

★
UNCLASSIFIED

TECHNICAL MANUAL

for

CONTROL SYNTHESIZER AND STANDARD

MODEL HFS-1

(0-941/UR)

(Modified by addition of TMC Kit 295)



THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N. Y.

OTTAWA, CANADA

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Kit 295 Addendum
to HFS-1 Manual

The cover and title page of this addendum, together with the modification instructions appearing below, replace the cover and title page of the HFS-1 instruction manual previously distributed. Upon receipt of this addendum, remove the cover and title page of the previously distributed HFS-1 manual and replace with (permanently attach) this addendum.

The addition of Kit 295 to the HFS-1 involves the addition and deletion of certain components to improve the reliability of operation of the unit. Those portions of the schematics within the HFS-1 that have been modified are indicated in Specification S1098 that has been incorporated within this addendum and should be referred to for (1) parts location, and (2) schematic changes for maintenance purposes. In addition, Sheets 2 and 3 spell out those changed components by symbol numbers, TMC part numbers and description, and should be used as an addendum to the parts list for the areas modified.

It is suggested that those schematics and Parts List pages that are changed by this modification be marked in ink as follows:

NOTE

This page changed by Modification Kit 295; please see addendum in front of the HFS-1 Instruction Manual.

TMC SPECIFICATION

NO. S 1098

REV:

0 A B C D E F G H J K

COMPILED:

CHECKED:

APPD:

*M. J. [unclear]
5/10/66*

SHEET 1

OF 18

TITLE:

typed by vab

5/10/66

KIT-295

MODIFICATION OF HFS()-1

TMC SPECIFICATION

NO. S 1098

REV:

Q A B C D E F G H J K

COMPILED

CHECKED:

APPD:

SHEET 2 OF 18

TITLE: KIT-295

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I KIT-295 is applicable to Synthesizers HFS-1, HFS-1A, HFSA-1, HFSA-1A, HFSR-1 and HFSR-1A. After conversion by KIT295, these units will now be electrically equivalent in operation and performance to an HFS-2, HFSA-2 and HFSR-2.

II. The purpose of this modification is to improve the reliability of the Synthesizer and, in particular, improve its operation in TechniMatic Control Operations.

III. Accomplishment of the modification can be determined by inspecting the 3400 deck (AX387). If the modification has been completed, this assembly will contain a printed circuit board assembly, A4454 in place of A2438 Terminal Board. There will also be a new BNC connector J3039, on the rear panel, marked SERVO.

IV. MATERIALS SUPPLIED:

<u>ITEM NO.</u>	<u>SYMBOL</u>	<u>QTY.</u>	<u>TMC PART NO.</u>	<u>DESCRIPTION</u>
1	C3104	1	CM15F101J03	Capacitor, Fixed Mica 100 pf
2	C3107	1	CM112F622G5S	Capacitor, Fixed Mica 6200 pf
3	R3211 R3112 R3313 R3004 R3435	5	RC20GF105J	Resistor, 1/2 watt, 1 megohm
4	C3105	1	CE116-1VN	Capacitor, Electrolytic, 8 uf
5	C3211 C3204	2	CM15F101G03	Capacitor, Fixed Mica, 100 pf
6	C3207	1	CM20F102G03	Capacitor, Fixed Mica, 1000 pf
6a	C3210	1	CM15F331G03	Capacitor, Fixed Mica, 330 pf
7	R3311 R3213	2	RC20GF472J	Resistor, 1/2 watt, 4.7K ohms
8	V3302 V3202	2	6AU6	Tube, Pentode

TMC SPECIFICATION

NO. S 1098

REV:

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APPD:

SHEET 4

OF 18

TITLE: KIT-295

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<u>ITEM NO.</u>	<u>SYMBOL</u>	<u>QTY.</u>	<u>TMC PART NO.</u>	<u>DESCRIPTION</u>
32		1	TE102-2	Terminal, Ins., Turret
33		1	DELETED	DELETED
34		1	SCBP0440BN3	Screw, Machine
35		1	LWEO4MRN	Washer, Lock, Ext.
36			DELETED	
37		1	NP362-65	Nameplate, Modification
38			DELETED	
39			DELETED	
40			DELETED	
41			DELETED	
42			DELETED	
43		1	TP131-2/6AU6	Rubber Stamp
44		1	TP131-1/J3039/SERVO	Rubber Stamp
45		1	Drill Bit, 7/16"	7/16" Drill Bit.
46		6"	MWC22/7/U9	Wire, Insulated
47		1	STAMP-PAD	Stamp Pad
48		1	Drill Bit 1/8"	1/8" Drill Bit.

V. MODIFICATION PROCEDURE

A. Preliminary

Disconnect HFS() from system, remove from rack and place on bench.

Remove top and bottom covers.

TMC SPECIFICATION

NO. S 1098

REV:

A B C D E F G H J K

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SHEET 5 OF 18

TITLE: KIT-295

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V. MODIFICATION PROCEDURE - Cont'd

B. 3100 Deck (AX384) - See Figure 1

1. Disconnect and remove AX384 from HFS chassis.
2. Unfasten sideplates for access to components.
3. Remove C3104 (.005 uf) and substitute Item 1 (100 pf).
4. Remove C3107 (1000 pf) and substitute Item 2 (6200 pf).
5. Remove R3112 (33K) and substitute Item 3 (1 megohm).
6. Remove R3119 (4.7K) and substitute Item 9 (15K).
7. Remove C3105 (0.1 uf) and replace with Item 4 (8 uf).
8. Replace sideplates and return AX384 to HFS chassis.

C. 3200 Deck (AX385) - See Figure 2

1. Disconnect AX385 and remove from HFS chassis.
2. Unfasten sideplates.
3. Remove C3204 (560 pf), and replace with Item 5 (100 pf).
4. Remove C3207 (330 pf) and replace with Item 6 (1000 pf).
5. Remove C3210 (68 pf) and replace with Item 6a (330 pf).
6. Remove C3211 (1100 pf) and replace with Item 5 (100 pf).
7. Remove R3211 (33K) and replace with Item 3 (1 megohm).
8. Remove R3213 (15K) and replace with Item 7 (4.7K).
9. Remove V3202 (6AB4) and replace with Item 8 (6AU6).
10. Rewire XV3202 as follows:

TMC SPECIFICATION

NO. S 1098

REV: D E F G H J K

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SHEET 6 OF 18

TITLE: 3100 DECK MODIFICATIONS

(AX384) 100 CYCLE

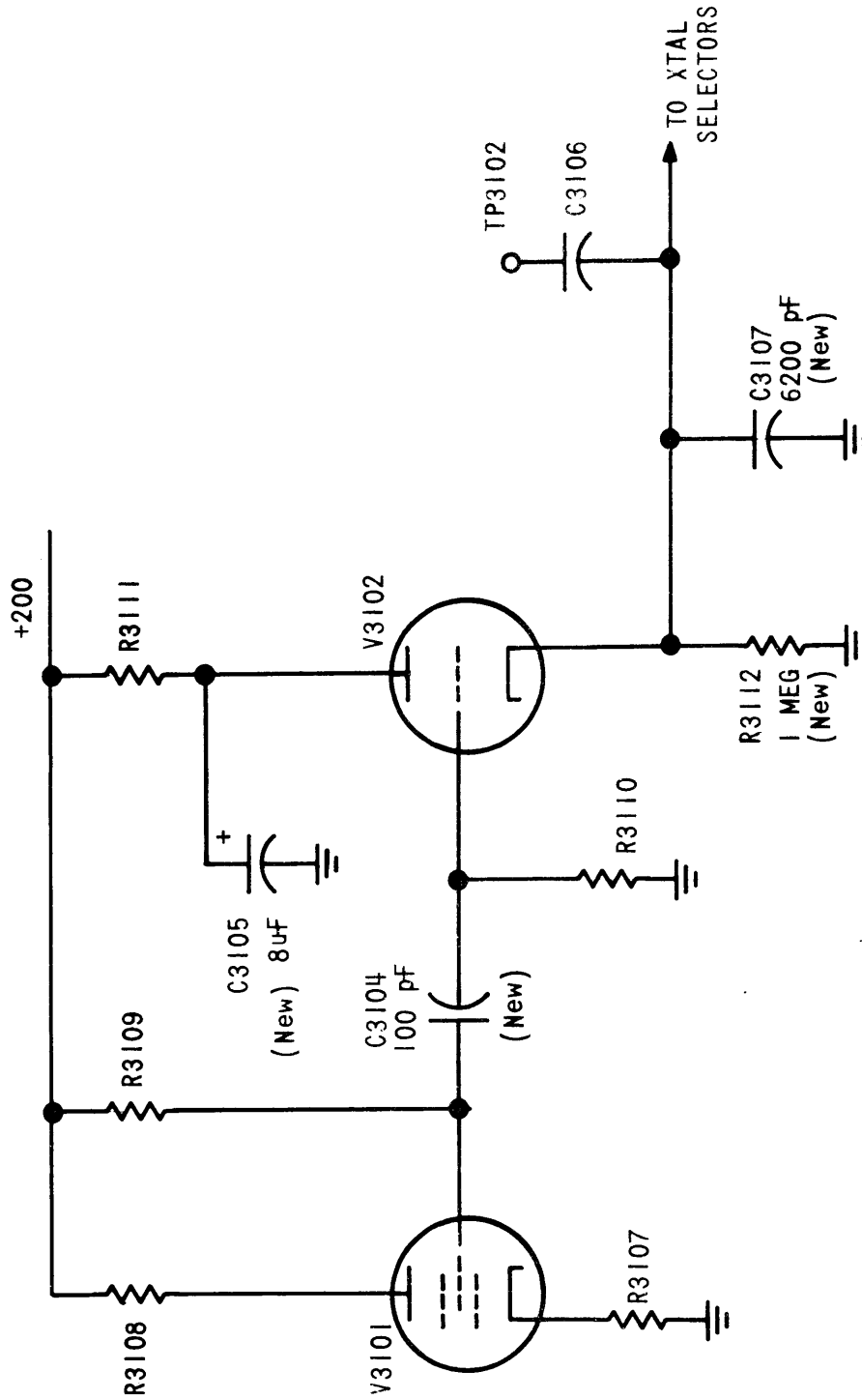


FIGURE 1

NOTE: VALUES ARE SHOWN ONLY WHERE COMPONENTS HAVE BEEN ADDED OR CHANGED

TMC SPECIFICATION

NO. S 1098

REV: D E F G H J K

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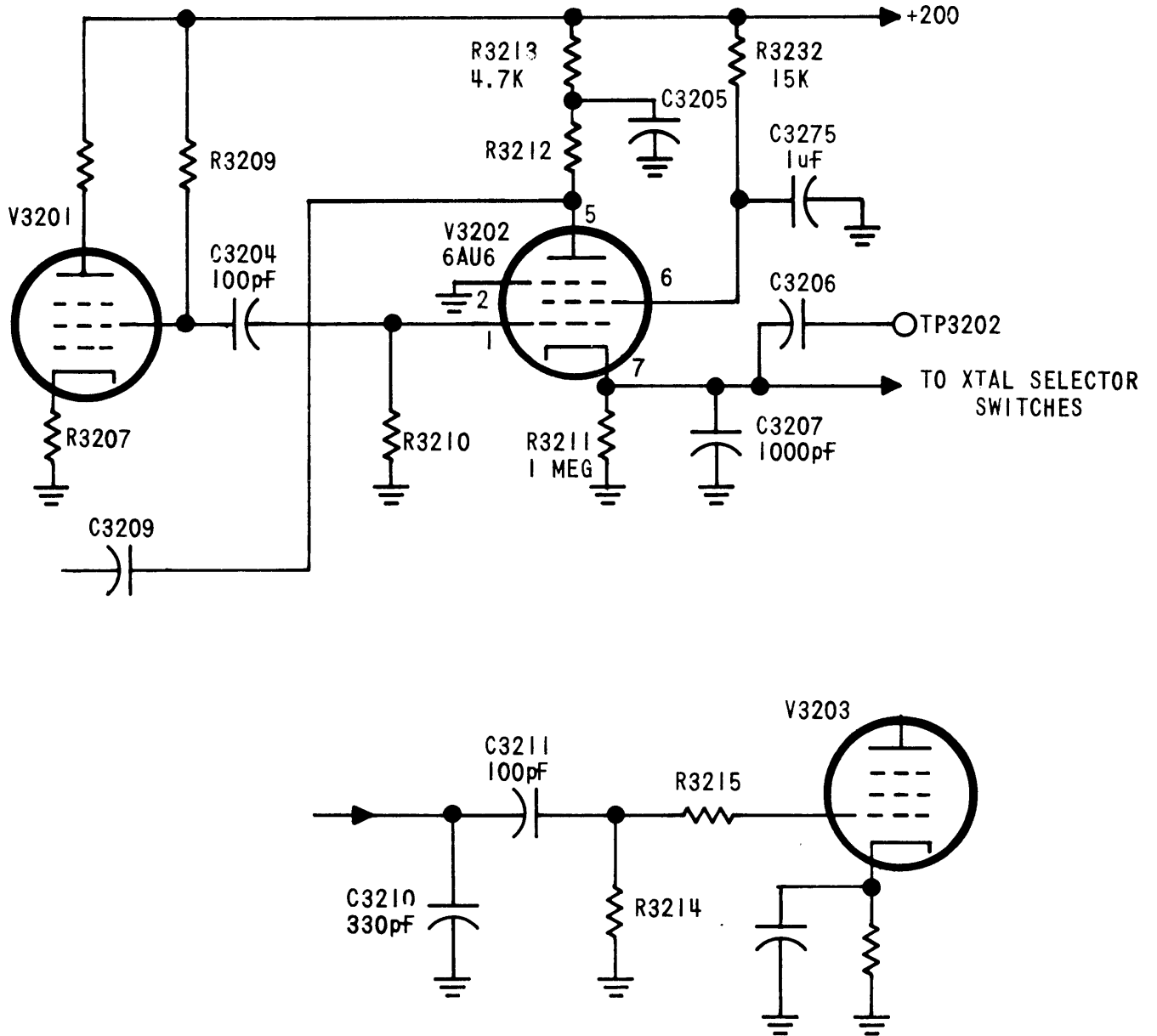
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SHEET 7

OF 18

TITLE: 3200 DECK MODIFICATIONS

(AX385) 1Kc



NOTE: VALUES ARE SHOWN ONLY WHERE COMPONENTS HAVE BEEN ADDED OR CHANGED.

FIGURE 2

TMC SPECIFICATION

NO. S 1098

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SHEET

8

OF

18

TITLE: KIT-295

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- a. Remove wire from pin 1 and reconnect to pin 5.
 - b. Remove wire from pin 6 and reconnect to pin 1.
 - c. Connect pin 2 to ground.
 - d. Add 15K resistor, Item 9, from pin 6 to 200 volt line.
(high side of R3203 pot.)
 - e. Connect 1 uf capacitor, Item 10, from pin 6 to ground.
11. On the top of the AX385 sub-chassis, adjacent to XV3202, remove lettering 6AB4 and stamp 6AU6 in its place, using Item 43.
12. Replace sideplates and return AX385 to the HFS chassis.
- D. 3300 DECK (AX386) SEE FIGURE 3
1. Disconnect AX386 and remove from HFS chassis.
 2. Unfasten sideplates.
 3. Remove R3313 (33K) and replace with Item 3 (1 megohm).
 4. Remove R3312 (560 Ω) and replace with Item 11 (2.2K).
 5. Remove R3311 (15K) and replace with Item 7 (4.7K).
 6. Remove V3302 (6AB4) and replace with 6AU6. (item 8)
 7. Rewire XV3302 as follows:
 - a. Remove wire from pin 1 and reconnect to pin 5.
 - b. Remove wire from pin 6 and reconnect to pin 1.
 - c. Connect pin 2 to ground.
 - d. Add 15K resistor, Item 9, from pin 6 to +200 volt line (high side of R3303 pot.)
 - e. Add 0.1 uf capacitor, Item 12, from pin 6 to ground.

TMC SPECIFICATION

NO. S 1098

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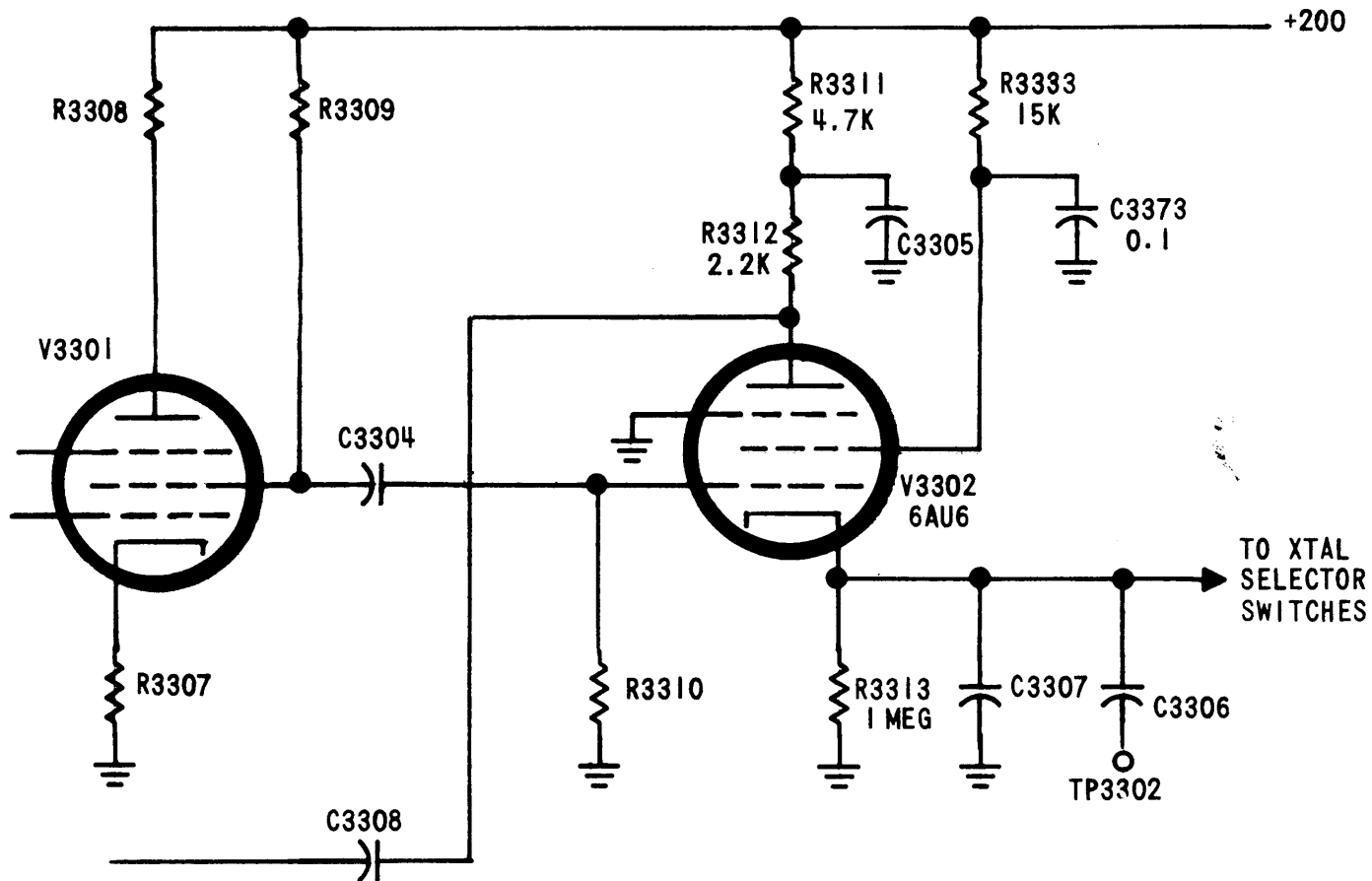
APPD: *[Signature]*

SHEET 9

OF 18

TITLE: 3300 DECK MODIFICATIONS

(AX386) 10Kc



NOTE: VALUES ARE SHOWN ONLY WHERE COMPONENTS HAVE BEEN ADDED OR CHANGED.

FIGURE 3

TMC SPECIFICATION

NO. S 1098

REV:

S A B C D E F G H J K

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APPD:

SHEET 10

OF 18

TITLE:

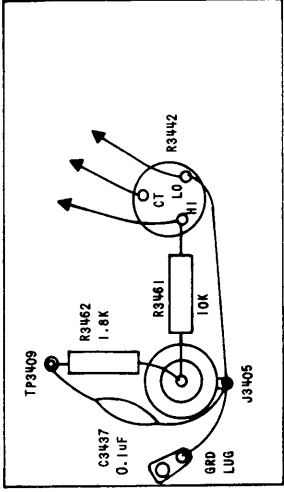
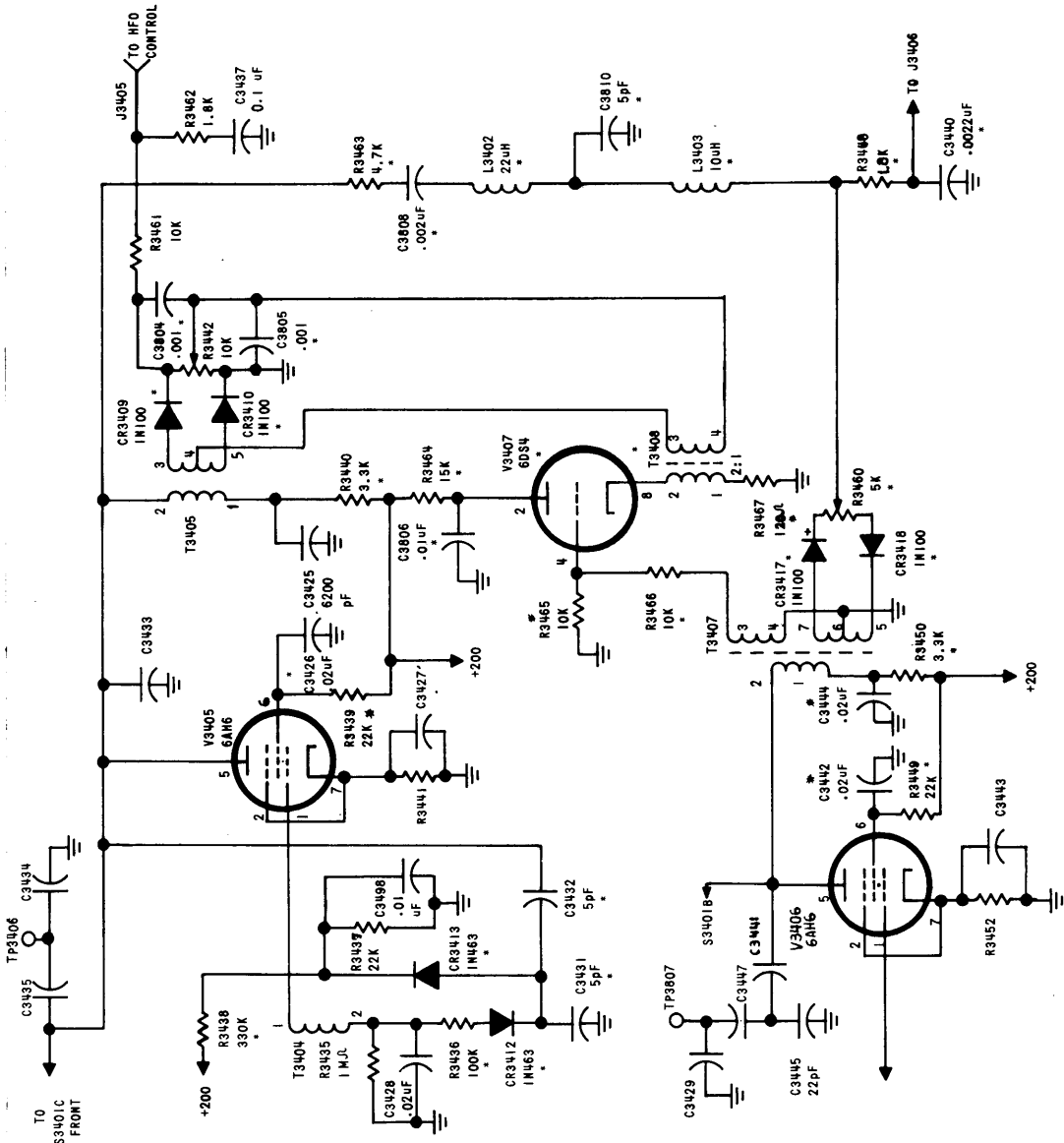
KIT-295

Typed by mtp 5/16/66

8. On the top of AX386 sub-chassis, adjacent to XV3302, remove lettering 6AB4 and stamp 6AU6 in its place using Item 43.
9. Replace sideplates and return AX386 to the HFS chassis.

E. 3400 Deck (AX387) - See Figure 4

1. Disconnect AX387 and remove from the HFS chassis.
 2. Unfasten the sideplates and remove shield between XV3405. and XV3406.
 3. Remove terminal board A2438 and clip connecting wires as close to terminals on the board as possible.
 - a. Remove black wire from ground lug near Pin 7 of XV3406.
 4. Remove R3442 (1K pot.) and replace with Item 14 (10K pot.)
 5. Remove R3443 (100 K) and R3444 (10 K).
 6. Remove C3445 (62 pf) and replace with Item 15 (22 pf).
 7. Remove the black wire from terminal 4 of T3405 to J3405.
 - 7a. Remove lead of C3425 from terminal 4 and connect to ground.
 8. Solder 6" piece of black insulated wire (Item 16) to terminal 4 of T3405
 9. Solder 6" piece of brown insulated wire to Pin 3 of XV3406. (item 17)
 10. Remove the violet wire from Pin 5 of XV3405. Follow blue wire going from Pin 5 of XV3405 to S3401C, and attach a 8" piece of violet wire (Item 18) to same terminal on S3401C.
 11. Remove the blue wire from Pin 5 of XV3406 and replace it with a 6" piece of blue insulated wire (Item 19).
- (SEE FIGURE #4 FOR FOLLOWING STEPS)
12. Remove the wire from TP3409.
 - 12a. Remove green/white wire on J3405.



NOTE:
* A4454 COMPONENTS

MODIFICATION OF 3400 DECK
(AX387) 100Kc

FIGURE 4

TMC SPECIFICATION

NO. S 1098

REV: A B C D E F G H J K

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TITLE: ME-295

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7. MODIFICATION PROCEDURE - Cont'd

13. Install R3461 (10K), Item 20, between high side connection of R3442 to the center terminal of J3405. Do not solder.
14. Install a 1.8K 1/2 watt resistor (R3462) from center terminal of J3405 to TP3409. (Item 21) Solder J3405 connections.
15. Install item 3 (1 megohm resistor, R3435) from T3404 Pin 2 to ground.
16. Install a 0.1 uf disc ceramic capacitor (C3437) from TP3409 to ground terminal of J3405. (Item 22)
17. Install a jumper wire (#22 Gauge) from the low side of R3442 to isolated ground terminal of J3405. Also run a jumper wire from J3405 isolated ground terminal to chassis ground. (Item 24)
18. Attach a 6" piece of #22 insulated white wire (green tracer) to high side of R3442 (Item 25). Solder connections.
19. Attach a 6" piece of #22 insulated solid yellow wire to R3442 CT. (Item 26)
20. Attach a 6" piece of #22 insulated white wire (brown tracer) to the low side of R3442. (Item 27)
21. Remove red wire from T3405 terminal #1.
22. Attach a 6" length of red wire (#22 gauge) to terminal #1 of T3405. (Item 28)
23. Install PC Board Assembly, A4454, per diagram (Figure 5) in same location as terminal board A2438 which was removed in Step 3.

TMC SPECIFICATION

NO. S 1098

REV: D E F G H J K

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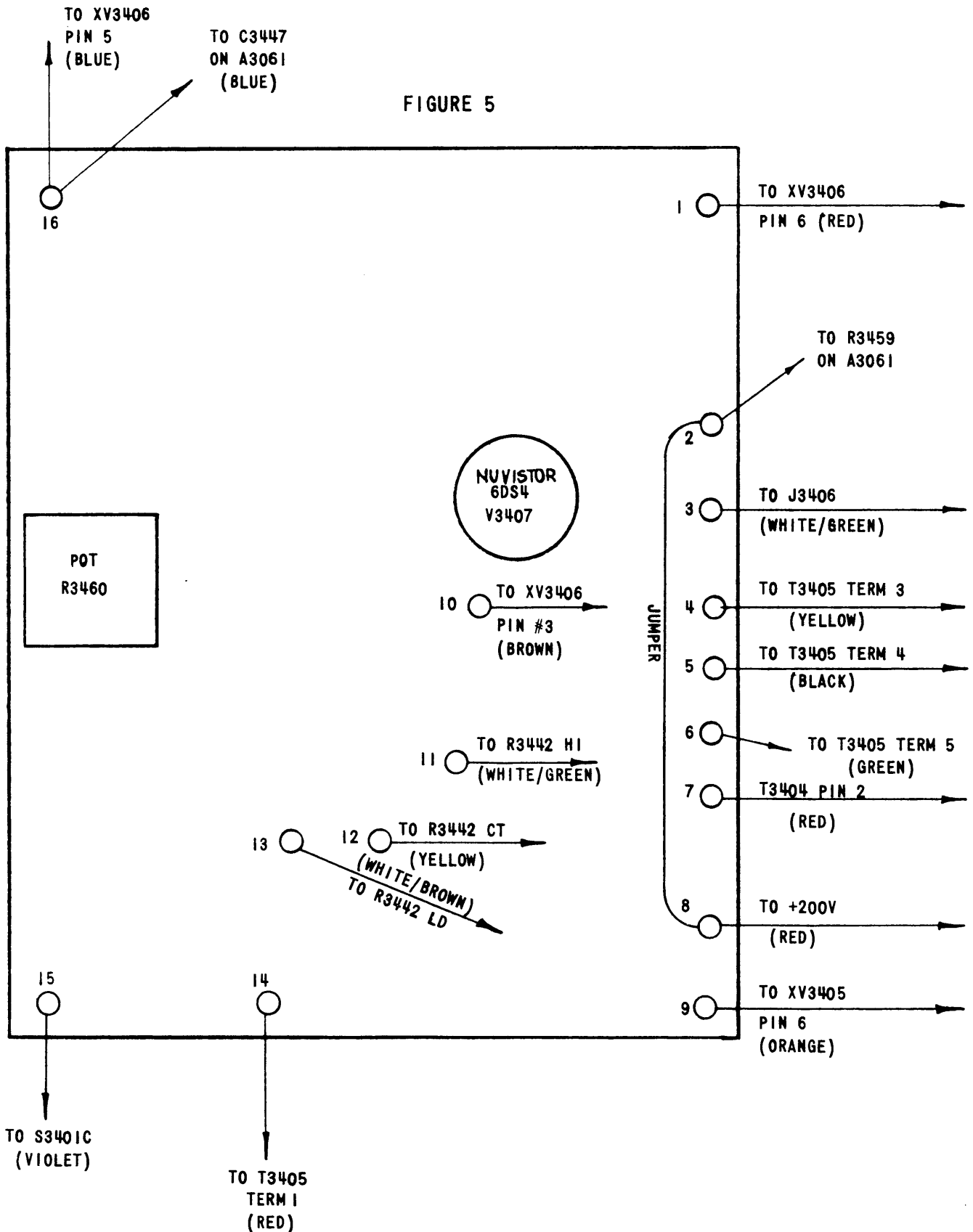
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SHEET 13 OF 18

TITLE: KIT 295

FIGURE 5



TMC SPECIFICATION

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REV: D E F G H J K

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SHEET 14 OF 18

TITLE: REAR PANEL DETAIL

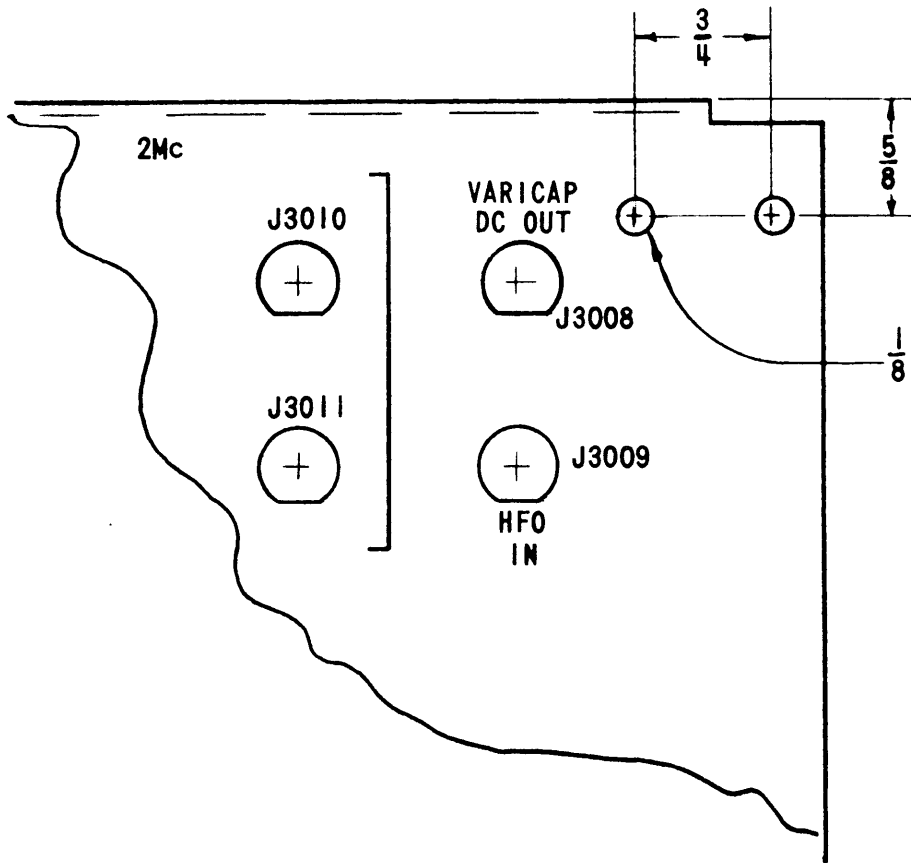


FIGURE 6

TMC SPECIFICATION

NO. S 1098

REV: Ø A B C D E F G H J K

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SHEET 15 OF 18

TITLE: **REAR PANEL MODIFICATION**

AX383

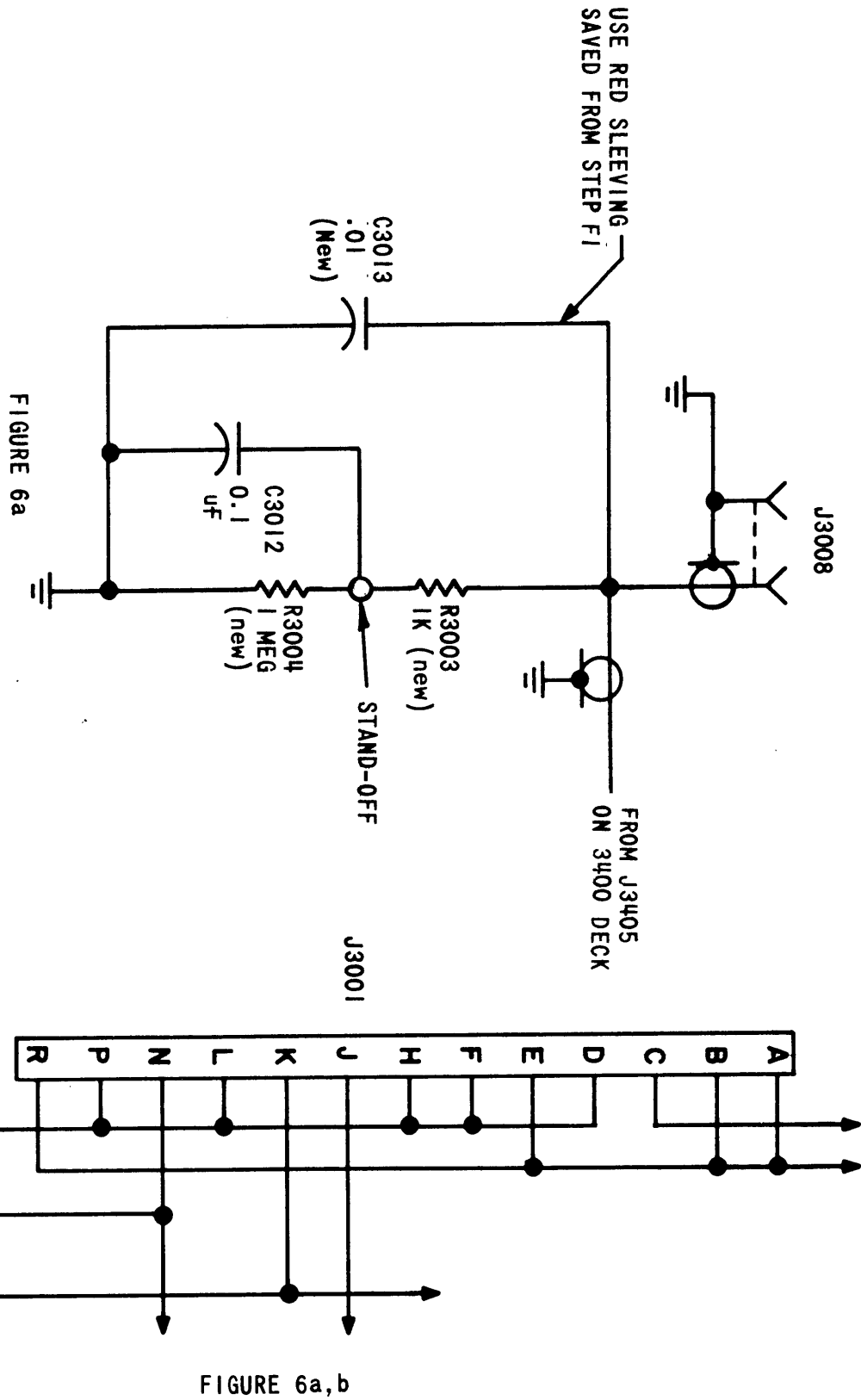


FIGURE 6a, b

TMC SPECIFICATION

NO. 5

REV: C A B C D E F G H J K

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APPD:

SHEET 16 OF 18

TITLE: KIT-295

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V. MODIFICATION PROCEDURE

F. Chassis AX383

1. Remove and save C3012 attached to J3008, also save piece of r d sleeving. Reconnect C3012 as shown in Figure 6a.
2. Drill a 1/8" hole using Item 48 as indicated in figure 6, and add a standoff insulator adjacent to J3008, (item 32,34,35
3. Connect the resistors and capacitors as indicated on diagram, Figure 6a, (items 3,22,29,30).
4. Next, with a center punch, ascribe a mark as indicated in Figure 7. Drill through with a 1/8" drill bit. Then, with item 45, establish a 7/16" diameter hole.

Insert BNC connector, Item 31, and fasten to chassis. Run a jumper wire (item 46) from Pin N of J3001 to center connection of new BNC connector. Apply rubber stamp, item 44, marked "SERVO", and J3039 as illustrated on Figure 7.

- G. Modification is now complete*. In automated versions, remove P3014-2 from J3014-and connect to J3039.

VI. ADJUSTMENT AND PHASE DETECTORS

NOTE

This alignment procedure is on the assumption that the unit includes a sync meter, calibrated to at least +5 and -5 volts on either side of 0 V and that this meter circuit reads the d-c connection output at J3008 jack. Another assumption is that the equipment also includes a sync lamp ignited by the energization of K3001 relay. If the equipment does not include these indicators, a VTVM may be substituted for the meter and K3001 may be observed instead of the lamp.

TMC SPECIFICATION

NO. 5

REV:

COMPILED:

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APPD:

SHEET 16a OF 18

TITLE:

- A. Ascertain that the receiver or transmitter sync meter is adjusted to zero-center-scale with its d-c correction voltage input grounded.
- B. Set R3442 to the middle of its total adjustment range. Set receiver or transmitter tuning control for 2.5 mc and HFS switches for 2.5000 mc.
- C. Readjust tuning control to obtain "0" on sync meter. Then slowly increase frequency setting on tuning control, observing needle movement away from "0". When needle flips back towards "0" this indicates one end of detector "capture range." At this point, adjust R3442 to bring needle to exactly "0".
- D. Readjust tuning control back towards 2.5 mc. Needle will reverse action in C., this time moving towards "0". Continue to adjust control needle until needle reaches "0". Then continue to slowly decrease tuning control to frequencies under 2.5 mc, until needle jumps back to "0" indicating other end of capture range. The range should extend from -2.5v to +2.5v.
- E. Leave HFS switches at 2.5000 mc and move tuning control to 2.9 mc.
- F. Adjust R3460 until sync lamp comes on.
- G. Decrease tuning control to 2.5 mc and to obtain "0" on meter. Then increase tuning control until needle flips back to "0". Readjust R3460 until sync lamp goes off. This indicates the high end of the "sync range." Note the reading on the meter; it should be at least +2.5V.
- H. Check the lamp at the low end of the "sync range" by decreasing the tuning control until the lamp goes out. The meter should now read at least -2.5V.

TMC SPECIFICATION

NO. 5

REV:

COMPILED:

CHECKED:

APPD:

SHEET 16b OF 18

TITLE:

- I. If voltage readings are not correct in steps G and H, repeat these steps until they are. Then perform a similar check with HFS and tuning control synchronized at 2.0 thru 2.9 mc, in 100-kc steps. Also check at 2.9990 mc.

*IMPORTANT NOTE

AT THE COMPLETION OF MODIFICATION PER THIS KIT, IF THE SYNC LAMP IS "ON" WHEN OUT OF SYNC AND "OFF" WHEN IN SYNC, REVERSE LEADS 3 AND 5 ON TRANSFORMER T3405.

TMC SPECIFICATION

NO. S 1098

REV: D E F G H J K

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APPD: *[Signature]*

SHEET 17 OF 18

TITLE: REAR PANEL DETAIL

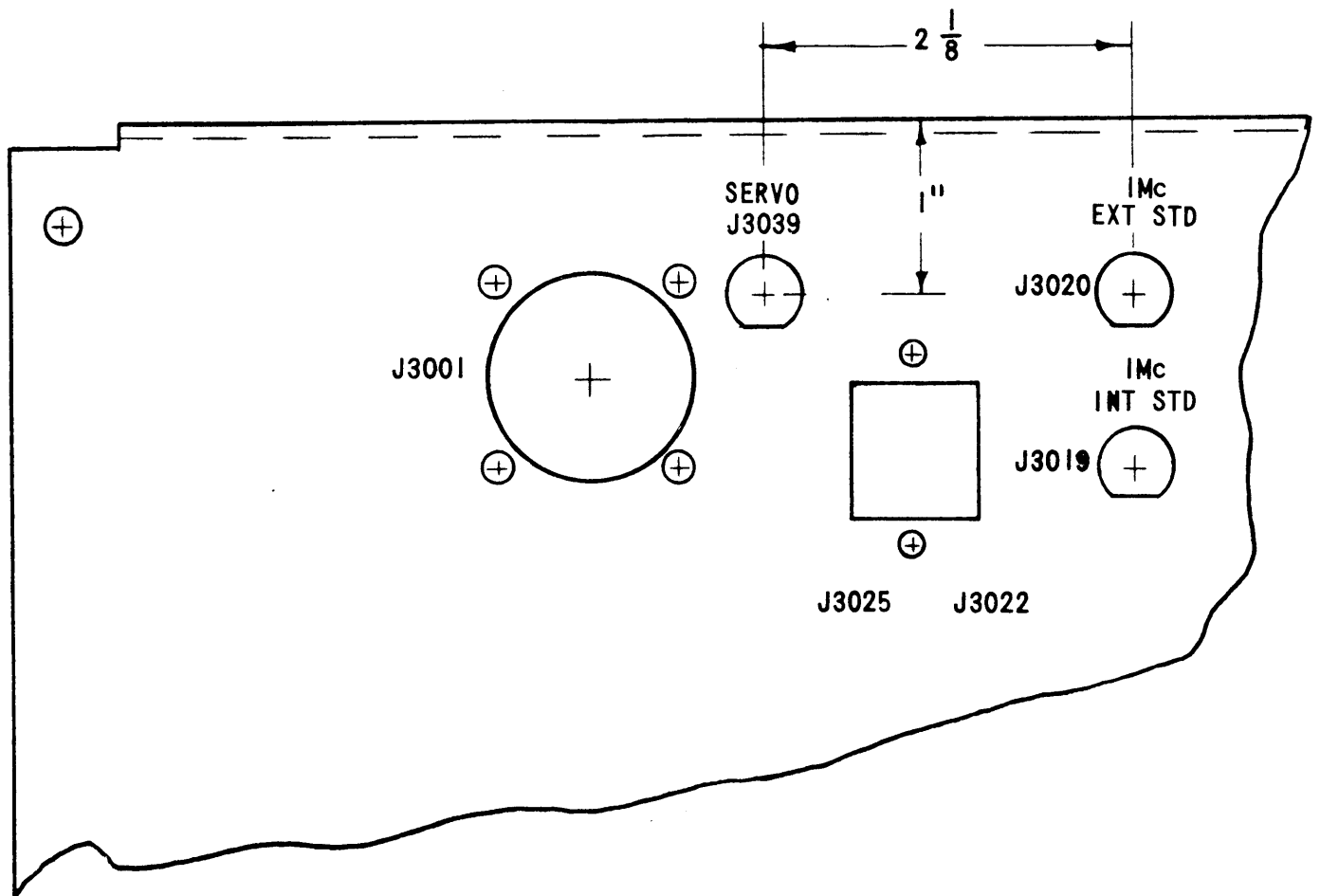


FIGURE 7

