"DATASPEED*" 40/4 SINGLE DISPLAY STATION ARRANGEMENTS

TESTING AND TROUBLESHOOTING

CONTENTS PAGE

1. GENERAL

1.01 This section includes all testing of the DATASPEED 40/4 Single Display Station (hereafter referred to as 40/4-type SDS). It also includes trouble analysis.

1.02 This section is being reissued to provide information for:

- The new-style forms access printer cabinet.

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

1.04 The correction of troubles in this section is based on replacement of defective major subassemblies (eg, monitor, opcon, printer, power supply, etc). Field level repair of the major subassemblies are given in component BSPs as follows:

582-210-XXX Printers
582-211-XXX Opcons
582-213-XXX Monitor
582-214-XXX Power Supply

1.05 See Section 582-200-705 for grounding strap locations.

Note: When ordering replaceable parts or components, unless otherwise specified, prefix each part number with the letters "TP" (ie, TP410055).

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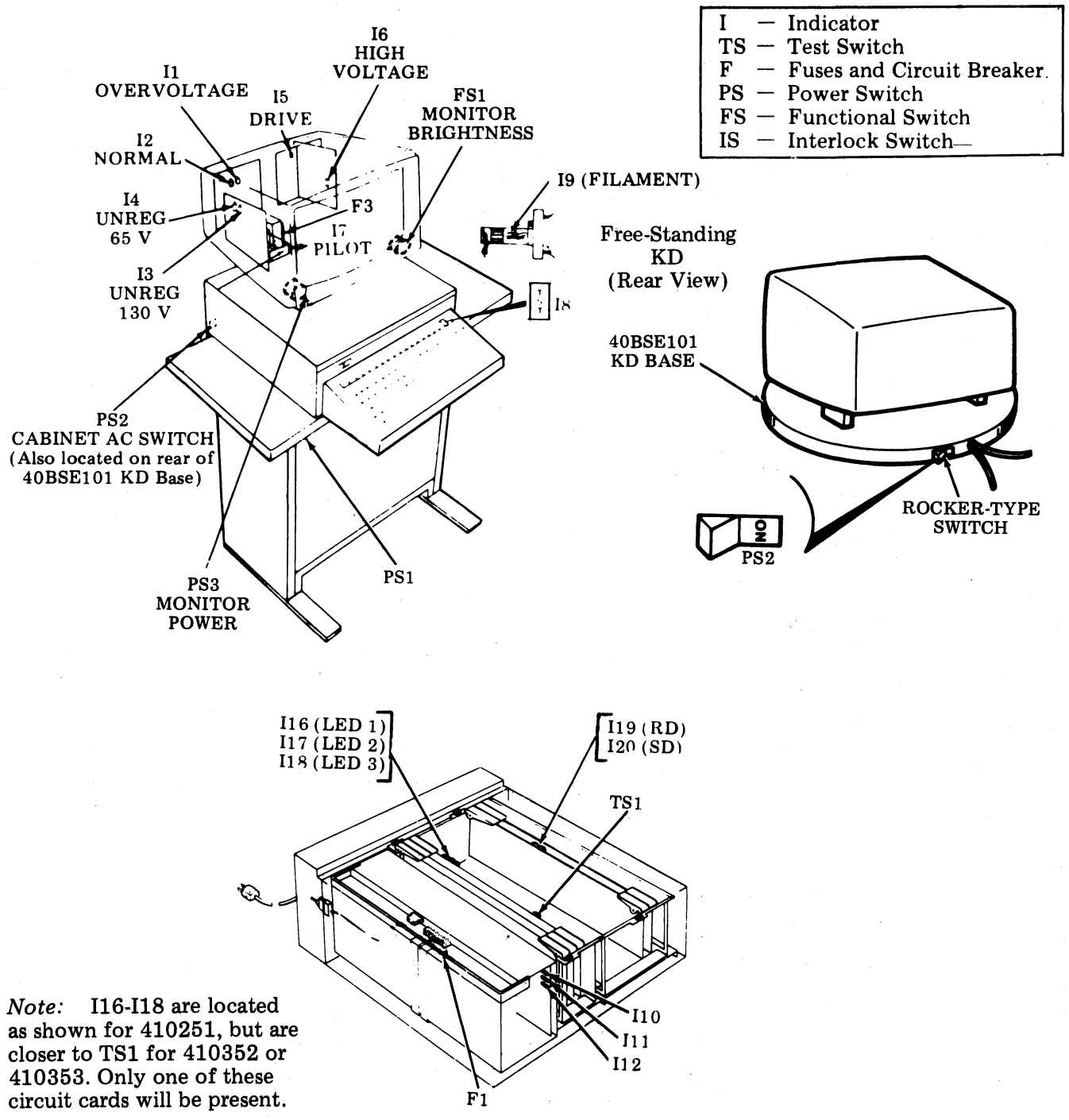
Prepared for American Telephone and Telegraph Company by Teletype Corporation

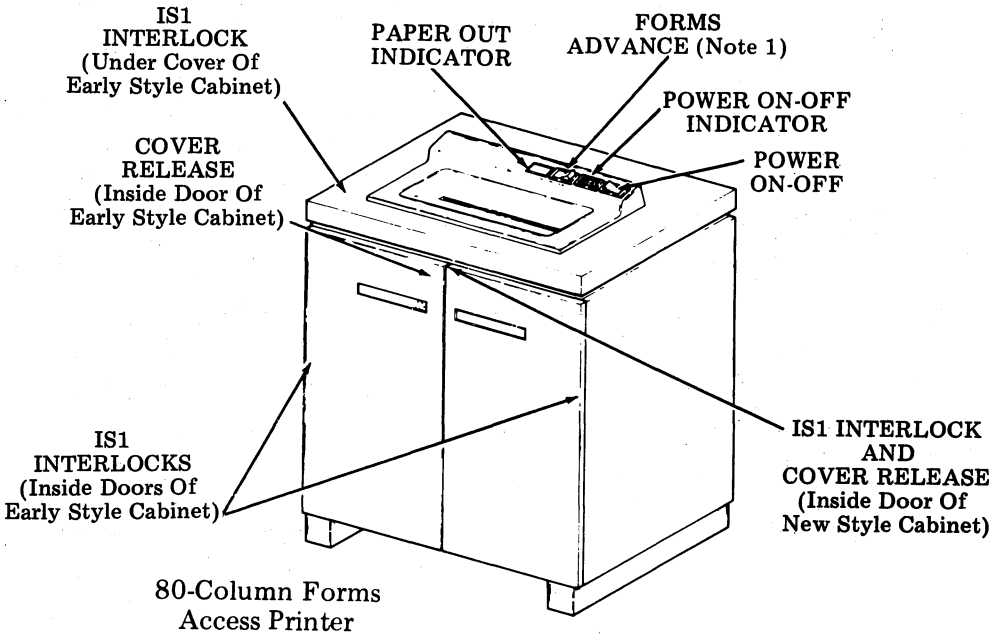
1.06 Test switches and indicators are shown in Fig. 1 and 2.

Note: The operation of test switches and indicators should be done under the direction of parts 2. TESTS and 3. TROUBLESHOOTING of this section or referenced sections.



Note: I16-I18 are located as shown for 410251, but are closer to TS1 for 410352 or 410353. Only one of these circuit cards will be present.

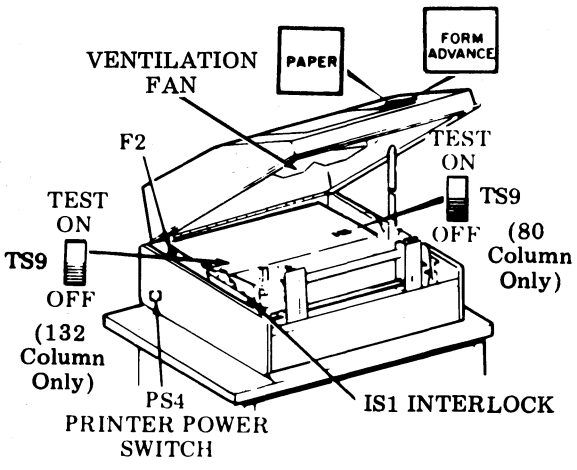
Fig. 1—Test Switches and Indicators (Controller and KD)



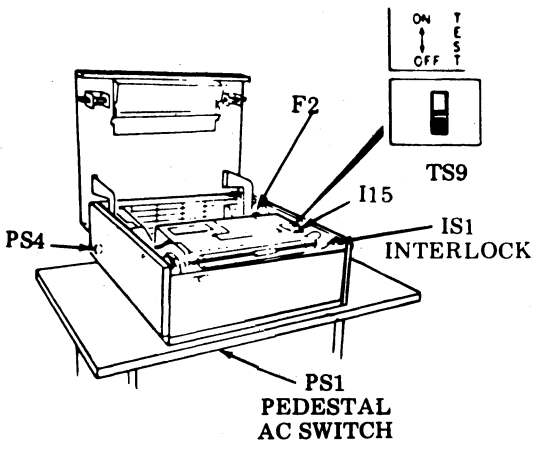
80-Column Forms
Access Printer

Note 1: For security reasons, some cabinets may be modified to have access to FORMS ADVANCE switch inside of cabinet. Cabinets may also be modified to have lock on left door.

Note 2: Printer Test switch and fuse location, same as 80-Column Tractor Feed Printer below.



Tractor Feed Printer



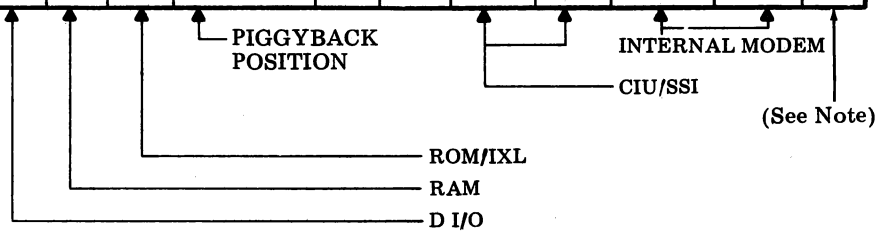
Friction Feed Printer

Fig. 2—Test Switches and Indicators (Printer)

1.07 Depending on the application and when the controller was manufactured, different circuit cards may be present in a controller. The allowed variations (also see 1.08) are:

Application				CIRCUIT CARD POSITION (All card numbers preceded by 410)										Back Panel
				1	2	3	3PB	4	5	6	7	8	9	
Late Design	Private Line	No 251A1		286	287	353	NA	—	—	291	—	—	—	277
		251A1		286	287	353	NA	—	—	291	—	—	251A1	277
	Dial up			286	287	352	NA	—	—	291	—	—	—	277
Early Design	Private Line	No 251A1	Version I	286	287	251	261-ISS 3A or less	—	—	—	290	—	—	276
			Version II	286	287	251	261-ISS 4 or more	—	—	291	—	—	—	277
			Version III	286	287	251	264 or 265	—	—	291	—	—	—	277
		251A1	Version I	286	287	251	261-ISS 3A or less	—	—	—	290	251A1	—	276
			Version II	286	287	251	261-ISS 4A or more	— —	— —	291	—	—	251A1	277
			Version III	286	287	251	264 or 265	—	—	291	—	—	251A1	277
	Dial up		Version III	286	287	251	262	—	—	291	—	—	—	277

NA — Not applicable.



Note: Controllers manufactured after July, 1979 may be equipped with a 410351 back panel which is electrically equivalent to a 410277 back panel.

1.08 Additional information about circuit cards may be required. Circuit cards unique to an application are:

CIRCUIT CARD	APPLICATION NOTES
410276 (Back Panel)	Rated MD, 410277 replaces. 410291 must be in position 6 or 410290 must be in position 7.
410277 (Back Panel)	410291 must be in position 6 or 410290 must be in position 7.
410290 (CIU/SSI)	Rated MD, 410291 replaces. Can be used only with 410251 and 410261 Issue 3A or earlier.
410291 (CIU/SSI)	Can be used in either design controller.
410251 (ROM/IXL)	Rated MD, can be used only in early design controllers (see 410352 and 410353).
410261 (EPROM) Issue 3A or earlier	Rated MD, 410265 replaces.
410261 (EPROM) Issue 4A or later	Rated MD, 410265 replaces.
410264 (EPROM)	Rated MD, 410265 replaces.
410265 (EPROM)	410265 rated MD. Replaced by 410353.
410262 (EPROM)	Rated MD, 410352 replaces.
410352 (ROM/IXL/EPROM)	Available now.
410353 (ROM/IXL/EPROM)	Available now.

1.09 The use of a 40C305-type controller allows for the KD to be placed up to 10 cable feet or 50 cable feet away from the pedestal mounted controller. However, when the 405375 (25 foot) or 405376 (50 foot) KD extension cable is used (required for length beyond 10 cable feet), the 406094 modification kit is required to provide a functional station.

1.10 This section uses the following abbreviations:

- 41026N — 410261, 410264 or 410265
- 41029N — 410290 or 410291
- 41035N — 410352 or 410353
- Back Panel — 410276 or 410277 (or 410351)

1.11 A 40MN101/AA monitor is generally used, however, a 40MN201/AA may be used to avoid "waviness" of displayed data when the 60 hertz voltage varies by more than 0.1% over an extended time. The 40MN201/AA can operate over a range of 48 hertz to 62 hertz.

2. TESTS

SELF-TEST

Controller Self-Test

2.01 The controller self-test should be performed. The test requires the use of the appropriate controller arrangement form (copies are shown in Section 582-200-205).

2.02 If during a controller self-test, a circuit card is indicated to be defective per the self-test trouble pattern, perform the following before replacing the circuit card:

(a) Remove card and check for bent connector pins.
(b) If circuit card contains sockets, make sure all I. C. packs are firmly seated.
(c) Reinstall circuit card and make sure card is firmly seated in connector.
(d) Perform the self-test again.

If the circuit card is still indicated as defective, then replace.

Warning: The ac power must be OFF before removing or replacing a circuit card. Wear 346392 static discharge strap when removing or replacing circuit cards. See Section 582-200-205, 1.04 Warnings 1, 2 and 3.

CHART 1

CONTROLLER SELF-TEST PROCEDURES

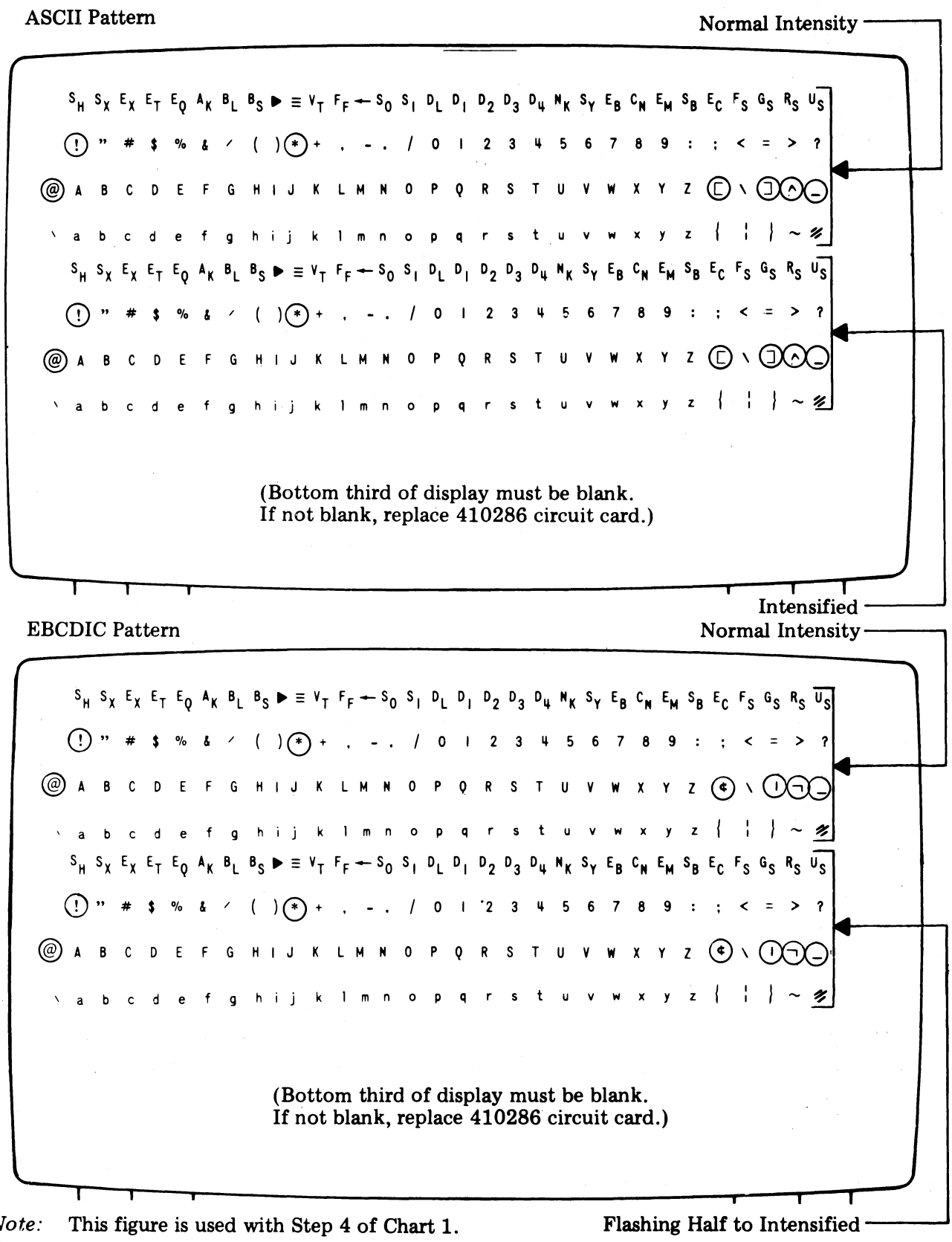
STEP	PROCEDURE	CORRECT RESPONSE	ANALYSIS
1	Connect ac cable(s) from cabinet(s) to power source. Turn on cabinet power switch(es). *Note:* If pedestal is part of station, connect pedestal ac to power source, and turn on pedestal power switch.	All power supply voltage lamps light. Fans at rear of controller must be moving air.	40PSU101, see Chart 10.
2	Depress and hold down on SELF-TEST switch on 41035N or 410251 circuit card for at least four seconds. Only one of the indicated cards will be present. (TS1 on Fig. 1)	All three indicators (pattern lamps) on the circuit card will light while switch is depressed.	•40PSU101, see Chart 10. •41035N or 410251. •41026N (Private Line Version.) •Refer to Chart 7, Step 2.
3	Release SELF-TEST switch.	Pattern lamps may flicker during this step. After a short time, the pattern lamps should blink sequentially. (See note on next page.)	If a light pattern (shown on controller arrangement form) appears and remains; power down, replace indicated card, power up and retest.

CHART 1

CONTROLLER SELF-TEST PROCEDURES

STEP	PROCEDURE	CORRECT RESPONSE	ANALYSIS
3 (Contd)		*Note:* If switch is held down for at least one half second but less than four seconds, the option menu will appear. Reset by depressing LOCAL or RESET and repeat Step 2.	If the indicated card is replaced and the problem remains; refer to Chart 7, Step 3.
4	When the pattern lamps blink sequentially, check the display on the monitor. Also, check that the cursor moves through the whole display.	See Fig. 3 The ASCII† pattern is displayed for about 30 seconds, then the EBCDIC‡ pattern is displayed for about 30 seconds, then the controller will return to the normal operating mode. *Note 1:* There is no requirement for LOCAL to be lighted automatically when the controller returns to the normal operating mode. *Note 2:* Depress switch and rotate it 1/4 turn clockwise to retain the Fig. 3 display (actually the self-test runs and the display cycles through ASCII followed by EBCDIC repeatedly). Depress switch and rotate it 1/4 turn counterclockwise to to end test. Normal operation returns after the EBCDIC display. As gauged by eye: All characters are sharply defined and are the same height throughout display. Lines of character are parallel to top and bottom of tube face.	•Monitor support cabinet (or base) ac switch off. •Monitor power switch off (turn counterclockwise for on). •Monitor brightness low (turn counterclockwise for on). •410286 circuit card. •410287 circuit card. •Monitor cable (may include extension cable and 406094 modification kit). •Further monitor analysis is given in Chart 8. •If monitor adjustments are needed, first refer to Section 582-200-205, Part 9.

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



Note: This figure is used with Step 4 of Chart 1.

Fig. 3—Self-Test Mode Displays

LOCAL TESTS

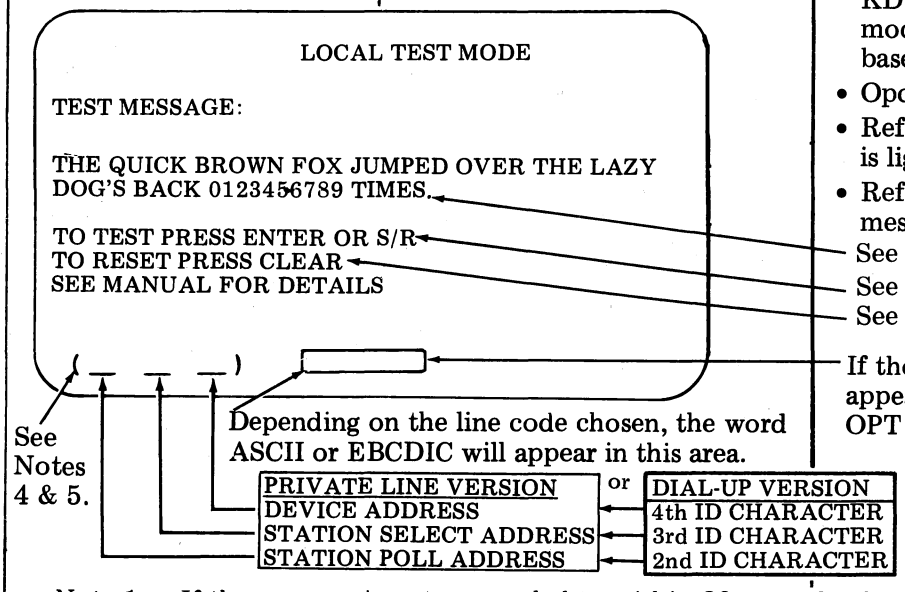
A. KD/Controller Local Test

2.03 Perform the Chart 2 procedures on the KD opcon.

CHART 2

KD/CONTROLLER LOCAL TEST PROCEDURES

STEP	PROCEDURE	CORRECT RESPONSE	LOCAL TEST ANALYSIS
Note: Start with Step 1 if the KD has a typewriter style opcon, start with Step 7 if the KD has an internal numeric cluster style opcon (see Fig. 5. if required).			
	TYPEWRITER STYLE OPCON (Steps 1-6)		
1	Depress LOCAL if indicator is not lighted. Request a local test by depressing the L/TST key while CONTROL key is held down.	The following message is displayed on the monitor.	• Optional keyboard lock is switched off or defective. (Lock can cause LOCAL indicator to stay off.) • Cable to opcon may include KD extension cable, 406094 modification kit, and opcon base cable. • Opcon. • Refer to Chart 8 if LOCAL is lighted but screen is dark. • Refer to Chart 7, Step 4 if message is not displayed.



See Note 2.
See Note 1.
See Note 3.
If the wrong line code appears, check the OPT 4 selection.

Note 1: If the message is not responded to within 20 seconds; the display will clear, the test will be automatically canceled, and S/R will flash repeatedly. Depress LOCAL to stop S/R from flashing.

Note 2: The QUICK BROWN FOX . . . message (appears on one line) may be changed provided that the first character remains a "T". If "T" is changed to any other character, the display will clear and test will be canceled when S/R is depressed.

Note 3: Depression of CLEAR or any PA or PF key will clear display and cancel test.

Note 4: Private Line Version — When SPACE character is selected, it is represented by a blank space. If characters are not per customer order and Fig. 4, check OPT 1 selection for station poll address and select address and OPT 2 selection for KD device address.

Note 5: Dial-Up Version — When SPACE character is selected, it is represented by a blank space. If characters are not per customer order, check OPT 1, OPT 2, and OPT 3 selections for 2nd, 3rd, and 4th characters of ID sequence respectively.

CHART 2 (Contd)

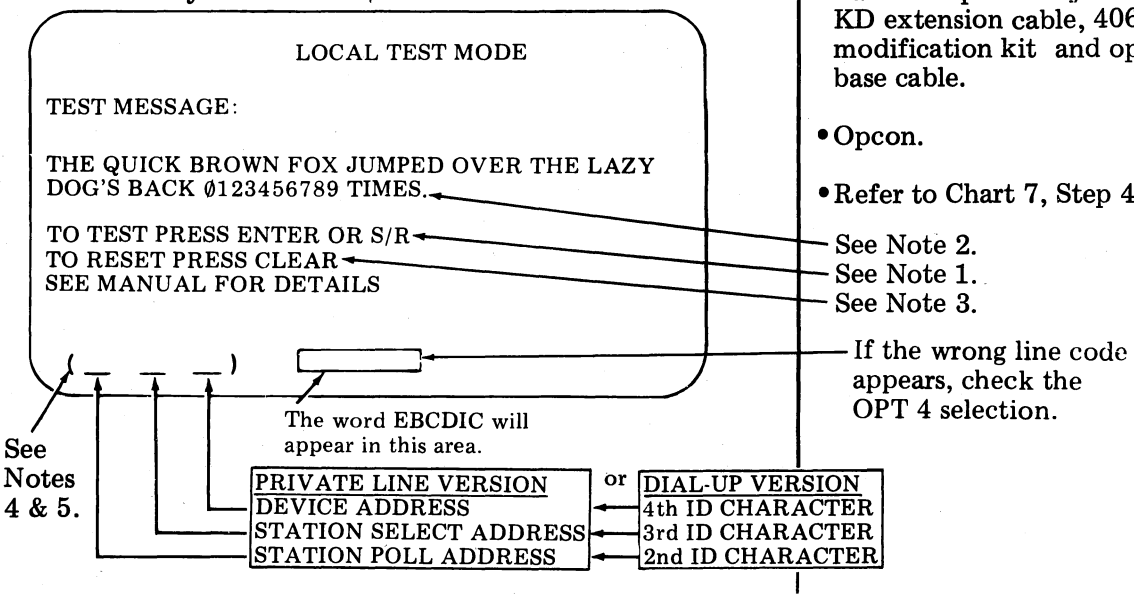
KD/CONTROLLER LOCAL TEST PROCEDURES

STEP	PROCEDURE	CORRECT RESPONSE	LOCAL TEST ANALYSIS
2	If LOCAL indicator is not lighted, depress LOCAL. Depress S/R. THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 0123456789 TIMES. *Note:* If any characters in the QUICK BROWN FOX . . . message were changed before depressing S/R, those characters will appear in the above message.	If received without error, the following message will appear on the monitor.	• If S/R is flashing, go to Step 4, Local Test Analysis. • If "test failed" message is received, go to Step 4, Procedure.
3	Depress CLEAR. Depress LOCAL if station is not connected to LCU.	Test is completed. Display is cleared. Proceed to Step 6.	
4	If message is received with an error in Step 2, the following message will be displayed on the monitor. **TEST FAILED** TEST MESSAGE: THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 0123456789 TIMES' RETEST PRESS ENTER OR S/R TO RESET PRESS CLEAR SEE MANUAL FOR DETAILS (__ __ __)	Go to Step 5.	Symptom: Flashing S/R indicator. • Normal Local Test: Replace 410290 or 410291. • Near-End Loopback Test: Check data set or data set cable. Replace controller back panel. (Data set DSR not "on" in AL mode can cause this failure.) • Far-End Loopback Test: Check far-end data set or check facilities between data sets. *Note 1:* Local test is canceled by symptom. *Note 2:* Depress LOCAL to to stop flashing S/R.
5	Depress LOCAL if station is not connected to LCU. Retry Steps 1 and 2 once then cancel test by depressing CLEAR key.		If test still fails, run controller self-tests.
6	If the local test of the KD is successfully completed, go to Chart 3 and 4.		

CHART 2 (Contd)

KD/CONTROLLER LOCAL TEST PROCEDURES

STEP	PROCEDURE	CORRECT REPONSE	LOCAL TEST ANALYSIS
	INTERNAL NUMERIC CLUSTER STYLE OPCON (Steps 7 through 15)		
7	Depress RESET if LOCAL indicator is not lighted. Request a local test by depressing the L/TST key and the ALPHA key simultaneously.	The following message is displayed on the monitor.	• Optional keyboard lock is switched off or is defective. (Lock can cause LOCAL indicator to stay off.) • Cable to opcon may include KD extension cable, 406094 modification kit and opcon base cable. • Opcon. • Refer to Chart 7, Step 4.



Note 1: If the message is not responded to within 20 seconds; the display will clear, the test will be automatically canceled, and S/R will flash repeatedly. Depress LOCAL to stop S/R from flashing.

Note 2: The QUICK BROWN FOX . . . message (appears on one line) may be changed provided that the first character remains a "T". If "T" is changed to any other character, the display will clear and test will be canceled when S/R is depressed.

Note 3: Depression of CLEAR or any PA or PF key will clear display and cancel test.

Note 4: Private Line Version — When SPACE character is selected, it is represented by a blank space. If characters are not per customer order and Fig. 4, check OPT 1 selection for station poll address and OPT 2 selection for KD device address.

Note 5: Dial-Up Version — When SPACE character is selected, it is represented by a blank space. If characters are not per customer order, check OPT 1, OPT 2, and OPT 3 selections for 2nd, 3rd, and 4th characters of ID sequences respectively.

CHART 2 (Contd)

KD/CONTROLLER LOCAL TEST PROCEDURES

STEP	PROCEDURE	CORRECT RESPONSE	LOCAL TEST ANALYSIS
8	If LOCAL indicator is not lighted, depress RESET. Depress ENTER. THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK Ø123456789 TIMES. *Note:* If any characters in the QUICK BROWN FOX. . . message were changed before depressing ENTER, those characters will appear in the above message.	If received without error, the following message will appear on the monitor.	•If S/R is flashing, go to Step 13, Local Test Analysis. •If "test failed", message is received, go to Step 13, Procedure.
9	Depress CLEAR. Depress RESET if station not connected to LCU.	Display is cleared.	
10	Request a local test by depressing the L/TST key and the NUMERIC key simultaneously.	The message of Step 7 is displayed.	Replace opcon.
11	Depress ENTER.	As given in Step 8.	As given in Step 8.
12	Depress CLEAR.	Test is completed. Display is cleared. Proceed to Step 15.	
13	If message is received with an error, the following message will be displayed on the monitor. **TEST FAILED** TEST MESSAGE: THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK Ø123456789 TIMES. RETEST PRESS ENTER OR S/R TO RESET, PRESS CLEAR SEE MANUAL FOR DETAILS (_ _ _)	Go to Step 14.	Symptom — Flashing S/R. Step 4 "Local Test Analysis" applies.
14	Depress RESET if station is not connected to LCU. Retry Steps 7 and 8 once then cancel test (depress CLEAR key).		If test still fails, run controller self tests of Chart 1.
15	If local test of KD device is successfully completed, proceed to Chart 3.		

Stn or Dvce No.	SPA	SSA	DA	Stn No.	SPA	SSA
00	SP	—	SP	18	K	2
01	A	/	A	19	L	3
02	B	S	B	20	M	4
03	C	T	C	21	N	5
04	D	U	D	22	0	6
05	E	V	E	23	P	7
06	F	W	F	24	Q	8
07	G	X	G	25	R	9
08	H	Y	H	26	](!)	:
09	I	Z	I	27	$	#
10	[(¢)	¦	[(¢)	28	*	@
11	.	,	.	29	)	'
12	<	%	<	30	;	=
13	(	_	(	31	^(¬)	"
14	+	>	+			
15	!(|)	'	!(|)			
16	&	0				
17	J	1				

(Private Line Version Only)

Note: This figure is used with Step 1 or Step 7 of Chart 2. The figure indicates all station and device identification for ASCII or EBCDIC coded stations. EBCDIC characters are shown in parentheses. Device numbers 00 through 15 can apply.

Fig. 4—ASCII or EBCDIC Station and Device Identification (Private Line Version)

B. Printer Local Tests

2.04 If a printer is not part of the station, proceed to 2.05. If a printer is part of the station, perform the Chart 3 procedures.

CHART 3

PRINTER LOCAL TEST PROCEDURES

Note: If a printer is not part of the station, proceed to Chart 4.

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
1	Preliminary requirements of printer: a. Ribbon and paper loaded. b. Switches (top right or left of printer, cabinet cover raised). LF-1 Test-Off Forms (Tractor Feed Only) — On c. Cabinet cover closed and ac power switched ON.	Printer motor is off. Fan in tractor feed printer cabinet is moving air. PAPER indicator is off. Fan in tractor feed printer cabinet must be moving air. *Note:* If tractor feed printer is 40P204 type or has paper jam modification kit (402920), PAPER indicator may be on. If so, refer to printer How To Operate to reset alarm.	Refer to Section 582-210-500.

CHART 3 (Contd)

PRINTER LOCAL TEST PROCEDURES

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
2	Momentarily depress PAPER button (red) on cover of printer cabinet. *Note:* Step 2 does not apply to forms access printer, go to Step 3.	Paper feeds out while button is depressed.	•Check for: a. Printer cable not connected (cable required only if printer has 410640 or 410729 circuit card). b. Printer cable defective. c. Defective 410290 or 410291 circuit card. Refer to Section 582-210-500.
3	TRACTOR FEED PRINTER ONLY: Depress and release FORMS ADVANCE button (black) on printer cabinet cover. (See Note.) *Note:* See chart on top of printer to determine the correct form out selection. Check that the selection is what the customer needs.	Forms Switch On: Paper feeds out until first line of next form is reached, (provided forms are registered — refer to printer How To Operate if required) then stops. Forms Switch Off: Paper feeds as long as button is depressed.	
4	Raise printer cabinet cover. (For forms access printer, first open lower doors. On early style cabinet, depress cover release button. Raise cover and close doors.	None	*Note:* Continuous feedout will occur if form selector lever not fully seated in slot 1, 2, 3, or 4.
5	Raise cover interlock arm to maintenance position. (For late style forms access printer cabinet, push interlock arm forward to maintenance position.)	None	
6	Push test switch to ON, allow printer to print two lines, then push test switch OFF.	Printer turns on and prints font identification symbol (See next page) repeatedly in all columns until switch is turned off. *Note:* On later version printers (which have 410071, 410072 or 410076 circuit card), the font identification symbol will not be printed in the columns margined per Option 17, however the first line will be printed in column one.	Refer to Section 582-210-500. *Note:* Interlock may be defective in maintenance position, check by closing cover.

CHART 3 (Contd)

PRINTER LOCAL TEST PROCEDURES

<table>
<tr><th>STEP</th><th>PROCEDURE</th><th>RESULTS</th><th>TROUBLE ANALYSIS</th></tr>
<tr><td>6
(Contd)</td><td></td><td>Note 2: If LF switch on top of printer is set for 1, printing will occur on each line. If LF switch is set for 2, a blank line will occur between printed lines.

<table>
<tr><th rowspan="2">Carrier Type</th><th colspan="4">Type Carrier Font ID Symbol</th></tr>
<tr><th colspan="2">132-Column</th><th colspan="2">80-Column</th></tr>
<tr><th></th><th>ASCII</th><th>EBCDIC</th><th>ASCII</th><th>EBCDIC</th></tr>
<tr><td>Monocase
Standard</td><td>=A=
=J=</td><td>=A=
=S=</td><td>=A=
=A=</td><td>=A=
=Q=</td></tr>
<tr><td>Up-Low
Standard</td><td>=A=
=Q=</td><td>=A=
=M=</td><td>=A=
=8=</td><td>=A=
=N=</td></tr>
<tr><td>Monocase
OCR-B</td><td>=8=
=3=</td><td>=8=
=K=</td><td>=8=
=0=</td><td>=8=
=M=</td></tr>
<tr><td>Up-Low
OCR-B</td><td>=8=
=C=</td><td>=8=
=J=</td><td>=8=
=8=</td><td>=8=
=N=</td></tr>
</table></td><td></td></tr>
<tr><td>7</td><td>FRICTION FEED PRINTER:
Lift paper roll to simulate a paper alarm. Lower paper roll, guide paper through window, and close cabinet cover.

TRACTOR FEED PRINTER:
Tear off next form at perforations under pedestal top (see Note), then depress PAPER button on cabinet cover until last form passes through printer. On Forms Access Printer, depress FORMS ADVANCE button since there is no PAPER button.

Note 1: If printer is forms access printer and includes a 406374 pre-sensor modification kit, tear paper below the sensor mechanism.

Note 2: For late style forms access printer cabinet, open doors before closing cover. Close doors after cover is closed.

Reload forms and guide first form through window. Close cabinet cover.</td><td>Paper indicator lights.
Paper indicator goes out.

<u>80-Column Printer With 410640 Circuit Card</u> — PAPER indicator lights and printer motor turns off.

<u>80-Column Printers With 410076 or 410071 Circuit Cards And All 132-Column Printers</u> — If Option 48a is selected, PAPER indicator lights and printer motor turns off when last form is partly through printer. If Option 48b is selected, PAPER indicator does not light and printer motor does not turn off until form is completely out of printer, (<u>Forms Access Printer With 406374 Modification Kit</u> — last form is above paper sensor mechanism) and end of form contact is sensed.

PAPER indicator goes out.</td><td>Refer to Section 582-210-500.</td></tr>
</table>

CHART 3 (Contd)

PRINTER LOCAL TEST PROCEDURES

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
8	Type some text on the display (lower case and upper case if possible) and then depress PRINT LOCAL key.	LOCAL indicator extinguishes and PRINT LOCAL indicator lights and then goes off when printer buffer receives the message; LOCAL indicator lights. Printer copies entire display (24 lines): Monocase Printer — All display characters print as capitals. See Note following Step 5 of Chart 4. Up-Low Printer — All display characters are copied as displayed. *Note 1:* Friction feed printer may or may not feed out 16 lines of paper before turning off, depending on Option 18. Tractor feed printer may or may not form feed before turning off depending on Options 18 and 39. *Note 2:* After printer is finished copying, the motor will remain on for approximately 20 seconds before turning off.	Flashing PRINT LOCAL indicator indicates: a. Printer cabinet lid open. b. Form or paper-out condition. c. Printer ac power is off. d. Printer is not print local to the KD. e. Printer cable defective or miswired, may include printer extension cable. Refer to Section 582-210-500. Option 18c not installed in monocase printer. Character set of type carrier in printer does not match Option 19. Option 19c not installed in printer.

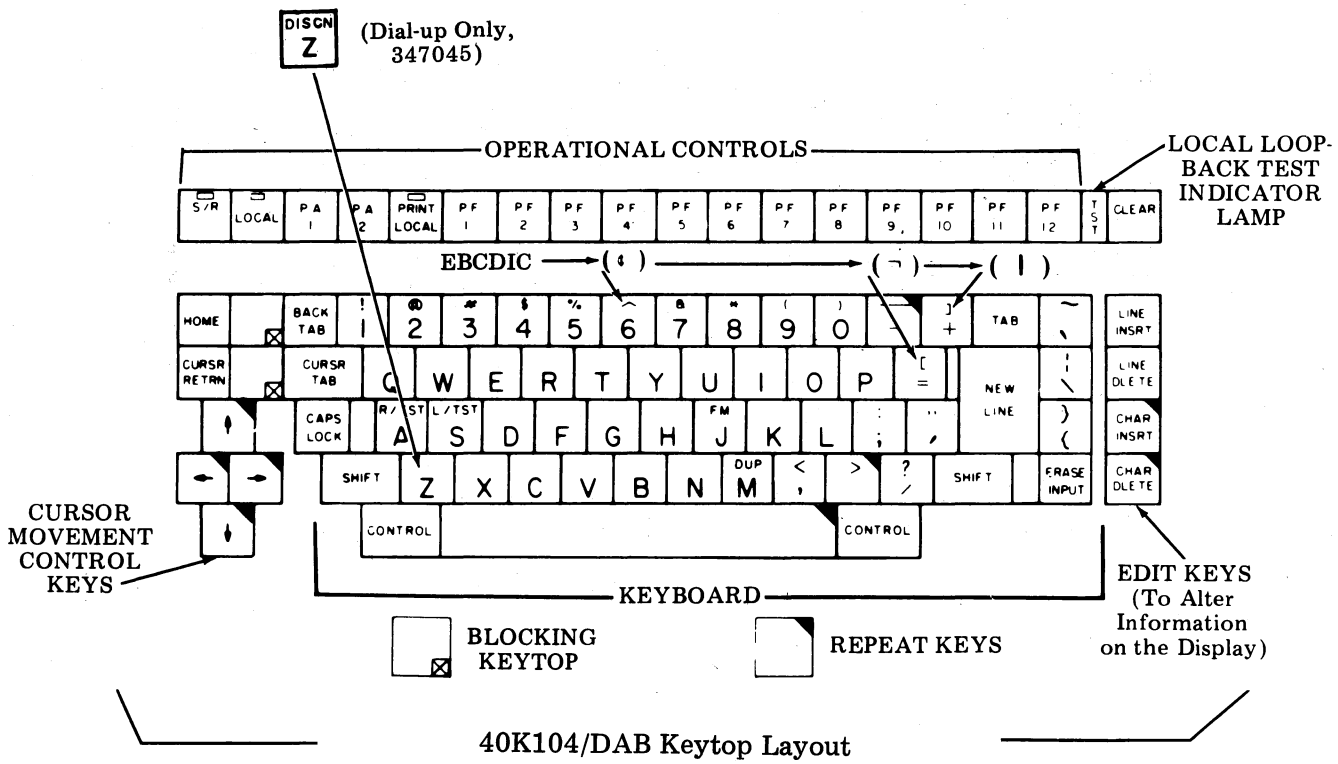
C. KD Local Test

2.05 Check the KD using the procedure given in paragraph 2.06 and Chart 4. The locations of the various control and data keys referred to in Chart 4 are given in Fig. 5. The SDS has only one KD and therefore, only one opcon and one monitor.

2.06 Follow these instructions before beginning Chart 4:

(a) Turn on power to the set or station (LOCAL indicator lights on the opcon).

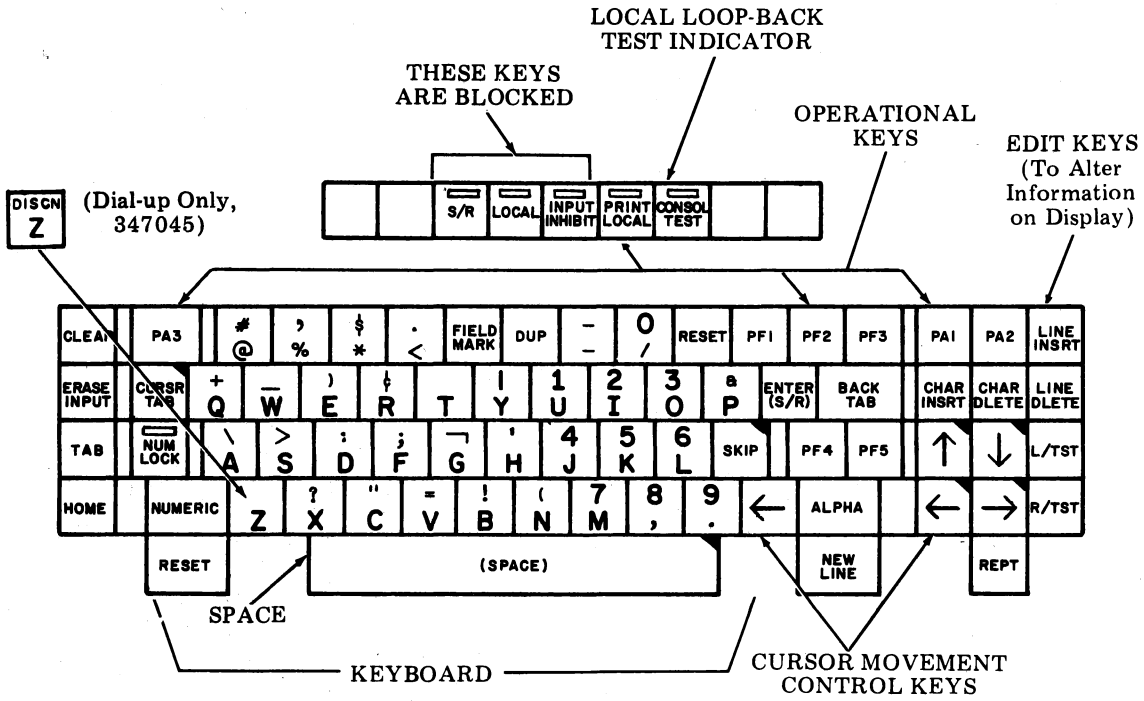
(b) Turn on power to the display and adjust brightness.



40K104/DAB Keytop Layout
(Typewriter Style Opcon)

(Other keytop layouts shown on next page.)

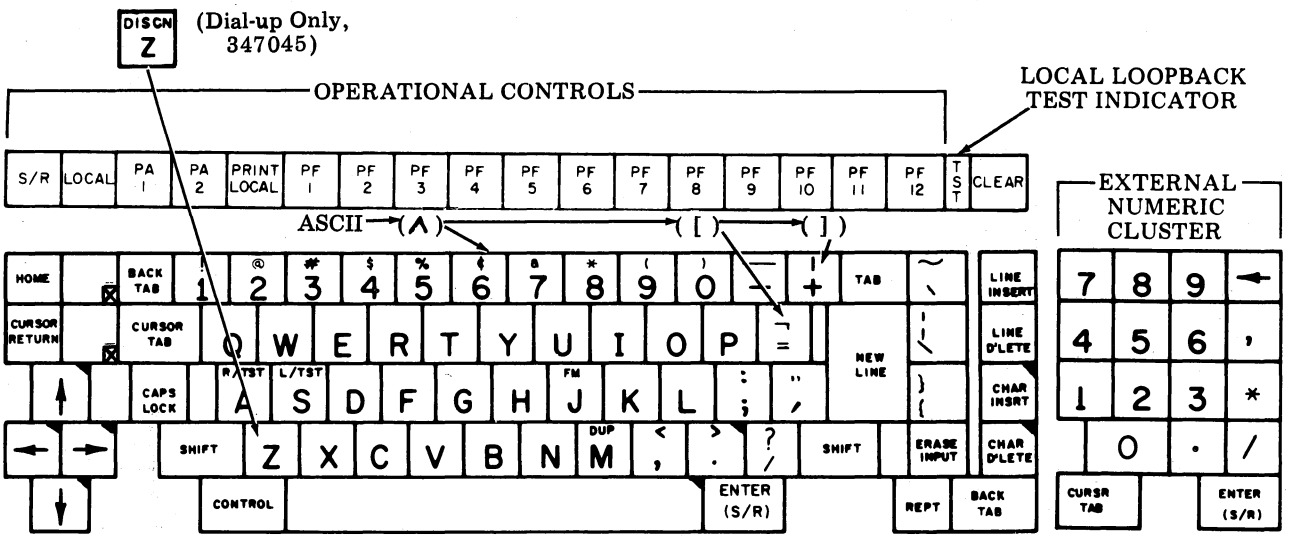
Fig. 5—Opcon Keytop Layouts



Note: The only locking keytop is NUM LOCK, depress to set (lights), depress to release (light goes out).

40K105/CAA Keytop Layout
(Internal Numeric Cluster Style Opcon)

40K105/CAA Keytop Layout
(Internal Numeric Cluster Style Opcon)



Note: The, (comma), *, and / keys located within the External Numeric Cluster are not functional with SDCs (Private Line Version Only) which employ the 410261 circuit card and, therefore may be covered with blocking keys.

40K203/GAB Keytop Layout

(External Numeric Cluster Style Opcon — In test procedures, treat as typewriter style opcon.)

Fig. 5—Opcon Keytop Layouts (Contd)

CHART 4

KD LOCAL TEST PROCEDURES

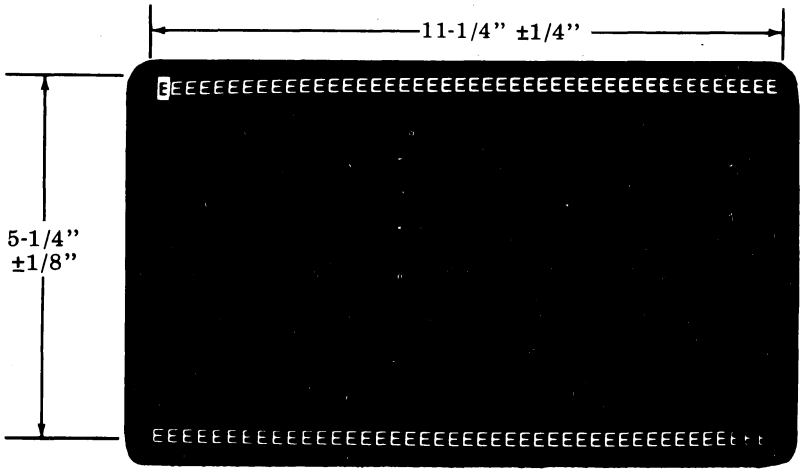
STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
Note: Start with Step 1 if KD of the station has typewriter style opcon. Start with Step 5 if KD has an internal numeric cluster style opcon. 'The Note of Step 8 of Chart 3 may apply to this procedure.			
1	a. Place typewriter style opcon into the caps mode by depressing and latching the CAPS LOCK key. (Opcons with no CAPS LOCK key require no action.)		
	b. On the monitor: • Observe that the raster is clearly visible (but not brilliant) when brightness control is turned up fully. • The display (80-characters by 24 lines) should be centered on the tube face as gaged by eye. • Enter a line of Es at top and bottom of display, then HOME cursor. Requirements are met.  Requirements: • Raster aligned vertically and horizontally. • All Es sharply defined. • Height and width of display as indicated. • Es uniform across full width. • Height of Es same at top and bottom lines.		• If raster is not present go to Chart 8. • If a requirement is not met, refer to adjustments of monitor in Section 582-213-700 to meet requirement. • If E cannot be entered, go to Chart 9.

CHART 4 (Contd)

KD LOCAL TEST PROCEDURES

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
2	Home the cursor and depress a few keys on the keyboard portion of the opcon. *Note:* Each keytop need not be checked except for a trouble call. If 40/4 is not connected to system when LOCAL indicator is on; depressing S/R, a PF, PA, or CLEAR causes LOCAL indicator to go out. Refer to How To Operate Manual for unique keytop functions.	Upper case alpha characters and numeric characters can be displayed. Refer to How To Operate Manual for unique keytop functions.	If the appropriate character is not displayed, go to Chart 7.

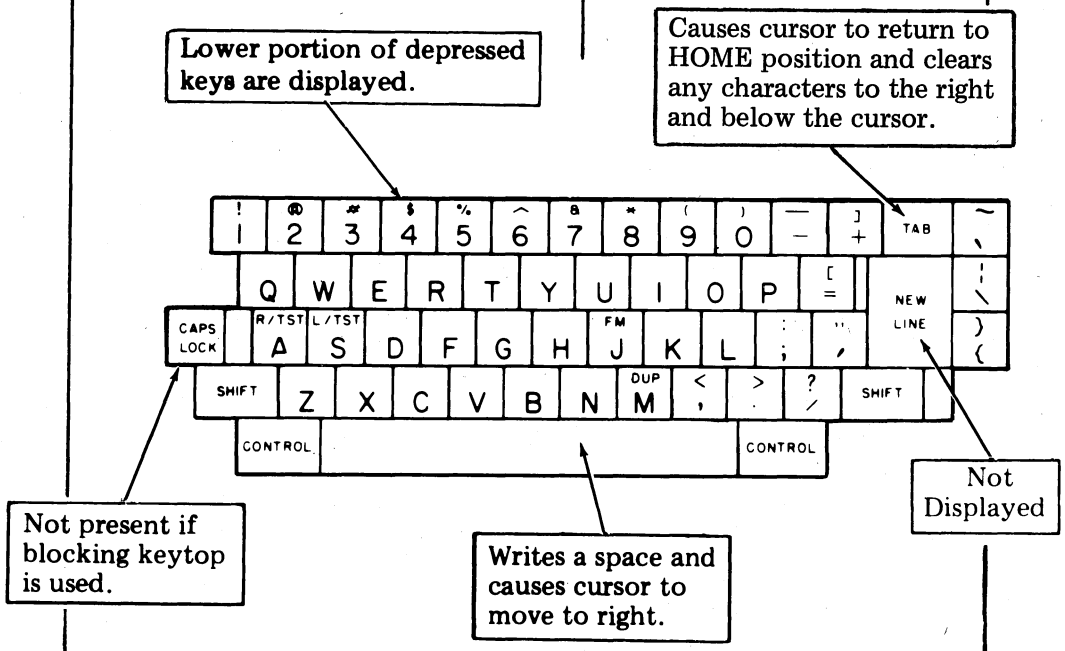


CHART 4 (Contd)

KD LOCAL TEST PROCEDURES

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS

2 (Contd)

Note: Some characters may be displayed as a character other than the character received on-line or entered from the opcon. See the table below which also provides printer actions for applicable characters. Observe that the foldover of " ~ " and " { " are different (for monocase EBCDIC) for the display and printer.

Application of Type of 40K104 Opcon		'/DAA or '/DAB					'/DAA			'/DAB			'/DAA or '/DAB	
Character Received From LCU or Entered on 40K104 Type Opcon		~	`	¦	{	}	^	]	[	¢	|	¬	DUP	FM
Character Displayed Using:	ASCII UP-LO	~	`	¦	{	}	^	]	[	^	]	[	DL	FS
	ASCII MONO	^	@	\	[	]	^	]	[	^	]	[	DL	FS
	EBCDIC UP-LO	~	`	¦	{	}	¢	|	¬	¢	|	¬	DL	FS
	EBCDIC MONO	¬	@	\	¢	|	¢	|	¬	¢	|	¬	DL	FS
Character Printed Using Type Carrier:	400629 80C ASCII UP-LO	~	`	¦	{	}	^	]	[	^	]	[	SP	SP
	400645 80C ASCII MONO	^	@	\	[	]	^	]	[	^	]	[	SP	SP
	400777 132C ASCII UP-LO	~	`	¦	{	}	^	]	[	^	]	[	SP	SP
	400780 132C ASCII MONO	^	@	\	[	]	^	]	[	^	]	[	SP	SP
	400783 132C EBCDIC UP-LO	~	`	¦	{	}	¢	|	¬	¢	|	¬	SP	SP
	400784 80C EBCDIC UP-LO	~	`	¦	{	}	¢	|	¬	¢	|	¬	SP	SP
	400785 80C EBCDIC MONO	¢	@	\	¬	|	¢	|	¬	¢	|	¬	SP	SP
	400887 132C EBCDIC MONO	¢	@	\	¬	|	¢	|	¬	¢	|	¬	SP	SP

LEGEND:

◥ Will print with fold-over option in printer enabled. Error symbol will print if fold-over option is not enabled.

CHART 4 (Contd)

KD LOCAL TEST PROCEDURES

STEPS	PROCEDURE	RESULTS	TROUBLE ANALYSIS
3	Depress PRINT LOCAL key, (if printer is not provided, go to Step 14).	LOCAL indicator extinguishes, PRINT LOCAL indicator lights and then goes off when printer buffer receives the message; LOCAL indicator lights. Printer copies entire display (24 lines): Monocase Printer — All display characters print as upper case characters. Up-Low Printer — All characters are copied as displayed.	•Flashing PRINT LOCAL indicates printer: a. Cabinet lid is open. b. Is in form-out or paper-out condition. c. The ac power is off. d. Printer SSI connection is not made. *Note:* Depress LOCAL to clear flashing PRINT LOCAL.
4	This step applies only to monocase opcons (blocking keytop over CAPS LOCK position). a. Depress ERASE INPUT and QUOTES keys together with additional force. b. Depress A (do not depress SHIFT). c. Depress ERASE INPUT and P keys together with additional force.	TST indicator lights and remains lighted. S/R key lights. If S/R key does not light, see Trouble Analysis column entry. TST indicator light goes out.	Chart 9 •Remove blocking keytop, check that plunger is in lower position. •Replace opcon. Chart 9
5	When typewriter style opcon has successfully passed Steps 1 through 4, go to Chart 5.		
6	INTERNAL NUMERIC CLUSTER STYLE OPCON (Steps 21 through 41) — 40K105 a. Perform Step 1b. b. Place internal numeric cluster style opcon into the NUM LOCK mode by depressing and latching the NUM LOCK key.	Results and Trouble Analysis of 1b apply. The indicator lights.	

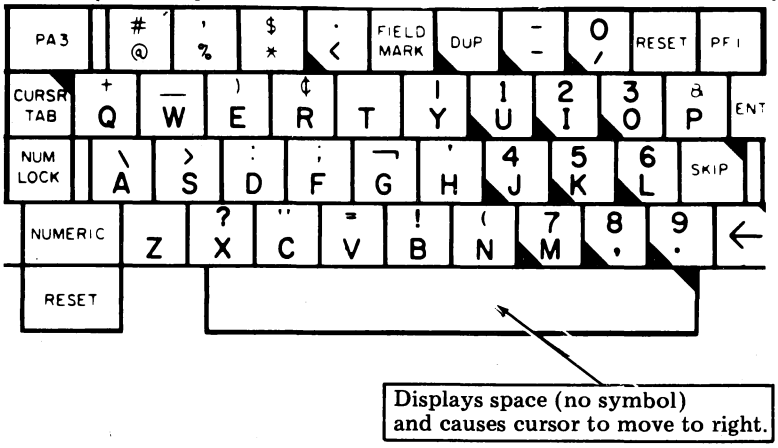
CHART 4 (Contd)

KD LOCAL TEST PROCEDURES

<table>
<tr><th>STEP</th><th>PROCEDURE</th><th>RESULTS</th><th>TROUBLE ANALYSIS</th></tr>
<tr><td>7</td><td colspan="2">Home the cursor and depress a few keys on the keyboard portion of the opcon.

Upper portion of depressed keys are displayed.

Note 1: Each key need not be checked except for a trouble call. Depressing the Z or T keytop while NUM LOCK is lighted will display space (no symbol) and cause cursor to move to right. If 40/4 is not connected to system when LOCAL indicator is on, depressing S/R, a PF, PA or CLEAR causes LOCAL indicator to go out.

Note 2: TAB causes cursor to move to home position. NEW LINE is not displayed when NEW LINE is depressed.

Refer to How To Operate Manual for unique keytop functions.</td><td></td></tr>
<tr><td>8</td><td>Depress PRINT LOCAL key, (if printer is not provided, go to Step 36).</td><td>LOCAL extinguishes, PRINT LOCAL key lights and then goes off when printer buffer receives the message; LOCAL lights. Printer copies entire display (24 lines).</td><td>•Flashing PRINT LOCAL indicates printer:
a. Cabinet lid is open.
b. Is in form-out or paper-out condition.
c. Ac power is off.
d. Printer SSI connection is not made.

Note: Depress RESET to clear flashing PRINT LOCAL.</td></tr>
<tr><td>9</td><td colspan="3">When the KD has successfully completed these tests, proceed to Chart 5.</td></tr>
</table>

D. Data Set Self-Test

2.07 Check the data set using Chart 5. Chart 5 includes Data Set Self-Test Procedures for Western Electric type data sets 201C, 212A and 208; and also 251A1 Terminal Data Units (TDU) and 500A-type data service units and 48230 Local Area Data Sets (LADS). Initial operating conditions are given in Step 4. If station includes a modem other than mentioned above, refer to operating manual that comes with that modem for testing and/or initial operating conditions.

CHART 5

DATA SET SELF-TEST PROCEDURES

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
	Note: If Data Set 208A or 208B is used, go directly to Step 2. If 48230 LADS is used, go directly to Step 3. If data set 212A is used, go directly to Step 4. If 500A type Data Service Unit (DSU) is used, go directly to Step 5. If a 251A1 TDU is used, go directly to Step 6.		
1	Data Set 201C-L1 and 201C-L1D: Apply ac power to data set. Perform Self-Test as follows:		
	•Depress AL button	AL button latches. TM lights and MR goes OFF. *Note:* MR stays on if 201C LID is used.	
	•Depress ST button.	ST button latches. All indicators except MC should be ON.	
	•Observe MC indicator for 30 seconds.	MC indicator should not blink ON.	• If MD indicator is ON or blinks, the data set has failed the self-test.
	•Depress RO button.	RO button latches. RS and CS indicators should be OFF; MC indicator should be ON. If Data Set has continuous carrier (Option XB), CO indicator should be ON. If data set has switched carrier (Option XA), CO indicator should be OFF.	• If test fails replace data set.
	•Release RO, ST, and AL	TM indicator should turn OFF. This completes the data set self-test. All buttons should be released. Go to Step 5.	

CHART 5 (Contd)

DATA SET SELF-TEST PROCEDURES

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
2	Data Set 208A or 208B: Apply ac power to data set. Perform Self-Test as follows:		
	•Depress LP nonlocking button.	All indicators on the data set should be lighted.	•If ON indicator is OFF, check that ac voltage to data set is between 105 to 130 volts. *Note 1:* The ON indicator will go OFF if the output voltage of the power supply becomes excessive. The power cord must be unplugged and plugged in again after correcting the overvoltage to make the indicator light again.
	•Depress AL button. •Depress ST button.	ON, RS, CS, and CO indicators should be lighted. MR and ER indicators should be OFF.	*Note 2:* (208B only) TR indicator is ON or OFF dependent on the state of the 40/4 DTR signal.
	•Observe ER indicator for 30 seconds.	ER indicator should not blink ON.	If ER indicator is ON or blinks, this indicates that the data set has failed the Self-Test.
	•Depress AL and ST buttons.	The data set is returned to normal operating conditions. This completes the data set self-test. All buttons should be released. Go to Step 5.	If test fails, replace data set.

CHART 5 (Contd)

DATA SET SELF-TEST PROCEDURES

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
3	48230 LADS:		
	Apply ac power to the data set. Perform Self-Test as follows:	POWER ON indicator should be ON.	
	Depress the DATA CLAMP (DC) and LOCAL LOOPBACK (LL) buttons (behind front panel).	The TEST and SIGNAL DETECT indicators should turn ON.	
		Note: SIGNAL DETECT may already be ON.	
	Observe the SIGNAL DETECT indicator for 30 seconds.	SIGNAL DETECT indicator should not turn OFF or blink.	
	Depress the DC and LL buttons again to release.	The data set is returned to normal operating condition. This completes self-test.	If test fails, replace data set.
		Go to Step 5.	
4	Data Set 212A:		
	Apply ac power to data set Perform the Self-Test as follows:		
	Note: HS button should be in depressed position.		
	• Depress AL and ST buttons.	The MB, HS, MR and TM indicators should be lit. The MC indicator light goes OFF after SD and RD indicators light. See Section 582-200-205 for data set optioning.	
		Note: The TR indicator may or may not be on depending on the state of the stations DTR lead.	
	• Observe the MC indicator for one minute.	MC indicator does not blink on.	
	• Release AL and ST buttons.	MB, TM, SD and RD indicators go out, MC will light if no carrier is being received.	
		Go to Step 5.	Replace Data Set.

CHART 5 (Contd)

DATA SET SELF-TEST PROCEDURES

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
5	201C, 208A, 208B, 212A, 500A and 48230 LADS:		
	With all ac power switches on, check for correct data set indicator lights. (Initial Operating Conditions)	Data Set 201C: ON Lighted TR Lighted	•Replace data set. •Replace 41029N in SDC. •Replace data set cable.
		MR Lighted RS Off } See Note 1 following chart. CS Off CO Off } See Note 2 following chart. MC Lighted TM Off	•Check that data set buttons are released. •Replace data set.
		Data Set 212A: MB Off TR Lighted	•Replace 41029N in SDC. •Replace data set cable.
		MR Lighted when data connector exists, otherwise off. SD Off RD Off HS Lighted MC Lighted TM Off	•Check that data set buttons are released (except HS). •Replace data set.
		Data Set 208A or 208B: ON Lighted MR Lighted (For 208B, only when data connector exists) RS Off } See Note 1 following chart. CS Off CO Off } See Note 2 following chart. ER Lighted TR Lighted (208B only)	•Replace data set. •Replace 41029N in SDC. •Replace data set cable.

CHART 5 (Contd)

DATA SET SELF-TEST PROCEDURES

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
5 (Contd)		500A-DSU: PWR On NS Lighted See Note 3 following chart. LL Off RT Off 48230 LADS: POWER ON Lighted SIGNAL DETECT } Off See Note 3 following chart. REMOTE LOOPBACK Off TEST Off Go to 2.08.	•Replace 500A-DSU. •Check DSU that switch is in center position. •Replace data set. •Check that LADS buttons are released.
6	Internal Modem 251A1 TDU. Depress and hold down the switch on the 251A1 for 5 seconds.	MC indicator on 251A1 flashes once immediately and then remains off. Go to 2.08.	Replace 251A1.

Note 1: If the station is part of a point-to-point installation, it is recommended that the data set be optioned for continuous carrier (and RTS if applies) which means CS and RS will always be on.

Note 2: When distant end (CPE) is providing carrier on condition, CO should be lighted (MC off) for 201C, ER off for 208A or 208B.

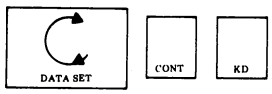
Note 3: When distant end (CPE) is providing carrier on condition; NS will be off for 500A DSU, SIGNAL DETECT will be lighted.

ON-LINE TESTS

A. Preliminary On-Line Testing

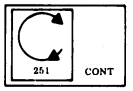
2.08 Preliminary Requirements — the data set must pass the requirements of Chart 5. Chart 5 makes this test:

201C, 208A
208B, 212A
or 48230 LADS



(OPT 8 has no effect)

251A1



(OPT 8 has no effect)

B. On-Line Test Methods

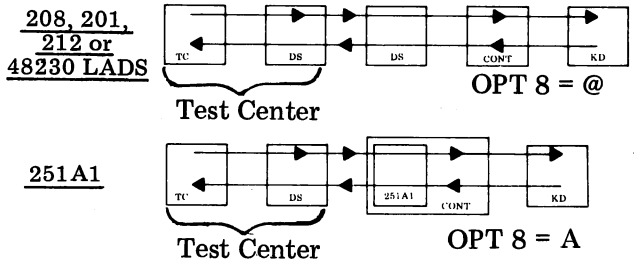
2.09 On-Line tests require access to a Data Test Center (DTC) by way of a Servicing Test Center (STC). Hereafter, the DTC is called the Test Center in private line applications. Access to the Test Center for private applications may require a four-wire DDD backup connection at the STC or installation site. This connection is beyond the scope of this section (refer to Section 598-082-201, if required).

Note: All on-line tests require that the KD/Controller Local Test of Chart 2, and Data Set Self-Test of Chart 5 have been successfully performed first.

2.10 On-line testing requires that the End-to-End Installation Test of 2.11 be performed first. If this test is performed satisfactorily the station should be put into service. If this test cannot be performed because you cannot gain access to the DTC, then the Near-End Loopback and/or Far-End Loopback tests of 2.12, 2.13 or 2.14 should be performed to isolate trouble (or check as much of the system as possible, as applies).

2.11 An End-to-End Installation Test is performed with the assistance of the DATASPEED Test Center.

(212: HS should be in depressed position.)



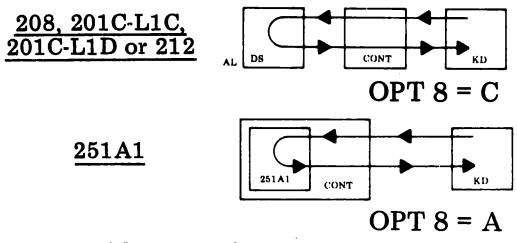
This test must be requested from a local area DATASPEED Test Center. In situations where access to a Test Center is not provided for in the customer's system, the required End-to-End Installation Test can be omitted if correct in-service operation testing with the customer equipment or system can be verified by the craftsperson and is customer accepted. If trouble does occur in an in-service operation test, refer to trouble analysis or request a Test Center to perform a line monitor test.

Perform the tests in Chart 6, End-to-End Installation Test Procedures.

Note: If the station passes the tests of Chart 6, then testing is complete.

2.12 The Near-End Loopback Test checks the station out to the data set, it does not check facilities:

(212: HS should be in depressed position.)



This test provides a craftsperson with a local test method to check station and local data set operation when access to the DTC cannot be attained for any reason.

This test cannot be performed if station is equipped with a Data Set 201C-L1 or 500A-Type DSU. If the station is so equipped, to to 2.13.

If the station is equipped with Data Set 201C-L1C, 201C-L1D, 212A, or 208; proceed to (a). If the station is equipped with a 251A1 TDU, proceed to (b).

(a) For 208, 201C-L1C, 201C-L1D, 212A, or 48230 LADS Only:

- Depress AL button (locking) on the data set (all other buttons released). (48230 LADS only: depress LOCAL LOOPBACK button.)

Caution: Do not release "AL" button during this test. If AL is released while "OPT 8C" is installed, data sent by S/R key depression can be sent into the customer's data system during the test; any data operation occurring at that time would be scrambled.

- Enter the "OPT" mode by depressing the controller SELF-TEST switch for at least one-half second but less than four seconds.
- Move the cursor to the character following "OPT 8" by depressing CURSR TAB repeatedly.
- Depress "C".
- Return to operating mode by depressing LOCAL (or RESET).
- Perform Local Tests using Chart 2, Steps 1 through 5 (for Typewriter Style Opcon) or Steps 7 through 9, 13 and 14 (for Internal Numeric Cluster Style Opcon). The test occurs when S/R (or ENTER) key is depressed.
- If test is not successfully completed, the controller or data set is at fault. If test is successfully completed, enter the OPT mode, move the cursor to the character following "OPT 8"; and depress "@". Depress LOCAL (or RESET) to return to operating mode.
- Release "AL" button on data set. (48230 LADS only: Release LOCAL LOOPBACK button.)

(b) For 251A1 TDU only:

- With "A" selected for "OPT 8", perform Local Tests using the same routine given in Chart 2, Steps 1 through 5 (for Typewriter Style Opcon) or Steps 7 through 9, 13 and 14 (for Internal Numeric Cluster Style Opcon). The test occurs when S/R (or ENTER) key is depressed.
- If test is not successfully completed, the controller or 251A1 TDU is at fault; proceed to (c).

If test is successfully completed, "OPT 8" requires no change.

(c) If a 251A1 TDU equipped station fails the test of (b):

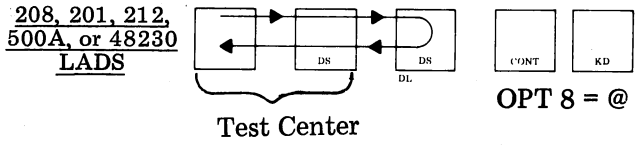
- Enter the "OPT" mode.
- Move cursor to character following "OPT 8".
- Depress "@".
- Return to operating mode by depressing LOCAL (or RESET).

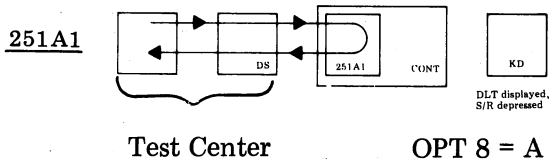
Perform local tests using Chart 2 Steps 1 through 5 or Steps 7, 8, 9, 13 and 14 (as applies).

- If the test is not successfully completed, the controller is at fault. If the test is successfully completed, the 251A1 TDU is at fault (provided that the test of (b) was not successful).

2.13 A Far-End Loopback Test checks the data sets and facilities from a test center:

(212: HS should be in depressed position.)





Caution: Do not perform a far-end loopback test if customer data channel is on the same circuit with other stations which are actively sending or receiving data. If this test is performed on an active circuit, data transmissions on the circuit will be scrambled and possibly halt data system operation. BEFORE TESTING, REQUEST PERMISSION FROM CUSTOMER AND DATA TRANSMISSION CENTER FOR TIME AND COOPERATION TO TEST.

If station is dial-up version, establish line connection first. For 201, 212, and 208 only: Depress data set "DL" button (locking) when directed by attendant at far-end. When test is complete, far-end attendant will tell you to release the key to the released position.

Note: (212A Data Set only) If station Data Set 212A is optioned for automatic answer, DTC may force station data set into "DL" by depressing "RDL" on 212A Data Set at DTC.

For 500A only: When directed by far-end attendant, place DSU into DL (see Section 595-200-200).

For 48230 LADS only: When directed by far-end attendant, place LADS into "DL" by depressing the DC BUSBACK button (locking). When test is complete, far-end attendant will tell you to release the key to the released position.

For 251A1 TDU only: When directed to go into "DL" by far-end attendant, perform the following:

(a) Depress CONTRL and L/TST (or ALPHA and L/TST, as applies) at a KD.

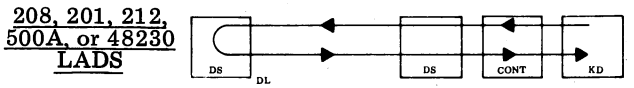
(b) Type "DLT" over the "THE" in the test message. Depress S/R (or ENTER). "DTL MODEM IN DIGITAL LOOPBACK TO RESET PRESS CLEAR" will be displayed.

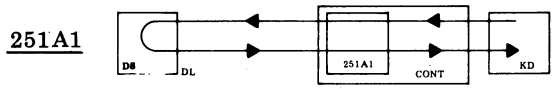
(c) The 251A1 is now in "DL". Each minute, depress S/R (or ENTER) to keep the 251A1 in loopback. The 251A1 will automatically come out of loopback in approximately 2 minutes if S/R (or ENTER) is not depressed.

(d) When directed to terminate "DL", depress CLEAR.

2.14 A Far-End Digital Loopback Test from the 40/4 checks the data sets and facilities from the 40/4:

(212: HS should be in depressed position.)





Note: This test should only be performed when the test of 2.13 cannot be performed.

Caution: Caution of 2.13 applies.

If a multistation arrangement shares the same data communications circuit, all communications on that circuit must cease during the test period. This test can be performed with the assistance of the DATASPEED Test Center (ie, similar type of data set patched into customer circuit to facilitate the test). If station is a dial-up version, establish line connection first.

(a) Enter "OPT" mode. Move cursor to character following "OPT 8". Depress "C". Depress LOCAL (or RESET).

(b) Have far-end attendant enter the "DL" mode. (48230 LADS only: Have far-end attendant depress DC BUSBACK button).

Note: If far-end data set is 212A and optioned for automatic answer, far-end data set can be forced into "DL" by depressing "RDL" at station Data Set 212A.

(c) Perform local tests using Chart 2, Steps 1 through 5 or Steps 7, 8, 9, 13 and 14 (as applies).

(d) If the test is not successfully completed, trouble is in transmission lines, far-end data set or near-end data set. If the test is successfully completed, then enter "OPT" mode, move cursor to character following "OPT 8", depress "@" (201, 208, or 212A only) or "A" (251A1 only). Depress LOCAL (or RESET) to return to operating mode. Have far-end attendant exit the "DL" mode. (48230 LADS only: Have far-end attendant release DC BUSBACK button.)

CHART 6

END-TO-END INSTALLATION TEST PROCEDURES

STEP	PROCEDURE	RESULT	TROUBLE ANALYSIS
1	Check that all equipment power switches are on and paper is installed in printer; cabinet lid closed, etc. Then depress LOCAL (or RESET) and ERASE INPUT keys on the opcon.	LOCAL indicator lights. Cursor returns to row 1 and column 1. Display is cleared of all data.	Go to Chart 7.
2	Depress PA1 key on the opcon.	LOCAL indicator extinguishes. (Also, see Notes 1 and 2 following Chart 6.) Internal Numeric Cluster Opcon: INPUT INHIBIT indicator lights.	Go to Chart 7.
3	Contact the Test Center and request End-to-End Installation Test. • Establish line connections per Test Center instructions, then observe "carrier on" indicators indicating line established to the Test Center. *Note:* The SDS may cancel the bid when the initial Status and Sense is sent, it may be required to depress PA1 again to start the test after line connections are made.	201C MC — Goes off CO — Lights 208 ER — Goes off CO — Lights 251A1 TDU no indication 212A MC — Goes off (HS should be in depressed position.)	Inform DTC of problem. DTC may advise: • Go to Chart 5. Perform Near-End Loopback Test of 2.12. • Perform Far-End Loopback Test of 2.13 or 2.14.
4	For Test Center only.	Proceed to Step 5. (Also see 2.17.)	

CHART 6 (Contd)

END-TO-END INSTALLATION TEST PROCEDURES

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
5	If talk line to the Test Center is not available after test is requested, verify that the test has started by observing the RS/CS LEDs on the front of a 201 or 208 Data Set or the SD/RD LEDs on the front of 212 Data Set. *Note:* For 251A1, see Note in result column.	RS/CS or RD/SD lights, on the front of the data set should flash ON then OFF during testing. *Note:* If RS and CS or RD and SD are on constantly (data set has continuous carrier option, or 251A1 is part of station), observe the LEDs on 410290 or 410291 circuit card. The RD and SD LEDs are normally off, indicating a mark. They turn on for space. Flashing of RD indicates received data. Flashing of SD indicates sent data. Go to Step 6.	Inform Test Center of problem. Go to Chart 7.
6	The Test Center will perform the remainder of the test. Proceed to devices and check for correct test results: For printer, see 2.15 through 2.18 and Fig. 6; for KD, see 2.19 and Fig. 7.	Test Center will inform of test acceptance or trouble. Call Test Center back if required. See Note 3 following Chart 6. Proceed to 2.15.	

Note 1: If the KD device is observed during this test, the S/R key must operate as follows:

S/R indicator flashing continuously (aborted condition) should be reported to the Test Center.
S/R indicator flashes once when KD has sent data.
S/R indicator lights when KD is selected to receive data.

Note 2: If a tractor feed printer is part of station, check that the forms switch is in ON position.

Note 3: If you are not in "talk" communication with the test center during this test, be sure to "call back" test center for verification of correct operation. After verification of correct operation using this test procedure (including test center approval), depress LOCAL (or RESET) then CLEAR key on the KD to normalize station. Verify correct operation in customer system before leaving site.

C. Checkout of Received Printer Message

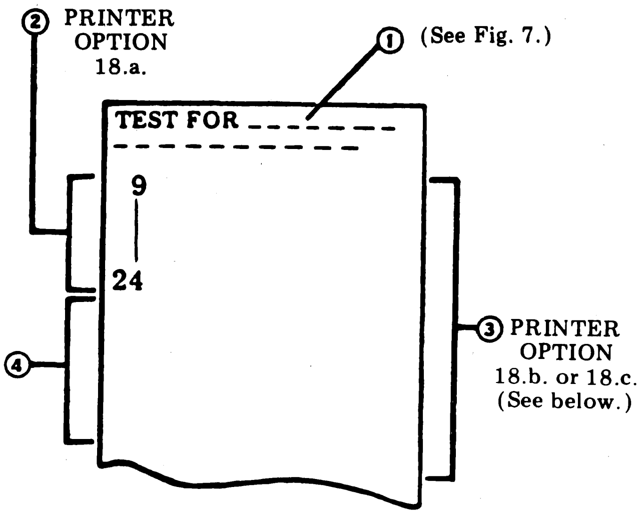


Fig. 6—Printed Test Message

2.15 If a printer is part of the station, check for correctness of printed test message, see (1) above. If printer is not part of station, proceed to 2.19.

2.16 The printer motor will remain on for approximately 20 seconds after the test message is received.

Note: Paragraphs 2.17 and 2.18 check the options that are located on the printer circuit card.

2.17 Option 18a (No Feedout) — The blank lines (2) are determined only by message length and column format sent to the printer. This test uses an 80-column format, therefore, lines 9 through 24 feedout (total of 1920 character).

2.18 Options 18b or 18c (16-line feedout on RM loss or 16-line feedout on RM loss or ETX). This option illustrated as (3), operates the same as for Option 18a with the exception that after the blank lines 9 through 24 a 16-line feedout (friction feed printer only) will occur. If Option 39a is installed, tractor feed printer will form feedout to the length of (4), if the printer forms switch is ON. Refer to the Form Selector Pointer Setting and the Belt and Form Length table on the printer to determine proper forms operation.

D. Checkout of Received KD Message

2.19 Check for correctness of display and station options (for references to lines, see Fig. 7; the relation of OPT numbers and options is given in Section 582-200-205):

Option 402a — Continuous Alarm (the keyboard bell repeatedly sounds if volume is turned up) until LOCAL (or RESET) key is depressed.

or

Option 402b — Single Alarm (the keyboard bell sounds once if volume is turned up) and LOCAL indicator lights.

Line 1 is copied as shown (Fig. 7). Line 2, the word PROTECTED begins in the fifth character position and is followed by the word INTENSIFIED which is brighter than normal for Option 403a or 403c; or blinks for Option 403b. Lines 3 through 8 are as shown in Fig. 7; the cursor must be positioned over "C" on line 8.

Option 406a (or 407a or 407b) — Alpha characters can be typed over periods in the numeric field — Line 5. (bell sounds for 406 only). (407 only; Hold down ALPHA key to enter Alpha characters, automatic up shift to numeric occurs on line 5 for 407 only).

or

(406b on next page)

```
TEST FOR A SYNCHRONOUS DATASPEED 40≡  ←Line 1
PROTECTED INTENSIFIED≡                                              ←Line 2
NONPROTECTED NONDISPLAYED FIELD >                      <≡           ←Line 3
PROTECTED NONDISPLAYED FIELD >                      <≡
NUMERIC FIELD> ... <≡ ←─────────────────────────────────────────────Line 5
80   CHARACTER ROW OF X'S≡
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
>C<    (May have "END OF TEST" on line 24.)                         ←Line 8
```

Fig. 7—SYNC 40 Test Message

Note: Format and content of test message are dependant upon test facilities.

Option 406b — Bell sounds when alpha character is typed over numeric field; only numeric characters can be entered into field — line 5.

Option 407a — Upper portion characters of any depressed keys are typed over periods in the numeric field — line 5.

or

Option 407b — Upper portion character of numeric cluster keys only (ie, 0-9, DUP, 1, and minus) are typed over periods in the numeric field — line 5.

3. TROUBLESHOOTING

3.01 The troubleshooting procedures for the controller are included in Chart 7, STATION ANALYSIS.

3.02 A brief troubleshooting reminder on the monitor is provided in Chart 8. For detailed analysis, refer to Section 582-213-500.

3.03 Limited troubleshooting for the opcon is provided in Chart 9. For detailed analysis refer to Section 582-211-500.

3.04 Trouble analysis for the printer is not given in this section. Refer to Section 582-210-500.

3.05 The use of a controller arrangement form (Section 582-200-205) is necessary to troubleshoot using the controller self-test.

3.06 If the troubleshooting procedures of Part 3 indicate that some controller circuit card is at fault, first check that the power supply connections to the back panel are tight. If the connections are tight, then perform the following before replacing the circuit card:

- Turn off power.
- Remove card and check for bent connector pins. (See warning following 2.02.)
- If circuit card contains sockets, make sure all I.C. packs are firmly seated.
- Reinstall circuit card and make sure card is firmly seated in connector.
- Turn on power.
- Perform the self-test again.

CHART 7

STATION ANALYSIS

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. Are fans moving air? Are all power supply voltage indicators lit?	Go to 2.	Fans not moving air : check ac wiring and fans. Power supply indicator not lit: Go to Chart 10, 40PSU101 Power Supply Analysis.
2. Depress and hold SELF-TEST switch. Do all three pattern lamps (LEDs) on 41035N (or 410251) light? *Note:* 3.06 applies to this chart.	Go to 3.	40PSU101, see Chart 10. If power supply voltages are correct with all controller cards installed, replace 41035N or 410251 circuit card (as applies). If problem remains, replace controller cards one at a time and repeat Step 2 until defecfective card is found. If all replacement cards together do not allow LEDs to light, disconnect opcon, monitor, data set (or data auxiliary set), and printer cables from controller back panel, then repeat Step 2. If disconnecting a cable corrects problem, cable or device at other end is at fault. If LEDs still do not light, replace the controller back panel. See Note 2 in Step 3.

CHART 7 (Contd)

STATION ANALYSIS

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
3. Release SELF-TEST switch. Does controller pass self-test? (See Note below.) This includes display patterns of Fig. 3 (see Note in "Yes" column). *Note 1:* Trouble patterns of controller arrangement forms are given in Section 582-200-205. When the card indicated by the trouble pattern in Section 582-200-205 is replaced, but the trouble remains, then the patterns given in the "NO" RESPONSIVE DIRECTIVE column of this question apply. *Note 2:* Whenever it becomes necessary to replace an existing back panel or circuit card with a back panel or circuit card that has a different part number, it may be necessary to also consult Section 582-200-205, Controller Arrangements for other affected circuit card positions.	Go to 4. *Note:* If display pattern appears with errors or is distorted, replace 410286 circuit card and repeat Steps 2 and 3. If 410286 circuit card does not correct a display pattern, replace 410287 circuit card and repeat Steps 2 and 3. If display pattern does not appear, go to Chart 8, MONITOR ANALYSIS. Legend for trouble patterns: ● LED 1 ● LED 2 ● LED 3 Front of 410251 or 41035N circuit card.	Replace circuit card indicated by trouble pattern of applicable controller arrangement form. If more than one trouble pattern appears, replace card indicated by last trouble pattern first. Repeat Steps 2 and 3. If indicated card does not pass, repeat Steps 2 and 3, then follow applicable procedure below (also see Note 2): a. Replace 41035N or 41026N circuit card, repeat Steps 2 and 3. b. Remove all circuit cards, except 41035N or 410251 and 41026N, repeat Steps 2 and 3. If only middle LED is lit, then replace 41035N or 410251 and 41026N circuit card, otherwise replace controller back panel. a. Replace 41035N or 410251 circuit card, repeat Steps 2 and 3. b. Follow b. entry of ● ● ●. a. Replace 41035N or 410251 circuit card, repeat Steps 2 and 3. b. Replace controller back panel. a. Replace 410287 circuit card, repeat Steps 2 and 3. b. Replace controller back panel.

CHART 7 (Contd)

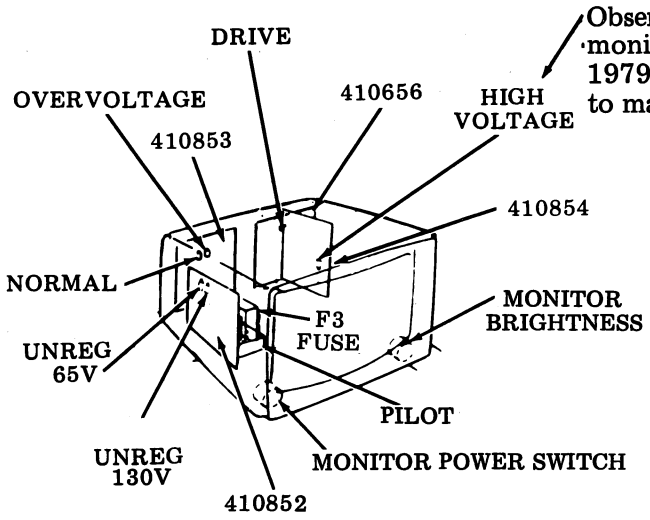
STATION ANALYSIS

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
4. Does the local test work? (CTRL and S keys or L/TST and ALPHA).	Go to 6.	Go to 5.
5. Depress the LOCAL (or RESET) key on the opcon. Is the LOCAL indicator lit?	Check the cable(s) between the controller and opcon. Refer to Section 582-200-505. *Note:* If a KD extension cable is used, the 406094 modification kit is required even for local operation.	Go to Chart 9, Opcon Analysis.
6. In the local mode, do all keys on the opcon function properly? Refer to C. KD Local Tests, (2.05).	Go to 7.	Replace opcon. Replace 41029N circuit card.
7. Input data on opcon so that it appears on monitor. Depress PRINT LOCAL key. Does the print local printer print data properly? *Note:* In operation, it is normal for print local to be inhibited when a protected alpha numeric attribute is in the home position of the KD, unless Option 414b is installed.	Go to 8.	Perform steps of Chart 3. Check SSI cable(s) between the controller and printer. Replace printer. Replace 41029N circuit card. Check printer cabinet wiring, refer to Section 582-212-400.
8. Does the station pass the on-line checkout?	Place in service.	Go to 9. (Also consider the tests of 2.12, 2.13, and 2.14.)
9. Does RD LED on 41029N circuit card flash during polling or selecting?	Go to 10.	Check data set (or 251A1) options. Check data set cable (EIA pin 3¶) or data auxiliary set cable. Replace data set (or 251A1).
10. Does RS LED (on 201 or 208 data set) or SD LED (on 212 data set) light after polling or selecting?	Go to 11.	Check data set cable (EIA pin 4¶) or data auxiliary set cable. Replace 41029N circuit card.
11. Does CS LED (on 201 or 208 data set) on data set light after polling or selecting?	Go to 12.	Check data set (or 251A1) options. Replace data set (or 251A1).
12. Does SD LED on 41029N circuit card flash after polling or selecting.	a. Check data set or 251A1. b. Check data set cable (EIA pin 2¶) or data auxiliary set cable. c. Replace 41029N circuit card.	Check data set cable (EIA pin 5¶) or data auxiliary set cable. Replace 41029N circuit card.

¶ EIA pin number applies to the data set end.

CHART 8

40MN101 MONITOR ANALYSIS

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
		
1. Is DRIVE indicator lit?	Go to 2.	Check cable(s) between controller and monitor. *Note:* If 406094 modification kit is present, check fuses on 406090 junction box. 410286 circuit card in controller. 410656 circuit card in monitor.
2. With PS1 and PS2 power switches on (see Fig. 1) is PILOT lit?	Go to 3.	Check F3 fuse and ac cable to monitor. Early Design: 1.4 SL-BL plug-in type-341578. Late Design: 1.5 SL-BL glass type-341686.
3. Are UNREG 65V and UNREG 130V indicators lit?	Go to 4.	Replace 410852
4. Is NORMAL indicator lit?	Go to 5.	Replace 410853 circuit card.
5. Is OVERVOLTAGE indicator lit?	Replace 410853.	Go to 6.
6. Is HIGH VOLTAGE indicator lit?	See Note below.	Replace 410854 circuit card. Replace 410656 circuit card.

Note: If CRT filament is not lighted or if problem still exists in the monitor, go to Section 582-213-500.

CHART 9

OPCON ANALYSIS

Note: Start with Question 1, if typewriter style opcon is present. Start with Question 4 if internal numeric cluster style opcon is present.

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
TYPEWRITER STYLE OPCON ANALYSIS		
1. Depress ERASE INPUT and QUOTES keys together (see above Note). Does TST indicator remain lit when keys are released?	Go to 2.	Check for +12 V, -12 V and ground to opcon. If keyboard disable lock feature is present, check that the opcon is enabled. Refer to Section 582-200-405 to check cable(s) between opcon and controller back panel. *Note 1:* If 406094 modification kit is present, check fuses in 406090 junction box. Replace opcon. *Note 2:* If lamps flash, clear by depressing ERASE INPUT and P keys, then repeat Question 1.
2. Do the following: (See Note 1 at right.) (See Note 2 at right.) Depress Keys: SHIFT + A → Indicator: S/R, ON Depress Keys: CTRL + R/TST → Indicator: S/R, OFF Depress Keys: SHIFT + C → Indicator: LOCAL, OFF Depress Keys: CTRL + C → Indicator: LOCAL, ON Depress Keys: SHIFT + F → Indicator: PRINT, ON Depress Keys: CTRL + \ → Indicator: LOCAL, OFF Depress Keys: → → Indicator: LOCAL, FLASH Depress Keys: CTRL + C → Indicator: LOCAL, OFF		*Note 1:* Ignore any characters that may be displayed during this test. *Note 2:* If opcon has CAPS LOCK key, when depressing A, C or F, CAPS LOCK key must be in latched position (ON) or SHIFT must be depressed. If opcon has no CAPS LOCK key, do not depress SHIFT.
a. Is the opcon a late design 40K104 or a 40K203?	Interface/bell card not present on 40K104, or 40K203 present. Go to 2b.	Interface/bell card present on 40K104. Go to 2c.

Note: Late design 40K104 opcons are sometimes called OPCON II and have a single card of new design. To check the vintage of an opcon, it is sufficient to remove opcon from cabinet (or base) and look through the slot at the rear for the interface/bell card.

CHART 9 (Contd)

OPCON ANALYSIS

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
2. (Contd)		
b. On late design 40K104 opcon (interface/bell card not present) or 40K203 opcon, fully depress ERASE INPUT. Does the alarm sound repeatedly as long as the key is depressed? *Note:* The alarm loudness control may require adjustment to hear the tone.	Go to 3.	Replace opcon.
c. Do all indicators operate as described?	Depress ERASE INPUT and P keys together to terminate test. TST indicator light goes out.	Replace opcon.
3. Does the opcon fail to generate proper characters?	Replace opcon.	Opcon OK.
INTERNAL NUMERIC CLUSTER STYLE OPCON ANALYSIS		
4. Depress CONSOL TEST and LINE INSERT keys (fully depress LINE INSERT) together. Does CONSOL TEST indicator remain lit when keys are released?	Opcon is in loopback mode. Go to 5.	Check for +12V, -12V and ground to opcon. If keyboard disable lock feature is present, check that the opcon is enabled. Refer to Section 582-200-405 to check cable(s) between opcon and controller back panel. *Note 1:* If 406094 modification kit is present, check fuses in 406090 junction box. Replace opcon. *Note 2:* If lamps flash or the alarm sounds more than once or continuously, clear by depressing CONSOL TEST and RESET keys, then repeat Question 4 (use RESET adjacent to PF1).

5. Do the following in the order given:

Depress key(s)	Indicator		Notes
	Key	Condition	
A	S/R	On	
C	LOCAL	On	If entered loopback mode from LOCAL, LOCAL is already on. (Question 5 continued on Page 41.)

CHART 9 (Contd)

OPCON ANALYSIS

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
5. (Contd)		

Depress key(s)	Indicator		Notes
	Key	Condition	
M	INPUT INHIBIT	On	
F	PRINT LOCAL	On	
I	NUM LOCK	On	
R/TST	S/R	Flashing On & Off	Depress only R/TST.
(Cursor right) →	LOCAL	Flashing On & Off	
LINE DLETE	INPUT INHIBIT	Flashing On & Off	
L/TST	PRINT LOCAL	Flashing On & Off	Depress only L/TST.
NUM LOCK	NUM LOCK	Flashing On & Off	
ALPHA & A	S/R	On (no flash)	
ALPHA & C	LOCAL	On (no flash)	
ALPHA & M	INPUT INHIBIT	On (no flash)	
ALPHA & F	PRINT LOCAL	On (no flash)	
ALPHA & I	NUM LOCK	On (no flash)	
NUM & R/TST	S/R	Off	LOCAL cannot be turned off while in loopback mode.
ERASE INPUT	INPUT INHIBIT	Off	PRINT LOCAL cannot be turned off while in loopback mode.
TAB	NUM LOCK	Off	Depress TAB not CURSR TAB. (Question 5, continued on Page 48)

CHART 9 (Contd)

OPCON ANALYSIS

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
5. (Contd)		

	Indicator		
Depress key(s)	Key	Condition	Notes
R/TST	S/R	Flashing On & Off	Depress only R/TST.
ALPHA & R/TST	S/R	Off	
CONSOL TEST	(See note to the right)		Opcon attention bell sounds repeatedly as long as key is depressed.

Do all indicators and bell operate as described in Question 9?	Depress CONSOL TEST and RESET (adjacent to PF1) keys together to terminate test. CONSOL TEST indicator goes out. Go to 6.	Replace opcon.
6. Does the following occur? a. CONSOL TEST indicator goes out, b. PRINT LOCAL indicator goes out, c. LOCAL indicator stays on.	All three conditions are met. Go to 7.	Replace opcon.
7. Does the opcon fail to generate proper characters?	Replace opcon.	Opcon is OK.

CHART 10

40PSU101 POWER SUPPLY ANALYSIS

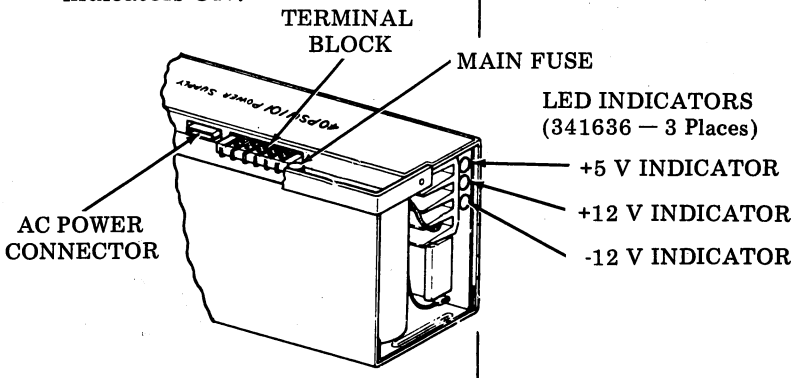
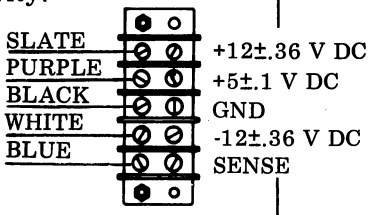
ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. With the set plugged in and power ON, are all LED indicators ON? 	All LEDs are on. Go to 2.	At least one LED is off. Go to 3.
2. Are all voltages correct at the output terminal block? Check voltage using a voltmeter having 20,000 ohms volt sensitivity. 	The power supply is OK.	Turn off all power. Remove all connections from back panel. Retighten all power supply connector screws (back panel is not connected to power supply now). Turn on power. Go to 6. *Warning: Wire colors of controller cable connecting to block are different from the wire colors of cable used in 40/1, 40/2, and 40/3 type.*
3. Are the ventilation fans in the electronics module moving air?	Go to 4.	Check ac power input power switch(es), cabinet ac wiring and ac connectors.
4. Turn off power. Is main fuse on the power supply blown?	Replace fuse, turn on power and go to 5. (129920 fuse, 5 amp SL-BL)	Replace power supply. If not on customer premises, go to Note following chart.
5. Turn off power. Did main fuse blow again?	Disconnect cable from back panel. Replace fuse, turn on power, and check output voltages. (Continued on next page.)	Replace power supply. If not on customer premises, go to Note following chart.

CHART 10-(Contd)

40PSU101 POWER SUPPLY ANALYSIS

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
5. (Contd)	If no output voltages are present and fuse blows again, replace power supply. If not on customer premises, go to Note following chart. If output voltages are present (power supply OK), go to 6.	
6. Are all voltages correct at the output terminal block? *Note:* See Question 2 for values.	Turn off power. Reconnect all leads from back panel. Remove all circuit cards from back panel. Turn power on. Go to 7.	Replace power supply. If not on customer premises, go to Note following chart.
7. Are all voltages at output terminal block now correct?	Turn off power. Reinstall one circuit card that was removed in 6. Turn on power. Repeat 7 until voltage not correct. Card causing problem is at fault.	Replace back panel. Replace power supply. If not on customer premises, go to Note following chart.

Note: When the power supply is shown to be at fault, refer to Sections 582-200-405, 582-214-400 or 582-214-500 as required.