AUTOVON AND FTS

MODULAR AUTOMATIC CONFERENCE ARRANGEMENT

SWITCHED SERVICE NETWORKS

CONTENTS PAGE

1. GENERAL

1.01 This section provides testing procedures for the Modular Automatic Conference Arrangement (MACA) used on the Automatic Voice Network (AUTOVON) and the Federal Telecommunications System (FTS).

1.02 When this practice is reissued, the reason(s) for reissue will be listed in this paragraph.

1.03 The AUTOVON system affords the Commander-In-Chief North American Air Defense (NORAD) a flexible backup conferencing arrangement for existing conference systems. It consists of various conference bridges in locations remote from NORAD headquarters which are accessed through the switched network.

1.04 MACA, which can serve as a backup communications system, will access conferences on many subnetworks such as Joint Chiefs of Staff (JCS), Primary Voice Alert system (PVAS), Weapons Alert System (WAS) and overseas conferees. In addition to its military mission, MACA is used by other federal agencies such as the office of Civil Defense, the Federal Aviation Administration, and the General Services Administration.

1.05 MACA combines many features provided in the Automatic and Ad-Lib Conference services. Basically, it enables an authorized subscriber to automatically or manually initiate and control a group conference through bridging equipment at switching centers.

1.06 The originator of a conference call has the capability to establish one of five preprogrammed conference patterns. The basic bridge has one calling originator port and nine called conferee ports. Each called conferee port can be programmed for five primary and five alternate telephone numbers. This means a total of 45 different conferees, each with a primary and alternate number, would be available for assignment in the five preprogrammed conferences.

1.07 Figure 1 illustrates, in block diagram form, the transmission level and lineup characteristics of the MACA. Typical equipment layouts are depicted in Fig. 2 for list 1 through 6 bridges and in Fig. 3 for list 7 through 17 bridges.

Note: Trouble Reporting and Release Procedures for the MACA will be established by the Service Manager.

2. TEST EQUIPMENT

2.01 The following test equipment is recommended:

- Volt-ohm meter (VOM [KS14510, L1, or equivalent])
- Digital electronic counter
- Signaling test set or equivalent (for control logic and interface lineup test [Part 3C])
- 4×4 TOUCH-TONE® source (for control logic and interface lineup test [Part 3C])

Note: This source can be obtained from a test board equipped with a T-T transmitter or from a telephone with access to a switch associated with the conference arrangement. The telephone would allow for direct access from the switch and eliminate the need for a signaling test set.

- 2—2P4C cords (6' with 310 plugs on each end)
- 1—2W9A cord (9.5' with tips on one end and a 310 plug on the other).

3. BRIDGE TEST PROCEDURES

3.01 The following bridge test procedures apply to lists 1 through 17 bridges. Various test differences occur between lists 1 through 6 and lists 7 through 17 bridges, and are so noted.

A. Preliminary Lineup

3.02 ***Power Check:***

(a) Remove all circuit packs from the shelves of the MACA before any power is applied to the bay. Install fuse or operate circuit breaker in the -48 volt power lead to the conference arrangement, and check the voltage on the -48 volt bus on the power panel with a VOM.

CAUTION: On early models the main power filter must be on the line side of the fuse. Failure to meet this requirement may cause damage to the power cubes when power is applied.

Item (b) applies only to list 1 through 6 bridges.

(b) The following voltages should be seen on the terminal strip (TSA) after the -48 volts has been applied to the bay.

TS(A)-Terminal	Voltage
1	+24
2	to 7 +5
8	-5

Item (c) applies only to list 7 through 17 bridges

(c) The following voltage will appear on terminal 4 of the power cubes:

52TR5 Nos. 1 through 8 +5 volts
12TRC1 No. 1 +24 volts

(d) If any of the voltages are missing (other than missing +5 volts on terminal 6 which is not included on the basic 10 port bridge) remove the -48 volt fuse or operate circuit breaker and check the wiring according to drawing FA25231 B25A-Q.

(e) If the wiring is correct and the voltages are still missing, remove the -48 volts fuse or operate circuit breaker and remove the wiring from the output leads of the associated power modules. Replace the -48 volt fuse or operate circuit breaker and measure the output of the modules that have the output leads removed. Since each power module generator furnishes a 40-volt square wave to the power module rectifiers, the generator should be checked if the two associated power rectifiers are not furnishing power.

CAUTION: Replace the defective unit only after removing the -48 volt fuse and a check of the -48 volt bus on the power panel indicates no voltage. (Newer models have a -48 volt circuit breaker.)

3.03 ***Fuse Panel Check:***

(a) Complete the power check that is covered in paragraph 3.02 and fuse the -48 volt power feed or operate circuit breaker.

Item (b) applies only to list 1 through 6 bridges

(b) Check for the following voltages on the power busses on the fuse panels with a VOM test set.

FUSE PANEL	GROUP	VOLTAGE
A	1-5	+5
A	6	+24
B	1	+5
B	2	-5
B	5	-48

Item (c) applies only to list 7 through 17 bridges

(c) Check for the following voltages on the fuses on the fuse panel with a VOM test set.

FUSE NO.	VOLTAGE	FUSE NO.	VOLTAGE
1	+5	7	+5
2	+5	8	+5
3	+5	9	+24
4	+5	10	-48
5	+5		
6	+5		

(d) If any of the voltages are missing, remove the -48 volts fuse or operate circuit breaker and check the wiring according to drawing FA25231 B26A-D (B26E-H for list 7 through 17 bridges). If the wiring is correct and the voltages are still missing, check the power modules as described in paragraph 3.02.

3.04 Insert fuses into holders that have circuit packs wired to them on the fuse panel and make the following checks for voltages at the circuit panel terminals on the back of the bay.

The following checks apply only to list 1 through 6 bridges.

SHELF	CARD LOCATION	VOLTAGE	TERMINAL PINS
Misc.	J1-J12	+5	16, T
1	J, J3-J8, J12-J19	+5	16, T
	J9-J11	+5	22, Z
	J1	+24	U
	J2, J19	+24	22, Z
2A-D	J1-J15	+5	16, T
4A-L	J1-J10	+5	22, Z
	J1, J3, J5, J7, J9	+5	4
	J1, J3, J5, J7, J9	-5	5
5A-C	J1, J3, J5, J7	-48	22
	J10-J19	+24	22, Z
Test	J1-J7	+5	22, Z
Center	TB 1	+5	9, 10

The following checks apply only to list 7 through 17 bridges.

SHELF	CARD LOCATION	VOLTAGE	TERMINAL PINS
Misc.	J4-J10	+5	16, T
	J8	+5	22, Z
1	J3, J5-18	+5	16, T
	J1-2	+5	22, Z
	J3	+24	U
	4	+24	22
2A-D	J1-J15, 16, 17, 18	+5	16, T
4A-L	J1-J10	+5	22, Z
5A-C	J1, J3, J5, J7	-48	22
Program Panel	TSA 17	+5	

3.05 If any of the voltages are missing, refer to drawings FA25231 W74-83 (T-W1-350 for list 7 through 17 bridges) for wiring errors. Before any changes are made to the wiring, the -48 volt fuse should be removed or the circuit breaker operated and a check of the power panel should be made for no voltage.

3.06 ***Fuse Alarm Check:***

(a) Insert the circuit pack CP 5 into J19 on the miscellaneous shelf.

(b) Insert a blown fuse into one of the fuse groups (alarm sockets for list 7 through 17 bridges). The group light (fuse light for list 7 through 17 bridges) should light and the central office alarm should operate. If the test is successful, remove the blown fuse and insert in each fuse group on the fuse panels until all groups have been tested.

(c) If the group light should fail to light, check the bulb to see if operable. If the bulb checks good, then check the wiring according to drawing FA25231 W124 (B26G-H for list 7 through 17 bridges).

(d) If the wiring and bulb check good, then verify if the fuses and relays on circuit pack CP 5 are good.

3.07 ***Power Check of the Multiport Bridge:***

(a) Remove all plug-in units from the bridge shelves. Insert the J87304A-L1 converters into the special converter shelf.

(b) Insert the -48 volt fuse or operate circuit breaker that powers the multiport bay, and check the B terminal on Fuse F7 on the fuse and alarm panel ED-5G073-30 for -48 volts.

(c) Measure the C terminal of fuse F1 to F5 for -24 volts.

(d) If any of the voltages are missing, check the fuses and the wiring according to drawing FA25231 B27A-F.

3.08 ***Multiport Alarm Check:***

(a) Place a blown fuse into any fuse holder F1-F5. The FA 1 lamp should light and the central office alarm should operate.

(b) Remove the J87304A-L1 converters from the shelf. Lamp VA 1 or VA 2 should light and the central office alarm should operate. If the central office alarm does not operate, verify the wiring according to drawing FA25231 B27A-F.

3.09 ***Check of Power to Multiport Bridge Terminal Connections:***

(a) Verify all fuses are inserted in the fuse and alarm panel and that the -48 volts fuse has been inserted or circuit breaker operated in the main power feed.

(b) Measure pin 20 on each connector that is located at positions J2-J4, J6-J8, J10-J12 for -24 volts. If any voltage is missing, check the wiring according to drawings FA25231 W125-W135 (T-W320-W for list 7 through 17 bridges).

(c) Insert all multiport plug-ins into their respective locations in accordance with drawing FA25231 E11.

3.10 Remove the -48 volt fuse or operate circuit breaker that powers the MACA and insert all the remaining circuit packs in the bay. The locations for various circuit packs can be found in drawings FA25231 D4A-H. Check the locations of the circuit packs and that the proper cards have been inserted. Replace the -48 volt fuse or operate circuit breaker in the main power feed.

3.11 ***TOUCH-TONE Receiver Alignment***

(a) Adjust a digital counter to read frequency. All connections and adjustments to the TOUCH-TONE receiver will be made on the card itself. Each MACA that uses a TOUCH-TONE receiver in the control equipment will have a card located in position J11 on shelf #1, (position J3 on miscellaneous shelf for list 7 through 17 bridges). If the MACA has a test center, a TOUCH-TONE receiver will be behind the swing-up panel face.

(b) Connect the digital counter to the following test points and adjust the associated potentiometer for the proper frequency.

TEST POINT	POTENTIOMETER	FREQUENCY
L1	R1	697 Hz
L2	R3	770Hz
L3	R5	852Hz
L4	R7	941 Hz
H1	R9	1209 Hz
H2	R11	1336 Hz
H3	R13	1477 Hz
H4	R15	1633 Hz

Items (c) and (d) apply only to list 1 through 6 bridges.

(c) Repeat the same lineup procedure on the TOUCH-TONE receiver card that is located inside the test center panel.

(d) Located on the test center panel are both a TOUCH-TONE transmitter and receiver test set. Turn both sets on by operating the key associated with each set. Connect a 2P4C cord from the transmitter output jack, which is located directly under the transmitter switch, to the receiver input jack, which is located directly under the receiver switch on the TOUCH-TONE test set. Press the CLEAR button to clear any information that may appear in the digital readout on the TOUCH-TONE test set. Press each key on the TOUCH-TONE pad that is associated with the transmit control. As each number is pressed, the digital display should record the same number that was pressed until twelve display readouts have been used. Clear the display again, and press the four remaining keys on the TOUCH-TONE pad that have not been tested. The indications that should be received are shown in drawing FA25231 B9E.

(e) ***Answer Notification Tone:***

(1) Adjust the digital counter to read frequency. All connections and adjustments to the answer notification tone will be made on the CP 1A itself. The card is located on Shelf #1 positions J1 (J3 for list 7 through 17 bridges).

(2) Connect the digital counter to TEST points TP 3 and 4 and adjust R16 to obtain a reading of 700 Hz.

(f) ***Conference Alert Tone:***

(1) Adjust a digital counter to read frequency. All connections and adjustments to the conference alert tone will be made on the CP 20 itself. The card is located on the miscellaneous shelf position J17 (J7 for list 7 through 17 bridges).

(2) Connect the digital counter to the following test points and adjust the associated potentiometer for the proper frequency.

TEST POINT	POTENTIOMETER	FREQUENCY
TP 3	R8	4Hz
TP 4	R7	900Hz*
TP 5	R6	1400Hz*

*Both tone generators can be adjusted for other frequencies upon request.

(g) ***Auto-Dialers:***

(1) Adjust a digital counter to read frequency. All connections and adjustments to the auto-dialers will be made on the CP 8 itself. The cards are located on shelf #4, positions J1, J3, J5, J7, and J9.

(2) Connect the digital counter to the following test points and adjust the associated potentiometers for the proper frequency.

TEST POINT	POTENTIOMETER	FREQUENCY
TP C	R7	10Hz
TP D	R11	440 Hz
		568 ± 1Hz for Automatic Electric Company switch

(h) *Option Straps*

(1) Check all CP 8s for the proper timing straps. The option straps are located on the strapping block AZ on the circuit board. The normal straps are as follows:

- DIAL TONE TIMING: PINS 15 to 2
- NO ANSWER TIMING: PINS 16 to 3
- RECYCLE TO ALTERNATE NUMBER: PINS 13 to 14, 11 to 12
- RECYCLE TO REGULAR NUMBER: PINS 12 to 13, 11 to 14

Other timing straps may be used by referring to FA25231 B8D.

(2) Check CP 15 for the proper option straps. The option straps are located on the circuit board. The normal straps are pins 1 to 6 and 2 to 4.

(3) Check CP 20 for the proper option straps. The option straps are located on strapping block L and M on the circuit board. The normal strap is block M, pins 15 and 16. If automatic timeout is required refer to FA25231 B20B to obtain timeout times.

(4) Check all CP 22s for the proper option straps. The option straps are located on the circuit board. The first CP 22 located on shelf 5A position J1 should have a strap from pins C to D. All CP 22s should have a strap from pins A to B.

B. Multipoint Bridge Lineup

3.12 Perform all power checks covered in paragraph 3.02.

3.13 Adjust the 21A TMS or TTS 4ANH or equivalent oscillator and level meter to the following settings.

Note: 600-ohm bridged readings with21A TMS will cause incorrect measurements.

OSCILLATOR	LEVEL METER
1000 Hz Frequency	Tune to 1000 Hz Frequency generated
600 ohm impedance	Bridged or High Impedance
0.0 dB level output	0.0 dB to +10 dB Scale

3.14 Insert one end of a 2P4C cord into the receiver BDG IN jack of the originator on the jack field, and the other end into the output of the oscillator. Insert the 310 plug end of the 2W9A cord into the input of the level meter and the tip end of the cord into the TRMT 1 pin jacks on the front of the bridge unit associated with the originator's port. See drawing FA25231 E12 for the location of the associated bridge units.

3.15 The level meter should read 0.0 dB at this point. If the reading is not 0.0 dB, then adjust the TRMT ADJ screw on the front of the originator's SW GAIN AMP until this level is reached. (See FA25231 E12 for location of SW GAIN AMP.)

3.16 Move the 2P4C cord from the originator's port to the receive BDG IN jack of the first conferee port on the jack field. Move the tip end of the 2W9A cord from the TRMT 1 jack of the first bridge unit to the TRMT 2 jack of the same bridge unit. The reading should be 0.0 dB at the TRMT2 jack. If the reading is not 0.0 dB, adjust the TRMT ADJ screw on the SW GAIN AMP that is associated with the conferee port #1.

3.17 Continue through the rest of the conferee—receive BDG IN jacks and TRMT 1 and 2 jacks. The TRMT 1 jack will be used for the even numbered conferee ports and the TRMT 2 jacks will be used for the odd numbered conferee ports.

3.18 Line up the receive amplifiers as follows:

OSCILLATOR	LEVEL METER
1000 Hz Frequency	Tune to 1000 Hz
600 ohm Impedance	600 ohm Impedance
0.0 dB Outpu	0.0-10 dB Scale

3.19 Patch a 2P4C cord from the output of the oscillator to the receive BDG IN jacks of the originator. Patch a 2P4C cord from the input of the level meter to the transmit BDG IN jacks of the first conferee port on the jack field. The reading on the level meter should be 0.0 dB, then adjust the RCV ADJ screw on the associated conferee's SW GAIN AMP. (See drawing FA25231 E12 for the location of the SW GAIN AMP.)

3.20 Move the cord from the level meter from the first conferee port transmit BDG IN jack to the second conferee port transmit BDG IN jack. Adjust the associated SW GAIN AMP for a 0.0 dB level. Continue this process of going from one conferee port transmit BDG IN jack to the next until all but originator's receiver amplifier have been adjusted.

3.21 Move the cord that comes from the oscillator to any one of the conferee port receive BDG IN jacks and move the cord from the level meter from the first conferee port transmit BDG IN jack to the originator's port transmit BDG IN jack. Adjust the originator's SW GAIN AMP to obtain a 0.0 dB level on the output.

C. Control Logic and Interface Lineup

3.22 Patch a 2P4C cord from the transmit control output jack on the front of the test panel (TOUCH-TONE source for list 7 through 17 bridges) to the receive INF IN jack on originator. Operate the transmitter key so the light associated with the switch will light. Patch the L and D signaling leads from the 2* signaling set to the L and D jacks associated with the originator's port. Plug off all transmit EQ IN jacks of the conferees to open the circuits.

3.23 Operate the line and drop keys of the * signaling set so as to seize the MACA. Dial a precedence level (1-4) and then a pattern selection (1-5) with the dial on the * signaling set. This will store a precedence level and the dialing pattern in the MACA, and cut the originator's port through to the bridge. The light which is associated with the jacks used for the originator should light.

3.24 Using the TOUCH-TONE pad on the transmit control (TOUCH-TONE source for list 7 through 17 bridges), dial the control character "A" or "#" and the "85" code. This should stop the operation of the auto-dialer and thereby cause only the light emitting diode (LED) to light on the edge of the auto-dialer units.

3.25 Adjust the signal generator for 1000 Hz, 600 ohms impedance at -2.0 dB level. Patch a 2P4C cord from the output of the signal generator to the receive EQ IN jack of the originator.

3.26 Adjust the level meter to read on the 0.0 to +10 dB scale. Readings should be made on a bridged or high impedance basis. Patch a 2W9A cord from the input of the level meter to the tip jacks of the following 4 pack amplifier cards, CP 10, and adjust the associated potentiometer to obtain a 0.0 dB level.

AMPLIFIER CARD	TEST POINTS	POTENTIOMETER
Shelf 1-J2 (J4 for List 7-17 Bridges)	TP 1&2	R9
Shelf 1-J2 (J4 for List 7-17 Bridges)	TP 5&6	R11

The following checks (paragraphs 3.26 through 3.36) should be made where applicable.

3.27 Remove cord from the receive EQ IN jack of the originator and patch to the receive BDG IN jack of the first conferee. Raise the level of the signal generator to a 0.0 dB output level. Change the 2W9A cord that is connected into the level meter to a 2P4C cord and change the impedance from bridged to 600 ohms. Patch the free end of the cord from the level meter into the originator's transmit DBG IN jack. The level should be 0.0 dB; if not, adjust per paragraph 3.21.

3.28 Remove the cord from the originator's transmit BDG IN jack and patch to originator's transmit jacks. Adjust the associated amplifier for a -2.0 dB level.

JACK	AMPLIFIER CARD	POTENTIOMETER
EQ IN	Shelf 1-J2 (J4 fir List 7-17 Bridges)	R10
INF IN	Shelf 5A-J19	R9

3.29 Lower the level of the signal generator to -2.0 dB and patch the output to the conferee port receive INF IN jack. Change impedance of the level meter from 600 ohms to a bridge reading. Change the cord on the level meter to a 2W9A cord and patch to the following 4 pack amplifier cards, CP 10. Adjust the associated potentiometers for a 0.0 dB level. Move the signal input cord to the next conferee port receive INF IN jack for each measurement.

PORT	AMPLIFIER CARD	TEST POINTS	POTENTIOMETER
01	Shelf 5A-J19	TP 7&8	R12
02	J18	TP 3&4	R10
03	J18	TP 7&8	R12
04	J17	TP 3&4	R10
05	J17	TP 7&8	R12
06	J16	TP 3&4	R10
07	J16	TP 7&8	R12
08	J15	TP 3&4	R10
09	J15	TP 7&8	R12
10	J14	TP 3&4	R10
11	J14	TP 7&8	R12
12	J13	TP 3&4	R10
13	J13	TP 7&8	R12
14	J12	TP 3&4	R10
15	J12	TP 7&8	R12
16	J11	TP 3&4	R10
17	J11	TP 7&8	R12
18	J10	TP 3&4	R10
19	J10	TP 7&8	R12

3.30 Return the signal generator to the originator's receive BDG IN jack. Raise the level of the signal generator to a 0.0 dB level. Change the cord on the level meter to a 2P4C cord and change the impedance from a bridged reading to 600 ohms. Measure each port at the conferee port transmit INF IN jack and adjust the associated 4 pack amplifier card, CP 10, for a -2.0 dB level.

3.31 Adjust the level meter to read on the 0.0 to +10 dB scale. Readings should be made on a bridged or high impedance basis. Patch a 2W9A cord from the input of the level meter to jack 7 and 8 of 4 pack amplifier in shelf 1-J2 (J4 for list 7 through 17 bridges).

PORT	AMPLIFIER CARD	POTENTIOMETER
01	Shelf 5A-J19	R11
02	J18	R9
03	J18	R11
04	J17	R9
05	J17	R11
06	J16	R9
07	J16	R11
08	J15	R9
09	J15	R11
10	J14	R9
11	J14	R11
12	J13	R9
13	J13	R11
14	J12	R9
15	J12	R11
16	J11	R9
17	J11	R11
18	J10	R9
19	J10	R11

3.32 If conferencing arrangement is equipped with conference alert tone option "A", release originator port and re-seize as in paragraph 3.24. This operation will automatically activate the conference alert tone.

3.33 If MACA is equipped with conference alert tone options "B" or "C", use TOUCH-TONE transmitter to activate conference alert tone by dialing A71.

> ***Note:*** On option "C" tone must be released manually by dialing # or A70.

3.34 Measure the conference alert tone on level meter. Adjust R12 on an amplifier card in shelf 1-J2 (J4 for list 7 through 17 bridges) for zero dB on the level meter.

> ***Note:*** If the time interval provided for tone activation is not long enough for adjustment, remove strap block M on CP 20. The tone will remain on until control code # or A70 is dialed to release conference alert tone.

3.35 Remove all cords and test sets from the MACA and restore the conference ports to normal operation.

4. PROGRAMMING THE AUTO-DIALERS

A. List 1 Through List 6 Bridges

4.01 Obtain a release of the MACA from the customer.

4.02 Operate the PROGRAM switch on the programmer panel. The lamp directly below the switch should light.

4.03 Select the port of the MACA where the telephone number is to be stored. This is accomplished by adjusting the two left-hand thumb wheel switches. The far left thumbwheel will select the "tens" number and the second from the left thumbwheel switch will select the "units" number of the port.

Thumb Wheel Switch	Port
01	1
02	2
—	—
58	58

4.04 Select the proper memory chip as shown below by the second from the right-hand thumbwheel switch.

	SELECTOR POSITION	PATTERN	PATTERN LEAD	SELECTED GATE	LEAD	MEMORY CHIP
	1	A	80	N1	CS 1	A1
	2	B	81	Q1	CS 2	A2
REG	3	C	82	Q2	CS 3	A3
	4	D	83	P1	CS 4	A4
	5	E	84	P2	CS 5	A5
	6	A	80	N2	CS 6	A6
	7	B	81	P3	CS 7	A7
ALT	8	C	82	R1	CS 8	A8
	9	D	83	Q3	CS 9	A9
	10	E	84	N3	CS10	A10

4.05 Set the far right thumbwheel switch to the number (0). This will set the address lead to the first position in the memory storage of the memory chip.

4.06 Press the RESTORE and WRITE key to blank the first position of the memory chip.

4.07 Select the next address code (1) by the far right thumbwheel switch.

4.08 Press the numbered key on the key pad located on the programmer panel that corresponds to the first digit of the telephone number, eg, the number 1 of telephone number 123-456, and press the WRITE switch.

Note: Keep the WRITE switch depressed during number inputting.

4.09 If the precedence level is to be stored in the memory, the first digit stored will be the precedence level followed by the telephone number.

4.10 When the number is keyed, the number will appear on the numeric readout on the associated auto-dialer. Verify that the number showing is the number keyed and that the correct auto-dialer is operating.

4.11 Continue the process of selecting the address location, keying the next digit in the telephone number, and at the same time keep the WRITE switch operated until the last address (15 on the address thumbwheel switch) is reached.

4.12 After the last digit of the telephone number has been entered, select the next address location and press the RESTORE switch and the WRITE switch simultaneously. Continue to advance to the next address, and write-in the RESTORE for the remaining address locations. When the last address is reached (15), the DL light emitting diode (LED) on the associated CP 8 will light. Release switches.

4.13 When new telephone numbers are to be programmed into the memory, the memory does not have to be restored but only has to have the new number entered.

4.14 If a particular dialing pattern does not have a telephone number assigned for that particular port, then program the RESTORE into all the address locations associated with the memory chip.

4.15 Turn programmer off by pushing the PROGRAM switch, the program light should go off. Return the MACA to service.

B. List 7 Through 17 Bridges

Fast Programmer Units

4.16 Associated with each conferee port is an auto-dialer unit (CP 8 and CP 9) that can store a regular and alternate telephone number up to 14 digits for five different calling patterns. Any of the 16 positions on a 4 × 4 TOUCH-TONE pad [except the star (★) or asterisk(*)] can be stored in the auto-dialer. The star or asterisk is used to blank out or restore unused memory cells.

4.17 On each CP 9 there are 10 random access memory (RAM) units. RAM units 1 to 5 are used to store the regular telephone numbers for patterns A through E. The alternate telephone numbers are stored in RAM units 6 to 10. Each RAM has 16 memory bins with the first and last bin blanked. This allows numbers up to 14 digits to be stored in each RAM.

4.18 Conferee telephone numbers are stored in the auto-dialer units by means of a programmer unit that is part of the MACA. This programmer is comprised of a 16-button pad and card dialer, control buttons, and LED display located on programmer card CP 18C.

4.19 The control buttons AD, NU, PT, and PU make it possible to select any particular port, RAM, or memory bin. Each time one of the control buttons is operated, it steps to the next digit as displayed by its respective readout on CP 18C.

4.20 The display is also stepped or cycled by the operation of the pad or card dialer. The 4 readouts on CP 18C display the counting chain used to select the ports, RAMs, and memory bins. When each successive part of the chain reaches its full count, it resets and steps to the next part. The count for each readout and its corresponding display is, in order

AD	NU	PU	PT
0-15	0-10	0-9	0-5

0-9 displayed corresponds to count, 10 is displayed as "A", 11 as "B", 12 as "C", 13 as "D", 14 as "E", and 15 as "F".

4.21 The RS button is a master reset. When operated, it resets the programmer and blanks all readouts. Operate the PU button one time—the readout should display as follows:

0 on AD
1 on NU
0 on PT
1 on PU

The programmer is now ready to program part one.

Manual Programming of the Auto-Dialers

4.22 Press ON switch. This will light the switch and enable the programmer. Press the RS switch to reset programmer as in paragraph 4.21. Select the port to be programmed with PU and PT buttons. The PU indicates the units digit (0-9) and the PT indicates the tens digits (0-5) of the port number. The NU button selects the RAM 1-10 to be programmed (see paragraph 4.20 for 10 display). The memory bins 0-15 are selected by the AD button (see paragraph 4.20 for 10-15 display).

4.23 After the port and memory (RAM) have been selected with the conrol button, the actual telephone number can be loaded into the memories. The card dialer or 16-button pad can be used to load the auto-dialer memories. The AD Readout should display a zero (zero is the first memory bin and should be blanked or restored in all cases by pressing ★ on the 16-button pad or * on 12-button pad).

4.24 Each time one of the buttons on the pad is pressed this digit is stored in the memory bin—indicated on CP 18C and the programmer—and then automatically steps to the next bin. After blanking the first bin, the AD readout should have stepped from zero to a one (#1) display. The telephone number may now be programmed in by pressing appropriate digits on the pad. Use the ★ or * to blank unused memory bins including bin 15 which must always be blanked on all RAMs.

4.25 After the RAM is completely programmed it may be checked for correct storage. This is accomplished by again resetting and selecting the same port and memory. Then cycle through memory bins 0 through 15 with the AD button observing the readout on the auto-dialer (CP 9) being programmed for proper digits.

Automatic Programming of the Auto-Dialers

4.26 The auto-dialers can be programmed automatically by prepunching cards for all conferees' regular and alternate telephone numbers for all patterns. One card should be punched with all ★ or * to blank unused memories where necessary.

> *Note:* The first, last, and all unused positions of the card should be punched @ or * to blank unused bins in the memory.

4.27 Place prepunched card with conferees' telephone numbers in order 1 to 10 for each port (1 to 5 would be the regular conferee numbers and 6 through 10 the corresponding alternate conferee numbers). Put the lots of 10 in port order first to last.

4.28 Reset the programmer and step to port number 01 with PU button as displayed on CP 18C. Insert the cards into the card dialer and depress start button. Dial each of the cards in this manner, inserting the blanking card on unused memories (RAM). As each card is inserted and loaded into the auto-dialers, the CP 18C will display automatically the port, RAM, and memory bin numbers to be loaded next. The AD readout should always return to zero. Follow this process until all auto-dialers are loaded. The cards should be kept in order and updated for emergency loading. After programming of the auto-dialers is complete, disable the programmer by pressing the ON switch (switch lamp should go off).

C. Auto-Dialer Disabling

4.29 Each time an automatic conference is established, all auto-dialers will operate. In some cases not all ports are required on a given conference pattern. This being the case, all unused ports will continue to go for dial tone, outpulse nothing, timeout and repeat cycle every 20 to 60 seconds. This condition will exist until the originator dials a stop-dialing code (85), or until the conference is completed. The constant recycling of the dialer could cause switching machine troubles necessitating disabling the unused dialing units. There are two ways in which the auto-dialer can be disabled.

- A quiet termination number can be programmed into each unused port.
- For a given pattern, remove the pattern sense lead and ground the terminal at the card connector for each unused CP 8. The following are the terminals that should be disabled when particular patterns are not used.

PATTERNS	TERMINALS ON CP 8
A	B
B	C
C	D
D	E
E	F

The other bridge port functions will remain normal.

5. OPERATIONAL TEST PROCEDURES

A. General

5.01 Procedures for operational preservice testing require the use of plant test phones and (possibly) 101 test trunks. Establish test patterns by programming local plant test phone numbers to bridge patterns using as many numbers as are available. A list of control codes and associated functions is shown in Table A.

5.02 To test hot line capability, one plant test phone should be assigned a hot line. When the hot line number is included in a bridge pattern, special bridge assignment procedures must be incorporated to allow the bridge to originate a hot line call.

5.03 Even though all ports are not assigned, the following tests must be made on all ports by rotating available test phones from port to port until all are tested.

> ***Note:*** Testing must be done using both flat-footed A or # and or * for commands to bridge. To decrease testing time this should be done at each stage of testing.

B. Level Check

5.04 Dial up conferencer, using telephone number of the largest pattern, and hold while tests and lineups are made. Check transmitting and receiving level between originator's port and each output port. Also check levels from each conferee's port to all other ports. After lineups are completed, release conference.

C. Variable Procedence Check (AUTOVON Only)

5.05 Establish a nonpriority conference by dialing code to access Pattern A of conferencer. Confirm that all conferees answer. Isolate and clear troubles before further testing. When all conferees answer, dial # or A85 (stop auto-dialers). Using a plant test phone, preempt each conferee's line with a priority code P (priority). As each conferee is preempted, a short preempted tone should be heard by the conferencer. At random, try preempting the conferee by dialing a code of equal or lower level of precedence. The call should reach an announcement. When all conferees have been preempted, dial priority code P + conference number for pattern A. This should preempt the originator from conference and re-establish the same pattern to all conferees, but on the next step of precedence. Verify that all conferees answer.

5.06 Repeat preemption tests on all conferee's lines. Preempt conferencer (originator's port) by dialing priority code I (immediate) + conference number for pattern A. Verify that all conferees answer.

5.07 Repeat tests (paragraphs 5.05 and 5.06) using (F) flash and (FO) flash override precedence for pattern.

5.08 Repeat steps above (paragraphs 5.05 through 5.07) for patterns B, C, D and E on each level of precedence.

D. Ad-Lib Feature Check

5.09 ***Ad-Lib Mode:*** Establish conference to any pattern. When bridge is accessed, originator will have a burst of 700 Hz continuous or warble tone. Dial # or A85 to stop auto-dialer. Dial code for conference port selection per Table A. Dial number for conferee when. When conferee answers, request they stand by, then dial next conferee port and repeat procedure until all conferees have been dialed. Dial # or A00 to connect originator to conference.

> ***Note:*** When dialing port selection, do not operate TOUCH-TONE keys for more than one second. Longer operation may cause loss of dial tone.

5.10 ***Privacy Mode:*** Establish conference to any pattern. Confirm that all conferees answer. Dial # or A85 to stop auto-dialers. Dial the bridge port number for a private conversation check on the selected conference. Dial # or A00 to return both of you to conference. Check the privacy feature for each bridge port.

5.11 ***Broadcast Mode:*** Dial # or A72 to verify that all ports hear originator but conferees cannot hear each other. Dial # or A70 to release the broadcast mode and return conferencer back to two-way mode.

5.12 ***Individual Conferee Forced Disconnect:*** Dial bridge port number of conferee intended to disconnect. Dial # or A73 to disconnect the individual conferee. Dial telephone number of new conferee to be added to conference. When party answers, dial # or A00 to return both of you to the conference. Check all conferees' ports for this application.

5.13 ***Individual Conferee Forced Disconnect—But No Dial Tone To Permit Adding Another Conferee:*** Dial individual port, when dial # or A75. This should disconnect the conferee. Dial # or A00 to add yourself back to conference. Check all ports for this application.

5.14 ***Release auto-dialers to access any pattern.*** Dial conference on any pattern and dial # or A86. This releases the auto-dialers. Dial # or A80. Verify that you reach pattern A. Release conference and redial any pattern plus # or A86. Dial # or A81. Verify that you reach pattern B. Repeat for codes E or A82, # or A83, # or A84.

E. Automatic Retry

5.15 Conferees who fail to answer within an adjustable interval of 10 to 100 seconds will cause conferencer to drop the primary number dialed and retry using the programmed secondary number. If the secondary number fails to answer, the conferencer will revert to the primary number and try again. This will continue until conferee answers or the stop auto dial code (# or A85) is keyed by originator. Once the stop auto dial code is sent, the automatic retry of conferencer stops for all conference ports. If any conferee disconnects during conference (which code # or A85 has not been dialed), the automatic retry feature will activate and re-establish call to the disconnected conferee's number.

5.16 Establish conference to any pattern. Ask each conferee to individually disconnect and verify automatic retry functions properly. Again ask conferees individually to disconnect and let phone ring through first cycle and answer a second cycle. Verify call to each port alternated to second number. Discontinue conference.

F. Tandem (Secondary) Operation Check

5.17 When conference requirements exceed the number of ports available, the tandem feature can be used to link a second modular conference bridge into the conference as shown in Table B. This is done by selecting a vacant port and dialing a number to access another MACA arrangement. Operation of tandem bridge is controlled by using digits 6, 7, 8, 9, or 0 as the last digit of its assigned telephone number. When one of these digits is received as the last digit, the bridge will set up to function with the ★ or * digit on the TOUCH-TONE handset rather than the flat-footed A or H. This allows the originator to control both bridges when they are a tandem, ie,

(a) The first bridge dialed up using digits 1, 2, 3, 4, or 5 as the last digit of its assigned telephone number will react only to commands using # or A XX

(b) The second bridge dialed up using digits 6, 7, 8, 9, or 0 as the last digit of its assigned telephone number will react only to commands using * or *XX.

G. Periodic Checks

5.18 Table C indicates the frequency of performing various test procedures.

6. REFERENCES

6.01 The following references provide additional information on the MACA.

FA25231	A3D
FA25231	B8D, B9E, B20B
FA25231	B25A-Q
FA25231	B26A-H
FA25231	B27A-F
FA25231	E11,E12
FA25231	T-W1-350
FA25231	W74-83, W124-135
332-435-100	Toll Conference Service, Multiport Conference Bridge, Description

TABLE A

CONTROL CODES

CONTROL CODE	DESCRIPTION
00	Code used by the originator to return to the bridge from the Ad-Lib Bus. All conferee ports connected to the Ad-Lib Bus will be returned to normal operation.
01-57	Conferee port selection numbers. Used to access a particular conferee port for either a private conversation or ad-lib mode of operation.
70	Releases the broadcast mode of operation and returns the two-way operation. Also, stop the operation of the conferencing alerting tone.
71	Start conference alerting tone.
72	Activates the broadcast feature that permits the originator to be heard but stops conferees from talking on the bridge.
73	Code used by the originator to drop a conferee and receive dial tone so that originator may dial a new telephone number. (Must be preceded by a port number.)
75	Code used by the originator to drop the conferee and not receive new dial tone. (Must be preceded by a port number.)
80	Automatic dialing Pattern A.
81	Automatic dialing Pattern B.
82	Automatic dialing Pattern C.
83	Automatic dialing Pattern D.
84	Automatic dialing Pattern E.
85	Stops the operation of the Auto-Dialer units for the length of the conference call. Used when originator does not want unanswered Auto-Dialers to continue after the start of his conference.
86	Releases the Auto-Dialers. Auto-Dialers can now be restarted by sending one of the 80-84 Codes. This Code has more application by the maintenance forces, but could be used by the customer for special dialing requirements.

Note: Each code must be preceded by a flat footed "A" or # for normal operation and ¾ or * for tandem (secondary) operation.

TABLE B

CONFERENCE ORIGINATING TELEPHONE NUMBERS

CONFERENCE	PATTERN	TELEPHONE NUMBER	CONTROL DIGIT
PRIMARY	A	NNX-XXX1	A or #
	B	NNX-XXX2	A or #
	C	NNX-XXX3	A or #
	D	NNX-XXX4	A or #
	E	NNX-XXX5	A or #
SECONDARY	A	NNX-XXX6	¾ or ¾
	B	NNX-XXX7	¾ or ¾
	C	NNX-XXX8	¾ or ¾
	D	NNX-XXX9	¾ or ¾
	E	NNX-XXX0	¾ or ¾

TABLE C

PERIODIC CHECKS

TEST	INITIAL CIRCUIT ORDER	ANNUAL ROUTINE	QUARTERLY ROUTINE	TROUBLE
Touch-Tone Receiver Alignment [3.11(a)]	YES		YES	As Req
Conference Alert Tone [3.11(f)]	YES			As Req
Multipoint Bridge Lineup (Part 3C)	YES	YES		As Req
Control Logic & Interface Lineup (Part 3C	YES	YES		As Req
Operational Test Procedures (Part 5)	YES			As Req

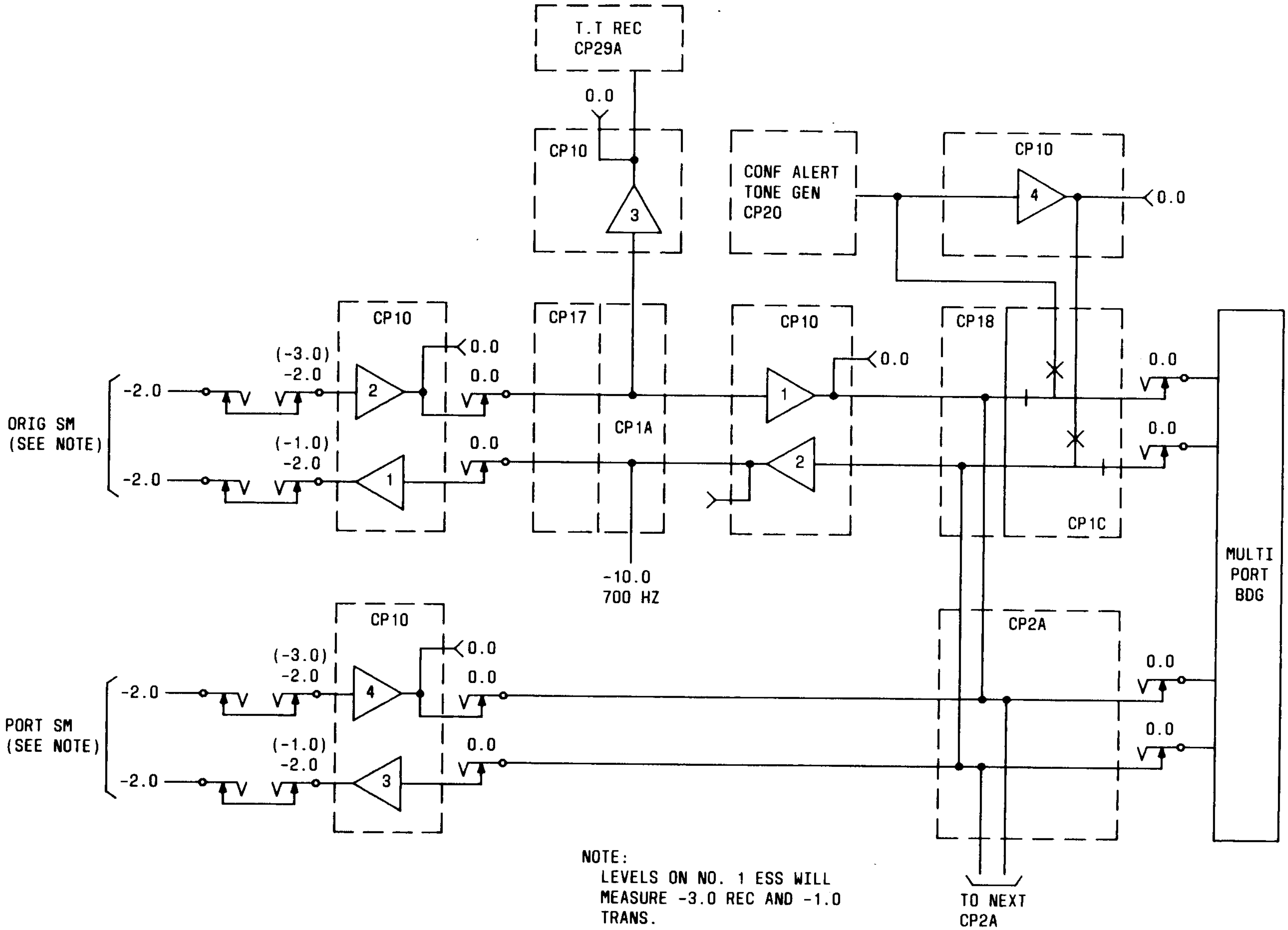

Fig. 1—Modular Automatic Conference Arrangement Levels and Lineup

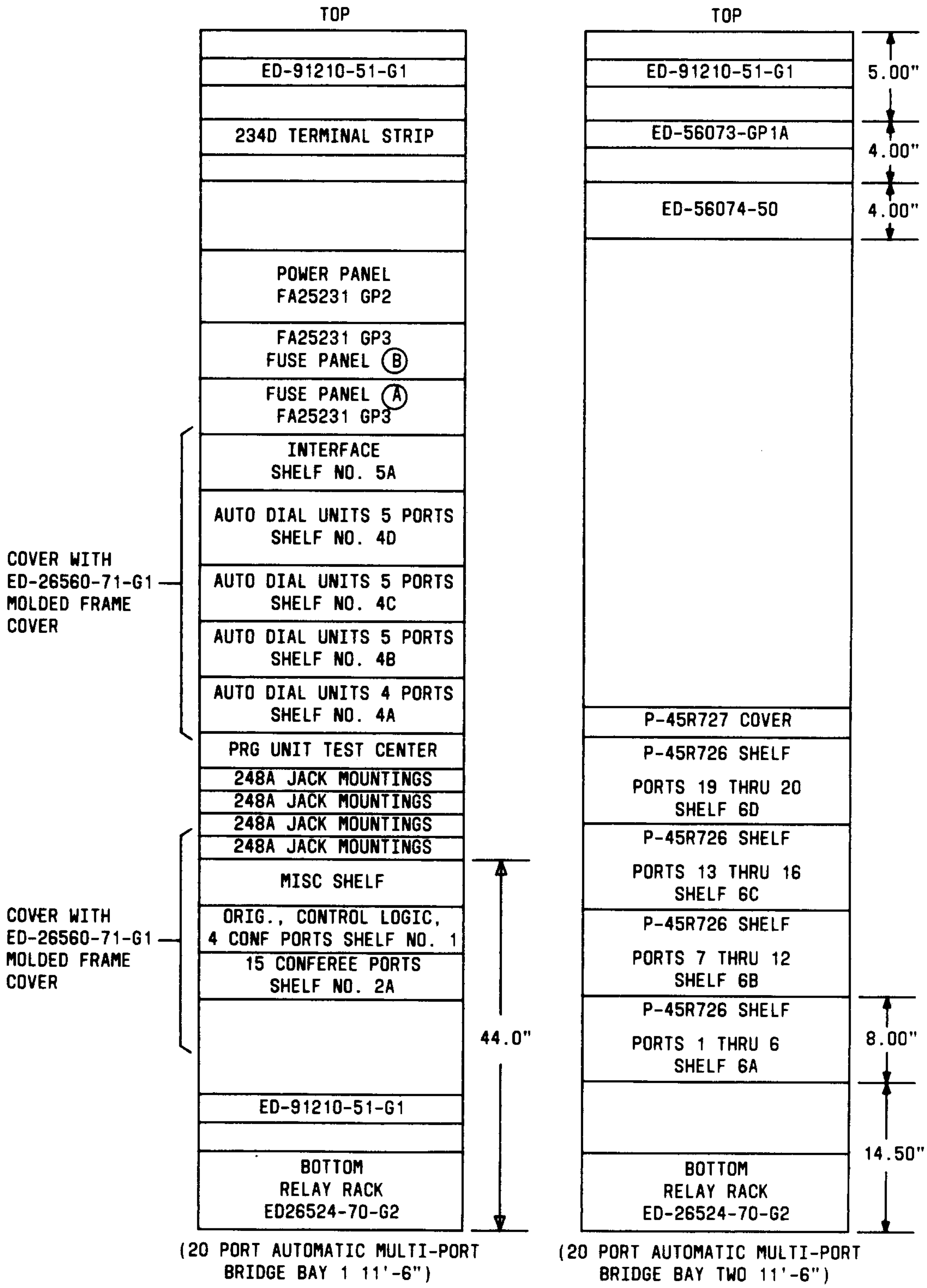

Fig. 2—Typical Equipment Layout for 20-Part Automatic Multipart Bridge—List 1 Through List 6

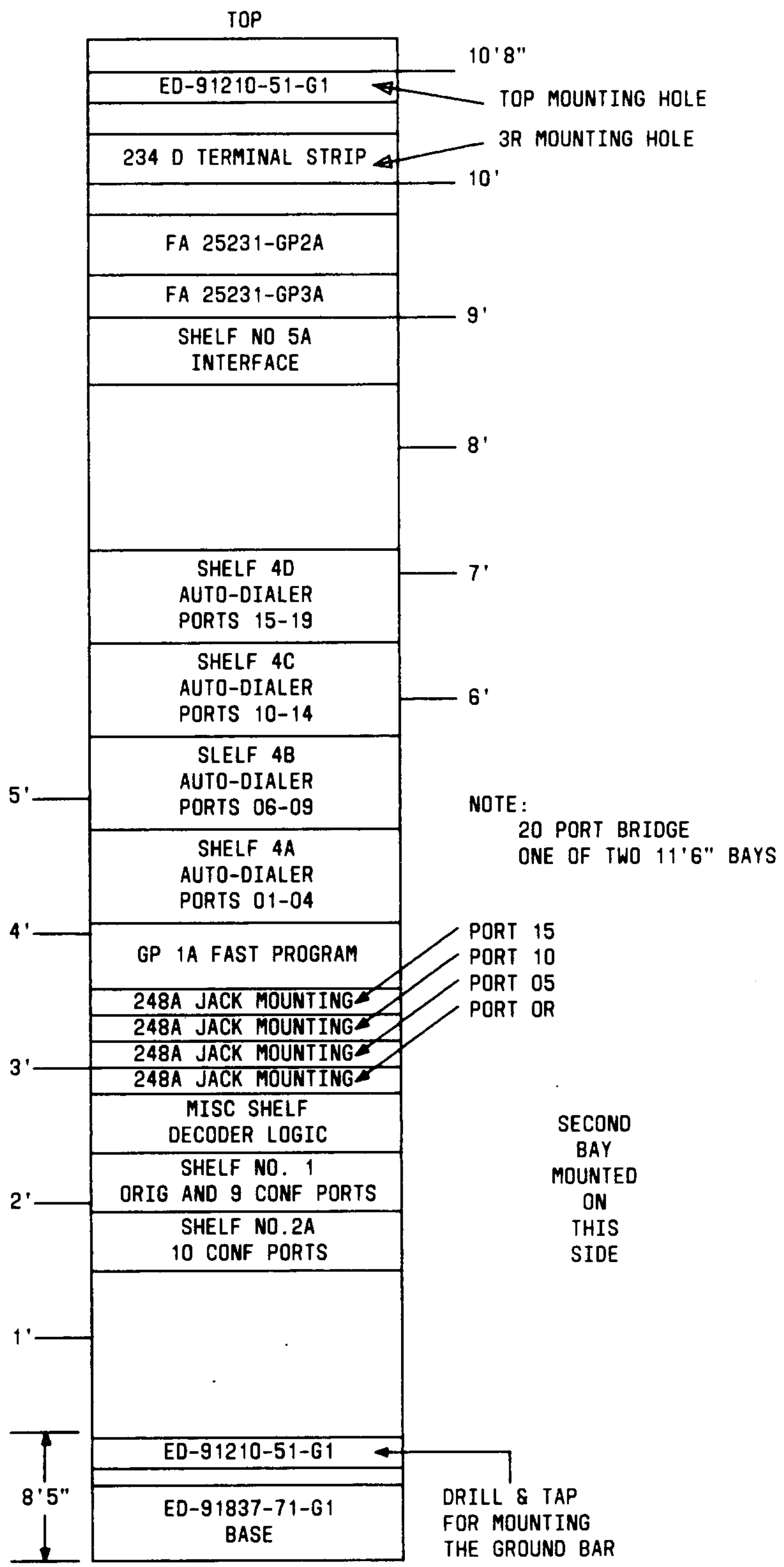

Fig. 3—Typical Equipment Layout for 20-Port Automatic Multiport Bridge—List 7 Through List 17