AUTOMATIC NUMBER ANNOUNCER
SXS AMA

CONTENTS

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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 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 (Y option)
NS-02502-01 Number Verification Circuit

1.13 The tests per this section verify these circuits when used in SXS office that employs AMA billing equipment.

1.2 Sequence of Operation

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

1.3 Cross-Connections

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 tests per this section, refer to NOTE 401, NS-02500-01.

1.4 General Precautions

PRECUATION: 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 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 relays required to verify normal operation are specified.

NOTE 2: Relays and terminals followed by an asterisk(*), per the following tests, are in NS-02502-01. Relays and terminals not followed by an asterisk per the following tests, are in NS-02500-01.

2. RECORDS AND REQUIREMENTS

2.1 Records

The results of the 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 EQUIPMENT

3.1 Test Sets

AMT	ITE	DESCRIPTION
1	4442A	Volt-Ohmmeter
1	4208A	Handset

3.2 Cords

AMT	ITE	COND.	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

No special test set up is required.

5. TEST OPERATIONS

5.1 Unit Test

5.11 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	Remove TM timer and TM* timer from their sockets.	
2	Strap terminals 48 T.S.(D) to 58 T.S.(D).	
3	Verify that the switch of the ITE-4208A Handset is in the Monitor position. Connect the ITE-4208A to the ANAC, tip to terminal 52T.S.(A)* and ring to terminal 42 T.S.(A)*.	
4	Operate the switch on the ITE-4208A Handset to the TALK position.	Relay RA1* operates.
5	Using the ITE-4208A dial the 3-digit office code corresponding to the lowest numbered OFF- relay, cross-connected per Paragraph 1.31, and dial Station Number 1234.	Steering relays AS*, BS*, CS* THS*, HS*, TS*, US* and END* advance for each digit dialed. Upon completion of dialing verify that relays TBS*, TBS1* and SA* are operated.
6	Insulate contacts 8B, relay NM*.	
7	Block relays ACA, ACB and ACC non-operated.	
8	Ground the two relay contacts, shown below which correspond to the lowest numbered OFF- relay cross-connected per Paragraph 1.31. 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 numbered OFF- relay which has cross-connect assignments, operates. Relay ON operates.

STEP	OPERATION	OBSERVATION
9	Remove the grounds applied per Step 8.	Relay OFF- remains operated.
10	Momentarily ground, one at a time 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 the 2/5 (2-out-of-5) coded Station Number 1234 in the reed relays, NS-02500-01.
11	Block relays END and END* non-operated.	
12	Remove the insulator from contact 8B, relay NM*.	Steering relays AS, BS, CS, THS, HS, TS, US, AS*, BS*, CS*, THS*, HS*, TS* and US* advance. Verify that relay NM* does not operate.
13	Operate relay NM*.	
14	Remove blocks from relays END and END*	
15	Block relay ON operated.	
16	Momentarily ground terminal 22, T.S.(A)* and (R option) or terminal 12, T.S.(A)* (Q option). NOTE: The readout can be repeated by restoring relay END to its non-operated position and repeating the operation per Step 16.	An audible readout of the three digit office index corresponding to the operated OFF- relay, followed by Station Number 1234 is heard from the ITE-4208A.
17	Remove the block from relay ON. Operate the switch of the ITE-4208A to the Monitor position.	The circuit is restored to an idle state.
18	Operate the switch on the ITE-4208A Hand-set to the Talk position.	Relay RA1* operates.
19	Using the ITE-4208A, dial the 3-digit office code corresponding to the second lowest numbered OFF- relay cross-connected per Paragraph 1.31, and dial Station Number 5678.	Steering relays AS* thrù END* advance as each digit is dialed.
20	Insulate contact 8B, relay NM*.	
21	Ground the two relay contacts, shown per Step 8, when corresponds to the second lowest numbered OFF- relay cross-connected per Paragraph 1.31.	The second lowest numbered OFF- relay, which has cross-connect assignments, operates. Relay ON operates.
22	Remove the grounds applied per Step 21.	Relay OFF- remains operated.
23	Momentarily ground, one at a time, contacts 7M and 9M, relay ACA; contacts 3M, 4M, 6M and 10M relay ACB, and contacts 2M and 5M relay ACC.	
24	Block relays END and END* non-operated.	
25	Remove the insulator from contact 8B, relay NM*.	Steering relays AS thru US and AS* thru US* advance. Verify that relay NM* does not operate.

STEP	OPERATION	OBSERVATION
26	Operate relay NM*.	
27	Block relay ON operated. Remove the blocks from relay END and END*.	
28	Momentarily ground terminal 22, T.S.(A)* (R option) or terminal 12, T.S.(A)* (Q option).	An audible readout of the three digit office index, corresponding to the operated OFF- relay, followed by Station Number 5678 is heard from the ITE-4208A.
29	Remove the block from relay ON. Operate the switch of the ITE-4208A to the Monitor position.	The circuit is restored to and idle state.
30	Operate the switch on the ITE-4208A Handset to the TALK position.	Relay RA1* operates.
31	Using the ITE-4208A, dial the 3-digit office code corresponding to the third lowest numbered OFF- relay, cross-connected per Paragraph 1.31, and dial Station Number 9809.	Steering relays AS* thru END* advance as each digit is dialed.
32	Insulate contact 8B, relay NM*.	
33	Ground the two relay contacts, shown per Step 8, which correspond to the third lowest numbered OFF- relay cross-connected per Paragraph 1.31.	The third lowest numbered OFF- relay which has cross-connect assignments, operates. Relay ON operates.
34	Remove the grounds applied per Step 33.	Relay OFF- remains operated.
35	Momentarily ground, one at a time, contacts 9M and 10M relay ACA; contacts 2M, 5M, 9M and 10M relay ACB; and contacts 3M and 5M relay ACC.	
36	Block relays END and END* non-operated.	
37	Remove the insulator from contact 8B, relay NM*.	Steering relays AS thru US and AS* thur US* advance. Verify that relay NM* does not operate.
38	Operate relay NM*	
39	Block relay ON operated. Remove the blocks from relays END and END*	
40	Momentarily ground terminal 22 T.S.(A)* (R option) or terminal 12, T.S.(A)* (Q option)	An audible readout of the three digit office index, corresponding to the the operated OFF- relay, followed by Station Number 9800 is heard from the ITE-4208A.
41	Restore the operated OFF- relay its non-operated position. Ground the ACA relay contacts corresponding to the next lowest numbered OFF- relay.	

STEP	OPERATION	OBSERVATION
42	Restore relay END to its non-operated position.	
43	Repeat the operations per Steps 49, 41 and 42 using each OFF- relay that has cross-connect assignments.	Same as step 40.
44	Option 10 - Remove the plug from the SMB jack.	Relay SYC1 releases and the SMB lamp extinguishes.
45	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, THS1 US, US1
46	Option 10 - Reinsert a dummy plug into the SMB jack.	
47	Insert timer TM.	Relay TMA operates in approximately 3 seconds. Relay RL operates in approximately 20 seconds.
48	Remove the block from relay ON. Operate the switch on the ITE-4208A to the Monitor position.	
49	Insert timer TM*.	
50	Operate the switch on the ITE-4208A to the TALK position.	Relay TMA* operates in approximately 3 seconds. After approximately 20 seconds verify that ground is removed from T.S. (A)* Terminal 32.
51	Remove all test connections.	

5.2 System Tests

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

5.22 Arrange with the Telephone Company for the use of three line circuits from which test calls can be made. These line circuits are to be selected to that each bit of the 2/5 (2-out-of-5) code can be validated for each of the station numbers four digits.

Ex. 1 Three numbers such as XXX-0000, XXX-1111 and XXX-222; digit 0 validates bits 4 and 7, digit 1 validates bits 0 and 1, and digit 2 validates bits 0 and 2.

Ex. 1 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 codes for the decimal digits.

5.23 Perform the test 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.

5.24 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 th 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 Handset to the line circuit, at the MDF or DF, and 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.
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.
3	From the second and third line circuits arranged for test, repeat the operations per Steps 1 and 2.	
4	From a line circuit arranged for test, dial the ANAC access code and the correct station line 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	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 TA thru U switches to the new security numbers. If the security number is not known, any combination of 6 digits may be set for test.	
7	Option 10 - Dial the 10 digit ANAC access code and the 1st office code 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 headset.
8	Option 10 - repeat Step 7 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 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	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 1379.

TABLE B

	Thousands Digit	Hundreds Digit	Tens Digit	Unit Digit
Decimal Number	1	3	7	9
2/5 Coded Number	11000	01100	1001	00101

6.12 Audio Playback Units

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

6.1221 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).

6.1222 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 -12V DC. 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.

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

STEP	OPERATION	OBSERVATION
5	Steering relays AS* thru END* do not advance	Check the Digit Steering circuit, FS3 NS-02502-01, and the Pulse Counting Circuit, FS4 NS-02502-01.
12, 25 37	Relay NM* operates	Check the 2/5 coded information stored in the reed relays A*, B*, C*, TH*, H*, T*, U*, TH, H, T and U. Check the cross-connections per Paragraph 1.31 for the OFF-relay. If the information stored in relays A* thru U* is in error check the Pulse Counting Circuit, FS4 NS-025020-1. If the information stored in relays TH thur U is in error, restore the information.
16, 28 40	Low audible readout level.	Repeat the readout and adjust the output level potentiomxter, 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.
	No audible readout is obtained and steering relays SYN 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 Line Verification Circuit and should be utilized if problems are encountered when performing the system tests.

6.31 Seizure

This test checks the seizure of the ANAC circuit via the associated selectors, verbal transmission of the calling telephone number and end of announcement signal.

STEP	OPERATION	OBSERVATION
1	At LV circuit restore all keys to normal.	All lamps are extinguished.
2	Connect the Talking Set to a single party line.	
3	Operate the Talking Set switch to the TALK position.	Dial tone is heard in the telephone receiver.
4	Dial the ANAC 3-digit access code plus the station line directory number.	Lamps NC, SB, TC, ST and TT light, LV circuit. A combination of 60 IPM and high tone is heard in the telephone receiver.
5	Operate the Talking Set switch to the Monitor position.	The tone ceases.

STEP	OPERATION	OBSERVATION
6	Operate the Talking Set switch to the TALK position.	Dial tone is heard in the telephone receiver.
7	Dial the ANAC 3-digit access code plus 222-222.	Audible ringing is heard in the telephone receiver.
8	Request the readout when the line is answered.	An audible readout of the station line directory number followed by 120 IPM is heard in the telephone receiver.
9	Operate the Talking Set switch to the Monitor position.	120 IPM ceases.

6.32 Line Verification Circuit Busy

This test checks the verbal transmission of the calling telephone number if the Line Verification Circuit becomes idle within 20 seconds, calling party disconnect if the Line Verification is busy for 20 seconds and Line Verification seizure during the readout of the calling telephone number.

STEP	OPERATION	OBSERVATION
1	Connect the Talking Set to a single party line.	
2	At LV circuit restore all keys to normal.	
3	At LV circuit, operate key ST.	ST, TALK and H lamps light.
4	Operate the Talking Set switch to the TALK position.	Dial tone is heard in the telephone receiver.
5	Dial the ANAC 3-digit access code plus the station line directory number.	
6	After approximately 10 seconds, restore the ST key on the LV circuit.	Lamps SB, TC, NC and TT light. A combination of 60 IPM and high tone is heard in the telephone receiver.
7	Operate the Talking Set switch to the Monitor position.	The Tone ceases.
8	At the LV circuit, operate key ST.	Lamps ST, TALK and H light.
9	Operate the Talking Set switch to the TALK position.	Dial tone is heard in the telephone receiver.
10	Dial the ANAC 3-digit access code plus the station line directory number.	Dial tone ceases.
11	After approximately 20 seconds.	Dial tone is heard in the telephone receiver.
12	Restore the ST key, on the LV circuit.	
13	Dial the ANAC 3-digit access code plus 222-2222.	Audible ringing is heard in the telephone receiver.

STEP	OPERATION	OBSERVATION
14	When the line is answered request the readout.	The start of the station line directory number is heard in the telephone receiver
15	During the readout of the station line directory number, operate the ST key on the LV circuit.	The completion of the readout of the station line directory number followed by 120 IPM is heard in the telephone receiver.
16	Restore the ST key on the LV circuit.	
17	Operate the Talking Set switch to the Monitor position.	120 IPM ceases.

6.33 Abandon Call

This test checks that a call abandoned while the sender is attached or a call abandoned during readout of the station line directory number will result in a disconnect.

STEP	OPERATION	OBSERVATION
1	Connect the Talking Set to a single party line.	
2	At the LV circuit restore all keys to normal.	
3	Operate the Talking Set switch to the TALK position.	Dial tone is heard in the telephone receiver.
4	Dial the ANAC 3-digit access code plus the the station line directory number.	Lamps SB, TC, ST, and TT light on LV Relays SA operates and lamp NC lights.
5	As soon at relay SA operates, operate the Talking Set switch to the Monitor position.	Verify that the LV circuit releases.
6	Operate the Talking Set switch to the Talk position.	Dial tone is heard in the telephone receiver.
7	Dial the ANAC 3-digit access code plus 222-2222. Request the readout when the line is answered.	Lamps ST, TC, ST, TT, and NC light on LV circuit. Listen for the first two digits of the station line directory number.
8	During the readout, operate the Talking Set switch to the Monitor position.	The readout ceases.

6.34 Idle Sender

This test checks the ability of the ANAC circuit to select either of the two Senders associated with the Line Verification Circuit.

STEP	OPERATION	OBSERVATION
1	Connect the Talking Set to a single party line.	
2	At the LV circuit restore all keys to normal.	
3	Block relay MB1 operated, LV circuit.	
4	Dial the ANAC 3-digit access code plus the station line directory number.	Lamps SB, TC, ST, TT, and NC light on LV circuit. A combination of 60 IPM and high tone is heard in the telephone receiver.
5	Operate the Talking Set switch to the Monitor position.	The tone ceases.
6	Remove the blocking tool from relay MB1.	

Manager, Product Engineering
Control Center

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