561

PE\PEM

TEKTRONIX

INSTRUMENT REFERENCE BOOK

for the Tektronix types

561

RM561

oscilloscopes

For all serial numbers

MPI EXTRACT

MPI May 1964

561 and RM561 (also see 561 IRB)		
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*3B1-3B3 Compatibility	Service Scope	12-63
*561A will replace 561; sales guidance, specs	SPR-128A	7-2-62
*Adapter-bezel for C-12, C-13, C-19	FEN	1-11-63
*Adapter-bezel for mounting C-12, C-13, C-19; RM561	FEN	7-27-62
*Beam rotator coil location affects orthogonality	FEN	1-26-62
Brightness-intensifying narrow pulses, with 51 and 67	FEN	7-13-62
*Calibration procedure 561		061-210
*Calibrator noise on lower ranges	FEN	6-29-62
*Camera-scope compatibility	FEN	5-11-62
*Cameras, Tek, mounting problems	FEN	6-30-61
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* Instruction Manual error, resistance of T801 primary incorrect	FEN	12-14-62
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* Slaving 560 Series scopes	FEN	9-15-61
Test specifications		
561		061-210

*Included within IRB.

SALES

Inter-City Mfg. Co., Inc.
St. Louis 11, Mo.

CONTENTS-SALES

CATALOG

TABLE 4-1
AMPLIFIER PLUG-IN UNITS FOR TYPE 561/565/567 OSCILLOSCOPES

General Description	Type	3-db Frequency Response	Input	Calibrated Deflection Factors
Basic, AC-Coupled	50	15 cps to 200 kc	1 meg Ω	1 mv/div
Basic, DC-Coupled	59	Dc to 400 kc	250 k	Approximately 1 v/div
General Purpose	60	Dc to 1 mc	1 meg Ω, 47 pf	50 mv/div to 50 v/div in 4 calibrated steps
Low-Level AC Differential	61*			50 μv/div
High-Gain DC Differential	63	Dc to 300 kc each channel	1 meg Ω, 47 pf each channel	1 mv/div to 20 v/div in 14 calibrated steps. Differential rejection ratio up to 2000:1
Dual-Trace DC-Coupled	72	Dc to 650 kc each channel	1 meg Ω, 47 pf each channel	10 mv/div to 20 v/div in 11 calibrated steps
Wide-Band DC-Coupled	75	Dc to 4 mc	1 meg Ω, 47 pf	50 mv/div to 20 v/div in 9 calibrated steps
Four Channel	74*			20 mv/div
Sampling	76*			

* In development stage at time of printing.

TABLE 4-2
TIME-BASE PLUG-IN UNITS
FOR TYPE 561/565/567 OSCILLOSCOPES

General Description	Type	Calibrated Sweep Range	Sweep Magnifier
Simplified Time-Base	51	5 msec/div	Variable, approximately 1X to 20X
Basic Time-Base	67	1 μsec/div to 5 sec/div in 21 calibrated steps	5X
Sampling	77*		

* In development stage at time of printing.

LOW COST TIME-BASE PLUG-IN FOR 561 SHELVED

FEN 3-31-61

We once made a low-cost time base for the 561; it was numbered the 77 (not to be confused with the present 77) and had four tubes. However, the performance was lacking in some areas and it was dropped for the present in view of something more in keeping with Tek quality. In the future we will probably have simpler plug-ins as the knowledge of other construction techniques becomes available. But for the time being, removing a few parts here and there will not reduce the price proportionately.

561A WILL REPLACE 561

SPR-128A 7-2-62

The TYPE 561A Oscilloscope will replace the TYPE 561. It was designed for better bandwidth, and to accommodate a Time-Base Plug-in having sweep delay.

Formal advertising is scheduled to appear in early August, but the instruments should be offered publicly starting July 1, 1962. At that time they will appear on the Product Availability lists, showing latest availability information. The price of the 561A will be thirty dollars more than the 561.

TYPE 561A

The TYPE 561A Indicator offers these improvements over the 561:

1. DC-coupled CRT trace-intensification circuit for compatibility with Delaying-Sweep Time Base units.
2. More sensitive vertical deflection plates for compatibility with Type 3A1 Plug-in.
3. Better LV power supply regulation for optimum performance with TYPES 3S76, 3T77 Sampling System Plug-ins.
4. Rectangular crt with internal edge-lit graticule.

Change No. 561A/564-1

INSTRUMENT PERFORMANCE CHARACTERISTIC
CHANGE NOTICE

Instrument Type: 561A, RM561A, 564 & RM564

Publication affected: Catalog No. 26 Dated March, 1967

Page: 144 & 150 Item Calibrator

Add:

After "peak to peak" (line 2) add "accurate within 3%."

Reason for change:

Calibrator accuracy of these 2 instruments was inadvertently omitted from this catalog edition.

Approved by: R. F. Fillingame
(Project Manager)

Effective date 11/7/67

MODIFIED PRODUCTS

Product	Mod	Description
561	778B	Channel marker. Pulse polarity reversal switch. PTM.
RM561	119E	Move four connectors to rear, BNC.
RM561	120L	Move pilot lite. 5 connectors on front panel paralleled to rear. Change panel mounting.
RM561	171A	Tilt lock slides (7 detents).
RM561	236A	Special panel and handles.
RM561	236C	Panel, handles, slides, knobs.
RM561/72	240A	Vertical paralleled to rear.

RACKMOUNTS

SPECIAL RM561 -- WITH RACK SLIDES

11-10-61

Due to ordering and stocking problems in-plant and out-of-plant, it does not seem desirable to make three varieties of Chassis Traks available for one particular instrument type. This opinion has been confirmed unanimously by District and Regional Managers responding to a questionnaire on the subject.

Future requests for RM561 with rack slides will be filled using the deluxe tilt-lock Chassis Trak. The additional price for this Chassis Trak mod is $45.00. The instrument should be ordered as RM561, Mod 171.

NOT ALL RACKS ACCEPT CHASSIS TRAKS

12-14-62
Revised 10-66

The question of whether the stationary part of a Chassis Trak is part of the instrument or a part of the rack leads to compatibility problems between Chassis Traks and some brands of racks. EIA (RETMA) says no part of a rackmount instrument shall project more than ±8-3/4" horizontally from the rack centerline at any point behind the front panel.

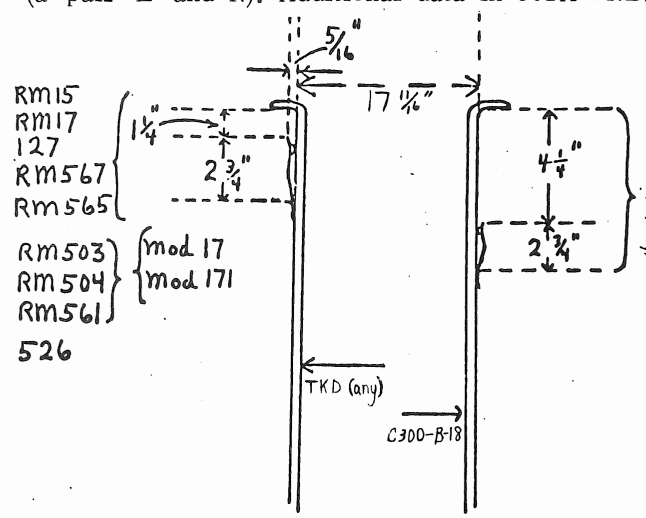
The outer surface of the stationary portion of a pair of Chassis Traks mounted directly to the rack extends ±8-27/32" (±1/16") from the rack centerline. The latch-pin--which prevents the instrument from falling in your lap when the tracks are fully extended--adds another 5/16", starting 1-1/4" behind the rear surface of the Chassis Trak mounting flange and extending about 2-3/4" back. An exception is the C-300-B Chassis Trak, used on the RM 527, where the latch-pin and spring require the extra clearance starting 4-1/4" back of the flange.

This requires that the rack not have any support structures back of the mounting surface which block the space behind the panel area where the latch-pin and spring assembly are located.

The compatibility problem is only important with RM instruments in which the Chassis Traks mount directly to the rack. In instruments having cabinets (dust covers) which mount to the rack with the Chassis Traks inside, the problem does not exist (RM30/40 Series, 525).

For the instruments affected (RM15, RM17, 127, 526, RM527, RM567, RM565 and Mod 17 or Mod 171 version of the RM503, RM504, RM561 and RM561A), an easy way to determine whether there'll be a compatibility problem is to eyeball or run a probe through the rack's mounting holes, which are on ±9-5/32" centers. If the space behind these holes is clear, there'll be no compatibility problem. The figure shows the clearances required, in case of doubt.

The stationary sections of the tilt-lock type tracks (as used in RM561 Mod 171) were modified in late 1964 -- long after the last RM561 was shipped -- to move the offending spring assembly back about 2 inches, and the old Tek numbers 351-010(L) and 351-011(R) were deleted, replaced by 351-0084-00 (a pair L and R). Additional data in 561A PRB.



Special clearances required for Chassis Traks. Chassis Traks are all symmetrical; same clearance required on each side (18-5/16" total).

CRADLE MOUNT FOR 503, 504, 560, 561, 561A, AND 564

9-27-63

Mod kit 040-321 supplies everything you need to convert the above listed instruments for rackmount in a standard 19 inch rack. A vertical front panel space of 15-3/4 inches is required.

The cradle mount can also be used with future instruments of the same front panel size and bottom feet design as those listed above.

At one time, some low-cost Chassis-Trak assemblies were suggested as special options for the RM561, and were given the general "change as specified" 2-digit mod number 17.

The non-tilt version employed the 351-040 assembly (now 351-0040-01 plus 351-0040-02). The basic-tilt (no detent) version employed the 351-051 assembly (no longer available as an assembly). Subparts of 351-051 were the instrument sections 351-0008-00 (left) and 351-0009-00 (right) and stationary/intermediate sections 351-010 and 351-011. The last two pieces are no longer available and have been replaced by 351-0084-00 (pair), which is now the minimum orderable sub-group for stationary sections.

The only mounting option achieving catalog status was Mod 171, the full tilt-lock assembly. The complete kit was and is 351-0050-00, consisting of 351-0027-00 (one set, left and right instrument sections) and the stationary/intermediate sections. These last were 351-010 and 351-011, but those pieces have now been replaced by 351-0084-00 (one set, left and right stationary/intermediate sections), and the individual left and right sections are no longer separately orderable.

RM561 RELEASE KNOBS

5-23-63

Problems with thick rack-mounting surfaces

The standard pawl-type fasteners used for the front panel RELEASE knobs on the RM561 use an angled pawl to accommodate relatively thin rack-mounting surfaces. In some cases -- particularly where mounting screws are not countersunk -- you may not be able to back off the pawl far enough to engage the rear of the mounting surface.

Use RM30/40 straight pawls

214-055 left, 214056 right

The easiest solution for this problem is to change the fastener to the type used on the RM30/40 series -- with a straight pawl. Although this fastener can't handle thin mounting surfaces, it does a good job in most other cases.

Use with RM15 cradle

A special problem exists in mounting the RM561 on Chassis traks in the RM15 cradle 426-063. The pawl fasteners on these instruments do not clear the sides of the cradle, and clearance holes must be cut or drilled in the sides of the cradle (and -- usually -- the fasteners must be changed to the straight-pawl type) for the fastener to be used. It's also necessary to drill new holes at the rear of the cradle to accommodate the 18" guides used with the RM561. The present holes are drilled only for the 20" guides used with the RM15, though a mod is in the works to add holes for 18" guides.

CRADLE MODIFIED FOR RM561A COMPATIBILITY

8-23-63

Cradle assemble 426-224 (formerly 426-063) has been modified for better compatibility with the Mod 171 versions of the RM561, RM561A and the RM564, by providing cutouts at the side for the front-panel pawl "release" fasteners on these instruments (5-23-63 FEN). This cradle--used only for mounting instruments with Chassis Traks in racks not having mounting surfaces at the rear--now is fully compatible with the following instruments:

127
RM15
526 (current production with 18" Chassis Traks)-----see next article.
RM561 MOD 171
RM561A MOD 171
RM564 MOD 171

MODIFICATION KIT

CRADLE MOUNT

040-0321-01

For the following Tektronix Oscilloscopes:

Types 503, 504, 560, 561, 561A, 564, and 647
All serial numbers

DESCRIPTION

This modification enables the above Tektronix Oscilloscopes to be rackmounted in a standard 19 in. relay rack. A vertical front panel space of 15-3/4 in. is required.

Future instruments with the same front panel dimensions may also be used with this kit, providing they have bottom feet similar to those on the above-listed instruments.

Publication:
Instructions for 040-0321-01
June 1966

Supersedes:
040-0321-00

PARTS LIST

Quantity	Part Number	Description
(1 ea)	(426-0208-00)	Assembly, cradle mount, consisting of:
2 ea	211-0025-00	Screw, 4-40 x 3/8 FHS
4 ea	212-0023-00	Screw, 8-32 x 3/8 PHS
1 ea	381-0198-00	Bar, stiffening, 1/4 x 5/8 x 16-5/8
2 ea	381-0211-00	Bar, stiffening, 1/4 x 1/2 x 8-1/8
1 ea	210-0011-00	Lockwasher, int, 1/4
2 ea	210-0056-00	Washer, split #10
3 ea	210-0410-00	Nut, hex, 10-32 x 5/16
1 ea	210-0805-00	Washer, #10
8 ea	210-0833-00	Washer, cup #10
2 ea	210-0852-00	Washer, spacer, 3/16 ID x 3/8 OD x 0.091
2 ea	210-0864-00	Washer, flat, 3/16 ID x 3/8 OD x 0.050
2 ea	210-0866-00	Washer, 0.264 ID x 1-1/8 OD x 0.1106
1 ea	210-0984-00	Washer, support, Neoprene*
1 ea	210-0985-00	Washer, flat, 0.512 ID x 7/8 OD x 0.054
6 ea	211-0025-00	Screw, 4-40 x 3/8 FHS
6 ea	211-0102-00	Screw, 4-40 x 1/2 FHS
6 ea	212-0008-00	Screw, 8-32 x 1/2 PHS
8 ea	212-0512-00	Screw, 10-32 x 1/2 OHS
3 ea	212-0557-00	Screw, 10-32 x 1/2 RHS
1 ea	213-0134-00	Screw, hex, 1/4-20 x 3/4
1 ea	214-0502-00	Pin, support
1 ea	333-0783-00	Panel, front, mask for rackmounting
2 ea	361-0065-00	Spacer, guide rail, aluminum 1/8 x 18 in.
2 ea	381-0202-00	Bar, guide rail, aluminum angle 1-1/8 x 18 in.
2 ea	387-0636-00	Plate, slide, Bakelite* 1-1/8 x 18 in.
1 ea	407-0073-00	Bracket, angle, support
1 ea	407-0287-00	Bracket, double angle

*Carboline Co. registered trademark.
*Union Carbide Corp. registered trademark.

INSTRUCTIONS

INSTRUMENTS WITH RECTANGULAR "FEET":

( ) 1a. Place 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 8-7/16 inches apart (Fig. 1b). Secure the rails to the cradle assembly with the six 4-40 x 3/8 FHS screws from the kit. DO NOT USE the two spacers provided in the kit.

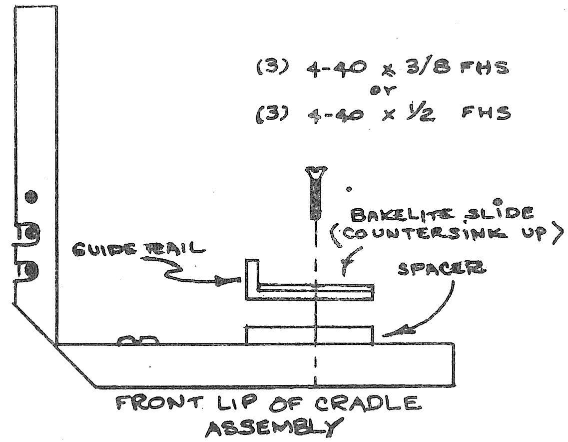


Fig. 1a

INSTRUMENTS WITH ROUND "FEET":

( ) 1b. Place the two guide rails, spacers, 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 7-1/4 inches apart (Fig. 1b). Secure the rails to the cradle assembly with the six 4-40 x 1/2 FHS sc screws from the kit.

( ) Remove the rubber balls from the four feet.

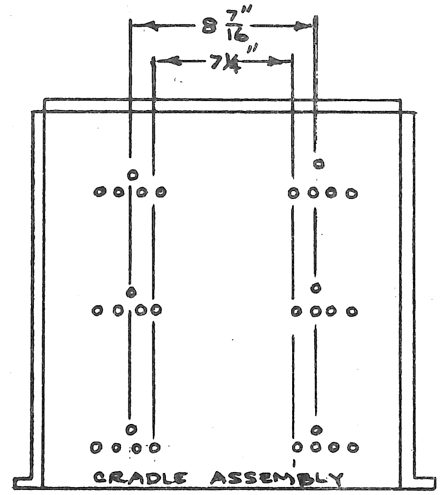


Fig. 1b

INSTRUCTIONS (cont)

( )   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 (Fig. 2). 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.

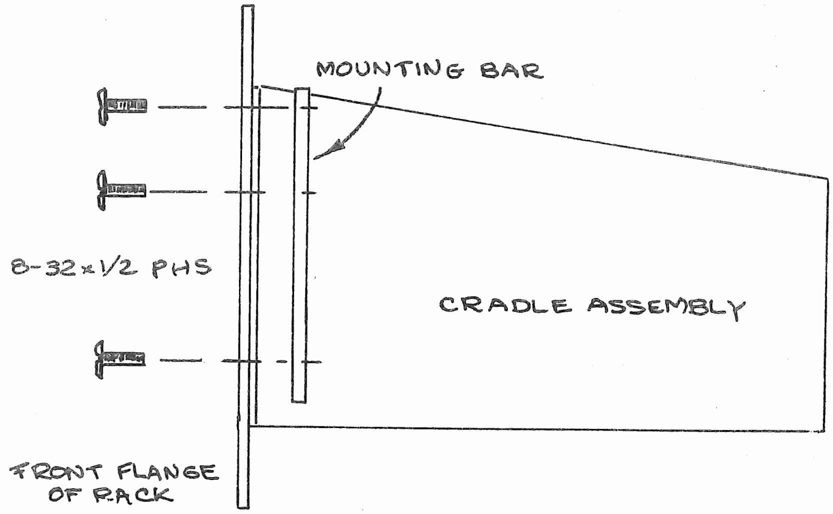


Fig. 2

TYPES 503, 504, 560, 561, 561A, and 564 ONLY:

( )   3. Mount the double angle 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 a hole in the rear panel as shown in Fig. 3. Use a #21 drill and a 10-32 tap.

CAUTION: BE CAREFUL NOT TO DRILL INTO COMPONENTS MOUNTED BEHIND THE REAR SUBPANEL.

( )   b) Mount the double angle bracket, using a 10-32 x 1/2 RHS screw from the kit.

( )   c) If the instrument will be subjected to excessive vibration, a 10-32 x 5/16 nut (from kit) should be added.

TYPE 647 ONLY:

( )   4. Remove the right-hand rear foot and mount the double angle bracket (from kit) as shown in Fig. 4.

ALL INSTRUMENTS:

( )   5. Place the instrument on the cradle guide rails and slide it into place.

( )   6. 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.

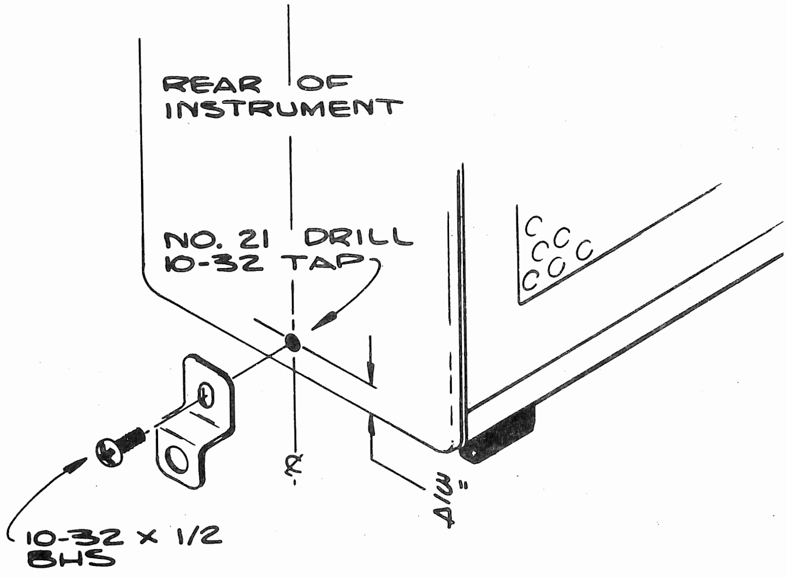

REAR OF
INSTRUMENT
NO. 21 DRILL
10-32 TAP
10-32 x 1/2
BHS

Fig. 3

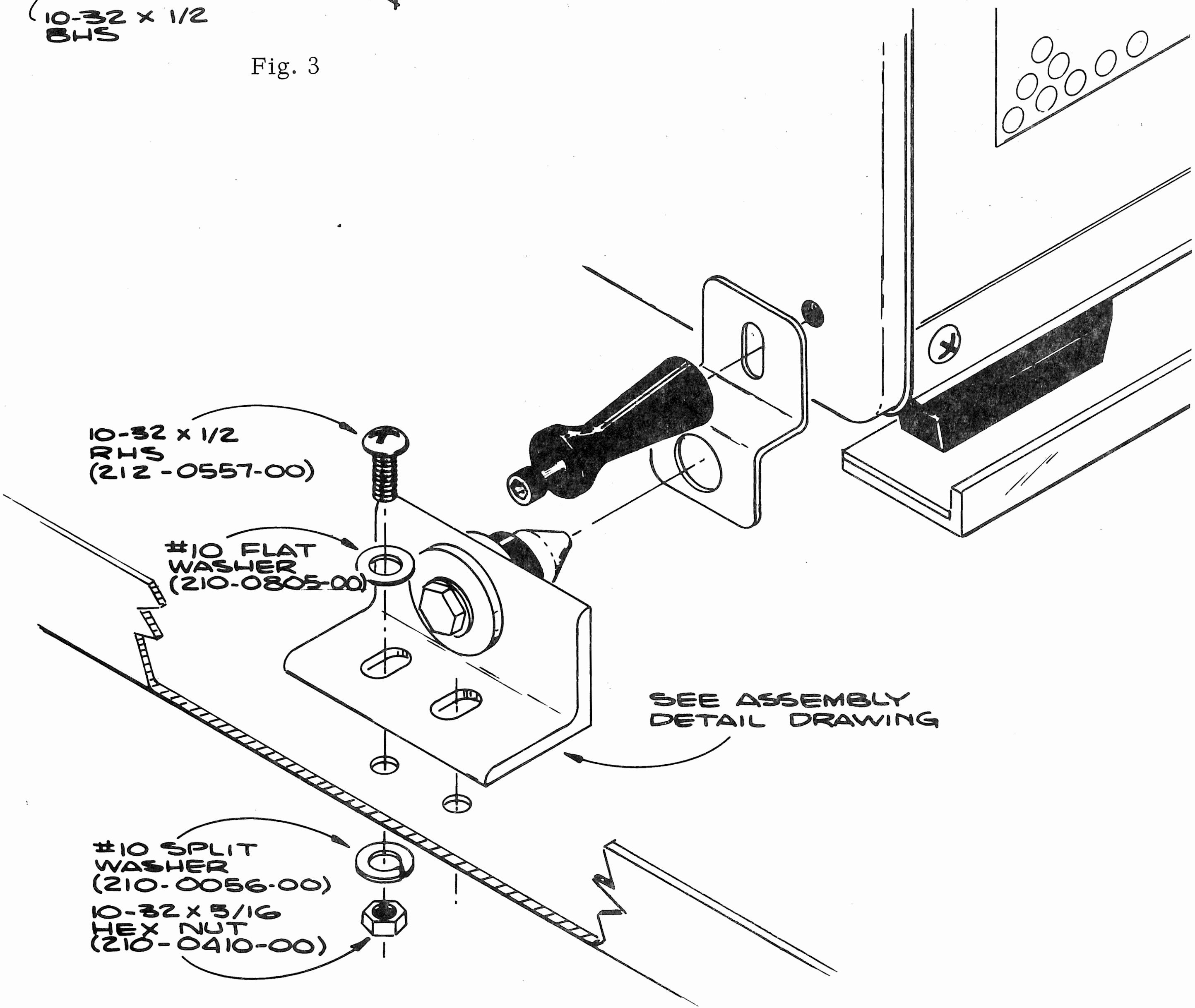

10-32 x 1/2
RHS
(212-0557-00)
#10 FLAT
WASHER
(210-0805-00)
SEE ASSEMBLY
DETAIL DRAWING
#10 SPLIT
WASHER
(210-0056-00)
10-32 x 5/16
HEX NUT
(210-0410-00)

Fig. 4

INSTRUCTIONS (cont)

( ) 7. Position the instrument so that the stainless steel ring on the instrument touches the mask all the way around the instrument (see Fig. 5).

( ) 8. Place the guide pin and angle bracket support assembly on the cradle so that it meshes with the double angle bracket on the instrument (see Fig. 6). If necessary, the double angle bracket may be adjusted up or down.

( ) Mark the exact location of the angle bracket support on the cradle.

( ) 9. Remove the mask and the instrument.

( ) 10. Place the angle bracket support in the location marked in step 8. Mark the location of the slots in the angle bracket support on the cradle and drill two #7 holes in the cradle at these points.

( ) 11. Mount the angle bracket support, using the 10-32 x 1/2 RHS screws, the #10 flat washers, the #10 split washers, and the 10-32 x 5/16 nuts from the kit (see Fig. 6).

( ) 12. Place the instrument in the cradle. Make sure the guide pin is fully seated in the hole in the double angle bracket.

( ) 13. Replace the mask, using the 10-32 x 1/2 OHS screws, #10 cup washers, and the two spacer washers from the kit (see Fig. 8).

THIS COMPLETES THE INSTALLATION.

JT:cet

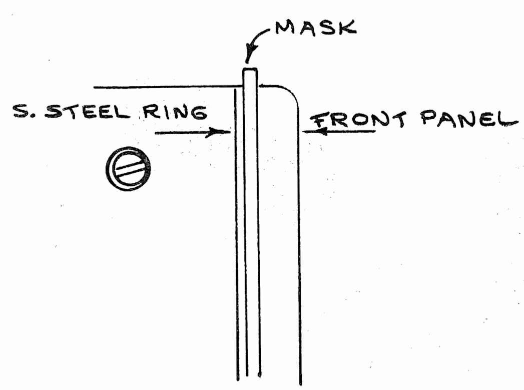


Fig. 5

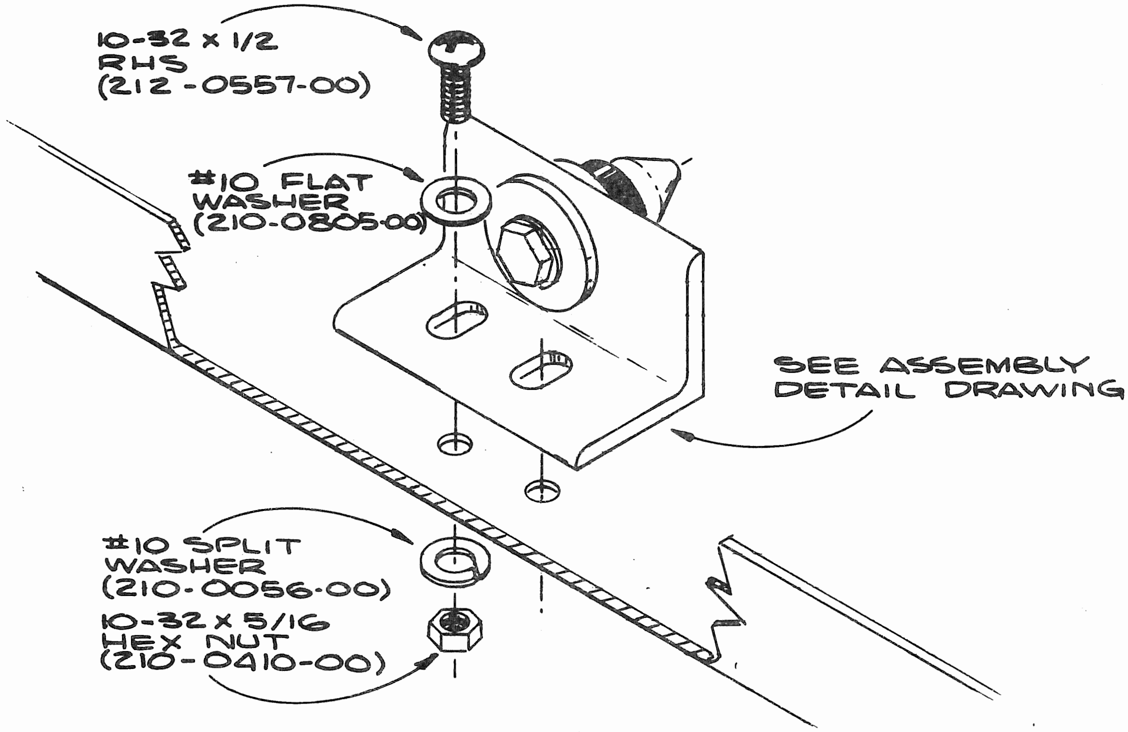


Fig. 6

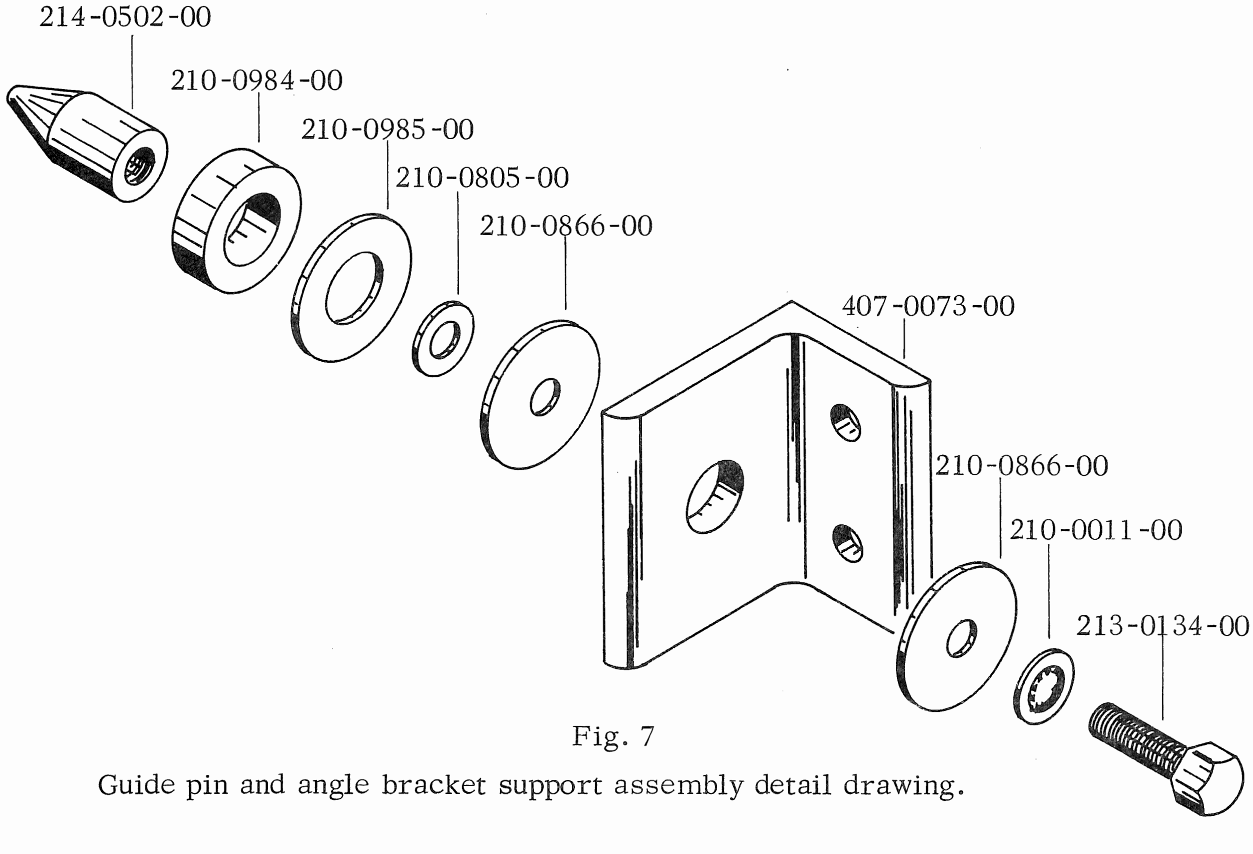
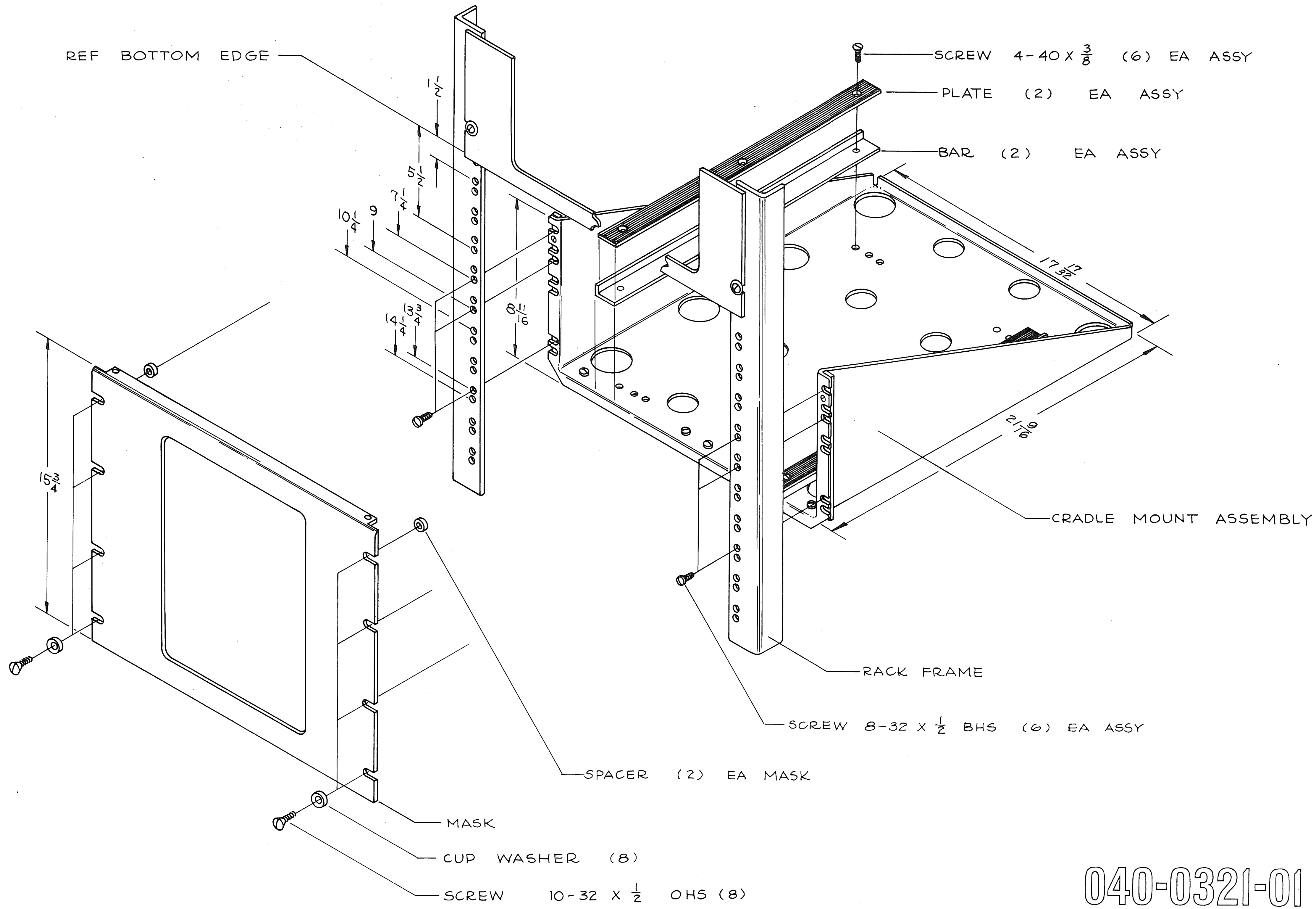


Fig. 7

Guide pin and angle bracket support assembly detail drawing.



040-0321-01

Fig. 8

MODIFICATION KIT

RELAY RACK CRADLE ASSEMBLY

040-0344-00

For the following Tektronix Oscilloscopes:

Types	127	serial numbers	309- up
	RM15	serial numbers	101- up
	526	serial numbers	101- up
	RM561	serial numbers	101- up
	RM561A	serial numbers	101-105
	RM561A	serial numbers	5001- up
	RM564	serial numbers	100- up
	RM647	serial numbers	100- up

DESCRIPTION

This modification provides a rear support cradle for mounting the above listed instruments in a backless relay rack by the use of slide-out tracks.*

The slide-out track allows the instrument to be pulled out of the rack like a drawer. When pulled out, the instrument can be locked in one of seven positions: horizontal, or 45°, 90°, or 105°, above and below the horizontal.

A detailed installation drawing is included giving all dimensions necessary to design a relay rack to support these instruments.

NOTE: This modification replaces Supporting Cradles, part number 426-0224-00.

* Slide-out track assemblies are not included in this kit. Order slide-out track assemblies for instruments not so equipped.

Publication:
Instructions for 040-0344-00
December 1966

Supersedes:
October 1964

PARTS LIST

Quantity	Part Number	Description
4 ea	210-0010-00	Lockwasher, int #10
4 ea	210-0410-00	Nut, hex, 10-32 x 5/16
6 ea	212-0509-00	Screw, 10-32 x 5/8 PHS, Phillips
4 ea	213-0090-00	Screw, 10-32 x 1/2 hex HS
1 ea	386-0817-00	Plate, alum, 0.080 x 3-3/8 in. x 18-3/4 in.
1 ea	406-0965-00	Bracket, aluminum, right side
1 ea	406-0966-00	Bracket, aluminum, left side

INSTRUCTIONS

Install the Relay Rack Cradle Assembly as shown in Fig. 2 on fold-out page.

NOTES:

a) Fig. 2 shows two sets of mounting dimensions: for 7 and 8-3/4 in. front panels.

Refer to the table (Fig. 1) below, to determine which set of mounting dimensions to use.

b) The opening between the front rails of the rack must be at least 17-13/16 inches.

( ) 1. Bolt the rear of each slide-out track to the rear of the corresponding bracket (from kit), using the hardware supplied.

( ) 2. Using Fig. 2 as a guide, mount the brackets and slide-out tracks on the front rails of the relay rack. Use the screws supplied with the kit and the slide-out tracks.

( ) 3. Fasten the bottom plate (from kit) across the rear of the brackets, using the hardware from the kit.

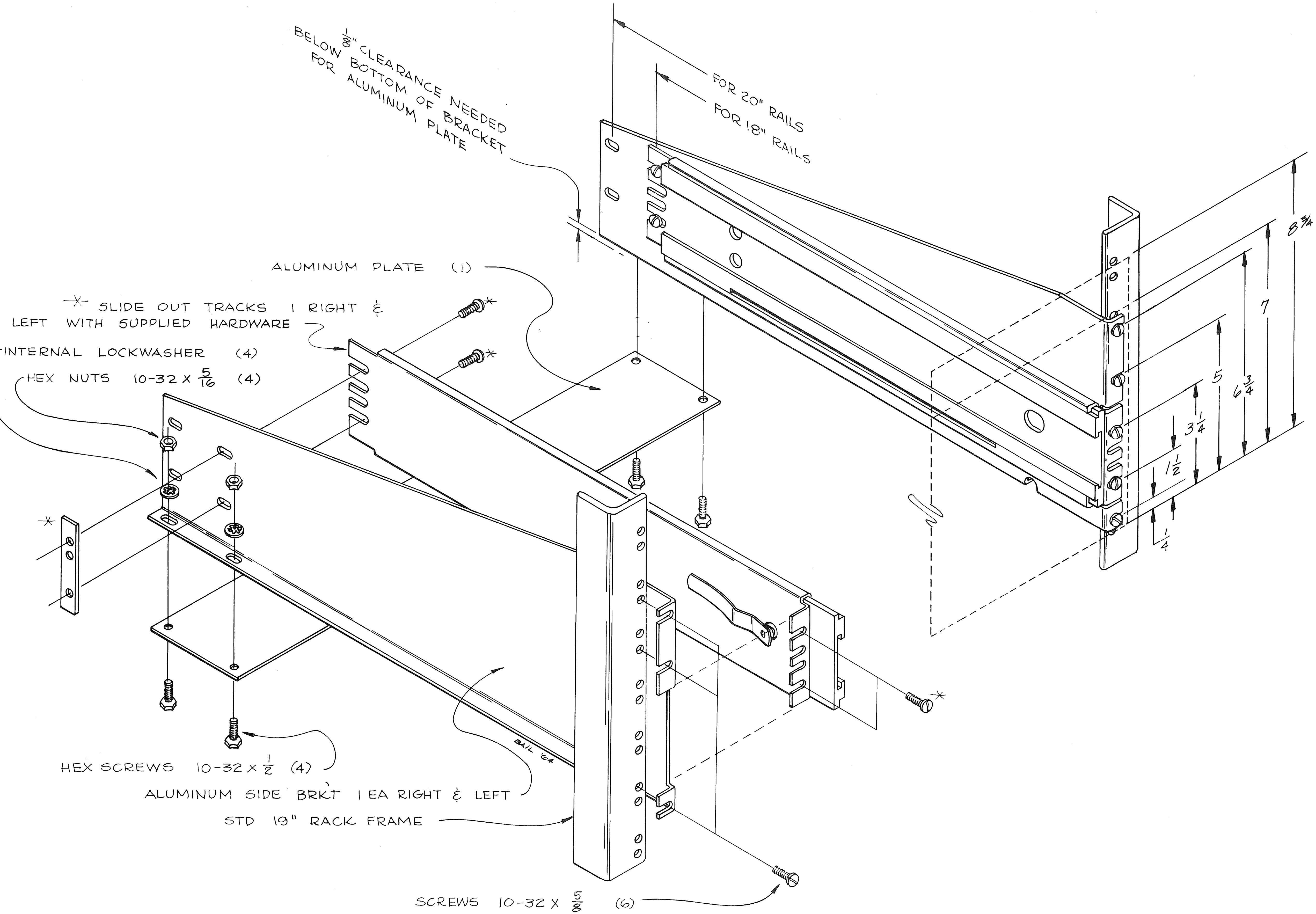
( ) 4. Place the instrument in the slide-out tracks, as shown in the instructions supplied with the tracks, and adjust as necessary.

THIS COMPLETES THE INSTALLATION.

JT:ls

	TRACK		PANEL	
	18"	20"	7"	8-3/4"
127		X		X
RM 15		X		X
526	X			X
RM561	X		X	
RM561A	X		X	
RM564	X		X	
RM647		X	X	

FIG. 1



1/8" CLEARANCE NEEDED BELOW BOTTOM OF BRACKET FOR ALUMINUM PLATE
FOR 20" RAILS
FOR 18" RAILS
ALUMINUM PLATE (1)
* SLIDE OUT TRACKS 1 RIGHT & LEFT WITH SUPPLIED HARDWARE
INTERNAL LOCKWASHER (4)
HEX NUTS 10-32 X 5/16 (4)
8 3/4
7
6 3/4
5
3 1/4
1 1/2
1/4
HEX SCREWS 10-32 X 1/2 (4)
ALUMINUM SIDE BRKT 1 EA RIGHT & LEFT
STD 19" RACK FRAME
SCREWS 10-32 X 5/8 (6)

Fig. 2

040-344

COMPATIBILITY

TEKAMERA COMPATIBILITY

FEN 6-20-61, 5-11-62

Mounting problems

camera	scope	notes
C-12, sn 101 to 210	561, sn 101 to 1369	Modify C-12 with new bezel and mounting adapter. Modify 561 with new pots and knobs. 561 uses round glass crt: use standard mounting bezel.
	561, sn 1370 up	Modify C-12 with new bezel and mounting adapter. 561 uses round glass crt: use standard mounting bezel.
	RM561, all sn	Modify C-12 with new bezel and mounting adapter. RM561 uses rectangular glass crt: use 016-217 mounting bezel, leave plastic insert in.
C-12, sn 211 up C-13, all sn C-19, all sn	561, sn 101 to 1369	Modify 561 with new pots and knobs. 561 uses round glass crt: use standard mounting bezel.
	561, sn 1370 up	561 uses round glass crt: use standard mounting bezel.
	RM561, all sn	RM561 uses rectangular glass crt: use 016-217 mounting bezel, leave plastic insert in.

NEW CAMERA ADAPTER-BEZELS FOR RECTANGULAR CRT'S

FEN 7-27-62

Engineering has decided on two adapter-bezel designs for mounting Tek C-12, C-13, and C-19 cameras on our 8 x 10 cm rectangular crt scopes. One bezel design has the same depth as the present 122-568 camera adapter-bezel used with our 5" round crt scopes, and positions the camera the same distance away from the crt faceplate. This new bezel is for use with the following scope types: RM561, 561A, RM561A, 567, RM567 and 564.

PLASTIC LIGHT SHIELD AVAILABLE FOR RECTANGULAR GLASS CRT'S

FEN 11-8-63

Light leakage from the pilot light and other sources has proved bothersome in some RM561 photography applications. A plastic light shield, similar to that used in the 5" round-CRT instruments, has been designed to block any entrance of light onto the phosphor via the crack between the CRT shield and the front panel. Designed for the RM561, the shield is equally useful in other instruments using a rectangular glass CRT--the 567, RM567, 527, RM527, and the 561A MOD 210C or 210E. This shield is not needed with the ceramic CRT since light is shielded by the ceramic envelope and rubber boot.

Tek number of the new light shield is 337-586; it may be ordered from Customer Service.

Compatible with 2 and 3-series plug-ins with some limitations

plug-in	scope	notes
2A50, all sn	561, all sn RM561, all sn	Fully compatible.
2A59, all sn	561, all sn RM561, all sn	Fully compatible.
2A60, all sn	561, all sn RM561, all sn	Fully compatible.
2A61, all sn	561, all sn RM561, all sn	Fully compatible.
2A63, all sn	561, all sn RM561, all sn	Fully compatible.
2A51, all sn	561, all sn RM561, all sn	Fully compatible.
2B67, all sn	561, all sn RM561, all sn	Fully compatible.
3A1, sn 101 to ?	561, all sn	2 cm vertical scan, modify scope with 470 Ω resistor for 3A1 protection.
	RM561, all sn	±2 cm vertical scan, modify scope with 470 Ω resistor for 3A1 protection. ±3 cm vertical scan, modify scope with 470 Ω resistor for 3A1 protection and change crt.
3A1, sn ? up	561, all sn RM561, all sn	±3 cm vertical scan, modify scopes with 470 Ω resistor for 3A1 protection.
3A2, all sn	561, all sn RM561, all sn	Fully compatible.
3A72, all sn	561, all sn RM561, all sn	Fully compatible.
3A74, all sn	561, sn 101 to 579	Fully compatible by removing +6 v unreg leads to pin 18 of both of the scopes' interconnecting sockets.
	561, sn 580 up	Fully compatible.
	RM561, all sn	Fully compatible.
3A75, all sn	561, all sn RM561, all sn	Fully compatible.
3B1, all sn	561, all sn RM561, all sn	Not compatible (no trace) without unblanking mod on scope. Partially compatible (no intensified mode) with unblanking mod on scope. Fully compatible with mod 040-? on scope.
3B2, all sn	561, all sn RM561, all sn	Fully compatible.

3B3, all sn	561, all sn RM561, all sn	Not compatible (no trace) without unblanking mod on scope. Partially compatible (no intensified mode) with unblanking mod on scope. Fully compatible with mod 040-? on scope.
3C66, all sn	561, all sn RM561, all sn	Fully compatible.
3S3, all sn	561, sn 101 to 579	Not compatible without mod 040-267 on scope. Fully compatible with mod 040-267 on scope.
	561, sn 580 up	Fully compatible.
	RM561, all sn	Fully compatible.
3S76, all sn	561, sn 101 to 429	Not compatible without mod 040-267 on scope. Fully compatible with mod 040-267 on scope. Compatibility further improved with mods 040-288, 3593 and 6254 on scope.
	561, sn 430 to 579	Not compatible without mod 040-267 on scope. Fully compatible with mod 040-267 on scope. Compatibility further improved with mods 040-288 and 6254.
	561, sn 580 up	Fully compatible. Compatibility further improved with mods 040-288 and 6254.
	RM561, all sn	Fully compatible. Compatibility further improved with mods 040-288 and 6254.
3T77, all sn	561, sn 101 to 429	Not compatible without mod 040-267 on scope. Fully compatible with mod 040-267 on scope. Compatibility further improved with mods 040-288, 3593 and 6254 on scope.
	561, sn 430 to 579	Not compatible without mod 040-267 on scope. Fully compatible with mod 040-267 on scope. Compatibility further improved with mods 040-288 and 6254.
	561, sn 580 up	Fully compatible. Compatibility further improved with mods 040-288 and 6254.
	RM561, all sn	Fully compatible. Compatibility further improved with mods 040-288 and 6254.

3A1 protection--add 470 Ω resistor to scope

When using a 3A1 in a 561 or an RM561, modify the scope with a 470 Ω resistor between C854 and pin 24 of the left interconnecting socket to prevent hv transients from wiping out the 3A1 transient blanking and switching multi diodes and transistors.

3A1, sn 101 to ?--±2 cm vertical scan

The vertical sensitivity of the 561's T503 crt or the RM561's T503R crt at 3.5 kv is 23.3 v/dm, ±1 v/cm. These crt's require a vertical amplifier output swing of up to ±98 v (±49 v per side) for ±4 cm deflection, or ±73 v (±37 v per side) for ±3 cm. 3A1's, sn 101 to ?, can only maintain compression specs over a swing of ±62 v (±31 v per side) and, therefore, are limited to about ±2 cm vertical scan in 561's and RM561's.

Several solutions to increase the deflection swing to ±3 cm are available:

561 and RM561	1.	Negotiate for a special 3A1 which provides more swing but has lower passband, or:
561 and RM561	2.	Reduce the high voltage to a point where standard 3A1 compression is acceptable. This will require recalibration and possible modification of the horizontal plug-in, depending on the amount of hv change required:
561 and RM561	3.	Install a 3A1, sn ? up, or:
561	4.	Install a 331-034 4 x 10 cm graticule and forget it, or:
RM561	5.	Change the crt. Since the RM561 uses a rectangular crt, 3A1 compatibility can be achieved simply by changing the crt to a type T5032 glass crt (formerly called a T503RSL) or a T5610 ceramic crt.

Converting to new glass crt T5032

No hardware changes are necessary. A 200-409 hood-mounting graticule cover and a 331-090 6 x 10 cm graticule are desirable.

Converting to new ceramic crt T5610

With internal graticule, add:

1	200-426	graticule cover
1	337-540	reflector shield
1	252-049	shield holder
1	337-539	implosion shield

Without internal graticule, add:

1	200-426	graticule cover
1	337-540	reflector shield
1	252-049	shield holder
1	331-106	implosion shield, scribed 6 x 10 cm
or	331-097	implosion shield, scribed 8 x 10 cm

Improving passband

Passband of the RM561-3A1 can be improved by minimizing vertical deflection plate capacitance as follows:

1. Change crt leads to 175-641 (brown) and 175-642 (blue), new Teflon insulated type. Remove the two nylon posts formerly used to support the leads and keep the leads as short as possible (about 7-1/8" and 5-7/8").

2. Change the vertical interconnecting plug on the RM561 to the new low-capacitance type. The new connector has the same part number, 131-148; the only difference in identification being the -1004 suffix on the Amphenol part number stamped on the connector (total new manufacturer's part number is 26-190-24-1004).
3. Restandardize crt capacitance.

3A1, sn ? up--±3 cm vertical scan

A mod is being worked on for the 3A1 to provide ±3 cm scan without further modification to the 561 or RM561 except the 470 Ω resistor.

3B1, 3B3--unblanking mod

Move lead from pin 14 of right-hand plug-in receptacle to pin 15 and remove R771, thus returning pin 7 of the crt directly to +125 v.

There is no dc coupled intensification circuit in the 561 or RM561, and so the usefulness of the delaying sweep plug-ins is considerably impaired, there being no way to obtain normal intensification of the delayed sweep in the "intensified" modes.

If desired, the leading edge of the intensification pulse (pin 14) can be differentiated and fed to the crt Z-axis input to provide a delay-start marker, but the other intensity aberrations introduced by this technique make it not altogether desirable.

3B1, 3B3--040-? changes hv supply

This mod converts the 561 or RM561 hv power supply to the type used in the 561A, making the 3B1 and 3B3 fully compatible, intensified modes and all.

3S3, 3S76, 3T77--040-267 rewires connectors

This mod provides proper 561 and RM561 connector wiring by removing the unregulated 6 v dc from pin 18 of the interconnecting sockets and changing the trigger signal leads to coaxial cables for proper shielding.

3S76, 3T77--040-288 reduces drift

This mod reduces drift and noise. It isn't absolutely necessary for sampling operation, but it does improve performance by reducing ripple and line sensitivity in the 561 or RM561's -100 v supply.

3S76, 3T77--3593 reduces ripple

This mod reduces the 561's -12 v ripple by changing the collector return of Q744. The first 040-267 kits didn't contain this mod but kits shipped after June 1962 do.

3S76, 3T77--6254 reduces ripple

This mod reduces the 561 and RM561's -12 v ripple by adding a capacitor between Q734 base and ground. The first 040-267 kits didn't contain this mod but kits shipped after June 1962 do.

561 Below S/N 580: Connector wiring was set up before sampling in this series was contemplated. To use the 3S76 and 3T77, the + side of the -12 v supply must be removed from Pin 18, and coax cables installed cross-connecting pins 18-19 and 3-4 (Kit 040-267). For 3A74 compatibility, removal of the "+6 v unreg" lead to Pin 18 is all that's necessary unless "paired" X-Y displays are required. Otherwise, the limitations are the same as for "561-General" below.

561 General: (3A1) Vertical deflection sensitivity of the T503 at 3.5 KV, as used in the 561, is 23.3 v/cm ±1 v/cm, requiring a vertical amplifier output swing of up to ±98 v (±49 v per side) for ±4 cm deflection, or ±73 v (±37 v per side) for ±3 cm. The 3A1 can maintain compression specs over a swing of ±62 v (±31 v per side), which provides ±3 cm deflection in the more sensitive (19.5 v/cm ±1 v/cm) T5032, T561 and T564 tubes used in the newer series. Although there is sufficient range in the 3A1 *gain* control to obtain calibrated deflection in a 561 from a 3A1, the swing limit remains fixed, and the compression will be noticeable even within the middle 6 cm.

Where a customer needs wideband dual trace in an old 561, three solutions are possible. (1) Negotiate for a modified 3A1 which will provide more swing (but lower bandwidth), (2) Reduce the 561 high voltage to the point where standard 3A1 compression is acceptable. This will require recalibration and possibly modification of the horizontal plug-in, depending on the amount of HV change required, or (3) Install a 4 x 10 cm graticule (331-034), without reducing HV.

In any event, whenever a 3A1 is poked into a 561, the 561 should be modified to add 470 Ω in series with C854, to prevent high voltage transients from wiping out transient-blanking and switching multi diodes and transistors.

We will not make a special CRT available to make the old 561 directly compatible with the 3A1.

(3B1-3B3) There is no dc-coupled intensification circuit in the 561, and so the usefulness of the delaying sweep plug-ins is considerably impaired, there being no way to obtain normal intensification of the delayed sweep in the "Intensified" modes.

For the 3B1 or 3B3 to provide a *trace* in an old 561 (or RM561), the indicator must be modified to remove the connection from Pin 14 of the right hand plug-in receptacle, and to run the lead from CRT pin 7 directly to the +125 v bus. All this involves is moving the lead that goes to pin 14 over to pin 15, and removing R771. If desired, the leading edge of the intensification pulse (pin 14) can be differentiated and fed to the CRT Z-axis input to provide a delay-start marker, but the other intensity aberrations introduced by this technique make it not altogether desirable.

A kit will be made available (about $40, 3 hours) to convert the entire 561 power supply to the type used in the 561A, for full compatibility.

RM561 General: All RM561's contain the cable mod which went into the cabinet model at S/N 580, so there are no 3S76-3T77-3A74 compatibility problems.

(3A1) Since the RM561 used a rectangular CRT, 3A1 compatibility can be achieved simply by changing the CRT to a Type 5032 (formerly identified as the T503RS L) glass CRT or a T5610 ceramic type, and adding a protective resistor in series with C854.

If the glass CRT is used, no hardware need be changed, although the hood-mounting graticule cover 200-409 is a desirable addition. A 6 x 10 cm graticule is Tek No. 331-090.

If the ceramic CRT is used, more hardware changes are necessary.

(a) Internal Graticule. Add:

1 each Graticule cover	200-426
1 each Reflector Shield	337-540
1 each Shield Holder	252-049
1 each Implosion Shield	337-539

(b) No internal graticule. Add:

1 each Graticule cover	200-426
1 each Reflector Shield	337-540
1 each Shield Holder	252-049
1 each Implosion Shield, scribed 6 x 10 cm	331-106
or 1 each Implosion Shield, scribed 8 x 10 cm	331-097

(c) Light filters (for internal or external graticule with ceramic CRT) are:

Green	378-534
Blue	378-535
Amber	378-536

It may be necessary to add a geometry pot (Mod 6125) if 8 x 10 cm operation is also contemplated. If a CRT change is out of the question, the 3 alternatives for the 561 apply, except we have no 4 x 10 cm graticule that will fit the RM561.

Compatibility - continued

To minimize vertical deflection plate capacitance for best 3A1 bandwidth, it may be necessary to replace the existing CRT leads with the new Teflon-insulated type, and maybe replace the vertical interconnecting plug on the RM561 with the new low-capacitance type. The new leads are (brown) 175-641 and (blue) 175-642. The new connector has the same part number, 131-148, so the low-C Durez No. 18276 material is only identified by the -1004 suffix on the Amphenol part number stamped on the connector (total new manufacturer's part-number is 26-190-24-1004). If these steps must be taken, eliminate also the two nylon posts formerly used to support the deflection plate leads, and keep the leads as short as possible (about 7-1/8 and 5-7/8"). CRT capacitance must be re-standardized if any of the above are done.

(3B1-3B3) Same as for 561, except the RM requires a different kit (about $10 more).

3A1 "LINEARIZED" FOR 8 CM SCAN

FEN 11-22-63

Linear scan of the 3A1 is increased to 8 cm in the 561A, 564 and 565 (and RM's) by production modification 7326, adding tightly-coupled transistor servo loops between grids and cathodes of the 3A1 output stage. The modification is effective at S/N 4328, and modified instruments will be on their way to customers this coming week.

The new scan capability, which also provides improved linearity over the center 6 cm and eliminates the necessity for the "±3 cm" notice on the front panel, will also be made available as a field kit for earlier instruments--availability about 6 weeks, price "under $20".

The modified 3A1's may also be used--with limitations--in old 561's, RM561's and in 567's for 6 cm linear scan. In instruments having about 22 v/cm CRT sensitivity, 8 cm scan with good linearity is achievable. For CRT's on the low-sensitivity side, however, 6 cm may be the practical limit, and the 3A1's internal (10 mv and 20 mv) gain adjustments for each channel will have to be re-tweaked. The front-panel CALIB control will not have sufficient range to cover the worst-case condition when set according to the usual procedure in a 561A.

For reliable operation of the 3A1 in the older indicators, a 470 Ω resistor should be added between C854 and pin 24 of the L.H. plug-in compartment in the indicator, to minimize the hazard of corona spikes damaging the semiconductors in the 3A1 switching circuitry.

3B1 AND 3B3 COMPATIBILITY

SS 12-63
FEN 11-8-63

This modification permits the Type 3B1 and Type 3B3 Plug-In Units to be used with the Type 561 Oscilloscopes and utilize their trace-intensifying feature.

The High Voltage circuit is replaced by a new assembly which has separate secondary windings for the crt grid and cathode. This permits insertion of intensifying pulses on the crt grid and/or chopped blanking (or external) pulses on the cathode.

A crt CATHODE SELECTOR switch is added to permit selection of CHOPPED BLANKING or CRT CATHODE inputs.

Order through your Tektronix Field Engineer or local Field Office. Specify Tektronix Part Number 040-320. Price: $43.40.

Special Note: As a further improvement in the performance of the Type 561 Oscilloscope with the Type 3B1 or Type 3B3 Plug-In Units, we suggest the installation of two previously-announced field modification kits. They are: Field Modification Kit 040-267 for Type 561 Oscilloscopes, serial numbers 102 through 578 (with some exceptions -- see your Tektronix Field Engineer before ordering). This modification improves stability and reduces ripple in the -12.2 volt supply. And, Field Modification Kit 040-288 for Type 561 Oscilloscopes, all serial numbers. This modification improves regulation and reduces ripple in the -100 volt supply.

560-SERIES: 2B67, 3B1, 3B3 AND 3B4 MODS PROVIDE INTERNAL SAWTOOTH SIGNAL FOR 3L10

Geoff Gass, 8-11-65

Production modifications 9725-9726-9727-9728 provide a standardized sawtooth signal from 560-series time-base plug-ins for driving the 3L10 Spectrum Analyzer swept oscillator. The sawtooth signal is a standardized current ramp of 66 μA/cm (nominal) fed from the sawtooth CF of the time base via a standardizing resistor (95.3 to 221 kΩ) to pin 18 of the interconnecting plug, driving pin 18 of the opposite plug-in connector.

The current signal is intended to drive a low-impedance ($\leq$2 kΩ) circuit, such as the minus input of an operational amplifier or the emitter of a transistor, with a positive-going linear ramp of current. It cannot be used to drive two circuits (e.g., 3L10 and Sawtooth Out) at the same time, nor can it be used successfully as a "voltage " signal source, especially at faster sweep rates. The high source impedance of this signal prevents excessive crosstalk of sweep signal into vertical plug-ins in which pin 18 is open.

The modification (one resistor and one piece of co-ax per time-base) is easily done in the field, and 040-kits will be available for this purpose.

For 561 S/N 101-578* kit 040-0267-00 "Adaptation to 3S76-3T77" must also be installed for 3L-Series compatibility.

Function assignment for pins 18/19 in the 560-series indicators is now:

1. "Sample" command from 3T series to 3S series sampling plug-ins.

2. X-Y Pairing signal for 3A74/3A74 or 3A72/3A72.

3. 66 μA/cm sawtooth signal from 2B67, 3B1-3-4 to opposite compartment.

In the 565-RM565, pins 18-19 remain unconnected, as multiple-trace X-Y pairing and sampling applications cannot be accommodated in this instrument, and the horizontal display switching between beams makes it difficult to have both accurate, stable drive to a 3L10 and foolproof connection of the proper time-base signal to the proper plug-in compartment. For a specific application (e.g., Time Base A always drives upper beam plug-in) the field mod would be similar to that for a 2B67.

*Eighteen 561's were factory-modified out of sequence and do not need the kit. They are S/N's 101, 105, 231, 241, 243, 250, 259, 350, 395, 411, 412, 500, 501, 502, 503, 504, 528 and 574.

560-Series Rackmount

Rear Connection Kits

Continuing demand for "special kits" to supply rear input connectors for the RM561, RM561A, RM564 and 2- and 3-series plug-ins has prompted development of a line of Tek-numbered application kits providing this facility for customers willing to accept the necessary limitations.

The plug-in kits provide one to four coaxial cables paralleling the front-panel inputs and running back to a special carrier for miniature co-ax connectors which attaches just below the regular 24-pin connector on the rear panel of the plug-in. The special connector carrier permits removal and interchange of plug-ins without having to unsolder the rear-panel connections in the indicator. The connector carriers are the same whether they hold one, two or four connectors, so the plug-ins having various numbers of connectors are interchangeable, except for basic compatibility limitations listed below.

Three indicator kits are available, each kit providing a mating part for the plug-in connector carrier, one, two, or four miniature co-ax connectors, cable, and BNC connectors to mount on the rear of the indicator in the holes provided (except in RM561's and RM561A's below S/N 6442, where holes will have to be added. In early RM561A's but not RM561's a new rear panel 387-0937-00 can be installed for a neater overall job).

Each indicator kit provides parts for modifying one plug-in compartment. If both X and Y compartments are to be modified, an appropriate (one, two or four-connector) kit must be ordered for each compartment. The four-connector kit provides compatibility with all modified plug-ins -- including corresponding custom instrument mods. The others provide some savings for systems only needing one or two connections to the rear.

The modified indicator remains compatible with all regular unmodified plug-ins (including sampling plug-ins).

LIMITATIONS

1. Plug-ins modified with the rear-connector carriers will not fit in the following indicators:

560	564
561	567
561A	RM567

In the 567-RM567, the digital readout connector blocks insertion.

In the bench instruments above, the solid back wall of the plug-in compartment makes it impossible for the modified plug-in to be inserted far enough for the 24-pin plug-in connector to contact the indicator connector.

The modified plug-ins are mechanically compatible with the 565, RM565 and 129, but there are no Tek-numbered main-frame kits for these instruments to secure rear-input connections. There may be some noise problems with a sensitive unit like the 2A61 having an open input connector facing into a 565 or 129 power-supply, however, so full electrical compatibility cannot be claimed here.

2. With front-panel inputs paralleled to the rear, the modified scope system becomes basically incompatible with conventional X10 or X100 high-impedance probes because the added capacitance takes the normally 47 pF inputs far beyond normal probe

compensation range. Although it would be nominally feasible to obtain a probe compatible with a ~100 pF input by simply shortening the cable on a 9' or 12' P6006, it would still be necessary for the customer to disconnect any cables attached at the rear panel before using the probe. Exotic switching arrangements with provision for suppressing crosstalk between front and rear inputs are beyond the scope of simple kits.

The plug-in kits include front panel tags warning of the changed input characteristics. The front-panel connector is not entirely useless in systems applications, however, as it does allow termination of low impedance signal lines as close as possible to the amplifier input, for best transient response. Termination at the rear panel only will produce a noticeable change in the 95 to 100% portion of the leading edge of a 3A1's transient response.

The present line of kits is as follows:

*Instructions Cover:	Kit Provides:	Tek No.
60/2A60, 75/3A75, 67/2B67, 3B1, 3B3, 3B4	One Connection	040-0406-00
2A61, 63/2A63, 67/2B67, 3A1, 3A6, 72/3A72, 3B1, 3B3, 3B4	Two Connections	040-0407-00
3A3, 3A74	Four Connections	040-0408-00
RM561A, RM564	One connection in one compartment	040-0409-00
RM561A, RM564	Two connections in one compartment	040-0410-00
RM561A, RM564	Four connections in one compartment	040-0411-00

*With some adaptation, the kits may be usable in plug-ins not listed, but only those listed have actually been checked out.

There will be no modification kits compatible with this system for sampling plug-ins or for the basic bench instruments (power transformer blocks use of connectors at rear of Y-compartment).

Geoff Gass/cmh
Product Technical Information
8-16-66

ENGINEERING

CONTENTS-ENGINEERING

PERFORMANCE

POWER SUPPLY CURRENT CAPABILITY

Chuck DeVere to Geoff Gass 9-21-62

Westinghouse Electric Corp, in Elmira, N.Y. would like to know what the maximum current capability is in each supply in the RM561. They would also like to know the amount of current drawn from each supply, from the 67 plug-in.

Geoff Gass to Chuck DeVere 9-25-62

The power supply capabilities of the RM561 are shown in the RM561 manual 070-289, page 3-1.

The manual indicates you can get full power supply capability into either plug-in compartment. This is only true when *both* plug-ins have "*full shunts*"-- the most you can get out of the supplies with full shunts on one side only is the full-shunt current for one side plus the no-shunt current for the other (if the other plug-in draws nothing).

Once upon a time, Manuals prepared a table showing the currents drawn by the various plug-ins for inclusion in the indicator unit manual. This move was vetoed by Engineering on the grounds that it would encourage the customer to use not only all the available current for one side, but all the unused current for the other. Since for the left-hand unit to use the excess current from the right-hand unit the right-hand unit's power supply shunts must be modified, this was considered highly undesirable.

Lemme give you an example.

The Type 67 applies a full shunt to the -100 v supply, but no shunt to the +125 or +300. It pulls 35 ma from the +125 out of a possible 45 it can pull without a shunt. Some customer wants to pull not only the 75 ma he can legitimately get in the left-hand compartment from the +125, but also the possible 40 ma "available" current the 67 isn't using. So he mods the 67 to provide *full shunt* on the +125, and pulls 115 ma from the left-hand compartment.

Guess what? That 67 has just become incompatible with the 63, 60, 59 and 50 plug-ins, though its front panel says it's still a Tek plug-in. The Types 72, 74, 75, 66 and 61 may also be in trouble with this modded 67.

Also, the 561 power supplies will not regulate when either of the plug-ins is removed. As a matter of fact, pulling out only the 67 would be extremely hard on the series regulator, trying to supply 115 ma *without* a sufficient shunt.

All this because the 67 contains a power-supply shunt for current which is not actually used *in the 67*.

So the advice to the customer is, regardless of how much current seems to be going unused in the "other" compartment, confine yourself to the 50% share allotted to the plug-in compartment you're working in. Accordingly, *regardless* of what's in the other hole, the "official" limits for one hole are as follows:

	NO SHUNT	2 K 5 W SHUNT	0 Ω SHUNT*
-100 v	0 - 25 ma	20 - 45 ma	40 - 65 ma (75 ma in the RM561)
- 12 v	750 ma		
+125 v	0 - 45 ma	25 - 60 ma	50 - 75 ma
+300 v	0 - 40 ma	35 - 67 ma	65 - 75 ma
6.3 V AC	5 a		
117 V AC	1 a**		

*0 Ω in the plug-in, but it's in series with 2 K in the indicator.
**Up to 5 amps in one plug-in if fuse is changed and total drain does not exceed 8 amps in plug-ins.

Note that with power-supply shunts, there's a *minimum* load as well as a maximum load for each supply to keep that supply in regulation and to keep from burning up its components.

The general thinking is, only a customer clever enough to figure out for himself what a plug-in current drain is, should be allowed to know it-- the customer who *asks* is probably not clever enough to avoid the pitfalls and compatibility problems he'll cause by trying to sneak one plug-in's power out into the other hole.

For your own information, the 67 draws:

-100 v	55 - 68 ma
- 12 v	0
+125	35 ma
+300	25 ma*
6.3 V AC	3.1 a
117 V AC	0

*Will probably vary with mag and position.

The data is approximate and was correct as of mid-1961. Whether you want to put this into the customer's eager little hands is up to you.

The attached data on plug-in loading is for power supply design purposes only, and should not be taken to indicate that any given plug-in(s) installed there may be a "surplus" of usable power in any 560-Series indicator.

With the exception of the 3S- and 3T-series plug-ins, plug-in cross-compatibility and the maintaining of power-supply regulation with one or both plug-in compartments empty is obtained only by providing in each plug-in just enough series-regulator shunting to supply the current needed for that plug-in in excess of 1/2 the series tube maximum current rating or 1/2 its maximum dissipation at high line.

Sampling plug-ins do not have this cross-compatibility feature with real-time units. For proper power supply regulation, one 3S-series and one 3T-series plug-in must be installed. Removal of either or replacement of one by a real-time plug-in, will cause loss of regulation or -- in some cases -- power supply damage.

Design information for custom plug-ins is contained in skeleton kit 040-0245-00. In the design of a custom plug-in or modification of an existing one for use in a Tektronix indicator, the customer must assume that no more than half the nominally available total current from any supply may be used in one compartment; that maximum loading for given shunt values should not be applied to the +125 v and +300 v supplies simultaneously; that DC dissipation should not exceed 45 watts per compartment (40 w total in 560); and that DC plus 6.3 v AC dissipation should not exceed 56 watts per compartment (60 w total in the 560). As the customer moves away from these rules, he may find the series regulator tubes or transformer outside of dissipation limits at high ambient temperature and/or high line voltage conditions, he may suffer loss of regulation at low line, or he may find his modified or custom plug-ins incompatible with some or all 2- and 3-series plug-ins.

Data is only approximate and will vary between plug-ins and with positioning, etc. Figures in mA, except as noted. "Shunt" is in series with 2 k in indicator; "FS" means 0 Ω in plug-in, using FULL SHUNT in indicator. SEE TEXT.

Plug-In,	S/N	-100 v,	shunt	-12.2 v	+125 v	shunt	+300 v,	shunt	6.3 vAC	117 v
(2A)50		40	1.2 k	365	2	--	17	--	0.8 A	0
(2A)51		35	1.5 k	0	15	--	19	--	2.93 A	0
(2A)59		31	1.8 k	0	12	--	18	--	1.2 A	0
(2A)60	101-431	18	--	0	18	--	23	--	1.63 A	0
	432-up	18		300	18	--	23	--	1.03 A	0
2A61		40	1 k	475	15.5	--	28	--	1.2 A	0
(2A)63		45-55	FS	365	6	--	22	--	0.9 A	0
(2B)67		50-70	FS	0	25-40	--	22-25	--	3.5 A	0
3A1	101-7929	35	FS	320	65	FS	70	FS	2.3 A	0
	7930-up	35	1 k	320	65	FS	70	FS	2.3 A	0
3A2		36	1.5 k	360	72*	FS	53	1.5 k	2.3 A	0
3A3		48	220 Ω	785	70	FS	53	1.5 k	1.04 A	0
3A5										
3A6		55	FS	328	74	FS	82	FS	1.93 A	0
3A7		37.5	1 k	690	67	FS	74	FS	1.2 A	0
3A8		46	FS	793	72	FS	56	700 Ω	1.55 A	0
3A72		24	--	600	53-65	FS	30	--	3.5 A	0
3A74		66	FS	600	64	FS	60	1 k	1.67 A	0
3A75		59	FS	750	63	FS	70	FS	2.0 A	0
3B1		70	FS	750	54	2 k	44	4 k	1.43 A	0
3B2		31	2.5 k	700	60	FS	26	--	1.43 A	0
3B3		62	FS	750	54	2 k	40	4 k	1.43 A	0
3B4		76	FS	500	45	2 k	31	1 k	1.05 A	0
3B5										
3C66		31	2 k	720	17	--	26	--	0.9 A	0
3L5										
3L10										
3S3		60	FS	565	76**	--	44	2.7 k	0	0
3S76		37	FS	550-910°	110-135°	FS	24	--	0.5 A	0
3T4										
3T77		73	FS	370	20*	FS	38	2 k	2.5 A	0
Maximum 'Available' Power (each compartment) with full shunts.										
560		50		425	25		20°°		4 A	
561,561A,564		65		750	75		75		4 A	
RM's,565,567,129		75		750	75		75		4 A	

*10 k from +300 to +125 supplies 17.5 mA extra for +125 v supply.
**Does not use shunt -- extra power supplied from 3T-time base.
°With 2 P6032 CF probes.
°°Requires 'cool-fin' heat shield on V657 above 20 mA or above 25°C.

SECTION 2

INDICATOR UNIT

INTRODUCTION

The Indicator Unit of the Type RM561 Oscilloscope contains a low-voltage power supply, a cathode-ray tube and associated circuitry (including a high-voltage power supply), and a calibrator.

The low-voltage power supply provides regulated and unregulated voltages for use throughout the instrument.

The crt circuit contains the necessary controls and adjustments for presenting a sharp trace of desired intensity to display the signals applied to the deflection plates by the plug-in units. The high-voltage power supply provides —3300 volts (the major portion of the accelerating potential) for the crt cathode.

The calibrator produces an amplitude-calibrated square wave for use in setting the gain of the amplifier plug-ins and the timing of the time-base plug-ins. The settings of the CALIBRATOR control indicate the peak-to-peak amplitude of the square wave available at the CAL. OUT connector. The negative half-cycle is at ground potential.

The numbered settings of the SCALE ILLUM. control may be used as an exposure guide for photographing waveforms on the Type RM561 Oscilloscope. The numbers indicate the recommended lens opening for the camera when using the type of film and exposure time specified on the panel below the control. Before taking photographs, remove the red graticule lamp inserts and adjust the trace intensity so that it is about the same as the graticule lines. Each time you make a significant change in the sweep rate of a time-base unit, the trace intensity should be readjusted so that it remains about the same as the graticule intensity.

You can modulate the intensity of the crt trace by applying a modulating signal to the CRT GRID connector at the rear of the oscilloscope. A negative-going signal of about 20 volts is required to cut off the beam from normal intensity.

CIRCUIT DESCRIPTION

Low-Voltage Power Supply

Power for the Type RM561 Oscilloscope and its plug-in units is supplied through the power transformer T601. The two primary windings of T601 are connected in parallel for 117-volt operation, or in series for 234-volt operation, as shown on the schematic diagram.

The secondary of T601 has nine secondary windings. Five of these windings provide 6.3 volts ac for the vacuum tube heaters and the pilot and graticule lights in the instrument. The remaining four windings provide power to the regulated supplies. The supplies produce regulated voltages of —100, —12, +125, and +300 volts. The unregulated side of each supply (except the —12-volt supply) is available at the plug-in connectors to provide shunt paths around the series regulator tubes for those plug-ins requiring current beyond the capability of the tubes. These shunt paths are completed in the plug-ins themselves, as necessary. In addition, the unregulated side of the +300-volt supply (approximately +420 volts) is used in the crt high-voltage supply.

All of the regulator circuits are of the series type; that is, a vacuum tube (or transistor, in the case of the —12-volt supply) in series with the load regulates the current through the load in such a manner as to maintain a constant voltage drop across the load. As the load increases (resistance of the load decreases), the series tube allows more current to flow; as the load decreases (resistance of the load increases), the series tube allows less current to flow.

The basic reference for all of the regulated voltages is the fixed drop across the voltage regulator tube, V609. The nature of this tube is such that it maintains a constant voltage drop of approximately 85 volts across itself regardless of the current through it, within rather wide limits. This constant drop directly establishes the reference for the —100-volt supply, and the —100-volt supply is then used as the reference for the other regulated supply voltages.

Manual adjustment of the —100-volt output is provided by the —100 VOLTS adjustment, R616. V609 holds the grid of V634A at a fixed potential of about +85 volts with respect to the —100-volt supply. Adjustment of R616 varies the grid of V634B with respect to the —100-volt supply, and therefore with respect to the grid of V634A. The voltage difference between the two grids of V634 determines the current through V634B and therefore sets the voltage at the grid of the series regulator tube, V627. Since the cathode of V627 is connected directly to ground, this determines the bias on the tube. Changing the bias on V627 changes its effective impedance, thereby increasing or decreasing the current through it and through the load. The change is such that moving the arm of R616 in the positive direction (toward ground) decreases the current through the load, thereby decreasing the voltage drop across the load. In other words, the output of the —100-volt supply drops. Moving the arm of R616 in the negative direction (toward the supply output) increases the current through the load, thereby increasing the voltage drop across the load. In other words, the output of the —100-volt supply rises. During calibration, R616 is set so that the output of the —100-volt supply lies as near to —100 volts as possible.

Regulation of the —100-volt supply takes place as follows. Any change in the output voltage produces exactly the same change at the grid of V634A due to the fixed drop across V609. The change which appears at the grid of V634B is less than one-sixth as great, due to the voltage-divider action of R616, R617, and R618. The resulting change in the relative levels of the two grids increases or decreases the current through V634B. This, in turn, changes the grid level of V627. The corresponding increase or decrease in the effective resistance of V627 changes the current through the load and brings the output voltage back toward its original level.

For example, suppose that the output of the supply drops from —100 volts to —99 volts due to a change in the load. This one-volt drop causes the grid of V634A to move positively by one volt, taking both cathodes of V634 with it. The grid of V634B, meanwhile, also moves positively, but by less than one-sixth of one volt. Since the cathode of V634B moves nearly one volt and the grid moves less than one-sixth of a volt, the bias on the tube is increased by more than five-sixths of a volt. The current through V634B therefore decreases. This causes the voltage at the plate of V634B and grid of V627 to become more positive. The more positive voltage on the grid of V627 allows more current to flow through the load which increases the voltage drop across the load back to —100 volts.

Regulation of the +125-volt supply is accomplished in the following manner. With the lower end of R561 fixed at —100 volts, any change in the +125-volt output produces a proportional change in bias on V654. This change is amplified and applied to the grid of the series regulator tube, V667A. The change at the grid of V667A is opposite in polarity to the initial change at the output resulting in an increase or decrease in the bias on V667A. The resulting increase or decrease in the effective impedance of V667A changes the current through the load in such a manner as to bring the drop across the load back toward its nominal value. C650 improves the response of the regulator circuit to sudden changes in output voltage.

A small sample of the unregulated-bus ripple appears at the screen of V654 through R657. This ripple signal appearing at the screen (which acts as an injector grid) produces a ripple component at the grid of V667A which is opposite in polarity to the ripple appearing at the plate of V667A. This tends to cancel the ripple at the cathode of V667A, and hence reduces the ripple on the +125-volt bus. This same circuit also improves the regulation of the circuit in the presence of line voltage variation.

The +300-volt supply functions in the same manner as the +125-volt supply. Rectified voltage from terminals 7 and 14 of the power transformer is added to the voltage supplying the +125-volt regulator to supply power for the +300-volt regulator.

Operation of the —12-volt regulating circuit is essentially the same as that of the other regulating circuits, except that transistors are used instead of vacuum tubes. The base of Q734 is fixed near —12 volts due to the voltage divider action of R731 and R732 between —100 volts and ground. Any variation from —12 volts at the emitter of Q734 is amplified by Q734 and Q744 to change the effective impedance of Q757 which is in series with the load. F720 protects the transistors in case of an overload on the —12-volt supply.

CRT Circuit

The cathode-ray tube normally supplied with the Type RM561 Oscilloscope is a Tektronix Type T503RP2. P1, P7, and P11 phosphors are optionally available; other phosphors are available on special order. The accelerating potential is approximately 3500 volts, provided by a potential of about —3300 volts at the crt cathode and an average potential of about +200 volts at the deflection plates. The nominal vertical and horizontal deflection factors are approximately 23 and 19 volts per centimeter, respectively, with this accelerating potential.

The —3300-volt supply for the crt cathode operates as follows: V800, the primary of T801, and the circuit capacitance (indicated by the dotted capacitor symbol on the schematic diagram) form a Hartley oscillator circuit which operates at about 50 kc. The output of the oscillator is stepped up in T801 and half-wave rectified by V822 to provide a dc potential of about —3400 volts at the plate of V822. The drop across R849, R847, and R852 places the crt cathode at about —3300 volts.

Regulation of this voltage is accomplished through feedback from the arm of R841. If, due to loading or change in input voltage, the output of the high-voltage supply should change, a proportional change at the arm of R841 would be coupled through V814 to the screen grid of V800. This would change the amplitude of oscillations in V800 and T801 in such a manner as to bring the plate of V822 back toward its original level.

The crt bias voltage, developed across R847 (INTENSITY control) and R852, varies from about 20 volts to 75 volts as R847 is moved through its range. At normal intensity the drop across R847 is in the vicinity of 45 to 55 volts. The focusing voltage at the arm of R844 (FOCUS control) varies from about —2300 volts to about —2900 volts with respect to ground as R844 is moved through its range.

Deflection-plate unblanking is used in the Type RM561 Oscilloscope crt. The voltages at the unblanking deflection plates (pins 6 and 7) are controlled by the right-hand plug-in unit. Normally, when the screen is unblanked, there is a potential of +125 volts on both plates. As long as the two unblanking deflection plates are at the same potential, the beam is not deflected toward either and passes on through to the crt screen. If one of the unblanking deflection plates is at a significantly higher positive or negative potential than the other, the electron beam will be deflected and absorbed by the accelerating anode; therefore, the screen will be blanked. Further discussion of the unblanking voltages is included in the time-base and sweep plug-in manuals.

C760 and C761 (shown on the Plug-In Connectors diagram) provide a means for adjusting the effective capacity of the crt deflection plates, as seen by each plug-in in the instrument. (The "effective" deflection-plate capacity is the capacity seen by the plug-in at terminals 17 and 21 of the plug-in connectors when the two terminals are driven by equal voltages of opposite phase, which is the case in all plug-ins with a push-pull output.) This capacity affects the bandpass and the amount of phase shift through the plug-in. C760 and C761 are adjusted at the factory to provide an effective deflection-plate capacity of 16 picofarads at the plug-in connectors of both openings.

The CRT BEAM ROTATOR adjustment, R860, provides a means of radially shifting the position of a trace or display so that it is exactly parallel with the horizontal graticule markings. This is done by varying the magnitude and polarity of a magnetic field produced by L860 which is located around the front portion of the cathode-ray tube.

Calibrator

The basic calibrator for the Type RM561 Oscilloscope produces a line-frequency amplitude-calibrated square wave.
In the line-frequency calibrator, the 6.3-volt (approximately

18 volts peak-to-peak) ac heater voltage for V884 is applied through C876 to the cathode of V884A, driving that tube into and out of cutoff at the line-frequency rate. The signal at the plate of V884A is then coupled to the grid of V884B to turn that tube on and off. Regenerative feedback from the plate of V884B to the grid of V884A speeds up the switching action of V884A.

The voltage present at the cathode of V884B during the time that V884B is conducting can be set to exactly 100 volts with the CAL. AMPL. adjustment, R871. The voltage divider in the cathode circuit of V884B contains precision resistors to provide an output accuracy of 3% or better at the various settings of the CALIBRATOR control.

TROUBLESHOOTING

General maintenance and troubleshooting information is contained in Section 1 of this manual. In the following discussion it is assumed that you have read that information and have definitely isolated a trouble to the Indicator Unit by the procedures described there.

The first step in troubleshooting the Indicator Unit is to measure the power-supply voltages at pins 10, 15, 16 and 23 of the interconnecting plugs. (Two plug-in units which have been checked for proper resistance between the plug-in connectors and ground should be inserted. If one is a time-base unit, its TIME/DIV. control should be set to EXT. INPUT.) If all of the voltages are not as indicated, the trouble is in the low-voltage power supply or the power source. To check these, refer to the paragraph entitled Troubleshooting the Power Supply. If all of these voltages are proper, the trouble is in the Crt Circuit. In this case, refer to the paragraph entitled Troubleshooting the Crt Circuit.

Troubleshooting the Power Supply

If there is no power present anywhere in the instrument (power-supply outputs, graticule lights, tube filaments) check the primary circuit of T601. Check especially the fuse, the thermal-cutout switch, the POWER ON switch, and the power source. If all of these are operating satisfactorily, check the primary of T601 for continuity. If the graticule lights or any of the tube filaments are lighted, the primary circuit of T601 may be assumed to be operating properly. On 117-volt operation, check the thermal cutout if the fan is running.

If one or more of the supplies fails to regulate, check the line voltage. It should be between 105 and 125 volts rms for an instrument wired for 117-volt operation, or between 210 and 250 volts rms for an instrument wired for 234-volt operation. If it is not, then the power source will need to be brought within these limits in order for the instrument to perform properly.

If the line voltage is within the specified limits, and one of the power-supply output voltages is not correct, check that particular regulator circuit. If none of the voltages are correct, the trouble is probably in the —100-volt supply, since this voltage serves as a reference for the other circuits. To check a regulator circuit, first replace the tubes as described in Section 1. If this does not eliminate the trouble, check the rest of the circuit by voltage and resistance measurements. One cause of insufficient voltage might be an open or shorted rectifier diode.

If there is excessive ripple on any of the supplies, replace the filter capacitor or capacitors (C640A, C642A, C644, C720, or C721).

Troubleshooting the CRT Circuit

To locate a trouble within the Crt Circuit, first remove the high-voltage shield, shown in Fig. 2-2, and see if the filament of the high-voltage rectifier, V822, is glowing. If it is, measure the voltage at the plate of V822; it should be about —3400 volts with respect to ground.

If the voltage at the plate of V822 is about —3400 volts, measure the potentials in the high-voltage divider and at the other points in the circuit for which typical voltages are given on the schematic diagram. If all of these voltages are correct, then the crt itself is probably faulty and should be checked.

If the filament of V822 is glowing but the voltage at its plate is significantly less than —3400 volts, measure the resistance from the plate of V822 to ground; it should be about 20 megohms. If it is, then the trouble is in V822 or in the secondary of T801. If the resistance between the plate of V822 and ground is significantly less than 20 megohms, locate the trouble by resistance checks throughout the rest of the circuit.

If the filament of V822 is not glowing, measure the voltage at the control grid of V800. It should be about —85 volts with respect to ground. If it is, the high-voltage oscillator is operating and the trouble lies in V822 or in the secondary of T801. If the voltage at the control grid of V800 is significantly less than —80 volts, then the oscillator is not operating properly. However, you must make certain circuit checks before replacing V800 to prevent possible damage to the replacement tube. First, measure the voltage at the plate of V800; it should be about +400 volts. If it is not, then the trouble lies in the plate circuit. If the voltage at the plate of V800 is about +400 volts, check the primary and secondary resistance of T801. The resistance of the primary should be about 40 ohms, and the resistance of the secondary (between the filament of V822 and ground) should be about 170 ohms. Check C807 and C822 to make sure that they are not shorted. Also check the resistance between the plate of V822 and ground; it should be about 20 megohms. If all of these resistances are correct, then replace V800 and V814. If tube replacement does not eliminate the trouble, check the rest of the circuit by voltage and resistance measurements.

CALIBRATION

The following equipment is required for complete calibration of the Type RM561 Oscilloscope Indicator Unit:

1. Dc voltmeter (sensitivity of at least 5000 ohms per volt), calibrated for an accuracy of 1% or better from 0 to 300 volts, and for an accuracy of 3% or better at 4000 volts.

2. Variable autotransformer with a rating of at least 250 watts.

3. Accurate rms-reading ac voltmeter with a range of at least 0 to 125 volts (0 to 250 volts for 234-volt instruments).

4. Test oscilloscope with calibrated vertical sensitivity of 50 millivolts per division or better.

5. Capacitance meter capable of a measurement accuracy of 0.1 picofarad or better at 16 picofarads; meter must have guard voltage available. Tektronix Type 130 L-C Meter recommended.

To set up the Type RM561 for calibration of the Indicator Unit, insert two plug-in units known to be in proper operating condition. If one is a time-base plug-in unit, set its TIME/DIV. switch to EXT. INPUT. Connect the autotransformer to a suitable power source and connect the Type RM561 Oscilloscope to the output of the autotransformer. Turn on the equipment and set the output of the autotransformer for the nominal operating voltage of the oscilloscope (117 volts or 234 volts). Allow the equipment to warm up for about 10 minutes.

Power Supply

With the dc voltmeter, measure the output of the —12-, —100-, +125-, and +300-volt supplies at pins 16, 23, 15, and 10, respectively, of the plug-in connectors. Set the —100 VOLTS adjustment (Fig. 2-1) so that all of the supplies are within 3% of their rated values.

NOTE

Do not adjust the —100 VOLTS adjustment unless one or more of the supplies is actually out of tolerance or unless you are planning to perform a complete calibration of the instrument.

Measure the voltage at the high-voltage test point (indicated on the high-voltage shield, Fig. 2-2). Adjust the HIGH VOLTAGE adjustment (Fig. 2-1) for a reading of —3300 volts.

Using the test oscilloscope, measure the amount of 120-cps ripple at the output of each power supply, except the —3300-volt supply. (For line frequencies other than 60 cps, the ripple will be twice the line frequency.) The ripple should not exceed 20 millivolts on the —100-volt supply, 15 millivolts on the +125-volt supply, 80 millivolts on the +300-volt supply, and 10 millivolts on the —12-volt supply. Do not attempt to measure the ripple on the —3300-volt supply.

Vary the autotransformer output voltage between 105 and 125 volts (or 210 and 250 volts if the power transformer is wired for 234-volt operation) and check to see that all voltages stay within tolerance over this range.

CRT Circuit

Check to see that the face of the crt rests snugly against the graticule. If it does not, loosen the crt clamp screw (Fig. 2-1) and move the tube forward by pushing on the tube socket. Then retighten the crt clamp screw.

Set the plug-in controls to produce a spot at the center of the crt. Set the FOCUS control fully counterclockwise and adjust the ASTIG. control so that the defocused spot is as nearly circular as possible. The INTENSITY control may have to be adjusted to produce the defocused circle, but care should be taken not to burn the crt phosphor when the spot is adjusted for sharp focus.

If you are using a time-base unit, set it for a free-running trace. If you are not using a time-base unit, apply a signal to the right-hand plug-in to produce a horizontal trace at least 10 centimeters long. Set the FOCUS control for the narrowest trace width and position the trace directly behind one of the graticule lines. Adjust the CRT BEAM ROTATOR as necessary to align the trace with the graticule line.

Calibrator

Set the CALIBRATOR switch to OFF and the CAL. AMPL. adjustment (Fig. 2-1) so that the voltage at the cathode of V884B (pin 7) is exactly +100 volts. Calibration of the various settings of the CALIBRATOR switch is not necessary.

Effective Deflection-Plate Capacity

The effective deflection-plate capacity of the cathode-ray tube, as seen by the plug-ins, can be adjusted by means of C760 and C761. This capacity has been set at the factory to provide a standard effective deflection-plate capacity of 16 picofarads for all instruments. If C760 or C761 has been inadvertently misadjusted, or if the cathode-ray tube has been changed, the effective capacity between one or both pairs of plates may be altered slightly. This is of consequence only if you are using a wide-band amplifier plug-in (such as the Type 75) near the limit of its bandpass or if you are using two plug-in amplifiers for X-Y phase comparison. If the proper response cannot be obtained throughout the bandwidth of a wide-band amplifier, or if X-Y phase measurements differ when the amplifier units are interchanged between openings, the effective deflection-plate capacity is probably not at the proper value at one or both plug-in connectors.

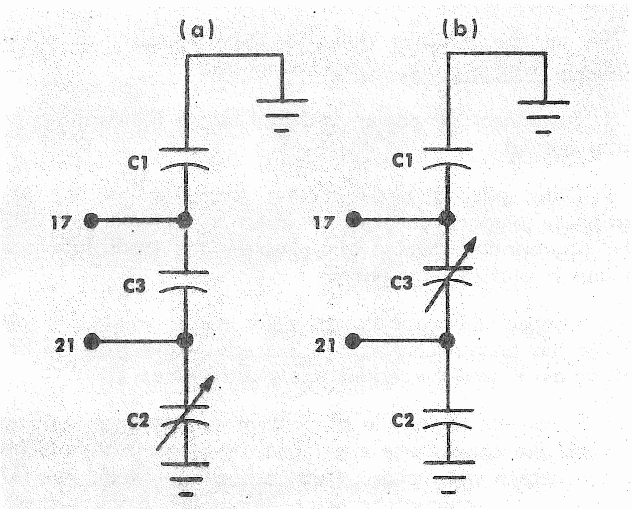


Fig. 2-3. Schematic representation of effective deflection-plate capacity: (a) left-hand opening; (b) right-hand opening.

Since the effective deflection-plate capacity of the cathode-ray tube is that capacity seen by the plug-in when the plates are driven push-pull, it cannot be measured directly with a capacitance meter. However, the circuit capacitances which make up the effective deflection plate capacity can be measured with the meter. These capacitances may be schematically represented as shown in Fig. 2-3. Because of the slight differences of the physical layouts of the left- and right-hand openings, the variable capacitors, C760 and C761, are connected differently in each opening. Their effect, however, is the same in both openings as each is capable of changing the effective deflection-plate capacity so that it may be set to a standard value. C1 and C2 in Fig. 2-3 represent the capacity from each deflection plate to ground and C3 represents the capacity between each set of deflection plates. In the left-hand opening of the Indicator Unit, variable capacitor C760 is part of the capacitance of C2. In the right-hand opening, variable capacitor C761 is part of the capacitance of C3. Since the deflection plates are driven push-pull, the effective deflection-plate capacity, C_{eff}, may be expressed in terms of C1, C2 and C3 as follows:

$$C_{eff} = \frac{C1 + C2}{2} + 2C3.$$

In the left-hand opening, C1 and C3 are fixed and C2 is adjustable by means of C760. In the right-hand opening, C1 and C2 are fixed but vary slightly from instrument to instrument and C3 is adjustable by means of C761. Setting C_{eff} equal to 16 picofarads (the factory standard) and rearranging terms for each opening, we obtain:

For the left-hand opening: $C2 = 32\text{ pf} - (C1 + 4C3)$

For the right-hand opening: $C3 = 8\text{ pf} - \dfrac{C1 + C2}{4}$

Thus, measuring C1 and C3 in the left-hand opening, we can determine the desired value for C2. Once the desired value of C2 has been determined for the left-hand opening, we can obtain this value by adjusting C760. Correspondingly, by measuring C1 and C2 in the right-hand opening, we can determine the desired value for C3 which we can then set with variable capacitor C761.

To set the effective deflection-plate capacity of either Indicator Unit opening, proceed as follows:

1. Disconnect the power cord and isolate the oscilloscope from ground.

2. Either plug a 24-pin mating connector into the appropriate plug-in connector or insert any plug-in unit into the appropriate opening and unsolder the leads from terminals 17 and 21 in the plug-in.

3. Connect the capacitance meter guard voltage to pin 21 of the plug-in connector and measure the capacity between pin 17 and the oscilloscope chassis—this is C1.

4. If you are setting the capacity of the left-hand opening, connect the capacitance meter guard voltage to the oscilloscope chassis and measure the capacity between pins 17 and 21 of the plug-in connector—this is C3. If you are setting the capacity of the right-hand opening, connect the capacitance meter guard voltage to pin 17 and measure the capacity between pin 21 and the oscilloscope chassis—this is C2.

5. Substitute the measured capacitance values into the appropriate equation and solve for C2 (for the left-hand opening) or for C3 (for the right-hand opening).

6. If you are setting the capacity of the left-hand opening, connect the guard voltage to pin 17 of the plug-in connector and measure the capacity between pin 21 and the oscilloscope chassis. If you are setting the capacity of the right-hand opening, connect the guard voltage to the oscilloscope chassis and measure the capacity between pins 17 and 21 of the plug-in connector.

7. For the left-hand opening, adjust C760 (see Fig. 2-1) until the measured capacity in step 6 equals the value of C2 obtained in step 5. For the right-hand opening, adjust C761 (see Fig. 2-1) until the measured capacity in step 6 equals the value of C3 obtained in step 5.

NOTE

Now that you have set the effective deflection-plate capacity in one of the openings, the other opening can easily be set by the use of a wide-band amplifier such as the Type 75. If you have an amplifier such as the Type 75 proceed with the following steps to set the deflection-plate capacity of the other opening. If you do not have an amplifier with a bandwidth from dc to at least 4 megacycles, you can complete the calibration by applying steps 1 through 7 to the other opening.

8. Disconnect the capacitance meter and resolder any unsoldered leads.

9. Insert a Type 75 (or other amplifier with a bandwidth from dc to at least 4 megacycles) in the calibrated opening of the oscilloscope and a time-base unit in the opposite opening. Turn the oscilloscope on.

10. Calibrate the wide-band amplifier for best square-wave response according to the Calibration procedures in the plug-in manual.

11. Interchange the positions of the two plug-in units.

12. Apply the same square wave used in the calibration of the wide-band amplifier plug-in to the INPUT connector.

13. Adjust C760 or C761, whichever is applicable, for best square-wave response on the screen.

The calibrated wide-band amplifier can now be used as a standard against which to calibrate the deflection-plate capacity of other Type 561 Oscilloscopes. This eliminates the necessity of repeating the entire procedure for each instrument to be standardized. Simply insert the calibrated plug-in in each opening to be calibrated (and a time-base plug-in in the other opening), apply the square wave used in calibrating the plug-in, and adjust C760 or C761, whichever is applicable, for best square-wave response on the screen.

SECTION 3
POWER SUPPLY ADDENDUM

Introduction

This section has been prepared to acquaint the maintenance technician with the various power-supply voltages and currents available from Type 561 and RM561 Indicator Units.

The information presented may also be of value to the design engineer who may wish to build his own signal amplifier plug-in unit. A blank plug-in chassis with detailed power supply information is available for this purpose; order Modification Kit number 040-245 from your local Tektronix Field Office or Representative.

The information in this section may be subject to minor changes due to production modifications during manufacturing.

TYPE 561, RM561 INDICATOR POWER SUPPLY LIMITS

The Tektronix Type 561 and RM561 Indicator Units provide power for the plug-in circuits. The total dc power available is 85 watts, divided between four regulated supplies. Current capabilities of both the regulated dc supplies and unregulated ac supplies are listed in Table 3-1. Use of current from the unregulated dc supply leads is not recommended.

The four regulated dc supplies listed in Table 3-1 should not all be operated at maximum current at the same time. If all four were to be used to their current limits, the total regulated power would be 93 watts, 8 watts above the maximum value. This limit should be no problem however, since it is rare that all supplies would ever be used at their maximum values at the same time.

TABLE 3-1

TYPE 561, RM561 POWER SUPPLY CURRENT CAPABILITIES FOR PLUG-INS

SUPPLY	MAX. TOTAL CURRENT	CONNECTOR TERMINALS
Reg. —100 vdc	130 ma	23— to 9 ground
Reg. —12 vdc	1.5 amps	16— to 5 ground
Reg. +125 vdc	150 ma	15+ to 9 ground
Reg. +300 vdc	150 ma	10+ to 9 ground
Unreg. 6.3 vac	5 amps per plug-in	1 — 2
Line 117 vac†	8 amps* total or 5 amps** per plug-in	7 — 8
Line 234 vac	4 amps	7 — 8

†In cases of 234-volt line, do not use power transformer as an autotransformer to obtain 117 volts for plug-in.

*Total of 10 amps limited by power cord; 8 amps for plug-ins, 2 amps for power transformer.

**Total of 5 amps per plug-in limited by interconnecting plug at rear of each plug-in unit.

Since the Type 561 and RM561 Indicator Units employ two plug-in units to operate the X and Y axis of the crt, currents listed in Table 3-1 are normally divided between them. However, a single plug-in alone can be used, such as a vertical amplifier, with moving-film recording used instead of a horizontal sweep. In such a case it will be necessary to elevate the crt horizontal deflection plates to approximately +180 to +210 volts dc to permit proper focus and astigmatism control.

The limit on how much power can be dissipated in one plug-in unit is based primarily upon the ambient temperature and amount of ventilation supplied. Vacuum tubes should not be operated with envelope temperatures above 150° C when the ambient temperature is at 25° C, or above 175° C when the ambient temperature is at 50° C. The Type 561 Indicator Unit can be operated in ambient temperatures up to 50° C.

SUGGESTED POWER SUPPLY SHUNT RESISTOR VALUES

To make efficient use of the Type 561 or RM561 Indicator Unit power supplies, the load currents for each supply and maximum or minimum load values must be known.

The nature of series regulated power supplies permits obtaining more current from them than can normally be handled by the series tube alone (providing the power transformer and rectifiers can supply more current). By placing a shunt resistor of appropriate value across the series regulator tube, additional current can be made available for the load. The correct value shunt resistor must be chosen to permit the regulator system to deliver current with low ripple, and the shunt resistor must have a power rating high enough to carry its share of current without overheating.

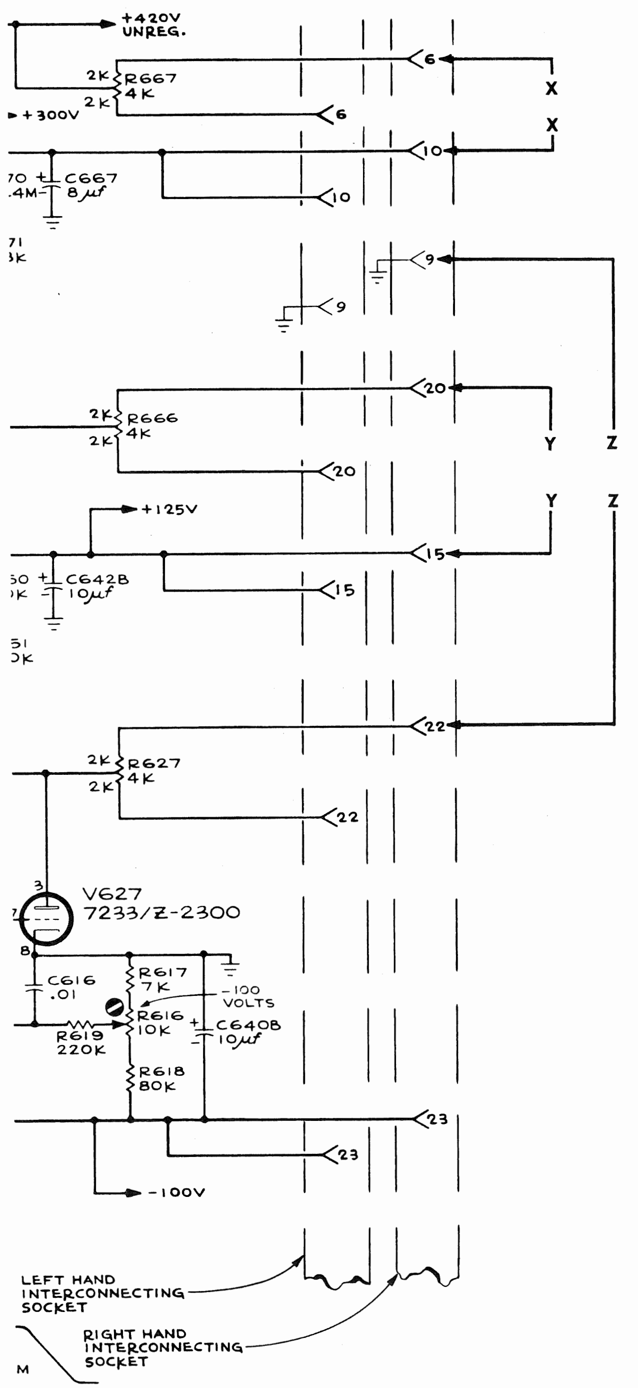
To permit the best selection of shunt resistors, Table 3-2 lists current limits for three conditions of the —100-volt, +125-volt and +300-volt dc supplies. The currents listed are one-half the total available, based upon the total current being divided between two plug-ins. Do not shunt any other supply.

TABLE 3-2

RECOMMENDED TYPE 561, RM561 REGULATED POWER SUPPLY SHUNT RESISTORS*

SHUNT RESISTOR VALUES	—100 v	+125 v	+300 v
No Shunt	0 to 25 ma	0 to 45 ma	0 to 40 ma
2000Ω, 5w between proper terminals of power connector.	20 to 45 ma	25 to 60 ma	35 to 67 ma
SHORT, between proper terminals of power connector.	40 to 65 ma	50 to 75 ma	65 to 75 ma

*Currents listed are one-half total available, based on two plug-in units being used.



X = +300-Volt Shunt

Y = +125-Volt Shunt

Z = —100-Volt Shunt

Terminals X, Y, and Z are located in plug-in units

Fig. 3-1. Power supply shunt resistor connections.

Table 3-3 lists the proper plug-in interconnecting plug terminals for connection of power supply shunt resistors.

TABLE 3-3

PLUG-IN INTERCONNECTING PLUG TERMINALS FOR REGULATED SUPPLY SHUNT RESISTORS

SUPPLY	TERMINALS
—100	22 — 9 return
+125	20 — 15 return
+300	6 — 10 return

As indicated on the power supply schematic, separate terminals are provided for the ground return of the —12-volt regulated heater supply. When using this supply in your own plug-in design, it is best to run two leads to the heater terminals so that the ground lead can be connected directly to terminal 9, thus eliminating ground currents. If your instrument indicates +6-volt unregulated terminals, do not draw current from these terminals.

A portion of the power supply schematic has been reproduced in Fig. 3-1, identifying interconnecting plug terminals specified in Table 3-3.

Use of shunt resistor values suggested in Table 3-2 will lead to a minimum of total power required, and give lowest plug-in temperature. It is the simplest method that will not overtax supplies, either for regulation or temperature. However, if Table 3-2 does not meet your design needs, refer to the curves of Figs. 3-2, 3-3 or 3-4 to aid your choice of individual power supply shunt resistors.

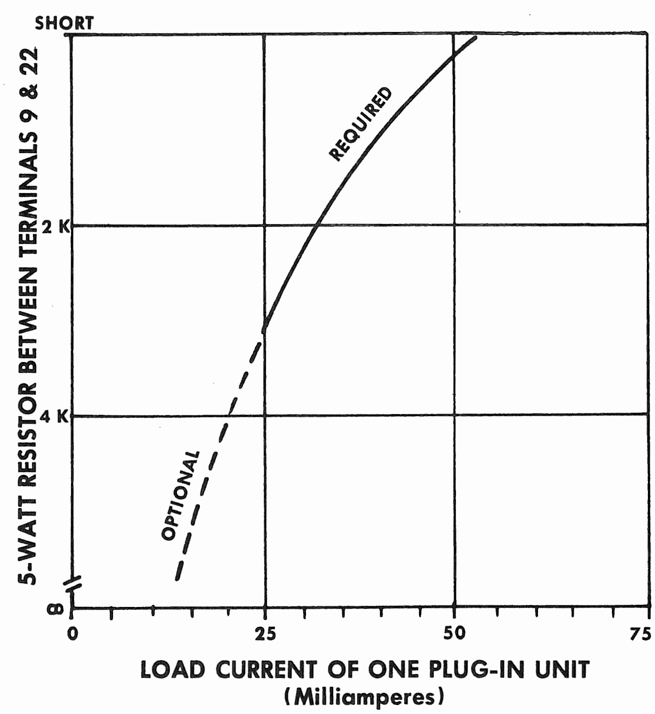


Fig. 3-2 —100-volt supply shunt.

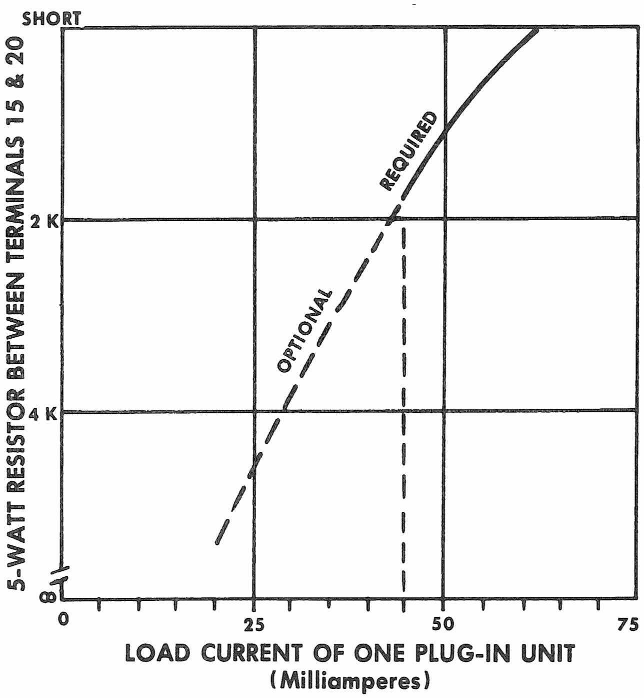


Fig. 3-3. +125-volt supply shunt.

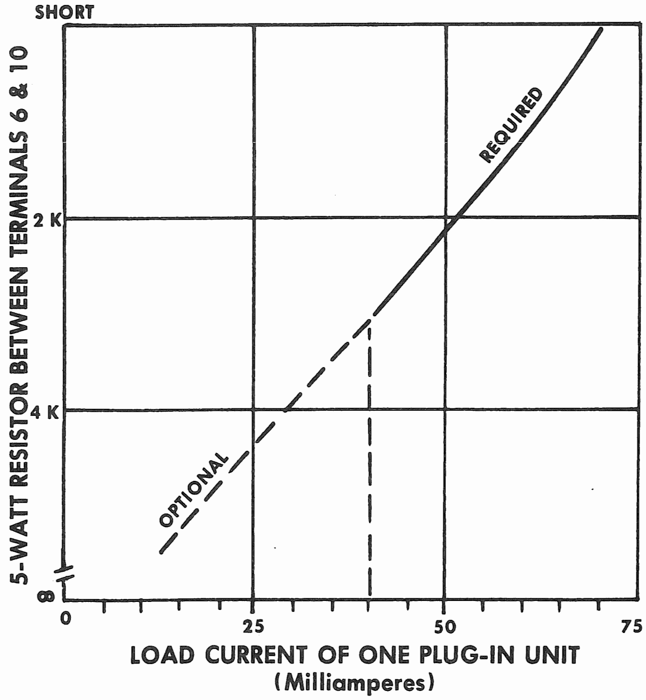


Fig. 3-4. +300-volt supply shunt.

INCOMPLETE UNBLANKING

FEN 3-13-64

A slight misalignment of the gun or deflection blanking plates in a T503, T5610, etc., can cause excessive beam intercept by the blanking plates when they are at equal potential (unblanked condition). The result is somewhat lower than normal writing rate, and -- especially at low intensity -- a noticeable variation in trace intensity across the screen.

The amount of excess intercept when the two blanking plates are at equal potential has been spec'd now at 15%: that is, the beam current when the two plates are at equal potential should not be down more than 15% from the maximum obtainable from any other setting of the plates.

Rather than scrapping an otherwise good CRT in the field for excessive blanking plate intercept, however, the mechanical misalignment may be corrected electrically, by changing the voltage on the fixed-potential blanking plate.

In the 503-504 and RM's, select a new value for (or shunt) R857 or R858.

In the 561, RM561, RM561A, 567, or RM567, the lead from CRT pin 7 picks up the +125 supply at the plug-in connector. This lead may be removed from the plug-in connector and run to a divider between +300 v and ground, and its potential set for maximum beam current and best uniformity of trace intensity. A 250 k 2 w pot between +300 v and ground may be used. Whether a fixed or variable divider is used, the centerpoint should be bypassed to ground through about .01 μf so that capacitive coupling from the opposite plate does not cause the fixed plate voltage to shift during unblanking.

In the 564, the divider should go to R867 so as not to interfere with the "locate" function.

In the 560 series (except 565), a CRT with the blanking plate alignment problem will show a bright dot at the start of a fast sweep either with a 2B67 or with a 3B1 or 3B3 time base. The two time base types drive the variable unblanking plate to +125 v from opposite directions. Depending on the direction of misalignment (if any), one of the two time base types will, in the process of unblanking, drive the plate through and past the potential for maximum beam-current.

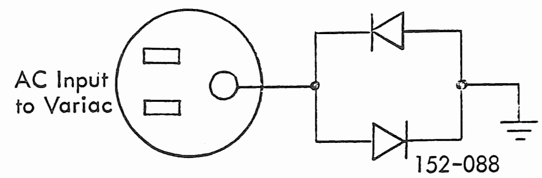
The blanking-plate alignment problem has not been reported in the 321 or 565. Electrical cures in these instruments would be more difficult, and CRT replacement would be indicated if the problem occurs.

TECHNIQUES

DIODES HELP WITH GROUND-LOOP PROBLEMS

FEN 10-11-63

When working with low level signals, the ground wire of our power cords can introduce error signals. To eliminate this problem, mount parallel back-to-back diodes (152-088) between the third wire ground pin and the chassis of your Variac test set. The diodes act as an open circuit to millivolt level signals below their forward-bias point, and at the same time will handle enough current to blow the Variac fuse in case of a short. The circuit is shown at right in fig. 1.



561/564 RASTER AND UNBLANKING WITH 2B67

Rick Kehrli to Field Info, Nov. 5, 1963

I have a customer at General Electric in Schenectady, New York, who is interested in using a 564 in a raster configuration. He wishes to use the slow time base in the vertical ramp and his faster time base in the horizontal ramp.

He further would like to be capable of obtaining rasters with unblanking from about 1 second total time to about 15 msec total time. The problem turns out to be one of unblanking the long time base.

I imagine this has come up before and would like to know what the best solution might be. It would be preferable if this could be hooked in internally as the customer will be introducing Z axis information on the grid also.

Geoff to Rick Kehrli, Nov. 11, 1963

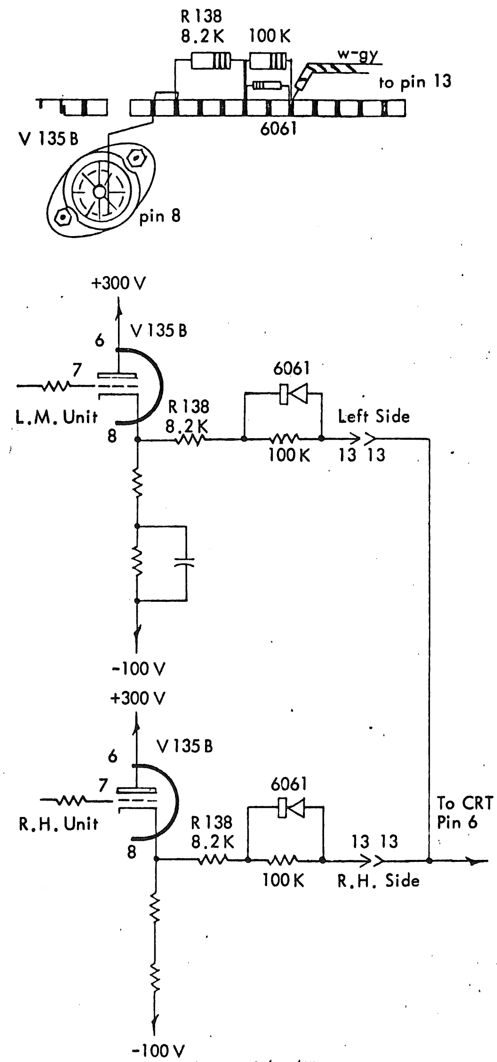
Enclosed is a circuit we worked out for Otto Rothfuss last year, for use with the 2B67 and moderately slow sweeps. If either time base says "off" the beam turns off. That way it's off during each retrace of the horizontal and off during vertical retrace too.

This will not work at very fast sweeps -- we don't have the current available in the 2B67 system to yank these plates around very rapidly.

Also, since the 3B1 and 3B3 unblank in the opposite direction (instead of hauling a low deflection unyank one of 'em down to 125 v), to do the logic bit in this one you turn the diodes the other way. The resistance values etc. would probably have to be horsed around, too. Hope you ain't usin' 3B1's or 3B3's.

Bruce Hollister to Otto Rothfuss, Oct. 2, 1962

1) On the bottom ceramic strip remove the white-gray lead from the end of R138 (8.2 k) and move it two (2) notches to the rear.
2) Connect a 100 k, 1/2 w resistor between the 8.2 k resistor (R138) and the white-gray lead just moved.
3) Shunt the 100 k just installed with a 6061 diode (TEK 152-061). Connect the cathode end of the diode to the junction of the 8.2 k and 100 k resistors.
4) Run a lead from pin 13 of the right-hand interconnecting socket to pin 13 of the left-hand socket.
5) You're in business.



Vertical Blanking Mod for 561/67/67

Minor mods, low cost

You can slave one 560 scope to another, with minor modification and at a relatively low cost.

The master scope must furnish four signals to the slave:

1. Vertical signal (single, dual or four trace)
2. Sweep sawtooth
3. Deflection blanking (for sweep retrace)
4. Transient-spike blanking to crt cathode (for dual and four trace applications)

Master scope mods required:

Vertical

1. Plug-in: Increase internal trigger cf transient response (for the 72, change C487 with a 1.5 to 7 pf variable).
2. Indicator: Bring out vertical signal from pin 11 of the left-side Amphenol connector (or pin 12 of the right side) to the vertical input connector of the slave.
3. Indicator: Bring out the chopped transient blanking signal from pin 24 of the indicator left-side Amphenol connector to pin 24 of the left-side Amphenol connector of the slave. For convenience, the first notch on the ceramic strip under the hv supply may be used instead.

Horizontal

4. Plug-in: Patch sweep signal to pin 24 of the right-side Amphenol connector (in the 67, install a lead from the cathode of V333A to pin 24 of the Amphenol connector).
5. Plug-in: For fast sweeps in the 67, you may have to decrease R138 to compensate for additional capacitive loading.
6. Indicator: Bring out the sweep signal from pin 24 of the right-side Amphenol connector in the indicator to the horizontal input connector of the slave.
7. Indicator: Bring out the sweep blanking signal from pin 13 of the right-side Amphenol connector of the master indicator to pin 13 on the left-side Amphenol connector of the slave indicator.

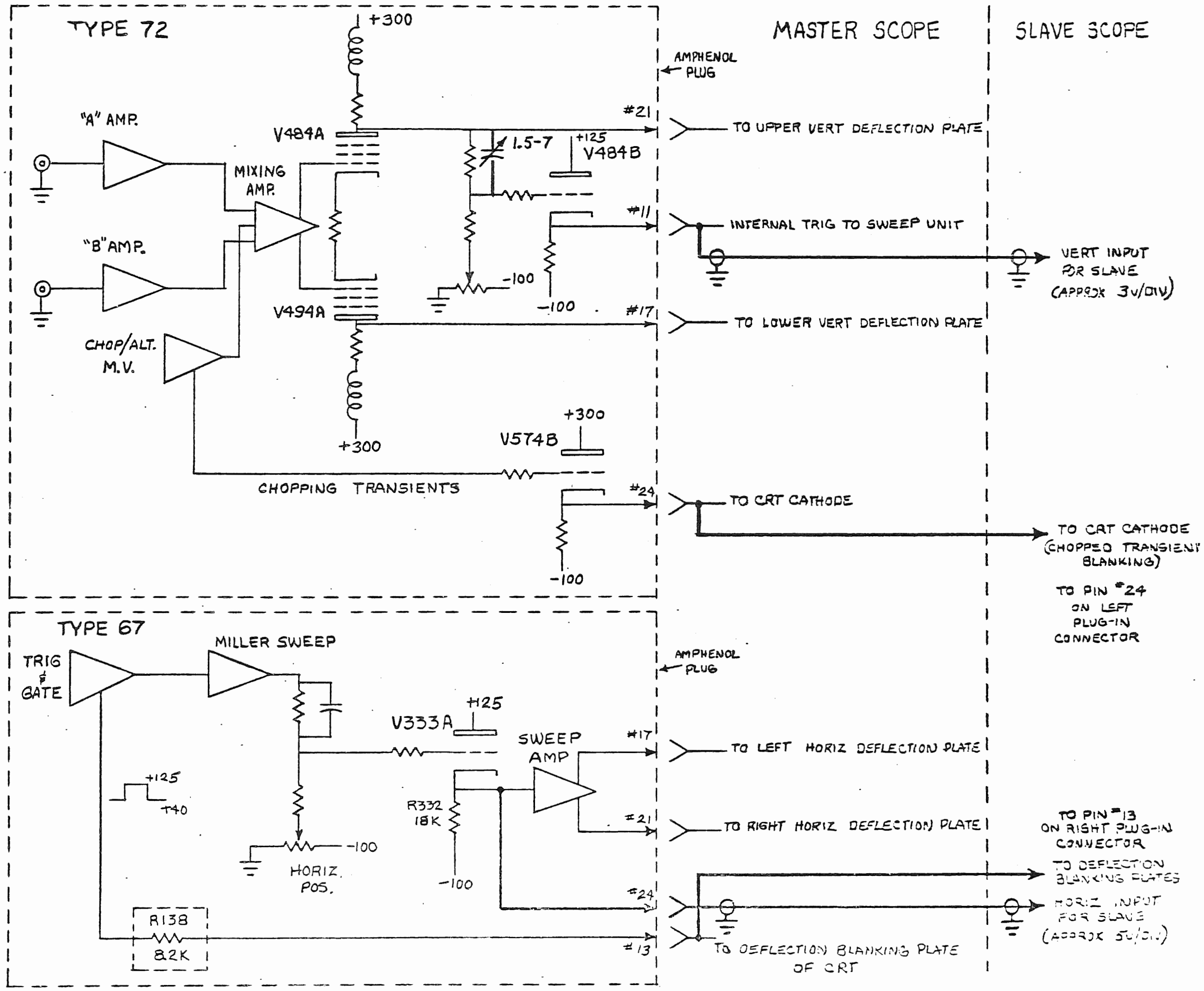
Slave scope mods required:

1. Plug-ins: Cut tie strap between pins 13 and 14.
2. Plug-ins: Remove ground strap from pin 24 (may not be present in early units).

Miscellaneous notes

Signal linearity will be about ±6% in 8 cm because we're using a single-ended sample of the vertical signal from the master. Linearity is dependent on the output stage of the master plug-in.

If you wish to install connectors on the back panel of the indicators, you're cautioned to limit coax length to four feet.


TYPE 72
MASTER SCOPE
SLAVE SCOPE
+300
AMPHENOL PLUG
"A" AMP.
"B" AMP.
V484A
MIXING AMP.
1.5-7
+125
V484B
#21
TO UPPER VERT DEFLECTION PLATE
#11
INTERNAL TRIG TO SWEEP UNIT
VERT INPUT FOR SLAVE (APPROX 3V/DIV)
-100
V494A
#17
TO LOWER VERT DEFLECTION PLATE
CHOP/ALT. M.V.
+300
V574B
CHOPPING TRANSIENTS
#24
TO CRT CATHODE
TO CRT CATHODE (CHOPPED TRANSIENT BLANKING)
TO PIN #24 ON LEFT PLUG-IN CONNECTOR
TYPE 67
TRIG & GATE
MILLER SWEEP
AMPHENOL PLUG
+125
V333A
SWEEP AMP
#17
TO LEFT HORIZ DEFLECTION PLATE
+125
+40
R332 18K
#21
TO RIGHT HORIZ DEFLECTION PLATE
TO PIN #13 ON RIGHT PLUG-IN CONNECTOR
HORIZ. POS.
-100
TO DEFLECTION BLANKING PLATES
#24
HORIZ INPUT FOR SLAVE
R138 8.2K
#13
TO DEFLECTION BLANKING PLATE OF CRT

040-0245-00 560-Series Blank Plug-In Kit

+125V Supply Shunting Instructions Changed

A conflict in the instructions for shunting the +125V supply in constructing custom plug-ins for 560-series instruments with kit 040-0245-00 is being resolved in new printings of the kit instructions.

Previous instructions indicate in one place that shunting is needed for all loads above 25mA in one compartment, but at another place, 45mA is given as the turnover point, and the shunt-auxiliary selection nomograph shows no +125V supply resistor values for loads below 40mA.

Instructions are being revised to make the various parts consistent (shunt should be used for any load over 25mA in one compartment) and extend the chart to show the resistance values to use down to 25mA.

The problem in previous customer-designed plug-ins is probably not serious. The +125V supply is capable of regulating without shunts in the 25-40mA range, even with both compartments so loaded (and is asked to do so with one or two 2B67's installed). The only basic problem is overheating of the series tube at high-line, high ambient -- probably with some reduction of its useful life under those conditions -- and excessive ripple at line voltage extremes. The customer with a 25mA load on the +125V supply and the supply shunted for 40mA (lowest value previously shown on the graph) could have problems regulating at high line, but only if the load in both plug-ins should drop significantly.

The probability of any customer-designed plug-ins being in trouble due to the kit instructions, then, is pretty small, and no extraordinary effort to locate and correct existing instructions is indicated.

Geoff Gass/cmh
Product Technical Information
10-3-66

MODIFICATION KIT

BLANK PLUG-IN

For the following Tektronix Oscilloscopes:

Types 560, 561, RM561, 561A (including Mod 210C), RM561A, 564, RM564, 565, RM565, 567, and RM567

All serial numbers

040-0245-00

DESCRIPTION

This kit provides the necessary 'skeleton' parts and information to construct a special plug-in unit for the above instruments.

With the information provided, it is possible to construct a plug-in unit for use in either a specific 560 Series oscilloscope or in several (or all) of these instruments. The special plug-in may be made to operate in conjunction with a standard Tektronix plug-in unit or with a second special plug-in.

Publication:
Instructions for 040-245
December 1966

Supersedes:
September 1966

PARTS LIST

Quantity	Description	Part Number
1 ea.	Connector, chassis mtg, 24-contact, male	131-0149-00
5 ea.	Lockwasher, int #4	210-0004-00
5 ea.	Nut, hex, 4-40 x 3/16	210-0406-00
2 ea.	Screw, 4-40 x 1/4 PHS, Phillips	211-0008-00
1 ea.	Screw, 4-40 x 3/8 PHS, Phillips	211-0012-00
3 ea.	Screw, 6-32 x 5/16 PHS, Phillips	211-0507-00
3 ea.	Screw, 6-32 x 5/16 FHS, Phil-slot 100°	211-0538-00
4 ea.	Screw, 8-32 x 1/2 FHS, Phil-slot 100°	212-0043-00
4 ea.	Screw, 8-32 x 1/2 RHS	212-0044-00
1 ea.	Fastener	214-0052-00
1 ea.	Panel, front, blank	333-0656-00
1 ea.	Guide, plug-in, nylon	351-0037-00
1 ea.	Knob, plug-in, securing, aluminum, 9/16	366-0109-00
4 ea.	Rod, frame spacing, chrome, 12-1/4	384-0615-00
1 ea.	Sub-panel, blank	387-0408-00
1 ea.	Plate, rear, 3-31/32 x 5-31/32	387-0581-00
1 ea.	Chassis, blank	441-0375-00

GENERAL INFORMATION

The following chart and text are intended as a guide only, showing the voltages, waveforms and currents supplied by each instrument at the plug-in connectors, as well as the voltages and waveforms which the plug-in should supply. Some of the figures are approximate. It is recommended that all information pertaining to a given instrument be examined before a designed plug-in is used in that instrument.

Each of the above instruments has two plug-in receptacles, the left-hand receptacle wired for the Vertical plug-in and the right-hand receptacle for the Horizontal (except Type 565 or RM565). For most of the plug-in connector pins, the available or required voltage is the same on both right and left-hand connectors. However, where connectors differ, the pin number listed in these instructions is followed by an 'R' (right-hand) or 'L' (left-hand).

The dual-beam instruments, Types 565 and RM565, have two identical plug-in receptacles, one for each 'vertical'. The horizontal deflection systems are built-in. For these instruments, the information given for the left-hand pin applies also to the right-hand pin.

NOTE: Information provided here is sufficient to construct plug-ins for operating the Types 567 and RM567 as conventional oscilloscopes only. Extra circuitry is required to use the digital readout plug-ins.

The limit of how much power can be dissipated in one plug-in unit is based primarily upon the ambient temperature and amount of ventilation supplied. Vacuum tubes should not be operated with envelope temperatures above 150°C when the ambient temperature is at 25°C, or above 175°C when the ambient temperature is at 50°C.

Based upon the preceding information, the designed plug-in should not dissipate more than 42 watts DC, or 52 watts AC and DC, regardless of the amount of power a given instrument could supply.

EXPLANATION OF CHART:

'X' indicates line pertains to instrument. Blank space indicates line does not pertain to instrument.

'N.C.' indicates no connection at this pin.

'See L' indicates that information is under left-hand pin.

For example: Pin 17R is wired the same as 17L.

INSTRUMENT					CONN. PIN NO.	DESCRIPTION	AVAILABLE or REQUIRED VOLTAGE	MAX. AVAIL. CURRENT per Plug-in		MAX.* RIPPLE (Approx.) mv	NOTES
560	561/A RM's	564 RM564	565 RM565	567 RM567				NO SHUNT	FULL SHUNT		
X			X	X	1-2	Fil. Power	6.3 V AC	4 amp			Floating
	X	X			1-2	Fil. Power	6.3 V AC	4 amp			Floating
X	X	X	X	X	3	Alt.-Trace Sync Pulse	+10 V to +15 V Pulse	Pins 3 and 4 cross-connected (see text)			Incoming Pulse
X	X	X	N.C.	X	4	Alt.-Trace Sync Pulse	+10 V to +15 V Pulse				Outgoing Pulse
X	X	X	X	X	5	-12 V gnd return					
N.C.	X	X	X	X	6	Shunt for 300 V Supply	+420 V unreg. (no load)				Use Graph
X	X	X	X	X	7-8	Line Voltage	117 V AC	See text			No Isolation
X	X	X	X	X	9	Ground					
X					10	300 V Supply	+300 V ±3%	25 ma		40 (120 cps) 25 (25 KC)	
	X	X	X	X	10	300 V Supply	+300 V ±3%	30 ma	75 ma	80 ****	
X	X	X	X	X	11	Int. Trig. Sig.	±15 V = 8 cm	Pins 11 and 12 cross-connected (see text)			Outgoing
X	X	X	N.C.	X	12	Int. Trig. Sig.	±15 V = 8 cm				Incoming
X	X	X	N.C.	X	13R	CRT Blanking	+125 V DC (no load)				±75 V for Blanking
N.C.	N.C.	N.C.	N.C.	N.C.	13L						
X	See**		N.C.		14R	CRT Blanking	+125 V DC (no load)				
	See***	X	N.C.	X	14R	Intensifying Signal	-8 V to -12 V Level				Raise to 0 V to intensify
N.C.	N.C.	N.C.	N.C.	N.C.	14L						
X					15	125 V Supply	+124 V to +130 V	25 ma		10 (120 cps) 50 (25 KC)	
	X	X	X	X	15	125 V Supply	+125 V ±3%	25 ma	75 ma	20 (567/RM) 10 (others)	

* Maximum ripple usually obtained under full load. Figures for newer instruments subject to revision.
** Unless modified, includes 561's (all s/n) and RM561's below s/n 430.
*** Includes 561A's and RM561A's.
**** 561 s/n 101-241 Ripple may be as high as 100 mv

INSTRUMENT					CONN. PIN NO.	DESCRIPTION	AVAILABLE or REQUIRED VOLTAGE	MAX. AVAIL. CURRENT per Plug-in		MAX. RIPPLE (Approx.) mv	NOTES
560	561/A RM's	564 RM564	565 RM565	567 RM567				NO SHUNT	FULL SHUNT		
X					16	-12 V Supply	-12.4 V to -10.8 V	350 ma		10 (120 cps) 20 (25 KC)	
	X	X	X	X	16	-12.2 V Supply	-12.2 V ±3%	800 ma		3 to 10*	Min. of 150 ma
X	X	X	See L	X	17R	Left-hand Defl. Plate	+180 V DC ±10%				17.4 - 19.6 V/CM
X	X	X	X	X	17L	Lower Defl. Plate	+180 V DC ±10%				17.6 - 24.4 V/CM
N.C.	See**	X	N.C.	X	18-19	Interconnecting pins					18R to 18L 19R to 19L
N.C.	X	X	X	X	20	Shunt for 125 V Supply	+210 V unreg. (no load)				Use graph
X	X	X	See L	X	21R	Right-hand Defl. Plate	+180 V ±10%				17.4 - 19.6 V/CM
X	X	X	X	X	21L	Upper Defl. Plate	+180 V ±10%				17.6 - 24.4 V/CM
N.C.	X	X	X	X	22	Shunt for -100 V Supply	+75 V unreg. (no load)				Use Graph
X					23	-100 V Supply	-100 V ±3%	50 ma		10 (120 cps) 20 (25 KC)	Min. load (see text)
	X	X	X	X	23	-100 V Supply	-100 V ±3%	20 ma	65 ma	20 (565/RM) 5 (others)	See***
N.C.	N.C.	N.C.	See L	N.C.	24R						
N.C.	X	SW854	X	X	24L	CRT Cathode	+30 V to +60 V Pulse				See text for LF Time Constants

* Maximum ripple 45 mv on 561's below s/n 420 (unless modified). Mod kit 040-267 reduces ripple to 5 mv.

** Includes 561's (above s/n 578), 561A's, RM561's and RM561A's. 561's below s/n 579 (unless modified) have "+6 V unreg" on pins 18 and "N.C." on pins 19. Mod kit 040-267 removes +6 V and ties pins together as above.

*** Maximum ripple 20 mv on 561's (all s/n) and RM561's below s/n 384. Mod kit 040-288 reduces ripple on these instruments to 5 mv and improves regulation.

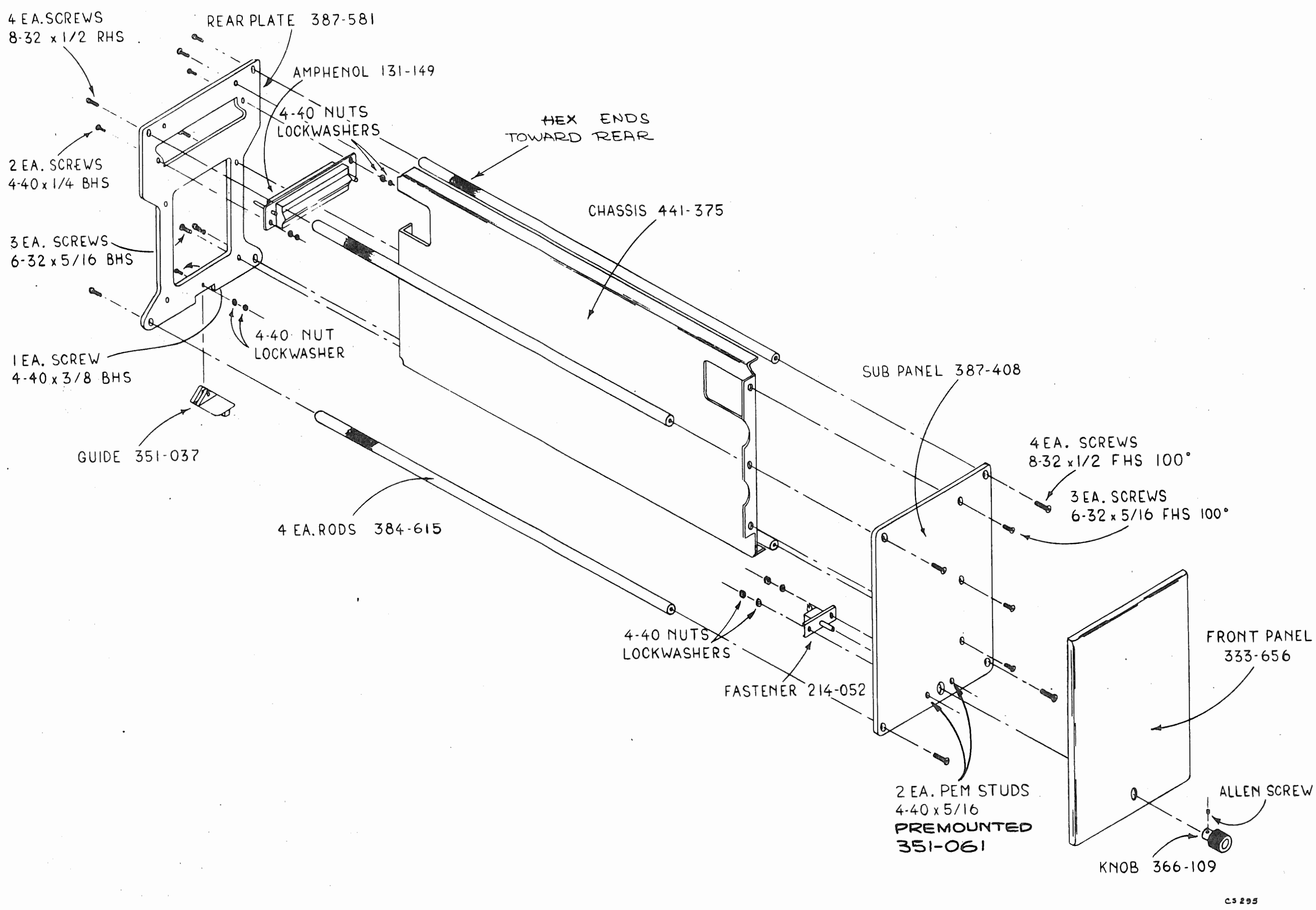
ASSEMBLY INSTRUCTIONS

( ) 1. Assemble the plug-in unit as shown in the drawing, except for the front panel.

( ) 2. Check to see that the plug-in is square, then tighten securely the screws which fasten the four rods to the rear plate and front sub-panel.

( ) 3. Install the front panel. If possible, use mounting nuts on switches, potentiometers, etc., to fasten the front panel.

IMPORTANT: The nylon guide (351-037) shown in drawing may be mounted in two ways. If plug-in requirements exceed capabilities of Type 560 oscilloscope, mount guide so it extends from rear of plug-in, preventing use in that instrument. Otherwise, mount as indicated in drawing.



EXPLANATION

PIN NO.	
1-2	FILAMENT POWER There is a separate floating 6.3 v AC transformer winding for each plug-in. Both are isolated from ground and from each other. One side may be grounded if necessary. The windings shouldn't be elevated above 600 v DC. NOTE: If a considerable amount of current (max current/plug-in shown on chart) is to be drawn from 6.3 v AC Supply, be sure to read paragraph on temperature-power limitations. ON ALL INSTRUMENTS EXCEPT TYPES 565 and RM565, PINS 3 and 4 ARE CROSS-CONNECTED (3R to 4L, and 4R to 3L).
3	ALTERNATE-TRACE SYNC PULSE When Type 67 or 2B67 Time-Base Generator* is used in the adjacent plug-in receptacle (or the instrument is a Type 565 or RM565), a 10 to 15 volt positive pulse, with an approximate risetime of 0.7 to 1.0 μsec is available at this pin. This pulse occurs at the end of the sweep. * A similar pulse will be obtained with certain other Time-Base plug-ins.
4.	ALTERNATE-TRACE SYNC PULSE (EXCEPT TYPES 565 and RM565) If the designed plug-in unit is to be used in conjunction with a standard Tektronix multi-trace plug-in unit, a 10 volt positive pulse (risetime of about 0.7 μsec) should be applied to this pin. This pulse should occur at the end of the sweep. It serves as a switching pulse for the alternate mode.
5	-12 V DC GROUND RETURN To prevent high ground currents, the ground side of the -12 v Supply should be returned to this pin.
6	SHUNT TERMINAL, +300 V (EXCEPT 560) If more than 25 ma is needed from the 300 v Supply, a shunt should be added between pins 6 and 10. Maximum shunt of 2k is obtained when pins 6 and 10 are shorted together. Use the graph on page 7 for selecting the shunt resistor. NOTE: The Type 560 differs from the other types in that shunts can't be used to extend the current range of the power supply.

PIN NO.	
7-8	LINE VOLTAGES With the power switch on, 117 v AC is available at pins 7 and 8. There is no isolation from the power line. There are two limitations to the amount of power which may be drawn at 117 v nominal line, and a third limitation which must be observed for 234 v operation. The limitations are:

1) FUSE: Unless the power drawn by both plug-ins is substantially less than 1 amp total, the line fuse must be increased in value. It should be increased only by the amount of the increased load and THE ORIGINAL FUSE REPLACED WHENEVER THE SPECIAL PLUG-INS ARE REMOVED.

2) CONNECTORS AND SWITCHES:
The amount of power that may be drawn is limited by the current ratings of the 24-pin connectors and the power switch and wiring in the oscilloscope.

LIMITS AND FUSING FOR 117 V OPERATION

Instrument Type	Normal Line Fuse for 117 v	Max Current each Plug-in (pins 7 and 8)	Line Fuse Absolute Max Value*
560	2.0 A	4.0 A	10.0 A
561 RM561 561A, RM561A 564 RM564	3.0 A	4.0 A	10.0 A
565, RM565	6.25 A	2.0 A	10.0 A
567, RM567	4.0 A	3.0 A	10.0 A

* Line fuse should never exceed Normal value plus actual current drawn by both plug-ins at 125 v line.

3) SPECIAL LIMITATIONS FOR 234 V LINE
When the power transformer is connected for 234 v operation, the plug-in connector pins 7 and 8 are normally connected to provide 117 v from the transformer primary center-tap. Current drawn from pins 7 and 8 therefore passes through half the transformer primary and increases transformer dissipation.

UNDER THESE CIRCUMSTANCES, NO MORE THAN 120 MA OF UNBALANCED CURRENT SHOULD BE DRAWN FROM PINS 7 AND 8 (total for both plug-ins).

EXPLANATION (con'd)

PIN NO.	
7-8	LINE VOLTAGES

3) (con'd)

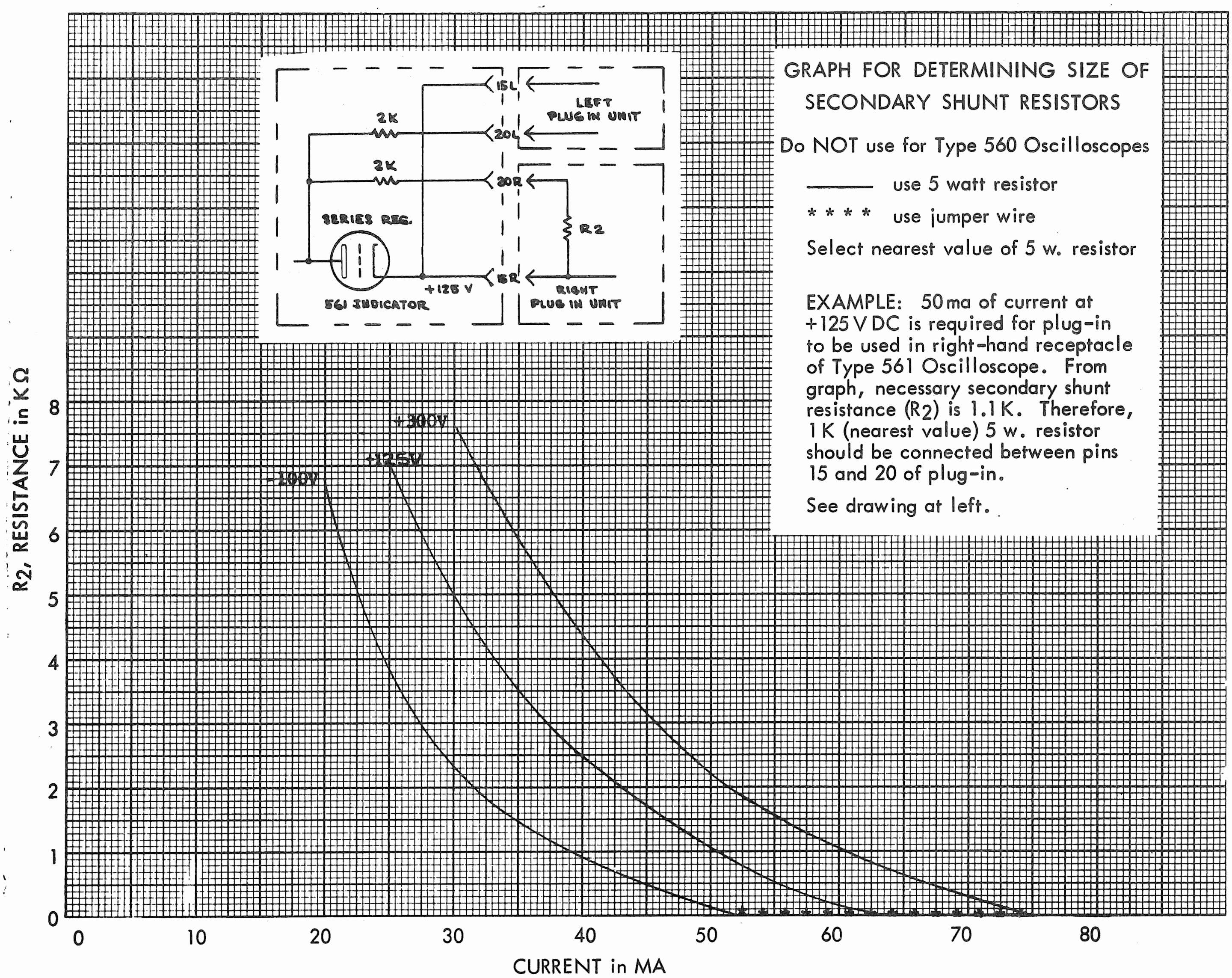
In instruments having a 117 v fan (RM561, RM561A, RM564, 565, RM565, 567, and RM567), if pins 7 and 8 of the plug-in connectors are connected across the opposite half of the primary from the fan connection, the load may be increased to a value equal to the fan current plus 120 ma.

If more power is required, it is possible to supply a small abount of shunt current by means of a resistor across the unloaded half of the transformer primary. However, the unbalance should never be allowed to be more than 120 ma (including fan current, if any) whether the special plug-in(s) are installed or removed. Operation with more than the indicated unbalance may damage the power transformer.

9 GROUND
This is the ground return for all the power supplies (except the -12 v supply) and signals.

10 +300 V DC SUPPLY (560 ONLY)
0 to 25 ma is available per plug-in.

+300 V DC SUPPLY (ALL OTHER TYPES)
0 to 30 ma is available per plug-in without a shunt. 30 to 75 ma is available with a suitable shunt connected between pins 6 and 10 (see 6).



GRAPH FOR DETERMINING SIZE OF SECONDARY SHUNT RESISTORS

Do NOT use for Type 560 Oscilloscopes

———— use 5 watt resistor

* * * * use jumper wire

Select nearest value of 5 w. resistor

EXAMPLE: 50 ma of current at +125 V DC is required for plug-in to be used in right-hand receptacle of Type 561 Oscilloscope. From graph, necessary secondary shunt resistance (R_2) is 1.1 K. Therefore, 1 K (nearest value) 5 w. resistor should be connected between pins 15 and 20 of plug-in.

See drawing at left.

PIN NO.	
11	ON ALL INSTRUMENTS EXCEPT TYPES 565 and RM565, PINS 11 and 12 ARE CROSS-CONNECTED (11R to 12L, and 12R to 11L). INTERNAL TRIGGER SIGNAL, OUTGOING For internally triggering a standard Tektronix Time-Base plug-in in the adjacent plug-in receptacle (or if the instrument is a Type 565 or RM565), a signal proportional to the Vertical deflection of the CRT should be applied at this pin. With no signal applied, the voltage at pin 11 should be +15 volts when the trace is positioned to the top graticule line (on 8 cm graticule), 0 volts when positioned to the center graticule line, and -15 volts when positioned to the bottom graticule line. In other words, ±15 volts is equivalent to 8 cm deflection. A wide variation in this voltage is permissible.
12	INTERNAL TRIGGER SIGNAL, INCOMING (EXCEPT 565 and RM565) When a standard Tektronix Vertical plug-in is used in the adjacent plug-in receptacle, a signal amplitude, as described in 11, is available at pin 12.
13R, 14R	CRT DEFLECTION BLANKING (560, 561, EARLY RM561's -- UNLESS MODIFIED) An average DC level of +125 volts is supplied to each of these pins by the instrument. The usual method of blanking the CRT is to increase, or decrease, the level on pin 13R by 75 volts (although a push-pull method may be used, using both pins).
13R	CRT DEFLECTION BLANKING (Later RM561, 561A, RM561A, 564, RM564, 565, RM565, 567, and RM567) An average DC level of +125 volts is supplied to this pin by the instrument. To blank the CRT, it is necessary to increase, or decrease, this level by 75 volts.
14R	INTENSIFYING SIGNAL (561A, RM561A, 564, RM564, 567, and RM567) When a Type 3B1 or 3B3 Time-Base Generator is used in the right-hand plug-in receptacle, a DC level of -12 v is supplied to this pin from the Generator during 'normal' intensity. A 12 v positive pulse raises the level to 0 v to intensify trace. Similarly, to obtain trace intensification with a designed plug-in, apply a pulse which swings from between -8 v and -12 v (normal) to 0 v (intensified).

PIN NO.	
15	+125 V DC SUPPLY (560 ONLY) 0 to 25 ma is available per plug-in. +125 V DC SUPPLY (ALL OTHER TYPES) 0 to 25 ma is available per plug-in without a shunt. 25 to 75 ma is available with a suitable shunt connected between pins 15 and 20 (see 20). The max load ripple voltage is 10 mv.
16	-12 V DC SUPPLY (560 ONLY) 0 to 350 ma is available per plug-in. -12.2 V DC SUPPLY (ALL OTHER TYPES) 800 ma is available per plug-in. A minimum load of 150 ma per plug-in is recommended, if the supply is used at all. This minimum load requirement does not apply to Types 565 and RM565.
17R	LEFT DEFLECTION PLATE (EXCEPT 565 and RM565) The average DC level on this pin should be 180 v ±10%. (Negative meter lead grounded.) Horizontal deflection sensitivities (abbr: D_h) for these instruments range approximately from 17.4 to 19.6 v/cm. For a full 10 cm of deflection, the potentials at pins 17R and 21R should vary $\pm 5/2 D_h$ and $\mp 5/2 D_h$ respectively, for push-pull operation. Example: Potentials of $+5/2 D_h$ on 17R and $-5/2 D_h$ on 21R deflect the spot 5 cm to the left of the graticule center. Similarly, potentials of $-5/2 D_h$ on 17R and $+5/2 D_h$ on 21R deflect it 5 cm to the right. Intermediate potentials deflect the spot within these limits.
17R	When pins 17 and 21 are driven by a push-pull signal, the effective value of capacitance driven by each side of the output is 16 pf. This effective value includes the capacitance of the connector mounted in the plug-in. The output stage bandwidth of the plug-in, then, will be limited to $\frac{1}{2\pi R(16 \times 10^{-12} + C_0)}$ cycles per second without peaking where R is the source resistance driving one deflection plate, and C_0 is the output stage internal and wiring capacitance to ground. The bandwidth may be improved by a factor of 2 to 2.5 by proper peaking techniques.

EXPLANATION (con'd)

PIN NO.	
17L	LOWER DEFLECTION PLATE

The average DC level on this pin should be 180 v ±10% (Negative meter lead grounded).

Vertical deflection sensitivities (abbr: D_V) vary somewhat with the instrument, as indicated below:

Instrument Type	Approximate D_V Range
560, 561, RM561, 567, RM567	21.6 - 24.4 v/cm
561A, RM561A, 564, RM564	18.5 - 20.5 v/cm
565, RM565	17.6 - 19.4 v/cm
Overall Range	17.6 - 24.4 v/cm

For a full 8 cm of deflection the potentials at pins 17L and 21L should vary $\pm 2D_V$ and $\mp 2D_V$ respectively, for push-pull operation.

Example: Potentials of $+2D_V$ on 17L and $-2D_V$ on 21L deflect the spot 4 cm below the graticule center. Similarly, potentials of $-2D_V$ on 17L and $+2D_V$ on 21L deflect it 4 cm above center. Intermediate potentials deflect the spot within these limits.

17L See 17R for effective capacitance.

18-19 INTERCONNECTING PINS (EXCEPT 560, EARLY 561's NOT MODIFIED, 565, and RM565)
These pins are used in the Types 3S76, 3T77, and 3A74 plug-in units. 18R connects to 18L, and 19R connects to 19L.

20 SHUNT TERMINAL, +125 V (EXCEPT 560)
If more than 25 ma is required from the +125 v supply, then plug-in terminals 15 and 20 should be shunted as follows:

1) 25 ma to 65 ma, use graph on page 7.
2) 65 ma to 75 ma, use a bare wire strap.

21R RIGHT DEFLECTION PLATE (EXCEPT 565, and RM565)
See 17R for characteristics.

21L UPPER DEFLECTION PLATE
See 17L for characteristics.

22 SHUNT TERMINAL, -100 V (EXCEPT 560)
If more than 20 ma is needed from the -100 v supply a shunt should be added between pin 22 and ground. A maximum shunt of 2k is obtained when pin 22 is shorted to ground.

Use the graph on page 7 for selecting the shunt resistor.

PIN NO.

23 -100 V DC SUPPLY (560 ONLY)
50 ma is available per plug-in. A minimum load of 20 ma is recommended to insure proper power supply regulation.

-100 V DC SUPPLY (ALL OTHER TYPES)
0 to 20 ma is available per plug-in without a shunt. Up to 65 ma is available with a suitable shunt connected between pin 22 and ground (see 22).

##24L CRT CATHODE (EXCEPT 560, no connection is made to this pin)
Capacitively coupled to the CRT cathode for blanking or intensifying relatively short segments of the trace. In instruments noted with an asterisk (*) below, rear panel switch SW854 must be set to 'Dual Trace' or 'Chopped Blanking' to complete the pin 24 to CRT connection.

AMPLITUDE REQUIREMENTS
A positive-going pulse will blank the trace; a negative-going pulse will intensify it. A slow or high-repetition-rate trace of normal viewing intensity (approximately 5 μA beam current) will be completely blanked by a positive pulse of 10-15 V; at maximum intensity, 45-60 V may be required for complete blanking, although apparently complete blanking may be obtained with considerably lower amplitudes. A negative-going pulse for intensification should not exceed approximately 30 V amplitude, or severe defocusing and deflection aberrations may result.

TIME-CONSTANT
Nominal coupling time-constants for various instruments are shown below. Because the dynamic impedance of the CRT cathode is part of the effective time-constant, the nominal values hold only near or below beam cutoff, and will be reduced to approximately half the indicated value at high intensity.

Instrument Type	SN Range	Nominal Time
561, RM561	All	55 μsec
*561A	5001-12112	67.5 μsec
	12113-up	135 μsec
*RM561A	5001-8739	67.5 μsec
	8740-up	135 μsec
*564	101-2979	67.5 μsec
	2980-up	135 μsec
*RM564	All	185 μsec
565, RM565	All	22 μsec
567	101-248	55 μsec
	249-up	67.5 μsec
RM567	102-up	67.5 μsec

BE:ls

MAINTENANCE

Inter-City Mfg. Co., Inc.
St. Louis 11, Mo.

CONTENTS-MAINTENANCE

MODIFICATION SUMMARY

561

NYLON POSTS REPLACED AND STANDARDIZED TO REDUCE COST AND ELIMINATE EXTRA POSTS	INFORMATION ONLY	M2397

Effective Prod s/n not given

DESCRIPTION:

Nylon posts produced from 1/4 in. nylon rod are replaced with molded delrin posts. The new posts are standardized to save time and expense, and to facilitate manufacture and installation.

Parts Removed:		Parts Added:	
Post, nylon	385-108	Post, delrin	385-137

+300 V POWER SUPPLY CAPACITOR CHANGED TO REDUCE RIPPLE	See SQB	M3300

Effective Prod s/n 241

Usable in field instruments s/n 101-240

DESCRIPTION:

Reduces the ripple in the +300 v Power Supply by replacing C644, a single 125 µf capacitor, with a 2x125 µf electrolytic capacitor.

This mod reduces the ripple from 30 MV to 20 MV at 117 v AC line voltage and from 95 MV to 80 MV at 105 v AC line volts.

Parts Removed:			Parts Added:		
C644	125 µf 350 v	290-044	C644	2x125 µf 350 v	290-133

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace C644, located below the CRT socket, with a 2x125 µf 350 v electrolytic capacitor.

POWER SUPPLY DIODES
REPLACED WITH MORE RELIABLE HERMETICALLY SEALED DIODE

See SQB

M3368

Effective Prod SN 301

Usable in field instruments SN 101-300

DESCRIPTION:

Replaces the power supply diodes D640A, B, C, D; D642A, B, C, D; and D644A, B, C, D with a more reliable hermetically sealed diode to improve reliability. Three ceramic strips were replaced to provide additional diode mounting away from the chassis. NOTE: The 1N3194 diodes do not have a 'top hat' as do the 1N2862 diodes. Therefore they lend themselves to an easier component dress and replacement.

Parts Removed:

D640A-D, D642A-D, D644A-D	1N2070	152-011
Strip, cer, 7/16 x 11 notch(3)		124-106

Parts Added:

D640A-D, D642A-D, D644A-D	1N2862	152-047
* Strip, cer, 3/4 x 11 notch (3)		124-091

Parts Required for Field Installation:

See 'Parts Added' with asterisk and parts listed below.

D640A-D, D642A-D, D644A-D	1N3194 or equivalent	152-066

INSTALLATION INSTRUCTIONS:

a) Replace the three 7/16 x 11 notch ceramic strips located above the Power Transformer connections with three 3/4 x 11 notch ceramic strips.

Wire new ceramic strips as before.

b) Replace diodes D640A-D, D642A-D and D644A-D (12 each) with twelve 1N3194 silicon diodes. Dress diodes to prevent any contact with other components or chassis.

POWER TRANSFORMER MODIFIED TO IMPROVE LOW LINE REGULATION | See SQB | M3367

Effective Prod SN 316 | Usable in field instruments SN 101-315

DESCRIPTION:

Improves the low line regulation of Power Transformer T601 by adding turns to increase unregulated supply voltages.

The -100 V and +125 V windings were increased by 3%. The +300 V winding was increased by 1%.

Also insure that the calibrator voltage will be properly phased with the line by making terminals 9, 3 and 4 all either start or finish of transformer winding operation.

Parts Removed:

T601 power transformer

Parts Added:

T601 LV power 120-0192-00

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace Power Transformer T601 with a 120-0192-00 Power Transformer

CALIBRATOR CAPACITOR REPLACED TO IMPROVE 'CORNERS' ON CALIBRATOR WAVEFORM — See SQB — M3495

Effective Prod s/n 420 — Usable in field instruments s/n 101-419

DESCRIPTION:

Improves the squareness of the corners on the calibrator waveform by replacing C878 with a 100pf capacitor.

The waveform had a 4% roll-off at start of falling edge and about 2% at the leading edge.

Parts Removed:			Parts Added:		
C878	1pf 500v	281-538	C878	100pf 350v	281-523

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS:

Replace C878, located between ceramic strips below V884, with a 100pf capacitor.

SEMICONDUCTOR INFORMATION STANDARDIZED — INFORMATION ONLY — M3535

Effective Prod s/n not given

DESCRIPTION:

The following changes are to be made, as applicable:

1) All semiconductor type numbers are deleted from the chassis, leaving only the circuit designation.
2) Circuit designations of silicon diodes change from 'V' to 'D'.
3) Circuit designations of transistors change from 'V' to 'Q'.

-12 V POWER SUPPLY WIRE
MOVED TO REDUCE RIPPLE

See SQB

M3593

Effective Prod s/n 396

Usable in field instruments s/n 101-395

w/exceptions	101-2	206	250	335	371-3
	105	213	259	339	375-6
	130	231	263	345	379-88
	148	241	276	357-63	390-4
	152-3	243	288	365-9	

DESCRIPTION:

Reduces the ripple in the -12v regulated power supply from 45 MV to approximately 5 MV by moving the R737 end of a series connected combo (C737 - R737) from the -12volt buss to the collector of Q744 and the base of Q757.

This mod is included in Field Modification Kit 040-267. Also see M3678, M3854 and M5841.

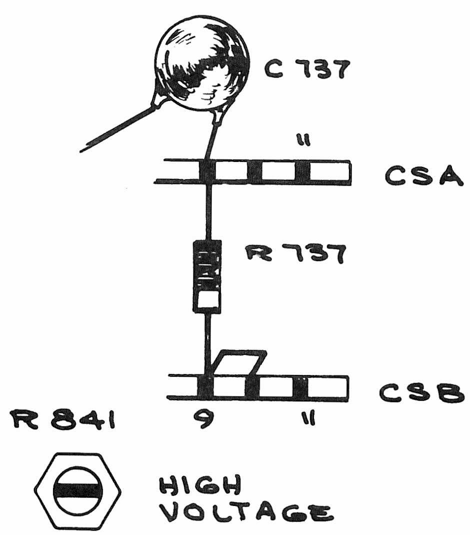
INSTALLATION INSTRUCTIONS:

Refer to Field Mod Kit 040-267 instructions, or:

a) Remove a 1-1/4 in. bare wire between CSB-9 and CSA-10.

b) Add a no. 22 bare wire between CSB-9 and CSB-10.

See Before and After schematics on following page.



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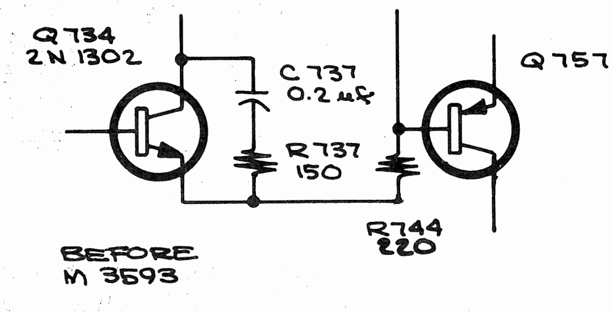
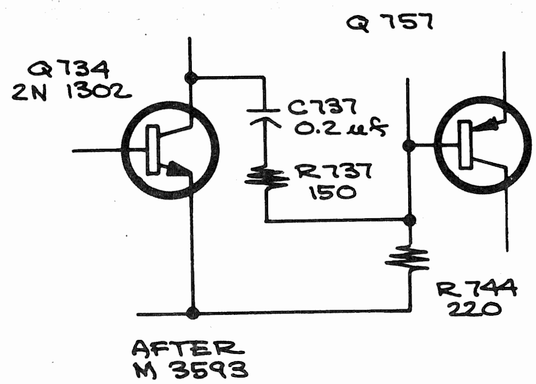




HV POWER SUPPLY FEEDBACK AMP, V814, AND COMPONENTS CHANGED TO REDUCE 60 Hz INTENSITY MODULATION

See SQB

M3609

Effective Prod s/n 433

Usable in field instruments s/n 101-432

DESCRIPTION:

Reduces 60 Hz intensity modulation by changing V814 to a type 12BH7 tube. Cathode capacitor C815 and resistor R816 were added to compensate for the circuit changes. The Indicator chassis was changed to correct for silkscreen differences.

Parts Removed:

V814	12AU7	151-041B
Chassis, Indicator		441-337

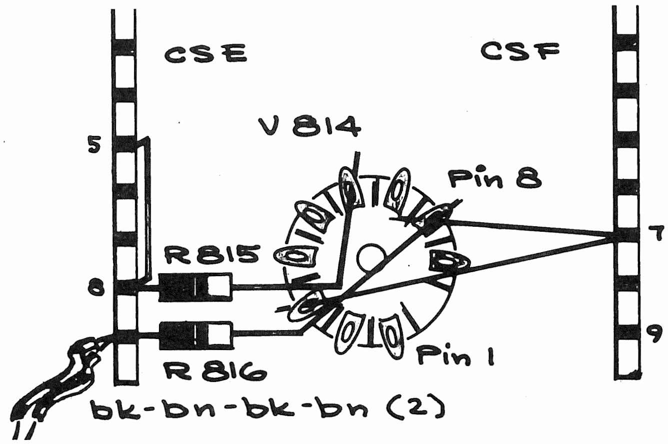
Parts Added:

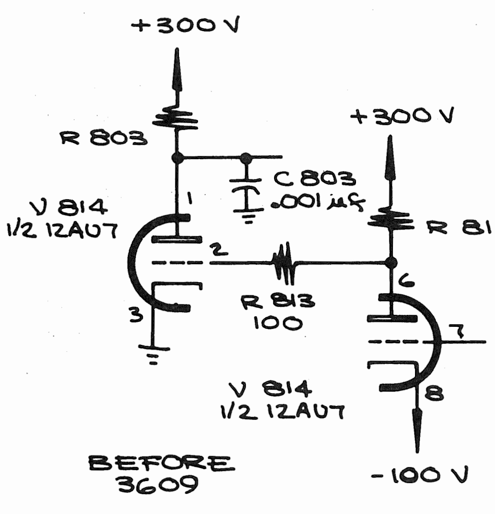
V814	12BH7	154-046
R816	2.2k 1/2w 10%	302-222
C815	5 µf 150 v	290-149
Chassis, Indicator		441-394

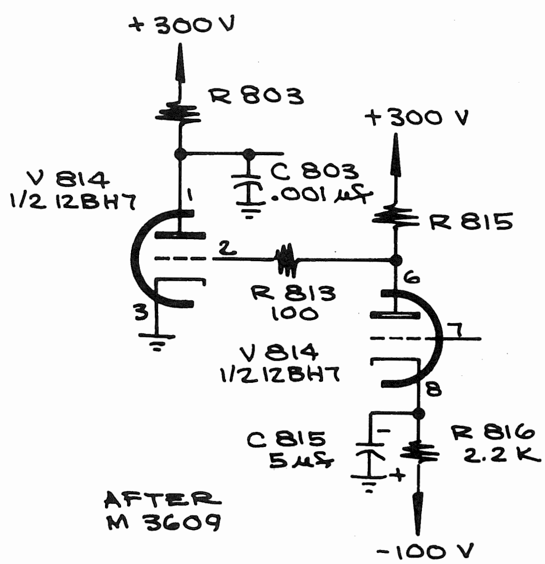
continued

INSTALLATION INSTRUCTIONS:

a) Move the black-brown-black-brown wires from pin 8 of V814 to CSE-9.
b) Move the CSE-7 end of a 470k resistor to CSE-8.
c) Remove a no.22 bare wire between CSE-5 and CSE-7.
d) Add a no.22 bare wire between CSE-5 and CSE-8.
e) Add a 2.2k resistor (R816) between CSE-9 and pin 8 of V814.
f) Add a no.22 solid wire between pin 8 of V814 and CSF-7.
g) Add a 5 µf 150 v electrolytic capacitor between CSE-7 (-) and CSF-7 (+).
h) Add a no.22 solid wire between CSE-7 and pin 3 of V814.
i) Replace the 12AU7 tube in the V814 socket with a 12BH7 tube.







SILVER-BEARING SOLDER PROVIDED FOR CUSTOMER CONVENIENCE

INFORMATION ONLY — M3660

Effective Prod s/n not given

DESCRIPTION:

The customer is provided with a spool of silver-bearing solder, mounted on the instrument, for repair purposes. A 5/32 in. hole is added in a conspicuous location and a press-in nylon spool with 3 ft. of solder is installed.

Parts Removed:

Parts Added:

Spool, assembly w/solder	214-210
Spacer, nylon molded, 0.063	361-007

POWER SUPPLY AND PLUG-IN CONNECTOR CIRCUITRY CHANGED TO ADAPT TO TYPES 76/3S76 AND 77/3T77 PLUG-INS

See SQB — M3678

Effective Prod s/n 580

Usable in field instruments s/n 101-578

w/exceptions 101	243	395	574
105	250	411-2	579
231	259	500-4	
241	350	528	

DESCRIPTION:

Adapts the 561 power supply and plug-in connector circuitry to permit the use of the type 3S76 and 3T77 plug-ins. This was accomplished by:

1) Removing the 6v DC unregulated from pin 18 of the plug-in connectors.
2) Changing the trigger signal and dual-trace sync pulse leads to coaxial cable for improved shielding. The 6 in. coax is connected between pin 18 of right and left interconnecting sockets and braided shield between pin 19 of right and left sockets.

   The 5-3/4 in. coax is connected between pin 3 of right interconnecting socket and pin 4 of left socket, and braided shield between pin 4 of right hand socket and pin 3 of left hand socket.

This mod is included in Field Modification Kit 040-267. Also see M3593 and M5841.

Parts Removed:

Cable, Indicator	179-456
Wire, no. 22 str, w-o (6-1/2")	175-527
Wire, no. 22 str, w-y (6-1/4")	175-527

Parts Added:

Cable, Indicator	179-570
Cable, RG/174 (6")	175-068
Cable, RG/174 (5-3/4")	175-068

Parts Required for Field Installation:

Field Modification Kit 040-267

INSTALLATION INSTRUCTIONS:

Refer to kit instructions.

-12 V POWER SUPPLY RESISTORS CHANGED TO IMPROVE REGULATION WITH AMBIENT TEMPERATURE CHANGES

See SQB

M3854

Effective Prod s/n 1110

Usable in field instruments s/n 101-1109

DESCRIPTION:

Improves the regulation of the -12 V power supply caused by ambient temperature changes, by lowering the resistance of voltage divider resistors R731 and R732. This will lessen the effect of base current changes from Q734 as it increases with temperature.

M3854 is part of Field Modification Kit 040-267.

Parts Removed:

R731	4.21 k 1/2 w 1%	309-105
R732	31.1 k 1/2 w 1%	309-037

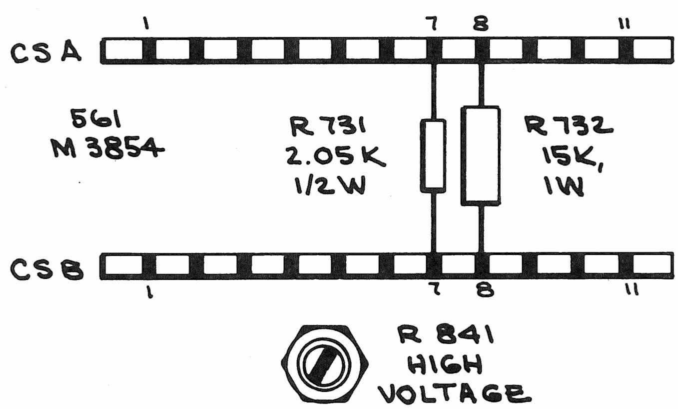
Parts Added:

R731	2.05 k 1/2 w 1%	309-104
R732	15 k 1 w 1%	310-115

INSTALLATION INSTRUCTIONS:

a) Replace R731, located between CSA-7 and CSB-7, with a 2.05 k 1/2 w 1% resistor.

b) Replace R732, located between CSA-8 and CSB-8, with a 15 k 1 w 1% resistor.



CRT HV RESISTOR REPLACED
TO IMPROVE RELIABILITY

See SQB

M5114

Effective Prod s/n 1160

Usable in field instruments s/n 101-1159

w/exceptions 231	763-6	818	921	1039	1084	1129-30
596	769	900-1	933-6	1042	1087	1132
647	771	904-8	980	1062	1093	1134-5
741	778	910-1	1013	1066	1106-7	1141
754	798	913-7	1036	1077	1115	1143-54

FRONT PANEL SYMPTOM: Intermittent intensity modulation or full intensity with no control.

PROBLEM: A 12 meg resistor (R842) in the CRT HV divider string is rated at 2kV. At turn on, the voltage across it can reach 2.5 kV which can cause internal arcing or a complete open.

PRODUCTION CHANGE: R842 was replaced by a pyrofilm resistor (310-595) having higher operation voltage characteristics.

NOTE: The 310-595 resistor continued to be used in the 561 and later in the 561A until approximately s/n 7620. At this time it was replaced, because of a high failure rate, with a 12 meg 2W composition resistor assembly composed of a series string of two 2.7 meg 2W 10% and two 3.3 meg 2W 10% composition resistors (See M7052 in the 561A).

Parts Replacement Kit (050-0118-00) containing 12 meg 2W composition series string was made available to replace the 310-568 and 310-595 resistors. It is also used as the part number for replacing the 12 meg series string.

Parts Removed:

R842	12 meg 2W ±5%	310-568

Parts Added:

R842	12 meg 2W ±5%	310-595

Parts Required for Field Installation:

Parts Replacement Kit 050-118

INSTALLATION INSTRUCTIONS:

Refer to kit instructions.

CAL OUT CONNECTOR CHANGED TO SCREW-MOUNTED TYPE

INFORMATION ONLY M3847

Effective Prod s/n 1245

DESCRIPTION:

To alleviate a mounting problem caused by the close tolerance requirements of the mounting hole, insulating bushing and coax connector, the connector is changed from the 'D' type to a two-screw-mounted type.

Parts Removed:		Parts Added:	
Connector, coax	131-081	Connector, coax	131-064
Plate, front subpanel	387-291	Plate, front subpanel	387-621

LV POWER SUPPLY RESISTOR ADDED TO REDUCE WARM-UP TIME

See SQB M5200

Effective Prod SN 1280

Usable in field instruments SN 101-1279

DESCRIPTION:

Reduces the LV Power Supply warm-up time by lowering the ignition potential of the gas regulator tube V609. This was accomplished by adding a 10 Meg resistor (R608) between +80 v and pin 6 of V609.

Parts Removed:

Parts Added:

R608	10 M 1/2 w 10%	302-106
Wire, no. 22, bk-bn-r (4-3/4")		179-570

Parts Required for Field Installation:

See 'Parts Added'.

INSTALLATION INSTRUCTIONS: Refer to the BEFORE and AFTER drawings for component locations.

a) Remove R609 (2.7 k 1/2 W 10%), between CSE-12 and CSF-12. (SAVE)

b) Remove the bare wire strap, between CSE-12 and ground lug, on socket V609.

c) Remove the bare wire strap, between CSF-12 and pin 5, of V609.

d) Unsolder the end of R610 (100 k 1/2 W 10%) connected to CSE-13.

e) Remove the bare wire strap, between CSE-13 and CSF-12.

f) Add a #22 bare wire strap, between CSE-13 and pin 1, of V609.

g) Solder R609, removed in step (a), between CSE-13 and V609 socket ground lug. Dress below notch level.

h) Resolder R610, unsoldered in step (d), to CSE-13.

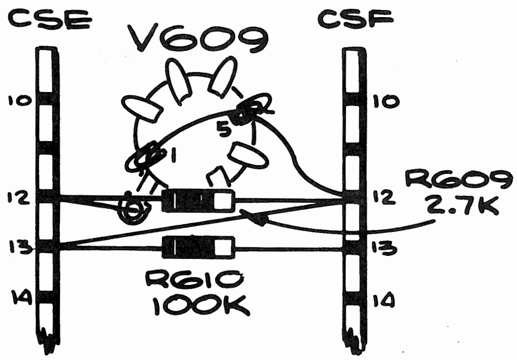
i) Solder a 4-3/4in. length of #22 black-brown-red wire between CSE-12 and pin 3, of V627.

continued

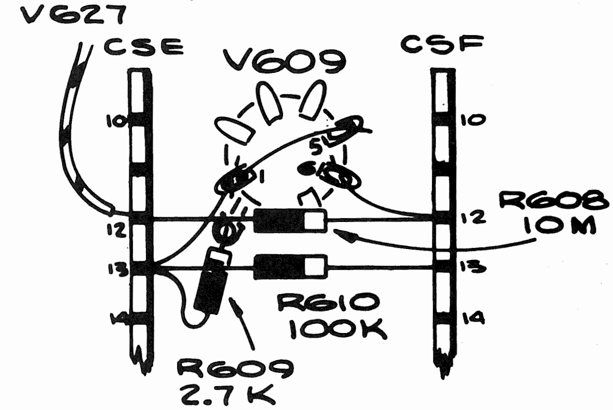
INSTALLATION INSTRUCTIONS (cont)

k) Solder a #22 bare wire strap, between CSF-12 and pin 6, of V609.

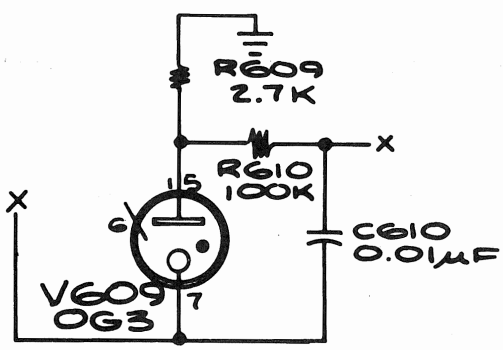
m) Solder a 10 M 1/2 W 10% resistor (R608), between CSE-12 and CSF-12.



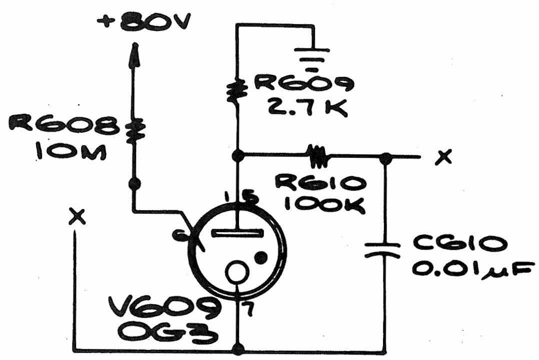
BEFORE
M5200



AFTER
M5200



BEFORE
M5200



AFTER
M5200

FRONT PANEL KNOBS CHANGED TO ALLOW USE WITH TEKAMERA

See SQB — M3648

Effective Prod s/n 1370 — Usable in field instruments s/n 101-1369

DESCRIPTION:

Permits use of Tektronix cameras by replacing the FOCUS knob with a smaller black knob. This eliminates interference between the camera latch and focus knob.

The SCALE ILLUM and INTENSITY potentiometers were also replaced and provided with the small knobs to decrease potentiometer shaft lengths and retain a uniform knob appearance.

NOTE: The present 500k INTENSITY potentiometer will change to a 1/4 in. short shaft pot by changing our purchase specifications with the manufacturer.

Field Modification Kit 040-0320-01 replaces the 500k INTENSITY potentiometer, with a 2 Meg pot which has a 3/8 in. shaft. Instrument serial numbers 101-5000, having Mod Kit 040-0320-01 installed, should use the special 311-0043-01, 1/4 in. shaft potentiometer, for replacement purposes.

Parts Removed:

R601	50Ω, 3/8" shaft	311-055
R844	5 Meg, 3/8" shaft	311-121
Knob, .781 x .591 high (3)		366-044

Parts Added:

R601	50Ω, 1/4" shaft	311-262
R844	5 Meg, 1/4" shaft	311-263
Knob, .781 x .406 high (3)		366-134

Parts Required for Field Installation:

See 'Parts Added', and part listed below.

R547	500k 1/4" shaft	311-188

INSTALLATION INSTRUCTIONS:

a) Replace the FOCUS (R844), SCALE ILLUM (R601) and INTENSITY (R547) potentiometers with ones having 1/4 in. shaft lengths.

b) Replace the three large black knobs with the three 366-134 knobs.

CALIBRATOR SWITCH CHANGED
TO PROVIDE ACCURATE 100MV
SIGNAL INTO 50Ω LOAD

See SQB

M5841

Effective Prod s/n 1580
w/exceptions 1385-6

Usable in field instruments s/n 101-1579

DESCRIPTION:

Provides an accurate 100MV signal into a 50Ω load with the 'Cal Sw' set at 0.5v by replacing the CALIBRATOR switch 262-207 with a 262-497 switch. The new switch is identical to the old switch except R898 was changed from a 100Ω 10% to a 100Ω 1% resistor.

This mod permits calibrating the 3S76 gain adjustments.

Included in Field Modification Kit 040-0267-00. Also see M3593 and M3678.

Parts Removed:			Parts Added:		
SW870	CALIBRATOR	262-207	SW870	CALIBRATOR	262-497

Parts Required for Field Installation:

See 'Parts Added', and part listed below.

R898	100Ω 1/2w 1%	309-0112-00

INSTALLATION INSTRUCTIONS:

Replace R898, located between the CALIBRATOR switch and the CAL OUT jack, with a 100Ω 1/2w 1% resistor.

CRT SECURING RING REPLACED TO PREVENT SLIPPAGE

See SQB — M5400

Effective Prod s/n 1619

Usable in field instruments SN 101-1618

DESCRIPTION:

Longitudinal slippage of the CRT inside the Rotator assembly may occur during shipment. To prevent this movement, the 'hard' butyrate securing ring (between clamping ring and CRT base) is replaced with a 'soft' natural urethane ring. Physical dimensions remain the same.

The CRT rotator base is also modified by adding a flange and hole to secure the rotator stud at the other end also. This will restrict the movement of the securing ring within the rotator base. Part number of the rotator base is unchanged.

Parts Replacement Kit 050-0063-00 is available to facilitate the replacement of CRT securing ring 354-078 in pre-modified instruments.

Parts Required for Field Installation:

Parts Replacement Kit	050-0063-00

INSTALLATION INSTRUCTIONS:

Refer to kit instructions.

+300 V SUPPLY REGULATION IMPROVED

See SQB — M6249

Effective Prod s/n 1845

Usable in field instruments s/n 101-1844

DESCRIPTION:

Low-line regulation of the +300v supply is improved by removing the 10Ω 'fuse' resistor.

Parts Removed:

R644	10Ω 1w 10%	304-100

Parts Added:

INSTALLATION INSTRUCTIONS:

a) Remove R644 (10Ω 1w resistor), in series with the +300 V rectifier, on bracket 406-617.

b) Move the gray-red-orange wire to the notch from which the other end of R644 was unsoldered.

ACCESSORIES CHANGED TO PERMIT PATCHING WITHOUT ADAPTERS

INFORMATION ONLY

M8313

Effective date 2-26-65 -- Mod 210G

DESCRIPTION:

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 inch red BNC to BNC	012-085
6 inch red BNC to banana plug	012-089
6 inch black BNC to BNC	012-084
6 inch black BNC to banana plug	012-088
18 inch black BNC to BNC	012-086
18 inch black BNC to banana plug	012-090

Parts Removed:

Adapter, BNC	(2)	103-033
Cord, patch, red, 18 in.		012-031

Parts Added:

Cord, patch, red, BNC to BNC, 18 in.	012-087
Cord, patch, red, BNC to banana plug, 18 in.	012-091
Jack, post, red, BNC	012-092

JB:fb

MODIFICATION SUMMARY

RM561

SILVER-BEARING SOLDER PROVIDED FOR CUSTOMER CONVENIENCE

INFORMATION ONLY

M3660

Effective Prod s/n not given

DESCRIPTION:

The customer is provided with a spool of silver-bearing solder, mounted on the instrument, for repair purposes. A 5/32 in. hole is added in a conspicuous location and a press-in nylon spool with 3 ft. of solder is installed.

Parts Removed:

Parts Added:

Spool, assembly, w/solder	214-0210-00
Spacer, nylon molded, 0.063	361-0007-00

-12 V POWER SUPPLY RESISTORS CHANGED TO IMPROVE REGULATION WITH AMBIENT TEMPERATURE CHANGES

See SQB

M3855

Effective Prod s/n 220

Usable in field instruments s/n 101-219

DESCRIPTION:

Improves the regulation of the -12 v power supply caused by ambient temperature changes, by lowering the resistance of voltage divider resistors R731 and R732. This will lessen the effect of base current changes from Q734 as it increases with temperature.

Parts Removed:

R731	4.21 k 1/2 w 1%	309-105
R732	31.1 k 1/2 w 1%	309-037

Parts Added:

R731	2.05 k 1/2 w 1%	309-104
R732	15 k 1 w 1%	310-115

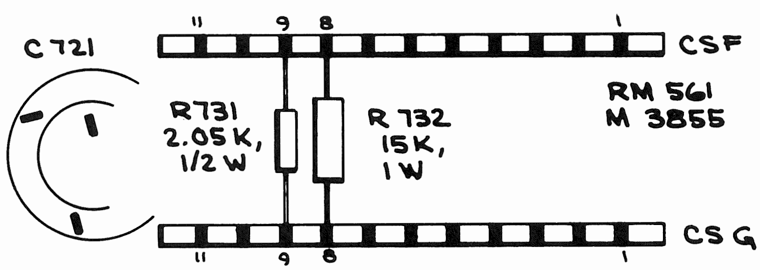
Parts Required for Field Installation:

See 'Parts Added.'

INSTALLATION INSTRUCTIONS:

a) Replace R731, located between CSF-9 and CSG-9, with a 2.05 k 1/2 W 1% resistor.

b) Replace R732, located between CSF-8 and CSG-8, with a 15 k 1 W 1% resistor.



CRT CIRCUIT HV RESISTOR
REPLACED TO IMPROVE RELIABILITY

See SQB

M5114

Effective Prod s/n 230 — Usable in field instruments s/n 101-229
w/exceptions: s/n 145, 162, 167, 171, 186, 192, 206, 220-4, 226

DESCRIPTION:

Improves the reliability of the HV CRT circuit by replacing R842 with a more reliable component. Some early 561 and RM561 Oscilloscopes can develop an intermittent-intensity-modulation problem. The problem stems from R842, a 12 Meg 2 w precision resistor in the CRT high-voltage-divider string. When R842 goes out completely, the operator will have no control over the intensity; the beam will be full on. R842 is rated at 2 kv. At turn on time, the voltage across R842 goes up to 2.5 kv and some of these resistors will be destroyed.

The Pyrofilm replacement resistor we originally recommended, performed very well during the tests we conducted to find a replacement, but later it proved just as susceptible to failure as the original resistor.

A more satisfactory replacement for R842 in these instruments is a series string of four 2 w 10% composition resistors -- two of 2.7 Megohms and two of 3.3 Megohms -- totaling 12 Megohms. The high-voltage environment and limited available space of R842 require a special arrangement and careful wiring of these resistors into a series string.

Parts Replacement Kit 050-147 (RM561) is available to facilitate the replacement of R842 in earlier instruments.

Parts Removed:			Parts Added:		
R842	12 M 2 w ±5%	310-568	R842	12 M 2 w ±5%	310-595

Parts Required for Field Installation:

Parts Replacement Kit 050-147

INSTALLATION INSTRUCTIONS:

Refer to Kit instructions.

CRT CLAMP CHANGED TO PROVIDE BETTER PARALLAX CORRECTION BETWEEN GRATICULE AND CRT FACE

INFORMATION ONLY — M3845

Effective Prod s/n 240

DESCRIPTION:

Provides a better parallax correction between the graticule and CRT face by replacing the CRT clamp and hardware with a new CRT parallax adjusting clamp and new mounting hardware. The new clamp assembly fastens to the CRT shield in a similar manner to the old, utilizing the top and right hand (from rear) holes in the shield. Approximately 3/16" adjustment is provided in all directions.

Parts Removed:		Parts Added:	
Clamp, CRT	343-078	Bracket, parallax adj	406-730
Screw, 6-32 x 3/8 BHS (6)	211-510	Nut, 0.312 x 110° w/(2) 6-32	214-207
Lockwasher, int #6 (6)	210-006	Ring, clamp, 1/2 x 2-1/2 ±D	354-147
Nut, hex, 6-32 x 1/4	210-407	Screw, 6-32 x 7/8 skt.head (2)	211-576
Screw, 10-32 x 7/8 RHS	212-548	Screw, 6-32 x 5/16 PHS (4)	211-534
Nut, square 10-32 x 3/8	210-501	Washer, 5-32 ID x 1/2 x 1/16 (2)	210-858
		Screw, 6-32 x 1 RHS	211-560

CAL OUT CONNECTOR CHANGED TO SCREW-MOUNTED TYPE

INFORMATION ONLY — M3848

Effective Prod s/n 260

DESCRIPTION:

To alleviate a mounting problem caused by the close tolerance requirements of the mounting hole, insulating bushing, and coax connector, the connector is changed from the "D" type to a two-screw-mounted type.

Parts Removed:		Parts Added:	
Connector, coax	131-0081-00	Connector, coax	131-0064-00
Plate, front subpanel	387-0291-00	Plate, front subpanel	387-0621-00

LV POWER SUPPLY RESISTOR
ADDED TO REDUCE WARM-UP TIME

See SQB

M5200

Effective Prod s/n 270 except s/n 268-9

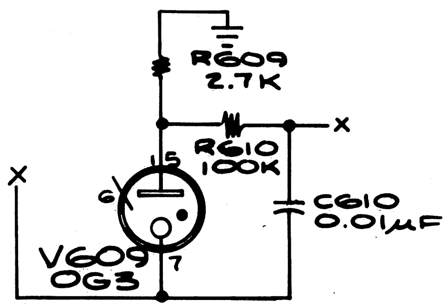
DESCRIPTION:

Reduces the LV Power Supply warm-up time by lowering the ignition potential of the gas regulator tube, V609. This was accomplished by adding a 10 Meg resistor (R608) between +80 v and pin 6 of V609.

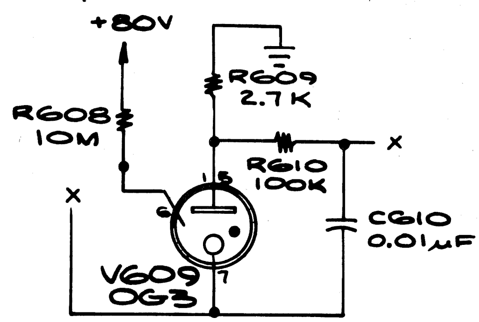
Parts Removed:

Parts Added:

R608 10 M 1/2 w 10% 302-106



BEFORE
M5200



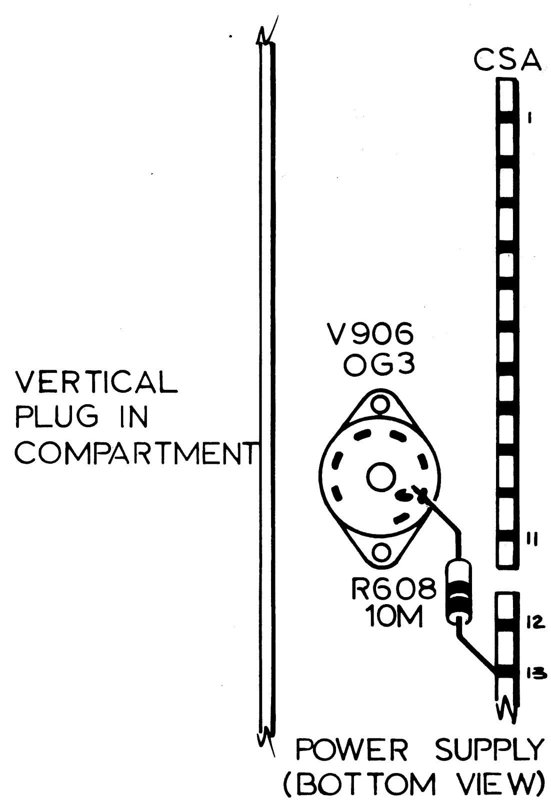
AFTER
M5200

Parts Required for Field Installation:

See 'Parts Added.'

INSTALLATION INSTRUCTIONS:

Add a 10 Meg 1/2 w 10% resistor (R608) between CSA-13 and pin 6 of V609. See drawing.



POWER CORD REPLACED BY RIGHT ANGLE TYPE TO ELIMINATE PROTRUSION — INFORMATION ONLY — M5193

Effective Prod s/n 290

DESCRIPTION:

The present power cord extends out too far with instrument installed in the rack. This was corrected by replacing the straight cord with a right angle type.

Parts Removed:		Parts Added:	
Cord, 16 ga 8', 3-wire	161-010	Cord, 18 ga 8', 3-wire angle	161-013

CRT BEAM ROTATOR COIL LOCATION CHANGED TO IMPROVE ORTHOGONALITY OF TRACE — See SQB — M5411

Effective Prod s/n 310

Usable in field instruments s/n 101-309

DESCRIPTION:

Improves the orthogonality of the trace by reversing the physical location of the CRT beam rotator coil so that its index tabs and coil electrical connections are on the side of the coil nearest the front of the scope. No field modification of instruments is necessary unless a geometry problem exists.

Parts Removed:

Parts Added:

INSTALLATION INSTRUCTIONS:

Reverse the physical position of the Beam Rotation coil so that its index tabs and coil electrical connections will be on the side of the coil nearest the front of the instrument.

-100 V POWER SUPPLY CIRCUIT CHANGED TO IMPROVE REGULATION PERMITTING USE WITH 3S76 AND 3T77 PLUG-INS

See SQB

M5812

Effective Prod s/n 384

Usable in field instruments s/n 101-383

DESCRIPTION:

Improves the regulation of the -100v Power Supply to allow proper usage of the Types 3S76 and 3T77 plug-ins by changing the power supply circuitry. Also changes V634 to a 6DJ8 and adds a new transistor (Q624) stage.

NOTE: M5812 is covered by Field Mod Kit 040-288, also see M5842.

Parts Removed:

V634	ECF-80	154-278
R609	2.7k 1/2 w 10%	302-272
R617	7k 1/2 w 1%	308-185
R633	330k 1/2 w 10%	302-334
R634	680k 1/2 w 10%	302-684
R635	27k 1/2 w 10%	302-273
R618	80k 1/2 w 1%	308-186
B633	NE-2	150-002
Clamp, #20 neon bulb		343-043

Parts Added:

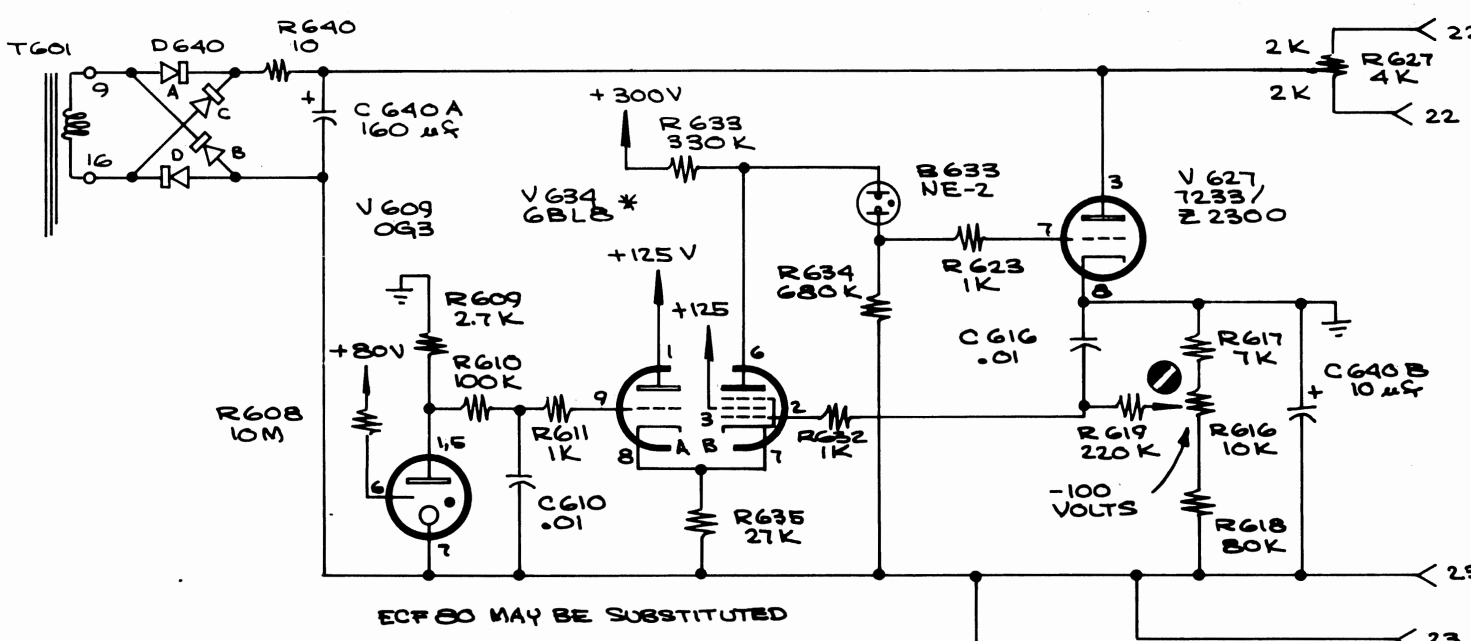
R617	80k 1/2 w 1%	308-186
R618	10k 1/2 w 1%	308-226
R633	47k 1/2 w 10%	302-473
R635	3k 1/2 w 5%	301-302
R612	2.7k 1/2 w 10%	302-272
R624	47k 1/2 w 10%	302-473
R626	180k 1/2 w 10%	302-184
R625	2.2k 1/2 w 10%	302-222
Q624	J3138	151-087
V634	6DJ8	154-187

Parts Required for Field Installation:

Field Modification Kit 040-288

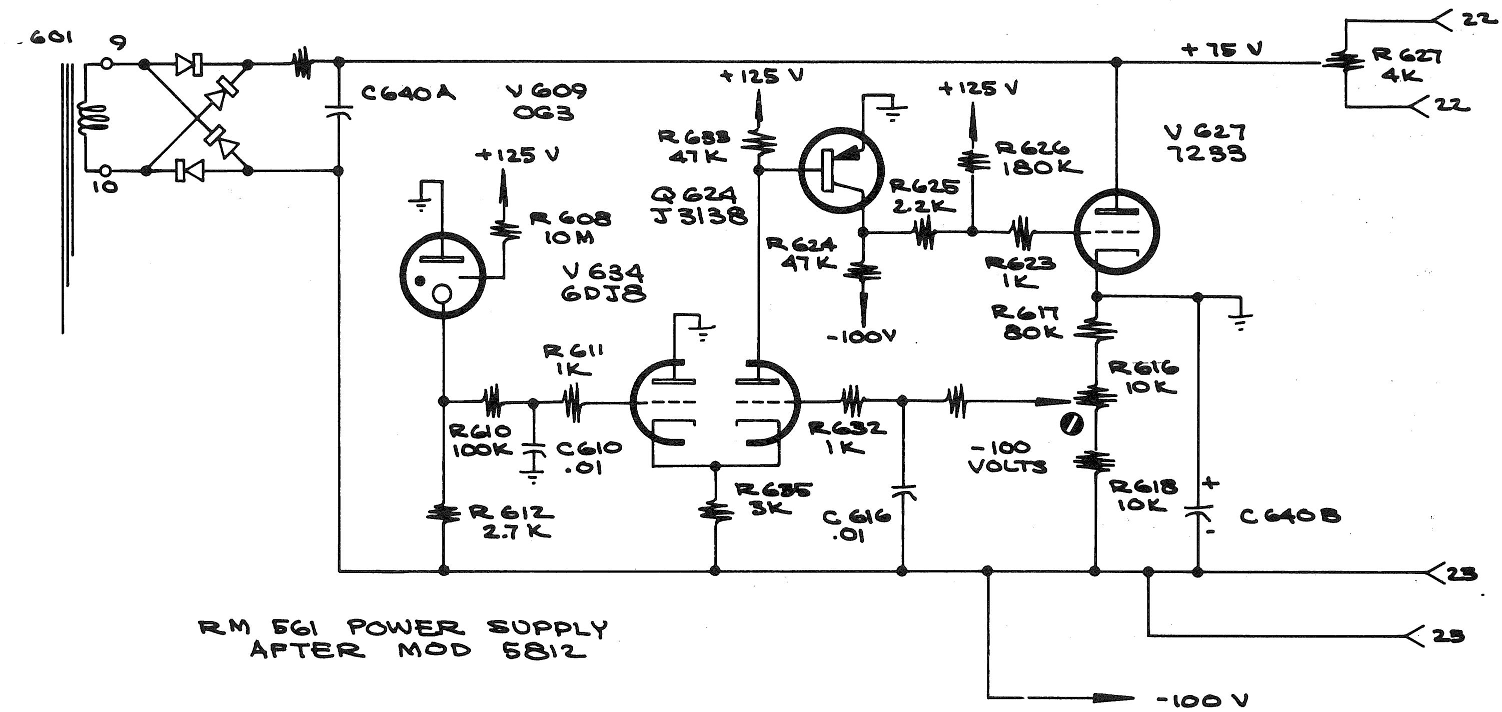
INSTALLATION INSTRUCTIONS:

Refer to Kit instructions. See 'After' schematic on following page.



RM 561 POWER SUPPLY
BEFORE MOD 5812

M5812
(con'd)



RM 561 POWER SUPPLY
AFTER MOD 5812

CALIBRATOR SWITCH RESISTOR CHANGED TO PROVIDE ACCURATE 100 MV SIG INTO 50 Ω AT 1.0 V OUT — See SQB — M5842

Effective Prod s/n 430 — Usable in field instruments s/n 101-429

DESCRIPTION:

Provides an accurate 100 mv signal into 50 Ω with the Calibrator switch set at 1.0 v by changing the value of R898 to a 250 Ω 1/2 w 1% resistor.

NOTE: M5842 is included in Field Modification Kit 040-288. However, 040-288 also covers M5812 which is very extensive.

Parts Removed:			Parts Added:		
R898	100 Ω 1/2 w 10%	302-101	R898	250 Ω 1/2 w 1%	309-178

Parts Required for Field Installation:

See 'Parts Added.'

INSTALLATION INSTRUCTIONS:

Refer to Kit instructions, or:

Replace R898 (100 Ω) located between the AMPLITUDE CALIBRATOR switch terminal W1-11F and "Cal Out" jack with a 250 Ω 1/2 w 1% resistor.

RIGHT INTERCONNECTING PLUG
COMPONENTS AND WIRES REMOVED
OR RELOCATED TO MAKE RM561
COMPATIBLE WITH 3B1, 3B3 and 3B4

See SQB — M5853

Effective Prod s/n 430 — Usable in field instruments s/n 101-429

DESCRIPTION:

Makes the RM561 compatible with the 3B1, 3B3 and 3B4 by removing or relocating components and wires connected to the right Interconnecting Plug to allow unblanking.

NOTE: This modification provides only unblanking, not intensification, when used with 3B1, 3B3. There is no mod kit for the RM561 to provide full RM561A capabilities.

Parts Removed:

R771 560k 1/2w 10% 302-564

Parts Added:

INSTALLATION INSTRUCTIONS:

a) Remove R771, a 560k resistor, located between pins 14 and 15.

b) Relocate the white-violet wire, from pin 7 of CRT, from pin 14 to pin 15.

+300 V SUPPLY NOISE AND
MICROPHONICS REDUCED

See SQB — M5920

Effective Prod s/n 490 — Usable in field instruments s/n 101-489

DESCRIPTION:

Discap C670 may cause excessive noise and microphonics in the +300v supply. Replace with a tubular capacitor.

Parts Removed:

C670 0.01 µf 500v 283-002

Parts Added:

C670 0.01 µf 600v 285-511

Parts Required for Field Installation:

See 'Parts Added.'

INSTALLATION INSTRUCTIONS:

Replace C670 (on ceramic strips above V674) with the 0.01 µf tubular capacitor.

PLUG-IN CONNECTOR WIRING MODIFIED TO ELIMINATE SHOCK HAZARD

INFORMATION ONLY — M6025

Effective Prod s/n 530

DESCRIPTION:

Eliminates a shock hazard when removing or installing plug-ins, by adding 47 Ω resistors between each plug-in connector guide post and ground (i.e., pin 5 of 9 of the connector).

Superseded by M6758-1, which grounds the plug-in at the front; and M7975-3, which removed the 47 Ω resistors.

Parts Removed:		Parts Added:		
		R781,R782, R783,R784	47 Ω 1/4 w	316-470

GRATICULE COVER REPLACED

INFORMATION ONLY — M6282

Effective Prod s/n 530

DESCRIPTION:

Change graticule cover to permit use of viewing hood with instrument.

Parts Removed:		Parts Added:	
Nut, graticule (4)	210-434	Nut, graticule (4)	210-571
Cover, graticule	200-272	Cover, graticule	200-409
		Washer, (4)	210-844

CRT CAPACITANCE STANDARDIZATION ASSURED FOR ALL CRT'S

INFORMATION ONLY — M6210

Effective Prod s/n 830

DESCRIPTION:

Reduces stray capacitance to the CRT so that C760 can compensate all CRT's to the specified 16 pf standard. The material for the J11 connector (131-148 is changed. The new connector is identified by the manufacturer's part number, 26-190-24-1004.

Parts Removed:		Parts Added:	
Wire, CRT lead w/conn	175-586	Wire, CRT lead w/conn	175-641
Wire, CRT lead w/conn	175-594	Wire, CRT lead w/conn	175-642
Connector	131-148	Connector	131-148
Clip, deflection plate	344-047		

JB:cet

MODIFICATION KIT

ADAPTATION TO SAMPLING AND SPECTRUM ANALYZER PLUG-INS

For Tektronix Type 561 Oscilloscopes
Serial numbers 102-578 *

040-0267-00

DESCRIPTION

This modification adapts the above listed in- ##struments for use with the Types 3L5, 3L10, 3S76 and 3T77 Plug-ins by:

1. Removing the 6 V dc unregulated from pin 18 of the plug-in connectors.
2. Changing the trigger signal and dual-trace sync pulse leads to coaxial cable for improved shielding.
3. Improving the stability and reducing the ripple in the -12.2 V supply.
4. Improving calibrator accuracy by changing R898 from a 10% to a 1% resistor. This provides an accurate 100 mV signal into 50Ω with the CALIBRATOR switch set at 0.5 V.

##NOTE: The following Time-Base plug-ins must be modified with Modification Kit 040-0413-00 if they are to be used in conjunction with the 3L5 or 3L10 Spectrum Analyzer plug-ins:

Type	Serial Number
67	101- 5000
2B67	5001-15179
3B1	101- 4039
3B3	100- 4269
3B4	100- 739

* The following serial numbered instruments were factory modified:

105	241	250	350	411-2	528
231	243	259	395	500-4	574

Publication:
Instructions for 040-0267-00
December 1967

Supersedes:
November 1965

PARTS LIST

Quantity	Part Number	Description
1 ea	214-0210-00	Spool, w/3 ft. silver-bearing solder
1 ea	290-0099-00	Capacitor, EMT, 100 μF 15 V
1 ea	309-0104-00	Resistor, prec, 2.05 k 1/2 W 1%
1 ea	309-0112-00	Resistor, prec, 100 Ω 1/2 W 1%
1 ea	310-0115-00	Resistor, prec, 15 k 1 W 1%
2 ea	(1-910D)	Tag, MODIFIED INSTRUMENT, gummed back
1 ea		Cable, coaxial, 175-0068-00, 50 Ω RG/174 6 in.
1 ea		Cable, coaxial, 175-0068-00, 50 Ω RG/174 5-3/4 in.

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

INSTRUCTIONS

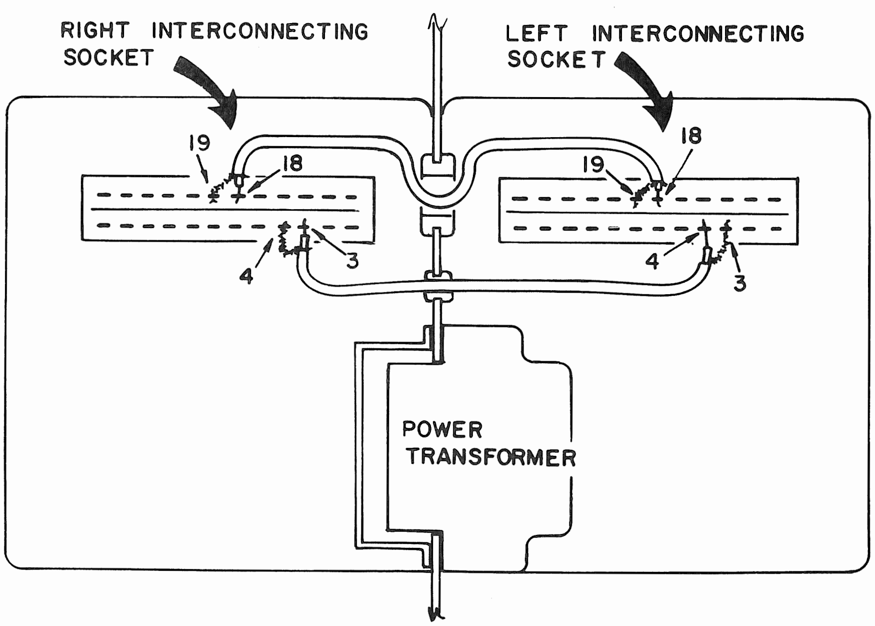
( ) 1. Unsolder and remove the white-yellow and white-orange wires connectioned between pins 3 and 4 of the two interconnecting sockets at the rear of the plug-in housings.

( ) 2. Dress the longest length of coaxial cable (from kit) from the left socket, through the grommet vacated in step 1, to the right socket (see Fig. 1).

( ) Solder the center conductor of the coaxial cable to pin 4 of the left socket and to pin 3 of the right socket, and solder the shield to pin 3 of the left socket and to pin 4 of the right socket.

( ) 3. Unsolder the two white-black-red wires from pin 18 of the right socket.

( ) 4. Unsolder the white-black-red wire from pin 18 of the left socket.



View looking from rear of Instrument

FIG. 1

INSTRUCTIONS (cont)

( ) 5. Trim and tape the wires, unsoldered in steps 3 and 4, to prevent shorting.

( ) 6. Dress the remaining length of coaxial cable (from kit) from the left socket through the large grommet hole to the right socket (see Fig. 1).

( ) Solder the center conductors to pins 18, and the shields to pins 19 of the two sockets.

( ) 7. Remove the 100Ω 1/2W 10% resistor (R898) mounted between the CALIBRATOR switch and the CAL OUT connector, and replace it with the 100Ω 1/2W 1% precision resistor from the kit.

( ) 8. Replace the 4.21k resistor (R731, not shown in Fig. 2) connected between CSA-7 and CSB-7 with the 2.05k resistor from the kit.

( ) 9. Replace the 31.1k resistor (R732, not shown in Fig. 2) connected between CSA-8 and CSB-8 with the 15k resistor from the kit.

( ) 10. Solder the 100µF capacitor (C732, from kit) with the '-' terminal to CSA-7 and the '+' terminal to CSB-7, as indicated in Fig. 2.

NOTE: Ceramic strips CSA and CSB are located on main chassis above right hand plug-in box. Both strips are numbered as shown at top of drawing.

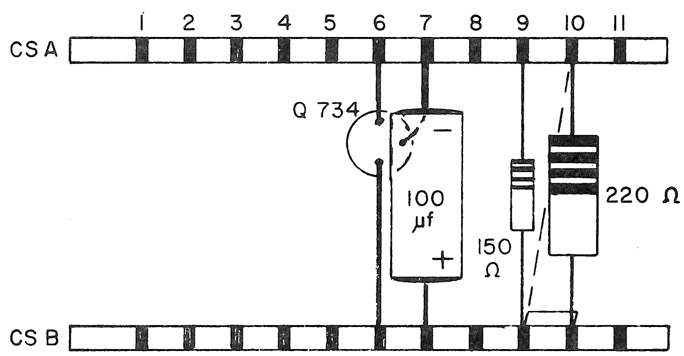


FIG. 2

STEPS 11 THROUGH 13 APPLY ONLY TO INSTRUMENTS BELOW SN 420.

NOTE: If your instrument DOES NOT have the strap shown in dotted lines between the 150Ω and 220Ω resistors, as indicated in Fig. 2, disregard steps 11 through 13.

( ) 11. Remove the 220Ω 2W resistor (R744) connected between CSA-10 and CSB-10 (see Fig. 2).

( ) 12. Remove the end of the strap (shown in dotted lines) from CSA-10, trim it, and re-solder to CSB-10 (see Fig. 2).

( ) 13. Replace the 220Ω 2W resistor removed in step 11.

THIS COMPLETES THE INSTALLATION.

( ) Check wiring for accuracy.

( ) Fasten the insert pages in your Instruction Manual.

( ) Moisten the MODIFIED INSTRUMENT tags (from kit) and fasten them to the appropriate diagrams in your Instruction Manual.

BE:ls

ADAPTATION TO SAMPLING AND SPECTRUM ANALYZER PLUG-INS

Type 561 -- SN 102-578

Installed in Type 561 SN________ Date______________

GENERAL INFORMATION

This modification adapts the above listed instruments for use with the Type 3L5, 3L10, 3S76 and 3T77 Plug-in units by

1. Removing the 6V dc unregulated from pin 18 of the plug-in connectors.
2. Changing the trigger signal and dual-trace sync pulse leads to coaxial cable for improved shielding.
3. Improving the stability and reducing the ripple in the -12.2V supply.
4. Improving cablirator accuracy by changing R898 from a 10% to a 1% resistor. This provides an accurate 100 mV signal into 50Ω with the CALIBRATOR switch set at 0.5V

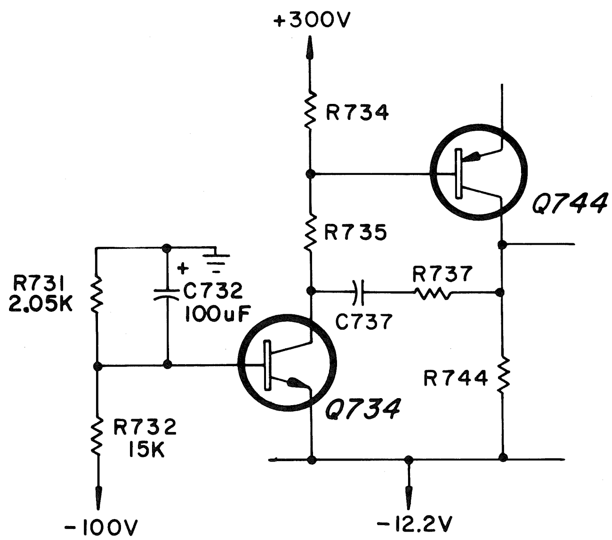
The information on these pages supplements or supersedes the information in your Manual.

NOTE: The following Time-Base plug-ins must be modified with Modification Kit 040-0413-00 if they are to be used in conjunction with the 3L5 or 3L10 Spectrum Analyzer plug-ins:

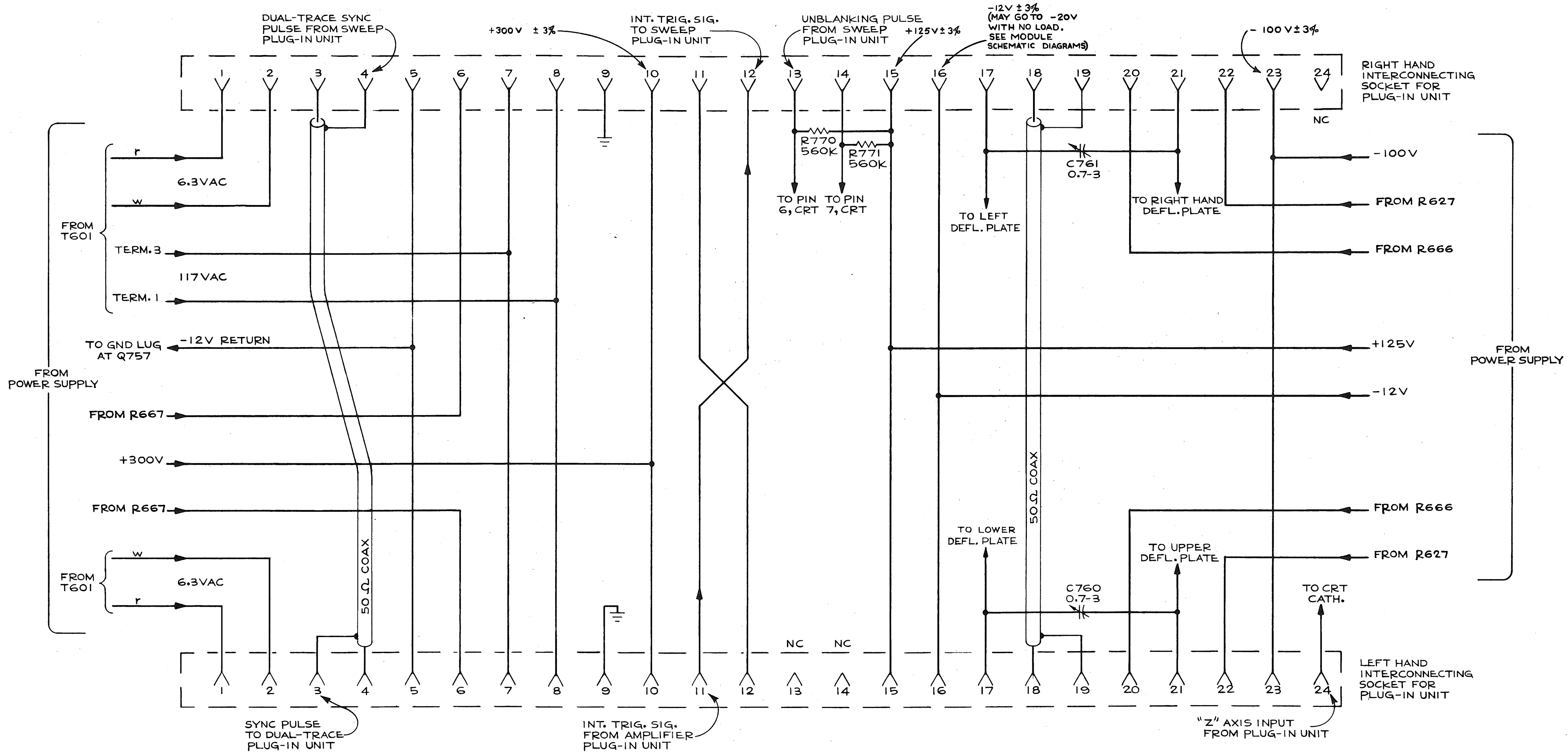
Type	Serial Number
67	101- 5000
2B67	5001-15179
3B1	101- 4039
3B3	100- 4269
3B4	100- 739

ELECTRICAL PARTS LIST

Ckt. No.	Part Number	Description				
		CAPACITORS				
C732	290-0099-00	100 μF	15 V	EMT		
		RESISTORS				
R731	309-0104-00	2.05 k	1/2 W	prec	1%	fixed
R732	310-0115-00	15 k	1 W	prec	1%	fixed
R898	309-0112-00	100Ω	1/2 W	prec	1%	fixed
		SWITCHES				
SW870	262-0497-00 (wired) 260-0253-00 (unwired)	CALIBRATOR				



LV POWER SUPPLY
(Partial Diagram)



7-13-61
TP

TYPE 561 OSCILLOSCOPE

B2

PLUG-IN CONNECTORS

MODIFICATION KIT

IMPROVED -100 V SUPPLY AND CALIBRATOR REFERENCE

040-0288-00

For the following Tektronix Instruments:

Types 561 -- serial numbers 101-5000
RM561 -- serial numbers 101-383

DESCRIPTION

This modification adds a transistor amplifier in the feedback loop of the -100 v supply, thereby improving power supply regulation and ripple. The improved regulation reduces drift in the 3S76 Sampling Plug-in.

This modification kit also supplies a precision resistor to replace one of the resistors in the calibrator circuit, thereby providing an accurate voltage reference when using 50 Ω systems, such as the Type 3S76 Sampling Plug-in.

Publication:
Instructions for 040-288
July 1967

Supersedes:
November 1963

PARTS LIST

Quantity	Description	Part Number
1 ea.	Transistor, J3138	151-0087-00
1 ea.	Tube, vacuum, 6DJ8	154-0187-00
1 ea.	Spool, w/3 ft. silver-bearing solder	214-0210-00
1 ea.	Resistor, comp, 3 k 1/2 w 5%	301-0302-00
1 ea.	Resistor, comp, 10 meg 1/2 w 10%	302-0106-00
1 ea.	Resistor, comp, 180 k 1/2 w 10%	302-0184-00
1 ea.	Resistor, comp, 2.2 k 1/2 w 10%	302-0222-00
1 ea.	Resistor, comp, 2.7 k 1/2 w 10%	302-0272-00
2 ea.	Resistor, comp, 47 k 1/2 w 10%	302-0473-00
1 ea.	Resistor, WW, 10 k 1/2 w 1% (Daven)	308-0226-00
1 ea.	Resistor, prec, 100 Ω 1/2 w 1%	309-0112-00
1 ea.	Resistor, prec, 250 Ω 1/2 w 1%	309-0178-00
1 ea.	Tag, ECC88/6DJ8 (cut special)	334-0767-00
1 ea.	Tubing, plastic, #20 black 2 in.	162-0504-00
1 ea.	Wire, #22 solid, black-red-black-black, 6 in.	175-0514-00
1 ea.	Wire, #22 stranded, black-brown-black-brown, 9 in.	175-0523-00
1 ea.	Wire, #22 solid, bare, 24 in.	176-0005-00
2 ea.	Wire, #22 solid, pre-bent, 3-notch jumper	176-0125-00
3 ea.	Wire, #22 solid, pre-bent, 4-notch jumper	176-0126-00

INSTRUCTIONS

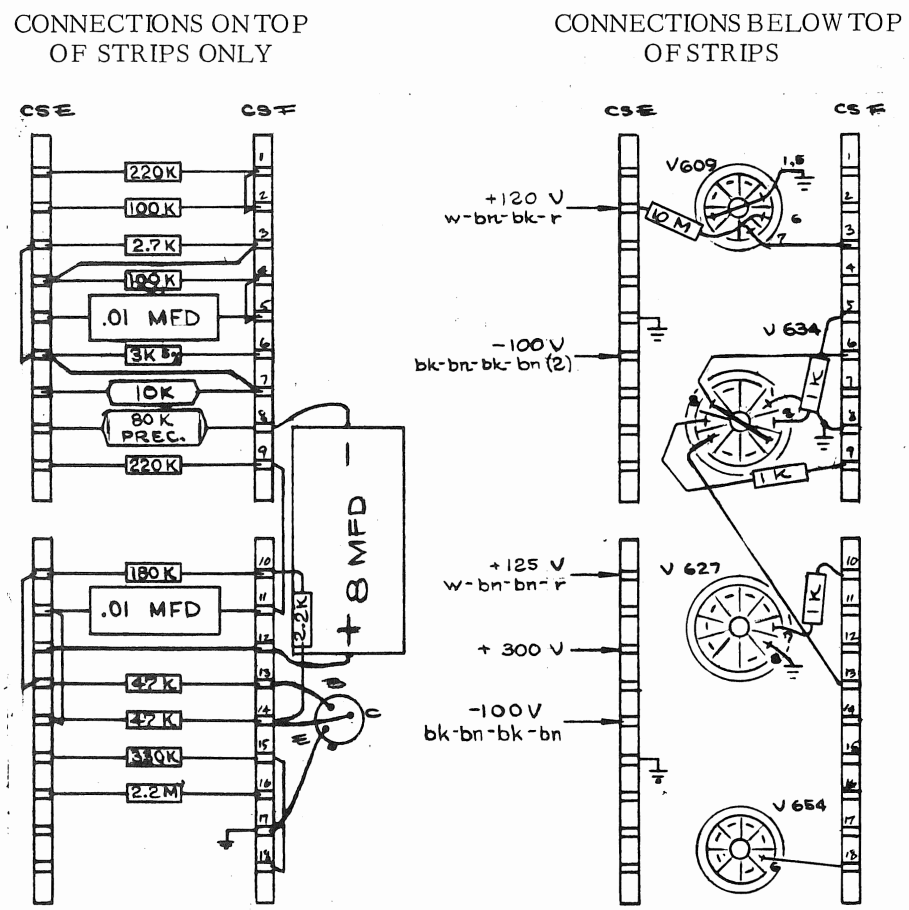


Fig. 1

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

NOTE: See SECTION A for Standard 561 instruments. See SECTION B for Rackmounted instruments.

SECTION A

( ) 1. Locate the ceramic strips, CSE and CSF, which are supporting the components associated with the -100 v supply (see Fig. 1). Also, note the slot numbering arrangement (i.e., CSE-1 indicates ceramic strip "E" and the first notch).

NOTE: Fig. 1 shows the completed modification.

( ) 2. Carefully unsolder the following components and wires:

DO NOT DISCARD ANY PARTS UNTIL THE MODIFICATION IS COMPLETED.

FOR INSTRUMENTS BELOW s/n 1280

( ) 100k resistor between CSE-2 and CSF-2

( ) 2.7k resistor between CSE-3 and CSF-3

( ) strap from CSE-3 to ground

( ) end of strap from CSF-3 to pins 1 and 5 of V609, at CSF-3 only

( ) 0.01 μf capacitor between CSE-5 and CSF-5

( ) end of strap from CSE-5 to pin 7 of V609, at CSE-5 only

FOR INSTRUMENTS ABOVE s/n 1279

( ) 100k resistor between CSE-2 and CSF-2

( ) 10meg resistor between CSE-3 and CSF-3

( ) strap from CSF-3 to pin 6 of V609

( ) 0.01 μf capacitor between CSE-5 and CSF-5

( ) end of strap from CSE-4 to pins 1 and 5 of V609, at CSE-4 only

( ) end of strap from CSE-5 to pin 7 of V609, at CSE-5 only

( ) 2.7k resistor from CSE-4 to ground

( ) black-brown-red wire from CSE-3 and tape the end

Step 2 (con'd)

FOR ALL INSTRUMENTS

( ) 27k resistor between CSE-6 and CSF-6

( ) black-brown-black-brown (-100 v) wires from CSE-5 and CSE-6

( ) strap between CSE-5 and CSE-6

( ) 80k Daven resistor between CSE-7 and CSF-7

( ) 7k Daven resistor between CSE-8 and CSF-8

( ) 220k resistor between CSE-9 and CSF-9

( ) strap between pins 7 and 8 of V634. Leave pin 8 connected to CSF-6.

( ) strap between CSE-10 and CSF-10

( ) 8 μf capacitor between CSF-10 and CSF-17

( ) 0.01 μf capacitor between CSE-11 and CSF-11

( ) 1k resistor from pin 2 of V634 to CSF-11

( ) 1k resistor from pin 9 of V634 to CSF-5

( ) 330k resistor between CSE-12 and CSF-12

( ) 3-notch jumper strap between CSE-10 and CSE-12

( ) NE-2 neon bulb and holder from CSF-12, CSF-14 and CSE-13

( ) 680k resistor between CSE-14 and CSF-14

( ) tubing covered strap from CSF-12 to pin 6 of V634

( ) strap between pins 1 and 3 of V634

( ) white-brown-brown-red (+125 v) wires from pin 1 of V634

( ) strap from CSE-11 to ground

( ) 3. Remove the silk-screening "ECF80/6BL8" from both sides of the chassis, with lacquer thinner or other similar solvent. Use caution not to remove the "V634" silk-screening.

( ) Install the "6DJ8" tag from the kit.

NOTE: Refer to Fig. 1 while performing steps 4 through 19.

( ) 4. Solder a 4-notch wire (jumper strap, from kit) on outside of strip CSE (on side away from V627), between CSE-10 and CSE-13.

( ) 5. Solder the two white-brown-brown-red (+125 v) wires (removed from pin 1 of V634 in step 2) to CSE-10.

( ) 6. Solder the free end of the bare wire, attached to pins 1 and 5 of V609, to the nearest tube socket ground lug.

( ) 7. Solder the end of the strap attached to pin 7 of V609 to CSF-3.

( ) 8. Solder a 4-notch wire (jumper strap, from kit) between CSE-3 and CSE-6.

( ) 9. Solder the 10 meg, 1/2 w resistor (from kit) from pin 6 of V609 to CSE-2.

( ) 10. Solder a length of bare wire (from kit) between CSE-4 and CSF-3. (This strap is already on instruments BELOW s/n 1280.)

( ) 11. Solder a length of bare wire (from kit) from pin 1 of V634 to the nearest tube socket ground lug.

( ) Solder a length of bare wire (from kit) from CSE-5 to the nearest tube socket ground lug.

( ) 12. Solder a 1 k, 1/2 w resistor (removed in step 2) from pin 2 of V634 to CSF-5.

( ) 13. Solder a length of bare wire (from kit) between pins 3 and 8 of V634 and CSF-6.

( ) 14. Remove the end of the 1 k, 1/2 w resistor from CSF-14 and solder it to CSF-10 (the other end goes to pin 7 of V627).

( ) 15. Solder a length of bare wire (from kit) to pin 6 of V634.

( ) Slip a 2 in. length of tubing over the strap, cut to length and solder the other end to CSF-13.

( ) 16. Solder a 1 k, 1/2 w resistor (removed in step 2) from pin 7 of V634 to CSF-9.

( ) 17. Solder a 4-notch jumper strap (from kit) between CSE-11 and CSE-14 on the inside of the strip (side nearest V627).

( ) 18. Solder the two #26 black-brown-black-brown (-100 v) wires (removed in step 2) to CSE-6. (Do not solder the #22, -100 v wire at this time.)

19. Solder in the following components and wire:

( ) 100 k, 1/2 w resistor (removed in step 2) between CSE-2 and CSF-2

( ) 2.7 k, 1/2 w resistor (from kit) between CSE-3 and CSF-3

( ) 0.01 μf capacitor (removed in step 2) between CSE-5 and CSF-5

( ) 3 k, 1/2 w 5% resistor (from kit) between CSE-6 and CSF-6

( ) 10 k, WW 1% resistor (from kit) between CSE-7 and CSF-7

( ) 80 k, WW 1% resistor (removed in step 2) between CSE-8 and CSF-8

( ) 220 k, 1/2 w resistor (removed in step 2) between CSE-9 and CSF-9

( ) 180 k, 1/2 w resistor (from kit) between CSE-10 and CSF-10

( ) 2.2 k, 1/2 w resistor (from kit) between CSF-10 and CSF-14

( ) 0.01 μf capacitor (removed in step 2) between CSE-11 and CSF-11

( ) a length of bare wire (from kit) between CSE-12 and CSF-12

( ) 47 k, 1/2 w resistor (from kit) between CSE-13 and CSF-13

( ) 47 k, 1/2 w resistor (from kit) between CSE-14 and CSF-14

( ) 8 μf electrolytic capacitor (removed in step 2) with '+' end to CSF-12 and '-' end to CSF-8

IMPORTANT: To avoid damaging the transistor, use pliers on the leads to dissipate the heat.

( ) transistor (from kit) with the base lead going to CSF-13, the collector to CSF-14 and the emitter to CSF-17 (ground)

( ) 20. Remove V634 (6BL8) from its socket and replace it with the 6DJ8 from the kit.

( ) 21. Disconnect the two black-brown-black-brown wires from the time-base plug-in connector, terminal 23.

( ) 22. With an ohmmeter, determine which of these wires is unsoldered, near CSE-6 (see step 18).

( ) 23. Clip this wire at both ends, as close to the cable as possible.

( ) 24. Solder one end of the 9 in. black-brown-black-brown wire (from kit) to the negative terminal (mounting lug) on C640 (opposite V627).

( ) 25. Dress this wire under the cables, as close to the chassis as possible, and solder it, along with the remaining black-brown-black-brown wire (left disconnected in step 21) to terminal 23 of the plug-in connector.

FOR INSTRUMENTS BELOW s/n 430, WITH EXCEPTIONS

NOTE: If your instrument does not have the strap shown in dotted lines between the 150 Ω and 220 Ω resistors, as indicated in Fig. 2, disregard steps 26 through 28.

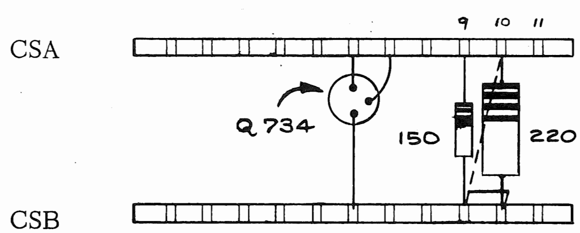


Fig. 2

( ) 26. Remove the 220 Ω, 2 w resistor (R744) from CSA-10 of the ceramic strips (see Fig. 2).

( ) 27. Move the end of the strap (shown in dotted lines) from CSA-10, trim it and resolder to CSB-10 (see Fig. 2).

( ) 28. Replace the 220 Ω, 2 w resistor removed in step 26.

FOR INSTRUMENTS BELOW s/n 1580 ONLY

( ) 29. Remove the 100 Ω, 1/2 w 10% resistor (R898) mounted between the Calibrator switch and the Cal Out connector, and replace it with the 100 Ω, 1/2 w 1% precision resistor from the kit.

( ) 30. THIS COMPLETES THE INSTALLATION for the Type 561. Check wiring for errors.

( ) 31. Insert the modified -100 v supply and Manual parts list pages in your instruction manual.

( ) 32. It will be necessary to re-adjust the power supplies. Refer to the CALIBRATION Procedure in your instruction manual.

SECTION B APPLIES TO RACKMOUNTED INSTRUMENTS ONLY

( ) 1. Locate the ceramic strips supporting the components associated with the -100 v supply in Fig. 3, and note the numbering arrangement.

NOTE: Fig. 3 shows the completed modification.

( ) 2. Carefully remove the following:

DO NOT DISCARD ANY COMPONENTS UNTIL THE MODIFICATION IS COMPLETED.

( ) all parts and straps connected between CSA and CSB, notches 12-22

( ) bare wire between CSA-11 and CSB-11

( ) 1k resistor from CSA-22 to pin 9 of V634

( ) jumper wire from CSA-22 to CSA-20

( ) jumper wire from CSA-21 to CSA-18 (leave ground strap connected to CSA-21)

( ) straps from CSA-19 to pin 7 or 8 of V634

Step 2 (con'd)

( ) 1k resistor from CSA-17 to pin 2 of V634

( ) strap from CSA-16 to pin 3 of V634

( ) strap from CSA-15 to pin 6 of V634

( ) jumper wire from CSA-14 to CSA-12 (leave 1k resistor in place from CSA-14 to pin 7 of V627)

( ) strap from CSA-13 to pin 3 of V627 (leave 10meg resistor in place from CSA-13 to pin 6 of V609)

NOTE: Instruments BELOW s/n 260 do not have this 10meg resistor. It will be installed on the instrument later.

( ) jumper wire from CSB-22 to CSB-21 (leave white-green wire connected to CSB-22)

( ) jumper wire from CSB-20 to CSB-19 (leave strap to -100v connected to CSB-19)

( ) strap from CSB-15 to +300v on adjacent ceramic strip

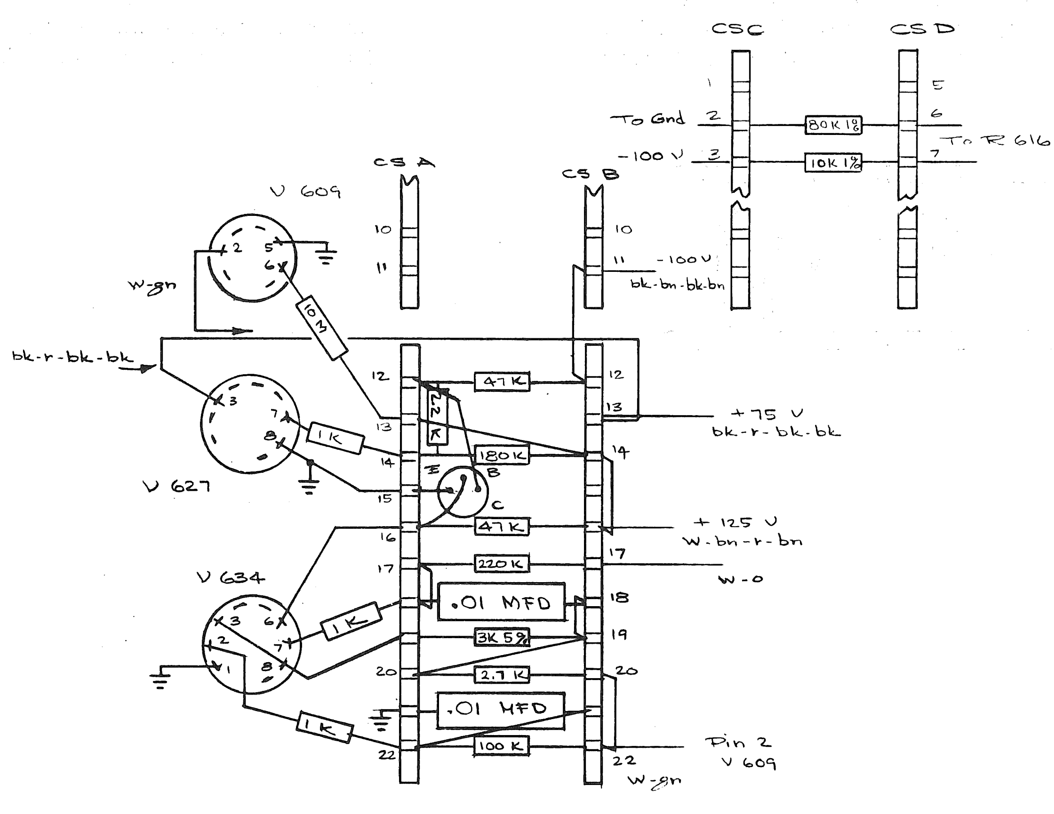


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Fig. 3

Step 2 (con'd)

( ) strap from CSA-11 to pin 4 or 7 of V609

( ) strap between pins 1 and 3 of V634

( ) strap between pins 7 and 8 of V634

( ) 3. Remove the silk-screening "6BL8" from both sides of the chassis with lacquer thinner or other similar solvent. Use caution not to remove the "V634" silk-screening.

( ) Install the "6DJ8" tag from the kit.

NOTE: Refer to Fig. 3 while performing steps 4 through 18.

( ) 4. Locate the 7k and 80k Daven resistors on strips CSC and CSD.

( ) Remove the 7k Daven resistor between CSC-2 and CSD-6.

( ) 5. Unsolder the 80k Daven resistor between CSC-3 and CSD-7, and resolder it between CSC-2 and CSD-6.

( ) 6. Solder the 10k Daven resistor (from kit) between CSC-3 and CSD-7.

( ) 7. Unsolder the white-green wire from pin 1 of V609 and resolder it to pin 2.

( ) 8. Solder a length of bare wire (from kit) from pin 5 of V609 to the nearest ground lug on the socket.

9. FOR INSTRUMENTS BELOW s/n 260

( ) Solder the 10 meg, 1/2 w resistor (from kit) from CSA-13 to pin 6 of V609.

( ) 10. Solder a length of bare wire (from kit) from pin 1 of V634 to the nearest tube socket ground lug.

( ) 11. Solder a length of bare wire (from kit) between pins 3 and 8 of V634 and CSA-19.

( ) 12. Solder a 1k resistor (removed in step 2) from CSA-22 to pin 2 of V634.

( ) 13. Solder a length of bare wire (from kit) from CSA-16 to pin 6 of V634.

( ) 14. Solder a 1k resistor (removed in step 2) from CSA-18 to pin 7 of V634.

( ) 15. Solder one end of the black-red-black-black wire (from kit) to pin 3 of V627.

( ) Solder the other end to CSB-13.

( ) 16. Solder a length of bare wire (from kit) from CSA-15 to the nearest tube socket ground lug.

17. Solder the following components and wire straps between the points specified:

( ) length of bare wire (from kit) from CSA-18 to CSA-17

( ) 3-notch jumper (pre-bent, from kit) from CSB-22 to CSB-20

( ) length of bare wire (from kit) from CSB-19 to CSB-18

( ) 3-notch jumper (pre-bent, from kit) from CSB-16 to CSB-14

( ) length of bare wire (from kit) from CSA-22 to CSB-21

( ) length of bare wire (from kit) from CSA-20 to CSB-19

( ) length of bare wire (from kit) from CSA-13 to CSB-14

( ) 2.2k resistor (from kit) from CSA-14 to CSA-12

( ) 100k resistor (removed in step 2) from CSA-22 to CSB-22

( ) 0.01 μf capacitor (removed in step 2) from CSA-21 to CSB-21

( ) 2.7k resistor (removed in step 2) from CSA-20 to CSB-20

( ) 3k resistor, 5% (from kit) from CSA-19 to CSB-19

( ) 0.01 μf capacitor (removed in step 2) from CSA-18 to CSB-18

( ) 220k resistor (removed in step 2) from CSA-17 to CSB-17

( ) 47k resistor (from kit) from CSA-16 to CSB-16

Step 17 (con'd)

( ) 180k resistor (from kit) from CSA-14 to CSB-14

( ) 47k resistor (from kit) from CSA-12 to CSB-12

IMPORTANT: To avoid damaging the transistor, use pliers on the leads to dissipate the heat.

( ) 18. Solder in the transistor with the base at CSA-16, the emitter at CSA-15 (ground) and the collector at CSA-12.

( ) 19. Remove V634 (6BL8) from its socket and replace it with the 6DJ8 from the kit.

Step 19 (con'd)

( ) Remove the 100 Ω, 1/2w 10% resistor (R898) mounted between the Calibration switch and the Cal Out connector, and replace it with the 250 Ω, 1/2w 1% precision resistor from the kit.

( ) 20. THIS COMPLETES THE INSTALLATION for RM561's

( ) Insert the modified -100v supply schematic and Manual parts list pages in your instruction manual.

( ) 21. It will be necessary to re-adjust the power supplies. Refer to the CALIBRATION Procedure in your instruction manual.

DW:ls

IMPROVED -100 V SUPPLY AND CALIBRATOR REFERENCE

Type 561 -- s/n 101-5000
Type RM561 -- s/n 101-383

GENERAL INFORMATION

This modification adds a transistor amplifier in the feedback loop of the -100 v supply, thereby improving power supply regulation and ripple. The improved regulation reduces drift in the 3S76 Sampling Plug-in.

This modification kit also supplies a precision resistor to replace one of the resistors in the calibrator circuit, thereby providing an accurate voltage reference when using 50 Ω systems, such as the Type 3S76 Sampling Plug-in.

ELECTRICAL PARTS LIST

Values fixed unless marked variable. Only new parts listed.

RESISTORS

Resistors are 10% composition unless otherwise indicated.

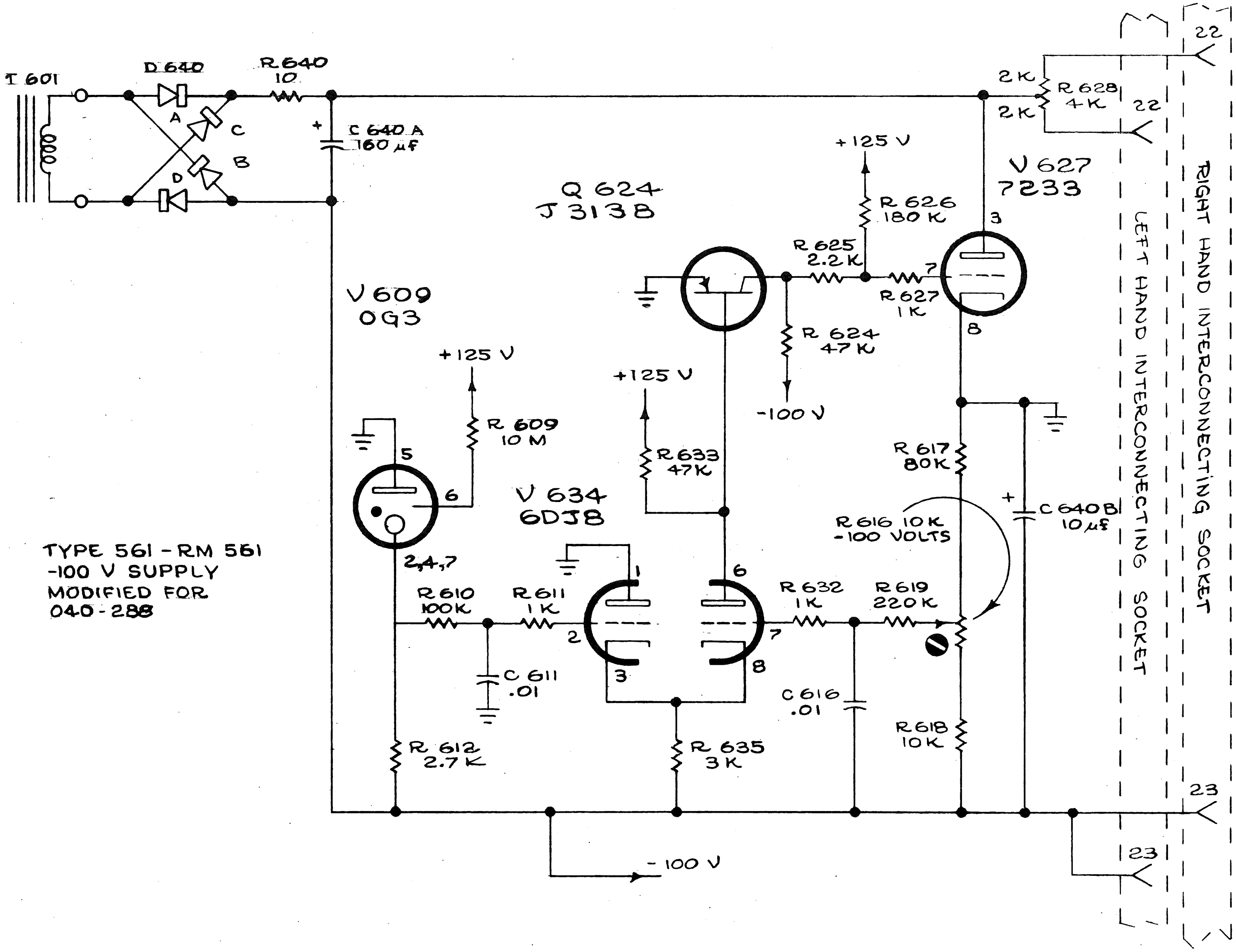
Ckt. No.	Part Number	Description			
R609	302-0106-00	10 meg	1/2 w		
R612	302-0272-00	2.7 k	1/2 w		
R618	308-0226-00	10 k	1/2 w	WW	1% (Daven)
R624	302-0473-00	47 k	1/2 w		
R625	302-0222-00	2.2 k	1/2 w		
R626	302-0184-00	180 k	1/2 w		
R633	302-0473-00	47 k	1/2 w		
R635	301-0302-00	3 k	1/2 w		5%
R898 (RM's)	309-0178-00	250 Ω	1/2 w	prec	1%
R898 (Stnd.)	309-0112-00	100 Ω	1/2 w	prec	1%

TRANSISTORS

Q624	151-0087-00	J3138

TUBES

V634	154-0187-00	6DJ8



TYPE 561 - RM 561
-100 V SUPPLY
MODIFIED FOR
040-288

MODIFICATION KIT

3B1 AND 3B3 COMPATIBILITY

For Tektronix Type 561 Oscilloscopes
Serial numbers 101-5000

040-0320-01

DESCRIPTION

This modification permits Tektronix Type 3B1 and 3B3 plug-in units to be used with the Type 561 and utilize their trace-intensifying features.

The High Voltage circuit is replaced by a new assembly which has separate secondary windings for the CRT grid and cathode. This permits insertion of intensifying pulses on the CRT grid and/or chopped blanking (or external) pulses on the cathode.

A CRT CATHODE SELECTOR switch is added to permit selection of CHOPPED BLANKING or CRT CATHODE inputs.

In addition, it is recommended that the following kits be installed to further improve performance with the 3B1 and 3B3:

040-0267-00 (s/n 102-578, with exceptions) -- improves stability and reduces ripple in -12.2 v supply.

040-0288-00 (all s/n) -- improves regulation and reduces ripple in -100 v supply.

Publication:
Instructions for 040-0320-01
August 1966

Supersedes:
February 1966

PARTS LIST

Quantity	Description					Part Number
1 ea.	Assembly, High Voltage, consisting of:					
1 ea.	Transformer, HV					120-0275-00
1 ea.	Strip, ceramic, 3/4 x 3 notches (large)					124-0087-00
2 ea.	Strip, ceramic, 3/4 x 11 notches (large)					124-0091-00
2 ea.	Bulb, neon, NE-2E					150-0025-00
2 ea.	Tube, vacuum, 5642					154-0051-00
2 ea.	Lockwasher, int #4					210-0004-00
1 ea.	Lug, solder, SE6					210-0202-00
2 ea.	Nut, hex, 4-40 x 3/16					210-0406-00
1 ea.	Nut, Keps, 6-32 x 5/16					210-0457-00
1 ea.	Screw, 6-32 x 1/4 PHS, Phillips					211-0504-00
3 ea.	Capacitor, cer,	0.0025 μf	6 kv			283-0036-00
2 ea.	Capacitor, cer,	0.0068 μf	5 kv			283-0071-00
1 ea.	Resistor, comp,	100 k	1/2 w	10%		302-0104-00
1 ea.	Resistor, comp,	1 meg	1/2 w	10%		302-0105-00
1 ea.	Resistor, comp,	10 meg	1/2 w	10%		302-0106-00
1 ea.	Resistor, comp,	22 k	1/2 w	10%		302-0223-00
1 ea.	Resistor, comp,	2.2 meg	1/2 w	10%		302-0225-00
2 ea.	Resistor, comp,	2.7 meg	2 w	10%		306-0275-00
2 ea.	Resistor, comp,	3.3 meg	2 w	10%		306-0335-00
3 ea.	Resistor, comp,	5.6 meg	2 w	10%		306-0565-00
2 ea.	Resistor, comp,	6.8 meg	2 w	10%		306-0685-00
1 ea.	Resistor, comp,	22 k	1/4 w	10%		316-0223-00
1 ea.	Resistor, comp,	470 Ω	1/4 w	10%		316-0471-00
1 ea.	Strap, HV transformer mounting					346-0001-00
5 ea.	Spacer, nylon molded,	0.313				361-0009-00
1 ea.	Plate, HV mounting					387-0877-00
1 ea.	Tubing, plastic, #2 black (low temp)			4-1/2 in.		(162-0004-00)
2 ea.	Tubing, plastic, thermofit, RF clear			1-3/4 in.		(162-0545-00)
1 ea.	Wire, #20 stranded, HV		4 in.	white-violet		(175-0513-00)
1 ea.	Wire, #20 stranded, HV		7 in.	white		(175-0513-00)
1 ea.	Wire, #20 stranded, HV		24-1/2 in.	white-gray		(175-0513-00)
1 ea.	Wire, #20 stranded, HV		25-1/2 in.	white-brown		(175-0513-00)
1 ea.	Wire, #22 solid,		7-1/4 in.	white-red		(175-0522-00)
1 ea.	Wire, #22 solid,		10-1/2 in.	white-violet		(175-0522-00)
1 ea.	Wire, #22 solid, HV		4-1/4 in.			(175-0549-00)
1 ea.	Wire, #22 solid, HV		4-3/4 in.			(175-0549-00)
1 ea.	Wire, #22 solid, HV		5-1/4 in.			(175-0549-00)

Quantity	Description				Part Number
1 ea.	Assembly, Resistor-Diode, consisting of:				
2 ea.	Strip, ceramic, 7/16 x 4 notches (large)				124-0120-00
2 ea.	Diode, silicon,	500-750 ma	400 PIV		152-0066-00
1 ea.	Lug, solder, SE6				210-0202-00
1 ea.	Screw, 6-32 x 1/4 PHS, Phillips				211-0504-00
1 ea.	Resistor, comp,	2.4 k	1/2 w	5%	301-0242-00
1 ea.	Resistor, comp,	100 k	1/2 w	10%	302-0104-00
4 ea.	Spacer, nylon molded,	0.063			361-0007-00
1 ea.	Rod, spacer, hex, 1/4 x 9/16, tapped 6-32 thru				384-0519-00
1 ea.	Bracket, mounting				406-0531-00
1 ea.	Wire, #22 solid,	2 in.	white-brown-red-brown		(175-0522-00)
1 ea.	Wire, #22 solid,	3-3/4 in.	white		(175-0522-00)

PARTS LIST (Con'd)

Quantity	Description					Part Number
1 ea.	Assembly, Switch, consisting of:					
	1 ea. Nut, hex, 15/32-32 x 9/16					210-0414-00
	1 ea. Nut, switch, 12-sided, 15/32-32 x 5/64					210-0473-00
	1 ea. Washer, steel, 1/2 x 5/8 x 0.020					210-0845-00
	1 ea. Switch, toggle, DPDT					260-0014-00
	1 ea. Resistor, comp,	1 meg	1/2 w	10%		302-0105-00
	1 ea. Resistor, comp,	470 Ω	1/2 w	10%		302-0471-00
	1 ea. Wire, #22 solid,	11-1/2 in.	white-violet			(175-0522-00)
1 ea.	Tube, vacuum, 12BH7					154-0046-00
1 ea.	Cover, potentiometer					200-0269-00
6 ea.	Lockwasher, int #6					210-0006-00
3 ea.	Screw, 6-32 x 5/8 PHS, Phillips					211-0513-00
1 ea.	Spool, w/3 ft. silver-bearing solder					214-0210-00
2 ea.	Capacitor, cer,	0.02 μf	500 v	discap		283-0006-00
1 ea.	Resistor, comp,	1 k	1/2 w	10%		302-0102-00
1 ea.	Resistor, comp,	27 k	1/2 w	10%		302-0273-00
1 ea.	Potentiometer, comp,	2 Meg				311-0260-00
1 ea.	Tag, CRT CATHODE SELECTOR					334-0879-00
3 ea.	Spacer, hex, 1/4 x 0.175, tapped 6-32 thru					361-0060-00
1 ea.	Wire, #22 solid,	4 in.	bare			(176-0005-00)
1 ea.	Wire, #22 solid, pre-bent for 6 large ceramic strip notches					(176-0128-00)
1 ea.	Tag, MODIFIED INSTRUMENT, gummed back					1-910D

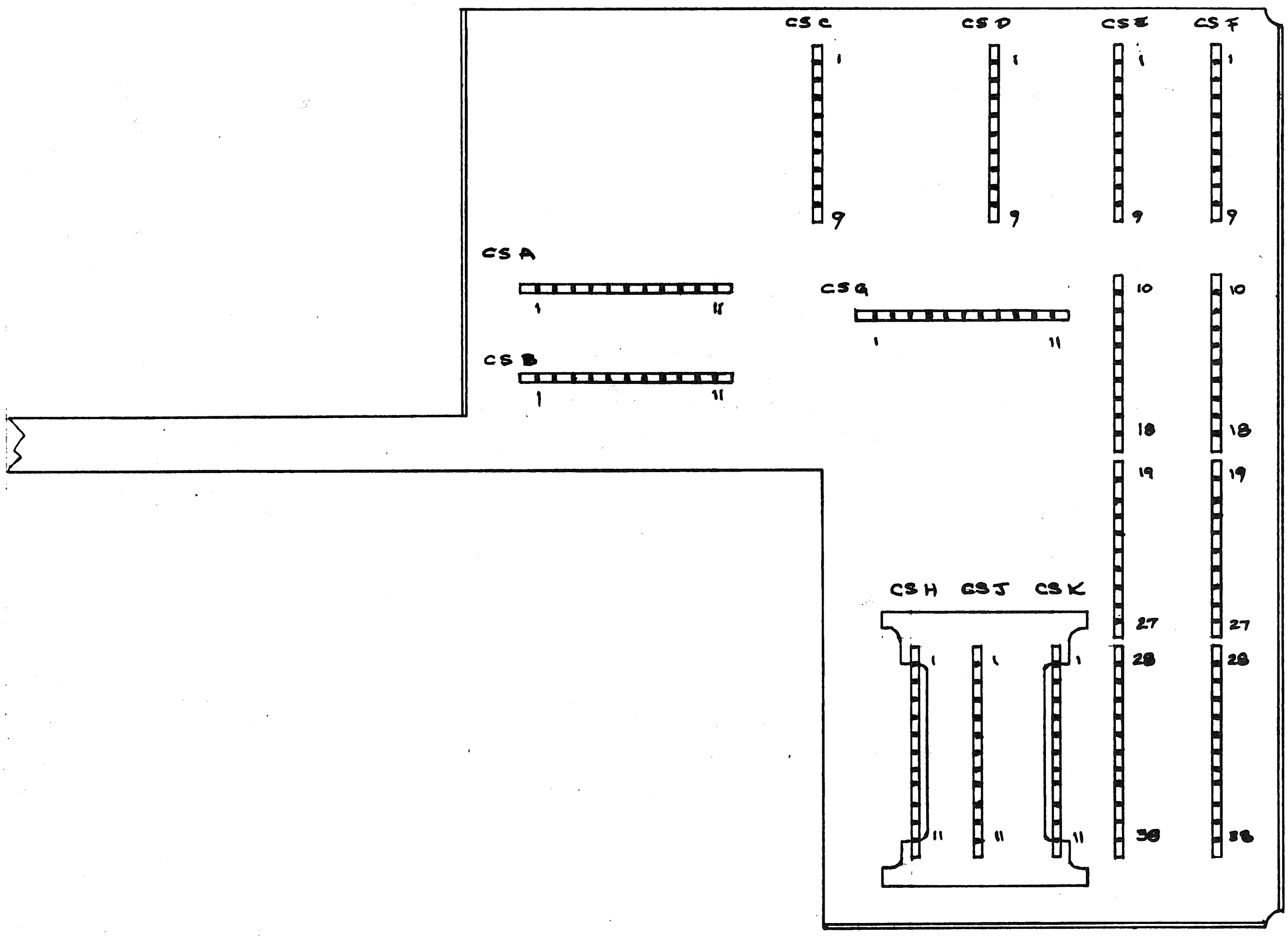

CS C
1
9
CS D
1
9
CS E
1
9
10
18
19
27
28
36
CS F
1
9
10
18
19
27
28
36
CS A
1
11
CS B
1
11
CS G
1
11
CS H
CS J
CS K
1
11
1
11
1
11

Fig. 1

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

A. TO REMOVE THE OLD CIRCUITRY

( ) 1. Remove the High Voltage shield.

( ) Remove the 1 meg resistor (R851) connected to the EXTERNAL INPUT binding posts on the rear panel.

( ) Unsolder the 0.0025 μf capacitor (C851) from the CRT GRID binding post.

NOTE: Refer to Fig. 1 for ceramic strip locations while performing steps A-2 through A-6.

Do not discard any parts until the modification is completed.

2. Unsolder the following components and wires:

( ) 0.0025 μf, 6 kv (C854) between CSG-1 and CSG-3.

( ) 2.2 meg (R854) between CSG-1 and ground lug.

( ) 22 k (R852) between CSG-3 and CSG-4.

( ) white-black wire from CSG-4.

( ) orange or white-orange wire (to CRT, pin 3) from CSG-8.

( ) white-green wire from CSE-4.

( ) white-red wire from CSF-6.

( ) white-blue wire from V800, pin 9.

( ) 3. Unsolder all the wires from CSC and CSD.

( ) 4. Remove the screw from the ground lug between CSC and CSD.

( ) 5. Remove the HV transformer (T801) mounting nuts.

( ) 6. Remove the high voltage assembly (and transformer) by prying CSC and CSD from the chassis.

( ) Remove the nylon spacers.

( ) 7. Replace the screw removed in step A-5.

( ) 8. Unsolder and remove the INTENSITY potentiometer (R847), along with the 0.01 μf capacitor (C847) and the 2.2 meg resistor (R846).

( ) 9. Remove the 15 meg resistor (R845) across the FOCUS potentiometer.

( ) 10. Replace the 100 Ω resistor (R804), between pin 7 of V800 and ground, with a bare wire from the kit.

SUGGESTION: Temporarily lift one end of the components above the V800 socket.

( ) 11. Remove the 560 k resistor (R771) connected between right hand (horizontal) plug-in connector terminals 14 and 15.

( ) 12. Unsolder the white-violet or violet wire from terminal 14 and resolder it to terminal 15.

B. TO DRILL THE SWITCH MOUNTING HOLE

( ) 1. Remove the EXTERNAL INPUT binding posts and ground strap from the rear panel.

( ) Place the SELECTOR switch tag (from kit) over the holes and mark the center of the switch hole.

( ) 2. Remove the tag and drill a 1/2 in. hole in the rear panel.

( ) Remove all drill shavings from the instrument with compressed air.

( ) 3. Position the tag over the holes and mount the binding posts. Replace the solder lugs on the posts.

( ) 4. Install the ground strap (removed in step B-1) on the binding posts so that it "hinges" on the ground post (see schematic on manual insert page).

C. TO MOUNT THE HV ASSEMBLY

( ) 1. Remove the posts on which the HV shield was mounted, noting the holes used. Save the posts for re-use.

( ) 2. Insert the no.6 screws (from kit) from the CRT side of the chassis, in the same holes from which the posts were removed. Secure with the no.6 lockwashers and mounting spacers from the kit.

( ) 3. Place a second no.6 lockwasher (from kit) on each of the screws, and position the HV assembly on the screws. It may be necessary to loosen the mounting spacers and reposition the screws slightly.

( ) Secure the assembly with the posts removed in step C-1. Tighten the metal post (on the lowest screw) with pliers, and the nylon posts by hand.

D. TO MOUNT THE REMAINING ASSEMBLIES

( ) 1. Mount the switch assembly (from kit) in the hole drilled in step B-2, with the 1 meg resistor toward the nearest side of the instrument.

( ) 2. Remove the nut from the upper, forward mounting screw of C640.

( ) Mount the resistor-diode assembly (from kit) on this screw, aligning the compoents horizontally with the 100k resistor at the top.

( ) 3. Mount the new 2 meg INTENSITY potentiometer (from kit); align with the terminals up. Use the old mounting washers and nut.

E. TO REPLACE V814 CIRCUIT:

STEPS E-1 THROUGH E-4 APPLY ONLY TO INSTRUMENTS WHICH USE A 12AU7 FOR V814 (MOST INSTRUMENTS BELOW S/N 433).

( ) 1. Replace V814 (12AU7) with the 12BH7 tube from the kit.

( ) Remove the 12AU7 silkscreening from both sides of the chassis with lacquer thinner or similar mineral solvent. Use care not to remove "V814".

REFER TO FIG. 2 WHILE PERFORMING STEPS E-2 THROUGH E-4.

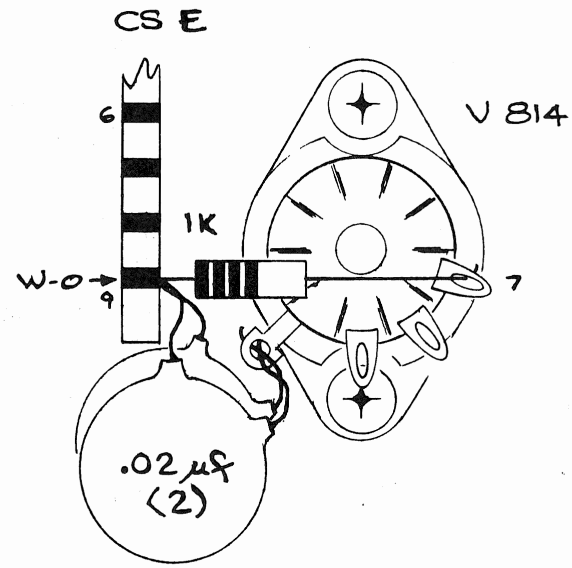


Fig. 2

( ) 2. Unsolder the white-orange wire from V814, pin 7.

( ) Pull it back through the cable about 1-1/2 in. and solder it to CSE-9. (See Fig. 1 for ceramic strip locations.)

( ) 3. Solder the two 0.02 µf capacitors (from kit) in parallel from CSE-9 to the nearest tube socket ground lug.

( ) 4. Solder the 1 k resistor (from kit) between CSE-9 and V814, pin 7.

F. TO REPLACE V814 CIRCUIT

STEPS F-1 THROUGH F-6 APPLY ONLY TO INSTRUMENTS WHICH USE A 12BH7 FOR V814 (ALL INSTRUMENTS ABOVE S/N 432 PLUS SOME INSTRUMENTS BELOW)

1. Unsolder and remove the following components and wires (see Fig. 1 for ceramic strip locations):

( ) $5\mu f$ capacitor (C815) between CSE-7 and CSF-7.

( ) 2.2k resistor (R816) between CSE-9 and V814, pin 8.

( ) bare wire between CSF-7 and V814, pin 8.

( ) bare wire between CSE-7 and V814, pin 3 (ground).

( ) 2. Move the wire connections from CSE-8 to CSE-7.

REFER TO FIG. 3 WHILE PERFORMING STEPS F-3 THROUGH F-6.

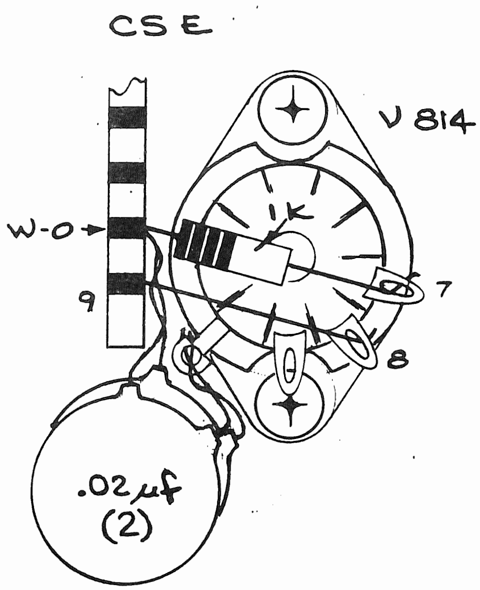


Fig. 3

( ) 3. Unsolder the white-orange wire from V814, pin 7.

( ) Pull it back through the cable about 1-1/2in. and solder it to CSE-8.

( ) 4. Solder the $0.02\mu f$ capacitors (from kit) in parallel from CSE-8 to the nearest tube socket ground lug.

( ) 5. Solder the 1k resistor (from kit) between CSE-8 and V814, pin 7.

( ) 6. Solder a bare wire (from kit) between CSE-9 and V814, pin 8.

G. TO COMPLETE THE WIRING

( ) 1. Dress the wiring cable from the HV Assembly under and along the wiring cable in the instrument to the FOCUS and INTENSITY potentiometers (the white-violet wire goes to the resistor-diode assembly).

( ) Solder the white-violet wire from the cable to the upper left ceramic strip notch on the resistor-diode assembly (i.e., to the "front" end of the 100k resistor).

( ) 2. Solder the wires to the FOCUS and INTENSITY potentiometers as indicated in Fig. 4 (shown as viewed from top).

( ) Slide the potentiometer cover (from kit) over the INTENSITY potentiometer.

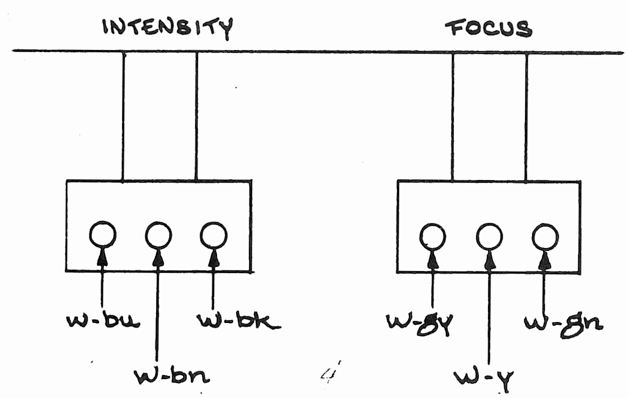
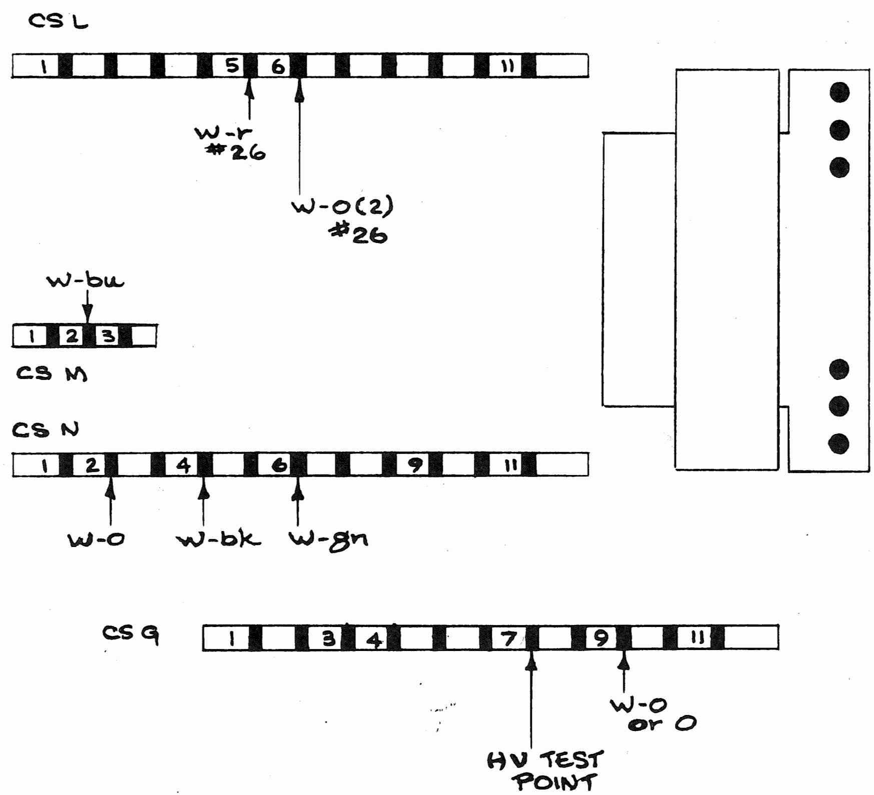
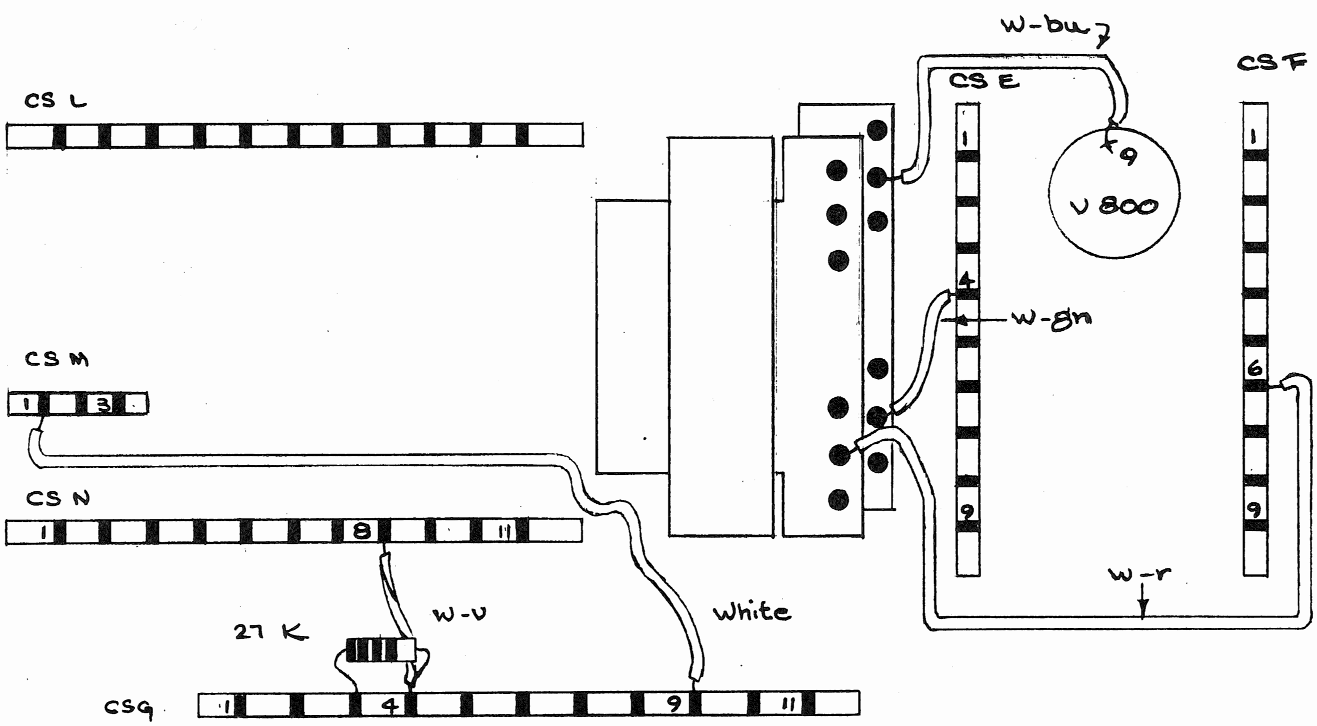


Fig. 4


CS L
1
5
6
11
W-r
#26
W-O(2)
#26
W-bu
1
2
3
CS M
CS N
1
2
4
6
9
11
W-O
W-bk
W-gn
CS G
1
3
4
7
9
11
W-O
or O
HV TEST
POINT

##Fig. 5


W-bu
CS E
CS F
CS L
9
V 800
1
1
4
W-gn
CS M
1
3
6
CS N
1
8
11
9
9
W-r
W-V
White
27 K
CSG
1
4
9
11

##Fig. 6

( ) 3. Solder the wires (unsoldered in steps A-2 and A-3) to the HV assembly, as indicated in Fig. 5.

( ) 4. Solder the remaining wires from the HV assembly indicated in Fig. 6.

( ) 5. Solder the 6-notch pre-bent wire (from kit) between CSG-3 and CSG-8.

( ) 6. Solder the 27k resistor (from kit) between CSG-3 and CSG-4.

( ) 7. Solder the white-brown-red-brown wire from the resistor-diode assembly to the terminal on C642 to which is soldered two similarly-colored no.26 wires.

( ) 8. Solder the white wire from the resistor-diode assembly to right hand plug-in connector terminal no. 14.

( ) 9. Wire the CATHODE SELECTOR switch as indicated in Fig. 7.

( ) 10. Replace the HV shield.

THIS COMPLETES THE INSTALLATION

( ) Check wiring for accuracy.

( ) Turn the instrument on and adjust High Voltage potentiometer R841 for -3300 volts at the HV test point (see Fig. 5).

( ) 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.

TL:cc

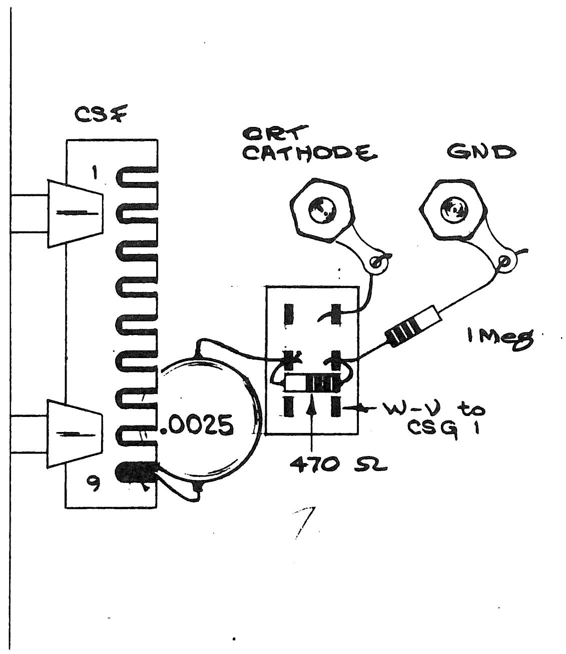


Fig. 7

3B1 AND 3B3 COMPATIBILITY

Type 561 -- s/n 101-5000
Installed in Type 561 -- s/n _____

GENERAL INFORMATION

This modification permits Tektronix Type 3B1 and 3B3 plug-in units to be used with the Type 561 and utilize their trace-intensifying features.

The High Voltage circuit is replaced by a new assembly which has separate secondary windings for the CRT grid and cathode. This permits insertion of intensifying pulses on the CRT grid and/or chopped blanking (or external) pulses on the cathode.

A CRT CATHODE SELECTOR switch is added to permit selection of CHOPPED BLANKING or CRT CATHODE inputs.

The information on these pages supplements or supersedes the information in your manual.

ELECTRICAL PARTS LIST

Values fixed unless marked Variable. Only new parts listed (delete old entries in Manual).

BULBS

Ckt. No.	Part Number	Description
B856	150-0025-00	Neon, NE-2E
B857	150-0025-00	Neon, NE-2E

##CAPACITORS

Tolerance ±20% unless otherwise indicated.

C822	283-0071-00	0.0068 μf	Disc Type	5 kv
C830	283-0036-00	0.0025 μf	Disc Type	6 kv
C832	283-0036-00	0.0025 μf	Disc Type	6 kv
C837	283-0036-00	0.0025 μf	Disc Type	6 kv
C841A	283-0006-00	0.02 μf	Disc Type	500 v
C841B	283-0006-00	0.02 μf	Disc Type	500 v
C842	283-0071-00	0.0068 μf	Disc Type	5 kv
C853	283-0036-00	0.0025 μf	Disc Type	6 kv

DIODES

D838	152-0066-00	Silicon	MR187 (or equivalent)
D839	152-0066-00	Silicon	MR187 (or equivalent)

RESISTORS

Resistors are composition, 10% unless otherwise indicated.

R816	302-0102-00	1 k	1/2 w		
R831	302-0104-00	100 k	1/2 w		
R832	302-0106-00	10 meg	1/2 w		
R833	311-0260-00	2 meg		var	INTENSITY
R834	302-0105-00	1 meg	1/2 w		

RESISTORS (Con'd)

Ckt. No.	Part Number	Description		
R835	306-0565-00	5.6 meg	2 w	30 meg unit (order 050-0256-00)
	306-0565-00	5.6 meg	2 w	
	306-0565-00	5.6 meg	2 w	
	306-0685-00	6.8 meg	2 w	
	306-0685-00	6.8 meg	2 w	
R836	316-0223-00	22 k	1/4 w	
R837	316-0471-00	470 Ω	1/4 w	
R838	301-0242-00	2.4 k	1/2 w	5%
R839	302-0104-00	100 k	1/2 w	
R842	306-0275-00	2.7 meg	2 w	12 meg unit (order 050-0118-00)
	206-0275-00	2.7 meg	2 w	
	306-0335-00	3.3 meg	2 w	
	306-0335-00	3.3 meg	2 w	
R846	302-0225-00	2.2 meg	1/2 w	
R851	302-0104-00	100 k	1/2 w	
R852	302-0273-00	27 k	1/2 w	
R853	302-0471-00	470 Ω	1/2 w	
R854	302-0105-00	1 meg	1/2 w	

SWITCHES

SW854	260-0014-00	Toggle	CRT CATHODE SELECTOR

TRANSFORMERS

T801	120-0275-00	H.V. Power

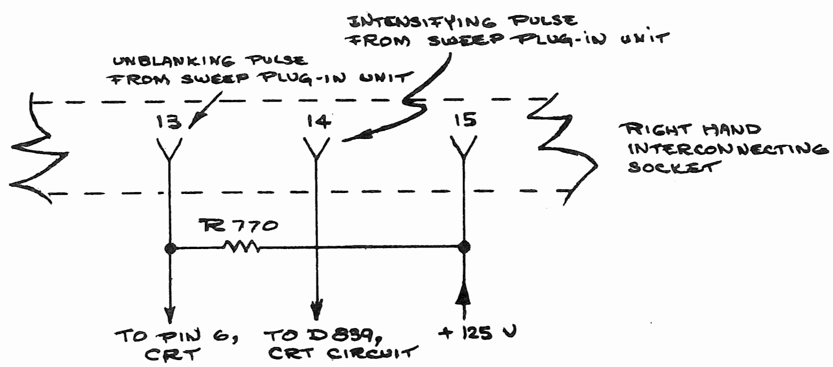
ELECTRON TUBES

V814	154-0046-00	12BH7
V832	154-0051-00	5642

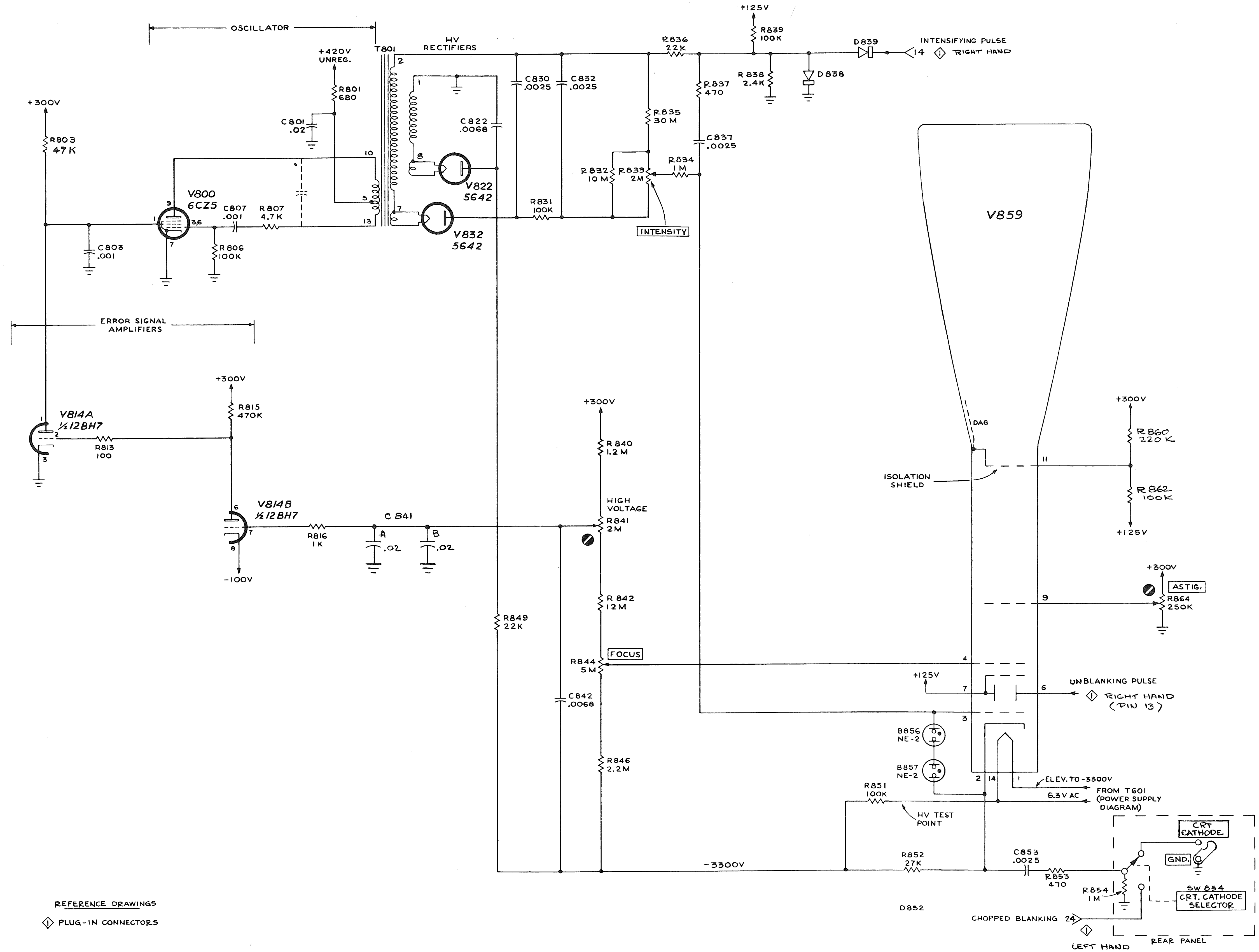
MECHANICAL PARTS LIST

	Part Number
Bracket, mounting	406-0531-00
Cover, potentiometer	200-0269-00
Lockwasher, int #4	210-0004-00
Lockwasher, int #6	210-0006-00
Lug, solder, SE6	210-0202-00
Nut, hex, 4-40 x 3/16	210-0406-00
Nut, hex, 15/32-32 x 9/16	210-0414-00
Nut, Keps, 6-32 x 5/16	210-0457-00
Nut, switch, 12-sided, 15/32-32 x 5/64	210-0473-00
Plate, HV mounting	387-0877-00
Rod, spacing hex, 1/4 x 9/16, tapped 6-32 thru	384-0519-00
Screw, 6-32 x 1/4 PHS, Phillips	211-0504-00
Screw, 6-32 x 5/8 PHS, Phillips	211-0513-00
Spacer, hex, 1/4 x 0.175, tapped 6-32 thru	361-0060-00
Spacer, nylon molded, 0.063	361-0007-00
Spacer, nylon molded, 0.313	361-0009-00
Strap, HV transformer mounting	346-0001-00
Strip, ceramic, 7/16 x 4 notches (large)	124-0120-00
Strip, ceramic, 3/4 x 3 notches (large)	124-0087-00
Strip, ceramic, 3/4 x 11 notches (large)	124-0091-00
Tag, CRT CATHODE SELECTOR	334-0879-00
Washer, steel, 1/2 x 5/8 x 0.020	210-0845-00

SCHEMATICS



PLUG-IN CONNECTORS
(PARTIAL DIAGRAM)



II 9/19/63

TYPE 561 OSCILLOSCOPE

MOD 040-0320-00

CRT CIRCUIT

CIRCUIT NUMBERS 800 THRU 869

MODIFICATION KIT

POWER SUPPLY IMPROVEMENTS

For the following Tektronix Oscilloscopes:

Type 561 Serial numbers 101-5000
Type 561A Serial numbers 5001-6634

040-0347-00

DESCRIPTION

This modification provides a means to accurately adjust power supply voltages, by adding potentiometers to the divider networks in the comparator circuits of the -12.2V, +125V, and +300V supplies.

The modification involves: (a) Drilling two holes and mounting the potentiometer assembly on the rear horizontal plug-in housing.
(b) Changing several components in the -12.2V, +125V, and +300V supplies.

Publication:
Instructions for 040-0347-00
June 1966

Supersedes:
November 1964

PARTS LIST

Quantity	Part Number	Description			
(1 ea)		Assembly, potentiometer, consisting of:			
3 ea	210-0046-00	Lockwasher, int. 1/4"			
3 ea	210-0583-00	Nut, hex, 5/16 brass, 1/4-32 x 1/16			
1 ea	302-0823-00	Resistor, comp,	82 k	1/2W	10%
3 ea	311-0068-00	Potentiometer, comp,	500 k	0.2W	20% w/hardware
1 ea	406-0893-00	Bracket, alum, potentiometer			
1 ea	(162-0504-00)	Tubing, plastic, #20	4 in.	black	
1 ea	(175-0523-00)	Wire, #22 stranded,	9 in.	black-brown-black-brown	
1 ea	(175-0527-00)	Wire, #22 stranded,	10 in.	white-brown-red-brown	
1 ea	(175-0527-00)	Wire, #22 stranded,	9 in.	white-orange	
1 ea	(175-0527-00)	Wire, #22 stranded,	11 in.	white-red	
1 ea	(175-0527-00)	Wire, #22 stranded,	14 in.	white-yellow	
7 ea	006-0531-00	Tie, nylon cable			
2 ea	211-0504-00	Screw, 6-32 x 1/4 PHS, Phillips			
1 ea	214-0210-00	Spool, w/3 ft. silver-bearing solder			
1 ea	283-0002-00	Capacitor, cer,	0.01 µF	500V	discap
1 ea	290-0137-00	Capacitor, EMT	100 µF	30V	
1 ea	301-0394-00	Resistor, comp,	390 k	1/2W	5%
1 ea	302-0272-00	Resistor, comp,	2.7 k	1/2W	10%
1 ea	302-0685-00	Resistor, comp,	6.8 M	1/2W	10%
1 ea	302-0825-00	Resistor, comp,	8.2 M	1/2W	10%
1 ea	309-0053-00	Resistor, prec,	333 k	1/2W	1%
1 ea	309-0156-00	Resistor, prec,	1.024 M	1/2W	1%
1 ea	(176-0005-00)	Wire, #22 solid,	6 in.	bare	
1 ea	(176-0126-00)	Wire, #22 solid, pre-bent for 4 large ceramic strip notches.			
1 ea	(176-0128-00)	Wire, #22 solid, pre-bent for 6 large ceramic strip notches.			
1 ea	1-910D	Tag, MODIFIED INSTRUMENT, gummed back.			

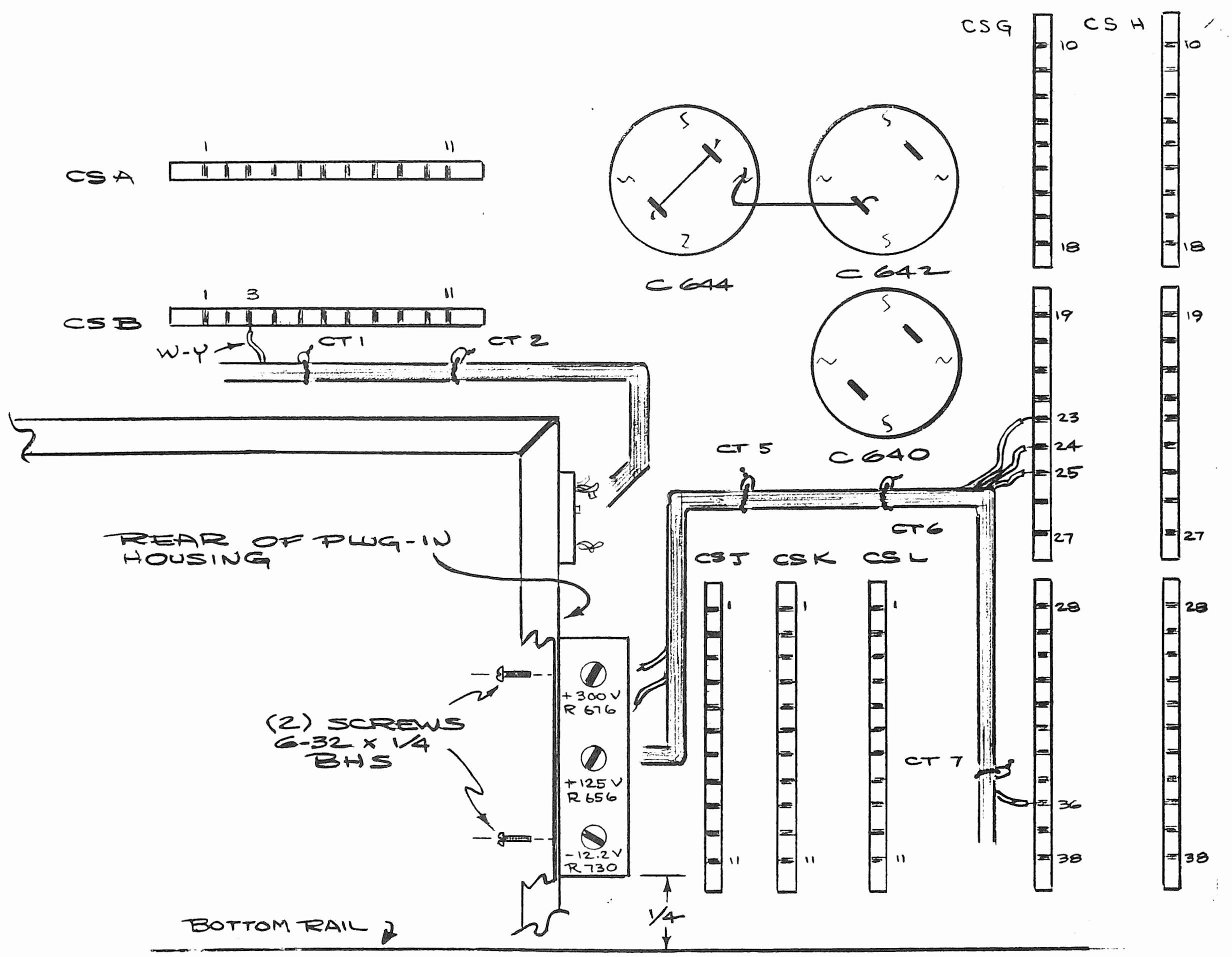


FIG. 1

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

A. TO INSTALL POTENTIOMETER ASSEMBLY:

REFER TO FIGURES 1 and 2

( )
( ) 1. Drill two 5/32 in. holes in the rear of the horizontal plug-in housing.

( ) 2. Mount the potentiometer assembly (from kit) with the two 6-32 x 1/4 BHS screws from the kit.

NOTE: The cable ties (step A-3) are designated as CT-1 through CT-7.

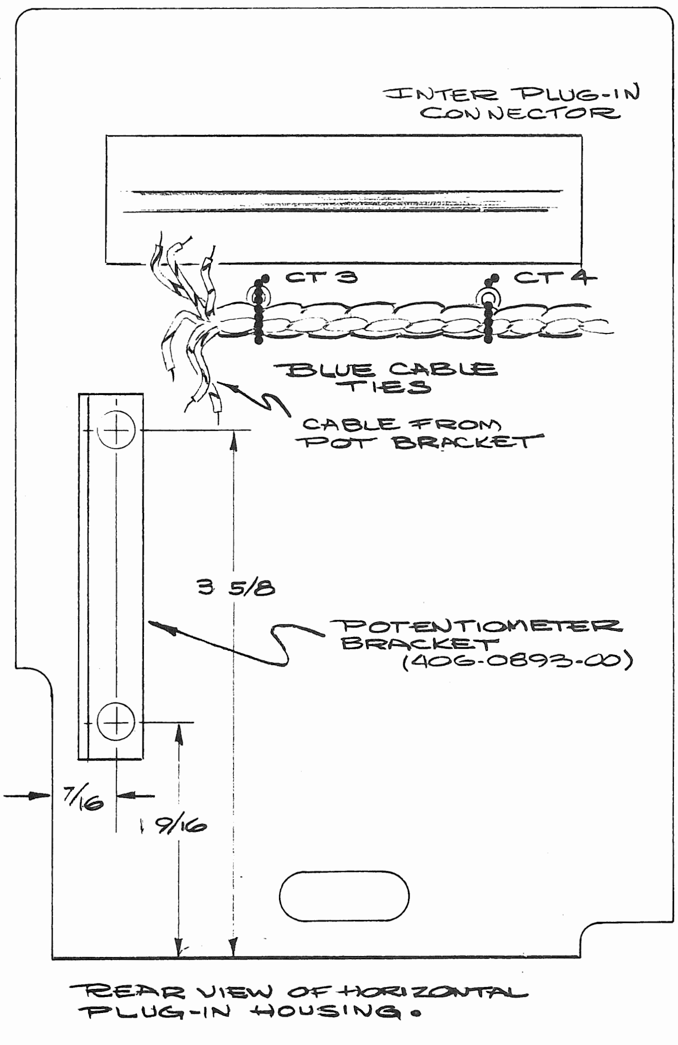


FIG. 2

( )
( ) 3. Secure the cable (from the bracket) to the cable harness in the instrument, with the seven blue cable ties from the kit.

B. TO INSTALL -12.2 VOLT ADJUST CIRCUIT (561 ONLY):

1. Remove the following components and wires (see Fig. 1 for ceramic strip locations):

( ) 2.7 k resistor (R735) between CSA-5 and CSB-5

( ) bare wire between CSB-4 and CSB-5

2. Install the following components and wires, as indicated in Fig. 3:

( ) white-yellow wire (from potentiometer cable) to CSB-5

( ) 2.7 k resistor (from kit) between CSA-5 and CSB-4

( ) 390 k resistor (from kit) between CSB-5 and CSB-8

( ) 100 μf capacitor (from kit) between CSA-7 (-) and CSB-7 (+)

C. TO INSTALL -12.2 VOLT ADJUST CIRCUIT (561A ONLY):

1. Remove the following components and wires (see Fig. 1 for ceramic strip locations):

( ) 330 k resistor (R734) between CSA-3 and CSB-3 --- SAVE

( ) bare wire between CSB-3 and base of Q744

( ) bare wire between CSB-4 and CSB-9

NOTE: Remove the following capacitor above serial number 6359:

( ) 100 μf capacitor (C732) between CSA-7 and CSB-7

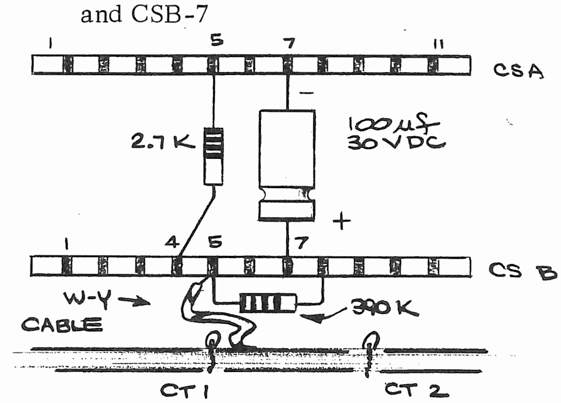


FIG. 3

INSTRUCTIONS (con'd)

Section C continued

2. Install the following components and wires, as indicated in Fig. 4:

( ) pre-bent wire (from kit) between CSB-4 and CSB-9. Mount wire on the 'inside' of CSB.

( ) 330k resistor (removed in step C-1) between CSA-3 and CSA-5

( ) white-yellow wire (from potentiometer cable) to CSB-3

( ) 390k resistor (from kit) between CSB-3 and CSB-6

( ) 100 μf capacitor (from kit) between CSA-7 (-) and CSB-7 (+)

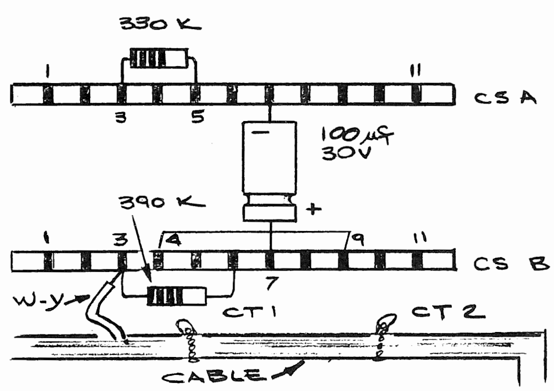


FIG. 4

D. TO INSTALL +125 VOLT ADJUST CIRCUIT (561 ONLY):

( ) 1. Move white-orange-black-brown wire(s) from CSG-26 to CSG-25

( ) 2. Remove the bare wire between CSG-25 and CSG-26 (see Fig. 5 for ceramic strip location).

3. Install the following components and wires, as indicated in Fig. 5:

( ) the black-brown-black-brown wire (from potentiometer cable) to CSG-23

( ) white-orange wire (from potentiometer cable) to CSG-26

( ) white-brown-red-brown wire (from potentiometer cable) to CSG-29

( ) 6.8 meg resistor (from kit) between CSG-26 and CSG-28

E. TO INSTALL +125 VOLT ADJUST CIRCUIT (561A ONLY):

1. Remove the following components and wires (see Fig. 6 for ceramic strip locations):

( ) 470k resistor (R654) between CSG-25 and CSH-25 --- SAVE

( ) bare wire between CSH-25 and CSH-26

( ) bare wire between CSG-25 and CSH-24

2. Install the following components and wires, as indicated in Fig. 6:

( ) bare wire (from kit) between CSH-24 and CSH-25

( ) white-orange wire (from potentiometer cable) to CSG-25

( ) 6.8 meg resistor (from kit) between CSG-25 and CSH-25

( ) the black-brown-black-brown wire (from potentiometer cable) to CSG-23

( ) white-brown-red-brown wire (from potentiometer cable) to CSG-24

( ) 470k resistor (removed in step E-1) between CSH-24 and CSH-26

INSTRUCTIONS (con'd)

F. TO INSTALL THE +300 VOLT ADJUST CIRCUIT (561 ONLY):

1. Remove the following components and wires (see Fig. 5 for ceramic strip locations):

( ) 333k resistor (R671) between CSG-36 and CSH-36

( ) 0.01 μf capacitor (C670) between CSG-37 and CSH-37

( ) 1.024 meg resistor (R670) between CSG-37 and CSH-37

( ) 33k resistor (R679) between CSG-38 and CSH-38 --- SAVE

( ) bare wire between CSG-38 and gnd lug

( ) bare wire between CSG-35 and CSG-37

( ) 2. Move the two black-brown-black-brown wires from CSG-36 to CSG-37.

( ) 3. Install the following wires and components, as indicated in Fig. 5:

( ) pre-bent wire (from kit) between CSG-35 and CSG-38

( ) white-red wire (from the potentiometer cable) to CSG-36

( ) 33k resistor (removed in step F-1) between CSH-38 and pin 7 of V674

( ) 8.2 meg resistor (from kit) between CSG-36 and CSH-36

( ) 333k resistor (from kit) between CSG-37 and CSH-37

( ) 1.024 meg resistor (from kit) between CSG-38 and CSH-37

( ) 0.01 μf discap (from kit) between CSG-38 and CSH-37

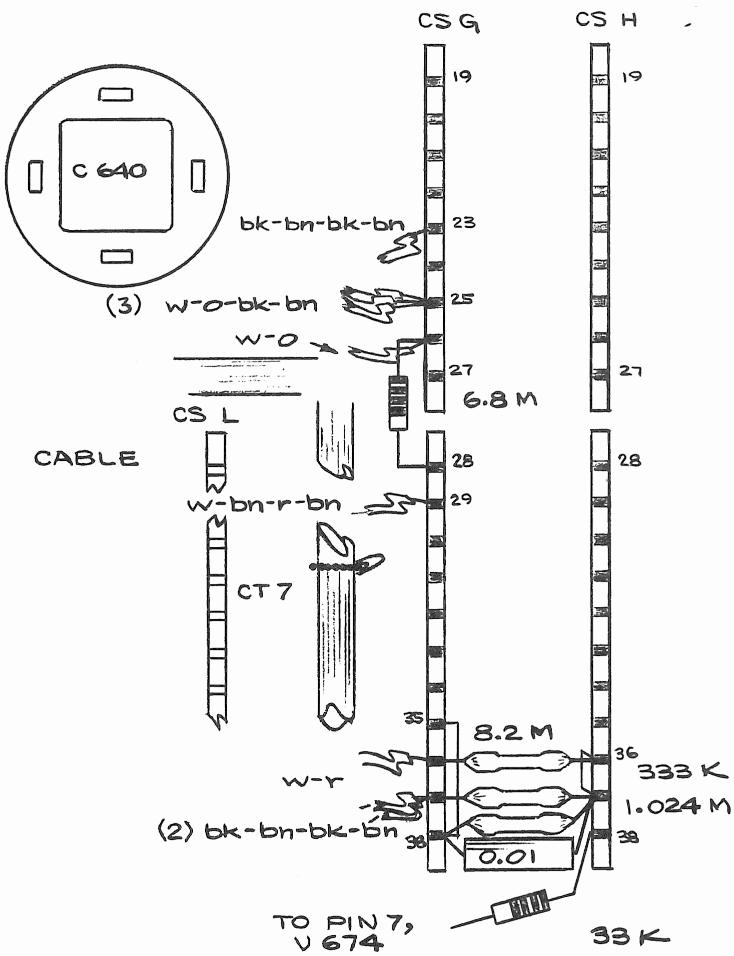


FIG. 5

INSTRUCTIONS (con'd)

G. TO INSTALL +300 VOLT ADJUST CIRCUIT (561A ONLY):

1. Remove the following components and wires (see Fig. 6 for ceramic strip locations).

( ) 333k resistor (R671) between CSG-36 and CSH-36

( ) bare wire between CSG-37 and CSG-38

( ) 0.01 μf capacitor (C670) between CSG-37 and CSH-37 --- SAVE

( ) 1.024 meg resistor (R670) between CSG-37 and CSG-38

( ) 2. Move the two black-brown-black-brown wires from CSG-36 to CSG-37.

3. Install the following components and wires, as indicated in Fig. 6:

( ) 1.024 meg resistor (from kit) between CSG-38 and CSH-37

( ) 333k resistor (from kit) between CSG-37 and CSH-37

( ) white-red wire (from the potentiometer cable) to CSG-36

( ) 8.2 meg resistor (from kit) between CSG-36 and CSH-36

( ) 0.01 μf tubular capacitor (removed in step G-1) between CSG-38 and CSH-37

THIS COMPLETES THE INSTALLATION.

( ) Check wiring for accuracy.

( ) Calibrate the power supplies as indicated on the Manual Insert page.

( ) Moisten the back of the MODIFIED INSTRUMENT tag (from kit) and place it on the manual schematic page affected by this modification.

( ) Fasten the insert pages in your Instruction Manual.

JB:cb

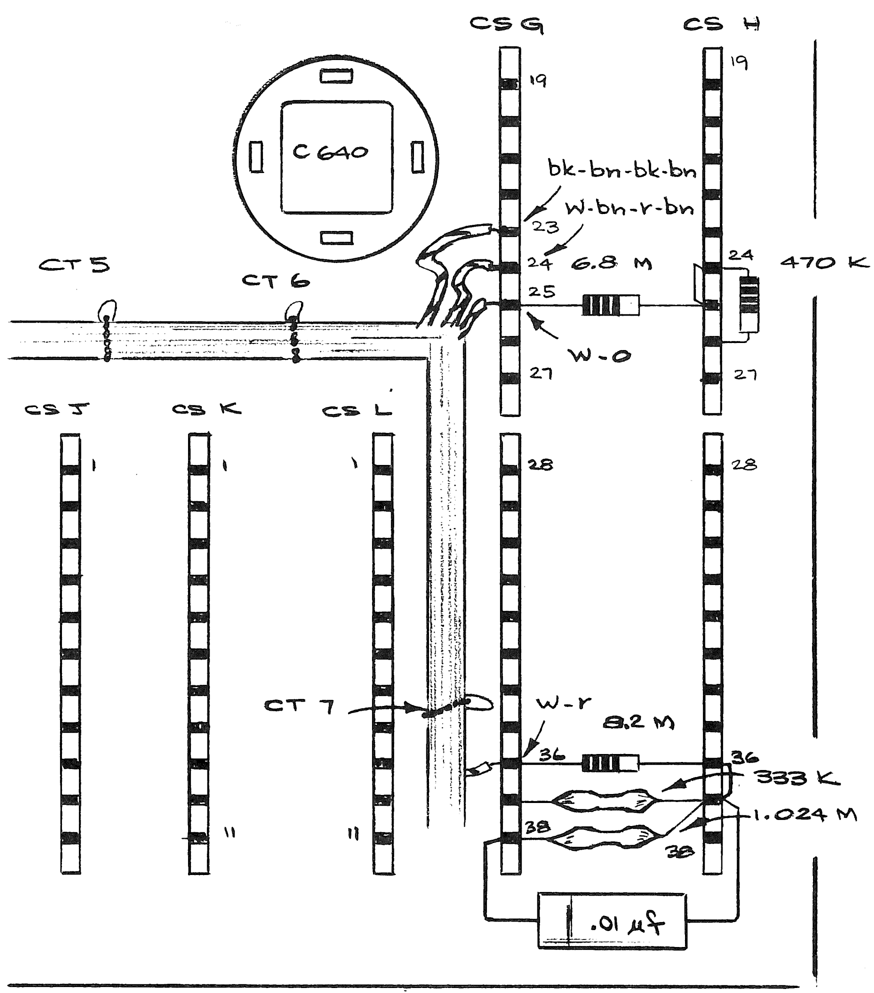


FIG. 6

POWER SUPPLY IMPROVEMENTS

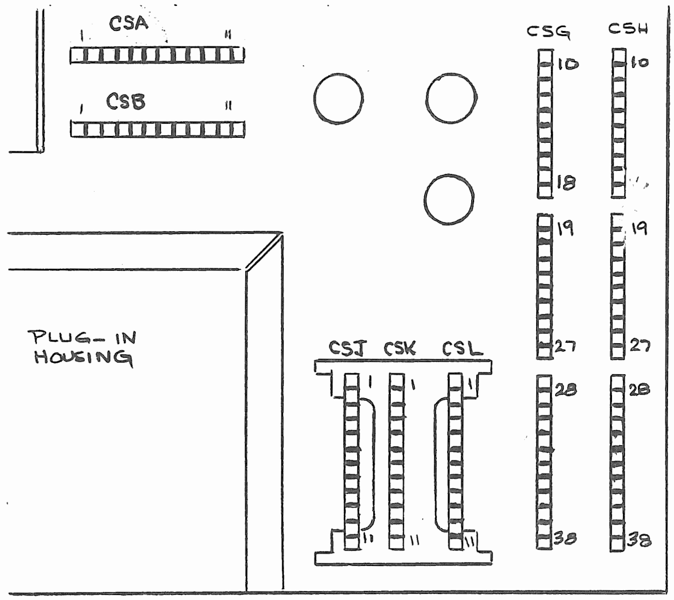
Type 561 s/n 101-5000; Type 561A s/n 5001-6634

GENERAL INFORMATION

This modification provides a means to accurately adjust power supply voltages, by adding potentiometers to the divider networks in the comparator circuits of the -12.2v, +125v and +300v supplies.

The modification involves: (a) Drilling two holes and mounting the potentiometer assembly on the rear horizontal plug-in housing. (b) Changing several components and wires in the -12.2v, +125v and +300v supplies.

The information on this page supplements or supersedes the information in your Manual.



CALIBRATION

EQUIPMENT REQUIRED:

1 VOM Simpson 262, or equivalent
1 VERTICAL PLUG-IN
1 HORIZONTAL PLUG-IN

NOTE: For the following adjustment, refer to drawing for TEST POINT identification.

CONTROL	ADJUST	TEST POINT 561	TEST POINT 561A
R730	-12.2v	CSA-6	CSA-8
R616	-100v	CSG-23	CSG-22 or 23
R656	+125v	CSG-29	CSG-24
R676	+300v	CSG-25	CSG-33

Repeat the above steps until all adjustable supplies are correct.

ELECTRICAL PARTS LIST

Values fixed unless marked Variable.

CAPACITORS

Ckt. No.	Part Number	Description			
C732	290-137	100 μf	EMT	30v	+75% -15%

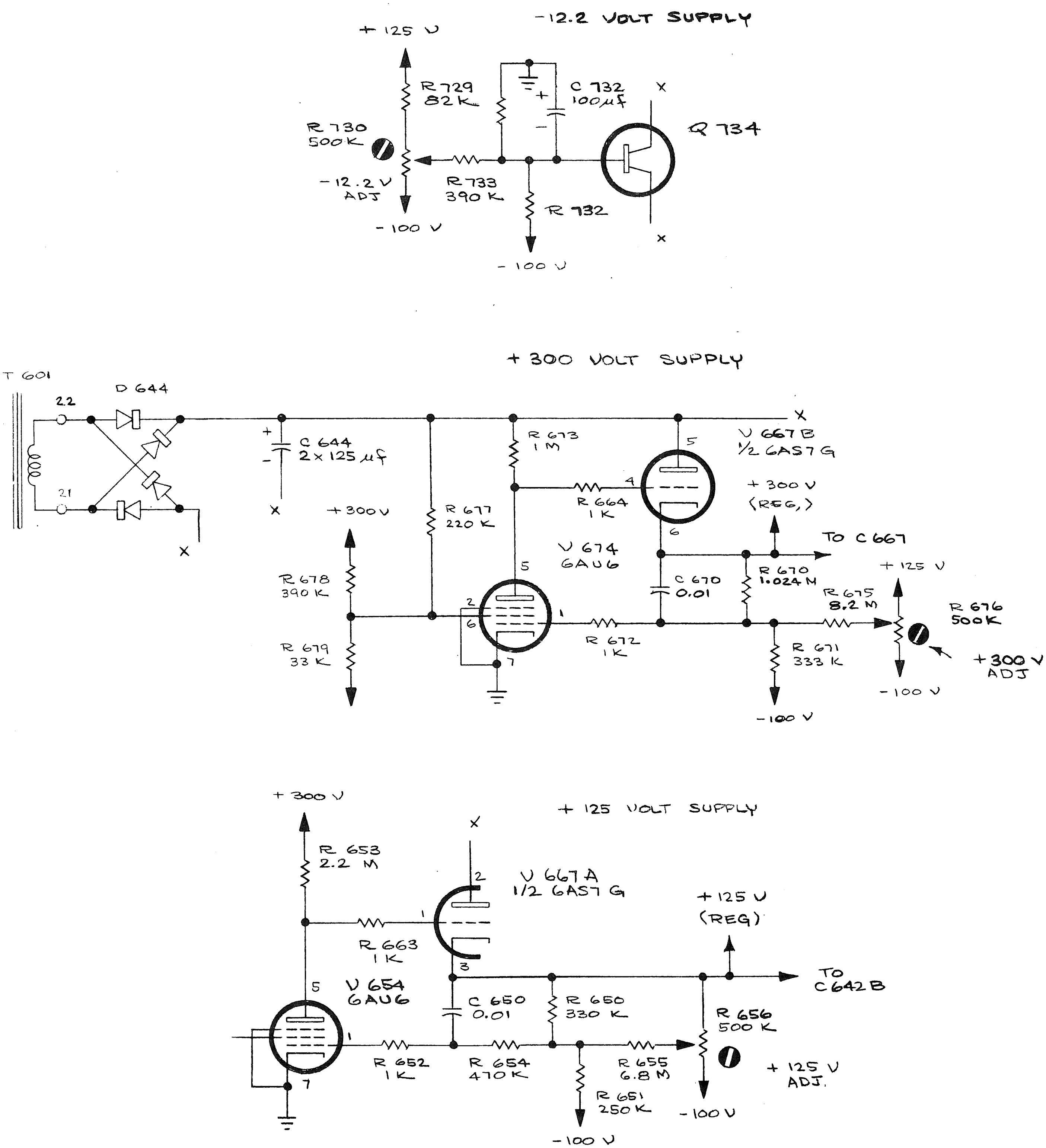
RESISTORS

Resistors are 1/2 watt, 10% composition unless otherwise indicated.

R655	302-685	6.8 meg				
R656	311-068	500k	0.2w	Var	20%	+125 Volts Adj
R675	302-825	8.2 meg				
R676	311-068	500k	0.2w	Var	20%	+300 Volts Adj
R729	302-823	82k				
R730	311-068	500k	0.2w	Var	20%	-12.2 Volts Adj
R733	301-394	390k			5%	

MECHANICAL PARTS LIST

	Part Number
Bracket, alum, potentiometer	406-893
Screw, 6-32 x 1/4 BHS	211-504
Tie, nylon cable	006-531



POWER SUPPLY (PARTIAL DIAGRAM)

MODIFICATION KIT

PARALLEL REAR CONNECTORS

040-0409-00

For the following Tektronix Oscilloscopes:

Type RM561 SN 101-5000
Type RM561A SN 101- 105, 5001-up
Type RM564 SN 101- up

DESCRIPTION

This modification provides one coaxial line from a BNC connector on the rear panel of the instrument to a front panel input on a plug-in placed in the proper compartment (see following paragraph). The plug-in/indicator interface is fitted with a pair of mating holders for miniature coaxial connectors, which permit withdrawal of the plug-in without unsoldering the cable.

Only one plug-in compartment may be modified with this kit. To modify both compartments or to later add a second coaxial line in one compartment, order an additional kit.

To complete the modification, you must install Modification Kit 040-0406-00 in the plug-in(s) to be used.

040-0406-00 provides one coaxial line in Types 60, 2A60, 67, 2B67, 75, 3A75, 3B1, 3B3, and 3B4.

Parallel Rear Connector kits 040-0410-00 and 040-0411-00 are also available to install two and four coaxial lines, respectively, in an RM561, RM561A, or RM564. To insure electrical continuity from front to rear panel, the plug-in and indicator coaxial lines must 'match'.

See 'LIMITATIONS' on page 2.

Publication:
Instructions for 040-0409-00
July 1966

LIMITATIONS

Compatibility

All 2- and 3-series plug-ins intended for use in an RM561, RM561A, or RM564, whether the plug-in is modified for rear connectors or not, will operate normally in a modified indicator. However, there could be noise problems with one of the more sensitive plug-ins having an open input connector at the rear of the plug-in facing into an indicator power supply.

Changes in Electrical Characteristics

The system is basically incompatible with conventional X10 or X100 high-impedance probes. This is because the input capacitance of the plug-in is raised to approximately 100 pF, plus the capacitance of the circuitry attached to the rear connector.

Optimum transient response for 10 MHz instruments may be preserved by terminating at the front-panel connector for signals applied to the rear-panel connector. There will be some degradation of transient response in 10 MHz instruments for signals applied to the front panel input or terminated at the rear panel. For lower bandwidth instruments, the only noticeable effect will be that of the increased cable capacitance on signals from sources greater than 50 Ω.

CONNECTOR EXTRACTION

The Cannon DM series miniature connectors may be removed from their Delrin* holders by using a special tool available from Cannon Electric Company. Order connector extractor CET-C6B.

To use the extractor, plunge the tubing down over the connector as far as it will go, then push the connector out with the inner shaft of the tool.

*Du Pont registered trademark.

PARTS LIST

Quantity	Part Number	Description
(1 ea)		Assembly, coax-connector, consisting of:
1 ea	131-0410-00	Connector, coax, Cannon DM53741-5001
1 ea	131-0411-00	Connector, coax, BNC, Dage #4818-2
1 ea	(162-0531-00)	Tubing, plastic, #12 3/4 in. black(heat-shrinkable)
1 ea	(175-0068-00)	Cable, coax, RG-174/U 6-1/2 in. gray
2 ea	211-0511-00	Screw, 6-32 x 1/2 PHS, Phillips
1 ea	334-1073-00	Plate, identification, J1-J2
1 ea	334-1074-00	Plate, identification, J5-J6
1 ea	352-0095-00	Holder, coax connector, Delrin
2 ea	361-0109-00	Nut, spacer
2 ea	361-0110-00	Spacer, flat

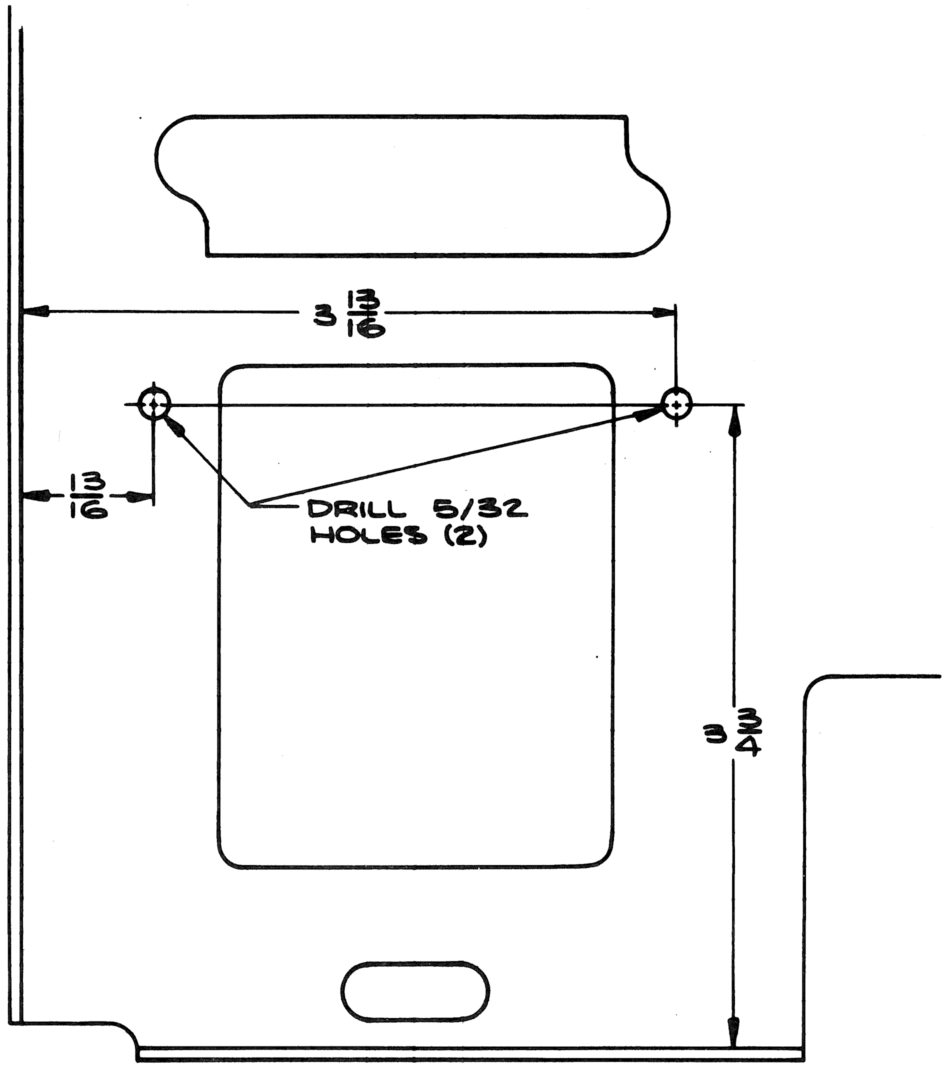


Fig. 1

INSTRUCTIONS

A. TO INSTALL CONNECTORS IN VERTICAL (LEFT, AS VIEWED FROM FRONT) PLUG-IN COMPARTMENT:

STEP A-1 APPLIES TO RM561 SN 101-5000 AND RM561A SN 101-105, 5001-6209:

( ) 1. Drill two 5/32 in. holes in the bulkhead, at the rear of the left plug-in compartment, as shown in Fig. 1.

STEP A-2 APPLIES TO RM561 SN 101-5000 AND RM561A SN 101-105, 5001-6441:

( ) 2. Remove the tape backing from the "J1-J2" identification plate (from kit) and fasten it to the rear plate above the two 1/2 in. "D" holes shown in Fig. 2. Leave about 3/16 in. of metal between holes and identification plate.

NOTE: Remove any previous silk-screened nomenclature around these connector holes, using lacquer thinner or similar mineral solvent.

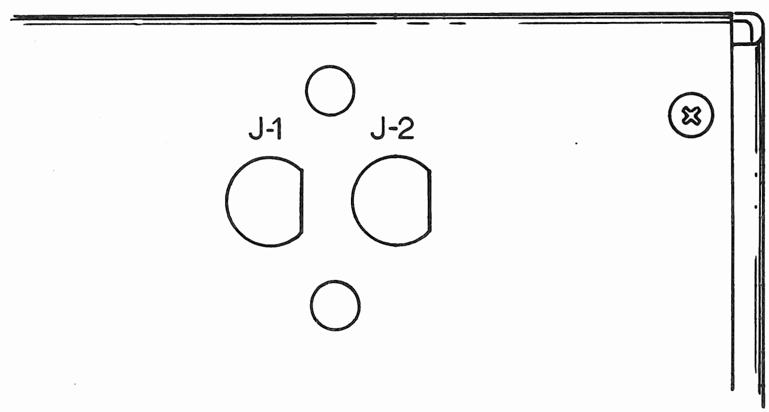


Fig. 2

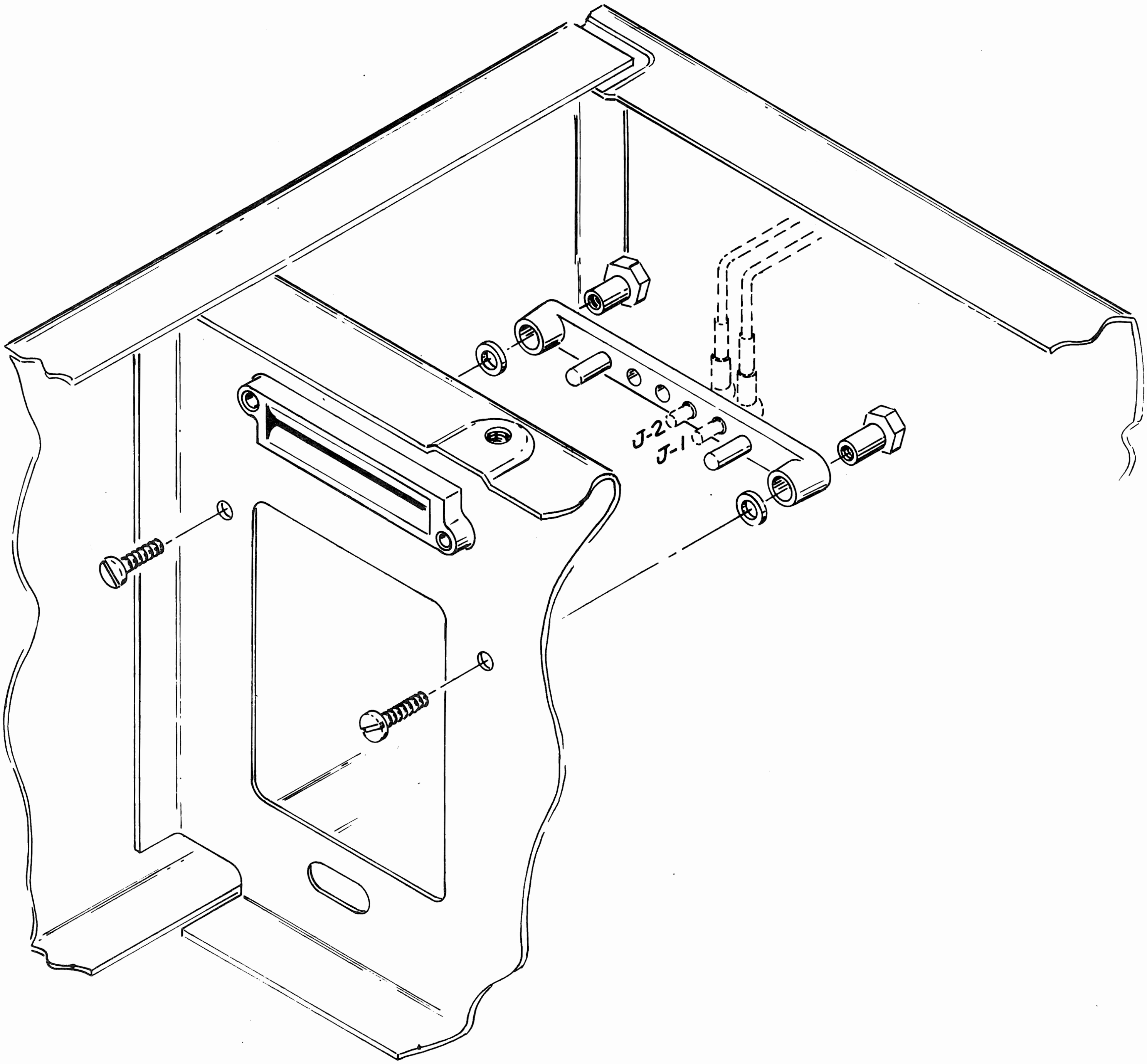


Fig. 3

INSTRUCTIONS (cont)

A. (cont)

STEPS A-3 THROUGH A-5 APPLY TO ALL INSTRUMENTS:

( ) 3. Mount the connector holder (from kit) as indicated in Fig. 3, using the 6-32 x 1/2 PHS screws, spacer nuts, and flat spacers from the kit.

( ) 4. Install the small (Cannon) connector from the coax-connector assembly (from kit) in position J-1 or J-2 on the holder (see Fig. 3). Since the proper location for the connector depends upon the plug-in type and specific input connector to be used, refer to the table below to make your choice:

Plug-in Type	Front Panel Connector	Cannon Connector Position on Holder	BNC Connector Position on Rear Panel
60/2A60	INPUT	J-1	J-1
67/2B67	EXT INPUT	J-1	J-1
67/2B67	EXT TRIG	J-2	J-2
75/3A75	INPUT	J-1	J-1
3B1	Delayed EXT TRIG	J-1	J-1
3B1	Normal EXT TRIG	J-2	J-2
3B3	Delayed EXT TRIG	J-1	J-1
3B3	Normal EXT TRIG	J-2	J-2
3B4	EXT HORIZ IN	J-1	J-1
3B4	EXT TRIG IN	J-2	J-2

( ) 5. Install the BNC connector (from assembly) in the J-1 or J-2 hole in the rear panel (see step A-2), placing the lockwasher between rear panel and connector shoulder. Refer to the table above for the proper position.

THIS COMPLETES THE INSTALLATION.

( ) Fasten the insert page in your Instruction Manual.

( ) Check alignment of the connector assembly by installing a plug-in modified for rear input connectors. The indicator connector assembly may be adjusted somewhat by loosening the two mounting screws.

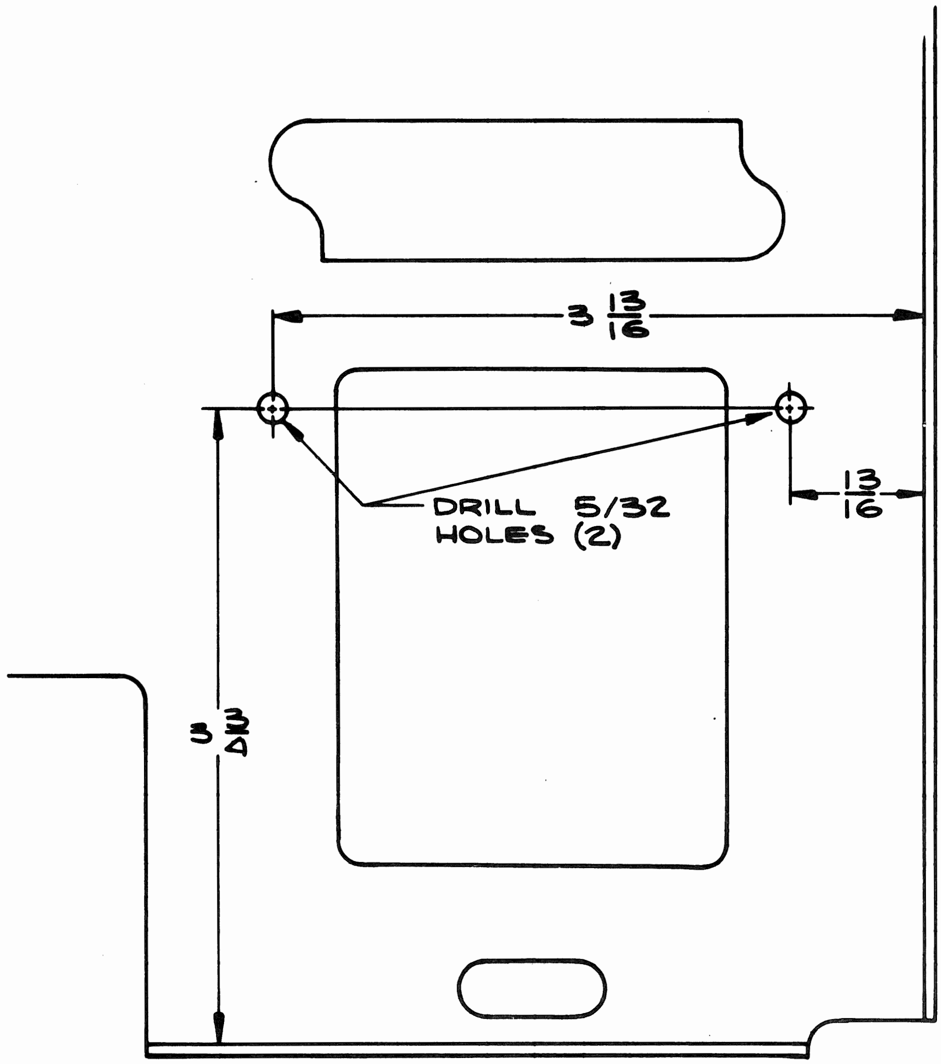


Fig. 4

B. TO INSTALL CONNECTORS IN HORIZONTAL (RIGHT, AS VIEWED FROM FRONT) PLUG-IN COMPARTMENT:

STEP B-1 APPLIES TO RM561 SN 101-5000 AND RM561A SN 101-105, 5001-6209:

( ) 1. Drill two 5/32 in. holes in the bulkhead, at the rear of the right plug-in compartment, as shown in Fig. 4.

STEP B-2 APPLIES TO RM561 SN 101-5000 AND RM561A SN 101-105, 5001-6441:

( ) 2. Remove the tape backing from the "J5-J6" identification plate (from kit) and fasten it to the rear plate above the two 1/2 in. "D" holes shown in Fig. 5. Leave about 3/16 in. of metal between holes and identification plate.

NOTE: Remove any previous silk-screened nomenclature around these connector holes, using lacquer thinner or similar mineral solvent.

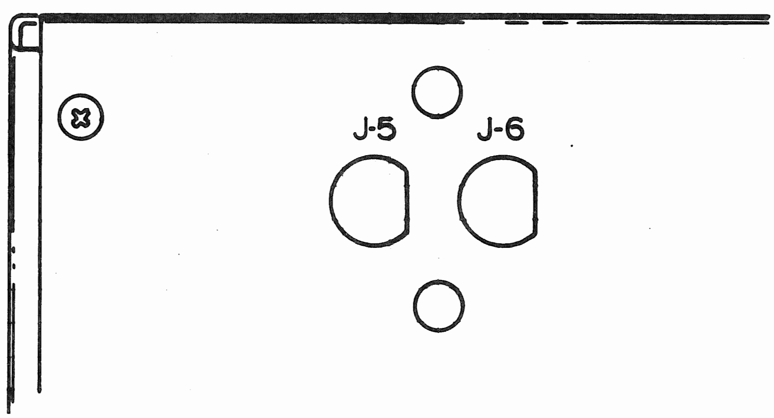


Fig. 5

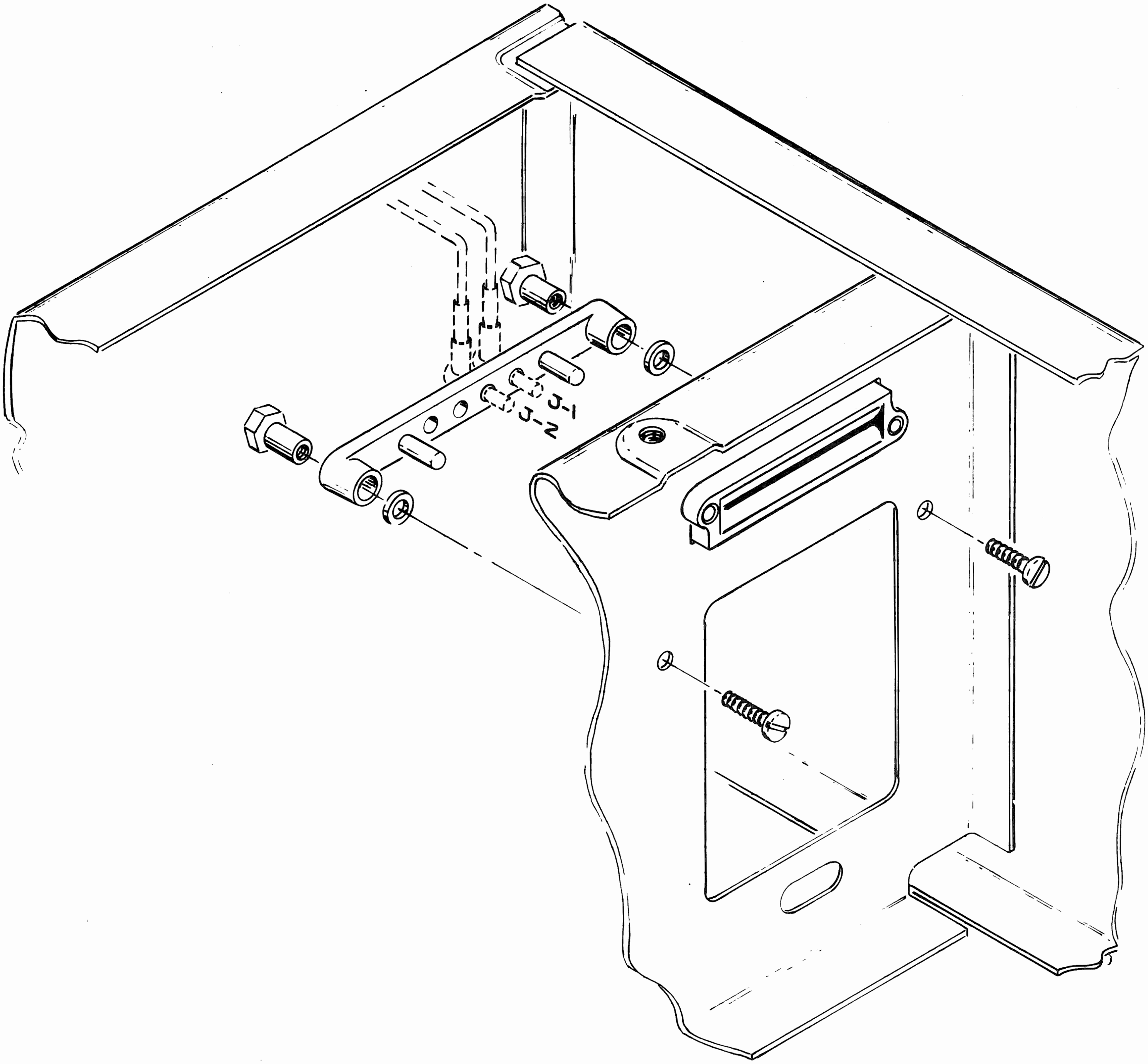


Fig. 6

B. (cont)

STEPS B-3 THROUGH B-5 APPLY TO ALL INSTRUMENTS:

( ) 3. Mount the connector holder (from kit) as indicated in Fig. 6, using the 6-32 x 1/2 PHS screws, spacer nuts, and flat spacers from the kit.

( ) 4. Install the small (Cannon) connector from the coax-connector assembly (from kit) in position J-1 or J-2 on the holder (see Fig. 6). Since the proper location for the connector depends upon the plug-in type and specific input connector to be used, refer to the table below to make your choice:

Plug-in Type	Front Panel Connector	Cannon Connector Position on Holder	BNC Connector Position on Rear Panel
60/2A60	INPUT	J-1	J-5
67/2B67	EXT INPUT	J-1	J-5
67/2B67	EXT TRIG	J-2	J-6
75/3A75	INPUT	J-1	J-5
3B1	Delayed EXT TRIG	J-1	J-5
3B1	Normal EXT TRIG	J-2	J-6
3B3	Delayed EXT TRIG	J-1	J-5
3B3	Normal EXT TRIG	J-2	J-6
3B4	EXT HORIZ IN	J-1	J-5
3B4	EXT TRIG IN	J-2	J-6

( ) 5. Install the BNC connector (from assembly) in the J-5 or J-6 hole in the rear panel (see step B-2), placing the lockwasher between rear panel and connector shoulder. Refer to the table above for the proper position.

THIS COMPLETES THE INSTALLATION.

( ) Fasten the insert page in your Instruction Manual.

( ) Check alignment of the connector assembly by installing a plug-in modified for rear input connectors. The indicator connector assembly may be adjusted somewhat by loosening the two mounting screws.

PARALLEL REAR CONNECTORS

Types RM561, RM561A, and RM564 -- All serial numbers

Installed in Type _______ SN _______ Date _______

GENERAL INFORMATION

This modification provides one coaxial line from a BNC connector on the rear panel of the instrument to a front panel input on a plug-in placed in the proper compartment (see following paragraph). The plug-in/indicator interface is fitted with a pair of mating holders for miniature coaxial connectors, which permit withdrawal of the plug-in without unsoldering the cable.

Only one plug-in compartment may be modified with this kit. To modify both compartments or to later add a second coaxial line in one compartment, order an additional kit.

To complete the modification, you must install Modification Kit 040-0406-00 in the plug-in(s) to be used.

> 040-0406-00 provides one coaxial line in Types 60, 2A60, 67, 2B67, 75, 3A75, 3B1, 3B3, and 3B4.

Parallel Rear Connector kits 040-0410-00 and 040-0411-00 are also available to install two and four coaxial lines, respectively, in an RM561, RM561A, or RM564. To insure electrical continuity from front to rear panel, the plug-in and indicator coaxial lines must 'match'.

LIMITATIONS

Compatibility

All 2- and 3-series plug-ins intended for use in an RM561, RM561A, or RM564, whether the plug-in is modified for rear connectors or not, will operate normally in a modified indicator. However, there could be noise problems with one of the more sensitive plug-ins having an open input connector at the rear of the plug-in facing into an indicator power supply.

Changes in Electrical Characteristics

The system is basically incompatible with conventional X10 or X100 high-impedance probes. This is because the input capacitance of the plug-in is raised to approximately 100pF, plus the capacitance of the circuitry attached to the rear connector.

Optimum transient response for 10 MHz instruments may be preserved by terminating at the front-panel connector for signals applied to the rear-panel connector. There will be some degradation of transient response in 10 MHz instruments for signals applied to the front panel input or terminated at the rear panel. For lower bandwidth instruments, the only noticeable effect will be that of the increased cable capacitance on signals from sources greater than 50 Ω.

CONNECTOR EXTRACTION

The Cannon DM series miniature connectors may be removed from their Delrin holders by using a special tool available from Cannon Electric Company. Order connector extractor CET-C6B.

To use the extractor, plunge the tubing down over the connector as far as it will go, then push the connector out with the inner shaft of the tool.

MECHANICAL PARTS LIST

	Part Number
Connector, coax, Cannon DM53741-5001	131-0410-00
Connector, coax, Dage #4818-2 BNC	131-0411-00
Holder, coax connector, Delrin	352-0095-00
Nut, spacer	361-0109-00
Plate, identification, J1-J2	334-1073-00
Plate, identification, J5-J6	334-1074-00
Screw, 6-32 x 1/2 PHS, Phillips	211-0511-00
Spacer, flat	361-0110-00

MODIFICATION KIT

PARALLEL REAR CONNECTORS

040-0410-00

For the following Tektronix Oscilloscopes:

Type RM561 SN 101-5000
Type RM561A SN 101- 105, 5001-up
Type RM564 SN 101- up

DESCRIPTION

This modification provides two coaxial lines from a corresponding number of BNC connectors on the rear panel of the instrument to the front panel inputs on a plug-in placed in the proper compartment (see following paragraph). The plug-in/indicator interface is fitted with a pair of mating holders for miniature coaxial connectors, which permit withdrawal of the plug-in without unsoldering the cable.

Only one plug-in compartment may be modified with this kit. To modify both compartments, order an additional kit.

To complete the modification, you must install one of the following Modification Kits in the plug-in(s) to be used:

040-0406-00 provides one coaxial line in Types 60, 2A60, 67, 2B67, 75, 3A75, 3B1, 3B3, and 3B4.

040-0407-00 provides two coaxial lines in Types 2A61, 63, 2A63, 67, 2B67, 3A1, 3A6, 72, 3A72, 3B1, 3B3, and 3B4.

Parallel Rear Connector kits 040-0409-00 and 040-0411-00 are also available to install one and four coaxial lines, respectively, in an RM561, RM561A, or RM564. To insure electrical continuity from front to rear panel, the plug-in and indicator coaxial lines must 'match'.

See 'LIMITATIONS' on page 2.

Publication:
Instructions for 040-0410-00
July 1966

LIMITATIONS

Compatibility

All 2- and 3-series plug-ins intended for use in an RM561, RM561A, or RM564, whether the plug-in is modified for rear connectors or not, will operate normally in a modified indicator. However, there could be noise problems with one of the more sensitive plug-ins having an open input connector at the rear of the plug-in facing into an indicator power supply.

Changes in Electrical Characteristics

The system is basically incompatible with conventional X10 or X100 high-impedance probes. This is because the input capacitance of the plug-in is raised to approximately 100 pF, plus the capacitance of the circuitry attached to the rear connector.

Optimum transient response for 10 MHz instruments may be preserved by terminating at the front-panel connector for signals applied to the rear-panel connector. There will be some degradation of transient response in 10 MHz instruments for signals applied to the front panel input or terminated at the rear panel. For lower bandwidth instruments, the only noticeable effect will be that of the increased cable capacitance on signals from sources greater than 50 Ω.

CONNECTOR EXTRACTION

The Cannon DM series miniature connectors may be removed from their Delrin* holders by using a special tool available from Cannon Electric Company. Order connector extractor CET-C6B.

To use the extractor, plunge the tubing down over the connector as far as it will go, then push the connector out with the inner shaft of the tool.

*Du Pont registered trademark.

PARTS LIST

Quantity	Part Number	Description		
(1 ea)		Assembly, connector, consisting of:		
2 ea	131-0410-00	Connector, coax, Cannon DM53741-5001		
2 ea	131-0411-00	Connector, coax, BNC, Dage #4818-2		
1 ea	352-0095-00	Holder, coax connector, Delrin		
2 ea	(162-0531-00)	Tubing, plastic, #12	3/4 in.	black (heat-shrinkable)
1 ea	(175-0068-00)	Cable, coax, RG-174/U	6-1/2 in.	gray-yellow-yellow
1 ea	(175-0068-00)	Cable, coax, RG-174/U	6-1/2 in.	gray-orange-orange
2 ea	211-0511-00	Screw, 6-32 x 1/2 PHS, Phillips		
1 ea	334-1073-00	Plate, identification, J1-J2		
1 ea	334-1074-00	Plate, identification, J5-J6		
2 ea	361-0109-00	Nut, spacer		
2 ea	361-0110-00	Spacer, flat		

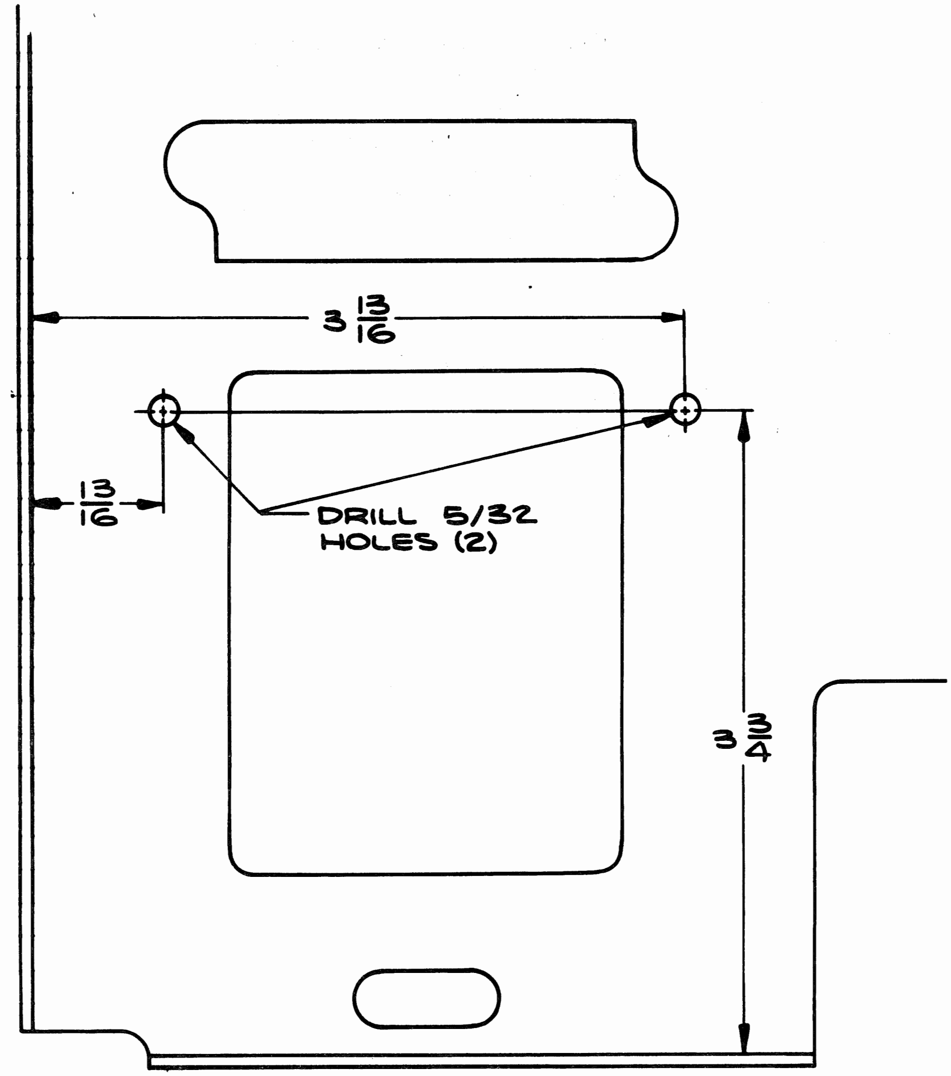


Fig. 1

INSTRUCTIONS

A. TO INSTALL CONNECTORS IN VERTICAL (LEFT, AS VIEWED FROM FRONT) PLUG-IN COMPARTMENT:

STEP A-1 APPLIES TO RM561 SN 101-5000 AND RM561A SN 101-105, 5001-6209:

( ) 1. Drill two 5/32 in. holes in the bulkhead, at the rear of the left plug-in compartment, as shown in Fig. 1.

STEP A-2 APPLIES TO RM561 SN 101-5000 AND RM561A SN 101-105, 5001-6441:

( ) 2. Remove the tape backing from the "J1-J2" identification plate (from kit) and fasten it to the rear plate above the two 1/2 in. "D" holes shown in Fig. 2. Leave about 3/16 in. of metal between holes and identification plate.

NOTE: Remove any previous silk-screened nomenclature around these connector holes, using lacquer thinner or similar mineral solvent.

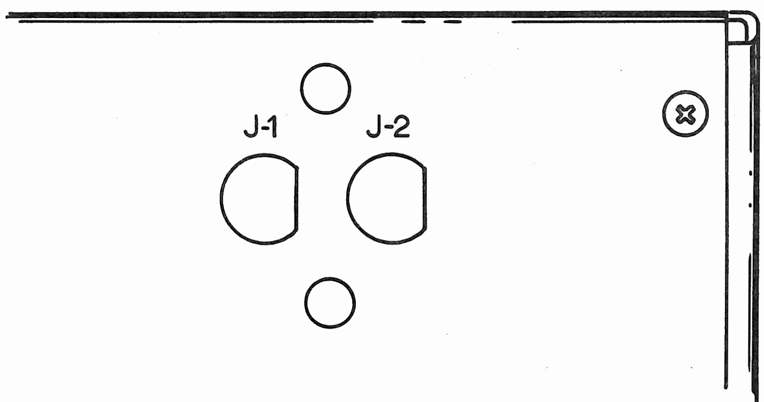


Fig. 2

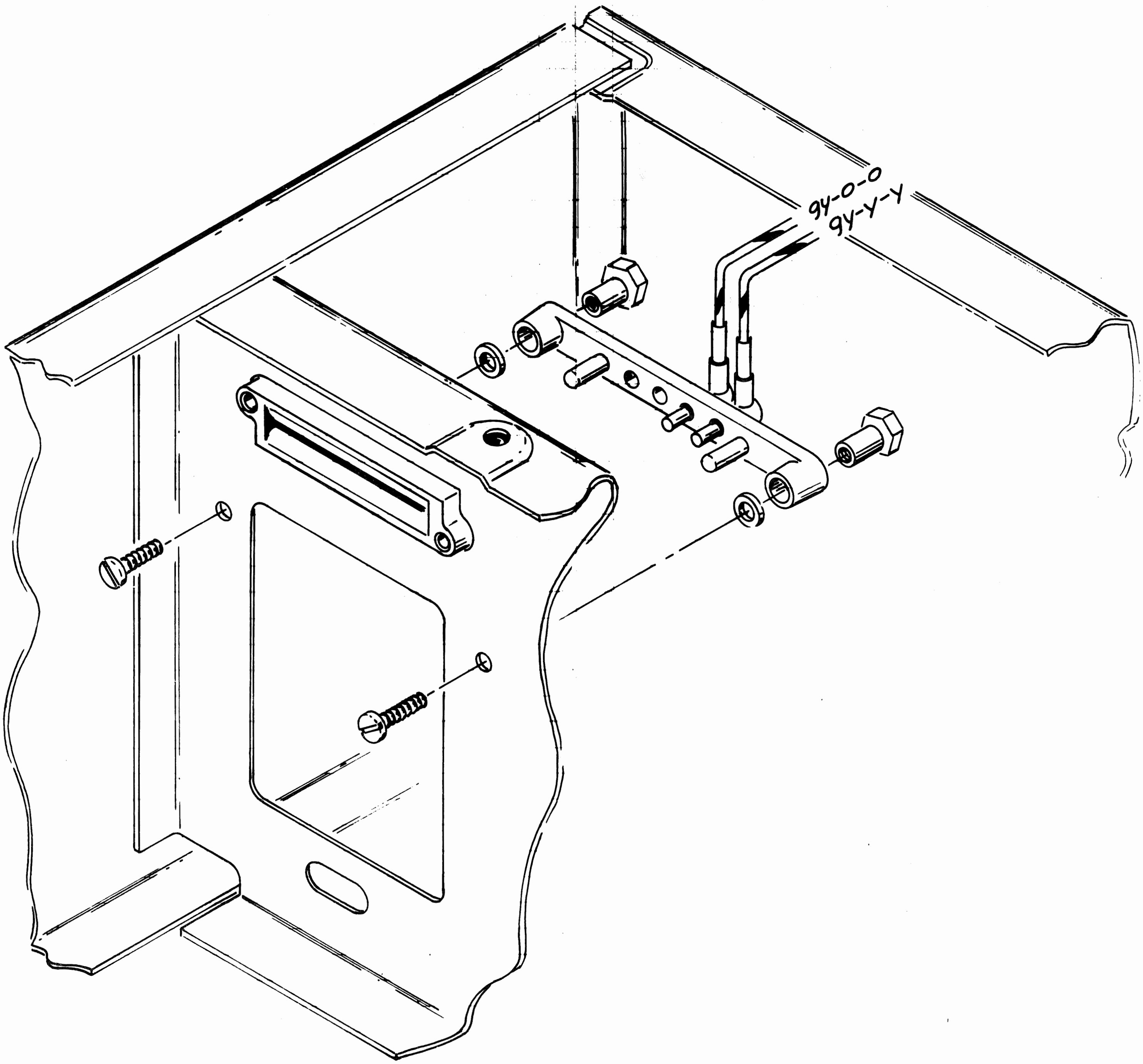


Fig. 3

A. (cont)

STEPS A-3 AND A-4 APPLY TO ALL INSTRUMENTS:

( ) 3. Mount the connector assembly (from kit) as indicated in Fig. 3 (make sure connectors are in positions shown). Use the 6-32 x 1/2 PHS screws, spacer nuts, and flat spacers from the kit.

( ) 4. Install the BNC connectors (from assembly) in the 1/2 in. holes in the rear panel, placing the lockwasher between rear panel and connector shoulder. Locate the connectors as follows:

Cable Color Code	Connector Position
gray-yellow-yellow	J-1
gray-orange-orange	J-2

THIS COMPLETES THE INSTALLATION

( ) Fasten the insert page in your Instruction Manual.

( ) Check alignment of the connector assembly by installing a plug-in modified for rear input connectors. The indicator connector assembly may be adjusted somewhat by loosening the two mounting screws.

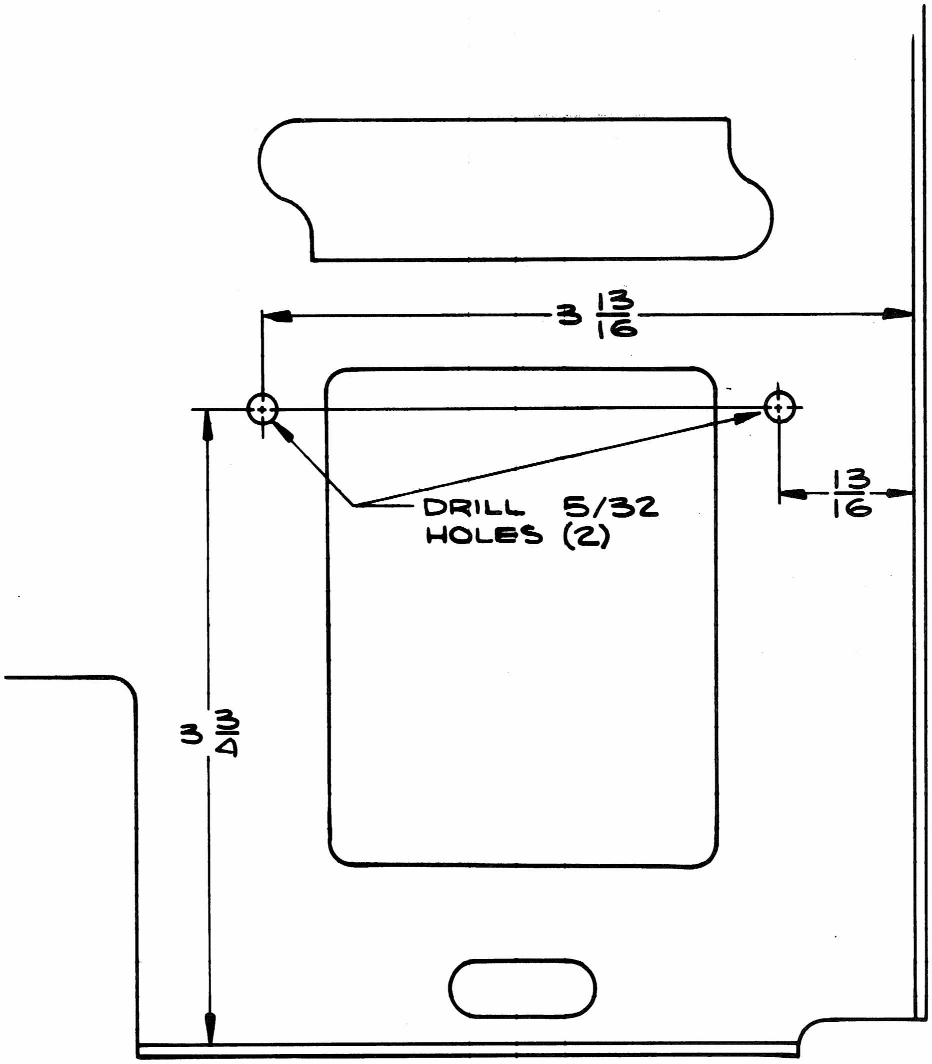


Fig. 4

INSTRUCTIONS (cont)

B. TO INSTALL CONNECTORS IN HORIZONTAL (RIGHT, AS VIEWED FROM FRONT) PLUG-IN COMPARTMENT:

STEP B-1 APPLIES TO RM561 SN 101-5000 AND RM561A SN 101-105, 5001-6209:

( ) 1. Drill two 5/32 in. holes in the bulkhead, at the rear of the right plug-in compartment, as shown in Fig. 4.

STEP B-2 APPLIES TO RM561 SN 101-5000 AND RM561A SN 101-105, 5001-6441:

( ) 2. Remove the tape backing from the "J5-J6" identification plate (from kit) and fasten it to the rear plate above the two 1/2 in. "D" holes shown in Fig. 5. Leave about 3/16 in. of metal between holes and identification plate.

NOTE: Remove any previous silk-screened nomenclature around these connector holes, using lacquer thinner or similar mineral solvent.

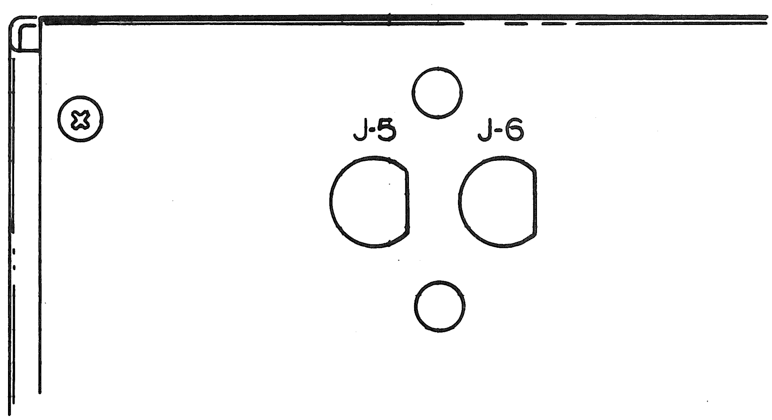


Fig. 5

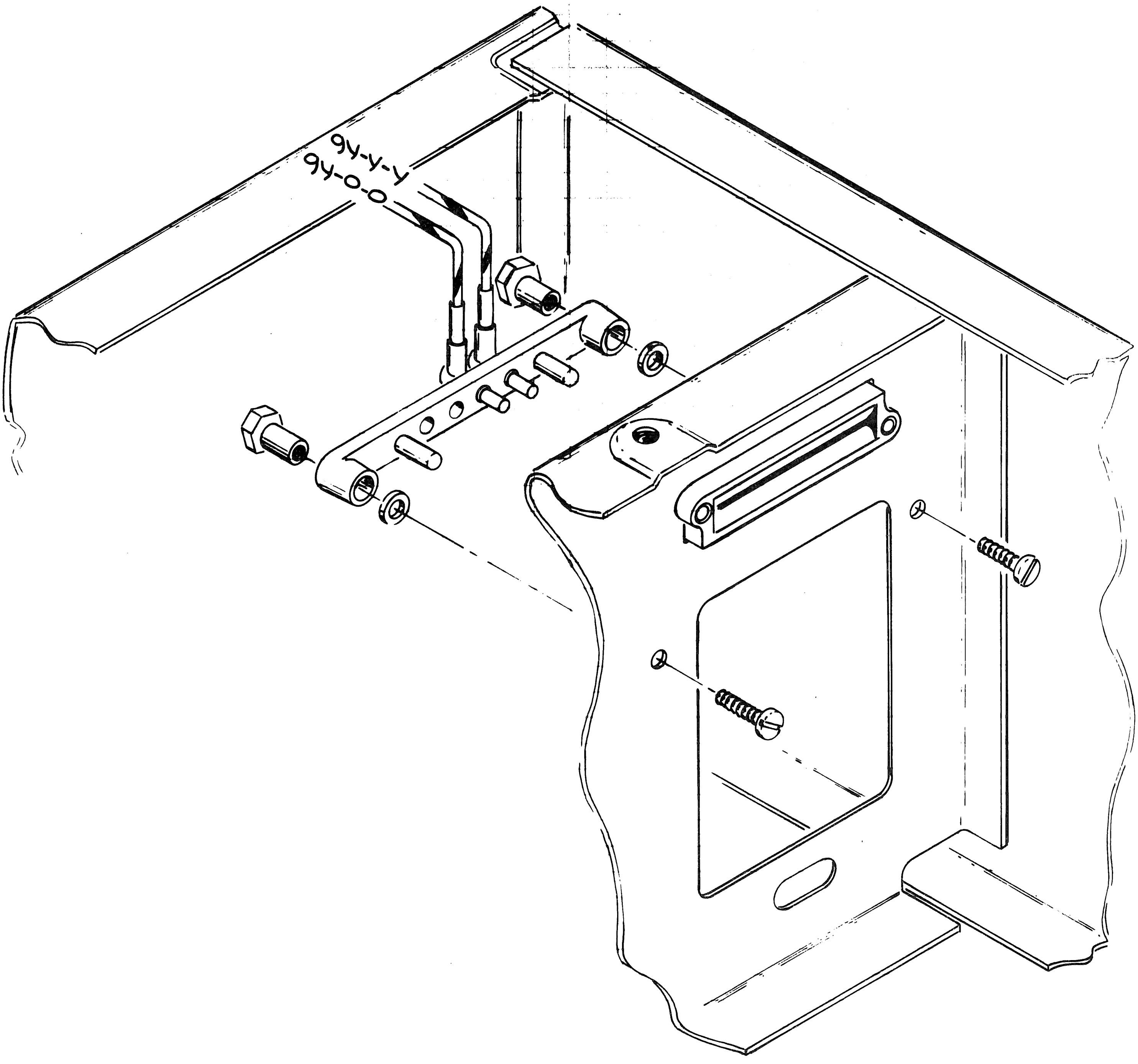


Fig. 6

B. (cont)

STEPS B-3 AND B-4 APPLY TO ALL INSTRUMENTS:

( ) 3. Mount the connector assembly (from kit) as indicated in Fig. 6 (make sure connectors are in positions shown). Use the 6-32 x 1/2 PHS screws, spacer nuts, and flat spacers from the kit.

( ) 4. Install the BNC connectors (from assembly) in the 1/2 in. holes in the rear panel, placing the lockwasher between rear panel and connector shoulder. Locate the connectors as follows:

Cable Color Code	Connector Position
gray-yellow-yellow	J-5
gray-orange-orange	J-6

THIS COMPLETES THE INSTALLATION

( ) Fasten the insert page in your Instruction Manual.

( ) Check alignment of the connector assembly by installing a plug-in modified for rear input connectors. The indicator connector assembly may be adjusted somewhat by loosening the two mounting screws.

CH:cet

PARALLEL REAR CONNECTORS

Types RM561, RM561A, and RM564 -- All serial numbers

Installed in Type _______ SN _______ Date _______

GENERAL INFORMATION

This modification provides two coaxial lines from a corresponding number of BNC connectors on the rear panel of the instrument to the front panel inputs on a plug-in placed in the proper compartment (see following paragraph). The plug-in/indicator interface is fitted with a pair of mating holders for miniature coaxial connectors, which permit withdrawal of the plug-in without unsoldering the cable.

Only one plug-in compartment may be modified with this kit. To modify both compartments, order an additional kit.

To complete the modification, you must install one of the following Modification Kits in the plug-in(s) to be used:

040-0406-00 provides one coaxial line in Types 60, 2A60, 67, 2B67, 75, 3A75, 3B1, 3B3, and 3B4.

040-0407-00 provides two coaxial lines in Types 2A61, 63, 2A63, 67, 2B67, 3A1, 3A6, 72, 3A72, 3B1, 3B3, and 3B4.

Parallel Rear Connector kits 040-0409-00 and 040-0411-00 are also available to install one and four coaxial lines, respectively, in an RM561, RM561A, or RM564. To insure electrical continuity from front to rear panel, the plug-in and indicator coaxial lines must 'match'.

LIMITATIONS

Compatibility

All 2- and 3-series plug-ins intended for use in an RM561, RM561A, or RM564, whether the plug-in is modified for rear connectors or not, will operate normally in a modified indicator. However, there could be noise problems with one of the more sensitive plug-ins having an open input connector at the rear of the plug-in facing into an indicator power supply.

Changes in Electrical Characteristics

The system is basically incompatible with conventional X10 or X100 high-impedance probes. This is because the input capacitors of the plug-in is raised to approximately 100 pF, plus the capacitance of the circuitry attached to the rear connector.

Optimum transient response for 10 MHz instruments may be preserved by terminating at the front-panel connector for signals applied to the rear-panel connector. There will be some degradation of transient response in 10 MHz instruments for signals applied to the front panel input or terminated at the rear panel. For lower bandwidth instruments, the only noticeable effect will be that of the increased cable capacitance on signals from sources greater than 50 Ω.

CONNECTOR EXTRACTION

The Cannon DM series miniature connectors may be removed from their Delrin holders by using a special tool available from Cannon Electric Company. Order connector extractor CET-C6B.

To use the extractor, plunge the tubing down over the connector as far as it will go, then push the connector out with the inner shaft of the tool.

MECHANICAL PARTS LIST

	Part Number
Connector, coax, Cannon DM53741-5001	131-0410-00
Connector, coax, Dage #4818-2 BNC	131-0411-00
Holder, coax connector, Delrin	352-0095-00
Nut, spacer	361-0109-00
Plate, identification, J1-J2	334-1073-00
Plate, identification, J5-J6	334-1074-00
Screw, 6-32 x 1/2 PHS, Phillips	211-0511-00
Spacer, flat	361-0110-00

MODIFICATION KIT

PARALLEL REAR CONNECTORS

040-0411-00

For the following Tektronix Oscilloscopes:

Type RM561 SN 101-5000
Type RM561A SN 101- 105, 5001-up
Type RM564 SN 101- up

DESCRIPTION

This modification provides four coaxial lines from a corresponding number of BNC connectors on rear panel of the instrument to the front panel inputs on a plug-in placed in the proper compartment. The plug-in/indicator interface is fitted with a pair of mating holders for miniature coaxial connectors, which permit withdrawal of the plug-in without unsoldering the cable. Only one plug-in compartment may be modified with this kit. To modify both compartments, order an additional kit.

To complete the modification, you must install one of the following Modification Kits in the plug-in(s) to be used:

040-0406-00 provides one coaxial line in Types 60, 2A60, 67, 2B67, 75, 3A75, 3B1, 3B3, and 3B4.

040-0407-00 provides two coaxial lines in Types 2A61, 63, 2A63, 67, 2B67, 3A1, 3A6, 72, 3A72, 3B1, 3B3, and 3B4.

040-0408-00 provides four coaxial lines in Types 3A3 and 3A74.

Parallel Rear Connector kits 040-0409-00 and 040-0410-00 are also available to install one and two coaxial lines, respectively, in an RM561, RM561A, or RM564. To insure electrical continuity from front to rear panel, the plug-in and indicator coaxial lines must 'match'.

See 'LIMITATIONS' on page 2.

Publication:
Instructions for 040-0411-00
July 1966

LIMITATIONS

Compatibility

All 2- and 3-series plug-ins intended for use in an RM561, RM561A, or RM564, whether the plug-in is modified for rear connectors or not, will operate normally in a modified indicator.

Changes in Electrical Characteristics

The system is basically incompatible with conventional X10 or X100 high-impedance probes. This is because the input capacitance of the plug-in is raised to approximately 100 pF, plus the capacitance of the circuitry attached to the rear connector.

Optimum transient response for 10 MHz instruments may be preserved by terminating at the front-panel connector for signals applied to the rear-panel connector. There will be some degradation of transient response in 10 MHz instruments for signals applied to the front panel input or terminated at the rear panel. For lower bandwidth instruments, the only noticeable effect will be that of the increased cable capacitance on signals from sources greater than 50 Ω.

CONNECTOR EXTRACTION

The Cannon DM series miniature connectors may be removed from their Delrin* holders by using a special tool available from Cannon Electric Company. Order connector extractor CET-C6B.

To use the extractor, plunge the tubing down over the connector as far as it will go, then push the connector out with the inner shaft of the tool.

*Du Pont registered trademark.

PARTS LIST

Quantity	Part Number	Description		
(1 ea)		Assembly, connector, consisting of:		
4 ea	131-0410-00	Connector, coax, Cannon DM53741-5001		
4 ea	131-0411-00	Connector, coax, BNC, Dage #4818-2		
1 ea	352-0095-00	Holder, coax connector, Delrin		
4 ea	(162-0531-00)	Tubing, plastic, #12	3/4 in.	black (heat-shrinkable)
1 ea	(175-0068-00)	Cable, coax, RG-174/U	6-1/2 in.	gray-yellow-yellow
1 ea	(175-0068-00)	Cable, coax, RG-174/U	6-1/2 in.	gray-orange-orange
1 ea	(175-0068-00)	Cable, coax, RG-174/U	6-1/2 in.	gray-green-green
1 ea	(175-0068-00)	Cable, coax, RG-174/U	6-1/2 in.	gray-white-white
2 ea	211-0511-00	Screw, 6-32 x 1/2 PHS, Phillips		
1 ea	334-1075-00	Plate, identification, J1-J2-J3-J4		
1 ea	334-1076-00	Plate, identification, J5-J6-J7-J8		
2 ea	361-0109-00	Nut, spacer		
2 ea	361-0110-00	Spacer, flat		
1 ea	(176-0124-00)	Wire, #16 solid,	12 in.	bare

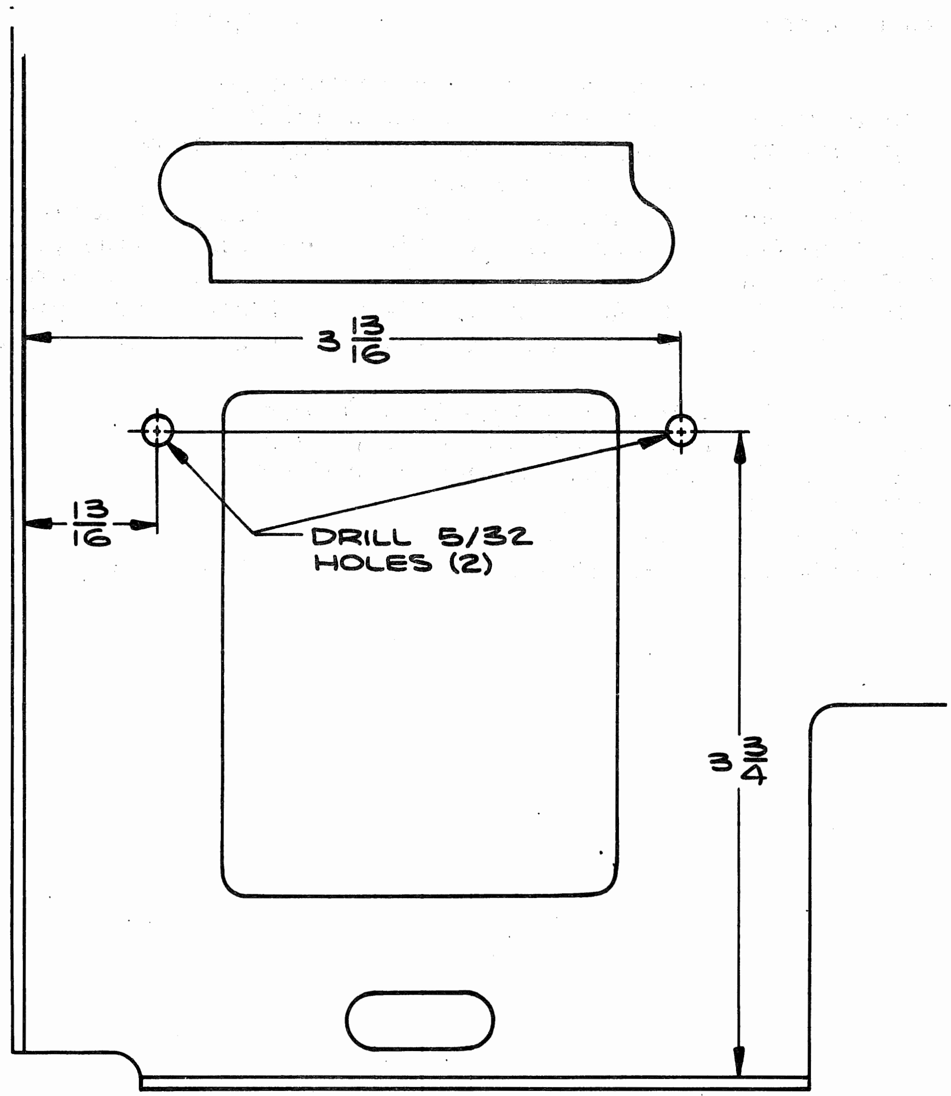


Fig. 1

INSTRUCTIONS

A. TO INSTALL CONNECTORS IN VERTICAL (LEFT, AS VIEWED FROM FRONT) PLUG-IN COMPARTMENT:

STEP A-1 APPLIES TO RM561 SN 101-5000 AND RM561A SN 101-105, 5001-6209:

( ) 1. Drill two 5/32 in. holes in the bulkhead, at the rear of the left plug-in compartment, as shown in Fig 1.

STEPS A-2 THROUGH A-5 APPLY TO RM561A SN 101-105, 5001-6441:

( ) 2. Unsolder the color-coded wires from C640, on the rear chassis.

( ) 3. Unsolder (both ends) and remove the bare wires connected to C640 and C720A.

( ) 4. Interchange the positions of C640 and C720A.

NOTE: Remove the old chassis markings for these capacitors, using lacquer thinner or similar mineral solvent.

( ) 5. Rewire C640 and C720A as indicated in Fig 2, using #16 bare wire from the kit.

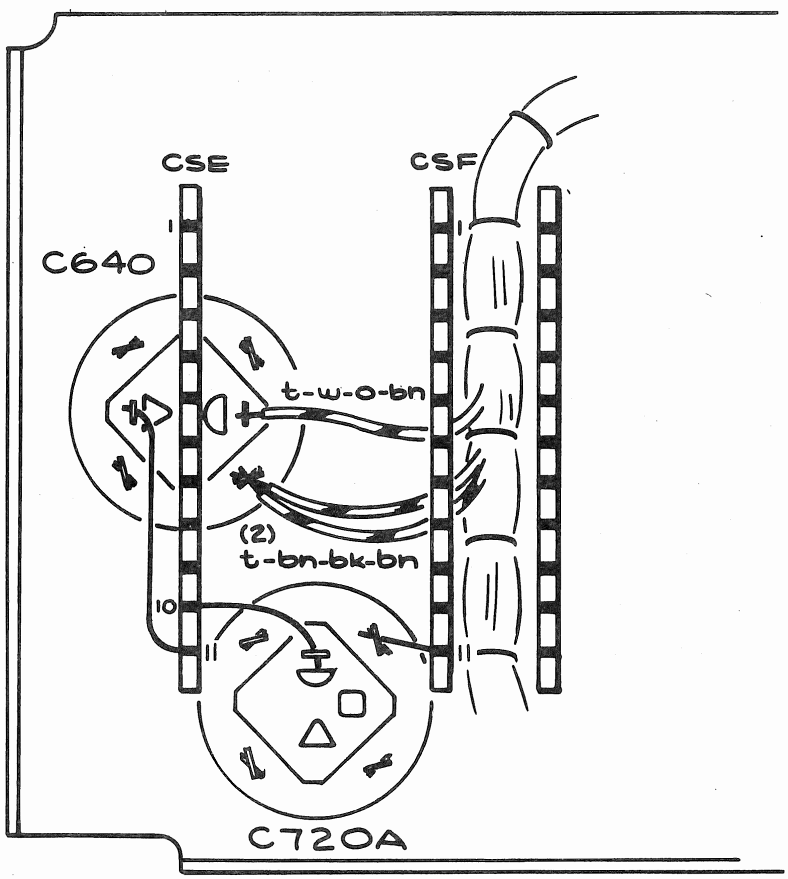


Fig. 2

INSTRUCTIONS (cont)

A. (cont)

STEPS A-6 AND A-7 APPLY TO RM561 SN 101-5000 AND RM561A SN 101-105, 5001-6441:

( ) 6. Drill two 1/2 in. holes in the rear plate, on each side of the two existing "D" holes, as shown in Fig. 3.

( ) 7. Remove the tape backing from the "J1-J2-J3-J4" identification plate (from kit) and fasten it to the rear plate above the four 1/2 in. holes. Leave about 3/16 in. of metal between holes and identification plate.

NOTE: Remove any previous printed nomenclature around these connector holes, using lacquer thinner or similar mineral solvent.

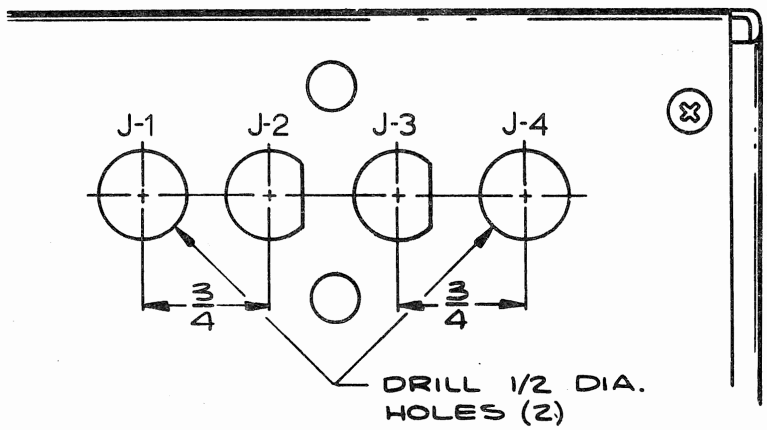


Fig. 3

STEPS A-8 AND A-9 APPLY TO ALL INSTRUMENTS:

( ) 8. Mount the connector assembly (from kit) as indicated in Fig. 4 (make sure cables are in positions shown). Use the 6-32 x 1/2 PHS screws, spacer nuts, and flat spacers from the kit.

( ) 9. Install the BNC connectors (from assembly) in the 1/2 in. holes in the rear panel, placing the lockwasher between rear panel and connector shoulder. Locate the connectors as follows:

Cable Color Code	Connector Position
gray-yellow-yellow	J-1
gray-orange-orange	J-2
gray-green-green	J-3
gray-white-white	J-4

THIS COMPLETES THE INSTALLATION

( ) Fasten the insert page in your Instruction Manual.

( ) Check alignment of the connector assembly by installing a plug-in modified for rear input connectors. The indicator connector assembly may be adjusted somewhat by loosening the two mounting screws.

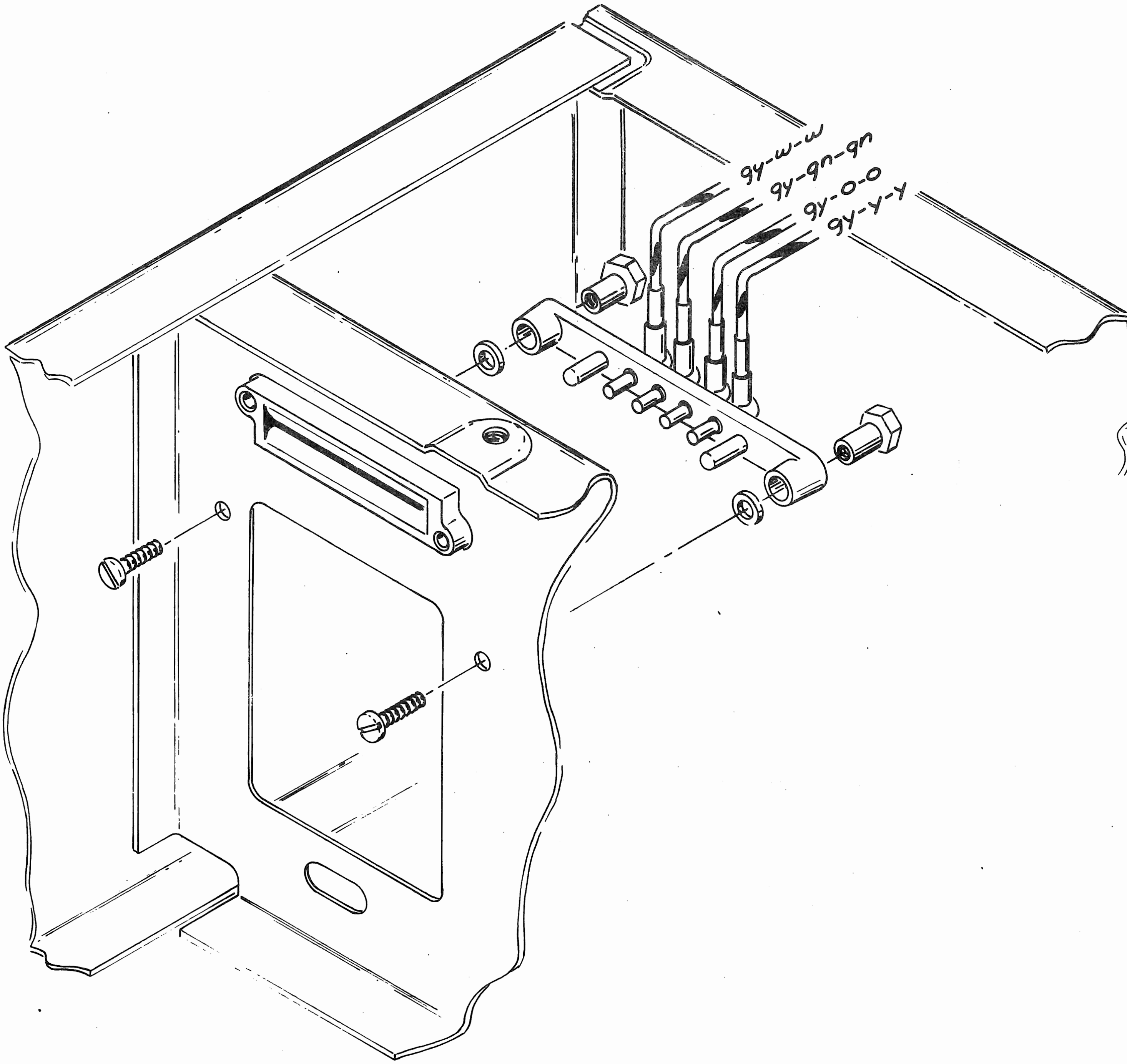


Fig. 4

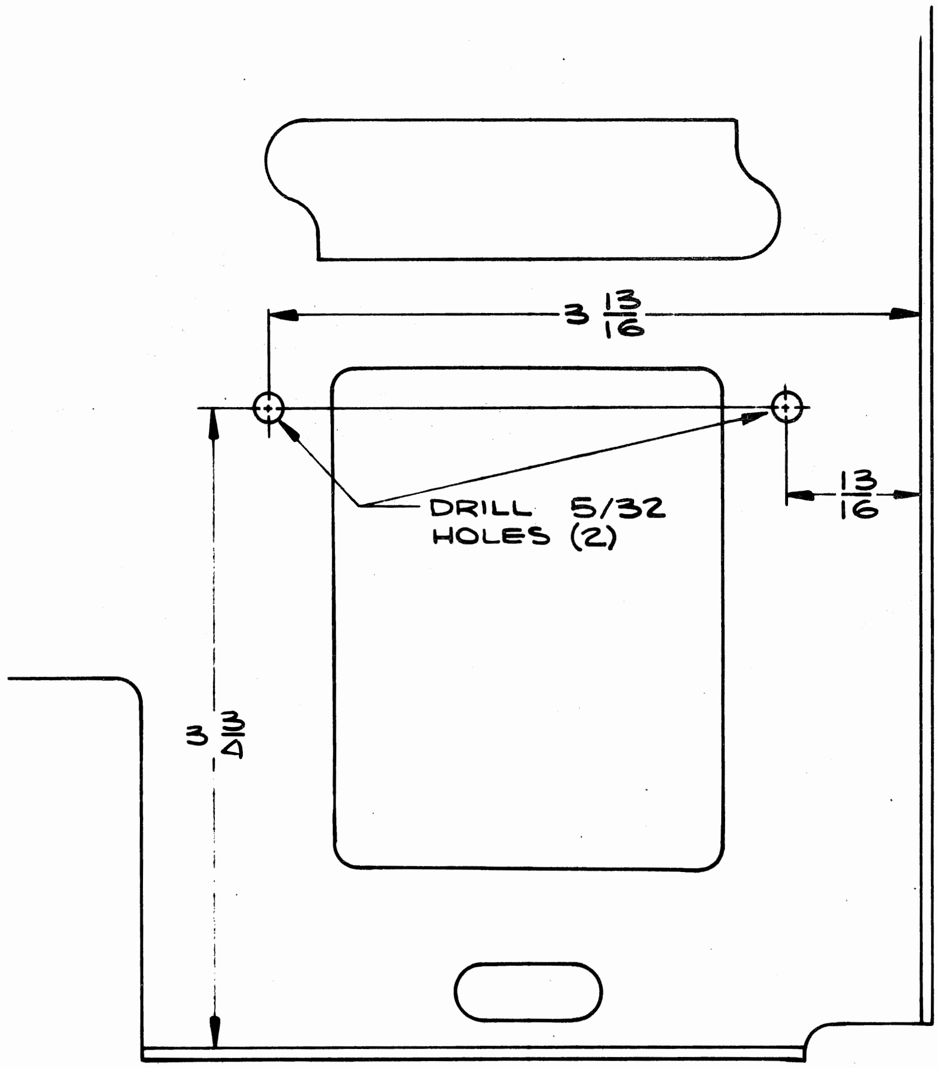


Fig. 5

B. TO INSTALL CONNECTORS IN HORIZONTAL (RIGHT, AS VIEWED FROM FRONT) PLUG-IN COMPARTMENT:

STEP B-1 APPLIES TO RM561 SN 101-5000 AND RM561A SN 101-105, 5001-6209:

( ) 1. Drill two 5/32 in. holes in the bulkhead, at the rear of the right plug-in compartment, as shown in Fig. 5.

STEPS B-2 AND B-3 APPLY TO RM561 SN 101-5000 AND RM561A SN 101-105, 5001-6441:

( ) 2. Drill two 1/2 in. holes in the rear plate, on each side of the two existing "D" holes, as shown in Fig. 6.

( ) 3. Remove the tape backing from the "J5-J6-J7-J8" identification plate (from kit) and fasten it to the rear plate above the four 1/2 in. holes. Leave about 3/16 in. of metal between holes and identification plate.

NOTE: Remove any previous silk-screened nomenclature around these connector holes, using lacquer thinner or similar mineral solvent.

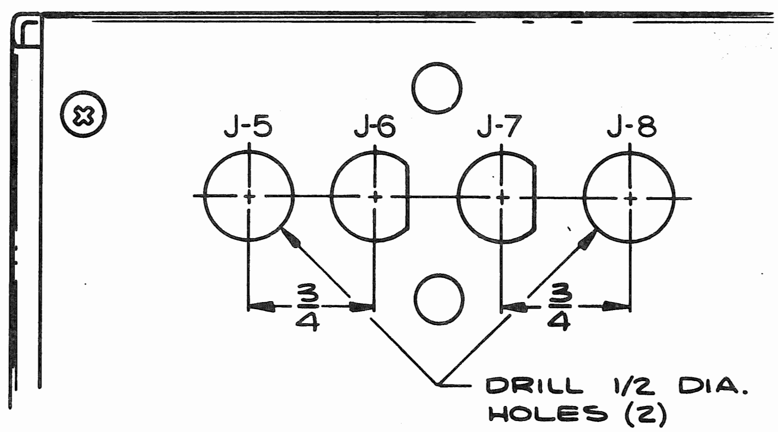


Fig. 6

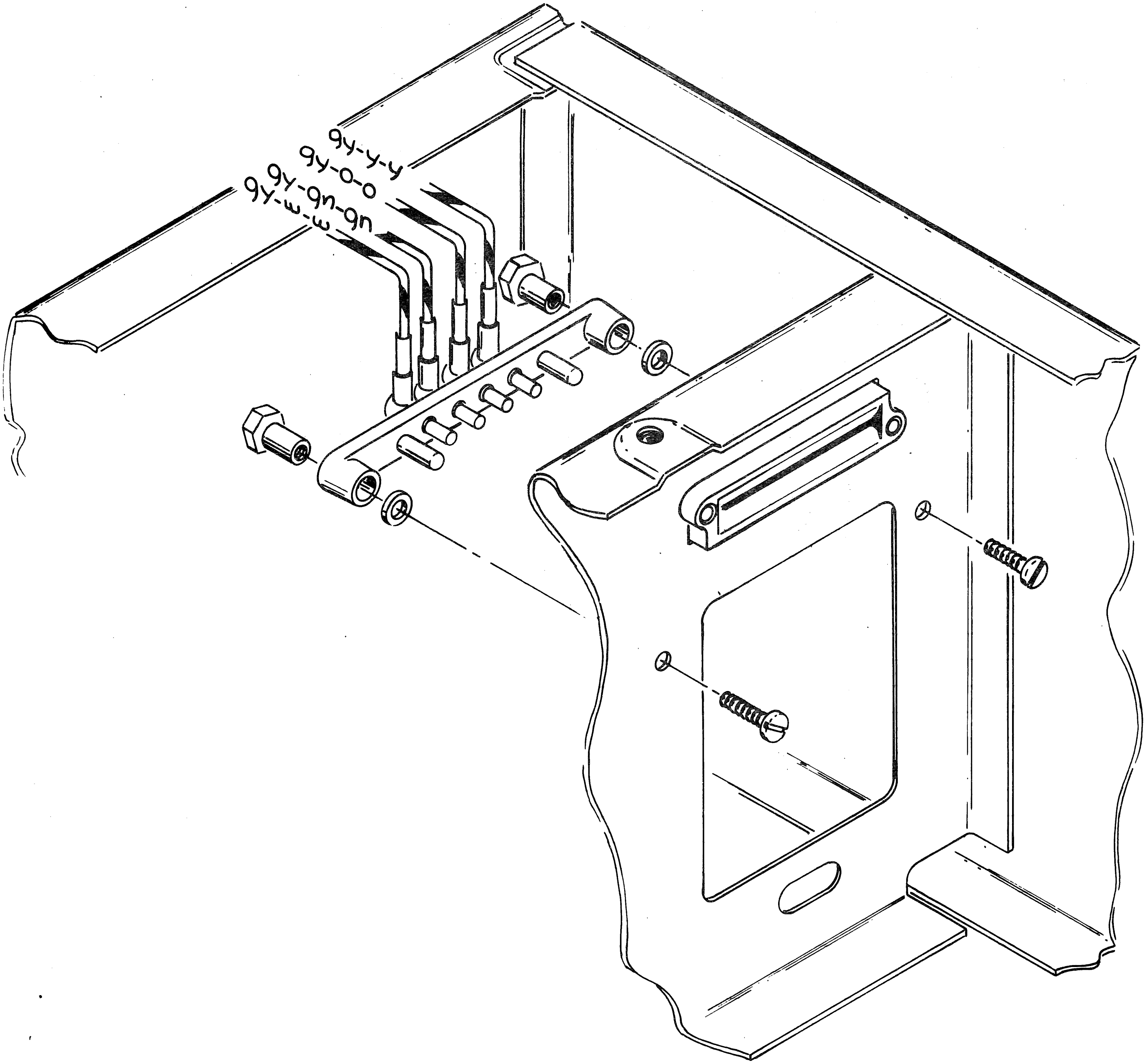


Fig. 7

B. (cont)

STEPS B-4 AND B-5 APPLY TO ALL INSTRUMENTS:

( ) 4. Mount the connector assembly (from kit) as indicated in Fig. 7 (make sure cables are in positions shown). Use the 6-32 x 1/2 PHS screws, spacer nuts, and flat spacers from the kit.

( ) 5. Install the BNC connectors (from assembly) in the 1/2 in. holes in the rear panel, placing the lockwasher between rear panel and connector shoulder. Locate the connectors as follows:

Cable Color Code	Connector Position
gray-yellow-yellow	J-5
gray-orange-orange	J-6
gray-green-green	J-7
gray-white-white	J-8

THIS COMPLETES THE INSTALLATION

( ) Fasten the insert page in your Instruction Manual.

( ) Check alignment of the connector assembly by installing a plug-in modified for rear input connectors. The indicator connector assembly may be adjusted somewhat by loosening the two mounting screws.

CH:cet

PARALLEL REAR CONNECTORS

Types RM561, RM561A, and RM564 -- All serial numbers

Installed in Type _______ SN _______ Date _______

GENERAL INFORMATION

This modification provides four coaxial lines from a corresponding number of BNC connectors on rear panel of the instrument to the front panel inputs on a plug-in placed in the proper compartment. The plug-in/indicator interface is fitted with a pair of mating holders for miniature coaxial connectors, which permit withdrawal of the plug-in without unsoldering the cable. Only one plug-in compartment may be modified with this kit. To modify both compartments, order an additional kit.

To complete the modification, you must install one of the following Modification Kits in the plug-in(s) to be used:

040-0406-00 provides one coaxial line in Types 60, 2A60, 67, 2B67, 75, 3A75, 3B1, 3B3, and 3B4.

040-0407-00 provides two coaxial lines in Types 2A61, 63, 2A63, 67, 2B67, 3A1, 3A6, 72, 3A72, 3B1, 3B3, and 3B4.

040-0408-00 provides four coaxial lines in Types 3A3 and 3A74.

Parallel Rear Connector kits 040-0409-00 and 040-0410-00 are also available to install one and two coaxial lines, respectively, in an RM561, RM561A, or RM564. To insure electrical continuity from front to rear panel, the plug-in and indicator coaxial lines must 'match'.

LIMITATIONS

Compatibility

All 2- and 3-series plug-ins intended for use in an RM561, RM561A, or RM564, whether the plug-in is modified for rear connectors or not, will operate normally in a modified indicator.

Changes in Electrical Characteristics

The system is basically incompatible with conventional X10 or X100 high-impedance probes. This is because the input capacitance of the plug-in is raised to approximately 100 pF, plus the capacitance of the circuitry attached to the rear connector.

Optimum transient response for 10 MHz instruments may be preserved by terminating at the front-panel connector for signals applied to the rear-panel connector. There will be some degradation of transient response in 10 MHz instruments for signals applied to the front panel input or terminated at the rear panel. For lower bandwidth instruments, the only noticeable effect will be that of the increased cable capacitance on signals from sources greater than 50 Ω.

CONNECTOR EXTRACTION

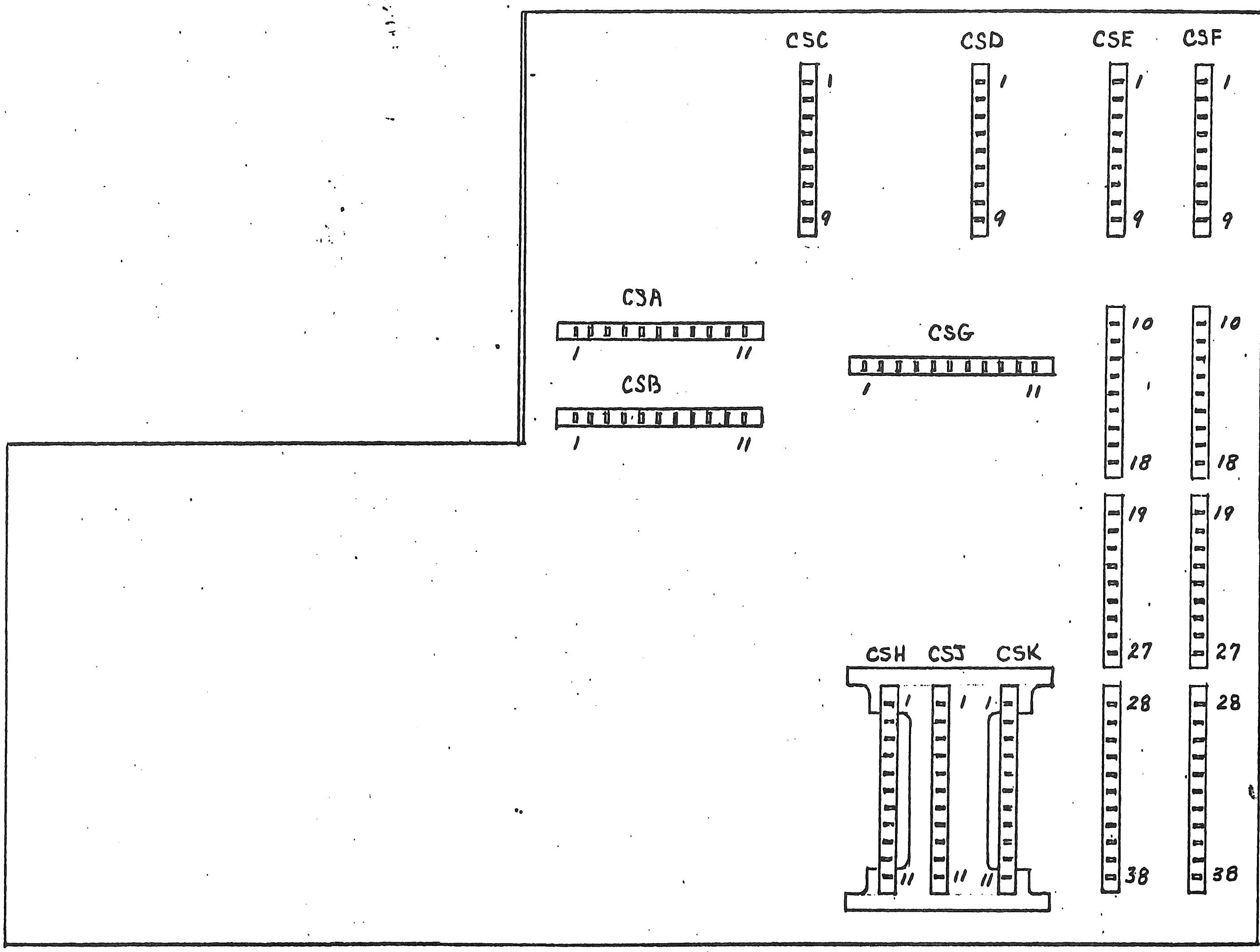
The Cannon DM series miniature connectors may be removed from their Delrin holders by using a special tool available from Cannon Electric Company. Order connector extractor CET-C6B.

To use the extractor, plunge the tubing down over the connector as far as it will go, then push the connector out with the inner shaft of the tool.

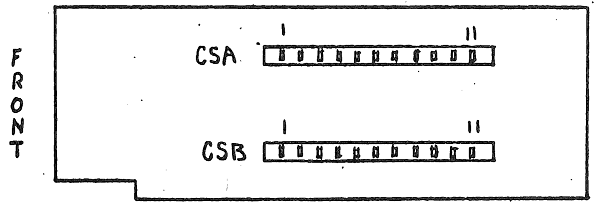
MECHANICAL PARTS LIST

	Part Number
Connector, coax, Cannon DM53741-5001	131-0410-00
Connector, coax, Dage #4818-2 BNC	131-0411-00
Holder, coax connector, Delrin	352-0095-00
Nut, spacer	361-0109-00
Plate, identification, J1-J2-J3-J4	334-1075-00
Plate, identification, J5-J6-J7-J8	334-1076-00
Screw, 6-32 x 1/2 PHS, Phillips	211-0511-00
Spacer, flat	361-0110-00

STRIP LAYOUT – 561



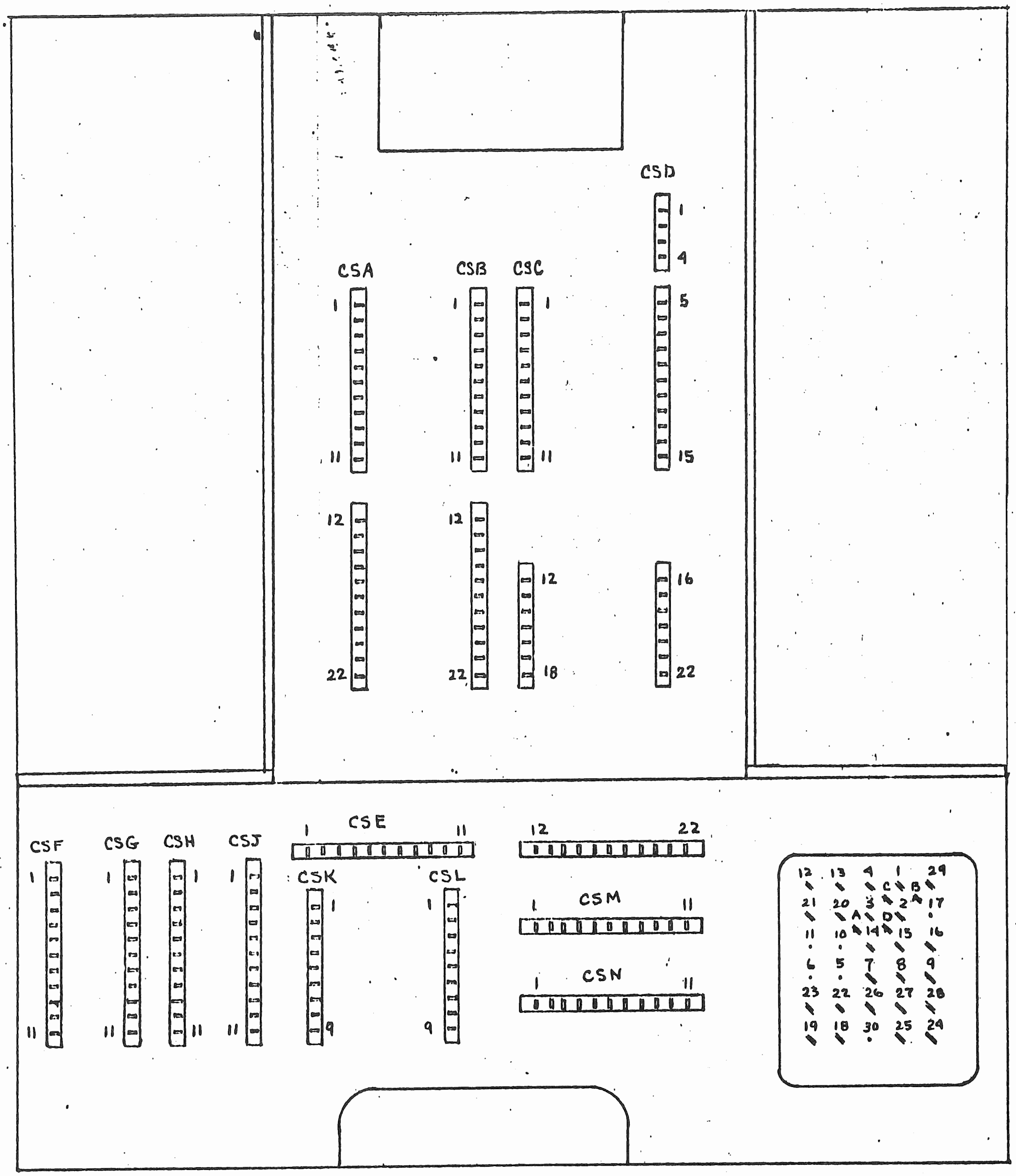
INDICATOR 610-432



CAL. CHASSIS 610-433

MOD #
DATE
CHASSIS

STRIP LAYOUT - RM561



CHASSIS 610-442

MOD #	
DATE	
KIT #	

6-20-61

MAINTENANCE NOTES

MANUAL ERROR -- T801 RESISTANCE WRONG

December 14, 1962

The value given in the 561 and RM561 manuals for the resistance of the primary of the high voltage transformer T801 is incorrect. It lists 40 Ω but it is actually about 8 Ω (tapped at about 5 Ω). The 170 Ω value listed for the secondary winding is correct. Manuals department will correct the error in future printings.

CALIBRATOR NOISE

June 29, 1962

Excessive calibrator noise on the lower ranges may be due to a poor ground path between the switch detent plate, switch bushing and subpanel. You can cure this by installing a 210-207 solder lug on the switch bushing and soldering the lug's tab to the switch detent plate between stops.

BEAM ROTATOR COIL

FEN 1-26-62

In tests conducted by CRT Design Engineering and IMQA, results showed that the location of the beam rotator coil in the TYPE RM561 does affect the trace "orthogonality".

To decrease the orthogonality error, it's necessary to physically reverse the beam rotator coil, placing it further back into the CRT shield. No field modification of instruments is necessary unless a geometry problem exists.

When mounted correctly, the indexing tabs and the coil electrical connections should be on the side of the coil nearest the front of the scope.

INTERMITTENT INTENSITY MODULATION

SS 10-63, 12-63;
FEN 12-22-61, 1-12-62

Some early 561 and RM561 Oscilloscopes can develop an intermittent-intensity-modulation problem. The problem stems from R842, a 12 meg, 2 w, precision resistor in the crt high-voltage-divider string. When R842 goes out completely, the operator will have no control over the intensity; the beam will be full on. R842 is rated at 2 kv. At turn on time the voltage across R842 goes up to 2.5 kv and some of these resistors just can't stand it.

In general, this information applies to TYPE 561's below sn 1165 and TYPE RM561's below sn 230.

The Pyrofilm replacement resistor we originally recommended performed very well during the tests we conducted to find a replacement, but later it proved just as susceptible to failure as the original resistor.

A more satisfactory replacement for R842 in these instruments is a series string of four 2 w, 10% composition resistors -- two of 2.7 megohms and two of 3.3 megohms -- totaling 12 megohms. The high-voltage environment and limited available space of R842 require a special arrangement and careful wiring of these resistors into a series string. These resistors, properly arranged and wired and with instructions for installation are available as a kit. For TYPE 561 Oscilloscopes specify Tektronix Part Number 050-118; for TYPE RM561 Oscilloscopes specify Tektronix Part Number 050-147.

T503, T5610 ETC. -- INCOMPLETE UNBLANKING

FEN 3-13-64

A slight misalignment of the gun or deflection blanking plates in a T503, T5610, etc., can cause excessive beam intercept by the blanking plates when they are at equal potential (unblanked condition). The result is somewhat lower than normal writing rate, and --- especially at low intensity --- a noticeable variation in trace intensity across the screen.

The amount of excess intercept when the two blanking plates are at equal potential has been spec'd now at 15%: that is, the beam current when the two plates are at equal potential should not be down more than 15% from the maximum obtainable from any other setting of the plates.

Rather than scrapping an otherwise good CRT in the field for excessive blanking plate intercept, however, the mechanical misalignment may be corrected electrically, by changing the voltage on the fixed-potential blanking plate.

In the 561, RM561, RM561A, 567, RM567, the lead from CRT pin 7 picks up the +125 supply at the plug-in connector. This lead may be removed from the plug-in connector and run to a divider between +300v and ground, and its potential set for maximum beam current and best uniformity of trace intensity. A 250k 2w pot between +300v and ground may be used. Whether a fixed or variable divider is used, the centerpoint should be bypassed to ground through about .01μf so that capacitive coupling from the opposite plate does not cause the fixed plate voltage to shift during unblanking.

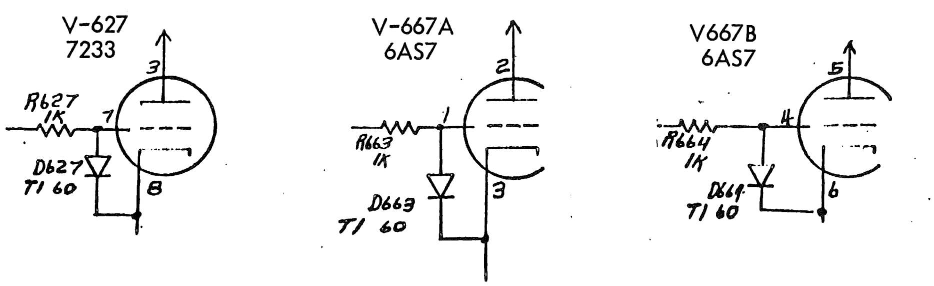
In the 560 series (except 565), a CRT with the blanking plate alignment problem will show a bright dot at the start of a fast sweep either with a 2B67 or with a 3B1 or 3B3 time base. The two time base types drive the variable unblanking plate to +125 v from opposite directions. Depending on the direction of misalignment (if any), one of the two time base types will, in the process of unblanking, drive the plate through and past the potential for maximum beam-current.

SERIES REGULATOR PROTECTION

GS 4-9-64

The regulator tubes need additional protection during warm-up.

Production Mod 7975 will add T160 diodes, D627-D663-D664, between cathode and grid of V627, V667A and V667B. The part number for these diodes is 152-107.



561-561A/3A1/3B1/3B3 SEMICONDUCTOR DAMAGE

BM 7-22-64

Failure of the following parts is frequently due to high voltage spikes fed into other circuitry from the indicator high voltage supply.

3A1-Q260, Q275, Q285, D278, D288
3B1/3B3-Q294
561A-D838, D839, D852

1. 561 or RM561: Add a 470 Ω 1/2 w 10% resistor between C854 and the RH plug-in connector pin 24.
2. 561A below sn 5789: Add kit 040-305.

The above takes care of most catastrophic failures. Erratic triggering (3B1-3) or erratic operation of the switching circuits in the 3A1 due to corona spikes may be caused by:

a. Poor dress of HV capacitors in indicator.
b. Defective HV capacitors (batch problem in early 561A's). See also Mod 7975.
c. Corona from 561A CRT grid and cathode leads (175-651 replaces both; also available with step-by-step instructions under 040-354).
d. Defective insulation on HV rectifier heater leads. Replace with 175-012.
e. Breakdown of HV Transformer (replace 12BH7 at the same time).
f. Intermittent Pyrofilm resistor in 561, RM561, or early 561A's and RM's. Replace with AB strings per Mod 7052.

Erratic chopping or failure to chop may also be due to D852 (561A sn 5001-5780) shorted. Remove this diode; we know of no way to protect it properly. Kit 040-305 contains instructions to remove this diode.

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560 SERIES CAPACITANCE NORMALIZATION: 16.0 pf or 14.3?

FEN 9-18-64

Manuals and factory cal procedures for the 560 series instruments (except 565) have referred to the normalized deflection plate capacitance at the plug-in connector as being 16 pf.

However, if you'll look at the detailed measurement procedure, you'll see that the value 16 pf is to be measured with a dummy 24-pin male connector plugged into the interconnecting socket.

Since there are now at least two different materials used in the manufacture of 24-pin plugs, and their capacitances are different, it's obvious that to get the indicator truly normalized, the extra plug must either be specially identified or be eliminated from the measurement.

In the 565 (see 565 manual, page 5-13), capacitance normalization is done without the extra plug installed, and the value is shown in the manual as 14 pf (actually 14.3).

Factory and manual cal procedures for other instruments in the 560 series are now being changed to measurement without the extra plug, and the value set (130 L, C method) to 14.3 pf.

Our article on the 3M1 in the September 4 issue of the FEN, then, should have read ".... capacitance is correctly set (14.3 pf at the female connector, corresponding to 16 pf as measured with a 24 pin plug of Diallyl Thialate dielectric installed)".

The change to 14.3 pf as the number to normalize on eliminates the need for stocking and keeping track of connectors of the particular material adding exactly 1.7 pf to the existing capacitance.

There should be few if any customer problems arising from the change, since the possible difference in results is not great, and a customer normalizing to a value a few tenths of a pf off will still obtain the interchangeability he desires. The change is primarily to assure uniformity and across-the-line compatibility in our own output, and to provide the customer with test methods assuring maximum agreement with our own measurements. -- Geoff Gass.

MISCELLANEOUS PARTS INFORMATION

PLUG-IN EXTENSIONS

FEN 2-23-62

The rigid 013-034 extension or flexible extension (no Tek number) can be modified for use with all 560 plug-ins, including the 3S76, 3T77 and 6R1, as follows:

Remove the wires connecting the plug to the socket at pins 3 and 4, 18 and 19. Connect a twisted pair of no. 27 hf wire from pins 3 and 4 of the plug to pins 3 and 4 of the socket. Connect a 50 Ω coax (RG-174/U) from pins 18 and 19 of the plug to pins 18 and 19 of the socket, with the center conductor at pin 18 and the shield at pin 19.

POLYETHYLENE FUSE COVER DISCONTINUED

FEN 12-20-63

The use of a polyethylene fuse cover (200-237) has been discontinued on the 561.

PARTS REPLACEMENT KIT

CRT SECURING RING

050-0063-00

For the following Tektronix Oscilloscopes:

502	s/n	2380- 7519	535A	s/n	21350-28840
503	s/n	101- 2379	RM35A	s/n	1230- 2739
RM503	s/n	101- 1334	536	s/n	1090- 2209
504	s/n	101- 529	541A	s/n	20470-22308
RM504	s/n	101- 529	RM41A	s/n	1030- 1435
507	s/n	170- 415	543	s/n	1250- 3000
515A	s/n	4804- 7499	543A	s/n	3001- 3909
RM15*	s/n	882- 2416	RM43	s/n	112- 1000
516	s/n	101- 1319	RM43A	s/n	1001- 1044
525	s/n	870- 1449	545A	s/n	22060-34039
526	s/n	101- 279	RM45A	s/n	1200- 3009
531A	s/n	20410-23759	551	s/n	1820- 4199
RM31A	s/n	1060- 1949	560	s/n	101- 378
532	s/n	6520- 7249	561	s/n	101- 1618
RM32	s/n	331- 559	570	s/n	5200- 5369
533	s/n	1470- 3000	575	s/n	1620- 4928
533A	s/n	3001- 3939	581	s/n	440- 1089
RM33	s/n	140- 1000	585	s/n	741- 3049
RM33A	s/n	1001- 1114	661	s/n	101- 249

*RM15-209C s/n 882-1572 (approx.)

DESCRIPTION

New CRT securing ring, 354-0178-00, replaces 354-0078-00 previously used.

The new CRT securing ring, plus an improved CRT Rotator base, prevent CRT from rotating or sliding, thereby making adjustment more reliable.

NOTE: If the serial number of your instrument is above those listed, or if this kit has already been installed, disregard instructions as part number 354-0178-00 is a direct replacement.

Publication:
Instructions for 050-0063-00
July 1965

Supersedes:
June 1962

PARTS LIST

Quantity	Description	Part Number
1 ea.	Ring, CRT Securing	354-0178-00
1 ea.	Base, CRT Rotator	432-0022-00

INSTRUCTIONS

( ) 1. Remove the CRT from the instrument.

REFER TO DRAWING OF CRT ROTATOR ASSEMBLY ON FOLLOWING PAGE.

( ) 2. Remove screws holding CRT rotator base to mounting bracket.

NOTE: Use same holes when installing new base.

( ) 3. Remove clamping ring and adjusting screw from old assembly and install on new CRT rotator base from kit.

( ) 4. Re-install CRT rotator assembly on mounting bracket.

( ) 5. Install new CRT securing ring (from kit) onto assembly.

NOTE: Make certain the ears on both sides of ring are properly positioned.

( ) 6. Install CRT and complete mechanical work as required.

THIS COMPLETES THE INSTALLATION:

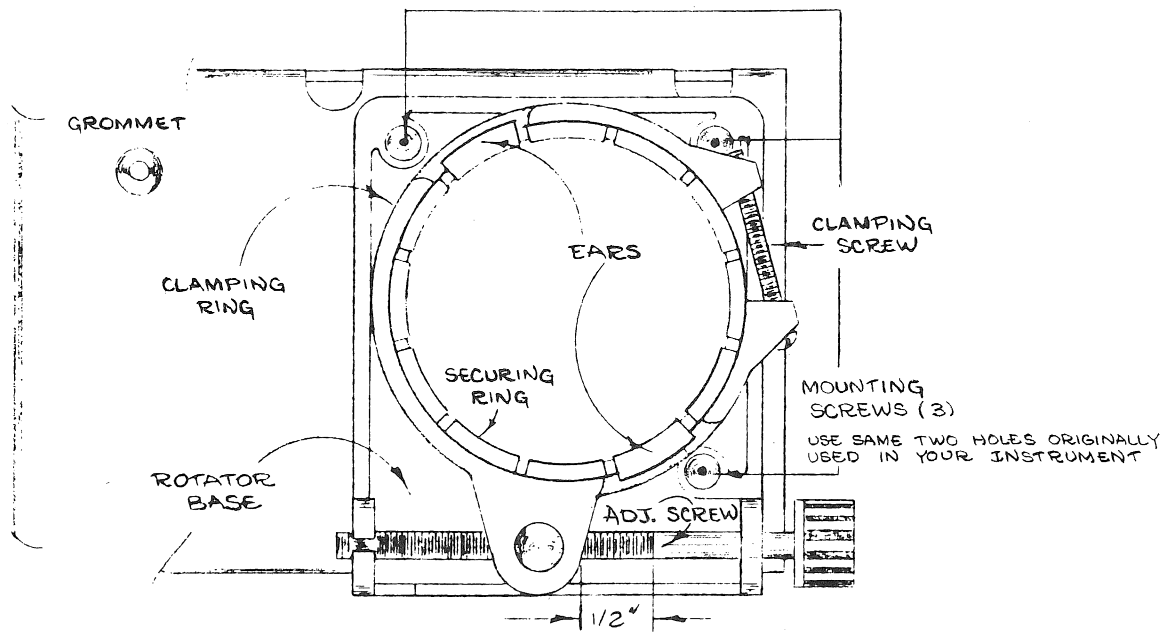
( ) Check installation for proper operation.

( ) Turn instrument on and align trace.

NOTE: After aligning trace, back off on adjustment 1/4 turn to relieve strain. If not relieved, the strain tends to cause a creeping rotation of the CRT.

CH:ceb

INSTRUCTIONS (con'd)



CRT ROTATOR ASSEMBLY

PARTS REPLACEMENT KIT

CRT SECURING RING

050-0063-00

For the following Tektronix Oscilloscopes:

	502	s/n 2380- 7519	535A	s/n 21350-28840
	503	s/n 101- 2379	RM35A	s/n 1230- 2739
	RM503	s/n 101- 1334	536	s/n 1090- 2209
	504	s/n 101- 529	541A	s/n 20470-22308
	RM504	s/n 101- 529	RM41A	s/n 1030- 1435
##	507*	s/n 180- 415	543	s/n 1250- 3000
	515A	s/n 4804- 7499	543A	s/n 3001- 3909
##	RM15**	s/n 882- 2416	RM43	s/n 112- 1000
	516	s/n 101- 1319	RM43A	s/n 1001- 1044
	525	s/n 870- 1449	545A	s/n 22060-34039
	526	s/n 101- 279	RM45A	s/n 1200- 3009
	531A	s/n 20410-23759	551	s/n 1820- 4199
	RM31A	s/n 1060- 1949	560	s/n 101- 378
	532	s/n 6520- 7249	561	s/n 101- 1618
	RM32	s/n 331- 559	570	s/n 5200- 5369
	533	s/n 1470- 3000	575	s/n 1620- 4928
	533A	s/n 3001- 3939	581	s/n 440- 1089
	RM33	s/n 140- 1000	585	s/n 741- 3049
	RM33A	s/n 1001- 1114	661	s/n 101- 249

* 507-211A s/n 170- 415

**RM15-209C s/n 882-1572 (approx)

DESCRIPTION

New CRT securing ring, 354-0178-00, replaces 354-0078-00 previously used.

The new CRT securing ring, plus an improved CRT Rotator base, prevent CRT from rotating or sliding, thereby making adjustment more reliable.

NOTE: If the serial number of your instrument is above those listed, or if this kit has already been installed, disregard instructions as part number 354-0178-00 is a direct replacement.

Publication:
Instructions for 050-0063-00
August 1967

Supersedes:
July 1965

PARTS LIST

Quantity	Description	Part Number
1 ea.	Ring, CRT Securing	354-0178-00
1 ea.	Base, CRT Rotator	432-0022-00

INSTRUCTIONS

( ) 1. Remove the CRT from the instrument.

REFER TO DRAWING OF CRT ROTATOR ASSEMBLY ON FOLLOWING PAGE.

( ) 2. Remove screws holding CRT rotator base to mounting bracket.

NOTE: Use same holes when installing new base.

( ) 3. Remove clamping ring and adjusting screw from old assembly and install on new CRT rotator base from kit.

( ) 4. Re-install CRT rotator assembly on mounting bracket.

( ) 5. Install new CRT securing ring (from kit) onto assembly.

NOTE: Make certain the ears on both sides of ring are properly positioned.

( ) 6. Install CRT and complete mechanical work as required.

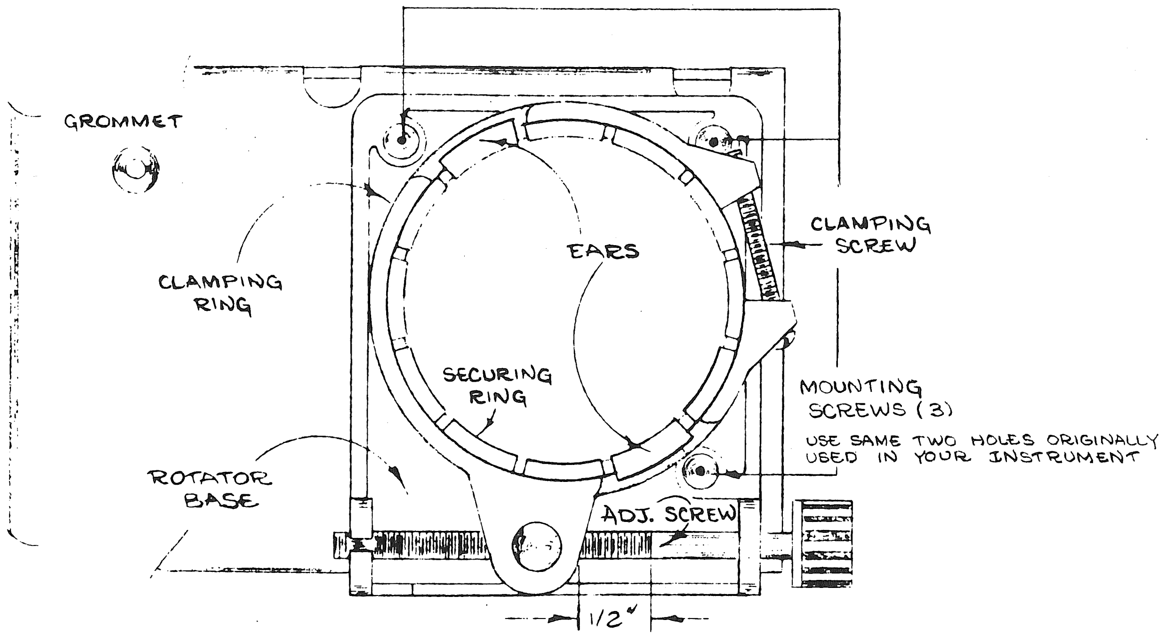
THIS COMPLETES THE INSTALLATION:

( ) Check installation for proper operation.

( ) Turn instrument on and align trace.

NOTE: After aligning trace, back off on adjustment 1/4 turn to relieve strain. If not relieved, the strain tends to cause a creeping rotation of the CRT.

BE:ls



CRT ROTATOR ASSEMBLY

PARTS REPLACEMENT KIT

HV RESISTORS

For the following Tektronix Oscilloscopes:

Type 561 serial numbers 101-5000
Type 561A serial numbers 5001-7799
Type 561A Mod 210C serial numbers 5001-7619
Type 564 serial numbers 101-581

050-0118-00

DESCRIPTION

A series combination of composition resistors replaces HV resistor R842 (part number 310-0568-00 or 310-0595-00*).

The change will increase reliability of the HV circuit. The unit is a direct replacement.

*Resistor 310-0595-00 replaced 310-0568-00, used in Type 561 instruments below s/n 1165.

NOTE: If the s/n of your instrument is above those listed or if this kit has already been installed, disregard the instructions as the resistor assembly is a direct replacement.

Publication:
Instructions for 050-0118-00
January 1966

Supersedes:
December 1963

PARTS LIST

Quantity	Description					Part Number
1 ea.	Series unit, resistor, consisting of:					
	2 ea. Resistor, comp,	2.7 M	2 W	10%		306-0275-00
	2 ea. Resistor, comp,	3.3 M	2 W	10%		306-0335-00
	1 ea. Tubing, plastic, thermofit, RF Clear				1-3/4 in.	(162-0545-00)
1 ea.	Wire, solder, silver-bearing				12 in.	

INSTRUCTIONS

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

( ) Replace the 12 meg resistor in the HV supply (R842) with the four resistor unit from the kit (see drawing).

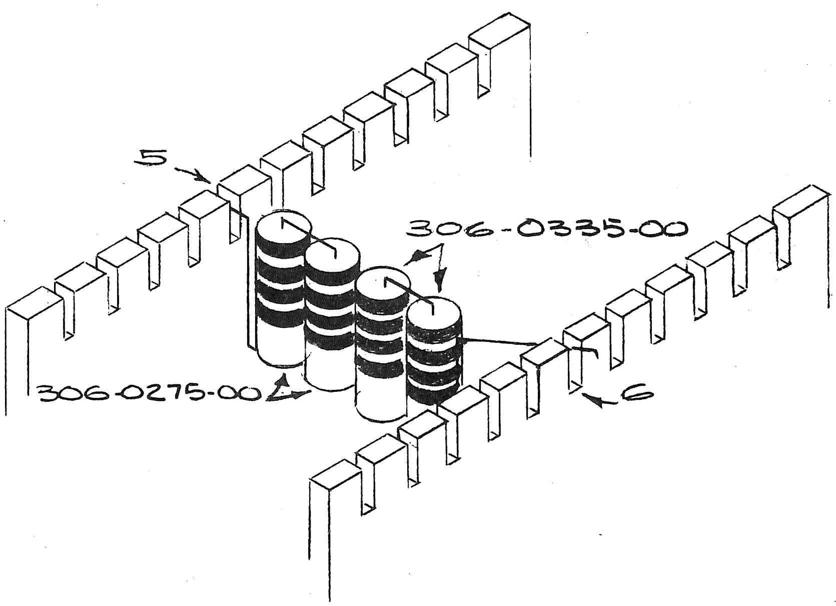
THIS COMPLETES THE INSTALLATION

( ) Make the following change to your Instruction Manual Parts List.

R842, a series unit* consisting of:

(2) 2.7 M 2 W 10% 306-0275-00 and (2) 3.3 M 2 W 10% 306-0335-00

*Available by ordering 050-0118-00



R 842

JB:bt

PARTS REPLACEMENT KIT

HV RESISTOR (310-0595-00)

050-0147-00

For the following Tektronix Oscilloscopes:

Type RM561 s/n 101-5000
Type RM561A s/n 101- 105 and 5001-5609

DESCRIPTION

HV resistor, R842 (part number 310-0568-00 or 310-0595-00*) is replaced by three composition resistors to increase the reliability of the HV circuit.

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 306-0395-00 is a direct replacement.

* Resistor 310-0595-00 replaced 310-0568-00, used in Type RM561 instruments below s/n 230.

Publication:
Instructions for 050-0147-00
March 1966

Supersedes:
September 1963

PARTS LIST

Qty.	Part Number	Description			
(1 ea)		Resistor, series unit, consisting of:			
2 ea	306-0395-00	Resistor, comp,	3.9 M	2W	10%
1 ea	214-0210-00	Spool, w/3 ft. silver-bearing solder			
1 ea	306-0395-00	Resistor, comp,	3.9 M	2W	10%
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. RM561 ONLY: REFER TO FIG 1 FOR STEPS A-1 THROUGH A-3.

( ) 1. Remove R842 between CSK-3 and CSL-3.

( ) 2. Replace the bare wire between CSK-3 and the right terminal of R841 (HV Adjust) with one 3.9 Meg resistor from the kit.

( ) 3. Solder the two-resistor assembly (from kit) between CSK-3 and CSL-3.

B. RM561A ONLY: REFER TO FIG 2 FOR STEPS B-1 THROUGH B-3.

( ) 1. Remove R842 between CSJ-7 and CSK-7.

( ) 2. Replace the bare wire between CSK-7 and the left terminal of R841 (HV Adjust) with one 3.9 Meg resistor from the kit.

( ) 3. Solder the two-resistor unit (from kit) between CSJ-7 and CSK-7.

THIS COMPLETES THE INSTALLATION.

( ) Check wiring for accuracy.

( ) Moisten the back of the MODIFIED INSTRUMENT tag (from kit) and place it on the Manual schematic page affected by this modification.

( ) Install the insert pages in your Instruction Manual.

GG:cet.

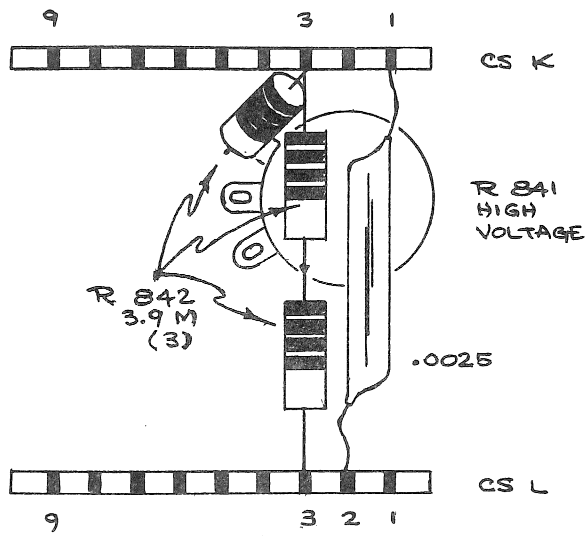


Fig. 1

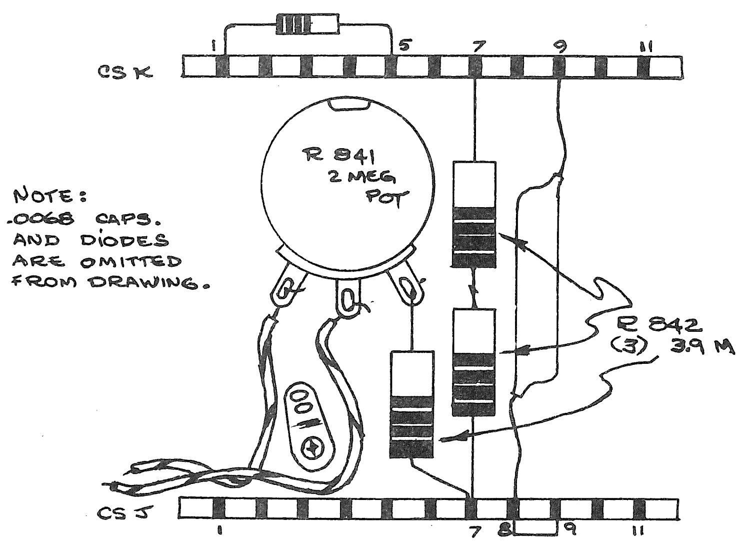


Fig. 2

NOTE: 0.0068 CAPS AND DIODES ARE OMITTED FROM DRAWING.

HV RESISTOR
(310-0595-00)

Type RM561 -- s/n 101-5000
Type RM561A -- s/n 101-105 and 5001-5609

Installed in Type _______ s/n _______ Date _______

GENERAL INFORMATION

HV resistor, R842 (part number 310-0568-00 or 310-0595-00*) is replaced by three composition resistors to increase the reliability of the HV circuit.

* Resistor 310-0595-00 replaced 310-0568-00, used in Type RM561 instruments below s/n 230.

ELECTRICAL PARTS LIST

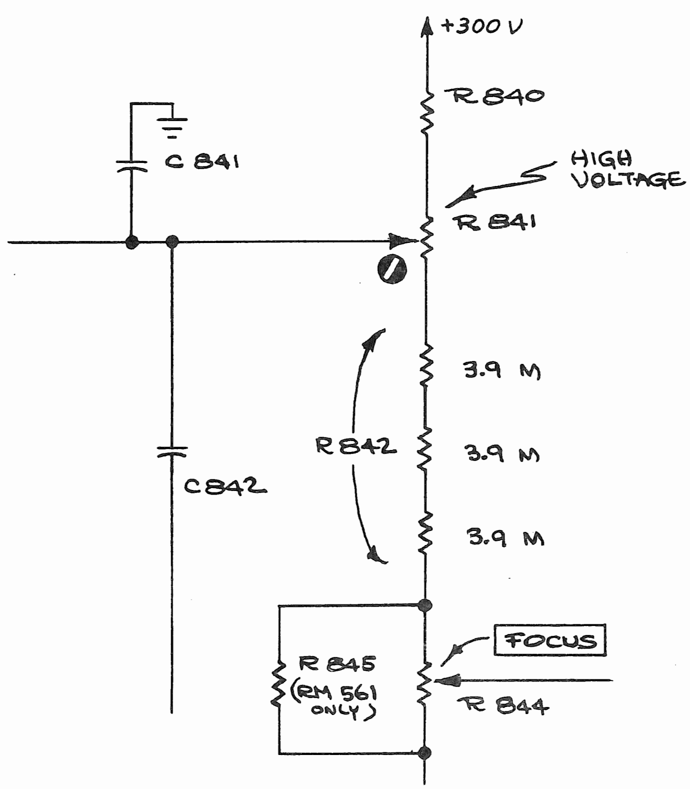
Values fixed unless marked variable. Only new parts listed.

Ckt. No.	Part Number	Description	
		RESISTORS	

Resistors are 10% composition unless otherwise indicated.

	306-0395-00	3.9 M	2W
R842	306-0395-00	3.9 M	2W
	306-0395-00	3.9 M	2W

SCHEMATICS



CRT CIRCUIT
(Partial Diagram)

Type 561
PARTS LIST

Values are fixed unless marked Variable.

Bulbs

Ckt. No.	S/N Range	Description	Tektronix Part Number
B601		Incandescent #47	150-001
B602		Incandescent #47	150-001
B603		Incandescent #12, Pilot Light	150-018
B633		NE-2	150-002

Capacitors

Tolerance ±20% unless otherwise indicated.

Ckt. No.	S/N Range	Description				Tektronix Part Number
C610		.01 μf	PTM		400 v	285-510
C616		.01 μf	PTM		400 v	285-510
C640A,B		160 x 10 μf	EMC		350 v	290-060
C642A,B		160 x 10 μf	EMC		350 v	290-061
C644	101-240	125 μf	EMC		350 v	use 290-133
C644	241-up	2 x 125 μf	EMC		350 v	290-133
C650		.01 μf	PTM		400 v	285-510
C667		8 μf	EMT		450 v	290-002
C670		.01 μf	Cer.		500 v	283-002
C720		2000 μf	EMC		30 v	290-087
C721		2000 μf	EMC		30 v	290-087
C737		.2 μf	Cer.		25 v	283-026
C757		100 μf	EMT		25 v	290-015
C760		.7-3 μμf	Tub.	Var.		281-027
C761		.7-3 μμf	Tub.	Var.		281-027
C801		.02 μf	Cer.		600 v	283-006
C803		.001 μf	Cer.		500 v	283-000
C807		.001 μf	PTM		1000 v	285-502
C815	X433-up	5 μf	EMT		150 v	290-149
C822		.0025 μf	Cer.		6000 v	283-036
C841		.02 μf	Cer.		600 v	283-006
C842		.0025 μf	Cer.		6000 v	283-036
C847		.01 μf	Cer.		500 v	283-002
C851		.0025 μf	Cer.		6000 v	283-036
C854		.0025 μf	Cer.		6000 v	283-036
C876		6.25 μf	EMT		300 v	290-000
C878	101-419	1 μμf	Cer.		500 v	Use 281-523
	420-up	100 μμf	Cer.		350 v	281-523
C884		150 μμf	Cer.		500 v	281-524
C897		.001 μf	Cer.		500 v	283-000

Fuses

Ckt. No.	Description	Tektronix Part Number
F601	2 amp 3 AG Slo-Blo 117 v operation 50-60 cycle	159-023
F601	1 amp 3 AG Slo-Blo 234 v operation 50-60 cycle	159-019
F720	2 amp 3 AG Slo-Blo	159-023

Diodes

Tektronix
Part Number

Even though the diodes may be different in physical size they are direct electrical replacements for the diodes in your instrument.

D640A,B,C,D	Silicon Diode	152-047
D642A,B,C,D	Silicon Diode	152-047
D644A,B,C,D	Silicon Diode	152-047
D720	Silicon Diode	152-035
D721	Silicon Diode	152-035

Resistors

Resistors are fixed, composition, ±10%, unless otherwise indicated.

R601		50 Ω		Var.	WW	SCALE ILLUM.	Use 311-262
R602		30 Ω	3 w		WW	5%	308-142
R608	X1280-up	10 meg	½ w				302-106
R609		2.7 k	½ w				302-272
R610		100 k	½ w				302-104
R611		1 k	½ w				302-102
R616		10 k		Var.	WW	—100 V	311-015
R617		7 k	½ w		WW	1%	308-185
R618		80 k	½ w		WW	1%	308-186
R619		220 k	½ w				302-224
R623		1 k	½ w				302-102
R627		4 k	20 w		WW	5%	308-176
R632		1 k	½ w				302-102
R633		330 k	½ w				302-334
R634		680 k	½ w				302-684
R635		27 k	½ w				302-273
R640		10 Ω	1 w				304-100
R642		10 Ω	1 w				304-100
R644		10 Ω	1 w				304-100
R650		330 k	½ w		Prec.	1%	309-101
R651		250 k	½ w		Prec.	1%	309-162
R652		1 k	½ w				302-102
R653		2.2 meg	½ w				302-225
R654		470 k	½ w				302-474
R657		680 k	½ w				302-684
R658		27 k	½ w				302-273
R659		33 k	½ w				302-333
R663		1 k	½ w				302-102
R664		1 k	½ w				302-102
R666		4 k	20 w		WW	5%	308-176
R667		4 k	20 w		WW	5%	308-176
R670		1.024 meg	½ w		Prec.	1%	309-156
R671		333 k	½ w		Prec.	1%	309-053
R672		1 k	½ w				302-102
R673		1 meg	½ w				302-105
R677		220 k	1 w				304-224
R678		390 k	½ w				302-394
R679		33 k	½ w				302-333
R731	101-1109	4.21 k	½ w		Prec.	1%	309-105
R731	1110-up	2.05 k	½ w		Prec.	1%	309-104
R732	101-1109	31.1 k	½ w		Prec.	1%	309-037
R732	1110-up	15 k	1 w		Prec.	1%	310-115
R734		330 k	½ w				302-334

							Tektronix Part Number
R735		2.7 k	½ w				302-272
R737		150 Ω	½ w				302-151
R744		220 Ω	2 w				306-221
R754		470 Ω	½ w				302-471
R770		560 k	½ w				302-564
R771		560 k	½ w				302-564
R801		680 Ω	2 w				306-681
R803		47 k	2 w				306-473
R804		100 Ω	½ w				302-101
R806		100 k	½ w				302-104
R807		4.7 k	½ w				302-472
R813		100 Ω	½ w				302-101
R815		470 k	½ w				302-474
R816	X433-up	2.2 k	½ w				302-222
R840		1.2 meg	½ w			5%	301-125
R841		2 meg		Var.		High Voltage Adj.	311-227
R842		12 meg	2 w			5%	Use 310-595
R844	101-1369	5 meg		Var.		FOCUS	311-121
R844	1370-up	5 meg		Var.		FOCUS	Use 311-263
R845		15 meg	1 w				304-156
R846		2.2 meg	1 w				304-225
R847		500 k		Var.		INTENSITY	311-188
R849		22 k	½ w				302-223
R850		1 meg	½ w				302-105
R851		1 meg	½ w				302-105
R852		22 k	½ w				302-223
R853		100 k	½ w				302-104
R854		2.2 meg	½ w				302-225
R860		220 k	½ w				302-224
R862		100 k	½ w				302-104
R864		250 k		Var.		ASTIG.	311-206
R870		39 k	½ w			5%	301-393
R871		20 k		Var.		Cal. Ampl.	311-187
R872		150 k	½ w			5%	301-154
R873		10 k	½ w				302-103
R876		15 k	½ w			5%	301-153
R877		18 k	½ w			5%	301-183
R878		560 k	½ w			5%	301-564
R879		120 k	½ w			5%	301-124
R883		22 k	2 w			5%	305-223
R885		9.5 k	½ w		Prec.	1%	309-121
R886		6.375 k	½ w		Prec.	1%	309-119
R887		2.1 k	½ w		Prec.	1%	309-117
R888		1.025 k	½ w		Prec.	1%	309-116
R889		610 Ω	½ w		Prec.	1%	309-113
R890		200 Ω	½ w		Prec.	1%	309-073
R891		100 Ω	½ w		Prec.	1%	309-112
R892		60 Ω	½ w		Prec.	1%	309-067
R893		40 Ω	½ w		Prec.	1%	309-066
R896		100 k	½ w		Prec.	1%	309-045
R897		100 Ω	½ w		Prec.	1%	309-112
R898	X1580-up	100 Ω	½ w			1%	309-112
R899		.25 Ω	1 w		WW		*308-090

Switches

		Tektronix Part Number Wired	Unwired
SW601	POWER ON		260-014
SW870	CALIBRATOR	Use *262-497	*260-253

Thermal Cutout

TK601	Thermal Cutout 160°	260-157

Transformers

T601	LV Power	*120-192
T801	High Voltage	*120-176

Transistors

Q734	2N1302	151-040
Q744	2N1378	151-042
Q757	2N1529	151-046

Electron Tubes

V609		OG3	154-291
V627		7233/Z2300	154-307
V634		6BL8	154-278
V654		6AU6	154-022
V667		6AS7G	154-020
V674		6AU6	154-022
V800		6CZ5	154-167
V814	101-432	12AU7A	154-041B
V814	433-up	12BH7	154-046
V822		5642	154-051
V859		T503 CRT P2 Standard Phosphor	*154-265
V884		6BL8	154-278

TYPE 561 - 561A
MOD 6249 (33)

R644	Remove	10Ω	1w	304-100	561-561A
R804	Remove	100Ω	1/2w	302-101	561A
R833	Add	10m	1/2w	302-106	561A

Type 561
Mechanical Parts List

	Tektronix Part Number
ADAPTER, 3 WIRE TO 2 WIRE	103-013
BAR, $3/16 \times 1/2 \times 1\,3/4$ W/2 TAPPED HOLES	381-073
BAR, EXT. TOP SUPPORT W/HANDLE	381-182
BASE, CRT ROTATOR	432-022
BRACKET, SP. PHOS. BRONZE	406-239
BRACKET, CRT SUPPORT	406-368
BRACKET, NYLON, COAX INSUL. (X1245-up)	406-244
BRACKET, P. I. HOUSING RIGHT	406-607
BRACKET, P. I. HOUSING LEFT	406-608
BRACKET, TRANSFORMER	406-617
BUSHING, $3/8$-32 x $9/16$ x .412	358-010
BUSHING, NYLON (FOR 5 WAY BINDING POST)	358-036
BUSHING, INSULATOR, COAX CONN. (101-1244)	385-097
CABLE, HARNESS INDICATOR (101-579)	179-456
CABLE, HARNESS INDICATOR (580-up)	179-570
CABLE, HARNESS 110V	179-461
CABLE, HARNESS CALIBRATOR CHASSIS	179-465
CABLE, HARNESS F & I	179-466
CAP, FUSE	200-015
CAP, SCREW POLY. (PROTECTIVE FOR 5-40 SCREWS)	200-174
CAP, INSULATION (FUSE HOLDER)	200-237
CAP, INSULATION (FOR CLAROSTAT POTS)	200-238
CHASSIS, CALIBRATOR	441-336
CHASSIS, INDICATOR (101-442)	441-337
CHASSIS, INDICATOR (443-up)	441-394
CLAMP, #20 WIRE	343-043
CLAMP, TUBE (TOP HAT STYLE)	343-074
CLIP, DEFLECTION PLATE	344-047
CONNECTOR, CABLE CRT PIN	344-049
CONNECTOR, CHASSIS MNT. 1 CONT. FEMALE (101-1244)	131-081
CONNECTOR, CHASSIS MNT. 24 CONT. FEMALE	131-148
CONNECTOR, CHASSIS MNT. (X1245-up)	131-064
CONNECTOR, CHASSIS MNT. 3 WIRE MOTOR BASE MALE	131-150
COVER, 9 PIN CABLE SOCKET	200-249
GRATICULE, 5"	331-056

	Tektronix Part Number
FILTER LIGHT GREEN PLEXI	378-522
GROMMET, RUBBER 5/16	348-003
GROMMET, RUBBER 1/2	348-005
GROMMET, RUBBER 3/4	348-006
GROMMET, RUBBER 5/8	348-012
GROMMET, POLYPROPOLENE SNAP IN	348-031
GUIDE, RAIL TRACK	351-038
HOLDER, FUSE	352-010
HOLDER, NYLON FOR COIL FORM 3/16 x 3/4 TAPPED 4-40	352-015
HOLDER, FUSE SINGLE	352-031
KNOB, SMALL RED 3/16 INSERT HOLE	366-032
KNOB, LARGE BLK. 1/4 HOLE PART WAY	366-042
KNOB, SMALL BLK. HOLE PART WAY 101-1369	366-044
KNOB, SMALL BLK. .780 x 406 1370-up	366-134
LOCKWASHER, INT. #4	210-004
LOCKWASHER, INT. #6	210-006
LOCKWASHER, EXT. #8	210-007
LOCKWASHER, INT. #8	210-008
LOCKWASHER, INT. #10	210-010
LOCKWASHER, POT INT. 3/8 x 1/2	210-012
LOCKWASHER, INT. 3/8 x 11/16	210-013
LUG, SOLDER, SE4	210-201
LUG, SOLDER, SE6 W/2 WIRE HOLES	210-202
LUG, SOLDER, SE10 LONG	210-206
LUG, SOLDER, #10 NONLOCK 7/8" LONG	210-224
LUG, SOLDER, POT PLAIN 3/8	210-207
LUG, SOLDER, GROUND MIL'D Stl.	210-241
MOTOR FAN	119-013
NUT, HEX 4-40 x 3/16	210-406
NUT, HEX 6-32 x 1/4	210-407
NUT, HEX 8-32 x 5/16	210-409
NUT, HEX 3/8-32 x 1/2	210-413
NUT, HEX 15/32-32 x 9/16	210-414
NUT, KNURLED, GRATICULE 3/8-24 x 9/16 x 3/16	210-424
NUT, HEX 10-32 x 3/8 x 1/8	210-445
NUT, KEPS 6-32 x 5/16	210-457
NUT, KEPS 8-32 x 11/32	210-458
NUT, HEX 8-32 x 1/2 x 23/64 25 w RES. MTNG.	210-462
NUT, SWITCH 12-SIDED	210-473
NUT, HEX 10-32 x 3/8 x 1/8	210-564
PANEL, FRONT	333-618

Mechanical Parts List *(continued)*

	Tektronix Part Number
PLATE, GROUND, PLATED, OPEN END	386-427
PLATE, SUB PANEL FRONT (101-1244)	387-291
PLATE, SUB PANEL (X1245-up)	387-621
PLATE, SUB PANEL REAR	387-292
PLATE, OVERLAY REAR	387-293
PLATE, BOTTOM CABINET	387-294
PLATE, CABINET SIDE	387-300
PLATE, BACK CRT SOCKET	387-344
PLATE, GUSSET	387-352
POST, BINDING 5 WAY STEM & CAP ASS'Y (FLUTED)	129-036
RING, LOCKING SWITCH	354-055
RING, SECURING	354-078
RING, CLAMPING	354-103
ROD, $^5/_{16} \times 1^3/_4$ TAPPED 6-32 BOTH ENDS	385-060
ROD, DELRIN, $^5/_{16} \times 2^1/_4$ MTNG. HOLE $^3/_8$ DEEP ONE END W/3 #44 CROSS HOLES	385-137
SCREW, 4-40 x $^1/_2$ BHS	211-014
SCREW, 4-40 x $^3/_8$ FHS (X1245-up)	211-025
SCREW, 4-40 x $^5/_{16}$ PAN HS W/LOCKWASHER	211-033
SCREW, 4-40 x $^5/_{16}$ FHS, PHILLIPS	211-038
SCREW, 6-32 x $^1/_4$ BHSQ	211-504
SCREW, 6-32 x $^5/_{16}$ BHS	211-507
SCREW, 6-32 x $^3/_8$ BHS	211-510
SCREW, 6-32 x $^5/_{16}$ PAN HS W/LOCKWASHER	211-534
SCREW, 6-32 x $^3/_8$ TRUSS HS, PHILLIPS	211-537
SCREW, 6-32 x $^5/_{16}$ FHS, 100°, CSK, PHILLIPS	211-538
SCREW, 6-32 x $^1/_4$ FHS, 100°, CSK	211-541
SCREW, 6-32 x $^5/_{16}$ RHS	211-543
SCREW, 6-32 x 1 RHS	211-560
SCREW, 6-32 x $^3/_8$ HEX SOC. FH CAP	211-561
SCREW, 8-32 x $^5/_{16}$ BHS	212-004
SCREW, 8-32 x $^3/_8$ BHS	212-023
SCREW, 8-32 x $2^1/_4$ FIL HS	212-035
SCREW, 8-32 x $1^3/_4$ FIL HS	212-037
SCREW, 8-32 x $^3/_8$ TRUSS HS, PHILLIPS	212-039
SCREW, 8-32 x $^3/_8$ FHS, 100°, PHILLIPS	212-040
SCREW, THREAD CUTTING, 4-40 x $^5/_{16}$ RHS, PHILLIPS	213-034
SCREW, THREAD CUTTING, 6-32 x $^3/_8$ TRUSS HS, PHILLIPS	213-041
SCREW, THREAD CUTTING, 5-32 x $^3/_{16}$ PAN HS, PHILLIPS	213-044

Mechanical Parts List *(continued)*

	Tektronix Part Number
SHIELD, 5" GRATICULE LIGHT	337-187
SHIELD, CRT	337-384
SHIELD, F & I	337-387
SHIELD, POWER SWITCH	337-398
SHIELD, H.V. POWER	337-400
SOCKET, STM7G	136-008
SOCKET, STM8 MOLDED	136-013
SOCKET, STM9	136-014
SOCKET, STM9G	136-015
SOCKET, GRAT. LIGHT W/GROUND LUG	136-035
SOCKET, LIGHT ASSEMBLY	136-047
SOCKET, CRT PIN ASS'Y	136-114
SOCKET, 9 PIN CABLE END	136-099
SPACER, NYLON MOLDED 1/16 FOR CERAMIC STRIP	361-007
SPACER, NYLON MOLDED 5/16 FOR CERAMIC STRIP	361-009
STRAP, MOUNTING	346-001
STRIP, FELT	124-022
STRIP, CERAMIC 3/4 x 9 NOTCHES, CLIP MOUNTED	124-090
STRIP, CERAMIC, 3/4 x 11 NOTCHES, CLIP MOUNTED (301-up)	124-091
STRIP, CERAMIC, 7/16 x 11 NOTCHES, CLIP MOUNTED (101-300)	124-106
STUD, STEEL	355-049
STUD, STN. STL. 1/4 x 4 1/2	355-070
TAG, VOLTAGE RATING 50-60 CYCLE	334-649
TAG, VOLTAGE RATING 50-800 CYCLE	334-650
TUBE, SPACER .180 x 1/4 x 1/8	166-029
TUBE, SPACER .180 x 1/4 x 1 23/32 TAPPED 6-32	166-099
TUBE, SPACER .180 x 1/4 x 7/32 1 END CSK	166-107
WASHER, STEEL 6L x 3/8	210-803
WASHER, BRASS CENTERING 20 W RES.	210-808
WASHER, FIBER #10 (X1245-up)	210-812
WASHER, RUBBER	210-816
WASHER, STEEL .390 x 9/16 x .020	210-840
WASHER, RUBBER (FOR FUSE HOLDER)	210-873
WASHER, STEEL .470 x 21/32 x .030	210-902
WASHER, STEEL, 3/16 ID x 3/8 x .050	210-864

MECHANICAL PARTS LIST

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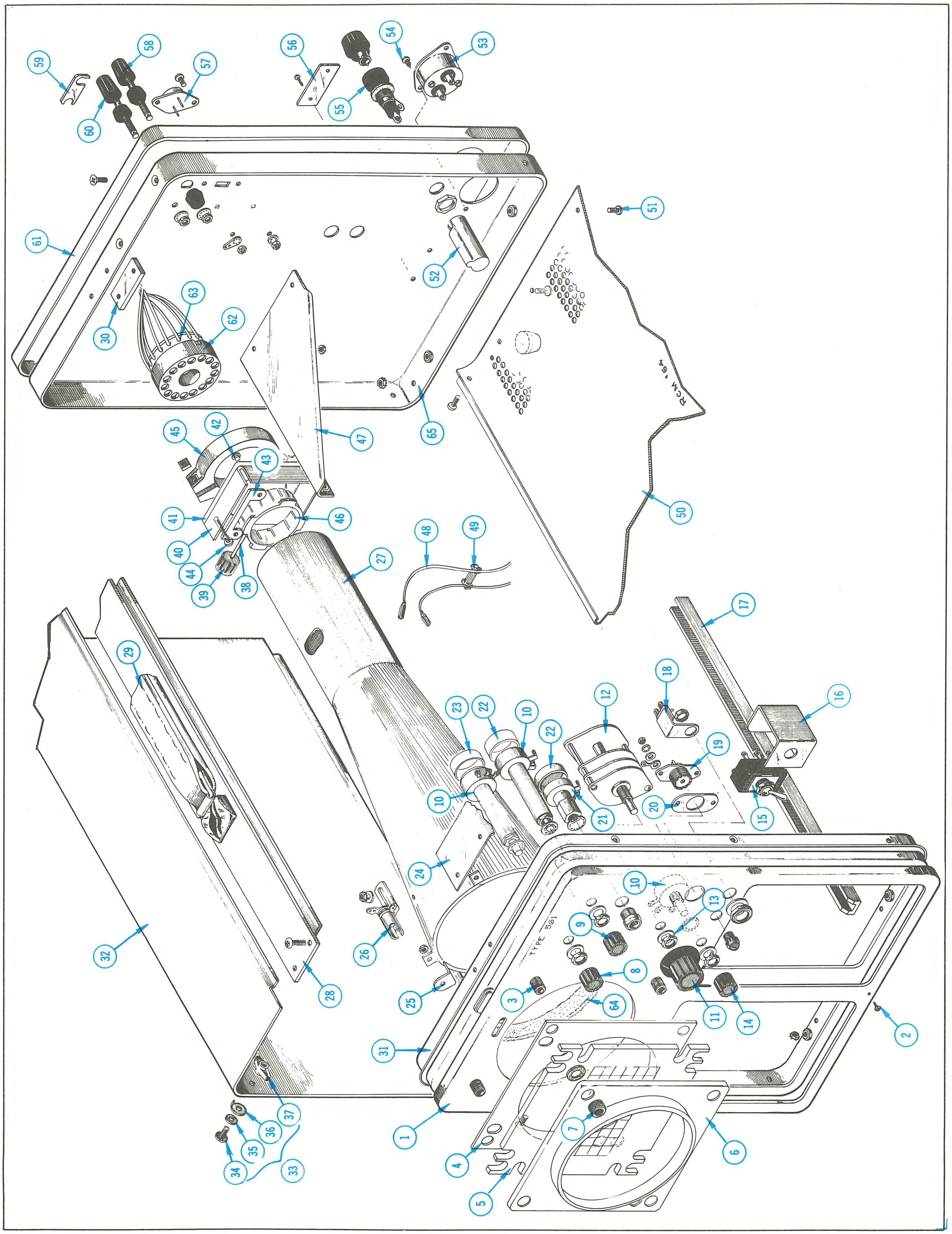
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TYPE 561

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
1	333-618			1	PANEL, front
	- - - -			-	mounting hardware: (not included w/panel)
2	213-045			1	SCREW, self-tapping, 4-40 x 5/16 inch PHS phillips
3	355-043			4	STUD, graticule, replacement
	- - - -			-	each stud includes:
	212-507			1	SCREW, 10-32 x 3/8 inch BHS
	210-010			1	LOCKWASHER, internal, #10
4	337-187			1	SHIELD, graticule light
5	331-056			1	GRATICULE
6	200-382			1	COVER, graticule (see ref. #7)
	- - - -			-	cover includes:
	354-116			1	RING, ornamental
7	- - - -			-	mounting hardware: (not included w/cover)
	210-816			4	WASHER, rubber
	210-424			4	NUT, knurled, graticule
8	366-044	101	1369	1	KNOB, small black -- FOCUS
	366-134	1370		1	KNOB, small black -- FOCUS
	- - - -			-	knob includes:
	213-004			1	SCREW, set, 6-32 x 3/16 inch HSS
9	366-044	101	1369	1	KNOB, small black -- INTENSITY
	366-134	1370		1	KNOB, small black -- INTENSITY
	- - - -			-	knob includes:
	213-004			1	SCREW, set, 6-32 x 3/16 inch HSS
10	- - - -			3	POT
	- - - -			-	mounting hardware for each: (not included w/pot)
	210-013			1	LOCKWASHER, internal, 3/8 x 11/16 inch
	210-840			1	WASHER, .390 ID x 9/16 inch OD
	210-413			1	NUT, hex, 3/8-32 x 1/2 inch
11	366-042			1	KNOB, large black -- CALIBRATOR
	- - - -			-	knob includes:
	213-004			1	SCREW, set, 6-32 x 3/16 inch HSS
12	262-207	101	1579	1	SWITCH, wired -- CALIBRATOR (see ref. #13)
	262-497	1580		1	SWITCH, wired -- CALIBRATOR (see ref. #13)
	- - - -			-	switch includes:
	260-253			1	SWITCH, unwired -- CALIBRATOR
13	- - - -			-	mounting hardware: (not included w/switch)
	210-012			1	LOCKWASHER, internal, 3/8 x 1/2 inch
	210-840			1	WASHER, .390 ID x 9/16 inch OD
	210-413			1	NUT, hex, 3/8-32 x 1/2 inch
14	366-044	101	1369	1	KNOB, small black -- SCALE ILLUM.
	366-134	1370		1	KNOB, small black -- SCALE ILLUM.
	- - - -			-	knob includes:
	213-004			1	SCREW, set, 6-32 x 3/16 inch HSS

FRONT-REAR cont.

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
15	260-014			1	SWITCH, toggle -- POWER ON
	- - - -			-	mounting hardware: (not included w/switch)
	210-414			1	NUT, hex, 15/32-32 x 9/16 inch
	354-055			1	RING, locking, switch
	210-902			1	WASHER, .470 ID x 21/32 inch OD
	210-473			1	NUT, switch, 15/32-32 x 5/64 inch, 12 sided
16	337-398			1	SHIELD, power switch
17	351-038			2	GUIDE, rail track, plug-in
	- - - -			-	mounting hardware for each: (not included w/guide)
	211-537			1	SCREW, 6-32 x 3/8 inch THS phillips
	211-538			1	SCREW, 6-32 x 5/16 inch FHS phillips
18	136-047			1	SOCKET, light (w/lens and nut)
19	131-081	101	1244	1	CONNECTOR, chassis mounted, UHF (w/hardware)
	131-064	1245		1	CONNECTOR, chassis mounted, UHF
	- - - -			-	mounting hardware: (not included w/connector)
	211-025			2	SCREW, 4-40 x 3/8 inch FHS
	210-812			2	WASHER, fiber, #10
	210-206			1	LUG, solder, SE10, long
	210-004			2	LOCKWASHER, internal, #4
	210-406			2	NUT, hex, 4-40 x 3/16 inch
20	406-244			1	BRACKET, coaxial insulator
21	- - - -			1	POT
	- - - -			-	mounting hardware: (not included w/pot)
	210-012			1	LOCKWASHER, internal, 3/8 x 1/2 inch
	210-207			1	LUG, solder, 3/8 inch
	210-494			1	NUT, hex, 3/8-32 x 1/2 x 11/16 inch
	210-013			1	LOCKWASHER, internal, 3/8 x 11/16 inch
	358-010			1	BUSHING, 3/8-32 x 9/16 inch
22	200-247			2	CAP, pot
23	200-238			1	COVER, pot
24	337-387			1	SHIELD, focus and intensity
	- - - -			-	mounting hardware: (not included w/shield)
	211-538			2	SCREW, 6-32 x 5/16 inch FHS phillips
25	406-239			2	BRACKET, CRT spring
26	136-035			2	SOCKET, graticule light
	- - - -			-	mounting hardware for each: (not included w/socket)
	211-534			1	SCREW, 6-32 x 5/16 inch PHS w/lockwasher
	210-803			1	WASHER, 6L x 3/8 inch
	210-457			1	NUT, keps, 6-32 x 5/16 inch
27	337-384			1	SHIELD, CRT
	- - - -			-	mounting hardware: (not included w/shield)
	211-538			5	SCREW, 6-32 x 5/16 inch FHS phillips
	210-457			5	NUT, keps, 6-32 x 5/16 inch
	211-511			1	SCREW, 6-32 x 1/2 inch BHS
	210-803			2	WASHER, 6L x 3/8 inch
	166-107			1	TUBE, spacing

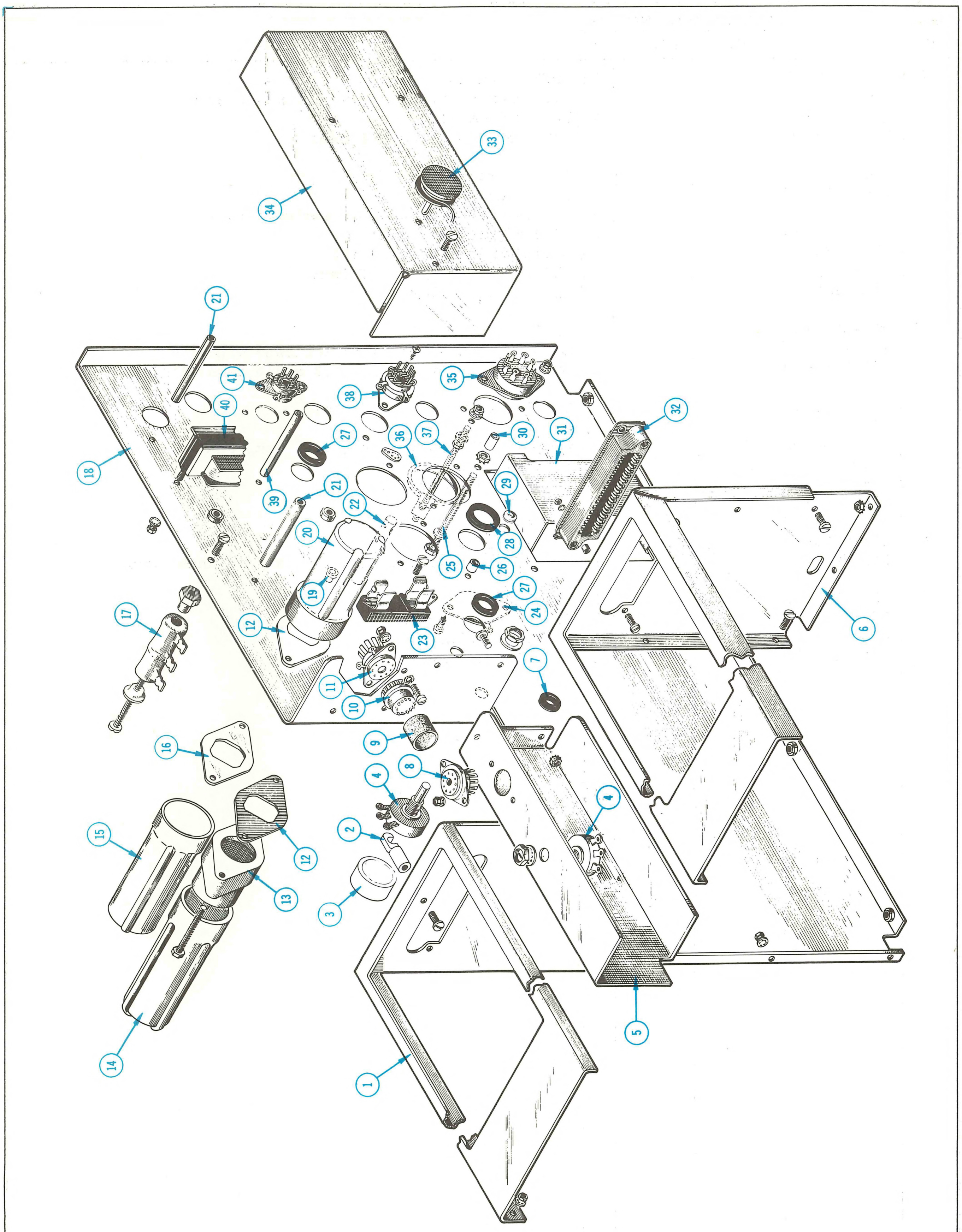
REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
28	381-182			1	BAR, top support (see ref. #30)
	- - - -			-	bar includes:
29	367-040			1	HANDLE, assembly
	- - - -			-	handle includes:
	367-011			1	HANDLE
	343-073			2	CLAMP, cover, handle
	211-507			4	SCREW, 6-32 x 5/16 inch BHS
	210-457			4	NUT, keps, 6-32 x 5/16 inch
30	- - - -			-	mounting hardware: (not included w/bar)
	381-073			2	BAR, retaining
	212-039			4	SCREW, 8-32 x 3/8 inch THS phillips
31	387-291	101	1244	1	PLATE, front subpanel
	387-621	1245		1	PLATE, front subpanel
	- - - -			-	plate includes:
	354-057			1	RING, ornamental
32	387-300			2	PLATE, cabinet side
	- - - -			-	each plate includes:
33	214-057			2	FASTENER, cabinet latch assembly
	- - - -			-	each fastener includes:
34	213-033			1	SCREW, fastening
35	210-847			1	WASHER, nylon, .164 ID x .500 inch OD
36	105-007			1	STOP
37	210-480			1	NUT, latch, nylon
38	355-049			1	STUD, CRT rotator
39	366-032			1	KNOB, small red
	- - - -			-	knob includes:
	213-004			1	SCREW, set, 6-32 x 3/16 inch HSS
40	406-368			1	BRACKET, CRT support
	- - - -			-	mounting hardware: (not included w/bracket)
	211-507			2	SCREW, 6-32 x 5/16 inch BHS
	210-202			2	LUG, solder, SE6
41	432-022			1	BASE, CRT, rotator
	- - - -			-	mounting hardware: (not included w/base)
42	211-561			2	SCREW, 6-32 x 3/8 inch FH cap
43	210-503			1	NUT, CRT rotator securing
44	211-560			1	SCREW, 6-32 x 1 inch RHS
	210-407			1	NUT, hex, 6-32 x 5/16 inch
45	354-103			1	RING, clamping
	- - - -			-	ring includes:
	210-502			1	NUT, CRT rotator
46	354-078	101	1618	1	RING, CRT rotator
	354-178	1619		1	RING, CRT rotator
47	387-352			1	PLATE, gusset
	- - - -			-	mounting hardware: (not included w/plate)
	211-538			2	SCREW, 6-32 x 5/16 inch FHS phillips
	210-457			2	NUT, keps, 6-32 x 5/16 inch

FRONT-REAR cont.

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
48	175-586			1	WIRE, CRT lead, .960 foot, striped brown, w/conn.
	175-592			1	WIRE, CRT lead, .960 foot, striped green, w/conn.
	175-594			1	WIRE, CRT lead, 1 foot, striped blue, w/conn.
	175-595			1	WIRE, CRT lead, .960 foot, striped red, w/conn.
49	344-047			3	CLIP, deflection plate
50	387-294			1	PLATE, bottom, cabinet (see ref. #51)
	- - - -			-	plate includes:
	348-015			4	CUSHION, rubber ball
	348-014			4	CUSHION, molded black
	- - - -			-	mounting hardware for each: (not included w/cushion alone)
	212-010			1	SCREW, 8-32 x 5/8 inch BHS
	210-458			1	NUT, keps, 8-32 x 11/32 inch
51	- - - -			-	mounting hardware: (not included w/plate)
	212-039			10	SCREW, 8-32 x 3/8 inch THS phillips
	210-007			4	LOCKWASHER, external, #8
	210-458			6	NUT, keps, 8-32 x 11/32 inch
52	200-237			1	COVER, insulation, fuse holder
53	131-150			1	CONNECTOR, chassis mounted, motor base
	- - - -			-	connector includes:
	129-041			1	POST, ground, 4-40 threads one end
	200-185			1	COVER, 3 wire motor base
	205-014			1	SHELL, mounting
	210-003			2	LOCKWASHER, external, #4
	210-551			2	NUT, hex, 4-40 x 1/4 inch
	211-015			1	SCREW, 4-40 x 1/2 inch RHS
	214-078			2	PIN, connecting
	377-041			1	INSERT, black urea
54	- - - -			-	mounting hardware: (not included w/connector)
	213-041			2	SCREW, thread cutting, 6-32 x 3/8 inch THS phillips
55	352-002			1	HOLDER, fuse, assembly
	- - - -			-	holder assembly includes:
	352-010			1	HOLDER, fuse
	200-582			1	CAP, fuse
	210-873			1	WASHER, rubber, 1/2 ID x 11/16 inch OD
	- - - -			1	NUT, fuse holder
56	334-649			1	TAG, voltage rating
	- - - -			-	mounting hardware: (not included w/tag)
	213-088			2	SCREW, thread forming, 4-40 x 1/4 inch PHS phillips
57	- - - -			1	TRANSISTOR
	- - - -			-	mounting hardware: (not included w/transistor)
	211-537			2	SCREW, 6-32 x 3/8 inch THS phillips
	210-006			1	LOCKWASHER, internal, #6
	210-202			1	LUG, solder, SE6
	210-407			2	NUT, hex, 6-32 x 1/4 inch

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
58	129-0036-00			1	POST, binding
	- - - - - - -			-	mounting hardware: (not included w/post)
	210-0206-00			1	LUG, solder, SE10
	210-0445-00			1	NUT, hex., 10-32 x 3/8 inch
59	386-0427-00			1	PLATE, ground
60	129-0036-00			1	POST, binding
	- - - - - - -			-	mounting hardware: (not included w/post)
	358-0036-00			1	BUSHING, binding post
	210-0010-00			1	LOCKWASHER, internal, #10
	210-0445-00			2	NUT, hex., 10-32 x 3/8 inch
	210-0206-00			1	LUG, solder, SE10
61	387-0293-00			1	PLATE, rear overlay
	- - - - - - -			-	mounting hardware: (not included w/plate)
	213-0041-00			2	SCREW, thread cutting, 6-32 x 3/8 inch, THS
62	136-0076-00	101	608	1	SOCKET, CRT, 14 pin w/leads
	387-0344-00	101	608	1	PLATE, CRT socket back
	211-0038-00	101	608	2	SCREW, 4-40 x 5/16 inch, 100° csk, FHS
	136-0114-00	609		1	ASSEMBLY, CRT socket
	- - - - - - -			-	assembly includes:
	136-0117-00			1	SOCKET, CRT
	131-0178-00			9	CONNECTOR, CRT pin
63	387-0393-00			1	PLATE, CRT socket back
	213-0086-00			2	SCREW, thread cutting, 2-32 x 7/16 inch, PHS
64	124-0022-00			1	STRIP, felt
65	387-0292-00			1	PLATE, rear subpanel
	- - - - - - -			-	plate includes:
	354-0057-00			1	RING, ornamental

CHASSIS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CHASSIS cont.

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
1	406-608			1	BRACKET, plug-in housing, left
	- - - -			-	mounting hardware: (not included w/bracket)
	211-538			1	SCREW, 6-32 x 5/16 inch FHS phillips
	210-006			1	LOCKWASHER, internal, #6
	210-407			1	NUT, hex, 6-32 x 1/4 inch
2	352-015			2	HOLDER, coil form
	- - - -			-	mounting hardware for each: (not included w/holder)
	213-034			1	SCREW, thread cutting, 4-40 x 5/16 inch RHS phillips
3	200-247			1	CAP, pot
4	- - - -			3	POT
	- - - -			-	mounting hardware for each: (not included w/pot)
	210-840			1	WASHER, .390 ID x 9/16 inch OD
	210-413			1	NUT, hex, 3/8-32 x 1/2 inch
5	441-336			1	CHASSIS, calibrator
	- - - -			-	mounting hardware: (not included w/chassis)
	212-004			2	SCREW, 8-32 x 5/16 inch BHS
	210-458			2	NUT, keps, 8-32 x 11/32 inch
6	406-607			1	BRACKET, plug-in housing, right
	- - - -			-	mounting hardware: (not included w/bracket)
	211-538			1	SCREW, 6-32 x 5/16 inch FHS phillips
	210-006			1	LOCKWASHER, internal, #6
	210-407			1	NUT, hex, 6-32 x 1/4 inch
	212-023			5	SCREW, 8-32 x 3/8 inch BHS
	210-008			5	LOCKWASHER, internal, #8
	210-409			5	NUT, hex, 8-32 x 5/16 inch
7	348-005			1	GROMMET, 1/2 inch
8	136-014			1	SOCKET, STM9
	- - - -			-	mounting hardware: (not included w/socket)
	211-033			2	SCREW, 4-40 x 5/16 inch PHS w/lockwasher
	210-201			2	LUG, solder, SE4
	210-004			2	LOCKWASHER, internal, #4
	210-406			2	NUT, hex, 4-40 x 3/16 inch
9	200-249			1	COVER, 9 pin cable socket
10	136-099			1	SOCKET, 9 pin cable end
11	136-015			1	SOCKET, STM9G
	- - - -			-	mounting hardware: (not included w/socket)
	211-033			2	SCREW, 4-40 x 5/16 inch PHS w/lockwasher
	210-004			2	LOCKWASHER, internal, #4
	210-406			2	NUT, hex, 4-40 x 3/16 inch
12	386-254			4	PLATE, fiber, large capacitor
	- - - -			-	mounting hardware for each: (not included w/plate)
	211-543			2	SCREW, 6-32 x 5/16 inch RHS
	210-006			2	LOCKWASHER, internal, #6
	210-407			2	NUT, hex, 6-32 x 1/4 inch

CHASSIS cont.

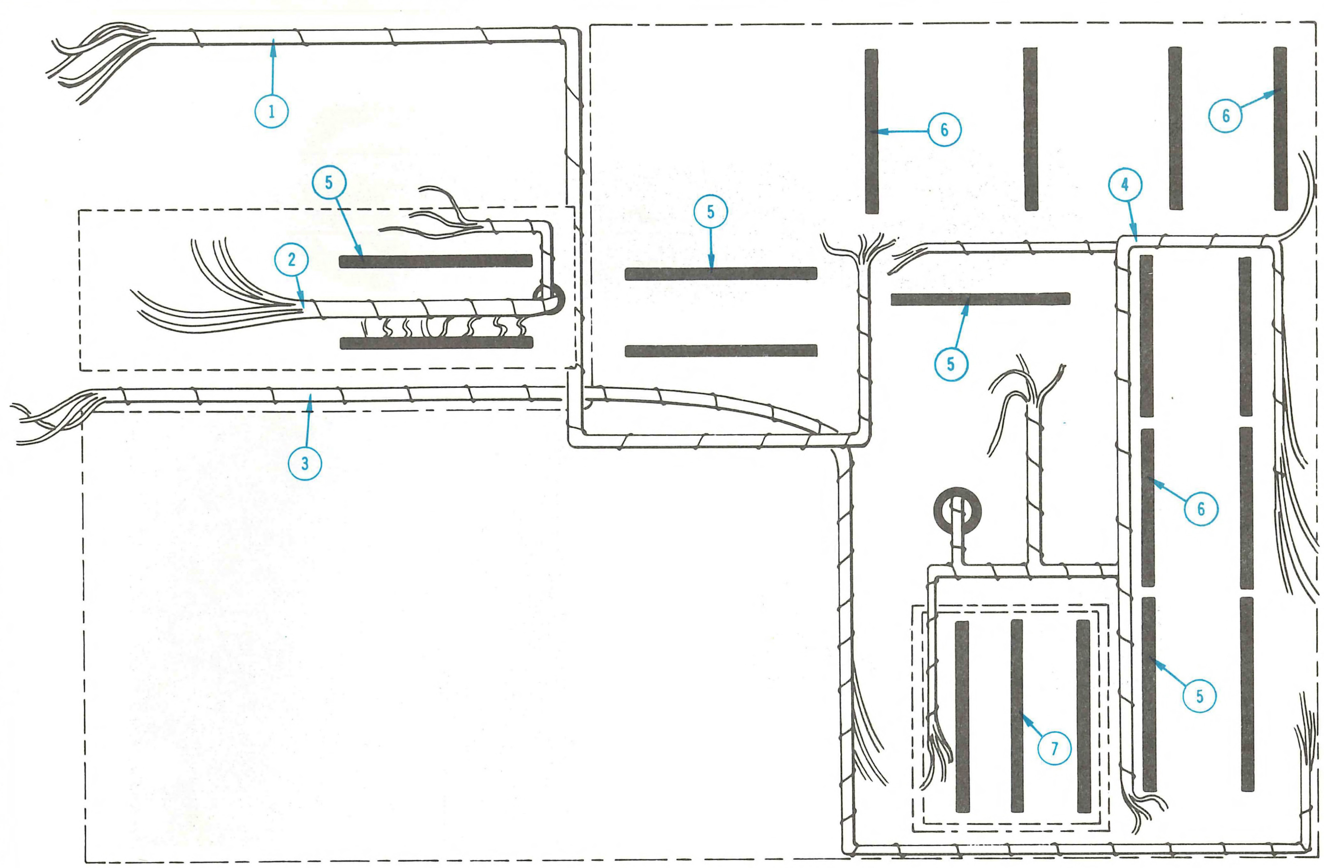
REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
13	432-044	X1950		1	BASE, capacitor mounting
	- - - -			-	mounting hardware: (not included w/base)
	211-514			2	SCREW, 6-32 x 3/4 inch BHS
	210-006			2	LOCKWASHER, internal, #6
	210-407			2	NUT, hex, 6-32 x 1/4 inch
14	200-261	101	1949	1	COVER, capacitor, 4 1/16 inches
	200-259	1950		1	COVER, capacitor, 3 9/16 inches
15	200-258			1	COVER, capacitor, 3 1/32 inches
16	386-255			1	PLATE, metal, large capacitor
	- - - -			-	mounting hardware: (not included w/plate)
	211-534			2	SCREW, 6-32 x 5/16 inch PHS w/lockwasher
	210-006			2	LOCKWASHER, internal, #6
	210-407			2	NUT, hex, 6-32 x 1/4 inch
17	- - - -			3	RESISTOR, 20 watt
	- - - -			-	mounting hardware for each: (not included w/resistor)
	212-037			3	SCREW, 8-32 x 1 3/4 inches Fil HS
	210-808			3	WASHER, resistor centering
	210-462			3	NUT, hex, resistor mounting
	212-004			3	SCREW, 8-32 x 5/16 inch BHS
18	441-337	101	432	1	CHASSIS, indicator
	441-394	433		1	CHASSIS, indicator
	- - - -			-	mounting hardware: (not included w/chassis)
	212-023			3	SCREW, 8-32 x 3/8 inch BHS
	212-040			7	SCREW, 8-32 x 3/8 inch FHS phillips
	210-008			3	LOCKWASHER, internal, #8
	210-409			3	NUT, hex, 8-32 x 5/16 inch
19	348-031			2	GROMMET, snap-in
20	200-293			2	COVER, capacitor, 2 9/16 inches
21	385-060			2	ROD, nylon
	- - - -			-	mounting hardware for each: (not included w/rod)
	211-507			1	SCREW, 6-32 x 5/16 inch BHS
22	385-137			1	ROD, delrin
	- - - -			-	mounting hardware: (not included w/rod)
	213-041			1	SCREW, thread cutting, 6-32 x 3/8 inch THS phillips
23	352-031			1	HOLDER, fuse, single
	- - - -			-	mounting hardware: (not included w/holder)
	211-510			1	SCREW, 6-32 x 3/8 inch BHS
	210-006			1	LOCKWASHER, internal, #6
	210-407			1	NUT, hex, 6-32 x 1/4 inch
24	260-157			1	SWITCH, thermal cutout
	- - - -			-	mounting hardware: (not included w/switch)
	213-044			2	SCREW, thread cutting, 5-32 x 3/16 inch PHS phillips

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
25	212-0515-00			4	SCREW, 10-32 x 2 1/4 inches Hex., HS
	210-0812-00			4	WASHER, fiber, #10
	210-0010-00			4	LOCKWASHER, internal, #10
	210-0564-00			4	NUT, hex., 10-32 x 3/8 inch
26	200-0174-00			1	CAP, screw
27	348-0012-00			2	GROMMET, 5/8 inch
28	348-0006-00			2	GROMMET, 3/4 inch
29	348-0003-00			2	GROMMET, 5/16 inch
30	200-0372-00			4	CAP, screw
31	406-0617-00			1	BRACKET, transformer strip mounting
32	131-0148-00			2	CONNECTOR, chassis mounted, 24 contact female
	- - - - - -			-	mounting hardware for each: (not included w/connector)
	211-0014-00			2	SCREW, 4-40 x 1/2 inch, BHS
	166-0029-00			2	TUBE, spacer
	210-0004-00			1	LOCKWASHER, internal, #4
	210-0201-00			1	LUG, solder, SE4
	210-0406-00			2	NUT, hex., 4-40 x 3/16 inch
33	214-0210-00	X419		1	SPOOL, solder, assembly
	- - - - - -			-	spool assembly includes:
	214-0209-00			1	SPOOL, solder
	- - - - - -			-	mounting hardware: (not included w/spool)
	361-0007-00			1	SPACER, nylon, 0.063 inch
34	337-0400-00			1	SHIELD, high voltage power
	- - - - - -			-	mounting hardware: (not included w/shield)
	211-0504-00			3	SCREW, 6-32 x 1/4 inch, BHS
35	136-0013-00			1	SOCKET, STM8
	- - - - - -			-	mounting hardware: (not included w/socket)
	211-0538-00			2	SCREW, 6-32 x 5/16 inch, FHS
	210-0006-00			2	LOCKWASHER, internal, #6
	210-0407-00			2	NUT, hex., 6-32 x 1/4 inch
36	343-0074-00			1	CLAMP, tube
	- - - - - -			-	mounting hardware: (not included w/clamp)
37	355-0070-00			1	STUD, 8-32 x 4 3/4 inches
	210-0008-00			2	LOCKWASHER, internal, #8
	210-0409-00			2	NUT, hex., 8-32 x 5/16 inch
38	136-0015-00			4	SOCKET, STM9G
	- - - - - -			-	mounting hardware for each: (not included w/socket)
	213-0044-00			2	SCREW, thread cutting, 5-32 x 3/16 inch, PHS
39	166-0099-00			1	TUBE, spacing
	- - - - - -			-	mounting hardware: (not included w/tube)
	211-0507-00			1	SCREW, 6-32 x 5/16 inch, BHS
	210-0006-00			1	LOCKWASHER, internal, #6

CHASSIS cont.

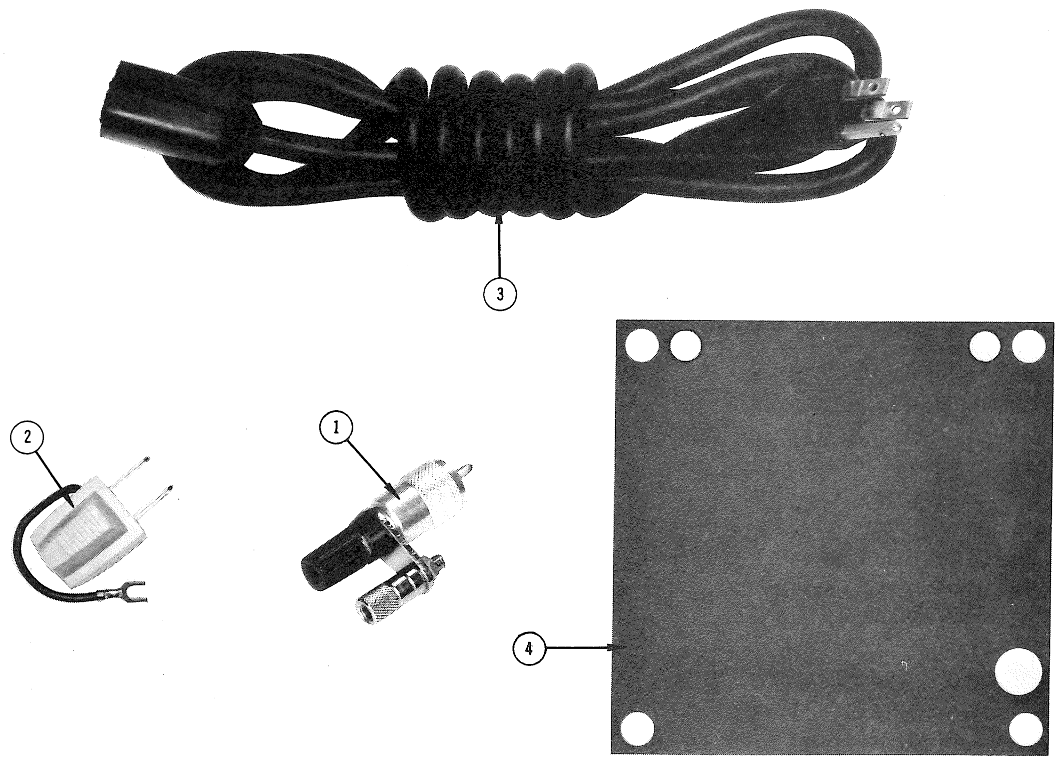
REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
40	346-001			1	STRAP, mounting, high voltage transformer
	- - - -			-	mounting hardware: (not included w/strap)
	210-004			2	LOCKWASHER, internal, #4
	210-406			2	NUT, hex, 4-40 x 3/16 inch
41	136-008			3	SOCKET, STM7G
	- - - -			-	mounting hardware for each: (not included w/socket)
	213-044			2	SCREW, thread cutting, 5-32 x 3/16 inch PHS phillips

CABLE HARNESS AND CERAMIC STRIP DETAIL



CERAMIC STRIP AND HARNESS DETAIL

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
1	179-466			1	CABLE HARNESS, focus and intensity
2	179-465			1	CABLE HARNESS, calibrator chassis
3	179-461			1	CABLE HARNESS, 110 volt
4	179-456	101	579	1	CABLE HARNESS, indicator
	179-570	580		1	CABLE HARNESS, indicator
5	124-091			7	STRIP, ceramic, 3/4 inch x 11 notches
	- - - -			-	each strip includes:
	355-046			2	STUD, nylon
	- - - -			-	mounting hardware for each: (not included w/strip)
	361-009			2	SPACER, nylon, .313 inch
6	124-090			8	STRIP, ceramic, 3/4 inch x 9 notches
	- - - -			-	each strip includes:
	355-046			2	STUD, nylon
	- - - -			-	mounting hardware for each: (not included w/strip)
	361-009			2	SPACER, nylon, .313 inch
7	124-106	101	300	3	STRIP, ceramic, 7/16 inch x 11 notches
	124-091	301		3	STRIP, ceramic, 3/4 inch x 11 notches
	- - - -			-	each strip includes:
	355-046			2	STUD, nylon
	- - - -			-	mounting hardware for each: (not included w/strip)
	361-007			2	SPACER, nylon, .063 inch



REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
1	013-0009-00			1	ADAPTER, binding post
2	103-0013-00			1	ADAPTER, power cord
3	161-0010-00			1	CORD, power
4	378-0514-00	X1449		1	FILTER, light

PARTS LIST

Values are fixed unless marked Variable.

Bulbs

Ckt. No.	Tektronix Part Number	Description		S/N Range
B601	150-001	Incandescent, G. E, #47	Graticule Light	
B602	150-001	Incandescent, G. E. #47	Graticule Light	
B603	150-018	Incandescent, G. E. #12	Pilot Light	
B633	150-002	Neon, Type NE-2		101-383X

Capacitors

Tolerance ±20% unless otherwise indicated.

Tolerance of all electrolytic capacitors are as follows: (with exceptions)

3V - 50V = −10% - +250%
51V - 350V- = −10% - +100%
351V - 450V = −10% - +50%

C610	285-510	.01 μf	PTM		400 v	
C616	285-510	.01 μf	PTM		400 v	
C640A,B	290-060	160 x 10 μf	EMC		350 v	
C642A,B	290-061	160 x 10 μf	EMC		350 v	
C644	290-133	2 x 125 μf	EMC		350 v	
C650	285-510	.01 μf	PTM		400 v	
C667	290-002	8 μf	EMT		450 v	
C670	Use 285-511	.01 μf	PTM		600 v	
C720	290-087	2000 μf	EMC		30 v	
C721	290-087	2000 μf	EMC		30 v	
C737	283-026	.2 μf	Discap		25 v	
C757	290-015	100 μf	EMT		25 v	
C760	281-027	.7-3 μμf	Tub.	Var.		
C761	281-027	.7-3 μμf	Tub.	Var.		
C801	283-006	.02 μf	Discap		600 v	
C803	283-000	.001 μf	Discap		500 v	GMV
C807	285-501	.001 μf	PTM		600 v	
C816	290-149	5 μf	EMT		150 v	
C822	283-036	.0025 μf	Discap		6000 v	
C841	283-006	.02 μf	Discap		600 v	
C842	283-036	.0025 μf	Discap		6000 v	
C847	283-002	.01 μf	Discap		500 v	GMV
C851	283-036	.0025 μf	Discap		6000 v	
C854	283-036	.0025 μf	Discap		6000 v	
C876	290-025	6.25 μμf	EMT		300 v	
C878	281-523	100 μμf	Cer.		350 v	
C884	281-524	150 μμf	Cer.		500 v	

Diodes

D640A,B,C,D	(4) 152-047	1N2862 or equal
D642A,B,C,D	(4) 152-047	1N2862 or equal
D644A,B,C,D	(4) 152-047	1N2862 or equal
D720	152-035	1N1563A
D721	152-035	1N1563A

Fuses

Ckt. No.	Tektronix Part Number	Description	S/N Range
F601	159-005	3 Amp 3 AG Slo-Blo 117 V operation 50 & 60 cycle	
F601	159-041	1.25 Amp 3 AG Slo-Blo 234 v 50 & 60 cycle	
F720	159-023	2 Amp 3 AG Slo-Blo	

Resistors

Resistors are fixed, composition, ±10% unless otherwise indicated.

R601	311-055	50 Ω		Var.	WW	SCALE ILLUM.	
R602	308-142	30 Ω	3 w		WW	5%	
R608	302-106	10 meg	½ w				X260-up
R609	302-272	2.7 k	½ w				101-383X
R610	302-104	100 k	½ w				
R611	302-102	1 k	½ w				
R612	302-272	2.7 k	½ w				X384-up
R616	311-015	10 k		Var.	WW	—100 Volts	
R617	308-185	7 k	½ w		WW	1%	101-383
R617	308-186	80 k	½ w		WW	1%	384-up
R618	308-186	80 k	½ w		WW	1%	101-383
R618	308-226	10 k	½ w		WW	1%	384-up
R619	302-224	220 k	½ w				
R623	302-102	1 k	½ w				
R624	302-473	47 k	½ w				X384-up
R625	302-222	2.2 k	½ w				X384-up
R626	302-184	180 k	½ w				X384-up
R627	308-176	4 k	20 w		WW	5%	
R632	302-102	1 k	½ w				
R633	302-334	330 k	½ w				101-383
R633	302-473	47 k	½ w				383-up
R634	302-684	680 k	½ w				101-383X
R635	302-273	27 k	½ w				101-383
R635	301-302	3 k	½ w			5%	384-up
R640	304-100	10 Ω	1 w				
R642	304-100	10 Ω	1 w				
R644	304-100	10 Ω	1 w				
R650	309-101	330 k	½ w		Prec.	1%	
R651	309-162	250 k	½ w		Prec.	1%	
R652	302-102	1 k	½ w				
R653	302-225	2.2 meg	½ w				
R654	302-474	470 k	½ w				
R657	302-684	680 k	½ w				
R658	302-273	27 k	½ w				
R659	302-333	33 k	½ w				
R663	302-102	1 k	½ w				
R664	302-102	1 k	½ w				
R666	308-176	4 k	20 w		WW	5%	
R667	308-176	4 k	20 w		WW	5%	
R670	309-156	1.024 meg	½ w		Prec.	1%	
R671	309-053	333 k	½ w		Prec.	1%	
R672	302-102	1 k	½ w				
R673	302-105	1 meg	½ w				
R677	304-224	220 k	1 w				
R678	302-394	390 k	½ w				

Ckt. No.	Tektronix Part Number	Description					S/N Range
R679	302-333	33 k	½ w				
R731	309-105	4.21 k	½ w		Prec.	1%	101-219
R731	309-104	2.05 k	½ w		Prec.	1%	220-up
R732	309-037	31.1 k	½ w		Prec.	1%	101-219
R732	310-115	15 k	1 w		Prec.	1%	220-up
R734	302-334	330 k	½ w				
R735	302-272	2.7 k	½ w				
R737	302-151	150 Ω	½ w				
R744	306-221	220 Ω	2 w				
R754	302-471	470 Ω	½ w				
R770	302-564	560 k	½ w				
R771	302-564	560 k	½ w				101-429X
R801	306-681	680 Ω	2 w				
R803	306-473	47 k	2 w				
R804	302-101	100 Ω	½ w				
R806	302-104	100 k	½ w				
R807	302-472	4.7 k	½ w				
R813	302-101	100 Ω	½ w				
R815	302-474	470 k	½ w				
R816	302-222	2.2 k	½ w				
R822	307-056	4.3 Ω	½ w			5%	
R840	301-125	1.2 meg	½ w			5%	
R841	311-227	2 meg		Var.		High Voltage	
R842	Use 310-595	12 meg	2 w		Prec.	5%	
R844	311-254	5 meg		Var.		FOCUS	
R845	304-156	15 meg	1 w				
R846	304-225	2.2 meg	1 w				
R847	311-253	500 k		Var.		INTENSITY	
R849	302-223	22 k	½ w				
R850	302-105	1 meg	½ w				
R851	302-104	100 k	½ w				
R852	302-223	22 k	½ w				
R853	302-104	100 k	½ w				
R854	302-225	2.2 meg	½ w.				
R860	311-007	2 x 1 k		Var.		CRT Beam Rotator	
R861	302-680	68 Ω	½ w				
R862	302-224	220 k	½ w				
R863	302-104	100 k	½ w				
R864	311-206	250 k		Var.		ASTIG.	
R870	301-364	360 k	½ w			5%	
R871	311-224	50 k		Var.		Cal Ampl.	
R872	301-154	150 k	½ w			5%	
R873	302-103	10 k	½ w				
R876	301-433	43 k	½ w			5%	
R877	301-473	47 k	½ w			5%	
R878	301-564	560 k	½ w			5%	
R879	301-114	110 k	½ w			5%	
R883	305-223	22 k	2 w			5%	
R885	310-066	18 k	1 w		Prec.	1%	
R886	309-030	1.8 k	½ w		Prec.	1%	

Resistors *(continued)*

Ckt. No.	Tektronix Part Number	Description				S/N Range
R887	309-072	180 Ω	½ w	Prec.	1%	
R888	309-064	20 Ω	½ w	Prec.	1%	
R890	309-030	1.8 k	½ w	Prec.	1%	
R891	309-072	180 Ω	½ w	Prec.	1%	
R892	309-064	20 Ω	½ w	Prec.	1%	
R898	Use 309-178	250 Ω	½ w	Prec.	1%	
R899	*308-090	.25 Ω	1 w	WW		

Switches

	Unwired	Wired	
SW601	260-014		POWER ON Toggle
SW870	*260-394	Use *262-515	CALIBRATOR Rotary

Thermal Cutout

TK601	260-246	Thermal Cutout 123°

Transformers

T601	*120-224	L.V. Power
T801	*120-225	H.V. Power

Transistors

Q624	151-087	J3138	X384-up
Q734	151-040	2N1302	
Q744	151-042	2N1378	
Q757	151-046	2N1529	

Electron Tubes

V609	154-291	OG3	
V627	154-307	7233/Z2300	
V634	154-278	6BL8	101-383
V634	154-187	6DJ8	384-up
V654	154-022	6AU6	
V667	154-056	6080	
V674	154-022	6AU6	
V800	154-167	6CZ5	
V814	154-046	12BH7	
V822	154-051	5642	
V859	*154-320	T503R CRT P-2 Standard Phosphor	
V884	154-278	6BL8	

Inductors

L860	*108-228	Beam rotating coil

Type RM561
Mechanical Parts List

	Tektronix Part Number
ADAPTOR, 3 WIRE TO 2 WIRE	103-013
BRACKET, CRT SHIELD, RIGHT	406-710
BRACKET, CRT SHIELD, LEFT	406-711
BRACKET, NYLON, COAX INSUL	406-244
BRACKET, PLUG-IN	406-716
BRACKET, PARALLAX ADJ. (240-up)	406-730
BUSHING, $3/8$-32 x $9/16$ x .412	358-010
BUSHING, INSULATOR, COAX CONN.	358-097
CABLE, HARNESS, CHASSIS	179-541
CABLE, HARNESS, AMPHENOL	179-560
CAP, POT 1" POLY.	200-247
CAP, PROTECTOR FOR #10 SCREW	200-372
CHASSIS, FRONT	441-389
CHASSIS, REAR	441-390
CLAMP, CABLE, $5/16$ PLASTIC	343-004
CLAMP, CRT (101-239X)	343-078
CONNECTOR, CHASSIS MTD., 1 CONTACT, FEMALE	131-081
CONNECTOR, CHASSIS MTD.	131-064
CONNECTOR, CHASSIS MTD., 24 CONTACT, FEMALE	131-148
CONNECTOR, CHASSIS MTD., 3 WIRE MOTOR BASE, MALE	131-150
CORD, POWER (101-289)	161-010
CORD, POWER (290-up)	161-013
COVER, GRATICULE ASS'Y	use 200-409
CUSHION, RUBBER	348-041
FASTENER, PAWL RIGHT	214-052
FASTENER, PAWL LEFT	214-053
FILTER, LIGHT GREEN PLEXI	378-525
GRATICULE, .125 x $4^{13}/16$ x $5^{5}/16$	331-076
GROMMET, RUBBER $1/2$	348-005
GROMMET, RUBBER $3/4$	348-006
GUIDE, CLIPS FOR "MUFFIN FAN"	351-046
GUIDE, RAIL TRACK	351-047
HANDLE, DRAWER	367-008
HOLDER, LITTLEFUSE	352-014
HOLDER, NYLON FOR COIL FORM $3/16$ x $3/4$ TAPPED 4-40	352-015
HOLDER, FUSE, SINGLE	352-031
INSERT, GRATICULE LIGHT, RED	377-064
KNOB, SMALL BLACK, $1/4$ HOLE PART WAY	366-044
KNOB, SMALL GREY	366-083
KNOB, SMALL METAL	366-109

Mechanical Parts List *(continued)*

	Tektronix Part Number
LOCKWASHER, INT. #4	210-004
LOCKWASHER, INT. #6	210-006
LOCKWASHER, INT. #10	210-010
LOCKWASHER, INT., POT, $3/8 \times 1/2$	210-012
LOCKWASHER, INT., $3/8 \times 11/16$	210-013
LUG, SOLDER, SE4	210-201
LUG, SOLDER, SE10	210-206
LUG, SOLDER, POT, PLAIN $3/8$	210-207
LUG, SOLDER, $1/4$"	210-223
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MOTOR FAN	119-013
NUT, HEX 4-40 x $3/16$	210-406
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NUT, HEX $15/32$-35 x $9/16$	210-414
NUT, SPEED, #6	210-434
NUT, KEPS, 6-32 x $5/16$	210-457
NUT, KEPS, 8-32 x $11/32$	210-458
NUT, HEX, 8-32 x $1/2$ x $23/64$ 25W RESISTOR MTG.	210-462
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NUT, HEX, $3/8$-32 x $1/2$ x $11/16$	210-494
NUT, SQUARE, 10-32 x $3/8$	210-501
NUT, HEX 10-32 x $3/8$ x $1/8$ STAINLESS	210-564
NUT, GRATICULE SHOULDERED 10-32 x $15/32$ (530-up)	210-571
NUT, ADJ., 6-33 TAPPED HOLES	214-207
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ROD, DELRIN, 5/16 x 1 9/16 W/MTG. HOLE ONE END & FOUR #44 HOLES	385-138
SCREEN, GRILLE FOR "MUFFIN FAN"	378-761
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SCREW, 4-40 x 3/8 FHS	211-025
SCREW, 4-40 x 5/16 PAN HS W/LOCKWASHER	211-033
SCREW, 2-56 x 1/2 RHS	211-034
SCREW, 2-32 x 5/16 RHS, PHILLIPS	213-113
SCREW, 6-32 x 1/4 BHS	211-504
SCREW, 6-32 x 5/16 BHS	211-507
SCREW, 6-32 x 3/8 BHS	211-510
SCREW, 6-32 x 3/4 BHS	211-514
SCREW, 6-32 x 3/4 BHS	211-514
SCREW, 6-32 x 5/16 PHS W/LOCKWASHER	211-534
SCREW, 6-32 x 5/16 FHS, 100°, CSK, PHILLIPS	211-538
SCREW, 6-32 x 1/4 FHS, 100°, CSK, PHILLIPS	211-541
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SCREW, 8-32 x 5/16 BHS	212-004
SCREW, 8-32 x 3/8 BHS	212-023
SCREW, 8-32 x 1 3/4 FIL HS	212-037
SCREW, 8-32 x 3/8 FHS, 100°, PHILLIPS	212-040
SCREW, 8-32 x 5/16 FHS, PHILLIPS	212-070
SCREW, 10-32 x 1/2 BHS	212-508
SCREW, 10-32 x 1/2 OHS	212-512
SCREW, 10-32 x 2 1/2 HHS	212-522
SCREW, 10-32 x 7/8 RHS	212-548
SCREW, 12-24 x 1/2 OHS	212-561
SCREW, THREAD CUTTING, 4-40 x 1/4 PHS, PHILLIPS	213-035
SCREW, THREAD CUTTING, 6-32 x 3/8 TRUSS HS, PHILLIPS	213-041
SCREW, THREAD CUTTING, 5-32 x 3/16 PAN HS, PHILLIPS	213-044
SCREW, THREAD CUTTING, 2-32 x 1/2 RHS	213-087
SCREW, THREAD FORMING, 4-40 x 1/4 PHS, PHILLIPS	213-088
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SCREW, 10-32 x 1/2 HEX, CAD PLATED	213-090
SHIELD, CRT	337-448
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SOCKET, STM8	136-013
SOCKET, STM9G	136-015
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STRIP, CERAMIC, $^3/_4 \times 7$ NOTCHES, CLIP MOUNTED	124-089
STRIP, CERAMIC, $^3/_4 \times 9$ NOTCHES, CLIP MOUNTED	124-090
STRIP, CERAMIC, $^3/_4 \times 11$ NOTCHES, CLIP MOUNTED	124-091
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TUBE, SPACER, $.180 \times {}^1/_4 \times {}^3/_{16}$	166-030
TUBE, SPACER, $.180 \times {}^1/_4 \times 1^{23}/_{32}$ TAPPED 6-32	166-099
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WASHER, STEEL 10S x $^7/_{16} \times .036$	210-805
WASHER, BRASS, 20W RES. CENTERING	210-808
WASHER, FIBER #10	210-812
WASHER, STEEL, #10	210-833
WASHER, NEOPRENE $^7/_{32} \times {}^3/_8 \times {}^5/_{64}$	210-844
WASHER, $^5/_{32} \times {}^1/_2 \times {}^1/_{16}$	210-858
WASHER, STEEL $^3/_{16}$ ID x $^3/_8$ OD x .050	210-864
WASHER, RUBBER (FOR FUSE HOLDER)	210-873
WASHER, CAP, BLACK NYLON	210-896
WASHER, INSULATING, RED	210-898
WASHER, CAP, RED	210-899
WASHER, STEEL $.470 \times {}^{21}/_{32} \times .030$	210-902
WASHER, BRASS $.265 \times {}^7/_{16} \times .050$	210-905
WASHER, TEFLON, $^5/_8 \times .191 \times .025$	210-917
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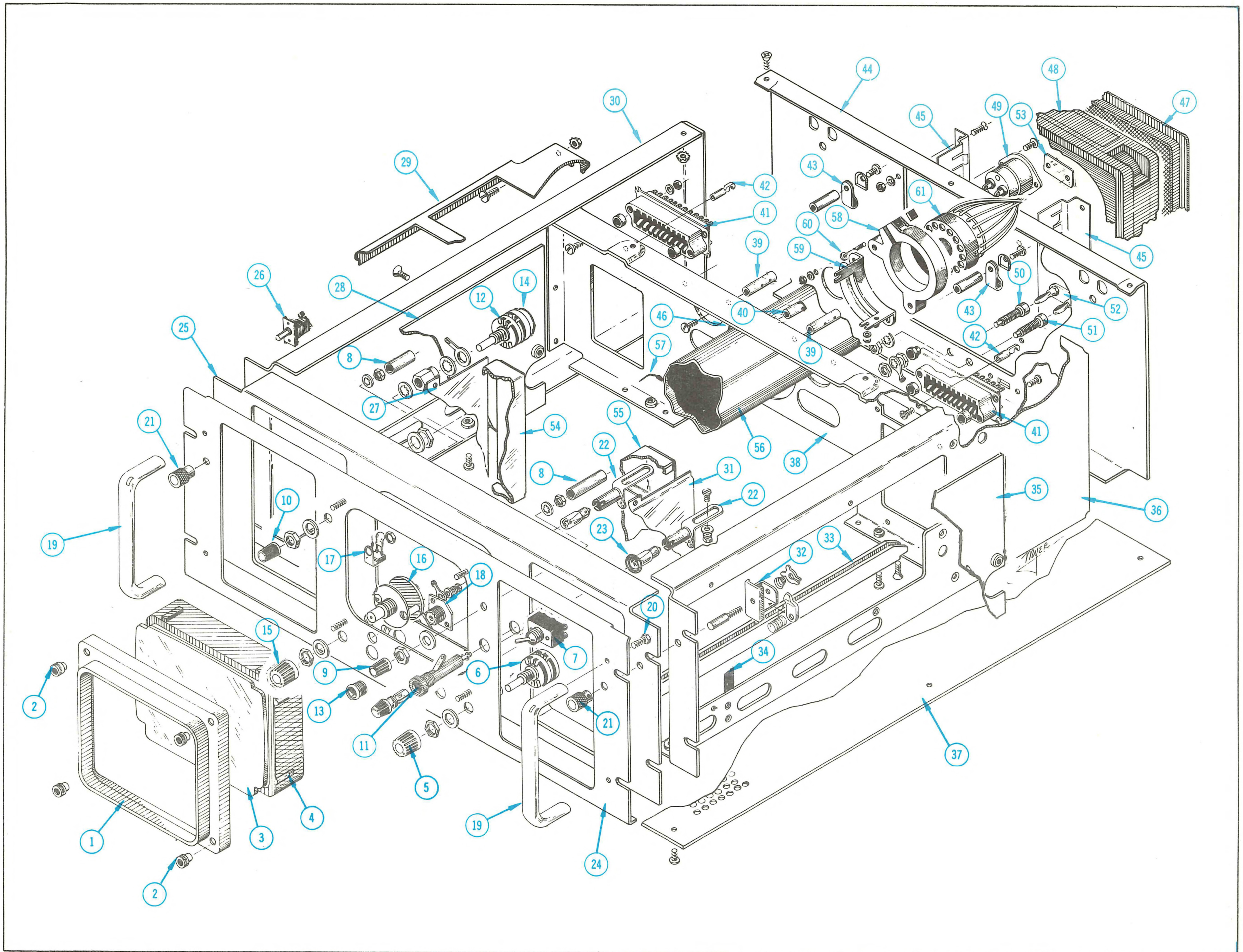
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FRONT-REAR

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
1	200-0272-00	101	529	1	COVER, graticule
	200-0409-00	530		1	COVER, graticule
	- - - - - -			-	cover includes:
	101-0005-00	X530		1	TRIM, graticule cover
	- - - - - -			-	mounting hardware: (not included w/cover)
2	210-0434-00	101	529	4	NUT, knurled, 10-32 x 0.515 inch
	210-0571-00	530		4	NUT, knurled, 10-32 x 15/32 inch
	210-0864-00			4	WASHER, flat, 3/16 ID x 3/8 inch OD
	210-0844-00	X530		4	WASHER, rubber, 7/32 ID x 3/8 inch OD
3	331-0076-00			1	GRATICULE
4	124-0142-00			1	STRIP, felt
5	366-0044-00			1	KNOB, black--SCALE ILLUM
	- - - - - -			-	knob includes:
	213-0004-00			1	SCREW, set, 6-32 x 3/16 inch, HSS
6	- - - - - -			1	RESISTOR, variable
	- - - - - -			-	mounting hardware: (not included w/resistor)
	210-0012-00			1	LOCKWASHER, internal, 3/8 ID x 1/2 inch OD
	210-0840-00			1	WASHER, flat, 0.390 ID x 9/16 inch OD
	210-0413-00			1	NUT, hex., 3/8-32 x 1/2 inch
7	260-0014-00			1	SWITCH, toggle--POWER
	- - - - - -			-	mounting hardware: (not included w/switch)
	210-0414-00			1	NUT, hex., 15/32-32 x 9/16 inch
	354-0055-00			1	RING, locking, switch
	210-0902-00			1	WASHER, flat, 0.470 ID x 21/32 inch OD
	210-0473-00			1	NUT, 12 sided, 15/32-32 x 0.634 inch
8	- - - - - -			2	RESISTOR, variable
	- - - - - -			-	mounting hardware for each: (not included w/resistor)
	210-0046-00			1	LOCKWASHER, internal, 1/4 ID x 0.400 inch OD
	210-0905-00			1	WASHER, flat, 0.265 ID x 7/16 inch OD
	210-0583-00			1	NUT, hex., 1/4-32 x 5/16 inch
9	366-0083-00			1	KNOB, gray--INTENSITY
	- - - - - -			-	knob includes:
	213-0004-00			1	SCREW, set, 6-32 x 3/16 inch, HSS
10	366-0083-00			1	KNOB, gray--FOCUS
	- - - - - -			-	knob includes:
	213-0004-00			1	SCREW, set, 6-32 x 3/16 inch, HSS
11	352-0014-00			1	HOLDER, fuse (w/cap)
	210-0873-00			1	WASHER, rubber, 1/2 ID x 11/16 inch OD
12	- - - - - -			1	RESISTOR, variable
	- - - - - -			-	mounting hardware: (not included w/resistor)
	210-0207-00			1	LUG, solder, 3/8 ID x 5/8 inch OD, SE
	210-0012-00			1	LOCKWASHER, internal, 3/8 ID x 1/2 inch OD
	210-0494-00			1	NUT, hex., 3/8-32 x 1/2 x 11/16 inch long
	210-0013-00			1	LOCKWASHER, internal, 3/8 ID x 11/16 inch OD
13	358-0010-00			1	BUSHING, 3/8-32 x 0.562 x 0.512 inch long

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
14	200-0247-00			1	CAP, variable resistor
15	366-0044-00			1	KNOB, black--CALIBRATOR
	- - - - - -			-	knob includes:
	213-0004-00			1	SCREW, set, 6-32 x 3/16 inch, HSS
16	262-0415-00	101	429	1	SWITCH, wired--CALIBRATOR
	262-0515-00	430		1	SWITCH, wired--CALIBRATOR
	- - - - - -			-	switch includes:
	260-0394-00			1	SWITCH, unwired--CALIBRATOR
	- - - - - -			-	mounting hardware: (not included w/switch)
	210-0840-00			1	WASHER, flat, 0.390 ID x 9/16 inch OD
	210-0413-00			1	NUT, hex., 3/8-32 x 1/2 inch
17	136-0047-00			1	SOCKET, light (w/jewel)
18	131-0081-00	101	259	1	CONNECTOR, coaxial, 1 contact, UHF
	131-0064-00	260		1	CONNECTOR, coaxial, 1 contact, UHF
	- - - - - -			-	mounting hardware: (not included w/connector)
	358-0097-00	101	259	1	BUSHING, insulator
	210-0241-00	101	259	1	LUG, ground
	406-0244-00	260		1	BRACKET, insulator
	211-0025-00	260		2	SCREW, 4-40 x 3/8 inch, 100° csk, FHS
	210-0224-00	260		1	LUG, solder, SE #10, non-locking
	210-0812-00	260		2	WASHER, fiber, 0.190 ID x 0.380 inch OD
	210-0004-00	260		2	LOCKWASHER, internal, #4
	210-0406-00	260		2	NUT, hex., 4-40 x 3/16 inch
19	367-0008-00			2	HANDLE, drawer
	- - - - - -			-	mounting hardware for each: (not included w/handle)
20	213-0090-00			2	SCREW, 10-32 x 1/2 inch, HSS
21	366-0109-00			2	KNOB, securing
	- - - - - -			-	each knob includes:
	213-0005-00			1	SCREW, set, 8-32 x 1/8 inch, HSS
22	136-0035-00			2	SOCKET, graticule light
	- - - - - -			-	mounting hardware for each: (not included w/socket)
	211-0534-00			1	SCREW, sems, 6-32 x 5/16 inch, PHS
	210-0803-00			1	WASHER, flat, 0.150 ID x 3/8 inch OD
	210-0006-00			1	LOCKWASHER, internal, #6
	210-0407-00			1	NUT, hex., 6-32 x 1/4 inch
23	377-0064-00			2	INSERT, graticule light
24	333-0665-00			1	PANEL, front
25	387-0448-00	101	259	1	PLATE, sub-panel
	387-0622-00	260		1	PLATE, sub-panel
26	214-0053-00			1	FASTENER, left
	- - - - - -			-	mounting hardware: (not included w/fastener)
	210-0004-00			2	LOCKWASHER, internal, #4
	210-0406-00			2	NUT, hex., 4-40 x 3/16 inch

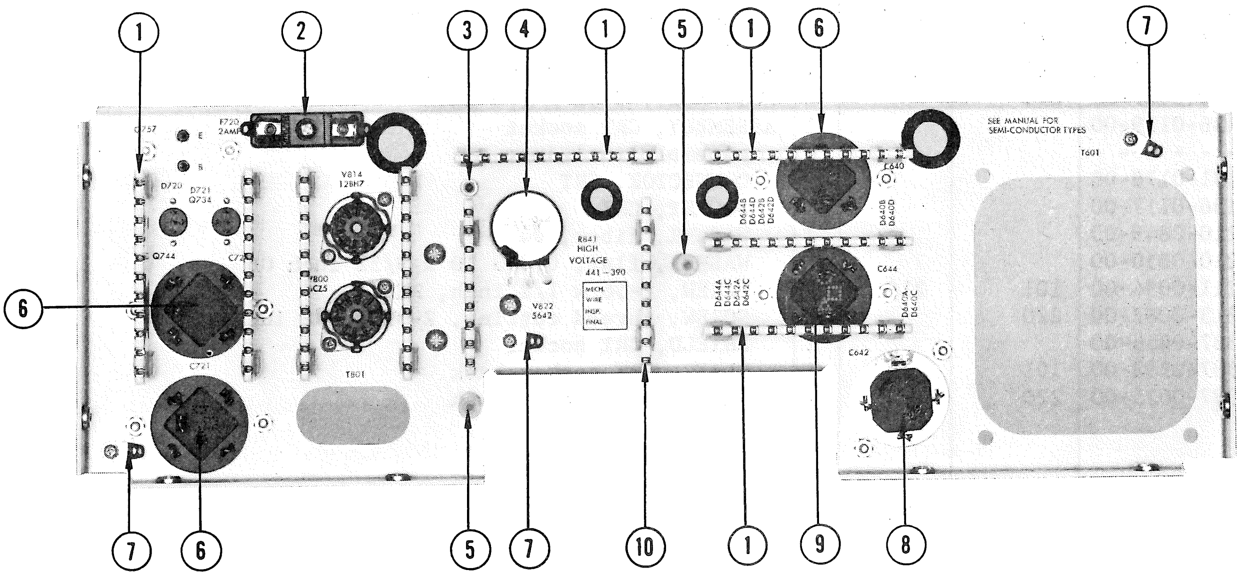
REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
27	337-0451-00			1	SHIELD, focus, left side
	- - - - - -			-	mounting hardware: (not included w/shield)
	211-0504-00			3	SCREW, 6-32 x 1/4 inch, PHS
28	387-0450-00			1	PLATE, left side cover
	- - - - - -			-	mounting hardware: (not included w/plate)
	211-0504-00			4	SCREW, 6-32 x 1/4 inch, PHS
	211-0541-00			2	SCREW, 6-32 x 1/4 inch, 100° csk, FHS
29	406-0716-00			2	BRACKET, plug-in housing
	- - - - - -			-	mounting hardware for each: (not included w/bracket)
	211-0538-00			2	SCREW, 6-32 x 5/16 inch, 100° csk, FHS
	210-0457-00			2	NUT, keps, 6-32 x 5/16 inch
	212-0004-00			2	SCREW, 8-32 x 5/16 inch, PHS
	210-0458-00			2	NUT, keps, 8-32 x 11/32 inch
30	387-0447-00			1	PLATE, left side
	- - - - - -			-	mounting hardware: (not included w/plate)
	212-0070-00			12	SCREW, 8-32 x 5/16 inch, 100° csk, FHS
	210-0458-00			10	NUT, keps, 8-32 x 11/32 inch
31	337-0452-00			1	SHIELD, intensity, right side
	- - - - - -			-	mounting hardware: (not included w/shield)
	211-0504-00			3	SCREW, 6-32 x 1/4 inch, PHS
32	214-0052-00			1	FASTENER, right
	- - - - - -			-	mounting hardware: (not included w/fastener)
	210-0004-00			2	LOCKWASHER, internal, #4
	210-0406-00			2	NUT, hex., 4-40 x 3/16 inch
33	351-0047-00			2	GUIDE, rail track
	- - - - - -			-	mounting hardware for each: (not included w/guide)
	211-0541-00			1	SCREW, 6-32 x 1/4 inch, 100° csk, FHS
	211-0538-00			1	SCREW, 6-32 x 5/16 inch, 100° csk, FHS
	210-0407-00			1	NUT, hex., 6-32 x 1/4 inch
34	105-0038-00	101	289X	2	CATCH, chassis track
	- - - - - -			-	mounting hardware for each: (not included w/catch)
	211-0023-00			2	SCREW, 4-40 x 1/4 inch, 100° csk, FHS
	210-0004-00			2	LOCKWASHER, internal, #4
	210-0406-00			2	NUT, hex., 4-40 x 3/16 inch

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
35	387-0449-00			1	PLATE, right side cover
	- - - - - -			-	mounting hardware: (not included w/plate)
	211-0504-00			4	SCREW, 6-32 x 1/4 inch, PHS
	211-0541-00			2	SCREW, 6-32 x 1/4 inch, 100° csk, FHS
36	387-0446-00			1	PLATE, right side
	- - - - - -			-	mounting hardware: (not included w/plate)
	212-0070-00			12	SCREW, 8-32 x 5/16 inch, 100° csk, FHS
	210-0458-00			10	NUT, keps, 8-32 x 11/32 inch
37	387-0452-00			2	PLATE, dust cover
	- - - - - -			-	mounting hardware for each: (not included w/cover)
	211-0565-00			8	SCREW, 6-32 x 1/4 inch, THS
38	387-0453-00			1	PLATE, bulkhead
39	385-0138-00	101	829	4	ROD, plastic, 1 9/16 inches high
	385-0138-00	830		2	ROD, plastic, 1 9/16 inches high
	- - - - - -			-	mounting hardware for each: (not included w/rod)
	213-0041-00			1	SCREW, thread cutting, 6-32 x 3/8 inch, THS
40	385-0033-00			1	ROD, plastic, 5/8 inch high
	- - - - - -			-	mounting hardware: (not included w/rod)
	211-0507-00			1	SCREW, 6-32 x 5/16 inch, PHS
41	131-0148-00			2	CONNECTOR, 24 contact
	- - - - - -			-	mounting hardware for each: (not included w/connector)
	211-0014-00			2	SCREW, 4-40 x 1/2 inch, PHS
	166-0030-00			2	TUBE, spacer, 0.180 ID x 1/4 OD x 3/16 inch long
	210-0201-00			1	LUG, solder, SE #4
	210-0004-00			1	LOCKWASHER, internal, #4
	210-0406-00			2	NUT, hex., 4-40 x 3/16 inch
42	352-0015-00			2	HOLDER, coil form
	- - - - - -			-	mounting hardware for each: (not included w/holder)
	213-0035-00			1	SCREW, thread cutting, 4-40 x 1/4 inch, PHS
43	343-0004-00			2	CLAMP, plastic, 5/16 inch
	- - - - - -			-	mounting hardware for each: (not included w/clamp)
	211-0507-00			1	SCREW, 6-32 x 5/16 inch, PHS
	385-0013-00			1	ROD, plastic, 3/4 inch high
	211-0510-00			1	SCREW, 6-32 x 3/8 inch, PHS
	210-0803-00			1	WASHER, flat, 0.150 ID x 3/8 inch OD

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
44	387-0451-00			1	PLATE, rear
	- - - - - -			-	mounting hardware: (not included w/plate)
	212-0004-00			8	SCREW, 8-32 x 5/16 inch, PHS
	210-0458-00			4	NUT, keps, 8-32 x 11/32 inch
45	351-0046-00			2	GUIDE, fan
	- - - - - -			-	mounting hardware for each: (not included w/guide)
	211-0538-00			2	SCREW, 6-32 x 5/16 inch, 100° csk, FHS
	210-0006-00			2	LOCKWASHER, internal, #6
	210-0407-00			2	NUT, hex., 6-32 x 1/4 inch
46	348-0041-00			1	CUSHION, rubber
47	378-0761-00			1	SCREEN, fan
48	119-0013-00			1	BLOWER, fan
49	131-0150-00			1	ASSEMBLY, motor base connector, 3 wire
	- - - - - -			-	assembly includes:
	129-0041-00			1	POST, ground
	200-0185-00			1	COVER, plastic
	205-0014-00			1	SHELL, mounting
	210-0003-00			2	LOCKWASHER, external, #4
	210-0551-00			2	NUT, hex., 4-40 x 1/4 inch
	211-0015-00			1	SCREW, 4-40 x 1/2 inch, RHS
	214-0078-00			2	PIN, connecting
	377-0041-00			1	INSERT, plastic
	- - - - - -			-	mounting hardware: (not included w/assembly)
	213-0041-00			2	SCREW, thread cutting, 6-32 x 3/8 inch, THS
50	136-0107-00	101	298	1	SOCKET, banana jack, red
	136-0139-00	299		1	SOCKET, banana jack, red
	- - - - - -			-	mounting hardware: (not included w/socket)
	210-0898-00			1	WASHER, plastic, 0.255 ID x 0.375 inch OD
	210-0465-00			2	NUT, hex., 1/4-32 x 3/8 inch
	210-0223-00			1	LUG, solder, 1/4 ID x 7/16 inch OD, SE
51	136-0106-00	101	298	1	SOCKET, banana jack, black
	136-0138-00	299		1	SOCKET, banana jack, black
	- - - - - -			-	mounting hardware: (not included w/socket)
	210-0223-00			1	LUG, solder, 1/4 ID x 7/16 inch OD, SE
	210-0465-00			1	NUT, hex., 1/4-32 x 3/8 inch
52	134-0012-00			1	PLUG, banana, twin
53	334-0649-00			1	TAG, voltage rating
	- - - - - -			-	mounting hardware: (not included w/tag)
	213-0088-00			2	SCREW, thread forming, 4-40 x 1/4 inch, PHS

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
54	406-0711-00			1	BRACKET, CRT shield, left
	- - - - - -			-	mounting hardware: (not included w/bracket)
	211-0534-00			4	SCREW, sems, 6-32 x 5/16 inch, PHS
	211-0507-00			2	SCREW, 6-32 x 5/16 inch, PHS
	210-0006-00			6	LOCKWASHER, internal, #6
	210-0407-00			6	NUT, hex., 6-32 x 1/4 inch
	212-0070-00			1	SCREW, 8-32 x 5/16 inch, 100° csk, FHS
	210-0458-00			1	NUT, keps, 8-32 x 11/32 inch
55	406-0710-00			1	BRACKET, CRT shield, right
	- - - - - -			-	mounting hardware: (not included w/bracket)
	211-0534-00			4	SCREW, sems, 6-32 x 5/16 inch, PHS
	211-0507-00			2	SCREW, 6-32 x 5/16 inch, PHS
	210-0006-00			6	LOCKWASHER, internal, #6
	210-0407-00			6	NUT, hex., 6-32 x 1/4 inch
	212-0070-00			1	SCREW, 8-32 x 5/16 inch, 100° csk, FHS
	210-0458-00			1	NUT, keps, 8-32 x 11/32 inch
56	337-0448-00			1	SHIELD, CRT
57	175-0582-00	101	829	1	WIRE, CRT lead, 0.458 foot, striped brown, w/connector
	175-0641-00	830		1	WIRE, CRT lead, 0.833 foot, brown, w/ connector
	175-0583-00			1	WIRE, CRT lead, 11 1/2 inches, striped red, w/connector
	175-0584-00			1	WIRE, CRT lead, 11 1/2 inches, striped green, w/connector
	175-0596-00	101	829	1	WIRE, CRT lead, 0.417 foot, striped blue, w/connector
	175-0642-00	830		1	WIRE, CRT lead, 0.833 foot, blue, w/connector
58	343-0078-00	101	239	1	CLAMP, CRT
	- - - - - -			-	mounting hardware: (not included w/clamp)
	211-0510-00			6	SCREW, 6-32 x 3/8 inch, PHS
	210-0006-00			6	LOCKWASHER, internal, #6
	210-0407-00			6	NUT, hex., 6-32 x 1/4 inch
	354-0147-00	240		1	RING, CRT clamping
	- - - - - -			-	mounting hardware: (not included w/ring)
	211-0576-00			2	SCREW, 6-32 x 7/8 inch, socket head cap
	210-0949-00			2	WASHER, flat, 9/64 ID x 1/2 inch OD
	214-0207-00			1	NUT, adjusting securing
59	406-0730-00	X240		1	BRACKET, adjusting
	- - - - - -			-	mounting hardware: (not included w/bracket)
	211-0534-00			4	SCREW, sems, 6-32 x 5/16 inch, PHS
	210-0803-00			4	WASHER, flat, 0.150 ID x 3/8 inch OD
	210-0006-00			4	LOCKWASHER, internal, #6
	210-0407-00			4	NUT, hex., 6-32 x 1/4 inch

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
60	212-0548-00	101	239	1	SCREW, 10-32 x 7/8 inch, RHS
	211-0560-00	240		1	SCREW, 6-32 x 1 inch, RHS
	210-0501-00	101	239	1	NUT, square, 10-32 x 3/8 inch
	210-0407-00	240		1	NUT, hex., 6-32 x 1/4 inch
61	136-0119-00			1	ASSEMBLY, CRT socket
	- - - - - -			-	assembly includes:
	131-0178-00			9	CONNECTOR, CRT
	136-0117-00			1	SOCKET, CRT
	210-0849-00			2	WASHER, fiber, #4
	210-0850-00			2	WASHER, flat, 0.093 ID x 9/32 inch OD
	211-0034-00	101	219	2	SCREW, 2-56 x 1/2 inch, RHS
	213-0087-00	220		2	SCREW, thread cutting, 2-32 x 1/2 inch, RHS
	337-0456-00			1	SHIELD, CRT socket
	387-0393-00	101	219	1	PLATE, CRT socket back
	387-0625-00	220		1	PLATE, CRT socket back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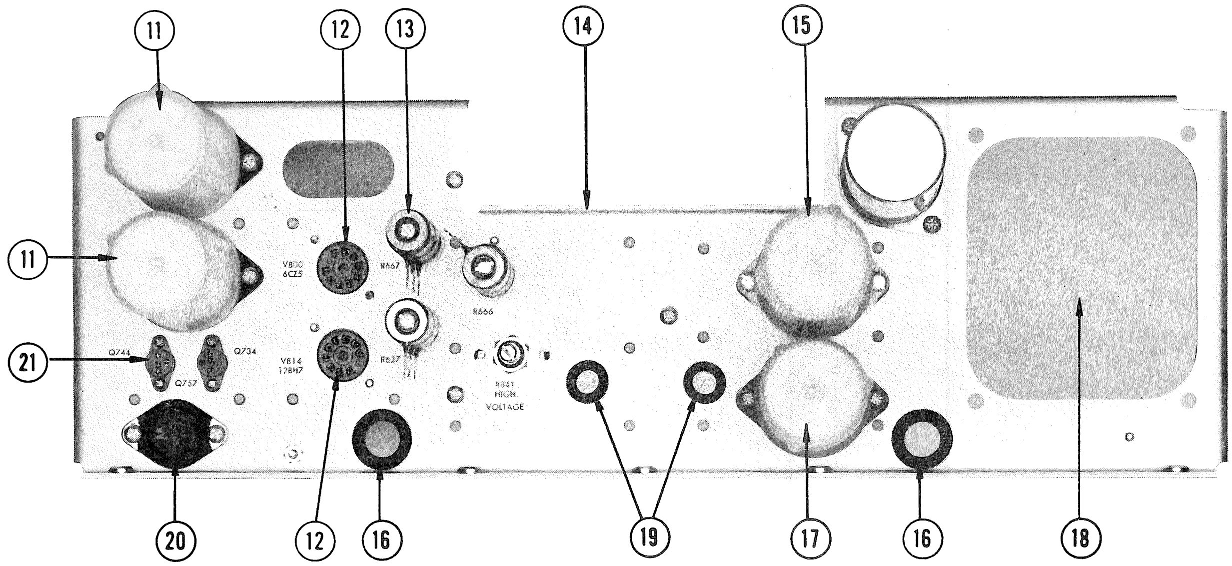
SEE MANUAL FOR SEMI-CONDUCTOR TYPES
R841 HIGH VOLTAGE
441-390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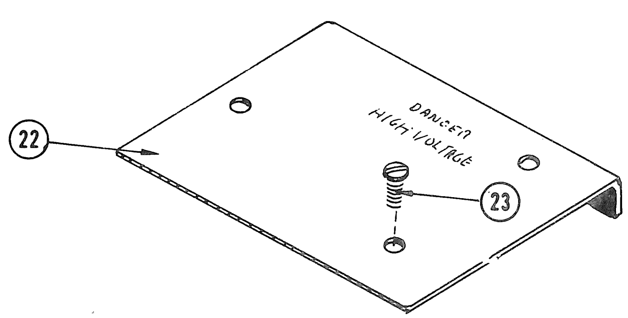
R841 HIGH VOLTAGE

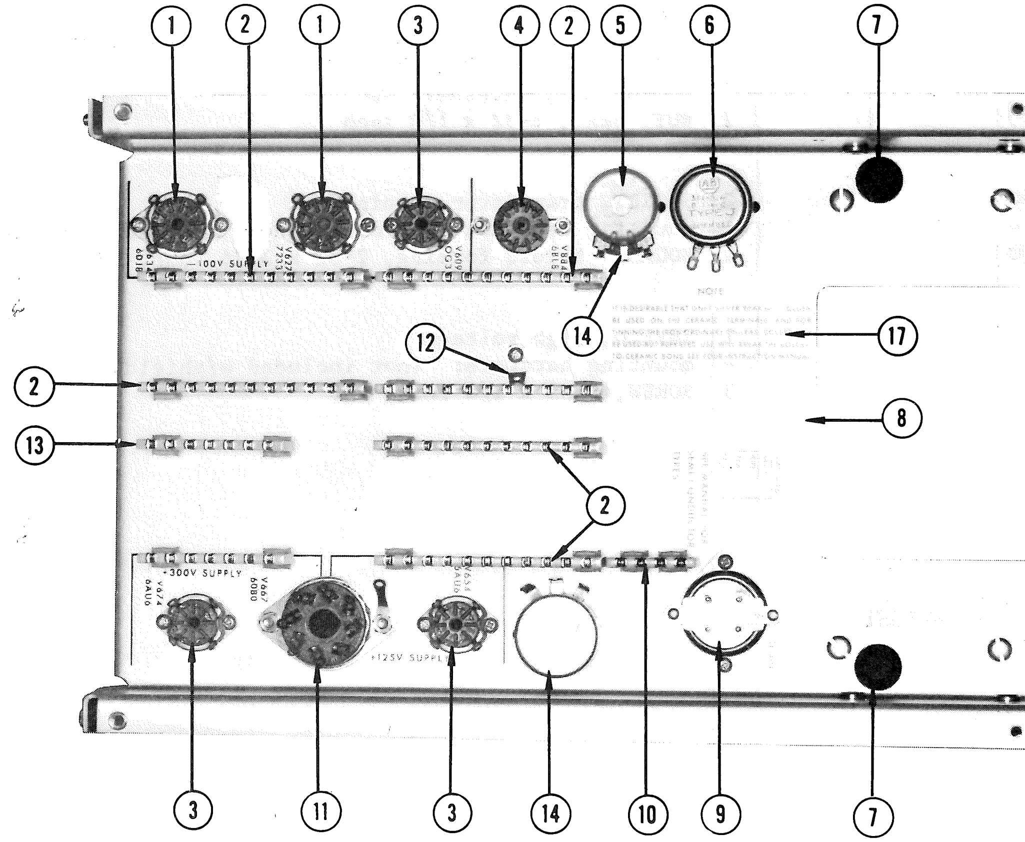

22
23
DANGER HIGH VOLTAGE

REAR CHASSIS

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
1	124-0091-00			8	STRIP, ceramic, 3/4 inch h, w/11 notches
	- - - - - -			-	each strip includes:
	355-0046-00			2	STUD, plastic
	- - - - - -			-	mounting hardware for each: (not included w/strip)
	361-0009-00			2	SPACER, plastic, 0.406 inch long
2	352-0031-00			1	HOLDER, fuse, single
	- - - - - -			-	mounting hardware: (not included w/holder)
	211-0510-00			1	SCREW, 6-32 x 3/8 inch, PHS
	210-0006-00			1	LOCKWASHER, internal, #6
	210-0407-00			1	NUT, hex., 6-32 x 1/4 inch
3	166-0099-00			1	TUBE, spacer, 0.180 ID x 1/4 OD x 1 23/32 inches
	- - - - - -			-	mounting hardware: (not included w/tube)
	211-0507-00			1	SCREW, 6-32 x 5/16 inch, PHS
4	- - - - - -			1	RESISTOR, variable
	- - - - - -			-	mounting hardware: (not included w/resistor)
	210-0840-00			1	WASHER, flat, 0.390 ID x 9/16 inch OD
	210-0413-00			1	NUT, hex., 3/8-32 x 1/2 inch
5	385-0060-00			2	ROD, plastic, 1 3/4 inches high
	- - - - - -			-	mounting hardware for each: (not included w/rod)
	211-0507-00			1	SCREW, 6-32 x 5/16 inch, PHS
6	- - - - - -			3	CAPACITOR
	- - - - - -			-	mounting hardware for each: (not included w/capacitor)
	386-0254-00			1	PLATE, fiber, mounting
	211-0543-00			2	SCREW, 6-32 x 5/16 inch, RHS
	210-0006-00			2	LOCKWASHER, internal, #6
	210-0407-00			2	NUT, hex., 6-32 x 1/4 inch
7	210-0201-00			3	LUG, solder, SE #4
	- - - - - -			-	mounting hardware for each: (not included w/lug)
	213-0044-00			1	SCREW, thread forming, 5-32 x 3/16 inch, PHS
8	- - - - - -			1	CAPACITOR
	- - - - - -			-	mounting hardware: (not included w/capacitor)
	386-0255-00			1	PLATE, mounting
	211-0534-00			2	SCREW, sems, 6-32 x 5/16 inch, PHS
	210-0006-00			2	LOCKWASHER, internal, #6
	210-0407-00			2	NUT, hex., 6-32 x 1/4 inch

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
9	- - - - - - -			1	CAPACITOR
	- - - - - - -			-	mounting hardware: (not included w/capacitor)
	432-0044-00	X530		1	BASE, plastic, mounting
	386-0254-00			1	PLATE, fiber, mounting
	211-0543-00	101	529	2	SCREW, 6-32 x 5/16 inch, RHS
	211-0514-00	530		2	SCREW, 6-32 x 3/4 inch, PHS
	210-0006-00			2	LOCKWASHER, internal, #6
	210-0407-00			2	NUT, hex., 6-32 x 1/4 inch
10	124-0090-00			2	STRIP, ceramic, 3/4 inch h, w/9 notches
	- - - - - - -			-	each strip includes:
	355-0046-00			2	STUD, plastic
	- - - - - - -			-	mounting hardware for each: (not included w/strip)
	361-0009-00			2	SPACER, plastic, 0.406 inch long
11	200-0293-00			2	COVER, capacitor
12	136-0015-00			2	SOCKET, tube, 9 pin, w/ground lugs
	- - - - - - -			-	mounting hardware for each: (not included w/socket)
	213-0044-00			2	SCREW, thread forming, 5-32 x 3/16 inch, PHS
13	- - - - - - -			3	RESISTOR
	- - - - - - -			-	mounting hardware for each: (not included w/resistor)
	212-0037-00			1	SCREW, 8-32 x 1 3/4 inches Fil HS
	210-0808-00			1	WASHER, centering, 0.173 ID x 9/16 inch OD
	210-0462-00			1	NUT, hex., 8-32 x 1/2 x 23/64 inch
	212-0004-00			1	SCREW, 8-32 x 5/16 inch, PHS
14	441-0390-00			1	CHASSIS, rear
	- - - - - - -			-	mounting hardware: (not included w/chassis)
	212-0004-00			2	SCREW, 8-32 x 5/16, inch, PHS
	212-0023-00			3	SCREW, 8-32 x 3/8 inch, PHS
15	200-0261-00	101	529	1	COVER, capacitor
	200-0259-00	530		1	COVER, capacitor
16	348-0006-00			2	GROMMET, rubber, 3/4 inch diameter
17	200-0258-00			1	COVER, capacitor
18	- - - - - - -			1	TRANSFORMER (not shown)
	- - - - - - -			-	transformer includes:
	212-0522-00			4	SCREW, 10-32 x 2 1/2 inches, HHS
	210-0812-00			4	WASHER, fiber, #10
	- - - - - - -			-	mounting hardware: (not included w/transformer)
	220-0410-00			4	NUT, keps, 10-32 x 3/8 inch
19	348-0005-00			2	GROMMET, rubber, 1/2 inch diameter

REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
20	- - - - - - -			1	TRANSISTOR
	- - - - - - -			-	mounting hardware: (not included w/transistor)
	211-0510-00			2	SCREW, 6-32 x 3/8 inch, PHS
	210-0006-00			2	LOCKWASHER, internal, #6
	210-0407-00			2	NUT, hex., 6-32 x 1/4 inch
21	136-0095-00			2	SOCKET, transistor, 4 pin
	- - - - - - -			-	mounting hardware for each: (not included w/socket)
	213-0113-00			2	SOCKET, thread forming, 2-32 x 5/16 inch, RHS
22	337-0455-00			1	SHIELD, high voltage
	- - - - - - -			-	mounting hardware: (not included w/shield)
23	211-0504-00			3	SCREW, 6-32 x 1/4 inch, PHS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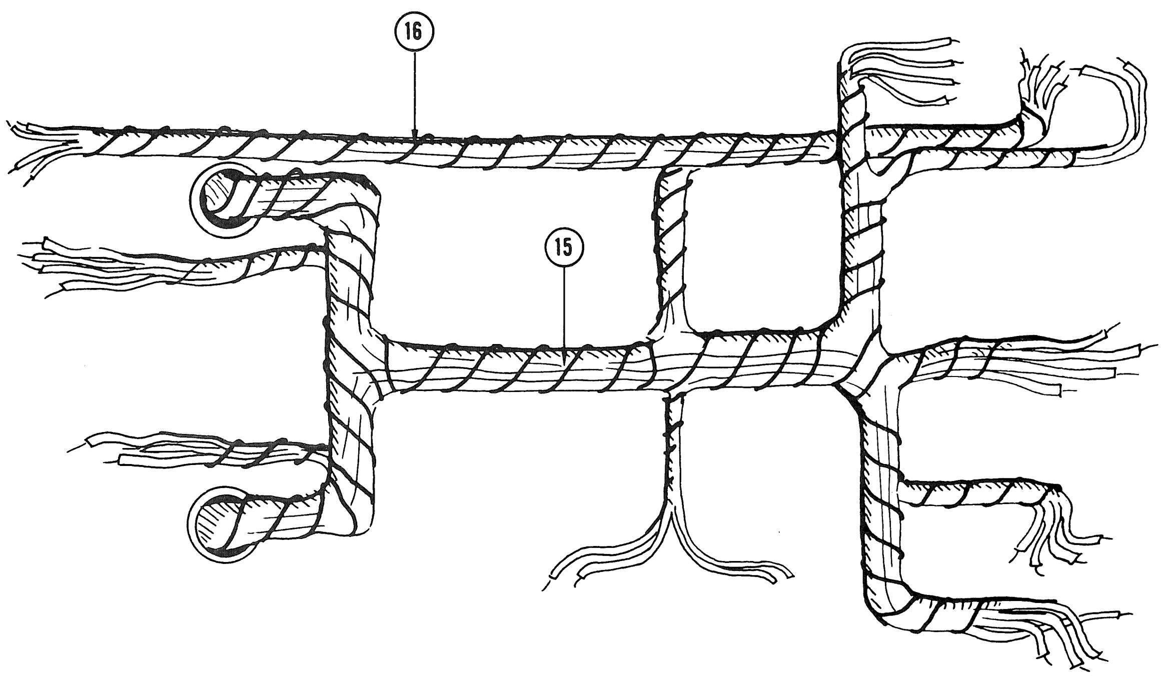
-100V SUPPLY
+300V SUPPLY
+125V SUPPLY


16
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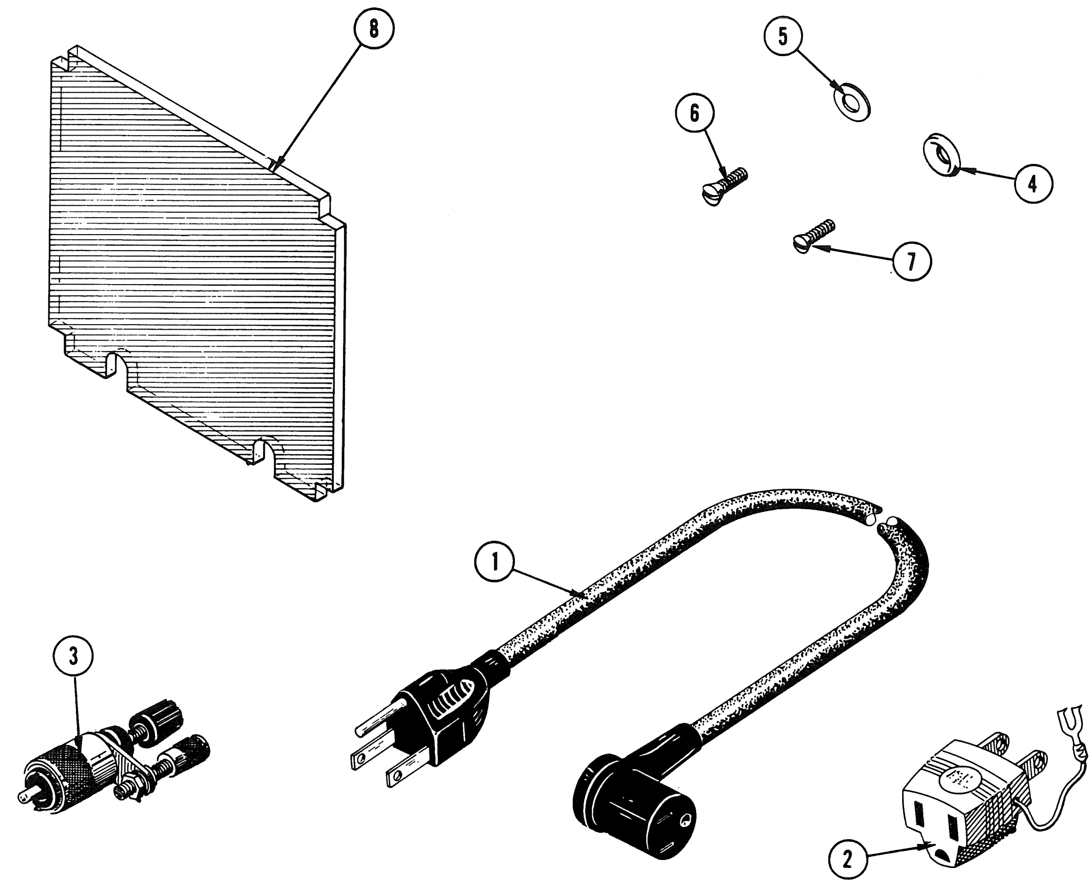
REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
1	136-0015-00			2	SOCKET, tube, 9 pin, w/ground lugs
	- - - - - -			-	mounting hardware for each: (not included w/socket)
	213-0044-00			2	SCREW, thread forming, 5-32 x 3/16 inch, PHS
2	124-0091-00			6	STRIP, ceramic, 3/4 inch h, w/11 notches
	- - - - - -			-	each strip includes:
	355-0046-00			2	STUD, plastic
	- - - - - -			-	mounting hardware for each: (not included w/strip)
	361-0009-00			2	SPACER, plastic, 0.406 inch long
3	136-0008-00			3	SOCKET, tube, 7 pin, w/ground lugs
	- - - - - -			-	mounting hardware for each: (not included w/socket)
	213-0044-00			2	SCREW, thread forming, 5-32 x 3/16 inch, PHS
4	136-0022-00			1	SOCKET, tube, 9 pin, w/shield
	- - - - - -			-	mounting hardware: (not included w/socket)
	211-0033-00			2	SCREW, sems, 4-40 x 5/16 inch, PHS
	210-0004-00			2	LOCKWASHER, internal, #4
	210-0406-00			2	NUT, hex., 4-40 x 3/16 inch
	337-0008-00			1	SHIELD, tube (not shown)
5	200-0247-00			1	CAP, variable resistor
6	- - - - - -			1	RESISTOR, variable
	- - - - - -			-	mounting hardware: (not included w/resistor)
	210-0207-00			1	LUG, solder, 3/8 ID x 5/8 inch OD, SE
	210-0012-00			1	LOCKWASHER, internal, 3/8 ID x 1/2 inch OD
	210-0840-00			1	WASHER, flat, 0.390 ID x 9/16 inch OD
	210-0413-00			1	NUT, hex., 3/8-32 x 1/2 inch
7	348-0005-00			2	GROMMET, rubber, 1/2 inch diameter
8	441-0389-00			1	CHASSIS, front
	- - - - - -			-	mounting hardware: (not included w/chassis)
	212-0070-00			2	SCREW, 8-32 x 5/16 inch, 100° csk, FHS
	212-0001-00			2	SCREW, 8-32 x 1/4 inch, PHS
	212-0002-00			2	SCREW, 8-32 x 1/4 inch, 100° csk, FHS
	212-0004-00			2	SCREW, 8-32 x 5/16 inch, PHS
	210-0458-00			4	NUT, keps, 8-32 x 11/32 inch
9	260-0246-00			1	SWITCH, thermal cutout
	- - - - - -			-	mounting hardware: (not included w/switch)
	213-0044-00			2	SCREW, thread forming, 5-32 x 3/16 inch, PHS

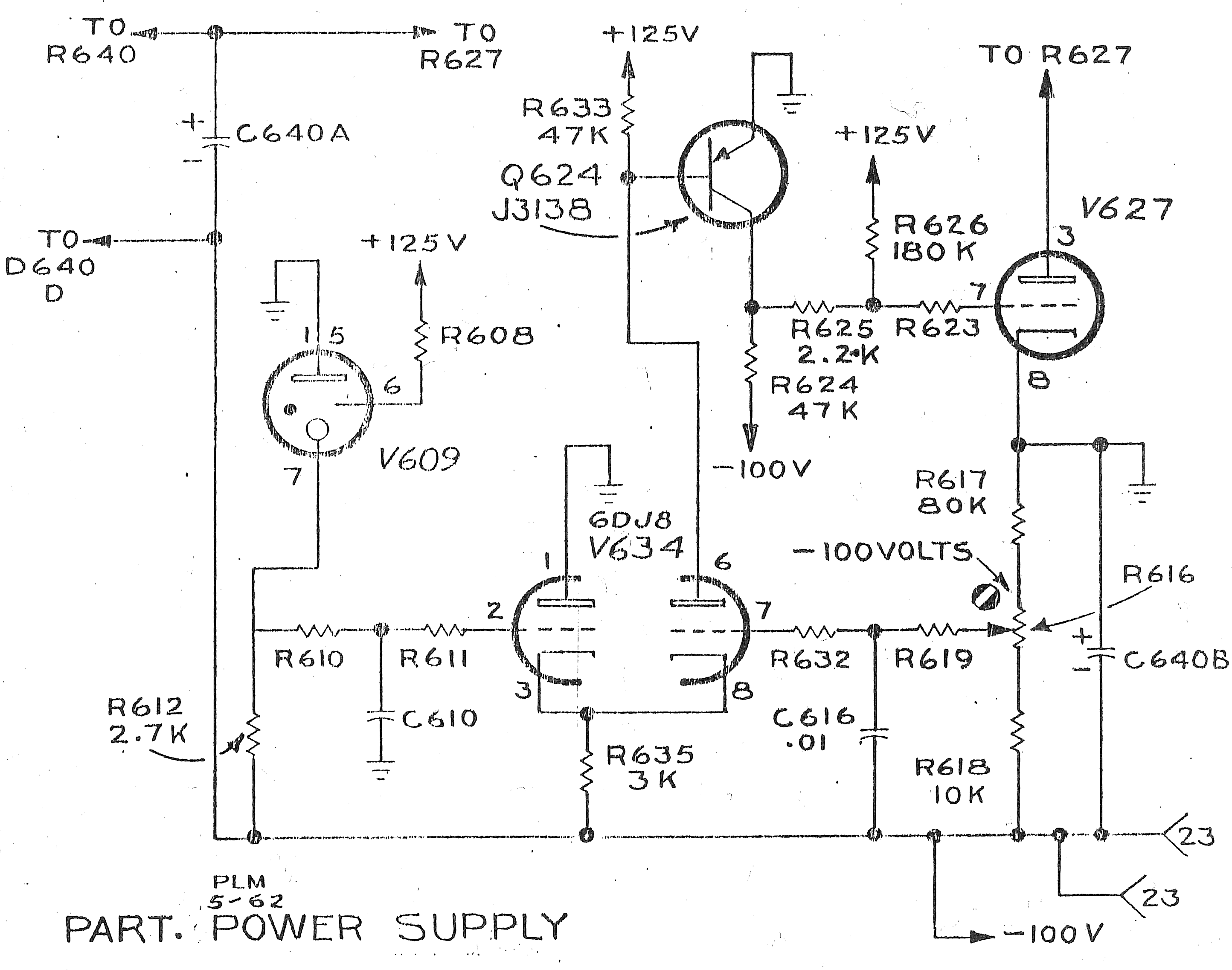
REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
10	124-0088-00			1	STRIP, ceramic, 3/4 inch h, w/4 notches
	- - - - - -			-	strip includes:
	355-0046-00			2	STUD, plastic
	- - - - - -			-	mounting hardware: (not included w/strip)
	361-0009-00			2	SPACER, plastic, 0.406 inch long
11	136-0013-00			1	SOCKET, tube, 8 pin
	- - - - - -			-	mounting hardware: (not included w/socket)
	211-0538-00			2	SCREW, 6-32 x 5/16 inch, 100° csk, FHS
	210-0006-00			2	LOCKWASHER, internal, #6
	210-0407-00			2	NUT, hex., 6-32 x 1/4 inch
12	210-0201-00			1	LUG, solder, SE #4
	- - - - - -			-	mounting hardware: (not included w/lug)
	213-0044-00			1	SCREW, thread forming, 5-32 x 3/16 inch, PHS
13	124-0089-00			2	STRIP, ceramic, 3/4 inch h, w/7 notches
	- - - - - -			-	each strip includes:
	355-0046-00			2	STUD, plastic
	- - - - - -			-	mounting hardware for each: (not included w/strip)
	361-0009-00			2	SPACER, plastic, 0.406 inch long
14	- - - - - -			2	RESISTOR, variable
	- - - - - -			-	mounting hardware for each: (notincluded w/resistor)
	210-0840-00			1	WASHER, flat, 0.390 ID x 9/16 inch OD
	210-0413-00			1	NUT, hex., 3/8-32 x 1/2 inch
15	179-0541-00			1	CABLE HARNESS, chassis
16	179-0560-00			1	CABLE HARNESS, connector
17	214-0210-00	X190		1	ASSEMBLY, solder spool
	- - - - - -			-	assembly includes:
	214-0209-00			1	SPOOL, solder
	- - - - - -			-	mounting hardware: (not included w/assembly)
	361-0007-00			1	SPACER, plastic



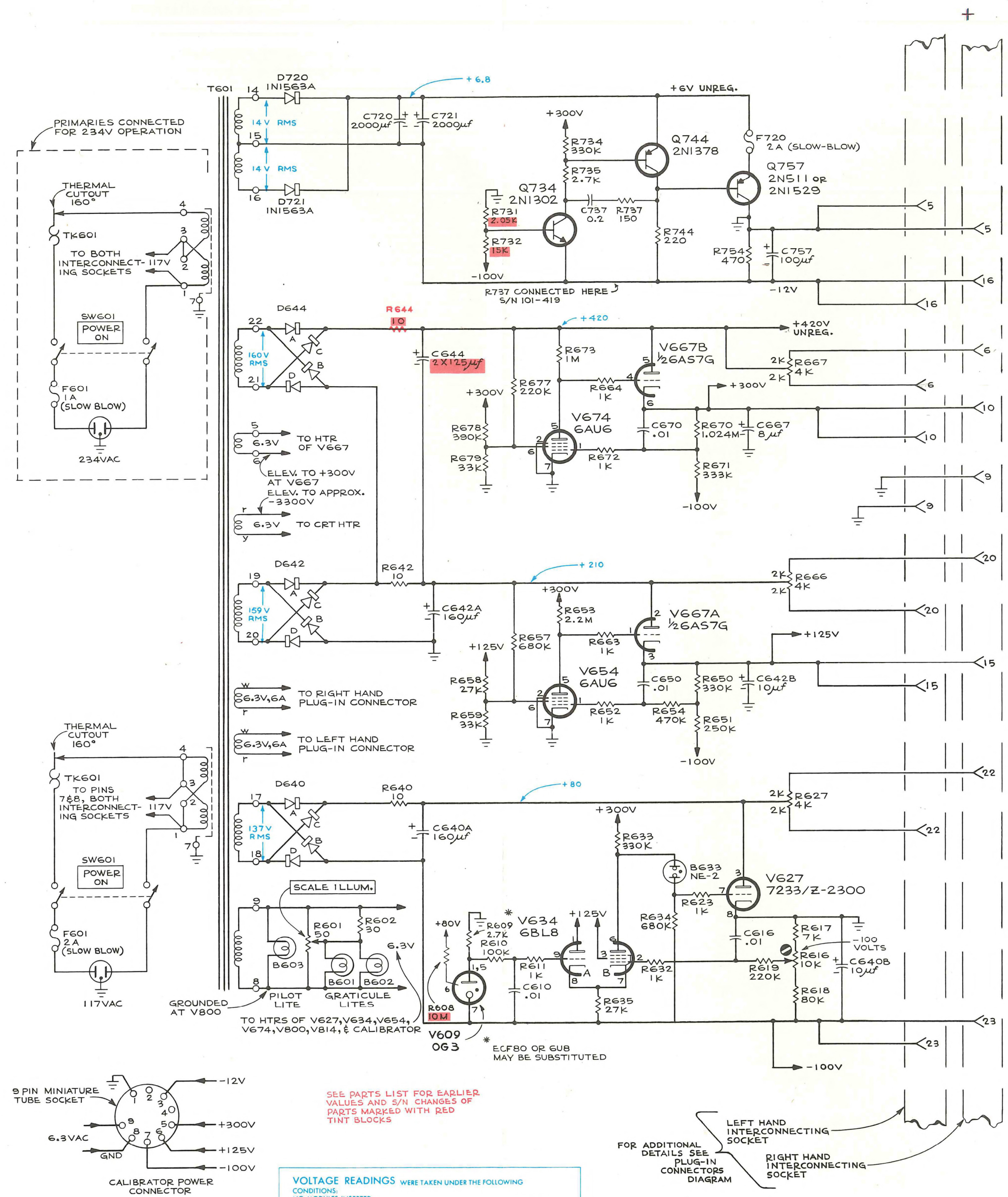
REF. NO.	PART NO.	SERIAL/MODEL NO. EFF.	DISC.	QTY.	DESCRIPTION
1	161-0010-00	101	289	1	CORD, power
	161-0013-00	290		1	CORD, power
2	103-0013-00			1	ADAPTER, power cord
3	013-0009-00			1	ADAPTER, dual binding post
4	210-0833-00			4	WASHER, finishing, #10
5	210-0917-00			4	WASHER, plastic, 0.255 ID x 0.375 inch OD
6	212-0512-00			4	SCREW, 10-32 x 1/2 inch, OHS
7	212-0561-00			4	SCREW, 12-24 x 1/2 inch, OHS
8	378-0525-00	X319		1	FILTER, light
- -	070-0289-00			2	MANUAL, instruction (not shown)

TYPE RM561
Mod 5812

B633	remove	150-022	Neon, Type NE-2			
R609	remove	302-272	2.7k	1/2w		
R612	add	302-272	2.7k	1/2w		
R617	change to	308-186	80k	5w	WW	1%
R618	change to	308-226	10k	5w	WW	1%
R624	add	302-473	47k	1/2w		
R625	add	302-222	2.2k	1/2w		
R626	add	302-184	180k	1/2w		
R633	change to	302-473	47k	1/2w		
R634	remove	302-684	680k	1/2w		
R635	change to	301-302	3k	1/2w		5%
Q624	add	151-087	J3138			
V634	change to	154-187	6DJ8			



PART. POWER SUPPLY



VOLTAGE READINGS WERE TAKEN UNDER THE FOLLOWING CONDITIONS:
NO MODULES INSERTED.
LINE VOLTAGE .... 117 VAC

561 PWR

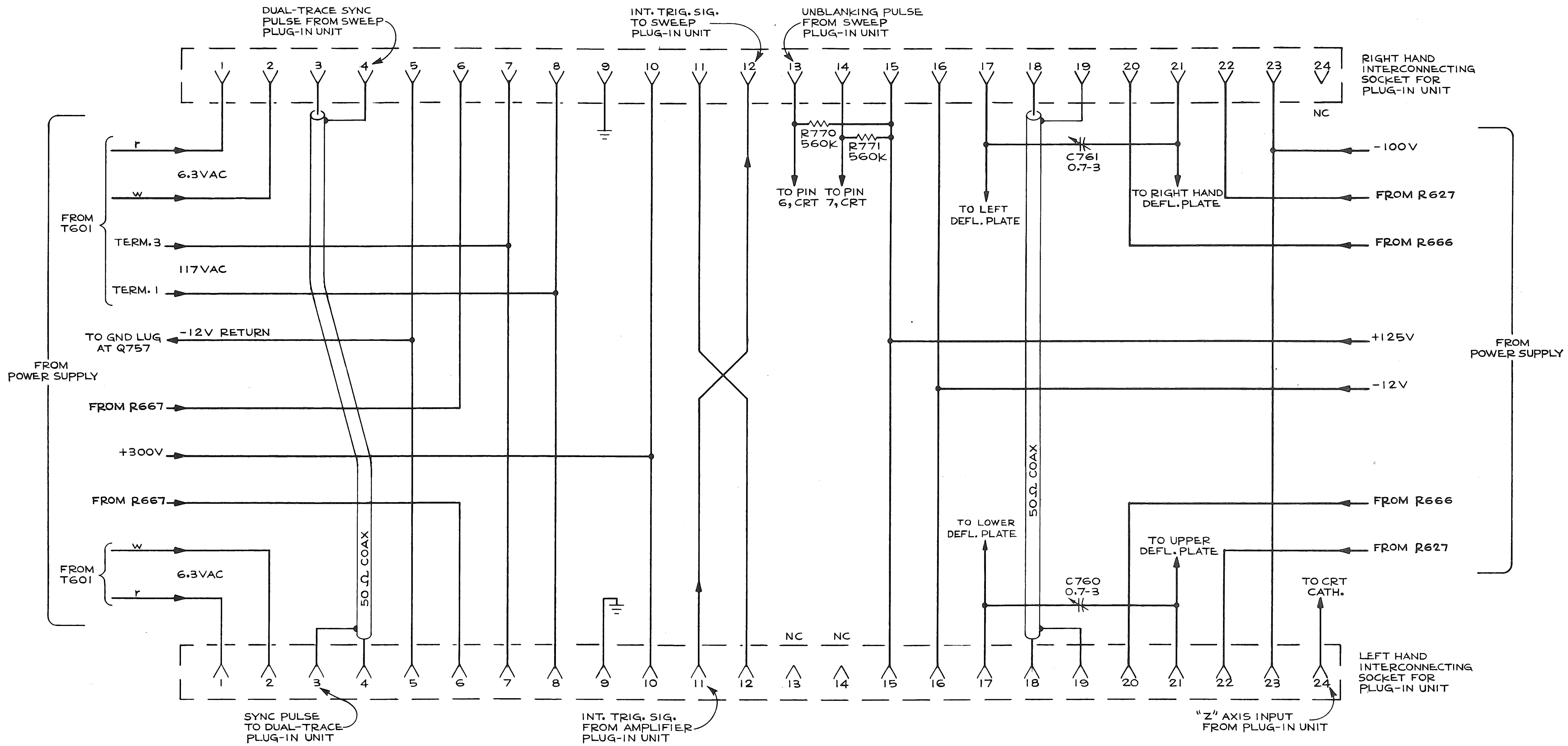
A

01-7-63
TP

TYPE 561 OSCILLOSCOPE

F,

POWER SUPPLY

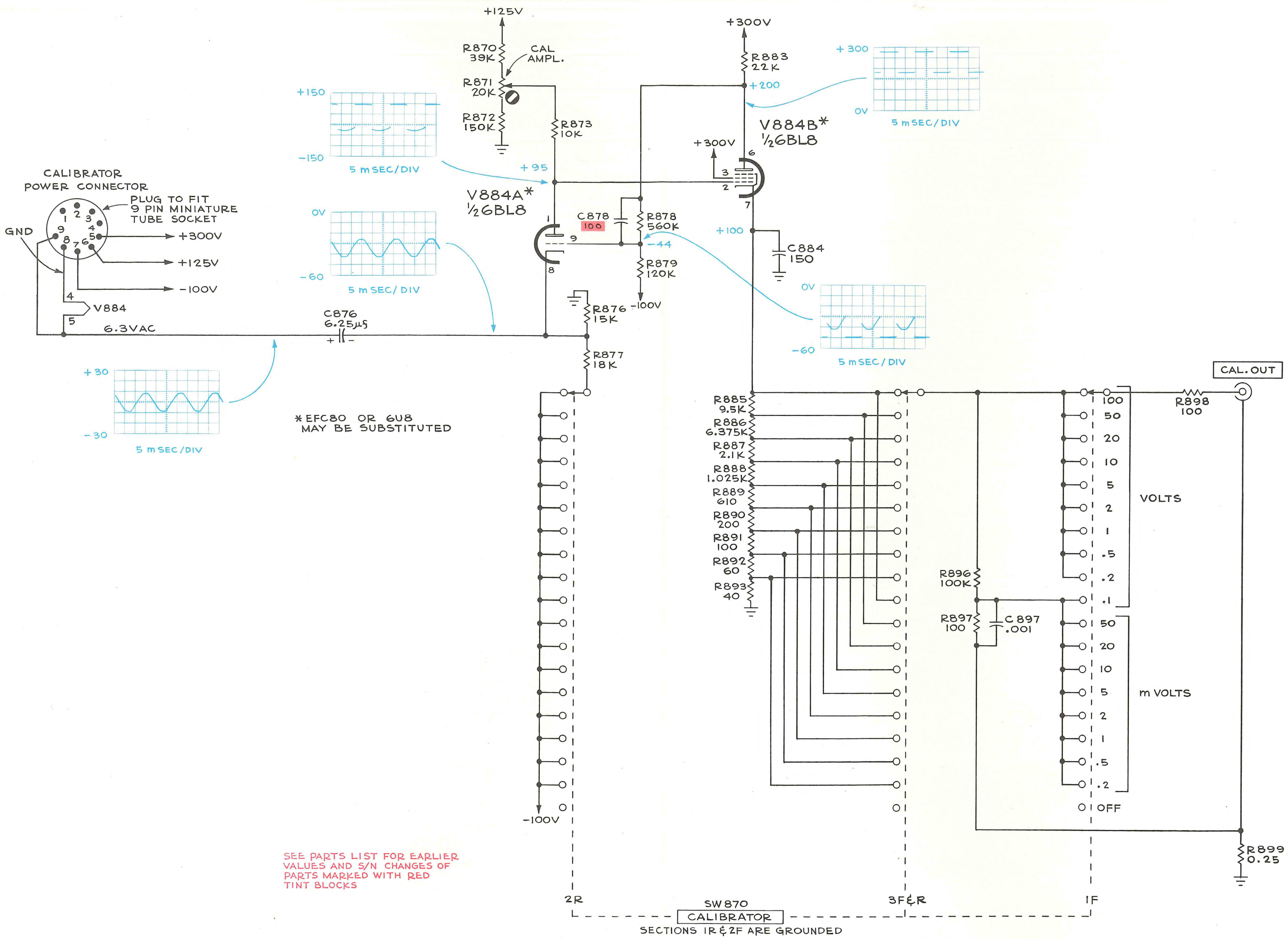


7/13/61 TP

TYPE 561 OSCILLOSCOPE

B_2

PLUG-IN CONNECTORS



SEE PARTS LIST FOR EARLIER VALUES AND S/N CHANGES OF PARTS MARKED WITH RED TINT BLOCKS

WAVEFORMS AND VOLTAGE READINGS WERE OBTAINED WITH CONTROLS SET AS FOLLOWS:

WAVEFORMS:
CALIBRATOR .... ON

VOLTAGE READINGS:
CALIBRATOR .... OFF

561 CAL

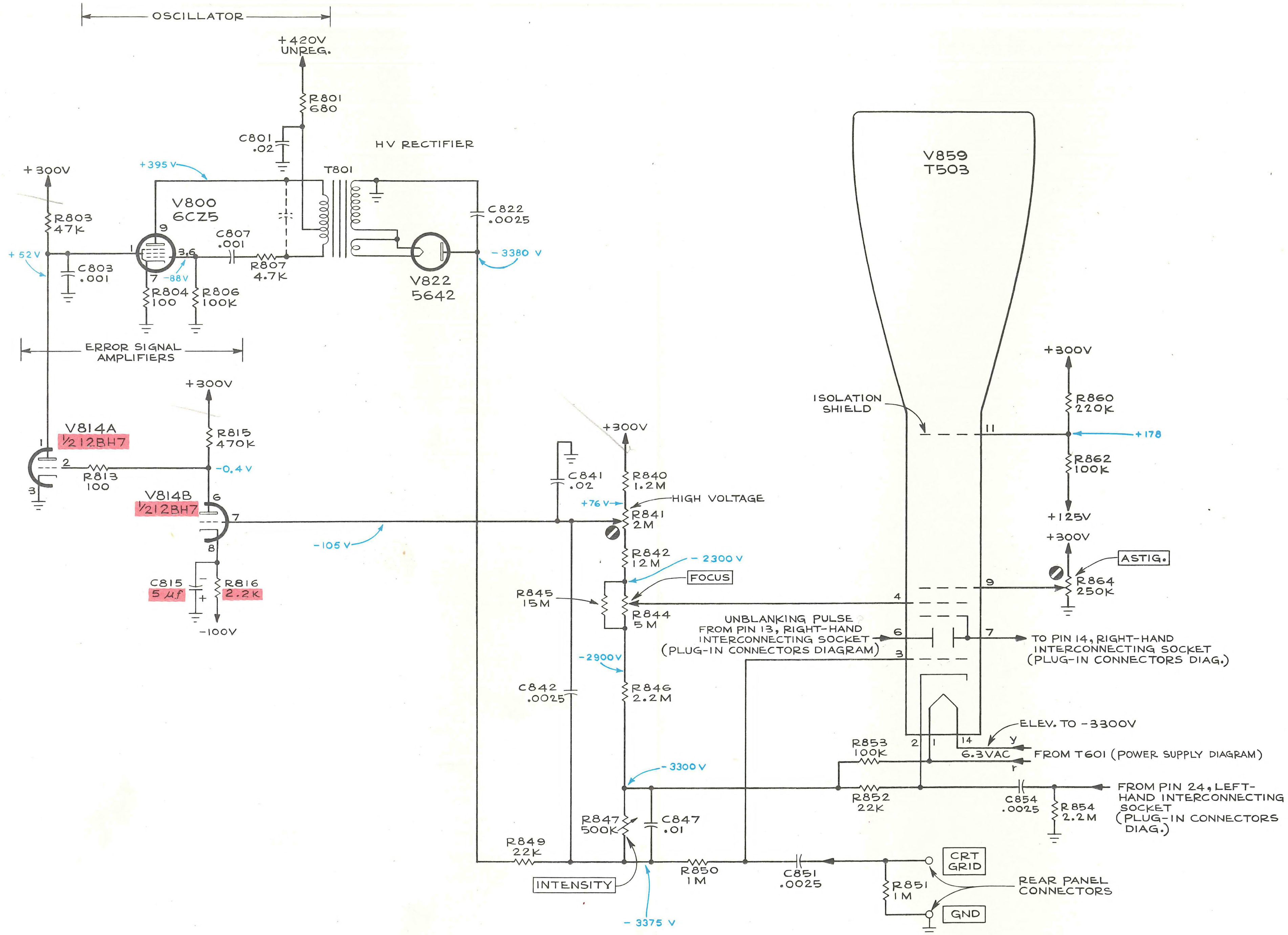
561 A1 CAL.

TYPE 561 OSCILLOSCOPE

B1

CALIBRATOR

GAB
4-19-61



SEE PARTS LIST FOR EARLIER VALUES AND S/N CHANGES OF PARTS MARKED WITH RED TINT BLOCKS

5-3-61
TP

VOLTAGE READINGS WERE TAKEN WITH CONTROLS SET AS FOLLOWS:
INTENSITY .... CCW
561 CRT

A¹

CRT CIRCUIT

SCHEMATICS

RM561

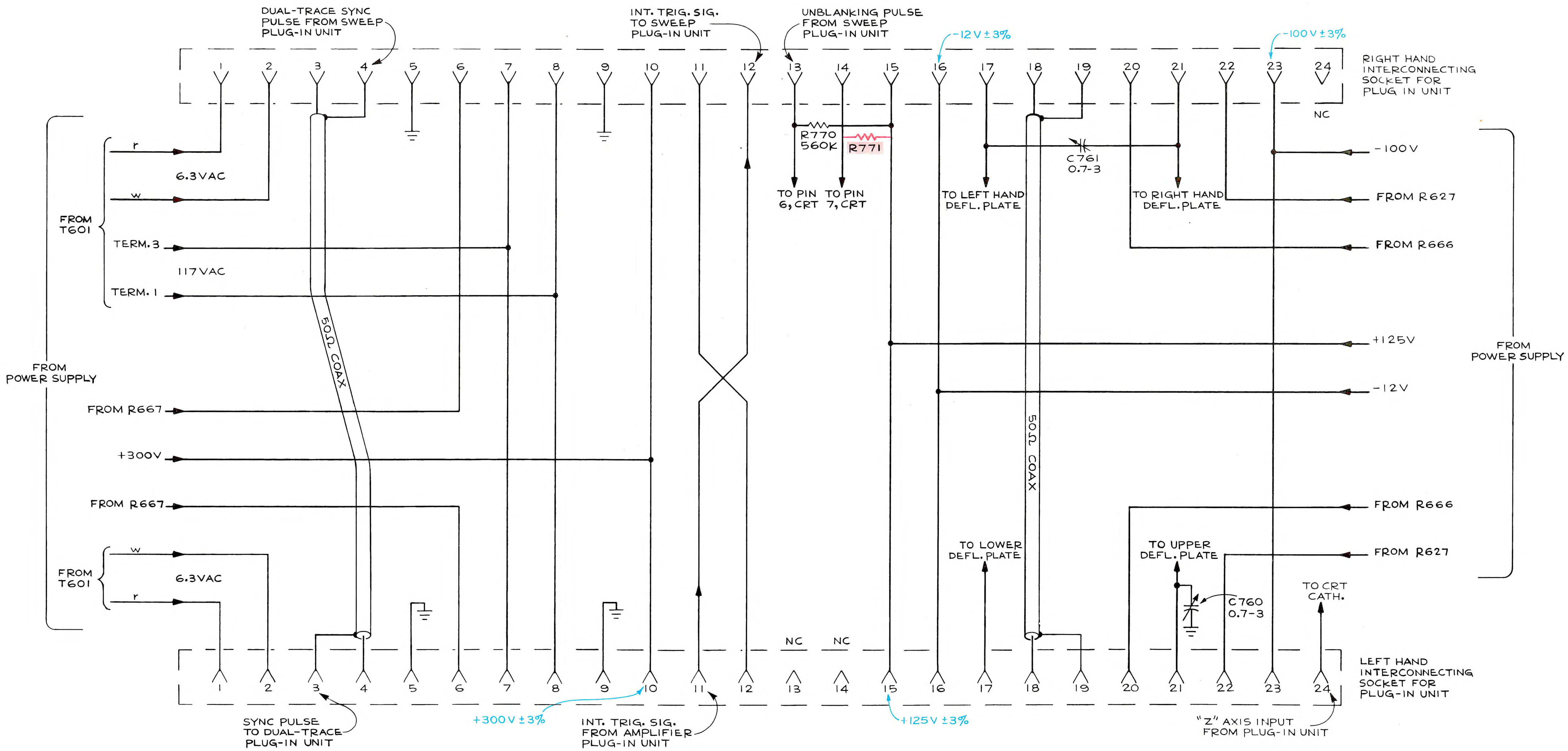
Publication:
061-401
December 1962

For RM561 only, all serial numbers, not for 561, 561A or RM561A.

CONTENTS:

ABBREVIATIONS:

cer	ceramic
comp	composition
emc	electrolytic, metal cased
gmv	guaranteed minimum value
h	henry
k	kilo (10^3)
k	kilohm
m	milli (10^{-3})
ma	milliamp
meg	megohm
mh	millihenry
mpt	metalized, paper tubular
mt	mylar, tubular
mv	millivolt
μ	micro (10^{-6})
μf	microfarad
μh	microhenry
μsec	microsecond
n	nano (10^{-9})
nsec	nano second
Ω	ohm
p	pico (10^{-12})
pbt	paper, "bathtub"
pcc	paper covered can
pf	picofarad ($\mu\mu$f)
piv	peak inverse voltage
pmc	paper, metal cased
poly	polystyrene
prec	precision
pt	paper, tubular
ptm	paper, tubular molded
sn or S/N	serial number
tub	tubular
v	working volt, dc
var	variable
w	watt
WW	wire wound



CIRCUIT NUMBERS 760 THRU 779

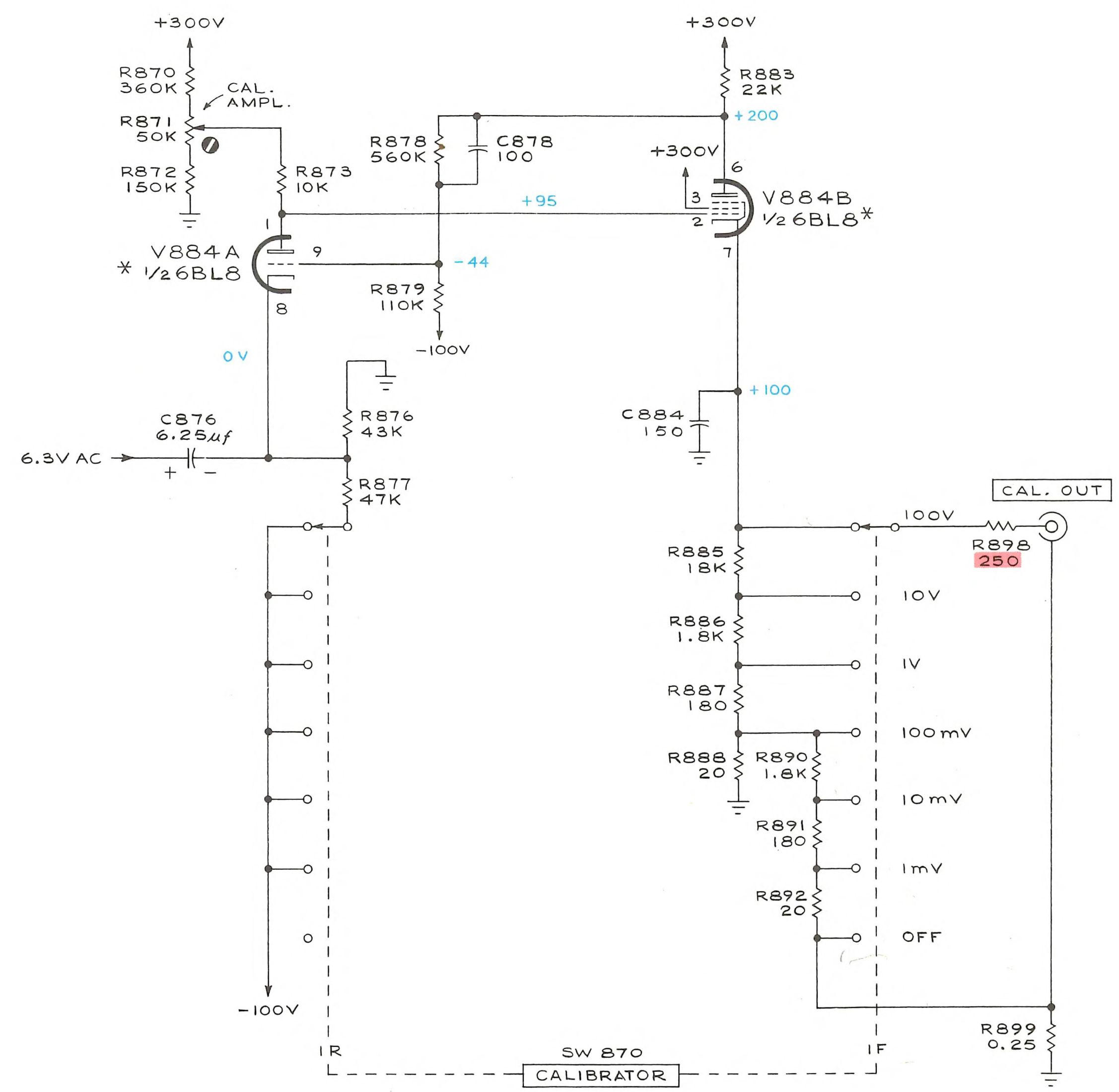
3-27-61
TP

TYPE RM561 OSCILLOSCOPE

B

PLUG-IN CONNECTORS

SEE PARTS LIST FOR EARLIER VALUES AND S/N CHANGES OF PARTS MARKED WITH RED TINT BLOCKS



SEE PARTS LIST FOR EARLIER VALUES AND S/N CHANGES OF PARTS MARKED WITH RED TINT BLOCKS

VOLTAGE READINGS WERE TAKEN UNDER THE FOLLOWING CONDITIONS:

CALIBRATOR .... OFF

RM561 CAL.

* ECF80 MAY BE SUBSTITUTED

CIRCUIT NUMBERS 870 THRU 899

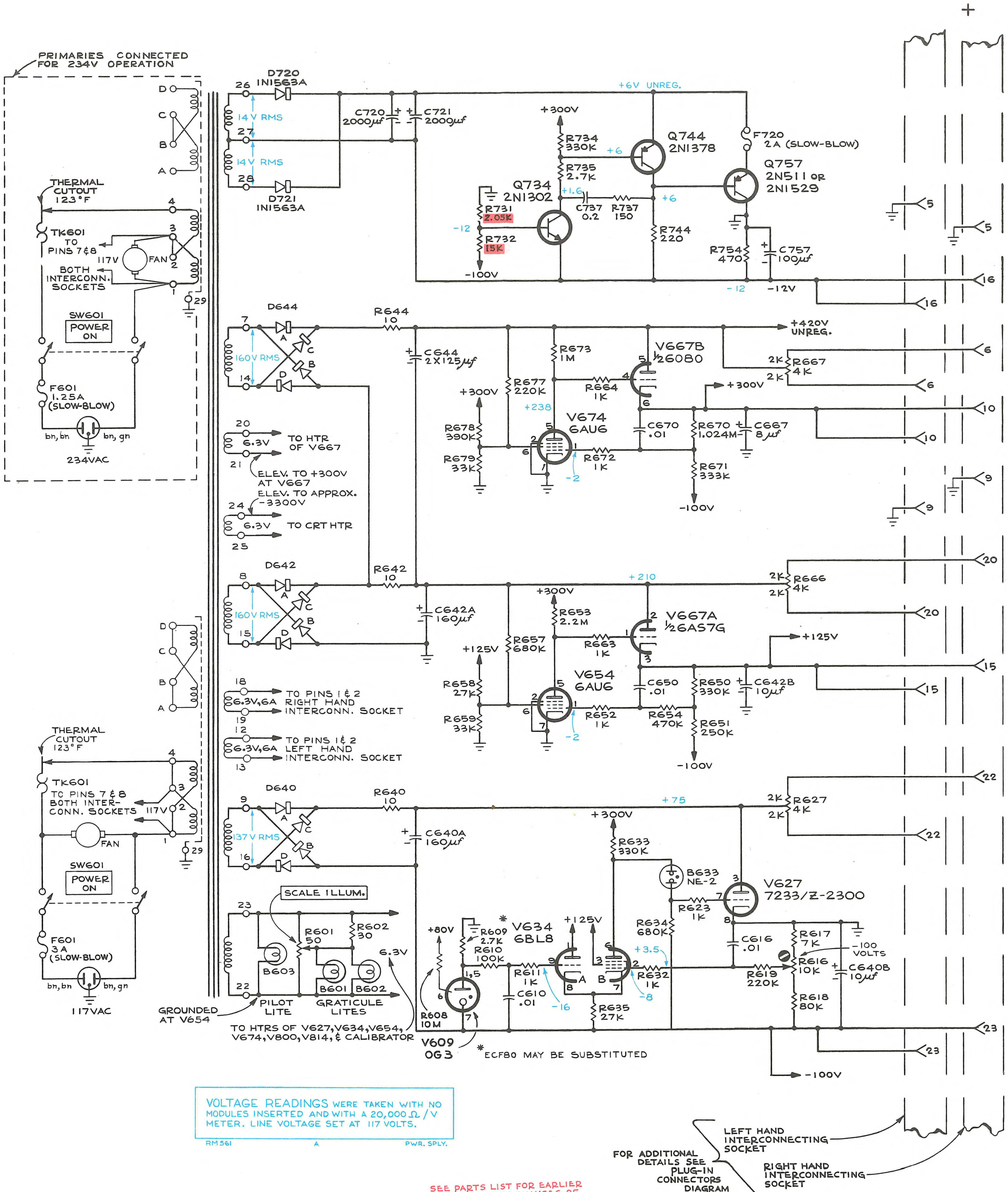
MRH
4-13-61

TYPE RM561 OSCILLOSCOPE

B

CALIBRATOR

CALIBRATOR



VOLTAGE READINGS WERE TAKEN WITH NO MODULES INSERTED AND WITH A 20,000 Ω/V METER. LINE VOLTAGE SET AT 117 VOLTS.

RM561 A PWR. SPLY.

SEE PARTS LIST FOR EARLIER VALUES AND S/N CHANGES OF PARTS MARKED WITH RED TINT BLOCKS

TYPE RM561 OSCILLOSCOPE

D2

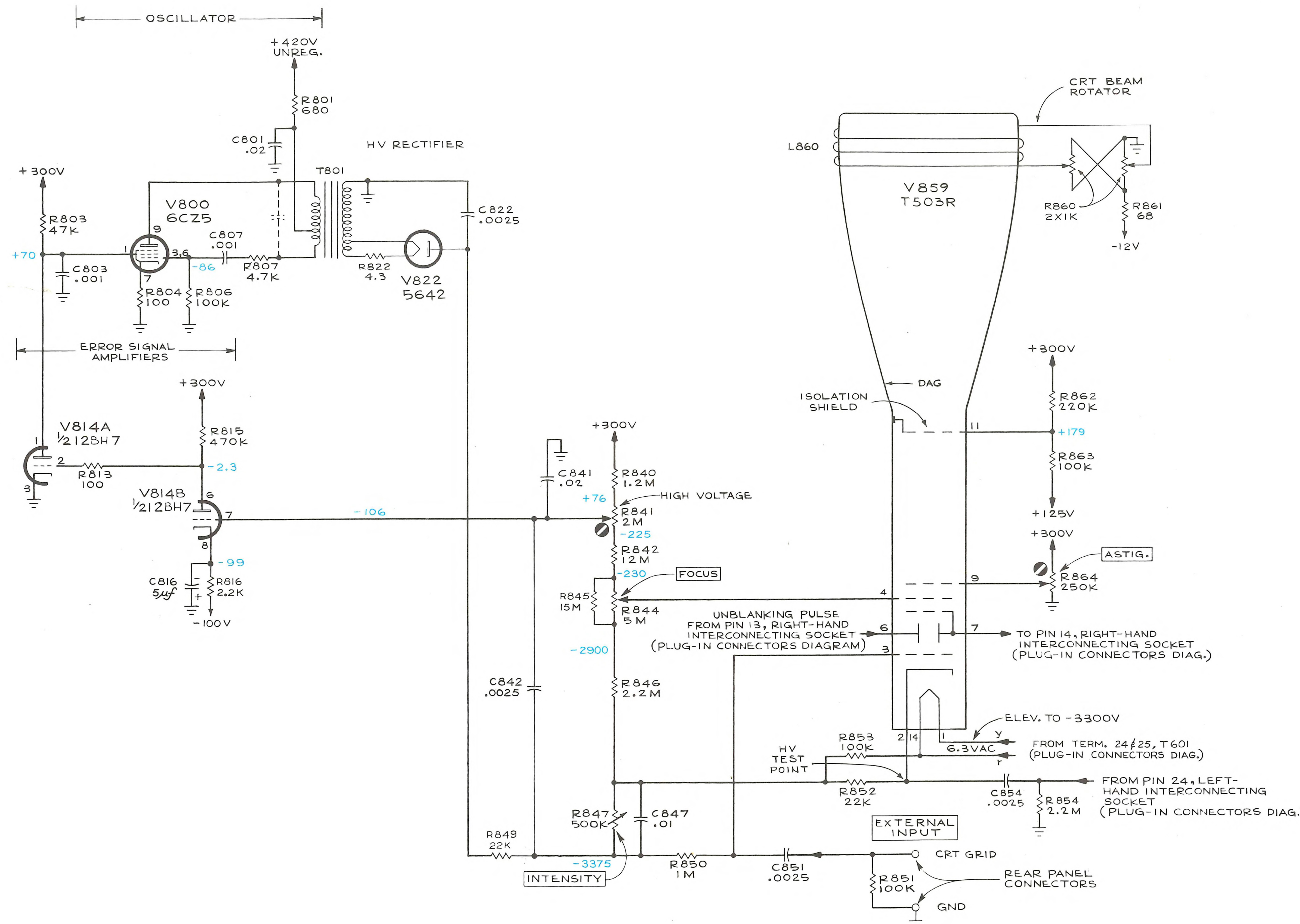
CIRCUIT NUMBERS 600 THRU 759

2-7-62 TP

POWER SUPPLY

EFF. S/N 101-383

POWER SUPPLY



VOLTAGE READINGS WERE TAKEN UNDER THE FOLLOWING CONDITIONS:

INTENSITY........................CCW

RM561 A1 CRT

TYPE RM 561 OSCILLOSCOPE

A1

CIRCUIT NUMBERS 800 THRU 869

6-5-61

CRT CIRCUIT

TYPE RM561 CRT CIRCUIT 800 THRU 869