AUTOMATIC NUMBER ANNOUNCER
NO. 1 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 (X option)
NS-02501-01 Number Verification Circuit

1.13 The tests per this section verify these circuits when used in No. 1 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 per this section, refer to NOTE 401 NS-02500-01.

1.33 Marker and translator cross connections must be run to perform the system tests.

1.4 Cabling Not To Be Connected Until After Unit Test

1.41 The C12 lead between the AMA Transverter and ANAC is not to be connected until after unit tests per 5.1 are completed. This lead appears on TS(T-) terminal 13 (X option).

1.5 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.

2. RECORDS AND REQUIREMENTS

2.1 Records - The results of these 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.

5. TEST OPERATIONS

5.1 Unit Test

5.11 Remove the TM timer from its socket.

5.12 Perform the tests per the following table in the order indicated.

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

STEP	OPERATION	OBSERVATION
1	block relays ON & DNK non-operated. Connect ground to terminals 13 on T.S.'s (T0), (T1), (T2), (T3), (T4) and (T5). If N option is provided connect ground to terminals 13 on T.S (T6) and T.S. (T7).	
2	Apply ground to terminals 11, 21, 31, 12, 22 and 32 T.S. (T0).	Relays ST0 and AC0 operate.
3	Move grounds on T.S.(T0) terminals 11, 21, 31, 12, 22 and 32 to T.S. (T1) terminals 11, 21, 31, 12, 22 and 32.	Relays ST0 and AC0 release. Relays ST1 and AC1 operate.
4	Repeat operations per step 3 using terminals 11, 21, 31, 12, 22 and 32 on T.S.(T2), T.S.(T3), T.S.(T4) and T.S. (T5); also using T.S.(T6) and T.S.(T7) if N option is provided.	The ST- and AC- relays, corresponding to the T.S. (T0) utilized, operate.
5	Remove the grounds from terminals 11, 21, 31, 12, 22 and 32 T.S.(T5) OR T.S (T7), N option.	
6	Verify that the NORMAL-OPEN LOOP-REVERSE key on the ITE-5248 is in the OPEN LOOP position. Connect the ITE-5248 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.

STEP	OPERATION	OBSERVATION
7A	Remove the block from relay ON. Insulate all make contacts of AC- Relays and 10M of ST- relays.	
7B	Ground the two make contacts shown below which correspond to the lowest numbered OFF- relay cross-connected per paragraph 1. FOR OFF- RELAY — GROUND RELAY ACO 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 numbered OFF- relay, which has cross-connect assignments, operates. Relay ON operates, Relay C* operates. S lamp (ITE)-5248) extinguishes.
8	Remove the grounds applied per Step 7.	Relay OFF- remains operated.
9	Momentarily ground contacts 6, 7, 11, 13, 17, 18. 21 and 24 of relay ACO. NOTE: Care must be exercised so that no unspecified contacts of relay ACO are inadvertently grounded.	NOTE: This operation stores 2/5 (2-out-5) coded information in the read relays.
10	Block operated Relay S*. Operate the NORMAL-OPEN-LOOP-REVERSE key to the REVERSE position. Remove the block from relay S*.	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.
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 ZT option- 7DA* relay operates.
14	Operate and release the 1 key (ITE-5248)	Relays RR0* and RR1* operate and release. Verify that relay NM* does not operate.
15	Block relay TS non-operated. Remove the block from relay HS.	
16	Operate and release the 2 key (ITE-5248).	Relay NM* operates. Relay THS relay releases and relay HS operate.
17	Restore relay NM* to its non-operated position.	

STEP	OPERATION	OBSERVATION
18	Operate and release the 2 key (ITE-5248).	Relays RRO* and RR2* operate and release. Verify that relay NM* does not operate.
19	Block relay US on-operated. Remove the block from relay TS.	
20	Operate and release the 4 key (ITEO5248).	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 RRO* 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 S operates. Relay D* operates.
30	Ground terminal 44 T.S.(D).	An audible readout of the 3 digit office index, corresponding to th operated OFF- relay, followed by station number 1234 is obtained via the ITE-5248's speaker. ZV- option - The audible readout will be repeated.
31	Block relay TRA* operated.	
32	Insulate contacts 8M relay S1 and 12M 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, but no audible readout is obtained and the TN- relays do not operate.
34	Ground the ACO relay contacts corresponding to the second lowest numbered OFF- relay cross connected per Paragraph 1.3 (refer to the table of Step 7), if applicable.	See Step 7.

STEP	OPERATION	OBSERVATION
35	Momentarily ground contacts 7M, 9M, 13M, 14M, 16M, 20M, and 22M relay ACO; and contact 10M, relay STO.	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 5678 is obtained via the ITE-5248's speaker. ZV option - The audible readout will be repeated.
37	Insulate contacts 8M relay S1 and 12M relay ON. Remove the two insulators.	See Step 32.
38	Repeat the operations per Step 34 grounding the ACO relay contacts corresponding to the third lowest numbered OFF- relay cross-connected per Paragraph 1.3, if applicable.	See Step 7.
39	Momentarily ground contacts 8M, 10M, 12M, 15M, 19M, 20M and 23M relay ACO; and contact 10M, relay STO.	See Step 9.
40	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 will be repeated.
41	Repeat Steps 37 and 40 for each OFF- relay that has cross-connect assignments.	
42	Insert timer TM. Remove block from relay DNK.	Relay TMA operates after approximately 3 seconds. Relay RL operates after approximately 20 seconds.
43	Remove all test connections.	
44	Momentarily ground terminal 15 T.S.(D).	Relay DNK operates and releases. ZU option. Relay DNK does not operate. ZV option.
45 ZV option	Block operated TMA relay. Momentarily ground terminal 15 T.S.(D).	Relay DNK operates and releases.
46 ZV option	Release TMA relay.	
47 ZP option	Ground terminal 22 (D)T.S.	TM1 and TMB relays operate. In aproximately 2.5 minutes relay RL operates. Option 10 - TM2 and TMB relays operate. In approximately 20 seconds relay RL operates.

STEP	OPERATION	OBSERVATION
48 ZP option	Remove ground on terminal 22 (D)T.S.	TMB and RL relays release.
49	Option 10 - Remove the plug from the SMB jack.	Relay SYC1 releases and the SMB lamp extingusihes.
50	Option 10 - Momentarily grounds 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
51	Option 10 - Reinsert a dummy plug into the SMB jack.	

5.2 System Test

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

5.22 Arrange with the Telephone Company for the use of three line circuits from which test calls can be made. The 4-digit station numbers assigned to these line circuits should be chosen so that each bit of the 2/5 (2-out-of-5) 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, and digit 2 validates bits 0 and 2.

EX2; Three numbers such as XXX-0123, XXX-1657 and XXX-9874.

Refer to TABLE A paragraph 6.11 for a list of the 2/5 coding for the decimal digits.

5.23 Connect the CI2 lead from the AMA transverter at this time.

5.24 Perform the tests per the following TABLE.

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

5.25 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 the line circuit arrange for test, connect the ITE-4208A Handset to the line circuit, at the MDF or DF and (1) dial the ANAC access code and the station line directory number with the least one digit dialed incorrectly, (2) ZT option dial the ANAC access code and the 4 digit station number.	Ringing is heard in the telephone receiver.
2	When the line is answered request the readout (See Note 1).	An audible readout of the station line directory number followed by 120 IPM is heard in the telephone receiver. ZV option - The audible readout will be repeated.
3	From the second and third line circuits, arrange for test, repeat the operations per Steps 1 and 2.	
4	From a line circuit arrange for test, dial the ANAC access code and the correct station directory number.	A combination of 60 IPM and high tone is heard in the telephone receiver.
5	Connect the Handset to a line circuit that is not assigned for service dial the ANAC access code and the station line directory number.	High tone is heard in the telephone receiver.
6 ZP option	From a line circuit arranged for test, dial the ANAC access code and the station line directory number with at least one digit dialed incorrectly.	Ringing is heard in the telephone receiver.
7 ZP option	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.
8 ZR option	Block relay CTA nonoperated. Dial the ANAC access code and the station line directory number with at least one digit dialed incorrectly.	Ringing is heard in the telephone receiver.
9 ZR option	When the line is answered request the readout.	Audible readout is not heard.
10 ZR option	Remove block on CTA relay.	
11	Option 10 - Remove the plug from the SMB jack. Set the B and C switches to the 2nd and 3th digit of the office code and the 1h 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.	

STEP	OPERATION	OBSERVATION
12	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.
13	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.

NOTE 1: If the 225A 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	1	1
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 3456.

TABLE B

	Thousands Digit	Hundreds Digit	Tens Digit	Unit Digit
Decimal Number	3	4	5	6
2/5 Coded Number	01100	10010	01010	00110

6.12 Audio Playback Unit

6.121 Cognitronics Model 630 - Test and Maintenance instructions for the electro-mechanical 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 audio output signal should vary between -6dbm and Odbm when any input to the system is activated. The output level is externally adjusted by the Volume control Potentiometer, accessed through the hole in the front of the APU.

6.123 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 incountered during the performance of the tests per Paragraphs 5.1 and suggests action to be taken to rectify the condition.

STEP	OPERATION	OBSERVATION
6	S lamp fails to light.	The Tip and Ring 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 from the ITE-5248 oscillators: with the ANAC used as the load the output AC voltage is approximately Odbm (.77 Vrms). The ANAC receivers are operational with the -6dB input signal.
13, 14 18, 22 26	Relays fail to sequence or operate as indicated.	Same as preceeding information. A) Verify the cross-connections specified per Paragraph 1.31, for relay OFF-. B) Check the 2/5 coded information stored in the reed relays, by checking for ground on terminals 12, 22, 32, 42 and 52 or reed relays TH, H, T and U. If the information is not stored correctly perform the following operates: 1) Insulate contacts 8M relay S1 and 12M relay ON. Remove the two insulators. 2) Repeat the operations per Steps 7, 8, and 9. 3) Operate the AS relay and restore all other steering relays to their non-operated positions. 4) Starting with Step 13, Paragraph 5.1 proceed with the test.
30	Low audible readout, however steering	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.
	Office Code is incorrect.	Verify the cross-connections per Paragraph 1.31.
	No audible readout is obtained and steering relays SYC thru END do not sequence.	Check the operate paths for relays S, S1 and SYC.

6.3 Supplemental System Tests

NOTE The following tests are performed from the Originating Trouble Indicator Circuit and should be utilized if problems are encountered with performing the system tests.

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

STEP	OPERATION	OBSERVATION
1	At the trouble indicator restore all operated keys.	
2	Insert a maker busy plug into the DB jack for the Marker to be tested.	
3	Operate the DT key corresponding to the Marker to be tested.	
4	Operate key LP.	
5	From office records find a line location wired in a ring translator that may be used for testing.	
6	Connect the Talking Set to the T and R leads of the selected line location.	

6.32 Marker Route Relay - This test checks that all Originating markers are cross-connected to direct calls to the office link, appearance associated with the ANAC circuit. Calls are routed 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 per Paragraph 6.31 Step 1 thru and including Step 4.	
2	Operate A-, B-, C- CS- and F- keys to select the ANAC circuit.	
3	Operate key ST.	Proper MB and MS lamps light. Receiving and transmitting leads properly closed. Correct office frame and trunk selected. EC lamp lights.
4	Operate key RL.	The above indication is released.
5	Make the OGT, associated with the ANAC circuit, busy.	
6	Operate key ST.	Overflow trunk selected.
7	Operate key RL.	The above indication is released.
8	Remove the make busy plug.	
9	Operate a NON-AMA CS- key.	
10	Operate key ST.	Overflow trunk selected.
11	Operate key RL.	The above indication is released.

6.33 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 announcement signal.

STEP	OPERATION	OBSERVATION
1	Perform the operations per Paragraph 6.31 Steps 5 and 6.	
2	Operate the switch on the Talking Set to the TALK position.	Dial tone is heard.
3	Dial the ANAC 3-digit access code plus the station directory number.	High tone interrupted by 60 IMP is heard.
4	Operate the Talking Set switch to the Monitor position.	The interrupted tone ceases.
5	Operate the Talking Set switch to the TALK position.	Dial tone is heard.
6	Dial the ANAC 3-digit access code plus 111-1111	Audible ringing is heard.
7	Request the readout when the line is answered.	The station line directory number followed by 120 IPM is heard.
8	Operate the Talking Set switch to the Monitor position.	120 IPM tone ceases.

6.34 Timed Release - This test checks that this circuit will release after an overall 20 second timing interval.

STEP	OPERATION	OBSERVATION
1	Perform the operations per Paragraph 6.31 Steps 5 and 6.	
2	Operate the Talking Set switch to the TALK position.	Dial Tone is heard.
3	Dial the ANAC 3-digit access code plus the station line directory number. Start timing when dialing is complete.	High tone interrupted by 60 IPM is heard.
4	After approximately 20 seconds.	The tone ceases and dial tone is heard.
5	Operate the Talking Set switch to the Monitor position.	Dial tone ceases.

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

STEP	OPERATION	OBSERVATION
1	Perform the operations per Paragraph 6.31, Steps 5 and 6.	
2	Connect the lead of the Talking Set to the ring of the test line. Connect the other lead of the Talking Set to frame ground.	
3	Operate the Talking Set switch to the TALK position.	Dial tone is heard.
4	Dial the ANAC 3-digit access plus any 7-digit number.	High tone is heard.
5	Operate the Talking Set switch to the Monitor position.	High tone ceases.

Manager, Product Engineering
Control Center

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