TEK CUSTOMER PRODUCT SERVICING INFORMATION

February 1989, Issue 54

SERVICETEKNOTES

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

New Digital Spectrum Analyzer

Provides

100-Times

Faster

Results

Tek Captures "Best New Product Honor"

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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 (W^2 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.,
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Beaverton, Oregon 97076 - 9958

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TABLE OF CONTENTS

(Continued on the following page)

TABLE OF CONTENTS

New Digital Spectrum Analyzer Wins Wescon Award

TEK Captures "Best New Product Honor"

WESCON will issue a scholarship award... to assist deserving engineering students with their educations.

Beaverton, Oregon — The new Tektronix, Inc., 3052 Digital Spectrum Analyzer, providing 100-times faster analysis results, captured the New Products & Technology Achievement Award in the Instrumentation, Test Equipment, and Control Systems category at November's WESCON/88 in Anaheim, California.

In conjunction with the Best New Product honor, WESCON will issue a $10,000 scholarship award in Tektronix' name to deserving electronics engineering students whom the company designates, to assist in their educations.

WESCON/88 marks the first time the trade show has held a New Products and Technology Achievement Awards competition. The Tektronix 3052 Digital Spectrum Analyzer was among more than 70 products that vied for top honors in three categories. The categories included: Components; Instrumentation, Test Equipment and Process Control; and Production Equipment.

The 3052 Digital Spectrum Analyzer employs signal processing innovations that provide a nearly 100-fold speedup in real-time spectrum analysis along with resolutions to 1.25 Hz on 800 element spans. The new spectrum analyzer uses a bank of 1,024 complex parallel digital filters to achieve a maximum 200 microsecond spectral output rate on signal bands to 10 MHz, with continuous real-time spectral displays on bands to 2 MHz.

These signal processing capabilities significantly expand analysis power in numerous application areas. They include communication channel fault characterization, laser testing, frequency monitoring or surveillance, high-throughput ATE, and many others.

In addition to the 3052's expanded analysis power, the digital spectrum analyzer makes it possible to see a complete RF signal, rather than a sample, in real time. The 3052 not only captures the entire signal, but also features the ability to scroll backward to review the pattern. ◊

New Digital Spectrum Analyzer

Provides 100-Times Faster Results

This is much faster than the conversion times previously available, and it provides better accuracy than conventional FFT techniques.

Beaverton, Oregon — The Strategic Project Unit of the Microwave Group at Tektronix, Inc., announced recent signal processing innovations that provide a nearly 100-fold speedup in real-time spectrum analysis along with resolutions to 1.25 Hz on 800 element spans. The core technology, essentially a bank of 1024 complex parallel digital filters, is central to the new 3052 Digital Spectrum Analyzer. The 3052 uses this technology for maximum 200 microsecond spectral output rates on signal bands to 10 MHz with continuous real-time spectral displays on bands to 2 MHz. This is much faster than the conversion times previously available, and it provides better accuracy than conventional FFT techniques.

The new 2 MHz real-time and nearly real-time 10 MHz capabilities of the Tektronix 3052 Digital Spectrum Analyzer significantly expand analysis power in numerous application areas. These include communication channel fault characterization, laser testing, frequency monitoring or surveillance, high-throughput ATE, and many others. With the special Block Capture Mode, sequential spectral frames can be stored and recalled or scrolled through for further examination. For example, the spectra before and after a synthesizer's frequency hop can be examined in detail for band splatter, carrier attenuation between hops, and synthesizer lock-in time. Sophisticated time triggers and spectral event detection offer further power for triggering capture of elusive transient occurrences. Spectral Event Detect is an especially powerful tool when used in conjunction with the Block Capture Mode's sequential storage of successive spectral frames.

Spectrum analyzer setup and control is through a detachable front panel designed for easy use from a variety of positions. Menu-driven operation from the front panel's LCD display, keystroke macro capability, recallable setups, single-knob zoom control, and dual-window display and processing are just a few of the convenience features provided for rapidly acquiring and viewing different spectral representations. Frequency display spans are selectable in a 1-2-5-10 sequence with 13 spans ranging from 1 kHz to 10 MHz. The center frequency of any span can be quickly tuned for coverage anywhere in the DC to 10 MHz range of the analyzer. Resolution around the center frequency is determined by the selected span, with the narrowest resolution being 1.25 Hz in the 1 kHz span.

For quicker interpretation of spectral displays, the 3052 uses a high-resolution color monitor. Because of the volume of spectral data available, an amount far beyond the human capacity to assimilate on a real-time basis, a variety of display format and summary selections are also provided. The formats include amplitude-frequency, amplitude-time, phase-frequency, spectragram, and waterfall.

(Article continued on following page)

Spectrum Analyzer *(Continued from previous page)*

Features include sophisticated triggering selections, spectral event detection, and an intelligent marker system that provides delta measurements of power and frequency...

These can be displayed in conjunction with color-coding to highlight specific areas of interest. Summaries for simpler and faster assimilation of information include display updating on every Rth selectable spectral frame with additional selections for display of frequency elements as averages, peaks, or minimum/maximum values taken over R frames. Other features include sophisticated triggering selections, spectral event detection, and an intelligent marker system that provides delta measurements of power and frequency and menu selections for a variety of peak and lobe searches.

To support these display and analysis capabilities, the Tektronix 3052 Digital Spectrum Analyzer uses a high-speed digital processing unit implemented in CMOS VLSI. A bit-serial architecture manages a parallel block of VLSI processors to provide several billion operations per second.

Actual spectral conversion is done with Tektronix-designed linear-phase, finite-impulse-response (FIR) filters. The flat passband and "brickwall" shape of these 1024 closely spaced filters provide the high dynamic range and frequency resolution of the 3052. And, since the filters are digitally implemented, they can be frequency panned and zoomed for magnified zone analysis around any selected center frequency.

The overall system is based on the VME architecture, which uses modular cards for the various functions. Along with spectrum analysis and central processing, other card functions include GPIB (option 01), RS-232, and hardcopy interfacing for a Tektronix 4696 Color Copier (option 11). The entire 3052, including the high-resolution color monitor and disk drives, is designed for rackmounting. However, it can be used on a bench top as well. Complete operation is from the detachable front-panel/keyboard, which resembles a conventional spectrum analyzer front panel, but includes an LCD display for viewing control menus and commands.

The Tektronix 3052 Digital Spectrum Analyzer and options are priced as follows:

3052 Digital Spectrum Analyzer	$75,000
Option 01 GPID Interface	1,995
Option 10 Real Time Interface	9,500
Option 11 Color Copier Interface	1,495

Prices are USD. All are now available for ordering.

Tektronix is a leading manufacturer of electronic products and systems in the areas of test and measurement, computer graphics, and communications. Sales in fiscal 1988 totalled $1.4 billion. The company has approximately 16,000 employees worldwide. The Strategic Product Unit, which is responsible for the 3052 Digital Spectrum Analyzer, is part of Microwave Group.

Literature is available by writing to:

Tektronix, Inc.
Marketing Communications
P.O. Box 15149
Portland, Oregon 97215

Or call, toll-free, 1-800-TEK-SPEC.
In Oregon, call (503) 235-7315. ◊

LID Telephone Response Center

Since Service Support was divisionalized, it has been difficult to reach the support people when help is needed. To help solve this problem, Lab Instruments Division (LID) has instituted a telephone response center. This phone is staffed between the hours of 6:00 AM and 6:00 PM Pacific Time. All questions will be answered or the call will be referred to someone capable of providing the answer. Our goal is to provide an answer immediately. However, some problems may require special support. When special support is required, an action plan will be developed.

The same people that provided support to you for LID products are still available to help you. This new service is an addition designed to insure that you get answers to all your questions or concerns in a timely manner.

So don't be afraid to call. Our goal is to provide you with the best service possible.

The number to call is: (503) 627-3086

W2 Issue: 18-19

Product Service Training Schedule (Pullout A)

An updated *Product Service Training Schedule* has been included as **Pullout "A"** in the back of this publication. This schedule will be updated and included in future editions of this publication.

Editor
Publications Support
94-925, (503) 629-1167

CPS250: Power Supply Cold Solder Joints Causing Fuse Failures

Cold solder joints should be suspected in any units that have unexplained fuse failures. The current control loops are most often affected. The 5 amp fuse in the +5 volt supply has been the most often seen failure. In those cases, the +5 volts and power-on light are out but the two 20 volt supplies both function.

W2 Issue: 18-20

ECO170A/SPG170A/TSG170A/TSG271/TSG300/SPG271: Power Supply Redesigned

Ref: ECO170A Instruction Manual, P/N 070-6113-00
SPG170A Instruction Manual, P/N 070-5965-00
TSG170A Instruction Manual, P/N 070-5680-00
TSG271 Instruction Manual, P/N 061-3457-00
SPG271 Instruction Manual, P/N 061-3546-00
TSG300 Instruction Manual, P/N 070-5722-00
MOD #64911

In order to provide increased reliability at a reduced cost, the power supply board in the above listed instruments has been redesigned. This is a totally new circuit board assembly that will be compatible with present production and earlier instruments, and will be documented in the instruction manuals that are received with the new instruments.

Mod #64911 will be installed in new instruments starting with the following serial numbers.

ECO170A	B020298
SPG170A	B020540
TSG170A	B041511
TSG271	B030525
SPG271	B020221
TSG300	B030704

Since the manual changes that were developed for this MOD are fairly extensive, they will not be included in this issue of *Wizards' Workshop*. Instead, copies have already been distributed to TV service centers via the normal manual insert mailings. If, for some reason, you have not received this insert, you may request a copy by sending a note, FAX, telex, etc. to TV Manuals Support, D.S. 58-594. The TV Manuals Support people will also be happy to make mailing list changes or updates if you just let them know what your needs are.

W2 Issue: 18-20

S3295: TEKTEST V Version V03.02A Software Release (Pullout B)

Refer to **Pullout "B"** for TEKTEST Software Release Notes.

To obtain the latest S3295 Software:

Tektronix Technical Support Specialists should contact Nancy Wise at 94-557, phone number; (503) 629-1560.

Please provide system Job Numbers and Serial Numbers for each update requested.

Customers should be directed to contact their local Sales Engineer.

W2 Issue: 18-19

TSG100: Screw Part Number Changed

REF: TSG100 INSTRUCTION MANUAL,
P/N 070-6881-00
MOD #67024

To make assembly of certain mechanical sections of the TSG100 easier, 6 screws, noted in your manuals as Figure 1-5, are being changed. Part Number 213-0088-00 will be replaced by Part Number 213-0912-00, which is a POSI-DRIVE equivalent part.

It is suggested that if one of the affected screws requires replacement, all 6 should be installed.

MOD #67024 will be installed in new instruments from the factory starting with S/N B010316.

W2 Issue: 18-20

TSG170A/SPG170A: Part Number Changed

REF: TSG170A INSTRUCTION MANUAL, P/N 070-5680-00

SPG170A INSTRUCTION MANUAL P/N 070-5965-00

MOD #65570

Due to increased reliability from our vendors, A5U106 in the Option 1 versions of the TSG170A and SPG170A will be changed from Part Number 156-0402-02 to Part Number 156-0402-00.

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

Mod 65570 will be installed in new instruments from the factory starting with the following serial numbers:

TSG170A	B031504
SPG170A	B010534
TVGF01	B010122

W2 Issue: 18-20

TSG170A/SPG170A/SG271/SPG271: Character ID Randomly Changing

REF: TSG170A INSTRUCTION MANUAL P/N 070-5680-00

SPG170A INSTRUCTION MANUAL P/N 070-5965-00

TSG271 INTERIM MANUAL P/N 061-3457-00

SPG271 INTERIM MANUAL

P/N 061-3546-00

Mod 67233

With certain memory IC's, the Character ID function has shown a tendency to change at random while characters were being modified by the operator.

To address this problem, A5U335 (TSG170A, SPG170A) and A5U230 (TSG271, SPG271) have been changed from P/N 156-0530-02 to a faster IC, P/N 156-2159-00.

Install the new part as required to address the stated symptoms.

This change is being installed in new instruments from the factory starting with the following serial numbers:

TSG170A	B041612
SPG170A	B026579
TSG271	B030584
SPG271	B020247

W2 Issue: 18-20

TSG271/SPG271: Oscillation Cure

REF: TSG271 INTERIM MANUAL,
P/N 061-3457-00

SPG271 INTERIM MANUAL,
P/N 061-3546-00

MOD #67139

On the TSG271/SPG271 Option board (A5), a few transistors from certain lots have shown a tendency to oscillate at 390 MHz and 780 MHz when used at lower temperatures.

To alleviate this possibility, a 15 Ω resistor, Part Number 315-0150-00, will be added "teepee" fashion in series with A5C870.

Add this change to instruments being returned for service as a preventative precaution.

MOD #67139 will be installed in new units from the factory starting with the following serial numbers:

TSG271	B020474
SPG271	B010200
TVGF02	B010108

W2 Issue: 18-20

WFM300: Gamut Limit Adjustment Centered

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

MOD #67713

Due to some tolerance build-ups, the plus gamut limit has occasionally been difficult to adjust.

To address this problem, A4R204 is being changed from 47 K ohms to 51 K ohms, Part Number 315-0513-00.

Make this change as required to address the stated symptom.

MOD #67713 will be installed in new instruments from the factory starting with S/N B011025.

W2 Issue: 18-20

WFM300: Low Frequency Bandwidth Improvement

REF: WFM 300 INSTRUCTION MANUAL, P/N 070-6039-00

MOD #67312

To improve circuit low frequency bandwidth problems, a capacitor (P/N 281-0775-00, 0.1 μF) has been added in parallel with A3VR366.

Since this bandwidth problem can cause a small change in vector timing, it is recommended that the capacitor be added to any unit brought in for routine maintenance before calibration is attempted.

The capacitor will be installed in new WFM300's from the factory starting with S/N B010937.

W2 Issue: 18-20

5A48: Vertical Oscillations Eliminated

Ref: Mod #H4691

S/N H700200

A vertical oscillation may develop after replacement of the input FET (Q140/Q340) or when replacing the attenuator board. To correct this a 100 ohm resistor was added between the attenuator board and the FET. Replace the wire going from the gate of the FET to the attenuator board with Tektronix P/N 315-0101-00.

W2 Issue: 18-18

067-0587-XX: Usage

There has been some confusion as to which 067-0587-XX Signal Standardizer is used with which 11000 Series mainframe. An error in the 11400 Service manual also added to this confusion. The manual called out a 067-0587-02. Following is a list of correct usages for the 11000 Series mainframes:

067-0587-02	11301
	11302
	11301A
	11302A
067-0587-10	11301
	11302
	11301A
	11302A
	11401
	11402

The key reason for the -10 is that it has a trigger output with the GAIN signal that enables it's use with digitizing mainframes. Without this trigger, the digitizers can't define the stair-step GAIN signal. The analog instruments (11300) can use Signal Standardizers with or without this feature.

A 067-0587-02 Signal Standardizer can be upgraded to a -10 with the addition of the field upgrade kit 040-1204-00. This kit adds the trigger signal necessary for digitizers.

For either the -02 or the -10 to be used in the 11000 Series instruments, the rear panel must be changed to fit the 11000 Series mainframes. This can be accomplished by installing the rear panel kit (040-1212-00) for this purpose.

If you have a 067-0587-02 that you want to use for the 11000 Series mainframes, the best bet would be to install both the 040-1204-00 and the 040-1212-00 compatibility kits. This will remove any doubt as to the compatibility of your Signal Standardizer with the 11000 Series mainframes.

W2 Issue: 18-19

118AS: IC Changed to New Vendor

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

MOD #66125

Due to the unavailability of the present part, all occurrences of P/N 156-2188-00 in the 118AS are being replaced by P/N 156-2372-00.

The new part is a direct replacement and should be installed only upon failure of the affected IC's.

Circuit locations using this part are A2U152, A2U252, A2U253, A2U352 and A2U452.

The new IC is being installed in new instruments from the factory starting with S/N B030372.

W2 Issue: 18-20

118AS: Transistor Insulator Changed

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

MOD #66124

In order to avoid some of the assembly/repair problems associated with mica insulators and thermal greases, the mica insulator used in the 118AS power supply has been changed to a silicon rubber insulator.

The new insulator, P/N 342-0629-00, should be installed under CR355 on an as required basis. Clean the mating surfaces of old thermal grease before installation using denatured alcohol.

MOD #66124 will be installed in new instruments from the factory starting with S/N B030372.

W2 Issue: 18-20

650HR Series: Power Switch Changed

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

656HR INSTRUCTION MANUAL, P/N 070-2647-00

MOD #65234

MOD #65234 has changed the 650 Series AC Power Switch to a less expensive part, P/N 260-0276-00.

This switch is a direct replacement for the previous switch, and should be used upon failure of an older part.

MOD #65234 will be installed in new instruments from the factory starting with S/N B057020 (650HR) and B0 50695 (656HR).

W2 Issue: 18-20

650HR Series: Screw Part Number Change

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

656HR-1 INSTRUCTION MANUAL P/N 070-2647-00

MOD #67282

The screw used to attach the 650HR Series front handles has been changed to a part number (212-0574-00) that is a bit longer to insure good fit with other tolerance build-ups.

This screw is illustrated as Figure 1-48 in the 650HR manual, and Figure 1-52 in the 656HR manual.

Use the new part number on an as required basis.

This change is being installed in new instruments from the factory starting with S/N B057116 (650HR) and B050700 (656HR-1).

W2 Issue: 18-20

60: External CRT Graticule Visibility Improved

REF: 760 INSTRUCTION MANUAL
P/N 070-5992-00

MOD #67067

The 760 External Graticule has been difficult to view because of an occasional tendency to adhere to the adjacent light filter.

To keep the two pieces properly separated, a spacer ring has been added. The addition of this ring, however, has necessitated other changes due to mechanical spacing tolerances.

To address the stated problem, a parts kit, P/N 050-2430-00, is recommended.

This change will be installed in new instruments from the factory starting with S/N B020791.

W2 Issue: 18-20

1410R/TSG3/118AS/118RC/118F02/1434/067-0916-00: Part Number Changed for NE555 Timer IC

Ref: MOD #66971

Due to improved reliability coming from our vendor, all occurrences of P/N 156-0402-02 in the listed instruments will be replaced by P/N 156-0402-00.

Use the new part as the replacement item upon failure only.

New instruments from the factory will use the 156-0402-00 parts beginning with the following serial numbers.

1410R	B041165
TSG3	B013075
118AS	B030381
118RC	B010181
118F02	B010127
1434	B010173
067-0916-00	B010331

W2 Issue: 18-20

1411R: Fuse Value Changed

REF: 1411R INSTRUCTION MANUAL
P/N 070-2322-00

MOD #66671

To alleviate some unpredicted fuse failures in the 1411R, F42 has been changed from a 0.75 amp fast blow to a 0.75 amp slow blow fuse.

The new part to use is P/N 159-0301-00.

The rear panel will also be changed by this modification to indicate the new fuse value.

MOD #66671 will be installed in new instruments from the factory starting with S/N B033567.

W2 Issue: 18-20

1421/1422 Series: S1820 Part Number

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

The part number for S1820, the INT/EXT Subcarrier switch, is 260-1608-00.

Add this note to your instruction manuals.

W2 Issue: 18-19

1450-1/1450-2/1450-3: Change to Improve Stability of Readout in Manual Mode

REF: 1450-1 INSTRUCTION MANUAL,
P/N 070-5568-00

1450-2 INSTRUCTION MANUAL,
P/N 070-2998-00

1450-3 INSTRUCTION MANUAL,
P/N 070-3660-00

MOD #67082

An IC within the 1450 Series has been changed to a new type to improve the stability of the power readout when in the manual gain mode.

A60U45 should be replaced by P/N 156-0158-07 to address the instability mention, o r upon failure. When replacing A60U45, a new socket can be added using P/N 136-0727-00.

MOD #67082 will be installed in new 1450's from the factory starting with the following serial numbers.

1450-1	B020675
1450-2	B020229
1450-3	B010287

W2 Issue: 18-20

1450-1/1450-2/1450-3: Transistor Clip Deleted

Ref: 1450-1 Instruction Manual, P/N 070-5568-00
1450-2 Instruction Manual, P/N 070-2998-00
1450-3 Instruction Manual, P/N 070-3660-00
MOD #64166

Transistor clamps, P/N 343-0783-00, that were used on the Audio Board have been deleted from the 1450 Series instruments. These clamps can be located in Figure 1 of your instruction manuals. In the 1450-1 and 1450-2 manuals, the clamps are item num ber 165, and in the 1450-3 manual, they are item number 51.

Although the clamps and their associated hardware will no longer be used, the affected transistors must still be bonded to the nearby aluminum extrusions for heat dissipation. This bonding will be accomplished by using a thermally conductive adhesive. The adhesive that will be recommended is LOCKTITE #17099 and #17100. Instructions for use of the Locktite adhesives are contained in the product packages.

These adhesives must be purchased loca lly. They will not be available through Tektronix.

It is recommended that 1450 Service Centers purchase the Locktite products when one of the affected transistors must be replaced due to failure. Obtaining the adhesive prior to actual need may cause some problems with the adhesive's shelf life.

This mod will be installed in new units from the factory starting with the following serial numbers.

1450-1	B020674
1450F20	B010402
1450-2	B020228
1450-3	B010287

W2 Issue: 18-20

1480 Series: Incandescent Lamps are Changed to LED's

Ref: 1480 Series Instruction Manual,
P/N 070-2338-00
MOD #64941

In the 1480 Series Waveform Monitors, the front panel indicator lamps have been difficult to replace when they fail, and being incandescent lamps, were prone to fail more often than desired.

To address this problem, new 1480's are going to be delivered with LED's used for indicator purposes. MOD #64941 will also establish a kit, P/N 050-2448-00, to allow earlier instruments to be updated to the new configuration.

Note: Due to the complexities associated with this change, it is recommended that the kit installation should be considered only when the 1480's front panel must be disassembled for other maintenance concerns.

This change will be installed in new units from the factory starting with the following serial numbers.

1480R	B106602
1480C	B094708
1480F30	B010312

W2 Issue: 18-20

1730 Series: Option 16 Added (Pullout C)

REF: 1730 Series Instruction Manual,
P/N 070-4474-02

Option 16 has been added to the 1730 Series Waveform Monitors.

This option will allow the 1730/1 to trigger on the 90 Hz (NTSC) or 100 Hz (PAL) timing signals provided by the new D2 standard digital VTR's.

The manual insert that describes the circuit and procedure changes pertinent to option 16 is attached as **Pull-out "C"**.

W2 Issue: 18-20

1740 Series: Option 16 Added (Pullout D)

REF: 1740 Series Instruction Manual,
P/N 040-4473-01

Option 16 has been added to the 1740 Series Waveform Vector Monitors.

This option will allow the 1740/1 to trigger on the 90 Hz (NTSC) or 100 Hz (PAL) timing signals provided by the new D2 standard digital VTR's.

The manual insert that describes the circuit and procedure changes pertinent to Option 16 is attached as **Pull-out "D"**.

W2 Issue: 18-20

1750 Series: Fan Added

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

MOD #67117

In order to extend the operating temperature range for the 1750/1751 operating environment, a small fan has been added to the rear panel.

The change involves a number of parts within the 1750 such as a new rear panel and a new circuit board shield. Therefore, adding the fan to a 1750 or 1751 in the field will be facilitated by a kit, P/N 040-1260-00.

Install the fan kit on an as required bases.

New instruments from the factory will have the fan installed starting with S/N B032862 (1750) and B031428 (1751).

W2 Issue: 18-20

1750 Series: Power Transformer Improved

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

MOD #67118

To prevent A6T252 from occasionally saturating at elevated temperatures, an improved part is being used.

Replace A6T252 with P/N 120-1546-01 upon failure.

This change is being installed in new instruments form the factory starting with S/N B032791 (1750) and S/N B031394 (1751).

W2 Issue: 18-20

1900/1910: Power Transistor Insulators Changed

REF: 1910 SERVICE MANUAL,
P/N 070-4523-00
MOD #66749

The metal spacers, P/N 342-0476-00, that are used under some of the chassis mounted power transistors are being replaced by silicon rubber insulators, P/N 342-0563-00.

This will alleviate the need for heat sink grease in these locations thereby saving manufacturing and repair time.

Install the new part on an as required basis.

MOD #66749 is being installed in new 1910's from the factory starting with S/N B021794.

W2 Issue: 18-20

2220/2221/2230: Acquisition Cables Replaced

Ref: MOD #67903

After several insertions and removals of the storage acquisition cables they may fall off with vibration. To prevent this failure they have been replaced with a cable with higher retention force. Order part number 174-0032-02.

W2 Issue: 18-20

2220/2221/2230: Firmware Change Corrects Power Up Failure and Wrong Readout in Reference Memory

Mod #67906

S/N: 2220 B021494
2221 B011183
2230 B028529

The firmware has been changed in the 2200 Series Digital Storage Scopes to correct for the following:

1. Power up RAM failure of "NMI 0004".

2. With a waveform saved in Ref Memory, when a new waveform is acquired and saved on screen, the Ref Memory saved waveform Volt/Div setting may now be incorrect.

Following are the kit part numbers:

Instrument	Part Number
2230	050-2157-08
2230 Option	050-2221-06
2221	050-2318-03
2221 Option	050-2327-02
2220	050-2231-06
2220 Option	050-2252-05

W2 Issue: 18-19

2225: Focus Pot Replacement

Ref: Mod #67523
P/N 670-9938-05

It is no longer necessary to order the focus board in order to replace the focus pot in the 2225. The focus pot part number is 311-2357-00.

This part can be used in all Beaverton (S/N BXXXXXX) and Guernsey (S/N 1XXXXX) built instruments.

For instruments built in Hoddesdon with S/N between 202062 and 203059, a MOD kit is necessary. To replace the focus pot only, use 050-2437-00. To replace the A5 board, order P/N 050-2438-00.

W2 Issue: 18-17

2245/2246: Attenuator Shield

Ref: P/N 337-3279-00

Some early 2245/2246 scopes have a short attenuator shield, installed on the back of the main board, which doesn't cover Channel four input.

The short shield has caused noise spikes on channel four due to the radiation.

Instruments received for service should have the short attenuator shield changed to the longer one. The part number is: 337-3279-00.

W2 Issue: 18-20

2245A/2246A: Increase Variable Hold-Off Range

MOD: #67731

SN 2245A: B012351
2246A: B012975

Some 2245A and 2245A instruments may not meet variable holdoff specifications. To correct this, change A10R638 to a 100K ohm resistor, Tektronix P/N 313-1104-00 and A10W612 to a diode A10CR612, Tektronix P/N 152-0141-02. Install the new diode with the cathode electrically connected to A10R636.

Perform this mod to instruments below the listed serial numbers which come in for service.

W2 Issue: 18-18

2245A/2246A: Manual Correction

Ref: A10C447

The part number called out for A10C447 in the Electrical Parts List of the 2245A and 2246A manual is incorrect. Please correct your manual to show A10C447 as Tektronix P/N 281-0765-00, which is a 100 pF capacitor.

W2 Issue: 18-18

2467/2467B: CRT, Z Axis Drive Adjustment

When performing the 2467/B CRT Adjustment procedure, step 2 directs that the drive be set to 40 volts. It is not usually necessary to change the factory set drive voltage. It has been set to produce optimum writing rate. It should be left as is at the beginning of the procedure and only readjusted later if necessary to produce proper writing speed in older CRTs that have aged.

When a CRT is replaced, use the enclosed "CRT Data Sheet" to preset the Z Axis drive to match the listed Writing Speed Voltage:

Writing Speed Voltage	Preset Z Axis Drive to:
850 to 950 V	40 volts
950 to 1050 V	50 volts
1050 to 1100 V	60 volts

In summary, it is usually not necessary to change the factory set value for Z Axis Drive when first starting the CRT adjustment procedure.

As the CRTs age, reducing the Z Axis Drive will allow the correct MCP Bias adjustments to be made which will produce the best Writing speed.

Use the Data Sheet to determine the starting voltages to be used on replacement CRTs.

W2 Issue: 18-19

4224/4225/4324/4325: GRAPHZ Boards with QPDM Rev "C" Need Boot Disk Version 42.5

Ref: Corporate Mod #66786
4220 Field Service Manual, P/N 070-6646-00
4220 Series GRAPHZ1 and GRAPHZ2 Technical Data Manual, P/N 070-6652-99

The GRAPHZ boards used in the 4224/4225 products are currently using QPDMs with a revised level of "C". Several PALs on the GRAPHZ boards have also been changed to suffix level "-01". The part numbers of the GRAPHZ boards that contain these changes are 670-9954-02 (GRAPHZ 1 board used in the 4224), and 670-9982-01 (GRAPHZ 2 board used in the 4225). The part numbers of the PALs that have been changed are 160-4463-01 (used in U325 and U725 on the GRAPHZ 1 and in U325 and U722 on the GRAPHZ 2 boards), 160-4464-01 (used in U331 and U731 on the GRAPHZ 1 and in U326 and U725 on the GRAPHZ 2 boards), and 160-4989-01 (used in U321 and U721 only on the GRAPHZ 2 board).

These changes **REQUIRE** the use of a boot disk with Version 42.5 or higher. Using a boot disk with Version 42.4 or lower will result in the GRAPHZ FRU test not passing the Video RAM "bit-blit" test (in Extended Self-Test). When this test does not pass, the keyboard bell sounds and the WAIT LED turns on. The user may also see screen anomalies when using the graphics mode.

W2 Issue: 18-18

5110/R & 5111A/R: High Voltage Tolerance

Ref: MOD #56727

S/N: 5110/R B140959
5111A/R B024058

With the major mod listed above, the high voltage adjustment was removed. At the same time, the voltage out of the HV circuit also changed. The insert only shows the adjustment as being removed.

For instruments with a serial number higher than those mentioned above, the high voltage should be checked for 3300 volts ±200 volts. Please note this in your manual.

W2 Issue: 18-18

5110/R & 5111A/R: Incorrect Value Documentation for A3R274

Ref: MOD #56727

S/N: 5110/R B140959
5111A/R B024058

The manual change information for the referenced MOD indicates that A3R274 is a 2M ohm resistor in the schematic as well as the parts list. The correct value is 1M ohm resistor, P/N 315-0105-03.

Please correct your manual.

W2 Issue: 18-18

5111A/R: CRT Part Number Clarification

Ref: Mod #56727

S/N: 5111A/R B024058

The manual change information for the referenced mod lists the CRT partnumber used in the 5110. The CRT's used in the 5111A are listed here:

154-0634-11	Standard
154-0634-12	P402 (Opt. 3) Internal Scale

Please correct your insert.

W2 Issue: 18-19

5440/5441: Vertical Oscillations with 5A21N Eliminated

Re: MOD #64902

Vertical oscillations may occur in these mainframes in the following use mode:

A 5A21N installed in the middle compartment, in the "CURRENT PROBE ONLY" mode, with amperes/div set to .5m or less.

To correct this oscillation, lift the bottom end of A2R728 and solder it to the ground end of A2R738.

W2 Issue: 18-18

7000 Series: High Efficiency Power Supplies

A Service Action Request was recently submitted requesting a listing of 7000 Series High Efficiency Power Supplies by part number, instrument usage and exchange status. This listing should also be useful for others dealing with 7000 Series instruments.

Subassembly # 620-0283-02

7854	ALL
7934	ALL
7104	ALL
R7903	ALL
7904A	ALL
7704A	B242132 and above

Subassembly # 620-0230-00

7704A	B010101 to B242131

Subassembly # 620-0250-00

7834	ALL

Subassembly # 620-0459-00

7704	ALL

Subassembly # 620-0461-00

7904	ALL

Subassembly # 620-0462-00

R7903	ALL

Subassembly # 620-0464-00

7844	ALL
R7844	ALL

The assemblies that are on exchange are: 620-0283-02 and 620-0230-00.

W2 Issue: 18-19

PRODUCT SERVICE TRAINING SCHEDULE

Tektronix Service Training provides electronic technicians the skills and techniques required for effective maintenance of Tektronix products. In addition, it brings experienced technicians up-to-date on maintenance of new products.

Class	Location	Dates
465B/475A Portable Oscilloscopes ($975)	Boston, MA Dallas, TX	Feb 13-17, 1989 May 15-19, 1989
2215/35/36 Portable Oscilloscopes ($975)	Boston, MA Dallas, TX	Feb 20-24, 1989 May 22-26, 1989
2246/2247 Portable Oscilloscope ($1,100)	Atlanta, GA	March 6-10, 1989
2230/2232 Digital Storage Oscilloscope ($2,200)	Boston, MA	May 8-19, 1989
2465/2467 Portable Oscilloscope ($1,950)	Dallas, TX	Feb 6-17, 1989
7904/7633 Laboratory Storage Oscilloscopes ($2,100)	Dallas, TX	Apr 24-May 5, 1989
TM500 Calibration Package ($975)	Dallas, TX	Apr 10-14, 1989
TM5000 Distortion Analyzer (SG/AA) ($1,300)	Beaverton, OR	Feb 20-24, 1989
TM5000 Function Generator (FG) ($1,300)	Beaverton, OR	Feb 27-Mar 3, 1989
TM5000 Calibration Generator (CG5001) ($1,300)	Beaverton, OR	Mar 6-10, 1989
113XX Programmable Oscilloscopes ($1,200)	Beaverton, OR	Apr 24-28, 1989
114XX Programmable Oscilloscope ($1,300)	Beaverton, OR	May 1-5, 1989
118XX Digitizing Sampling Oscilloscope ($1,500)	Beaverton, OR	May 8-12, 1989

(Continued on next page)

PRODUCT SERVICE TRAINING SCHEDULE

Class	Location	Dates
2710 Portable Spectrum Analyzer ($3,700)	Beaverton, OR	May 8-26, 1989
7612D Programmable Waveform Digitizer ($2,800)	Beaverton, OR	Feb 6-17, 1989
412X Color Graphic Workstation ($2,400)	Santa Clara, CA	Feb 6-17, 1989
422X/423X Color Graphic Terminals ($3,000)	Atlanta, GA	Apr 3-14, 1989
4692/4695/4696 Color Printers ($1,100)	Santa Clara, CA	Feb 20-24, 1989
4693D/4693RGB Color Printer ($1,100)	Santa Clara, CA	Feb 27-Mar 3, 1989
Introduction to TekniCAD User Training ($800)	Irvine, CA Washington DC	Feb 20-24, 1989 Apr 24-28, 1989
Advanced TekniCAD User Training ($600)	Irvine, CA Washington DC	Feb 27-Mar 1, 1989 May 1-3, 1989
Workstation User/UTek User Training ($950)	Irvine, CA Washington DC	Feb 13-17 1989 Apr 17-21, 1989

In addition to classroom instruction, Tektronix Service Training has a variety of training packages and video tapes available for self-study. Classes are available for maintenance of other Tektronix products. On-Site classes are also offered. Call for further information.

Registration Information*

Class sizes are limited. We recommend that you enroll early.

For more information or to register for these classes, call Tektronix Service Training, 1-800-835-9433, EXT. WR1407 (in Oregon, call 629-1407), or contact your local Tektronix Field Office.

*We retain the option to cancel or reschedule a class.

DIAGNOSTIC PROBLEMS

Corrected A2 error condition when pin is 100 or above.

correction files:

[3,20]BUFADJ.TEK	V02.02
[3,20]C140.TSK	V02.02

Changed instructions in Part 2 for no extender card.

correction files:

[3,20]CLKCAL.TEK	V02.05
[3,20]C080.TSK	V02.05

Changed test spec for dacs 5 thru 8.

correction files:

[3,20]DACCAL.TEK	V02.01
[3,20]C030.TSK	V02.01
[3,10]DACCK.TEK	V02.01
[3,10]F040.TSK	V02.01

Corrected instructions in Part 2 for adjustment of R627.

correction files:

[3,20]DCSCAL.TEK	V02.02
[3,20]C020.TSK	V02.02

Modified so that Part 7 works with card on extender.

correction files:

[3,20]DSKADJ.TEK	V02.02
[3,20]C160.TSK	V02.02

Changed phase start/stop pulse width test specs for reliable DESKEW operation.

correction files:

[3,20]FAZCAL.TEK	V02.06
[3,20]C081.TSK	V02.06

Added support for 93 ohm VERSION 2 pin cards.

correction files:

[3,20]SLWADJ.TEK	V02.03
[3,20]C100.TSK	V02.03

Changed test tolerances for -11.9996V check.

correction files:

[3,20]FCRCAL.TEK	V02.03
[3,20]C040.TSK	V02.03

DIAGNOSTIC PROBLEMS (Cont.)

New Verdict program for R7612D digitizer.

correction files:

[3,10]R7612V.TEK	V02.00
[3,10]F780.TSK	V02.00
[3,10]R7612V.PPA	V02.00
[3,10]R7612V.PPL	V02.00

Modified to check all RTIB address crossover connections.

correction files:

[3,10]ACROSS.TEK	V02.01
[3,10]B070.TSK	V02.01

Corrected test tolerance in Part 3; changed source code for use in TCM.

correction files:

[3,10]CLOCK9.TEK	V02.04
[3,10]F390.TSK	V02.04

Changed test tolerances which were too tight.

correction files:

[3,10]CLOK10.TEK	V02.02
[3,10]F395.TSK	V02.02

Changed program to measure Reference Voltage through active load bridge.

correction files:

[3,10]LODCHK.TEK	V02.01
[3,10]F170.TSK	V02.01

Fixed LOOP-ON-PASS/FAIL and PIN selection.

correction files:

[3,10]MATRIX.TEK	V02.02
[3,10]F110.TSK	V02.02

Changed program to initially set Write Data and Write Mask registers for all bits on all RTIB memory partitions.

correction files:

[3,10]MEMORY.TEK	V02.02
[3,10]B020.TSK	V02.02

DIAGNOSTIC PROBLEMS (Cont.)

Corrected printouts which were reversed for PS12 and PS13.

correction files:

[3,10]POWER.TEK	V02.01
[3,10]F030.TSK	V02.01

Added 5ms wait before measuring compliance voltage (measurement failed run on 1151 power supply).

correction files:

[3,10]TIS1.TEK	V02.02
[3,10]F070.TSK	V02.02

Added measurement system tolerances which were missing; changed measurement correction factors.

correction files:

[3,10]SLWCHK.TEK	V02.04
[3,10]F520.TSK	V02.04

Added micro-code for 7S14 sampling trigger in D100.TSK.

correction files:

[3,50]VERIFY.PPA	V02.01
[3,50]VERIFY.PPL	V02.01

Changed 10V aberration test limit to +/-400mV; removed support for 93 ohm pin cards from program.

correction files:

[3,50]DRIVER.TEK	V02.09
[3,50]D100.TSK	V02.09

Corrected random trigger problems; program cleanup; changed pin lists to include all pins.

correction files:

[3,110]R7612D.TEK	V02.00
[3,110]FF02.TSK	V02.00
[3,110]R7612D.PPA	V02.01
[3,110]R7612D.PPL	V02.01

DIAGNOSTIC PROBLEMS (Cont.)

New DRVER and MENU programs to support all OEM Verify customers.

correction files:

[3,110]DRVER.TEK	V03.00
[3,110]DRVER.TSK	V03.00
[3,110]MENU.TEK	V03.00
[3,110]FF00.TSK	V03.00

Modified program to measure voltages up to 30V and to test AC only if AC Option is installed.

correction files:

[3,110]FLUKE8502.TEK	V02.01
[3,110]FF06.TSK	V02.01

Changed program to specify SY: instead of DU2: for the default drive, and added file output capability.

correction files:

[3,110]HP5335A.TEK	V02.01
[3,110]FF01.TSK	V02.01
[3,110]HP8160A.TEK	V02.01
[3,110]FF04.TSK	V02.01
[3,110]HP8161A.TEK	V02.01
[3,110]FF05.TSK	V02.01
[3,110]HP8165A.TEK	V02.01
[3,110]FF03.TSK	V02.01

Added file output capability, fixed erronious errors; changed to print out FF07 test title.

correction files:

[3,110]R7912AD.TEK	V02.08
[3,110]FF07.TSK	V02.08

Added configuration entry for the R7612 digitizer.

correction files:

[3,1]CONFIG.BIN	V02.02
[3,1]CONFIG1.TEK	V02.02
[3,1]CONFIG1.BIN	V02.02
[3,1]CONFIG2.TEK	V02.02
[3,1]CONFIG2.BIN	V02.02

SYSTEM PROBLEMS

New program to load DESKEW registers at boot time.

correction files:

[1,54]DESKEW.TSK	V02.00
[1,2]STARTUP.CMD	V03.03

STARTUP.CMD did not load the MS tape drive at boot time.

correction files:

[1,2]STARTUP.CMD	V03.04

The wrong error messages were displayed for TEK errors 12, 21-26.

correction files:

[1,2]TEKERROR.HLP	no version #

New program (R7612V.TEK, F780.TSK) added to build instruction list.

correction files:

[1,54]BLDTEK.CMD	V02.12

Specifying a 0 in CONFIG.CMD for IS1 or IS2 (not present) caused a B9 error when the Verdict test is run.

correction files:

[1,54]CONFIG.CMD	V02.04

New INTFAC program that will boot and execute from RSX-11.

correction files:

[1,54]INTFAC.CMD	V02.00
[1,54]INTFAC.SYS	V02.00

The dynamic storage for Tektest strings or pinlists declared in TEKTEST subroutines or functions is now released when the function or subroutine completes.

correction files:

[1,1]TEKLIB.OLB	(STRING.MAC)	V02.02
[1,1]TCMTEKLIB.OLB	(STRING.MAC)	V02.02
[1,54]TRAN.TSK	V02.06	

The Tektest accept statement reported an error condition when 0.0 was entered.

correction files:

[1,1]TEKLIB.OLB	(CAC1X.C)	V02.01
[1,1]TCMTEKLIB.OLB	(CAC1X.C)	V02.01

SYSTEM PROBLEMS (Cont.)

The binary and octal PRINT formats did not work correctly.

correction files:

[1,1]TEKLIB.OLB	(PRNTF.C)	V02.02
[1,1]TCMTEKLIB.OLB	(PRNTF.C)	V02.02

The UNSET TO MEASURE statements also reset previous DCSS setups.

correction files:

[1,1]TEKLIB.OLB	(CONNECT.MAC)	V02.03
[1,1]TCMTEKLIB.OLB	(CONNECT.MAC)	V02.03

A Tektest A2 error is generated when evaluating un-initialized strings.

correction files:

[1,1]TEKLIB.OLB	(RELOPS.MAC)	V02.03
[1,1]TCMTEKLIB.OLB	(RELOPS.MAC)	V02.03

Tektest string functions sometimes cause a register dump when assigning a value to the function.

correction files:

[1,1]TEKLIB.OLB	(SUBR.MAC)	V02.05
[1,1]TCMTEKLIB.OLB	(SUBR.MAC)	V02.05

Foreground Tektest tasks did not check for test station power. A run-time erorr now occurs if the test station power is off when the test station is initialized.

correction files:

[1,1]TEKLIB.OLB	(TSINIT.MAC)	V02.02
[1,1]TCMTEKLIB.OLB	(TSINIT.MAC)	V02.02

GPIB programs generated an EA error while inputting data from the GPIB instruments.

correction files:

[1,1]TEKLIB.OLB	(GPDRV.MAC)	V2.14D
	(GPDRVI.MAC)	V2.03D
[1,1]TCMTEKLIB.OLB	(GPDRV.MAC)	V2.14D
	(GPDRVI.MAC)	V2.03D
[1,1]TEKMAC.MLB	(ERRDEF.MAC)	V02.10
[1,2]TEKERROR.HLP	no version #	

SYSTEM PROBLEMS (Cont.)

Optional device driver for the SYMTEK handler.

correction files:

[1,1]TCM.ODL	V02.08	
[1,1]VDT.ODL	V02.07	
[1,1]HW.ODL	V02.08	
[1,1]RTRTNTBL2.MAC	V02.02	
[1,1]TEKLIB.OLB	(HNDLR2.MAC)	V02.00
	(HNDL2I.MAC)	V02.00
	(HNDLR2D.MAC)	D02.00
	(HNDL2ID.MAC)	D02.00
[1,1]TCMTEKLIB.OLB	(HNDLR2.MAC)	V02.00
	(HNDL2I.MAC)	V02.00
	(HNDLR2D.MAC)	D02.00
	(HNDL2ID.MAC)	D02.00
[1,1]TCMSRCLIB.OLB	(RTAUT1.OBJ)	V02.01
	(RTLBT1.OBJ)	V02.01
	(RTAUT2.OBJ)	V02.01
	(RTLBT2.OBJ)	V02.01

Program does not properly set up a 4207 terminal with VT200 option.

correction files:

[3,1]420X.TEK	V02.01
[3,1]420X.TSK	V02.01

The LOGIN.CMD file for the diagnostics account did not support TEK 4200 series terminals.

correction files:

[3,1]LOGIN.CMD	V02.02

1) PPASM did not properly evaluate constant declarations.
2) The SCAN keyword generated incorrect micro-code.
3) The pattern processor assembler now generates up to 1024 inhibit/mask vectors.

correction files:

[1,54]PPASM1.TSK	V05.16
[1,54]PPASM2.TSK	V05.22

SYSTEM PROBLEMS (Cont.)

When TRAN's declare switch was used, not all undeclared variables were flagged as errors.

correction files:

[1,1]PREDEFINE.ENV	V02.02	
[1,1]S3295.ENV	V02.00	
[1,1]BACKGRND.ENV	V02.00	
[1,54]TRAN.TSK	V02.05	
[1,1]SYNTRAN.OLB	(SYNTAX1.MAC)	V02.01

TekTest function TEKSTAT caused TCM to crash. Illegal immediate mode statements were incorrectly echoed to the user's terminal.

correction files:

[1,1]TEKLIB.OLB	(GBLDAT.MAC)	V02.03
	(IOSTATUS.MAC)	V02.01
[1,1]TCMTEKLIB.OLB	(GBLDAT.MAC)	V02.03
	(IOSTATUS.MAC)	V02.01
[1,1]TCMSRCLIB.OLB	(TCMINIT.C)	V02.06
	(TCMMAIN.C)	V03.02
	(BLDPSD.C)	V02.01
[1,54]TCM.TSK	V03.02	

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MANUAL CHANGE INFORMATION Group Code 24

Date: 10-18-88 Change Reference: C6-1088

Product: 1730/1731 OPT 16 Manual Part No: 070-4474-02

DESCRIPTION

OPTION 16

Option 16 allows a 1730-Series monitor to trigger on the 90 Hz (100 Hz PAL) timing signals from the D2 standard VTR. Synchronizing signals are applied through the rear panel REMOTE SYNC input, pin 10. The instrument's Remote Sync Polarity jumper (J635) must be moved to the Inverted position. (See Operating Options in Section 3 of this manual for location of this jumper.) A TTL low or ground closure to pin 4 of the remote connector enables 30 Hz operation. To enable 90 Hz (100 Hz PAL) sweep rate pin 3 must also be grounded. The 1730-Series sweep selection must be set to 2 Field. The instrument must be triggered by REMOTE SYNC. The triggering range is nominally 90 Hz ±15% (100 Hz ±15% PAL). RGB sweep is available in 1730-Series Option 16 instruments.

Remote sync amplitude for 90 (100) Hz operation is greater than 2 V; 4 V for 30 Hz. One field sweep is not available in Option 16 instruments.

The following changes are made to a standard instrument to create an OPT 16.

CHECKS AND ADJUSTMENTS CHANGES

ADD:

Add Step 7a Short Form Check Procedure, Page 5-4 with:

7a. CHECK OPT 16 OPERATION (OPT 16 Instruments Only)
- e. CHECK—for approximately 12 divisions.
- f. CHECK—for stable display from 76 to 104 Hz (85-115 Hz PAL).

Add Step 7a Check Procedure, Page 5-7, with:

7a. CHECK OPT 16 OPERATION (OPT 16 Instruments Only)
- a. Connect the Function Generator output to the 1730-Series CH-A INPUT. Terminate in 75 Ω.
- b. Set the generator for a 1V p/p square wave, 90 Hz output (100 Hz PAL).
- c. Set 1730 Opt 16 to CH-A, Waveform, Flat, 2 FLD, and INT REF.
- d. Ground Pins 3 and 4 of the 1730-Series rear-panel REMOTE connector. (Pin 4 is the Remote Sync enable and pin 3 is the 1 Line/1 Field enable line in standard instruments, together they are the triggering enable in OPT 16 instruments.)
- e. CHECK—for a stable display of approximately 12 divisions.
- f. CHECK—that the display remains stable (although sweep length varies) while varying the generator from 76 to 104 Hz (85-115 Hz PAL).

(Continued on the following page)

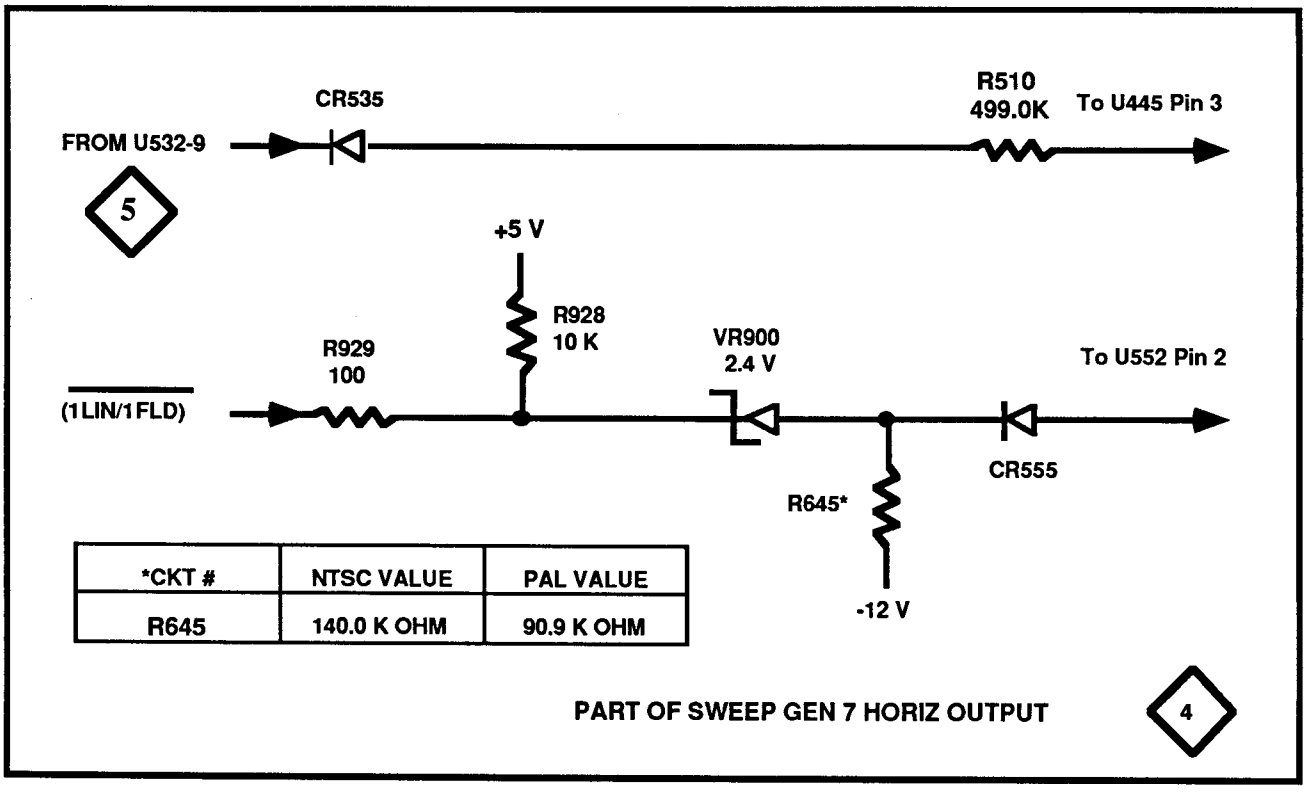
Date: 10-18-88 Group Code 24 Change Reference: C6-1088

Product: 1730/1731 OPT 16 Manual Part No: 070-4474-02

ELECTRICAL PARTS LIST AND SCHEMATICS CHANGES

CHANGE TO READ:			DIAG.LOC
A3	671-1168-00	CIRCUIT BD ASSY:MAIN (1730 OPTION 16 ONLY)	
A3	671-1169-00	CIRCUIT BD ASSY:MAIN (1731 OPTION 16 ONLY)	
A3R544	321-0245-00	RES,FXD,FILM: 3.48K OHM,1%,0.125W	4
ADD:			
A3CR535	152-0141-02	SEMICOND DVC,DI:SW,30V,150MA,30V,DO-35	4
A3CR555	152-0141-02	SEMICOND DVC,DI:SW,30V,150MA,30V,DO-35	4
A3R510	321-0452-00	RES,FXD,FILM: 499.0K OHM,1%,0.125W	4
A3R645	321-0399-00	RES,FXD,FILM: 140.0K OHM,1%,0.125W(1730 OPT 16 ONLY)	4
A3R645	321-0381-00	RES,FXD,FILM: 90.9K OHM,1%,0.125W(1731 OPT 16 ONLY)	4
A3R928	315-0223-00	RES,FXD,FILM: 10K OHM,5%,0.25W	4
A3R929	315-0101-00	RES,FXD,FILM: 100 OHM, 5%, 0.25W	4
A3VR900	152-0688-00	SEMICOND DVC, DI:ZEN,S1,2.4V,5%,0.4W,DO-35	4

NEW PARTS SHOWN BELOW



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MANUAL CHANGE INFORMATION Group Code 24

Date: 9-10-88 Change Reference: C1-988

Product: 1740/1741 OPT 16 Manual Part No: 070-4473-01

DESCRIPTION

OPTION 16

Option 16 allows a 1740-Series monitor to trigger on the 90 Hz (100 Hz PAL) timing signals from the D2 standard VTR. A TTL low or ground closure to pin 25 of the remote connector sets the sweep rate to 90 Hz (100 Hz PAL). The 1740-Series must be set to 1 or 2 Field. It is not necessary to enable the REMOTE function (pins 12 and 13). The instrument may be triggered by INT REF, EXT REF or REMOTE SYNC. The triggering range is nominally 90 Hz ±15% (100 Hz ±15% PAL). Pin 25, used for RGB in standard instruments, is used for OPT 16 enable in OPT 16 instruments. There is no RGB available.

90/100 Hz operation requires a faster sweep rate than 50/60 Hz field rates. This is accomplished by adding extra timing current to the field sweep generator, A4U713A, with resistor R601. When pin 25 is not enabled, Q613 saturates, shutting of CR611 and removing the extra timing current.

The following changes are made to a standard instrument to create an OPT 16.

CHECKS AND ADJUSTMENTS CHANGES

ADD:

Replace Step 6 Short Form Check Procedure, Page 5-4 with:

6. CHECK OPT 16 OPERATION (OPT 16 Instruments Only)

Replace Step 6 Check Procedure, Page 5-8 with:

6. CHECK OPT 16 OPERATION (OPT 16 Instruments Only)
   a. Connect the Function Generator output to the 1740-Series CH-A INPUT. Terminate in 75 Ω.
   b. Set the generator for a 1V p/p square wave, 90 Hz output (100 Hz PAL).
   c. Set 1740 Opt 16 to CH-A, Waveform, Flat, 1 FLD, and INT REF.
   d. Ground Pin 25 of the 1740-Series rear-panel REMOTE connector. (Pin 25 is used as the RGB enable in standard instruments, it is the triggering enable in OPT 16 instruments. There is no RGB available.)
   e. CHECK—for a stable display of approximately 12 divisions.
   f. CHECK—that the display remains stable (although sweep length varies) while varying the generator from 75 to 105 Hz (85-115 Hz PAL).

(Continued on the following page)

Date: 9-10-88 Group Code 24 Change Reference: C1-988

Product: 1740/1741 OPT 16 Manual Part No: 070-4473-01

ELECTRICAL PARTS LIST AND SCHEMATICS CHANGES

CHANGE TO READ:			DIAG.LOC
A4	671-1083-00	CIRCUIT BOARD ASSY:HORIZONTAL (1740 OPT 16)	
A4	671-1084-00	CIRCUIT BOARD ASSY:HORIZONTAL (1741 OPT 16)	
A4R426	315-0472-00	RES,FXD,FILM: 4.7K OHM,5%,0.25W	4
A4R734	321-0309-00	RES,FXD,FILM: 16.2K OHM,1%,0.125W	4
A4R735	321-0280-00	RES,FXD,FILM: 8.06K OHM,1%,0.125W	4

ADD:			
A4CR611	152-0141-02	SEMICOND DVC,DI:SW,30V,150MA,30V,DO-35	4
A4CR612	152-0141-02	SEMICOND DVC,DI:SW,30V,150MA,30V,DO-35	4
A4Q613	151-0188-00	TRANSISTOR:PNP,SI,TO-92	4
A4R613	315-0223-00	RES,FXD,FILM: 22K OHM,5%,0.25W	4
A4R601	321-0376-00	RES,FXD,FILM: 80.6K OHM,1%,0.125W (1740 OPT 16 ONLY)	4
A4R601	321-0356-00	RES,FXD,FILM: 49.9K OHM,1%,0.125W (1741 OPT 16 ONLY)	4

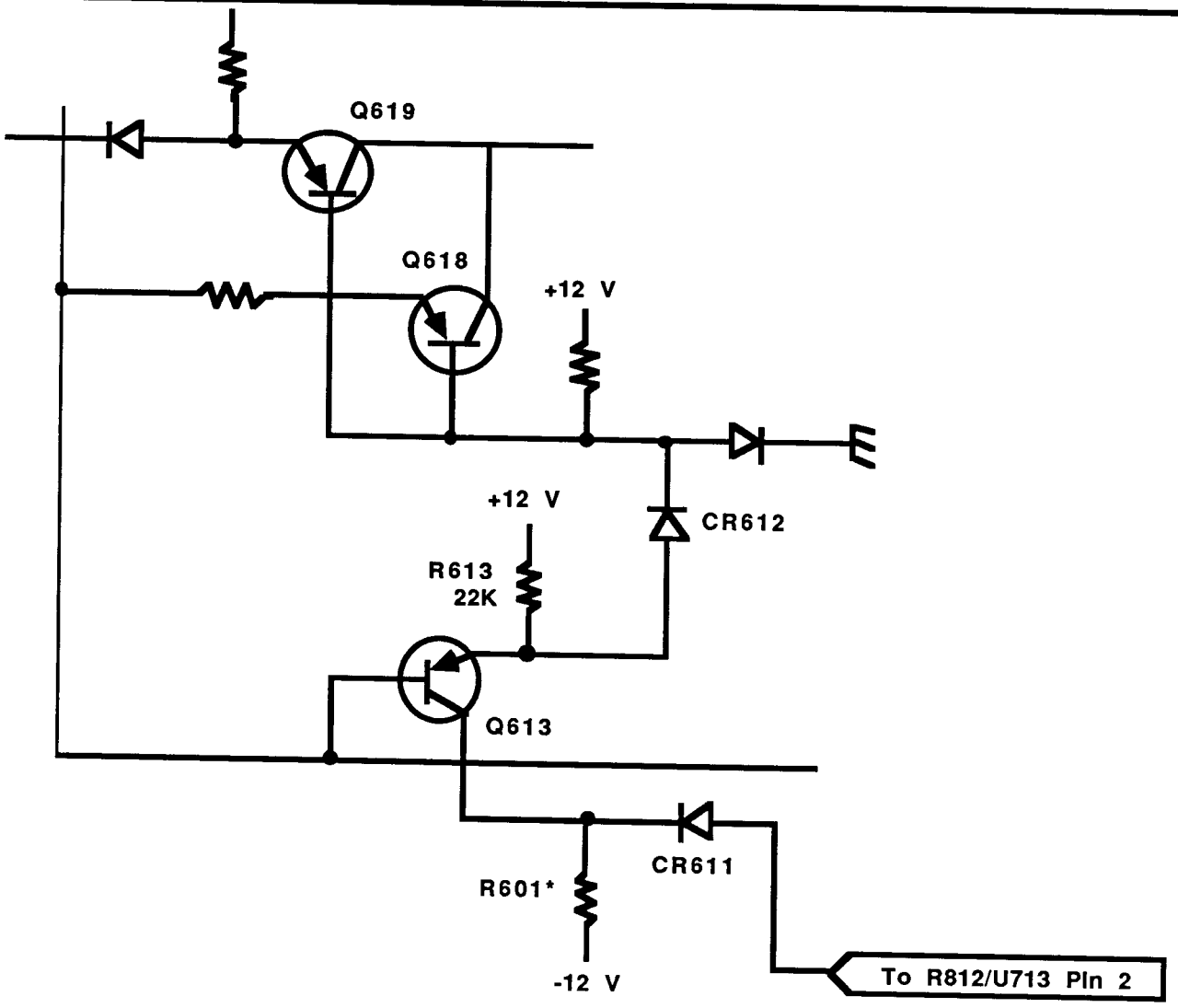
DELETE:			
A4J612	131-0608-00	TERMINAL,PIN: 0.365 L X 0.025 BRZ GLD PL	4
A4Q611	151-0207-00	TRANSISTOR: NPN,SL,X-55,SEL	4
A4R425	315-0332-00	RES,FXD,FILM: 3.3K OHM,5%,0.25W	4

(Continued on the following page)

Date: 9-10-88 Group Code 24 Change Reference: C1-988

Product: 1740/1741 OPT 16 Manual Part No: 070-4473-01

NEW PARTS SHOWN BELOW



*CKT #	NTSC VALUE	PAL VALUE
R601	88.7 K OHM	54.9 K OHM

PART OF SWEEP
GENERAL & HORIZ OUTPUT

4