COMMUNICATIONS DISPLAY TERMINAL (CDT)

CDIF814 STATION CONTROLLER INTERFACE MODULE

TROUBLESHOOTING

CONTENTS PAGE

1. GENERAL

1.01 This section contains procedures for troubleshooting the CDIF814 Station Controller Interface Module.

1.02 Troubleshooting information in this section is intended to provide a method to isolate an operating trouble to individual circuit cards. Known good circuit card assemblies can then be used to replace a defective one or one thought to be defective. This method may not resolve or contain all possible trouble situations that could occur, but it should serve as a guide to locate a trouble and thereby give significance to what corrective action must be taken.

1.03 Do not start probing or conducting random circuit card substitutions until the trouble is isolated and its solution is realized. A nonsystematic approach to a trouble may very well result in further complications.

1.04 If any of the circuit card assemblies or parts assemblies are found defective, they should be returned to the nearest WECO Service Center or Teletype Corporation Product Service Center for repair or replacement.

1.05 It is intended that the 2597 logic flow diagram supplied in the station controller wiring diagram package, WDP0325, be used in conjunction with this section when troubleshooting.

2. TEST EQUIPMENT

2.01 The test equipment required for troubleshooting the station controller module is as follows:

(a) Dual Trace Oscilloscope (such as Tektronix 422-type or equivalent).

(b) A calibrated volt-ohmmeter, or equivalent.

Optional Test Equipment

2.02 A TP344360 modification kit is available to provide a troubleshooting aid for all CDIF814/CD and earlier factory production module arrangements. In the modification kit is a TP322586 circuit card, the required amount of wire to connect XZ101 module receptacle, and a 50,774 Specification containing instructions. Light emitting diodes (LEDs) on MC586 provide visual indication of ten major module signal states to assist trouble analysis. Later factory production of the CDIF814/CB, CC, CD, or CE arrangements are prewired at XZ101 receptacle and need only have the TP322586 circuit card plugged into the receptacle for trouble analysis, if required. Analysis for on-off states of MC586 indicator diodes is provided in Part 5 of this section.

2.03 Reminder: Circuit cards have integrated circuit (IC) packages and other components that are low voltage and low power devices. They can be permanently damaged if subjected to voltages in excess of their rating. NEVER ATTEMPT TO REMOVE A CIRCUIT CARD WHEN POWER IS ON. After power is off, wait approximately 20 or 25 seconds, then only if

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necessary remove the circuit card. This insures that the power supplies in the equipment have drained sufficiently. Oily skin and other body chemicals present on your fingers may also cause circuit card terminals to become resistive after short periods of time — DO NOT TOUCH CARD CONTACT AREAS.

2.04 It is suggested that the recommended volt-ohmmeter be properly set for checking the power supply voltage by the user before attempting to make the measurement. The ohm scale may be used for point-to-point checks of surface wiring, cabling, and interconnecting cords after the circuit cards are removed from the circuit. NEVER USE THE VOMMETER TO CHECK VOLTAGE OUTPUT OR CONTINUITY OF THE MICROLOGIC ELEMENTS ON A CIRCUIT CARD. Only an oscilloscope should be used for micrologic signal or voltage checks.

3. BASIC TROUBLESHOOTING PROCEDURE

3.01 The following checks should be made prior to troubleshooting:

(a) All circuit cards should be firmly seated and in their appropriate connector.

(b) All cabling and interconnecting cords should be properly connected. If cable connections are made to an external device, make certain that the interface cords meet the signal interface requirements.

(c) Check that optional features are in accordance with the system programming requirements (data transfer rates, codes, formats, SID programming, etc).

(d) Check that no terminal pins are bent over and touching or are damaged.

4. TROUBLE ANALYSIS

4.01 The following procedures are intended to troubleshoot the station controller module while it is interconnected to peripheral station equipment. Before using these procedures, it should be determined that a trouble is isolated to the station controller and is not caused from other interconnected equipment. If the MC586 indicator board is provided (2.02) in module position XZB101, refer to the analysis provided in Part 5 before using Tables A, B, or C. If the indicator board is not provided, use the analysis provided in Table A, B, or C and ignore Part 5.

4.02 Analysis of the station controller transmit and receive circuitry is provided in Table A and B respectively. If an auxiliary receive-only hard copy device is used, analysis is found in Table C.

4.03 In the trouble analysis tables, references are made to certain signals and designations as shown on the station controller wiring diagrams.

4.04 Wherever a small m precedes an abbreviation of the word seconds, it means that the time is in milliseconds, thousandths of a second, or 10^{-3} power. If a small μ symbol precedes the word or abbreviation of the word second, the time is given in microseconds, millionths of a second, or 10^{-6} power.

WARNING: ALL POWER TO THE MODULE MUST BE OFF WHENEVER A CIRCUIT CARD IS REMOVED OR REPLACED.

POWER FAILURE

4.05 All direct current voltage to operate the module is furnished from the CDPS802 low voltage power supply. The voltages used are +5 volts dc, +12 volts dc, -12 volts dc, and voltage return (circuit common).

4.06 If the power supply is suspected of causing a trouble, check for the following: power cable is plugged into module securely at connector JB301, ON-OFF power supply control is in ON position, and that any fuses in the power supply are not blown.

4.07 With power supply and equipment turned ON (set interlocks in bypass, etc) use an oscilloscope or a volt-ohmmeter and check for the following dc voltage levels to the station controller JB301 connector.

CONNECTOR JB301	TERMINAL
Frame Ground	C6
Voltage Return (common)	A5, B5, and C5
+5 volts ±10%	A1 and B1
+12 volts ±10%	A3
-20 volts ±10%	B9

4.08 If an oscilloscope is used to monitor logic signals in the troubleshooting tables, all circuit card receptacles in the module have signal ground (voltage common) on pin 36 and +5 volts dc (+Vcc) on pin 35.

TABLE A

Transmit

STEP	ACTION	NORMAL INDICATION AND PROCEDURE	CORRECTIVE PROCEDURE
1		DSR signal should be on and place a high (+12 volts) at ZB316/3. 2579SD-B2	Check the data set, cable, and cable connection at JB401.
2	Enter a message on send/ receive device screen and terminate with ETX character. Press TRANS button. TRANS button lights.	For the station controller to transmit a message from the S/R device upon detection of a poll sequence (SID DC1), the following sequence of events must take place.	
		DTR signal should be on and place a high (+12 volts) at ZB316/25. 2579SD-B2	Check for +12 volts at ZB316/30 and -12 volts at ZB316/20. If present, replace the MC579 circuit card in location ZB316. If not present, check the MC958 circuit card in location ZB317, and the low voltage power supply.
		SS signal should be on and place a low (0 volts) at ZB109/9. 2597SD-B4	Trace the SS signal back to the MC591 circuit card (ZB105) 2597SD-B5 and the MC969 circuit card (ZB315) 2597SD-B1. Check cable connection at JB101. Refer to troubleshooting procedures for the S/R device display controller module send interface (PTI driver).
		POLL signal should pulse (approximately 3 msec) on (low, 0 volts) at ZB109/10. If pulse is present, proceed to step 4. 2597SD-B4	If pulse is not present, proceed to step 3.
3	Check that the station controller always monitors the received data (RD) lead from the data set.	Check RD input at ZB316/5 for a serial EIA signal from data set. 2597SD-B1	Check the data set, cable, and cable connection at JB401. If trouble is not corrected, refer to data set troubleshooting.

TABLE A

Transmit (continued)

STEP	ACTION	NORMAL INDICATION AND PROCEDURE	CORRECTIVE PROCEDURE
3 (contd)	Check that the receiving distributor (MC985) establishes bit synchronism and presents parallel data to the decoder (MC967).	Check for RD signal at ZB316/1. 2597SD-B1	Replace the MC579 circuit card in location ZB316.
		Check for mark-to-space (+5 volts to 0 volts) transitions at ZB114/1 to 8 and ZB114/11 to 18. 2597SD-B3	Check for serial clock receive (SCR) signal at ZB114/9. If present, replace the MC985 circuit card in location ZB114. If not present, trace signal back to the MC579 circuit card (ZB316) and the data set.
	If a proper SID has been received, check that the programmed outputs from the decoder enable the poll detect on MC572.	IN SYNC signal should turn on when bit synchronism has been established and place a low (0 volts) at ZB111/10. 2575SD-B2	Replace the MC575 circuit card in location ZB111.
		Check for +5 volt to 0 volt transitions at the programmed outputs (◄-Ⓐ-►) of ZB113. Check that the proper row and column outputs turn on for the programmed SID. 2597SD-B3	Replace the MC967 circuit card in location ZB113.
		Check that the inputs have been connected properly at ZB112/7, 11, 12, and 13.	Replace the MC572 circuit card in location ZB112.
		POLL signal should pulse low (0 volts) at ZB112/27. 2597SD-B3	
4	Once the poll sequence is detected, check that the station controller enables the data set interface by turning on request to send (RTS).	SS OUT signal should be on and place a low (0 volts) at ZB109/7. 2597SD-B4	Replace the MC578 circuit card in location ZB109.

TABLE A

Transmit (continued)

STEP	ACTION	NORMAL INDICATION AND PROCEDURE	CORRECTIVE PROCEDURE
4 (contd)		RTS signal should be on and place a high (+12 volts) at ZB316/27. 2597SD-B1	Replace the MC579 circuit card in location ZB316.
	When the data set comes back with clear to send (CTS), the transmit distributor is enabled and the station controller sends out the heading.	CTS signal should be on and place a high (+12 volts) at ZB316/21. 2597SD-B1	Check data set, cable, and cable connection at JB401. If trouble is not corrected, refer to data set trouble-shooting.
		SM TO DEVICE signal should be on and place a low (0 volts) at ZB316/29. 2597SD-B1	Replace the MC579 circuit card in location ZB316.
		SM TO TD signal should be on and place a low (0 volts) at ZB316/24. 2597SD-B1	Replace the MC579 circuit card in location ZB316.
		NC signal should pulse (approximately 0.8 msec) low (0 volts) at ZB312/30. 2597SD-B1	Check for serial clock transmit (SCT) signal at ZB312/27. If present, replace the MC984 circuit card in location ZB312. If not present, trace signal back to the MC579 circuit card (ZB316) and the data set.
		DIST LOAD signal should pulse (approximately 0.4 msec) low (0 volts) at ZB312/24. 2597SD-B1	
5	The first non-NULL, non-DEL character from the S/R device initiates the transmission of the heading. Once the heading has been sent, the station controller transmits the message from the send device.	REQ HEADING signal should turn on and place a low (0 volts) at ZB307/18. This signal turns off after the heading has been sent. 2597SD-B2	Replace the MC582 circuit card in location ZB307.

TABLE A

Transmit (continued)

STEP	ACTION	NORMAL INDICATION AND PROCEDURE	CORRECTIVE PROCEDURE
5 (contd)		REQ SEQ signal should turn on and place a low (0 volts) at ZB309/18. This signal turns off after the heading has been sent. 2597SD-B2	Replace the MC580 circuit card in location ZB309.
		SEND SEQ signal should turn on and place a low (0 volts) at ZB310/31. This signal turns off after the heading has been sent. 2597SD-B2	Replace the MC583 circuit card in location ZB310.
		Check for sequence timing pulses at ZB310/13 to 20. 2597SD-B2	
		TD SOH-EOT signal should turn on and place a low (0 volts) at ZB310/33. 2597SD-B2	
6	Upon completion of the transmission and after sending the ETX, the station controller sends the message check character (MCC) and begins a timeout while waiting for a response from the computer control station.		
	Check that receipt of an ACK causes the station controller to pulse the transmit data acknowledge (TDA) lead to the S/R device interface. This causes the device to change from transmit to receive.	ACK RECEIVED: ACK PRIME signal pulses low (0 volts) at ZB112/24. 2597SD-B3	Check at ZB112/8 and ZB112/22 for negative pulses from MC967 (ZB113) indicating detection of an ACK by the decoder circuit card. If no pulses are present, replace the MC967 circuit card in location ZB113. If pulses are present, replace the MC572 circuit card in location ZB112.

TABLE A

Transmit (continued)

STEP	ACTION	NORMAL INDICATION AND PROCEDURE	CORRECTIVE PROCEDURE
6 (contd)	Receipt of a NAK, however, causes the station controller to pulse a transmit data error (TDE) lead to the S/R device interface, which conditions the device and station controller for a retransmission.	TDA signal pulses on, low (0 volts) at ZB308/27. 2597SD-B2	Replace the MC576 circuit card in location ZB308.
		TDA signal pulses on, high (+4 volts) at ZB108/6. 2597SD-B4	If no signal is present at ZB108/6, replace the MC571 circuit card in location ZB108. If the signal is present at ZB108/6 but the S/R device does not change from transmit to receive, or to local (optional), check cabling and refer to troubleshooting procedures for the S/R device display controller module.
		NAK RECEIVED: NAK PRIME signal pulses low (0 volts) at ZB112/33. 2597SD-B3	Check at ZB112/9 and ZB112/21 for negative pulses from MC967 (ZB113) indicating detection of a NAK by the decoder circuit card. If no pulses are present, replace the MC967 circuit card in location ZB113.
			If pulses are present, replace the MC572 circuit card in location ZB112.
		TDE signal pulses on, low (0 volts) at ZB308/31. 2597SD-B2	Replace the MC576 circuit card in location ZB308.
		TDE signal pulses on, high (+4 volts) at ZB108/7. 2597SD-B4	If no signal is present at ZB108/7, replace the MC571 circuit card in location ZB108. If signal is present, check cable and refer to troubleshooting procedures for the send/receive device display controller module.

TABLE A

Transmit (continued)

STEP	ACTION	NORMAL INDICATION AND PROCEDURE	CORRECTIVE PROCEDURE
7	After two attempts to re-transmit the message, receipt of a NAK will cause the station controller to pulse transmit abort (TA) lead to the send device interface, which forces the device into the LOCAL. (The LOCAL lamp will flash on-off at a rate of one hertz.)	TA signal pulses on, low (0 volts) at ZB308/24. 2597SD-B2	Replace the MC576 circuit card in location ZB308.
		TA signal pulses on, high (+4 volts) at ZB108/8. 2597SD-B4	If no signal is present at ZB108/8, replace the MC571 circuit card in location ZB108. If signal is present but device does not change mode, check cable connection at JB201 and refer to troubleshooting procedure for the send/receive device display controller module.
	If no response is received from the computer control station, the station controller completes the timeout and sends a sequence consisting of: SYN SYN SYN SYN ENQ.	NO RESPONSE: TIMEOUT START turns on and places a low (0 volts) at ZB308/3. 2597SD-B2	Replace the MC576 circuit card in location ZB308.
		TIMEOUT PULSE turns on (for approximately 360 μ sec) and places a low (0 volts) at ZB108/15. 2597SD-B4	Replace the MC571 circuit card in location ZB108.
		REQ ENQ turns on (for approximately 360 μ sec) and places a low (0 volts) at ZB308/5. 2597SD-B2	Replace the MC576 circuit card in location ZB308.
	After the third timeout, two ENQ's having been sent to the computer control station, the station controller will pulse the transmit abort (TA) lead to the send device interface which forces the device into LOCAL with flashing Local Lamp indication.	Refer to Step 7 for normal indication and corrective procedure.	

TABLE B

Receive

STEP	ACTION	NORMAL INDICATION AND PROCEDURE	CORRECTIVE PROCEDURE
1	The station controller, upon detection of a select sequence (SID DC2 ENQ), will prepare to receive a message from the computer control station.	DSR signal should be on and place a high (+12 volts) at ZB316/3. 2597SD-B1	Check the data set, cable, and cable connection at JB401.
		DTR signal should be on and place a high (+12 volts) at ZB316/25. 2597SD-B1	Check for +12 volts at ZB316/30 and -12 volts at ZB316/20. If present, replace the MC579 circuit card in location ZB316. If not present, check the MC958 circuit card in location ZB317 and the low voltage power supply.
		SLOW select signal should pulse on low (0 volts) at ZB112/28. If pulse is present, proceed to Step 3. 2597SD-B3	If pulse is not present, proceed to Step 2.
2	The receiving distributor (MC985) establishes bit synchronism and presents the parallel data to the decoder (MC967).	Check RD input at ZB316/5 for serial EIA signal from data set. 2597SD-B1	Check the data set, cable, and cable connection at JB401.
		Check for RD signal at ZB316/1. 2597SD-B1	Replace the MC579 circuit card in location ZB316.
		Check for mark-to-space (+5 volts to 0 volt) transitions at ZB114/1 to 8 and ZB114/11 to 18. 2597SD-B3	Check for serial clock receive (SCR) signal at ZB114/9. If present, replace the MC985 circuit card in location ZB114. If not present, trace signal back through the MC579 (ZB316) to the data set.
		IN SYNC signal should turn on once bit synchronism has been established and place a low (0 volts) at ZB111/10. 2597SD-B3	Replace the MC575 circuit card in location ZB111.

TABLE B

Receive (continued)

STEP	ACTION	NORMAL INDICATION AND PROCEDURE	CORRECTIVE PROCEDURE
2 (contd)	If a proper select sequence has been received, check that the programmed outputs from the decoder enable the select detect on MC572.	Check for +5 volt to 0 volt transition at the programmed outputs of ZB113. Check that the proper row and column outputs turn on for the programmed SID. 2597SD-B3	Replace the MC967 circuit card in location ZB113.
		Check that the inputs have been connected properly at ZB112/7, 11, 12, and 13. SLOW select signal should pulse low (0 volts) at ZB111/28. 2597SD-B3	Replace the MC572 circuit card in location ZB112.
3	Once a select sequence is detected the station controller will respond with SYN SYN SYN SYN SID ACK (or NAK). If the S/R device is in receive, the response will be ACK. A NAK is sent if the device is not in receive.	STATION SELECT signal should be on and place a low (0 volts) at ZB111/20. 2597SD-B3	Replace the MC575 circuit card in location ZB111.
		ACK: RS signal should be on (if device is in receive) and place a low (0 volts) at ZB109/34. 2597SD-B4	Trace RS signal back to the MC976 circuit card (ZB117). Check cable and cable connection at JB103.
		GEN ACK A/B signal should pulse on low (0 volts) at ZB109/18. 2597SD-B4	Replace the MC578 circuit card in location ZB109.
		REQ ACK signal should pulse on low (0 volts) at ZB110/3. 2597SD-B4	Replace the MC574 circuit card in location ZB110.

TABLE B

Receive (continued)

STEP	ACTION	NORMAL INDICATION AND PROCEDURE	CORRECTIVE PROCEDURE
3 (contd)		REQ SEQ signal should turn on and place a low (0 volts) at ZB309/18. This signal turns off after the answer-back sequence has been sent. 2597SD-B2	Replace the MC580 circuit card in location ZB309.
		SEND SEQ signal should turn on and place a low (0 volts) at ZB310/31. This signal turns off after the answer-back sequence has been sent. 2597SD-B2	Replace the MC583 circuit card in location ZB310.
		Check for sequence timing pulses at ZB310/13 to 20. 2597SD-B2	
		NAK: If the device is not in the receive, the RS signal should be off (+5 volts) and the GEN NAK A/B signal should pulse on, low at ZB109/19. 2597SD-B4	Replace the MC578 circuit card in location ZB109.
		REQ NAK signal should pulse on, low (0 volts) at ZB110/4. 2597SD-B4	Replace the MC574 circuit card in location ZB110.
		Refer to ACK: response in the beginning of Step 3 for the events in the generation of the answer-back sequence beginning with the REQ SEQ signal.	

TABLE B

Receive (continued)

STEP	ACTION	NORMAL INDICATION AND PROCEDURE	CORRECTIVE PROCEDURE
4	Having detected a select sequence and turned on receive message (RM) to the S/R device the station controller looks for SOH or STX to enable the receive MCC accumulator and enable the character control to the device.	RS OUT signal should be on and place a low (0 volts) at ZB109/16. 2597SD-B4	Replace the MC578 circuit card in location ZB109.
		RM signal should be on and place a low (0 volts) at ZB316/2. 2597SD-B1	Replace the MC579 circuit card in location ZB316.
		SOH-ETX signal should be on and place a low (0 volts) at ZB112/29. 2597SD-B3	Replace the MC572 circuit card in location ZB112.
		SOH/STX-EOT signal should be on and place a low (0 volts) at ZB112/25. 2597SD-B3	Replace the MC575 circuit card in location ZB111.
		COPY ENABLE signal should be on and place a low (0 volts) at ZB111/28. This signal turns off momentarily if the character to be presented to the receive device is NULL or SYN. 2597SD-B3	
	Upon detection of ETX, SOH-ETX as well as COPY ENABLE turn off. The MCC is received after the ETX.		
	If the MCC is valid, no parity errors were received, and the receive device did not malfunction during receipt of the message, the station controller responds with SYN SYN SYN SYN SID ACK to the computer control station.	ACK: $\overline{\text{REQ}}$ ACK signal should pulse on, low (0 volts) at ZB110/3. 2597SD-B4	Replace the MC574 circuit card in location ZB110.

TABLE B

Receive (continued)

STEP	ACTION	NORMAL INDICATION AND PROCEDURE	CORRECTIVE PROCEDURE
4 (contd)		RDA signal should pulse on, low (0 volts) at ZB110/5. 2597SD-B4	
	The controller will also pulse the receive data acknowledge (RDA) lead to the device interface, which causes the device to change from receive to local.	RDA signal should pulse on, high (+4 volts) at ZB108/10. 2597SD-B4	If no signal is present at ZB108/10, replace the MC571 circuit card in location ZB108. If the signal is present at ZB108/10 but the device does not change modes, check cable connection at JB201 and refer to troubleshooting procedures for the device display controller module.
	If the MCC is invalid, a parity error was detected, or the device malfunctioned during receipt of the message, the station controller responds with SYN SYN SYN SYN SID NAK to the computer control station.	NAK: REQ NAK signal should pulse on, low (0 volts) at ZB110/4. 2597SD-B4	Replace the MC574 circuit card in location ZB110.
		RDE signal should pulse on low (0 volts) at ZB110/2. 2597SD-B4	
	The controller will also pulse the receive data error (RDE) lead to the device interface which causes the device to home the cursor and remain in receive.	RDE signal should pulse on, high (+4 volts) at ZB108/9. 2597SD-B4	If no signal is present at ZB108/9, replace the MC571 circuit card in location ZB108. If signal is present at ZB108/9 but the send/receive device does not home the cursor, or remains in receive, check cable connection at JB201 and refer to troubleshooting procedures for the S/R device display controller module.

TABLE C

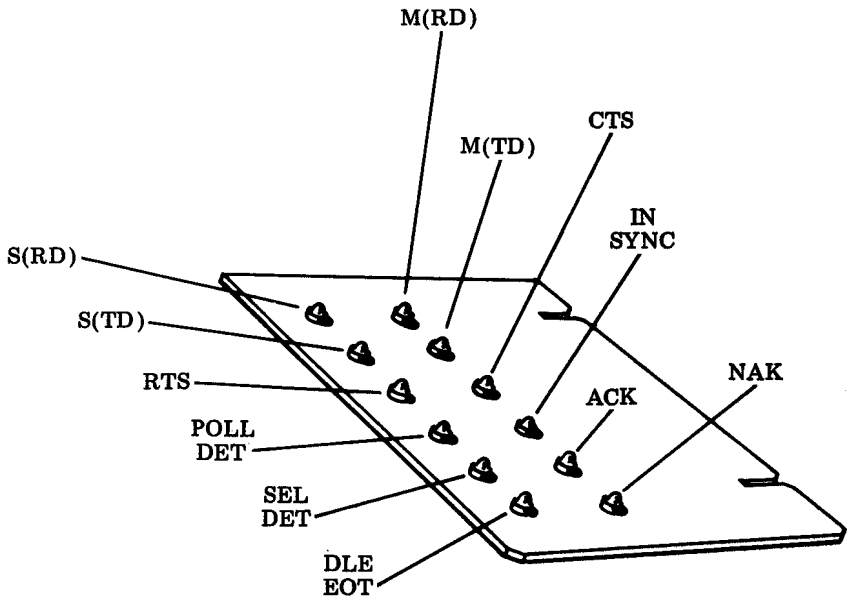
Hard Copy — Receive

STEP	ACTION	NORMAL INDICATION AND PROCEDURE	CORRECTIVE PROCEDURE
1	Upon depressing the HARD COPY button, the S/R device will go into transmit and the HARD COPY button will illuminate.	HARD COPY SWITCH signal, when button is depressed, will be on and place a high (+5 volts) at ZB106/17. 2597SD-B5	Check cable and connection at JB303.
		AUX SELECT signal should be off and place a high (+5 volts) at ZB106/18. 2597SD-B5	If the AUX SELECT signal is on (0 volts) and the hard copy device is not receiving data from the line, replace the MC588 circuit card in location ZB305.
		HARD COPY signal should be on and place a low (0 volts) at ZB106/14.	Replace the MC589 circuit card in location ZB106.
		AUX RS signal should be on and place a low (0 volts) at ZB106/22.	Trace RS signal back to the MC976 circuit card in location ZB306. Check cable connection at JB403. Check to see that the hard copy device is selectable, (ie, no alarms are on).
		TRANS SW signal should be on and place a high (+5 volts) at ZB106/2. If the signal is on but the device does not go into the transmit, refer to troubleshooting procedures for the device display controller module.	Replace the MC589 circuit card in location ZB106.
		SS signal should be on and place a low (0 volts) at ZB106/23.	Trace SS signal to the MC969 circuit card in location ZB315. Check cable connection at JB101.
		HARD COPY LAMP signal should be on and place a low (0 volts) at ZB106/1. If signal is on but hard copy switch does not illuminate, check bulb in switch. 2597SD-B5	Replace the MC589 circuit card in location ZB106.

TABLE C

Hard Copy — Receive (continued)

STEP	ACTION	NORMAL INDICATION AND PROCEDURE	CORRECTIVE PROCEDURE
1 (contd)		RM AUX signal should be on and place a low (0 volts) at ZB106/6. 2597SD-B5	Replace the MC591 circuit card in location ZB105.
		NC signal should be on and place a low (0 volts) at ZB105/13. 2597SD-B5	Trace NC signal from the MC976 circuit card in location ZB306. Check cable connection at JB403.
		CA signal should be on and place a low (0 volts) at ZB105/17. 2597SD-B5	Trace CA signal from the MC969 circuit card (ZB315) through the MC591 circuit card (ZB105) to the MC976 circuit card (ZB306).
2	At the end of the hard copy transmission, detection of the message ending delimiter (ETX), on circuit card MC591, will cause the station controller to force the S/R device into the local.	HARD COPY END signal should be on and place a low (0 volts) at ZB105/1. 2597SD-B5	Replace the MC591 circuit card in location ZB105.
		AUX RDA signal should pulse on and place a high (+4 volts) at ZB106/10. 2597SD-B5	Replace the MC589 circuit card in location ZB106.
		LOCAL SW signal should pulse on and place a high (+5 volts) at ZB106/3. 2597SD-B5	



Note: This list is designed to reference the light emitting diodes (LEDs) on the indicator card to the signals in the CDIF814 module that drives them and also the location of the signals in the WDP for the module.

LED DESIGNATION	SIGNAL NAME	SD	SHEET	AREA
RD (M & S)	RD	2579	2	E2
TD (M & S)	DTL TD	2579	2	E7
RTS	DTL RTS	2579	2	E6
CTS	DTL CTS	2579	2	E5
POLL DET	POLL DETECT	2578	2	C7
SEL DET	SELECT DETECT	2578	3	D7
IN SYNC	IN SYNC	2575	2	D7
ACK	REQ ACK	2574	3	C7
NAK	REQ NAK	2574	3	C7
DLE-EOT	REQ D-EOT	2578	2	C7

Figure 1 - TP322586 (MC586) Indicator Board and Cross Reference List

4.09 Check that a negative 12 volts ±10 percent is present at connector location ZB317, pin number 20. If not present, replace circuit card TP322958 in position ZB317.

5. INDICATOR BOARD ANALYSIS

5.01 If the module is equipped with the MC586 indicator board (2.02) shown in Figure 1, check for the proper signal conditions in the sequence described in 5.02, 5.03, or 5.04 as determined by the station condition, idle, send, or receive.

WARNING: TO PREVENT EQUIPMENT DAMAGE, ALL POWER TO THE MODULE MUST BE OFF WHENEVER A CIRCUIT CARD IS REMOVED OR REPLACED.

CAUTION: PRIOR TO PERFORMING ANY TESTS, NOTIFY COMPUTER CENTER OR SERVICE BUREAU AND ADVISE OF PROPOSED TESTING. DO NOT PERFORM TESTING UNTIL SERVICE BUREAU OR COMPUTER CENTER IS NOTIFIED. UPON COMPLETION OF TESTING, NOTIFY OF RETURN TO SERVICE.

5.02 Light emitting diode indicators (LEDs) on MC586 should react as described in (a) through (h) when the station controller send device is not conditioned to send but is being polled by the remote computer.

(a) The M (RD) and S (RD) indicators should blink whenever a polling sequence or data generated by the computer is received by the station controller.

Note: If indicators do not blink, remote computer is not sending (idle line), local data set is defective (SCR signal defective), or MC579 circuit card in the station controller could be defective.

(b) The IN SYNC indicator should blink on while M (RD) and S (RD) are blinking indicating that SYN characters have been received and the station controller receive distributor MC985 is in synchronism with data being received.

Note: If indicator does not blink on, SYN is not being received (idle line), SYN is received with parity errors, or MC985 or MC575 circuit card in station controller is defective.

(c) The POLL DET indicator should blink on when the module decodes its discrete polling sequence, SID1 and SID2 (example: station A device B).

Note: If indicator does not blink on, received station or device address code could have errors (incorrect parity), wrong station or device address received, MC967 decoder circuit in XZB113 defective, station and device back plane wire straps installed incorrectly or missing between XZB112 and 113, or MC572 circuit card in XZB112 is defective.

(d) The RTS indicator comes on when the station controller sends a response to the poll sender inquiry.

Note: If indicator does not come on, DSR signal from the data set to the station controller could be off or MC579 circuit card could be defective.

(e) The CTS indicator comes on in response to RTS in (d) indicating that the data set is ready to send.

Note: If indicator does not come on, CTS in data set is defective or MC579 is defective.

(f) The DLE-EOT indicator will blink on when the station controller logic detects polled (C) and the send device is not conditioned to send. This condition causes the module to get ready to send negative answer-back to the remote computer.

Note: If the DLE-EOT indicator does not blink on, the MC591 or MC589 circuit board in the station controller could be defective.

(g) The M (TD) and S (TD) indicators blink indicating DLE-EOT sequence is sent from station controller to local data set for transmission to the line.

Note: If indicators do not blink, transmit data problem in station controller logic MC579, MC984, MC577, MC580, or MC583 or SCT from data set not being received by station controller transmit distributor.

(h) During the period of time described in (d), (e), and (f), the M (RD) indicator should be in a mark hold state and the IN SYNC indicator will be off.

5.03 If the station controller terminal is being polled by the remote computer and is conditioned to send (TRANSMIT selected), check for the following indicator light responses:

(a) The M (RD) and S (RD) indicators should blink whenever a polling sequence or data generated by the computer is received by the station controller.

Note: For trouble analysis see 5.02 (a) Note.

(b) The IN SYNC indicator should blink on while M (RD) and S (RD) are blinking indicating that SYN characters have been received and the station controller receive distributor MC985 is in synchronism with data being received.

Note: For trouble analysis see 5.02 (b) Note.

(c) The POLL DET indicator should blink on when the module decodes its discrete polling sequence, SID1 and SID2 (example: station A device B).

Note 1: For trouble analysis see 5.02 (c) Note.

Note 2: If DLE-EOT indicator blinks at this point, request to send signal from send device could be defective (off), or MC969 or MC591 in station controller is defective.

(d) The RTS indicator comes on when the send device is conditioned to send (TRANSMIT selected on device causes request to send signal to station controller).

Note: If indicator does not come on, DSR signal from data set could be off, MC579 circuit card could be defective, or send device request to send (RTS) signal could be off. The RTS signal from send device to station controller must be held on until the entire message is sent.

(e) The CTS indicator comes on in response to RTS in (d) indicating that the data set is ready to send.

Note: If indicator does not come on, CTS in data set is defective or MC579 is defective.

(f) The M (TD) and S (TD) indicators blink on and off as the message is sent out of the send device to the station controller data set.

Note: For trouble analysis see 5.02 (g) Note.

(g) At the end of the sent message, the transmit data (TD) indicators in (f) stop blinking, and the receive data (RD) indicators in (a) and IN SYNC indicators in (b) will blink when the remote computer response to the message is received.

(h) NAK response: If a NAK response is received, the M (TD) and S (TD) indicators will start blinking as the send device retransmits the message. If after two retransmits, if a third NAK response is received, the send terminal will not retransmit, and RTS, CTS, and POLL DET indicators will go out (aborted transmission).

ACK response: If an ACK response is received, the M (TD) and S (TD) indicators will blink as the DLE-EOT terminating sequence is sent to the remote computer.

Note: Trouble causing NAK response could be local or remote, refer to BTL system analysis routines.

(i) The RTS, CTS, and POLL DET indicators will go off after the DLE-EOT terminating sequence is generated by the station controller.

5.04 Light emitting diodes (LEDs) on MC586 circuit board react as described in (a) through (g) when the station controller device is selected to receive. The sequence given here is for select receiver with responses (answerback). For operation using fast select (answerback at end of message only), ignore (e) and (f).

(a) The M (RD) and S (RD) indicators should blink whenever a polling sequence or data generated by the computer is received by the station controller.

Note: For trouble analysis refer to 5.02 (a) Note.

(b) The IN SYNC indicator should blink on while M (RD) and S (RD) are blinking indicating that SYN characters have been received and the station controller receive distributor MC985 is in synchronism with data being received.

Note: For trouble analysis refer to 5.02 (b) Note.

(c) The SEL DET indicator comes on when the station controller decodes its received discrete station and device address.

Note: If indicator does not come on, received station or device select address code is incorrect or contains errors (incorrect parity), MC967 circuit in XZB113 could be defective, station and device back plane wire straps installed incorrectly or missing between XZB112 and XZB113, or MC572 or MC578 circuit card is defective.

(d) Device in RECEIVE (selectable on): The receive terminal when in receive has its selectable signal on to the station controller. When SEL DET turns on with the device selectable on, the module prepares to send answer-back response and turns on RTS, CTS, and ACK indicators. The M (TD) and S (TD) indicators will blink as ACK is sent from the station controller to the data set for transmission on the line — go to (e).

Device not in RECEIVE (selectable off): If the receive device is not conditioned to receive when the SEL DET (c) indicator comes on, the module will generate a negative answer-back (NAK) response to the line. The RTS, CTS, and NAK indicators will blink as the answer-back is sent on line. The M (TD) and S (TD) indicators will blink as the NAK is sent.

(e) The IN SYNC indicator will go off when the answer-back in (d) is sent from the station controller to the data set. Also, the M (RD) indicator remains in the mark hold state.

(f) After the ACK response in (d) is sent, the M (RD) and S (RD), and IN SYNC indicator will blink and the station controller device will receive the message. If NAK response is sent the computer may or may not attempt to retransmit (usually two retransmits are attempted).

(g) At the end of the received message is the MCC character from the sender which is compared to the message check character counted in the station controller error control logic.

Message received without errors: If the received MCC character concurs with station controller MCC character, the RTS, CTS and ACK indicators will pulse on. The M (TD) and S (TD) indicators will blink as the station controller generates ACK response. When the computer responds to the ACK answer-back with a DLE-EOT disconnect, the SEL DET (c) indicator will go out.

Message received with errors: If the received MCC character does not concur with the station controller MCC character, the RTS, CTS, and NAK indicators will pulse on. The M (TD) and S (TD) indicators will blink as the station controller generates NAK answer-back to the remote computer. The computer will then attempt to retransmit or it will terminate by sending a DLE-EOT sequence which will turn off the SEL DET indicator.