

Type 310A

PRODUCT MODIFICATION INDEX

 circuit
 section — XXX.XX
 page

 1 SWEEP TRIGGER

EFF. SN. S.M.*	DESCRIPTION	MOD. NO.	PAGE	LABOR TIME	KIT NO.
12420	The value of several components was changed to improve low frequency triggering.	3069	101.01	15min	-----
14454	To identify transformer connections for proper line triggering, a white-blue-brown wire from the power transformer to the Vertical Amplifier chassis is replaced with a white wire.	3451-2	----	-----	-----
15960	Low amplitude trigger characteristic improved by changing R13 from a 27k 2W resistor, 306-0273-00, to a 22k 2W 5% resistor, 305-0223-00.	3857	----	-----	-----
21260	Incorrect internal trigger DC Level corrected by changing R462 from 143k 1% resistor, 309-0092-00, to 147k 1% resistor, 323-0401-00.	10107	----	-----	-----
24230	S17148 changed the part number of the TRIG LEVEL/STABILITY potentiometer to 311-0096-02 Centralab only. Other brands of potentiometers were too large. This mod changes the part number to 311-0096-00 as Centralab is now the only source for this part.	19114	----	-----	-----

2-9-73

* series model

Indicates change since last publication.




Page 1

Type 310A

PRODUCT MODIFICATION INDEX

 circuit
 section —XXX.XX
 page

 2 SWEEP GENERATOR

EFF. SN. S.M.*	DESCRIPTION	MOD. NO.	PAGE	LABOR TIME	KIT NO.
15060	Several components changed and relocated to prevent free running of the Sweep when set for Auto or +Internal Trigger Mode at Sweep speeds of 20 μ sec/cm or faster.	3793	102.01	1h	-----
15150	Possible slow sweep timing error prevented by connecting inter-element shield, pin 6, to one plate, pin 7 of V150.	3779	----	-----	-----
15221	Sweep length variations between triggered and free run operations prevented by adding a T12G type diode in parallel with R129.	3822	----	-----	-----
17579	Unblanking circuit layout changed to reduce intensity modulation.	5522-2	----	-----	-----
21500	Slow sweep timing error and fast sweep speed jitter reduced by adding a semiconductor diode in series with Miller tube control grid disconnect diode.	10189	102.02	-----	-----
21880	Jitter at 50 μ sec sweep speed with VARIABLE Time/Div potentiometer rotated full counter clockwise prevented by adding R150, a 22M 1/4W resistor, 316-0226-00, in parallel with the Miller tube control grid disconnect diode, V152.	11796	----	-----	-----
24230	S17148 changed the part number of the TRIG LEVEL/STABILITY potentiometer to 311-0096-02 Centralab only. Other brands of potentiometers were too large. This mod changes the part number to 311-0096-00 as Centralab is now the only source for this part.	19114	----	-----	-----

2-9-73

* series model

Indicates change since last publication.



Page 2

Type 310A

PRODUCT MODIFICATION INDEX

◇ 3 TIMING SWITCH

circuit
section —XXX.XX
page

EFF. SN. S.M*	DESCRIPTION	MOD. NO.	PAGE	LABOR TIME	KIT NO.
N/A	Timing capacitor, C175D, either a .001 μ F +1/4%, 291-0008-01 or a .001 μ F -1/4%, 291-0008-02, replaced by C175D, a .001 μ F \pm 1/2% capacitor, 291-0008-00.	3337	----	-----	-----

2-18-72

* series model

Indicates change since last publication.



Page 3

Type 310A

PRODUCT MODIFICATION INDEX

 circuit
 section — XXX.XX
 page


4 HORIZONTAL AMPLIFIER

EFF. SN. S.M.*	DESCRIPTION	MOD. NO.	PAGE	LABOR TIME	KIT NO.
11040	Chassis current hum in the preamplifier and sweep output stages reduced by improving the bond between power chassis and vertical chassis, adding a wire to cable to connect ground points on power chassis and vertical chassis, isolating the transformer mounting bolts from the chassis, and not lacquering chassis and subpanel areas to which ground connections are made. Part number of preamp cable changes from 179-0292-00 to 179-0402-00.	2612	----	-----	-----
24230	To increase availability of components, R214 3.1M was changed from a carbon film resistor (309-0027-00) to a metal film resistor (325-0177-00).	21007	-----	-----	-----

12-6-74

* series model

##Indicates change since last publication



Page 4

Type 310A

PRODUCT MODIFICATION INDEX

 circuit
 section — XXX.XX
 page


5 VERTICAL PREAMPLIFIER

EFF. SN. S.M.*	DESCRIPTION	MOD. NO.	PAGE	LABOR TIME	KIT NO.
11040	Chassis current hum in the preamplifier and sweep output stages reduced by improving the bond between power chassis and vertical chassis, adding a wire to cable to connect ground points on power chassis and vertical chassis, isolating the transformer mounting bolts from the chassis, and not lacquering chassis and subpanel areas to which ground connections are made. Part number of preamp cable changes from 179-0292-00 to 179-0402-00.	2612	----	-----	-----
11170	Trace drift with temperature change prevented by changing C340 from 0.1 μ F 500V capacitor, 283-0008-00, to a 0.1 μ F 200V capacitor, 285-0572-00.	2636	----	-----	-----
17579	Selection of vacuum tubes and capacitors to match the preamplifier and vertical amplifier input capacitance prevented by changing C323 from a 3.3pF \pm 0.25pF capacitor, 281-0534-00, to a 4.7pF \pm 1pF capacitor, 281-0501-00.	5522-1	----	-----	-----
21430	V320 changed from a 6AU6 vacuum tube, 154-0022-00, to an 8425/6AU6 type vacuum tube, 154-0022-07.	10548	----	-----	-----

2-18-72

* series model

Indicates change since last publication.



Page 5

Type 310A

PRODUCT MODIFICATION INDEX

 circuit
 section —XXX.XX
 page

 6 VERTICAL AMPLIFIER

EFF. SN. S.M.*	DESCRIPTION	MOD. NO.	PAGE	LABOR TIME	KIT NO.
11040	Switching transient eliminated by changing the -150V power supply point for R400, R412, and R414 from a decoupled point to the main -150V supply. This change also eliminates an instrument wiring error.	2611	----	----	----
11460	L450 and L451 changed from 77-140 μ H coils, 114-0036-00, to 90-150 μ H, 114-0129-00.	2538	----	----	----
18470	R442, the Vertical Gain Adjust potentiometer, changed from 500 Ω , 311-0005-00, to 200 Ω , 311-0004-00.	6134	----	15min	----
20030	DC Balance Adjustment improved by changing R412 and R414 from 33k 2W 10% resistors, 306-0333-00, to 33k 2W 5% resistors, 305-0333-00.	8279	----	----	----
21430	V401 and V408 changed from 6AU6 vacuum tubes, 154-0022-00, to 8425/6AU6 type vacuum tubes, 154-0022-07.	10548	----	----	----
22640	C325, C402, and C403 changed from 6.25 μ F EMT 300V capacitor, 290-0000-00 to 6.25 μ F EMT 300V with insulated sleeving, 290-0025-00.	13655	----	----	----

2-18-72

* series model

Indicates change since last publication.



Page 6

Type 310A

PRODUCT MODIFICATION INDEX

 circuit
 section - XXX.XX
 page

 7 LOW VOLTAGE POWER SUPPLY

EFF. SN. S.M.*	DESCRIPTION	MOD. NO.	PAGE	LABOR TIME	KIT NO.
10110	Connections to power transformer terminals 4 and 5 and terminals 29 and 30 reversed to standardize the primary circuit of all Low Voltage Power Supplies.	2228	----	-----	-----
10123	C661, a 0.02 μ F 600V capacitor, 283-0006-00, changed to a 0.02 μ F 1400V capacitor, 283-0022-00.	2292	----	-----	-----
10620	Fuse changed from 1 amp AGC, 159-0022-00, to 0.8 amp MDL, 159-0018-00.	2548	----	-----	-----
10920	Silicon diodes, V601A-D, V630A-D, and V660A-D, 106-0056-00, replaced by silicon diodes 1N2070, 152-0011-00.	2563	----	-----	-----
14210	V601A-D, V630A-D, and V660A-D changed from 1N2070 diodes, 152-0011-00, to 1N2862 diodes, 152-0047-00.	3315	----	-----	-----
14454	Changes in power supply circuit and layout improve the performance at line frequencies above 60 cycles.	3451-1	107.01	-----	-----
14454	To identify transformer connections for proper line triggering, a white-blue-brown wire from the power transformer to the Vertical Amplifier chassis is replaced with a white wire.	3451-2	----	-----	-----
N/A	A potential shock hazard, which exists when inserting or removing fuse, was eliminated by changing wire from motor base to fuse to a color coded wire to prevent fuse holder from being wired incorrectly.	7521	----	-----	-----
N/A	Electrolytic capacitor assemblies changed to facilitate replacement.	S8959	107.02	-----	-----

4-14-72

* series model

Indicates change since last publication.



Page 7A

Type 310A

PRODUCT MODIFICATION INDEX

circuit
section—XXX.XX
page

7 LOW VOLTAGE POWER SUPPLY (Continued)

EFF. SN. S.M*	DESCRIPTION	MOD. NO.	PAGE	LABOR TIME	KIT NO.
20600	Insufficient range of adjustment of R610, the -150V Adjust potentiometer corrected by changing R609 from 56.5k 1% resistor, 309-0040-00, to 36.5k 1%, 323-0343-00, and changing R611 from 68k 1% resistor, 309-0042-00, to 49.9k 1% resistor, 323-0356-00.	9158	----	-----	-----
21500	D601A-D, D630A-D, and D660A-D changed from 152-0047-00 type diodes to 152-0066-00 type diodes.	9973	----	-----	-----
22080	Ground connection between power cord and instrument motor base improved by adding a ground spring to the non-current carrying ground receptacle.	11292	107.03 107.04	-----	----- 040-0424-01
22230	Part number of motor base connector changed from 131-0150-00 to 131-0150-01.	9271	----	-----	-----
22320	Part number of motor base connector changed from 131-0150-01 to 131-0572-00 to provide better grounding.	12876	----	15min	-----

4-14-72

* series model

Indicates change since last publication.




Page 7B

Type 310A

PRODUCT MODIFICATION INDEX

 circuit
 section ~~XXX.XX~~
 page

 8 CRT CIRCUIT

EFF. SN. S.M.*	DESCRIPTION	MOD. NO.	PAGE	LABOR TIME	KIT NO.
11530	C720 changed from .015 μ F 3kv oil-filled capacitor to .01 2kv ceramic capacitor. Partially superseded by Mod 3793.	2868	108.01	-----	-----
12420	High voltage oil-filled capacitors replaced due to high reject rate.	2816	108.02	-----	-----
17373	CRT changed from 3WP2, 154-0059-00, to one of the following: T310P1, 154-0362-00, T310P2, 154-0363-00, T310P7, 154-0364-00, or T310P11, 154-0365-00.	5219	108.03	-----	050-0141-01
18970	Part number of CRT socket changed from 136-0063-00 to 136-0143-00.	5081	-----	-----	-----
21120	Shape and color of CRT light filter standardized.	9022	108.04	-----	-----
21880	Poor unblanking on lms to 500 μ s sweep speeds corrected by changing C720 and adding two resistors in series with R274 to slow down the unblanking waveform.	11269	108.05	-----	-----
22350	Part number of FOCUS potentiometer, R743, changed from 311-0043-00 to 311-0043-02 and INTENSITY potentiometer, R723, changed from 311-0041-00 to 311-0041-02.	11369	-----	-----	-----
24206	Smoke gray CRT filter, 378-0550-00, replaced with blue CRT filter, 378-0552-00.	16765-1	-----	-----	-----

4-14-72

*series model

#Indicates changes made since last publication.



Page 8

Type 310A

PRODUCT MODIFICATION INDEX

◇ 9 CALIBRATOR

circuit
section — **XXX.XX**
page

EFF. SN. S.M*	DESCRIPTION	MOD. NO.	PAGE	LABOR TIME	KIT NO.
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None

4-14-72

* series model

Indicates change since last publication.



Page 9

Type 310A

PRODUCT MODIFICATION INDEX

 circuit
 section — XXX.XX
 page

 10 MISCELLANEOUS

EFF. SN. S.M.*	DESCRIPTION	MOD. NO.	PAGE	LABOR TIME	KIT NO.
10451	Ceramic strips changed to clip-mounted type to facilitate production.	2203	110.01	-----	-----
N/A	Part number of germanium diode, T12G, changed from 158-0001-00 to 152-0008-00.	2371	----	-----	-----
10534	Three-notch ceramic strip on the Vertical Amplifier chassis changed from 3/4 inch, 124-0087-00, to 7/16 inch, 124-0092-00, to increase clearance between ceramic strips on Power chassis and Vertical chassis.	2540	----	-----	-----
12579	Cabinet finish and material changed to improve appearance and to provide a cabinet that is easier to clean.	2545	110.02	-----	-----
13417	Motor base connector assembly changed to provide better clearance between the motor base connector and the low voltage transformer.	3177	110.03	-----	-----
18320	Part number for probe assembly package for Type 310A, Mod 210B only, changed from 020-0004-00 to 020-0007-00.	7005	----	-----	-----
19120	UHF connectors changed to BNC connectors.	6860	110.04	-----	-----
19370	Eighteen inch long red patch cord, 012-0031-00, and adapter BNC to binding post, 103-0033-00, added to accessories to provide additional utility and adaptability for instruments with BNC connectors.	7641	----	-----	-----
19425	Part number of top bar handle assembly w/handle changed from 381-0166-00 to 381-0235-00. Part number of handle changes from 367-0001-00 to 367-0037-00.	6692	----	-----	-----

2-9-73

* series model
 ## Change since last publication.



Page 10A

 10 MISCELLANEOUS (Continued)

EFF. SN. S.M*	DESCRIPTION	MOD. NO.	PAGE	LABOR TIME	KIT NO.
19560	Part number of fuse holder changed from 352-0007-00 to 352-0114-00.	6911	----	-----	-----
19850	Neon bulbs replaced with more reliable type.	7843	110.05	15min	-----
N/A	Standard accessories changed to permit patching without the use of adapters.	8313	110.06	-----	-----
20400	Part number of power cord changed from 161-0013-00 to 161-0022-00.	8330	----	-----	-----
20760	Front panel knob color changed to charcoal for compatibility with new instruments.	9172	110.07	-----	-----
20940	Part number of instrument power cord changed from 161-0022-00 161-0024-00.	9473	----	-----	-----
21332	Neon indicating lamps and holders replaced with improved type.	8002	110.08	-----	-----
21740	P6006 type probe, 010-0127-00, replaced by P6012 type probe. 010-0203-00	11641	----	-----	-----
22970	Part number of power cord changes from 161-0024-00 to 161-0024-02. For Customer Service purposes, power cord part number 161-0024-03 replaces 161-0024-01 (161-0024-02 with spring 214-0698-00 installed).	14629	----	-----	-----
24206	3 to 2 wire adapter, 103-0013-00, changed from standard to optional accessory. At the same time, the standard accessory probe was changed from P6012, part number 010-0203-00, to P6006, part number 010-0127-00.	16765-2	----	-----	-----

8-20-71

* series model

##Indicates changes made since last publication.



Page 10B

Type 310A

PRODUCT MODIFICATION INDEX

 circuit
 section - XXX.XX
 page

 10 MISCELLANEOUS (Continued)

EFF. SN. S.M*	DESCRIPTION	MOD. NO.	PAGE	LABOR TIME	KIT NO.
N/A	Coupling restraints added to potentiometer shafts to eliminate backlash. Part number of restraint for 1/8 inch shafts is 361-0233-00 and for 1/4 inch shaft is 361-0234-00.	14165	----	-----	-----
24230	3/4 inch ceramic strips replaced with 7/16 inch ceramic strips.	16795	110.09	-----	-----
24230	Carbon film resistors, PN 309-XXXX-XX (1/2W) and 310-XXXX-XX (1W) were replaced with more reliable metal film resistors. PN 323-XXXX-XX and 325-XXXX-XX.	18313	110.10	----	-----

2-9-73

* series model

Indicates change since last publication.



Page 10C

Type 310A

PRODUCT MODIFICATION INDEX

circuit
section - ~~XXX~~.XX
page

◇ 11 FIELD MODIFICATION KITS AND PARTS REPLACEMENT KITS

EFF. SN. S.M.*	DESCRIPTION	MOD. NO.	PAGE	LABOR TIME	KIT NO.
# 101- 10000	Selenium Rectifiers Replaced with Silicon Diodes	---	111.01	-----	040-0195-00

* 101- 7139	CRT Replacement Kit	---	109.03	-----	050-0141-01
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2-18-72

* series model



Page 11

IMPROVES LF TRIGGERING

Effective Prod SN 12420

Usable in SN 10001-12419

C46, R50, and R55 are changed in value to improve the low frequency triggering.

Parts Removed:

C46	281-0511-00	Capacitor, 22pF
R50	304-0223-00	Resistor, 22k 1W 10%
R55	302-0275-00	Resistor, 2.7M 1/2W 10%
SW2,SW3	262-0200-00	Switch, Trigger

Parts Added:

*C46	281-0512-00	Capacitor, 27pF
*R50	304-0183-00	Resistor, 18k 1W 10%
*R55	302-0225-00	Resistor, 2.2M 1/2W 10%
SW2,SW3	262-0361-00	Switch, Trigger

INSTALLATION:

Parts Required: See 'Parts Added' with asterisks.

- 1) Replace C46, a 22pF capacitor, located on the ceramic strips near V40, with a 27pF capacitor.
- 2) Replace R50, a 22k 1W resistor, with an 18k 1W resistor.
- 3) Replace R55, a 2.7M 1/2W resistor, with a 2.2M 1/2W resistor.

COMPONENTS CHANGED TO
PREVENT FREE-RUNNING

Effective Prod SN 15060

Usable in SN 10001-15059

Components are changed and relocated to prevent free-running of the sweep when set for AUTO and +INT TRIGGER MODE, at sweep speeds of 20 μ sec/cm or faster, 'Variable' uncalibrated, and utilizing low amplitude signals at 50 cycles. Free-running was caused by loading of the sweep multi by the unblanking circuit, and by the unblanking pulse being picked up by the trigger pickoff CF (V465).

Parts Removed:

C720	283-0011-00	Capacitor, 0.01 μ F 2kV
R720	302-0153-00	Resistor, 15k 1/2W 10%

Parts Added:

C720	283-0030-00	Capacitor, 0.015 μ F 2.5kV
R720	302-0683-00	Resistor, 68k 1/2W 10%

INSTALLATION:

Parts Required: See 'Parts Added'.

For SN 10001-11669: R724 302-0225-00 2.2M 1/2W 10%

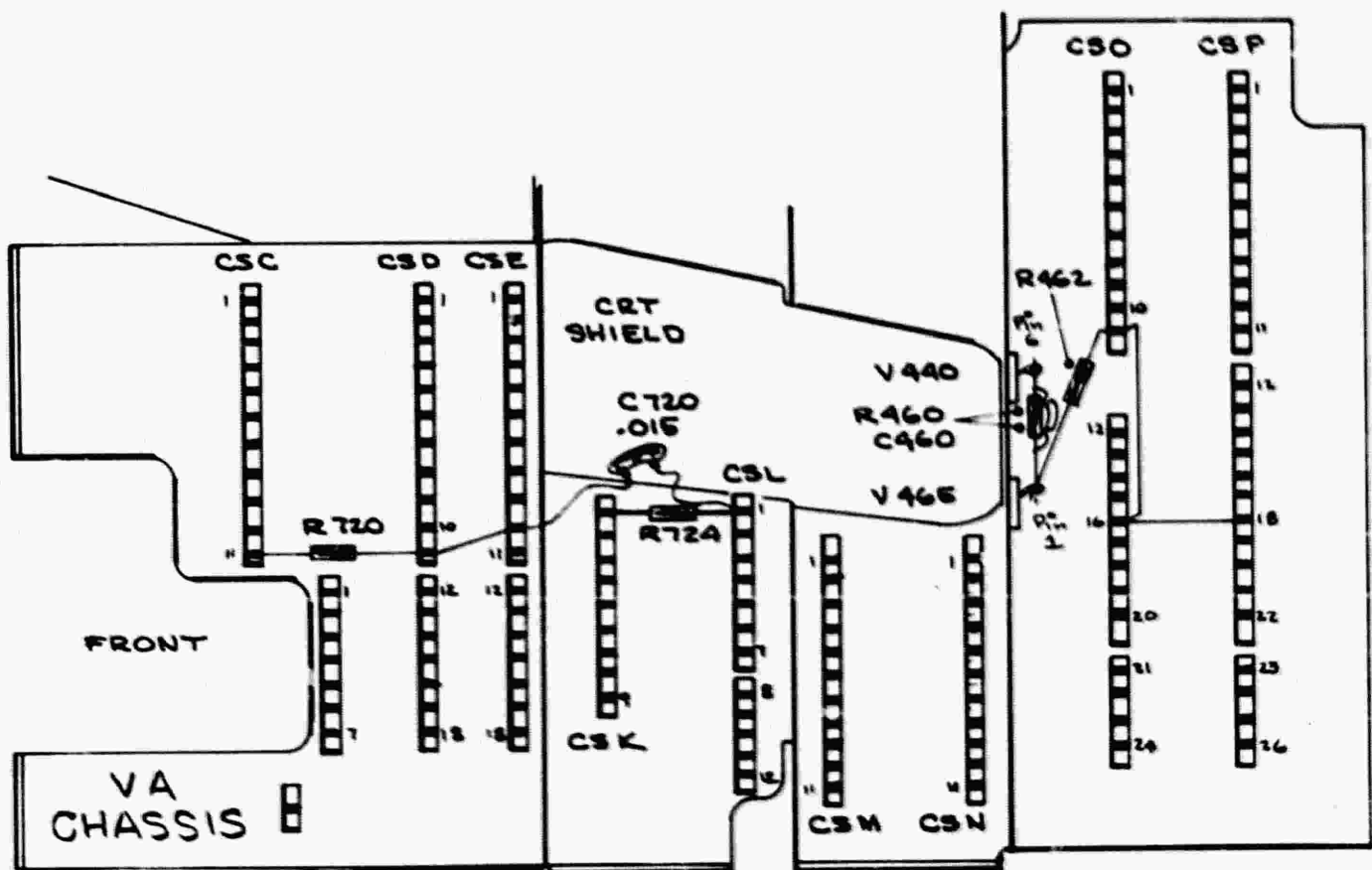
Refer to ceramic strip layout on next page while performing the following steps:

- 1) Locate R720, a 15k resistor, located between CSC-11 and CSD-11. If it is a 15k resistor, replace it with a 68k 1/2W 10% resistor.
 - 2) Replace C720, located between CSE-10 and CSL-1, with a 0.015 μ F 2.5kV discap.
- STEP 3 APPLIES ONLY TO SN 10001-11669.
- 3) Replace R724, a 1.5M 1/2W resistor, connected between CSK-1 and CSL-1 with a 2.2M 1/2W resistor.
 - 4) Relocate one end of the parallel combination of R460 (183k) and C460 (1.5pF) from CSO-11 to pin 6 of V440.

Continued.

INSTALLATION: (Continued)

- 5) Remove the bare wire between pin 6 of V440 and CS0-11.
- 6) Relocate R462 (143k 1% resistor) from between CS0-15 and CSP-18, to between pin 1 of V465 and CS0-11 (dress under R460).
- 7) Remove the bare wire between pin 1 of V465 and CS0-16.
- 8) Install bare wire from CS0-16 to CSP-18.
- 9) Install bare wire from CS0-16 to CS0-11.



D150 ADDED TO REDUCE
SELECTION OF V150

Effective Prod SN 21500

Usable in SN 10001-21499

Excessive leakage of the Miller disconnect diode was causing slow speed timing error and fast sweep speed jitter. A low leakage semiconductor diode was added in series with the Miller tube control grid disconnect diode. This combines the low leakage characteristic of the semiconductor with the fast turn-off capability of the vacuum diode.

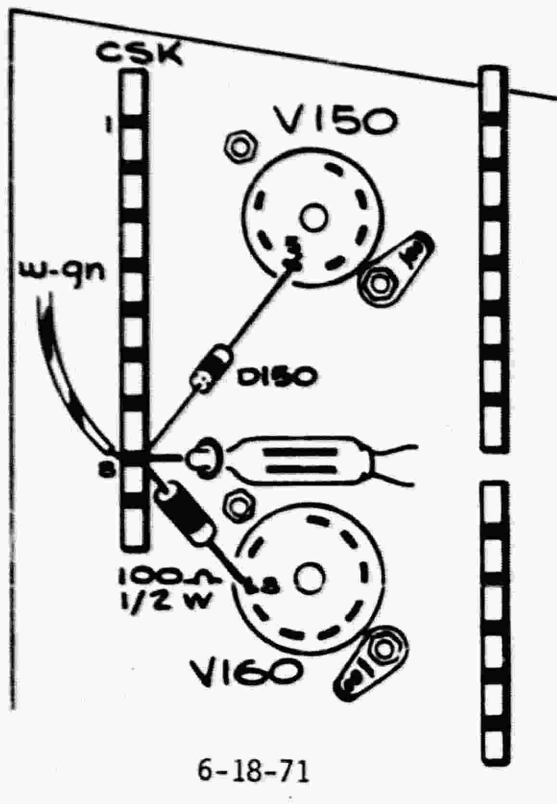
Parts Added:

D150	152-0246-00	Diode, low leakage silicon
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INSTALLATION:

Parts Required: See 'Parts Added'.

- 1) Relocate the 100Ω resistor (R170) lead and the white-green wire from pin 5 of V150 to CSK-8 (see drawing). Splice extra wire onto the white-green wire if necessary.
- 2) Add diode D150 between CSK-8 (banded end) and pin 5 of V150.



IMPROVES PERFORMANCE ABOVE 60Hz

Effective Prod SN 14454

Changes in the power supply improve the performance at line frequencies above 60Hz. The ceramic strips around the LV transformer are changed from 3/4 in. to 7/16 in., C661 is deleted, 6.3V supply at terminals 25-26 is interchanged with that at 27-28 to provide a 'cleaner' supply to critical tubes. The power switch leads are replaced with shielded leads.

Parts Removed:

C661	283-0022-00	Capacitor, 0.02 μ F 1440V
	124-0090-00	Strip, cer, 9-notch
	124-0091-00	Strip, cer, 11-notch

Parts Added:

	124-0095-00	Strip, cer, 9-notch
	124-0106-00	Strip, cer, 11-notch
	175-0152-00	Cable, shielded pair

CAPACITOR ASSEMBLIES REPLACED

Effective Prod SN Not Available

All electrolytic capacitor assemblies were replaced with their equivalent raw capacitor, metal or fiber flange, plastic cover and DELRIN® base (when required) to eliminate unnecessary part numbers and to facilitate replacement of electrolytic capacitors by customers. For replacement of capacitor assemblies, Customer Service will supply raw capacitors with both metal and fiber flanges and plastic covers when required.

Parts Removed:

C610A-C	290-0056-00	Capacitor, 2 x 15 μ F 350V
C630	290-0048-00	Capacitor, 150 μ F 250V
C660	290-0102-00	Capacitor, 40 μ F 350V

Parts Added:

C610A-C	290-0006-00	Capacitor, 2 x 15 μ F 350V
C630	290-0019-00	Capacitor, 150 μ F 250V
C660	290-0088-00	Capacitor, 40 μ F 350V
	200-0256-00	Cover
	386-0252-00	Flange
	386-0255-00	Flange

DELRIN Reg. TM of the DuPont Co.

3-WIRE POWER CORD GROUND
CONNECTION IMPROVED

Effective Prod SN 22080

Usable in SN 10001-22079

Inadequate ground connection between power cord and instrument motor base. A ground spring was added to the non-current carrying ground receptacle on the female connector end of the power cord.

Parts Added:

214-0698-00 Spring, power cord ground

INSTALLATION;

Parts Required: See 'Parts Added' or part listed below.

040-0424-01 Field Modification Kit

NOTE: Field Mod Kit includes enough springs to modify 25 power cords.

Refer to mod kit instructions.



product modification

040-0424-01

M11292

General

3-WIRE POWER CORD FEMALE GROUND CONNECTION IMPROVEMENT

For 3-Wire Power Cords

Used on TEKTRONIX® Type Instruments

Modification Kit, PN 040-0424-01, improves the non-current carrying ground contact on the 3-wire power cords, used on TEKTRONIX Type instruments, by adding a spring to the female contact.

The kit includes enough springs to modify twenty-five power cords.

PARTS INCLUDED IN MODIFICATION KIT:

Quantity	Part Number	Description
25 ea	214-0698-00	Spring, power cord ground

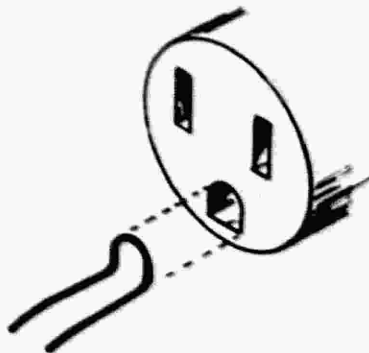
INSTRUCTIONS

- () Insert the spring (from kit) as indicated in the drawing below, and push it in by plugging the male end of the power cord into the female end.

THIS COMPLETES THE INSTALLATION.

- () Add the spring to the Mechanical Parts List of your Instruction Manual (if applicable).

DF:ls



C/20 REPLACED

Effective Prod SN 11530**
11670

The manufacturer is having difficulty supplying HV oil-filled capacitors due to high reject rate and failure rate from oil leaks. Replace 285-0513-00 oil-filled capacitor with a ceramic capacitor. To prevent disturbances in the unblanking, additional circuitry changes must also be made.

A .015 μ F 3kV PTM capacitor, 285-0513-01, is now available as a direct replacement.

This mod is partially superseded by M3793, which changes C720 and R720.

Parts Removed:

C720	285-0513-00	Capacitor, 0.015 μ F 3kV PTM
R720	302-0683-00	Resistor, 68k 1/2W 10%
R724	302-0155-00	Resistor, 1.5M 1/2W 10%

Parts Added:

C720	283-0011-00	Capacitor, 0.01 μ F 2kV cer.
R720	302-0153-00	Resistor, 15k 1/2W 10%
R724	302-0225-00	Resistor, 2.2M 1/2W 10%

**Only C720 was changed at this SN. All other changes were made at SN 11670.

HV CAPACITORS REPLACED

Effective Prod SN 12420

The manufacturer is having difficulty supplying HV oil-filled capacitors due to high reject rate and failure rate from oil leaks. Replace 285-0508-00 oil-filled capacitors with ceramic capacitors.

A .0068 μ F 3kV PTM capacitor, 285-0508-01, is now available as a direct replacement for the capacitor listed below.

Parts Removed:

C731,C732 C733,C772	285-0508-00	Capacitor, 0.0068 μ F 3kV PTM
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Parts Added:

C731,C732 C733,C772	283-0011-00	Capacitor, 0.01 μ F 2kV cer.
------------------------	-------------	----------------------------------



product modification

050-0141-01
M5079, M5219

Type 310, 315D,
360

CRT REPLACEMENT

For the following TEKTRONIX® Type Oscilloscopes:

Type 310 Serial Numbers 101-7139
315D Serial Numbers 101-2978
360 Serial Numbers 101-2576

The Type T3100 ___ CRT replaces the Type 3WP ___ CRT. Replacement of the CRT socket by a 136-0081-00 socket is required to install the new CRT. Four of the binding head screws used in the Type 315D CRT shield are replaced with flat head screws to allow clearance for the new T3100 ___ CRTs.

This kit does not include the CRT.

NOTE: If the serial number of your instrument is above those listed, or if this kit has been installed, disregard the instructions as the T3100 ___ CRT is a direct replacement.

<u>CRT Types</u>	<u>Part No.</u>
T3100-01	154-0362-00
T3100-02	154-0363-00
T3100-07	154-0364-00
T3100-11	154-0365-00
T3100-31	154-0366-00

PARTS LIST

Quantity	Part Number	Description
1 ea	136-0081-00	Socket, tube, CRT
4 ea	211-0559-00	Screw, 6-32 x 3/8 FHS, 100° Phillips

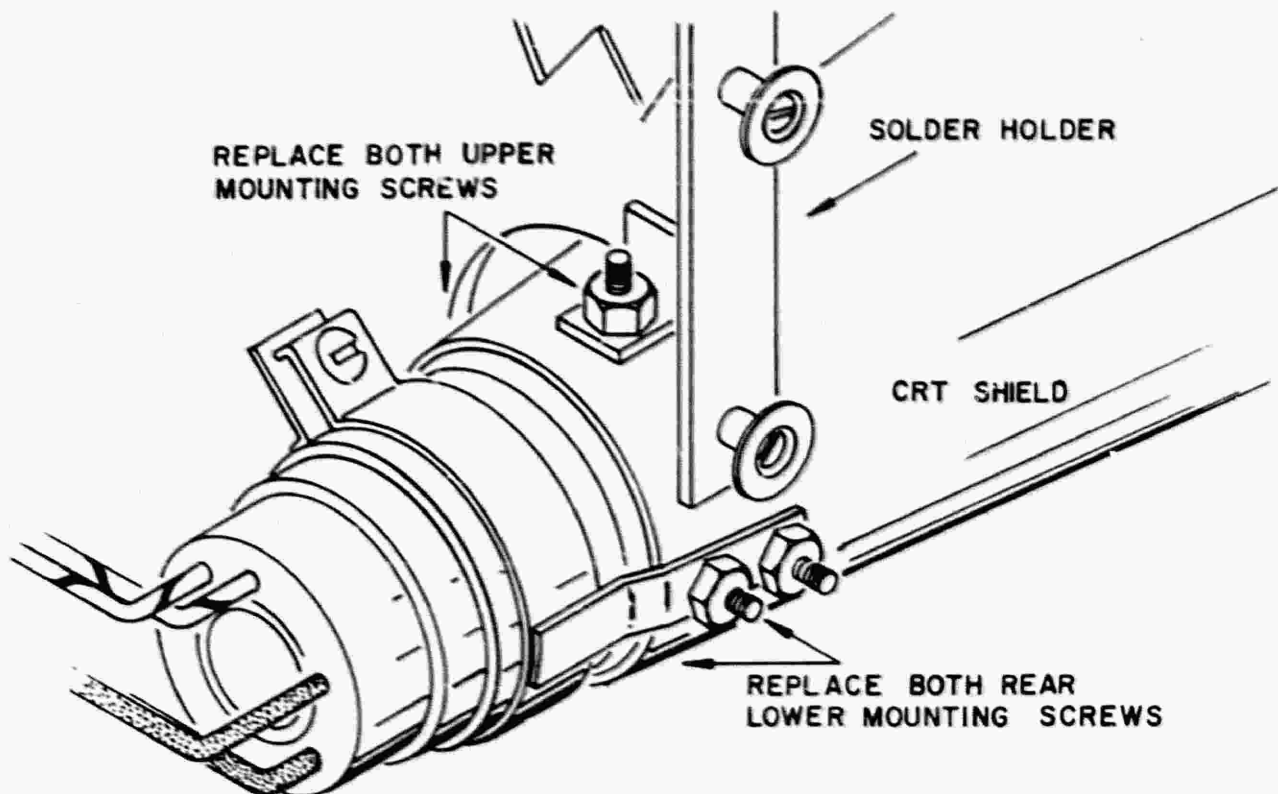
INSTRUCTIONS

A. FOR TYPE 315D INSTRUMENTS:

- () 1. Remove the cathode ray tube (CRT).
- () 2. Remove the HV shield (337-0016-00) from the top rear, left side of the instrument.
- () 3. Remove the DC Shift Comp bracket over the rear of the CRT shield.
- () NOTE: Position the bracket up and toward the opposite side of the instrument.
- () 4. Unsolder the CRT socket leads, noting their locations in respect to color-code.
- () 5. Replace the four CRT shield mounting screws, indicated in the drawing, with the four flat head screws from the kit.
- () 6. Cut the leads of the new socket to match those on the old socket.
NOTE: The new socket has a white-red lead in place of one of the two brown filament leads on the old socket.
- () 7. Install the new CRT socket in the instrument.
- () 8. Replace the DC Shift Comp bracket and HV shield previously removed.
- () 9. Install the CRT.

THIS COMPLETES THE INSTALLATION FOR TYPE 315D INSTRUMENTS.

- () Check wiring for accuracy.



INSTRUCTIONS (cont)

B. FOR TYPE 360 INSTRUMENTS:

- 1. Remove the cathode ray tube.
- 2. Remove the two HV shields.
- 3. Remove the CRT socket leads, noting their locations in respect to color-code.
- 4. Cut the leads of the new socket to match those on the old socket.

NOTE: There is a white-red lead on the new socket that replaces one of the two brown filament leads on the old socket.

- 5. Install the new CRT socket.
- 6. Replace both the HV shields previously removed.
- 7. Install the CRT.

THIS COMPLETES THE INSTALLATION FOR TYPE 360 INSTRUMENTS.

- Check wiring for accuracy.

C. FOR TYPE 310 INSTRUMENTS:

- 1. Remove the cathode ray tube.
- 2. Remove the CRT socket leads, noting their locations in respect to color-code.
- 3. Cut the leads of the new socket to match those on the old socket.

NOTE: There is a white-red lead on the new socket that replaces one of the two brown filament leads on the old socket.

- 4. Install the new CRT socket.
- 5. Install the new CRT.

THIS COMPLETES THE INSTALLATION FOR TYPE 310 INSTRUMENTS.

- Check wiring for accuracy.

JT:ljs

CRT FILTER CHANGED

Effective Prod SN 21120

Shape and color of CRT light filters standardized. This was accomplished by replacing .060" thick green, blue, and amber filters for 5" rectangular and round external graticule instruments and .030" thick smoke-gray filter for 5" rectangular internal graticule instruments with new .030" thick green, blue, amber, and smoke-gray filters with configuration acceptable for both internal and external graticule use. Also replaces .060" thick green, blue, and amber filters for 3" CRT instruments with new .030" thick green, blue, amber, and smoke-gray filters with same configurations. Change the configuration of internal graticule clear scratch plates (5" round and 5" rectangular) to conform to new filter configurations, thereby allowing use of common tooling.

Smoke-gray will replace green as standard filter shipped with external graticule instruments. Amber, green, and blue filters in all configurations will be set up as optional filters supplied on customer demand and with special phosphors.

The recommended optional filters for various phosphors is as follows:

Smoke-gray filter	P1	P2	P20	P28	P31	P7	
Blue filter	P5	P11	P14	P17	P32		
Amber filter	P12	P13	P19	P25	P26	P27	P7
No filter necessary	P15	P16	P24				

P7 phosphor requires both a smoke-gray and an amber filter.

Parts Removed:

378-0509-00 Filter, green

Optional filters:

378-0510-00 Blue
 378-0511-00 Amber
 378-0512-00 Yellow

Continued.

Parts Added:

378-0550-00 Filter, smoke-gray

Optional filters:

378-0551-00	Green
378-0552-00	Blue
378-0553-00	Amber

6-18-71

2 of 2
108.04

UNBLANKING IMPROVED

Effective Prod SN 21880

Poor unblanking on 1ms-500 μ s sweep speeds. Free run rate or frequency is changed on AUTO INT position with no signal in, AUTO tried to run at sweep rate. Absolute value of C720 is only approximately 0.002 μ F to 0.003 μ F at 2kV. This allows one or two time constants to overshoot, causing unblanking bright spot. Auto Multi picks up radiation from CRT grid line and lead to INT potentiometer through internal trigger pickoff lead. C720 was changed from 283-0030-00 to 283-0042-00, plus the addition of a 10k 1/4W 5% and 1M 1/2W 10% resistors. See schematic for changes and additions.

Layout changes are necessary to keep voltage differences on adjacent ceramic strip terminals to less than 2kV. Shield has to be trimmed slightly.

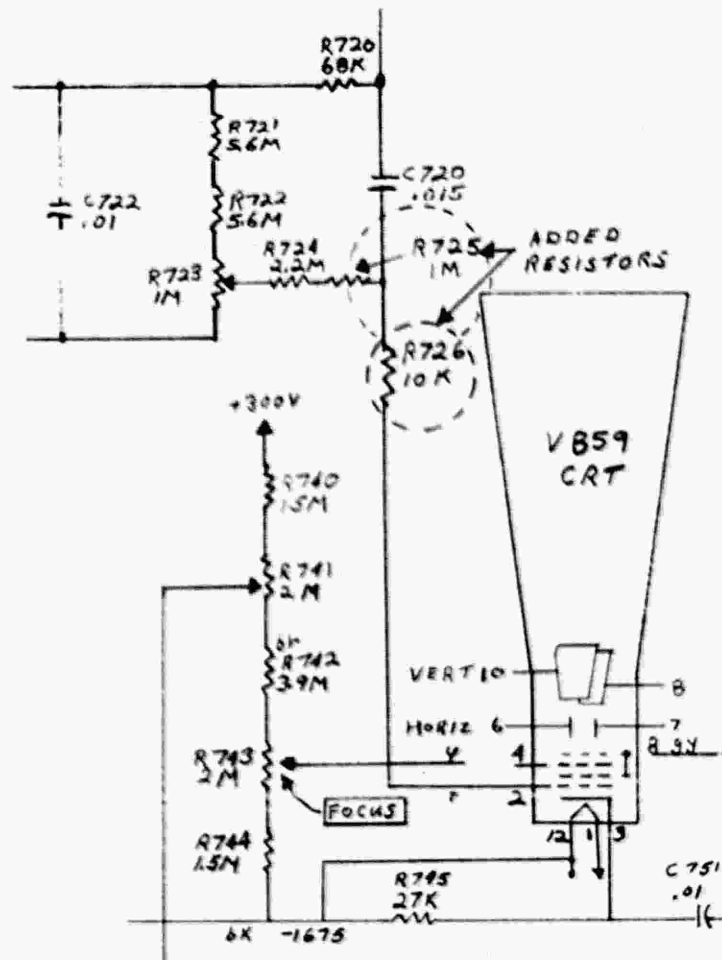
Parts Removed:

C720	283-0030-00	Capacitor, 0.015 μ F 2.5kV
	179-0291-00	Cable, VA #1
	337-0267-00	Shield, sweep generator

Parts Added:

C720	283-0042-00	Capacitor, 0.015 μ F 3kV
R725	302-0105-00	Resistor, 1M 1/2W 10%
R726	315-0103-00	Resistor, 10k 1/4W 5%
	179-0291-01	Cable, VA #1
	337-0267-01	Shield, sweep generator

Continued.



CRT CIRCUIT
(partial)

CERAMIC STRIPS CHANGED

Effective Prod SN 10451

Ceramic strips changed to clip-mounted type to facilitate production and to simplify replacement.

Parts Removed:

124-0060-00	Strip, cer, 5-notch
124-0051-00	Strip, cer, 7-notch
124-0052-00	Strip, cer, 9-notch
210-0405-00	Nut, 2-56 x 3/16
210-0850-00	Washer, #2 flat
210-0002-00	Lockwasher, #2 ext.

Parts Added:

124-0093-00	Strip, cer, 5-notch
124-0094-00	Strip, cer, 7-notch
124-0095-00	Strip, cer, 9-notch
361-0008-00	Sapcer, nylon molded

CABINET FINISH IMPROVED

Effective Prod SN 12579

To obtain a tougher and easier to clean finish, change the material used for cabinet sides, bottoms, overlays, etc., to textured aluminum (Reynold's pebble grain, 5005, H154). Change the paint from blue wrinkle to blue vinyl of approximately the same color. Paint filter housings, top rails, bottom rails, and dot fasteners with blue vinyl also.

Parts Removed:

381-0113-00	Bar, alum, ext. top	
386-0874-00	Cabinet side	(2)
386-0879-00	Overlay, Power half	
386-0880-00	Overlay, VA half	
386-0952-00	Cabinet bottom, Power half	
386-0953-00	Cabinet bottom, VA half	
386-0954-00	Door, bottom	

Parts Added:

381-0166-00	Bar, alum, ext. top	
387-0045-00	Cabinet side	(2)
387-0046-00	Cabinet bottom, Power half	
387-0047-00	Cabinet bottom, VA half	
387-0048-00	Door, bottom	
387-0049-00	Overlay, Power half	
387-0050-00	Overlay, VA half	

MOTOR BASE ASSEMBLY CHANGED

Effective Prod SN 13417

The 3-wire motor base assembly, consisting of the surface-mounted type connector and the recessing spacer, is replaced by the shell-recessed type connector. This provides more clearance between the connector and LV transformer, improves appearance, and reduces cost.

Parts Removed:

131-0102-00	Connector
361-0012-00	Spacer
386-0881-00	Plate, subpanel
387-0049-00	Plate, overlay

Parts Added:

131-0150-00	Connector
387-0321-00	Plate, overlay
387-0324-00	Plate, subpanel

UHF CONNECTORS REPLACED
WITH BNC CONNECTORS

Effective Prod SN 19120

The UHF connectors are replaced with BNC connectors, to match the military and manufacturing trend toward the BNC type. The BNC type has a constant 50 Ω impedance and a lower input capacitance. It also requires less front panel space.

Parts Removed:

013-0004-00	Post, binding UHF
103-0015-00	Adapter, probe, BNC to UHF
131-0081-00	Connector, UHF female

Parts Added:

103-0033-00	Adapter, BNC to binding post
131-0126-00	Connector, BNC female

NEONS REPLACED TO STABILIZE
FIRING POTENTIAL

Effective Prod SN 19850

Usable in SN 10001-19849

NE-2 neons may not fire after they have been subjected to prolonged darkness, because of increased firing potential. They are replaced with NE-23 neons, which contain a small deposit of radioactive material to aid in the ionization process.

Parts Removed:

B165, B166	150-0002-00	NE-2
B177, B400		

Parts Added:

B165, B166	150-0027-00	NE-23
B177, B400		

INSTALLATION:

Parts Required: See 'Parts Added'.

Replace the following NE-2 neons with NE-23 neons:

- 1) B165 and B166, located above V160.
- 2) B177, located in the TIME/DIV UNCALIBRATED neon holder.
- 3) B400, located in the VOLTS/DIV UNCALIBRATED neon holder.

ACCESSORIES CHANGED

Effective Prod SN Not Available

To permit patching from BNC to BNC connectors, or from BNC to UHF (or banana jack) connectors without the use of adapters, the present patch cords and/or adapters are changed/added as indicated below.

Also, these patch cords are set up as optional accessories:

6 in, red BNC to BNC	012-0085-00
6 in. red BNC to banana plug	012-0089-00
6 in. black BNC to BNC	012-0084-00
6 in. black BNC to banana plug	012-0088-00

See M6860.

Parts Removed:

012-0031-00	Patch cord, 18 in. in dbl banana plug
103-0033-00	Adapter, BNC to binding post

Parts Added:

012-0087-00	Patch cord, 18 in. BNC to BNC
012-0091-00	Patch cord, 18 in. BNC to banana plug
012-0092-00	Adapter, red, BNC to post

KNOB COLOR CHANGED

Effective Prod SN 20760

To standardize indicator and plug-in knob colors, all knobs, switch buttons, binding posts, etc., on older instruments are changed to the charcoal colored ones used on the new instruments.

Parts Removed:

129-0036-00	Binding post	(6)
358-0036-00	Binding post bushing	(5)
366-0028-00	Knob assembly	
366-0029-00	Knob assembly	(3)
366-0030-00	Knob assembly	
366-0033-00	Knob assembly	(8)

Parts Added:

129-0063-00	Binding post	(6)
358-0169-00	Binding post bushing	(5)
366-0142-00	Knob assembly	(3)
366-0145-00	Knob assembly	
366-0146-00	Knob assembly	
366-0148-00	Knob assembly	(8)

NEON LAMPS AND HOLDERS REPLACED

Effective Prod SN 21332

The indicating neon holders were replaced with a type which increased wide-angle visibility and is neater in appearance. The new holders, being slightly shorter, require a type NE-2V neon bulb and a shorter mounting screw.

Parts Removed:

B117,B400	150-0027-00	Bulb, neon, NE-23
	211-0031-00	Screw, 4-40 x 1 FHS
	352-0006-00	Holder, neon, double

Parts Added:

B117,B400	150-0030-00	Bulb, neon, NE-2V
	211-0109-00	Screw, 4-40 x 7/8 FHS
	352-0064-00	Holder, neon, double
	378-0541-00	Filter, lens, neon indicator

CERAMIC STRIPS REPLACED

Effective Prod SN 24230

All 3/4 inch ceramic strips were replaced with 7/16 inch ceramic strips. To maintain approximately the same height between the chassis and the top of the ceramic strips the spacers were changed.

3/4 inch ceramic strip	Replacement - 7/16 inch ceramic strip
124-0100-00 1 notch	124-0118-00
124-0086-00 2 notches	124-0119-00
124-0087-00 3 notches	124-0092-00
124-0088-00 4 notches	124-0120-00
124-0089-00 7 notches	124-0094-00
124-0090-00 9 notches	124-0095-00
124-0091-00 11 notches	124-0106-00

Spacer for 3/4 inch ceramic strip	Replacement
361-0007-00 .093" high	361-0039-00 .406" high
361-0008-00 .156" high	361-0039-00 .406" high
361-0009-00 .281" high	361-0392-00 .593" high



product modification

M18313
Type 310A

CARBON FILM RESISTORS REPLACED

Effective Prod SN 24230

All 1/2W and 1W carbon film resistors were replaced with more reliable 1/2W and 1W metal film resistors.

Parts Removed:

R310	309-0003-00	Resistor, prec.	500K
R311	309-0014-00 or 309-0148-00	Resistor, prec.	1M
R669	309-0014-00	Resistor, prec.	1M

Parts Added:

R310	323-0740-00	Resistor, prec.	500K
R311	323-0481-00	Resistor, prec.	1M
R669	323-0481-00	Resistor, prec.	1M



product modification

040-0195-00

Type 310

SELENIUM RECTIFIERS REPLACED WITH SILICON DIODE^c

For TEKTRONIX[®] Type 310 Oscilloscopes
Serial Numbers 101-10000

Modification Kit, PN 040-0195-00 provides parts and instructions to replace selenium rectifiers, PN 106-0020-00 or PN 106-0032-00 (SR601 and SR660), and selenium rectifier PN 106-0033-00 (SR630) with silicon rectifiers, offering more reliability and longer life.

The installation involves adding three resistors (R601, R630 and R660), to compensate for the lower voltage drop across the silicon diodes. The resistors, and diodes are mounted on a bracket.

Indicates change since last publication.

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Supersedes: 8-28-68

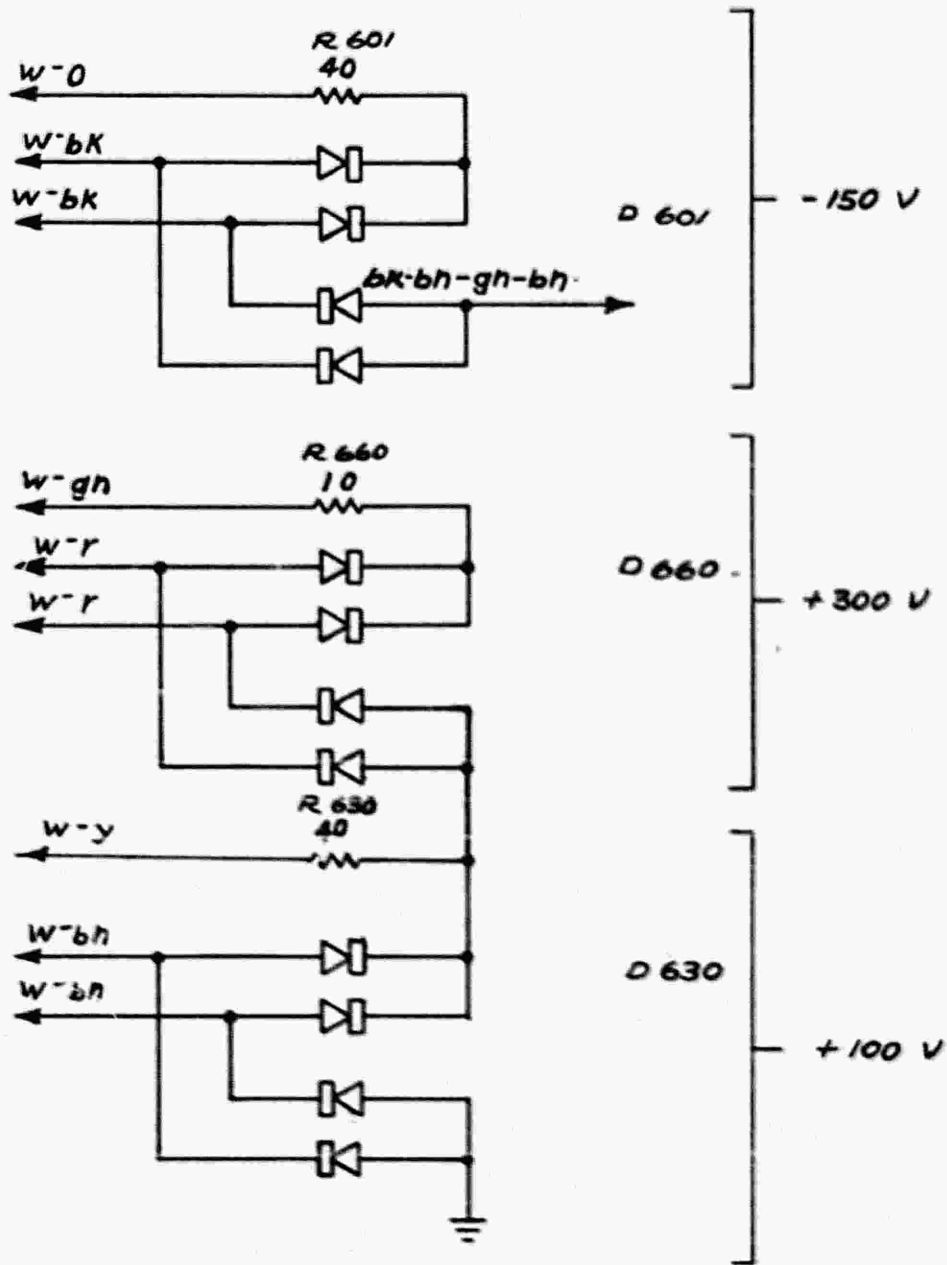
Page 1 of 6
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PARTS INCLUDED IN MODIFICATION KIT:

Quantity	Part Number	Description	
(1 ea)		Assembly, silicon rectifier, consisting of:	
6 ea	124-0088-00	Strip, cer, 3/4 x 4-notch, clip-mounted	
12 ea	152-0066-00	Diode, silicon, 500-750mA 400PIV	
1 ea	210-0202-00	Lug, solder, SE-6 w/2 wire holes	
1 ea	210-0407-00	Nut, hex, 6-32 x 1/4	
3 ea	210-0478-00	Nut, hex, 6-32 x 5/16	
3 ea	210-0601-00	Eyelet	
1 ea	211-0504-00	Screw, 6-32 x 1/4 PHS, Phillips	
3 ea	211-0507-00	Screw, 6-32 x 5/16 PHS, Phillips	
3 ea	211-0553-00	Screw, 6-32 x 1-1/2 RHS, Phillips	
2 ea	308-0012-00	Resistor, WW, 40Ω 10W 5%	
1 ea	308-0175-00	Resistor, WW, 10Ω 10W 5%	
12 ea	361-0009-00	Spacer, nylon molded, 0.313	
1 ea	386-0835-00	Plate, rectifier	
1 ea	214-0210-00	Spool, w/3 ft. silver-bearing solder	
1 ea	(1-910D)	Tag, MODIFIED INSTRUMENT, gummed back	
1 ea		Wire, #22 solid, 175-0522-00, wht-yel	5-1/2"
1 ea		Wire, #22 solid, 175-0522-00, wht-orn	4"
1 ea		Wire, #22 solid, 175-0522-00, wht-grn	6"

INSTRUCTIONS

BRACKET WIRING



DIODES DRAWING AS LOCATED ON BRACKET

FIG. 1

INSTRUCTIONS (continued)

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

STEPS 1 THROUGH 10 ARE FOR INSTRUMENTS BELOW SN 1383:

- () 1. Remove the four rectifier bracket screws.
- () 2. Position the rectifier bracket back and unsolder all lead connections to the selenium rectifiers and the thermal cut-out disc.

NOTE: Temporarily remove V520, V602, V613, V631 and V661 to facilitate selenium bracket removal.

- () 3. Remove the rectifier bracket assembly.
- () 4. Drill a 3/16 inch hole, 11/16 inch below the R668 mounting nut.
- () 5. Remove R608 from the rectifier bracket assembly and mount it, using the hole just drilled. Align the terminals in the same direction as R668 and leave the ground lug connected to the bottom terminal.
- () 6. Locate the white-orange wire soldered to the positive terminal of C601 and dressed through the grommet to the old rectifier bracket.
() Remove this wire and replace it with the white-orange wire from the kit.
- () 7. Locate the white-green wire soldered to the positive terminal of C660 and dressed through the grommet near the corner of the power transformer.
() Remove this wire and replace it with the white-green wire from the kit.
- () 8. Locate the white-yellow wire soldered to the negative terminal of C660 and dressed through the grommet near the corner of the power transformer.
() Remove this wire and replace it with the white-yellow wire from the kit.
- () 9. Remove the thermal cut-out from the old bracket and mount it on the new bracket.

NOTE: If the mounting holes on the inside of the chassis do not line up with the holes in the bracket, it will be necessary to drill new 5-32 inch mounting holes. Use the bracket as a template to locate the new holes.

- () 10. Mount the new rectifier bracket in the instrument.

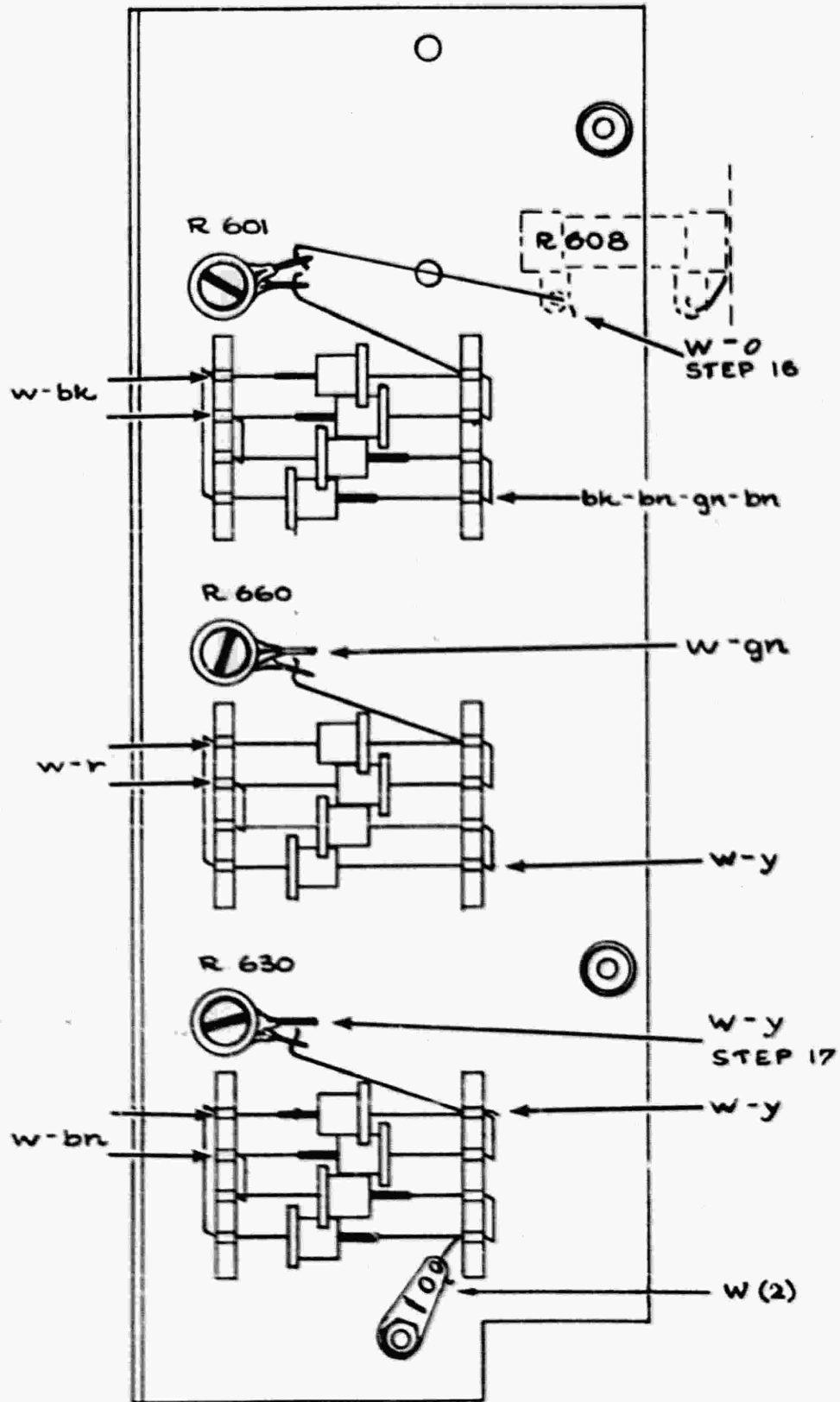


FIG. 2

INSTRUCTIONS (continued)

STEPS 11 THROUGH 14 ARE FOR INSTRUMENTS ABOVE SN 1382 (with exceptions)

NOTE: These instruments have the selenium rectifiers mounted directly on the Power chassis.

- () 11. Remove the two thermal cut-out mounting screws, the four rectifier bracket mounting screws, and the selenium rectifier mounting nuts located on the inside of the chassis.
- () 12. Unsolder the leads to the selenium rectifiers and remove the rectifiers from the chassis.
- () 13. Remove the old rectifier bracket and mount the new silicon rectifier bracket (from kit) in its place.
- () 14. Mount the thermal cut-out on the new bracket.

FOR ALL INSTRUMENTS.

- () 15. Solder two yellow-brown-brown-brown wires to the thermal cut-out.
- () 16. Solder the white-orange wire from C601, and the strap from R601, to R608 (see Fig. 2, step 16).
- () 17. Solder the white-yellow wire from C660 to the top terminal of R630 (see Fig. 2, step 17).
- () 18. Solder the remaining wires to the points indicated in Fig. 2.
- () 19. Reinstall V520, V602, V613, V631 and V661 (if removed in step 3).

THIS COMPLETES THE INSTALLATION.

- () Check wiring for accuracy.
- () Turn the instrument on and check for proper voltages and regulation of the power supply as outlined in your Instruction Manual. (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.

JT:ls

INSTRUCTION MANUAL

MODIFICATION INSERT

SELENIUM RECTIFIERS REPLACED WITH SILICON DIODES

Type 310 -- SN 101-10000

Installed in Type 310 SN _____ Date _____

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

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GENERAL INFORMATION

Modification Kit, PN 040-0195-00, provided parts and instructions to replace selenium rectifiers, PN 106-0020-00 or PN 106-0032-00 (SR601 and SR660), and selenium rectifier PN 106-0033-00 (SR630) with silicon rectifiers, offering more reliability and longer life.

ELECTRICAL PARTS LIST:

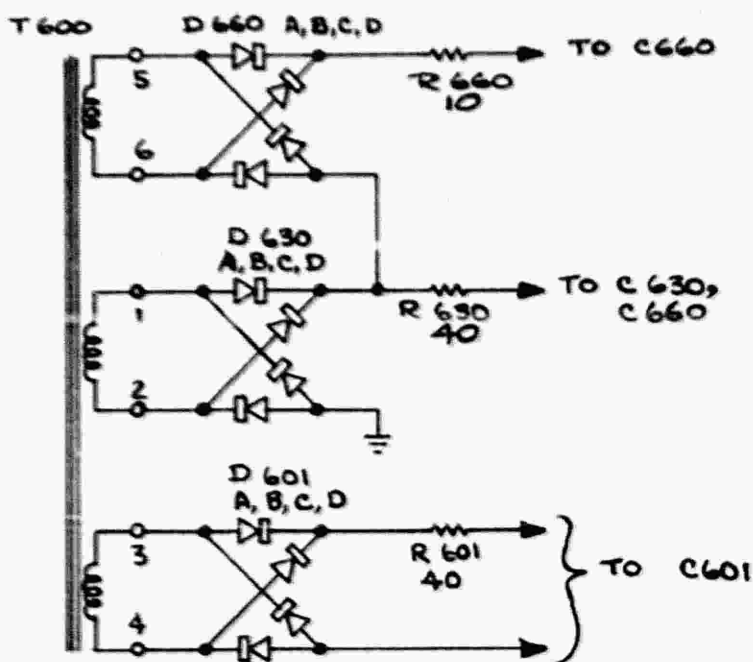
Values fixed unless marked Variable.

Ckt.No.	Part Number	Description
DIODES		
D601A,B,C,D	152-0066-00	500-750mA 400PIV Silicon
D630A,B,C,D	152-0066-00	500-750mA 400PIV Silicon
D660A,B,C,D	152-0066-00	500-750mA 400PIV Silicon
RESISTORS		
R601	308-0012-00	40Ω 10W WW 5%
R630	308-0012-00	40Ω 10W WW 5%
R660	308-0175-00	10Ω 10W WW 5%

MECHANICAL PARTS LIST

210-0601-00	Eyelet
210-0202-00	Lug, solder, SE-6 w/2 wire holes
210-0407-00	Nut, hex, 6-32 x 1/4
210-0478-00	Nut, hex, 6-32 x 5/16
386-0835-00	Plate, rectifier
211-0504-00	Screw, 6-32 x 1/4 PHS, Phillips
211-0507-00	Screw, 6-32 x 5/16 PHS, Phillips
211-0553-00	Screw, 6-32 x 1-1/2 RHS, Phillips
361-0009-00	Spacer, nylon molded, 0.313
124-0088-00	Strip, cer, 3/4 x 4-notch, clip-mounted

SCHEMATICS



LOW VOLTAGE POWER SUPPLY
(Partial Daigram)

MOD SUMMARY INDEX

PRODUCT FILE 310A DATE AUG 77 PAGE 1

SECTION TITLE	LOC	REFERENCE PAGES
MOD SUMMARY INDEX		
SWEEP TRIGGER	B1	101.01 D1
SWEEP GENERATOR	B3	102.01 D2 102.02 D4
TIMING SWITCH	B5	
HORIZONTAL AMPLIFIER	B7	
VERTICAL PREAMPLIFIER	B9	
VERTICAL AMPLIFIER	B11	
LOW VOLTAGE POWER SUPPLY	B13	107.01 E1 107.02 E2 107.03 E3 107.04 E4
CRT CIRCUIT	C3	108.01 F1 108.02 F2 108.03 F3 108.04 F6 108.05 F8
CALIBRATOR	C5	
MISCELLANEOUS	C7	110.01 G1 110.08 G8 110.02 G2 110.09 G9 110.03 G3 110.10 G10 110.04 G4 110.05 G5 110.06 G6 110.07 G7
MOD KITS & PARTS REPLACEMENT KITS	C13	111.01 H1