AUTOMATIC DATA TEST LINE
TROUBLE LOCATING PROCEDURES

1. GENERAL

1.01 This section describes trouble locating procedures and the use of maintenance test cards on the automatic data test line No. 5A (ADTL).

1.02 This section is based on the results of tests in Section 205-102-501. All tests referred to by test letter in parentheses in Table A of this section refer to tests of Section 205-102-501.

1.03 This section provides minor readjustment procedures on various circuit packages due to aging of components responsible for test or normal operation failures.

1.04 ***Caution: Care should be exercised in regard to the testing device used. No device should have an open circuit voltage greater than 5 volts nor a short circuit current greater than 10 milliamperes.***

1.05 ***Caution: If for any reason AE or AF circuit packages are replaced, both packages shall be readjusted as a pair.***

2. APPARATUS

2.01 72A frequency meter J64072A.

2.02 164C-4 test set.

2.03 AC-VTVM with logarithmic calibration.

2.04 Oscilloscope — Tectronix 535.

2.05 J70153BR, L2 maintenance cards (for program trunks only).

2.06 KS-3008 stopwatch.

2.07 P2A cord, 6 feet long, equipped with two 347B plugs (2P3B cord).

TABLE A

TROUBLE ENCOUNTERED DURING TESTING OR NORMAL OPERATION OF	TEST LETTER FAILURE	POSSIBLE FAULTY CIRCUIT PACKAGE	TABLE FOR CORRECTIVE ACTION	POTENTIOMETER CROSS-REFERENCE
Instruction word generator	(B)	BJ, BK, BL, BM, BN	B	
Test sentence generator	(B) (E)	BA, BB, BC, BD BE, BF, BG, BH	B, C E	BA-R2
Distortion generator	(C), (D), (E)	BP	B, E, C	BP-R68, R69
Data signal distortion measuring circuit	(B)	AE, AF, AG, AH	D	AE-R40 AF-R91 AE-L1 (inductor)
Automatic data test line	(A)	AA, AB, AC, AD	C	AA-R20, R33 AB-R27

2.08 Patch cords are to be made locally using 201 tip plugs at each end.

3. METHOD

3.01 Table A provides a list of locations where trouble may be encountered when performing the test in Section 205-102-501 or during normal operation. This table also lists possible faulty circuit packages in respect to the test involved. The table identification is in reference to additional testing procedures used to isolate trouble to a specific circuit package or relay equipment.

TABLE B

STEP NO.	MISC ACTION	72A	164C-4	AC-VTVM	OSCILLOSCOPE	ADJUST	OBSERVE
1	Block operated CY relay.	BA-TP5				R2-BA	110.0 cps — Should remain for 10 pulses.
2					BA-TP5		Sine wave — Circle one revolution every 10 seconds.
3					BA-TP4		Reset pulses.
4	Block operated CY relay.						Pulses extinguished.
5					BA-TP3		Clock pulses.
6	Release CY relay.						Pulses extinguished.
7				BA-TP2			24 volts
8				BA-TP1			24 volts
9	Block operated CY relay. (for Steps 9 through 30)				BA-TP1		Mark and space signals square wave
10					BA-TP2		
11					BB-TP1		Ring counter function square wave
12					BC-TP1		
13					BD-TP1		
14					BE-TP1		Character gate function square wave
15					BF-TP1		
16					BG-TP1		
17					BH-TP1		
18					BJ-TP1		Output signal
19	Operate P2 relay.						Square wave
20	Operate P3 relay.				BJ-TP1		Output signal square wave
21	Operate P4 relay.				BK-TP1		Output signal square wave
22	Operate SB relay.				BL-TP1		Output signal square wave
23	Operate SE relay.				BM-TP1		Output signal square wave
24	Release CY relay.						
25	Remove AB card.						
26	Insert BR card into test position.						

TABLE B (Cont)

STEP NO.	MISC ACTION	72A	164C-4	AC-VTVM OSCILLOSCOPE	ADJUST	OBSERVE
27	Patch AA-TP1 to BR-TP1.		MON-OUT jack			
28	Operate RU relay.					AN, BY, M relays operated.
29	Operate CON relay.					Zero distortion; if not, readjust BA-R2 (Step 1).
				BN-TP1		Proper operation.
				BN-TP2		
						After 15 seconds, P2 relay operated. 28 percent switch combination distortion. After 15 seconds, P3 relay operated. 28 percent switch combination distortion. After 15 seconds, P4 relay operated. GAS, TMP, P, SA, REC relays operated. 5 percent lamp lighted, FPS relay operated.
30	Operate RB relay.					FPD, OR relays operated; FPS, BY relays remain operated; all other relays released.
31	Operate CON relay.					CY, CNX relays operated. TO relay pulses, FPD relay released.
32						Same as Step 29. 5 seconds after 5 percent lamp lighted, DISC relay operated; all relays released.
33	Replace AB card; remove patches.					

TABLE C

STEP NO.	MISC ACTION	72A	164C-4	AC-VTVM	ADJUST	OBSERVE
1	Momentarily operate RU relay.	AA-TP4				AN, M relays operated. After 8 to 10 seconds, S relay operated and released all relays.
2	Remove AC-AD cards.					
3						2225 ± 2 cps
4	Operate S relay.					2025 ± 2 cps
5	Release AN relay.					
6	Operate OR, CON relays.					
7	Block nonoperated CY relay.					1270 ± 3 cps
8	Operate S relay.					1070 ± 3 cps
9	Remove blocking tools. Release all relays. Insert AC-AD cards in proper position.					
10				AA-TP5, AA-TP6 (900 ohms)		
11	Remove AC-AD cards.					
12	Operate AN, M relays.				R-20 AA card	−8±2.5 with R20 potentiometer −8±1 with R20
13	Operate S relay.					Level change not greater than ±0.2 db.
14	Release all relays.					
15	Block nonoperated STP relay.					
16	Operate OR, CON, P2 relays.					−8±1 db with R20 potentiometer; −8±2.5 db without
17	Operate P3 relay.					Level dropped 10 db.
18	Replace AC-AD cards in proper position.					
19	Remove BN-BP cards.					

TABLE C (Cont)

STEP NO.	MISC ACTION	72A	164C-4	AC-VTVM	ADJUST	OBSERVE
20	Patch AA-TP5 and AA-TP6 to corresponding test points of another working trunk.					
21	Block nonoperated P1 relay in second trunk.		MON-OUT jack			
22	Patch AB-TP4 to BR-TP6					
23	Operate OR relay in second trunk.					
24	Operate AN relay in first trunk.					
25	During connect cycle, momentarily operate STP relay.				R27-AB card	Distortion reading is less than 3 percent.
26	Operate DISC relay in first trunk.					Both trunks disconnect.
27	Operate OR relay in first trunk and AN relay in second trunk.					Distortion reading is less than 3 percent; if not, replace AB card.
28	Restore all circuits to normal.					

TABLE D

STEP NO.	MISC ACTION	72A	OSCILLOSCOPE	ADJUST	OBSERVE
1	Operate TST key.				P relay pulses 10 to 11 pps.
		AE-TP2		L1 (inductor)	2200.0 cps — This requirement must be exact.
2	Patch BA-TP1 of second trunk to BR-TP1.				
3	Patch BR-TP2 to AE-TP1 in first trunk.				
4	Operate CY relay in second trunk.		AE-TP2	Set sweep for 10 milliseconds. R91-AF card	Sine waves 8-3/4 division followed by 1-1/4 division straight lines.
5	Restore all circuits to normal.				
6	Patch AA-TP5 and AA-TP6 of first trunk to corresponding test points on second trunk.				
7	Remove BN and BP card of first trunk.				
8	Block nonoperated TO relay in first trunk.				
9	Block nonoperated P1 relay in second trunk.				
10	Operate OR relay in first trunk.				
11	Operate AN relay in second trunk.				
12	Operate GAS relay in first trunk.				5 percent lamp lighted in first trunk; if not, momentarily operate RLS key.
		BA-TP5 (2nd trunk)		R2-BA (2nd trunk) (raise slowly)	110.7 cps 10 percent distortion 111.4 15 112.1 20 112.8 + 110.0 0
				R2-BA (2nd trunk) (lower slowly)	109.2 10 108.6 15 107.9 29 107.3 + 110.0 0
13	Restore all circuits to normal.				

TABLE E

STEP NO.	MISC ACTION	72A	164C-4	AC-VTVM	OSCILLOSCOPE	ADJUST	OBSERVE
1		BA-TP5				R2-BA	110.0 cps — Should remain for 10 pulses.
2					BA-TP5		Sine wave — Circle one revolution every 10 seconds.
3					BA-TP4		Reset pulses.
4	Block operated CY relay.						Pulses extinguished.
5					BA-TP3		Clock pulses.
6	Release CY relay.						Pulses extinguished.
7				BA-TP2			24 volts
8				BA-TP1			24 volts
9	Block operated CY relay. (for Steps 9 through 17)				BA-TP1		Mark and space signals square wave.
10					BA-TP2		
11					BB-TP1		Ring counter function square wave.
12					BC-TP1		
13					BD-TP1		
14					BE-TP1		Character gate function square wave.
15					BF-TP1		
16					BG-TP1		
17					BH-TP1		

TABLE E (Cont)

STEP NO.	MISC ACTION	164C-4	ADJUST	OBSERVE
18		MON-OUT jack		
19	Release CYA relay.			
20	Remove AB card.			
21	Operate RUA relay.			ANA, MA relays operated.
22	Operate CONA relay.			Zero distortion.
23	Operate RBA relay.			W1 relay operated.
24	Release RBA relay.		R68,R69-BP card	Z1 relay operated. 28 percent switch bias distortion.
25	Operate RBA relay.			W2 relay operated.
26	Release RBA relay.			Z2 relay operated.
27	Operate RBA relay.		R68,R69-BP card	28 percent switch combination distortion.
28	Replace AB card to proper location.			Trunk disconnected.
29	Restore all circuits to normal.			