66972
070-6512-00 16-Inch Display Service Manual
070-5270-02 4115/4120 Field Procedures Manual

4120 Option 30/4100F30 Service Maintenance Information, *Wizards Workshop* Issue 17-10, dated May 22, 1987.

4220/4230/4320/4330 Series 16 and 19-Inch Display Service Maintenance Information, Wizards Workshop Issue 18-7, Dated April 15, 1988.

The deflection or "D" board (P/N 118-6313-00), used in the 16-inch display (display part number 119-2499-00) and used only on the 4115B/4120 Series Products, has undergone a modification changing C224 from 0.0039 µF at 1600 V to 0.006 µF at 1600 V. The part number of this new capacitor is 118-7877-00.

This modification increases the reliability of the deflection board in the Option 30, 16-inch display.

With this modification, the deflection, or "D" board's part number changes to 671-0946-00.

W2 Issue: 18-12

7612D NEW PLUG-IN GUIDE AVAILABLE

REF: SN B052275
M66828

A new guide has been designed to prevent damage to the Plug-In Interface Board, if the plug-in has been incorrectly installed. The new guide is in addition to the guides already in the digitizer, and is easily retrofitted into older digitizers. While the guide is designed for the 7612D, it is equally adaptable and useful for the 7912AD and 7912HB. It is recommended this guide be installed whenever a damaged Plug-In Interface is repaired, or wherever the customer has a history of damaged interfaces.

There is no installation kit for this guide; however, only the guide and two(2) screws are required. The required parts are:

211-0012-00 2ea. Screw, Machine: 4-40 X 0.375
351-0842-00 1ea. Guide, Deflector

The following instructions are for installation into a 7612D; however, installation into a 7912AD or 7912HB is identical.

Instructions:

This procedure outlines the process of installing a new guide deflector into the 7612D. This new guide prevents damage to the 7612D Plug-in Interface should the plug-in amplifier be installed at an angle other than 90 degrees to the interface.

Warning

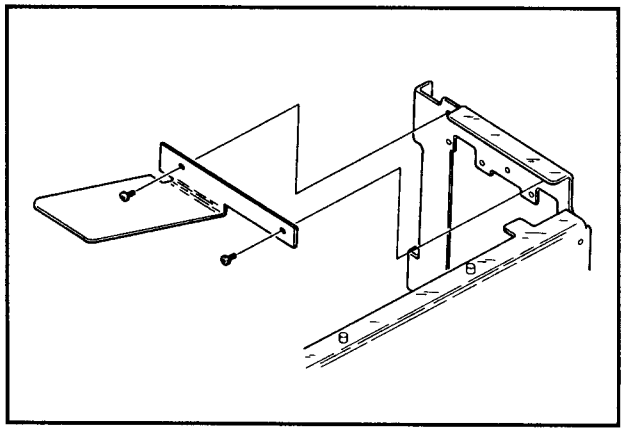
To avoid an electric shock hazard, disconnect the instrument from all other electrical equipment and the power source before proceeding.

The following instructions are to be used by qualified service personnel only. To avoid personal injury, do not perform any of the following procedures unless you are qualified to do so.

(Article continued in the next column)

Remove the top cover of the 7612D.

While referring to the following illustration (or Fig. 2, at the rear of the 7612D Service Manual, 070-2387-01) locate index number 70 (CHAS, PL-IN UNIT:).



Remove and discard the two machine screws identified by index number 73 (SCREW, MACHINE: 4-40 X 0.25, PNH, STL), these are located toward the rear and top of the chassis.

Install the new guide deflector so that the holes in this guide align with the existing holes in the chassis.

Fasten the guide in place with the longer 211-0012-00 (SCREW, MACHINE: 4-40 X 0.375, PNH, STL, POZ).

Reinstall the top cover.

W2 Issue: 18-16