AUTOMATIC NUMBER ANNOUNCER
NO. 5 CROSSBAR AMA

CONTENTS

1. GENERAL INFORMATION

1.1 Description

1.11 The Automatic Number Announcer Circuit in conjunction with the Number Verification Circuit is designed to verify central office and station wiring, confirm customer billing and to identify unknown subscriber lines.

1.12 The circuits tested per this section are:

NS-02500-01 Automatic Number Announcer (K or Z option)
NS-02501-01 Number Verification Circuit

1.13 The tests per this section verify these circuits when used in No. 5 Crossbar office that employs AMA billing equipment.

1.2 Sequence of Operation

1.21 Fusing Tests per Section 351, Handbook 59, are to be performed prior to the tests of this section.

1.22 The Multifrequency Receiver Test per Section 352, Handbook 59 are to be performed prior to the tests of this Section.

1.3 Cross-Connection

1.31 The cross-connections required to generate the 3-digit office indices should be obtained from the Telephone Company and applied prior to the performance of the unit tests of this section, refer to NOTE 401 NS-02500-01.

1.4 General Precautions

PRECAUTION: THIS CIRCUIT CONTAINS SOLID STATE DEVICES THAT MAY BE DAMAGED BY THE USE OF A BUZZER FOR BATTERY AND GROUND CHECKS. FOR THIS REASON THE VOLT-OHMMETER IS SPECIFIED AND SHOULD BE USED FOR ALL CHECKS.

NOTE 1: Relays specified per the observations in the following tests are not necessarily the only relays to operate or release. Only the relays required to verify normal circuit operation are specified.

NOTE 2: Relays and Terminals followed by an asterisk (*) per the following tests are in NS-02501-01. Relays and terminals without an asterisk per the following tests are in NS-02500-01.

1.5 Cabling Procedures

1.51 The CI2, or CI2A and CI2B, ERT, TM1, TM1A and TM1B leads between the AMA Recorder and the ANAC are not to be connected until after unit tests per paragraphs 5.12 and 5.13 or 5.22 are completed.

1.52 These leads appear as follows:

CI2 - TS(D) Terminal 52 (Z option)
CI2A - TS(D) Terminal 52 (K option NJ02500A)
TS(E) Terminal 16 (K option NJ02500B)
CI2B - TS(F) Terminal 16 (K option NJ02500B)
TS(H) Terminal 16 (K option NJ02500A)
ERT - TS(E) Terminal 26 (K option NJ02500B)
TS(F) Terminal 17 (K option NJ02500A)
TM1 - TS(D) Terminal 33 (Z option)
TM1A - TS(D) Terminal 33 (K option NJ02500A)
TS(E) Terminal 17 (K option NJ02500B)
TM1B - TS(F) Terminal 17 (K option NJ02500B)
TS(H) Terminal 17 (K option NJ02500A)

2. RECORDS AND REQUIREMENTS

2.1 Records - The results of tests per this section shall be recorded on Form SD-97-1313 and summarized on Form SD-97-1315.

2.2 Requirements - The tests per this section are based on NS and NCD information.

3. TEST EQUIPMNT

3.1 Test Sets

Amt	ITE	Description
1	4442A	Volt-Ohmmeter
1	5248	Portable Trunk Test Set
1	4208A	Handset

3.2 Cords

Amt	ITE	Cord	Lgth	One End	Other End
8	9140,L2	1	1'	Allig. Clip	Allig. Clip
8	9140,L3	1	3'	Allig. Clip	Allig. Clip

4. SETUP INFORMATION

4.1 Insert the plug of the ITE-9573 cord into the -48V jack of the ITE-5248 test set. Connect the other end of the ITE-9573 tip lead to -48V and sleeve lead to ground.

4.2 Insert the plug of the ITE-9621 cord into the TRK jack of the ITE-5248 test set. The other end of the ITE-9621 will be connected during the test operations.

4.3 Verify that the NORMAL-OPEN LOOP REVERSE key is in the OPEN LOOP position.

4.4 If option 10, Security check Feature, is provided insert a dummy plug into the SMB jack. Relay SYC1 operates and SMB lamp lights. Operate the NA (no attendant) key.

5. TEST OPERATIONS

5.1 No 5 Crossbar (K option)

5.11 Remove timer TM from its socket.

NOTE: In the following test terminal strips E and F refer to the NJ02500-B unit and terminal strips G and H refer to the NJ-02500-A Applique Unit.

5.12 Three digit operation (K operation) The following tests verify the three digit access feature of the ANAC equipped with K option.

STEP	OPERATION	OBSERVATION
1	Block relay ON non-operated. Apply ground to T.S.(F or H) terminal 38.	Relays THR, THR1, THR2 and On1 operate. Lamp BD lights.
2	Momentarily apply -48V to T.S.(F or H) terminal 18.	Relay ST operates and locks operated.
3	Momentarily connect ground to T.S.(E) terminal 26 (NJ-02500B) or T.S.(F) terminal 17 (NJ-02500A).	Relays ERTA, ERTB and ERTC operate and release.
4	Block operated relays ERTA, ERTB and ERTC.	
5	Momentarily connect ground to TS.S (F or H) terminal 16.	Relays ACA, ACB and ACC operate and release. Relay CK operates and locks operated.
6	Block operated relays ACA, ACB and ACC. Insulate all make and break contacts ERTA, ERTB and ERTC. Unblock relay ON.	

STEP	OPERATION	OBSERVATION
7	Ground the two contacts, shown below, which correspond to the lowest numbered OFF- relay cross-connected per Paragraph 1.31. FOR OFF- RELAY — GROUND RELAY ERTA CONTACTS 0 — 4,5 1 — 1,2 2 — 1,3 3 — 2,3 4 — 1,4 5 — 2,4 6 — 3,4 7 — 1,5 8 — 2,5 9 — 3,5	The lowest numbered OFF- relay which has cross-connect assignments, operates. Relays ON operates. Relay ST releases.
8	Remove the grounds applied per Step 7.	Relay OFF- remains operated.
9	One at a time, momentarily ground contacts 7 and 9 relay ERTA; contacts 3, 4, 6 and 10 relay ERTB; and contacts 9 and 12 relay ERTC.	NOTE: This operation stores 2-out-of-5 (2/5) coded information in the reed relays. Care must be exercised to prevent the inadvertant grounding of non-specified contacts of relays ERTA, ERTB and ERTC.
10	Block relay ON operated.	
11	Operate the key of the ITE-4208A Hand Set to the monitor position. Connect the Talking Set to T.S.(F or H) terminals 46 and 56.	
12	Verify that the NORMAL-OPEN-LOOP-REVERSE key on the ITE-5248 is in the OPEN LOOP position. Connect the TRK jack ring lead to TS)F) terminal 48 and the tip lead to TS(F) terminal 58 (NJ02500B) or the ring lead to TS(H) terminal 48 and the tip lead to TS(H) terminal 58 (NJ02500A).	
13	Operate the NORMAL-OPEN-LOOP-REVERSE key to the NORMAL position. NOTE: The readout can be repeated by restoring relay END to its non-operated position.	An audible readout of the three digit office index followed by station numbers 5678 is heard via the Talking Set. ZV option - The audible readout will be repeated.
14	Remove the blocks from relays ON, CA, ACB and ACC. Remove the ground from T.S (F or H) terminal 38. Do not remove the blocks or insulators from relays ERTA, ERTB and ERTC. Disconnect the cord placed in Step 12.	

5.13 Ten Digit Operation (K option - The following tests verify the ten digit access feature of the ANAC equipped with K option.

STEP	OPERATION	OBSERVATION
1	Connect the ITE-5248 Test Set ring lead to T.S.(E) terminal 58 and tip lead to T.S.(E) terminal 48 (NJ-02500B) or ring lead to T.S.(G) terminal 58 and tip lead to T.S.(G) terminal 48 (NJ02500A).	
2	Apply ground to T.S.(E or G) terminal 38.	Relay TEN and ONl operate.
3	Momentarily apply -48V to T.S.(E or G) terminal 18.	Relay ST operates and locks operated.
4	Momentarily ground contact 12 relay ERTA.	Relays ACA, ACB and ACC operate and release. Relay CK operates and locks operated.
5	Block relays ACA, ACB and ACC operated.	
6	Operate the NORMAL-OPEN-LOOP-REVERSE key on the ITE-5248 test set to the NORMAL position.	Relays S* and REV* operate, and the S lamp (ITE-5248) lights.
7	Ground the two contacts shown below which corresponds to the second lowest numbered OFF- relay cross-connected per Paragraph 1.31. FOR OFF-RELAY — GROUND RELAY ERTA CONTACTS 0 — 4,5 1 — 1,2 2 — 1,3 3 — 2,3 4 — 1,4 5 — 2,4 6 — 3,4 7 — 1,5 8 — 2,5 9 — 3,5	The second lowest numbered OFF- relay, which has cross-connect assignments, operates. Relay ON operates. Relay ST releases. Relay C* operates. S lamp (ITE-5248) extinguishes.
8	Remove the grounds applied per Step 7.	Relay OFF- remains operated.
9	One at a time momentarily ground contacts 6 and 7 relay ERTA; contacts 1, 3, 7 and 8 relay ERTB; and contacts 8 and 11 relay ERTC.	NOTE: The operation stores 2/5 coded information in the reed relays.
10	Block relay S* operated. Operate the NORMAL-OPEN LOOP-REVERSE key (ITE-5248) to the REVERSE position. Remove the block form the S* relay.	S lamp (ITE-5248) lights.
11	Block relay ON operated. Block relay HS non-operated.	
12	Operate and release the KP key (ITE-5248).	Relay KP* operates and locks operated.

STEP	OPERATION	OBSERVATION
13	Using the keys on the ITE-5248 test set, key-in the 3-digit office index corresponding to the operated OFF- relay.	As each digit is keyed, steering relays AS, BS, CS and THS sequence. As each digit is keyed, verify that relay NM* does not operate. NOTE: If relay NM* operates it will lock operated.
14	Operate and release the 1 key (ITE-5248).	Relay RR0* and RR1* operate and release. Verify that relay NM* does not operate.
15	Block relay TS non-operated. Remove block from relay HS.	
16	Operate and release the 2 key (ITE-5248).	Relay NM* operates. Relay THS releases and relay HS operates.
17	Restore relay NM* to its non-operated position.	
18	Operate and release the 2 key (ITE-5248).	Relays RR0* and RR2* operate and release. Verify that relay NM* does not operate.
19	Block relay US non-operated. Remove the block from relay TS.	
20	Operate and release the 4 key (ITE-5248).	Relay NM* operates. Relay HS releases and relay TS operates.
21	Restore relay NM* to its non-operated position.	
22	Operate and release the 3 key (ITE-5248).	Relays RR1* and RR2* operate and release. Verify that relay NM* does not operate.
23	Block relay END non-operated. Remove the block from relay US.	
24	Operate and release the 9 key (ITE-5248).	Relay NM* operates. Relay TS releases and relay US operates.
25	Restore relay NM* to its non-operated position.	
26	Operate and release the 4 key (ITE-5248).	Relays RR0* and RR4* operate and release. Verify that relay NM* does not operate.
27	Remove the block from relay END.	
28	Operate and release the 5 key (ITE-5248).	Relay NM* operates. Relay US releases and relay END operates.
29	Operate and release the ST key (ITE-5248).	Relay D* operates. Relay S operates. Relay END releases.
30	Ground T.S.(D) terminal 15. NOTE: The readout can be repeated by restoring relay END to its non-operated position.	An audible readout of the 3-digit office index, corresponding to the operated OFF- relay, followed by Station Number 1234 is obtained via the ITE-5248's speaker. ZV option - The audible readout is repeated.

STEP	OPERATION	OBSERVATION
31	Block relays ON1 and TRA* operated.	
32	Insulate contacts 8M, relay S1 and 6M, relay ON. Remove the two insulators.	NOTE: this removes the reed relay information storage.
33	Restore relay END to its non-operated position.	The steering relays AS thru END sequence, however, no audible readout is obtained and the TN- relays do not operate.
34	Ground the relay contacts corresponding to the third lowest numbered OFF- relay cross-connected per Paragraph 1.31, if applicable.	See Step 7.
35	Momentarily ground, on at a time, contacts 8 and 10 relay ERTA; contacts 2, 5, 9 and 10 relay ERTB and contacts 10 and 12 relay ERTC.	See Step 9.
36	Restore relay END to its non-operated position.	An audible readout of the 3-digit office index, corresponding to the operated OFF- relay, followed by Station Number 9809 is obtained via the ITE-5248's speaker. ZV option - The audible readout is repeated.
37	Restore the OFF- relay to its non-operated position.	
38	Repeat Steps 34 and 36 for each of the remaining OFF- relays that have cross-connect assignments.	Same as Step 36.
39	Insert timer TM.	Relay TMA operates after approximately 3 seconds. Relay RL operates after approximately 20 seconds.
40	Remove all test connections.	
41	Momentarily apply ground to T.S.(D) terminal 46 (NJ-02599B) or terminal 15 (NJ-02550A).	Relay DNK operates and releases. (ZU option) Relay DNK does not operate (ZV option).
42 ZV option	Block operated TMA relay. Momentarily ground terminal 15 T.S.(D).	Relay DNK operates and releases.
43 ZV option	Release TMA relay.	
44 ZP option	Ground terminal 22 (D) T.S.	TM1 and TMB relays operate. In approximately 2.5 minutes relay RL operates. Option 10 - TM2 and TMB relays operate. In approximately 20 seconds relay RL operates.
45 ZP option	Remove ground on terminal 22 (D) T.S.	TMB and RL relays release.

STEP	OPERATION	OBSERVATION
46	Option 10 - Remove the plug from the SMB jack.	Relay SYC1 releases and the SMB lamp extinguishes.
47	Option 10 - Momentarily ground the following terminals U (AS) relay U (BS) U (CS) U (THS) U (HS) U (TS) U (US)	The following relays momentarily operate. AS, AS1 BS, BS1 CS, CS1 THS, THS1 HS, HS1 TS, TS1 US, US1
48	Option 10 - Reinsert a dummy plug into the SMB jack.	

5.14 System Test (K option)

5.141 Obtain from the Telephone company the two 3-digit access codes (the access code for 10-digit operation and the access code for 3 digit operation) for the ANAC.

5.142 Arrange with the Telephone Company for the use of three line circuits from which test calls can be made. The numbers (4-digit station numbers) assigned to these line circuits should be such that each bit of the 2-out-of5 code can be validated for each digit of the number.

Ex. 1 Three numbers such as XXX-0000, XXX-1111 and XXX-2222; digit 0 validates bits 4 and 7, digit 1 validates bits 0 and 1, digit 2 validates bits 0 and 2.

Ex. 2 Three numbers such as XXX-0123, XXX-1657 and XXX-9874. Refer to Table A Paragraph 6.11 for a list of the 2-out-of-5 coding for the decimal digits.

5.143 Connect the CI2A, CI2B, ERT, TM1A and TM1B leads at this time.

5.144 Perform the tests per the following Table.

NOTE: Prior to performing any tests, authorization must be obtained from the Telephone Company representative for these operations that utilize in-service equipment or cause equipment to be temporarily taken out of service.

5.145 If trouble is encountered during the performance of the system test, check that the cross-connections in the marker, sender, etc. are run properly according to the information supplied by the telephone company. If the test still fails, contact the telephone company personnel for advice and assistance. The proper programming of the common control equipment is the responsibility of the telephone compnay. Adding an ANAC unit is the same as establishing a new trunk route.

STEP	OPERATION	OBSERVATION
1	From a line circuit arranged for test, connect the ITE-4208A Hand Set to the line circuit, at the MDF or DF, and dial the access code for 3-digit operation.	An audible readout of the line circuits directory number, followed by 120 IPM is obtained via the main frame loud speaker.
2	From the second and third line circuits arranged for test, repeat the operation as per Step 1.	Same as Step 1.

STEP	OPERATION	OBSERVATION
3	Transfer the Regular AMA Recorder, (only when an Emergency AMA Recorder is provided).	
4	Repeat the operations per Steps 1 and 2.	Same as Step 1.
5	Restore the Regular AMA Recorder to service.	
6	From a line circuit arranged for test, dial the access code for 10-digit operation and dial the correct station directory number.	A combination of 60 IPM and high tone is heard in he Telephone receiver.
7	From a line circuit arranged for test, dial the access code for 10-digit operation and dial the station directory number with at least 1 digit dialed incorrectly.	Ringing is heard in the Telephone receiver.
8	When the line is answered request the readout. (See Notes 3 and 4).	An audible readout of the station directory number followed by 120 IPM is obtained via the Telephone receiver. ZV option - The audible readout is repeated.
9 ZP option	From a line circuit arranged for test, dial the access code for 10-digit operation and dial the station directory number with at least 1 digit dialed incorrectly.	Ringing is heard in the telephone receiver.
10 ZP option	When the line is answered instruct security attendant not to permit the ANAC readout and do not hang-up the handset.	In approximately 2.5 minutes all relays will release.
11 ZR option	Block CTA relay non-operated. From a line circuit arranged for test, dial the access code for 10-digit operation and dial the station directory number with at least 1 digit dialed incorrectly.	Ringing is heard in the telephone receiver.
12 ZR option	When the line is answered request the readout.	Audible readout is not heard.
13 ZR option	Remove block on CTA relay.	
14	Block the TEN relay operated. Dial the access code for 3-digit operation.	120 IPM is heard in the Telephone receiver; an audible readout of the station directory number is not obtained via the loud speaker.
15	Remove the block from relay TEM.	
16	Block relay THR operated. Dial the access code for 10-digit operation.	120 IPM is heard in the telephone receiver.

STEP	OPERATION	OBSERVATION
17	Remove the block from relay THR.	
18	Option 10 - Remove the plug from the SMB jack. Set the B and C switches to the 2nd and 3rd digits of the office code and the TH thru U switches to the new security number . If the security number is not known, any combination of 6 digits may be set for test.	
19	Option 10 - Dial the 10 digit ANAC access code and the 1st office code digit and the security number set on the B-U switches.	1. Ringing will be heard in the handset. 2. An audible readout of the station directory number followed by 120 IPM is heard in the handset. Option 8 - The audible readout is repeated.
20	Option 10 - Repeat Step 19 except dial an incorrect B digit.	Ringing will be heard in the handset for 20 seconds and then ckt auto - disconnects.
21	Connect the Talking Set to a line circuit that is not assigned for service. Dial the access code for 10-digit operation followed by the Station directory number.	High tone is heard in the Telephone receiver.
22	Disconnect the Talking Set from the line circuit.	

NOTE 3: If the 225A KTU has not been connected to the ANAC a readout can be obtained by operating relay SYC.

NOTE 4: SD-25823-01 or 02 does not supply 120 IPM TONE on a 10-digit call.

5.2 No. 5 Corssbar (Z option)

5.21 Remove the TM timer from its socket.

5.22 Unit Test (Z option) - the following tests verify the ANAC circuit equipped with Z option.

STEP	OPERATION	OBSERVATION
1	Momentarily apply -48V to terminal 13 T.S.(D). Block relay ON non-operated.	Relay ST operates and locks operated.
2	Momentarily ground terminal 52 T.S.(D).	Relays ACA, ACB, CC and CK operate and release.
3	Block non-operated relays ACA, ACB and ACC. Insulate make contacts of these relays. Unblock relay ON. Connect contact 12 of relay ACB to contact 12M of relay ACC. Short out contacts 11 and 11M of relay ACC.	

STEP	OPERATION	OBSERVATION
4	Connect the ITE-5248 Test Set tip lead to terminal 33 T.S.(A)* and ring lead to terminal 23 T.S.(A)*. Operate the NORMAL-OPEN LOOP-REVERSE key to the NORMAL position.	Relays S* and REV* operate, and the S lamp on the ITE-5248 lights.
5	Ground the two contacts shown below which correspond to the lowest numbered OFF- relay cross-connected per Paragraph 1. FOR OFF- RELAY — GROUND RELAY ACA CONTACTS 0 — 4M,5M 1 — 1M,2M 2 — 1M,3M 3 — 2M,3M 4 — 1M,4M 5 — 2M,4M 6 — 3M,4M 7 — 1M,5M 8 — 2M,5M 9 — 3M,5M	The lowest number OFF- relay, which has cross-connect assignments, operates. Relay ON operates, relay ST releases. Relay C* operates. S lamp (ITE-5248) extinguishes.
6	Remove the grounds applied per Step 5.	Relay OFF- remains operated.
7	Momentarily ground contacts 6M and 7M relay ACA; contacts 1M, 3M, 7M and 8M relay ACB; and contacts 1M and 4M relay ACC.	NOTE: This operation stores 2-out-of5 (2/5) coded information in the reed relays.
8	Block operated the S* relay. Operate the NOR-OP-REV key)ITE-5248) to the REV position. Remove the block from the S* relay.	S lamp (ITEO5248() lights.
9	Block relay ON operated. Block relay HS non-operated.	
10	Operate and release the KP key (ITE-5248).	Relay KP* operates and locks operated.
11	Using the keys on the ITE-5248 test set, key in the 3-digit office index corresponding to the operated OFF- relay.	As each digit is keyed, steering relays AS, BS, CS and THS sequence. As each digit is keyed, verify that relay NM* does not operated. NOTE: If relay NM* operates it will lock operated.
12	Operate and release the 1 key (ITE-5248).	Relays RRO* and RR1* operate and release. Verify that relay NM* does not operate.
13	Block relay TS non-operated. Remove the block from relay HS.	
14	Operate and release the 2 key (ITE-5248).	Relay NM* operates. Relay THS releases and relay HS operates.
15	Restore relay NM* to it's non-operated position.	
16	Operate and release the 2 key (ITE-5248).	Relays RRO* and RR2* operate and release. Verify that relay NM* does not operate.

STEP	OPERATION	OBSERVATION
17	Block relay US non-operated. Remove the block from relay T.S.	
18	Operate and release the 4 key (ITE05248).	Relay NM* operates. Relay HS releases and relay T.S. operates.
19	Restore relay NM* to it's non-operated position.	
20	Operate and release the 3 key (ITE-5248).	Relays RR1* and RR2* operate and release. Verify that relay NM* does not operate.
21	block relay END non-operated. Remove the block from relay US.	
22	Operate and release the 9 key (ITE-5248).	Relay NM* operates. Relay TS releases and relay US operate.
23	Restore relay NM* to its non-operated position.	
24	Operate and release the 4 key (ITE-5248).	Relays RR0* and RR4* operate and release. Verify that relay NM* does not operate.
25	Remove the block from relay END.	
26	Operate and release the 5 key (ITE-5248).	Relay NM* operates. Relay US releases and relay END operates.
27	Operate and release the ST key (ITE-5248).	Relay D* operates. Relay S operates. Relay END releases.
28	Ground T.S.(D) terminal 44.	An audible readout of the 3-digit office corresponding to the operated OFF- relay, followed by Station Number 1234 is obtained via the ITE-5248's speaker. ZV option - The audible readout is repeated.
29	Block relay TRA* operated.	
30	Insulate contacts 8M, relay S1 and 12M, relay ON. Remove the two insulators.	NOTE: This releases the reed relay information storage.
31	Restore relay END to its non-operated position.	Steering relays AS thru END sequence, however, no audible readout is obtained and the TN- relays do not operate.
32	Restore the operated OFF- relay to its non-operated position. Ground the ACA relay contacts corresponding to the second lowest numbered OFF- relay cross-connected per Paragraph 1.3 (Refer to the Table of Step 5), if applicable.	See Step 5.
33	Remove the grounds applied per Step 32.	
34	Momentarily ground contacts 7M and 8M relay ACA; contacts 3M, 4M, 6M and 10M relay ACB; contacts 2M and 5M relay ACC.	See Step 7.

STEP	OPERATION	OBSERVATION
35	Restore relay END to its non-operated position.	An audible readout of the 3-digit office index, corresponding to the operated OFF- relay, followed by Station Number 5678 is obtained via the ITE-5248's speaker. ZV option - The audible readout is repeated.
36	Insulate contacts 8M relay S1 and 12M relay ON. Remove the two insulators.	See Step 30.
37	Repeat the operations per Steps 32 and 33 grounding the ACA relay contacts corresponding to the third lowest numbered OFF- relay cross-connected per Paragraph 1.3, if applicable.	
38	Momentarily ground contacts 8M and 10M relay ACA; contacts 2M, 5M, 9M and 10M relay ACB; and contacts 3M and 5M relay ACC.	See Step 7.
39	Restore relay END to its non-operated position.	An audible readout of the 3-digit office index, corresponding to the operated OFF- relay, followed by Station Number 9809, is obtained via the ITE-5248's speaker. ZV option - the audible readout is repeated.
40	Repeat Steps 36 and 39 for each OFF- relay that has cross-connected assignments.	
41	Insert timer TM.	Relay TMA operates after approximately 3 seconds. Relay RL operates after approximately 20 seconds.
42	Remove all test connections.	
43	Momentarily apply ground to T.S. (D) terminal 15.	Relay DNK operates and releases.
44 ZP option	Ground terminal 22 (D) T.S.	TM1 and TMB relays operate. In approximately 2.5 minutes relay RL operates.
45 ZP option	Remove ground on terminal 22 (D) T.S.	TMB and RL relays release.

5.23 System Test (Z option)

5.231 Obtain from the Telephone Company the 3-digit access for the ANAC.

5.232 Arrange with the Telephone Company for the use of three line circuits from which test calls can be made. The number (4-digit satation numbers) assigned to these line circuits should be such that each bit of the 2-out-of-5 code can be validated for each digit of the number.

Ex. 1 Three numbers such as XXX-1111, XXX-6666 and XXX-7777; digit 7 validates bits 0 and 7.

Ex 2 Three numbers such XXX-1234, XXX=0579 and XXX-2741 refer to Table A, Paragraph 6.11, for a list of the 2-out-of-5 coding for the decimal digits.

5.233 Connect the CI2, ERT and TM1 leads at this time.

5.234 perform the tests per the following table.

NOTE: Prior to performing any system tests, authorization must be obtained from the Telephone Company Representative for those operations that utilize in-service equipment or cause equipment to be temporarily taken out of service.

5.235 If trouble is encountered during the performance of the system these check that the cross-connections in the marker, sender, etc. are run properly according to the information supplied by the telephone company. if the test still fails, contact the telephone company personnel for advice and assistance. The proper programming of the common control equipment is the responsibility of the telephone company. Adding an ANAC unit is the same as establishing a new trunk route.

STEP	OPERATION	OBSERVATION
1	From a line circuit arranged for test, connect the ITE-4208A Hand Set to the line circuit, at the MDF or DF, and dial the ANAC access code and the station directory number with at least 1 digit dialed incorrectly.	Ringing is heard in the telephone receiver.
2	When the line is answered request the readout (see Note 3).	An audible readout of the station directory number followed by 120 IPM is obtained via the telephone receiver. ZV option - The audible readout is repeated.
3	From the second and third line circuits arranged for test, repeat the operations per Steps 1 and 2.	Same as Steps 1 and 2.
4	From a line circuit arranged for test, dial the access code for th ANAC and dial the correct station directory number.	A combination of 60 IPM and high tone is heard in the telephone receiver.
5	Connect the Talking Set to a line circuit that is to assigned for service. Dial the access code and the Station directory number.	High Tone is heard in the receiver.
6 ZR option	From a line circuit arranged for test, dial the access code for the ANAC and the station directory with at least one digit dialed incorrectly.	Ringing is heard in the telephone receiver
7 ZP option	When the line is answered instruct security attentant not to permit the ANAC readout and do not handup the hand-set.	In approximately 2.5 minutes all relays will release.

NOTE 3: If the 255A KTU has not been connected to the ANAC a readout can be obtained by operating relay SYC.

6. TROUBLE LOCATING PROCEDURES

6.1 General

6.11 2-out-of-5 Coding

6.111 Table A lists the 2/5 (2-out-of-5) coding for the decimal numbers.

TABLE A

Decimal Digit	2/5 Code Bit Position Value				
	0 Bit	1 Bit	2 Bit	4 Bit	7 Bit
0	0	0	0	0	0
1	1	1	0	0	0
2	1	0	1	0	0
3	0	1	1	0	0
4	1	0	0	1	0
5	0	1	0	1	0
6	0	0	1	1	0
7	1	0	0	0	1
8	0	1	0	0	1
9	0	0	1	0	1

6.112 Table B illustrates 2/5 coding for station Number 5678.

TABLE B

	Thousands Digit	Hundreds Digit	Tens Digit	Unit Digit
Decimal Number	5	6	7	8
2/5 Coded Number	01010	00110	10001	01001

6.12 Audio Playback Unit

6.121 Cognitronics Model 630 - Test and Maintenance instructions for the electromechanical APU are provided on the back of the front panel of the Audio Playback Unit.

6.122 MSC APU

(A) Normal Operation - the Master Specialities Company Audio Playback Unit is considered to be functioning normally if -12V DC (Pin 15 or 16) is applied to any one of the ten inputs (pins 1 thru 10) and the output is a clear audible number (zero thru nine).

(B) Trouble Shooting - The following three tests, are to be utilized to verify the normal operation of the APU. If the APU does not pass all three tests it should be returned to MSC for repair.

A) Input Check - When an input is selected the voltage at the input must be -12DC. when none of the inputs are selected the voltage at the inputs must be approximately 5V DC, otherwise the system is not operating normally.

B) Sync Pulse Check - The Sync Pulse varies between +12 and -12V DC with 50 msec. duration. The pulse occurs at the end of each digit, approximately 800 msec. between pulses. Any error caused by the sync pulse signal will create a malfunction in the APU.

C) Output Check - The audio output signal should vary between -6dbm and 0dbm when any input to the system is activated. The output level is externally adjusted by th Volume Control potentiometer, accessed through the hole in the front of the APU.

(C) Cognitronics Model 640 - The solid-state Cognitronics APU is equipped with an LED which provides a visual indication that the unit is functioning. The volume control potentiometer is accessed through the hole in the front of the APU. See note 113 on NS-02500-01.

6.2 Unit Procedures

NOTE: The following table lists troubles possibly encountered during the performance of the tests per Paragraphs 5.1 and suggests action to be taken to rectify the condition.

6.21 Three digit operation (K option)

STEP	OPERATION	OBSERVATION
7	Relays OFF-, ON and/or ST fail to operate.	Refer to NS-02500-01 FS2 and FS4 and check the operate paths of the relays involved.
12	No or low audible readout, however steering relays SYC, AS, BS, CS, THS, HS, TS, US and END Sequence.	Repeat the readout and adjust the output level potentiometer, located on the APU, to obtain a satisfactory audible output level.
	The audible readout sounds distorted.	Repeat the readout and adjust the output level potentiometer to decrease audible output level.
	Office Code is incorrect.	Verify cross-connections per Paragraph 1.31.
	Station Number is incorrect.	a) Block relay ON1 operated. Insulate contacts 8M, relay S1 and 6M relay ON. Remove the two insulators. b) Restore relay END to its non-operated position and verify that the TN-relays do not operate during the Station Number portion of the readout. c) Repeat the operations per Step 0 Paragraph 5.12. Repeat the readout.
	No audible readout is obtained and steering relays SYC, AS, BS, CS, THS, HS, TS, US and END do not sequence.	Check the operate paths of relays S, S1 and SYC.

6.22 Ten Digit Operation (K option)

NOTE: The following table lists troubles possibly encountered during the performance of tests per Paragraph 5.13 and suggests the action to be taken to rectify the condition.

STEP	OPERATION	OBSERVATION
6	S lamp fails to light. Relays S* and REV* operate.	The Tip and Ring test leads, connecting the ITE-5248 to the ANAC, are reversed.
12	KP* relay does not operate.	Check the adjustment of the Multi-frequency Receivers. Check the output AC voltage of the ITE-5248 oscillators; with the ANAC used as the load the output AC voltage is approximately Odb. (.77V rms) The ANAC receivers are operational with a -6db input signal.

STEP	OPERATION	OBSERVATION
13, 14 18, 22 26	Relays fail to sequence or operate as indicated.	Same as preceeding information.
	Relay NM* operates	a) Verify the cross-connections, specified per Paragraph 1.31, for relay OFF-. b) Check the 2-out-of-5 coded information stored in the reed relays, check for ground on terminals 12, 22, 32, 42 and 52 of reed relays TH, H, T and U. If the information is not stored correctly perform the following operations: 1) Block relay ON1 operated. Insulate contacts 8M, relay S1 and 6M relay ON. Remove the insulators. 2) Repeat the operations per Steps 7, 8, & 9. 3) Operate the AS relay and restore all other steering relays to their non-operated positions. 4) Starting with Step 13, Paragraph 5.13 proceed with the test.
30	Low audible readout, however steering relay SYC, AS, BS, CS, THIS, HS, TS, US and END sequence.	Repeat the readout and adjust the output level potentiometer, located on the APU to obtain a satisfactory output level.
	The audible readout sounds distorted.	Repeat the readout and adjust the output level so as to decrease the audible output volume.
	Office Code is incorrect.	Verify cross-connections per Paragraph 1.31.
	Station Number is incorrect.	a) Block relay ON1 operated. Insulate contacts 8M relay S1, and 6M relay ON. Remove the two insulators. b) Restore relay END to its non-operated position and verify that the TN- relays do not operate during the Station Number portion of the readout. c) Repeat the operations per Steps 7, 8 and 9, Paragraph 5.13. d) Repeat the readout.
	No audible readout is obtained and steering relaysSYC, AS, BS, CS, PAS, THS, HS, TS, US and END do not sequence.	Check the operate paths of relays S, S1 and SYC.
36	See Trouble and suggested action for Step 30.	

6.3 No. 5 Crossbar (Z option)

NOTE: The following table lists trouble conditions possibly encountered during the performance of the tests per Paragraph 5.2 and suggests action to be taken to rectify the condition.

STEP	OPERATION	OBSERVATION
4	S lamp fails to light. Relays S* and REC* operate.	The Tip and Ring test leads, connecting the ITE-5248 to the ANAC, are reversed.
10	KP* relay does not operate.	Check the adjustment of the Multi-frequency Receivers. Check the output AC voltage from the ITE-5248 oscillators; with the ANAC used as a load the output AC voltage is approximately 0db (7.7V rms). The ANAC receivers are operational with a -6db input signal.
11, 12 16, 20 24	Relays fail to sequence or operate as indicated.	Same as preceeding information.
	Relay NM* operates	a) Verify the cross-connections, specified per Paragraph 1.31, for relay OFF-. b) Check the 2-out-of-5 coded information stored in the reed relays by checking for ground on terminals 12, 22, 32, 42 and 52 if relays TH, H, T, U. If the information is not stored correctly perform the following operations: 1) Block relay ON1 operated. Insulate contacts 8M, relay S1 and 6M relay ON. Remove the insulators. 2) Repeat the operations per Steps 5, 6 and 7. 3) Operate the AS relay and restore all other steering relay to their non-operated positions. 4) Starting with Step 11, Paragraph 5.22, preceed with the test.
28	Low audible readout, however, steering relays SYC, AS, BS, CS, THS, HS, TS, US and END operate.	Repeat the readout and adjust the output level potentiometer, located on the APU, to obtain a satisfactory output level.
	The audible readout sounds distorted.	Repeat the readout and adjust the output level potentiometer so that the audible output volume is decreased.
	Station Number is incorrect.	a) Block relay ON1 operated. Insulate contacts 8M, relay S1 and 6M relay ON. Remove the insulators. b) Restore relay END to its non-operated position and verify that the TN- relays do not operate during the readout. c) Repeat the operations per Steps 5, 6 and 7, Paragraph 5.22. d) Repeat the readout.

STEP	OPERATION	OBSERVATION
28 Cont	No audible readout is obtained and steering relays SYC thru END do not sequence.	Check the operate paths of relays S S1 and SYC.
35, 39	See Trouble and Suggested action for Step 28.	

6.4 Supplemental System Tests

NOTE: The following tests are performed from the Master Test Control Circuit and should be utilized if problems are encountered when performing the system tests.

6.41 Preparation - The following operations provide the preliminary steps for the succeeding tests.

STEP	OPERATION	OBSERVATION
1	At the MTF jack, lamp and key circuit insert a make busy plug into a OGT- MB jack of the trunk associated with the ANAC circuit.	
2	At MTF, restore all keys to normal.	
3	Momentarily operate key RL.	All lamps are extinguished.
4	Operate keys NTFS, NTTS and KY.	
5	Operate keys FS, FG and TS-, to select the trunk associated with the ANAC circuit.	
6	Operate the appropriate A thru K keys to select the three digit access code assigned to the ANAC circuit plus the test line directory number.	

6.42 Marker Route Relay - This test checks that all markers are cross-connected to direct calls to the AMA out-going trunks associated with the ANAC circuit.

STEP	OPERATION	OBSERVATION
1	Perform the operations per Paragraph 6.41, Steps 1 thru 6, inclusive.	
2	Operate CST-CSU keys to select 1 or 2 party class of service.	
3	Operate keys MTO, OGT and REC.	
4	Momentarily operate key ST.	OGT and AS lamps light. A TBL-RCDR card is produced. Verify the routing information on the TBL-RCDR card.
5	Momentarily operate key RL.	Lamps OGT and AS are extinguished.

STEP	OPERATION	OBSERVATION
6	Restore key MTO.	
7	Operating each MT- key one at a time, repeat Steps 4 and 5 for each Marker.	
8	Momentarily operate key RL.	
9	Restore keys OGT and REC.	

6.43 Seizure - This test checks seizure of the ANAC circuit via the associated Office Link appearance, the verbal transmission of the calling telephone number and the end of the announcement signal.

STEP	OPERATION	OBSERVATION
1	Perform the operations per Paragraph 6.41, Steps 1 thru 6, inclusive.	
2	Operate key MISC.	
3	Momentarily operate key ST.	High tone interrupted by 60 IPM is heard.
4	Momentarily operate key RL.	Tone Ceases.
5	Repeat Steps 4 and 5 per Paragraph 6.41.	
6	Set up the 3-digit ANAC access code plus 111-1111 on keys A thru K.	
7	Momentarily operate key ST.	Audible ringing is heard.
8	Request the readout when the line is answered.	An audible readout of the test line directory numbered followed by 120 IPH is heard.
9	Momentarily operate key RL.	120 IPM tone ceases.

6.44 No Translator Cross-Connection - This test checks that high tone is transmitted when there is no translator cross-connect associated with this station.

STEP	OPERATION	OBSERVATION
1	Perform the operations per Paragraph 6.41 Steps 1 thru 6, inclusive.	
2	Operate key TP.	
3	Momentarily operate key ST.	In 2 to 5 seconds high tone is heard in handset.
4	Momentarily operate key RL.	Tone ceases.
5	Restore key TP.	

6.45 Timed Release - This test checks the release of the ANAC circuit after a 20 second timing period.

STEP	OPERATION	OBSERVATION
1	Perform the operations per Paragraph 6.41, Steps 1 thru 6, inclusive.	
2	Momentarily operate key ST.	Lamps AS and MISC light; high tone interrupted by 60 IPM is heard. After approximately 20 seconds the tone ceases.
3	Momentarily operate key RL.	Lamps are extinguished.

6.46 Overflow - This test checks that the marker route advances to overflow tone when the ANAC circuit is busy. Non AMA classes of service are also routed to overflow tone.

STEP	OPERATION	OBSERVATION
1	Perform the operations of Paragraph 6.41, Steps 1 thru 6, inclusive.	
2	Operate key RA.	
3	Momentarily operate key ST.	120 IPM is heard.
4	Momentarily operate key RL.	Tone ceases.
5	Restore key RA.	
6	Operate CST-CSU key to select a non-AMA class of service.	
7	Momentarily operate key ST.	120 IPM is heard.
8	Momentarily operate key RL.	Tone ceases.
9	Restore all keys to normal.	

Manager, Product Engineering
Control Center

Reason for Reissue:
Add test of the Security Check Feature.