TEK CUSTOMER PRODUCT SERVICING INFORMATION

November 1990, Issue 61

SERVICETEKNOTES

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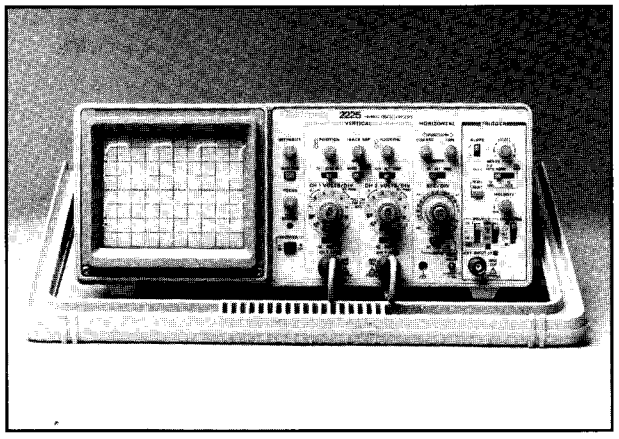

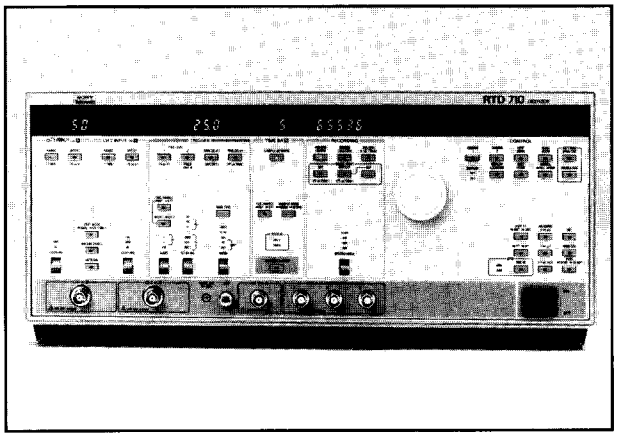

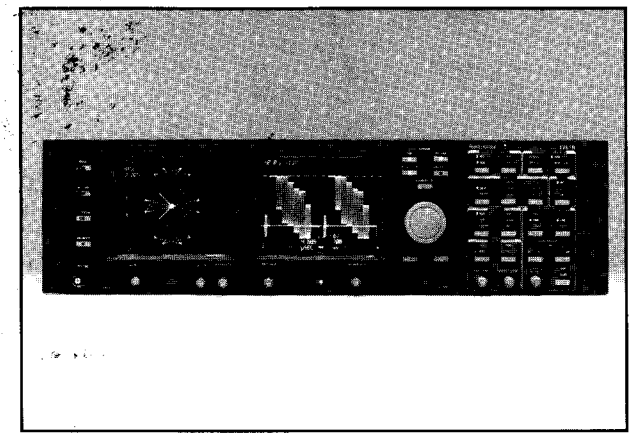

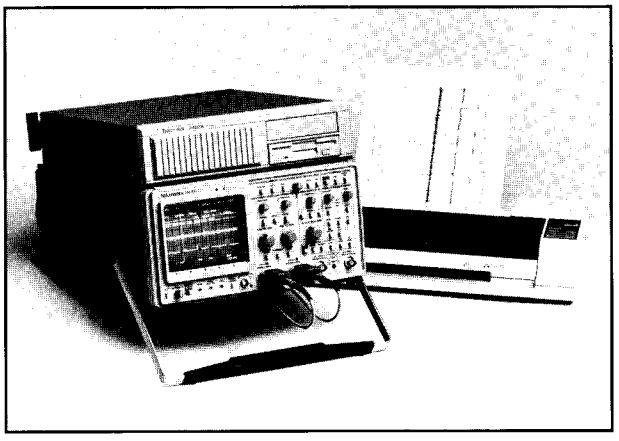

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This publication is meant to provide technical information to customers who have elected to maintain their own Tektronix products. It contains product servicing information and is written for the technician. The notation at the bottom of each article (W^2 Issue: XX-X) signifies that the article has previously been published in an internal publication known as *WIZARDS' WORKSHOP*.

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

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THE EDITOR

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11A72: U350 Replacement

When replacing U350 (P/N 165-0021-01) U1110 (P/N 160-4845-07) also needs to be changed. This applies only to products in the serial number range B010100 through B030279.

The kit number for these parts is 050-2613-02. The current version level for the EPROM 160-4845-07 is 2.12.

W2 Issue: 20-10

1450-3A: New Instruction Manual

Ref: MOD # 71500

With the advent of the new 1450-3A, the changes to the circuitry to add the new NICAM compatible features have been added in to the previous 1450-3 instruction manual.

The new, updated manual that covers early and current 1450-3/A instruments can be ordered as P/N 070-3660-01.

W2 Issue: 20-10

1480 Series: Horizontal Variable Control Replaced by Kit

Ref: 1480 Series Instruction Manual,
P/N 070-2338-00

In order to provide the components and instructions required to facilitate an easy replacement of the Horizontal Variable control, R9892, in the 1480 Series, a kit has been established.

Orders for P/N 311-2170-00, for these applications, will be replaced by P/N 050-2739-00.

W2 Issue: 20-9

1500B/C: YT-1 Controller Board Replacement

The YT-1 is the chart recorder used in the 1500B and 1500C Series TDR's. The YT-1 Controller ECB was changed and the part number changed from 118-7614-00 to 118-7614-01. The new board contains a coil which needs more clearance than the frame allowed. A small hole in the case/frame was added to provide clearance on newer recorders. Older YT-1 recorders do not have the hole needed to use -01 level Controller boards.

Newer chart recorders will have two holes in the bottom of the frame. One large hole (1.5 x 0.5" / 38 x 12mm) for clearance for two IC's. A small hole (0.2 x 0.2"/5 x 5mm) was added to provide clearance for the coil. Old frames will only have the large hole.

You should replace the frame (part number 118-7622-02) when replacing a -00 Controller board with a -01 (all new boards are -01's). The cost of a new -01 Controller board and Frame together are less than the cost of the old -00 board. Additional labor to change the frame is minimal.

The exception to the situation above is when you have a very old YT-1 with a flat motor hinge. A YT-1 with flat (as opposed to an inset hinge) would need kit 050-2553-01 to replace the frame. In this situation it is more time and cost effective to replace the entire YT-1 as an Exchange Module or Repair and Return.

W2 Issue: 20-10

1700F02: New Front Cover Added to the 1700F02 Carrying Case

Ref: 1700F02 Data Sheet,
P/N 062-8897-02

MOD # 72200

New orders for the popular 1700F02 Carrying Case will now include a snap-on front cover that has been designed specifically for current half-rack TV products.

The new cover, P/N 200-3897-01, is TV grey. The previous blue cover, P/N 200-1566-00, will remain available for the older 528/1420 Series applications.

W2 Issue: 20-10

1720 Series: Main Board Redesigned for Manufacturability, and Changes Made to Assure Proper Circuit Performance in Two Areas

Ref: 1720 Series Instruction Manual,
P/N 070-5846-01

MOD # 72713

The Main board in the 1720 Series Vectorscopes has been redesigned to allow for improvements in manufacturing methods, and to address two performance concerns.

In general, the redesign of the board will not affect the technician unduly. Parts have been realigned, CAD processes have been implemented, and previous modifications have been incorporated into the circuitry. However, the technician working on the new 1720's will need to be cognizant of the following items:

1. Most 0.25 watt resistors (Tek part number categories 315-XXXX-XX and 321-XXXX-XX) have been replaced with 322-XXXX-XX category parts. In all cases, the new parts are equivalent value/wattage or better. They do, however, have a smaller lead spacing. Inventories of the previous parts will need to be scrutinized over a period of time as the new 322 parts become more prevalent.

   In many cases, you will find that the 322 equivalent will substitute for its 315/321 counterpart with few problems. But, in a few key circuit locations, 315 and 321 parts will continue to be used for the particular characteristics that they might offer. Check you manual's parts list.

2. One of the changes being implemented at this time will also specify part number 151-0233-07 as the replacement item for A3Q552 and A3Q553. This new part number should also be used as the replacement item in older 1720's.

3. Another change being implemented at this time is the addition of a capacitor, C246, a 0.001 µF capacitor, P/N 281-0862-00, between the base and the collector of Q246. This capacitor has been added to filter out a small amount of pulse noise coming from the graticule illumination circuit, and being observed as a small spike near the center of the displayed waveform. This part of the change is not applicable to earlier 1720's. The noise spikes are only objectionable with the new board design.

Due to the extent of these changes, it is recommended that the servicing technician order a new 1720 Instruction Manual, P/N 070-5846-01, which will contain the new component location information as well as the appropriate part numbers for the resistors previously mentioned.

This redesign will be incorporated into new instruments from the factory beginning with serial number B028749 (1720) and B022905 (1721).

W2 Issue: 20-10

1730HD: Change to More Accurately Position Trace When Switching to RGB Mode

The 1730HD Waveform Monitor has been recently modified in order to keep the trace closer to CRT horizontal center when switching modes.

To install this improvement, two circuit changes must be implemented.

1. A3R326 gets changed from a 10k ohm resistor to a 13k ohm resistor (P/N 322-3300-02).

2. A new 49.9k ohm resistor, A3R324 (P/N 322-3356-00) is teepee'd into the circuit. One end is connected to the left (schematically) end of R413 and the remaining end is connected to the U222B pin 6 end of R223.

This change is recommended for installation in all 1730HD instruments returned for routine service, and will be installed in new instruments from the factory beginning with serial number B020439.

W2 Issue: 20-10

1780 Series: Cal Procedure Changes *(Pullout A)*

Attached to this issue as *Pullout A* are some recent text changes pertinent to the adjustment section of the 1780R Series Service Manual, P/N 070-6891-00.

W2 Issue: 20-10

1780R Series: Frequency Response Change with Input DC Level Change

Ref: 1780R Interim Service Manual, P/N 061-3612-00

MOD # 68925

A small tendency for the 1780R Series' frequency response to change with changes in the incoming DC level has been addressed by adding a low impedance network to the Vertical Deflection Amp on the A2 Waveform board.

This low impedance is made up of the following parts.

- Two each, 0.1 µF cap, P/N 281-0775-01

- One each, 100 ohm resistor, P/N 322-3097-00

Construction is as follows.

- Solder one leg of one of the capacitors to the R515 end of R509.

- Solder one leg of the remaining capacitor to the Q514 end of R412.

- Solder one leg of the resistor to the ground end of C414.

- Bring the loose ends of these three parts together into a three-legged teepee, solder and trim.

This change is being installed in new instruments from the factory beginning with serial number B010109.

For the 10 previously unmodified instruments, it is recommended that this change be made whenever they are brought in for routine service.

W2 Issue: 20-10

1900, 1910: Oscillator Oven Assembly Reliability Improvement

Ref: 1900 Service Manual,
P/N 070-4867-00
1910 Service Manual,
P/N 070-4523-00

MOD # 72422

The temperature controlled oscillator assembly used in the 1900 and 1910 Inserter Generators has been modified in order to make use of more readily available parts, and to extend the oscillator unit's operating life.

The improvements are available as a kit, P/N 050-2702-00, which is applicable to both instruments.

Installation of this kit is recommended on an "as fails" basis.

This change will be installed in new 1910's from the factory beginning with serial number B022604.

W2 Issue: 20-9

2200 Series: Main Board Silk Screening Incorrect for Filter Board Wires

Ref: MOD # 70911

This article concerns the following 2200 Series products:

2213	2230
2213A	2232
2215	2235
2215A	2235 OPT 1
2220	2235A
2221	2236
2224	2236A

When the EMI Filter board was changed to Tektronix P/N 670-7615-02, the color of the wires changed. The main board is silk screened with the color coding where the wires are soldered into the board; however, it reflects the wires used on the 670-7615-01 and -00.

When desoldering the wires from the Main board please note on the latest Filter board that W9191 is blue and goes into the hole on the Main board marked BR/W. W9041 is now brown and goes into the hole marked BL/Y.

W2 Issue: 20-9

2205: Power Consumption Reduction Correction

Ref: MOD # 73789
S/N HK54509
HK12226

A modification kit is now available which will prevent the 2205 power transformer from overheating. The kit consists of a small board which can be fitted into the main board. The new board will regulate the inverter frequency.

To install this mod order Tektronix P/N 040-1327-00.

W2 Issue: 20-10

2214: Firmware Change for Slow Plot and 50 mSec Timing Error in Roll Mode

Ref: MOD # 72476

The 2214 firmware has been changed to incorporate the corrections and enhancements listed below.

1. A transfer in Hex format of front panel data and a 16K byte record for each channel can be output either by a "plot" command or by using the plot button with the dip switch position four and seven set to '0'.

2. Plot output is now twice as fast and half the size.

3. Single sweep can be reset remotely by the "SGL ARM" command

4. Timing error at 50 mSec in roll mode has been corrected.

To perform this mod, change A10U1258 to Tektronix P/N 160-7285-03.

This mod should in installed in all 2214's which come in for service.

W2 Issue: 20-9

2224/2232: Acquisition Hybrid Replacement

Ref: MOD # 72722
S/N 2224 B010511
2232 B013897

The Acquisition Hybrid used in the 2224 and 2232 (A10U2200 and U2201) has been changed from Tektronix P/N 165-0011-00 to 165-0011-01. The new part cannot be used in instruments below the Serial Numbers referenced without making several other changes, so the -00 hybrid is in stock for older instruments.

The part number of the storage board did not change when the new hybrid went into production. Therefore the 2232 and 2224 storage boards (671-0796-02 and 671-1401-01 respectively) will have a sticker to indicate pin 1 on A10J2111 and J2112, if the hybrid on the board is a -01. Install the cables using the sticker as the true indicator for pin 1. When the silk screen is corrected on the board the part numbers will change.

W2 Issue: 20-10

2224/2232: -05 Firmware Implemented

Ref: MOD # 73813
S/N 2224 B010530
2232 B014133

New Firmware has been implemented in the 2224 and 2232 to provide or correct the following:

1. The probe ident function will now cause the readout to display "IDENT".

2. A field complaint has been that the line shown under ADDR in an RS232 Option is distorted. This version firmware will generate a calibration box like that in the 2230 which may be easier to adjust for a straight line indicator in the options.

3. X-Y is displayed in readout when the XY Mode is selected to avoid operator error.

4. If the instrument is turned on in the Non Store Mode, between 0.5 µS and 0.05 µS/Div, then the ACQ SETUP button is pressed, and finally Store Mode is selected, an erroneous ACQ MENU is displayed with missing information.

(continued on following page)

5. If the instrument is turned off during the execution of the power up Diagnostic routines, a NV SETUP failure may occur at the next power on. This was corrected with the new firmware. Now if a valid NV SETUP failure should occur the number of bytes corrupted will be displayed in readout and the NV SETUP failure will not clear until a SETUP button is pressed.

6. If a Factory Reset is performed when the PWR UP State in the Save Setup Menu is other than PWR DOWN, a NV SETUP failure would occur.

The -05 firmware should only be installed in instruments routinely, if the version firmware present in the instrument is -02 or lower, or if there is a specific complaint about one of the bugs corrected.

W2 Issue: 20-10

2225: +5.2 Volt Power Supply Limits Changed

Ref: 2225 Service Manual,
P/N 070-6299-00
Revised April '90

The nominal value for the +5.2 Volt supply in the 2225 has been changed to +5.1 Volts. The limits for the supply are now +4.95 to +5.25 Volts. Please mark your manuals to reflect this change.

W2 Issue: 20-8

2402A with Hard Disk: Xcopy Problem

An unknown number of 2402A's with a hard disk have a problem with the xcopy command. These would have a serial number B010565 and below. The problem is simply that the file names XCOPY.EXE in the DOS directory on the hard disk is corrupted. The solution is to recopy this file from the DOS diskette that comes with the 2402A.

W2 Issue: 20-9

24XX: Intermittent Cable Assemblies

Two intermittent problems have been found to be associated with two cable assemblies:

1. CRT display changing, giving the appearance that the CRT is bad. W101 (P/N 175-9023-00) soldered in on the Side board can cause this.

2. Intermittent CCD failures, particularly when using Diagnostics or Self Cal. W141 (P/N 175-9026-00) on the Time Base board may be defective.

The problem occurs when the unit is not warmed up or when operating in a cool environment. These parts are currently being screened by the manufacturing group in C1.

The cable assemblies that may be defective have a black connector that is soldered to the board. The quickest way to test for these cables is to put one finger on the soldered connector and gently wiggle the wires in the assembly. If the symptoms occur while doing this, replace the cable assembly. Do not pull on the cable assembly too hard, or you may damage it.

Not all of these parts are defective. Only change them when found to be defective.

W2 Issue: 20-9

24XX: Shipping Instructions

When packaging a 2400 Series product for shipping, please put the front panel cover in the space beside the product, rather than under the product. It is possible that the product may be damaged if the cover is under the instrument.

W2 Issue: 20-9

24XX DSO: Processor Board *Correction*

Ref: Service Tek Notes
August 1990, Issue 60

There were two typos in the kit numbers. The corrections are:

Product	Version	Kit Number
2430	2.21/2.0	020-1878-00
2440	2.30/2.5	020-1704-02

Sorry for any problems this may have caused.

W2 Issue: 20-8

520/A Series: Adjustment Hint

Ref: 520A Instruction Manual,
P/N 070-1709-00
521A Instruction Manual,
P/N 070-1794-00
522A Instruction Manual,
P/N 070-1874-00

After you have replaced the Calibrated Phase Shifter, or have been working on the supporting circuitry, re-aligning the circuits for proper phase shifter tracking can sometimes be a bit of a frustrating experience.

Following is a suggested procedure that may assist in getting your phase shifter aligned with a few less steps. This suggestion is a minor alteration to adjustment step 34 in the 520A (NTSC) manual. Appropriate adjustment steps in the 521A (PAL) and 522A (PAL-M) manuals should be equally applicable.

1. Monitor TP345 on the subcarrier output amplifier, schematic 3 with your oscilloscope.
2. Set phase dial to 0 degrees and adjust L331 for maximum signal.
3. Set dial to -15 (end stop) and adjust L332 for minimum signal.
4. Set dial to 0 degrees and select a vector reference point.
5. Set dial to +14 degrees and adjust R335 for +14 degrees of vector phase shift from the reference previously established.
6. Set dial to 0 degrees, note a reference vector position, set dial to -14 degrees and adjust L332 for -14 degrees of Vector phase shift from the previously noted reference.
7. Repeat steps 2 through 6 to eliminate any interaction.
8. Disconnect probe and repeat steps 4 through 6.
9. Check against specifications.

W2 Issue: 20-10

528: External Graticule, New Parts Too Thick

A recent batch of 528 External Graticules, P/N 331-0208-01, were too thick as received from the vendor. The thickness should be 0.100" +/- 0.012. Parts inspected in warehouse stocks were as much as 0.135" thick. Inspect your stocks of this part, scrap defects, and re-order as necessary.

W2 Issue: 20-9

650/A/HR Series: Transistor Selection Required Due to Changes in Vendor's Processes

Ref: 650HRC Series Instruction Manual, P/N 070-2646-02

The transistor used as the Horizontal Output, Q4090, in our 650 Series, has been influenced by process changes from the vendor. The effects of these changes have usually been negligible, but recent batches of this transistor have not functioned in an ideal manner in the circuit.

One of the symptoms that is immediately obvious is a drastic change in the displayed signal's pin-cushion correction, coupled with pin-cushion correction controls that no longer seem to have adequate range.

The present suggested "work-around" for the apparent mismatch will be to put the new transistor into the circuit, and then test select R4795 for correct/best operation. A note to remember is that in several cases, R4795 had to be selected to as low as 250 ohms (10 watts) for proper operation. (This can be accomplished easily in the present circuit by paralleling a 400 to 500 ohm resistor across the 750 ohm resistor that is in the circuit.) Also note that a few of the new transistors may still not function satisfactorily. These few transistors should be returned for credit and re-ordered.

W2 Issue: 20-10

7A29P: Attenuator Sticking

Ref: 7A29P Service Manual, P/N 070-6442-00
S/N B010296 and below

MOD # 66866

When operating or calibrating the 7A29P programmable plug-in amplifier, it has been noted that the attenuator relays (A10AT4100, Tek P/N 119-2397-00) may not operate consistently or properly. The relays may appear to be "sticking" in the operate position.

First check that the control voltages present on the relay driver (A10U3091) input and output pins are correct. If these control voltages are correct, the relays may be "sticking" in the operate position because the release voltage for the attenuators in instrument S/N B010296 and lower is on the borderline of the specification.

If you suspect faulty relay operation on any 7A29P, first check for the presence of the resistors (R3095-R3098, described below) on the back of the Analog board (A10, P/N 671-0179-XX). If these resistors are not installed, perform the procedure described below in order to ensure proper operation of the relay switches in the 7A29P attenuator:

CAUTION

Delicate parts – see maintenance section of the manual prior to performing this procedure.

On 671-0179-00 (circuit board assembly, Analog board), which will change to 671-0179-01, make the following run cuts and insert one each (total of four) 317-0103-00 (Res, Fxd, 10k ohm, 5%, 0.125W) across the cut run:

1. From U3091, pin 10 to U3100, pin 7 (R3095)

2. From U3091, pin 12 to U3100, pin 6 (R3096)

(continued on following page)

3. From U3091, Pin 13 to U3100, pin 5 (R3097)

4. From U3091, pin 14 to U3100, pin 4 (R3098)

This change will reduce the voltage present across the attenuator relays, allowing the relays to properly release.

W2 Issue: 20-10

Attenuator Success Story

Tektronix had been experiencing cracked Attenuator substrates on channel 1 of the Analog Real Time Oscilloscopes. To correct this problem, Tektronix has initiated an update plan that will add an impact pad to the cabinet which will absorb any blows to the rib-seam area and prevent the substrate from cracking. To receive this update, you may bring your instrument to a Tektronix Service Center and have this impact pad installed or you can contact a Tektronix Service Center and request them to send the amount of impact pads you need.

If you have any questions regarding this update, contact the Waveform Measurement Division Service Group at (503) 627-2282.

W2 Issue: 20-9

CSA803 Accessory

The calibrator has been changed in the CSA803 making it unnecessary to have the 015-1020-00 short circuit SMA. It has been removed as a standard accessory and all new CSA803 products are being shipped without it.

W2 Issue: 20-9

RTD710: New Revision of Service Manual (Volume I) Available

A new revision of the RTD710 Service Manual (Volume I) will be available for ordering on October 1, 1990. Order part number 070-6398-00. The updated version will have a revision date of September 1990.

Besides incorporating mods and making corrections, this revision contains an updated Performance Check and Adjustment Procedure.

W2 Issue: 20-9

RTD710/RTD710A: Connector Compatibility

The original configuration of the RTD710 and RTD710A used gold-plated headers (P/N 131-3863-00) and gold-plated cable contacts (P/N 131-3850-00) between the Main Interconnect board and the two boards in the Power Supply.

These gold-plated component parts are no longer available. The current product configurations are being manufactured with tin-plated headers (P/N 131-4954-00) and tin-plated cable contacts (P/N 131-4953-00). The wires and connectors included in the 050 kit have tin-plated headers or tin-plated cable contacts.

You cannot use a gold-plated cable contact with a tin-plated header. **A TIN-TO-GOLD CONNECTION WILL CORRODE AND CIRCUIT FAILURE WILL RESULT.**

To ensure that this instrument will not fail due to tin-to-gold corrosion, it is mandatory to replace all affected headers and cables with appropriate tin-to-tin connections. Where applicable, replace existing gold-plated contacts with the tin-plated contacts, and replace the gold-plated headers with the tin-plated headers.

(continued on following page)

The affected parts are listed below:

A70	Ckt bd assy; main interconnect P/N 670-9869-01
A70J842	
A70J868	
A70J870	
A80	Power Supply P/N 620-0038-01
A80A84	Ckt bd assy; regular analog P/N 670-9846-01
A80A84J842	
A80A86	Ckt bd assy; regular digital P/N 670-9847-01
A80A86J868	
A80A86J870	
W842	Ca assy, sp, elec:12, 18 awg, 41.0 L, 8-3 P/N 174-0793-01
W868	Ca assy, sp, elec:12, 18 awg, 41.0 L, 8-1 P/N 174-0795-01
W870	Ca assy, sp, elec:12, 18 awg, 23.0 L, 8-2 P/N 174-0796-01

Instrument serial numbers affected:

RTD710	300101 to 300451 J300452 to J300507
RTD710A	J300508 to J300868

For a replacement kit containing affected wires and connectors order P/N 050-2679-00.

W2 Issue: 20-9

SPG170A, SPG271, TPG625, TSG170A, TSG170D, TSG271, TSG300, TSG370, TSG371, TSG422, VITS201: Oscillator Transistor Changed to Assure Starting

Ref: SPG170A Instruction Manual, P/N 070-5965-00
SPG271 Interim Manual, P/N 061-3546-00
TPG625 Instruction Manual, P/N 061-3677-00
TSG170A Instruction Manual, P/N 070-5680-00
TSG170D Instruction Manual, P/N 070-6943-00
TSG271 Instruction Manual, P/N 070-6304-00
TSG300 Instruction Manual, P/N 070-5722-00
TSG370 Instruction Manual, P/N 070-3656-00
TSG371 Instruction Manual, P/N 070-3717-00
TSG422 Interim Manual, P/N 061-3596-00
VITS201 Instruction Manual, P/N 070-7385-00

Transistor Q10, which is located in the subcarrier oscillator assembly of the listed instruments, has been changed to a different part number to assure that the oscillator will start under a wide range of conditions. The new part number will be 151-5035-00.

Use the new transistor to address failures of the previous part where the part number was 151-5001-00, or to address an intermittent failure with familiar symptoms.

The new transistor will be installed in instruments from the factory beginning with the following serial numbers:

(continued on following page)

Product	Serial Number
SPG170A	B021113
SPG271	B020886
TPG625	B010182
TSG170A	B042644
TSG170D	B010243
TSG271	B031475
TSG300	B031460
TSG370	B031460
TSG371	B010352
TSG422	B010225
VITS201	B010256

W2 Issue: 20-10

SPG170A, SPG271, TPG625, TSG170A, TSG170D, TSG271, TSG300, TSG370, TSG371, TSG422, VITS201, 728E: Cooling Fan Part Number Changed

Ref: SPG170A Instruction Manual, P/N 070-5965-00
SPG271 Instruction Manual, P/N 070-6814-00
TPG625 Interim Manual, P/N 061-3677-00
TSG170A Instruction Manual, P/N 070-5680-00
TSG170D Instruction Manual, P/N 070-6943-00
TSG271 Instruction Manual, P/N 070-6304-00
TSG300 Instruction Manual, P/N 070-5722-00
TSG370 Instruction Manual, P/N 070-7446-00
TSG371 Interim Manual, P/N 061-3717-00
TSG422 Interim Manual, P/N 061-3596-00
VITS201 Instruction Manual, P/N 070-7385-00
728E Instruction Manual, P/N 070-7630-00

MOD # 71229

The part number of the cooling fan used in the listed instruments has been changed from 119-2068-00 to 119-2068-01. This new part number will deliver a fan with appropriate electrical connectors, etc. attached from the vendor.

The new fan will be a direct replacement for field failures of the older one.

W2 Issue: 20-10

SPG271, TSG271: Changes to Analog Board Allow for Increased Adjustment Range

Ref: SPG271 Interim Manual, P/N 061-3546-00
TSG271 Instruction Manual, P/N 070-6304-00

MOD # 72525

The Analog board, P/N 670-9906-03, that is used in the TSG271 and the SPG271 has been modified to allow for proper adjustment range with a variety of transistor beta characteristics.

The two changes that were made are as follows:

1. To assure adjustment range of the Black Burst levels, A3R724 was changed from 82k ohms to 56k ohms, P/N 315-0563-00, A3R725 was changed from 56k ohms to 47k ohms, P/N 315-0473-00 and A3R726 was changed from 50k ohms to 100k ohms, P/N 311-0613-00.

   All three resistors must be replaced as a set to assure functionality.

2. To assure adjustment range of the Subcarrier DC level, A3R393 was changed from 3.65k ohms to 3.74k ohms, P/N 322-3248-00.

(continued on following page)

NOTE: Instruments produced before approximate serial number B030731 (TSG271) and B020310 (SPG271) may not have the affected circuitry installed.

These changes can be installed on an "as required" basis when inadequate adjustment range of the associated controls is encountered after one of the connecting transistors has been replaced.

This modification will be installed in new instruments from the factory beginning with serial number B031562 (TSG271) and B020971 (SPG271).

W2 Issue: 20-10

TSG271: Option 05 Established

Ref: TSG271 Instruction Manual,
P/N 070-6304-00

MOD # 69611

Option 05 has been added to the TSG271's list of offerings. This option will deliver a TSG271 configured with special test signals appropriate to the PAL-D environment.

This change replaces custom mod PC. The instruction manual will be updated with the part number changes, and will be the reference document henceforth.

No field upgrade kits to add Option 05 to a standard TSG271 have been established as of the date of this article.

W2 Issue: 20-10

Television Measurement Series #1 Videotapes Available

A new series of videotape tutorials that discuss several measurement techniques peculiar to the television industry are now orderable from Tektronix.

These new tapes discuss the measurement of several types of signal distortion, are based upon conventional analog instrumentation, and cover most of the major topics that have previously appeared in the "NTSC Measurements" book published by Tektronix TV Division.

The topics and their associated part numbers are:

1. Differential Phase
   P/N 068-0331-04

2. Differential Gain
   P/N 068-0330-04

3. Luminance Nonlinearity
   P/N 068-0334-04

4. Chrominance Nonlinearity
   P/N 068-0335-04

5. Short Time Distortion and K Factor Measurements
   P/N 068-0333-04

6. Line Time, Field Time and Long Time Distortions
   P/N 068-0336-04

7. Chrominance-to-Luminance Gain and Delay Inequalities
   P/N 068-0337-04

8. Frequency Response
   P/N 068-0338-04

9. Group Delay
   P/N 068-0339-04

(continued on following page)

10. Transmitter Measurements
    P/N 068-0340-04

The complete set of the above tapes, entitled Measurement Series Set #1, is orderable as P/N 068-0341-04.

These tapes are supplied on VHS NTSC format and average length of each tape is 12 minutes. VHS PAL versions are available on special order.

Contact your Tektronix Television Sales Engineer for pricing and delivery.

W2 Issue: 20-10

VITS201: Changes to Performance Verification Procedures and Parts Lists *(Pullout B)*

Ref: VITS201 Instruction Manual,
P/N 070-7385-00

Attached to this issue as *Pullout B* are corrections to the VITS201 Instruction Manual's procedures and parts lists.

W2 Issue: 20-10

VITS201: IC Change May Result in Component Latch Timing Problem

Ref: VITS201 Instruction Manual,
P/N 070-7385-00

MOD # 72569

If you have reason to change integrated circuit A1A1U45 due to a failure, and if the replacement part is made by AMD, a latch timing problem associated with A1A1U76 may result.

To alleviate this problem, the VITS201 has been modified as follows:

1. Pin 11 of A1A1U76 was lifted from the circuit board and the circuit trace that led to pin 11 was severed. (This trace is accessible nearby on the top of the board.)

2. A1A1U76 pin 11 was connected to A1A1U38 pin 9 with a small piece of strapping wire.

This change can be installed on an "as required" basis and will be implemented in new instruments from the factory beginning with serial number B020196.

W2 Issue: 20-10

VITS201: Improvements to Genlock Performance and Return Loss

Ref: VITS201 Instruction Manual,
P/N 070-7385-00

MOD # 71191

The VITS201 has been modified to address concerns associated with the following:

1. Improvements to the Return Loss and cross talk characteristics of the Program I and Test Signal Out ports.

2. Changes to decrease the time necessary to acquire full Genlock.

Concern 1 has been addressed by redesigning the circuit board, and by changing the values of L2 and L11, and by removing C21. NOTE: The net effect of this improvement will only be applicable to the new circuit board, which changes from P/N 671-0856-04 to 671-0856-05.

(continued on following page)

Concern 2 has been addressed by changing R103 to 39.2k ohms, P/N 322-3346-00, and should be installed when the instrument is in for routine service.

The above mentioned changes are being installed in new instruments from the factory beginning with serial number B020220.

W2 Issue: 20-10

VITS201: Power Supply Ripple from Cooling Fan

Ref: VITS201 Instruction Manual, P/N 070-7385-00

MOD # 73421
MOD # 73740

Under certain conditions, the VITS201 has been known to oscillate at about 3 kHz, causing a 60 mV ripple on the +5 supply. In order to eliminate this problem, two changes were implemented.

In the first change, MOD # 73421, C620 was changed to a 0.047 µF capacitor, P/N 283-0341-00, and R620 was changed to a 100 ohm resistor, P/N 315-0101-00. This change occurred at S/N B030285. The Power Supply board changed from P/N 671-0663-00 to 671-0663-01.

A later change, MOD # 73740, implemented more extensive changes. R620 was changed to a 3.23k ohm resistor, P/N 322-3243-00, C620 was changed to a 0.027 µF capacitor, P/N 283-0058-00, C613 was changed to a 0.22 µF capacitor, P/N 281-0925-01, and C926 was changed to a 1000 pF capacitor, P/N 281-0812-00. In addition, a circuit board trace needed to be altered via cuts and wire straps. The circuit trace on the top of the power supply board that supplied +15 V to pin 1 of U613 was cut at a location between C613 and L329. A wire strap was then added to connect pin 1 of U613 to the +5 V end of R517.

This change is being installed in new instruments from the factory beginning with S/N B030309.

This second change supersedes the initial change, and is the one that is recommended for installation in any VITS201 exhibiting problems possibly associated with fan-induced ripple.

W2 Issue: 20-10

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MANUAL CHANGE INFORMATION Group Code 24

Date: 8/20/90 Change Reference: C1/890

Product: 1780R Series Manual Part No: 070-6891-00

DESCRIPTION

TEXT CHANGES

CHANGE TO READ:

Section 5, Page 5-2

CHANGE: In the description for the Detector Head, change "(item 4)" to read "(item 6)".

Section 5, Pages 5-2 & 5-3

CHANGE items 11 and 12 to read as follows:

11. Function Generator
Signal: 1 kHz, +10 V, squarewaves for checking YRGB mode of operation.

For example: TEKTRONIX FG501A Function Generator installed in a TEKTRONIX TM500 Series Power Module.

12. Power Module Mainframe (required for Items 4, 5, 6, 8, 9, 10, and 11)
For powering and housing TEKTRONIX DC503A, DM501A, FG501A, SG503, SG505, 067-0916-00, and 015-0408-00.

For example: TEKTRONIX TM506 Power Module Mainframe.

Section 5, Page 5-6

CHANGE: The NOTE that precedes "Preliminary Setup" to read as follows --

NOTE
Leave the 1780R-Series internal jumpers in their factory-set positions unless directed otherwise. The factory-set positions are listed in Section 9, Installation, Electrical. Install the metal cover on the instrument and leave it installed when following this procedure to check performance requirements.

CHANGE: In Step 1 REQUIREMENT, change "252" to read "250".

Section 5, Page 5-8

DELETE: In Step 3h, delete "between".

Date: 8/20/90	Group Code 24	Change Reference: C1/890
Product: 1780R Series		Manual Part No: 070-6891-00

CHANGE TO READ:

Section 5, Page 5-12

CHANGE parts e through q in Step 9 to read:

e. Select VAR and REL on the Waveform crt menu.

f. Use the VERT POS control to position the center traces to the center of the Waveform crt graticule.

g. Turn the Precision Measurement control so the center traces are overlayed and appear as one trace.

h. Press the REFERENCE SET button so that the relative CAL readout is 100.0% on the Waveform crt.

i. Move the VAC signal from the 1780R-Series CH A INPUT to the CH B1 INPUT connector.

j. Select the 1780R-Series CH B1 INPUT and repeat part g of this step.

k. **CHECK** – that the relative CAL readout is 99.8% to 100.2%.

l. Move the VAC signal from the 1780R-Series CH B1 INPUT to the CH B2 INPUT connector.

m. Select the 1780R-Series CH B2 INPUT and repeat part g of this step.

n. **CHECK** – that the relative CAL readout is 99.8% to 100.2%.

o. Move the VAC signal from the 1780R-Series CH B2 INPUT to the CH B3 INPUT connector.

p. Select CH B3 INPUT and repeat part g .

q. **CHECK** – that the relative CAL readout is 99.8% to 100.2%. After completing this check, select FIX on the Waveform crt menu.

Section 5, Page 5-13

DELETE: In Step 9jj, delete "REF TO EXT".

ADD to Step 9kk: Disconnect the terminator from the CH A INPUT connector.

CHANGE in Step 10c: "Check" to read "Connect".

Date: 8/20/90	Group Code 24	Change Reference: C1/890
Product: 1780R Series		Manual Part No: 070-6891-00

CHANGE TO READ:

Section 5, Page 5-17

CHANGE Step 17d. to read: **CHECK** – Repeat parts c through g of Step 16 to check X10 frequency response.

CHANGE Step 18e to read: Set the WAVEFORM GAIN to X5.

Section 5, Page 5-19

ADD to Step 21a: Check that a Black Burst signal is applied to the 1780R-Series EXT REF connector and REF-EXT is selected on the front panel. Check that the internal jumpers for A2J865 and A2J866 are set to their factory-set positions.

Section 5, Page 5-20

DELETE Steps 21e and 21f.

DELETE in Step 21i and k: "portion of the".

CHANGE in Step 21l: "signals" to read "hum signal".

CHANGE Step 21n to read: Move the sine wave hum signal from the 1780R-Series CH B3 INPUT connector to the left front-panel PROBE input connector.

CHANGE in Step 21q: "DC RESTORER-FAST" to read "DC RESTORER-OFF".

CHANGE Step 21r to read: Disconnect the hum signal from the PROBE connector.

Section 5, Page 5-21

CHANGE Step 23f to read: **CHECK** – That the sync tip goes to the graticule baseline. (The graticule baseline is 0 IRE for NTSC; 0.3 for PAL.) **CHECK** – by setting the generator Burst switch to Off and then to On, that the sync tip moves less than 1 IRE for NTSC (7 mV for PAL).

CHANGE: In the 2nd column of Table 5-2, change "≤" to read " ≥".

Date: 8/20/90	Group Code 24	Change Reference: C1/890
Product: 1780R Series		Manual Part No: 070-6891-00

CHANGE TO READ:

Section 5, Page 5-24

CHANGE Step 29d through m to read as follows:

d. Use the VERT POS control to move the center two traces (bottom of the upper signal and top of the lower signal) to the graticule baseline (0 IRE for NTSC; 0.3 for PAL).

e. Set the WAVEFORM GAIN to X5 and turn the Precision Measurement control to adjust for a null.

f. **CHECK** – that the CAL readout is between 970 mV and 1030 mV.

g. Select PROBE X10 on page 2 of the CONFIGURE menu.

h. Set the VAC to 100.0 mV.

i. Turn the Precision Measurement control to obtain a CAL readout of 100.0 mV. Repeat part d of this step. Then, slightly readjust the Precision Measurement control to obtain a null.

j. **CHECK** – that the CAL readout is between 97.0 mV and 103.0 mV.

k. Set the WAVEFORM-X5 to Off. Leave VAR selected on the Waveform crt to perform the next step.

l. Disconnect the VAC signal from the PROBE input connector.

Section 5, Page 5-26

CHANGE: In the 6th column of Table 5-3, change "±0.1 µs" to read "± 1.0 µs", and "±0.135 µs" to read "± 1.35 µs".

Date: 8/20/90	Group Code 24	Change Reference: C1/890
Product: 1780R Series		Manual Part No: 070-6891-00

CHANGE TO READ:

Section 5, Page 5-28

CHANGE Step 35h and Step 36 to read as follows:

h. Leave the Color Bar and Black Burst signals connected to the instrument.

36. Check RGB/YRGB Operation

REQUIREMENT – Squarewave or Staircase Input Amplitude: +10 V input will result in a horizontal display of 6.7 divisions ±0.7 major division. Sweep Repetition Rate: Field or line rate of displayed video as selected by the WFM HORIZONTAL buttons.

a. Check that a Color Bar signal is applied to the CH A INPUT.

b. Check that a Black Burst signal is applied to the 1780R–Series EXT REF connector and this connector is terminated into 75Ω.

c. Select 1780R–Series WFM HORIZONTAL-ONE-LINE mode. Check that RIGHT DISPLAY-WFM, INPUT-CH A, and REF-EXT are selected.

d. Use the 1780R–Series HORIZ POS and VERT POS controls to center the display on the Waveform crt.

e. Connect the RGB Parade Display Test Connector fixture (see Fig. 5-4) to the 1780R–Series rear-panel **REMOTE** connector.

f. **CHECK** — that the color bar display (or sweep) has shortened to 3.2 to 3.7 divisions when jumper A2J585 is set to its factory-set 4-Step YRGB Parade position (pins 2 and 3 are jumpered).

g. Use the 1780R–Series HORIZ POS control so that the color bar display ends at the last major division mark on the right side of the Waveform crt graticule baseline. Note the waveform-end location.

h. Connect the output of the Function Generator to the test oscilloscope vertical amplifier input. Set the generator controls for 1 kHz, 0 V to +10 V, squarewaves as displayed on the test oscilloscope crt.

i. Move the Function Generator signal from the test oscilloscope to the RGB Parade Display Test Connector.

j. **CHECK** — that the first or left-hand waveform ends 6.7 major divisions, ±0.7 major division, to the left of the location noted in part g of this step.

k. Disconnect the Function generator and RGB Parade Display Test Connector from the REMOTE connector. Disconnect the Color Bar signal from the CH A INPUT connector.

Date: 8/20/90	Group Code 24	Change Reference: C1/890
Product: 1780R Series		Manual Part No: 070-6891-00

CHANGE TO READ:

Section 5, Page 5-30

CHANGE in Step 39o: "tset" to read "set".

Section 5, Page 5-31

CHANGE in Step 40f: "does move" to read "does not move".

Section 5, Page 5-35

CHANGE Step 48f to read: **CHECK** — that the test circles are overlayed within 0.36 mm (typically one trace width) and located on the compass rose as displayed on the Vectorscope crt.

Section 5, Page 5-39

DELETE Fig. 5-12.

CHANGE in Step 54e: "See Fig.5-12." to read "See Fig.5-10."

Section 5, Page 5-41

ADD to Step 57b: Check that the Differential Comparator + and -Input Coupling switches are set to AC.

Section 6, Page 6-4

CHANGE items 11 and 12 to read:

11. Function Generator
Signal: 1 kHz, +10 V, squarewaves for checking YRGB mode of operation.

For example: TEKTRONIX FG501A Function Generator installed in a TEKTRONIX TM500 Series Power Module.

12. Power Module Mainframe (required for Items 4, 5, 6, 8, 9, 10, and 11)
For powering and housing TEKTRONIX DC503A, DM501A, FG501A, SG503, SG505, 067-0916-00, and 015-0408-00.

For example: TEKTRONIX TM506 Power Module Mainframe.

Date: 8/20/90	Group Code 24	Change Reference: C1/890
Product: 1780R Series		Manual Part No: 070-6891-00

CHANGE TO READ:

Section 6, Page 6-7

CHANGE: In the first column of Table 6-1, change Step # "17,26" to read "17".

CHANGE: In the second column of Table 6-1, change "CMRR" to read "CMR".

Section 6, Page 6-13

ADD to Step 7m: Select FIX on the Waveform crt menu.

Section 6, Page 6-15

DELETE: Delete part f of Step 8.

CHANGE: parts a through c of Step 9 to read:

a Check that the button below the Waveform crt is On. Check that the CALIBRATE button is On and TRACE ROTATION is selected on the Vectorscope .

b. **ADJUST** — Vertical Readout Pos (A2R309) and Vertical Readout Size (A2R215) so that the bottom and top horizontal electronic graticule lines are aligned with the -40 and 100 IRE graticule lines (0 and 1.0 volt lines for PAL), respectively. Align the + marks of the Waveform crt electronic graticule with the 0 IRE (0.3 for PAL) graticule baseline. Readjust, as necessary, to obtain the correct alignment.

For earlier versions of the instrument, align the horizontal electronic graticule lines with LED lenses in the Waveform crt bezel.

c. **ADJUST** — WFM Readout H Center (A2R170) and WFM Readout H Gain (A2R167) so the left-hand + mark of the electronic graticule aligns with the first major division mark on the graticule baseline. Align the right-hand + mark of the electronic graticule with the 11th major division graticule mark on the baseline. (Fig. 5-7 in Section 5 identifies the major division marks on the Waveform crt graticule baseline.)

For earlier versions of the instrument, align the vertical electronic graticule lines with LED lenses in the Waveform crt bezel.

DELETE: Delete part e of Step 10.

CHANGE part a of Step 11 to read: Check that the button below the Vectorscope crt is On. Check that the CALIBRATE button is On.

Date: 8/20/90	Group Code 24	Change Reference: C1/890
Product: 1780R Series		Manual Part No: 070-6891-00

CHANGE TO READ:

Section 6, Page 6-19

CHANGE: The first sentence of Step 17q to read "Set the front panel RIGHT DISPLAY to WFM and WAVEFORM GAIN-X5 to On.

Section 6, Pages 6-22 & 6-23

CHANGE: "CMRR" to read "CMR".

Section 6, Page 6-24

ADD to Step 26d: Typically the amplitude should be less than 30 mV.

Section 6, Page 6-35

CHANGE Step 39 to read as follows:

39. Adjust Chrominance/Luminance

a. Connect a Pulse & Bar signal from a TEKTRONIX TSG-170A NTSC Television Generator to the 1780R CH A INPUT connector. (For the 1781R, use the TSG-271 PAL Generator).

b. Select REF-INT on the 1780R-Series front panel.

c. Press the button below the Vectorscope crt to On. Press the PHASE SHIFT button and use the Precision Measurement control to place the burst vector dot(s) on the reference line(s).

d. Press the MEASURE button. Touch the CHROMA/LUM pad on the Vectorscope crt. Select C/Y mode on the menu.

e. **ADJUST** — Lum Comp (A6C153) for minimum loop located at about 45° as displayed on the Vectorscope crt. (For PAL, there will be two loops located at about 45° and 315°.

f. Press the MEASURE button to exit the menu. Press the PHASE SHIFT button to Off.

g. Disconnect the Pulse & Bar signal.

Date: 8/20/90	Group Code 24	Change Reference: C1/890
Product: 1780R Series		Manual Part No: 070-6891-00

CHANGE TO READ:

Section 6, Page 6-36

CHANGE Step 41 to read as follows:

41. Adjust RGB/YRGB

a. Connect a Color Bar signal from the Television Test Signal Generator, through a 75Ω feed-through terminator, to the 1780R–Series CH A INPUT.

b. Check that a Black Burst signal is applied to the 1780R–Series EXT REF connector and this connector is terminated into 75Ω.

c. Select 1780R–Series RIGHT DISPLAY-WFM. Check that INPUT-CH A, REF-EXT, and WFM HORIZONTAL-ONE-LINE are selected.

d. Use the 1780R–Series HORIZ POS and VERT POS controls to center the display on the Waveform crt.

e. Connect the RGB Parade Display Test Connector fixture (see Fig. 6-5) to the 1780R–Series rear-panel **REMOTE** connector.

f. Note that the color bar display (or sweep) has shortened to 3.2 to 3.7 divisions when jumper A2J585 is set to its factory-set 4-Step YRGB Parade position (pins 2 and 3 are jumpered).

g. **ADJUST** — RGB/YRGB Staircase Offset (A5R194) to horizontally position the color bar waveform so that it ends at the last major division mark on the right side of the Waveform crt graticule baseline.

h. Connect the output of the Function Generator to the test oscilloscope vertical amplifier input. Set the generator controls for 1 kHz, 0 V to +10 V, squarewaves as displayed on the test oscilloscope crt.

i. Disconnect the Function Generator output signal from the test oscilloscope. Connect the generator output Squarewave signal to the RGB Parade Display Test Connector bnc input connector.

j. **ADJUST** — RGB/YRGB Staircase Comp (A5C195) for no smearing.

k. Disconnect the generator Squarewave signal and RGB Parade Display Test Connector from the instrument. Leave the Color Bar and Black Burst signals connected to the instrument.

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MANUAL CHANGE INFORMATION **Group Code 20**

Date: 12/1/89 Change Reference: C3/1289

Product: VITS201 Manual Part No: 070-7385-00

DESCRIPTION

TEXT and PARTS LIST CHANGES

SECTION 6 PERFORMANCE CHECK and CALIBRATION
Pg. 6–2, Table 6–1 **REPLACE** Leveled Sine Wave Generator entry **WITH**

Step Attenuator	1 dB steps; DC coupled with 75Ω impedance; Flat response to at least 5 MHz.	Wavetek 7580

Pg. 6–11,
ADD part h to Step 5. Check PROGRAM IN **AS FOLLOWS:**

h. Return the VITS 201 BYPASS switch (S1) to the Operate position.

Pg 6–12.
MOVE step 6e **TO BE** step 7d.

CHANGE parts a and b of step 8. Check EXTERNAL INPUTS **TO READ:**

a. Remove any connection to the PROGRAM IN and EXTERNAL 1 connectors, and set S11-9 and -10 open. Perform a reset, and the display will read ***d. 1*** (Diagnostic **1**). Use the **INCR** push button to select diagnostic 16, then press the **ENTER** button; the display will read ***d.E. 1*** (Diagnostic, External 1), indicating that you are in the External Mode diagnostic, ready to select the indicated external input. Push the **ENTER** button again to select External 1.

b. Connect the Return Loss Bridge Unknown arm to the EXTERNAL 1 connector.

SECTION 7 REPLACEABLE ELECTRICAL PARTS
CHANGE A2CR460 entry **TO READ:**

A2CR460	152-0884-00	SEMICOND DEV,DI:16 AMP,35V,TO-220,AC PKG
		ATTACHED PARTS
	210-4293-00	NUT:CAD PL STL,ASSEM,WA
	210-1178-00	WASHER,SHLDR:NYLON
	211-0012-00	SCREW,MACHINE:4-40 X 0.375,PNH,STL
	211-0097-00	SCREW,MACHINE:4-40 X 0.312,PNH,STL
	214-4293-00	HEAT SINK:COPPER
	342-0563-00	INSULATOR PLATE:TRANSISTOR,FIBERGLASS REINFORCED SILICON RUBBER
		END ATTACHED PARTS

SECTION 9 REPLACEABLE MECHANICAL PARTS
CHANGE Fig. 1–14 **TO READ:**

-14	210-0004-00	2	WASHER,FLAT:0.031 ID X 0.155 OD X 0.03,PP