INTEGRATED SYNCHRONOUS "DATASPEED*" 40 RECEIVE-ONLY PRINTER STATION

TESTING AND TROUBLESHOOTING

CONTENTS PAGE

1. GENERAL

1.01 This section provides procedures for off-line and on-line testing, and all troubleshooting of Integrated Synchronous DATASPEED 40, hereafter referred to as 40-type, Receive-Only Printer (ROP) Stations in switched network, point-to-point private line and multipoint private line service.

1.02 This section is reissued to include information pertaining to forms access arrangements and printer and cabinet section reference numbers for troubleshooting. Since this reissue is a general revision, no revision arrows have been used to denote significant changes.

1.03 Troubles isolated to the data set, telephone lines, or associated systems are not analyzed in this section.

Note: When ordering replaceable components, unless otherwise specified, prefix each part number with the letters "TP" (ie, TP410733).

2. OPERATIONAL CHECKOUT

GENERAL

2.01 An operational checkout should be performed after installation or on trouble calls. On maintenance or trouble calls at a location, confine the checkout to the specified trouble area. Perform a complete checkout after an extensive repair.

2.02 The checkout routines are presented in tables. Each table covers a particular checkout, depending on the type of station.

*Registered Trademark of AT&TCo.

Prepared for American Telephone and Telegraph Company by Teletype Corporation

2.03 If the indicated response is not obtained in any step of a checkout procedure, repeat the step to make sure that the procedure has been performed correctly. If the results are still unsatisfactory, perform the indicated trouble analysis. Always perform the checkout in the order given in the table. The trouble analysis steps are based on satisfactory results of all previous steps.

PRELIMINARY CHECK

2.04 Before turning on the equipment, check the following:

(a) Is station connected to a properly grounded ac service?

(b) Are all cable connectors fully seated?

(c) Is cabinet lid closed?

(d) Are printer paper and ribbon properly installed?

2.05 In addition to the above, check the wiring plan to determine the options and features present in the station. In cases where the results are affected by options, alternate results for each option are provided in the table.

OFF-LINE CHECKOUT

2.06 Off-line checkout (Table A) provides a check of the operating condition of the Integrated Synchronous ROP Terminal. The off-line checkout should be performed before attempting any on-line procedures.

ON-LINE CHECKOUT — SWITCHED NETWORK SERVICE

2.07 On-line checkout for switched network stations is performed between the station under test and a Data Test Center (DTC) equipped with a 40-Type Synchronous Test Set. The DTC operator controls the checkout using standard test procedures. Table B provides on-line end-to-end checkout procedures.

2.08 When ready for on-line checkout, contact the DTC serving your area.

2.09 When calling a DTC, be prepared to furnish any information requested by the operator as to options and features (type of printer used, selection format, etc). To establish a standard line protocol, the DTC operator will normally request the station under test to hang up and wait for a return call. If an unplanned disconnect occurs at any time during the test, place data set in talk mode, hang up, and wait for the DTC operator to reestablish the call.

ON-LINE CHECKOUT — POINT-TO-POINT AND MULTIPOINT PRIVATE LINE SERVICE

2.10 Preliminary requirements: The data set must pass the data set test requirements.

2.11 On-line checkout for private line stations is performed between the station under test and a Data Test Center (DTC) through a Serving Test Center (STC). The DTC operator controls the checkout using standard test procedures. Table B provides on-line end-to-end checkout procedures.

2.12 Caution should be exercised that valid tests are not omitted.

2.13 In order to perform tests without interference from the line controller (data communications processor), the station under test must be disconnected from the data link to the line controller.

DATA SET CHECKOUT

2.14 At the time of installation or if trouble is suspected in the data set perform the data set checkout according to the appropriate BSP section.

TABLE A

OFF-LINE CHECKOUT

This table checks the basic operation of Integrated Synchronous 40-Type ROP Terminals.

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
1	Preliminary requirement: a. Data set connected. b. Ribbon and paper loaded. c. Switches (top left) set as follows: FORMS — ON (Option 39.a.) LF — 1 (Option 20.a.) Test — Off d. Cabinet cover closed. e. In addition to those options in c. the following printer options must be selected: 17.a., 17.c. (80 column) or 17.e. (132 column), 19.a. or c., 23.b., 57.a., 58.a., 60.b. and 61.c.		
2	Turn power on.	IN SERVICE lamp turns on. Fan moves air in printer cabinet (table top cabinet). Power lamp lights (forms access cabinet).	Integrated Synchronous Controller Analysis — Table E, Page 16. Opcon Analysis — Table F, Page 18. Check: a. PAPER lamp not lit. b. Cabinet Interlock switch is closed. c. Cabinet wiring, Section 582-212-400.
3	Momentarily depress PAPER button (red) on cover of printer cabinet (table top only).	Paper feeds out as long as button is depressed.	Printer Analysis, Section 582-210-500. Check cabinet wiring, Section 582-212-400.

TABLE A (Cont)

OFF-LINE CHECKOUT

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
4	Depress and release FORMS ADVANCE button (black button on cover of table top printer cabinet; red rocker switch on top cover of forms access cabinet).	Paper feeds out until first line of next form is reached, then stops.	Printer Analysis, Section 582-210-500. Check cabinet wiring, Section 582-212-400.
5	Unlatch and raise printer cabinet cover (open doors to forms access printer cabinet).	IN SERVICE lamp extinguishes.	Check cabinet wiring and Interlock switch, Section 582-212-400.
6	Raise cover interlock to maintenance position.	IN SERVICE lamp stays off.	If motor was on when cover was raised, depress IN SERVICE button. Check Interlock switch and cabinet wiring, Section 582-212-400.
7	Momentarily set Test switch to ON position, then return to OFF position.	Printer motor starts. Font identification symbol (such as ≡A≡ ≡A≡, ≡A≡ ≡8≡, etc, depending on type carrier) prints repeatedly while switch is on. Single line feed occurs. Motor turns off when switch is returned to off.	Printer Analysis, Section 582-210-500.
8	Depress IN SERVICE button. Tear off next form on perforations (end of form) at bottom of printer cabinet, then slowly roll paper out until last form is fed completely out of printer. Reload forms and close cabinet cover.	IN SERVICE lamp lights. With Option 48.a. PAPER lamp lights and IN SERVICE lamp extinguishes when form is partly through printer. With Option 48.b. PAPER lamp lights when form is partly through printer but IN SERVICE does not extinguish until form out contact closes. The form out contact may be closed by placing the printer Forms switch in the ON position and then depressing the FORMS button/switch on the top of the cabinet. PAPER lamp extinguishes.	Printer Analysis, Section 582-210-500.

TABLE A (Cont)

OFF-LINE CHECKOUT

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
9	Depress TEST button on opcon, then depress again after a few seconds.	TEST lamp lights, printer motor starts, and character set is printed repeatedly as shown beginning in column as selected by Options 17, 121 and 131. Lamp extinguishes and printing stops when depressed a second time. Form-out occurs (if Option 39a is selected), feed out occurs (if Options 18b and 39b are selected) or no feed out (if Options 18a and 39b are selected). After TEST lamp is extinguished, printer motor goes off after a delay of approximately 20 seconds. IN SERVICE lamp lights approximately 3 seconds after TEST lamp extinguishes.	Integrated Synchronous Controller Analysis — Table E, Page 16. If font identification symbol appears, refer to Section 582-202-200 and verify that Option 19.a. or c. is enabled. Integrated Synchronous Controller Analysis — Table E, Page 16.
	Depress IN SERVICE button (OFF), depress TEST button on Opcon, then depress IN SERVICE button (ON) after a few seconds.	Form-out occurs (if Option 39a is selected), feed out occurs (if Options 18b and 39b are selected) or no feed out (if Options 18a and 39b are selected). After TEST lamp is extinguished, printer motor goes off after a delay of approximately 20 seconds. IN SERVICE lamp lights approximately 3 seconds after TEST lamp extinguishes.	
	!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ [\ ] ^ _ (for ASCII† Type carrier) !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ ¬ \ ¦ ¢ _ (for EBCDIC‡ Type carrier) Ξ Ξ #$%& Ξ Ξ Ξ * Ξ ,-./0123456789 Ξ Ξ ◇ Ξ Ξ Ξ @ABCDEFGHIJKLMNOPQRSTUVWXYZ Ξ Ξ Ξ Ξ Ξ (for 48 character set) TYPE FONT SYMBOL (TYPICAL) Local Test Message Generated by TEST Button (Option 19.a. or c. must be enabled.)	
10	Check printing quality.	Characters should be clearly legible and unbroken on original copy. *Note:* The TEST message does not check all printing columns.	Printer Analysis, Section 582-210-500.

†American National Standard Code for Information Interchange
‡Extended Binary Coded Decimal Interchange Code.

TABLE A (Cont)

OFF-LINE CHECKOUT

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
11	Raise printer cabinet cover. Set LF switch to position 2. Close cover. Depress TEST button. While printer is printing, raise cover.	 IN SERVICE lamp remains off. Repeated character set prints with double line spacing. When cover is raised, printer stops. TEST lamp extinguishes.	 Printer Analysis, Section 582-210-500.
12	Restore setting of LF switch (or leave in position 2 if Option 20b required). Set Forms switch to Off (Option 39b). Close cabinet cover. Depress and release FORMS ADVANCE button.	 IN SERVICE lamp comes ON. Paper feeds out as long as button is depressed.	 Printer Analysis, Section 582-210-500.
13	Tear form off below cabinet. Depress IN SERVICE button (OFF). Depress TEST button (ON).	IN SERVICE lamp extinguishes. TEST lamp lights, TEST message prints. Printing stops when end of form passes Paper-Out switch, PAPER-OUT lamp turns on and TEST lamp extinguishes.	
14	Raise cover and restore setting of Forms switch (or leave in Off position if Option 39b required). Close cabinet cover.		
THIS COMPLETES OFF-LINE CHECKOUT OF INTEGRATED SYNCHRONOUS ROP TERMINALS.			

END-TO-END INSTALLATION TEST

TABLE B

END-TO-END INSTALLATION TEST PROCEDURES

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
1	Preliminary requirements: a. Data set connected. b. Ribbon and paper loaded. c. Switches (top left of printer, cabinet cover raised) set as follows: LF — 1 or 2 (Option 20.a. or b.) Forms — On or Off (Option 39.a. or b.) Test — Off d. Cabinet cover closed. e. In addition to those options in c. the following printer options must be selected: 17.c. (80 column) or 17.e. (132 column), 19.a. or c., 23.b., 57.a., 58.a., 60.b. and 61.c.		If results are not as stated for a particular option, verify installation of that option.
2	Turn on power.	IN SERVICE lamp lights, fan moves air (table top cabinet only) or POWER lamp lights (forms-access cabinet only).	Integrated Synchronous ROP Terminal Analysis. Table D, Page 14.
3	a. Go to location of station data set in building. Contact DATA-SPEED Test Center and request End-to-End Installation Test. b. Establish line connections per DTC instructions, then observe carrier on indicators indicating line established to DTC.	201C MC — Goes Off CO — Lights 208A, 208B, 209A ER — Goes Off CO — Lights 212A — L1A MC — Goes Off	Check data sets per applicable trouble-shooting section.
4	If talk line to the DTC is not available after test is requested, verify that the test has started by observing the RS/CS lamps on the front of the data set.	RS/CS lamps on the front of the data set should flash ON and then OFF during testing. *Note:* On 212 data sets the SD/RD lamps should flash ON and then OFF during testing.	Inform DTC of problem.
5	The DTC will perform the remainder of the test. On receiving the Selection sequence as specified by Option 171.	DTC will inform of test acceptance or trouble. Call DTC back, if required. The POL/SEL will flash once for one second and then remain lit.	Integrated Synchronous ROP Terminal Analysis. Table D, Page 14.

TABLE B (Cont)

END-TO-END INSTALLATION TEST PROCEDURES

STEP	PROCEDURE		RESULTS	TROUBLE ANALYSIS
5 (Cont)	The following controller options should be verified while the DTC is conducting the On-Line Test.			
	Space Extension	170a	Only one space per space character received.	Check for proper option. Integrated Synchronous Controller Analysis, Table E, Page 16.
		170b	Three spaces per space character received.	
	Additional functions receiving one of the following characters:			
	ETB	173a	Block terminator only.	See Trouble Analysis for Space Extension.
		173b	Block terminator, executes printing a line, executes a VT ESC sequence (or New Line if no tabs set) or terminate an HT setting sequence.	
	ETX	174a	Block terminator or terminates an HT setting sequence.	See Trouble Analysis for Space Extension.
		174b	Block Terminator, terminates an HT setting sequence, executes printing a line or executes a VT ESC sequence (or New Line, if no tabs set).	
	ITB	175a	Intermediate block terminator only.	See Trouble Analysis for Space Extension.
		175b	Intermediate block terminator, executes printing a line, executes a VT ESC sequence (or New Line, if no tabs set) or terminates an HT setting sequence.	
	LF(EBCDIC)/NL	176a	Executes printing a line, executes VT ESC sequence (or New Line, if no tabs set) or terminates an HT setting sequence.	See Trouble Analysis for Space Extension.
		176b	Space only.	
	RS/IRS (EBCDIC)	177a	Executes printing a line, and executes a VT ESC sequence (or New Line, if no tab setting).	See Trouble Analysis for Space Extension.
		177b	Space only.	
	Permanent Request to Send	167a	RS lamp on data set OFF when receiving.	See Trouble Analysis for Space Extension.
		167b	RS lamp ON while sending or receiving.	

TABLE B (Cont)

END-TO-END INSTALLATION TEST PROCEDURES

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
5 (Cont)	Immediate WACK 178a *Note:* If Option 179.b. is enabled the ROP will 178b not respond with a WACK regardless of the choice of Option 178. Check the following features:	When the buffer is full, the ROP Terminal will respond with WACK to every block of data. The ROP will respond with a WACK to every second block of data.	See Trouble Analysis for Space Extension.
	Bell characters received.	Tone is heard. If Bell characters are less than one second apart, a continuous tone will be heard.	Alarm volume. Opcon Analysis, Table F, Page 18. Integrated Synchronous Controller Analysis, Table E, Page 16.
	Paper-Out — Tear form off below printer cabinet.	PAPER lamp lights when end of form passes paper out switch, an EOT reply is sent if requested within three seconds. Following an EOT reply or if no reply is requested within three seconds of the paper out, the ALARM lamp will light and the audible alarm will sound for eight seconds. The terminal will then disconnect.	Cabinet Analysis, Section 582-212-400. Opcon Analysis, Table F, Page 18.
	Carriage Return on ESC M.	The M is not printed; the character following the M is printed at the left-hand margin.	Integrated Synchronous Controller Analysis, Table E, Page 16.
	Space Compression/Expansion ASCII — DTC sends: GSB GSO GSZ	The terminal receives: 2 spaces 15 spaces 26 spaces	Integrated Synchronous Controller Analysis, Table E, Page 16.
	EBCDIC — DTC sends: IGS ¢ IGS & IGS $	The terminal receives: 10 spaces 16 spaces 27 spaces	
	Determine from DTC where On-Line Horizontal Tabs (ESC HT) are set.	Horizontal Tabs set per DTC.	Integrated Synchronous Controller Analysis, Table E, Page 16.

TABLE B (Cont)

END-TO-END INSTALLATION TEST PROCEDURES

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
5 (Cont)	Single Line Feed *Note:* Single line feed assumes Printer Option 20.a. Option 20.b. will result in a two-line movement.	An ESC Q (ASCII) or ESC/ (EBCDIC) when followed by LF (EBCDIC)/NL with Option 176.a., ETB with Option 173.b., ETX with Option 174.b. or IRS (EBCDIC)/RS with Option 177.a. will cause the next character to be printed at the left-hand margin in the next lower line.	Check for proper options. Printer Analysis, Section 582-210-500. Integrated Synchronous Controller Analysis, Table E, Page 16.
	Double Line Feed *Note:* Double line feed assumes Printer Option 20.a. Option 20.b. will result in a four-line movement.	An ESC R (ASCII) or ESC S (EBCDIC) when followed by LF (EBCDIC)/NL with Option 176.a., ETB with Option 173.b., ETX with Option 174.b. or IRS (EBCDIC)/RS with Option 177.a. will cause the next character to be printed at the left-hand margin in the second line below the present print line.	Check for proper option. Printer Analysis, Section 582-210-500. Integrated Synchronous Controller Analysis, Table E, Page 16.
	Triple Line Feed *Note:* Triple line feed assumes Printer Option 20.a. Option 20.b. will result in a six-line movement.	An ESC S (ASCII) or ESC T (EBCDIC) when followed by LF (EBCDIC)/NL with Option 176.a., ETB with Option 173.b., ETX with Option 174.b. or IRS (EBCDIC)/RS with Option 177.a. will cause the next character to be printed at the left-hand margin in the third line below the present print line.	Check for proper options. Printer Analysis, Section 582-210-500. Ingegrated Synchronous Controller Analysis, Table E, Page 16.
	Form Feed	With Printer Option 39.b. (Forms OFF) a received FF (Form Feed) character will result in a single line feed with Printer Option 20.a. or a double line feed with Printer Option 20.b. With Printer Options 39.a. (Forms ON) and 20.a. or 20.b., the paper will advance until the next form is in registration.	Check for proper options. Printer Analysis, Section 582-210-500. Integrated Sybchronous Controller Analysis, Table E, Page 16.
	Vertical Tab (VT)	A VT will cause the next character to be printed in the first printing position of the next lower line that corresponds to a preset VT position. If no stops exist between the present print location and the end of the form, then the VT will cause a form feed to be performed.	

TABLE B (Cont)

END-TO-END INSTALLATION TEST PROCEDURES

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
5 (Cont)	ESC Vertical Tab § ESC A — Vertical Tab No. 1 ESC B — Vertical Tab No. 2 ESC C — Vertical Tab No. 3 ESC D — Vertical Tab No. 4 ESC E — Vertical Tab No. 5 ESC F — Vertical Tab No. 6 ESC G — Vertical Tab No. 7 ESC H — Vertical Tab No. 8 ESC I — Vertical Tab No. 9 ESC J — Vertical Tab No. 10 ESC K — Vertical Tab No. 11 ESC L — Vertical Tab No. 12 § The above ESC Vertical Tab positions correspond to the 12 preset tab positions.	An ESC α when followed by LF (EBCDIC)/NL with Option 176a, ETB with Option 173b, ETX with Option 174b, or IRS (EBCDIC)/RS with Option 177a will cause the next character to be printed at the first printing position of the designated vertical tab position. If the received ESC α sequence calls for movement to a position that is above the present location on the form, the printer will be directed to advance to the indicated line on the next form. If the ESC α sequence invokes a position where no preset tab stop exists, then a form feed operation will be performed. If the location corresponding to the received ESC α is the same as the present print position, no paper movement will occur.	Check for proper options. Printer Analysis, Section 582-210-500. Integrated Synchronous Controller Analysis, Table E, Page 16.

CHECKOUT OF RECEIVED PRINTER MESSAGE

TABLE C

CHECKOUT OF RECEIVED PRINTER MESSAGE

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
1	After printing stops, the printer motor should turn off.	With Controller Option 148a approximately 30 seconds. With Controller Option 148b approximately three minutes.	Integrated Synchronous Controller Analysis, Table E, Page 16.
2	Determine from DTC what message was sent. Check for correctness of printed message.		

TABLE C (Cont)

CHECKOUT OF RECEIVED PRINTER MESSAGE

STEP	PROCEDURE	TROUBLE ANALYSIS	RESULTS
3	Check for left-hand margin.	Left-hand margin must match Left-Hand Margin Option as specified by Printer Option 17.a. and Controller Options 121 and 131.	Printer Analysis, Section 582-210-500. Integrated Synchronous Controller Analysis, Table E, Page 16.
4	Check for right-hand margin.	Right-hand margin must match Right-Hand Margin Option as specified by Printer Option 17.c. for 80-column printers or 17.e. for 132-column printers and diode removed to indicate last printing column.	Printer Analysis, Section 582-210-500.
5	Check for paper feed out. With Printer Option 18.a. With Printer Options 18.b. or c. and 39.a. With Printer Options 18.b. or c. and 39.b. *Note:* Option 18.c. not recommended.	 No feed out. Feed out to next form feed position. Maximum 16 lines; will be shorter if form feed position occurs before 16-line feed out.	Printer Analysis, Section 582-210-500.
6	Check for Up-Low printing. Up-low printer with Printer Option 21a and Controller Option 162a. Up-low printer with Printer Option 21b and Controller Option 162a. Monocase printer with Printer Option 22a and Controller Option 162a. Monocase printer with Printer Option 22b and Controller Option 162a. Optimized printer with Printer Option 22a and Controller Option 162b. Optimized printer with Printer Option 22b and Controller Option 162b.	 Upper and lower case characters should appear in the text. No lower case characters should appear in text. Errored character symbols appear in place of lower case characters. Only upper case characters appear in text. Errored character symbols appear in place of lower case characters. Only upper case characters appear in text.	Printer Analysis, Section 582-210-500.

TABLE C (Cont)

CHECKOUT OF RECEIVED PRINTER MESSAGE

STEP	PROCEDURE	TROUBLE ANALYSIS	RESULTS
7	Check for preset horizontal tab settings (Controller Option 122).	With Controller Option 122.a., no horizontal tabs set. With Controller Option 122.b. tabs set as specified. *Note:* A diode representing the last printing column must be removed in Option 122.	Integrated Synchronous Controller Analysis, Table E, Page 16.
8	Check for preset vertical tab settings (Controller Option 123).	With Controller Option 123a, no vertical tabs are set. With Controller Option 123c through 123n, tabs set as specified.	Integrated Synchronous Controller Analysis, Table E, Page 16.
9	Check printed copy for test pattern. AMZZMAAMZZMAamzzmaAMZZ... for the Up-low printer or AMZZMAAMZZMAAMZZMAAMZZ... for the Monocase printer.	Repeating pattern should appear without any errors.	Printer Analysis, Section 582-210-500.
THIS ENDS CHECKOUT OF RECEIVED PRINTER MESSAGE.			

3. TROUBLESHOOTING

GENERAL

3.01 When installing a replacement component, make certain that all options (if present) in this component are implemented for proper set operation.

Note: In the absence of instructions to the contrary, return all components not repairable in the field to Western Electric per local instructions.

3.02 Once the trouble has been corrected, the terminal should be checked out to be sure that it is performing properly. Refer to Part 2 for Operational Checkout.

3.03 The following caution procedures must be observed when troubleshooting a 40-Type Station or Set.

Caution 1: Turn off all power before removing or replacing any component of the 40-Type Station or Set.

Caution 2: To avoid possible internal damage to MOS circuitry, use a 346392 static discharge strap as discussed in Section 582-202-200.

3.04 To locate components, circuit cards, connectors, test switches, indicator lamps and other elements indicated in the troubleshooting information, refer to Section 582-202-700.

3.05 The troubleshooting information is divided into:

Terminal Analysis — Table D
Component Analysis — Tables E and F

Component Analysis is broken down into:

A. Integrated Synchronous Controller — Table E
B. Operator Console — Table F

3.06 Recommended Procedures: If trouble is known, proceed with the appropriate Component Analysis, ie, printer, etc. If trouble is not known, begin with Terminal Analysis and then proceed with Component Analysis.

TERMINAL ANALYSIS

TABLE D

INTEGRATED SYNCHRONOUS ROP TERMINAL ANALYSIS

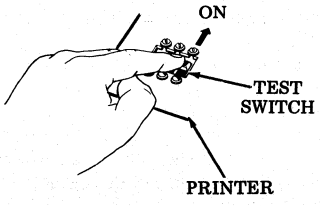
ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. Is IN SERVICE key lit?	Go to 2.	Make certain that plug on power cord is properly seated in power outlet. Make certain that power switch is on. If power plug is properly connected, all switches are on, and no lamps are lit, determine whether power supply in the building has failed by checking lights in the room, etc. Make certain that all connectors inside cabinet are securely mated and that printer cover is closed. Make certain PAPER alarm light is off. Go to Cabinet Analysis, Section 582-212-400. Go to Integrated Synchronous Controller Analysis, Table E, Page 16.
2. Does test message print correctly when TEST key is depressed (IN SERVICE key off)?	Go to 4.	If about half of test message is replaced by font identification symbols (≡A≡, etc), verify that Option 19a or c is installed. Otherwise, go to 3.
3. Does type carrier symbol print in every column when printer Test switch is on and cover is closed?  	Go to Integrated Synchronous Controller Analysis, Table E, Page 16. *Note:* After several lines of type carrier symbols the ALARM, IN SERVICE and TEST lamps may flash.	Go to 80-Column or 132-Column Printer Analysis, Section 582-210-500.

TABLE D (Cont)

INTEGRATED SYNCHRONOUS ROP TERMINAL ANALYSIS

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
3. (Cont) Open cover. Slide Test switch to ON position. Rethread paper through guide window in cover. Close cover. Ξ Ξ Ξ Ξ Ξ Ξ Ξ Ξ or Ξ Ξ symbols should be printed until cover is reopened (80-column tractor feed printer). Slide Test switch to OFF position. Ξ Ξ Ξ Ξ Ξ Ξ Ξ Ξ or Ξ Ξ symbols should be printed until cover is reopened (132-column tractor feed printer). Slide Test switch to OFF position.		
4. Are messages received on-line?	Go to 5.	Check data set and associated cables. Go to Integrated Synchronous Controller Analysis, Table E, Page 16.
5. Do received messages contain errors?	Check data set and associated cables. Go to Integrated Synchronous Controller Analysis, Table E, Page 16. Go to 80-Column or 132-Column Printer Analysis, Section 582-210-500.	

COMPONENT ANALYSIS

A. Integrated Synchronous Controller

TABLE E

INTEGRATED SYNCHRONOUS CONTROLLER ANALYSIS

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. Were any opcon lamps flashing (not ON steady or flickering rapidly)?	Refer to Opcon Lamp Analysis below. If controller trouble is indicated, go to 2; if not, take step indicated.	If no lamps are ON, verify that P6 (left side) and P21 (rear) connectors are connected firmly; if so, check printer for selection of Option 60.b., character set Option 19 for proper character set selection and check voltages to controller using wiring diagram in Section 582-202-400. If good, go to 2. If all four lamps are ON steady, press key. If lamps do not reset, check both 129919 4 amp SL-BL fuses on rear of printer; if good, replace printer. If lamps reset when depressed, go to 4.

Opcon Lamps Flashing

ALARM	POL SEL	IN SERVICE	TEST	Required Action
X			X	Verify that SSI cable (P5 connector) is securely mated to card. If so, refer to Printer Analysis, Section 582-210-500.¶
X		X		Refer to Printer Analysis, Section 582-210-500.¶
X	X	X		Refer to Printer Analysis, Section 582-210-500.¶
X		X	X	Refer to Printer Analysis, Section 582-210-500.¶ ††
X	X			Refer to Printer Analysis, Section 582-210-500.¶
X	X	X	X	Replace circuit card 410733; if flashing lamps continue, refer to Integrated Synchronous Controller Analysis, Table E, Page 16.**

¶ If printer analysis indicates printer is good, refer to Integrated Controller Analysis, Table E, Analysis Question 2, Page 16.

**In addition to the indicated lamps flashing the two unmarked lamps will flash.

††These lamps may flash after printing several lines of type carrier symbols with the printer in the TEST mode.

Opcon Lamp Analysis

TABLE E (Cont)

INTEGRATED SYNCHRONOUS CONTROLLER ANALYSIS

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
2. Have compatible (usable) options been selected?	Go to 3.	Review Section 582-202-200 and eliminate any incompatible or undesirable option selections. Change options and retest.
3. Have all controller options (121 through 190) been verified?	Go to 4.	Check for wrong switch settings for Options 189 and 190. Check for removed or open diodes of Options 121 — 123, 125, 131, 148 and 159 — 188 by removing the rightmost blocking keytop and depressing the keyswitch (with the IN SERVICE lamp extinguished). The printer will print out a matrix of —s for diodes "IN" and x's for diodes "OUT" or "OPEN". Compare printout with option list. Replace blocking keytop. Replace 410734 card or replace any open or incorrectly cut diodes on card with 407336 diodes and cut out any diodes that should not be in. If all options are good, go to 4.
4. Replace 410733 and 410735 cards as a unit and retest. Is trouble cleared?	Go to 5.	Replace 410734 card.
5. Replace 410733 card alone (use original 410735 card) and retest. Is trouble cleared?	Original 410733 card is defective.	Original 410735 card is probably defective. Replace it alone and retest. Further trouble may indicate cables or connectors are defective. Go to Opcon Analysis, Table F, Page 18.

B. Operator Console (Opcon)

TABLE F

OPCON ANALYSIS

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. Do any lamps light?	Go to 2.	Check for open in ground lead.
2. Does IN SERVICE lamp light when power is turned on? (Cabinet lid closed and no paper alarm.) Depress IN SERVICE key if motor is running.	Go to 5.	Go to 3.
3. Is approximately +12 V dc present at pins 1, 3, 5, 7 or 16 with respect to frame ground (pin 13) when ALARM, TEST, IN SERVICE or POL/SEL lamps should be lit?	Check wiring to failing key-switch indicator or audible alarm. Replace keyswitch or 410765 circuit card.	Go to 4.
4. Is +12 V dc present when associated keyswitch is removed? (See ROP Opcon Schematic.)	Replace shorted keyswitch.	Check for short in wiring across keyswitch.

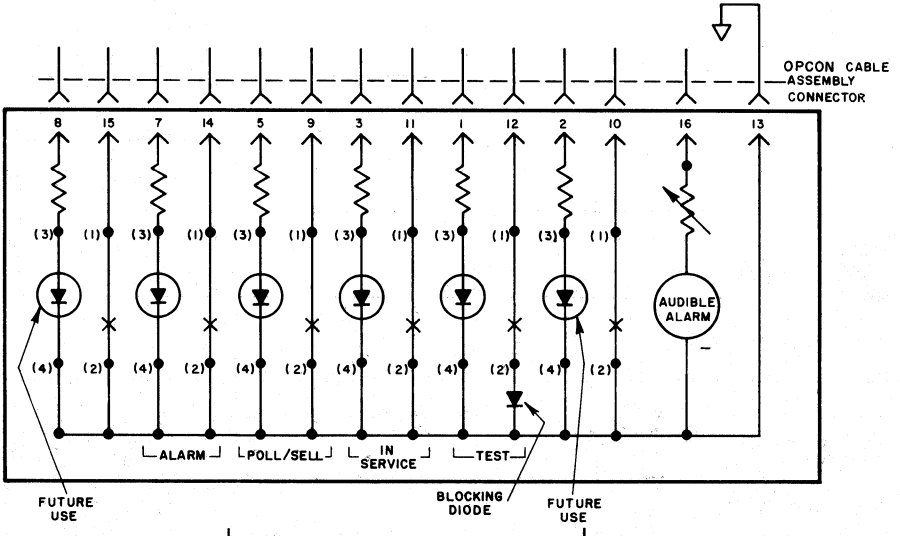


TABLE F (Cont)

OPCON ANALYSIS

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
5. Does test message print when TEST key is depressed with IN SERVICE lamp OFF.	Go to 6.	Check wiring to keyswitch terminals. Replace open keyswitch. Go to Integrated Synchronous Controller Analysis, Table E, Page 16.
6. Does TEST lamp light?	Go to 7.	Go to 3.
7. Does the POL/SEL lamp turn on when the terminal is selected?	Go to 8.	Check wiring to keyswitch. Replace opcon keyswitch. Go to Integrated Synchronous Controller Analysis, Table E, Page 16.
8. When receiving data, does an out of paper condition cause the ALARM lamp to light?	Go to 9.	Check wiring to keyswitch. Replace open keyswitch. Go to Integrated Synchronous Controller Analysis, Table E, Page 16.
9. Does the audible alarm sound?	Go to 10.	Go to 3.
10. Does depressing ALARM key extinguish audible alarm?	Place printer in service.	Check wiring to keyswitch terminals. Replace open diode on key-switch. Go to Integrated Synchronous Controller Analysis, Table E, Page 16.