

MODIFICATION SUMMARY

541



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541 MODIFICATION SUMMARY

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VERTICAL AMPLIFIER RISETIME
IMPROVED BY LR REPLACEMENT

INFORMATION ONLY

M1143

Effective Prod s/n 169

DESCRIPTION:

Vertical risetime was improved by changing the LR combinations LR1022, LR1042 to series combination of resistor and coil. The values of L1021 and L1042 were changed also. This mod and M1204 are combined with M1567 which will contain the instructions for the three mods.

Parts Removed:

LR1022, LR1041 LR17 108-087
L1021, 0.79-1.5 μ H CVA791 114-025
L1042

Parts Added:

L1022, L1041 3.2 μ H 108-088
*R1022, 100 Ω 1/2W 10% 302-101
*R1041
*L1021, CVA301 114-037
*L1042

VERT AMP INTERNAL TRIGGER AMP
SUBSTITUTE PLATE RESISTOR
REPLACED BY NORMAL VALUE

INFORMATION ONLY

M1161

Effective Prod s/n 169

DESCRIPTION:

Use of a substitute value for R1067 was no longer necessary with the availability of the optimum value resistor in stock.

Parts Removed:

R1067 2.2k 1W 10% 304-222

Parts Added:

R1067 2k 1W 5% 303-202

POWER SUPPLY CHASSIS
SILK-SCREENING CHANGED TO
IMPROVE MECHANICAL OPERATIONS

INFORMATION ONLY

M1190

Effective Prod s/n 176 (approx)

DESCRIPTION:

Assembly procedure improved by changing silk-screening on power supply chassis so it will be common to the 531, 535 and 545 mechanical assembly operation. The wire-wound resistors will be mounted at the time the chassis is wired. The R752 reference was removed from the silk-screen. A tag will be mounted under the resistor in the wiring process.

Parts Removed:

Parts Added:

Tag "R752" 334-597

**SWEEP CHASSIS WAS CHANGED
TO STANDARDIZE**

INFORMATION ONLY

M1194

Effective Prod s/n 176 (approx)

DESCRIPTION:

The Sweep chassis was standardized with the 531 chassis through a common silkscreen. The two only differ in that the 541 chassis has R1053 mounted where a bakelite post is on the 531 front section of the chassis. A tag, R1053 (334-599), will be added under the component at the time it is mounted.

Parts Removed:

Parts Added:

Tag "R1053"	334-599
Sweep chassis	441-079

**VERT AMP BAND-PASS ASSURED
BY CHANGING COMPONENT
LOCATION AND VALUES**

INFORMATION ONLY

M1204

Effective Prod s/n 182

DESCRIPTION:

Vertical Amplifier band-pass was assured by relocating R1023, R1047, R1021 and R1042. L1022 and L1041 values were changed from 3.2 μ H to 2.5 μ H coils. M1204 and M1143 are combined with M1567 which will contain the instructions for the three mods. Refer also to M1224 for reference to C1280 and C1281.

Parts Removed:

Parts Added:

L1022, L1041 3.2 μ H	108-088	L1022, L1041 2.5 μ H fixed	108-103
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**VERTICAL AMPLIFIER SUBSTITUTE GRID
COMBINATION TERMINATION RESISTOR
REPLACED BY NORMAL VALUE**

INFORMATION ONLY

M1166

Effective Prod s/n 197

DESCRIPTION:

Use of a substitute combination of a 10k 5W 5% resistor and a 1.8k 1W 10% resistor for R1141 was no longer necessary with the availability of the optimum value resistor in stock.

Parts Removed:

Parts Added:

R1141 10k 5W 5% WW	308-008	R1141 12k 8W 5% WW	308-069
1.8k 1W 10%	304-182	Screw, 8-32 x 2	212-013
Screw, 8-32 x 1-1/2	212-022		

M1186

Effective Prod s/n 262

DESCRIPTION:

Reducing the value of C1074 and adding a new capacitor C1078 in parallel with C1076 extended the adjustment range of C1075 and C1076. They are located on the Vertical Amplifier termination network.

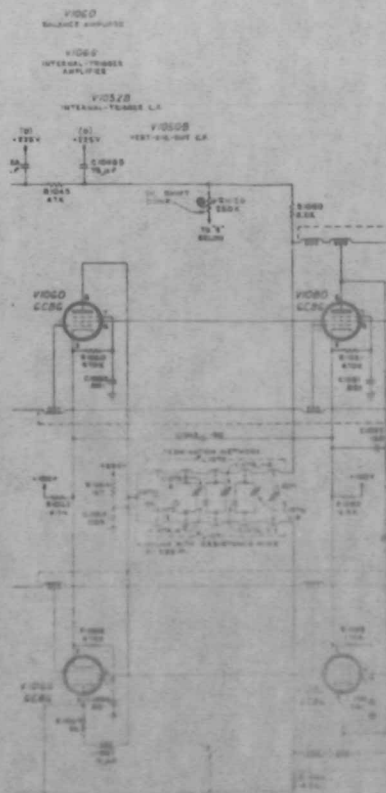
NOTE: C1075 is normally adjusted at minimum capacity; C1076 is normally adjusted at maximum capacity.

Parts Removed:

C1074 10pF 500V cer 281-504

Parts Added:

C1074	47 pF	500 V	cer	281-501
C1078	2.2 pF	500 V	cer	281-500



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**POWER SUPPLY COMPARATOR
OSCILLATION ELIMINATED WITH
ADDED SUPPRESSOR RESISTOR**

M1202

Effective Prod s/n 286

Usable in field instruments s/n 101-285

DESCRIPTION:

Parasitic suppressor resistors were added in the grid circuits of the comparator V765B and V712B, thus improving the stability of the +225 V and -150 V supplies.

Parts Removed:

Parts Added:

R767, R713 1k 1/2W 10% comp 302-102

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

- a) Install R767 (1k 1/2W) between pin 7 of V765B and the junction of C770 and R770.
- b) Install R713 (1k 1/2W) between pin 7 of V712B and the junction of C717 and R717.

**CRT T54P HAVING HIGH VOLTAGE
DEFLECTION SENSITIVITY IS USABLE
BY ADDED FRONT PANEL CAM ADJ**

INFORMATION ONLY

M1208

Effective Prod s/n 305

DESCRIPTION:

CRT T54P has achieved high vertical deflection sensitivity through rigid control of the configuration of its gun elements. Any variation from the tolerances causes "off axis" spot to the CRT face. Our rejection of tubes having this characteristic can be avoided through the use of a cam-adjusted graticule offering a measure of compensation along the vertical axis.

- NOTE:**
- 1) A #40 hole was added to the sub-panel to position the cam, and a 5/32 D clearance hole was added to the front panel to facilitate hole alignment.
 - 2) The cam makes it possible to displace the graticule vertically, approximately 3/32 of an inch (2.38 millimeter) maximum in either direction.
 - 3) CRT replacement will require checking and probable readjustment of the graticule and spot alignment.

Parts Removed:

Parts Added:

Graticule

331-025

Graticule

331-034

Cam, alum, 3/8 in. OD

401-004

Screw, 4-40 x 3/8 FHS

213-012

**DELAY LINE TERMINATION PERFORMANCE
IMPROVED BY REMOVAL OF SHUNT
CAPACITOR**

INFORMATION ONLY

M1224

Effective Prod s/n 345

DESCRIPTION:

It was necessary to remove either C1280 or C1281, 0.68pF ceramic capacitors, from the Delay Line network. This was done as part of M1204 and added to M1567 instructions.

Parts Removed:

Parts Added:

C1281 0.68pF 500V cer 281-537

**VERT AMP 6CB6 TUBES REPLACED
WITH AGED AND SELECTED TYPE
TO ELIMINATE TEST TIME**

INFORMATION ONLY

M1293

Effective Prod s/n 488

DESCRIPTION:

Raw 6CB6's used in the Vertical Amplifier were replaced with aged and selected tubes. This reduced test time and insured that the tubes had 'settled down' prior to shipment.

Parts Removed:

Parts Added:

V1060, V1066,
V1080, V1082,
V1090, V1092,
V1100, V1102, 6CB6 154-030
V1110, V1112,
V1120, V1122,
V1130, V1132

V1060, V1066,
V1080, V1082,
V1090, V1092,
V1100, V1102,
V1110, V1112,
V1120, V1122,
V1130, V1132
6CB6 aged, min,
Ip and Ep swing, 157-037
(violet)

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**'VERT SIG OUT' SHOCK HAZARD REDUCED
WITH REPLACED COUPLING CAPACITOR**

M1287

Effective Prod s/n 532

Usable in field instruments s/n 101-531

DESCRIPTION:

Coupling capacitor C1055 is changed from a 400V to a 600V PTM to prevent premature failure. A possible short would place approximately +350V DC at the front panel 'Vert Sig Out' post.

Parts Removed:

C1055 0.022 μ F 400V 285-515

Parts Added:

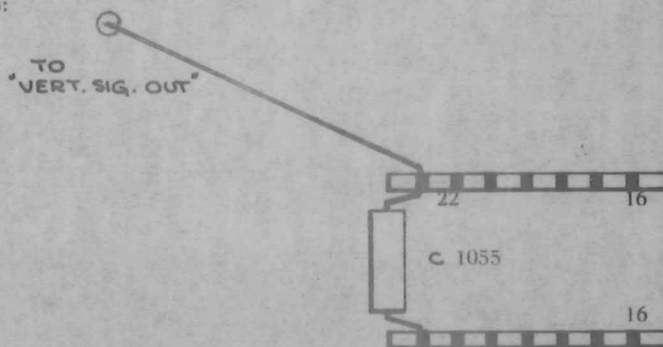
C1055 0.022 μ F 600V 285-517

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace C1055, a 0.022 μ F 400V capacitor on the Driver chassis, with a 0.022 μ F 600V capacitor.



**+225 V REGULATION AT HIGH
LINE LOW LOAD IMPROVED WITH
CHANGED RESISTOR VALUE**

INFORMATION ONLY

M1289

Effective Prod s/n 569

DESCRIPTION:

To improve the +225 V regulation at High Line Low Load condition, R762 (+225 V Series Regulator shunt resistor) was increased from 2.25k to 2.4k.

M1289 is superseded by M1565.

Parts Removed:

R762 2.25k 20W WW 308-064

Parts Added:

R762 2.4k 20W WW 308-068

**SWEEP GENERATOR REDUNDANT
RESISTOR REMOVED WITHOUT
LOSS OF PERFORMANCE**

INFORMATION ONLY

M1314

Effective Prod s/n 650

DESCRIPTION:

To eliminate a redundant part, R97, a 100Ω parasitic suppressor was removed from the grid of V90. An insulated wire replaced the resistor with no noticeable effect in operation.

Parts Removed:

Parts Added:

R97 100Ω 1/2W 10% 302-101

**SWEEP DRIVER DIVIDER
RESISTORS RELOCATED TO
ELIMINATE POSSIBLE SHORTS**

INFORMATION ONLY

M1318

Effective Prod s/n 657

DESCRIPTION:

Divider resistors R259 and R260 are relocated to eliminate the possibility of shorting together due to their close proximity on the ceramic strip.

**SWEEP GENERATOR FILAMENT
GROUND RELOCATED TO
IMPROVE 30MHz TRIGGERING**

M1322

Effective Prod s/n 657

Usable in field instruments s/n 101-656

DESCRIPTION:

Relocating the ground of the Miller tube V90 to the tube socket of V73 eliminated jitter occurring in some instruments when a 30MHz sine wave is applied.

INSTALLATION INSTRUCTIONS:

Remove bare wire between pin 4 and ground lug of V90 on the Sweep chassis.

Install a bare wire between pins 4 and 7 of V90, and ground lug of V73 nearest pin 4.

**FRONT PANEL VERTICAL POSITION
NEONS CHANGED TO RAW NE-2 NEONS**

INFORMATION ONLY

M1337

Effective Prod s/n 683

DESCRIPTION:

Investigation of NE-2 neon bulb characteristics and their application as vertical beam-position indicators has shown that "aged and checked" NE-2's are not required in the NE1010 and NE1014 circuit positions. Raw stock NE-2's will be used in this application.

Parts Removed:

Parts Added:

NE1010 NE-2 150-014
NE1014 "aged and ckd" 150-014
65-75V ignition

NE1010, NE1014 NE-2, raw 150-002

**VERTICAL AMPLIFIER RINGING
ELIMINATED BY FILAMENT REWIRING
AND ADDED FILTERING**

M1350

Effective Prod s/n 724
w/exceptions s/n 677,711,714,721

Usable in field instruments s/n 101-723

DESCRIPTION:

To remove a 'wrinkle' or pulse in the response of the vertical amplifier. This interfering signal, arising in the sweep trigger, appears following the leading edge of square waves and can be phased to interfere when adjusting the compensation of the 53/54B plug-ins.

The wiring supplying 6.3V AC across terminals 13 and 14 of the plug-in interconnecting socket was altered in such a manner as to place the terminals in parallel with the V1040, 6AW8 filament, rather than directly across terminals 22 and 23 of the power transformer, as was previously the case. This places the source of 6.3V AC plug-in filament voltage at the point most remote from the point of infiltration of the interfering sweep trigger signal, and allows some degree of attenuation to occur as the signal travels down the filament string. In addition, C1155, a 0.005 μ F ceramic capacitor, by passes terminal no. 14 and the pin no. 4 side of the 6AW8 filaments to ground.

The wiring change was affected in the following manner:

- 1) The no. 20 stranded 9-64 (blue, yellow on white) and 9-68 (blue, gray on white) wires running from terminal no. 13 and no. 14 of the Amphenol interconnecting socket to slot no. 8 and no. 9 of the lower ceramic strip adjacent to C1153A and B (a $2 \times 20 \mu$ F, 450V electrolytic capacitor) on the VA deck, were removed from the VA cable.
- 2) A short length of no. 20, 9-64 and 9-68 stranded wire were added to the VA cable and were run from terminal no. 13 and no. 14 of the Amphenol interconnecting socket to pin no. 5 and no. 4 of V1040, 6AW8.

Parts Removed:

Wire, #20, stranded wh-bl-y	175-512
Wire, #20, stranded w-bl-g	175-512

Parts Added:

C1155 0.005 μ F cer	283-001
Wire, #20 stranded w-bl-y 7"	175-512
Wire, #20 stranded w-bl-g 7"	175-512

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTION:

- a) Remove the #20 white-blue-yellow and the #20 white-blue-gray wires that connect between terminals #13 and #14 of the Amphenol interconnecting socket and to slots #8 and #9 of the lower ceramic strip adjacent to C1153 A and B (a $2 \times 20 \mu$ F 450V capacitor) on the VA chassis.
- b) Install a #20 white-blue-yellow stranded wire between terminal #13 on the Amphenol connector and pin 5 of V1040.
- c) Install a #20 white-blue-gray stranded wire between terminal #14 on the Amphenol connector and pin 4 of V1040.
- d) Install C1155, a 0.005 μ F ceramic capacitor between pin 4 of V1040 and its socket ground lug.

**INDICATOR AND INPUT AMP TUBES
STABILITY IMPROVED BY CHANGING
TO AGED AND MICROPHONICS-
CHECKED TUBES**

INFORMATION ONLY

M1347

Effective Prod s/n 725

DESCRIPTION:

To insure that the tubes used as "Indicator and Input Amplifiers" will be stable in their characteristics and free from microphonics, they (6AW8's) were changed to aged and microphonic-checked tubes.

NOTE: Raytheon 6AW8's are currently recommended for use at V1025 and V1040. Sylvania 6AW8's develop interface and for that reason are not now recommended for use.

Parts Removed:

V1025, V1040 6AW8 154-095

Parts Added:

V1025, V1040 6AW8 157-039
(aged and micro ckd)

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**POWER SUPPLY PRECISION
RESISTOR WATTAGE RATING
INCREASED TO IMPROVE STABILITY**

M1298

Effective Prod s/n 744

Usable in field instruments s/n 101-743

DESCRIPTION:

Applying a DC voltage to a 1% tolerance precision resistor produces a 'stress effect' that is caused by migration of the carbon particle film. Amplitude of voltage, temperature, and time duration of applied voltage influence the 'stress effect'. The carbon film is deteriorated, causing resistor instability -- either as an increase in resistor value or, in some cases, an open resistor.

Increasing the wattage ratings of the resistors from 1/2W to 1W reduces the high failure rate due to deterioration, and improves their stability.

The replacement of R715 and R718 took place at s/n 2820.

Parts Removed:

R715	50k 1/2W 1%	309-090
R718	68k 1/2W 1%	309-042
R750, R772	333k 1/2W 1%	309-053
R751	490k 1/2W 1%	309-002
R771, R797	220k 1/2W 1%	309-052
R787	1.84M 1/2W 1%	309-021
R788	780k 1/2W 1%	309-011
R798	720k 1/2W 1%	309-009

Parts Added:

R715	50k 1W 1%	310-086
R718	68k 1W 1%	310-054
R750, R772	333k 1W 1%	310-056
R751	490k 1W 1%	310-057
R771, R797	220k 1W 1%	310-055
R787	237k 1W 1%	308-124
R788	100k 1/2W 1%	308-084
R798	720k 1W 1%	310-059

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

- Replace R715, a 50k 1/2W precision resistor located on the ceramic strips above V757 on the Power chassis, with a 50k 1W resistor.
- Replace R718, a 68k 1/2W precision resistor located on the ceramic strips above V757, with a 68k 1W 1% precision resistor.
- Replace R750 and R772, 333k 1/2W precision resistors on the ceramic strips above V765, with 33k 1W precision resistors.
- Replace R751, a 490k 1/2W precision resistor, on the ceramic strips above V742, with a 490k 1W precision resistor.
- Replace R771 and R797, 220k 1/2W precision resistors located on the ceramic strips above V742 and V794, with 220k 1W precision resistors.
- Replace R787, a 1.84Meg 1/2W precision resistor located on the ceramic strips above V784, with a 237k 1W wirewound resistor.
- Replace R788, a 780k 1/2W precision resistor located on the ceramic strips above V784 and adjacent to R787, with a 100k 1/2W wirewound resistor.
- Replace R798, a 720k 1/2W precision resistor located on the ceramic strips above V794, with a 720k 1W precision resistor.

**EXT SWEEP AMPLIFIER FILAMENT
GROUND RELOCATED TO
REDUCE 60Hz MODULATION**

M1368

Effective Prod s/n 846

Usable in field instruments s/n 101-845

DESCRIPTION:

Separating the common grounding point for the filament center top of V105 and the Grid of V105B reduces the influence of the heater ripple in the Ext Sweep Amplifier.

INSTALLATION INSTRUCTIONS:

Remove the ground strap connecting pin 9 of V105 to the V105 socket ground. Ground pin 9 of V105 to the socket ground of V115.

**SWEEP MULTIPLIER VARIABLE CONTROL
AND DIVIDER CHANGED TO ENABLE USE
OF STANDARDIZED MULTIPLIER SWITCH**

INFORMATION ONLY

M1357

Effective Prod s/n 866

DESCRIPTION:

A modification required in the 535 and 545 delaying sweep circuitry is also incorporated in the 531 and 541 because the change effects Multiplier switch SW90, which is common to all four instruments.

R99K and R99L were reduced by approximately 1/3 of their former value.

Parts Removed:

R99K	10k 1/2W 10%	302-103
R99L	20k 2W	311-018

Parts Added:

R99K	6.8k 1W 10%	304-682
R99L	15k 2W	311-045

**'CAL TEST PT' JACK ADDED
TO POWER CHASSIS TO EASE
CALIBRATOR VOLTAGE CHECK**

INFORMATION ONLY

M1360

Effective Prod s/n 883

DESCRIPTION:

To bring the calibrator voltage to a more accessible point for checking, a black pin jack labeled 'Cal Test Pt' was added in the right outside edge of the Power chassis, 2-1/2 in. in from the rear of the subpanel. The jack is connected to the cathode (pin 3) of V246A, the Calibrator Cathode Follower.

Parts Removed:

Parts Added:

Jack, tip, black	136-037
Washer, brass	210-840
Nut, hex, brass	210-413
Wire, no.22 sol,w-y (4-1/2")	175-522

**CABINET REDESIGNED TO USE NEW
3-SECTION TYPE TO IMPROVE ACCESS**

INFORMATION ONLY

M1327

Effective Prod s/n 5001

DESCRIPTION:

The cabinet style was changed to the new 3-section, round corner cabinet used on the 530 and 540 series instruments to improve appearance and access to fuses and CRT controls.

Parts Removed:

Cabinet	437-018
Panel, front	333-155
Plate, rectifier mtg	386-407
Bracket, relay and fan mtg	406-164
Chassis, F and I	441-065
Clamp, CRT socket	343-027
Housing, air filter	380-006
Plate, subpanel	386-348
Bracket, CRT shield support	406-112
Plate, frame, bottom	387-527
Plate, frame, top	387-528
Frame, left	426-023
Frame, right	426-024
Ring, fan	354-034
Bracket, Time/CM switch	406-160
Shield, F and I - HV	337-104
Plate, switch support	386-408
Bracket, fan ring	406-119
Tube, transformer support	166-061
Tube, insulating (2)	166-057
Tube, spacer (2)	166-030
Rod, spacing, fan mt (2)	385-081
Rod, CRT support post	385-080
Rod, nylon, 5/16 x 1-1/8	385-075
Connector, coax, modified	131-038
Filter, air, 10x10x1	378-005
Vert Delay Line	441-099
Rod, chassis support	384-518
Rod, spacing	384-523

Parts Added:

Plate, cabinet, left side	386-564
Plate, cabinet, right side	386-565
Plate, cabinet, bottom	386-563
Panel, front	333-239
Plate, rectifier mtg	386-548
Bracket, relay mtg	406-144
Mount, fan motor	426-047
Chassis, F and I	441-142
Clamp, CRT	343-034
Housing, air filter	380-008
Plate, subpanel front	386-556
Plate, subpanel rear	386-557
Plate, rear overlay	386-558
Angle, frame bottom (2)	122-021
Angle, frame top	122-019
Bar, ext ch top supt, w/handles	381-067
Ring, fan w/mtg ears	354-053
Bracket, Time/CM switch	406-240
Shield, F and I	337-148
Shield, HV	337-150
Plate, switch support	386-525
Tube, spacing, trans support	166-105
Tube, spacing, 3/8 OD x 1/4	166-110
Rod, CRT support post	385-088
Rod, HV O support post	384-135
Rod, nylon, 5/16 x 1-1/8	385-087
Connector, coax, modified	131-064
Tube, spacing, 1/4 OD x 7/32 (2)	166-107
Filter, air, modified, 10x10x1	378-011
Plate, access panel, plexi	386-560
Clamp, access panel	343-033
Lockwasher, int no. 8 (2)	210-008
Lug, solder, no. 10 non-lkg (2)	210-224
Nut, hex, 8-32 x 5/16 (2)	210-409
Nut, cap, hex, 8-32 x 5/16 (2)	210-402
Screw, 8-32 x 1-1/4 RHS (2)	212-031
Bracket, CRT support	406-238
Screw, 4-40 x 5/16 RHS	213-034
Screw, 6-32 x 5/16 BHS	213-030
Screw, 8-32 x 3/8 Truss HS	212-036
Screw, 6-32 x 1-1/8 FHS	211-536
Screw, 4-40 x 5/8 RHS	211-016
Washer, shoulder no. 4 fiber	210-849
Rod, nylon 5/16 x 1-9/16	385-090
Clamp, cable 3/16 in.	343-002
Rod, support post	385-089
Chassis, Delay Line Vert	441-137

**+225V PLUG IN SUPPLY STABILITY
INCREASED TO IMPROVE CHOPPED
WAVEFORM PRESENTATION WITH
A 53/54C**

INFORMATION ONLY

M1389

Effective Prod s/n 5001

DESCRIPTION:

Changing the value of bypass capacitor, C1152, improved the stability of the +225V supply and the chopping multi-waveform presentation when operating a 53/54C Plug-in unit in the Chopped Mode.

The new C1152 is mounted on the plug-in housing rear plate with a cable clamp and hardware.

Parts Removed:

C1152 0.005 μ F 500V discap 283-001

Parts Added:

C1152	0.1 μ F 400V PTM	285-526
Screw, 6-32 x 1/2 BH		211-511
Washer, brass no.62		210-803
Lockwasher, int. no.6		210-006
Nut, hex, brass 6-32 x 1/4		210-407
Clamp, cable, plastic 1/2		343-006

**CALIBRATOR 'CAL OUT' CONNECTOR
ELEVATED 1/4 Ω ABOVE GROUND
TO REDUCE 60Hz MODULATION**

INFORMATION ONLY

M1413

Effective Prod s/n 5001

60Hz hum was eliminated in high gain plug-in (i.e., B and D), by elevating the Calibrator 1/4 Ω above ground. The hum was attributable to ground current effects between the plug-in and Calibrator while the Calibrator was operated in the multivolt range. This was reduced to a point where a clean 'Cal' output was obtained in the 0.2 millivolt range.

The mechanical changes necessary to the cabinet were included in the cabinet change, M1324, and involved the following:

The D 'Cal Out' coax clearance hole in the subpanel was enlarged to 11/16 in. dia.

The D 'Cal Out' coax connect access hole in the front panel was enlarged to 3/4 in. dia.

The coax connector mounting holes were enlarged to 7/16 in. dia to accept the 4 fiber washers, and/or nylon molded insulator, and two fiber washers to insulate the connector.

Circuit changes involved adding R698, a 1/4 Ω 1/2w resistor, between the connector and ground, and relocating the RC combination of R695 and C695 to the connector ground lug.

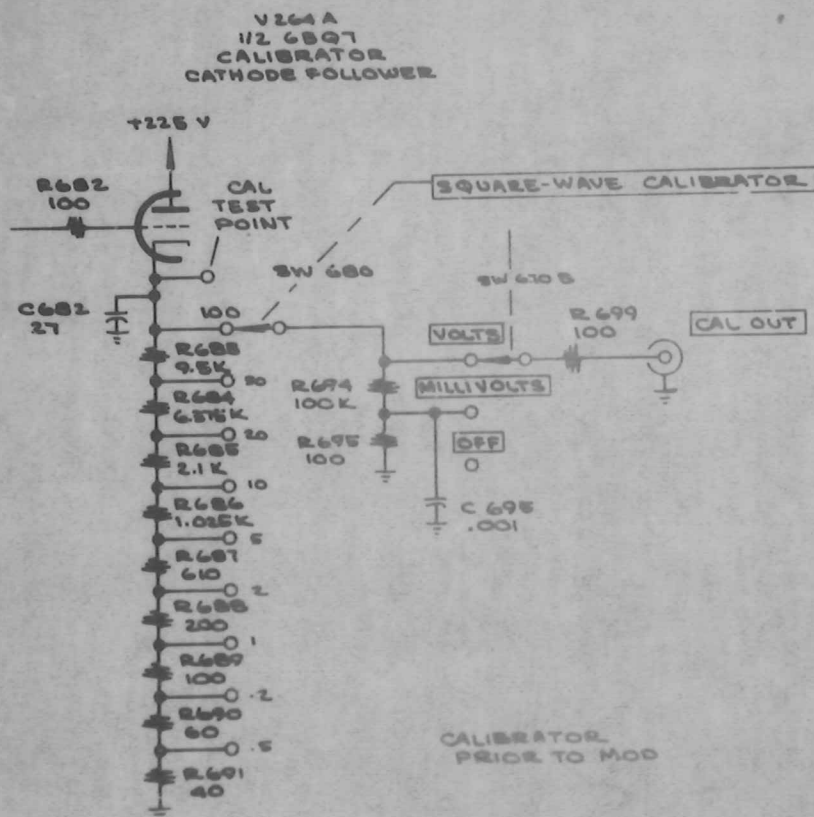
Parts Removed:

Parts Added:

R698	1/4 Ω 1/2w WW	308-090
Connector, modified		131-064
Lockwasher, int no.4		210-004
Lug, solder, no.10		210-224
Nut, hex, 4 x 3/16		210-406
Washer, plain, .55		210-801
Washer, fiber, extruded no.4		210-849
Screw, 4-40 x 3/8 FHS		211-025
Insulator, nylon		406-244

See schematics and drawings on following pages.

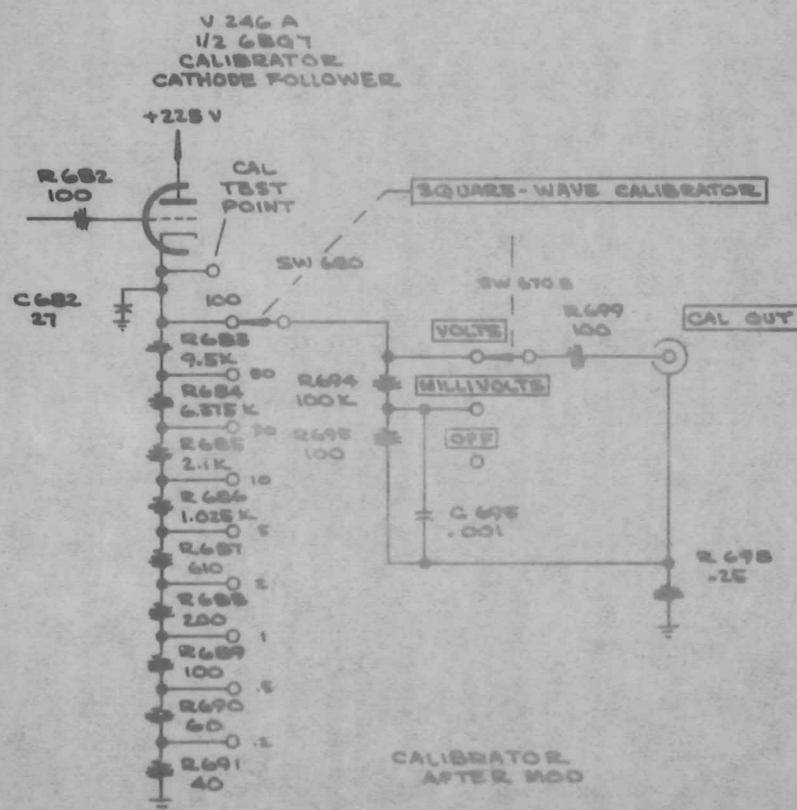
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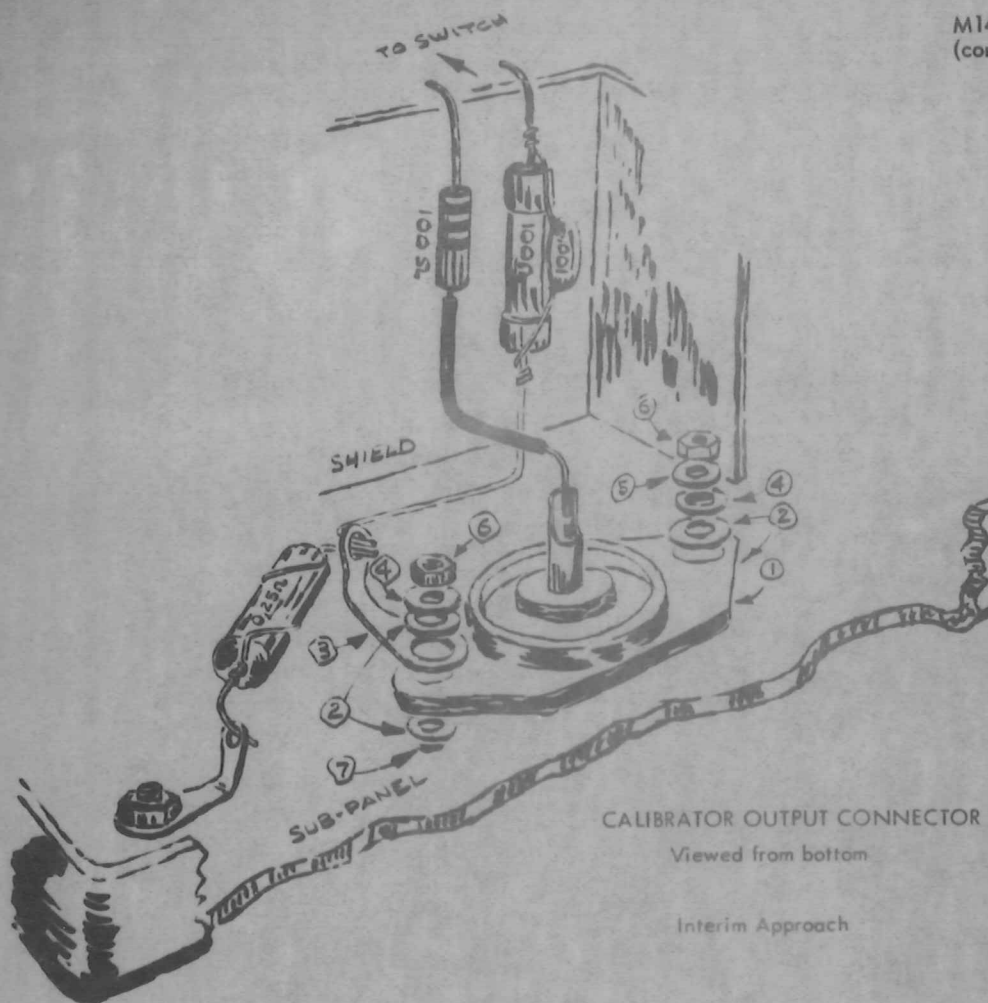
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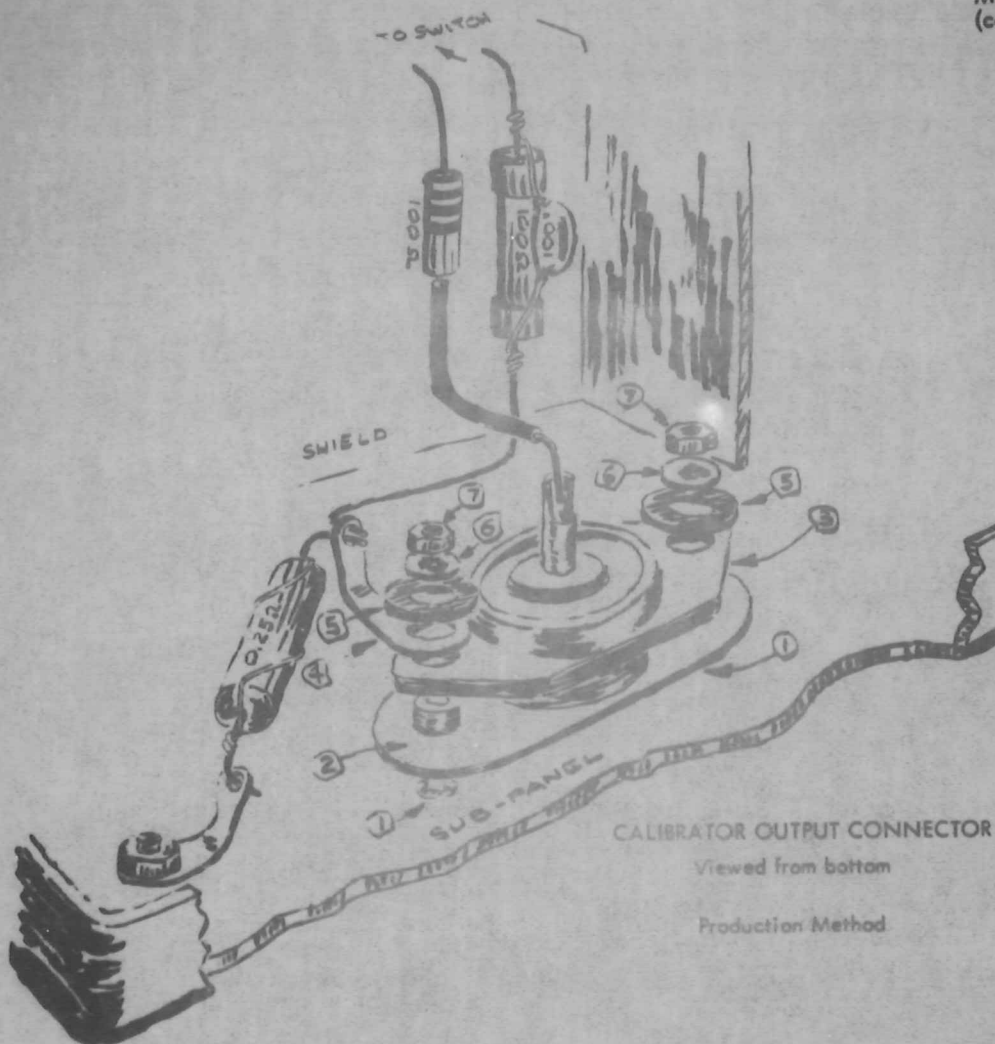
Pag

M1413
(con'd)

Hardware List

- | | | |
|----|-------------------------------|---------|
| 1) | Connector, modified 83-IRTY | 131-064 |
| 2) | Washer, fiber, extruded no. 4 | 210-849 |
| 3) | Lug, solder, no. 10 | 210-224 |
| 4) | Washer, plain, 55 | 210-801 |
| 5) | Lockwasher, int, no. 4 | 210-004 |
| 6) | Nut, hex, 4 x 3/16 | 210-406 |
| 7) | Screw, 4-40 x 3/8 FHS | 211-025 |

continued

M1413
(con'd)

Hardware List

1)	Screw, 4-40 x 3/8 FHS	211-025
2)	Insulator, nylon	406-244
3)	Connector, modified 83-IRTY	131-064
4)	Lug, solder, no.10	210-224
5)	Washer, fiber, no.10	210-812
6)	Lockwasher, int, no.4	210-004
7)	Nut, hex, 4 x 3/16	210-406

**SWEEP GENERATOR +225 V DECOUPLING
ADDED TO +GATE OUT CF TO
REDUCE 'SWEEP WRINKLE'**

M1379

Effective Prod s/n 5063

Usable in field instruments s/n 101-5062

DESCRIPTION:

Adding resistor R72 and capacitor C72 to the plate circuit of V73B reduced the 'Sweep wrinkle' which entered the Vertical Amplifier through the +225 V regulated supply.

The additional decoupling afforded by this mod is especially useful when using a 53/54B plug-in in the 0.05 volts/cm position.

Parts Removed:

Parts Added:

R72	47 Ω 1/2W 10%	302-470
C72	0.005 μ F discap	283-001

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

- Move the ground end of R77, a 3.7k 1W resistor, to the nearest ground lug on V73.
- Unsolder the +225 V lead from pin 6 of V73B and connect at the slot vacated in step a.
NOTE: On some instruments it may be necessary to install a ceramic post as there isn't a vacant slot.
- Install R72, a 47 Ω resistor, between pin 6 of V73B and the slot mentioned in step b.
- Install C72, a 0.005 μ F capacitor between pin 6 of V73B and ground.

**THERMAL CUTOUT 'OFF' TIME REDUCED
BY HIGHER DEGREE 'ON' SWITCH**

INFORMATION ONLY

M1332

Effective Prod s/n 5160

DESCRIPTION:

A new 'Therm-O-Disc' having a smaller differential between the 'OFF' and 'ON' temperature will replace the present one. This will shorten the 'OFF' time after the switch is actuated.

Parts Removed:

Parts Added:

TK601	Thermal Cutout	260-070
	128 \pm 5 $^{\circ}$ F - 'Off'	
	98 \pm 5 $^{\circ}$ F - 'On'	

TK701	Thermal Cutout	260-070
	128 \pm 5 $^{\circ}$ F - 'Off'	
	113 \pm 5 $^{\circ}$ F - 'On'	

**PLUG-IN SIDE PANELS REPLACED
BY ONE INTERCHANGEABLE PANEL
FOR IMPROVED ACCESS**

INFORMATION ONLY

M1395

Effective Prod s/n 5210

DESCRIPTION:

Plug-in housing side panels were replaced with ones having larger access holes to allow internal adjustments with a plug-in in the instrument. Mechanical changes were made to allow using the panel for either the left or right side.

Parts Removed:

Plate, plug-in housing, right 386-357
Plate, plug-in housing, left 386-356
Shield, plug-in housing, Vert 337-067

Parts Added:

Plate, plug-in housing, side (2) 386-566
Shield, plug-in housing, Vert 337-091

**-150V SUPPLY RINGING AND RIPPLE
REDUCED BY ADDED DECOUPLING**

M1423

Effective Prod s/n 5213
s/n 899 on 541 Rackmount**

Usable in field instruments s/n 101-5212

DESCRIPTION:

To reduce ringing and ripple in the -150V supply, a decoupling network was added between the -150V buss and ground. Although physically located on the sweep chassis, the C720-R720 combination will be shown in shunt with C715 on the LV Power Supply schematic.

****NOTE:** A new style cabinet appears on all standard instruments above s/n 5000 -- see M1327. The serial numbers between the last old style standard instrument and the first new style instruments were reserved for the 541 Rackmounts. These have an old style cabinet with an enlarged front panel for rackmounting, and should not be confused with RM41 instruments.

Parts Removed:

Parts Added:

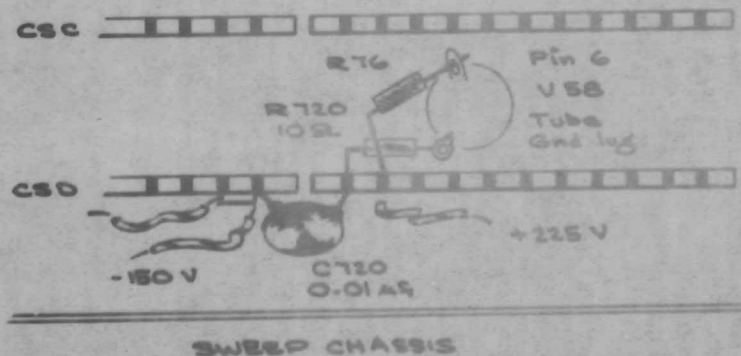
C720	0.01 μ f 500v	283-002
R720	10 Ω 1/2w 10%	302-100

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

- Relocate one end of R76, a 47 Ω 1/2w resistor, and the +225v lead from CSD-12 to CSD-13.
- Unsolder and discard the wire strap between CSD-12 and CSD-13.
- Install R720, a 10 Ω 1/2w resistor, between CSD-12 and the ground lug directly below it on the tube socket of V58.
- Install C720, a 0.01 μ f discap capacitor, between CSD-11 (-150v) and CSD-12.



**POWER CABLE REDUNDANT
HUM PRODUCING HEATER
GROUND WIRE REMOVED**

M1430

Effective Prod s/n 5215
s/n 899 on 541 Rackmount**

Usable in field instruments s/n 101-5214

DESCRIPTION:

To eliminate a redundant heater circuit ground wire which was a source of hum-producing heater currents in the chassis, the solid white wire (which ran from terminal 13 to terminal 19 of the power transformer) was removed from the power cable.

****NOTE:** A new style cabinet appears on all standard instruments above s/n 5000 -- see M1327. The serial numbers between the last old style standard instrument and the first new style instruments were reserved for the 541 Rackmounts. These have an old style cabinet with an enlarged front panel for rackmounting, and should not be confused with RM41 instruments.

INSTALLATION INSTRUCTIONS:

Cut the solid white wire which runs between terminals 13 and 19 on the power transformer at the respective terminals.

**SCALE ILLUMINATION CONTROL
IMPROVED BY REWIRING
AS A POTENTIOMETER**

M1445

Effective Prod s/n 5310

Usable in field instruments s/n 101-5309

DESCRIPTION:

Rewiring the 'Scale Illumination' control as a true potentiometer allows the control of the voltage applied to the graticule lights through a full measure of variation -- i.e., full brilliance to complete extinction. The present method of wiring, which does not permit complete extinction, only becomes a problem when the need for photographic record is required.

Parts Removed:

Parts Added:

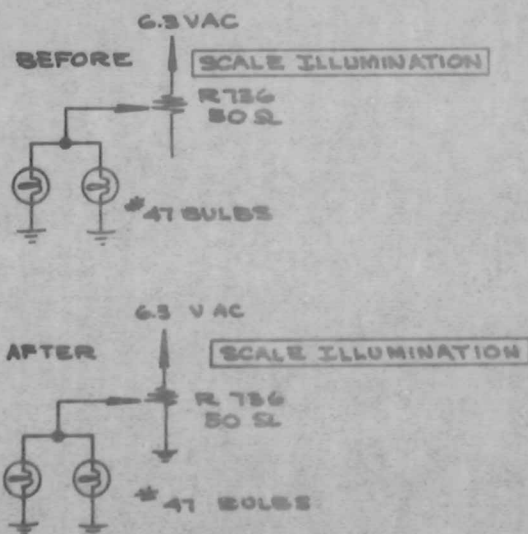
Lockwasher, pot, int	210-012
Lug, solder, plain	210-207

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

- Remove R736 (Scale Illum pot) and install lockwasher and solder lug between pot and subpanel.
- Solder unused terminal of R736 to the solder lug just installed.
- Interchange the two existing wires connected to the pot (the white-red-blue wire should now be connected to the outside terminal -- this places the pot between 6.3 v and ground.)



INDICATOR AMPLIFIER GRID CURRENT ELIMINATED BY LOWERING THE VALUE OF GRID RESISTORS

M1471

Effective Prod s/n 5394

Usable in field instruments s/n 101-5393
s/n 904 on 541 Rackmount (see Note with M1423)

DESCRIPTION:

Some difficulty was experienced with a batch of Raytheon 6AW8's which exhibited grid current tendencies in the triode section. The value of the Indicator Amplifier (triode section) grid resistors were such that, with the grid current problem, a voltage was developed sufficient to bias-to-cut-off the triode sections making the beam-position indicators inoperative.

A solution to the problem with a consequent reduction in the reject rate of 6AW8's was effected by reducing the value of the grid resistors, R1011 and R1013.

Parts Removed:

R1011, R1013 1M 1/2W 10% 302-105

Parts Added:

R1011, R1013 100k 1/2W 10% 302-104

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace R1011 and R1013 (1 Meg 1/2 W), located between pin 2 of V1025A and V1050A and between pin 2 of V1040A, pin 3 of V1052A respectively, with 100k 1/2 W resistors.

AUXILIARY TRANSFORMER VOLTAGE TOO HIGH

INFORMATION ONLY

M1467

Effective date 1-7-57 -- (Mod S4 only)

DESCRIPTION:

The auxiliary transformer voltage is too high for safe operation of the time delay relay. Reduces the secondary voltage from 27V AC to 25V AC and adds a series resistor.

Parts Removed:

T700 DC 1 120-075

Parts Added:

T700 DC 1 120-084
R708 100Ω 1W 10% 304-101

AUXILIARY TRANSFORMER VOLTAGE TOO HIGH

INFORMATION ONLY

M1475

Effective date 1-7-57 -- (Mod S3 only)

DESCRIPTION:

The auxiliary transformer voltage is too high for safe operation of the time delay relay. Reduces the secondary voltage from 27V to AC to 25V AC and adds a series resistor.

Parts Removed:

T700 DC 2 120-072

Parts Added:

T700 DC 2 120-085
R708 100Ω 1W 10% 304-101

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Parts f

Panel,

M1692
(cont)

Parts Removed:

R1030 Axial 4k 5W 5% WW 308-051

Parts Added:

R1036, 1046 27k 2W 10% 306-273

TRIGGERING 'AC AUTO' MODE CHANGED TO 'AUTOMATIC'

INFORMATION ONLY

M1406

Effective Prod s/n 5415 (see list in Description)
s/n 899 (see Note with M1423)

DESCRIPTION:

An 'Automatic' mode of triggering replaces the present 'AC Auto' mode. In the New Mode of operation, the front panel 'Stability' control is replaced by an internal control which is preset for optimum triggering. The new 'Preset Stability' R49, a 100k 2W potentiometer, was mounted at the front outside corner on the Sweep chassis.

Included with the new circuitry requirements was a switch circuit SW5G, added to the front side of section 5 of the Triggering Mode switch. The switch will remain a direct replacement.

The front panel was changed to the extent that the 'AC Auto' position of the Triggering Mode control was redesignated 'Automatic'.

The following changes were effected in the Sweep Cable:

- 1) The white-violet wire which formerly tied to the 'Stability' pot center contact (variable arm) was rerouted to tie to the lower wiper arm of the newly added 'Triggering Mode' switch section.
- 2) A white-orange wire was added from the SW5G 'Automatic' contact to the Preset Stability pot center contact (arm).
- 3) A white-blue wire was added to the upper arm of the newly added 'Triggering Mode' switch section to the center arm of the 'Stability' pot.
- 4) A black-brown-green-brown wire was added from one end of the 'Preset Stability' pot to -150V available at the outboard ceramic strip adjacent to V40. The other end contact of the 'Preset Stability' pot is grounded by means of a pot ground lug.

The completed change was done over a series of serial numbers as listed below:

	<u>541</u>	<u>Rackmounted</u>
New switch section added, but not wired	5254	898
Pot mounted hole added to Sweep Chassis	5283	898
Pot and new panel added, switch wired	5415	922

This mod is incorporated in Modification Kit 040-152.

Parts Removed:

Panel, front "AC Auto" 333-239

Parts Added:

Panel, front "Automatic" 333-303
R49 100k 3/8 x 3/8 311-026

**RECTIFIER PLATE AND CRT BRACKET
IMPROVED BY REDESIGN**

INFORMATION ONLY

M1452

Effective Prod s/n 5500

DESCRIPTION:

To improve the rigidity of the instrument and to simplify the final assembly squaring and aligning operation, a rectifier mounting plate of new design was used. The new plate has no rear flange, and the top and bottom were extended to the rear making the overall width 11-5/8 in. Additional fastening points were provided at the top rear through a newly added hole in the Sweep chassis and at the bottom rear through the existing Clare relay bracket mounting holes in the Power chassis. In addition, two new holes were provided in the Rectifier mounting plate for fastening a new CRT support bracket which was installed as a part of this modification. The former CRT support bracket was fastened to the rear flange of the old rectifier mounting plate.

Parts Removed:

Plate, rectifier mounting 386-548
Bracket, CRT support 406-238

Parts Added:

Plate, rectifier mounting 386-576
Bracket, CRT support 406-251

**FOCUS, INTENSITY, ASTIGMATISM
AND SCALE ILLUMINATION KNOBS
REPLACED TO IMPROVE APPEARANCE**

INFORMATION ONLY

M1490

Effective Prod s/n 5551
s/n 5551 on 541 Rackmount (See Note with M1423)

DESCRIPTION:

Improves the appearance of the FOCUS, INTENSITY, ASTIGMATISM and SCALE ILLUMINATION knobs by replacing them with knobs of smaller diameter and height.

Parts Removed:

Knob, 0.780 D x 0.591 H (4) 366-044

Parts Added:

Knob, 0.700 D x 0.525 H (4) 366-033

**DEFLECTION PLATE CONNECTOR
ACCESS PANEL REMOVED**

INFORMATION ONLY

M1547

Effective Prod s/n 5735

DESCRIPTION:

Because of low usage, the access plate has been removed and will be supplied as an accessory (013-008), on special order only.

Parts Removed:

Clamp, access panel 343-033
Panel, plexi plate, access 386-560

Parts Added:

9-21-66

541 MODIFICATION SUMMARY

Page 27

Parts Removed:
Tue

334-599

Parts Added:
Clamp, P.A. Access Panel

131-014

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**POWER SUPPLY TRANSFORMER CHANGED
TO EXPORT TYPE FOR ECONOMY**

INFORMATION ONLY

M1552

Effective Prod s/n 5823

DESCRIPTION:

A high percentage of instruments require an export transformer (Mod 161A). To save the cost of handling and rework, the export transformer (with multi-tap primary) replaces the domestic type on standard instruments also.

Parts Removed:

T700 LV 117/234v 120-037

Parts Added:

T700 LV, Export 120-086
Tag, Voltage 334-634

**+225 V HIGH LINE REGULATION
IMPROVED WITH INCREASE
IN SHUNT RESISTOR VALUE**

M1565

Effective Prod s/n 5874

w/exceptions s/n 5796, 5859

Usable in field instruments s/n 101-587

DESCRIPTION:

Increasing the value of the +225 V Series Regulator shunt resistor, R762, from 2.4 k 20W to 3 k 10W 5%, eliminates the problem of regulation at High Line with the calibrator in use.

Parts Removed:

R762 2.4 k 20W WW 308-068

Parts Added:

R762 3k 10W WW 5% 308-020

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace R762, on the Power chassis just ahead of V700, with a 3k 10W 5% WW resistor.

TRIGGERING 'PRESET' POSITION ADDED TO STABILITY CONTROL

M1513

Effective Prod s/n 5942

Usable in field instruments s/n 101-5941

DESCRIPTION:

A 'Preset' position was added to the front panel stability control. This was to make use of the internal Preset stability adjustment, added by M1406 for the automatic mode, for all modes of triggering. In preset position, the front panel stability control is replaced by the internal preset stability control and only the triggering level control needs adjustment for proper triggering.

Parts Removed:

R14, R43 2-100k 311-030

Parts Added:

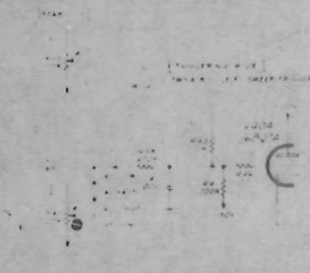
R14, R43 2-100k w/SPDT sw 311-096

Parts Required for Field Installation:

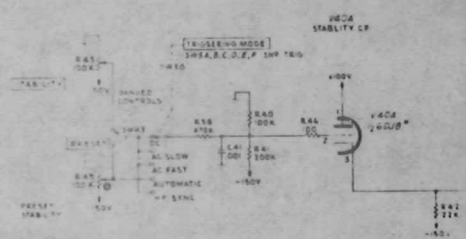
Modification kits 040-0152-00 (s/n 101-5414)
040-0154-00 (s/n 5415-5942)

INSTALLATION INSTRUCTIONS:

Refer to kit instructions.



BEFORE



AFTER

GRATICULE STUDS PROVIDED FOR REPLACEMENT PURPOSES

INFORMATION ONLY

M1570

Effective date 10-23-57

DESCRIPTION:

Facilitates the replacement of damaged or corroded graticule studs by providing an easy-to-install graticule stud.

The old stud may be removed by drilling through with a 9/32 in. drill, then breaking off with pliers. The new internally-threaded stud is then installed, using a 10-32 x 3/8 screw and no. 10 internal lockwasher.

Parts Removed:

Parts Added:

Stud, graticule, 10-32 int 355-043

CRT ROTATING RING INSTALLED**INFORMATION ONLY****M1611**

Effective Prod s/n 5971
s/n 933 on 541 Rackmount (see Note with M1423)

DESCRIPTION:

To provide an easier method of rotating the CRT, a molded mylon rotating ring (with handle) has been fitted to the CRT socket.

Parts Removed:**Parts Added:**

Ring, rotating

354-062

SWEEP CHANGED TO ELIMINATE NEED FOR CHECKED NEON DIODES

INFORMATION ONLY

M1593

Effective Prod s/n 6002

s/n 933 for 541 Rackmount (see Note with M1423)

DESCRIPTION:

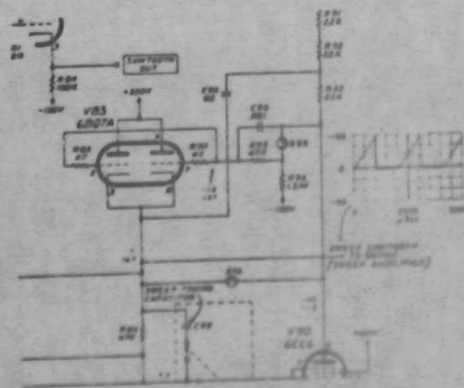
To eliminate the need for checked neon diodes in the Sweep Generator circuit, neon diode B96 was relocated from the junction of R93, C95 and the cathode of V85 to the junction of R95, R90 and the cathode of V85. With the change in circuitry for B96, it is not necessary that B95 be a checked neon. It was established that B287 of the Sweep Amplifier also required only a raw neon.

Parts Removed:

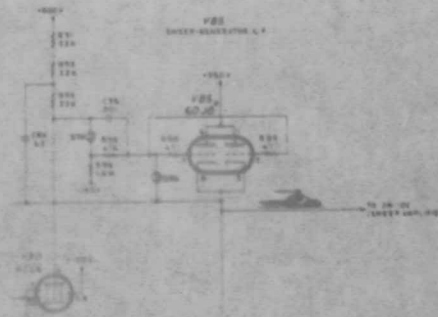
B95, B287 NE-2 55V ckd 150-009
B287 NE-2 65V ckd 150-011

Parts Added:

B95, B287, NE-2, raw 150-002
*B96



BEFORE



AFTER

**CALIBRATOR SWITCH REDESIGNED
FOR EASIER INSTALLATION**

INFORMATION ONLY

M1499

Effective Prod s/n 6187

DESCRIPTION:

The Square-wave Calibrator switch was replaced to use a separate shield for ease of installation and to simplify wiring.

Parts Replacement Kit 040-034 is available to facilitate the replacement of Square-wave Calibrator switch 260-013 in pre-effective serial number instruments.

Parts Removed:

SW670	Calibrator	260-013
Shield		337-064

Parts Added:

SW670	Calibrator	260-177
Shield		337-093

**EXT SWEEP AMP DC BAL
DIVIDER RESISTOR CHANGED
TO INCREASE CONTROL RANGE**

INFORMATION ONLY

M1606

Effective Prod s/n 6197

s/n 935 on 541 Rackmount (see Note with M1423)

DESCRIPTION:

The External Sweep DC Bal divider resistor R112 was changed from 47k to 33k to provide an increased adjustment range.

Parts Removed:

R112	47k 1W 10%	304-473
------	------------	---------

Parts Added:

R112	33k 1W 10%	304-333
------	------------	---------

**DELAY LINE MECHANICAL
CONSTRUCTION IMPROVED WITH
NYLON SUPPORT CLIP**

INFORMATION ONLY

M1580

Effective Prod s/n 6203

DESCRIPTION:

In the interest of better delay line construction in the 540 series instruments, and a considerable saving in assembly time, a new nylon clip to support the delay line coil forms has been placed in use.

The nylon clip, designated part no. 352-011, has eliminated the cementing of poly posts to each coil form, which in turn were fastened to the delay line chassis members with screws. Mechanical revision of the plexiglass delay line mounting plates was made by adding 3 slots to accommodate the clip.

Parts Removed:

Rod, poly	(12)	385-003
Screw, 4-40 x 1/4 BHS	(12)	211-008

Parts Added:

Holder, nylon	(6)	352-011
---------------	-----	---------

VERTICAL AMPLIFIER TRANSIENT RESPONSE IMPROVED BY BALANCING INPUT AMPLIFIERS

M1567

Effective Prod s/n 6209

Usable in field instruments s/n 101-6208

DESCRIPTION:

To accommodate the normal variation of transient response in the leading edge of a square wave, because of deviation in the gain of the input amplifier (V1025B and V1040B) and circuit variables, the fixed 2.5 μ H peaking coils, L1022 and L1041, are replaced by slug tuned 1.8-3.7 μ H coils mounted on the socket center of V1025 and V1040.

The coils (114-079) are wound on nylon forms (276-005) and consists of 22 turns of no.31 wire. The bottom of the coil form is tapped for a 4-40 thread and mounted with a 1/2 in. nylon screw.

The instructions combine M1143, M1204 and M1567. The instrument involved should be thoroughly inspected for application of parts removed and replaced.

NOTE: Do not install if 040-0368-00 is installed.

Parts Removed:

LR1022, 1041 LR17 108-087
(s/n 101-168)

L1022, 1041 3.02 μ F CF322 108-088
(s/n 169-181)

L1022, 1041, 2.5 μ H 108-103
(s/n.182-6208)

Parts Added:

L1022, 1041 Var 1.8-3.7 μ H 114-079
Screw, nylon 4-40x1/2 BH(2) 211-036

Parts Required for Field Installation:

See 'Parts Added' and those listed below.

R1022, R1041 100 Ω 1/2W 10% 302-101
L1021, L1042 CVA301 114-037

continued

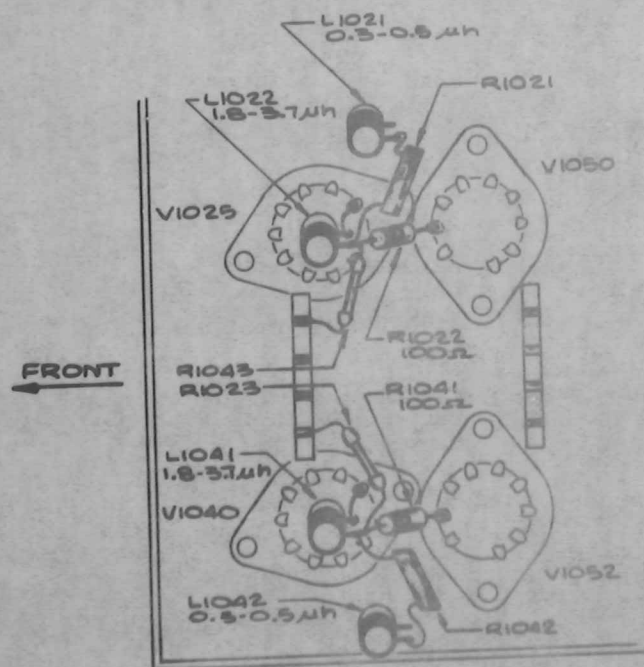
INSTALLATION:

- a) Remove
- b) Replace
- c) Install and V
- d) Relocate respec
- e) Connect
- f) Relocate L102:
- g) Install L102:

M1567
(con'd)

INSTALLATION INSTRUCTIONS:

- a) Remove L1022 and L1041 (108-103).
- b) Replace L1021 and L1042 (0.79 - 1.5 μ H) with two 0.3-0.5 μ H coils.
- c) Install L1022 and L1041, Var, 1.8 - 3.7 μ H coils, on the bottom of tube sockets V1040 and V1025. Use two nylon 4-40 x 1/2 BH screws.
- d) Relocate R1023 and R1043, 68k 1/10W resistors from pins 9 of V1040 and V1025 respectively to the top terminal of L1041 and L1022.
- e) Connect the bottom of L1022 and L1041 to pins 9 of V1025 and V1040 respectively.
- f) Relocate R1021 and R1042 from pins 2 of V1050 and V1052 to the top terminal of L1022 and L1041.
- g) Install R1022 and R1041 between pins 2 of V1050 and V1052 and the top terminal of L1022 and L1041.



**SWEEP CABLES REPLACED
WITH ONE MAIN CABLE**

INFORMATION ONLY

M1673

Effective Prod s/n 6283 (w/exception s/n 6196)
s/n 939 on 541 Rackmount (see Note with M1423)

DESCRIPTION:

To replace twenty-two separate insulated wires, and two separate cable harnesses with one main cable harness. This simplified production of the chassis and cured some problems existing in the older cables.

Parts Removed:

Cable, Main Sweep, no.1 179-071
Cable, Main Sweep, no.3 179-072

Parts Added:

Cable, Main Sweep 179-188

**+500V TERMINAL POINT PROVIDED
FOR USE WITH NEW RM VERT AMPS**

INFORMATION ONLY

M1677

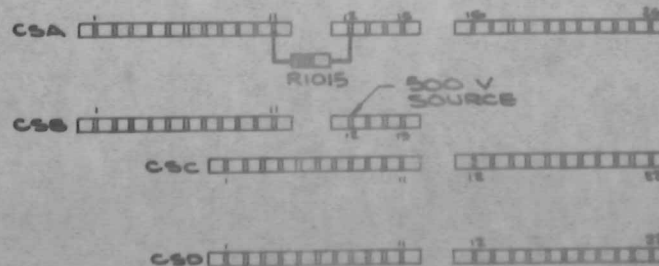
Effective Prod s/n 6283
s/n 939 on 541 Rackmounts (see Note with M1423)

DESCRIPTION:

The objective of this mod is to make 500 sweeps, in present production, usable with new vertical amplifiers which will be incorporated in the RM series instruments.

To provide access to a 500V supply which will be 'striking' voltage for the neon vertical indicators through dividers, a loop breakout was made in the main sweep cable and brought up to CSB-12. R1015, a 1k 1/2W 10% resistor, was repositioned to connect from CSA-11 to CSA-12. This change establishes CSB-12 as a 500V terminal point compatible with the needs of the new vertical amplifier circuitry. No additional changes in components or circuitry were made.

SWEEP CHASSIS



VERTICAL AMP OUTPUT AMPLIFIER CIRCUIT TOLERANCES TIGHTEN TO REDUCE REJECTION OF 6CB6'S

INFORMATION ONLY

M1627

Effective Prod s/n 6286
s/n 933 on 541 Rackmounts (see Note with M1423)
w/exception s/n 934

DESCRIPTION:

The high rejection rate of 6CB6's in the vertical amplifier of the 541 series instruments because of low bias, and a consequent loss of calibration time, has brought about an increase in the screen voltage of the output amplifiers and tightening of circuit tolerances. This was accomplished by decreasing the value of R1142 from 1.2k to 1.0k (308-106) and replacing R1020 with a 5% resistor (305-122) in place of the 10% used previously.

NOTE: An interim modification of instruments prior to s/n 6286 was made by shunting R1142 with a 5.6k 1/2W 10% composition resistor (302-562). Instruments using this interim modification are numbers 5945, 5956, 6111, 6145, 6147, 6160, 6162, 6166, 6167, 6168, 6171, 6173, 6176, 6178, 6179, 6180.

Parts Removed:

R1142	1.2k	5W	5%	WW	308-063
R1020	1.2k	2W	10%		306-122

Parts Added:

R1142	1.0k	5W	5%	WW	308-106
R1020	1.2k	2W	5%		305-122

DELAY LINE REPLACED TO IMPROVE VERTICAL AMPLIFIER BANDWIDTH

INFORMATION ONLY

M1632

Effective Prod s/n 6410
s/n 939 on 541 Rackmount (see Note M1423)

DESCRIPTION:

Bandwidth of the Vertical Amplifier was improved with a redesigned Delay Line.
See M1767.

Parts Removed:

C1260-1275 inclusive	3.3pF	500V	281-534
R1201-1208 inclusive	680Ω	1/2W 10%	302-681
L1234, 1235	3/16"	20 section	108-093
L1204, 1205	3/16"	30 section	108-094

Parts Added:

C1281	0.68pF	500V	281-537
C1260-1275 inclusive	1.5pF	500V	281-526
R1201-1208 inclusive	1k	1/2W 10%	302-102
L1234, 1235	3/16"	20 section	108-132
L1204, 1205	3/16"	30 section	108-133

**SILVER BEARING SOLDER SAMPLE
REMOVED FROM INSTRUMENT**

INFORMATION ONLY

M1684

Effective date Dec. 1957 (approx)

DESCRIPTION:

Since silver-bearing solder is now available on the market, remove the solder sample and mounting hardware from all instruments. Also change the silk-screened test to the following:

NOTE

It is desirable that only silver-bearing solder be used on the ceramic terminals and for tinning the iron. Ordinary tin-lead solder may be used, but repeated use will break the solder-to-ceramic bond. See your Instruction Manual.

Parts Removed:

Screw, 6-32	(2)	211-503
Nut, 6-32	(2)	210-407
Lockwasher, int #6	(2)	210-005
Washer, centering	(2)	210-809
Wire, solder, silver-bearing,		251-514
approx 15 in.		251-515

Parts Added:

5-4-67

541 MODIFICATION SUMMARY

Page 23 of 24

VERTICAL AMPLIFIER AND RECTIFIER IMPROVED BY EXTENSIVE REDESIGN

INFORMATION ONLY

M1692

Effective Prod SN 9292

DESCRIPTION:

Extensive changes were made in the Vertical, Delay Line and rectifier assemblies to simplify construction and increase adaptability to the new RM30-40 series. The previous Vertical Amplifier, Driver and Delay Line were replaced with completely new units offering mechanical and electrical improvements. See "BEFORE" and "AFTER" schematics. Also see M1764.

Parts Removed:

R1140, 1143	390 Ω 1/2 W 5%	301-391
R1025, 1040	27 Ω 1/2 W 10%	302-270
R1152, 1153	47 Ω 1/2 W 10%	302-470
R1052, 1054	"	"
R1047, 1046	100 Ω 1/2 W 10%	302-101
R1022, 1041	"	"
R1026, 1028	330 Ω 1/2 W 10%	302-331
R1050, 1045	47 k 1/2 W 10%	302-473
R1013, 1011	100 k 1/2 W 10%	302-104
R1156	150 k 1/2 W 10%	302-154
R1012, 1066	470 k 1/2 W 10%	302-474
R1083, 1092	"	"
R1102, 1112	"	"
R1122, 1132	"	"
R1060, 1081	"	"
R1090, 1100	"	"
R1110, 1120	"	"
R1130	"	"
R1010, 1014, 1 M	1/2 W 10%	302-105
R1056	"	"
R1067	2 k 1 W 5%	303-202
R1154, 1151	100 Ω 1 W 10%	304-101
R1150	"	"
R1051	2.2 k 1 W 10%	304-222
R1035	10 k 1 W 10%	304-103
R1020	1.2 k 2 W 5%	305-122
R1057	2.7 k 2 W 10%	306-272
R1055	15 k 2 W 10%	306-153
R1043, 1023	68 k 1/10 W 10%	307-006
R1042, 1021	Mica Plate 650 Ω	310-513
R1064	167 Ω 5 W 5% WW	308-045

Parts Added:

R1206, 1216	360 Ω 1/2 W 5%	301-361
R1011, 1021	27 Ω 1/2 W 10%	302-270
R1039, 1049	39 Ω 1/2 W 10%	302-390
R1007, 1008	47 Ω 1/2 W 10%	302-470
R1221, 1226	100 Ω 1/2 W 10%	302-101
R1018, 1026	330 Ω 1/2 W 10%	302-331
R1090, 1095	8.2 k 1/4 W 10%	307-017
R1093, 1098	15 k 1/2 W 10%	302-153
R1092, 1097	47 k 1/2 W 10%	302-473
R1015	150 k 1/2 W 10%	302-154
R1083, 1087	330 k 1/2 W 10%	302-334
R1081	"	"
R1080	150 k 1/2 W 10%	302-154
R1062, 1112	470 k 1/2 W 10%	302-474
R1132, 1152	"	"
R1172, 1192	"	"
R1029, 1019	"	"
R1052, 1102	"	"
R1122, 1142	"	"
R1202, 1212	"	"
R1162, 1182	"	"
R1228	1 M 1/2 W 10%	302-105
R1084	680 k 1/2 W 10%	302-684
R1085, 1089	1 M 1/4 W 10%	307-016
R1064	2 k 1 W 5%	303-202
R1003, 1005	100 Ω 1 W 10%	304-101
R1009	"	"
R1031	4.7 k 1 W 10%	304-472
R1013	910 Ω 2 W 5%	305-911
R1223	2.7 k 2 W 10%	306-272
R1227	15 k 2 W 10%	306-153

continued

Parts Removed:

R1030 Axl
R1142
R1015
R781
R782
R1080, 108
R1082, 110
R1121, 106
R1091, 111
R1131
* R785, 786
R1031
R1141
R1053
R1027
R1059

*In 541, R78
WW 308-C

C1150 EM
C1151, 115
C1050A, B
C1152
C1045A, B
C1060, 108
C1083, 109
C1102, 111
C1132, 112
C1057
C1010, 103
C1020, 115
C1064
C1062, 15
C1082
C1091, 110
C1111, 112
C1052, 105

continued

M1692
(cont)

Parts Removed:

R1030 Axial	4k 5W 5% WW	308-051
R1142	1.0k 5W 5% WW	308-106
R1015	1k 1/2W 10%	302-102
R781	1.5M 1/2W 10%	302-135
R782	390k 1/2W 10%	302-394
R1080, 1084	8.2k 1/2W 10%	302-822
R1082, 1101	4.5k 5W 5%	308-066
R1121, 1062	"	"
R1091, 1111	"	"
R1131	"	"
*R785, 786	2k 20W WW	308-031
R1031	15k 10W 5% WW	308-024
R1141	12k 8W 5%	308-069
R1053	30k 10W WW	308-027
R1027	200Ω 2W pot	311-004
R1059	250k DC Shift pot	311-061

*In 541, R785 and 786 are 2.25k 20W WW 308-064.

C1150 EMC, 2x20 μF 450 V	290-036
C1151, 1153A, B 2x20 μF 450 V	290-037
C1050A, B EMC 2x75 μF 150 V	290-053
C1152 0.1 μF 400 V	285-526
C1045A, B EMC 2x75 μF 150 V	290-053
C1060, 1081 0.001 μF 500 V	283-000
C1083, 1092	"
C1102, 1112	"
C1132, 1122	"
C1057	"
C1010, 1035 5k 500 V	283-001
C1020, 1155	"
C1064	"
C1062, 150 pF GP2A 500 V 20%	281-524
C1082	"
C1091, 1101	"
C1111, 1120	"
C1052, 1054 cer 100 pF 500V	281-536

Parts Added:

R1036, 1046	27k 2W 10%	306-273
R1099, 1094	68k 1/10 W 10%	307-006
R1014, 1024	Mica Plate 500Ω 1/2W 2%	310-515
R1054	167Ω 5W 5% WW	308-104
R1218	1k 5W 5% WW	308-106
R1033	1.5k 5W 5% WW	308-061
R1016	4k 5W WW	308-051
R1071, 1073	Mica Plate 600Ω	310-541
R1077	47Ω 1/4 W 10%	307-018
R1075	220Ω 1/4 W 10%	307-020
R1078	150Ω 1/4 W 10%	307-019
R1027	200Ω 2W pot	311-004
R1091	250k 2W pot	311-001
R1185, 1205	4.5k 5W WW	308-066
R1055, 1105	"	"
R1125, 1145	"	"
R1165	"	"
R1017, 1208	12k 8W WW	308-069
R1224	30k 10W WW	308-027
R781	1M 1/2W 10%	302-105
R782	560k 1/2W 10%	302-564
*R785, 786	1.5k 25W WW	308-040

* In 541, 2k 20W WW 308-031

C1202, 1212	Discap, 0.001 μF	283-000
C1132, 1142	"	"
C1152, 1162	"	"
C1172, 1182	"	"
C1192, 1029	"	"
C1223, 1052	"	"
C1062, 1102	"	"
C1112, 1122	"	"
C1054, 1030	Discap 0.005 μF	283-001
C1015, 1220	"	"
C1013, 1031	"	"
C1033, 1085	"	"
C1089, 1208	"	"

continued

M1692
(cont)

Parts Removed:

C1055	0.022 μ F 600 V 20%	285-517
C1078	cer, 2.2 pF NPOA 500 V	281-500
C1074	cer, 4.7 pF 500 V N330	281-501
C1072	cer, 12 pF GP1A 500 V	281-506
C1070	cer, 100 pF GP1A 500 V	281-523
C1084	Tubular .7-3 ErIE	281-027
C1093	"	"
C1113	"	"
C1123	"	"
C1133	"	"
C1103	"	"
C1076	Tubular 1-8 pF	281-003
C1075	"	"
C1073	"	"
C1077	"	"
L1021, 1042	var CV301	114-037
L1082, 1081	Grid 7 section	108-080
L1067	CF123	108-005
LR1041, 1022	CV182	114-079
L1080	Coil, plate 7 section	108-096
L1083	"	"
L1070	Term network 5 sec	108-081
L1071	"	"
B292	Checked 1/25 W	150-014
B293	"	"
B1010, 1014	Neon, raw	150-002
V1025	Checked 6AW8	157-039
V1040	"	"
V1050	Tube, 6BQ7A	154-028
V1052	Tube, 6BQ7A	"
V1060	Tube, 6CB6	157-037
V1066	"	"
V1080	"	"
V1082	"	"
V1090	"	"
V1022	"	"
V1100	"	"
V1102	"	"
V1110	"	"
V1112	"	"
V1120	"	"
V1122	"	"
V1130	"	"
V1132	"	"

continued

Parts Added:

C1146, 1166	cer 150 pF GP2A	281-524
C1186, 1105	"	"
C1205, 1036	"	"
C1106, 1126	"	"
C1039, 1049	cer 1000 pF GP2A	281-536
C1228	PTM .022 MFD 600V	285-517
C1075	Trimmer 8-50 pF	281-022
C1077	Trimmer 8-50 pF	281-022
C1184	Trimmer .7-3 pF	281-027
C1204	"	"
C1078	"	"
C1104	"	"
C1124	"	"
C1144	"	"
C1164	"	"
C1003	2x20 MFD 450 V	290-036
C1005A-C	40x20x10 MFD 475V	290-063
C1093A-D	4x75x150 V	290-071
L1014, 1024	var CVC 172	114-088
L1036, 1046	var CV 501	114-087
L1103, 1113	Grid	108-136
L1071, 1073	var CV 901	114-038
L1104, 1114	Plate line	108-135
V1054	Vacuum 6DK6	154-149
V1064	"	"
V1104	"	"
V1114	"	"
V1124	"	"
V1134	"	"
V1144	"	"
V1154	"	"
V1164	"	"
V1174	"	"
V1184	"	"
V1194	"	"
V1204	"	"
V1214	"	"
V1033	Vacuum 6BQ7A	154-028
V1043	"	"
V1223	"	"
V1084	Vacuum 12AU7	154-041
V1014 ckd	Vacuum 12BY7	157-053
V1024	"	"
B292, 293	Neon, raw	150-002
B1083, 1087	"	"

M1692
(cont)

Parts Removed:

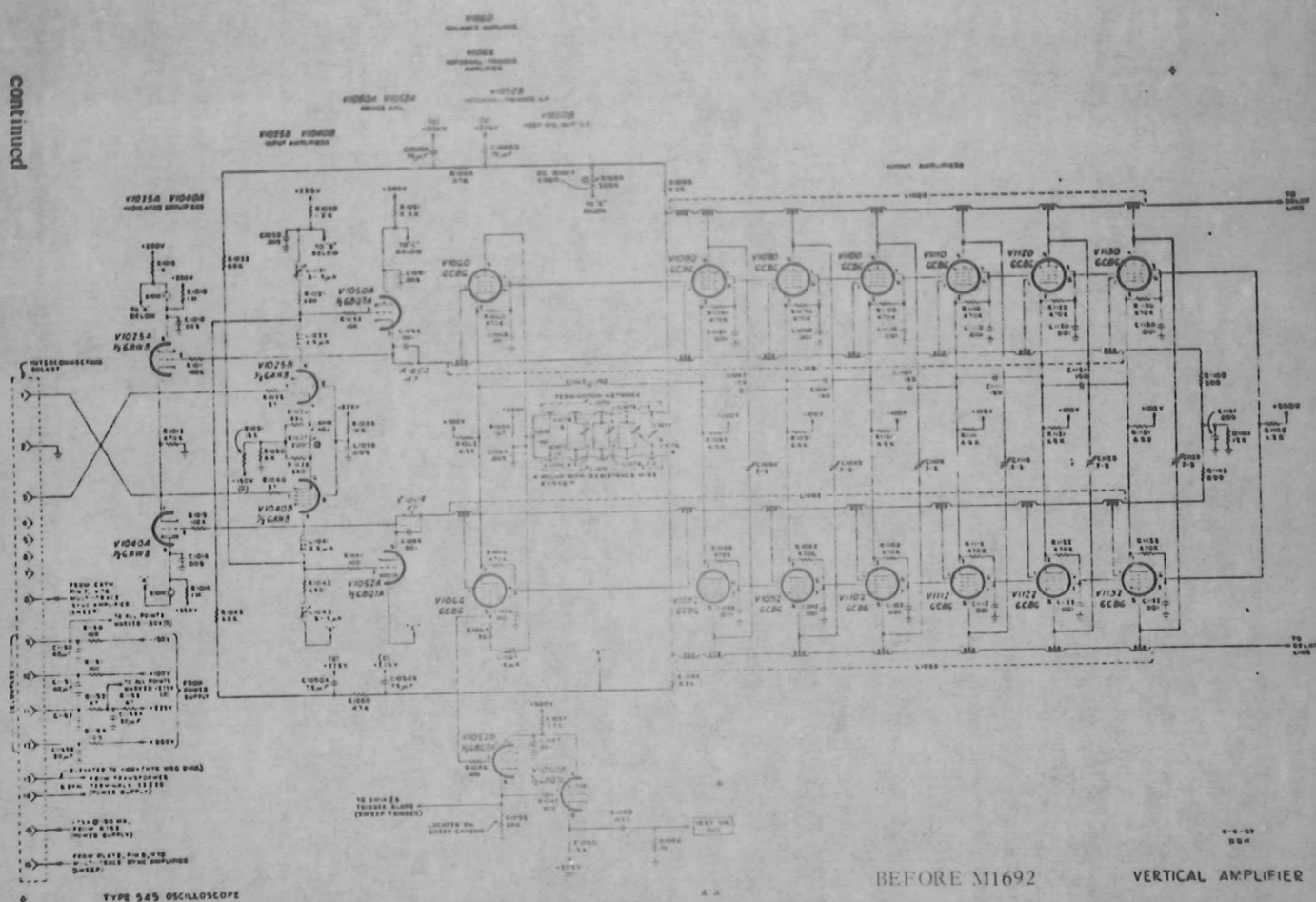
Tug	334-599
Connector, Amphenol	131-018
Cable, harness VA#1	179-080
Cable, harness VA#2	179-082
Plate, plate load mtg	386-409
Chassis, VA	441-106
Socket, STM 7 (14)	136-008
Socket, STM 9 (4)	136-015

Parts Added:

Connector, Amphenol	131-018
Cable, rectifier 530, 540	179-186
Termination Plate, Plexiglas	392-106
Chassis VA (RM45)	441-180
Socket, STM 7 (14)	136-008
Socket, STM 9 (6)	136-015

continued

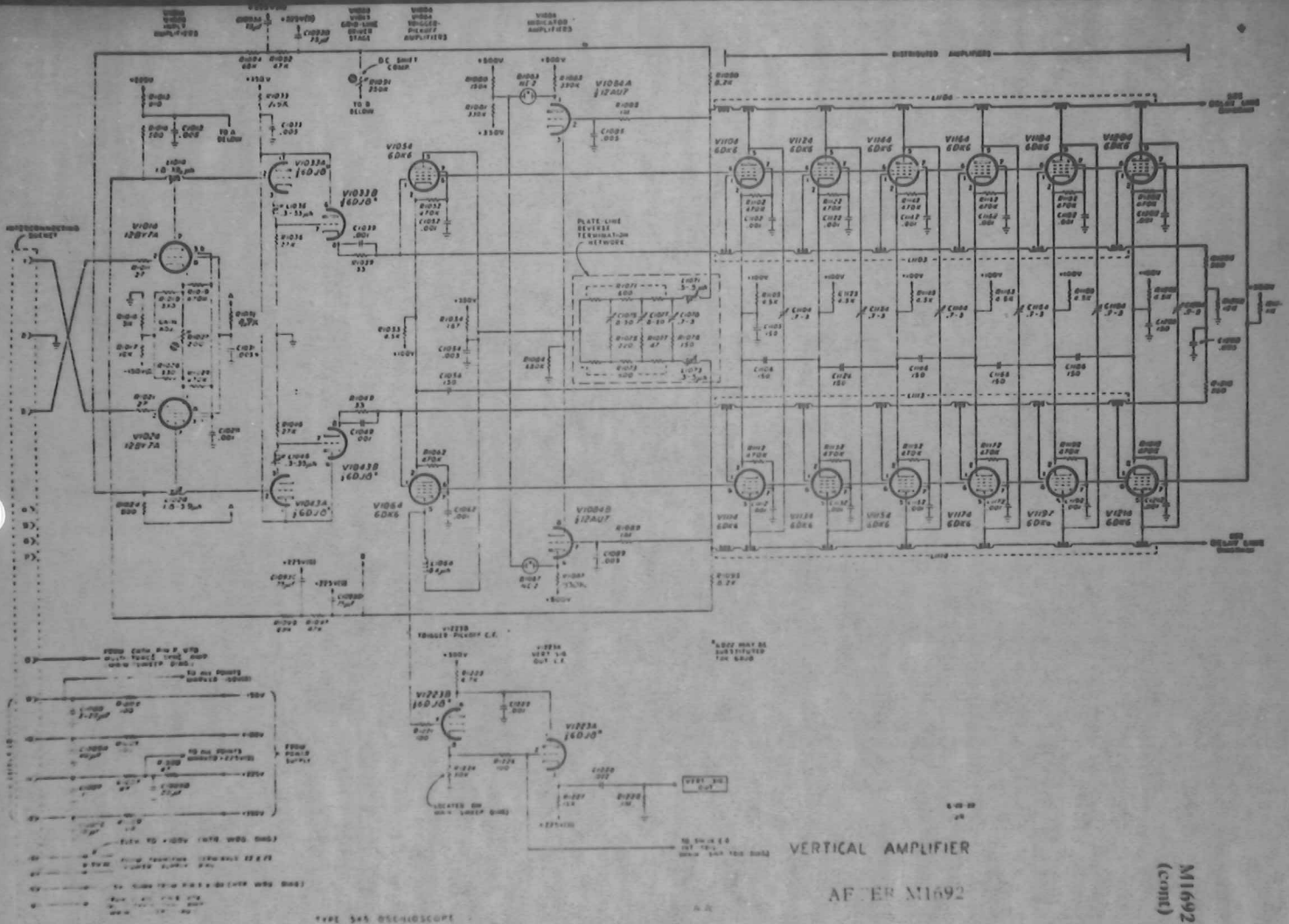
continued



BEFORE M1692

VERTICAL AMPLIFIER

M11692



M1692
(cont)

FAN MOTOR REWIRED TO BYPASS THERMAL CUTOUT

INFORMATION ONLY

M1708

Effective Prod s/n 6475

DESCRIPTION:

To enable the ventilating fan to continue operating after the thermal cutout has opened, the AC fan motor was connected ahead of the thermal cutout for 117 V operation. For the AC fan motor must continue to be connected across one of the power transformer primary windings behind the thermal cutout.

Instruments prior to s/n 6475 can be modified with a minor cable change and installation of a 3-notch ceramic strip in place of the 2-notch strip used previously, as shown in the drawing.

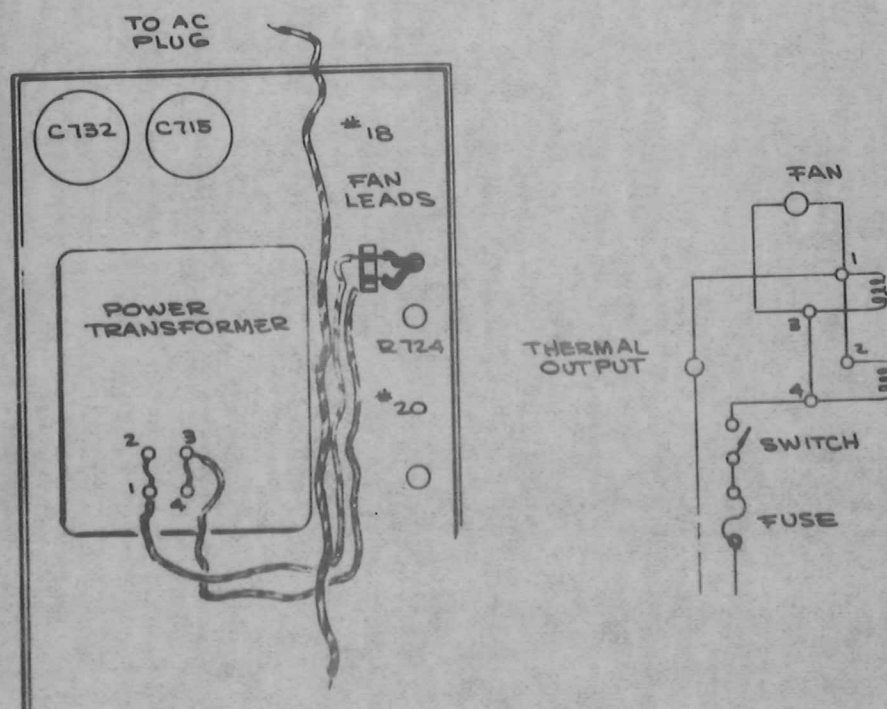
Conversion of instruments after s/n 6475 from 117 V to 234 V operation, or from 234 V to 117 V operation, must be accompanied with a change of fan lead hookup to the ceramic strip.

Parts Removed:

Strip, cer, 2-notch large 124-020

Parts Added:

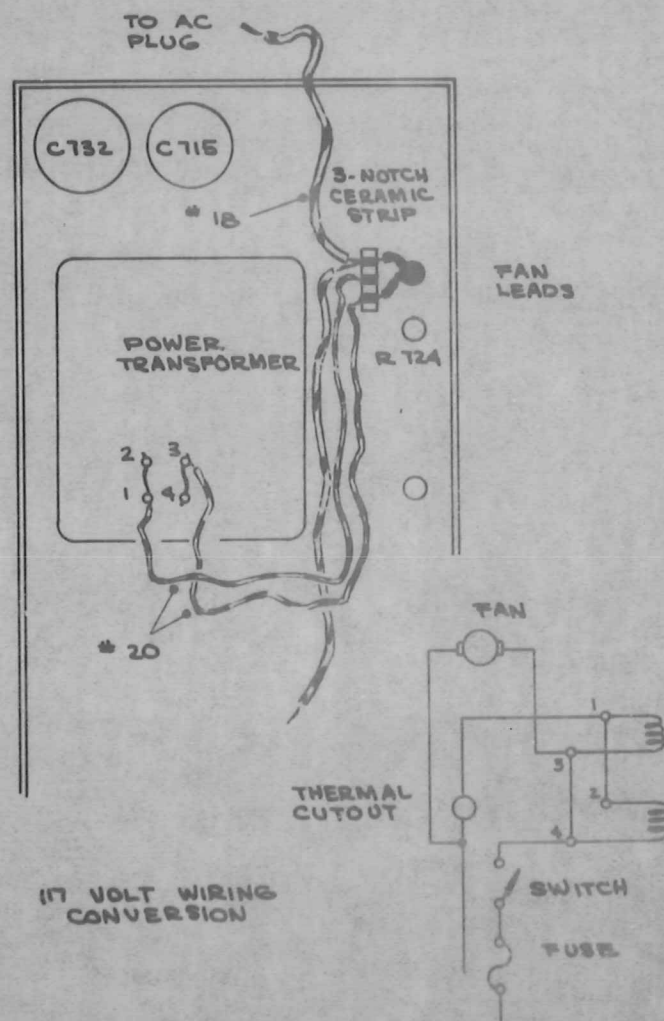
Strip, cer, 3-notch large 124-065



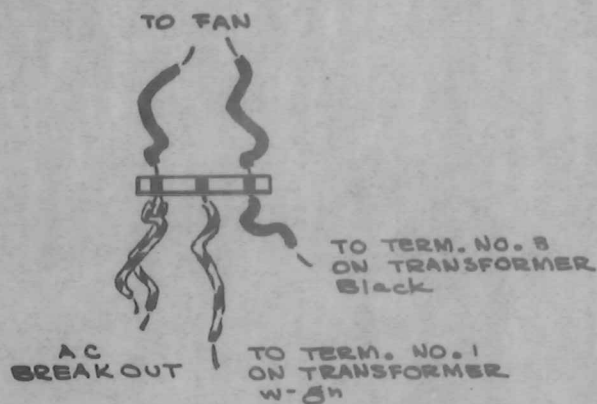
BEFORE M1708

continued

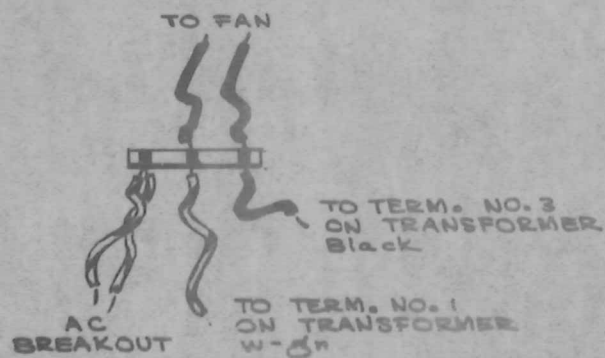
M1708
(con'd)



continued

M1708
(con'd)

FOR 117 VOLT OPERATION



FOR 234 VOLT OPERATION

**POWER TRANSFORMER ELECTROSTATIC
SHIELD ADDED TO ISOLATE LINE**

INFORMATION ONLY

M1737

Effective Prod s/n 6499

DESCRIPTION:

To prevent the radiation of scope-generated signals into the power line and to isolate the transformer secondary windings from the influence of extraneous line-induced signals, an electrostatic shield identified as terminal 29 was added between the primary and secondary windings of the power transformer.

Grounding of the shield was accomplished by tying terminal 29 to terminal 19 on the transformer with a 4-1/2in. length of #22 insulated wire.

**VERTICAL AMPLIFIER WAVEFORM
DISTORTION ELIMINATED BY ADDED
DECOUPLING CAPACITOR**

M1751

Effective Prod s/n 6502

Usable in field instruments s/n 6475-6501

DESCRIPTION:

Distortion of the Vertical Amplifier waveform is eliminated by adding a filament by-pass capacitor to V20. The distortion was caused by "feed-thru" of the Sweep trigger pulse at fast sweep speeds.

Parts Removed:

Parts Added:

C22 0.01 μ F 500 V Discap 283-002

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

() Install C22 (0.01 μ F Discap) between pin 4 of V20 and its ground lug.

**HORIZONTAL
SHUNTING RESISTOR
ASSURE CORRECT**

Effective P

DESCRIPTION:

Actuation of
placement of
their shunt

Parts Removed:

R294, R295

Parts Required:

See 'Parts Added'

INSTALLATION INSTRUCTIONS:

Replace R294
below the

**DELAY LINE
MINIMIZE DISTORTION**

Effective

DESCRIPTION:

To minimize
added (on
member)

Although
the short
to M1692

**HORIZONTAL POSITION INDICATOR
SHUNTING RESISTORS CHANGED TO
ASSURE CORRECT INDICATION**

M1721

Effective Prod s/n 6514

Usable in field instruments s/n 101-6513

s/n 941 on 541 Rackmount (see Note with M1327)

DESCRIPTION:

Actuation of the beam position indicator neons B292 and B293, coincident with the spot displacement on either side of the graticule's center, was assured by changing the value of their shunting resistors from 470k to 820k resistors.

Parts Removed:

R294, R295 470k 1/2W 10% 302-474

Parts Added:

R294, R295 820k 1/2W 10% 302-824

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace R294 and R295, the two rear 470k 1/2W resistors on the ceramic strip directly below the Swp Mag Regis potentiometer on the Sweep chassis, with 820k 1/2W 10% resistors.

**DELAY LINE CAPACITOR ADDED TO
MINIMIZE HF "UNDERSHOOT"**

INFORMATION ONLY

M1767

Effective Prod s/n 6538

DESCRIPTION:

To minimize "Undershoot" at higher frequencies, two 0.68pF ceramic capacitors were added (one on each side of the symmetrical, vertically mounted, 30-section delay line member) between the 0.7-3pF tubular trimmer, C1305 and C1307.

Although the above problem was caused by the new delay line configuration (refer to M1632), the shortcoming became more apparent when combined with the new 540 series VA. (Refer to M1692.)

SINGLE SWEEP LOCKOUT SPIKE ELIMINATED BY CIRCUIT CHANGES

INFORMATION ONLY

M1776

Effective date 1-8-58

DESCRIPTION:

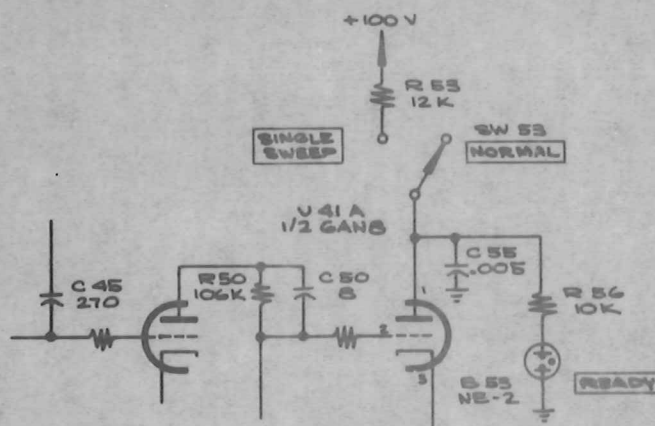
Decoupling was added to the Ready light and the multi circuit was changed to eliminated a spike, being generated by the Ready light, from preventing the circuit being locked out. Fourteen 531 instruments, along with about fifty early Sweep Lockout Field Modification Kits (040-118) could be effected by this problem.

Parts Removed:

R50	120k 1/2w 1%	309-091
C45	0.001 pf discap	283-000

Parts Added:

R50	106k 1/2w 1%	309-161
C45	270 pf 500v	281-545
R56	10k 1/2w 10%	302-103
C55	0.005 pf 500v	283-001



9-21-66

541 MODIFICATION SUMMARY

Page 47

SWEEP TRIG AND CAL CIRCUITS CHANGED TO IMPROVE RELIABILITY

INFORMATION ONLY

M1997

Effective Prod s/n 7484

**POWER TRANSFORMER HEATER
WINDING CHANGED TO
DOUBLE CURRENT RATING**

INFORMATION ONLY

M1747

Effective Prod s/n 6543

DESCRIPTION:

Changing the heater winding at terminals 28 and 29 from a single #17 wire to two #17 wires, increased its current rating from 3.8 to 7.4 amperes. This allowed both the standard and export transformers to be used with the newly designed 541/545 instruments that added more tubes to their circuit. No part number change was made as both the standard and export are directly replaceable.

**VERTICAL AMPLIFIER DC SHIFT
OPERATION IMPROVED BY REMOVAL
OF DELAY LINE RESISTORS**

M1763

Effective Prod s/n 6552

Usable in field instruments s/n 6475-6551

w/exceptions 6480-1, 6496, 6499, 6505, 6509, 6515, 6518,
6521, 6523, 6526-8, 6532-4, 6536-8, 6540-1, 6543-6550.

DESCRIPTION:

To improve the operation of the DC shift compensation network in the new vertical amplifier (M1692 s/n 6475), R1093 and R1098, 15k 1/2W 10% composition resistors, were removed.

A length of #20 tinned copper wire connected from the junction of R1092 and R1094 to C1093A, in the L1104 half of the distributed amplifier, replaces R1093; R1098 is similarly replaced by a #20 tinned copper wire connected from the junction of R1097 and R1099 to C1093C, in the L1114 half of the symmetrical network.

Parts Removed:

R1093	15k 1/2W 10%	302-153
R1098	15k 1/2W 10%	302-153

Parts Added:

Wire, #20 Tinned Copper 2in. 176-004

INSTALLATION INSTRUCTIONS:

- Replace R1093, located between the junction of R1092 and R1094 and C1093A L1104, with a piece of #20 bare wire.
- Replace R1098, located between the junction of R1097 - R1099 and C1093C on L1114, with a #20 bare wire.

TIME-BASE GENERATOR MYLAR TIMING CAPACITOR PART NUMBERS SHUFFLED

INFORMATION ONLY

M1866

Effective date 3-31-58

DESCRIPTION:

To clarify part number information and simplify handling of replacement orders, the part numbers of the Tek-made timing capacitors (series CT14A2) are changed as follows:

- 1) Discontinue the 0.001 μ f \pm 0% capacitor, which is impractical to manufacture.
- 2) Change the matching combination of 1x.1x.01 μ f and .001 μ f capacitor (291-007) to a Customer Service item.
- 3) Change the part numbers of the individual 1x.1x.01 μ f and .001 μ f capacitors as indicated (match the capacitors of like tolerance).

Parts Removed:

C490A-D	1x.1x.01x.001 μ f	291-007
C490A-C	1x.1x.01 μ f +1/4%	291-013
C490A-C	1x.1x.01 μ f -1/4%	291-015
C490D	.001 μ f +1/4% (wh)	291-014
C490D	.001 μ f -1/4% (bk)	291-016
C490D	.001 μ f \pm 0%	291-008

Parts Added:

C490A-C	1x.1x.01 μ f +1/4%	291-0007-01
C490A-C	1x.1x.01 μ f -1/4%	291-0007-02
C490D	.001 μ f +1/4% (wh)	291-0008-01
C490D	.001 μ f -1/4% (bk)	291-0008-02

DELAY LINE TERMINATING RESISTORS REPLACED WITH TEK MATCHED PAIR TO IMPROVE TUNING

INFORMATION ONLY

M1761

Effective Prod s/n 6565

DESCRIPTION:

Difficulty in tuning the distributed amplifier termination network necessitated a closer matching of R1071 and R1073. Satisfactory results were obtained by holding the resistance values to within 1/2% of each other. The matched pair was assigned part number 312-587 and are furnished as a replacement for the individual resistor.

Parts Removed:

R1071	Mica plate	600 Ω 5W 1%	310-541
R1073	Multi-tap		

Parts Added:

R1071	Mica plate	600 Ω 5W 1%	312-587
R1073	Multi-top		
(paired within 1/2% of each other)			

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**RIGHT CABINET SIDE CHANGED
TO PROVIDE A STORAGE BOX**

INFORMATION ONLY

M1840-2

Effective Prod s/n 6574

w/exceptions 6477, 6479, 6490, 6493, 6510, 6511
6529, 6542, 6545, 6567, 6568, 6572

DESCRIPTION:

Provides a storage box in the right hand cabinet side to accept a 4 x 5 in. operation manual.

Parts Removed:

Cabinet side, right
(crossbreak)

386-565

Parts Added:

Cabinet side, right
(crossbreak w/box)

386-719

**SWEEP SYNC AMP GRID
DIVIDER RESISTOR REPLACED TO
IMPROVE CAPABILITY WITH 53/54C**

M1820

Effective Prod s/n 6592

w/exceptions 6589 and 6590

Usable in field instruments s/n 101-6591

DESCRIPTION:

Mod #1730 (53/54C unit) installed a 12pf 500v ceramic capacitor across each diode section of the 6AL5 "Trigger Coupling Diode," V3803, to prepare the unit for use in scopes which will incorporate trace blanking circuitry for the purpose of extinguishing the trace during the switching transients. This had the undesirable effect of reducing the trigger sensitivity of the "C" unit's Multi-vibrator in the "Alternate" position to the point where its operation was dependent on the operating characteristics of V70, the 12BY7 Negative Multi-vibrator.

This situation was corrected by changing the value of R78 from 47k to 36k, thereby lowering the bias on V78, the Multi-Trace Unit's Sync. Amplifier and increasing the amplitude of the trigger pulse.

Parts Removed:

R78 47k 1/2w 10% 302-473

Parts Added:

R78 36k 1/2w 5% 301-363

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace R78 on the ceramic strips above V70 and V85 on the Sweep chassis, with a 36k 1/2w 5% resistor.

**CRT HV CIRCUIT TRANSFORMER
CHANGED TO IMPROVE CRT
CUTOFF RANGE**

Effective Prod SN 7516

INFORMATION ONLY

M2054

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**FAN MOTOR REPLACED DUE TO
UNAVAILABILITY OF OLD MOTOR**

M1744

Effective Prod s/n 6621

Usable in field instruments s/n 101-6620

DESCRIPTION:

The Westinghouse AC/DC fan motor is no longer available and is replaced with a Heinze (Type KF141) AC/DC fan motor of similar design. The new Heinze motor is physically larger and requires new mounting brackets to allow its adaptation in the instrument.

Parts Removed:

Motor, fan AC/DC	147-011
Bracket, fan support	406-242
Bracket, fan support	406-243

Parts Added:

Motor, fan, KF141 AC/DC	147-016
Bracket, fan mounting	406-327
Bracket, fan support	406-328

Parts Required for Field Installation:

Parts Replacement Kit	050-0022-00	(SN 101-5000)
Parts Replacement Kit	050-0023-00	(SN 5001-6620)

INSTALLATION INSTRUCTIONS:

Use kit instructions.

**SWEEP TIMING CAPACITOR RELOCATED
TO SWITCH FOR EASE OF HANDLING**

INFORMATION ONLY

M1648

Effective Prod s/n 6638

DESCRIPTION:

To minimize handling of the Tektronix manufactured capacitor (281-007) during assembly and to make the Sweep Timing switch a more complete unit, the timing capacitor was removed from the Sweep chassis and installed on the switch support plate, located between the Sweep Time/CM switch and Time/CM Multiplier switch. Two 5/32 in. holes spaced 1-13/16 in. apart were added to the support plate to allow the move. Four #22 solid leads, connected between the Sweep Time/CM switch and timing capacitor were lengthened and run through #4 plastic tubing to improve lead dress.

Parts Removed:

Wire, #22 sol, w-y (3-1/2")	
Wire, #22 sol, w-gn (3-1/4")	175-522
Wire, #22 sol, w-bl (3-1/4")	
Wire, #22 sol, w-v (3-1/4")	

Parts Added:

Wire, #22 sol, w-y (5")	
Wire, #22 sol, w-gn (5")	175-522
Wire, #22 sol, w-bl (313/4")	
Wire, #22 sol, w-v (5")	
Tubing, plastic, #4 cl (1-1/2")	162-018

**SWEEP AMPLIFIER INPUT CF
CAPACITOR REPLACED TO
INCREASE ADJUSTMENT RANGE**

INFORMATION ONLY

M2144

Effective Prod SN 7637

CRT ANODE

Effective
w/ea

DESCRIPTION:

An improve
with com
using 5 in
anode cap
plug fits

To accom
brush on
3/16 in.
provides

To allow
phosphor
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pressure
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Parts Re

Cover, c
Clip, an
Bracket

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REPLACE
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CRT ANODE CONNECTOR IMPROVED

INFORMATION ONLY

M1659

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Effective Prod s/n 6641
w/exceptions 6644

DESCRIPTION:

An improved, automatic method of connecting the anode lead to the anode button of the CRT, with complete light shielding of the CRT anode opening, has been installed in all instruments using 5 inch Tektronix CRT's. The unit consists of an anode connector plate inserted into the anode opening of the CRT shield, an anode cover, cap, brush connector, and CRT contact plug fitted into the CRT anode contact.

To accommodate the new anode connector and provide improved centering of the connector brush on the anode of the CRT, shields have been modified to deepen the anode opening 3/16 in. However, the new anode connector can be installed in unmodified shields and provides satisfactory contact, with a minor alteration of the anode connector plate.

To allow for easier installation of the new anode connector, in oscilloscopes using three phosphor bronze springs to hold and position the CRT, the spring adjacent to the anode opening has been removed. It has been found that the automatic connector provides sufficient pressure to obviate the need for the third spring. For easier rotation of the CRT, and to eliminate interference with installation of the new anode connector, the felt strip at the bottom of the CRT shield has been repositioned to leave 1/2 in. clearance from the bottom edge of the shield anode opening.

Parts Removed:

Cover, anode	200-023
Clip, anode	131-026
Bracket	406-239

Parts Added:

Cover, anode	200-111
Plate, anode	386-647
Cap, anode	200-110
Connector, brush, CRT	131-073
Plug, contact, CRT	134-031

**VERTICAL AMPLIFIER TERMINATION,
GRID AND PLATE COILS CHANGED TO
IMPROVE SYMMETRY AND REDUCE
TUNING TIME**

M1765

Effective Prod s/n 6664

Usable in field instruments s/n 6475-6663

Note: 1) Instruments s/n 6642 and 6643 were shipped unmodified.
2) In the following instruments the Distributed Amplifier grid lines, L1103 and L1113, underwent change as described in revision (2b) of this modification:
S/N's 6475-9, 6482-4, 6486-8, 6490-4, 6500-4, 6507, 6510, 6511, 6514, 6516, 6517, 6520, 6525, 6530, 6570, 6589, 6592, 6593-7 6599, and above.

DESCRIPTION:

The following changes in the configuration of the Termination Network and the 6-section Distributed Amplifier output stage were effected for the reasons indicated:

1. Termination Network

To extend the low-end tuning range of variable inductors L1071 and L1073, .3-.5 μ H inductors replace the .9-1.6 μ H inductors previously used.

2. Distributed Amplifier

a) To improve the Distributed Amplifier waveform and reduce the time required to tune the delay line, an additional section - consisting of 8 turns (0.45 μ H) - was added to the 6-section plate line inductors, L1104 and L1114. The new section added to L1104 is electrically oriented between the first tapped coil section - plate of V1104 - and the junction of R1085 (1M), T1090 (8.2k), and L1071 (.3-.5 μ H). The addition to L1114 is oriented between the first tapped coil section - plate of V1114, and the junction of R1089 (1M), R1095 (8.2k), and L1073 (.3-.5 μ H), thereby maintaining the symmetrical aspect of the amplifier configuration.

The part number of the plate line coil used in both halves of the amplifier was changed from 108-135 to 108-139.

b) To improve the high frequency tuning in the region of the plate line termination, the first section of each of the Distributed Amplifier grid lines, L1103 and L1113, was deleted. The control grids of V1054 and V1064 (6DK6's), formerly tied to the center tap of the deleted coil sections, were tied directly to the junction of L1103 and L1113 with their respective 39 Ω /.001 μ F parallel-wired combos, R1039-C1039 and R1049-C1049. (This section incorporated in 050-0151-00).

Parts Removed:

L1071 .9-1.6 μ H Var	114-038
L1073 .9-1.6 μ H Var	114-038
L1103 7-section Grid Line	108-136
L1104 6-section Plate Line	108-135
L1113 7-section Grid Line	108-136
L1114 6-section Plate Line	108-135

Parts Added:

L1071 .3-.5 μ H Var	114-092
L1073 .3-.5 μ H Var	114-092
L1103 6-section Grid Line	108-145
L1104 7-section Plate Line	108-139
L1113 6-section Grid Line	108-145
L1114 7-section Plate Line	108-139

**VERTICAL INDICATING NEON
RESISTORS CHANGED TO OVERCOME
SLOW ACTION**

INFORMATION ONLY

M1827

Effective Prod s/n 6714

DESCRIPTION:

Insufficient voltage across beam-position indicators, B1083 and B1087, caused their operation to be sluggish. This shortcoming was rectified by increasing the value of R1083 and R1087 from 330k to 390k, thereby increasing the voltage across the neons and insuring more prompt action when positioning the beam.

Parts Removed:

R1083 330k 1/2W 10%
R1087 330k 1/2W 10%

302-334
302-334

Parts Added:

R1083 390k 1/2W 10% 302-394
R1087 390k 1/2W 10% 302-394

**CENTRALAB CAPACITOR
VOLTAGE RATING REDUCED**

INFORMATION ONLY

M1847

Effective date 6-1-58

DESCRIPTION:

Centralab Manufacturing Co. has reduced the voltage rating of their 'Hi-Kap' 0.01 μ f and 0.02 μ f ceramic capacitors from 250 to 150 volts.

Investigation has shown that the 150v rating is adequate in all present instrument usage. Future instrument instruction Manuals and Tek parts book releases will assign the 150v rating to the capacitors under discussion. No part number changes will be effected.

Parts Removed:

C700 0.02 μ f 250v 283-004

Parts Added:

C700 0.02 μ f 150v 283-004

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**EXTERNAL SWEEP INPUT
OSCILLATIONS ARE ELIMINATED
BY ADDING SUPPRESSOR RESISTOR**

M1850

Effective Prod s/n 6729

Usable in field instruments s/n 101-6728

DESCRIPTION:

Parasitic oscillations occurring in the grid circuit of the Ext Sweep Amp Cathode Follower were eliminated by adding R100 between the EXTERNAL SWEEP IN binding post and the HORIZONTAL DISPLAY switch.

Parts Removed:

Parts Added:

R100 47Ω 1/2w 10% 302-470

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace the bare wire between the EXTERNAL SWEEP IN binding post and the HORIZONTAL DISPLAY switch with R100, a 47Ω 1/2w 10% resistor.

**CRT SOCKET HAS +350 V ADDED FOR
POSSIBLE CRT TUBE SUBSTITUTION**

INFORMATION ONLY

M1894

Effective Prod s/n 6929

DESCRIPTION:

To adapt the instrument for possible future substitution of the Type T65P (T65P2, 154-175) CRT for T54P/5BHP, +350 V was connected to terminal 8 of the CRT socket.

The supply was run from the 'Geom Adj' pot to CSD-2, then from CSD-2 through an existing hole in the F and I chassis to terminal 8 of the CRT socket. A 10 in. and 6-1/2 in. length of #22 stranded white-orange-green-brown wire, respectively, was used.

The new tube could still not be directly interchanged however as the vertical shield connection is to pin 11 on the T65P and to pin 12 on the T54P/5BHP.

**CABINET BO
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Parts Rem

Frame, a
Screw, 6
Nut, Kep
Washer, 9

CABINET SI

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Parts Re

Cabinet
Cabinet

**CABINET BOTTOM PLATE
SUPPORT ADDED TO PREVENT
ACCIDENTAL BOWING**

INFORMATION ONLY

M1857

Effective Prod s/n 6935 (S/n for Interim change 6552 approx.)

DESCRIPTION:

Provides additional support under the cabinet bottom plate, to prevent accidental bowing of the plate with the resultant possibility of shorting power chassis wiring and/or ceramic strip-mounted components to ground. Increased structural rigidity was obtained through the addition of a 1/4 in. square aluminum bar, tapped on both ends to receive 6-32 screws which serve to fasten the bar between the bottom rails, in line with the plug-in housing back plate. New bottom rails, left and right side, were required to accommodate the new support bar.

Prior to the inception of this mod as described, an attempt was made at approximately s/n 5890 to alleviate the problem potential in another fashion. It was felt that a steel washer, of sufficient OD to extend beyond the inboard edge of the bottom rails, installed near the longitudinal center of each bottom rail, would provide additional support, sufficient to reduce the incidence of bowing.

Two nickel plate steel washers 9/64 ID x 1/2 OD x 1/32 were attached to the bottom rails by means of two 6-32 x 1/2 FHS screws and two 6-32 x 5/16 steel Keps nuts. The required countersunk mounting holes were already in the rails. Although this approach did not eliminate the problem, it did provide an interim 'measure of relief'.

Parts Removed:

Frame, angle (2)	122-021
Screw, 6-32 x 1/2 FHS (2)	211-512
Nut, Keps 6-32 x 5/16 (2)	210-457
Washer, 9/64 ID x 1/2 OD x 1/32 (2)	210-867

Parts Added:

Frame, angle, right bottom	122-050
Frame, angle, left bottom	122-051
Bar, support, 1/4 x 1/4 x 17/32	381-107
Screw, 6-32 x 5/8 FHS (2)	211-522

CABINET SIDE CHANGED

INFORMATION ONLY

M1890-1

Effective Prod s/n 6952

w/exceptions 6475-6, 6478, 6482-4, 6486-8, 6491-2, 6494, 6500-4, 6507
6514, 6516-7, 6520, 6525, 6530, 6660, 6663, 6677, 6691,
6695, 6745-6, 6779, 6790, 6820-2, 6852-3, 6880, 6881-5,
6901, 6902-4, 6921, 6926, 6934-5, 6941, 6943, 6945-6 and 6949.

DESCRIPTION:

The crossbreak stiffening crease on the cabinet side was removed. Improved rigidity and appearance was provided by simpling, or recessing, the perforated section.

Parts Removed:

Cabinet side, right w/box	386-719
Cabinet side, left	386-564

Parts Added:

Cabinet side, right w/box	386-770
Cabinet side, left	386-736

**SELENIUM RECTIFIERS STAMPED
WITH PART NUMBER**

INFORMATION ONLY

M1932

Effective Prod s/n not given

DESCRIPTION:

To provide quick identification of Tek-made selenium rectifiers, the part number will be stamped on the end plate.

VERT AMP TUBE BIAS INCREASED

M1950

Effective Prod s/n 7023

Usable in field instruments s/n 6475-7022

DESCRIPTION:

Increases the bias on the 6DK6 tubes in the Vertical Amplifier.

Parts Removed:

R1016	4k	5w	308-051
R1017	12k	8w	308-069
R1031	4.7k	1w	304-472

Parts Added:

R1016	3k	5w	308-062
R1017	10k	8w	308-126
R1031	2.2k	1w	304-222

Parts Required for Field Installation:

Modification Kit 040-191

INSTALLATION INSTRUCTIONS:

Refer to kit instructions.

**VERTICAL AMP
CHANGED TO**

Effective P

DESCRIPTION:

Incorporate

Parts Remo

R1039, R10-
R1033 1.
R1223 2.
L1036, L10
L1014, L10

V1033,
V1043,
V1223

Parts Requ

See 'Parts

**INSTALLA
For SN's 1

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- b) Repla
- c) Repla
- d) Repla
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- e) Repla
respe
- f) Repla

**VERTICAL AMPLIFIER TUBES
CHANGED TO ECC88**

M1945

Effective Prod s/n 7079

Usable in field instruments s/n 6475 - 7078

DESCRIPTION:

Incorporates ECC88 tubes in the Vertical Amplifier.

Parts Removed:

R1039, R1049	39Ω 1/2w	302-390
R1033	1.5k 5w	308-061
R1223	2.7k 2w	306-272
L1036, L1046	0.3-1μh var	114-087
L1014, L1024	1.7-3.7μh var	114-088
V1033,		
V1043,	6BQ7A	154-028
V1223		

Parts Added:

R1039, R1049	33Ω 1/2w	302-330
R1033	2.5k 5w	308-127
R1223	4.7k 2w	306-472
L1036, L1046	0.3-0.55μh var	114-111
L1014, L1024	1.8-3.9μh var	114-112
V1033,		
V1043,	ECC88/6DJ8	154-187
V1223		

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

**For SN's 101-6474 see Vertical Amplifier Improvement Kit 040-0368-00.

- Replace 39Ω resistors R1039 and R1049 (connected to pins 8 of V1033 and V1043, respectively) with 33 resistors.
- Replace 1.5k 5w resistor R1033 (on ceramic strips above C1005) with 2.5k resistor.
- Replace 2.7k 2w resistor R1223 (above C1005) with 4.7k resistor.
- Replace variable coils L1036 and L1046 (mounted on V1033 and V1043 sockets, respectively) with 0.3-0.55μh variable coils.
- Replace variable coils L1014 and L1024 (mounted on V1014 and V1024 sockets, respectively) with 1.8-3.9 h variable coils.
- Replace 6BQ7A tubes V1033, V1043 and V1223 with ECC88/6DJ8 tubes.

**MOTOR BASE CONNECTOR
CHANGED TO 3-WIRE TYPE**

M1912

Effective Prod s/n 7085

Usable in field instruments s/n 101-7084

DESCRIPTION:

The 2-wire motor base connector was changed to a 3-wire connector.

Parts Removed:

Connector, 2-wire no number

Parts Added:

Connector, 3-wire, Tek 131-102

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace the 2-wire motor base connector with a 3-wire connector.

**MOTOR BASE CONNECTOR
REWired TO ELIMINATE SHOCK
HAZARD AT TRANSFORMER**

INFORMATION ONLY

M1934

Effective Prod s/n 7085

DESCRIPTION:

To eliminate a shock hazard at the transformer primary when the power switch is turned off, the 'hot' wire (connected to brass screw of motor base connector) is color-coded and run directly to the power switch.

**SWEEP AMPLI
TO ELIMINAT
OF POSITIONI**

Effective P

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Parts Remo

Parts Requi

See 'Parts I

INSTALLA

Install C29;
strip on the

**SWEEP 6BQ7
BY 6DJ8 TUB
PERFORMAN**

Effective F

DESCRIPT

The 6BQ7 i
in the Swe

Parts Remo

V8, V40,
V55, V58,
V73, V85,
V115, V240
V265, V270

**SWEEP AMPLIFIER CAPACITOR ADDED
TO ELIMINATE PREMATURE FIRING
OF POSITIONING NEON**

M1961

Effective Prod s/n 7484

Usable in field instruments s/n 101-7483

DESCRIPTION:

To eliminate the Sweep Amplifier from firing too soon with the sweep running, C292 (0.005 μ f discap) was added to the sweep chassis between the junction of R292-R294 and R293-R295.

Parts Removed:

Parts Added:

C292 0.005 μ f 500v 283-001

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Install C292, a 0.005 μ f capacitor, between the two center notches of the 4-notch ceramic strip on the Sweep chassis directly below the Swp Mag Regis potentiometer.

**SWEEP 6BQ7 TUBES REPLACED
BY 6DJ8 TUBES TO IMPROVE
PERFORMANCE AND RELIABILITY**

INFORMATION ONLY

M1975

Effective Prod s/n 7484

DESCRIPTION:

The 6BQ7 tubes were replaced by 6DJ8's for improved performance and increased reliability in the Sweep circuits.

Parts Removed:

V8, V40,
V55, V58, 6BQ7A 154-028
V73, V85,
V115, V240
V265, V272 6BQ7, aged/ckd 157-022

Parts Added:

V8, V40,
V55, V58,
V73, V85, 6DJ8 6922 6BQ7A 154-187
V115, V240,
V265, V272

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**VERTICAL INDICATING NEON
RESISTORS CHANGED TO
OVERCOME SLOW ACTION**

INFORMATION ONLY

M1928

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SWEEP TRIG AND CAL CIRCUITS CHANGED TO IMPROVE RELIABILITY

INFORMATION ONLY

M1997

Effective Prod s/n 7484

DESCRIPTION:

Reliability of the Sweep and Calibrator circuit was improved, along with extensive mechanical changes to the Sweep and Power chassis. The Sweep Trigger Shaper, a 6U8 tube, was replaced by a more reliable 6DJ8 tube. Circuit changes for the new tube required the TRIGGER MODE switch be changed also. The Calibrator tubes, V246 and V670, were changed along with the associated circuitry for the new type tubes.

Both the Sweep and Power chassis, and cables were replaced.

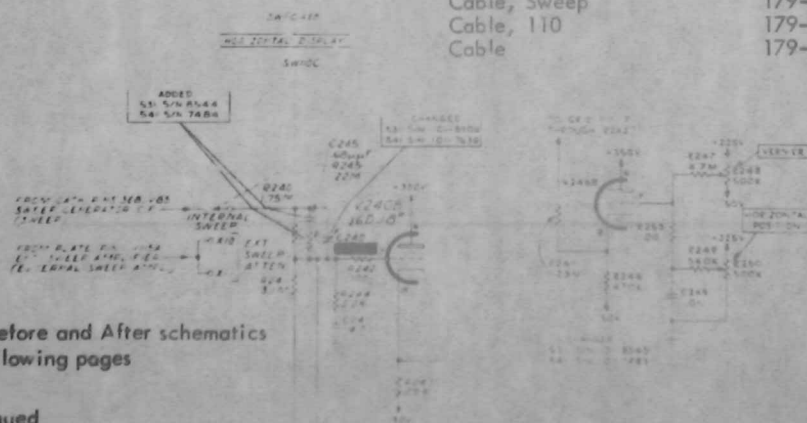
Parts Removed:

R248, R250	500k	311-048
R240	1.9M 1w 1%	309-022
R241	1.23M 1/2w 1%	309-016
R253	100Ω 1/2w 10%	302-101
R247	4.7M 1/2w 10%	302-475
R246	470k 1/2w 10%	302-474
R249	560k 1/2w 10%	302-564
C249	0.01μf 400v	285-510
R680	100k 1/2w 10%	302-104
R672	3.3M 1/2w 10%	302-335
R23	1k 1/2w 10%	302-102
R24	2.7k 1/2w 10%	302-272
V246	68Q7A	154-028
V20, V670A, B	6U8	154-033
SW5	Triggering Mode	262-080
Chassis, Power		441-078
Cable, Rectifier		179-186
Cable		179-070

Parts Added:

R246, R248	100k	311-030
R240	1.75M 1w 1%	309-019
R241	3.1M 1/2w 1%	309-027
R247	9M 1/2w 1%	309-232
R249	33k 1/2w 10%	302-333
R250	47k 1/2w 10%	302-473
R245	22M 1/2w 10%	302-226
C245	0.68pf	281-537
R680	68k 1/2w 10%	302-683
R672	3.9M 1/2w 10%	302-395
R23	680Ω 1/2w 10%	302-681
R24	1.5k 1/2w 10%	302-152
V246	12AU7	154-041
V670	6AU6	154-022
V20	6DJ8	154-187
SW5	Triggering Mode	262-183
Bracket, pot mounting		406-396
Chassis, Power		441-212
Chassis, Sweep		441-221
Cable, Rectifier		179-266
Cable, Sweep		179-265
Cable, 110		179-223
Cable		179-221

(EXTERNAL SWEEP AMPLIFIER)



See Before and After schematics
on following pages

continued

9-21-66

541 MODIFICATION SUMMARY

Page 61

Page 62

EXTERNAL SWEEP INPUT
OSCILLATIONS ELIMINATED BY
ADDING SUPPRESSOR RESISTOR

Effective Prod s/n 134

See 500

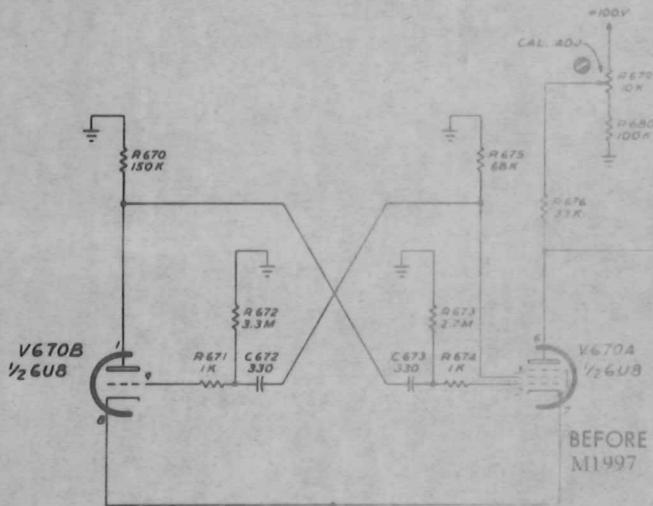
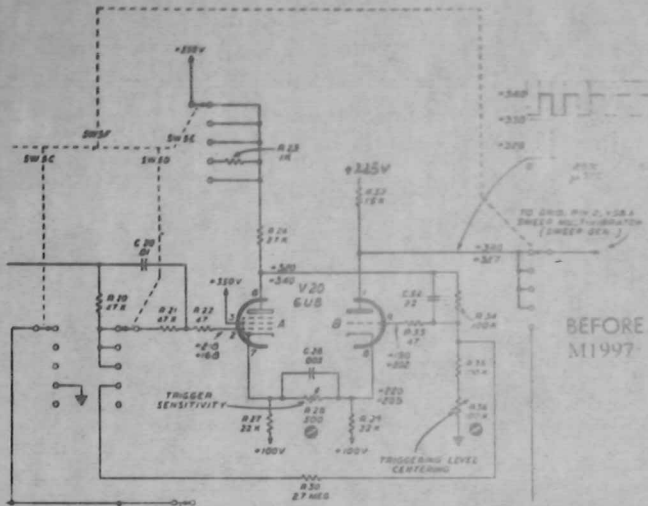
Usable in field instruments s/n 101-133

M1851

CRT SOCKET
ADDED FOR
TUBE SUBS

Effective

M1997
(con'd)





CRT HV CIRCU
CHANGED TO
CUTOFF RANK

Effective Pro

DESCRIPTIC

**Insufficient
impossible to
volts to this**

Parts Removal



**EXTERNAL SW
CONTROL RE
ELIMINATE B**

Effective Pr

DESCRIPTION

**To eliminate
cessive noise**

Parts Removal

Parts Requi

See 'Parts A

INSTALLA*

Replace the potentiometer

9-21-66

541 MODIFICATION SUMMARY

Page 63

Page 64

VERTICAL AMPLIFIER TUBES CHANGED TO ECC88

Effective Prod #/n 150

A1944

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**CRT HV CIRCUIT TRANSFORMER
CHANGED TO IMPROVE CRT
CUTOFF RANGE**

INFORMATION ONLY

M2054

Effective Prod SN 7516

DESCRIPTION:

Insufficient differential voltage between the CRT cathode and grid supplies may make it impossible to cut off the CRT. Increasing the grid supply winding by 4 turns adds 15-16 volts to this differential voltage. The HV transformer part number remains the same.

Parts Removed:

T801 High Voltage no number

Parts Added:

T801 High voltage no number

**EXTERNAL SWEEP ATTENUATOR
CONTROL REPLACED TO
ELIMINATE EXCESSIVE NOISE**

M2119

Effective Prod SN 7577

Usable in field instruments SN 101-7576

DESCRIPTION:

To eliminate the present Allen Bradley potentiometer, which was consistently having excessive noise at the high end, a Centralab potentiometer was substituted.

Parts Removed:

R117 15k 2W AB 311-045

Parts Added:

R117 15k 2W Centralab 311-112

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace the External Sweep Attenuator control R117, a 15k 2W AB with a 15k 2W Centralab potentiometer.

**SELENIUM RECTIFIERS STAMPED
WITH PART NUMBER**

INFORMATION ONLY

M1902

Effective Prod s/n not given

DESCRIPTION

**SWEEP AMPLIFIER INPUT C F
CAPACITOR REPLACED TO
INCREASE ADJUSTMENT RANGE**

INFORMATION ONLY

M2144

Effective Prod SN 7637

DESCRIPTION:

Trimmer capacitor C240 was increased in value to insure proper range and to increase the area of adjustment in the Input C F of the Sweep Amplifier.

Parts Removed:

C240 3-12pF 281-007

Parts Added:

C240 4.5-25 pF 281-010

**QUARTER-WATT RESISTOR
PART NUMBERS CHANGED**

INFORMATION ONLY

M1968

Effective Prod s/n 7648

DESCRIPTION:

Change the part numbers of the 1/4 w 10% composition resistors from 307-xxx to 316-xxx.

Parts Removed:

R1075 220Ω 1/4 w 307-020
R1077 47Ω 1/4 w 307-018
R1078 150Ω 1/4 w 307-019
R1085, R1089 1 meg 1/4 w 307-016
R1090, R1095 8.2 k 1/4 w 307-017

Parts Added:

R1075 220Ω 1/4 w 316-221
R1077 47Ω 1/4 w 316-470
R1078 150Ω 1/4 w 316-151
R1085, R1089 1 meg 1/4 w 316-105
R1090, R1095 8.2 k 1/4 w 316-822

HV TRANSFORMER IMPROVED

M2106

Effective Prod SN 7687

Usable in field instruments SN 101-7686

DESCRIPTION:

Decreases high frequency ripple on the unblanking winding of the HV transformer by adding two turns of Mylar* tape between the plate winding and the grid winding.

Parts Removed

T801 High Voltage 120-036

Parts Added:

T801 High Voltage 120-036

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace the High Voltage transformer, T801, with a new 120-036 transformer which has the added Mylar tape.

* Du Pont registered trademark.

**SWEEP 6BQ7 TUBES REPLACED
BY 6DJ8 TUBES TO IMPROVE
PERFORMANCE AND RELIABILITY**

INFORMATION ONLY

M1976

Effective Prod s/n 168

**VERT AMP
REPLACED
TO SAVE M**

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R248, I
R240

**VERT AMP SERIES L R COMBINATION
REPLACED WITH RESISTIVE COIL
TO SAVE MOUNTING SPACE**

INFORMATION ONLY

M2086

Effective Prod SN 7693

DESCRIPTION:

Removing R1064 and changing L1064 from a 14 μ H coil to a 8.4 μ H 2k resistive coil improves the available space for mounting part in the Vertical Amplifier.

Parts Removed:

L1064	14 μ H coil	108-134
R1064	2k 1W 5%	303-202

Parts Added:

L1064	8.4 μ H 5%	108-157
-------	----------------	---------

**BINDING POST CHANGED
FOR COMPATIBILITY**

INFORMATION ONLY

M2196

Effective Prod SN 7798

DESCRIPTION:

The binding posts were changed to a design compatible with our knobs.

Parts Removed:

Post, binding	129-030
---------------	---------

Parts Added:

Post, binding	129-036
---------------	---------

CH:fb

Parts Removed:

R248, R250	500k	311-048
R240	1.9M 1w 1%	309-022
R241	1.9M 1/2w 1%	309-022

Parts Added:

R248, R248	100k	311-030
R240	1.75M 1w 1%	309-019
R241	1.75M 1/2w 1%	309-022

M1998
(cont)

MODIFICATION SUMMARY

RM41



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**DELAY LINE CAPACITOR ADDED
TO MINIMIZE HF 'UNDERSHOOT'**

INFORMATION ONLY

M1787

Effective Prod s/n 105

DESCRIPTION:

To minimize 'Undershoot' at higher frequencies, two 0.68pF ceramic capacitors were added (one to each side of the symmetrical, vertically mounted, 30-section delay line member), between the 0.7-3pF tubular trimmers, C1305 and C1307.

Although the cause of the above problem was directly traceable to the new delay line configuration, the shortcomings became more apparent when combined with the new 540 series Vertical Amplifier at the upper limit of its wider bandpass. The RM41 incorporated the new 540 series delay line and Vertical Amplifier in its initial design.

Parts Removed:

Parts Added:

C1384, 0.68pF 500 V 20% 281-537
C1385

**POWER TRANSFORMER
HEATER WINDING CHANGED
TO DOUBLE CURRENT RATING**

INFORMATION ONLY

M1800

Effective Prod s/n 105

DESCRIPTION:

Changing the heater winding at terminals 28 and 29 from a single #17 wire to two #17 wires, increased its current rating from 3.8 to 7.4 amperes. This allowed both the standard and export transformers to be used with the newly designed 541/545 instruments that added more tubes to their circuit. No part number change was made as both the standard and export are directly replaceable.

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**VERTICAL AMPLIFIER DC SHIFT
OPERATION IMPROVED BY REMOVAL
OF DELAY LINE RESISTORS**

See SQB

M1806

Effective Prod s/n 106
w/exceptions 102, 104

Usable in field instruments s/n 101-105

DESCRIPTION:

To improve the operation of the DC shift compensation network in the new Vertical Amplifier (M1796 s/n 134), R1093 and R1098, 15k 1/2W 10% resistors were removed.

A length of #20 tinned copper wire, connected from the junction of R1092 and R1094 to C1093A in the L1104 half of the distributed amplifier, replaces R1093. R1098 is similarly replaced by a #20 tinned copper wire connected from the junction of R107 and R1099 to C1093C, in the L1114 half of the symmetrical network.

Parts Removed:

R1093, 15k 1/2W 10% 302-153
R1098

Parts Added:

Wire, #20 tinned copper 2 in. 176-004

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

- Replace R1093, located between the junction of R1092 - R1094 and C1093A on L1104, with a piece of #20 bare wire.
- Replace R1098, located between the junction of R1097 - R1099 and C1093C on L1114, with a piece of #20 bare wire.

**DELAY LINE TERMINATING
RESISTORS REPLACED WITH TEK
MATCHED PAIR TO IMPROVE TUNING**

INFORMATION ONLY

M1804

Effective Prod s/n 111

DESCRIPTION:

Difficulty in tuning the distributed amplifier termination network necessitated a closer matching of R1071 and R1073. Satisfactory results were obtained by holding the resistance values to within 1/2% of each other. The matched pair was assigned part number 312-587 and is furnished as a replacement for the individual resistor.

Parts Removed:

R1071 Mica plate 600Ω 5W 1% 310-541
R1073 Multi-top

Parts Added:

R1071 Mica plate 600Ω 5W 1% 312-587
R1073 Multi-top
(paired within 1/2% of each other)

**SWEEP SYNC AMPLIFIER GRID
DIVIDER RESISTOR REPLACED TO
IMPROVE CAPABILITY WITH 53/54C**

See SQB

M1821

Effective Prod s/n 114

Usable in field instruments s/n 101-113

DESCRIPTION:

Mod #1730 (53/54C unit) installed a 12pf 500v ceramic capacitor across each diode section of the 6AL5 "Trigger Coupling Diode," V3803, to prepare the unit for use in scopes which will incorporate trace blanking circuitry for the purpose of extinguishing the trace during the switching transients. This had the undesirable effect of reducing the trigger sensitivity of the "C" unit's Multi-vibrator in the "Alternate" position to the point where its operation was dependent on the operating characteristics of V70, the 12BY7 Negative Multi-vibrator.

This situation was corrected by changing the value of R78 from 47k to 36k, thereby lowering the bias on V78, the Multi-Trace Unit's Sync. Amplifier and increasing the amplitude of the trigger pulse.

Parts Removed:

R78 47k 1/2w 10% 302-473

Parts Added:

R78 36k 1/2w 5% 301-363

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace R78 on the ceramic strips above V70 and V85 on the Sweep chassis, with a 36k 1/2w 5% resistor.

**SWEEP TIM. CAPACITOR
RELOCATED TO SWITCH
FOR EASE OF HANDLING**

INFORMATION ONLY

M1648

Effective Prod s/n 119

DESCRIPTION:

To minimize handling of the Tektronix manufactured capacitor (281-007) during assembly and to make the Sweep Timing switch a more complete unit, the timing capacitor was removed from the Sweep chassis and installed on the switch support plate, located between the Sweep Time/CM switch and Time/CM Multiplier switch. Two 5/32 in. holes spaced 1-13/16 in. apart were added to the support plate to allow the move. Four #22 solid leads, connected between the Sweep Time/CM switch and timing capacitor were lengthened and run through #4 plastic tubing to improve lead dress.

Parts Removed:

Wire, #22 sol, w-y (3-1/2")
Wire, #22 sol, w-gn (3-1/4")
Wire, #22 sol, w-bl (3-1/4")
Wire, #22 sol, w-v (3-1/4")
175-522

Parts Added:

Wire, #22 sol, w-y (5")
Wire, #22 sol, w-gn (5")
Wire, #22 sol, w-bl (3-1/4")
Wire, #22 sol, w-v (5")
Tubing, plastic, #4 cl (1-1/2") 162-018
175-522

CRT ANODE C

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Parts Rema

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Clip, an
Bracket

CRT ANODE CONNECTOR IMPROVED

INFORMATION ONLY

M1659

Effective Prod s/n 134

DESCRIPTION:

An improved, automatic method of connecting the anode lead to the anode button of the CRT, with complete light shielding of the CRT anode opening, has been installed in all instruments using 5 inch Tektronix CRT's. The unit consists of an anode connector plate inserted into the anode opening of the CRT shield, an anode cover, cap, brush connector, and CRT contact plug fitted into the CRT anode contact.

To accommodate the new anode connector and provide improved centering of the connector brush on the anode of the CRT, shields have been modified to deepen the anode opening 3/16 in. However, the new anode connector can be installed in unmodified shields and provides satisfactory contact, with a minor alteration of the anode connector plate.

To allow for easier installation of the new anode connector, in oscilloscopes using three phosphor bronze springs to hold and position the CRT, the spring adjacent to the anode opening has been removed. It has been found that the automatic connector provides sufficient pressure to obviate the need for the third spring. For easier rotation of the CRT, and to eliminate interference with installation of the new anode connector, the felt strip at the bottom of the CRT shield has been repositioned to leave 1/2 in. clearance from the bottom edge of the shield anode opening.

Parts Removed:

Cover, anode	200-023
Clip, anode	131-026
Bracket	406-239

Parts Added:

Cover, anode	200-111
Plate, anode	386-647
Cap, anode	200-110
Connector, brush, CRT	131-073
Plug, contact, CRT	134-031

**VERTICAL AMPLIFIER TERMINATION,
GRID AND PLATE COILS CHANGED
TO IMPROVE SYMMETRY AND
REDUCE TUNING TIME**

See SQB

M1796

Effective Prod s/n 134

Usable in field instruments s/n 101-133

NOTE: In instruments s/n 116 and 118, the Distributed Amplifier grid lines, L1103 and L1113, underwent change as described in revision (2-b) of this modification.

DESCRIPTION:

The following changes in the configuration of the Termination Network and the 6-section Distributed Amplifier output stage were effected for the reasons indicated:

1. Termination Network

To extend the low-end tuning range of variable inductors L1071 and L1073, .3-.5 μ H inductors replace the .9-1.6 μ H inductors previously used.

2. Distributed Amplifier

a) To improve the Distributed Amplifier waveform and reduce the time required to tune the delay line, an additional section - consisting of 8 turns (0.45 μ H) - was added to the 6-section plate line inductors, L1104 and L1114. The new section added to L1104 is electrically oriented between the first tapped coil section - plate of V1104 - and the junction of R1085 (1M), T1090 (8.2k), and L1071 (.3-.5 μ H). The addition to L1114 is oriented between the first tapped coil section - plate of V1114, and the junction of R1089 (1M), R1095 (8.2k), and L1073 (.3-.5 μ H), thereby maintaining the symmetrical aspect of the amplifier configuration.

The part number of the plate line coil used in both halves of the amplifier was changed from 108-135 to 108-139.

b) To improve the high frequency tuning in the region of the plate line termination, the first section of each of the Distributed Amplifier grid lines, L1103 and L1113, was deleted. The control grids of V1054 and V1064 (6DK6's), formerly tied to the center tap of the deleted coil sections, were tied directly to the junction of L1103 and L1113 with their respective 39 Ω /.001 μ F parallel-wired combos, R1039-C1039 and R1049-C1049. (This section incorporated in the 050-0151-00.)

Parts Removed:

L1071 .9-1.6 μ H Var	114-038
L1073 .9-1.6 μ H Var	114-038
L1103 7-section Grid Line	108-136
L1104 6-section Plate Line	108-135
L1113 7-section Grid Line	108-136
L1114 6-section Plate Line	108-135

Parts Added:

L1071 .3-.5 μ H Var	114-092
L1073 .3-.5 μ H Var	114-092
L1103 6-section Grid Line	108-145
L1104 7-section Plate Line	108-139
L1113 6-section Grid Line	108-145
L1114 7-section Plate Line	108-139

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**VERTICAL INDICATING NEON
RESISTORS CHANGED TO
OVERCOME SLOW ACTION**

INFORMATION ONLY

M1828

Effective Prod s/n 134

DESCRIPTION:

Insufficient voltage across beam-position indicators, B1083 and B1087, caused their operation to be sluggish. This shortcoming was rectified by increasing the value of R1083 and R1087 from 330k to 390k, thereby increasing the voltage across the neons and insuring more prompt action when positioning the beam.

Parts Removed:

R1083, 330k 1/2W 10% 302-334
R1087

Parts Added:

R1083, 390k 1/2W 10% 302-394
R1087

**CENTRALAB CAPACITOR
VOLTAGE RATING REDUCED**

INFORMATION ONLY

M1847

Effective date 6-1-58

DESCRIPTION:

Centralab Manufacturing Co. has reduced the voltage rating of their 'Hi-Kap' 0.01 μ f and 0.02 μ f ceramic capacitors from 250 to 150 volts.

Investigation has shown that the 150v rating is adequate in all present instrument usage. Future instrument instruction Manuals and Tek parts book releases will assign the 150v rating to the capacitors under discussion. No part number changes will be effected.

Parts Removed:

C700 0.02 μ f 250v 283-004

Parts Added:

C700 0.02 μ f 150v 283-004

**EXTERNAL SWEEP INPUT
OSCILLATIONS ELIMINATED BY
ADDING SUPPRESSOR RESISTOR**

See SQB

M1851

Effective Prod s/n 134

Usable in field instruments s/n 101-133

DESCRIPTION:

Parasitic oscillations occurring in the grid circuit of the Ext Sweep Amp Cathode Follower were eliminated by adding R100 between the EXTERNAL SWEEP IN binding post and the HORIZONTAL DISPLAY switch.

Parts Removed:

Parts Added:

R100 47Ω 1/2W 10% 302-470

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace the bare wire between the EXTERNAL SWEEP IN binding post and the HORIZONTAL DISPLAY switch with R100, a 47Ω 1/2W 10% resistor.

**TIME-BASE GENERATOR MYLAR TIMING
CAPACITOR PART NUMBERS SHUFFLED**

INFORMATION ONLY

M1866

Effective date 3-31-58

DESCRIPTION:

To clarify part number information and simplify handling of replacement orders, the part numbers of the Tek-made timing capacitors (series CT14A2) are changed as follows:

- 1) Discontinue the 0.001μf ±0% capacitor, which is impractical to manufacture.
- 2) Change the matching combination of 1x.1x.01μf and .001μf capacitor (291-007) to a Customer Service item.
- 3) Change the part numbers of the individual 1x.1x.01μf and .001μf capacitors as indicated (match the capacitors of like tolerance).

Parts Removed:

C490A-D	1x.1x.01x.001μf	291-007
C490A-C	1x.1x.01μf +1/4%	291-013
C490A-C	1x.1x.01μf -1/4%	291-015
C490D	.001μf +1/4% (wh)	291-014
C490D	.001μf -1/4% (bk)	291-016
C490D	.001μf ±0%	291-008

Parts Added:

C490A-C	1x.1x.01μf +1/4%	291-0007-01
C490A-C	1x.1x.01μf -1/4%	291-0007-02
C490D	.001μf +1/4% (wh)	291-0008-01
C490D	.001μf -1/4% (bk)	291-0008-02

**CRT SOCKET
ADDED FOR
TUBE SUBST**

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R1016
R1017
R1031

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**CRT SOCKET HAS +350 V
ADDED FOR POSSIBLE CRT
TUBE SUBSTITUTION**

INFORMATION ONLY

M1890

Effective Prod s/n 136

DESCRIPTION:

To adapt the instrument for possible future substitution of the Type T65P (T65P2, 154-175) CRT for T54P/5BHP, +350 V was connected to terminal 8 of the CRT socket.

The supply was run from the 'Geom Adj' pot to CSD-2, then from CSD-2 through an existing hole in the F and I chassis to terminal 8 of the CRT socket. A 10 in. and 6-1/2 in. length of #22 stranded white-orange-green-brown wire, respectively, was used.

The new tube could still not be directly interchanged however as the vertical shield connection is to pin 11 on the T65P and to pin 12 on the T54P/5BHP.

VERT AMP TUBE BIAS INCREASED

See SQB

M1951

Effective Prod s/n 143

Usable in field instruments s/n 101-142

DESCRIPTION:

Increases the bias on the 6DK6 tubes in the Vertical Amplifier.

Parts Removed:

R1016	4k 5w	308-051
R1017	12k 8w	308-069
R1031	4.7k 1w	304-472

Parts Added:

R1016	3k 5w	308-062
R1017	10k 8w	308-126
R1031	2.2k 1w	304-222

Parts Required for Field Installation:

Modification Kit 040-191

INSTALLATION INSTRUCTIONS:

Refer to kit instructions.

VERTICAL AMPLIFIER TUBES CHANGED TO ECC88

See SQB

M1944

Effective Prod s/n 150

Usable in field instruments s/n 101-149

DESCRIPTION:

Incorporates ECC88 tubes in the Vertical Amplifier.

Parts Removed:

R1039, R1049	39Ω 1/2w	302-390
R1033	1.5k 5w	308-061
R1223	2.7k 2w	306-272
L1036, L1046	0.5-1μh var	114-087
L1014, L1024	1.7-3.7μh var	114-088

V1033,		
V1043,	6BQ7A	154-028
V1223		

Parts Added:

R1039, R1049	33Ω 1/2w	302-330
R1033	2.5k 5w	308-127
R1223	4.7k 2w	308-472
L1036, L1046	0.3-0.55μhvar	114-111
L1014, L1024	1.8-3.9μhvar	114-112

V1033,		
V1043,	ECC88/6DJ8	154-187
V1223		

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

- Replace 39Ω resistors R1039 and R1049 (connected to pins 8 of V1033 and V1043, respectively) with 33 resistors.
- Replace 1.5k 5w resistor R1033 (on ceramic strips above C1005) with 2.5k resistor.
- Replace 2.7k 2w resistor R1223 (above C1005) with 4.7k resistor.
- Replace variable coils L1036 and L1046 (mounted on V1033 and V1043 sockets, respectively) with 0.3-0.55μh variable coils.
- Replace variable coils L1014 and L1024 (mounted on V1014 and V1024 sockets, respectively) with 1.8-3.9 h variable coils.
- Replace 6BQ7A tubes V1033, V1043 and V1223 with ECC88/6DJ8 tubes.

MOTOR BASE CONNECTOR CHANGED TO 3-WIRE TYPE

See SQB

M1912

Effective Prod s/n 168

Usable in field instruments s/n 101-167

DESCRIPTION:

The 2-wire motor base connector was changed to a 3-wire connector.

Parts Removed:

Connector, 2-wire	no number
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Parts Added:

Connector, 3-wire, Tek	131-102
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Parts Required: See 'Parts Added'

INSTALLATION INSTRUCTIONS:

Replace the 2-wire connector with a 3-wire connector.

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**SELENIUM RECTIFIERS STAMPED
WITH PART NUMBER**

INFORMATION ONLY

M1932

Effective Prod s/n not given

DESCRIPTION:

To provide quick identification of Tek-made selenium rectifiers, the part number will be stamped on the end plate.

**MOTOR BASE CONNECTOR
REWired TO ELIMINATE SHOCK
HAZARD AT TRANSFORMER**

INFORMATION ONLY

M1934

Effective Prod s/n 168

DESCRIPTION:

To eliminate a shock hazard at the transformer primary when the power switch is turned off, the 'hot' wire (connected to brass screw of motor base connector) is color-coded and run directly to the power switch.

**SWEEP AMPLIFIER CAPACITOR
ADDED TO ELIMINATE PREMATURE
FIRING OF POSITIONING NEON**

See SQB

M1962

Effective Prod s/n 168

Usable in field instruments s/n 101-167

DESCRIPTION:

To eliminate the Sweep Amplifier from firing too soon with the sweep running, C292 (0.005 μ f discap) was added to the sweep chassis between the junction of R292-R294 and R293-R295.

Parts Removed:

Parts Added:

C292 0.005 μ f 500v 283-001

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Install C292, a 0.005 μ f capacitor, between the two center notches of the 4-notch ceramic strip on the Sweep chassis directly below the Swp Mag Regis potentiometer.

**SWEEP 6BQ7 TUBES REPLACED
BY 6DJ8 TUBES TO IMPROVE
PERFORMANCE AND RELIABILITY**

INFORMATION ONLY

M1976

Effective Prod s/n 168

DESCRIPTION:

The 6BQ7 tubes were replaced by 6DJ8's for improved performance and increased reliability in the Sweep circuits.

Parts Removed:

V8, V40,		
V55, V58,	6BQ7A	154-028
V73, V85,		
V115, V240		
V265, V272	6BQ7, aged/ckd	157-022

Parts Added:

V8, V40,		
V55, V58,		
V73, V85,	6DJ8/6922/6BQ7A	154-187
V115, V240,		
V265, V272		

**SWEEP TRIG AND CAL CIRCUITS
CHANGED TO IMPROVE RELIABILITY**

INFORMATION ONLY

M1998

Effective Prod s/n 168

DESCRIPTION:

Reliability of the Sweep and Calibrator circuits was improved, along with extensive mechanical changes to the Sweep and Power chassis. The Sweep Trigger Shaper, a 6U8 tube, was replaced by a more reliable 6DJ8 tube. Circuit changes for the new tube required the TRIGGER MODE switch to be changed also. The Calibrator tubes, V246 and V670, were changed along with the associated circuitry for the new type tubes.

Both the Sweep and Power chassis, and cables were replaced.

See Before and After schematics on following pages.

continued

Parts Rem

R248, R251
R240
R241
R253
R247
R246
R249
C249
R680
R672
R23
R24
V246
V20, V670
SW5
Chassis,
Cable, 1
Cable

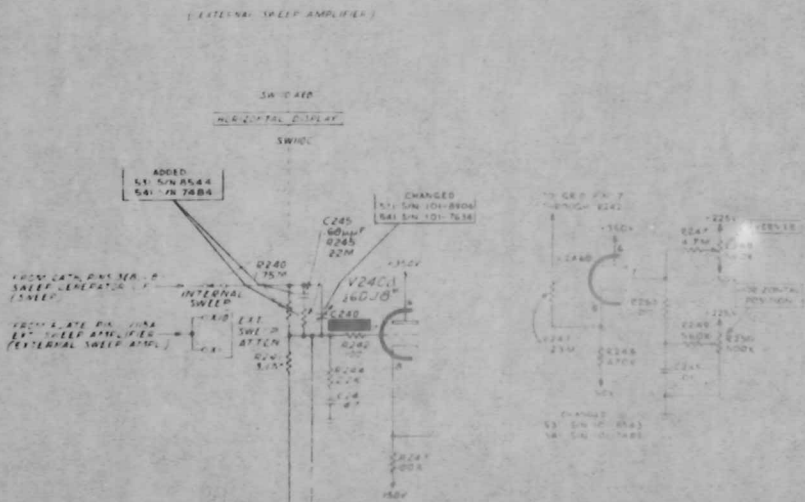
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Parts Removed:

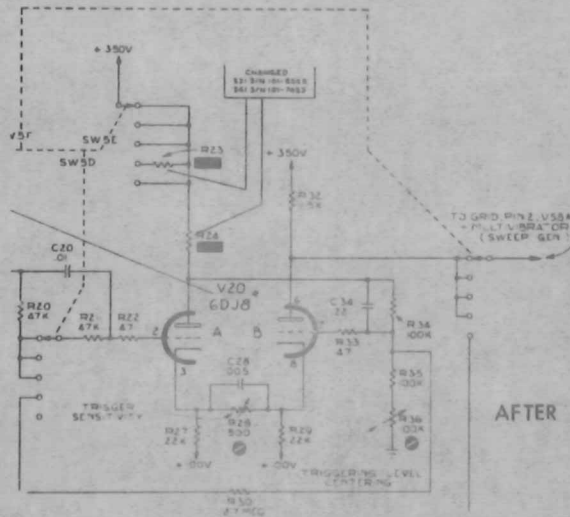
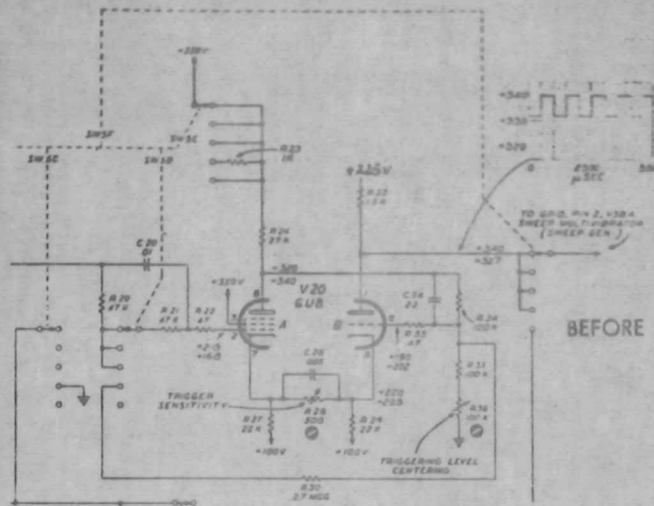
R248, R250	500k	311-048
R240	1.9M 1w 1%	309-022
R241	1.23M 1/2w 1%	309-016
R253	100Ω 1/2w 10%	302-101
R247	4.7M 1/2w 10%	302-475
R246	470k 1/2w 10%	302-474
R249	560k 1/2w 10%	302-564
C249	0.01 μf 400v	285-510
*R680	100k 1/2w 10%	302-104
R672	3.3M 1/2w 10%	302-335
R23	1k 1/2w 10%	302-102
R24	2.7k 1/2w 10%	302-272
V246	68Q7A	154-028
V20, V670A, B	6U8	154-033
SW5	Triggering Mode	262-080
Chassis, Power		441-078
Cable, Rectifier		179-186
Cable		179-070

Parts Added:

R246, R248	100k	311-030
R240	1.75M 1/w 1%	309-019
R241	3.1M 1/2w 1%	309-027
R247	9M 1/2w 1%	309-232
R249	33k 1/2w 10%	302-333
R250	47k 1/2w 10%	302-473
R245	22M 1/2w 10%	302-226
C245	0.68pf	281-537
R680	68k 1/2w 10%	302-683
R672	3.9M 1/2w 10%	302-395
R23	680Ω 1/2w 10%	302-681
R24	1.5k 1/2w 10%	302-152
V246	12AU7	154-041
V670	6AU6	154-022
V20	6DJ8	154-187
SW5	Triggering Mode	262-183
Bracket, pot mounting		406-396
Chassis, Power		441-212
Chassis, Sweep		441-221
Cable, Rectifier		179-266
Cable, Sweep		179-265
Cable, 110		179-223
Cable		179-221



continued

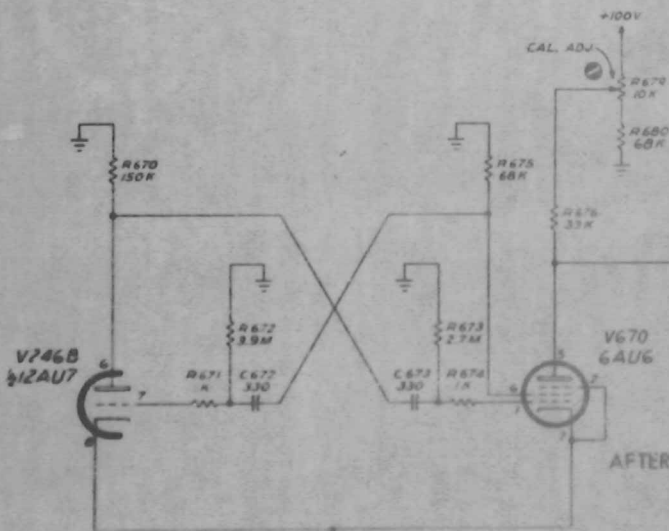
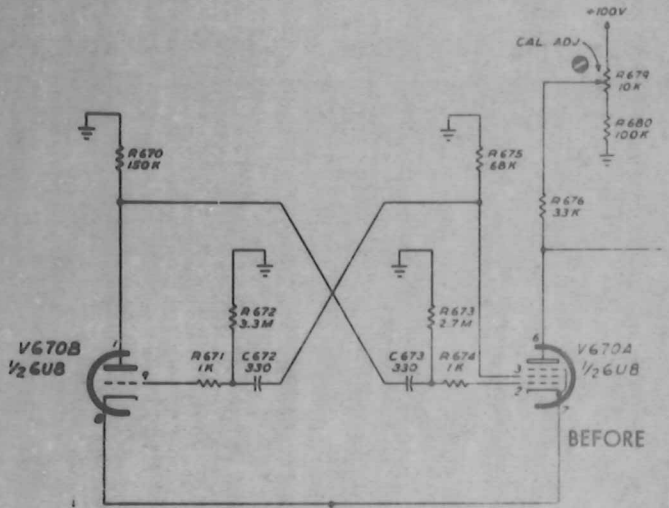


continued

MOD SUMMARY INDEX

PRODUCT FILE	DATE	PAGE
SECTION TITLE	LOC	REFERENCE PAGES

M1998
(cont)



CRT HIGH
TRANSFORM
IMPROVE C

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DESCRIP

Insuffici
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Parts Re
T801

EXTERNAL
CONTROL
ELIMINATI

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Parts Re
R117

Parts Re
See 'Pa

INSTAL
Replace
potenti

**CRT HIGH VOLTAGE CIRCUIT
TRANSFORMER CHANGED TO
IMPROVE CRT CUTOFF RANGE**

INFORMATION ONLY

M2054

Effective Prod s/n 168

DESCRIPTION:

Insufficient differential voltage between the CRT cathode and grid supplies may make it impossible to cut off the CRT. Increasing the grid supply winding by 4 turns adds 15-16 volts to this differential voltage. The HV transformer part number remains the same.

Parts Removed:

T801 High Voltage 120-036

Parts Added:

T801 High Voltage 120-036

**EXTERNAL SWEEP ATTENUATOR
CONTROL REPLACE TO
ELIMINATE EXCESSIVE NOISE**

See SQB

M2120

Effective Prod s/n 169

Usable in field instruments s/n 101-168

DESCRIPTION:

To eliminate the present Allen Bradley potentiometer, which was consistently having excessive noise at the high end, a Centralab potentiometer was substituted.

Parts Removed:

R117 15k 2W AB 311-045

Parts Added:

R117 15k 2W Centralab 311-112

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace the External Sweep Attenuator control R117, a 15k 2W AB with a 15k 2W Centralab potentiometer.

**SWEEP AMPLIFIER
CAPACITOR
INCREASE ADJ**

Effective Pr

DESCRIPTIC

Trimmer cap
area of adj

Parts Remov

C240

**CABINET POW
INSTRUMENT
BY 'FLOATIN**

Effective F
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See 'Parts

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b) Reinst
of spe

continued

**SWEEP AMPLIFIER INPUT CF
CAPACITOR REPLACED TO
INCREASE ADJUSTMENT RANGE**

INFORMATION ONLY

M2145

Effective Prod s/n 178

DESCRIPTION:

Trimmer capacitor C240 was increased in value to insure proper range and to increase the area of adjustment in the Input CF of the Sweep Amplifier.

Parts Removed:

C240 3-12 pF

281-007

Parts Added:

C240 4.5-25 pF

281-010

**CABINET POWER CONNECTOR TO
INSTRUMENT STRESS REDUCED
BY 'FLOATING' CONNECTOR**

See SQB

M2154

Effective Prod s/n 180
w/exceptions 175, 177-8

Usable in field instruments s/n 101-179

DESCRIPTION:

Stress on the power connector from movement of the instrument in the cabinet is reduced by 'floating' the connector.

Parts Removed:

Parts Added:

Spacer, .1801D x 1/4 OD x 1/8 (2) 166-029

Washer, #6L (2) 210-803

Parts Required for Field Installation:

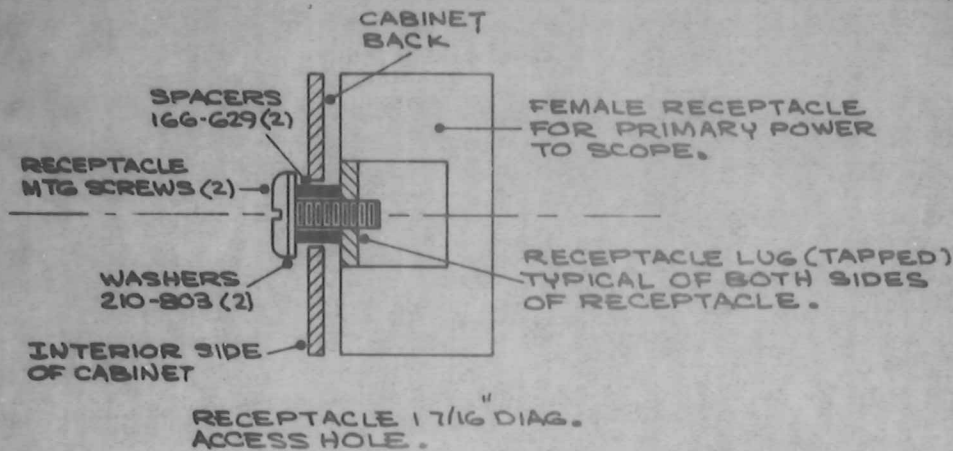
See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

- Refer to drawing to rework cabinet power receptacle by enlarging the mounting holes to 5/16 in. and the access hole to 1-7/16 in.
- Reinstall receptacle, using the drawing on the following page for proper placement of spacers.

continued

M2154
(cont)



**TRIGGER PICKOFF AMP SERIES PLATE
COIL AND RESISTOR REPLACED BY
A RESISTIVE COIL TO ELIMINATE
MOUNTING PROBLEM**

INFORMATION ONLY

M2087

Effective Prod s/n 188

DESCRIPTION:

The plate series load (V1064) combo of R1064 (2k 1W 5%) resistor and L1064 (14μH coil) was replaced by a resistive coil consisting of an 8.4μH 2k ±5% resistive coil, L1064. This improved the physical mounting of the component.

Parts Removed:

L1064	14μH	108-134
R1064	2k 1W 5%	303-202

Parts Added:

L1064	8.4μH 2k ±5%	108-157
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HV TRANSFORMER

Effective P

DESCRIPTION

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Parts Remo

T801

Parts Requi

See 'Parts

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added myh

CH: fb

HV TRANSFORMER IMPROVED

See SQB

M2106

Effective Prod s/n 188

Usable in field instruments s/n 101-187

DESCRIPTION:

Decreases high frequency ripple on the unblanking winding of the HV transformer by adding two turns of mylar type between the plate winding and the grid winding.

Parts Removed:

T801 High Voltage 120-036

Parts Added:

T801 High Voltage 120-036

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace the High Voltage transformer, T801, with a new 120-036 transformer which has the added mylar tape.

CH:fb

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PRODUCT FILE 541, R541

DATE Mar 77

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SWEEP	C5
HIGH VOLTAGE	C9
TIME DELAY RELAY	C10
VERTICAL AMPLIFIER	C11
TERMINATION PLATE	D1
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FOCUS AND INTENSITY	D4
RECTIFIER BRACKET	D6
CABINET	D8
ACCESSORIES	D10
DIAGRAMS	E1
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SWEEP TRIGGER	E3
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MOD SUMMARY INDEX

PRODUCT FILE 541, RM41 DATE Mar 77 PAGE 2

[illegible]



modification instructions

MI - 040-0065-00

See Below

BLANK PLUG-IN

For all Tektronix Oscilloscopes using Letter or '1' Series Plug-Ins -- including Types 581/A, 585/A, and RM585A with a Type 81 Adapter.

Modification Kit, PN 040-0065-00, with the enclosed information allows the construction of special plug-in units for the above instruments.

PARTS REQUIRED

Quantity	Tektronix Part Number	Description
1 ea	040-0055-00	Modification Kit

INSTALLATION

Installation instructions are included in the Modification Kit.

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12-5-68
Supersedes: March 1968

Page 1

PARTS I

Quantit

1 ea
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SCHEMATICS

SCHEM

PARTS INCLUDED IN MODIFICATION KIT:

Quantity	Part Number	Description
1 ea	131-0017-00	Connector, amphenol, 16-pin
1 ea	210-0004-00	Lockwasher, int #4
1 ea	210-0201-00	Lug, solder, SE #4
2 ea	210-0406-00	Nut, hex, 4-40 x 3/16
1 ea	210-0812-00	Washer, fiber
2 ea	211-0097-00	Screw, 4-40 x 5/16 PHS, Phillips
1 ea	212-0043-00	Screw, 8-32 x 1/2 PHS, Phillips, 100°
4 ea	212-0008-00	Screw, 8-32 x 1/2 PHS, Pozidrive
1 ea	333-0150-00	Panel, front, special blank plug-in
1 ea	354-0025-00	Ring, retaining
1 ea	366-0125-00	Knob, retaining, gray
1 ea	384-0510-00	Rod, securing, RS53
4 ea	384-0631-00	Rod, spacer, plug-in
1 ea	386-0423-00	Plate, sub-panel, special blank plug-in
1 ea	387-0549-00	Plate, blank, FP53 special
1 ea	441-0108-00	Chassis, special blank, CH53

continued

GEN

PIN
NO.

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GENERAL INFORMATION:

The following chart is intended as a guide to the voltages and signals supplied by the various oscilloscopes at the plug-in connector. It lists the approximate load current requirements necessary to keep each power supply in regulation. In addition, it lists the inputs used by the oscilloscopes.

PIN NO.	DESCRIPTION	INSTRUMENTS	VOLTAGE	MAX LOAD CURRENT	MIN LOAD CURRENT	NOTES
1 3	Vertical Signal Input	All	See *Note			
2	Ground	All				Grounded in oscilloscope
4 5	Int Trig Sig Input	544, 546 547, 555** only	(See Manual)			These pins blank in all other oscilloscopes
6	Blank Pin	All				
7	Slave Pulse Output	547 only	(See Manual)			This pin blank in all other oscilloscopes
8 16	Alt Trace Sync Pulse Output	All	(See Manual)			Pin 8 grounded by Types CA, M, etc, in Alt Trace mode.
9	-150v Supply	All	-150v DC	60ma	3.8ma	
10	+100v Supply	All	+100v DC	50ma	4.5ma	
11	-225v Supply	All	+225v DC	75ma	16.0ma	
12	+350v Supply	All	+350v DC	20ma	0 ma	
13 14	Heater Supply	All	6.3v AC	2.8amp	0 ma	Elevated to +100v in some oscilloscopes (see Manuals). Do not ground either pin.
15	Series Heater String Supply	All	+ 75v DC	150ma	150ma	Instrument should not be operated without loading this supply.

*NOTE: Bias required at both pins is +67.5v ($\pm 2\%$). Signal Amplitude limited by sensitivity of oscilloscope (100mv/cm).

** Used on Type 555 SN 7000-up, or Type 555 modified with Field Modification Kits 040-0328-00 or 040-0328-01.

TW:jfb

Page 4 of 4 040-0065-00



product
modification

040-0157-00

PART

040

MODIFICATION KIT

SWEEP LOCKOUT



For the following Tektronix Oscilloscopes:
Types 531, 541, RM31, and RM41
All serial numbers

DESCRIPTION

This modification provides the above instruments with the sweep lockout feature, enabling them to be used to study "one-shot" phenomena requiring a single sweep of the CRT spot.

This is accomplished by adding a sweep-arming multivibrator to the hold-off circuit of the sweep generator. A front panel switch enables either normal or single sweep operation.

040-0118-00

Publication:
Instructions for 040-0118-00
December 1966

Supersedes:
April 1966

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040-0118-00

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PARTS INCLUDED IN MODIFICATION KIT

Quantity Part Number

Description

PARTS LIST

Qty.	Part Number	Description
(1 ea)		Assembly, circuit board, consisting of:
1 ea	136-0034-00	Socket, tube, circuit, 9-pin
1 ea	179-0127-00	Cable harness
5 ea	210-0004-00	Lockwasher, int #4
5 ea	210-0406-00	Nut, hex, 4-40 x 3/16
5 ea	211-0097-00	Screw, 4-40 x 5/16 PHS, Phillips
1 ea	281-0503-00	Capacitor, cer, 8 pF 500V
1 ea	281-0543-00	Capacitor, cer, 270 pF 500V
2 ea	302-0101-00	Resistor, comp, 100 Ω 1/2W 10%
1 ea	302-0106-00	Resistor, comp, 10 M 1/2W 10%
1 ea	302-0123-00	Resistor, comp, 12 k 1/2W 10%
1 ea	302-0223-00	Resistor, comp, 22 k 1/2W 10%
1 ea	309-0125-00	Resistor, prec, 300 k 1/2W 1%
1 ea	309-0128-00	Resistor, prec, 50 Ω 1/2W 1%
1 ea	309-0161-00	Resistor, prec, 106 k 1/2W 1%
1 ea	386-0541-00	Board, circuit
1 ea	406-0147-00	Bracket, aluminum
1 ea	(175-0514-00)	Wire, #22 solid, 5 in. black-brown-green-brown
1 ea	(175-0522-00)	Wire, #22 solid, 4 in. white-gray
(1 ea)		Assembly, neon, consisting of:
1 ea	150-0030-00	Bulb, neon, NE-2V
1 ea	302-0103-00	Resistor, comp, 10 k 1/2W 10%
1 ea	352-0067-00	Holder, neon bulb, single
1 ea	378-0541-00	Filter, lens, neon indicator
(1 ea)		Assembly, lever switch, consisting of:
1 ea	210-0021-00	Lockwasher, int 0.472-0.480 ID
1 ea	210-0414-00	Nut, hex, 15/32-32 x 9/16
1 ea	210-0473-00	Nut, 12-sided, 15/32-32 x 9/16
1 ea	260-0190-02	Switch, lever, DPDT
1 ea	283-0001-00	Capacitor, cer, 0.005 μ F 500V discap
(1 ea)		Assembly, resistor combination, consisting of:
2 ea	309-0042-00	Resistor, prec, 68 k 1/2W 1%
(1 ea)		Assembly, resistor combination, consisting of:
2 ea	309-0108-00	Resistor, prec, 80 k 1/2W 1%
1 ea	154-0078-00	Tube, vacuum, 6AN8
2 ea	210-0406-00	Nut, hex, 4-40 x 3/16
1 ea	211-0109-00	Screw, 4-40 x 7/8 EHS
1 ea	214-0210-00	Spool, w 3ft. silver-bearing solder
1 ea	283-0001-00	Capacitor, cer, 0.005 μ F 500V discap
1 ea	302-0821-00	Resistor, comp, 820 Ω 1/2W 10%
1 ea	334-0822-00	Tag, RESET-SINGLE SWEEP-NORMAL
1 ea	334-0823-00	Tag, READY
1 ea	348-0004-00	Grommet, rubber, 3/8
1 ea	385-0041-00	Rod, nylon, 5/16 x 1/4, tapped 6-32, w 2 pins
1 ea	(162-0504-00)	Tubing, plastic, #20 black 4 in.
1 ea	1-3581	Template, drilling (531-541)
1 ea	1-3591	Template, drilling (RM31-RM41)
2 ea	1-9103	Tag, MODIFIED INSTRUMENT, gummed back

040-0118-00

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INSTRUCTIONS

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing

—When soldering to the ceramic strips, use the silver-bearing

INSTRUCTIONS

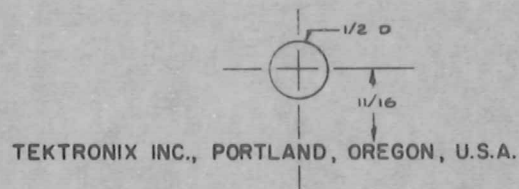


Fig. 1

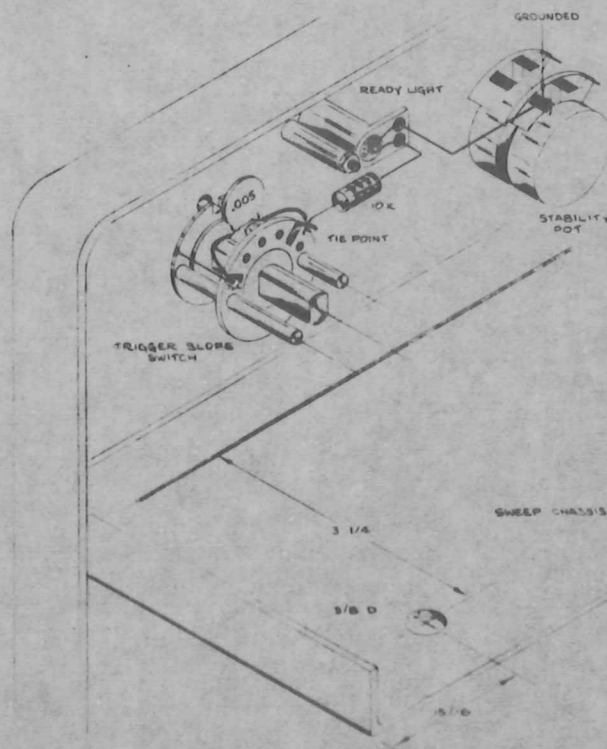


Fig. 2

INSTRUCTIONS (continued)

- () 6. Determine if the fifth (rear) wafer of the TRIGGERING MODE switch has three unused contacts on the front side. OMIT STEPS 7 and 8 IF THESE

INSTRUCTIONS (Con'd)

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

A. TO INSTALL LEVER SWITCH:

TYPES 531, 541 ONLY

- () 1. Locate the 1/2 in. hole already drilled in the front sub-panel just below the EXT-ERNAL SWEEP IN connector.
- () Cut a 1/2 in. hole in the front panel in line with the hole in the sub-panel.

NOTE: One method is to drill a small pilot hole through front panel, then enlarge this hole with a tapered reamer.

TYPES RM31, RM41 ONLY

- () 2. Center-punch and cut a 1/2 in. hole in the front panel and sub-panel, located as shown in Fig. 1.
- () See the NOTE after step 1.

ALL INSTRUMENTS

- () 3. Remove the protective backing from the RESET-SINGLE SWEEP-NORMAL tag (from kit) and carefully align the hole in the tag with the hole cut in the front panel. Press firmly into place.
- () 4. Mount the lever switch assembly (from kit) in the hole, with the locking position down. Place the lockwasher and hex nut on the inside, next to the sub-panel, and the 12-sided nut on the outside.

B. TO INSTALL CIRCUIT BOARD ASSEMBLY:

- () 5. Drill a 3/8 in. hole in the sweep chassis, located as shown in Fig. 2.

NOTE: In some instruments there is a 1/4 in. hole near this location which may be used. Enlarge hole to 3/8 in., being careful not to damage wiring cable.

- () 6. Mount the rubber grommet (from kit) in the hole.
- () 7. Remove the EXTERNAL SWEEP ATTENUATOR knob and potentiometer mounting nut.
- () Push the potentiometer back to allow the circuit board assembly to be mounted underneath it, as shown in Fig. 3. Align the assembly so that the circuit board is parallel to the sweep chassis.
- () Remount the potentiometer, tighten the mounting nut, and replace the knob.
- () 8. Solder the black-brown-green-brown wire (from assembly) to the terminal on the 4th wafer of the sweep MULTIPLIER switch that has a black-brown-green-brown wire (or wires) already soldered to it (see Fig. 3).
- () 9. Solder the white, white-blue and white-gray wires (from assembly) to the RESET-SINGLE SWEEP-NORMAL switch, as shown in Fig. 3.

NOTE: On the RM31's and RM41's, the switch is located lower than shown in drawing and is rotated 90°.

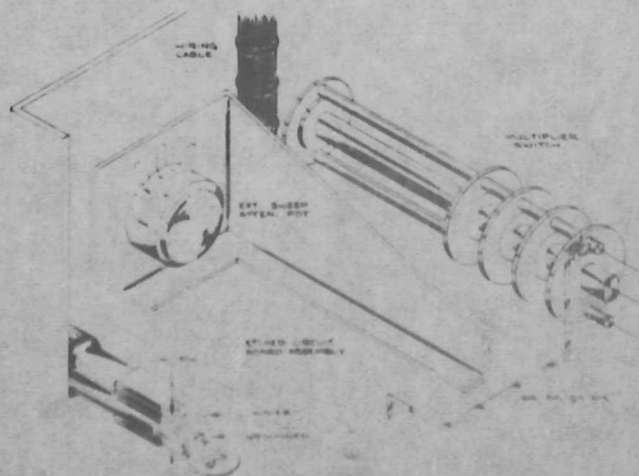


Fig. 3

INSTRUCTIONS (Con'd)

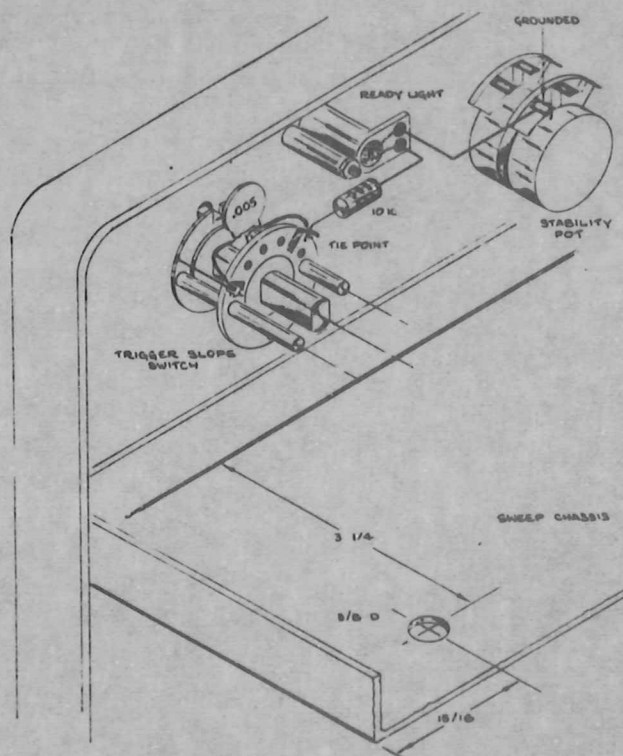


Fig. 4

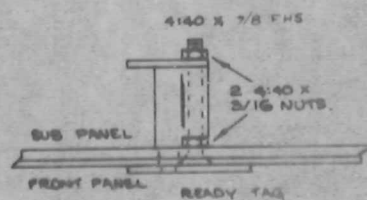


Fig. 5

INSTRUCTIONS (Con'd)

- () 10. Dress the wiring cable (from assembly) along the front sub-panel and the bottom of the sweep chassis, through the grommet installed in step 6.

NOTE: Pull as much of the cable as possible through the grommet, so that all wires will reach.

- () 11. Dress the white and white-violet wires from the cable toward the front panel, beneath the TRIGGER SLOPE switch, to the tie-point on the switch shown in Fig. 4.
- () Solder the wires to the tie-point, but leave room for two more leads.

NOTE: On 531's and 541's, below approximately s/n 5000, there is no tie-point on the switch. In this case, replace insulated terminal post between TRIGGER MODE switch and STABILITY potentiometer with two-pin nylon post (rod) from the kit. Solder old leads to bottom pin. Top pin will serve as tie-point referred to above.

C. TO INSTALL READY LIGHT:

- () 12. Turn the TRIGGERING LEVEL potentiometer fully counter-clockwise and make a light pencil mark on the front panel, in line with the white dot on the knob, to insure proper replacement.
- () Remove the STABILITY, TRIGGERING LEVEL, TRIGGER SLOPE and TRIGGERING MODE knobs.
- () 13. Select the correct template (from kit), according to the instrument type, and place the template over the front panel as indicated. Center-punch and drill the holes as shown on the template.
- () Countersink the 1/8 in. hole to receive the 4-40 FHS screw from the kit.

NOTE: It is suggested that the 9/32 in. hole be drilled undersize, then enlarged with a tapered reamer.

- () 14. Mount the neon READY light with the 4-40 x 7.8 FHS screw and 4-40 nuts from the kit (see Fig. 5).
- () 15. Remove the protective paper backing from the READY tag, carefully position it on the front panel over the neon light opening and press firmly into place.
- () 16. Replace the knobs removed in step 12. Make sure the white dot on the TRIGGERING LEVEL knob is aligned with the pencil mark when the potentiometer is counter-clockwise.
- () 17. Solder the bare wire (from neon assembly) to the grounded terminal on the STABILITY (rear) potentiometer (see Fig. 4).
- () 18. Insert the free end of the 10k resistor (from neon assembly) in the tie-point on the TRIGGER SLOPE switch (or nylon post), noted in step 11. DO NOT SOLDER YET.

NOTE: On RM31's and RM41's, place a length of plastic tubing (from kit) over the resistor lead attached to the tie-point.

- () 19. Place a length of plastic tubing (from kit) over each lead of the 0.005 μ f ceramic disc capacitor from the kit.
- () Insert one end of the capacitor in the tie-point above. Solder this lead and the 10k resistor lead to the tie-point.
- () Solder the other end of the capacitor to the grounded terminal on the last wafer of the TRIGGER SLOPE switch, as shown in Fig. 4.

INSTRUCTIONS (Con'd)

D. TO COMPLETE SWEEP WIRING:

REFER TO FIG. 6 FOR STEPS 20 THROUGH 24.

20. Solder the remaining wires from the cable to the following locations on the sweep deck:
 - () white-brown-black-brown to CSD-18
 - () white-green to CSC-9 (dress beneath CSD)
 - () white-blue-red to pin 5 of V40 (dress beneath CSD)
 - () white-black to CSD-9
 - () white-yellow to CSD-7
21. Unsolder the end of R46 (100 Ω , 1/2w 10% resistor) from CSC-10 and resolder it to CSD-10.
22. Replace R65 (39k, 1w 10% resistor), between CSC-14 and CSD-14, with the 80k resistor combination from the kit. Be sure to replace C67 (12pf discap) across the resistors.

23. Replace R66 (33k, 1w 10% resistor), between CSC-15 and CSD-15, with the 68k resistor combination from the kit.

NOTE: DO NOT let the resistor combinations touch.

24. Replace R32 (1.5k, 1/2w 10% resistor), between CSA-11 and CSB-11, with the 820 Ω resistor from the kit.
25. Install the 6AN8 tube (from kit) in the socket on the etched circuit board.

THIS COMPLETES THE INSTALLATION

- () Check wiring for accuracy.
- () Fasten the insert pages in your Instruction Manual.
- () Moisten the backs of the MODIFIED INSTRUMENT tags (from kit) and attach them to the Manual schematics affected by this modification.

BE:ls

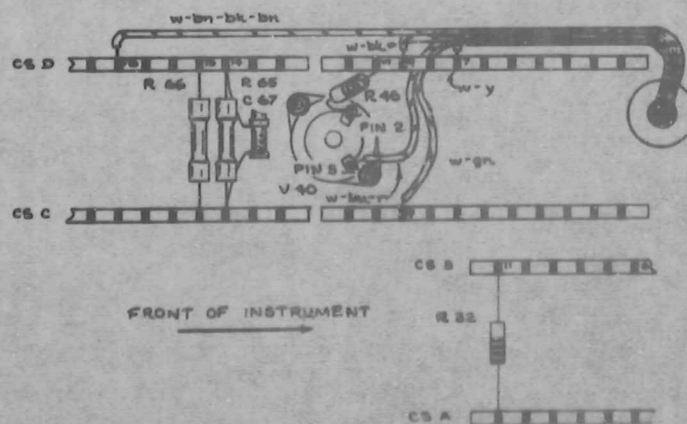


Fig. 6

SWEEP LOCKOUT

Types 531, 541, RM31, and RM41 -- All serial numbers

Installed in Type _____ s/n _____ Date _____

GENERAL INFORMATION

This modification provides the above instruments with the sweep lockout feature, enabling them to be used to study "one-shot" phenomena requiring a single sweep of the CRT spot.

OPERATING INSTRUCTIONS

To display a single-shot phenomenon:

1. Set the TRIGGERING MODE to AC SLOW or DC.
2. Set the RESET-SINGLE SWEEP-NORMAL lever switch, SW53, to NORMAL.
3. Adjust the STABILITY and TRIGGERING LEVEL controls for triggered operation. To do this, display successive trial single traces of the desired waveform or of a waveform having similar characteristics. Alternatively, you can use the calibrator waveform for a trial display.
4. Set the rest of the front panel controls for settings suited to the waveform to be observed.
5. Remove the signal source from the INPUT or CHANNEL connector. Set the lever switch to SINGLE SWEEP.
6. If the READY lamp is not lighted, push the lever switch to RESET. The lamp should now be lighted.
7. Connect the source of the expected signal to the INPUT or CHANNEL connector.

When a signal is received to trigger the sweep, a single sweep will occur. Following this, the READY lamp will be extinguished and subsequent signals will not trigger the sweep. The sweep circuits can be prepared for another sweep by pushing the lever switch to RESET.

THEORY OF OPERATION

When the RESET-SINGLE SWEEP-NORMAL lever switch, SW53, is in the NORMAL position, V41A is effectively removed from the circuit. V41B is the stability cathode follower used in the place of V40A. The plate current of V40A is held at cutoff because the grid is connected to -150 volts.

In the SINGLE SWEEP position of the lever switch, V41A and V41B form a bi-stable Schmitt multivibrator. In the first stable state that exists after the completion of the sweep and before the lever switch is moved to RESET, V41A is conducting while V41B is cut off. Under these conditions, the divider network in the grid circuit of V41A sets the voltage level of the common cathode circuits of V40 and V41. This level is high enough to hold V58A from being triggered by incoming trigger pulses from the sweep trigger circuit.

Moving the lever switch to RESET connects C45 to ground through R44. A positive-going pulse is applied to the grid of V41B, lowering the plate voltage. The negative-going plate voltage is transferred to the grid of V41A through the divider R50 and R51. As the cathode current of V41A cuts off, the plate voltage rises and the READY lamp ignites. This action is cumulative, ending with V41B conducting and V41A cut off. The transition to the second stable state of the sweep-arming multivibrator is now complete. Capacitor C50 speeds up the transition between the two multivibrator stable states.

The common cathode voltage of V40 and V41 is now set by the STABILITY control. The grid of V58A is lowered to a point where either of two conditions exists, depending upon the setting of the STABILITY control. If the STABILITY control is set in the full right position, a new sweep is initiated. If the STABILITY control is set for triggered operation, the sweep will be initiated by the next trigger pulse from the sweep trigger circuit.

As the CRT spot moves across the screen, a rising sawtooth voltage waveform at the grid of V40B eventually causes the tube to conduct. The potential at the V40B cathode starts to rise, V41B plate current cuts off and V41A conducts. The continued rise of V40B cathode potential eventually causes V41A to cut off also. Both cathodes of V41 are now held above their grid levels for the remainder of the sweep. The READY lamp lights during this interval. The change in potential at the cathode of V40B is applied to the grid of V58A. When the potential at the grid of V58A reaches the point at which the main sweep multivibrator reverts, the sweep is terminated.

During the retrace portion of the sweep sawtooth, the holdoff capacitor, C54, discharges and the potential at the cathode of V40B decreases. This decrease in potential causes V41A to conduct, the READY lamp extinguishes, and thus the sweep-arming multivibrator returns to the first stable state. We have now completed one cycle of operation and successive trigger pulses cannot initiate a new sweep until the lever switch is moved to RESET.

ELECTRICAL PARTS LIST

Values fixed unless marked variable. Only new parts listed.

Ckt. No.	Part Number	Description
		BULBS
B53	150-0030-00	Neon NE-2V raw

CAPACITORS

Tolerance $\pm 20\%$ unless otherwise indicated.

C44	283-0001-00	0.005 μ F	Cer	500V
C45	281-0543-00	270 pF	Cer	500V
C50	281-0503-00	8 pF	Cer	500V
C55	283-0001-00	0.005 μ F	Cer	500V

RESISTORS

Resistors are 10% composition unless otherwise indicated.

R32	302-0821-00	820 Ω	1/2W		
R44	309-0128-00	50 Ω	1/2W	prec	1%
R45	302-0106-00	10 M	1/2W		
R47	302-0101-00	100 Ω	1/2W		
R48	302-0223-00	22 k	1/2W		
R50	309-0161-00	106 k	1/2W	prec	1%
R51	309-0125-00	300 k	1/2W	prec	1%
R52	302-0101-00	100 Ω	1/2W		
R53	302-0123-00	12 k	1/2W		
R56	302-0103-00	10 k	1/2W		
R65 (40 k)	309-0108-00	80 k	1/2W	prec	1%
	309-0108-00	80 k	1/2W	prec	1%
R66 (34 k)	309-0042-00	68 k	1/2W	prec	1%
	309-0042-00	68 k	1/2W	prec	1%

SWITCHES

==SW53	260-0190-02	1 Lever	DPDT	RESET-SINGLE SWEEP-NORMAL
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TUBES

V41	154-0078-00	6AN8	Sweep-Arming Multi
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040-0118-00

Page 2 of 6

MECHANICAL PARTS LIST

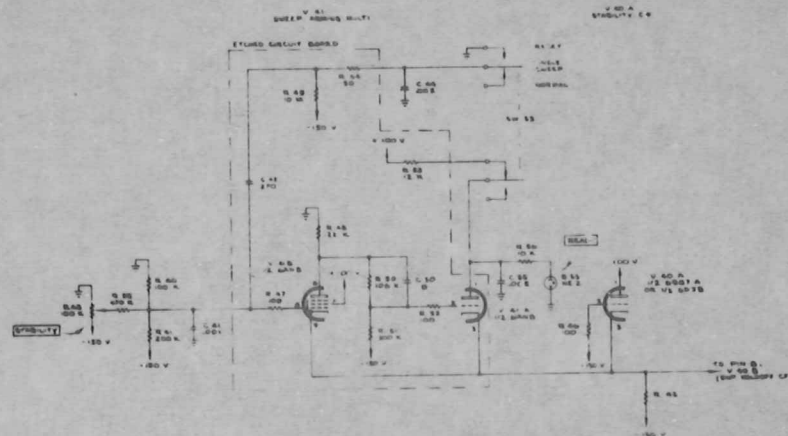
	Part Number
Board, circuit	386-0541-00
Bracket, aluminum	406-0147-00
Cable harness	179-0127-00
Filter, lens, neon holder	378-0541-00
Grommet, rubber, 3/8	348-0004-00
Holder, neon bulb, single	352-0067-00
Lockwasher, int. #4	210-0004-00
Lockwasher, int. 0.472-0.480 ID	210-0021-00
Nut, hex, 4-40 x 3/16	210-0406-00
Nut, hex, 15/32-32 x 9/16	210-0414-00
Nut, 12-sided, 15/32-32 x 9/16	210-0473-00
Rod, * nylon, 5/16 x 1-1/4, tap 6-32, w/2 pins	385-0041-00
Screw, 4-40 x 5/16 PHS, Phillips	211-0097-00
Screw, 4-40 x 7/8 FHS	211-0109-00
Socket, tube, circuit, 9-pin	136-0034-00
Tag, RESET-SINGLE SWEEP-NORMAL	334-0822-00
Tag, READY	334-0823-00

*Types 531 and 541 below s/n 5000 only

Make the following corrections in your Manual:

Change R32 (Sweep Trigger Diagram)	from 1.5 k to 820 Ω
R65 (Sweep Generator Diagram)	from 39 k to 40 k
R66 (Sweep Generator Diagram)	from 33 k to 34 k

SCHEMATICS

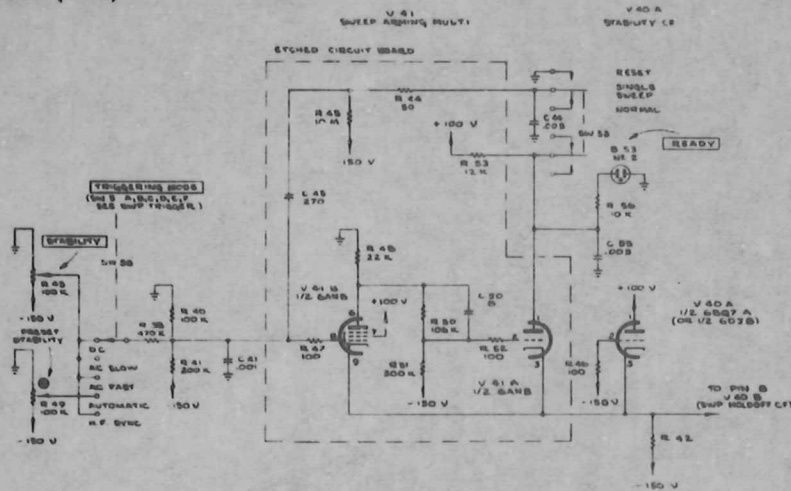


For instruments without AUTOMATIC triggering,
including the following instruments (if not modified):

Types 531 s/n 101-6019; 541 s/n 101-5414

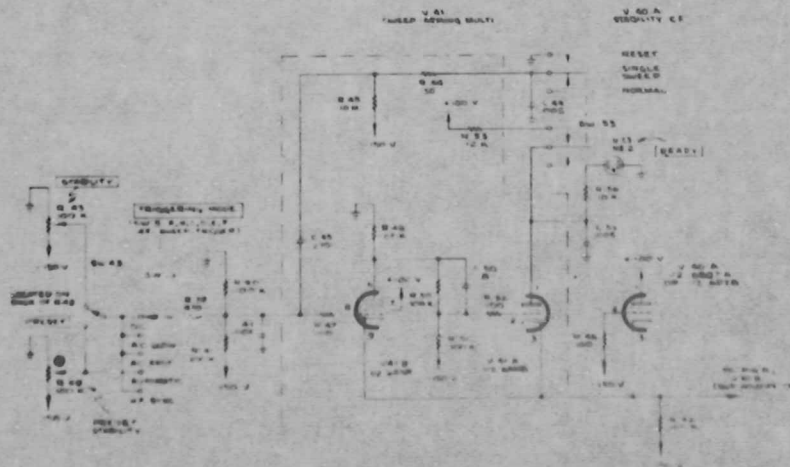
NOTE: The A and B sections of V40 are reversed
on some of the early schematics. Avoid connecting
the grid of the holdoff CF to -150v.

SCHEMATICS (cont)



For instruments with AUTOMATIC triggering, but without PRESET switch, including the following instruments (if not modified):

Types 531 s/n 6020-6710; 541 s/n 5415-5942



For instruments with both AUTOMATIC triggering and PRESET switch, including the following instruments:

Types 531 s/n 6711-20000; RM31 s/n 101-1000
541 s/n 5963-20000; RM41 s/n 101-1000



product modification

040-0152-00

Types 531, 535, 541, 545

PRESET STABILITY AND FULLY AUTOMATIC TRIGGERING INSTALLED

For the following TEKTRONIX® Type Oscilloscopes:

Types 531	Serial Numbers	608-6019
535	Serial Numbers	1075-6044
541	Serial Numbers	101-5414
545	Serial Numbers	101-5945

Modification Kit, PN 040-0152-00, supplies the necessary parts and instructions for adding special STABILITY/TRIGGERING LEVEL and PRESET ADJUST potentiometer assemblies, which provide the instrument with fully automatic triggering mod capabilities and permit triggering in the PRESET position without further control adjustments. In the improved AC AUTO triggering mode, the STABILITY and TRIGGERING LEVEL controls do not function.

This kit replaces Modification Kit 040-0153-00.

PARTS INCLUDED IN MODIFICATION KIT:

Quantity	Part Number	Description
(1 ea)		Assembly, STABILITY/TRIGGERING LEVEL potentiometer, consisting of:
1 ea	210-0012-00	Lockwasher, int, 3/8 x 1/2
1 ea	210-0413-00	Nut, hex, 3/8-32 x 1/2
1 ea	302-0223-00	Resistor, comp, 22k 1% 10%
1 ea	311-0096-00	Potentiometer, comp, 2 x 100k w/S. 31 switch
1 ea		Wire, #22 solid, 175-0522-00, w-o 2"
1 ea		Wire, #22 solid, 175-0522-00, w-o 10"
1 ea		Wire, #22 solid, 175-0522-00, w-bu 10"
(1 ea)		Assembly, PRESET ADJUST potentiometer, consisting of:
1 ea	210-0471-00	Nut, (spacer), miniature potentiometer
1 ea	311-0219-00	Potentiometer, comp, 200k 2W
1 ea		Wire, #22 solid, 175-0514-00, bk-bn-gn-bn 3"
1 ea	108-0010-00	Coil, fixed, 1.8μH
1 ea	210-0011-00	Lockwasher, int, 1/4 in.
1 ea	214-0210-00	Spool, w/3 ft. silver-bearing solder
1 ea	263-0503-00	Wafer, switch
1 ea	334-0825-00	Tag, PRESET ADJUST
1 ea	358-0054-00	Bushing, banana jack
1 ea	366-0064-00	Knob, PRESET, engraved
1 ea	(1-753D)	Template, drilling
1 ea		Wire, #22 solid, 175-0522-00, w-v 9"

INSTRUCTIONS

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

- () 1. Remove the STABILITY, TRIGGERING LEVEL, TRIGGERING MODE and TRIGGER SLOPE knobs.
- () 2. Place the template (from kit) over the TRIGGERING LEVEL potentiometer and TRIGGER SLOPE switch shafts.
- () Mark and drill a 1/4 in. hole in the front panel, as indicated on the template.
- () 3. Unsolder all leads from the STABILITY/TRIGGERING LEVEL potentiometer assembly.
- () Remove the potentiometer assembly.
- () 4. Mount the STABILITY/TRIGGERING LEVEL potentiometer assembly (from kit) in the hole vacated by the old potentiometer assembly.
- () 5. Mount the PRESET ADJUST potentiometer assembly (from kit) in the hole drilled in the front panel (step 2), using the bushing and lockwasher from the kit. Place the PRESET ADJUST tag (from kit) under the bushing and align the potentiometer with the terminals down (see Fig. 1).

NOTE: On some instruments, it may be necessary to move R1053 (30k 10W WW resistor) to allow room for the potentiometer assembly.

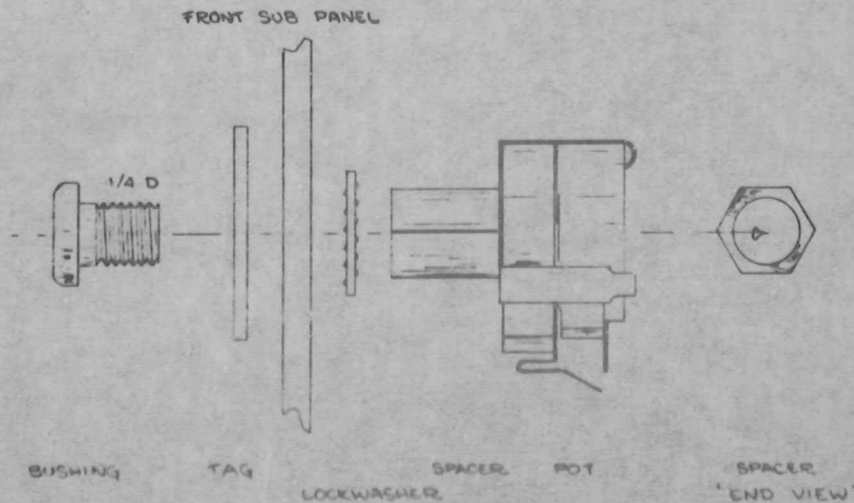
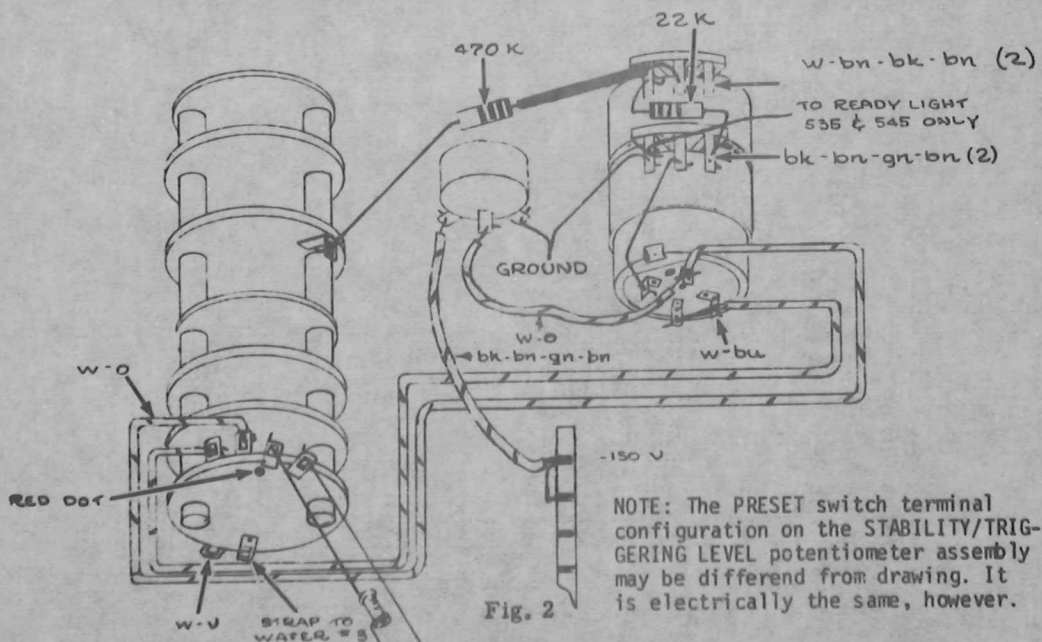


FIG. 1

INSTRUCTIONS (continued)

- () 6. Determine if the fifth (rear) wafer of the TRIGGERING MODE switch has three unused contacts on the front side. OMIT STEPS 7 and 8 IF THESE CONTACTS ARE ON THE SWITCH.
- () 7. Unsolder all the wires attached to the rear wafer of the TRIGGERING MODE switch.
- () 8. Replace the rear wafer with the wafer from the kit. It may be necessary to wedge a small screwdriver in the screw slot to prevent the screw from turning. Be sure red dot on wafer is at top and faces to rear of switch (see Fig. 2). Also, small notch on wafer rotor next to switch shaft should line up with the notches in other rotors.
- () 9. Solder the leads to the points indicated in Fig. 2. Pull the white-violet wire back to wiring harness to reach switch and clip off excess wire; or, locate the other end of the wire, clip off both ends where they enter the wiring cable and solder the white-violet wire (from kit) between the location shown in Fig. 2 and the point to which the old wire was connected.



- () 10. Replace the TRIGGERING MODE and TRIGGER SLOPE knobs (removed in step 1) on their shafts and tighten securely.
- () 11. Replace the TRIGGERING LEVEL knob (removed in step 1) on its shaft and tighten only enough to allow temporary operation of the control. The knob will be aligned later.

INSTRUCTIONS (continued)

- () 12. Place the PRESET knob (from kit) on the STABILITY shaft, align the knob so that the white dot is down (six o'clock) when the control is in the counter-clockwise (PRESET) position, and tighten securely.

PERFORM STEPS 13 THROUGH 15 ONLY ON THE FOLLOWING INSTRUMENTS:

Type 531 SN 608-651; Type 535 SN 1075-1207

- () 12. On the bottom of the Vertical Amplifier chassis, locate the bare wire connected from the BAKELITE® post to the ceramic strip (this is part of the trigger pickoff lead from V535 to the TRIGGER SLOPE switch).
- () Unsolder the bare wire from the pin on the BAKELITE post.
- () 14. Solder one end of the 1.8 μ H coil (from kit) to the pin.
- () 15. Solder the other end of the coil to the bare wire unsoldered in step 12. Trim the wire as necessary.

THIS COMPLETES THE INSTALLATION

- () Check wiring for accuracy.
- () Turn the instrument on. Align the TRIGGERING LEVEL knob as follows:
- a) Set the TRIGGERING MODE switch to AC SLOW.
 - b) Connect a voltmeter from the center terminal of the TRIGGERING LEVEL potentiometer to ground.
 - c) Adjust the TRIGGERING LEVEL potentiometer for zero volts when the meter is switched to its most sensitive range.
- CAUTION: Start on a higher range to protect the meter.
- d) Loosen the TRIGGERING LEVEL knob on its shaft and reset the knob so that the white dot is aligned with the '0' on the front panel when the voltmeter reads zero.
- () Refer to the Manual insert pages for Recalibration Procedure.
- () Fasten the insert pages in your Instruction Manual.

Type 531 SN608-651; Type 535 SN 1075-1207:

- () On the Vertical Amplifier diagram, in the Manual, add L536 (a 1.8 μ H coil) in the trigger pickoff lead from pin 3 of V535A to SW1A and SW1B.

BAKELITE Reg. TM of Union Carbide Corp.

TL:ls

INSTRUCTION MANUAL

MODIFICATION INSERT

PRESET STABILITY AND FULLY AUTOMATIC TRIGGERING INSTALLED

Type 531 -- SN 608-6019
Type 535 -- SN 1075-6044
Type 541 -- SN 101-5414
Type 545 -- SN 101-5945

Installed in Type _____ SN _____ Date _____

This insert has been written to supplement the Instruction Manual for these instruments. The information given in this insert will supersede that given in the manual.

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GENERAL INFORMATION

Modification Kit, PN 040-0152-00, supplies the necessary parts and instructions for adding special STABILITY/TRIGGERING LEVEL and PRESET ADJUST potentiometer assemblies, which provide the instrument with fully automatic triggering mod capabilities and permit triggering in the PRESET position without further control adjustments. In the improved AC AUTO triggering mode, the STABILITY and TRIGGERING LEVEL controls do not function.

This kit replaces Modification Kit 040-0153-00.

OPERATING INSTRUCTIONS

The PRESET position is selected when the STABILITY control is turned fully counter-clockwise. In this position only the TRIGGERING LEVEL control needs to be adjusted to trigger the sweep.

Automatic triggering is selected by placing the TRIGGERING MODE switch in the AC AUTO position. No other trigger adjustments are required. Since the TRIGGERING LEVEL control has no effect on the display when automatic triggering is used, it is impossible to select the point on the triggering waveform where the sweep is triggered. Instead, each sweep is triggered at the average voltage point of the waveform. (This mode is useful for triggering on waveforms from approximately 60Hz to 2MHz in frequency.)

RECALIBRATION

To set the PRESET ADJUST potentiometer, perform the following steps:

NOTE: It may be desirable to adjust the Triggering Level Centering, Trigger Sensitivity, and/or Int Trig DC Level Adj before performing these steps. Refer to the Calibration Procedure in your Instruction Manual.

1. Set the front panel controls as follows:

TRIGGERING MODE	--	AC AUTO
TRIGGERING SLOPE	--	+INT
TIME/CM	--	100 μ sec/CM
HORIZONTAL DISPLAY (535/545)	--	MAIN SWEEP NORMAL
HORIZONTAL DISPLAY (531/541)	--	INTERNAL SWEEP

2. Connect a voltmeter with its positive lead to the chassis and its negative lead to the terminal on the PRESET switch to which the white-orange wire is attached.

Notice that the voltage varies from zero to -150V as the PRESET ADJUST potentiometer is turned.

3. Turn the PRESET ADJUST potentiometer fully clockwise and adjust the INTENSITY and POSITIONING controls for a normal free-running trace.
4. Slowly turn the PRESET ADJUST potentiometer counter-clockwise and note the voltage point at which the trace dims.
Continue turning it counter-clockwise and note the point at which the trace extinguishes.
Repeat this step several times to insure accuracy.
5. Set the PRESET ADJUST potentiometer midway between these two voltage points.

ELECTRICAL PARTS LIST:

Values fixed unless marked variable.

Ckt.No.	Part Number	Description
COILS		
L536	108-0010-00	1.8 μ H
RESISTORS		
Resistors are all composition.		
R14	311-0096-00*	100k var
R43		100k var
R49	311-0219-00	200k 0.2W var
SWITCHES		
SW43	311-0096-00*	PRESET

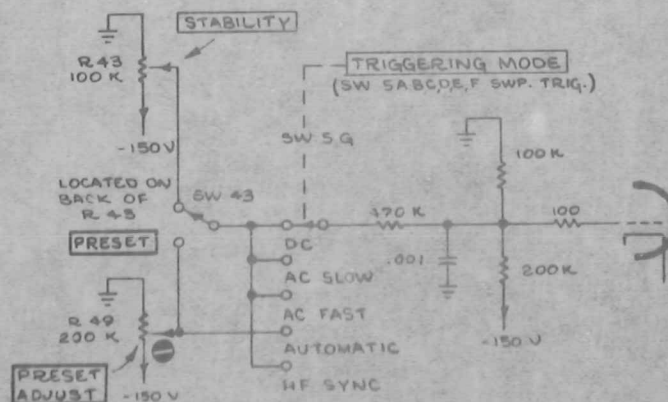
NOTE: SW1 and SW5 retain their old part number (262-0080-00), although a new switch section is added.

*R14, R43 and SW43 furnished as a unit.

MECHANICAL PARTS LIST

358-0054-00	Bushing, banana jack
366-0064-00	Knob, PRESET, engraved
210-0011-00	Lockwasher, int, 1/4 in.
210-0012-00	Lockwasher, int, 3/8 x 1/2
210-0413-00	Nut, hex, 3/8-32 x 1/2
210-0471-00	Nut, (spacer) miniature potentiometer
334-0825-00	Tag, PRESET ADJUST

SCHEMATICS





FIELD MODIFICATION KIT

file 040-153
Types 530/540 Series
date December 27, 1957

Type 531 Oscilloscope S/N 5454 thru 6019

Type 535 Oscilloscope S/N 5470 thru 6044

K530/K540-2 Preset Stability

Type 541 Oscilloscope
S/N 5254 thru 5414

Type 545 Oscilloscope
S/N 5351 thru 5945

Tek Number 040-153

INTRODUCTION:

Preset Stability features a way of providing easy sweep stability setting. When the STABILITY control is full left, an auxiliary preset stability potentiometer is switched into the triggering circuitry. Only the TRIGGERING LEVEL control needs to be adjusted for effective triggering.

Operation of the triggering circuitry is further improved when TRIGGERING MODE is set for AC AUTO. Both front-panel STABILITY and TRIGGERING LEVEL controls do not function and triggering becomes automatic.

KIT LIST:

Quantity	Description	Tek Number
1 each	Potentiometer Assembly, consisting of:	
	1 each potentiometer, comp, 100k x 100k, $\frac{1}{2}$ W, R14, R43, SW43	311-096
	1 each resistor, comp, 22k, $\frac{1}{2}$ W, 10% R15	302-223
	10", #22 wire, white-orange	
	10", #22 wire, white-blue	
1 each	Potentiometer Assembly, consisting of:	
	1 each potentiometer, comp, 100k, 2W R49	311-026
	1 each tag, PRESET STABILITY	334-644
	1 each grounding lug	210-207
	1 each washer	210-240
	1 each nut	210-413
	11", wire, #22, brown-green-brown	
	8", wire, #22, white-orange	
1 each	Knob, PRESET engraved	366-064
12"	Wire, #22, bare, strapping	
1 each	Photo	
1 set	Manual Schematic	
1 set	Instructions	

TEKTRONIX FIELD MODIFICATION (Cont.)

INSTRUCTIONS:

- () 1. Remove: STABILITY, TRIGGERING LEVEL, TRIGGERING MODE, TRIGGER SLOPE knobs. Discard STABILITY KNOB.
- () 2. Unsolder all leads from STABILITY and TRIGGERING LEVEL potentiometers.
- () 3. Remove STABILITY and TRIGGERING LEVEL potentiometer assembly and discard.

NOTE: If the serial number of your oscilloscope is:

Type 531,	S/N 5521 through 6019
Type 535,	S/N 5553 through 6044
Type 541,	S/N 5283 through 5414
Type 545,	S/N 5642 through 5945

You do not need to remove the TRIGGERING MODE, TRIGGER SLOPE switch, so you can disregard steps 4, 5, 6, 7, and 10. Proceed to step 8 after locating hole punched in chassis under and to the outside of the TRIGGERING MODE, TRIGGER SLOPE switch.

- () 4. Unsolder all wires leading to the TRIGGERING MODE, TRIGGER SLOPE switch. Do not displace wires. Save the 470 k resistor.

NOTE: Unsolder the external trigger lead at the coax connector-- (not at the switch.)

- () 5. Remove switch, save for reinstallation.
- () 6. Drill a 3/8" hole on sweep chassis 7/8" from right side of chassis and 1-3/8" from the front. This is for R49, 100 k potentiometer.
- () 7. Drill a hole, using a #27 drill, 1-3/8" from the front of sweep chassis and 1-3/8" from the right side. This is for the index of R49.
- () 8. Mount R49, 100 k potentiometer in hole made in step 6 with shaft pointing upwards, placing PRESET STABILITY tag under nut.

NOTE: It will be easier to insert wires from potentiometer thru grommet located near front panel and to the right of TRIGGERING MODE, TRIGGER SLOPE switch before mounting potentiometer.

- () 9. Mount new STABILITY, TRIGGERING LEVEL potentiometers (from kit) in front panel hole where old potentiometers were removed.
- () 10. Mount TRIGGERING MODE, TRIGGER SLOPE switch removed in Step 5.
- () 11. Solder the two white-brown wires, removed in Step 2, to CW terminal of TRIGGERING LEVEL potentiometer. (This is potentiometer nearest the front panel). (Some instruments have only one wire.).

December 27, 1957
K530/K530-2 Preset Stability

Tek No. 040-118
Page 2 of 2

TEKTRONIX FIELD MODIFICATION (Cont.)

- () 12. Solder one end of R16, 470 k, $\frac{1}{2}$ w resistor, removed in step 4, to center terminal of TRIGGERING LEVEL potentiometer.
- () 13. Solder the two brown-green-brown wires, removed in step 2, in CW terminal of STABILITY potentiometer.
- () 14. Insert ground lead from chassis lug, removed in step 2, in CCW terminal of STABILITY potentiometer. On Types 531 and 541, solder. On Types 535 and 545 also insert ground lead from ready-light indicator and solder both wires.

NOTE: If the serial number of your oscilloscope is:

Type 531,	S/N 5521 through 6019
Type 535,	S/N 5551 through 6044
Type 541,	S/N 5253 through 5414
Type 545,	S/N 5642 through 5945

You can disregard steps 15 through 28. Proceed to step 29.

NOTE: The following method is used to identify the TRIGGERING MODE, TRIGGER SLOPE switch wafers and terminals.

The switch wafers are numbered consecutively from front to rear, i.e., wafer No. 1 is nearest the front panel, and No. 5 is at the rear.

There are 12 positions on each wafer and only a part of them will have contacts or terminals on them. These positions are numbered 1 thru 12 in a clockwise direction. Looking at the switch from the front, number 1 position is located directly above, and adjacent to the left side of wafer mounting rod. Counting clockwise, No. 2 position will be above, and to the right of position No. 1. No. 12 position is directly below the left side wafer mounting rod.

- () 15. Solder the two white-blue-red wires (unsoldered in step 4) to both terminals at position No. 5 of first wafer.
- () 16. Solder the #20 strap wire from position No. 9 of first wafer to External Trigger Input connector on front panel.
- () 17. Solder white-green wire that comes from R3, 50 k, INT. TRIGGER DC LEVEL ADJ. to terminal at position No. 11 of 1st wafer.
- () 18. Solder strap from terminal at position No. 1 of first wafer to tie point on bakelite or nylon post located to the left of wafers 1 & 2. This is the internal trigger lead from the vertical amplifier.

TEKTRONIX FIELD MODIFICATION (Cont.)

- () 19. Solder other end of R16, 470 k, $\frac{1}{2}$ w resistor to terminal at position No. 1 of 2nd wafer.
- () 20. Solder 47 Ω , $\frac{1}{2}$ w resistor (unsoldered in step 4) from pin 2 of V8 socket to both terminals at position No. 11 of 2nd wafer.
- () 21. Solder 47 Ω , $\frac{1}{2}$ w resistor (unsoldered in Step 4) from pin 7 of V8 socket to both terminals at position No. 12 of 2nd wafer.
- () 22. Locate the 11-slot ceramic strip nearest the front panel and 2nd from left of sweep chassis. Counting from the front panel solder the lead from slot #10 (this is the junction of R21, 47 k, $\frac{1}{2}$ w resistor) to the terminal at position of No. 1 of the 4th wafer.
- () 23. Solder white wire (some instruments this wire is black) from slot No. 5 of ceramic strip described in step 22 to terminal at position No. 4 of 4th wafer.
- () 24. Solder the white wire that comes from slot No. 6 of ceramic strip described in step 22 to the terminal at position No. 10 of 4th wafer.
- () 25. Solder the 2.7 k, $\frac{1}{2}$ w resistor that comes from slot No. 9 of ceramic strip described in step 22 to the terminal No. 11 of 4th wafer.
- () 26. Solder a piece of #20 strapping wire from slot No. 11 of ceramic strip described in step 22 to terminal at position No. 2 of 5th wafer.
- () 27. Solder C58, 27 μ f, ceramic capacitor from slot No. 8 of 11-slot ceramic strip located adjacent and to the right of strip described in step 22 to terminal of position 3 of 5th wafer.
- () 28. Solder white-orange-green-brown wire (+350) that was removed in step 4 to terminal at position No. 7 of 4th wafer.
- () 29. Pull the white-purple wire that was unsoldered from STABILITY pot in Step 2 back in the wiring harness at right side of sweep chassis. Cut off, leaving enough to reach terminal at position No. 8 of 5th wafer. Solder at this point.
- () 30. Dress the white-orange wire, from PRESET switch along sweep chassis and under the switch, insert in terminal at position No. 4 of 5th wafer; do not solder.
- () 31. Insert the white-orange wire that comes from PRESET potentiometer installed in step 8 in terminal at position No. 4 of 5th wafer. Solder both wires.
- () 32. Dress the white-blue wire from PRESET switch along side the wire installed in step 30 and solder the end to terminal at position 5 of 5th wafer.

TEKTRONIX FIELD MODIFICATION (Cont.)

INSTRUCTIONS: (CONT.)

- () 33. Dress the brown-green-brown wire that comes from PRESET potentiometer installed in step 8 along right side of sweep chassis toward the rear. Solder to slot 11 of 11-slot ceramic strip. This is the 1st strip from front panel and adjacent to the right chassis flange.
- () 34. Install the new STABILITY and TRIGGERING LEVEL knobs.
- () 35. Inspect for possible wiring errors, then turn instrument on.
- () 36. To set TRIGGERING LEVEL controls to physical center--(For this adjustment, the TRIGGERING MODE control should not be set to AC AUTO.)
- A. Connect a voltmeter from the junction of R16 and R17 to chassis. (R16 is connected to the center arm of the Main Sweep TRIGGERING LEVEL control, which is the control nearest the panel in the dual-control assembly of which it is a part). Set the Main Sweep TRIGGERING LEVEL control so that zero deflection is obtained even on the lowest range of the voltmeter.
- b. Loosen the Main Sweep TRIGGERING LEVEL knob on its shaft. Turn the knob on its shaft so that its index points to "0" on the panel, and tighten the knob on the shaft. Re-check that a voltmeter reading of zero is obtained when the knob index is at "0". Remove the voltmeter connections.
- () 37. To adjust TRIGGERING LEVEL CENTERING -- Settings:
- | | |
|--------------------------------|----------------------|
| Main Sweep TRIGGERING LEVEL--- | TIME/CM--1 millise |
| TRIGGER SLOPE--INT | 5X MAGNIFIER--OFF |
| TRIGGERING MODE--AC SLOW | HORIZONTAL DISPLAY-- |
| | MAIN SWEEP NORMAL |
- a. Display calibrator signal. Set calibrator output and the VOLTS/CM switch for 3 or 4 mm of vertical deflection. Set Main Sweep STABILITY control and the TRIGGERING LEVEL CENTERING control so that a stable display is obtained. Then make further adjustments of TRIGGERING LEVEL CENTERING, R36, so that the sweep triggers equally well on +INT and -INT settings of the TRIGGER SLOPE switch.

NOTE: The Main Sweep STABILITY control and the Main Sweep TRIGGERING LEVEL control may be touched up slightly to obtain the above result. The final setting of the Main Sweep STABILITY control will be in the vicinity of that needed just to produce triggering. The final setting of the Main Sweep TRIGGERING LEVEL control will be essentially at "0".

(Continued)

TEKTRONIX FIELD MODIFICATION (Cont.)

INSTRUCTIONS: (Cont.)

() 37. (Continued)

a. NOTE: After the TRIGGERING LEVEL CENTERING is adjusted, reliable triggering must be obtained as the TRIGGER SLOPE switch is moved back and forth between the +INT and the -INT positions without touching the Main Sweep TRIGGERING LEVEL or Main Sweep STABILITY controls.

b. Check the polarity of the TRIGGER SLOPE switch on +INT and -INT positions. The leading edge at the left end of the graticule should be a rising edge when the switch is in the +INT position, and it should be a falling edge when the switch is in the -INT position.

NOTE: If the reverse of this is apparent, re-check the connections of the two 47Ω , $\frac{1}{2}W$ resistors that were soldered to the switch in Steps 20 and 21. These could be reversed.

() 38. To set INT TRIG DC LEVEL, display calibrator waveform at about 2 or 3 mm vertical deflection. Keep the display centered vertically about the graticule horizontal center line. Use these settings:

Main Sweep TRIGGERING LEVEL--0
TRIGGER SLOPE---+INT
5X MAGNIFIER--OFF
HORIZONTAL DISPLAY--MAIN SWEEP NORMAL

TRIGGERING MODE---DC
TIME/CM---1 milliseC
MULTIPLIER--X1

Adjust the Main Sweep STABILITY control and the INT TRIG DC LEVEL control for a stable trace. With correct adjustment of the INT TRIG DC LEVEL, the sweep will trigger equally well on +INT and on -INT slope settings, with a given setting of the Main Sweep STABILITY control.

() 39. To check AC AUTO operation - Settings:

Main Sweep TRIGGERING LEVEL--CW
Main Sweep STABILITY--CW
TRIGGER SLOPE---+INT
TRIGGERING MODE--AC AUTO

TIME/CM ---100 μ Sec
MULTIPLIER--X1
5X MAGNIFIER--OFF
HORIZ. DISPLAY--MAIN SWEEP NORMAL

TEKTRONIX FIELD MODIFICATION (Cont.)

INSTRUCTIONS: (Cont.)

() 39. (Continued)

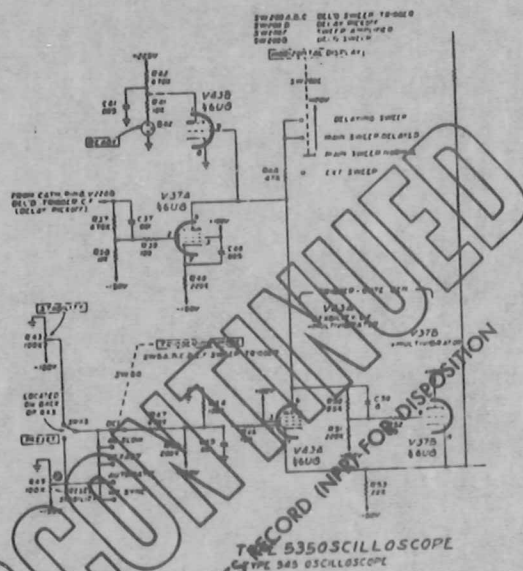
Use no signal input. Operation in the AC AUTO mode is indicated if, upon advancing the internal PRESET STABILITY control slowly CW, you obtain a trace, and if further advance of this control results abruptly in a brightening of the trace. (The first trace results from triggering of the sweep by the trigger-shaper multivibrator operating in a free-running manner at about 50 cps. The brightening occurs when the sweep generating circuits themselves become free-running at advanced internal PRESET STABILITY settings.) Turn the control CCW until the first condition (a faint trace) returns to the screen.

Now apply sufficient calibrator signal to provide 2 mm of vertical deflection. Set the TIME/CM control to 0.1 millise. A stable display should be obtained when the internal PRESET STABILITY control is set for triggered operation of the sweep. A further check on the AC AUTO mode is obtained by removing the input lead at the calibrator connector. Usually sufficient 60-cps signal will be picked up in the room so that if the bare end of the lead is held in the hand, a (distorted) ac wave can be obtained on the screen. The TIME/CM and VOLTS/CM controls should be set to obtain a display of suitable size on the screen, and it should be checked that a stable display can be obtained by setting the internal PRESET STABILITY control if necessary.

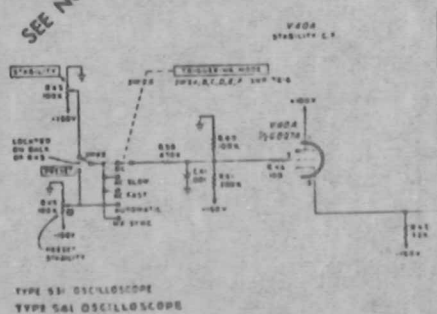
December 27, 1957
K530/K540-2 Preset Stability

Tek No. 040-153
Page 7 of 7

These schematics should be cut out and pasted over a portion of the indicated schematic-diagram in order to correct your manual to the circuits changed by this Preset Stability modification.



Cut out and paste the above schematic in the lower left-hand corner area on the Type 995 or Type 545 Main Sweep Generator page.



Cut out and paste the above schematic in the lower left-hand corner area on the Type 531 or Type 541 Sweep Generator page.

Tek 4042-152
Tek 4040-153
Tek 4040-154

K530/K540-2 PRESET STABILITY
K530/K540-3 PRESET STABILITY

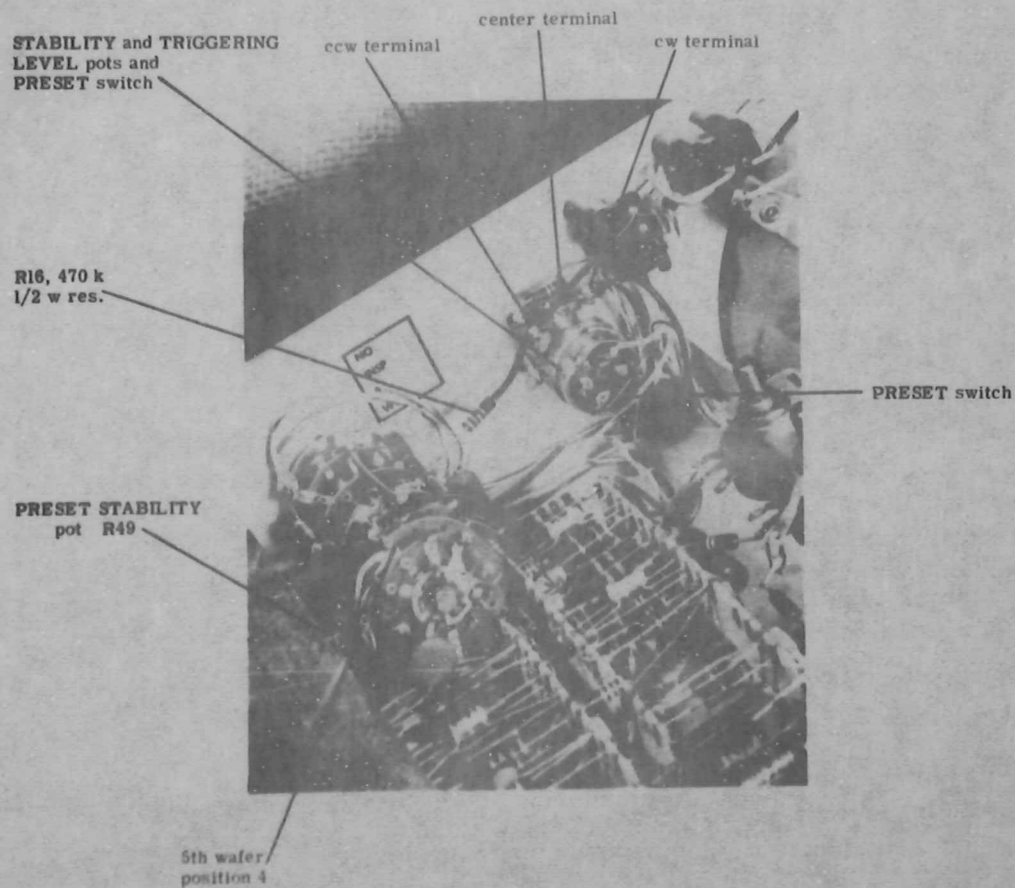
December 27, 1957

Type 531 Oscilloscope
S/N 5454 thru 6710

Type 541 Oscilloscope
S/N 5254 thru 5942

Type 535 Oscilloscope
S/N 5470 thru 7552

Type 545 Oscilloscope
S/N 5551 thru 7400



MODIFICATION KIT

PRESET SWITCH



For the following Tektronix Oscilloscopes:

Types 531 serial numbers 6020-6710
535 serial numbers 6045-7552
541 serial numbers 5415-5942
545 serial numbers 5946-7400

DESCRIPTION

This modification provides the above listed instruments with a PRESET position of the STABILITY control.

The new position provides an optimum setting which permits proper triggering in most applications without further adjustment of the control.

040-0154-00

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Instructions for 040-0154-00
December 1966

Supersedes:
040-154

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040-0154-00

Page 1 of 3

PARTS LIST

Quantity	Part Number	Description
(1 ea)		Assembly, potentiometer, consisting of:
1 ea	210-0012-00	Lockwasher, int 3/8 x 1/2
1 ea	210-0413-00	Nut, hex, 3/8-32 x 1/2
1 ea	302-0223-00	Resistor, comp, 22k 1/2W 10%
1 ea	311-0096-00	Potentiometer, comp, 2x100k w/SPDT switch
1 ea	(175-0522-00)	Wire, #22 solid, 12 in. white-orange
1 ea	366-0064-00	Knob, PRESET, engraved
1 ea	(1-910D)	Tag, MODIFIED INSTRUMENT, gummed back

INSTRUCTIONS

- () 1. Remove the STABILITY and TRIGGERING LEVEL knobs.
- () 2. Unsolder all leads from the STABILITY/TRIGGERING LEVEL potentiometer assembly.
- () Remove the potentiometer assembly.
- () 3. Mount the new potentiometer assembly (from kit) in the hole vacated by old assembly.
- () 4. Solder the wires to the potentiometer assembly as indicated in Figs. 1 and 2.
- () 5. Solder the white-orange wire (from assembly) to the TRIGGERING MODE switch terminal shown in Fig. 1. (There is already one white-orange wire soldered to this terminal.)
- () 6. Replace the TRIGGERING LEVEL knob (removed in step 1) on its shaft and tighten only enough to allow temporary operation of the control. Knob will be aligned later.
- () 7. Place the PRESET knob (from kit) on the STABILITY shaft, align the knob so that the white dot is down (six o'clock) when the control is in the counter-clockwise (PRESET) position, and tighten securely.

THIS COMPLETES THE INSTALLATION.

- () Check wiring for accuracy.
- () Turn the instrument on. Align the TRIGGERING LEVEL knob as outlined in following steps:
 - a. Set the TRIGGERING MODE switch to AC SLOW.
 - b. Connect a voltmeter from the center terminal of the TRIGGERING LEVEL potentiometer to ground.
 - c. Adjust the TRIGGERING LEVEL potentiometer for zero volts when the meter is switched to its most sensitive range.

CAUTION: Start on a high range to protect the meter.

 - d. Loosen the TRIGGERING LEVEL knob on its shaft and reset the knob so that the white dot is aligned with the "O" on the front panel when the voltmeter reads zero.
- () Check adjustment of the Preset Stability potentiometer as indicated in the Calibration Procedure in your Manual.
- () Fasten the insert pages in your Instruction Manual.
- () Moisten the back of the MODIFIED INSTRUMENT tag (from kit) and place it on the Manual schematic page affected by this modification.

BE:ls

INSTRUCTIONS (cont)

- NOTE: 1) There may be either 1 or 2 white-brown-black-brown wires, depending on the instrument.
- 2) The PRESET switch terminal configuration on the potentiometer assembly may vary. Fig. 2 shows the proper connection for the white-blue wire in each case.

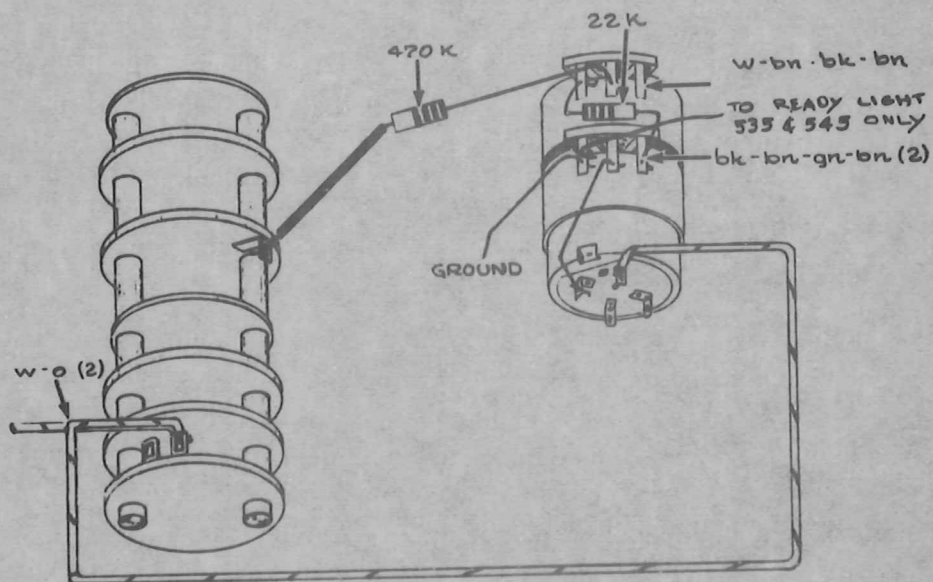


FIG. 1

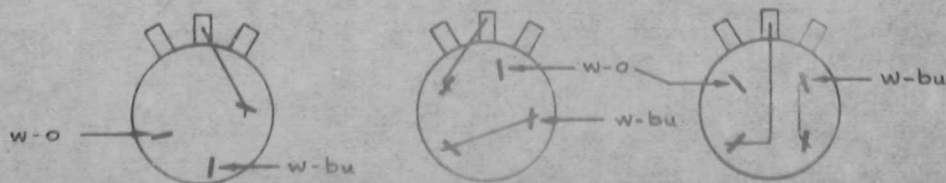


FIG. 2

PRESET SWITCH

Types 531 -- SN 6020-6710 541 -- SN 5415-5942
 535 -- SN 6045-7552 545 -- SN 5946-7400

Installed in Type _____ SN _____ Date _____

GENERAL INFORMATION

This modification provides the above listed instruments with a PRESET position of the STABILITY control.

The new position provides an optimum setting which permits proper triggering in most applications without further adjustment of the control.

OPERATING INSTRUCTIONS

The PRESET position is selected when the STABILITY control is turned fully counter-clockwise. In this position, only the TRIGGERING LEVEL control needs to be adjusted to trigger the sweep.

ELECTRICAL PARTS LIST

Ckt.No.	Part Number	Description
RESISTORS		
R14	311-0096-00*	100k Var comp
R43		100k Var comp

SWITCHES

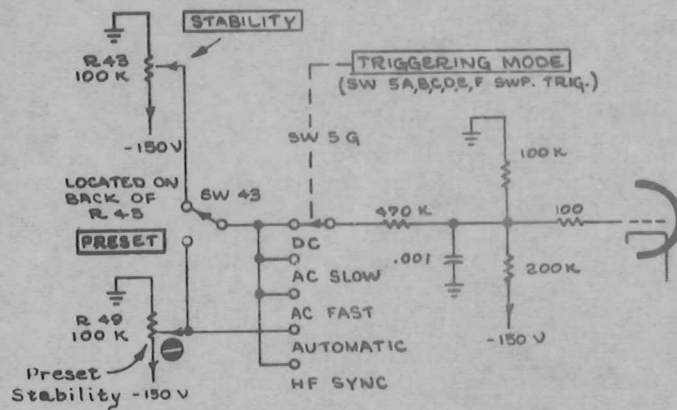
SW43	311-0096-00*	PRESET
------	--------------	--------

* R14, R43 and SW43 furnished as a unit.

MECHANICAL PARTS LIST

366-0064-00	Knob, PRESET, engraved
210-0012-00	Lockwasher, int, 3/8 x 1/2
210-0413-00	Nut, hex, 3/8-32 x 1/2

SCHEMATICS



(Partial Diagram)
SWEEP GENERATOR

MODIFICATION KIT

MAXIMUM INTENSITY



For the following Tektronix Oscilloscopes:

Types: 531, 531A, 532, 533, 533A, 535, 535A,
541, 541A, 543, 543A, 545, 545A
All serial numbers

DESCRIPTION

The object of this modification is to prevent cathode-ray tube phosphor from burning, especially at slow sweep speeds. Basically the modification consists of replacing the 1 M INTENSITY potentiometer with two 2 M potentiometers in parallel. One is a screwdriver adjustment, the other is the front panel INTENSITY control.

WARNING: IF THE MAXIMUM INTENSITY POTENTIOMETER IS ADJUSTED FOR BEST PHOSPHOR PROTECTION AT SLOW SWEEP SPEEDS, THE WRITING RATE WILL NOT BE ADEQUATE AT THE FASTEST SWEEP SPEEDS. CONSEQUENTLY, A READJUSTMENT OF THE MAXIMUM INTENSITY POTENTIOMETER IS NECESSARY.

CONVERSELY, IT SHOULD BE RESET AGAIN AT THE SLOW SPEEDS.

The screwdriver adjusted potentiometer is set for maximum required intensity when the front panel INTENSITY CONTROL is fully clockwise.

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April 1969

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December 1966

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040-0159-00

040-0159-00

Page 1 of 3

PARTS LIST

Quantity	Part Number	Description
(1 ea)		Assembly, potentiometer, consisting of:
1 ea	210-0012-00	Lockwasher, int, 3/8 x 1/2
1 ea	210-0013-00	Lockwasher, int, 3/8 x 11/16
1 ea	210-0494-00	Nut, hex, aluminum bushing
## 1 ea	311-0043-02	Potentiometer, 2M, 3/8 x 3/8 w/insulated shaft
1 ea	358-0010-00	Bushing, aluminum
1 ea	(175-0522-00)	Wire, #22 solid, 2 in. white-orange
1 ea	(175-0522-00)	Wire, #22 solid, 2 in. white-brown
2 ea	210-0614-00	Rivet, aluminum, 1/16 x 3/16
1 ea	311-0043-00	Potentiometer, 2M, 3/8 x 3/8 w/insulated shaft
1 ea	334-0527-00	Tag, MAX INT, adjust
1 ea	334-0741-00	Tag, MAX INT

Indicates change since last publication.

INSTRUCTIONS

- () 1. Unsolder the three wires from the INTENSITY potentiometer.
- () 2. Remove the INTENSITY knob.
- () 3. Remove the INTENSITY potentiometer and replace it with the 2M potentiometer (from kit) that doesn't have wire connected to it.
- () Replace the knob.
- () 4. Locate the plate on top of the plug-in housing. On the outside flange, mark and drill a 3/8 in. hole, 3/4 in. from the bottom, and 3 in. from the front panel (see drawing).
- () 5. Install the 2M potentiometer (from kit) that has the two wires soldered to it. Use the large lockwasher on the inside of the flange, install the bushing from the outside over the MAX INT tag and tighten with a 1/4 in. allen wrench (see drawing, step 5).
- () 6. Solder the white-green wire to the center terminal of the INTENSITY potentiometer.
- () 7. Solder both the white-brown wires (one that was removed from the old INTENSITY potentiometer, and one that is connected to the MAX INT potentiometer installed in step 5) to the counter-clockwise terminal of the new INTENSITY potentiometer (see drawing).
- () 8. Solder both white-orange wires (one that was removed from the old INTENSITY potentiometer, and one that is connected to the MAX INT potentiometer installed in step 5) to the clockwise terminal of the new INTENSITY potentiometer (see drawing, step 8).
- () 9. Drill a 3/8 in. adjustment access hole in the cabinet.
- () 10. Drill two #50 rivet holes and mount tag onto cabinet.

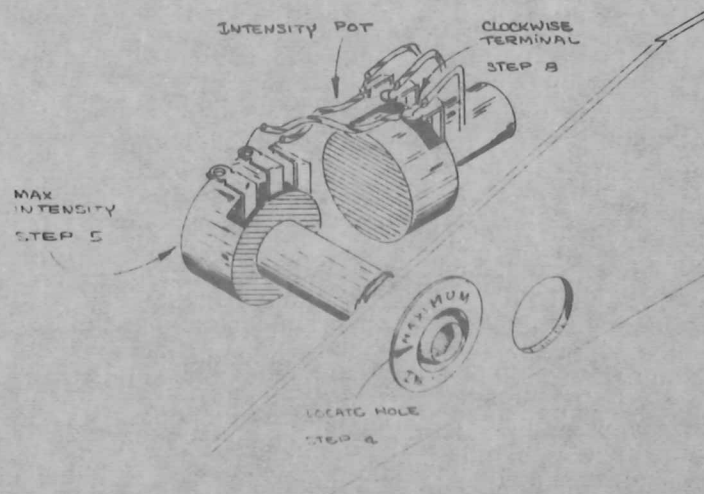
THIS COMPLETES THE INSTALLATION.

INSTRUCTIONS (cont)

- () Check wiring for accuracy.
- () Correct your Instruction Manual as required.
- () Turn on the instrument and free-run the sweep at the fastest sweep speed.
- () Set the MAXIMUM INTENSITY potentiometer fully counter-clockwise and the front panel INTENSITY control fully clockwise.
- () Adjust the MAX INT potentiometer to give optimum intensity with a sharply focused trace (maximum writing rate).

NOTE: If the instrument is not used for maximum writing rate application, you might want to set the MAX INT potentiometer a little below the optimum intensity point to give ample protection against phosphor burning.

BE:ls



MODIFICATION KIT

12 KV HIGH VOLTAGE

For the following Tektronix Oscilloscopes:

541 s/n 101-20000	545 s/n 101-20000
RM41 s/n 101- 1000	RM45 s/n 101- 1000
541A s/n 20001-up	545A s/n 20001-up
RM41A s/n 1001-up	RM45A s/n 1001-up
543 s/n 101- 3000	581 s/n 101- 3974
RM43 s/n 101- 1000	581A s/n 3975- 4999*
543A s/n 3001-up	585 s/n 101- 5968
RM43A s/n 1001-up	585A s/n 5969- 8999*
	RM85A s/n 100- 999*

DESCRIPTION

This modification increases the CRT accelerating potential to provide greater intensity at fast sweep speeds. This is accomplished by replacing the 10kv high voltage transformer with a 12kv transformer.

The vertical and horizontal deflection sensitivities of the CRT are reduced approximately 15%; a special graticule is used to compensate for this reduction. All front panel and manual references to "CM" should be interpreted as "DIV." (For example: Read "TIME CM" as "TIME DIV.")

*NOTE: This kit can be installed in instruments, above these serial numbers, with EXTERNAL graticule CRT's. It can also be installed in instruments above these serial numbers with INTERNAL graticule CRT's providing the instrument is converted to an EXTERNAL graticule CRT first.

For converting to EXTERNAL graticule CRT's, refer to Page 4 of these instructions.

The EXTERNAL graticule CRT must be ordered separately.

CRT, EXTERNAL, gr.0, PTH T5810-4L
134-0354-00

CRT, EXTERNAL, gr.0, PTH T5810-11
134-0230-00

EXTRA PHOSPHORS ALSO AVAILABLE



040-017

Publication:
Instructions for 040-0176-01
May 1965

Superceded by:
040-0176-00

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040-0176-01

Page 4 of 7

December 27, 1957
K530/K540-2 Preset Stability

Tek No. 040-153
Page 5 of 7

PARTS LIST

Quantity	Description	Part Number
1 ea.	Template	001-0656-00
1 ea.	Transformer, high voltage	120-0066-00
2 ea.	Bulb, incandescent #47, 6-8 v	150-0001-00
1 ea.	Screw, 6-32 x 3/8 BHS	211-0510-00
1 ea.	Screw, thread-cutting type 1, 4-40 x 3/8 FHS	213-0012-00
1 ea.	Spool, w/3ft. silver-bearing solder	214-0210-00
1 ea.	Capacitor, cer., 500 pf 10 kv	281-0556-00
1 ea.	Resistor, comp., 1.8 Meg 1/2 w 10%	302-0185-00
1 ea.	Potentiometer, comp., 50 Ω WW	311-0055-00
1 ea.	Graticule	331-0052-00
1 ea.	Tag, HV ADJ., -1640 V	334-0720-00
1 ea.	Shield, (modified)	337-0143-00
1 ea.	Cam, nylon 3/8 OD x 0.150H	401-0004-00

INSTRUCTIONS

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

- () 1. Remove the shield over the HV Supply and discharge all capacitors.
- () 2. Locate the 5042 (high voltage rectifier) filament windings on the high voltage transformer. Each winding consists of a single loop of insulated wire around the transformer core.
- () Unsolder the end of each filament winding which passes around the outside of the transformer core (do not unsolder the other end of the winding).
- () 3. Unsolder all remaining wires from the HV transformer.

PERFORM STEPS 4 THROUGH 6 ONLY IF YOUR INSTRUMENT HAS ACCESS HOLES IN THE SWEEP CHASSIS FOR THE HV TRANSFORMER MOUNTING NUTS.

- () 4. Loosen the HV transformer mounting nuts and remove transformer.

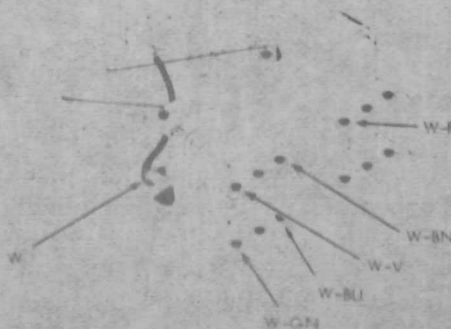
NOTE: On some instruments this will necessitate the temporary removal of the shunt resistor bracket, fastened to the rear panel.

- () 5. Install the new 12 kv transformer from the kit. Replace the HV rectifier filament windings (unsoldered in step 2) around the transformer core.
- () 6. Remove the rear-most HV board mounting screw.
- () Mount the plastic shield (from kit), using the 6-32 x 3/8 BHS screw from the kit.

INSTRUCTIONS (con'd)

PERFORM STEPS 7 THROUGH 11 ONLY IF YOUR INSTRUMENT HAS NO ACCESS HOLES FOR THE HV TRANSFORMER MOUNTING NUTS

- () 7. Unsolder the bare (if present) between the HV board and the ceramic strip just forward of the board.
- () 8. Remove the three mounting screws that hold the HV board to the chassis.
- () 9. Raise the end of the HV board and loosen the HV transformer mounting nuts.
- () Remove the transformer, at the same time withdrawing the rectifier filament windings from the core.
- () 10. Install the new 12kv transformer from the kit. Replace the HV rectifier filament windings (unsoldered in step 2) around the transformer core.
- () 11. Position the HV board and mount the plastic shield (from kit), using the 6-32 x 3/8 BHS screw from the kit.
- () Install the remaining screws and resolder the bare wire unsoldered in step 7.
- () 12. Resolder the HV rectifier filament leads (unsoldered in step 2) to the original ceramic strip notches.
- () Apply corona dope to all connections which were previously coated.
- () 13. Solder the wires to the transformer as indicated in the drawing.
- () 14. Locate the 2.2 Meg 1/2w resistor, mounted between the center terminal of the HV ADJ. potentiometer and pin 2 of V810 (or V814).
- () Replace this resistor with the 1.8 Meg resistor from the kit.



040-0176-01

INSTRUCTIONS (con'd)

PERFORM STEP 15 ONLY FOR TYPES 541A, 543,
545A AND THEIR RACKMOUNT VERSIONS.

- () 15. Locate the 10 kv capacitor mounted beneath the handle assembly (cabinet-type instruments) or guide rail assembly (rackmount instruments) and connected from the HV Anode lead to ground.
- () If this is a 500 pf capacitor, proceed with step 16.
- () If this is a 470 pf capacitor, replace it with the 500 pf capacitor from the kit.

NOTE: On cabinet-type instruments, the handle assembly may be temporarily removed to facilitate installation of capacitor.

- () 16. Remove the protective paper backing from the "HV ADJ. -1640 V" tag from the kit.
- () Apply the tag firmly on the side of the Sweep chassis, over old "HV ADJ. -1350 V" silkscreening.

PERFORM STEPS 17 THROUGH 22 FOR TYPES 581A, 585A,
AND RM585A THAT HAVE INTERNAL GRATICULE CRT'S.

- () 17. Remove the graticule nuts, graticule cover, light filter or scratch shield, hold-down spring or plastic ring, "eyebrow" plate, and CRT. Be sure to disconnect CRT neck pins before removing CRT.
- () 18. Replace the graticule lights with the #47 bulbs from the kit.
- () 19. Replace the SCALE ILLUM potentiometer with the 50 Ω potentiometer from the kit.
- () 20. Place the template (from kit) over graticule studs and center-punch the hole for the graticule cam.
- () 21. Drill a #41 hole and mount the graticule cam (from kit) using the 4-40 FHS thread-cutting screw from the kit.
- () 22. Install the external graticule CRT, connect the neck pins, and tighten neck clamp.
- () Install the graticule (from kit) and the old graticule cover and nuts.

THIS COMPLETES THE INSTALLATION.

- () Check wiring for accuracy.
 - () Replace the HV shield, removed in step 1.
 - () Turn instrument on and adjust HV ADJ. for -1640 volts at the HV test point (see Instruction Manual).
 - () Adjust graticule cam as follows: Display a trace on the CRT and rotate the CRT or adjust the Trace Beam Rotation potentiometer to align the trace with the horizontal graticule lines.
 - () Position the trace vertically and note the limits of the scan area.
 - () With the graticule cam, position the graticule to the center of the scan area. Tighten the graticule to the center of the scan area. Tighten the graticule cam screw.
 - () Replace the graticule with the new one from the kit (unless installed in step 22).
 - () Check the calibration of the horizontal and vertical circuits (substituting "DIV" for all references to "CM").
- Fasten the insert pages in your Instruction Manual. Change all references to "-1350 v" in the Calibration Procedure in your Manual to read "-1640 v". Also, correct the component values on the CRT circuit diagram, as indicated on the insert parts list.

IF C H505B

12 KV HIGH VOLTAGE

Types:	541 s/n 101-20000	545A s/n 20001-up
	RM41 s/n 101- 1000	RM45A s/n 1001-up
	541A s/n 20001-up	581 s/n 101-3974
	RM41A s/n 1001-up	581A s/n 3975-4999
	543 s/n 101- 3000	585 s/n 101-5968
	RM43 s/n 101- 1000	585A s/n 5969-8999
	543A s/n 3001-up	RM85A s/n 100- 999
	RM43A s/n 1001-up	
	545 s/n 101-20000	
	RM45 s/n 101- 1000	

Installed in Type _____ s/n _____

GENERAL INFORMATION

This modification increases the CRT accelerating potential to provide greater intensity at fast sweep speeds. This is accomplished by replacing the 10kv high voltage transformer with a 12kv transformer.

The vertical and horizontal deflection sensitivities of the CRT are reduced approximately 15%; a special graticule is used to compensate for this reduction. All front panel and manual references to "CM" should be interpreted as "DIV." (For example: Read "TIME/CM" as "TIME/DIV.")

The information on on these pages supersedes the information in your Manual.

CALIBRATION PROCEDURE

Any Manual references to "-1350 v" should be corrected to read "-1640 v."

ELECTRICAL PARTS LIST

Values fixed unless marked Variable.

Ckt. No.	Part Number	Description
----------	-------------	-------------

BULBS

B601	581A, 585A, RM85A	150-0001-00	#47
B602			

CAPACITORS

Tolerances $\pm 20\%$ unless otherwise indicated.

C825	543 A, RM43 A				
C836	541A, RM41A, 545A, RM45A, 581 A, 585 A, RM585A	281-0556-00	500 pf	10 kv	Cer.

ELECTRICAL PARTS LIST (con'd)

Ckt. No.	Part Number	Description
----------	-------------	-------------

RESISTORS

Resistors are 10% composition unless otherwise indicated.

R602	581A,585A,RM585A	311-0055-00	50 Ω	Var.	WW	SCALE ILLUM
R812	541,RM41,543/A, RM43/A,545,RM45					
R841	541A,RM41A,545A, RM45A,581,585/A, RM585A	302-0185-00	1.8 Meg	1/2 w		

TRANSFORMERS

T801	120-0066-00	12kv High Voltage
------	-------------	-------------------

MECHANICAL PARTS LIST

	Part Number
Cam, nylon 3/8 OD x 0.150H	401-0004-00
Graticule	331-0052-00
Screw, thread-cutting, 4-40 x 3/8 FHS	213-0012-00
Screw, 6-32 x 3/8 BHS	211-0510-00
Shield, (modified)	337-0143-00
Tag, HV ADJ., -1640 V	334-0720-00

MODIFICATION KIT

VERTICAL AMPLIFIER BIAS



For the following Tektronix Oscilloscopes:

Type 541 s/n 6475- 7022
Type 543 s/n 101- 181
Type 545 s/n 9292-11691
Type RM41 s/n 101- 142
Type RM45 s/n 101- 205
Type 551* s/n 101- 291

* Order two kits for Type 551 Oscilloscope.

DESCRIPTION

This modification increases the bias on the 6DK6's used in the distributed amplifier, resulting in greater reliability of the tubes and better stability of the Vertical Amplifier.

040-0191-00

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March 1965

Supersedes:
July 1964

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040-0191-00

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PARTS LIST

Quantity	Description				Part Number
1 ea.	Resistor, comp.	2.2k	1w	10%	304-0222-00
1 ea.	Resistor, WW,	3k	5w	5%	308-0062-00
1 ea.	Resistor, WW,	10k	8w	5%	308-0126-00

INSTRUCTIONS

- () 1. Locate R1017 (R2017 in Type 551), mounted on the top and near the front of the Vertical Amplifier chassis. Replace this resistor with the 10k 8w WW resistor from the kit.
- () 2. Locate R1016 (R2016 in Type 551), a 4k 5w WW resistor, connected between R1017 (step 1) and ground (between R2017 and ground in Type 551). Replace this resistor with the 3k 5w WW resistor from the kit.
- () 3. Locate R1031 (R2031 in Type 551), a 4.7k 1w comp resistor, mounted on the ceramic strips on the bottom of the

Step 3 (con'd)

Vertical Amplifier chassis above and halfway between C1093 and C1003 (above C1093 and above C2093 in Type 551). Replace this resistor with the 2.2k 1w resistor from the kit.

THIS COMPLETES THE INSTALLATION

- () Check wiring for accuracy.

NOTE: Refer to your Instruction Manual for the Vertical Amplifier adjustment procedure to recalibrate your instrument after this modification is installed.

GG/CH:cc/lis

MODIFICATION KIT

CHOPPING TRANSIENT BLANKING



For the following Tektronix Oscilloscopes:

Types 531, 535, 541 and 545
Serial numbers 5001-20000

Types RM31, RM35, RM41 and RM45
Serial numbers 101-1000

DESCRIPTION

This modification allows a blanking voltage to be applied to the CRT cathode, to eliminate switching transients from the display which occur when a multiple-trace plug-in unit is operated in its chopped mode. The blanking voltage is applied by means of a switch on the rear panel of the instrument.

040-0198-01

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Instructions for 040-0198-01
March 1965

Supersedes
October 1963

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040-0198-01

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Quantit

1 ea.
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1 ea.
1 ea.
1 ea.
1 ea.
2 ea.
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1 ea.
1 ea.
1 ea.

Page

PARTS LIST

Quantity	Description				Part Number
1 ea.	Transformer, Toroid, 6T bifilar				120-155
1 ea.	Tube, vacuum 6J6				154-032
1 ea.	Nut, hex, 15/32-32 x 9/16				210-414
1 ea.	Nut, switch, 15/32-32 x 5/64, 12-sided				210-473
1 ea.	Washer, steel, 1/2 x 5/8 x 0.020				210-845
2 ea.	Screw, thread-forming, 4 x 1/4 PHS, Phillips				213-088
1 ea.	Switch, toggle, SPDT				260-209
2 ea.	Capacitor, cer,	12pf	500v	±0.6pf	281-508
1 ea.	Capacitor, cer,	22pf	500v	±2.2pf	281-511
1 ea.	Resistor, comp,	36k	1/2w	5%	301-363
1 ea.	Resistor, comp,	10k	1/2w	10%	302-103
1 ea.	Resistor, comp,	10meg	1/2w	10%	302-106
1 ea.	Resistor, comp,	1.8meg	1/2w	10%	302-185
1 ea.	Resistor, comp,	270k	1/2w	10%	302-274
1 ea.	Resistor, comp,	8.2k	1w	10%	304-822
1 ea.	Tag, CHOPPING SPIKE BLANKING				334-674
1 ea.	Tag, tube, "6J6"				334-692
1 ea.	Tag, CRT CATHODE SELECTOR				334-706
1 ea.	Post, nylon, 2-hole				385-075
1 ea.	Post, nylon, 3-hole				385-096
2 ea.	Tag, MODIFIED INSTRUMENT, gummed back				(001-910)
1 ea.	Wire, no.22 solid,	6 in.	white-brown-black-brown		(175-522)
1 ea.	Wire, no.22 solid,	19 in.	white		(175-522)
1 ea.	Wire, no.22 solid,	7 in.	white		(175-522)
1 ea.	Wire, no.22 solid,	6 in.	bare		(176-005)
1 ea.	Wire, solder, silver-bearing, 24 in.				

INSTRUCTIONS

NOTE: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

1. TYPES 531, 535, 541 and 545 ONLY

- () a. On the rear of the instrument, locate the two binding posts marked GND and CRT CATHODE.
- () b. $15/16$ " from the center of the binding post marked GND toward the center of the instrument and in line with both binding posts, mark and drill a small pilot hole.
- () c. Drill or ream out the hole to $1/2$ ".
- () d. Place the hex nut (from kit) on the switch and tighten it against the bottom of the shank.
- () e. Mount the switch in the hole drilled in step 1c, using the flat washer and the 12-sided switch nut from the kit. (Mount with the terminals toward the top). See Fig. 1.

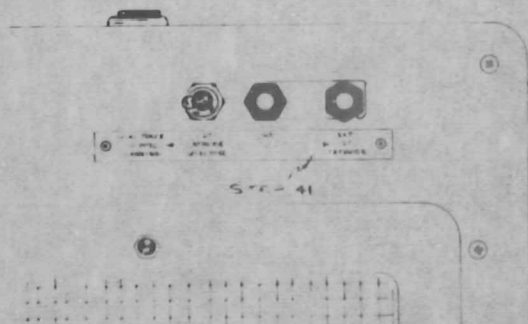


Fig. 1

2. TYPES RM31, RM35, RM41, RM45 ONLY

- () a. Remove the instrument from the cabinet and on the rear sub-panel locate the two binding posts. (The binding post nearest the center of the instrument is the GND binding post).
- () b. $15/16$ " from the center of the GND binding post toward the center of the instrument and in line with both binding posts, mark and drill a small pilot hole.
- () c. Drill or ream out the hole to $1/2$ ".
- () d. Place the hex nut (from kit) on the switch and tighten it against the bottom of the shank.
- () e. Mount the switch in the hole drilled in step 2c, using the CHOPPING SPIKE BLANKING tag and the 12-sided nut from the kit. (Mount switch with terminals toward top of instrument). See Fig. 2.



Fig. 2

INSTRUCTIONS (Con'd)

- () 3. Loosen the solder lug on the CRT CATHODE binding post and point it in a downward direction. Retighten.
- () 4. Unsolder the white wire connected to CSC-1 and resolder it to the left terminal (as seen from the front of the instrument) of the switch mounted in step 1 or 2. See Fig. 3.
- () 5. Solder the 7 in. white wire (from kit) between CSC-1 and the center terminal of the switch. See Fig. 3.
- () 6. Remove the bare wire, connected between the Swp Length potentiometer (R88) and the 4k, 5w WW resistor (R89).
- () 7. Remove the 4k, 5w WW resistor (R89).
- () 8. Resolder R89 from the front terminal of the Swp Length potentiometer to the rear terminal of the Swp/Mag Regis potentiometer (see Fig. 4, step 8).
- () 9. Unsolder the end of the 68k, 2w resistor (R840) from CSA-20 and temporarily bend the resistor back out of the way (see Fig. 4).
- () 10. Remove and discard the 1.8 meg resistor (R83) connected between CSA-22 and CSC-17 (see Fig. 4).
- () 11. Unsolder and remove the bare wire soldered from pin 5 of V78 to CSA-22.
- () 12. Unsolder the white wire soldered to CSA-22.
- () 13. Remove the 10k, 1/2w resistor (R80) soldered from pin 1 of V78 to CSC-19.
- () 14. Remove the bare wire soldered from pin 2 to pin 4 of V78, but leave the bare wire connecting pin 4 to ground.
- () 15. Remove the bare wire soldered from pin 7 of V78 to CSA-23.
- () 16. Remove the 1 meg resistor (R82) soldered from pin 6 of V78 to CSA-21.
- () 17. Remove and discard the white-brown-black-brown wire connected between pin 6 of V78 and CSC-12 (see Fig. 4).
- () 18. Solder a 6 in. white-brown-black-brown wire (from kit) between CSC-12 and CSA-22; dress the wire along the cable harness (see Fig. 4).
- () 19. Unsolder the remaining white-brown-black-brown wire from pin 6 of V78 and solder it to CSA-22 (see Fig. 4).
- () 20. Solder the 270k, 1/2w resistor (from kit) from pin 5 of V78 to CSA-22 (see Fig. 4).
- () 21. Solder a no. 22 bare wire (from kit) between pin 7 of V78 and the ground lug on the V78 tube socket.
- () 22. With lacquer thinner, remove the printing on the chassis near V78 calling out "6AU6".
- () 23. Mount the "6J6" tag (from kit) under one of the V78 socket mounting screws.
- () 24. Solder the 8.2k, 1w resistor (from kit) between pin 2 of V78 and CSC-12.
- () 25. Unsolder and temporarily remove the two white wires passing through the nylon post in Fig. 3.
- () 26. Replace this post with the 3-hole nylon post from the kit (see Fig. 3).
- () 27. Dress the white wire (from pin 16 of the plug-in connector) through the middle hole in the 3-hole post; pass it through the grommet and solder it to CSA-21 (see Fig. 4).
- () 28. Locate the 1-hole nylon post, mounted on the bottom of the F and I chassis above the neck of the CRT (see Fig. 3).
- () 29. Pull the other white wire (unsoldered in step 23) back through the hole in the post.
- () 30. Replace the 1-hole post with the 2-hole post from the kit.
- () 31. Dress the above white wire through the top hole (hole furthest from chassis) in the 2-hole post, the top hole in the 3-hole post (step 24) and through the grommet.
- () 32. Solder this wire to CSA-20 (see Fig. 4).
- () 33. Solder one end of the 19 in. white wire (from kit) to pin 2 of V78.

INSTRUCTIONS (Con'd)

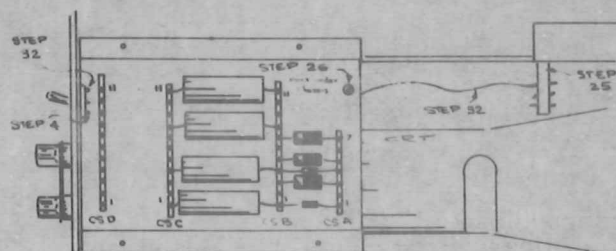


Fig. 3

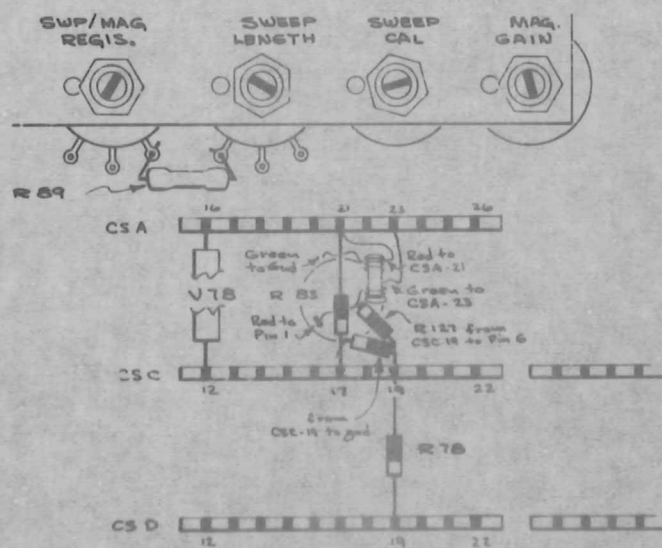


Fig. 4

INSTRUCTIONS (Con'd)

- () 32. Dress the other end of this wire through the same grommet that the white wire soldered to R840 (68k, 2w resistor) is dressed through, through the bottom hole of the 3-hole post (step 24), through the bottom hole of the 2-hole post (step 28), through the grommet below the Geom Adj potentiometer and solder it to the right hand terminal of the switch mounted in step 1 or 2 (see Fig. 5, step 32).

33. Install T129, a 6T bifilar wound transformer as follows (see Fig. 6):

- () Select one of the red wires and connect it to pin 1 of V78.
- () The green wire, which is paired with the red wire connected to pin 1, connects to ground lug of V78 tube socket.
- () The second red wire connects to CSA-21.
- () Second green wire connects to CSA-23.
- () 34. Solder C129 (22pf capacitor, from kit) between pin 5 of V78 and CSA-21 (see Fig. 6).
- () 35. Replace the 47k, 1/2w resistor (R78), between CSC-19 and CSD-19, with the 10meg, 1/2w resistor from the kit (see Fig. 6).

NOTE: In some instruments R78 will be a 36k resistor instead of a 47k.

- () 36. Solder the 10k, 1/2w resistor (from kit) between pin 6 of V78 and CSC-19 (see Fig. 6).
- () 37. Solder R128 (36k 1/2w resistor, from kit) between CSC-19 and the ground lug of V78 tube socket (see Fig. 6).
- () 38. Resolder the end of the 68k resistor (unsoldered in step 9) to CSA-20.
- () 39. Solder the 1.8meg, 1/2w resistor (from kit) between CSA-21 and CSC-17 (see Fig. 6).
- () 40. Replace V78 with the 6J6 tube from kit.
41. TYPES 531, 535, 541, 545 ONLY
- () Line up the CRT CATHODE SELECTOR tag (from kit) below the binding posts on the rear of the instrument so that it covers the existing printing and mark the mounting hole positions.
- () Drill two no. 43 holes and mount the tag with the 4 x 1/4 thread-forming screws from the kit (see Fig. 7).

42. TYPES RM31, RM35, RM41, RM45 ONLY

- () The binding post cut-out on the rear of the cabinet may have to be enlarged. The cut-out should be 1-1/4" wide x 3-3/4" long. If this is not the case, follow the procedure below.
- () a. Clip the template from page 9 and cut out that area of the template which is enclosed by the solid line.
- () b. Align this hole over the cut-out in the rear of the cabinet. (Area of template enclosed by dotted line extending towards the center of instrument).
- () c. Locate the point on the template which is marked with a "+".
- Transfer this point onto the cabinet with a center punch or a scribe.
- () d. Using this point as the center, punch out the area with a 1-1/4" circular chassis punch.
- () e. Smooth out the edge of the hole with a file.
- () f. Place the cabinet back on the instrument.

43. If you are using the Type 53/54C plug-in unit with serial number lower than 14078, or a Type 53C plug-in unit, it will be necessary to make the following modification to the plug-in:

- () a. TYPE 53/54C ONLY
- Solder one of the 12pf ceramic capacitors (from kit) between pin 1 and pin 7 of V3803.
- () Solder the other 12pf ceramic capacitor (from kit) between pin 2 and pin 5 of V3803.
- () b. TYPE 53C ONLY
- Solder one of the 12pf ceramic capacitors (from kit) between pin 1 and pin 7 of V3793.
- () Solder the other 12pf ceramic capacitor (from kit) between pin 2 and pin 5 of V3793.

INSTRUCTIONS (Con'd)

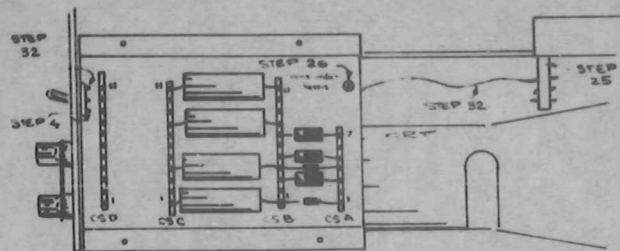


Fig. 5

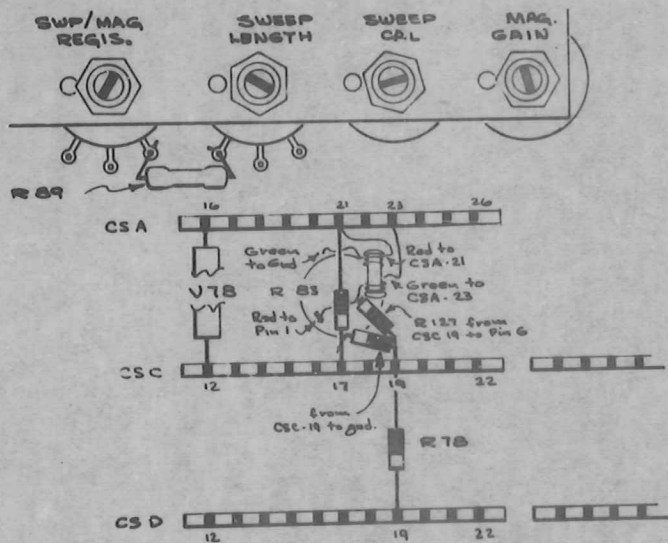


Fig. 6

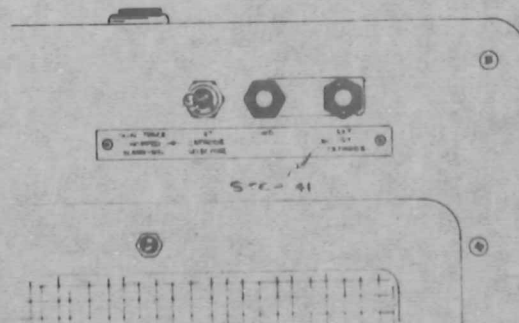


Fig. 7

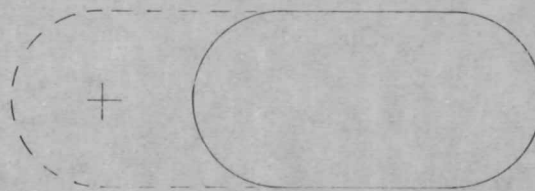
INSTRUCTIONS (Con'd)**THIS COMPLETES THE INSTALLATION**

- () Check wiring for accuracy before turning on instrument.
- () Moisten the backs of the MODIFIED INSTRUMENT tags (from kit) and place them on the

manual schematic pages affected by this modification.

- () Fasten the insert pages in your Instruction Manual.
- () Refer to your manual insert section for proper operating instructions.

JB/JT:cc/lr



TEMPLATE

CHOPPING TRANSIENT BLANKING

Types 531, 535, 541 and 545 -- Serial numbers 5001-20000
Types RM31, RM35, RM41, and RM45 -- Serial numbers 101-1000

Installed in Type _____ s/n _____

GENERAL INFORMATION

This modification allows a blanking voltage to be applied to the CRT cathode, to eliminate switching transients from the display when a multiple-trace plug-in unit is operated in its chopped mode. The blanking voltage can be applied by means of a switch on the rear panel of the oscilloscope.

NOTE: When using this instrument with a Type 53/54C plug-in unit below s/n 14078, or a Type 53C plug-in unit, the plug-in must be modified. For a Type 53/54C, add a 12pf 500v ceramic capacitor (C3743) between pins 1 and 7 of V3803; another 12pf capacitor (C3753) between pins 2 and 5 of V3803. For a Type 53C, add a 12pf capacitor (C3793) between pins 1 and 7 of V3793; another 12pf capacitor (C3794) between pins 2 and 5 of V3793.

OPERATING INSTRUCTIONS

- () 1. Insert a Type 53C, 53/54C or CA Dual Trace plug-in unit into your instrument and check for proper operation as indicated in the following steps.

- () 2. Set the instrument controls as follows:

CRT CATHODE SELECTOR SW -- DUAL
TRACE CHOPPED BLANKING
TIME/CM -- 10 μ sec/CM
TRIGGER -- +INT/AUTO
Operating Mode (C Unit) -- CHOPPED

- () 3. Turn on power.

- () 4. By adjusting the Vertical Position of both A and B inputs, display the switching square wave.

At normal intensity the switching transient should be blanked out.

- () 5. Place the CRT CATHODE SELECTOR switch in the EXT CATHODE position.

You should now be able to see the switching transient.

ELECTRICAL PARTS LIST

Values fixed unless marked Variable. Only new parts listed.

CAPACITORS

Ckt. No.	Part Number	Description
C129	281-511	22pf cer 500v ± 2.2 pf

RESISTORS

Resistors are 10% composition unless otherwise indicated.

Part Number	Value	Power	Notes
R83	302-185	1.8 meg	1/2w
R125	302-106	10 meg	1/2w
R127	302-103	10k	1/2w
R128	301-363	36k	1/2w
R129	302-274	270k	1/2w
R137	304-822	8.2k	1w

SWITCHES

Part Number	Description
W301	260-209 SPDT or CHOPPED SPDT BLANKING (RM31, RM35, RM41, RM45)

TRANSFORMERS

Ckt. No.	Part Number	Description		
T129	120-155	Toroid	6T	bifilar

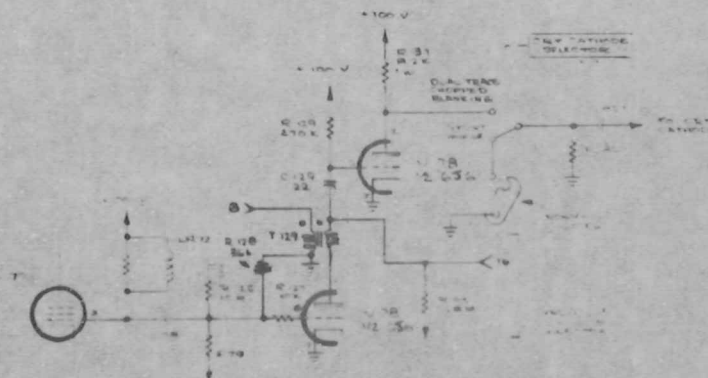
ELECTRON TUBES

V78 154-032 6J6

MECHANICAL PARTS LIST

	Part Number
Nut, switch, 15/32-32 x 5/64, 12-sided	210-473
Nut, hex, 15/32-32 x 5/16	210-414
Post, nylon, 2-hole	385-075
Post, nylon, 3-hole	385-096
Screw, thread-forming, no.4 x 1/4 PHS, Phillips	213-088
Tag, CHOPPING SPIKE BLANKING	334-674
Tag, CRT CATHODE SELECTOR	334-706
Tag, tube, "6J6"	334-692
Washer, steel, 1/2 x 5/8 x 0.020	210-845

SCHEMATICS



Partial Drawing -- SWEEP GENERATOR
(also see CRT CIRCUIT diagram)

MODIFICATION KIT

CHOPPING TRANSIENT BLANKING

For the following Tektronix Instruments:
Types 531, 535, 541 and 545
Serial numbers 101-5000

DESCRIPTION

This modification allows a blanking voltage to be applied to the CRT cathode, to eliminate switching transients from the display which occur when a multiple-trace plug-in unit is operated in its chopped mode.

The blanking voltage is applied by means of a switch on the rear panel of the instrument.



Quantity

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March 1965

Supersedes:
October 1964

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040-0200-01

Page 1 of 2

Page 2

PARTS LIST

Quantity	Description				Part Number
1 ea.	Transformer, Toroid, 6T bifilar				120-155
1 ea.	Tube, vacuum, 6J6				154-032
1 ea.	Nut, switch				210-414
1 ea.	Nut, switch				210-473
1 ea.	Washer, switch				210-845
2 ea.	Screw, thread-forming, no.4 x 1/4 PHS, Phillips				213-088
1 ea.	Switch, toggle, SPDT				260-209
2 ea.	Capacitor, cer,	12pf	500 v	±0.6 pf	281-508
1 ea.	Capacitor, cer,	22pf	500 v	±2.2 pf	281-511
1 ea.	Resistor, comp,	36 k	1/2 w	5%	301-363
1 ea.	Resistor, comp,	10k	1/2 w	10%	302-103
1 ea.	Resistor, comp,	10 meg	1/2 w	10%	302-106
1 ea.	Resistor, comp,	1.8 meg	1/2 w	10%	302-185
1 ea.	Resistor, comp,	270k	1/2 w	10%	302-274
1 ea.	Resistor, comp,	8.2k	1 w	10%	304-822
1 ea.	Tag, CRT CATHODE SELECTOR				334-687
1 ea.	Tag, tube "6J6"				334-692
1 ea.	Grommet, 1/4 in.				348-002
1 ea.	Post, nylon, 2-hole				385-075
1 ea.	Post, nylon, 3-hole				385-096
1 ea.	Wire, no.22 solid,	6 in.	white-brown-black-brown		(175-522)
1 ea.	Wire, no.22 solid,	7 in.	white		(175-522)
1 ea.	Wire, no.22 solid,	19 in.	white		(175-522)
1 ea.	Wire, no.22 solid,	6 in.	bare		(176-005)
1 ea.	Wire, solder, silver-bearing				24 in.

INSTRUCTIONS

NOTE: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

- () 1. Remove the instrument from the cabinet. On the rear sub-panel locate the two binding posts. (The binding post nearest the center of the instrument is the GND binding post.)
- () 2. Mark and drill a small pilot hole, 1-1/4 in. from the center of the GND binding post (toward the center of the instrument) and in line with both binding posts.
- () 3. Drill or ream out the above hole to 1/2 in.
- () 4. Mount the switch (from kit) in this hole, using the flat washer and the 12-sided switch nut from the kit (see Fig. 1).
- () 5. Unsolder the white wire connected to CSC-1; pull through the grommet and solder to the left terminal (viewed from front) of the CRT CATHODE SELECTOR switch (see Figs. 1 and 2).
- () 6. Solder the 7 in. white wire (from kit) between CSC-1 (see Figs. 1 and 2) and the center terminal of the CRT CATHODE SELECTOR switch.
- () 7. Remove the bare wire connected between the Swp Length control (R88) and 4k WW resistor (R89).

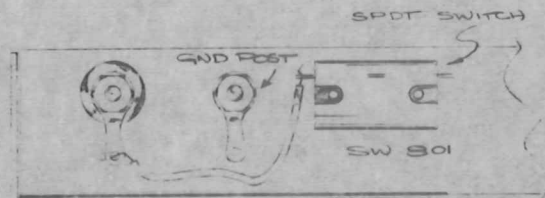


Fig. 1

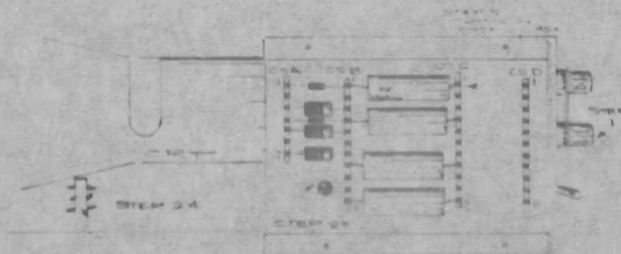


Fig. 2

INSTRUCTIONS (Con'd)

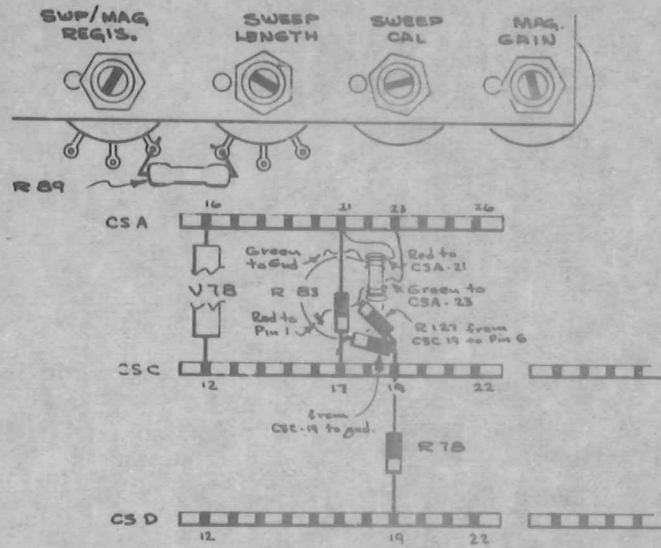


Fig. 3

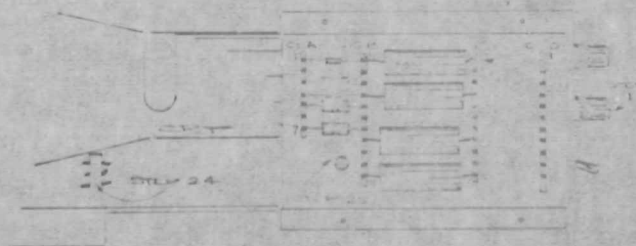


Fig. 4

INSTRUCTIONS (Con'd)

- () 8. Unsolder R89 and resolder it between the Swp/Mag Regis control (R262) and the Swp Length control (R88). See Fig. 3.
- () 9. Unsolder the end of the 68k, 2w resistor (R840) connected to CSA-20 (see Fig. 3).
- () Bend R840 up out of the way.
- () 10. Remove the 1.8meg resistor (R83) connected between CSA-22 and CSC-17 (see Fig. 3).
- () 11. Remove the bare wire connected between pin 5 of V78 and CSA-22 (see Fig. 3).
- () 12. Unsolder the white wire connected to CSA-22 (see Fig. 3).
- () 13. Remove the 10k resistor (R80) connected between pin 1 of V78 and CSC-19.
- () 14. Remove the bare wire soldered from pin 2 to pin 4 of V78, but leave the wire connecting pin 4 to ground.
- () 15. Remove the bare wire soldered from pin 7 of V78 to CSA-23.
- () Remove the 1meg resistor (R82) soldered from pin 6 of V78 to CSA-23.
- () 16. Remove and discard the white-brown-black-brown wire soldered between pin 6 of V78 and CSC-12 (see Fig. 3).
- () 17. Solder one end of the 6 in. white-brown-black-brown wire (from kit) to CSC-12 (see Fig. 3).
- () Dress the other end of this wire over towards the middle of the instrument, along the cable harness, and solder it to CSA-22 (see Fig. 3).
- () 18. Unsolder the remaining white-brown-black-brown wire from pin 6 of V78 and solder to CSA-22 (see Fig. 3).
- () 19. Solder the 270k, 1/2w resistor (from kit) from pin 5 of V78 to CSA-22 (see Fig. 3).
- () 20. Solder a no. 22 bare wire (from kit) from pin 7 of V78 to the ground lug on the V78 tube socket.
- () 21. With lacquer thinner, remove the printing on the chassis near V78 calling out "6AU6".
- () 22. Mount the 6J6 tag (from kit) under one of the V78 socket mounting screws.
- () 23. Solder the 8.2k, 1w resistor (from kit) between pin 2 of V78 and CSC-12 (see Fig. 3).
- () 24. Replace the two-hole post (directly below the Mag Gain adjustment) with a three-hole post, placing the two white wires (removed when replacing post) through the two top holes in the three-hole post. Resolder wires to their original connections (see Fig. 4, step 24).
- () 25. Locate the bakelite or nylon post mounted on the F and I chassis (the chassis located above the base of the CRT), below the Geometry Adj (R 70).
26. If the post located in step 25 is mounted on the top side of the F and I chassis:
- () Unsolder the end of the white wire that is dressed through this post and temporarily pull it back through the hole.
- () Replace this post with the two-hole nylon post from the kit. Mount the post on the bottom of the F and I chassis.
- () Mark and drill a 1/4 in. hole 1-1 8 in. directly in back of this post.
- () Mount the 1/4 in. grommet (from kit) in this hole (see Fig. 4, step 25).
27. If the post located in step 25 is located on the bottom side of the F and I chassis:
- () Unsolder the end of the white wire that is dressed through this post and temporarily pull it back through the hole.
- () Replace this post with the two-hole nylon post from the kit.
- () 28. Redress the white wire removed in step 26 or 27 through the bottom hole in the two-hole post, through the grommet, and resolder it to the ceramic strip where it was originally soldered to.
- () 29. Solder one end of the 19 in. white wire (from kit) to pin 2 of V78.

040-0200-01

Page 5 of 7

INSTRUCTIONS (Con'd)

- () 30. Dress the other end of this wire through the same grommet that the white wire soldered to R840 (68k 2w resistor) is dressed through. Thread the wire through the bottom hole of the 3-hole post (step 24); through the top hole of the 2-hole post (step 26 or 27), and solder it to the right-hand terminal of the switch mounted in step 4 (see Fig.5).
31. Install T129, a 6-turn bifilar wound transformer, as follows (see Fig.6):
 - () Select one of the red wires and connect it to pin 1 of V78.
 - () The green wire, paired with the red wire connected to pin 1, connects to ground lug of V78 tube socket.
 - () Second red wire connects to CSA-21.
 - () Second green wire connects to CSA-23.
- () 32. Solder the 22pf capacitor (from kit) between pin 5 of V78 and CSA-21 (see Fig.6).
- () 33. Replace R78 (47k, 1/2w or 36k, 1/2w resistor) connected between CSC-19 and CSD-19 with a 10meg 1/2w resistor from the kit (see Fig.6, R78).
- () 34. Solder the 10k 1/2w resistor (from kit) between pin 6 of V78 and CSC-19 (see Fig.6, R127).
- () 35. Solder R126 (a 36k 1/2w resistor, from kit) between CSC-19 and tube socket ground lug of V78 (see Fig.6).
- () 36. Resolder the end of the 68k resistor (R840, unsoldered in step 9) to CSA-20 (see Fig.6).
- () 37. Solder a 1.8meg resistor (from kit) between CSA-21 and CSC-17 (see Fig.6, R83).
- () 38. Enlarge the binding post cut-out on the rear of the cabinet, by using the template on bottom of page 7.

NOTE: Place the area of the template enclosed by the solid line over the existing cut-out with the dotted line toward the center of the instrument.

- () 39. Center-punch through the template at the two points marked with a "+".
- () 40. Drill or punch two 3/4in. holes in the cabinet.
- () 41. Smooth out the edge of the holes with a file.

- () 42. Remove the nomenclature tag on the rear of the cabinet, being careful not to enlarge the rivet holes. To do this, drill off the flange on the rivet and knock the rivet out with a punch.
- () 43. Enlarge the right rivet hole (as seen when looking at the instrument from the rear) with a no.43 drill.
- () 44. Mount the nomenclature tag (from kit) using the 4-40 x 1/4in. thread-forming screw and the right mounting hole (see Fig.7).
- () 45. Line up the tag, drill the other mounting hole (no. 43 drill) and mount the other 4-40 x 1/4in. thread-forming screw from the kit.
46. If you are using a Type 53/54C plug-in unit with serial number lower than 14078, or a Type 53C, it will be necessary to make the following modification to the plug-in:
 - () a. Type 53/54C only: Solder one of the 12pf ceramic capacitors (from kit) from pin 1 to pin 7 of V3803.
 - () Solder the other 12pf ceramic capacitor (from kit) from pin 2 to pin 5 of V3803.
 - () b. Type 53C only: Solder one of the 12pf ceramic capacitors (from kit) from pin 1 to pin 7 of V3793.
 - () Solder the other 12pf ceramic capacitor (from kit) from pin 2 to pin 5 of V3793.
- () 47. Replace V78 with the 6J6 tube from kit.

THIS COMPLETES THE INSTALLATION

- () To check for proper operation, set the instrument controls as follows:

CRT CATHODE SELECTOR Sw -- DUAL TRACE
CHOPPED BLANKING
TIME/CM -- 10 μ S/CM
Trigger -- +INT. AUTO
Operating Mode (plug-in unit) -- CHOPPED

- () a. By adjusting the Vertical Position of both A and B inputs, display the switching square wave.
- () At normal intensity setting, the switching transient should be blanked out.
- () b. Place the CRT CATHODE SELECTOR switch in the EXT CATHODE position.
- () You should now be able to see the switching transient.

INSTRUCTIONS

INSTRUCTIONS (Con'd)

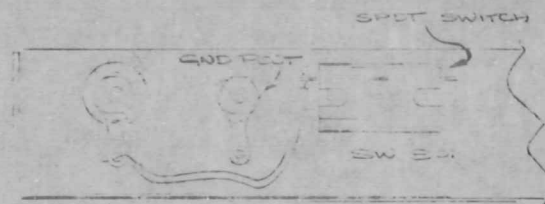


Fig. 5

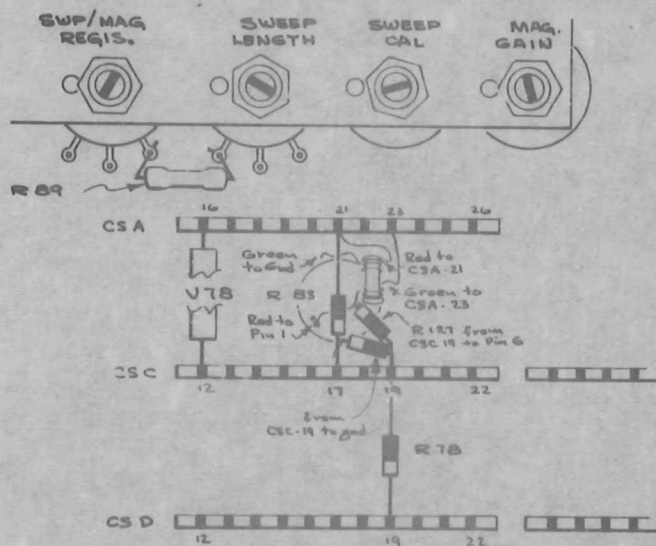


Fig. 6

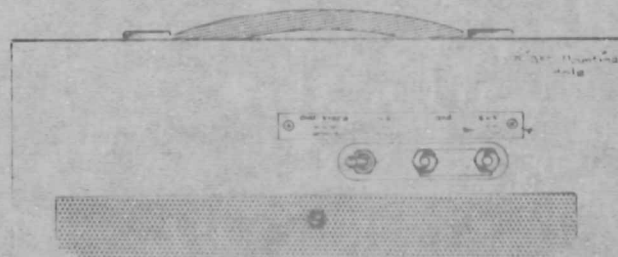


Fig. 7

TEMPLATE: Drawing File: 040-0198-01

CHOPPING TRANSIENT BLANKING

Types 531, 535, 541 and 545 -- s/n 101-5000

Installed in Type _____ s/n _____

GENERAL INFORMATION

This modification allows a blanking voltage to be applied to the CRT cathode, to eliminate switching transients from the display which occur when a multiple-trace plug-in unit is operated in its chopped mode.

The blanking voltage is applied by means of a switch on the rear panel of the instrument.

ELECTRICAL PARTS LIST

Values fixed unless marked Variable. Only new parts listed.

CAPACITORS

Tolerance $\pm 20\%$ unless otherwise indicated.

Ckt. No.	Part Number	Description
C129	281-511	22 pf cer 500 v

RESISTORS

Resistors are 10% composition unless otherwise indicated.

Ckt. No.	Part Number	Description
R78	302-106	10 meg 1/2 w
R126	301-363	36 k 1/2 w 5%
R127	302-103	10 k 1/2 w
R129	302-274	270 k 1/2 w
R137	304-822	8.2 k 1 w

SWITCHES

Ckt. No.	Part Number	Description
SW801	260-209	SPDT CRT CATHODE SELECTOR

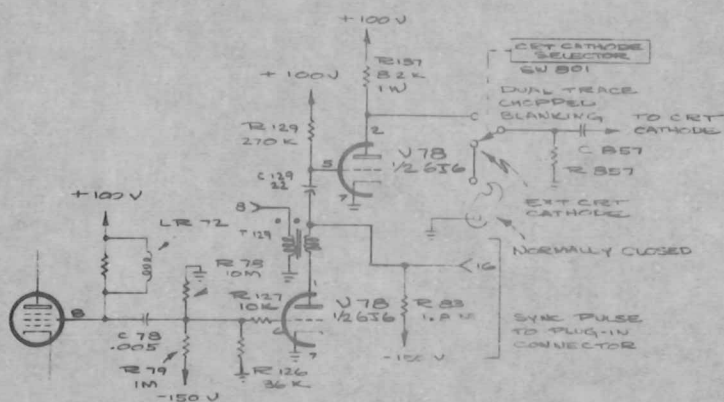
ELECTRON TUBES

Ckt. No.	Part Number	Description
V78	154-032	6J6

TRANSFORMERS

Ckt. No.	Part Number	Description
T129	120-155	6T Toroid Bifilar

SCHEMATICS



CHOPPED TRANSIENT BLANKING CIRCUIT

MODIFICATION KIT

FUSE FOR PROTECTION OF THE DISTRIBUTED AMPLIFIER



For the following Tektronix Oscilloscopes:

Types	541	s/n 6473 - up
	543	all serial numbers
	545	s/n 9292 - up
	541A	s/n 20001 - 21719
	543A	s/n 3001 - 3199
	545A	s/n 20001 - 29959
		(w/exc. 29857/8/9)
	RM41	s/n 111 - up
	RM43	all serial numbers
	RM45	s/n 132 - up
	RM41A	s/n 1001 - 1275
	RM43A	s/n 1001 - 1014
**	RM45A	s/n 1001 - 2209

040-227

DESCRIPTION

This modification installs a fuse in series with the plate supply of the Vertical Output Amplifiers in the above instruments to protect the termination resistor from burning in case of a short to ground in the plate circuit (delay line included) of these amplifiers.

A current limiting resistor is also installed to prevent damage to the DC shift compensation Electrolytic capacitors and other components.

Publication:
Instructions for 040-227
October 1966

Supersedes:
August 1966

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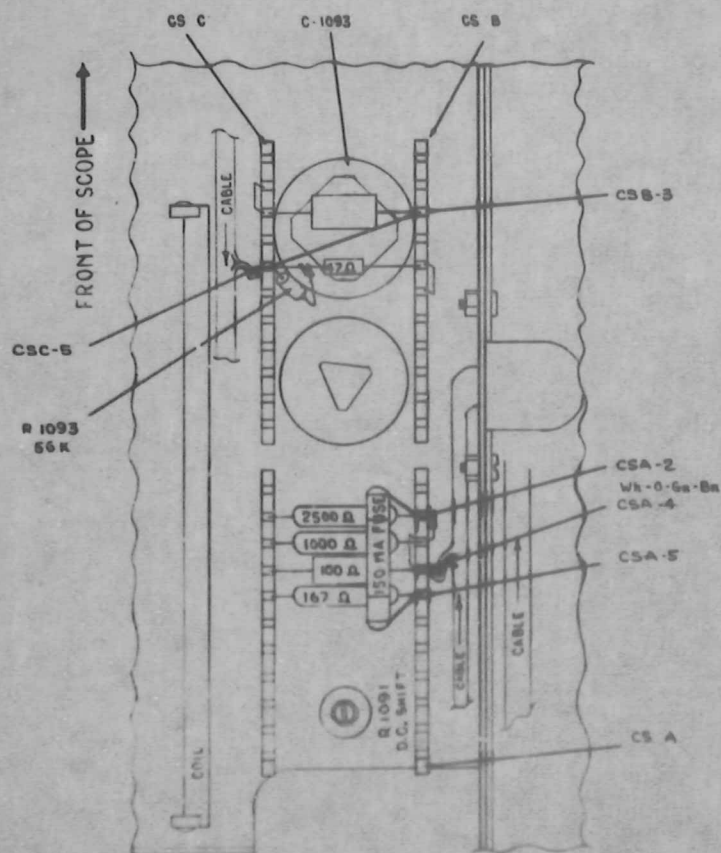
040-227

Page 1 of 3

PARTS LIST

Quantity	Description	Part Number
1 ea.	Fuse, 3AG, 150ma, pigtail	159-049
1 ea.	Resistor, comp, 56k 1w 10%	304-563
1 ea.	Tag, MODIFIED INSTRUMENT, gummed back	(001-910)
1 ea.	Wire, no.22 solid, 2-1/2in. bare	(176-122)
1 ea.	Wire, solder, silver-bearing 12in.	

INSTRUCTIONS



INSTRUCTIONS (Con'd)

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

- () 1. Turn the instrument over and remove the bottom plate.
- () 2. Locate the ceramic strip A (see drawing, CSA).
- () 3. Unsolder one end of the 167 Ω , 5w resistor from CSA-5 and the 100 Ω , 1w resistor from CSA-4 and pull them up slightly out of the way (see drawing).
- () 4. Unsolder the white-orange-green-brown wire (2 wires in some instruments) from CSA-4 (CSA-5 in some instruments) and bend it back out of the way.
- () 5. Using a scribe (or similar sharp tool), unsolder and pry the strapping wire out of CSA-5 and cut off at CSA-4.
- () 6. Resolder the white-orange-green-brown wire (or wires, removed in step 4) to CSA-4 and the two resistors (removed in step 3) to the notches from which they were unsoldered.
- () 7. Solder the fuse (from kit) between CSA-2 and CSA-5. Cut the leads to 3/4 in. before installing (see drawing).
- () 8. Locate ceramic strips "B" and "C" (see drawing CSB and CSC).
- () 9. Unsolder and remove the strapping wire between CSB-3 and the negative (can) side of C1093 (see drawing).

NOTE: Be careful not to touch the soldering iron to the small coil near this area.

- () 10. Unsolder and lift up the end of a 47 Ω , 1/2w resistor, which is connected to CSC-5 (see drawing).
- () 11. Unsolder and remove the strapping wire between CSC-5 and the negative side of C1093. Replace it with the 56k, 1w resistor from kit (see drawing).
- () 12. Resolder the end of the 47 Ω , 1/2w resistor (unsoldered in step 10).
- () 13. Solder a length of bare strapping wire (from kit) from CSB-3 to CSC-5.

THIS COMPLETES THE INSTALLATION

- () Check wiring for accuracy.
- () Install the insert pages in your Instruction Manual.
- () Moisten the back of the MODIFIED INSTRUMENT tag (from kit) and place it on the manual schematic page affected by this modification.

GG:cc

FUSE FOR PROTECTION OF THE DISTRIBUTED AMPLIFIER

Types 541	s/n 6473 - up	Types RM41	s/n 111 - up
543	all serial numbers	RM43	all serial numbers
545	s/n 9292 - up	RM45	s/n 132 - up
541A	s/n 20001 - 21719	RM41A	s/n 1001 - 1275
543A	s/n 3001 - 3199	RM43A	s/n 1001 - 1014
545A	s/n 20001 - 29959	RM45A	s/n 1001 - 2209
	(w/exc. 29857/8/9)	##	

GENERAL INFORMATION

This modification installs a fuse in series with the plate supply of the Vertical Output Amplifiers in the above instruments to protect the termination resistor from burning in case of a short to ground in the plate circuit (delay line included) of these amplifiers.

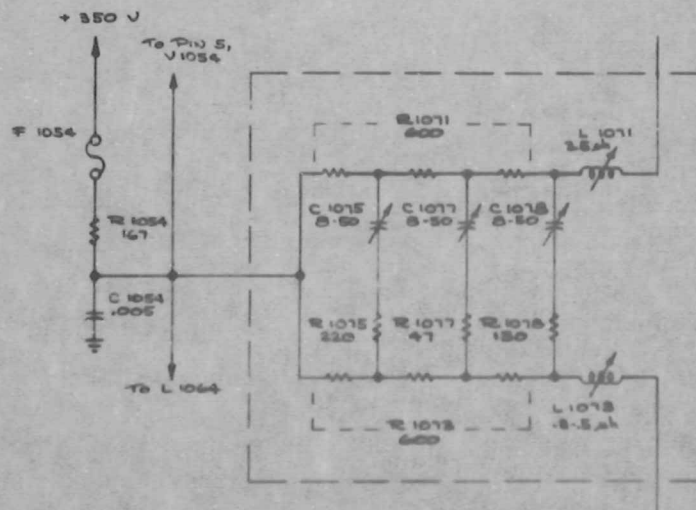
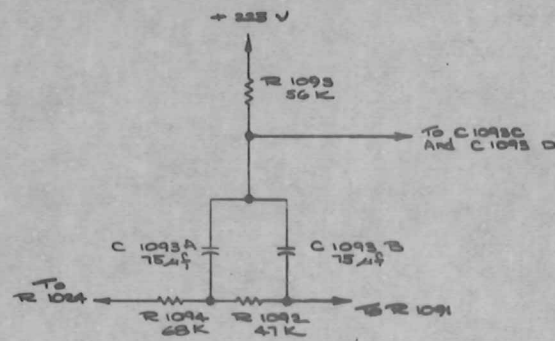
A current limiting resistor is also installed to prevent damage to the DC shift compensation Electrolytic capacitors and other components.

ELECTRICAL PARTS LIST

Values fixed unless marked Variable. Only new parts listed.

FUSES			
Ckt. No.	Part Number	Description	
F1054	159-049	150ma	3 AG Fast-blo
RESISTORS			
Resistor is 10% composition.			
R1093	304-563	56 k	1 w

SCHEMATICS



MODIFICATION KIT

SILICON RECTIFIER



For the following Tektronix Oscilloscopes:

Types	531	serial number 7601-20000
	533	serial number 101-1190
	RM33	serial number 101-129
	543	serial number 101-950
	RM43	serial number 101-105
	RM31, 541, RM41	all serial numbers

DESCRIPTION

This modification replaces the selenium rectifiers used in the instruments listed above with silicon rectifiers offering more reliability and longer life.

040-240

Publication
Instructions for 040-240
April 1964

Supersedes
April 1964

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040-240



modification
instructions

PARTS LIST

Quantity	Description	Part Number
1 ea.	Assembly, silicon rectifier bracket, consisting of:	
7 ea.	Strip, cer, 3/4 x 4 notches, clip-mounted	124-088
3 ea.	Strip, cer, 3/4 x 9 notches, clip-mounted	124-090
20 ea.	Diode, silicon 500ma 400 PIV	152-047
1 ea.	Cable harness	179-561
1 ea.	Lockwasher, int #6	210-006
1 ea.	Lug, solder, SE6	210-202
1 ea.	Nut, hex, 6-32 x 1/4	210-407
4 ea.	Nut, hex, resistor mounting	210-478
4 ea.	Eyelet	210-601
5 ea.	Screw, 6-32 x 5/16 BHS	211-507
4 ea.	Screw, 6-32 x 1-1/2 RHS, Phillip	211-553
1 ea.	Resistor, WW, 15 Ω 10 w	308-143
1 ea.	Resistor, WW, 100 Ω 10 w 5%	308-153
2 ea.	Resistor, WW, 10 Ω 10 w 5%	308-175
20 ea.	Spacer, nylon, molded, 0.281	361-009
1 ea.	Bracket, silicon rectifier mounting	406-475
1 ea.	Tag, MODIFIED INSTRUMENT, gummed back	(001-910)
4 ea.	Tubing, #12 black 1-1/2 in.	(162-014)
1 ea.	Wire, #22 solid, 2 in. blue	(175-520)
2 ea.	Wire, #22 solid, 2 in. white-red	(175-522)
1 ea.	Wire, #22 solid, 2 in. white-violet	(175-522)
2 ea.	Wire, #22 solid, 2 in. gray-red-red	(175-544)
1 ea.	Wire, #22 solid, 2 in. gray-blue-brown	(175-544)
1 ea.	Wire, solder, silver-bearing 24 in.	

040-240

PARTS INCLUDED IN MODIFICATION 117

Quantity

Part Number

Description

INSTRUCTIONS

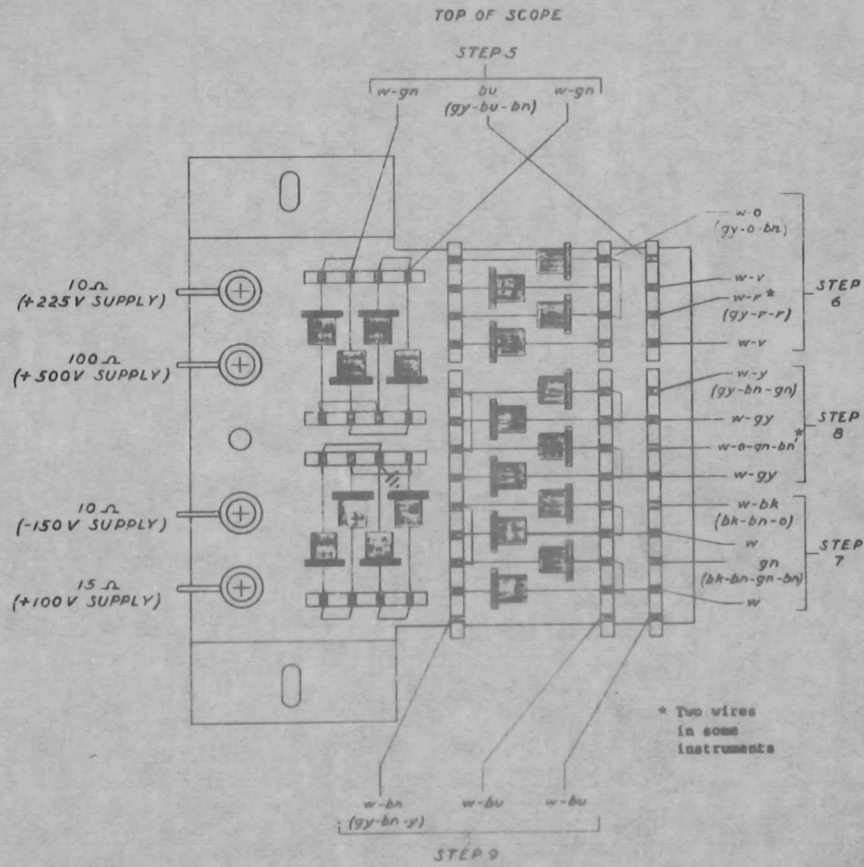


Fig. 1

INSTRUCTIONS (Con'd)

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

NOTE: Below is a list of instruments which have had some of the wire color-coding changed. If your instrument falls in this serial number range, use the wire color shown in parenthesis.

TYPE	SERIAL NUMBER
531	8544 and above
RM31	310 and above
533	301 and above
RM33	All serial numbers
541	7484 and above
RM41	168 and above
543	319 and above
RM43	All serial numbers

- () 1. Unsolder and remove selenium rectifiers from the bulkhead (except SR752 in 533, RM33, 543 and RM43).
- () 2. Mount the silicon rectifier bracket, using the mounting holes and screws that were used for mounting the SR740 selenium rectifier stack (see Fig. 1).

NOTE: On some of the older instruments, the mounting holes for SR740 were only spaced 4 inches apart. If this is the case, drill and tap new holes 9/32 in. above the top hole and 9/32 in. below the bottom hole. Use a no. 36 drill and a 6-32 tap.

- () 3. Locate the cable that was soldered to SR780 and SR756 (located on the left side of the bulkhead). Pull this cable back through the grommet to the right side of the bulkhead.
- () 4. Locate the white-red (gray-red-red) wire that was soldered to SR756.
- () 5. Pull this wire out of the cable and discard.
- () 6. Solder the two white-green wires and the solid blue (gray-blue-brown) wire to the ceramic strip slots, as shown in Fig. 1 (step 5).

NOTE: If the solid blue (gray-blue-brown) wire does not reach, use the short piece of solid blue or gray-blue-brown wire and a piece of the black tubing from kit and splice.

To do this, strip the ends of the wires, slide the short piece of tubing over one of the wires, lay the ends of the wires side-by-side, solder the two wires together and slide the tubing over the splice.

- () 6. Solder the white-orange (gray-orange-brown), the two white-violet, and the white-red (gray-red-red) wires to the ceramic strip slots as shown in Fig. 1 (step 6).

NOTE: If the white-red (gray-red-red), or white-violet wires will not reach, it will be necessary to splice them. Use the short pieces of wire and the tubing from the kit.

- () 7. Locate the two white, the green (black-brown-green-brown) and the white-black (black-brown-orange) wires that were soldered to SR732.
- () 8. Solder them to the ceramic strip slots as shown in Fig. 1 (step 7).
- () 8. Locate the two white-gray, the white-yellow (gray-brown-green), and white-orange-green-brown wires that were soldered to SR790.
- () 9. Dress these wires under the power cable and solder them to the ceramic strip slots as shown in Fig. 1 (step 8).
- () 9. Locate the two white-blue and the white-brown (gray-brown-yellow) wires that were soldered to SR740.
- () 10. Solder them to the ceramic strip slots as shown in Fig. 1 (step 9).

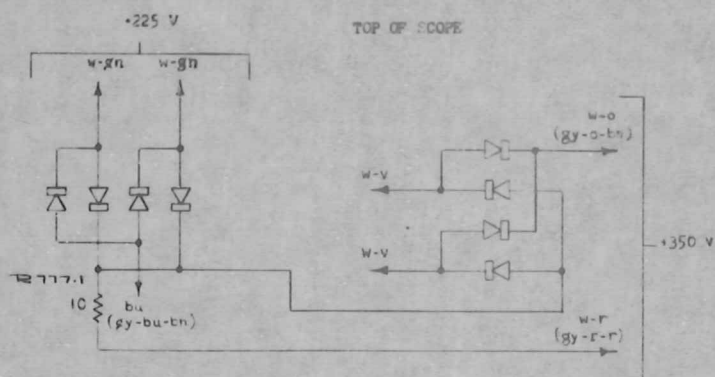
NOTE: It may be necessary to pull the white-brown (gray-brown-yellow) wire back through two of the cable facings in order to obtain enough length.

THIS COMPLETES THE INSTALLATION

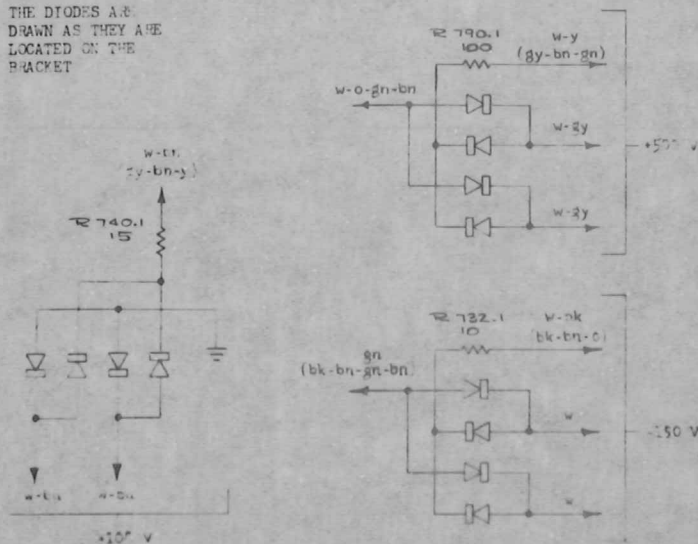
- () Check wiring for accuracy.
- () Turn the instrument on and check for proper voltages and regulation of the power supply. (If you make any adjustments in the power supply, you will have to check the calibration of the rest of the instrument.)
- () Moisten the back of the MODIFIED INSTRUMENT tag (from kit) and place it on the manual schematic page, affected by this modification.

1. PREP

INSTRUCTIONS (Con'd)



THE DIODES ARE
DRAWN AS THEY ARE
LOCATED ON THE
BRACKET



SILICON DIODE LAYOUT
Fig. 2

SILICON RECTIFIER

Types 531 serial number 7601-20000
 533 serial number 101-1190
 RM33 serial number 101-129

Types 543 serial number 101-950
 RM43 serial number 101-105
 RM31, 541, RM41 all serial numbers

GENERAL INFORMATION

This modification replaces the selenium rectifiers used in the instruments listed above with silicon rectifiers offering more reliability and longer life.

ELECTRICAL PARTS LIST

Values fixed unless marked Variable. Only new parts listed.

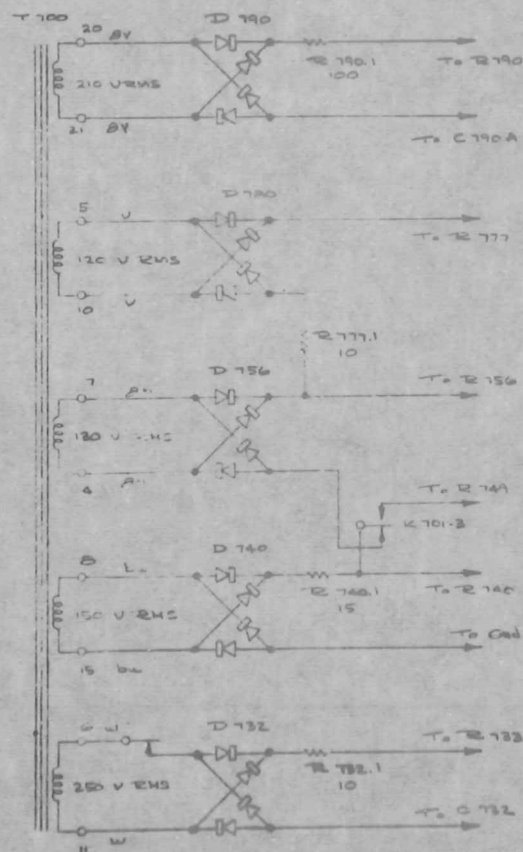
DIODES

Ckt. No.	Part Number	Description
D732A,B,C,D	152-047	1N2862 (or equiv.) Silicon
D740A,B,C,D	152-047	1N2862 (or equiv.) Silicon
D756A,B,C,D	152-047	1N2862 (or equiv.) Silicon
D780A,B,C,D	152-047	1N2862 (or equiv.) Silicon
D790A,B,C,D	152-047	1N2862 (or equiv.) Silicon

RESISTORS

Ckt. No.	Part Number	Value	Power	Temp. Coef.	Notes
R732,1	308-175	10Ω	10w	WW	5
R740,1	308-143	15Ω	10w	WW	5
R777,1	308-175	10Ω	10w	WW	5
R790,1	308-153	100Ω	10w	WW	5

SCHEMATICS



MODIFICATION KIT

DC FAN MOTOR

For the following Tektronix Oscilloscopes:

531 s/n 5001-20000	541 s/n 5001-20000
RM31 s/n 101- 3000	RM41 s/n 101- 1000
533 s/n 101- 3000	543 s/n 101- 3000
RM33 s/n 101- 1000	RM43 s/n 101- 1000
535 s/n 5001-20000	545 s/n 5001-20000
RM35 s/n 101- 1000	RM45 s/n 101- 1000

DESCRIPTION

This modification replaces 040-0128-00 and 040-0130-00 which supplies a DC fan motor to enable the above listed instruments to operate on 50-400 cycle power lines.

Publication:
Instructions for 040-0255-00
May 1965

Supersedes:
March 1961

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040-0255-00

Page 1 of 5

PARTS LIST

Quantity	Description	Part Number
1 ea.	Assembly, DC fan transformer and rectifier, consisting of:	
1 ea.	Bracket, rectifier mounting	406-0648-00
1 ea.	Capacitor, EMT, 6.25 μ f 300 v	290-0000-00
2 ea.	Strip, c-r. 7/16 x 5 notches, clip-mounted	124-0093-00
4 ea.	Spacer, nylon, molded .188	361-0008-00
4 ea.	Diode, silicon 500 ma 400 PIV	152-0047-00
4 ea.	Rod, spacing, 9/16 x 1/4, tapped 6-32 thru	384-0519-00
1 ea.	Transformer, DC fan, 50-400 cycles	120-0084-00
4 ea.	Screw, 6-32 x 1-1/4 RHS	211-0545-00
1 ea.	Screw, 6-32 x 1/4 BHS	211-0504-00
4 ea.	Lockwasher, int. no. 6	210-0006-00
1 ea.	Nut, hex, 6-32 x 1/4	210-0407-00
1 ea.	Lug, solder, SE no. 6	210-0202-00
1 ea.	Tubing, 1/2 in. ID, clear 1 in. (162-0021-00)	(162-0021-00)
1 ea.	Wire, no. 22 solid, 3 in. white (175-0522-00)	(175-0522-00)
2 ea.	Wire, no. 22 solid, 2 in. white (175-0522-00)	(175-0522-00)
1 ea.	Assembly, fan motor, consisting of:	
1 ea.	Bracket, fan mounting, U shape	406-0328-00
1 ea.	Bracket, fan mounting	406-0327-00
3 ea.	Shockmount, rubber	348-0008-00
1 ea.	Motor	147-0016-00
2 ea.	Screw, 8-32 x 5/16 BHS	212-0004-00
6 ea.	Lockwasher, int. no. 8	210-0008-00
2 ea.	Lockwasher, ext. no. 8	210-0007-00
6 ea.	Nut, hex, 8-32 x 5/16	210-0409-00
1 ea.	Capacitor, EMC, 2 x 20 μ f, 450 v	290-0010-00
1 ea.	Relay, Clare	148-0005-00
1 ea.	Relay, Amperite thermal delay	148-0006-00
4 ea.	Screw, 6-32 x 3/8 BHS	211-0510-00
4 ea.	Lockwasher, int. no. 6	210-0006-00
1 ea.	Tag, 50-400 cycles	334-0615-00
1 ea.	Cable harness	179-0181-00
1 ea.	Template	1-447D
1 ea.	Spool, w/3 ft. of silver-bearing solder	214-0210-00

INSTRUCTIONS

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

- () 1. Remove the shield from the high-voltage power supply.
- () 2. Remove the top three 6-32 screws securing the high-voltage transformer board to the sweep deck.
- () 3. Unsolder the high-voltage anode lead from the high-voltage transformer board.
- () 4. Lift the high-voltage board out of the way.
- () 5. Place the drilling template on the sweep chassis as shown; mark and drill the 4 holes (see Fig. 1).
- () 6. Mount the transformer and rectifier assembly on the under side of the sweep chassis with four 6-32 x 3/8 BHS screws and washers. The 6.25 μ F capacitor mounted on the rectifier assembly should be nearest the back panel.
- () 7. Replace the high-voltage board and resolder high-voltage anode lead.
- () 8. RM'S ONLY
Remove the chassis track located on the side near the plug-in box.
- () 9. TYPE 541 BELOW S/N 5431 AND TYPE 545 BELOW S/N 5854 ONLY
Remove C1153A,B, 2 x 20 μ F, EMC, 450 v capacitor, from the vertical amplifier chassis (do not remove mounting flange), and replace it with the new short C1153A,B from the kit.
- () 10. Unsolder all the wires from K701 relay.
Replace the old K701 power relay with the new relay from the kit.
- () 11. Unsolder the fan motor leads and pull them through the grommet. Remove the old fan-ring assembly and motor.
- () 12. TYPES 535, 545, RM35 AND RM45 ONLY
Remove the air-deflection plate.
- () 13. Install the 3-wire cable (from kit) through the grommet where the old fan leads had previously run.
The end of the cable, with the long white wire, goes through to the inside of the power chassis.
- () 14. Solder the two white-black wires to the 3 or 4 slot ceramic strip near the power transformer. (Connect them to the slots previously vacated by the fan motor leads.)
- () 15. Dress the cable up the inside of the back panel and connect the two white-black wires to the two outside lugs on the transformer (mounted under the sweep deck in step 6).
- () 16. Solder the white wire to the + side of the 6.25 μ F capacitor.
- () 17. Remove the three nuts holding the rubber shockmounts to the fan-ring.
- () 18. Remove the fan-ring from the old motor and mounting bracket and re-mount on the new motor and mounting.
- () 19. Mount the new fan assembly. (Be sure the oil hole in the motor is pointing toward the top of the instrument.)

NOTE: On the RM's -- the motor may touch the back of the rectifier bulkhead, making it necessary to file a small groove in the bulkhead.

040-0255-00

Page 3 of 5

MOD SUMMARY INDEX

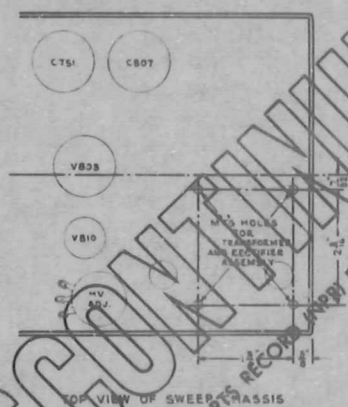
PRODUCT FILE

541 RM45

DATE

PAGE 2

REFERENCE PAGE NO	LOC	REFERENCE PAGE NO	LOC
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INSTRUCTIONS (con'd)

INSTRUCTIONS (con'd)

- () 20. Solder one motor lead to the ground lug (mounted on the rectifier bracket).
- () 21. Solder the remaining motor lead to the + side of the 6.25 μ f capacitor.
- () 22. Wire relay socket as shown in Fig. 2.
 - a) Unsolder and remove R708 (12 Ω , 1 w resistor).
 - b) Unsolder the wire going to pin 7 of K700 socket. Unsolder from pin 9 of K700 socket, one of the white-blue-red wires (the wire that goes to terminal 12 of the power transformer).
 - c) Tape the ends of the above wires. (These are filament wires and should be taped to avoid shorting to ground.)
 - d) Ground pin 1 of K700 socket.
- () 23. RM'S ONLY
Replace chassis tracks removed in step 8.
- () 24. Replace the shields on the high-voltage power supply.
- () 25. Mount the line frequency tag under the power switch nut.
- () 26. TYPES 535, RM35, 545 AND RM45 ONLY
Reinstall air-deflection shield plate (removed in step 12) behind delaying sweep chassis.
- () 27. Install the new thermal-delay tube (26N045T, from kit) in the K700 socket.
- () 28. Remove the fan blade from the old motor and remount it on the new one.

NOTE: Be careful not to bend the blades because it will make the fan out of balance.

THIS COMPLETES THE INSTALLATION.

- () Check wiring for accuracy.
- () Insert parts list and schematic in your Manual.

GG:bt

ELECT

Only

Ckt.

C115
C701

D701

K700
K701

T701

DC FAN MOTOR

SCHEMATIC

531 s/n 5001-20000	541 s/n 5001-20000
RM31 s/n 101- 1000	RM41 s/n 101- 1000
533 s/n 101- 3000	543 s/n 101- 3000
RM33 s/n 101- 1000	RM43 s/n 101- 1000
535 s/n 5001-20000	545 s/n 5001-20000
RM35 s/n 101- 1000	RM45 s/n 101- 1000

Installed in Type _____ s/n _____

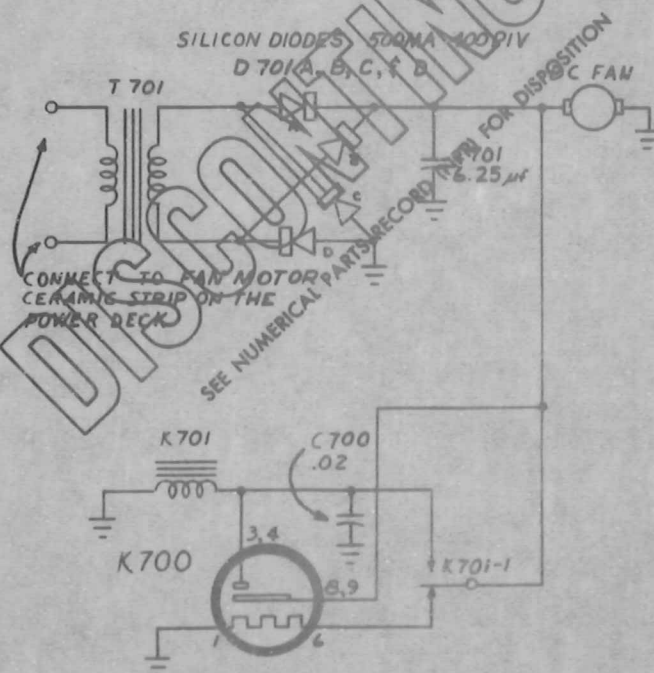
ELECTRICAL PARTS LIST

Only new parts listed

Ckt. No.	Part Number	Description
		CAPACITORS
C1153	290-0010-00	2 x 20 μ f EMC fixed 350 v (540 Series only)
C701	290-0000-00	6.25 μ f EMT fixed 300 v
		DIODES
D701	152-0047-00	500 ma 400 PIV
		MOTORS
	147-0016-00	DC Fan Motor
		RELAYS
K700	148-0006-00	Thermal Time Delay
K701	148-0005-00	DC Relay
		TRANSFORMERS
T701	120-0084-00	50-400 Cycle DC Fan

DISCONTINUED
SEE NUMERICAL PARTS RECORD (NPR) FOR DISPOSITION

SCHEMATICS





modification instructions

MI - 040-0281-00

Instrument Types
See Below

CRADLE MOUNT

For the following Tektronix Oscilloscopes:

Type	524AD	Serial Numbers	5001-up
Type	531	Serial Numbers	5001-up
Type	531A	Serial Numbers	All Serial Numbers
Type	532	Serial Numbers	5001-up
Type	533A	Serial Numbers	All Serial Numbers
Type	535	Serial Numbers	5001-up
Type	535A	Serial Numbers	All Serial Numbers
Type	536	Serial Numbers	All Serial Numbers
Type	541	Serial Numbers	5001-up
Type	541A	Serial Numbers	All Serial Numbers
Type	543	Serial Numbers	All Serial Numbers
Type	543A	Serial Numbers	All Serial Numbers
Type	543B	Serial Numbers	All Serial Numbers
Type	544	Serial Numbers	All Serial Numbers
Type	545	Serial Numbers	5001-up
Type	545A	Serial Numbers	All Serial Numbers
Type	545B	Serial Numbers	All Serial Numbers
Type	546	Serial Numbers	All Serial Numbers
Type	547	Serial Numbers	All Serial Numbers
Type	549	Serial Numbers	All Serial Numbers
Type	570	Serial Numbers	5001-up
Type	575	Serial Numbers	All Serial Numbers
Type	581	Serial Numbers	All Serial Numbers
Type	581A	Serial Numbers	All Serial Numbers
Type	585	Serial Numbers	All Serial Numbers
Type	585A	Serial Numbers	All Serial Numbers
Type	661	Serial Numbers	All Serial Numbers

This modification enables the above Tektronix instruments to be rackmounted in a standard 19in. relay rack. A vertical front panel space of 17-1/2in. is required.

Future instruments with the same front panel dimensions may also be used with this kit, providing they have bottom rails similar to those on the above listed instruments. This kit directly replaces 040-0182-00.

PARTS INCLUDED IN MODIFICATION KIT

Quantity	Part Number	Description
1 ea.	426-0208-00	Assembly, cradle mount, oscilloscope, including:
2 ea.	(211-0025-00)	Screw, 4-40 x 3/8 FHS
4 ea.	(212-0023-00)	Screw, 8-32 x 3/8 PHS, Phillips
1 ea.	(381-0198-00)	Bar, stiffening, 1/4 x 5/8 x 16-5/8
2 ea.	(381-0211-00)	Bar, mounting, 1/4 x 1/2 x 8-1/8
1 ea.	105-0013-00	Stop, instrument
2 ea.	210-0008-00	Lockwasher, int #8
2 ea.	210-0409-00	Nut, hex, 8-32 x 5/16
2 ea.	210-0804-00	Washer, flat, 8S x 3/8
8 ea.	210-0833-00	Washer, cup, #10
2 ea.	210-0852-00	Washer, spacer, 3/16ID x 3/8OD x 0.091
6 ea.	211-0025-00	Screw, 4-40 x 3/8 FHS
2 ea.	212-0004-00	Screw, 8-32 x 5/16 PHS, Phillips
8 ea.	212-0008-00	Screw, 8-32 x 1/2 PHS, Phillips
8 ea.	212-0512-00	Screw, 10-32 x 1/2 OHS
1 ea.	333-0491-00	Panel, front, mask for rackmounting
2 ea.	381-0202-00	Bar (guide rail), aluminum, angle, 18in.
2 ea.	387-0636-00	Plate (slide), bakelite, 1-1/8 x 18in.
1 ea.	406-0424-00	Bracket, hold-down

INSTRUCTIONS

- () 1. Mount the two guide rails and bakelite slides (from kit) on the cradle assembly, with the rail lip on the outside (Fig. 1A). Use the threaded holes in the cradle, spaced according to the lengths listed for the kits in Fig. 1B. Mount the rails with the 4-40 x 3/8 FHS screws from the kit.
- () 2. Fasten each side of the cradle assembly to the front flange of the relay rack, with three 8-32 x 1/2 PHS screws from the kit (see Figs. 2 and 6). Each mounting bar is fastened to the cradle by a single 4-40 screw, allowing it to be adjusted for slight variations in rack width.

NOTE: To install the cradle assembly in channel-type racks, it will be necessary to tilt the assembly sideways, while bending one side inward.

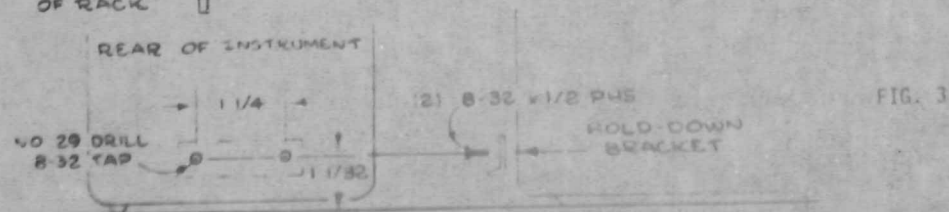
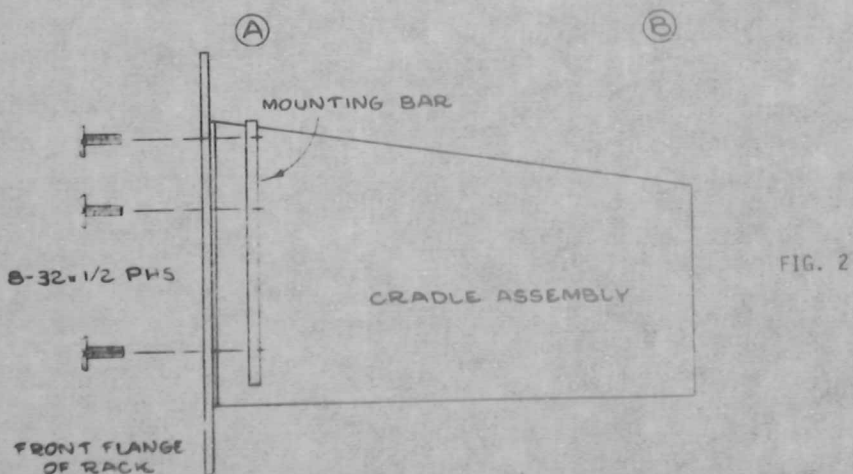
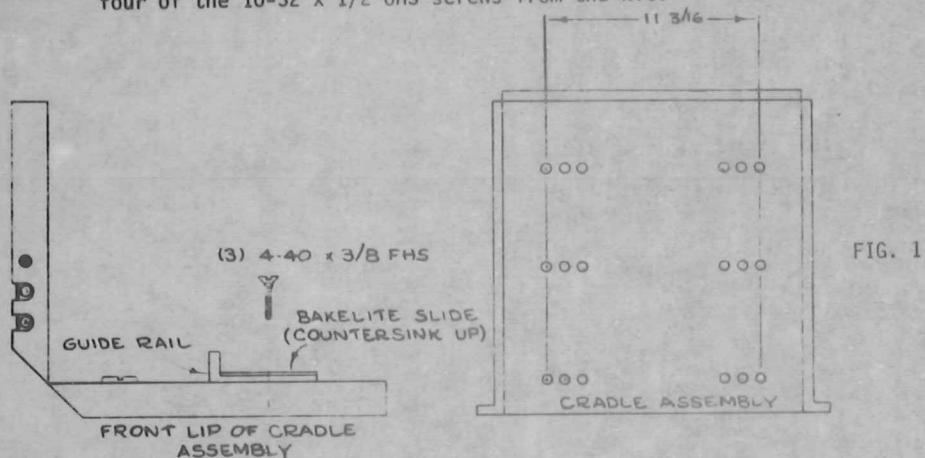
- () 3. Remove the voltage tap on the rear right hand side of the instrument.
- () 4. Relocate the voltage tap on the middle left hand side of the instrument, use a #43 drill (see Fig. 3).
- () 5. Mount the hold-down bracket (from kit) on the rear panel of the instrument, as near to the vertical center line as possible (see Fig. 3).
- () a. Drill and tap the two holes in the rear panel shown in Fig. 3. Use a #29 drill and an 8-32 tap.

CAUTION: BE CAREFUL NOT TO DRILL INTO COMPONENTS MOUNTED BEHIND THE REAR SUB-PANEL.

- () b. Mount the hold-down bracket, using two 8-32 x 1/2 PHS screws from the kit.

INSTRUCTIONS (cont)

- () c. If the instrument will be subject to excessive vibration, the 8-32 nuts (from kit) should be added.
- () 6. Place the instrument on the cradle guide rails and slide it into place.
- () 7. Temporarily mount the mask (from kit) on the front of the relay rack, over the instrument front panel, and hold it in place with three or four of the 10-32 x 1/2 OHS screws from the kit.



INSTRUCTIONS (cont)

- () 8. Position the instrument so that the stainless steel ring touches the mask all the way around the instrument (see Fig. 4).
- () 9. Place the instrument stop (from kit) on the cradle so that it meshes with the hold-down bracket on the instrument (see Fig. 5). If necessary, the hold-down bracket may be adjusted up or down.
- () Mark the exact location of the stop on the cradle.
- () 10. Remove the mask and the instrument.
- () 11. Place the instrument stop in the location marked in step 7. Select two of the tapped holes in the stop, and mark and drill 11/64in. holes in the cradle at these points.
- () 12. Mount the stop, using the 8-32 x 5/16 PHS screws, flat washers and lockwashers from the kit (see Fig. 5).
- () 13. Replace the instrument. Make sure the hold-down bracket and instrument stop come together properly.
- () 14. Replace the mask, using the 10-32 x 1/2 OHS screws, the #10 cup washers, and the two spacer washers from the kit (see Fig. 6).

THIS COMPLETES THE INSTALLATION

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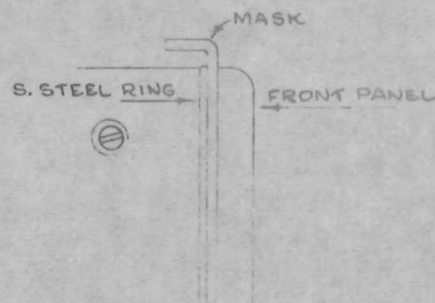


FIG. 4

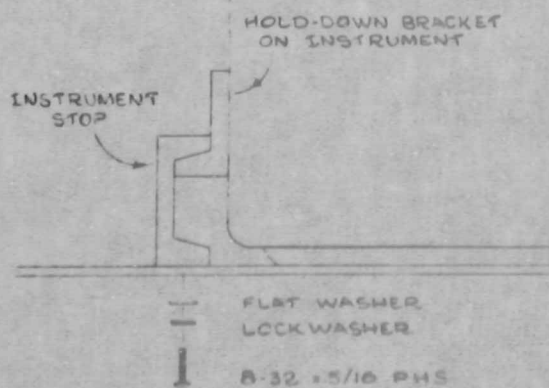


FIG. 5

RACK OP

MOD SUMMARY INDEX

PRODUCT FILE 541, RM41 DATE Mar 77 PAGE 3

[illegible]

MODIFICATION KIT

CRT SCREW ALIGNMENT

For the Following Tektronix Oscilloscopes:

531 s/n 5791-20000	536 s/n 101- 1089
531A s/n 20001-20409	541 s/n 5500-20000
532 s/n 5341- 6519	541A s/n 20001-20469
533 s/n 101- 1469	543 s/n 101- 1249
535 s/n 5985-20000	545 s/n 6075-20000
535A s/n 20001-21349	545A s/n 20001-22059

DESCRIPTION

This modification provides a more satisfactory means of CRT alignment. The entire support bracket and clamp assembly at the base of the CRT is replaced by a new bracket, rotator and clamp assembly.

The main feature of this new assembly is a finger-operated screw adjustment for easy and precise rotation of the CRT. The CRT rotator assembly permits lateral and vertical adjustment of the socket end of the CRT -- adjustments which are needed because the long axis of the CRT is seldom found to have an angle of precisely 90° with respect to the faceplate. If the angle is not precisely 90°, the faceplate will not touch the graticule at all points around its circumference unless adjustments are provided.

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August 1965

Supersedes:
040-0292-00

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C-0-0292-01

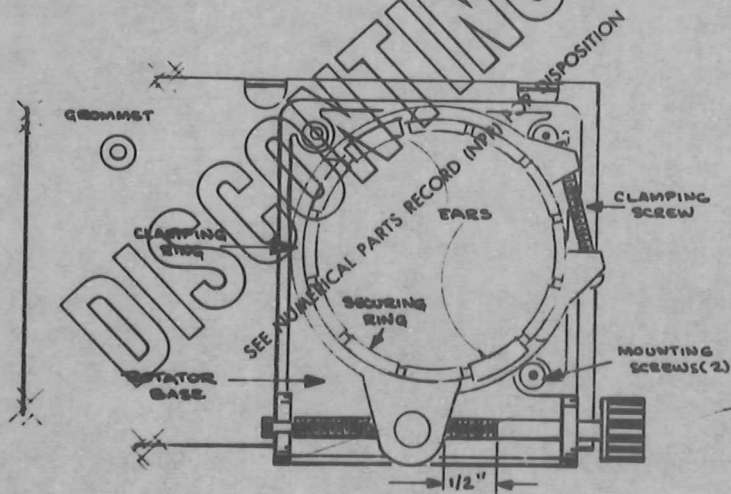
Page 1 of 4

CALIBRATION

NOTE 1: Most of the tolerances in the following procedure are closer than

PARTS LIST

Quantity	Description	Part Number
1 ea.	Assembly, CRT support, consisting of:	
2 ea.	Tie, nylon cable, blue	006-0531-00
1 ea.	Nut, hex, 6-32 x 1/4	210-0407-00
1 ea.	Nut, securing, double 6-32	210-0503-00
1 ea.	Screw, 6-32 x 1 RHIS	211-0560-00
2 ea.	Screw, 6-32 x 3/8 hex socket, FH cap	211-0561-00
1 ea.	Grommet, rubber, 1/4	348-0002-00
1 ea.	Ring, clamping, delrin	354-0103-00
1 ea.	Ring, securing	354-0178-00
1 ea.	Stud (screw), CRT rotator	355-0049-00
1 ea.	Knob, red, small	366-0032-00
1 ea.	Bracket, CRT support	406-0251-00
1 ea.	Base, CRT rotator	432-0022-00



INSTRUCTIONS

- () 1. Carefully remove the CRT from the instrument. Be sure to disconnect the high voltage anode lead.
- () 2. Remove (cut if necessary) the molded nylon rotating handle on the CRT socket.

NOTE: Some earlier instruments will not have this handle.

- () 3. Remove the old CRT support bracket and clamp. It is held with five screws, two on the rectifier bulkhead, two on the small chassis above, and one at the bottom rear of the CRT shield. SAVE SCREWS AND WASHERS.

NOTE: On some instruments there is a wire which passes through a grommet in the bracket. Unsolder this wire from the CRT Cathode Selector switch (on rear panel) before removing the bracket.

TO INSTALL NEW CRT ALIGNMENT ASSEMBLY:

- () 4. Loosen the clamping screw on the CRT support assembly (from kit) to allow the CRT base to slide easily through the securing ring (see drawing).
- () 5. Set the rotator screw so that about 1/2 in. of thread shows (see drawing).
- () 6. Check to see that the securing ring is properly seated. The two "ears" on one side should fit in the notches in the clamping ring (see drawing). On the other side, one of the two shorter "ears" on the securing ring should fit inside the hollow formed by the double nut.

NOTE: Do not remove blue nylon ties (which hold securing ring in place) until CRT is installed.

- () 7. Install the CRT support assembly (from kit) in the place of the old bracket and clamp removed in step 2. USE OLD HARDWARE.
- () If the wire to the CRT Cathode Selector switch was disconnected in step 3, dress this wire through the grommet as before, and resolder the wire to the switch.
- () 8. Slide the CRT back in place and reconnect all wires except for the high voltage anode lead. Replace the graticule and cover.

TO ALIGN CRT IN CLAMP:

- () 9. Center the CRT anode terminal in the CRT shield anode opening (older instruments) or the hole in the insulated anode connector plate (newer instruments). Push the CRT face against the graticule.
- () Tighten the clamping screw until the CRT base is firmly clamped in the rotator.
- () 10. Reinstall the CRT high voltage anode lead.

040-0292-01

Page 3 of 4

INSTRUCTIONS

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INSTRUCTIONS (con'd)

THIS COMPLETES THE INSTALLATION.

- () Check that the CRT does not slip within the securing ring while turning the red rotator knob.

TO ALIGN TRACE WITH GRATICULE LINES:

- () Turn the instrument on. With no signal into the Vertical Amplifier and the sweep free-running, set the FOCUS, ASTIGMATISM, and INTENSITY controls for a fine horizontal trace.
- () By turning the red knob on the rotator screw, align the trace with the horizontal graticule lines.

NOTE: The CRT can be positioned slightly to minimize parallax between the phosphor surface and the graticule, by loosening the mounting screws (see drawing). Be sure to tighten these screws securely.

GG/CH:ceb

DISCONTINUED
SEE NUMERICAL PARTS RECORD (NPR) FOR DISPOSITION

MODIFICATION KIT

CRT SCREW ALIGNMENT

For the following Tektronix Oscilloscopes:

Type RM31 s/n 101-1000
Type RM31A s/n 1001-1059
Type RM32 s/n 101- 330
Type RM33 s/n 101- 139
Type RM35 s/n 101-1000
Type RM35A s/n 1001-1229
Type RM41 s/n 101-1000
Type RM41A s/n 1001-1029
Type RM43 s/n 101- 111
Type RM45 s/n 101-1000
Type RM45A s/n 1001-1199

DESCRIPTION

This modification provides a more satisfactory means of CRT alignment. The entire support bracket and clamp assembly at the base of the CRT is replaced by a new bracket, rotator and clamp assembly.

The main feature of this new assembly is a finger-operated screw adjustment for easy and precise rotation of the CRT. The CRT rotator assembly also permits lateral and vertical adjustment of the socket end of the CRT--adjustments which are needed because the long axis of the CRT is seldom found to have an angle of precisely 90° with respect to the faceplate. If the angle is not precisely 90°, the faceplate will not touch the graticule at all points around its circumference unless adjustments are provided.

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Instructions for 040-0293-00
May 1965

Supersedes:
June 1963

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040-0293-00

Page 1 of 1

PARTS LIST

Quantity	Description	Part Number
1 ea.	Assembly, CRT support, consisting of:	
2 ea.	Tie, nylon cable, blue	006-0531-00
1 ea.	Nut, hex, 6-32 x 1/4	210-0407-00
1 ea.	Nut, securing, double 6-32	210-0503-00
1 ea.	Screw, 6-32 x 1 RHS	211-0560-00
2 ea.	Screw, 6-32 x 3/8 hex socket, FH cap	211-0561-00
1 ea.	Grommet, rubber, 1/4	348-0002-00
1 ea.	Ring, clamping, delrin	354-0103-00
1 ea.	Ring, securing	354-0178-00
1 ea.	Stud (screw), CRT rotator	355-0049-00
1 ea.	Knob, red, small	366-0032-00
1 ea.	Bracket, CRT support	406-0306-00
1 ea.	Base, CRT rotator	432-0022-00

INSTRUCTIONS

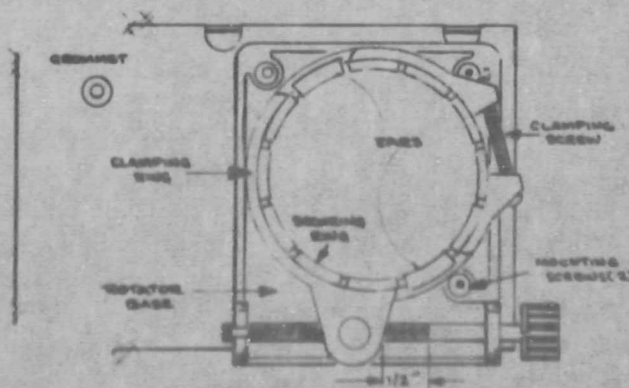
TO REMOVE OLD SUPPORT BRACKET AND CLAMP:

1. Carefully remove the CRT from the instrument. Be sure to disconnect the high voltage anode lead.
2. Remove (cut if necessary) the molded nylon rotating handle on the CRT socket.
NOTE: Some earlier instruments will not have this handle.
3. Remove the old CRT support bracket and clamp. It is held by five (5) screws, two (2) on the rectifier bulkhead, two (2) on the small chassis to the side, and one (1) at the rear of the CRT shield. SAVE SCREWS AND WASHERS.

NOTE: On some instruments there is a wire which passes through a grommet in the bracket. Unsolder this wire from the CRT Cathode Selector switch (on rear panel) before removing the bracket.

TO INSTALL NEW CRT ALIGNMENT ASSEMBLY:

4. Loosen the clamping screw on the CRT support assembly (from kit) to allow the CRT base to slide easily through the securing ring. (See drawing.)



040-0293-00



modification

AM - 040-0293-01

INSTRUCTIONS (con'd)

- () 5. Set the rotator screw so that about 1/2 in. of thread shows. (See drawing.)
- () 6. Check to see that the securing ring is properly seated. The two (2) "ears" on one side should fit in the notches in the clamping ring (see drawing). On the other side, one of the two shorter "ears" on the securing ring should fit inside the hollow formed by the double nut.
IMPORTANT: Do not remove blue nylon ties (which hold securing ring in place) until CRT is installed.
- () 7. Install the CRT support assembly (from kit) in place of the old bracket and clamp removed in step 3. USE OLD HARDWARE.
- () If the wire to the CRT Cathode Selector switch was disconnected in step 3, dress this wire through the grommet as before, and resolder the wire to the switch.
- () 8. Slide the CRT back in place and reconnect all wires except for the high voltage anode lead. Replace the graticule and cover.

TO ALIGN CRT IN CLAMP:

- () 9. Center the CRT anode terminal in the CRT shield anode opening (older instruments) or the hole in the insulated anode connector plate (newer instruments). Push the CRT face against the graticule.
- () Tighten the clamping screw until the CRT base is firmly clamped in the rotator.
- () 10. Re-install the CRT high voltage anode lead.

THIS COMPLETES THE INSTALLATION

- () Check that the CRT does not slip within the securing ring while turning the red rotator knob.

TO ALIGN TRACE WITH GRATICULE LINES:

- () 11. Turn the instrument on. With no signal into the Vertical Amplifier and the sweep free-running, set the FOCUS, ASTIGMATISM, and INTENSITY controls for a fine horizontal trace.
- () By turning the red knob on the rotator screw, align the trace with the horizontal graticule lines.

NOTE: The CRT can be positioned slightly to minimize parallax between the phosphor surface and the graticule, by loosening the mounting screws (see drawing). Be sure to tighten these screws securely.

Clt:ceb



modification instructions

040-0360-00

Type 541, 545

VERTICAL AMPLIFIER TUBES

For the following Tektronix Oscilloscopes

Type 541 Serial Numbers 101-6474

Type 545 Serial Numbers 101-9291

This modification replaces the checked 6CB6 tubes (157-0037-00) with type 8136 tubes.

The new tubes offer the advantages of greater reliability, higher gain and negligible cathode interface over a long period of time.

In addition to replacing the tubes in the distributed amplifier stage, the screen resistor (R1142) is changed to provide better bias for the new tubes, and the plate resistors (R1021 and R1042) of the input amplifier stage are changed to compensate for the increased gain of the 8136's.

PARTS INCLUDED IN MODIFICATION KIT:

Quantity	Part Number	Description
1 ea	157-0082-00	Tubes, (set of 14), 8136 checked for bias
1 ea	214-0210-00	Spool, w/3 ft. silver-bearing solder
1 ea	306-0821-00	Resistor, comp. 820Ω 2W 10%
2 ea	309-0179-00	Resistor, prec. 500Ω 1/2W 1%
1 ea	334-0925-00	Tag, Tube Identification, Mylar
1 ea	1-910D	Tag, MODIFIED INSTRUMENT, gummed back

INSTRUCTIONS

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

A. TO REPLACE THE TUBES:

- () 1. Remove the 6CB6 tubes (V1060 through V1132).
- () 2. Remove the "6CB6" silkscreening from both sides of the chassis with lacquer thinner or similar mineral solvent. USE CARE not to remove the circuit symbols.
- () 3. Install the 8136 tubes from the kit.

B. TO IMPROVE THE 8136 BIAS:

- () 1. Locate the 1.2k (may be 1.5k or 1k) 5W resistor (R1142) on the rear-most pair of vertically mounted ceramic strips on the Vertical Amplifier chassis.
- () 2. Replace this resistor with the 820Ω, 2W resistor from the kit.

C. TO CORRECT INPUT AMPLIFIER GAIN:

- () 1. Locate the 650Ω precision wirewound resistors (R1021 and R1042) near the V1025 and V1040 sockets.
- () 2. Replace these resistors with the 500Ω resistors from the kit.
- () 3. Remove the protective paper backing from the Mylar tag (from kit) and position the tag on the edge of the Vertical Amplifier chassis.

THIS COMPLETES THE INSTALLATION

- () Check wiring for accuracy.

D. TO CORRECT INSTRUCTION MANUAL:

1. Make the following changes in the VERTICAL AMPLIFIER parts list:

R1021	500Ω	1/2W	fixed prec 1%	309-0179-00
R1042	500Ω	1/2W	fixed prec 1%	309-0179-00
R1142	820Ω	2W	fixed comp 10%	306-0821-00
**V1060 through V1132	8136			154-0367-00
(or, order set of 14 checked tubes.				157-0082-00)

2. Make the following changes on the VERTICAL AMPLIFIER Schematic:

Change R1021 to 500Ω
 Change R1042 to 500Ω
 Change R1142 to 820Ω
 Change V1060 through V1132 to 8136

- () Moisten back of MODIFIED INSTRUMENT tag (from kit) and place it on the VERTICAL AMPLIFIER Schematic.



modification instructions

MI - 040-0368-00

Types 541, 545

VERTICAL AMPLIFIER IMPROVEMENTS

For the following Tektronix Oscilloscopes:

Type 541 Serial Numbers 101-6474

Type 545 Serial Numbers 101-9291

Modification Kit, PN 040-0368-00, when installed in the above listed instruments will improve the reliability and transient response of the Vertical Amplifier. The improvements are accomplished in the following steps:

1. The input amplifier is changed to improve the transient response.
2. The delay line termination is improved to eliminate the termination 'bump'.
3. V1050 and V1052 are changed from 6BQ7 tubes to the more reliable type 6DJ8.
4. Modification Kit, PN 040-0360-00, is installed, if it has not been previously. This kit replaces the 6CB6 tubes with 6136 tubes which offer greater reliability, higher gain, and negligible cathode interface over a long period of time.

PARTS REQUIRED

Quantity	Tektronix Part Number	Description
1 ea	040-0368-00	Modification Kit
1 ea	040-0360-00	Modification Kit (see NOTE)

INSTALLATION

Installation instructions are included in the Modification Kit.

NOTE: If not already installed, Modification Kit PN 040-0360-00, must be ordered separately. If it is to be installed with Modification Kit PN 040-0368-00, disregard the instructions in 040-0360-00 and install the parts from both kits as indicated in these instructions.

PARTS INCLUDED IN MODIFICATION KIT:

Quantity	Part Number	Description
(1 ea)		Assembly, resistor, consisting of:
1 ea	210-0478-00	Nut, resistor mounting, 6-32
1 ea	210-0601-00	Eyelet, resistor mounting
1 ea	211-0553-00	Screw, 6-32 x 1-1/2 RHS, Phillips
1 ea	308-0023-00	Resistor, WW, 10k 10W 5%
2 ea	114-0112-00	Coil, variable, 1.8-3.9 μ H
2 ea	154-0187-00	Tube, vacuum, 6DJ8
1 ea	210-0202-00	Lug, solder, SE6 w/2 wire holes
1 ea	210-0803-00	Washer, flat, 6L x 3/8
2 ea	211-0036-00	Screw, 4-40 x 1/2 BH, nylon
1 ea	211-0507-00	Screw, 6-32 x 5/16 PHS
1 ea	281-0501-00	Capacitor, cer, 4.7pF 500V \pm 1pF
1 ea	281-0503-00	Capacitor, cer, 8pF 500V \pm 0.5pF
1 ea	283-0001-00	Capacitor, cer, 0.005 μ F 500V discap
1 ea	308-0062-00	Resistor, WW, 3k 5W 5%

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing solder supplied with the kit.

INSTRUCTIONS

NOTE: These instructions assume that Modification Kit PN 040-0360-00, has NOT been installed. If it has, ignore those parts of the following instructions that have already been completed.

A. TO REPLACE THE VERTICAL AMPLIFIER TUBES:

- () 1. Remove the 6BQ7 tubes (V1050 and V1052) and the 6CB6 tubes (V1060 through V1132).
- () 2. Remove the '6BQ7' and '6CB6' silk-screening from both sides of the chassis with lacquer thinner or similar mineral solvent. USE CARE not to remove the circuit symbols.
- () 3. Install the 6DJ8 tubes (from kit) in the V1050 and V1052 sockets.
- () Install the 8136 tubes (from Modification Kit 040-0360-00) in the remaining sockets.

INSTRUCTIONS (cont)

B. TO IMPROVE THE 8136 TUBE BIAS:

- () 1. Replace the 1.2k (may be 1.5k or 1k) 5W resistor (R1142) located on the rear-most pair of vertically mounted ceramic strips on the underside of the Vertical Amplifier chassis, with the 820 Ω 2W resistor from the 040-0360-00 Modification Kit.

C. TO IMPROVE INPUT AMPLIFIER TRANSIENT RESPONSE:

- () 1. On the top of the Vertical Amplifier chassis, locate R1031, a chassis-mounted 10W resistor, and R1030, a 5W resistor connected between a ground lug and one end of R1031.
- () Remove V1025 and V1040 for access.
- () Unsolder and remove these two resistor and the R1031 mounting hardware.
- () 2. Mount the 10k 10W resistor (from kit) in the hole from which R1031 was removed. Use the flatwasher and 6-32 x 5/16 screw from the
- () 3. Solder the 3k 5W resistor (from kit) between the ground lug, from which R1030 was removed in step C-1, and the closest terminal of the 10k resistor mounted in step C-2. Also, solder the two 330 Ω 1/2W resistors to this terminal of the 10k resistor.
- () Solder the black-brown-green-brown wire (unsoldered in step C-1) to the remaining terminal of the 10k resistor.
- () 4. On the underside of the Vertical Amplifier, locate coils L1022 and L1040, connected to pin 9 of the V1025 and V1040 sockets. Also, locate the 650 Ω 'graham cracker' resistors R1021 and R1042, connected to one end of these coils.
- () Unsolder and remove these coils and resistors. DO NOT remove the 100 Ω resistors from pin 2 of V1050 and V1052, or the 68k precision resistors from the ceramic strip. They will be reconnected to the new circuit.
- () 5. Mount the coils (from kit) in the center of the V1025 and V1040 sockets with the nylon screws from the kit. The coil terminals should point toward the rear of the instrument.
- () 6. Solder the coil center taps to pin 9 of V1025 and V1040.
- () 7. Replace the 6AW8 tubes in the V1025 and V1040 sockets.
- () 8. Solder the 100 Ω 1/2W resistors (from pin 2 of V1050 and V1052, unsoldered in step C-4) to the coil terminals closest to the tube sockets.
- () 9. Dress the 68k precision resistors (from ceramic strip, unsoldered in step C-4) to the remaining coil terminals. DO NOT solder yet.
- () 10. Solder the 500 Ω precision resistors (from Modification Kit 040-0360-00) between L1021 and L1042 (vacant terminals) and the coils mounted in step C-5 (terminals farthest from socket), along with the 68k resistors.

INSTRUCTIONS (cont)

D. TO IMPROVE DELAY LINE TERMINATION:

- () 1. Locate the vertically-mounted plastic plate on which C1073, C1075, C1076 and C1077 are mounted.
- () 2. Mount the solder lug (from kit) under the rear mounting screw farthest from the chassis.
- () 3. Solder the 0.005 μ F disc capacitor (from kit) between the solder lug (mounted in step D-2) and the bare wire connecting the termination coils (to which a white-blue wire is also soldered).

NOTE: USE CAUTION while performing steps D-4 and D-5 to avoid applying too much heat to the capacitor bodies.

- () 4. If one is present, remove the fixed capacitor in parallel with C1076.
- () Solder the 4.7 pF capacitor (from kit) across C1076.
- () 5. Remove the fixed capacitor in parallel with C1075.
- () Solder the 8 pF capacitor (from kit) across C1075.

THIS COMPLETES THE INSTALLATION.

- () Check wiring for accuracy.
- () Remove the Vertical Amplifier schematic page from your Instruction Manual.
- () Install the Manual Modification Insert pages in your Instruction Manual.

BD:ls

INSTRUCTION MANUAL

MODIFICATION INSERT

VERTICAL AMPLIFIER IMPROVEMENTS

TYPE 541 -- SN 101-6474

TYPE 545 -- SN 101-9291

Installed in Type _____ SN _____ Date _____

This insert has been written to supplement the Instruction Manual for these instruments. The information given in this insert will supersede that given in the manual.

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GENERAL INFORMATION

This instrument has been modified with Modification Kit, PN 040-0368-00, to improve the reliability and transient response of the Vertical Amplifier.

The improvements were accomplished in the following steps:

1. The input amplifier was changed to improve the transient response.
2. The delay line termination was improved to eliminate the termination 'bump'.
3. V1050 and V1052 were changed from 68Q7 tubes to the more reliable type 6DJ8.
4. Modification Kit, PN 040-0360-00 was installed, which replaced the 6CB6 tubes with 8136 tubes, offering greater reliability, higher gain, and negligible cathode interface over a long period of time.

CALIBRATION

NOTE I: Most of the tolerances in the following procedure are closer than advertised specifications. This is done purposely to insure that the instrument will meet or exceed advertised specifications after the instrument has been operated for a time after calibration. These tolerances should be used, therefore, as a guide only.

NOTE II: Before calibrating the Vertical Amplifier, the delay line termination coils (L1070 and L1071) should be carefully inspected for any signs of over-heat, especially at the front (C1077) section. If any signs are noted, these coils should be replaced with PN 108-0081-00.

To avoid over-heating the termination coils, do not remove the 6AW8 tubes with the instrument turned on.

1. Check Vertical Amplifier Bias:

- a) Position the trace to the center of the screen with the VERTICAL POSITION control on the plug-in unit.
- b) Connect a jumper lead between the grid lines of the DA (distributed amplifier).
- c) Measuring from the grid lines to pin 2 of each tube on one side of the DA (i.e., V1066, V1082, V1092, V1102, V1112, V1122 and V1132), check for a minimum of 1 V bias.

2. Check Vertical Amplifier Balance:

The unbalance in each stage of the DA should not exceed 2mm, and the total distributed amplifier unbalance should not exceed 2mm. To check, proceed as follows:

- a) With the DA grid lines still shorted, connect a jumper wire from +100V to pin 2 (cathode) of each pair of DA tubes. This will bias to cut off each pair of tubes, eliminating their effect by 'turning them off'. Note and record the amount and direction of trace shift.
- b) Exchange tubes if necessary to balance as close as possible.
- c) Repeat steps 2-a and 2-b until the best conditions are obtained. The pair of tubes with the most unbalance should be placed in V1060 and V1066 sockets.
- d) Check the net DA unbalance by shorting the CRT vertical deflection plate leads and noting the trace shift. If the shift exceeds 2mm, one or more pairs of DA tubes can be reversed (i.e., exchange V1130 and V1132) until the overall effect is very small.
- e) Remove the jumper lead from the DA grid lines. Short the CRT vertical deflection plate leads and position the trace to the CRT electrical center with the VERTICAL POSITION control.
- f) Short the grids (pin 2) of V1050 and V1052. The unbalance should not exceed 1cm.
- g) Short the grids (pin 7) of V1025 and V1040. The unbalance should not exceed 1cm.
- h) The Total, net unbalance (algebraic sum of each stage) should not exceed 1.5cm. If it does, reverse the 6AW8 tubes to nullify the overall effect.

CALIBRATION (cont)

3. Check Compression or Expansion:

Apply 2 cm of any convenient signal to the vertical, and position it up and down within the graticule area. Compression or expansion should not exceed ± 0.5 mm.

4. Set Vertical Gain Adj:

Apply a signal of known accuracy to the vertical plug-in and adjust the Gain Adj for the proper vertical deflection.

5. Adjust Vertical DC Shift Compensations:

Vertically deflect the trace about 4 cm with a DC voltage (such as an ohmmeter). Note the very slow drift after the trace stops. Adjust the DC Shift Comp for minimum drift.

6. Adjust Delay Line and HF Compensations:

- a) Preset the coils mounted on V1025 and V1040 sockets so that the slugs are close to the sockets, just clear of the windings. Preset the slugs of L1021 and L1022 fully into the coils.
- b) Apply a properly-terminated fast-rise signal through a wide bandwidth plug-in unit.
- c) Adjust the delay line trimmers for optimum response. The coils at the CRT end of the delay line (L1254 and L1255) should be turned into the coils, then brought out counter-clockwise to the point where the tuning of the leading edge just stops being affected. Further leading edge adjustments can be made with the coils mounted on V1025 and V1040 sockets.

7. Check Vertical Response:

Apply a signal from a constant-amplitude sine-wave generator, such as the Tektronix Type 1908. Adjust the generator to display 4 cm at 500 kHz. Increase the signal to about 28-30 MHz and note the frequency at which the signal drops to 3 cm. This is the 3.5 db point.

The exact frequency will vary according to the accuracy of the vertical response adjustments, the response characteristics of the plug-in used, and the constancy of the sine-wave generator used.

ELEC

Valu

Ckt.

C10

C10

C10

L10

L10

R10

R10

R10

R10

R11

V10

V10

V10

V10

V10

V10

V10

V11

V11

V11

V11

V11

V11

V11

V11

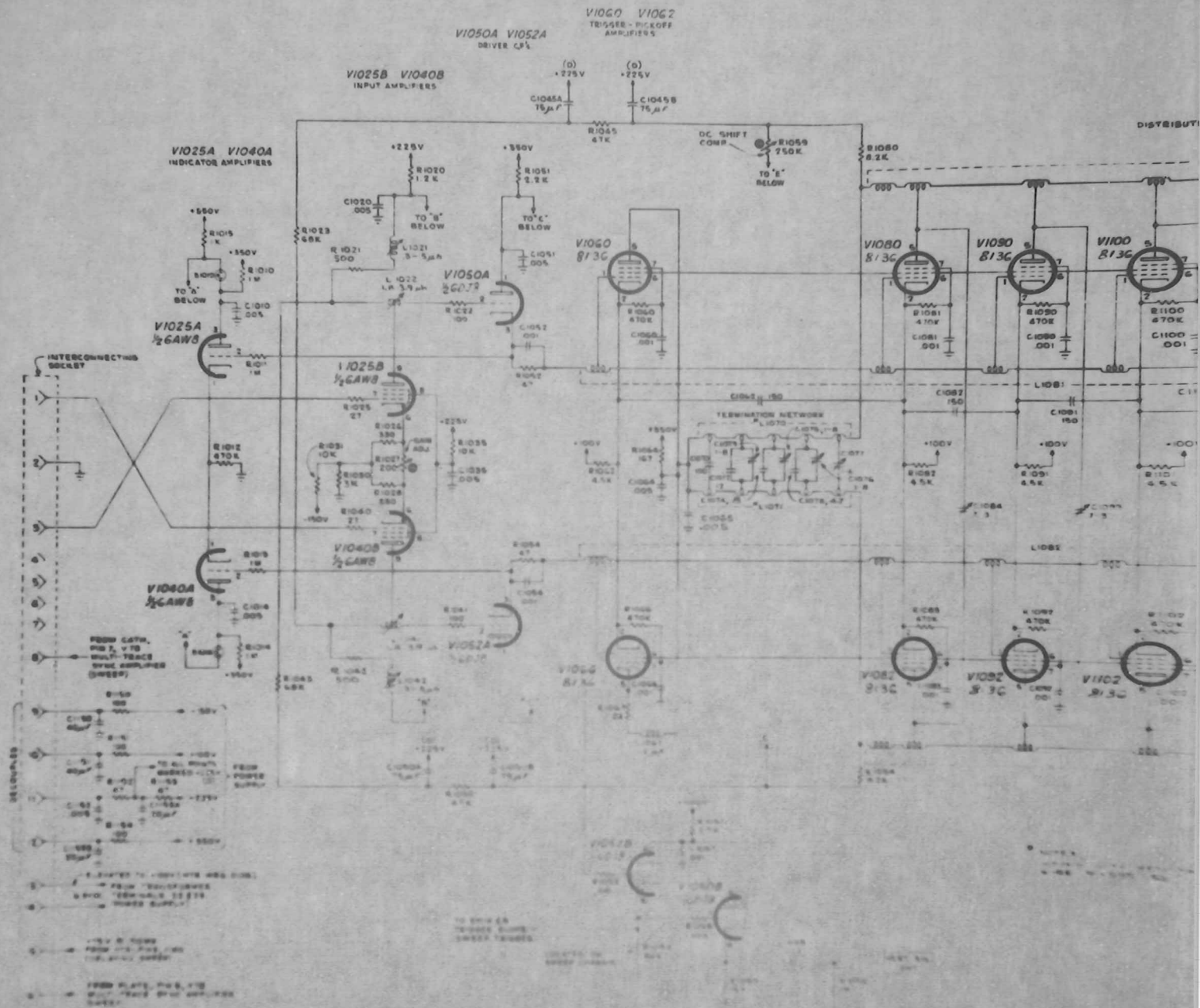
ELECTRICAL PARTS LIST

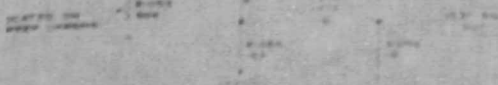
Values fixed unless marked Variable.

Ckt.No.	Part Number	Description
CAPACITORS		
C1065	283-0001-00	0.005 μ F Disc T ₁ 50V \pm 20%
C1074	281-0503-00	8 pF Cer 500V \pm 0.5 pF
C1078	281-0501-00	4.7 pF Cer 500V \pm 1 pF
INDUCTORS		
L1022	114-0112-00	1.8-3.9 μ H Var
L1041	114-0112-00	1.8-3.9 μ H Var
RESISTORS		
R1021*	309-0179-00	500 Ω Prec 1/2W 1%
R1030	308-0062-00	3 k WW 5W 5%
R1031	309-0023-00	10 k WW 10W 5%
R1042*	309-0179-00	500 Ω Prec 1/2W 1%
R1142*	306-0821-00	820 Ω Comp 2W 10%
TUBES		
V1050	154-0187-00	6DJ8
V1052	154-0187-00	6DJ8
V1060*	154-0367-00	8136
V1066*	154-0367-00	8136
V1080*	154-0367-00	8136
V1082*	154-0367-00	8136
V1090*	154-0367-00	8136
V1092*	154-0367-00	8136
V1100*	154-0367-00	8136
V1102*	154-0367-00	8136
V1110*	154-0367-00	8136
V1112*	154-0367-00	8136
V1120*	154-0367-00	8136
V1122*	154-0367-00	8136
V1130*	154-0367-00	8136
V1132*	154-0367-00	8136

NOTE: To replace V1060 through V1132 with a set of 14 checked tubes, order 1 set, PN 157-0082-00.

* Installed with Modification Kit PN 040-0360-00.







modification instructions

MI - 040-0395-01
 TYPES 531/RM, 533/RM,
 535/RM, 541/RM,
 543/RM, 545/RM

SILICON RECTIFIER REPLACEMENT

For the following Tektronix Oscilloscopes:

Types 531 SN 101-20000	541 SN 101-20000
RM31 SN 101- 1000	RM41 SN 101- 1000
533 SN 101- 1190	543 SN 101- 949
RM33 SN 101- 129	RM43 SN 101- 105
535 SN 101-20000	545 SN 101-20000
RM35 SN 101- 1000	RM45 SN 101- 1000

Modification Kit, PN 040-0395-01, replaces selenium rectifiers in the above listed instruments with silicon rectifiers which offer more reliability and longer life.

The following selenium rectifiers will be eliminated by this modification:

SR732 -- 106-0012-00	SR780 -- 106-0014-00
SR740 -- 106-0013-00	SR790 -- 106-0015-00
SR756* -- 106-0014-00	SR756* -- 106-0019-00

The instructions are divided into sections for the different series instruments and serial number ranges. Additional shunt resistors and wiring instructions are added to meet the wide range of instruments involved and their respective power requirements.

The kit replaces 040-0201-00, 040-0239-00, 040-0240-00 and 040-0395-00.

*SR756 changed from 106-0014-00 to 106-0019-00 in:

Type 531 at serial number 7601
 Type 535 at serial number 8628

PARTS LIST

Quantity	Part Number	Description
(1 ea)		Assembly, silicon rectifier bracket, consisting of:
1 ea	210-0202-00	Lug, solder, SE6
5 ea	210-0478-00	Nut, hex, 6-32 x 5/16, resistor mounting
5 ea	210-0601-00	Eyelet
4 ea	211-0116-00	Screw, assembled washer, 4-40 x 5/16 PHB, nickel plate
5 ea	211-0507-00	Screw, 6-32 x 5/16 PHS, Phillips
3 ea	211-0514-00	Screw, 6-32 x 3/4 PHS, Phillips
2 ea	211-0553-00	Screw, 6-32 x 1-1/2 RHS, Phillips
1 ea	308-0143-00	Resistor, WW, 15Ω 10W
1 ea	308-0153-00	Resistor, WW, 100Ω 10W 5%
1 ea	308-0422-00	Resistor, WW, 15Ω 5W
2 ea	308-0423-00	Resistor, WW, 10Ω 5W
1 ea	406-0475-01	Bracket, silicon rectifier mounting
1 ea	670-0159-00	Board, circuit, wired
(1 ea)		Assembly, resistor, consisting of:
1 ea	210-0478-00	Nut, hex, 6-32 x 5/16, resistor mounting
1 ea	210-0601-00	Eyelet
1 ea	211-0507-00	Screw, 6-32 x 5/16 PHS, Phillips
1 ea	211-0553-00	Screw, 6-32 x 1-1/2 RHS, Phillips
1 ea	308-0020-00	Resistor, WW, 3k 10W 5%
2 ea	210-0457-00	Nut, Keps, 6-32 x 5/16
2 ea	210-0803-00	Washer, steel, 6L x 3/8 x 0.032
2 ea	211-0510-00	Screw, 6-32 x 3/8 PHS, Phillips
1 ea	306-0680-00	Resistor, comp, 68Ω 2W 10%
1 ea	308-0402-00	Resistor, WW, 30Ω 5W 5%
1 ea	(1-910D)	Tag, MODIFIED INSTRUMENT, gummed back
4 ea		Tubing, #12, 162-0014-00, black, 1-1/2 in.
1 ea		Wire, #22 solid, 175-0520-00, blue, 6 in.
2 ea		Wire, #22 solid, 175-0522-00, white-red, 6 in.
1 ea		Wire, #22 solid, 175-0522-00, white-orange, 6 in.
2 ea		Wire, #22 solid, 175-0522-00, white-violet, 6 in.
2 ea		Wire, #22 solid, 175-0544-00, gray-red-red, 6 in.
1 ea		Wire, #22 solid, 175-0544-00, gray-brown, blue, 6 in.

INSTRUCTIONS

A. FOR TYPES 531 SN 101-7600 AND 535 SN 101-8627

Refer to FIG. 1 for steps A-1 through A-9

- () 1. Before installing the assembly in the instrument, remove (by cutting) the bare wire between terminals A and B of the two +225V wirewound resistors.
- () 2. In your instrument, remove the bare wire connected from the top terminal of SR780 to the center terminal of SR756. On new instruments, this is a short black wire connected directly between the two rectifier stacks. On older instruments (SN approximately 1000 and below), this wire was dressed around the back of SR756 and wired into the main power cable.
- () 3. Unsolder and remove the selenium rectifiers from the bulkhead.
- () 4. Enlarge the SR740 mounting holes with a 5/32 (#23) drill.
- () 5. Mount the silicon rectifier bracket, using the holes just drilled and the mounting hardware from the kit.

NOTE: On some of the older instruments, the mounting holes for SR740 were spaced only 4 in. apart. If this is the case, drill new holes 9/32 in. above the top hole, and 9/32 in. below the bottom hole. Use a 5/32 (#23) drill.

- () 6. Solder all wires that were removed from the selenium rectifiers to the circuit board as shown in Fig. 1. If any of the wires will not reach, splice them, using the color-coded wires from the kit. Cover the splice with black tubing from the kit.
- () 7. Solder the 30 Ω 5W resistor (from kit) across the 15 Ω 10W resistor, as shown.
- () 8. Solder the 68 Ω 2W resistor (from kit) across the 100 Ω 10W resistor, as shown.

FOR TYPES 531 SN 101-6638 AND 535 SN 101-1059

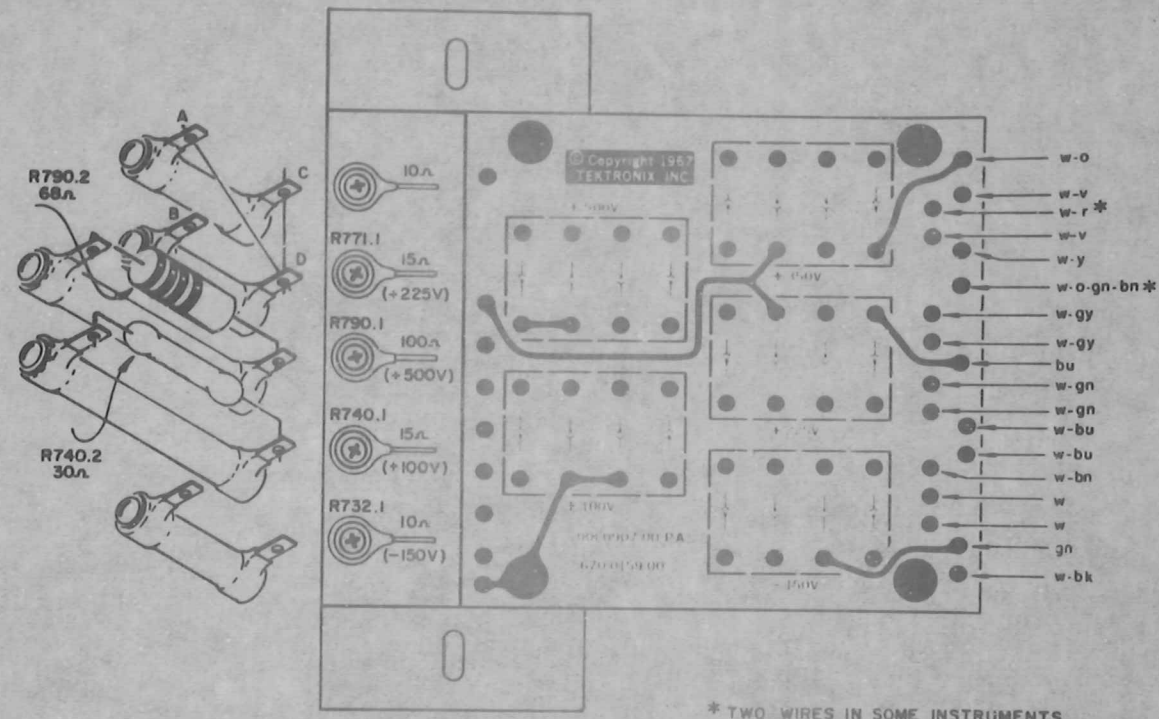
- () 9. Locate R762 (531) or R761 (535) on lower side of power chassis near V784. If the value of this resistor is NOT 3k, replace it with the 3k WW resistor assembly from the kit.

THIS COMPLETES THE INSTALLATION FOR THE ABOVE LISTED INSTRUMENTS.

- () Check wiring for accuracy.
- () Turn the instrument on and check for proper voltages and regulation of the power supply. If you make any adjustments to the power supply, you will have to check the calibration of the rest of the instrument.

NOTE: For Type 535 SN 101-1059 -- If the -150V supply fails to regulate on High Line, Low Load, remove R724 (10k 2W resistor) which is in parallel with R725 (1k 25W resistor).

- () Moisten the back of MODIFIED INSTRUMENT tag (from kit) and place it on the Power Supply schematic.
- () Select the Manual insert page which corresponds to your instrument and fasten it in your Manual.



* TWO WIRES IN SOME INSTRUMENTS

FIG. 1

INSTRUCTIONS (cont)

B. FOR THE FOLLOWING INSTRUMENTS:

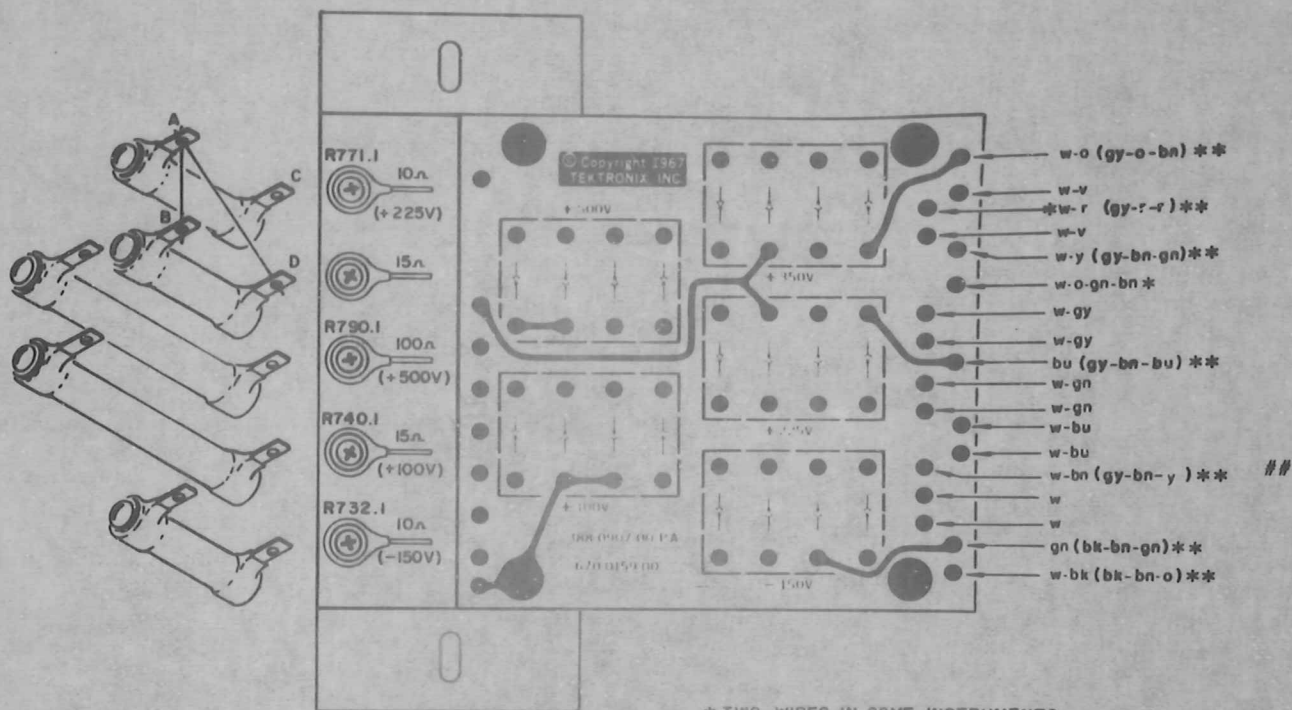
Type 531 serial numbers 7601-20000
Type 533 serial numbers 101- 1190
Type RM33 serial numbers 101- 129
Type 543 serial numbers 101- 950
Type RM43 serial numbers 101- 105
Types RM31, 541, RM41, all serial numbers

Refer to FIG. 2 for steps B-1 through B-8

- () 1. Before installing the assembly in the instrument, remove (by cutting) the bare wire between terminals C and D of the two +225V wirewound resistors.
- () 2. Unsolder and remove the selenium rectifiers from the bulkhead (except SR752 in Types 533, RM33, 543, and RM43).
- () 3. Enlarge the SR740 mounting holes with a 5/32 (#23) drill.
- () Mount the silicon rectifier bracket, using the holes just drilled and the mounting hardware from the kit.
NOTE: On some of the older instruments, the mounting holes for SR740 were spaced only 4 in. apart. If this is the case, drill new holes 9/32 in. above the top holes, and 9/32 in. below the bottom hole. Use a 5/32 (#23) drill.
- () 4. Pull the cable that was soldered to SR780 and SR756 back through the grommet to the right side of the bulkhead.
- () 5. Locate and remove from the cable the white-red (or gray-red-red) wire that was soldered to SR756.
- () 6. Dress the two white-gray, and white-yellow (or gray-brown-green) and white-orange-green-brown wires from SR790 under the power cable to the new assembly.
- () 7. Pull the white-brown (or gray-brown-yellow) wire back through two loops of the cable lacing in order to obtain enough length to reach the assembly.
- () 8. Solder all wires that were removed from the selenium rectifiers to the circuit board, as shown.

THIS COMPLETES THE INSTALLATION FOR THE ABOVE LISTED INSTRUMENTS.

- () Check wiring for accuracy.
- () Turn the instrument on and check for proper voltages and regulation of the power supply. If you make any adjustments to the power supply, you will have to check the calibration of the rest of the instrument.
- () Moisten the back of MODIFIED INSTRUMENT tag (from kit) and place it on the Power Supply schematic.
- () Select the Manual insert page which corresponds to your instrument and fasten it in your Manual.



* TWO WIRES IN SOME INSTRUMENTS

** SOME EARLY INSTRUMENTS HAD WIRES
COLOR CODED AS SHOWN IN BRACKETS

FIG. 2

INSTRUCTIONS (cont)

C. FOR TYPES 535 SN 8628-20000 AND RM35, 545, AND RM45 -- ALL SERIAL NUMBERS

Refer to FIG. 3 for steps C-1 through C-9

- () 1. Before installing the assembly in the instrument, remove the bare wires between terminals A and B, and between terminals C and D, of the +225 V wirewound resistors.
- () 2. Unsolder and remove the selenium rectifiers from the bulkhead.
- () 3. Enlarge the SR740 mounting holes with a 5/32 (#23) drill.
- () Mount the silicon rectifier bracket, using the holes just drilled and the mounting hardware from the kit.

NOTE: On some of the older instruments, the mounting holes for SR740 were spaced only 4 in. apart. If this is the case, drill new holes 9/32 in. above the top hole, and 9/32 in. below the bottom hole. Use a 5/32 (#23) drill.

- () 4. Pull the cable that was soldered to SR780 and SR756 back through the grommet to the right side of the bulkhead.
- () 5. Locate and remove from the cable the white-red (or gray-red-red) wire that was connected to SR756.
- () 6. Dress the two white-gray, and white-yellow (or gray-brown-green), and white-orange-green-brown wires from SR790 under the power cable to the new assembly.
- () 7. Pull the white-brown (or gray-brown-yellow) wire back through two loops of the cable lacing in order to obtain enough length to reach the assembly.
- () 8. Solder all wires that were removed from the selenium rectifiers to the circuit board, as shown.
- () 9. Solder the 30Ω 5W resistor (from kit) across the terminals of the 15Ω 10W resistor, as shown.

THIS COMPLETES THE INSTALLATION FOR THE ABOVE LISTED INSTRUMENTS.

- () Check wiring for accuracy.
- () Turn the instrument on and check for proper voltages and regulation of the power supply. If you make any adjustments in the power supply, you will have to check the calibration of the rest of the instrument.
- () Moisten the back of the MODIFIED INSTRUMENT tag (from kit) and place it on the Power Supply schematic.
- () Select the Manual insert page which corresponds to your instrument and fasten it in your Manual.

NM:ls

INSTRUCTION MANUAL

MODIFICATION INSERT

SILICON RECTIFIER REPLACEMENT

TYPE 531 SN 101-7600
TYPE 535 SN 101-8627

Installed in Type _____ SN _____ Date _____

This insert has been written to supplement the Instruction Manual for these instruments. The information given in this insert will supersede that given in the manual.

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GENERAL INFORMATION

This instrument has been modified with Modification Kit, PN 040-0395-01, which replaced the selenium rectifiers used in the instruments listed, with silicon rectifiers offering more reliability and longer life.

ELECTRICAL PARTS LIST

Values fixed unless marked variable.

Ckt.No.	Part Number	Description
DIODES		
D732A, B, C, D	152-0066-00	500-750mA Silicon 400PIV
D740A, B, C, D	152-0066-00	500-750mA Silicon 400PIV
D756A, B, C, D	152-0066-00	500-750mA Silicon 400PIV
D780A, B, C, D	152-0066-00	500-750mA Silicon 400PIV
D790A, B, C, D	152-0066-00	500-750mA Silicon 400PIV

RESISTORS

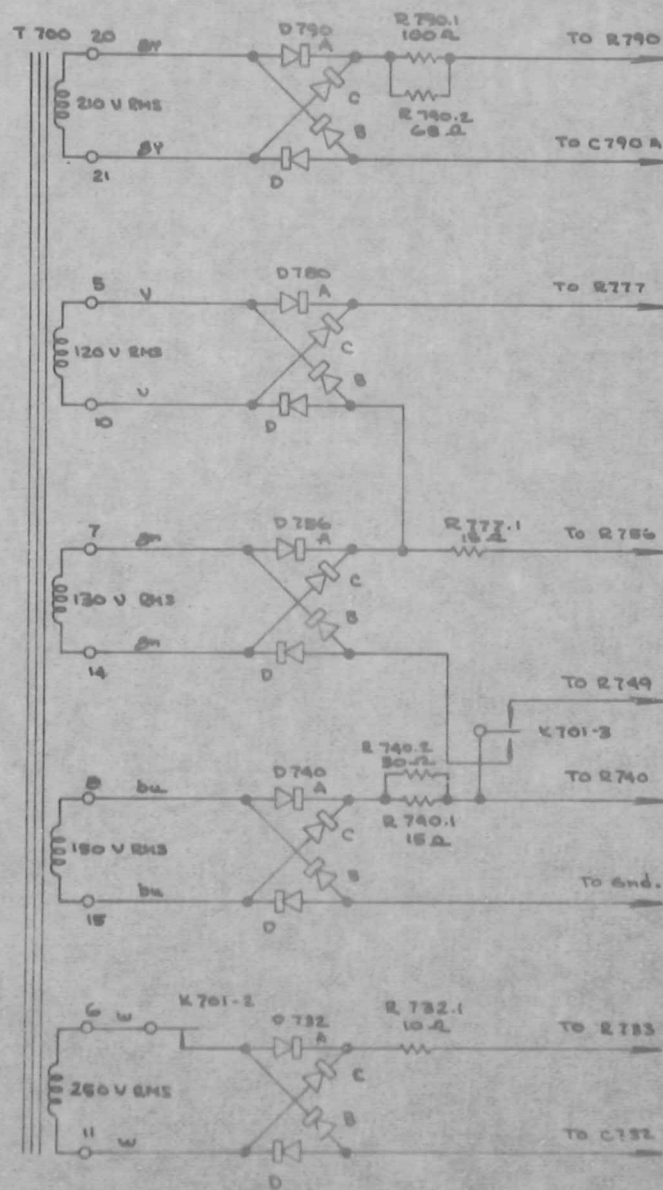
All resistors are WW 5% unless otherwise marked.

R732.1	308-0423-00	10Ω	5W		
R740.1	308-0143-00	15Ω	10W		
R740.2	308-0402-00	30Ω	5W		
R777.1	308-0422-00	15Ω	5W		
R790.1	308-0153-00	100Ω	10W		
R790.2	306-0680-00	68Ω	2W	10%	comp

MECHANICAL PARTS LIST

406-0475-01	Bracket, silicon rectifier mounting
670-0159-00	Board, circuit, wired
210-0601-00	Eyelet
210-0202-00	Lug, solder, SE6
210-0457-00	Nut, Keps, 6-32 x 5/16
210-0478-00	Nut, hex, 6-32 x 5/16, resistor mounting
211-0116-00	Screw, assembled washer, 4-40 x 5/16 PHB nickel plate
211-0507-00	Screw, 6-32 x 5/16 PHS, Phillips
211-0510-00	Screw, 6-32 x 3/8 PHS, Phillips
211-0514-00	Screw, 6-32 x 3/4 PHS, Phillips
211-0553-00	Screw, 6-32 x 1-1/2 RHS, Phillips
210-0803-00	Washer, steel, 6L x 3/8 x 0.032

SCHEMATICS



INSTRUCTION MANUAL

MODIFICATION INSERT

SILICON RECTIFIER REPLACEMENT

TYPES 531 SN 7601-20000	RM31 SN 101-1000
533 SN 101- 1190	RM33 SN 101- 129
535 SN 8628-20000	RM35 SN 101-1000
541 SN 101-20000	RM41 SN 101-1000
543 SN 101- 949	RM43 SN 101- 105
545 SN 101-20000	RM45 SN 101-1000

Installed in Type _____ SN _____ Date _____

This insert has been written to supplement the Instruction Manual for these instruments. The information given in this insert will supersede that given in the manual.

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GENERAL INFORMATION

This instrument has been modified with Modification Kit, PN 040-0395-01, which replaced the selenium rectifiers used in the instruments listed, with silicon rectifiers offering more reliability and longer life.

ELECTRICAL PARTS LIST

Values are fixed unless marked variable.

Ckt.No.	Part Number	Description
DIODES		
D732A, B, C, D	152-0066-00	500-750 mA Silicon 400 PIV
D740A, B, C, D	152-0066-00	500-750 mA Silicon 400 PIV
D756A, B, C, D	152-0066-00	500-750 mA Silicon 400 PIV
D780A, B, C, D	152-0066-00	500-750 mA Silicon 400 PIV
D790A, B, C, D	152-0066-00	500-750 mA Silicon 400 PIV

RESISTORS

All resistors are WW 5% unless otherwise marked.

R732.1	308-0423-00	10 Ω	5W
R740.1	308-0143-00	15 Ω	10W
R740.2*	308-0402-00	30 Ω	5W
R777.1	308-0423-00	10 Ω	5W
R777.2*	308-0422-00	15 Ω	5W
R790.1	308-0153-00	100 Ω	10W

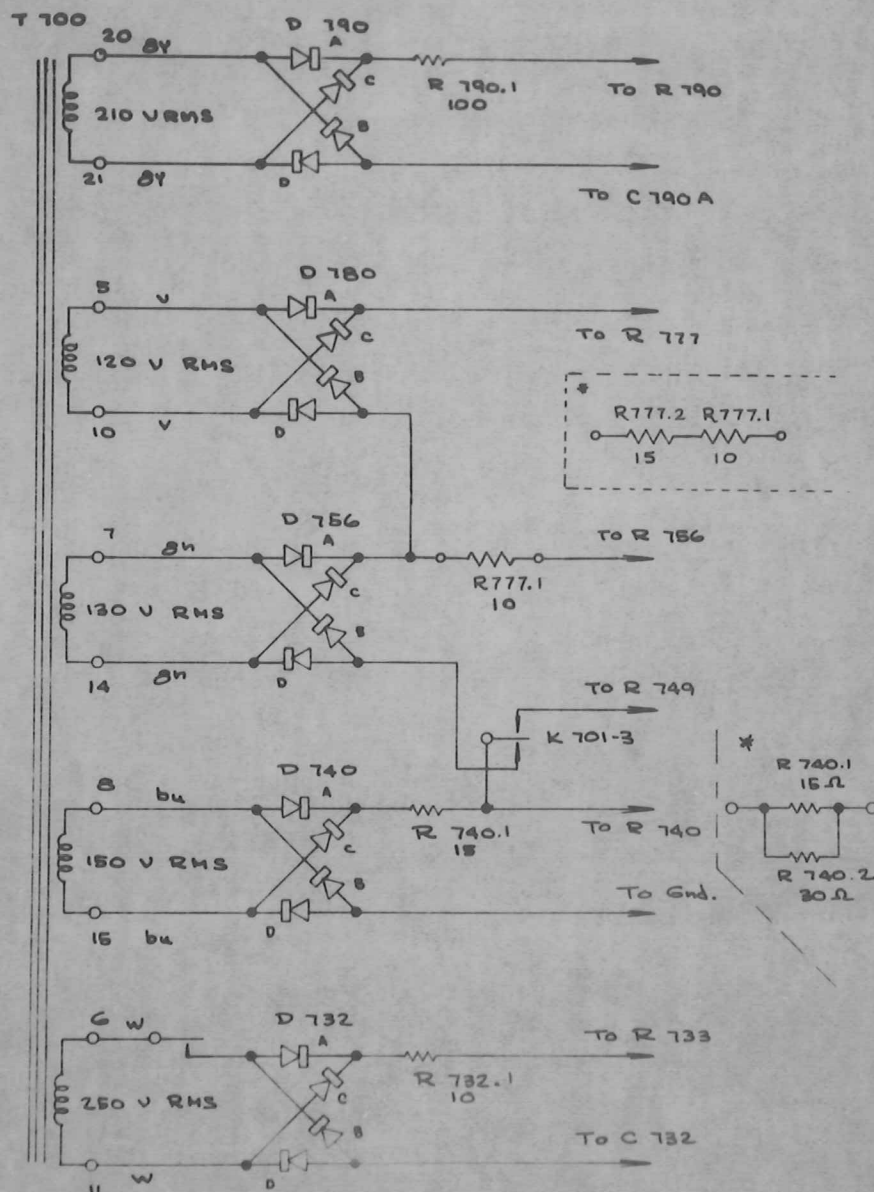
* Used only in the following instruments:

Types 535 -- SN 8628-20000; RM35, 545, RM45 -- SN 101-up

MECHANICAL PARTS LIST

406-0475-01	Bracket, silicon rectifier mounting
670-0159-00	Board, circuit, wired
210-0601-00	Eyelet
210-0202-00	Lug, solder, SE6
210-0457-00	Nut, Keps, 6-32 x 5/16
210-0478-00	Nut, hex, 6-32 x 5/16, resistor mounting
211-0116-00	Screw, assembled washer, 4-40 x 5/16 PHB nickel plate
211-0507-00	Screw, 6-32 x 5/16 PHS, Phillips
211-0510-00	Screw, 6-32 x 3/8 PHS, Phillips
211-0514-00	Screw, 6-32 x 3/4 PHS, Phillips
211-0553-00	Screw, 6-32 x 1-1/2 RHS, Phillips
210-0803-00	Washer, steel, 6L x 3/8 x 0.032

SCHEMATICS



* Resistor values for the following instruments:

Types 535 -- serial numbers 8628-20000
 RM33, 545, RM45 -- all serial numbers

MODIFICATION KIT

CHOPPING TRANSIENT BLANKING



For the following Tektronix Oscilloscopes:

Types 531, 535, 541, and 545
Serial numbers 101-20,000

Types RM31, RM35, RM41, and RM45
Serial numbers 101-1000

DESCRIPTION

This modification allows a blanking voltage to be applied to the CRT cathode, to eliminate switching transients from the display which occur when a multiple-trace plug-in unit is operated in its chopped mode.

The blanking voltage is applied by means of a switch on the rear panel of the instrument.

V78, the Multi-Trace Units Sync Amplifier, a 6AU6, is replaced by a 6DJ8. One half of the 6DJ8 is used as the Sync Amplifier and the other half is used to generate the blanking pulse.

The installation involves changing the V78 socket to a 9-pin type, adding a CRT Cathode Selector switch to the rear panel plus other minor circuit changes.

The instructions are divided into parts to facilitate the installation in all instruments listed above.

This kit replaces kits 040-0198-00, 040-0198-01, 040-0200-00, and 040-0200-01.

040-0403-00

Publication:
Instructions for 040-0403-00
January 1966

Supersedes:
May 1965

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040-0403-00

Page 1 of 11

PARTS LIST

Quantity	Description	Part Number
1 ea.	Socket, tube 9-pin STM9G	136-0015-00
1 ea.	Tube, vacuum ECC88/6DJ8	154-0187-00
2 ea.	Lockwasher, int #4	210-0004-00
2 ea.	Nut, hex 4-40 x 3/16	210-0406-00
1 ea.	Nut, hex 15/32-32 x 9/16	210-0414-00
1 ea.	Nut, switch, 15/32-32 x 5/64, 12-sided	210-0473-00
1 ea.	Washer, steel, 1/2 x 5/8 x 0.020	210-0845-00
2 ea.	Screw, 4-40 x 1/4 BHS	211-0008-00
2 ea.	Screw, thread-forming #4 x 1/4 PHS Phillips	213-0088-00
1 ea.	Spool, solder, w/3ft. of silver-bearing solder	214-0210-00
1 ea.	Switch, toggle, DPDT (modified)	260-0014-00
3 ea.	Capacitor, cer., 12 pf 500 v +0.6 pf	281-0508-00
1 ea.	Resistor, comp., 68k 1/2 w 5%	301-0683-00
1 ea.	Resistor, comp., 1k 1/2 w 10%	302-0102-00
1 ea.	Resistor, comp., 10k 1/2 w 10%	302-0103-00
1 ea.	Resistor, comp., 1 Meg 1/2 w 10%	302-0105-00
1 ea.	Resistor, comp., 1.8 Meg 1/2 w 10%	302-0185-00
1 ea.	Resistor, comp., 470k 1/2 w 10%	302-0474-00
1 ea.	Resistor, comp., 3.3k 2 w 10%	306-0332-00
1 ea.	Tag, CHOPPING SPIKE BLANKING	334-0674-00
1 ea.	Tag, CRT CATHODE SELECTOR	334-0706-00
1 ea.	Tag, tube, ECC88/6DJ8	334-0767-00
1 ea.	Grommet, 1/4 in.	348-0002-00
1 ea.	Rod, nylon, 2-hole	385-0075-00
1 ea.	Rod, nylon, 3-hole	385-0096-00
2 ea.	Tag, MODIFIED INSTRUMENT, gummed back	(001-0910-00)
1 ea.	Tubing, plastic #20 2 in. black	(162-0504-00)
1 ea.	Wire, #22 solid 6 in. white-brown-black-brown	(175-0522-00)
1 ea.	Wire, #22 solid, 19 in. white	(175-0522-00)
1 ea.	Wire, #22 solid, 7 in. white	(175-0522-00)
1 ea.	Wire, #22 solid, 13 in. white	(175-0522-00)
1 ea.	Wire, #22 solid, 16 in. white	(175-0522-00)
1 ea.	Wire, #22 solid, 6 in. bare	(176-0122-00)

040-0403-00

INSTRUCTIONS

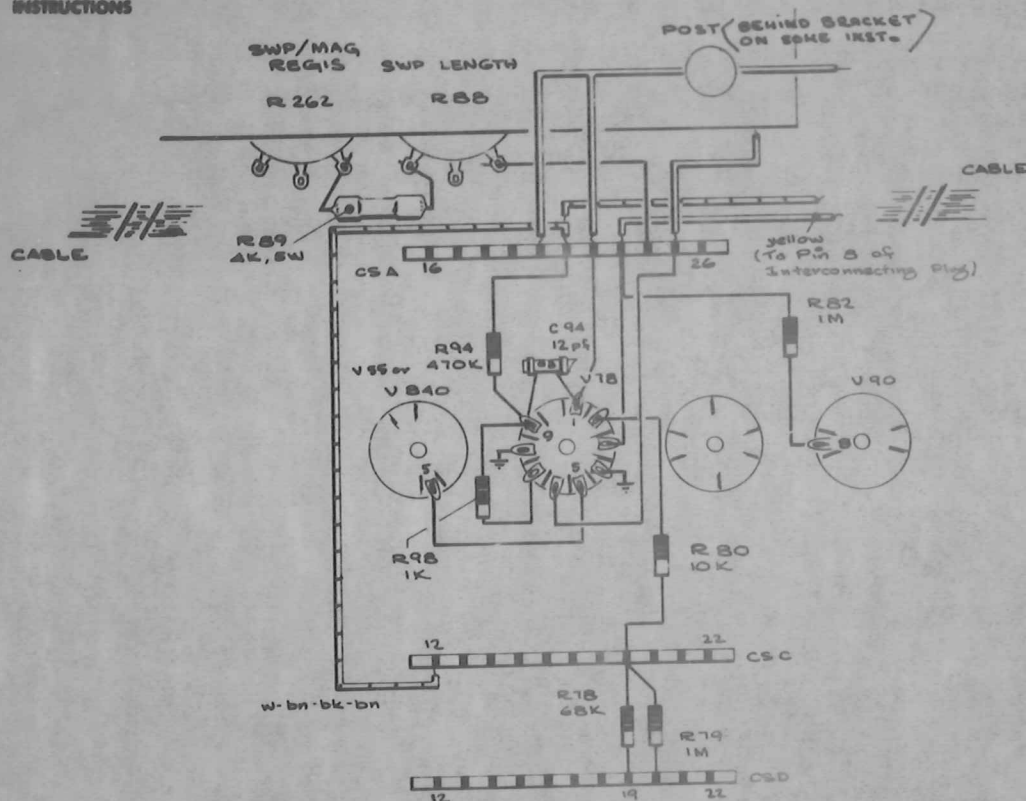


Fig. 1

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

1. Remove the following wires and components (see Fig. 1 for ceramic strip locations):

- () R89, a 4k 5w WW resistor, connected between CSA-21 and CSC-17. **SAVE.**
- () R840, a 2 68k 2w resistor, connected between CSA-20 and CSC-16.
- () R83, a 1.8 Meg 1/2w 10% resistor, connected between CSA-22 and CSC-17.
- () R80, a 10k 1/2w 10% resistor, connected between pin 1 of V78 and CSC-19.
- () a bare wire that connects pin 7 of V78 to CSA-23.
- () R82, a 1 Meg 1/2w 10% resistor, connected between CSA-23 and pin 6 of V78.
- () a white-brown-black-brown wire that connects CSC-12 to pin 6 of V78. **DISCARD** this wire.
- () a bare wire that connects pin 5 of V78 to CSA-22.
- () a bare wire that connects the forward terminal of R88 (Sweep Length) to CSA-21.
- () R78, a 36k or 47k 1/2w resistor, connected between CSC-19 and CSC-19.

2. Unsolder the following wires:

- () a white-brown-black-brown wire from pin 6 of V78
- () a bare wire from pin 3 of V78.

INSTRUCTIONS (con'd)

- () 3. Remove the V78 tube socket and enlarge the mounting hole to 3/4 in. to accommodate the 9-pin tube socket from the kit. Use a Greenlee punch or a large reamer.
- () Using the 9-pin tube socket (from kit) as a template and rotating it enough to miss old mounting holes, drill two new 1/8 in. socket mounting holes.
- () 4. With lacquer thinner, remove the printing on both sides of the chassis near V78 calling out "6AU6."
- () 5. Mount the 9-pin socket (from kit) with pins 4 and 5 nearest the outside of instrument. (See Fig. 1)
- () Mount the ECC88/6DJ8 tag (from kit) under one of the V78 mounting screws. Use the 4-40 hardware from the kit.
6. Install the following wires and components (from kit unless noted otherwise). (See Fig. 1)
 - () a bare wire from pin 4 of V78 to tube socket ground lug.
 - () the bare wire from pin 5 of V840 or V85 to pin 5 of V78.
 - () the white-brown-black-brown wire unsoldered in step 2, to CSA-21 (+100v).
 - () a bare wire from pin 8 of V78 to tube socket ground lug.
 - () R98, a 1k 1/2w 10% resistor, between pins 7 and 9 of V78. DO NOT SOLDER PIN 9.
 - () a 6 in. length of white-brown-black-brown wire between CSC-12 and CSA-21.
 - () R94, a 470k 1/2w 10% resistor between CSA-21 and pin 9 of V78. DO NOT SOLDER PIN 9.
 - () a bare wire from pin 1 of V78 to CSA-22.
 - () R89, a 4k 5w WW resistor, removed in step 1, between the rear terminal of R262 (Sweep Mag Regis) and the forward terminal of R88 (Sweep Length).
 - () a bare wire from pin 3 of V78 to CSA-23.
 - () R82, a 1Meg 1/2w 10% resistor, between CSA-23 and pin 8 of V90 (+100v).
 - () a bare wire from pin 6 of V78 to CSA-25. Insulate this wire with a length of #20 tubing from the kit. NOTE: If CSA-25 is not an empty slot, omit this step and change steps 20 and 30 to read as follows: Solder one end of the 19 in. white wire (from kit) to pin 6 of V78.
 - () C94, a 12pf ceramic capacitor, between pins 1 and 9 of V78.
 - () R100, a 3.3k 2w 10% resistor, between pin 6 of V78 and CSA-21.
 - () R83, a 1.8Meg 1/2w 10% resistor, between CSA-22 and CSC-17.
 - () R80, a 10k 1/2w 10% resistor, between CSC-19 and pin 2 of V78.
 - () R78, a 68k 1/2w 5% resistor, between CSC-19 and CSC-19.
 - () R840, a 68k 2w resistor, removed in step 1, between CSA-20 and CSC-16.
 - () an ECC88, 6DJ8 in V78 tube socket.

INSTRUCTIONS (con'd)

FOR THE FOLLOWING TEKTRONIX OSCILLOSCOPES, PERFORM STEPS 7 THROUGH 23

(For all other instruments, continue with step 24.)

Types 531, 535, 541, and 545
Serial numbers 5001-20,000

Types RM31, RM35, RM41, and RM45
Serial numbers 101-1000

7. TYPES 531, 535, 541, AND 545 ONLY:

- () a. On the rear of the instrument, locate the two binding posts marked GND and CRT CATHODE.
- () b. $15/16$ " from the center of the binding post marked GND toward the center of the instrument, and in line with both binding posts, mark and drill a small pilot hole.
- () c. Drill or ream out the hole to $1/2$ ".
- () d. Place the 15/32-32 hex nut (from kit) on the switch and tighten it against the bottom of the shank.
- () e. Mount the switch in the hole drilled in step 7c, using the flat washer and the 12-sided switch nut from the kit. (Mount with the terminals toward the top.) See Fig. 2.

8. TYPES RM31, RM35, RM41, AND RM45 ONLY:

- () a. On the rear sub-panel, locate the two binding posts. (The binding post nearest the center of the instrument is the GND binding post.)
- () b. $15/16$ " from the center of the GND binding post toward the center of the instrument, and in line with both binding posts, mark and drill a small pilot hole.
- () c. Drill or ream out the hole to $1/2$ ".
- () d. Place the 15/32-32 hex nut (from kit) on the switch and tighten it against the bottom of the shank.
- () e. Mount the switch in the hole drilled in step 8c, using the CHOPPING SPIKE BLANKING tag and the 12-sided nut from the kit. (Mount switch with terminals toward top of instrument.) See Fig. 3.

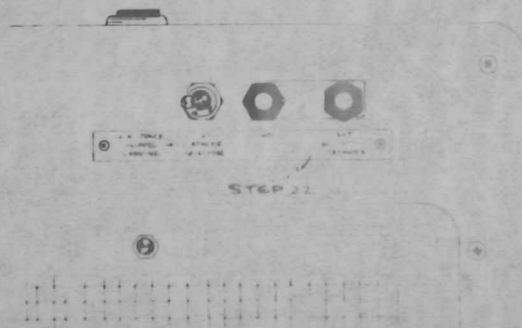


Fig. 2



Fig. 3

INSTRUCTIONS (cont'd)

INSTRUCTIONS (con'd)

22. TYPES 531, 535, 541, AND 545 ONLY:

- () a. Line up the CRT CATHODE SELECTOR tag (from kit) below the binding posts on the rear of the instrument, so that it covers the existing printing, and mark the mounting hole positions.
- () b. Drill two #43 holes and mount the tag with the #4 x 1/4 thread-forming screws from the kit (see Fig. 6).

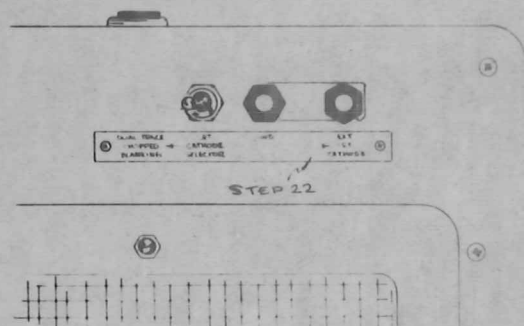


Fig. 6

23. TYPES RM31, RM35, RM41, AND RM45 ONLY:

The binding post cut-out on the rear of the cabinet may have to be enlarged. The cut-out should be 1-1/4" wide x 3-3/4" long. If this is not the case, follow the procedure below:

- () a. Clip the template from page 11 and cut out that area of the template which is enclosed by the solid line.
- () b. Align this hole over the cut-out in the rear of the cabinet (area of template enclosed by dotted line extending towards center of instrument).
- () c. Locate the point on the template which is marked with a "+". Transfer this point onto the cabinet with a center punch or a scribe.
- () d. Using this point as the center, punch out the area with a 1-1/4" circular chassis punch.
- () e. Smooth out the edge of the hole with a file.
- () f. Place the cabinet back on the instrument and check for proper clearance.

PERFORM STEP 24 FOR TYPE 53/54C AND TYPE 53C PLUG-INS:

24. If you are using a Type 53/54C plug-in unit with serial number lower than 14078, or a Type 53C plug-in unit, it will be necessary to make the following modification to the plug-in:

a. TYPE 53/54C ONLY:

- () Solder one of the 12pf ceramic capacitors (from kit) between pin 1 and pin 7 of V3803.
- () Solder the other 12pf ceramic capacitor (from kit) between pin 2 and pin 5 of V3803.

b. TYPE 53C ONLY:

- () Solder one of the 12pf ceramic capacitors (from kit) between pin 1 and pin 7 of V3713.
- () Solder the other 12pf ceramic capacitor (from kit) between pin 2 and pin 5 of V3713.

INSTRUCT

() 25.

() 26.

() 27.

() 28.

() 29.

() 30.

() 31.

() 32.

INSTRUCTIONS (con'd)

FOR THE FOLLOWING TEKTRONIX INSTRUMENTS, PERFORM STEPS 25 THROUGH 45

Types 531, 535, 541, and 545
Serial numbers 101-5000

- () 25. On the rear sub-panel, locate the two binding posts. (The binding post nearest the center of the instrument is the GND binding post.)
- () 26. Mark and drill a small pilot hole, 1-1/4 in. from the center of the GND binding post (toward the center of the instrument) and in line with both binding posts.
- () 27. Drill or ream out the above hole to 1/2 in.
- () 28. Mount the switch (from kit) in this hole, using the flat washer and the 12-sided switch nut from the kit (see Fig. 7).
- () 29. Unsolder the white wire connected to CSC-1 and resolder to the left terminal (viewed from front) of the switch mounted in the above step (see Figs. 7 and 8).
- () 30. Solder the 7 in. white wire (from kit) between CSC-1 and the center terminal of the switch (see Fig. 7 and 8).
- () 31. Replace the 2-hole bakelite or nylon post (either below or next to the Mag Gain adjustment) with a 3-hole post, placing the two white wires (removed when replacing post) through the two top holes in the 3-hole post. Resolder wires to their original connections. It may be necessary to replace one or both of the white wires with the white wires from the kit.
- () 32. Locate the bakelite or nylon post mounted on the chassis above the neck of the CRT, below the Geometry Adj potentiometer (R270).

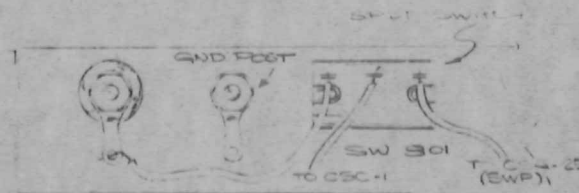


Fig. 7

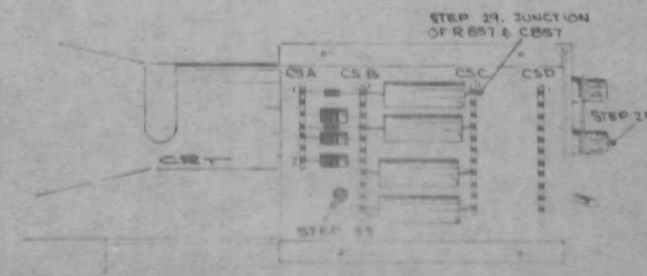


Fig. 8

INSTRUCTIONS (con'd)

33. If the post located in step 32 is mounted on the top side of the chassis:
- () Unsolder the end of the white wire that is dressed through this post and temporarily pull it back through the hole.
 - () Replace this post with the 2-hole nylon post from the kit. Mount post on bottom of the chassis.
 - () Mark and drill a 1/4 in. hole 1-1/8 in. directly in back of this post.
 - () Mount the 1/4 in. grommet (from kit) in this hole (see Fig. 8, step 33).
34. If the post located in step 32 is mounted on the bottom side of the chassis:
- () Unsolder the end of the white wire that is dressed through this post and temporarily pull it back through the hole.
 - () Replace this post with the 2-hole nylon post from the kit.
35. Re-dress the white wire (unsoldered in step 33 or 34) through the bottom hole in the 2-hole post, through the grommet, and resolder to its original connection.
36. Solder one end of the 19 in. white wire (from kit) to CSA-25 (see Fig. 5 on page 7).*
37. Dress the other end of this wire through the same grommet that the white wire soldered to R840 (68k 2w resistor) is dressed through. Thread the wire through the bottom hole of the 3-hole post (step 31); through the top hole of the 2-hole post (step 33 or 34), and solder it to the right-hand terminal of the switch mounted in step 28 (see Fig. 7).

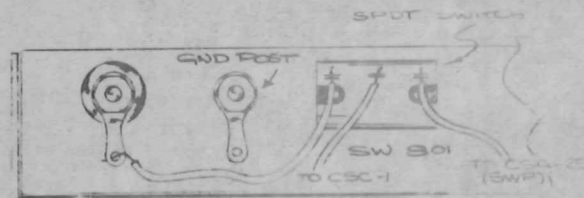


Fig. 7

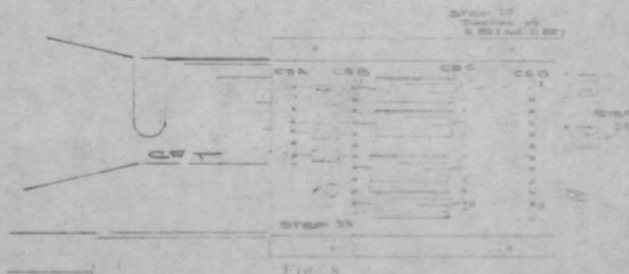


Fig. 8

38. Enlarge the binding post cut-out on the rear of the cabinet, by using the template on page 11.
- NOTE: Place the area of the template enclosed by the solid line over the existing cut-out with the dotted line toward the center of the instrument. Some earlier instruments have a 3/4 in. cut-out. The template will be centered over the cut-out.
39. Center punch through the template at the two points marked with a dot.
40. Drill or punch two 3/4 in. holes in the cabinet, 2 1/8 in. to 2 1/4 in. apart and centered over the cut-out in the cabinet.
41. Smooth out the edge of the holes with a file.

* or pin 6 of V₁, see note in step 6.

INSTRUCTIONS (con'd)

- () 42. Remove the nomenclature tag on the rear of the cabinet, being careful not to enlarge the rivet holes. To do this, drill off the flange on the rivet and knock the rivet out with a punch.
- () 43. Enlarge the right rivet hole (as seen when looking at the instrument from the rear) with a #43 drill.
- () 44. Mount the CRT CATHODE SELECTOR tag (from kit) using one #4 x 1/4 in. thread-forming screw (from kit) and the right-hand mounting hole (see Fig. 9).
- () 45. Line up the tag, drill the other mounting hole (#43 drill) and mount the other #4 x 1/4 in. thread-forming screw from the kit.

THIS COMPLETES THE INSTALLATION

- () Check wiring for accuracy before turning on instrument.
- () Moisten the backs of the MODIFIED INSTRUMENT tags (from kit) and place them on the Manual Schematic pages affected by this modification.
- () Fasten the insert pages in your Instruction Manual.
- () Refer to your Manual insert section for proper operating instructions.

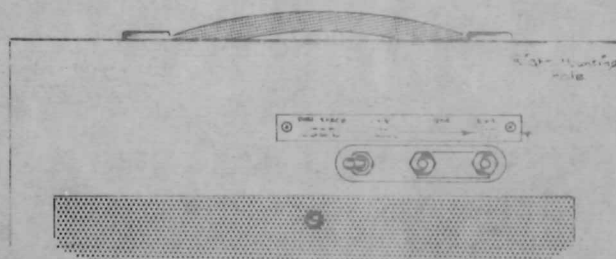
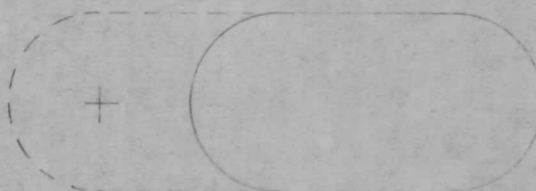


Fig. 9

JT/CH:ceb



TEMPLATE FOR RM31, RM35, RM41, RM45

TEMPLATE FOR RM31, RM35, RM41, RM45
Serial numbers 105-5000

CHOPPING TRANSIENT BLANKING

Types 531, 535, 541, and 545 -- Serial numbers 101-20,000

Types RM31, RM35, RM41, and RM45 -- Serial numbers 101-1000

Installed in Type _____ s/n _____

GENERAL INFORMATION

This modification allows a blanking voltage to be applied to the CRT cathode, to eliminate switching transients from the display which occur when a multiple-trace plug-in unit is operated in its chopped mode.

The blanking voltage is applied by means of a switch on the rear panel of the instrument.

V78, the Multi Trace Units Sync Amplifier, a 6AU6, is replaced by a 6DJ8. One half of the 6DJ8 is used as the Sync Amplifier and the other half is used to generate the blanking pulse.

NOTE: When using this instrument with a Type 53/54C plug-in unit below s/n 14078, or a Type 53C plug-in unit, the plug-in must be modified. For a Type 53/54C, add a 12 pf 500 v ceramic capacitor (C3743) between pins 1 and 7 of V3803; another 12 pf capacitor (C3753) between pins 2 and 5 of V3803. For a Type 53C, add a 12 pf capacitor (C3793) between pins 1 and 7 of V3793; another 12 pf capacitor (C3794) between pins 2 and 5 of V3793.

The information on these pages supersedes the information in your Manual.

OPERATING INSTRUCTIONS

Insert a Type 53C, 53/54C, CA, M, 1A1, 1A2, or other multiple-trace plug-in unit in your instrument and check for proper operation as indicated in the following steps:

- () 1. Set the instrument controls as follows:

CRT CATHODE SELECTOR SW	-- DUAL TRACE CHOPPED BLANKING
TIME/CM	-- 10 μ SEC/CM
TRIGGER	-- +INT/AUTO
Operating Mode (plug-in)	-- CHOPPED

- () 2. Turn on power.

- () 3. By adjusting the Vertical Position of both A and B inputs, display the switching square wave.

At normal intensity the switching transient should be blanked out.

- () 4. Place the CRT CATHODE SELECTOR* switch in the EXT CATHODE position. You should now be able to see the switching transient.

*Designated CHOPPING SPIKE BLANKING switch on RM's.

ELECTRICAL PARTS LIST

Values fixed unless marked variable.

CAPACITORS				
Ckt. No.	Part Number		Description	
C94	281-0508-00	12 pf	Cer.	500 v

RESISTORS

Resistors are 1/2w 10% composition unless otherwise indicated.

R78	302-0683-00	68 k		5%
R94	302-0474-00	470 k		
R98	302-0102-00	1 k		
R100	306-0332-00	3.3 k	2 w	

SWITCHES

SW801	260-0014-00	SPDT	CRT CATHODE SELECTOR*	
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ELECTRON TUBES

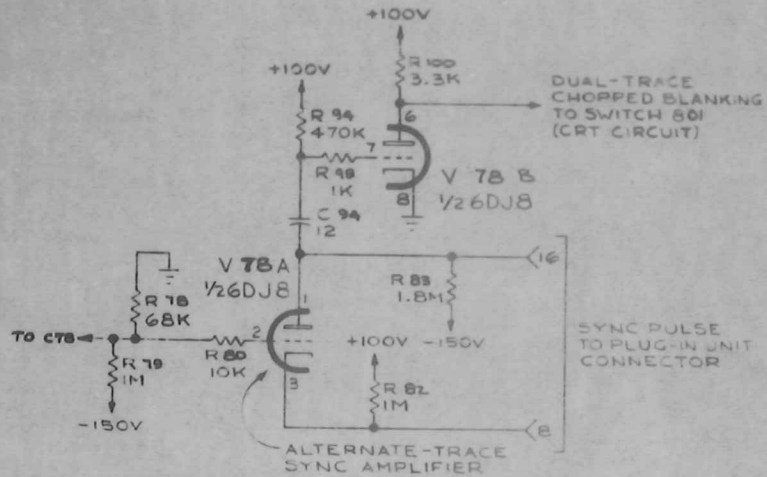
V78	154-0187-00	ECC88/6DJ8		
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*Designated CHOPPING SPIKE BLANKING switch on RM's.

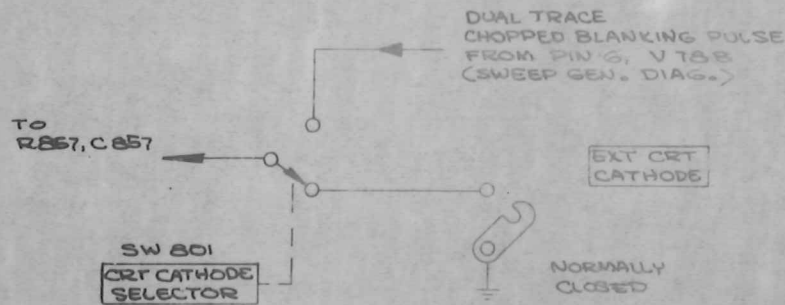
MECHANICAL PARTS LIST

	Part Number
Grommet, 1/4 in.	348-0002-00
Lockwasher, int #4	210-0004-00
Nut, switch, 15/32-32 x 5/64, 12-sided	210-0473-00
Nut, hex, 4-40 x 3/16	210-0406-00
Nut, hex, 15/32-32 x 9/16	210-0414-00
Rod, nylon, 2-hole	385-0075-00
Rod, nylon, 3-hole	385-0096-00
Screw, 4-40 x 1/4 BHS	211-0008-00
Screw, thread-forming, #4 x 1/4 PHS, Phillips	213-0088-00
Socket, 9-pin STMØG	136-0015-00
Tag, CHOPPING SPIKE BLANKING	334-0674-00
Tag, CRT CATHODE SELECTOR	334-0706-00
Tag, tube, ECC88/6DJ8	334-0767-00
Washer, steel, 1/2 x 5/8 x 0.020	210-0845-00

SCHEMATICS



PARTIAL DIAGRAM, SWEEP GENERATOR



PARTIAL DIAGRAM, CRT CIRCUIT

Also make the following changes on the Heater Wiring Diagram:

For V78 heater, change pin 3 (ungrounded pin) to pin 5.

ELECTRICAL PA

Values fixed

Ckt. No.

C94

Resistors are

R78
R94
R98
R100

SW801

V78

*Designated t

MECHANICAL I

Grommet, 1/
Lockwasher,
Nut, switch,
Nut, hex, 4-4
Nut, hex, 15/
Rod, nylon, 2
Rod, nylon, 3
Screw, 4-40 :
Screw, thread
Socket, 9-pin
Tag, CHOPPI
Tag, CRT CA
Tag, tube, EC
Washer, stee

MODIFICATION KIT

ALTERNATE/CHOPPED COMPATIBILITY REWORK



For the Tektronix Oscilloscopes listed below that have incorporated the Chopped Transient Blanking feature:

Types 531, 535, 541, and 545
Serial numbers 101-20000

Types RM31, RM35, RM41, and RM45
Serial numbers 101-1000

DESCRIPTION

This modification will provide proper Alternate Trace operation of the Type 1A1 and 1A2 plug-ins in the instruments listed above that have been modified with Field Modification Kits, part numbers 040-0198-00/01 and 040-0200-00/01, to include Chopping Transient Blanking.

The Type 1A1 and 1A2 plug-ins require an alternate trace sync pulse on pin 8 of the plug-in interconnecting socket. This is not supplied by the existing 6J6 Multi-Trace Sync Amplifier.

To meet this requirement, the 6J6 is replaced with a 6DJ8, and the circuit changed to conform to the Tektronix Type 531A, 535A, 541A, 545A/B, 546, 547, etc., oscilloscope Multi-Trace Sync and Chopped Blanking circuitry.

To install the 6DJ8 it is necessary to enlarge the mounting hole and replace the V78 socket with a 9-pin type.

Publication:
Instructions for 040-0404-00
May 1965

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040-0404-00

Page 1 of 4

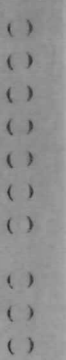
Quantity

1 ea.	S
1 ea.	T
2 ea.	L
2 ea.	N
2 ea.	S
1 ea.	S
1 ea.	C
1 ea.	R
1 ea.	R
1 ea.	R
1 ea.	R
1 ea.	R
1 ea.	R
1 ea.	T
2 ea.	T
1 ea.	W



Page 2 of 4

INSTRON

IMPO

INSTRUCTIONS

REFER TO DRAWING WHEN PERFORMING STEPS 1 THROUGH 9

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

1. Remove the following wires and components:

- () R840, a 68k 2w 10% resistor, connected between CSA-20 and CSC-16.
- () R129, a 270k 1/2w 10% resistor, connected between CSA-22 and pin 5 of V78.
- () R137, an 8.2k 1w 10% resistor, connected between CSC-12 and pin 2 of V78.
- () C129, a 22pf capacitor, connected between CSA-21 and pin 5 of V78.
- () R78 or R125, a 10Meg 1/2w 10% resistor, connected between CSC-19 and CSD-19.
- () R127, a 10k 1/2w 10% resistor, connected between CSC-19 and pin 6 of V78.
- () R126 or R128, a 36k 1/2w 5% resistor, connected between CSA-23 and CSC-19, or between CSC-19 and V78 tube socket ground lug.
- () R83, a 1.8Meg 1/2w 10% resistor, connected between CSA-21 and CSC-17.
- () a bare wire (if present) that connects pin 1 of V78 to CSA-21.
- () T129 (if present), a 6T bifilar toroid; red wires connected to pin 1 of V78 and CSA-21; and green wires connected to CSA-23 and tube socket ground lug of V78.

2. Unsolder the following wires:

- () two white-brown-black-brown wires from CSA-22.
- () a white wire from CSA-21.
- () a bare wire from pin 3 of V78.
- () a white wire from pin 2 of V78.

- () 3. Remove the V78 tube socket and enlarge the mounting hole to 3/4 in. to accommodate the 9-pin tube socket from the kit. Use a Greenlee punch or a large reamer. Hold a cloth or other container under the hole to catch the metal shavings.
- () 4. Using the 9-pin tube socket (from kit) as a template, and rotating it enough to miss the old mounting holes, drill two new 1/8 in. socket mounting holes.
- () 5. Mount the 9-pin socket (from kit) with pins 4 and 5 nearest the outside of the instrument.
Mount the LCC87/6DJ8 tag (from kit) under one of the V78 mounting screws. Use the 4-40 hardware from the kit.
- () 6. Connect the two white-brown-black-brown wires, unsoldered in step 2, to CSA-21.
- () 7. Connect the white wire (that goes to pin 16 of the interconnecting plug) to CSA-22. This wire was unsoldered in step 2.
- () 8. Connect the white wire that was unsoldered from pin 2 of V78 to pin 6 of V78.

INSTRUCTIONS (con'd)

9. Install the following wires and components, from the kit except as noted:

- () a bare wire from pin 4 of V78 to tube socket ground lug.
- () the bare wire from pin 5 of V840 or V55 to pin 5 of V78.
- () a bare wire from pin 8 of V78 to tube socket ground lug.
- () R98, a 1k 1/2w 10% resistor, between pins 7 and 9 of V78. DO NOT SOLDER PIN 9.
- () R94, a 470k 1/2w 10% resistor between CSA-21 and pin 9 of V78. DO NOT SOLDER PIN 9.
- () a bare wire from pin 1 of V78 to CSA-22.
- () a bare wire from pin 3 of V78 to CSA-23.
- () R82, a 1Meg 1/2w 10% resistor, between CSA-23 and pin 8 of V90 (+100v).
- () C94, a 12pf ceramic capacitor, between pins 1 and 9 of V78.
- () R100, a 3.3k 2w 10% resistor, between pin 6 of V78 and CSA-21.
- () R83, a 1.8Meg 1/2w 10% resistor, between CSA-22 and CSC-17.
- () R80, a 10k 1/2w 10% resistor, between CSC-19 and pin 2 of V78.
- () R78, a 68k 1/2w 5% resistor, between CSC-19 and CSD-19.
- () R840, a 68k 2w resistor, removed in step 1, between CSA-20 and CSC-16.
- () an ECC88/6DJ8 in V78 tube socket.

THIS COMPLETES THE INSTALLATION

- () Check wiring for accuracy before turning on instrument.
- () Moisten backs of the MODIFIED INSTRUMENT tags (from kit) and place them on the Manual Schematic pages affected by this modification.
- () Fasten the insert pages in your Instruction Manual.
- () Refer to your Manual insert section for proper operating instructions.

JT/CH:ceb

ALTERNATE/CHOPPED COMPATIBILITY REWORK

For the Tektronix Oscilloscopes listed below that have incorporated the Chopped Transient Blanking feature:

Types 531, 535, 541, and 545
Serial numbers 101-20000

Types RM31, RM35, RM41, and RM45
Serial numbers 101-1000

Installed in Type _____ s/n _____

GENERAL INFORMATION

This modification will provide proper Alternate Trace operation of the Type 1A1 and 1A2 plug-ins in the instruments listed above that have been modified with Field Modification Kits, part numbers 040-0198-00/01 and 040-0200-00/01, to include Chopping Transient Blanking.

The Type 1A1 and 1A2 plug-ins require an alternate trace sync pulse on pin 8 of the plug-in interconnecting socket. This is not supplied by the existing 6J6 Multi-Trace Sync Amplifier.

To meet this requirement, the 6J6 is replaced with a 6DJ8, and the circuit changed to conform to the Tektronix Type 531A, 535A, 541A, 545A/B, 546, 547, etc., oscilloscope Multi-Trace Sync and Chopped Blanking circuitry.

To install the 6DJ8 it is necessary to enlarge the mounting hole and replace the V78 socket with a 9-pin type.

The information on these pages supplements or supersedes the information in your Manual.

OPERATING INSTRUCTIONS

Insert a Type 1A1 or 1A2 Dual Trace plug-in unit in your instrument and check for proper operation as indicated in the following steps:

- () 1. Set the instrument controls as follows:

CRT CATHODE SELECTOR	-- DUAL TRACE CHOPPED BLANKING
TIME/CM	-- 10 μ SEC/CM
TRIGGER	-- INT/AUTO
Operating Mode (plug-in)	-- CHOPPED

- () 2. Turn on power.
- () 3. By adjusting the Vertical Position of both A and B inputs, display the switching square wave. At normal intensity the switching transient should be blanked out.
- () 4. Place the CRT CATHODE SELECTOR switch in the EXT-CATHODE position.
- () 5. Set the MODE switch to the ALT position.
- () 6. Rotate the oscilloscope STABILITY control fully clockwise so the oscilloscope time base is free running.
- () 7. Check for a two-trace display on the CRT.
- () 8. Set the oscilloscope TIME/CM switch to the slower sweep rate and check that the traces run alternately across the face of the CRT.

ELECTRICAL PARTS LIST

Values fixed unless marked variable. (Supersedes Parts List in old Chopping Transient Blanking Mod.)

Ckt. No.	Part Number	Description
CAPACITORS		
C94	281-0508-00	12 pf Cer. 500 v

RESISTORS

Resistors are 1/2 w 10% composition unless otherwise indicated.

R78	302-0683-00	68 k	5%
R94	302-0474-00	470 k	
R98	302-0102-00	1 k	
R100	306-0332-00	3.3 k	2 w

SWITCHES

SW801	260-0209-00	SPDT	CRT CATHODE SELECTOR
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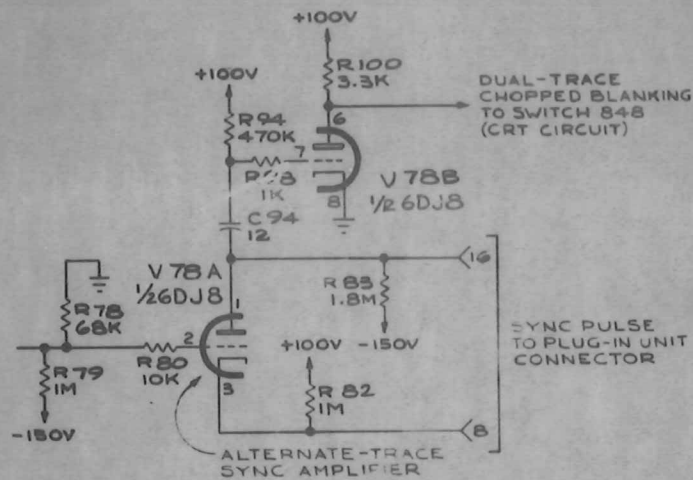
ELECTRON TUBES

V78	154-0187-00	ECC88/6DJ8
-----	-------------	------------

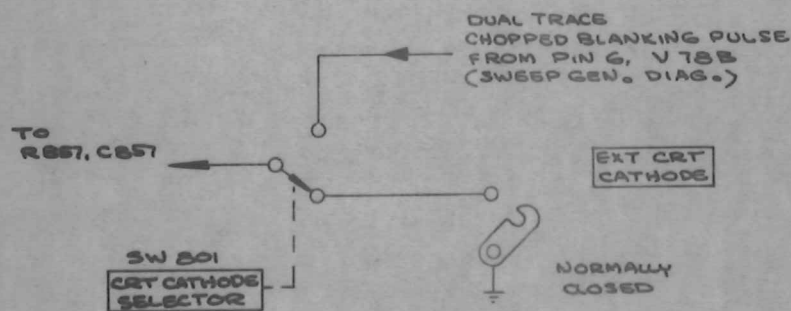
MECHANICAL PARTS LIST

	Part Number
Lockwasher, int #4	210-0004-00
Nut, hex, 4-40 x 3/16	210-0406-00
Screw, 4-40 x 1/4 BHS	211-0008-00
Socket, tube, 9-pin STM9G	136-0015-00
Tag, tube, ECC88/6DJ8	334-0767-00

SCHEMATICS



PARTIAL DIAGRAM, SWEEP GENERATOR



PARTIAL DIAGRAM, CRT CIRCUIT

Also make the following changes on the Heater Wiring Diagram:

For V78 heater, change pin 3 (ungrounded pin) to pin 5.

MODIFICATION KIT

VERTICAL GAIN REGULATOR



For the following Tektronix Oscilloscopes:

Types 541, RM541, 541A, RM541A
543, RM543, 543A, RM543A
545, RM545, 545A, RM545A

All serial numbers

DESCRIPTION

This modification provides a 'Distributed Amplifier' screen-grid regulator circuit, that will typically maintain the Vertical gain within $\pm 2\%$ with a line voltage change between 105V and 125V.

The regulator circuit is supplied as an assembly which is to be mounted to the rear of the plug-in housing.

040-0436-00

Publication:
Instructions for 040-0436-00
February 1967

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040-0436-00

Page 1 of 4

Quan
(1 ea)

(1 ea)

2 ea
2 ea
1 ea
2 ea

Page

PARTS LIST

Quantity	Part Number	Description
(1 ea)		Assembly, Vertical Gain Regulating, consisting of:
2 ea	124-0187-00	Strip, cer, 7/16 x 5-notch, clip-mount
1 ea	136-0015-00	Socket, 9-pin, STM9G
1 ea	154-0044-00	Tube, vacuum, 12B4A
1 ea	179-1169-00	Cable harness
1 ea	210-0863-00	Washer, #10, 'D' type
1 ea	211-0507-00	Screw, 6-32 x 5/16 PHS
2 ea	213-0044-00	Screw, 5-32, thread-forming
1 ea	285-0533-00	Capacitor, PTM, 0.22 μ F 400V
1 ea	301-0226-00	Resistor, comp, 22 M 1/2 W 5%
1 ea	301-0470-00	Resistor, comp, 47 Ω 1/2 W 5%
1 ea	304-0681-00	Resistor, comp, 680 Ω 1 W 10%
1 ea	305-0473-00	Resistor, comp, 47k 2 W 5%
1 ea	343-0003-00	Clamp, cable, plastic, 1/4 in.
1 ea	348-0067-00	Grommet, plastic, 5/16 in.
4 ea	361-0009-00	Spacer, cer strip, nylon, 9/32 in.
1 ea	407-0358-00	Bracket, angle
(1 ea)		Assembly, wirewound resistor, consisting of:
1 ea	210-0478-00	Nut, hex, alum, resistor mounting
1 ea	210-0601-00	Eyelet
1 ea	211-0553-00	Screw, 6-32 x 1-1/2 PHS
1 ea	308-0017-00	Resistor, WW, 2k 10W 5%
2 ea	210-0858-00	Washer, brass, 5/32 ID x 1/2 OD, cad plate
2 ea	211-0510-00	Screw, 6-32 x 3/8 PHS
1 ea	214-0210-00	Spool, w/3 ft. silver-bearing solder
2 ea	1-910D	Tag, MODIFIED INSTRUMENT, gummed back

INSTRUCTIONS

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

STEPS 1 THROUGH 6 APPLY TO THE FOLLOWING INSTRUMENTS ONLY:

Types	541 SN 101-20000	RM541 SN 101-1000
	543 SN 101- 3000	RM543 SN 101- 250
	545 SN 101-20000	RM545 SN 101-1000

- () 1. Remove the instrument cabinet.
- () 2. This step for Rack-Mount instruments only: (Refer to Fig. 1 on pull-out page)
 - () a) Drill a 5/32 in. hole as indicated.
 - () b) Remove the 6-32 screw, washer, and nut as indicated.
- () 3. Mount the 'Vertical Gain Regulator' bracket on the rear frame plate of the plug-in housing. Use the 6-32 x 3/8 screws and washers from the kit. Washers are not required for rack-mount instruments. Refer to Fig. 2 on pull-out page.
- () 4. The 'Vertical Gain Regulator' cable should be dressed from the tube bracket toward the bulkhead, then down between the bulkhead and the front of the Vertical Amplifier chassis. Refer to Figs. 2 and 3 on the pull-out page.
- () 5. Solder the wires to the connections as follows, or refer to Fig. 3 on pull-out page:

NOTE: Some of the wires in this cable are extra long to insure compatibility between different instrument models. Trim as required for proper dress.

 - () white-brown-black-brown to +100V
 - () white-green-black-brown to +500V
 - () white-green to pin 6 of V1060 (V1064 on later instruments), screen-grid of the output amplifier tubes
 - () gray to +325V unregulated
 - () white-blue-blue to pin 16 of the low voltage power transformer
 - () white-blue-gray to pin 9 of the low voltage power transformer
 - () white to chassis ground
- () 6. If not already present, replace the 3k WW resistor (R295), located at the front of the power chassis, with a 2k 10W WW resistor assembly from the kit. Refer to Fig. 4 on the pull-out page.

INSTRU

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Page 4

INSTRUCTIONS (cont)

STEPS 7 THROUGH 12 APPLY TO THE FOLLOWING INSTRUMENTS ONLY:

Types	541A SN 20001- up	RM541A SN 1001- up
	543A SN 3001- 4764	RM543A SN 1001-1163
	545A SN 20001-40561	RM545A SN 1001-4388

- () 7. Remove the instrument cabinet.
8. This step for Rack-Mount instruments only: (Refer to Fig. 1 on pull-out page)
- () a) Drill a 5/32 in. hole as indicated.
- () b) Remove the 6-32 screw, washer, and nut as indicated.
- () 9. Mount the 'Vertical Gain Regulator' bracket on the rear frame plate of the plug-in housing. Use the 6-32 x 3/8 screws and washers from the kit. Washers are not required for rack-mount instruments. Refer to Fig. 2 on pull-out page.
- () 10. The 'Vertical Gain Regulator' cable should be dressed from the tube bracket toward the bulkhead, then down between the bulkhead and the front of the Vertical Amplifier chassis. Refer to Figs. 2 and 5 on the pull-out page.
11. Solder the wires to the connections as follows, or refer to Fig. 5 on pull-out page:
NOTE: Some of the wires in this cable are extra long to insure compatibility between different instruments models. Trim as required for proper dress.
- () white-brown-black-brown to +100V
- () white-green-black-brown to +500V
- () white-green to pin 6 of V1064, screen-grid of the output amplifier tubes
- () gray to +325V unregulated (pin 10 of the low voltage power transformer)
- () white-blue-blue to pin 16 of the low voltage power transformer
- () white-blue-gray to pin 9 of the low voltage power transformer
- () white to chassis ground
- () 12. If not already present, replace the 3k WW resistor (R767), located on the 'Resistor Mounting Bracket' adjacent to the power transformer, with a 2k 10W WW resistor assembly from the kit. Refer to Fig. 6 on pull-out page.

THIS COMPLETES THE INSTALLATION.

- () Check wiring for accuracy.
- () Moisten the backs of the MODIFIED INSTRUMENT tags (from kit) and place one on the LV POWER SUPPLY schematic page, and the other on the VERTICAL AMP schematic page.
- () Fasten the insert pages in the instrument instruction Manual.
- () Refer to your Manual insert section for proper operating instructions.

KH-15

GENER

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Refer to
Power :ELECTR
Ckt. No

C1254

R1254
R1255
R1256
R1257

V1254

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*R795

MECH

VERTICAL GAIN REGULATOR

Types 541, RM541, 541A, RM541A -- All SNs
 543, RM543, 543A, RM543A -- All SNs
 545, RM545, 545A, RM545A -- All SNs

Installed in Type _____ SN _____ Date _____

GENERAL INFORMATION

This modification provides a 'Distributed Amplifier' screen-grid regulator circuit that will typically maintain the Vertical gain within $\pm 2\%$ with a line voltage change between 105V and 125V.

The information on these pages supplements or supersedes the information in your Manual.

RECALIBRATION

Refer to the instrument Instruction Manual and check for proper operation of the Low Voltage Power Supplies and the Vertical Amplifier.

ELECTRICAL PARTS LIST

Ckt.No.	Part Number	Description		
CAPACITORS				
C1254	285-0533-00	0.22 μ F	400V	PTM
RESISTORS				
R1254	301-0226-00	22M	1/2 W	5%
R1255	301-0470-00	47 Ω	1/2 W	5%
R1256	304-0681-00	680 Ω	1 W	10%
R1257	305-0473-00	47k	2 W	5%
TUBES				
V1254	154-0044-00	12B4A	vacuum	

Changed Parts:

*R795	308-0017-00	2k	10W	5%	WW
*(R767 on later SN instruments)					

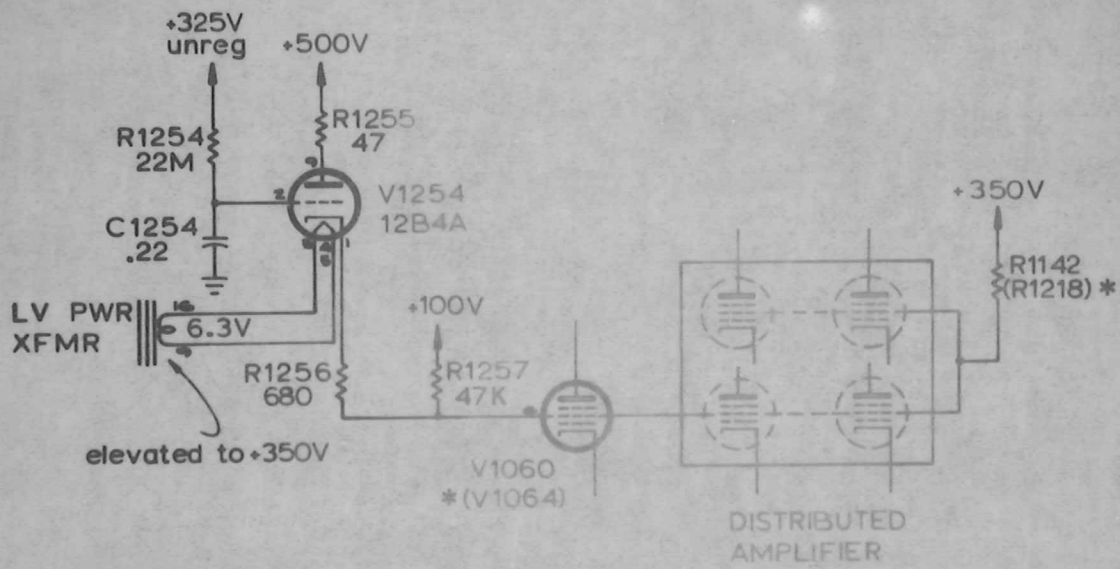
MECHANICAL PARTS LIST

407-0358-00	Bracket, angle
179-1169-00	Cable harness
343-0003-00	Clamp, cable, 1/4in.
210-0601-00	Eyebolt
348-0067-00	Grammet, plastic, 5/16in.
210-0478-00	Nut, hex, alum, resistor mounting
211-0553-00	Screw, 6-32 x 1-1/2 FH
136-0015-00	Socket, 9-pin, STMG
367-0009-00	Spacer, nylon 0.281in.
124-0187-00	Strip, cer., 7/16 x 3-notch

SCHEMATIC

LV P
XFMI

SCHEMATICS



*LATER S/N INST

PARTS REPLACEMENT KIT

Quantity

1 ea.

CABINET



For the following Tektronix Oscilloscopes:

Type RM31 s/n 101-1000	RM41 s/n 101-1000
Type RM32 s/n 101-308	RM45 s/n 101-1000
Type RM33 s/n 101-1000	RM45A s/n 1001-1003
Type RM35 s/n 101-1000	

4 ea.
1 ea.
1 ea.
1 ea.
1 ea.
1 ea.

DESCRIPTION

New standardized cabinet 437-045 replaces 437-040, 437-042, and 437-044.

NOTE: If the serial number of your instrument is above those listed, or if this kit has been installed, disregard the instructions as P/N 437-045 is a direct replacement.

050-010

Publication:
Instructions for 050-010
March 1966

Supersedes:
August 1963

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050-010

Page 1 of 3

Page 2

PARTS LIST

Quantity	Description	Part Number
1 ea.	Assembly, Cabinet, consisting of:	
1 ea.	Socket, grounding	136-036
1 ea.	Cord, power	161-C17
2 ea.	Tube, spacer	166-029
1 ea.	Cover	200-173
1 ea.	Lug, solder, SE6	210-202
1 ea.	Lug, solder, SE8	210-205
2 ea.	Washer, 8S	210-804
4 ea.	Screw, 6-32 x 5/16 BHS	211-507
2 ea.	Screw, 8-32 x 3/8 BHS	212-023
1 ea.	Bushing, nylon cord	358-025
1 ea.	Spacer, socket shield	361-011
2 ea.	Rod, hex	385-122
1 ea.	Cabinet	437-045
1 ea.	Wire, no.24 braided, Belden 4 in.	(176-045)
4 ea.	Screw, 4-40 x 1/4 PHS	213-035
1 ea.	Tag, 117 Volts	334-649
1 ea.	Tag, 234 Volts	334-655
1 ea.	Tag, GND	334-672
1 ea.	Tag, CRT CATHODE	334-673
1 ea.	Tag, CHOPPING SPIKE BLANKING	334-674
1 ea.	Tag, FUSE DATA 5A	334-698
1 ea.	Tag, FUSE DATA 6A	334-699

INSTRUCTIONS

- () 1. Remove the old cabinet from the instrument.

NOTE: In some instruments the GND and CRT CATHODE binding posts, and the CHOPPING SPIKE BLANKING switch located on the rear sub-panel plate, are identified by lettering on the cabinet.

If this identification is on the cabinet of your instrument, perform all the following steps.

If the identification is on the rear sub-panel plate, disregard steps 2, 3, 4, 5, 6 and 7 and continue with step 8.

- () 2. Remove the GND binding post from the back of the instrument.
- () 3. Re-install the GND binding post, placing the GND tag (from kit) between the post and sub-panel.
- () 4. Remove the CRT CATHODE binding post from the back of the instrument.
- () 5. Re-install the CRT CATHODE binding post, placing the CRT CATHODE tag (from kit) between the post and sub-panel.

NOTE: If your instrument does not have a CHOPPING SPIKE BLANKING switch, disregard steps 6 and 7 and continue with step 8.

- () 6. Remove the nut holding the CHOPPING SPIKE BLANKING switch to the rear sub-panel.

- () 7. Install the CHOPPING SPIKE BLANKING tag (from kit) over the threaded portion of the switch. Replace the nut (removed in step 6) to hold the tag against the sub-panel.

- () 8. Select the proper FUSE DATA and VOLTAGE tags (from kit) and install them in their respective positions on back plate of new cabinet, using screws supplied.

- () 9. Remove the cabinet aligning guide (mounted near the power plug) from the old cabinet.

- () 10. Install the guide (removed in step 9) in the new cabinet, using the hole provided near the power socket. (See NOTE before tightening).

NOTE: Install the instrument in the cabinet before tightening the aligning guide retaining screw. This will correctly position the guide.

THIS COMPLETES THE INSTALLATION

- () Recheck your work.

GG:cc

file 050-0017-00
 Type 500 Series
 date November 23, 1959



REPLACEMENT PARTS INFORMATION

TEK 386-770 and 386-736 replace TEK 386-719

INTRODUCTION:

The manufacturing of Tek 386-719 instrument cabinet side panels (for some Type 500 Series Oscilloscopes) has been discontinued.

A kit of two new side panels, comprised of Tek 386-770 and Tek 386-736, replaces both sides of the instrument cabinet.

These new cabinet panels provide proper air circulation, greater rigidity, and an accessories compartment.

When placing future orders for cabinet side panels, specify the Tek part numbers listed in the parts list below.

PARTS LIST:

Quantity	Description	Tek Number
1 ea.	Cabinet side w/box, right	386-770
1 ea.	cabinet side, left	386-736



modification instructions

MI - 050-0022-01

Types 531,532
535,541,545

FAN MOTOR REPLACEMENT

For the following Tektronix Oscilloscopes

Type	531	Serial Numbers	101-5000
Type	532	Serial Numbers	101-5000
Type	535	Serial Numbers	101-5000
Type	541	Serial Numbers	101-5000
Type	545	Serial Numbers	101-5000

Fan Motor 147-0016-01 replaces 147-0011-00 and 147-0016-00 previously used.

The new fan motor replaces the Westinghouse motor which is no longer available.

NOTE: If the serial number of your instrument is above those listed, or if this kit has been installed, disregard the instructions as P/N 147-0016-01 is a direct replacement.

PARTS LIST

Quantity	Part Number	Description
1 ea		Assembly, Fan Motor, consisting of:
1 ea	147-0016-01	Motor AC-DC 110V
2 ea	210-0008-00	Lockwasher, int. no. 8
4 ea	212-0023-00	Screw, 8-32 x 3/8 BHS
2 ea	212-0096-00	Screw 8-32 x 7/16 slot
2 ea	361-0285-00	Spacer, plate .500 x .149
4 ea	384-0544-00	Rod, spacing, 1/2 x 2-3/32, tapped 8-32
1 ea	406-0352-00	Bracket, fan mounting
1 ea	214-0210-00	Spool, w/3 ft. silver-bearing solder

INSTRUCTIONS

- () 1. Remove the fan blade from the instrument.
- () 2. Remove the four screws holding the fan assembly to the mounting ring and unsolder the fan motor leads.
- () 3. Remove the motor assembly (consisting of motor, mounting bracket and four mounting rods) as a unit.
- () 4. Install the new motor assembly from the kit.
- () 5. Solder the new motor leads to the points from which the old motor leads were removed in step 2.
- () 6. Install the fan blade (removed in step 1), making sure that it does not hit the air filter.

THIS COMPLETES THE INSTALLATION

- () Recheck your work.
- () Check installation for proper operation.

PARTS REPLACEMENT KIT

FAN MOTOR

For the following Tektronix Oscilloscopes:

Types 531 -- serial numbers 5001-7792
532 -- serial numbers 5001-5916
535 -- serial numbers 5001-8787
541 -- serial numbers 5001-6621
545 -- serial numbers 5001-10005

DESCRIPTION

New Fan Motor 147-016 replaces 147-011 previously used.

For instruments with serial numbers higher than those listed above, disregard these instructions as 147-016 is a direct replacement.

The new Heinze fan motor replaces Westinghouse motor which is no longer available.

NOTE: If the serial number of your instrument is above those listed, or if this kit has been installed, disregard the instructions as P/N 147-016 is a direct replacement.

Publication
Instructions for 050-023
March 1964

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050-023

PARTS LIST

Quantity	Description	Part Number
1 ea.	Assembly, fan motor, consisting of:	
1 ea.	Motor, AC-DC, 110v	147-016
2 ea.	Lockwasher, ext, #8	210-007
5 ea.	Lockwasher, int, #8	210-008
3 ea.	Nut, hex, 8-32 x 5/16	210-409
2 ea.	Screw, 8-32 x 1/4 BHS	212-001
3 ea.	Shockmount, rubber	348-008
1 ea.	Bracket, DC Fan	406-327
1 ea.	Bracket, fan mounting, "U" shape	406-328
1 ea.	Spool, w/3 ft. silver-bearing solder	214-210

INSTRUCTIONS

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

- () 1. Remove the fan blade from the instrument.
- () 2. Unsolder the fan motor leads at the rear of the unit.
- () 3. Remove the three nuts and lockwashers holding the shockmounts to the fan frame.
- () 4. Remove the motor assembly consisting of motor, bracket and shockmounts from the instrument as a unit.
- () 5. Assemble the new motor assembly from the kit.
- () 6. Solder the new motor leads to the points from which the old motor leads were removed in step 2.
- () 7. Install the fan blade (removed in step 1), making sure that it does not hit the air filter.

THIS COMPLETES THE INSTALLATION

Recheck your work.

Check installation for proper operation.

GG:cc



modification instructions

MI - 050-0023-01

Types 531,532
535,541,545

FAN MOTOR REPLACEMENT

For the following Tektronix Oscilloscopes:

Type	531	Serial Numbers	5001-7792
Type	532	Serial Numbers	5001-5916
Type	535	Serial Numbers	5001-8787
Type	541	Serial Numbers	5001-6621
Type	545	Serial Numbers	5001-10005

Fan Motor 147-0016-01 replaces 147-0011-00 and 147-0016-00 previously used.

For instruments with serial numbers higher than the numbers listed above, disregard these instructions as 147-0016-01 is a direct replacement.

The new fan motor replaces the Westinghouse motor which is no longer available.

NOTE: If the serial number of your instrument is above those listed, or if this kit has been installed, disregard the instructions as P/N 147-0016-01 is a direct replacement.

PARTS LIST

Quantity	Part Number	Description
1 ea		Assembly, fan motor, consisting of:
1 ea	147-0016-01	Motor, AC-DC, 110V
2 ea	210-0007-00	Lockwasher, ext. #8
5 ea	210-0008-00	Lockwasher, int. #8
3 ea	210-0409-00	Nut, hex, 8-32 x 5/16
2 ea	212-0096-00	Screw 8-32 x 7/16
3 ea	348-0008-00	Shockmount, rubber
2 ea	361-0285-00	Spacer, plate .500 x .149
1 ea	406-0327-00	Bracket, DC Fan
1 ea	406-0328-00	Bracket, fan mounting, "U" shape
1 ea	214-0210-00	Spool, w/3 ft. silver-bearing solder

INSTRUCTIONS

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

- () 1. Remove the fan blade from the instrument.
- () 2. Unsolder the fan motor leads at the rectifier stack.
- () 3. Remove the three nuts and lockwashers holding the shockmounts to the fan ring.
- () 4. Remove the motor assembly (consisting of motor, brackets and shockmounts) from the instrument as a unit.
- () 5. Install the new motor assembly from the kit.
- () 6. Solder the new motor leads to the points from which the old motor leads were removed in step 2.
- () 7. Install the fan blade (removed in step 1), making sure that it does not hit the air filter.

THIS COMPLETES THE INSTALLATION

- () Recheck your work.
- () Check installation for proper operation.

PARTS REPLACEMENT KIT

SQUARE-WAVE CALIBRATOR SWITCH



For the following Tektronix Oscilloscopes:

Types 531 serial numbers 101-7000
 532 serial numbers 101-5753
 535 serial numbers 101-7893
 541 serial numbers 101-6186
 545 serial numbers 101-8266

DESCRIPTION

Square-Wave Calibrator switch 262-132 replaces 262-065.

The unwired part number has also been changed from 260-013 to 260-177.

The new switch is designed to use a separate shield for ease of installation.

NOTE: If the serial number of your instrument is above those listed, or if this kit has been installed, disregard the instructions as P N 262-132 is a direct replacement.

050-034

Publication
 Instructions for 050-034
 March 1966

Supersedes
 November 1965

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050-034

Quantity

1 ea.

1 ea.

1 ea.

1 ea.

1 ea.

Page 2

PARTS LIST

Quantity	Description				Part Number
1 ea.	Assembly, switch (262-132), consisting of:				
1 ea.	Switch, raw				260-177
1 ea.	Capacitor, cer.	27 pf	500 v	20%	281-513
1 ea.	Capacitor, cer.	0.001 μ f	500 v	discap	283-000
1 ea.	Resistor, comp.	100 Ω	1/2 w	10%	302-101
1 ea.	Resistor, prec.	100k	1/2 w	1%	309-045
1 ea.	Resistor, prec.	40 Ω	1/2 w	1%	309-066
1 ea.	Resistor, prec.	60 Ω	1/2 w	1%	309-067
1 ea.	Resistor, prec.	200 Ω	1/2 w	1%	309-073
2 ea.	Resistor, prec.	100 Ω	1/2 w	1%	309-112
1 ea.	Resistor, prec.	610 Ω	1/2 w	1%	309-113
1 ea.	Resistor, prec.	1025 Ω	1/2 w	1%	309-116
1 ea.	Resistor, prec.	2.1k	1/2 w	1%	309-117
1 ea.	Resistor, prec.	6.375k	1/2 w	1%	309-119
1 ea.	Resistor, prec.	9.5k	1/2 w	1%	309-121
1 ea.	Tubing, plastic, no.20 black,	1 in.			(162-504)
1 ea.	Tubing, plastic, no.20 black,	2 in.			(162-504)
1 ea.	Wire, no.22 solid,	18 in.	bare		(176-005)
1 ea.	Lockwasher, int. no.6				210-006
1 ea.	Nut, hex, 6-32 x 1/4				210-407
1 ea.	Screw, 6-32 x 5/16 PHS, Phillips				211-507
1 ea.	Shield				337-093

INSTRUCTIONS

NOTE: The following method is used to identify the Calibrator Switch terminals:

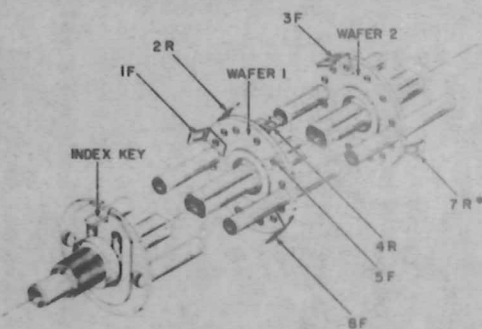
The wafers are numbered from the front to the rear.

The contact positions are numbered 1 through 24 relative to the index key as shown in drawing.

The contacts have an "F" or "R" suffix which denotes that they are on the front or the rear of the wafer.

EXAMPLE: W2-7R (denoted by * on drawing) is contact no. 7 on the rear of wafer 2.

(TYPICAL SWITCH CONFIGURATION)



- () 1. Remove cabinet from instrument. Remove red and black knobs from Calibrator switch.
- () 2. Unsolder 100Ω comp. resistor from Cal. Out coax connector.
- () 3. Unsolder 100Ω prec resistor, paralleled by 0.001μf capacitor, from solder lug mounted on Cal. Out coax connector.
- () 4. Unsolder white-black wire from W3-6F.
- () 5. Unsolder the black-brown-green-brown wire from W3-5F.
- () 6. Unsolder white-yellow wire (or wires) from W1-6F.
- () 7. Remove Calibrator switch from chassis.

- () 8. Remove screw holding the post supporting the Vertical Signal Out lead located near switch.
- () 9. Position new shield (from kit) on bottom side of power chassis symmetrically over chassis cut-out. Position holes 1-3/4in. from front of chassis. Center-punch and drill mounting holes with no. 27 drill on each side of cut-out.
- () 10. Install new Calibrator switch (from kit) with index toward bottom of instrument.
- () 11. Solder wire (or wires) removed in step 6 to W2-6R.

NOTE: If your instrument has a CAL TEST POINT jack, be sure the wire from it is dressed on outside of new bracket mounting hole and parallel to front panel.

- () 12. Solder white-black wire to W3-5R.
- () 13. Solder black-brown-green-brown wire to W3-6R.
- () 14. Bend resistors connected to wafer 3 away from switch toward bottom of instrument.
- () 15. Position new bracket over holes and secure side near CAL. ADJUST potentiometer with 6-32 x 5/16 FHS screws, nut and lockwasher from the kit.
- () 16. Secure other side of bracket with post and screw removed in step 8.
- () 17. Dress and solder 100Ω prec resistor and 0.001μf capacitor to solder lug on Cal. Out coax connector.
- () 18. Dress and solder 100Ω comp resistor to Cal. Out coax connector.
- () 19. Replace Calibrator knobs.

THIS COMPLETES THE INSTALLATION

- () Check wiring for accuracy.
- () For future reference, correct your Instruction Manual as required.
- () Refer to your Instruction Manual, adjust and check calibrator as required.



modification instructions

MI - 050-0123-01

Instrument Type
See Below

AIR FILTER

For the following Tektronix Oscilloscopes:

Type 531	Serial Numbers	101-20000	
Type 531A	Serial Numbers	20001-25609 and 100025-100477	
Type 532	Serial Numbers	101-up	
Type 533	Serial Numbers	101-3000	
Type 533A	Serial Numbers		100001-100778
Type 535	Serial Numbers	101-20000	
Type 535A	Serial Numbers		101250-102117
Type 536	Serial Numbers	101-2969	
Type 541	Serial Numbers	101-20000	
Type 541A	Serial Numbers	20001-	100166
Type 543	Serial Numbers	101-3000	
Type 543A	Serial Numbers	3001-up	
Type 543B	Serial Numbers		100023-100128
Type 544	Serial Numbers		100013-100043
Type 545	Serial Numbers	101-20000	
Type 545A	Serial Numbers	20001-up	
Type 545B	Serial Numbers		100057-101593
Type 546	Serial Numbers		100015-100038
Type 547	Serial Numbers		100248-100530
Type 567	Serial Numbers	101-749	
Type 581	Serial Numbers	101-up	
Type 581A	Serial Numbers		100013-100063
Type 585	Serial Numbers	101-up	
Type 585A	Serial Numbers		100038-100181
Type 551 Ind	Serial Numbers	101-5299 and	100001-100468
Type 555 Ind	Serial Numbers	101-4859 and	100159-100352
Type RM31	Serial Numbers	101-1000	Type RM41A Serial Numbers 1001-up
Type RM31A	Serial Numbers	1001-2509	Type RM43 Serial Numbers 101-1000
Type RM32	Serial Numbers	101-up	Type RM43A Serial Numbers 1001-up
Type RM33	Serial Numbers	101-1000	Type RM45 Serial Numbers 101-1000
Type RM35	Serial Numbers	101-up	Type RM45A Serial Numbers 1001-up
Type RM41	Serial Numbers	101-1000	Type RM567 Serial Numbers 101-239

Scott foam air filter 378-0023-00 replaces aluminum air filters 378-0011-00, 378-0011-01 and nylon air filter 378-0011-02 (for Guernsey).

An aluminum filter screen, 378-0762-00 is included to maintain clearance between the fan blade and the filter.

NOTE: If the serial number of your instrument is above those listed, or if this kit has been installed, disregard the instructions as PN 378-0023-00 is a direct replacement.

This Parts Replacement Kit replaces the 050-0123-00, which replace the air filter in the Types 551 and 555 only.

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PARTS INCLUDED IN PARTS REPLACEMENT KIT:

Quantity	Part Number	Description
4 ea	213-0054-00	Screw, 6-32 x 5/16 thread-forming
1 ea	378-0023-00	Filter, air, Scott foam, 10-3/8 square
1 ea	378-0762-00	Screen, filter

INSTRUCTIONS

- A. TO REPLACE THE FILTER ON THE FOLLOWING INSTRUMENTS BELOW SN 5000:
Types 531, 532, 535, 541 and 545

- () 1. Remove the filter and filter housing.
- () 2. Center the filter screen (from kit) over the fan opening in the cabinet.
Mark and drill the four 7/64 in. (#36) holes in the cabinet for mounting the screen.
- () Mount the filter screen, using the four 6-32 x 5/16 thread-forming screws from the kit.
- () 3. Place the new air filter over the screen, and between the two mounting screws.
- () 4. Replace the filter housing.

THIS COMPLETES THE INSTALLATION.

- () Record the part number of the air filter and filter screen in your Instruction Manual.

- B. TO REPLACE THE FILTER ON ALL REMAINING INSTRUMENTS LISTED ON PAGE 1:

- () 1. Remove the filter and filter housing.
- () 2. Loosen the two right hand (viewing from rear) fan ring mounting screws.
- () 3. Remove the two left hand fan ring mounting screws.
- () 4. Install the filter screen (from kit) under the two loosened screws, using the two notches provided.

NOTE: Mount with the curved area away from fan.

- () 5. Replace the two screws removed in step 3.
- () 6. Tighten all four mounting screws securing the fan ring and filter screen.
- () 7. Place the new air filter (from kit) over the screen and between the four mounting screws.
- () 8. Replace the filter housing.

THIS COMPLETES THE INSTALLATION.

- () Record the part numbers of the air filter and filter screen in your Instruction Manual.

DA:ls

GRID

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PARTS REPLACEMENT KIT

GRID LINE COIL



For the following Tektronix Oscilloscopes:

Type 541	s/n 6475-6663*
Type RM41	s/n 101-133*
Type 545	s/n 9292-10119*
Type RM45	s/n 101-171*

DESCRIPTION

Distributed Amplifier grid line coil 108-145 replaces 108-136. The first section of the grid line was deleted to improve high-frequency tubing.

NOTE: This kit replaces only one of the grid lines (L1103 or L1113) in the instrument. Order two kits to replace both lines.

*Some instruments within this range were factory modified.

NOTE: If the serial number of your instrument is above those listed, or if this kit has been installed, disregard the instructions as P N 108-145 is a direct replacement.

050-151

Publication:
Instructions for 050-151
March 1966

Supersedes:
March 1964

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050-151

Page 1 of 2

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Quantity	Description	Part Number
1 ea.	Coil, fixed, 6-section Grid Line	108-145

() 1. Replace either L1103 or L1113 with the coil from the kit.

() Connect the grid (pin 1) of V1054 or V1064 directly to the end of the grid line where the 39Ω resistor, 1000pfcapacitor combination is soldered.

() 2. Unwind and remove the front section on the grid line not being replaced, in order to make the grid lines symmetrical.

() Rewire this side like the replaced coil.

THIS COMPLETES THE INSTALLATION

() Check wiring for accuracy.

Make the following change to your Instruction Manual parts list:

L1103 Coil, fixed 6-section Grid line 108-145

OR

L1113 Coil, fixed 6-section Grid line 108-145

GG:cc

PARTS REPLACEMENT KIT

HV CAPACITORS

For the following Tektronix Oscilloscopes:

Types 531/531A	s/n 101-20649
Types RM31/RM31A	s/n 101- 1259
Type 532	s/n 101- 6629
Type RM32	s/n 101- 359
Type 533	s/n 101- 1659
Type RM33	s/n 101- 149
Types 535/535A	s/n 101-21979
Types RM35/RM35A	s/n 101- 149
Types 541/541A	s/n 101-20649
Types RM41/RM41A	s/n 101- 111
Type 543	s/n 101- 1429
Type RM43	s/n 101- 121
Types 545/545A	s/n 101-22289
Types RM45/RM45A	s/n 101- 1399

DESCRIPTION

High voltage ceramic capacitor 283-011 replaces the oil-filled high voltage capacitor 285-513 previously used.

The new ceramic capacitor offers greater reliability and longer life.

Additional circuitry is added to prevent disturbances in unblanking.

NOTE: If the s/n of your instrument is above those listed, or if this kit has already been installed, disregard the instructions as P/N 283-011 is a direct replacement.

Publication:
Instructions for 050-199
January 1965

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050-199

Page 1 of 2

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PARTS LIST

Quantity	Description	Part Number
5 ea.	Capacitor, ceramic, 0.01 μ f 2kv	283-011
1 ea.	Resistor, comp, 33k 1/2w 10%	302-333
1 ea.	Wire, solder, silver-bearing 12in.	

INSTRUCTIONS

IMPORTANT: When soldering to the ceramic strips, use the silver-bearing solder supplied with this kit.

- () 1. Replace the four 0.015 μ f 3kv PTM capacitors on the Fandl chassis with 0.01 μ f 2kv ceramic capacitors from the kit. Note that one of these PTM capacitors is replaced by two of the ceramic capacitors (see drawing).
- () 2. Replace the 100k 1/2w 10% resistor between CSB-8 and CSB-11 with the 33k 1/2w 10% resistor from the kit.

NOTE: On some early instruments, CSA is an 11-notch ceramic strip, with the 100k resistor located between CSA and CSB.

THIS COMPLETES THE INSTALLATION

() Check wiring for accuracy.

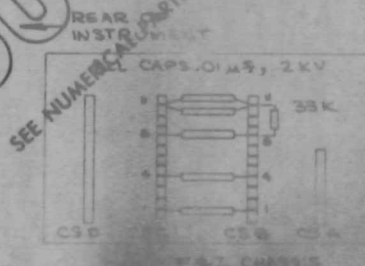
() Make the following corrections in your Instruction Manual (circuit numbers in parentheses are for 532, RM32, 533, RM33, 543, and RM43):

Change C821, C827, C845, and C848 (C832, C844, C855, and C857) to 0.01 μ f 2kv ceramic 283-011.

Add C828 (C835) 0.01 μ f 2kv ceramic 283-011. On schematics, show this capacitor in parallel with C827 (C834).

Change R827 (R834) to 33k 1/2w 10% 302-333.

JB:ceb



PARTS REPLACEMENT KIT

SILICON RECTIFIER FOR DC FAN MOTORS



For the following Tektronix Oscilloscopes:

Type 513 s/n 1348-up*
 Type 531 s/n 101-20000
 Type 532 s/n 5001- 5070
 Type 535 s/n 101-20000
 Type 541 s/n 101-20000
 Type 545 s/n 101-20000

DESCRIPTION

This modification kit replaces selenium rectifier 106-024 which is no longer available. An assembly, containing four 152-066 silicon diodes, replaces the selenium rectifier, offering more reliability and longer life.

NOTE: If the s/n of your instrument is above those listed, or if this kit has already been installed, disregard the instructions as P/N 152-0066-00 is a direct replacement.

*Also for 513's s/n 633-1347 which have been modified by moving the ventilating fan from the right side to the rear of the instrument, and for s/n 101-632 which have been modified to use a Type 210B Power Supply and have had the ventilating fan moved from the right side to the rear of the instrument.

050-230-00

Quantity
1 ea.

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INSTRUCTION

IMPORTANT:
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PARTS LIST

Quantity	Description	Part Number
1 ea.	Assembly, silicon rectifier, consisting of:	
2 ea.	Strip, cer, 7/16 x 5-notch (large) clip-mount	124-0093-00
4 ea.	Diode, silicon IN1394 400V	152-0066-00
1 ea.	Lug, solder, SL25	210-0202-00
1 ea.	Nut, hex 6-32 x 1/4	210-0407-00
1 ea.	Screw, 6-32 x 1/2 Blt	211-0504-00
1 ea.	Capacitor, EMT, 6.25 μ F	290-0000-00
4 ea.	Spacer, nylon-molded, 0.156	361-0008-00
1 ea.	Bracket, rectifier mounting	406-0648-00
1 ea.	Tubing, 1/2 in. ID, clear, 1 ft.	(162-0021-00)
1 ea.	Wire, #22 solid	(175-0522-00)
1 ea.	Spool, w. 3 ft. of silver-bearing solder	214-0210-00

INSTRUCTIONS

IMPORTANT: When soldering to a ceramic strip, use the silver-bearing solder supplied with kit.

- () 1. Remove the wires attached to the selenium rectifier.
- () 2. Remove the mounting bracket and rectifier assembly.
- () 3. Install the assembly from kit using the old hardware. Position the new assembly on the transformer unit as shown, opposite the transformer terminals.

- () 4. Solder the wires from the selenium stack to the new assembly. See the drawing and schematic for their locations.

THIS COMPLETES THE INSTALLATION

- () Check wiring for accuracy.
- () Correct your Instruction Manual Parts List and Power Supply schematic as necessary.

GG:ceb

