

FREQUENCY SHIFT CONVERTERS CV-116/URR, CV-116A/URR,  
 CV-116B/URR AND CV-116C/URR

TM 11-2241  
 TO 31R1-2URR-201  
 CHANGES No. 3

DEPARTMENTS OF THE ARMY  
 AND THE AIR FORCE,  
 WASHINGTON 25, D. C., 2 December 1957

TM 11-2241/TO 31R1-2URR-201, 28 March 1955, is changed as follows:

Change the title of the manual to: **FREQUENCY SHIFT CONVERTERS CV-116/URR, CV-116A/URR, CV-116B/URR, AND CV-116C/URR.**

*Note.* The parenthetical reference to a previous change indicates that the pertinent material was published in that change.

Add and CV-116C/URR after CV-116B/URR in the following places:

- Page 3, paragraph 1b (p. 1 of C 2).
- Page 7, paragraph 10.1d (p. 1 of C 2).
- Page 33, paragraph 41c and d (p. 1 of C 2).
- Page 33, figure 22, note 3 and note 4 (p. 1 of C 2).
- Page 34, figure 23, note (p. 1 of C 2).
- Page 36, paragraph 41 (p. 1 of C 2).
- Page 52, paragraph 52, lines 4 and 6 (p. 2 of C 2).
- Figures 46.1 and 49.1 caption (p. 2 of C 2).
- Page 56, figure 42 (p. 3 of C 2).
- Page 72, figure 58, note 2 (p. 3 of C 2).
- Page 76, figure 63, caption (p. 4 of C 2).
- Page 76, figure 64, caption (p. 4 of C 2).
- Page 76, figure 63 (p. 4 of C 2), note 10.
- Line 2. Delete "SERIAL NUMBERS 1 THROUGH 380" and substitute: and CV-116C/URR.
- Part D. Begin first sentence with: In CV-116B/URR.
- Page 76, figure 64, (p. 4 of C 2).
- Note 11, line 2. Delete "SERIAL NUMBERS 1 THROUGH 380" and substitute: and CV-116C/URR.
- Note 11, part E. Begin first sentence with: In CV-116B/URR.
- Page 7, paragraph 10.1 (p. 1 of C 2).

f. (Added) In Frequency Shift Converter CV-116C/URR, switch S13 has been added to provide switching from the internal to an external loop power supply (figs. 27.1 and 46.2 and par. 19.1).

19.1. Internal and External Loop Switching  
 (Added)

a. In Frequency Shift Converter CV-116C/URR, double-pole, double-throw switch S13 has been added, and circuit changes have been made (fig. 27.1) so that either the converter loop power supply or an external loop power supply may be used. This modification allows the converter to be used in a greater number of system applications. Set the LOOP SUPPLY switch S13 in either the INT or EXT position depending upon the particular system in which the converter is used.

b. Switch S13 is mounted on a bracket which is secured to the bottom subchassis (fig. 46.2). To reach switch S13, release the turn-locks on the front panel and pull the converter forward until the switch is clear of the cabinet.

Page 37, paragraph 42c. Make the following changes:

Line 4. Change "(fig. 27)" to: (fig. 27 or 27.1).

a.1. (Added) In Frequency Shift Converter CV-116C/URR, LOOP SUPPLY switch S13

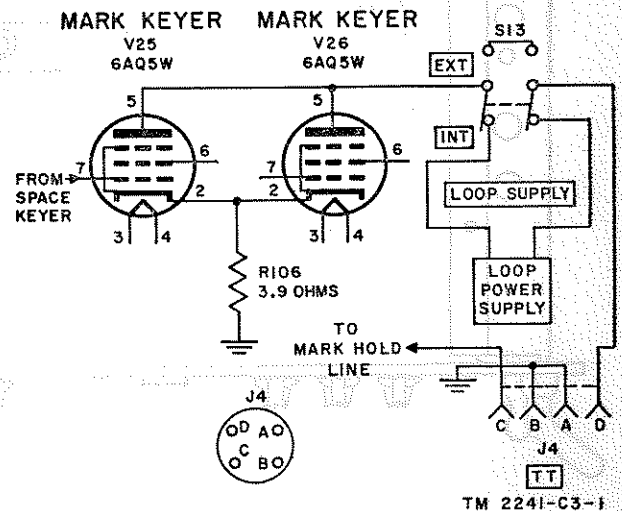


Figure 27.1. (Added) Frequency Shift Converter CV-116C/URR, simplified loop current circuit.

(fig. 27.1) is used to connect either the internal or an external loop power supply in the circuit.

Page 37, figure 27, caption. Change to read: **Frequency Shift Converter CV-116/URR, CV-116A/URR and CV-116B/URR, simplified loop current circuit.**

Page 48, paragraph 50c. Line 2. Change "measures" to: **indicates.**

Page 59, figure 45. Add call-out M2 to meter at right-hand end of the front panel. Change call-out "X12" to: **XI 2.**

Page 60, figure 46.

NOTE. (Added) IN FREQUENCY SHIFT CONVERTERS CV-116B/URR AND CV-116C/URR, CAPACITORS C92 AND C93 AND RESISTORS R202 AND R203 ARE DELETED.

Page 63, figure 49. Change the caption to: **Frequency Shift Converters CV-116/URR and**

**CV-116C/URR, rear of front panel.** Interchange meter call-outs M2 and M3.

Page 72, figure 58. Add to note 2: **AND CV-116C/URR.**

Figure 63 (2d fold-out after p. 76) Add the following after note 10:

11. FREQUENCY SHIFT CONVERTERS CV-116C/URR HAVE THE FOLLOWING CIRCUIT CHANGES:

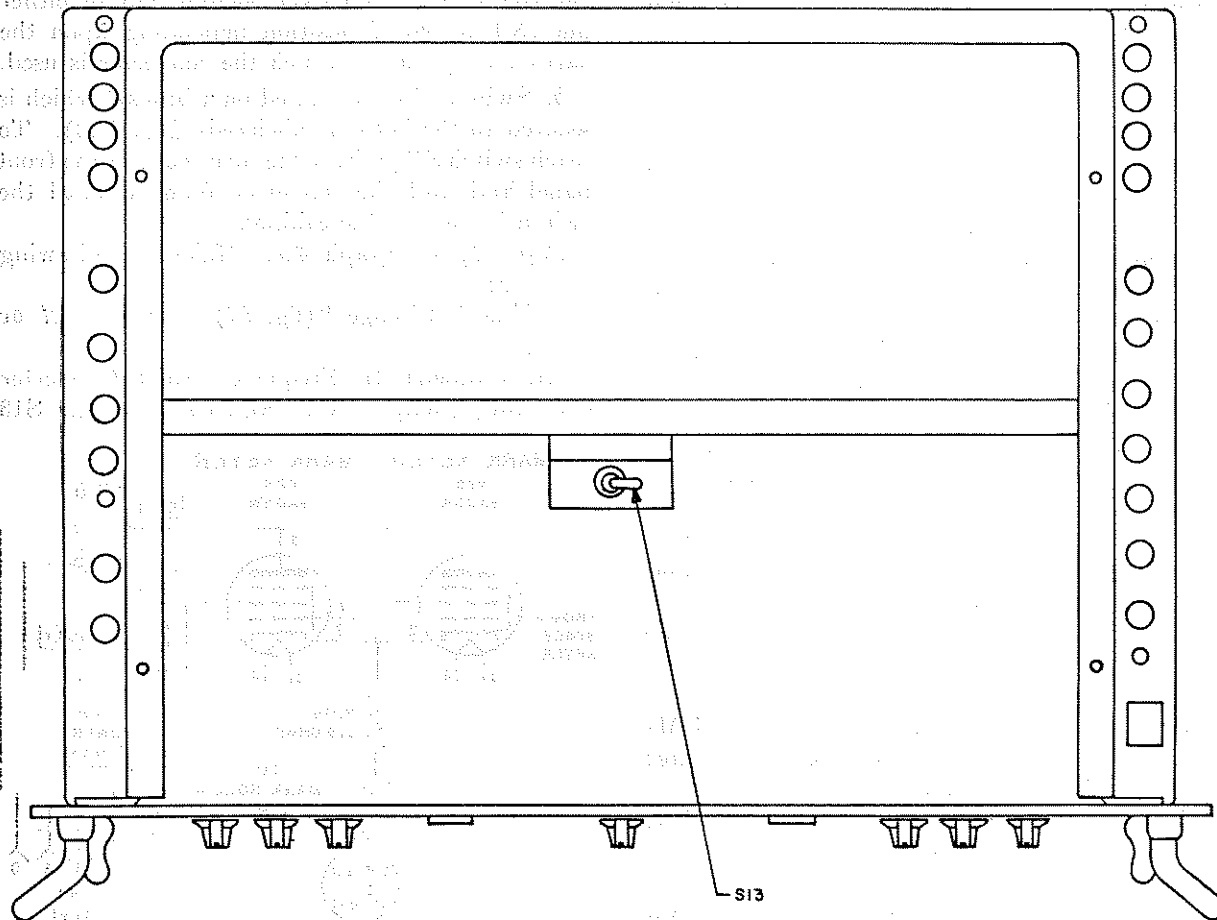
A. CAPACITOR C96 (.068 UF) IS ADDED FROM TERMINAL 3 OF Z5 TO GROUND.

B. CAPACITORS C92 AND C93 AND RESISTORS R202 AND R203 ARE DELETED.

C. **LOOP SUPPLY** SWITCH S13 IS ADDED IN MARK KEYS CIRCUIT V25 AND V26 (FIGS. 27.1 AND 46.2).

Figure 64 (3d fold-out after page 76) Add the following after note 11:

12. IN FREQUENCY SHIFT CONVERTER CV-116C/URR, SWITCH S13 HAS BEEN ADDED.



TM 2241-C3-2

Figure 46.2. (Added) Frequency Shift Converter CV-116C/URR, LOOP SUPPLY switch S13.

[AG 413.44 (22 Nov 57)]

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USATC	USA White Sands Sig	11-98	
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NG: State AG; units—same as Active Army.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

FREQUENCY SHIFT CONVERTERS CV-116/URR, CV-116A/URR,  
AND CV-116B/URR

TM 11-2241  
TO 31R1-2URR-201  
CHANGES No. 2

DEPARTMENTS OF THE ARMY AND  
THE AIR FORCE  
WASHINGTON 25, D. C., 11 April 1957

TM 11-2241, 28 March 1955, is changed as follows:

Change the title of the manual to: **FREQUENCY SHIFT CONVERTERS CV-116/URR, CV-116A/URR, AND CV-116B/URR.**

*Note.* The parenthetical reference to a previous Change indicates that pertinent material was published in that Change.

*Page 3*, paragraph 1*b* (p 1 of C 1), note, last line. Delete "and CV-116A/URR" and substitute the following: CV-116A/URR, and CV-116B/URR.

*Page 7*, paragraph 10.1 (p 1 of C 1).

*c.* (Added) In Frequency Shift Converter CV-116A/URR, meters M3 and M4, with an internal resistance of 900 ohms are used. With meter M3 a 680-ohm resistor R211 is connected across the terminals of meter M3. With meter M4 a 360-ohm resistor R210 is connected between the plus terminal of M4 and terminal 2 of switch S10.

*d.* (Added) In Frequency Shift Converter CV-116B/URR, capacitor C96 (.068  $\mu$ f) has been added from terminal 3 of filter Z5 to ground. Capacitors C92 and C93 are deleted. Resistors R202 and R203 are deleted and direct wire connections are made in place of the resistors.

*e.* (Added) In Frequency Shift Converters CV-116B/URR, serial numbers 1 through 380, meters M1 and M2, with an internal resistance of 940 ohms are used. With these meters, two 290-ohm resistors, R26A and R136A, are connected in series with existing resistors R26 and R136, respectively.

*Page 33*, paragraph 41. Make the following changes:

Add after the last sentence in subparagraph *c*: In Frequency Shift Converter CV-116B/URR, resistor R202 and capacitor C92 are not used in the discriminator stage because

of the design of discriminator Z3. Capacitor C96 has been added to the circuit to reduce the signal-plus-noise-to-noise ratio.

Add after the last sentence in subparagraph *d*: In Frequency Shift Converter CV-116B/URR, resistor R203 and capacitor C93 are not used in the discriminator stage because of the design of Z4.

*Page 33*, figure 22 (p 1 of C 1). Make the following changes:

Note 3, line 2. Add after "CV-116A/URR": AND CV-116B/URR.

Add note 4 as follows:

4. IN FREQUENCY SHIFT CONVERTER CV-116B/URR, CAPACITORS C92 AND C93 ARE DELETED. RESISTORS R202 AND R203 ARE DELETED AND A DIRECT CONNECTION MADE IN PLACE OF THE RESISTORS.

*Page 34*, figure 23. Add the following note:

IN FREQUENCY SHIFT CONVERTER CV-116B/URR, CAPACITORS C92 AND C93 ARE DELETED. RESISTORS R202 AND R203 ARE DELETED AND DIRECT WIRE CONNECTIONS MADE IN PLACE OF THE RESISTORS.

*Page 36*, paragraph 41 (p 1 of C 1), line 1. Add after "CV-116A/URR": and CV-116B/URR.

*Page 40*, figure 30. Make the following changes:

Delete the note: "UNLESS OTHERWISE SPECIFIED, ALL CAPACITORS ARE IN  $\mu$ F, ALL RESISTORS ARE IN OHMS."

Page 1 of C 1, change the word "Note" to **Notes.**

Number the existing note "1," the note in C 1 as "2" and add the following:

3. FREQUENCY SHIFT CONVERTER CV-116B/URR WITH SERIAL NUMBERS FROM 1 THROUGH 380, HAVE RESISTOR R26A (290 OHMS) ADDED IN SERIES WITH R26.

*Page 40*, paragraph 43*d*. Add after the last sentence: In Frequency Shift Converter CV-116B/URR, meter M1 shunt resistor is com-

prised of an added resistor R26A (290 ohms) in series with resistor R26.

Page 48, paragraph 50. Make the following changes:

b. Last sentence. Change "keyer amplifier" to: **cathode follower**.

c. Last sentence. Change "keyer amplifier" to: **cathode follower**.

Page 50, figure 39. Add the following to the notes:

3. IN FREQUENCY SHIFT CONVERTER CV-116B/URR, A 360-OHM RESISTOR R210 IS CONNECTED BETWEEN THE PLUS TERMINAL

OF METER M4 AND TERMINAL 2 OF **PRESS TO TEST** SWITCH S10.

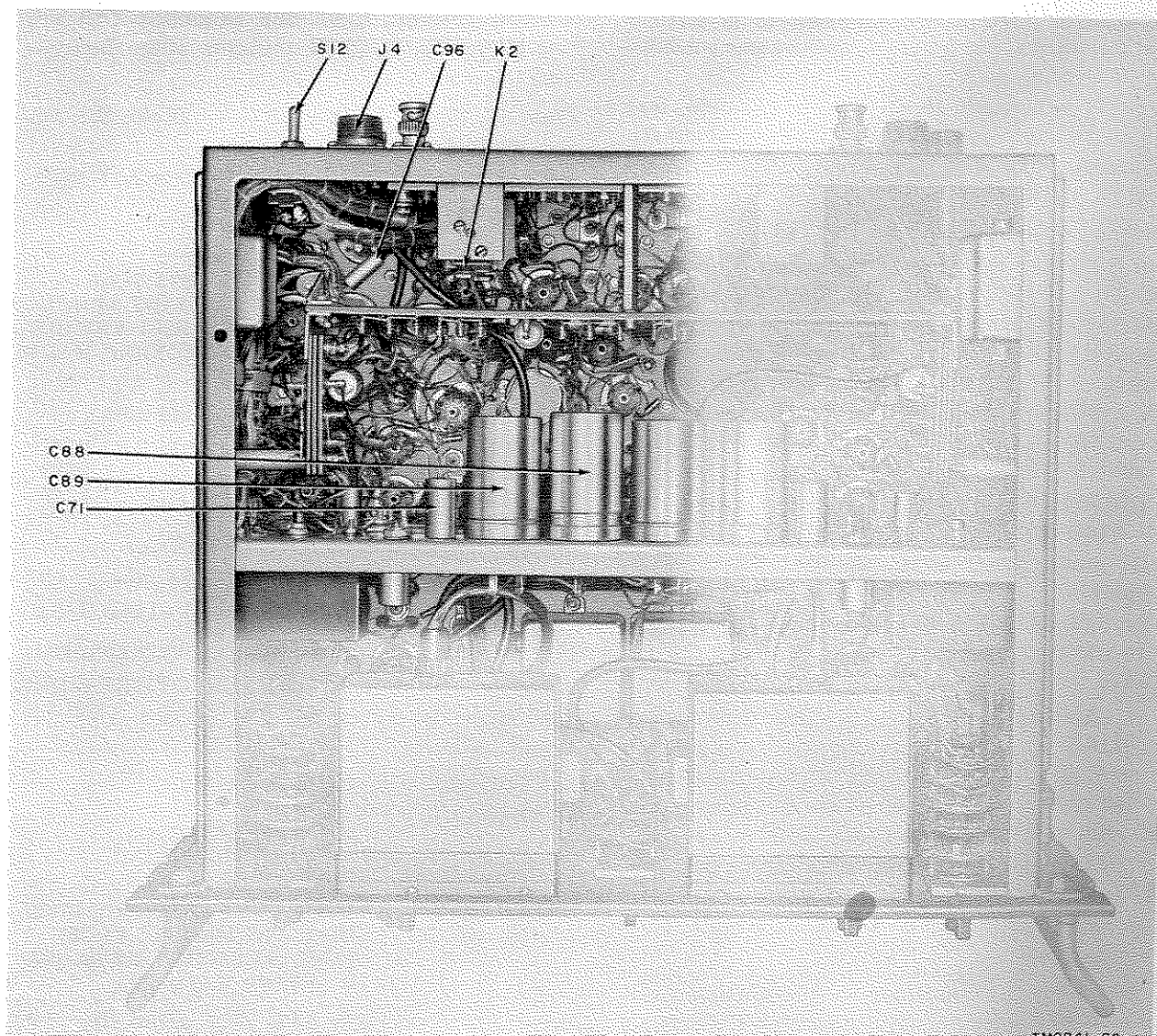
Page 51, paragraph 51b. Add the following note after the chart at the end of b:

Note. For Frequency Shift Converters CV-116B/URR with serial numbers from 1 through 380, refer to tube socket resistance and voltage measurement chart in figure 42.

Page 52, paragraph 52 (p 1 of C 1). Make the following changes:

42. .... Add after "CV-116A/URR": and CV-116B/URR.

63. .... Add after "CV-116A/URR": and CV-116B/URR.



TM2241-C2-1

Figure 46.1 (Added) Frequency Shift Converters CV-116A/URR and CV-116B/URR, bottom view, location of added capacitor C96.

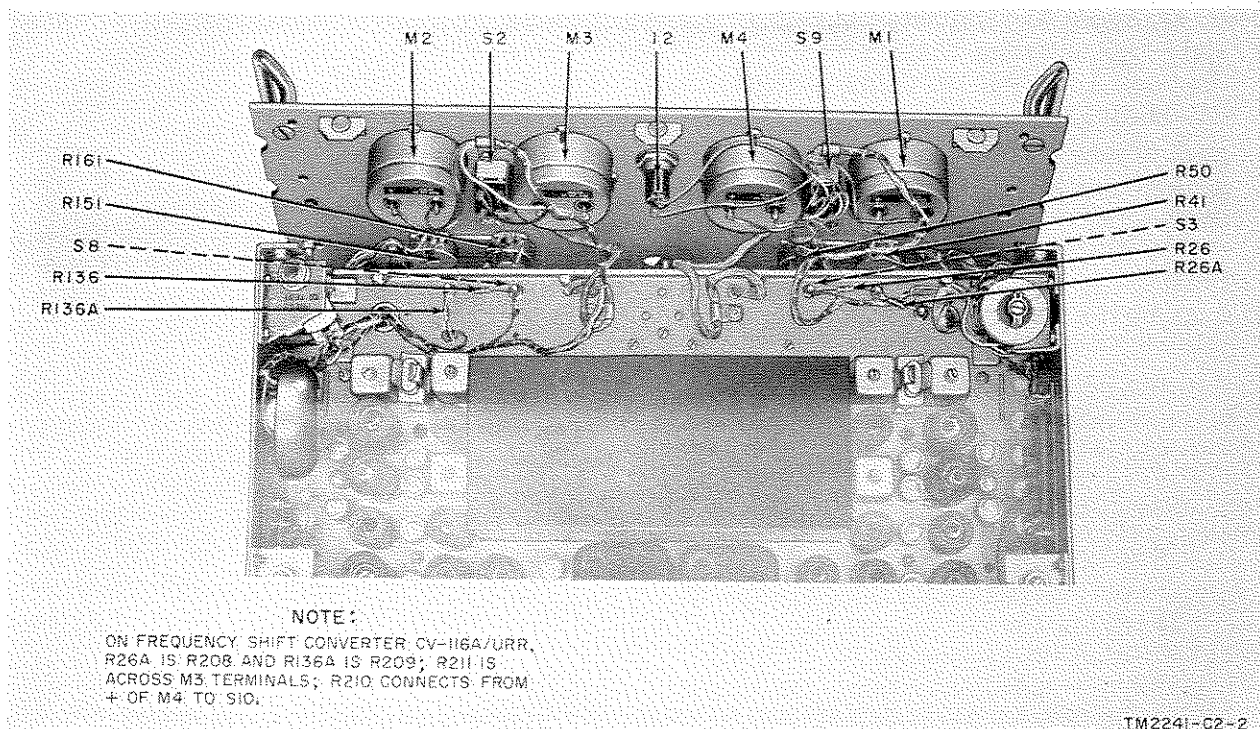


Figure 49.1 (Added) Frequency Shift Converters CV-116A/URR and CV-116B/URR, rear of front panel.

Page 53, paragraph 55a(1). Last line. Change "fig. 46)" to read: (fig. 46 or 46.1).

Page 56, figure 42 (page 2 of C 1). Add after "CV-116A/URR": and CV-116B/URR.

Page 63, figure 49. Make the following changes: Interchange the call-outs M2 and M3 and change the caption to: **Frequency Shift Converter CV-116/URR, rear of front panel.**

Page 63, paragraph 58.1 (p 2 of C 1). Make the following changes:

Line 2. Add after "CV-116A/URR": or CV-116B/URR.

Delete the last sentence and substitute the following: When the meter (or meters) with 500 ohms internal resistance are replaced in Frequency Shift Converter CV-116A/URR, remove resistor R208 and/or R209 (fig. 49.1) from the circuit and make direct connections. When the meter (or meters) with 500 ohms internal resistance are replaced in Frequency Shift Converter CV-116B/URR, remove resistors R26A and/or R136A (fig. 49.1) from the circuit and make direct connections.

Page 63, paragraph 58.1 (p 2 of C 1). Add the following:

### 58.2. Replacement of Meters M3 and/or M4 in Frequency Shift Converter CV-116A/URR

(Added)

If meters M3 and/or M4 in Frequency Shift Converter CV-116A/URR are defective, replace with meters which have an internal resistance of 500 ohms. When this is done with meter M3 remove R211. When this is done with meter M4, remove R210 and the standoff mounted on the meter mounting screw. Replace with a direct connection to terminal 2 of PRESS TO TEST switch S10.

Page 70, paragraph 68e, second line. Change "position B" to: position A+B.

Page 72, figure 58 (p 2 of C 1), note 2. Add after "CV-116A/URR": and CV-116B/URR.

Page 72, figure 59 (fold-out). Add the following to the notes:

10. IN FREQUENCY SHIFT CONVERTER CV-116A/URR, A 360-OHM RESISTOR R210 IS CONNECTED BETWEEN THE PLUS TERMINAL OF METER M4 AND TERMINAL 2 OF THE PRESS TO TEST SWITCH.



Page 76, figure 63 (fold-out) (page 2 of C 1).

Make the following changes:

Caption. Add after "CV-116A/URR": and CV-116B/URR.

Note 9. Add the following:

D. RESISTOR R210, 360 OHMS, CONNECTED BETWEEN THE PLUS TERMINAL OF METER M4 AND TERMINAL 2 OF THE PRESS TO TEST SWITCH S10.

E. RESISTOR R211, 680 OHMS, CONNECTED ACROSS THE TERMINALS OF METER M3.

Add the following to the notes:

10. FREQUENCY SHIFT CONVERTER CV-116B/URR, SERIAL NUMBERS 1 THROUGH 380, HAS THE FOLLOWING CIRCUIT CHANGES:

A. RESISTORS R202 AND R203 ARE DELETED AND REPLACED BY DIRECT CONNECTIONS IN PLACE OF THE RESISTORS.

B. CAPACITORS C92 AND C93 ARE DELETED.

C. CAPACITOR C96 (.068  $\mu$ F) IS ADDED FROM TERMINAL 3 OF FILTER Z5 TO GROUND.

D. RESISTOR R26A (290 OHMS) HAS BEEN ADDED IN SERIES WITH RESISTOR R26 AND RESISTOR R136A (290 OHMS) HAS BEEN ADDED IN SERIES WITH RESISTOR R136.

Page 76, figure 64 (fold-out). Make the following changes:

Add to the caption the following: and CV-116B/URR.

Add the following to the notes:

11. FREQUENCY SHIFT CONVERTER CV-116B/URR, SERIAL NUMBERS 1 THROUGH 380, HAS THE FOLLOWING CIRCUIT CHANGES:

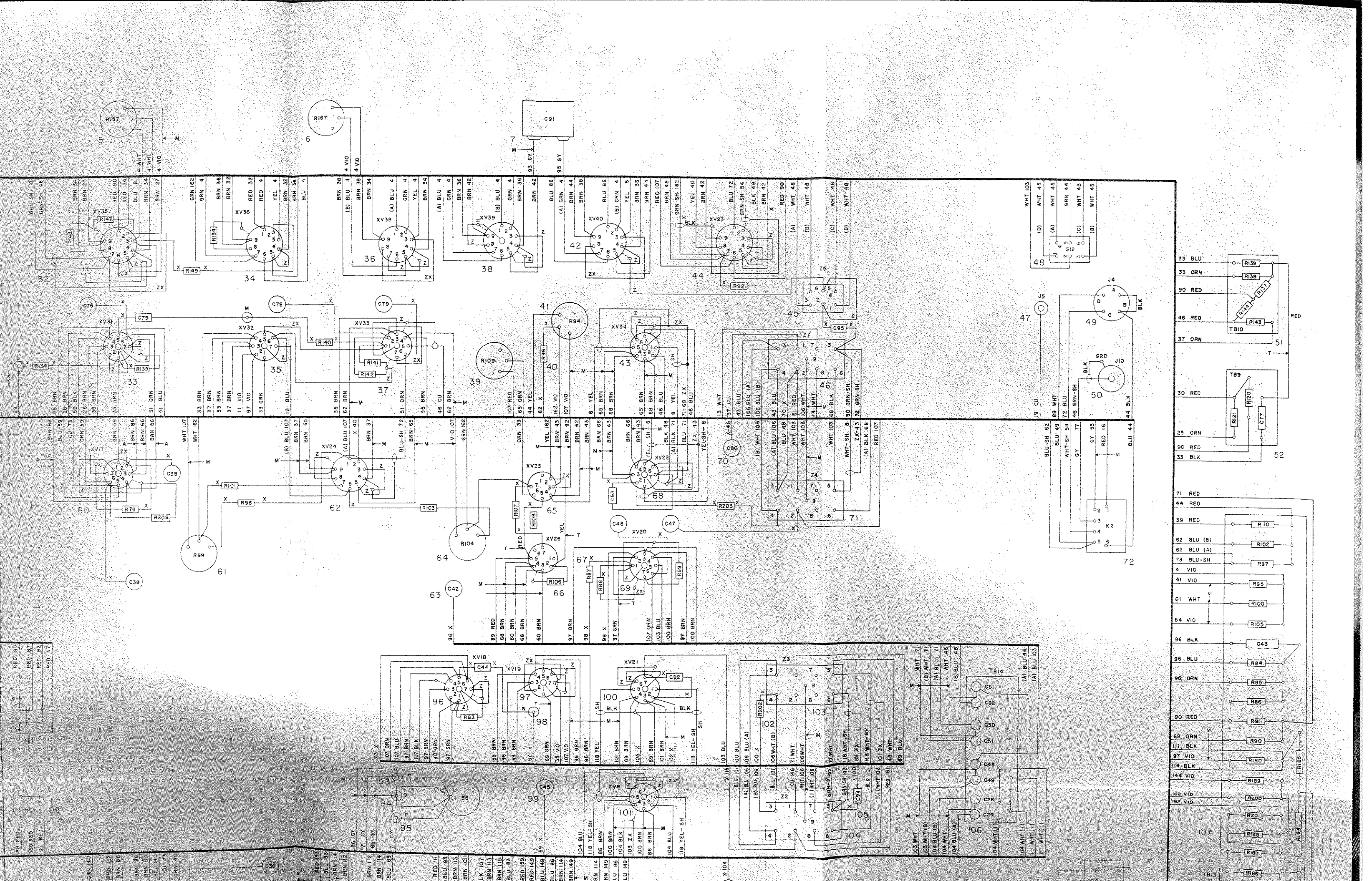
A. RESISTOR R203 IS DELETED AND REPLACED BY A DIRECT WIRE CONNECTION IN PLACE OF THE RESISTOR.

B. RESISTOR R202 IS DELETED AND REPLACED BY A DIRECT WIRE CONNECTION IN PLACE OF THE RESISTOR; THE ADDED WIRE END TERMINATING AT PIN 2 OF Z2 IS CHANGED TO TERMINATE AT PIN 2 OF XV21.

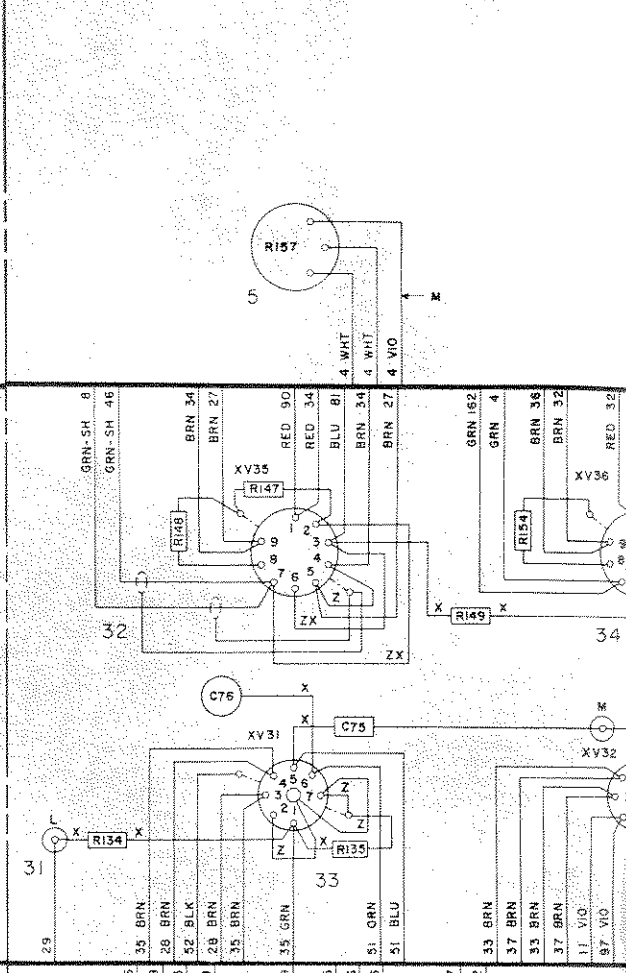
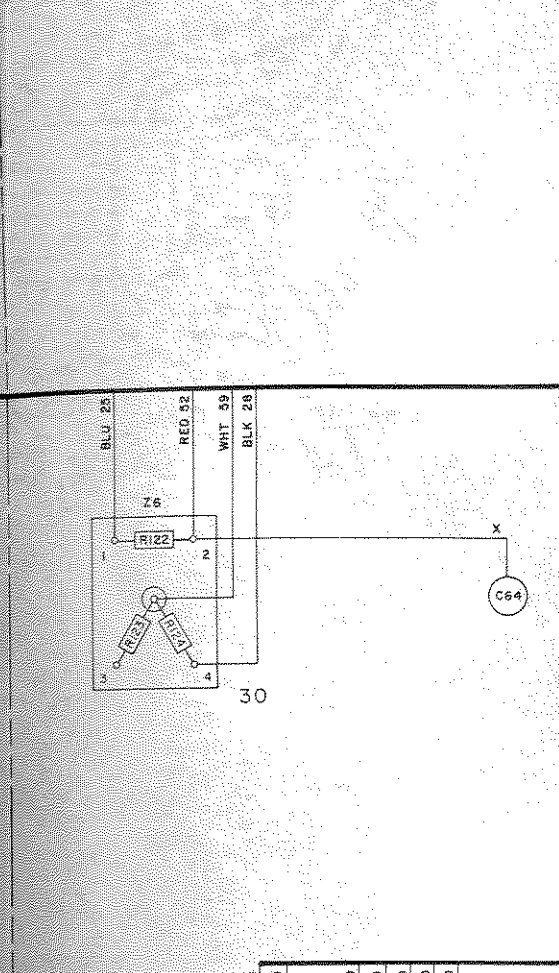
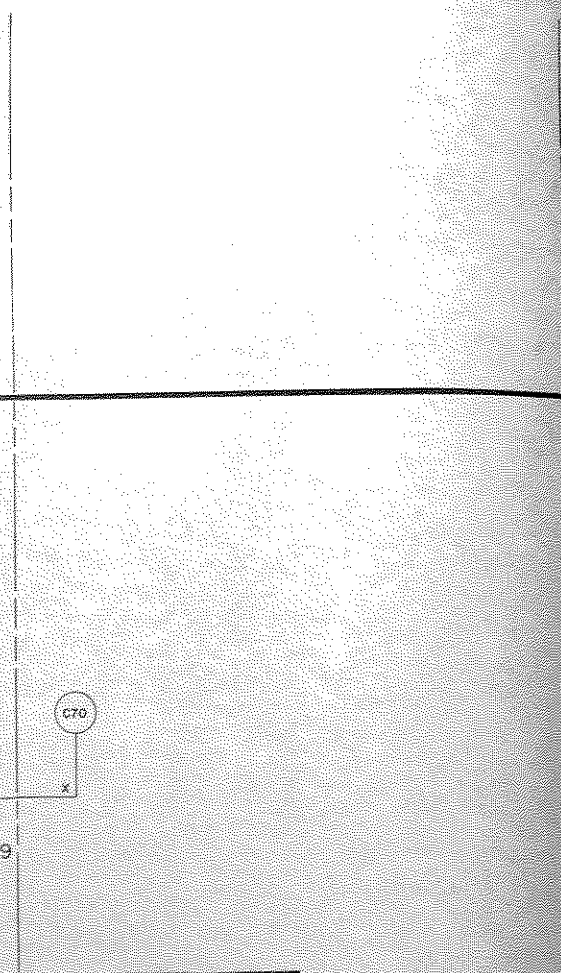
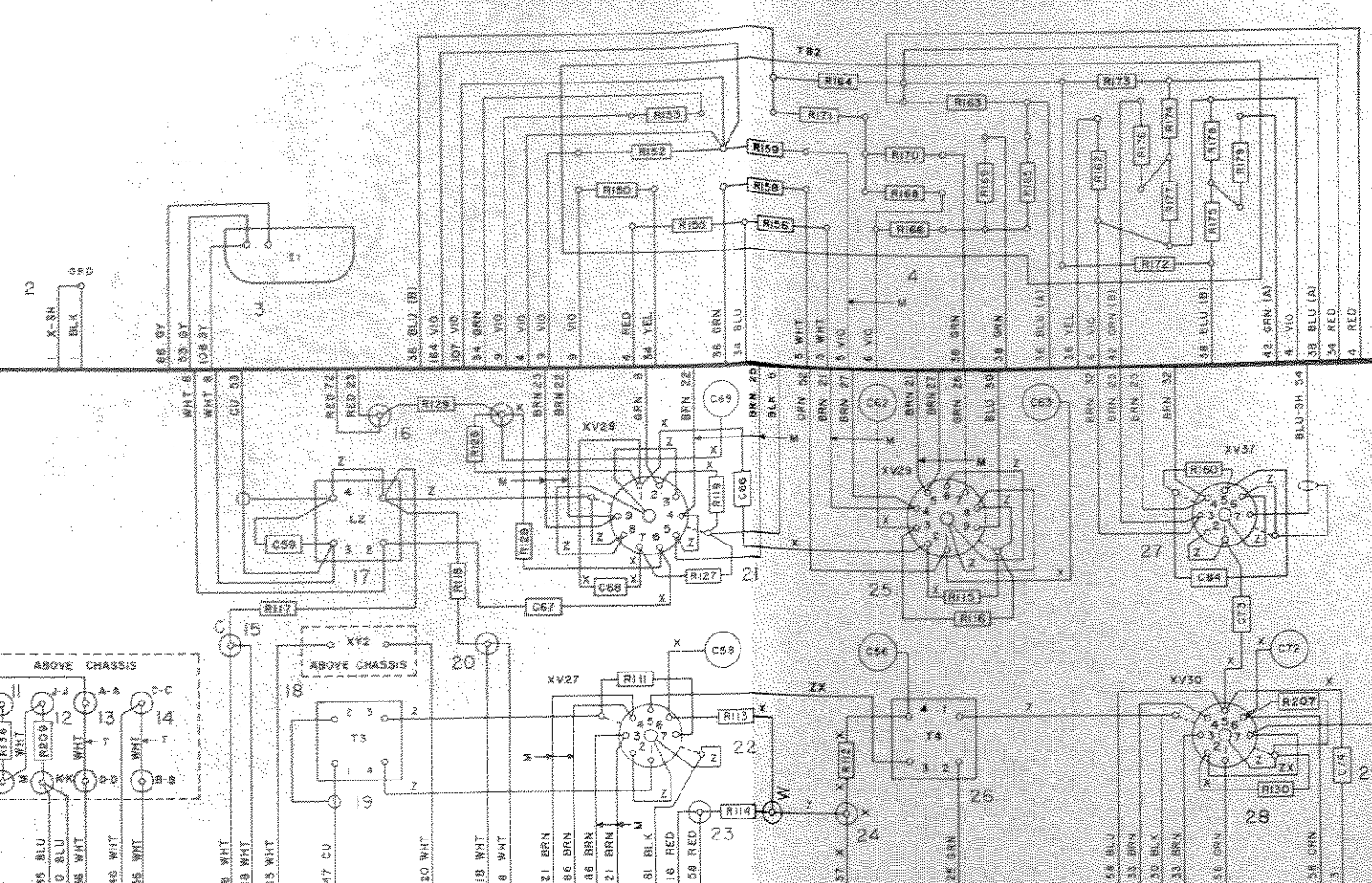
C. CAPACITORS C92 AND C93 ARE DELETED.

D. CAPACITOR C96 (.068  $\mu$ F) IS ADDED FROM TERMINAL 3 OF Z5 TO GROUND.

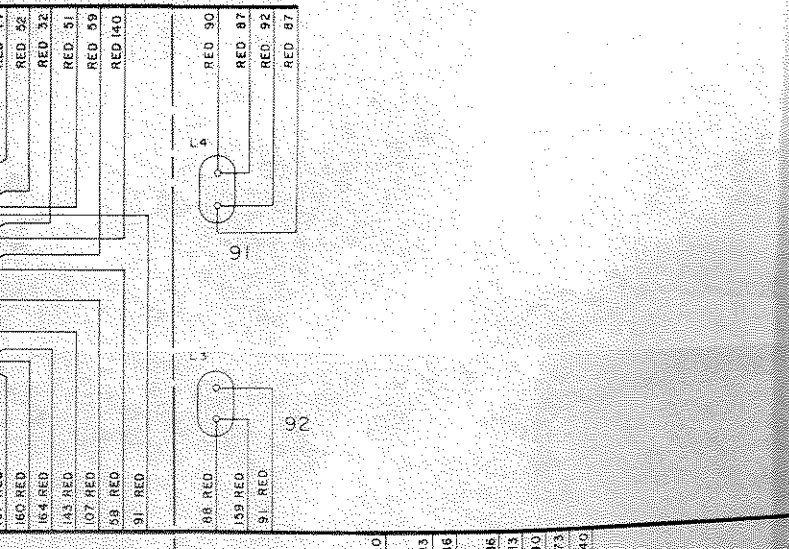
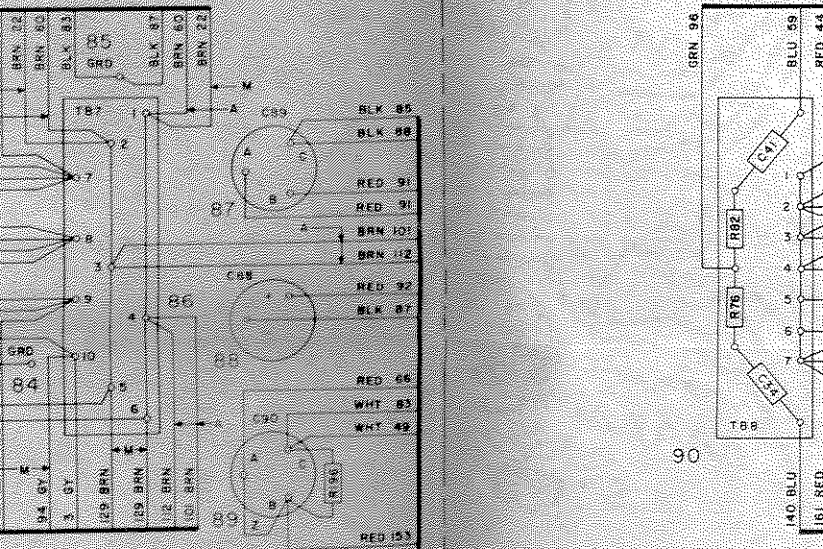
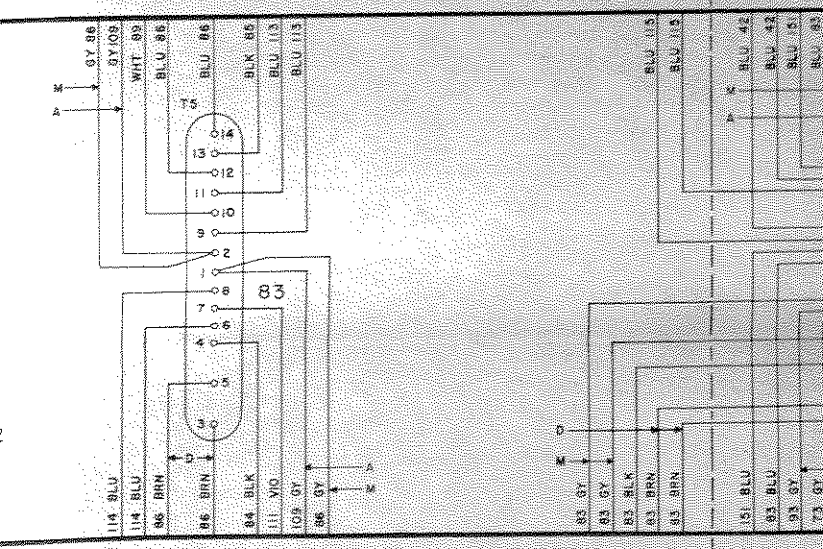
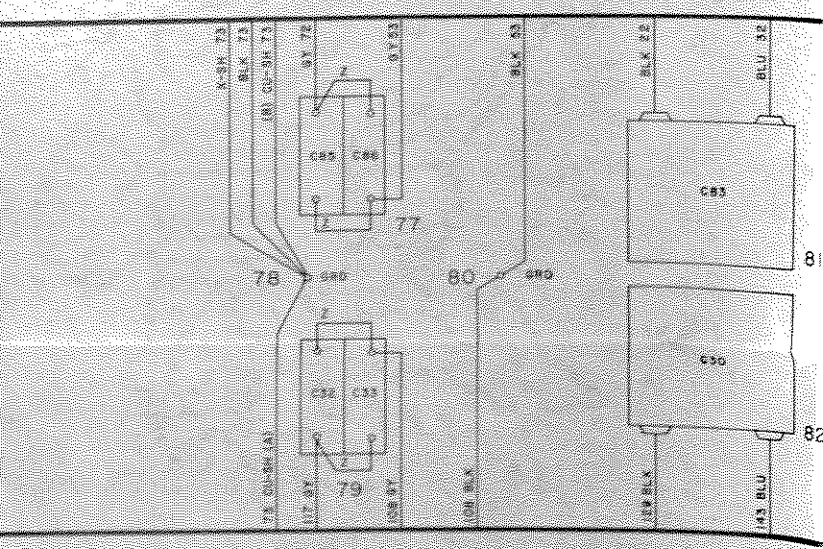
E. RESISTOR R26A (290 OHMS) HAS BEEN ADDED IN SERIES WITH RESISTOR R26 AND RESISTOR R136A (290 OHMS) HAS BEEN ADDED IN SERIES WITH RESISTOR R136.





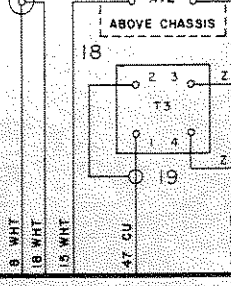
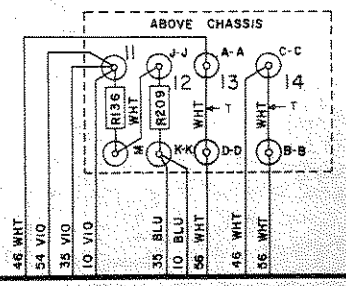
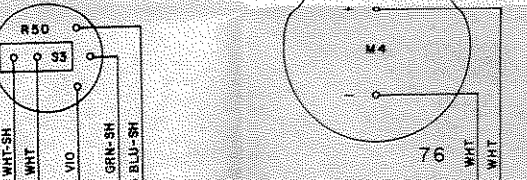
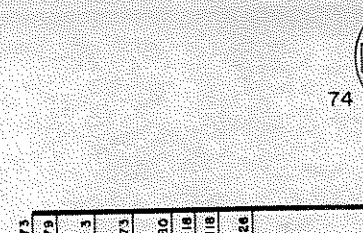
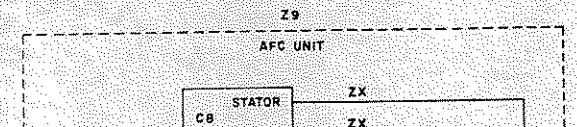
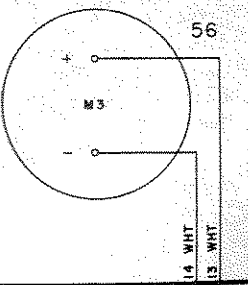
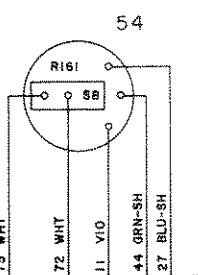
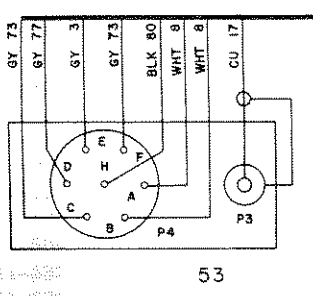
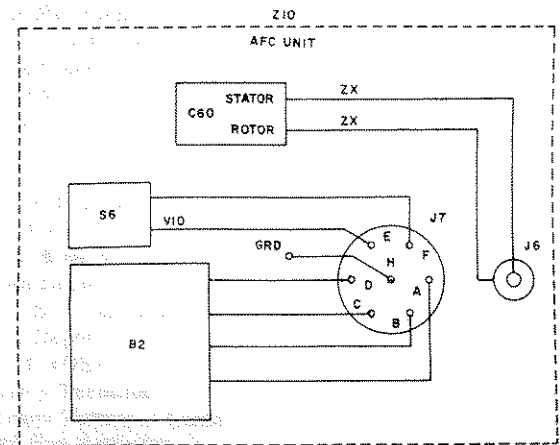
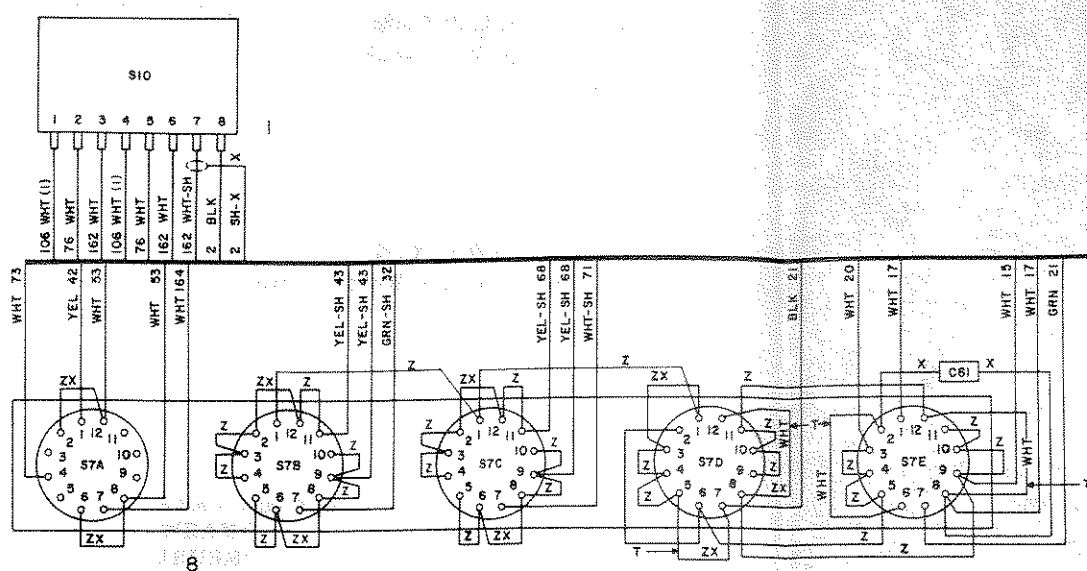


- NOTES:
1. ALL WIRES BEARING A COLOR DESIGNATION ARE 24 GA. STRANDED UNLESS OTHERWISE CODED.
  2. "M" DENOTES 20 GA. STRANDED.
  3. "A" DENOTES 18 GA. STRANDED.
  4. "D" DENOTES 14 GA. STRANDED.
  5. "SH" DENOTES SHIELDED WIRE.
  6. "CU" DENOTES COAXIAL CABLE.
  7. "Z" DENOTES 22 GA. BARE BUSS WIRE.
  8. LEADS NOT CODED WITH ANY OF THE ABOVE DESIGNATIONS ARE A PART OF THE COMPONENT.
  9. "X" DENOTES LEADS COVERED WITH SLEEVINGS.
  10. DENOTES STANDOFF TIE POINT TERMINAL.
  11. "T" DENOTES 22GA. STRANDED.

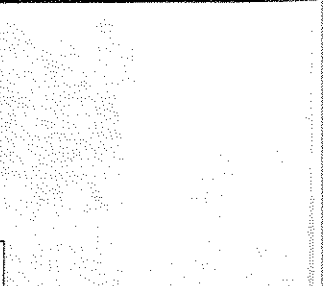
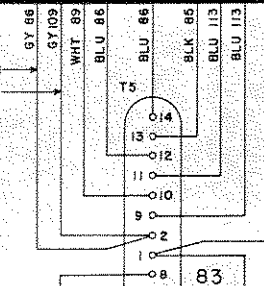
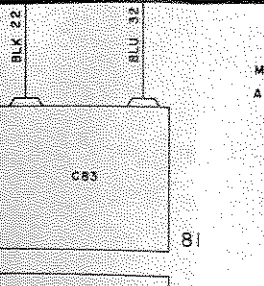
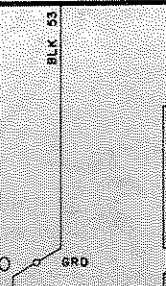
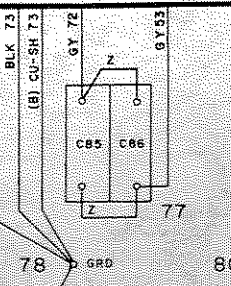




WENT M. JONAS  
United States  
Adjutant General



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  11. "1" DENOTES 22GA STRANDED.







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 10. "O" DENOTES STANOFF THE POINT TERMINAL.  
 11. "T" DENOTES 22GA STRANDED.

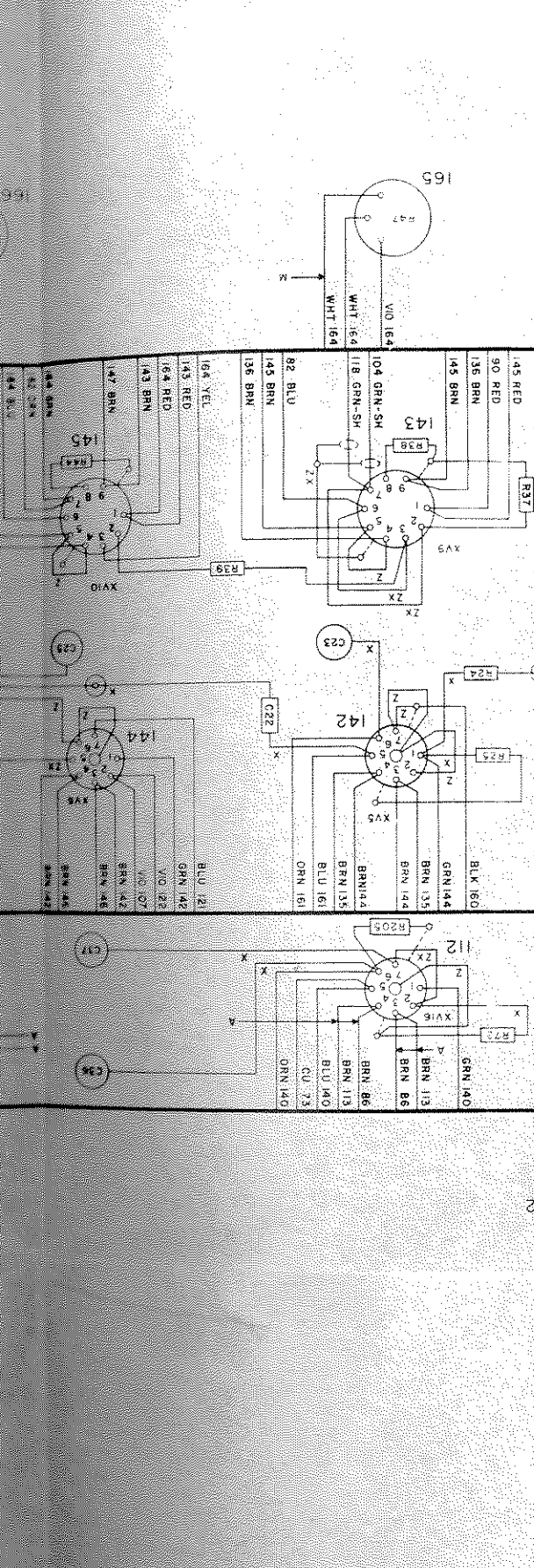
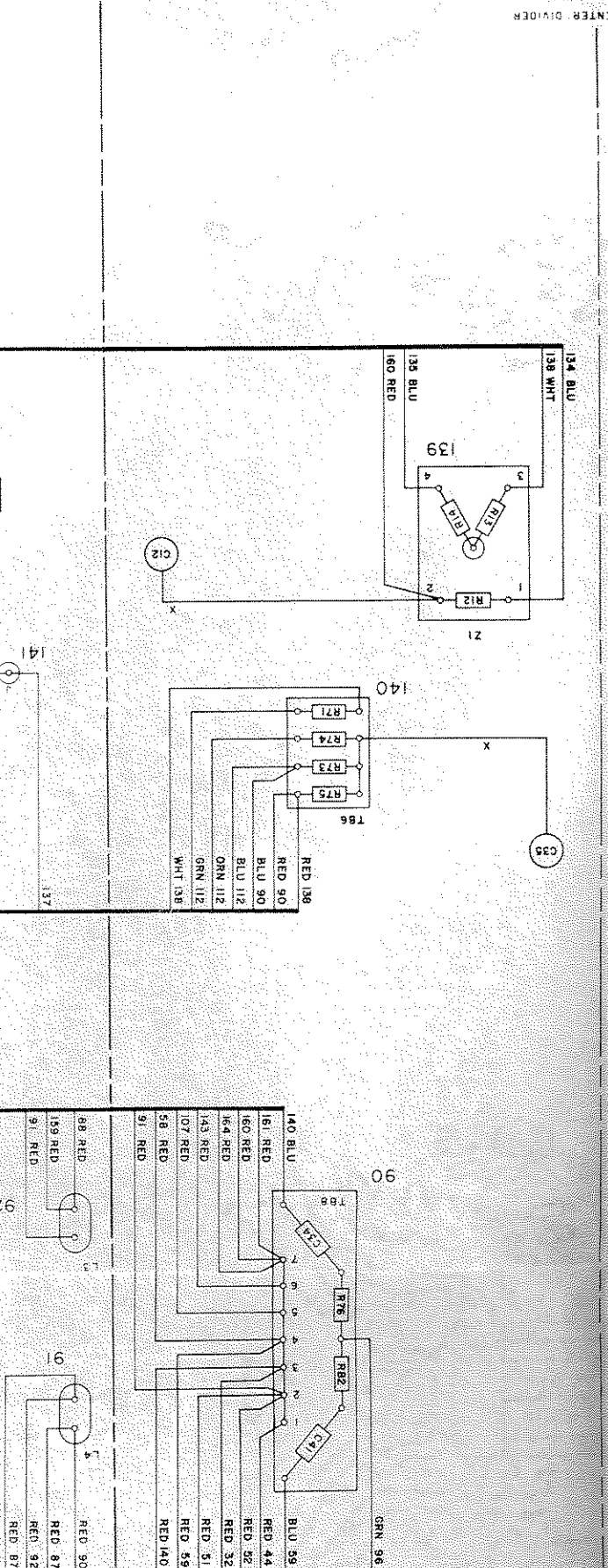
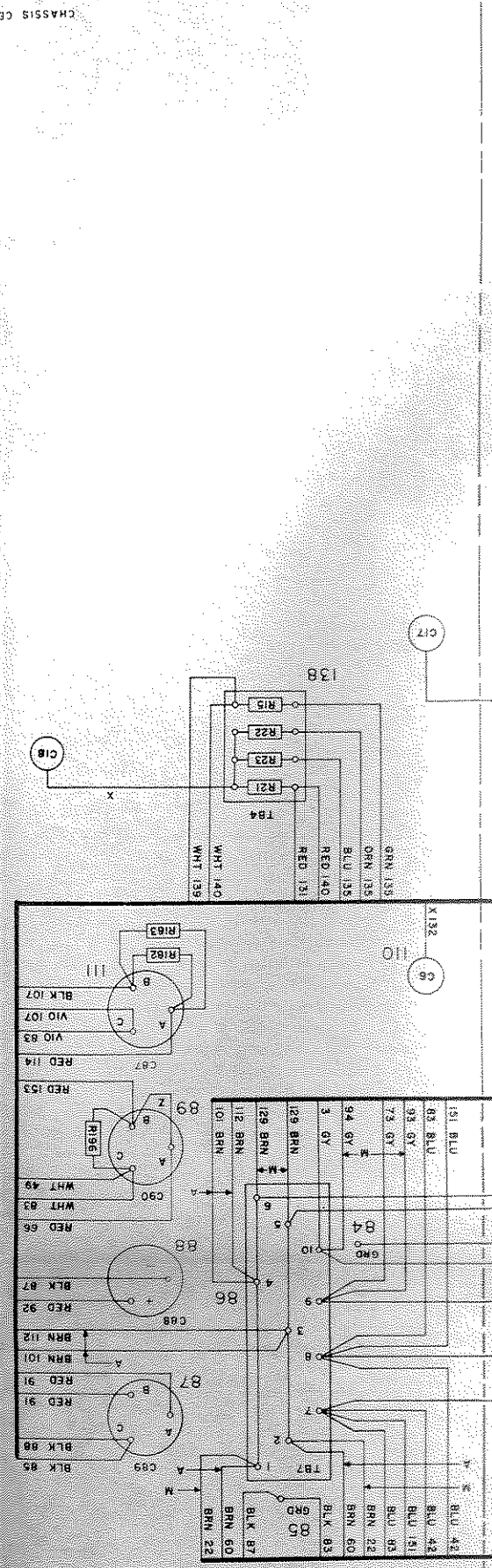
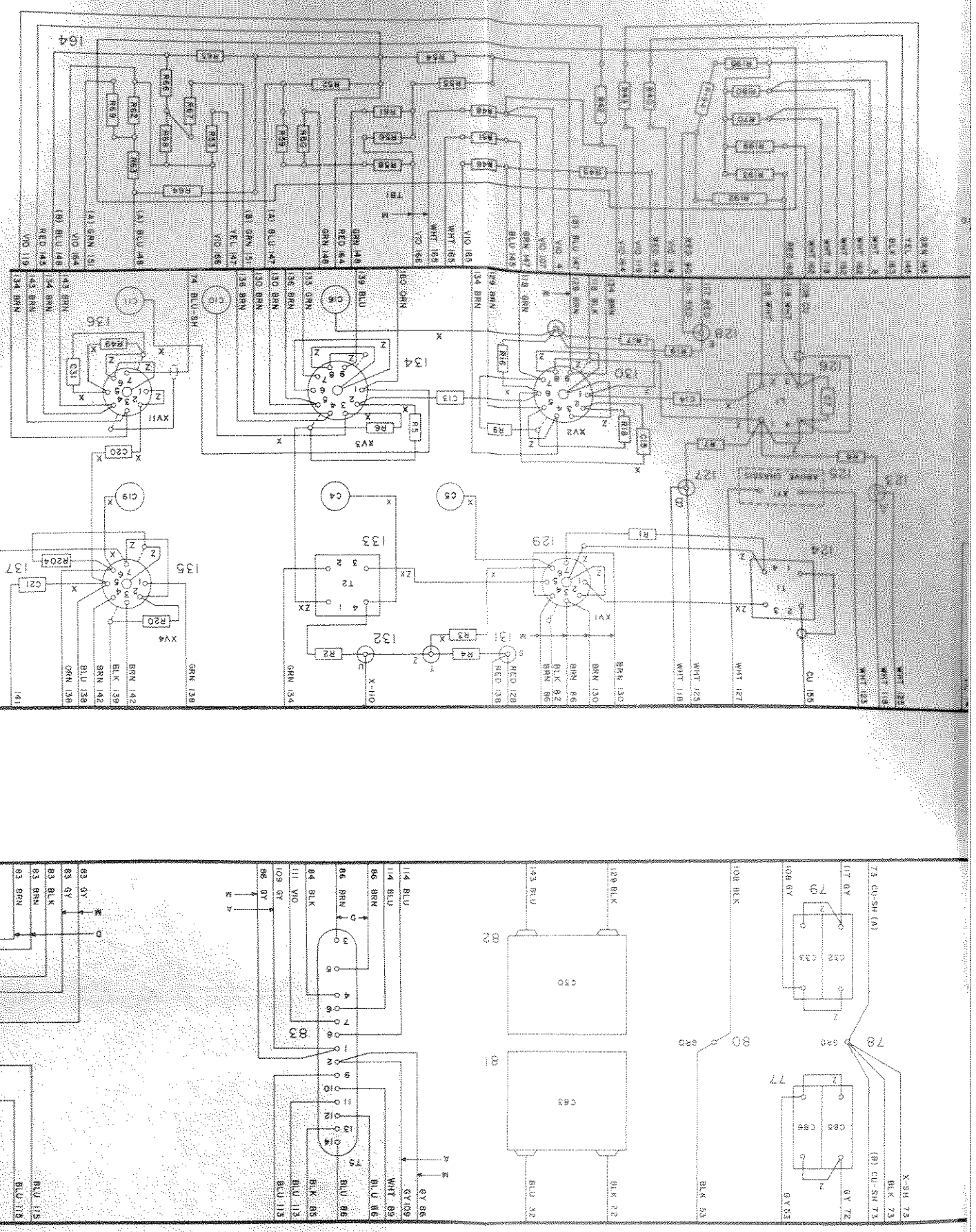
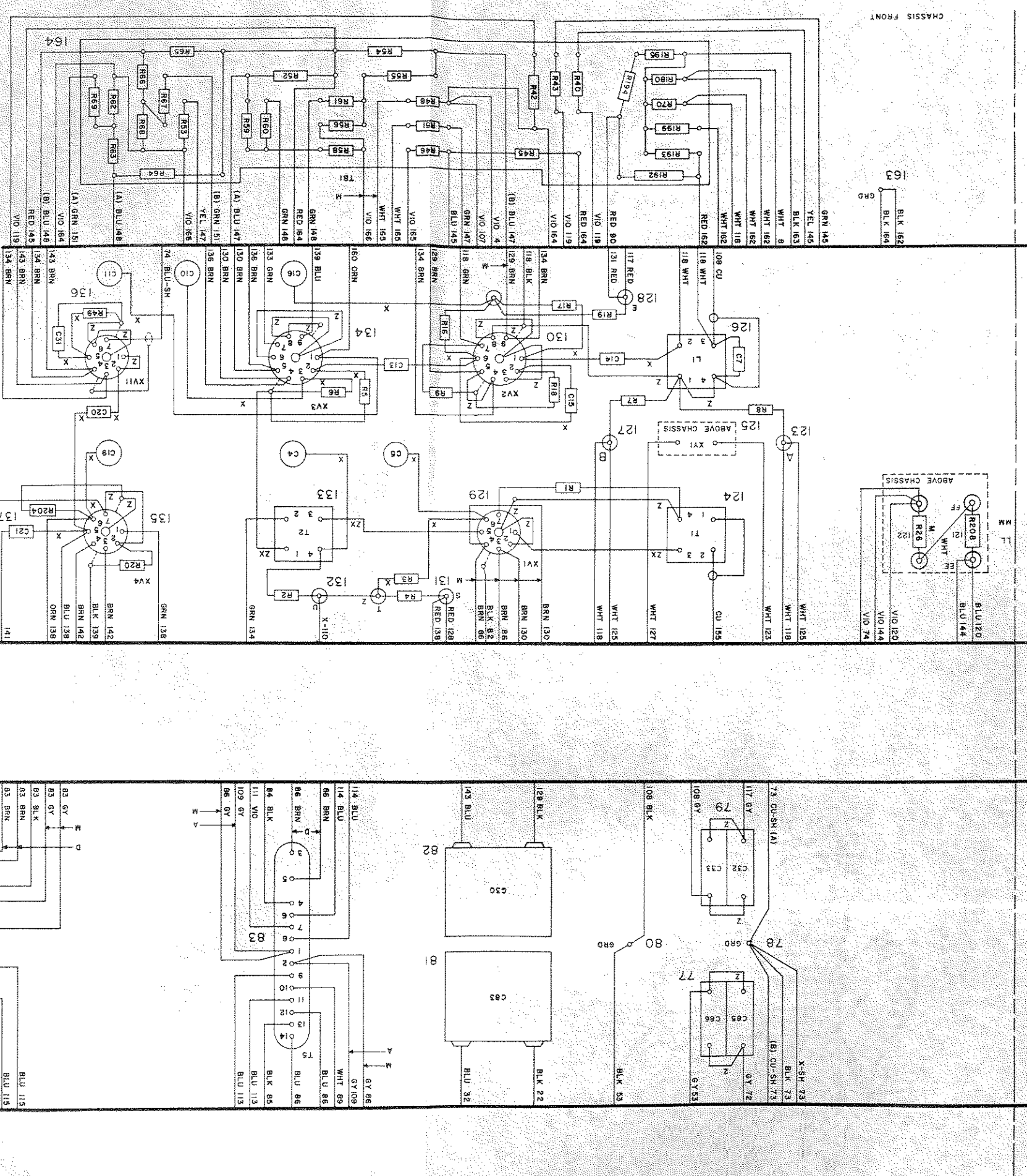
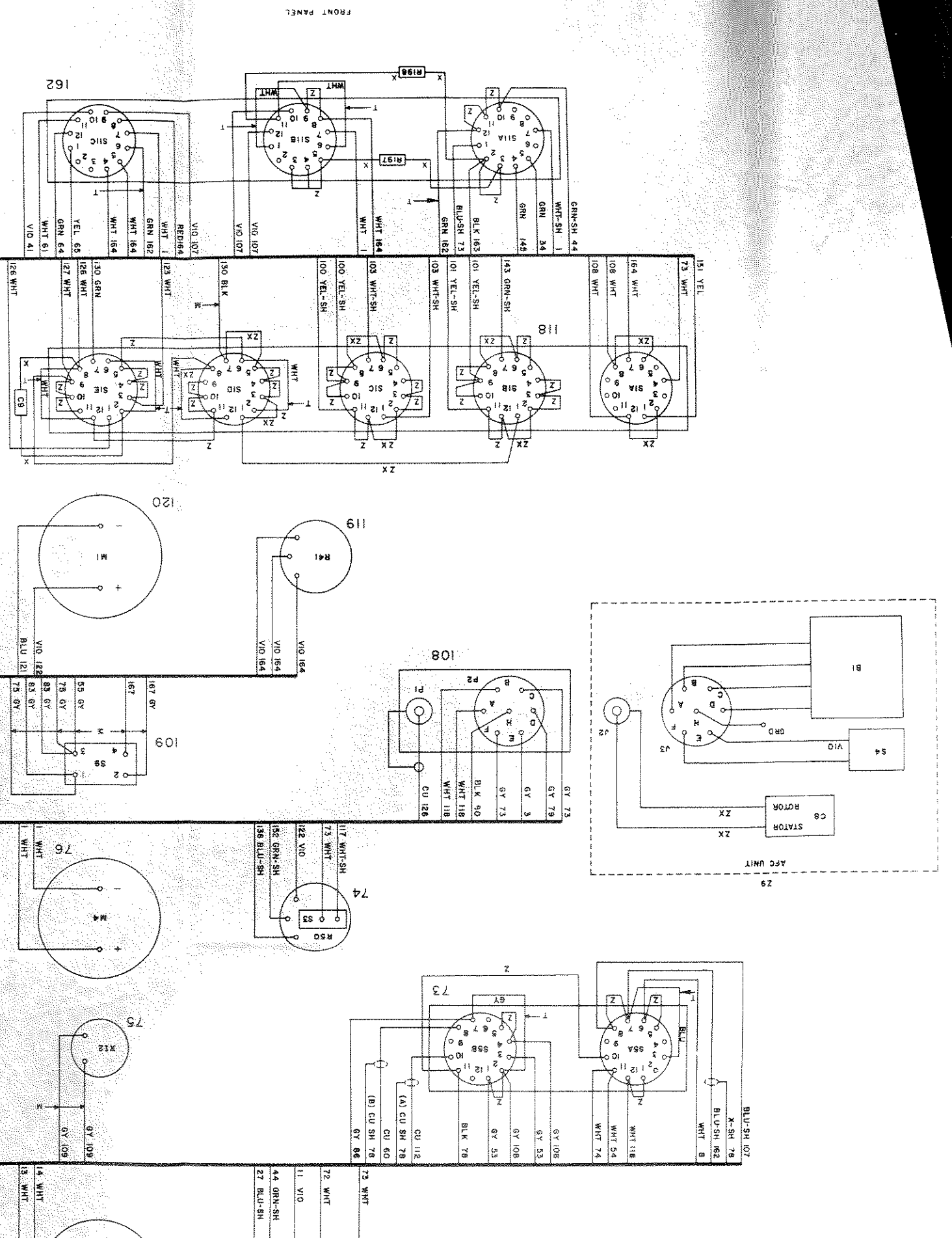


Figure 65 (Added) Frequency Shift Converter CV-116A/URR, cabling diagram.

CHASSIS CENTER DIVIDER





11. T DENOTES 22GA STRANDED.  
 10. DENOTES STANDOFF THE POINT TERMINAL.  
 9. X DENOTES LEADS COVERED WITH SLEEVING.  
 8. LEADS NOT COVERED WITH ANY OF THE ABOVE DESIGNATIONS ARE A PART OF THE COMPONENT.  
 7. 151 BLU

BY ORDER OF THE SECRETARIES OF THE ARMY AND THE AIR FORCE:

MAXWELL D. TAYLOR,  
*General, United States Army,  
Chief of Staff.*

OFFICIAL:

HERBERT M. JONES,  
*Major General, United States Army,  
The Adjutant General.*

N. F. TWINING,  
*Chief of Staff, United States Air Force.*

OFFICIAL:

J. L. TARR,  
*Colonel, United States Air Force,  
Air Adjutant General.*

Distribution:

*Active Army:*

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CNGB	WRAMC
Tec Svc, DA	JBUSMC
Tec Svc Bd	USAMS
Hq CONARC	Engr Maint Cen
CONARC Bd	Mil Dist
CONARC Bd Test Sec	Units org under fol TOE:
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USA Air Def Comd	6-317
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Trans Terminal Comd	11-587
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Sig Fld Maint Shops	11-597
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USAACS	17-55
USA Sig Pub Agency	20-45
USA Sig Sup Agency, Phila	20-46
USA Sig Comm Engr Agency	20-300
USA Cnl Cen	32-51
Sp Wpn Comd, Sandia Base	32-55
USA White Sands Sig Agency	32-56
USA Elet PG	

NG: State AG; units—Same as Active Army.

USAR: None.

For explanation of abbreviations used, see SR 320-50-1.