



## Safety Guidelines

If you are aware of the guidelines for working with electrical and mechanical equipment and practice these guidelines, you can work safely with this equipment.

*You need not fear electricity, but you must respect it.*

You should take every safety precaution possible and observe the following safety practices while maintaining IBM equipment.

1. You should not work alone under hazardous conditions or around equipment with dangerous voltage. Always advise your manager if this is a potential problem.
2. Remove all power before removing or assembling major components, working in the immediate area of power supplies, performing mechanical inspection of power supplies, or installing changes in machine circuitry.
3. Power supplies, pumps, blowers, motor generators, and other units with voltages which exceed 30V ac or 42.4V dc must not be serviced with power on when the unit is removed from its normal installed position within the machine, unless maintenance documentation clearly states otherwise. (This is done to ensure that proper grounding is maintained.)
4. Unplug the power supply cord whenever possible before working on the machine. The wall box switch when turned off should be locked in the off position or tagged with a DO NOT OPERATE tag (form Z229-0237). Be aware that a non-IBM attachment to an IBM machine may be powered from another source and be controlled by a different disconnect or circuit breaker.
5. When it is absolutely necessary to work on equipment having exposed live electrical circuitry, observe the following precautions:
  - a. Another person familiar with power off controls must be in immediate vicinity. (Someone must be there to turn off power if it should become necessary.)
  - b. Do not wear any jewelry, chains, metallic frame eyeglasses, or metal cuff links. (In the event of contact, there will be more current flowing because of the greater contact area afforded by the metal.)
  - c. Use only insulated pliers, screwdrivers, and appropriate probe tips/ extenders. (Remember, worn or cracked insulation is unsafe.)
6. Use only one hand when working on energized equipment. Keep the other hand in your pocket or behind your back. (Remember there must be a complete circuit for electrical shock. This procedure helps eliminate a path that could complete a circuit through you!)
7. When using test equipment, be certain that controls are set correctly and that insulated probes of proper capacity are used.
8. Avoid contacting ground potential (metal floor strips, machine frames, etc.), use suitable rubber mats purchased locally if necessary.
9. Follow special safety instructions when working with extremely high voltages. These instructions are outlined in CEMs and the safety portion of maintenance documentation. Use extreme care when checking high voltage.
10. Avoid use of tools and test equipment that have not been approved by IBM. (Electrical hand tools [wire wrap guns, drills, etc.] should be inspected periodically.)
11. Replace worn or broken tools and test equipment.
12. After maintenance, restore all safety devices, such as guards, shields, signs, and ground leads. Replace any safety device that is worn or defective. (These safety devices are there to protect you from a hazard. Don't defeat their purpose by not replacing them at the completion of the service call.)
13. Safety glasses must be worn when:
  - Using a hammer to drive pins, etc.
  - Power hand drilling.
  - Using spring hooks, attaching springs.
  - Soldering, wire cutting, removing steel bands.
  - Parts cleaning, using solvents, chemicals, and cleaners.
  - All other conditions which might be hazardous to your eyes.
14. Never assume that a circuit is deenergized. (Check it first.)
15. Always be alert to potential hazards in your working environment (i.e., damp floors, nongrounded extension cords, power surges, missing safety grounds, etc.)
16. Do not touch live electrical circuits with the surface of the plastic dental mirrors. The surface of the dental mirror is conductive and can result in machine damage and personal injury.
17. Four steps that should be taken in the event of an electrical accident:
  - a. USE CAUTION - DON'T BE A VICTIM YOURSELF.
  - b. TURN POWER OFF.

- c. HAVE SOMEONE ELSE GET MEDICAL HELP.
  - d. ADMINISTER RESCUE BREATHING IF VICTIM IS NOT BREATHING.
15. Do not use solvents, cleaners, or oils that have not been approved by IBM.
  16. Lift by standing or pushing up with stronger leg muscles. This takes strain off back muscles. Do not lift any equipment or parts which you feel uncomfortable with.
  17. Each customer engineer is responsible to be certain that no action on his/her part renders the product unsafe or exposes hazards to customer personnel.
  18. Place removed machine covers in a safe out-of-the-way location while servicing the machine. These covers must be in place on the machine before the machine is returned to the customer.
  19. Always place CE tool kit away from walk areas where no one can trip over it (i.e., under desk to table.)
  20. Avoid wearing loose clothing that may be caught in machinery. Shirt sleeves must be left buttoned or rolled up above the elbow. Long hair and scarves must be secured.
  21. Ties must be tucked in shirt or have a tie clasp (preferably non-conductive) approximately three inches from the end when servicing a machine.
  22. Before starting equipment, make sure that fellow CEs and customer personnel are not in a hazardous position.
  23. Maintain good housekeeping in the area of the machines while performing and after completing maintenance.
  24. Avoid touching moving mechanical parts when lubricating, checking for play, etc.

*Prevention* is the key to electrical safety. You should always be conscious of electrical safety. Follow the Safety Guidelines and practice good habits such as:

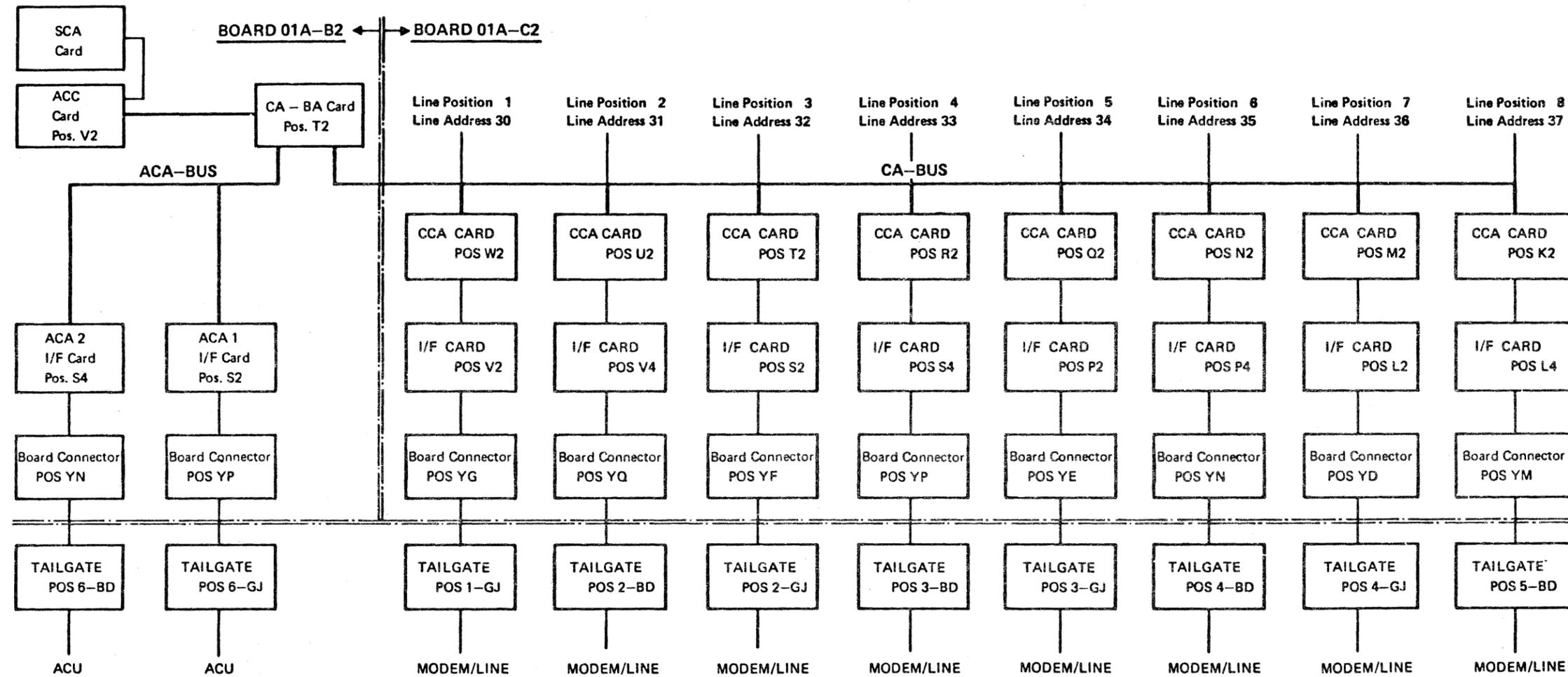
- Making certain that the customer's power receptacle meets IBM equipment requirements.
- Inspect line cords and plugs. Check for loose, damaged or worn parts.
- Before removing a component which can retain a charge from the machine, review the procedure in the maintenance documentation. CAREFULLY discharge the necessary component exactly as directed by the service procedure.
- Do not use an ordinary lamp as an extension trouble light.

## Table of Contents

Table of Contents	0000.0
Table of Contents (continued)	0000.1
CA Data Flow, Boards, Tailgate	0001
CA Data Flow (continued)	0002
CA Data Flow Adapter Interface Card Overview	0003
CCA-I/F Hardware Configuration	0004
CCA-I/F Hardware Configuration (continued)	0005
Blank Page	0007
CA Adapter Interface Chart	0010
CA-BA Test (Off-Line Test)	0020
CA-BA Handling Procedure	0030
CA-Channel Check Log-Layout	0040
CA-Unit Check Log (General)	0041
CA-Unit Check Log Table	0042
CA-Unit Check Problem Categories	0043
Unit Check Conditions for BSC Lines Descriptions	0044
Unit Check Conditions for BSC Lines Descriptions (continued)	0046
Unit Check Conditions for Start/Stop Lines Description	0050
Unit Check Conditions for Start/Stop Lines Description (continued)	0052
Unit Check Conditions for SDLC-Lines	0056
Unit Check Conditions for SDLC-Lines (continued)	0057
Unit Check Conditions for SDLC-Lines (continued)	0058
Adapter Interface Cards EIA/CCITT, V24	0060
Adapter Interface Cards Integrated Modem Card Types	0062
Blank Page	0064
Adapter Interface Cards US and Canada Modems Adjustments	0068
Adapter Interface Cards (continued)	0070
Adapter Interface Cards (continued)	0072
Blank Page	0073
Adapter Interface Cards WT Modems Adjustments	0074
Adapter Interface Cards (continued)	0076
Adapter Interface Cards V35	0078
Adapter Interface Cards DDSA	0080
Adapter Interface Cards Local Attachment	0082
Adapter Interface Cards (continued)	0084
Adapter Interface Card X, 21 XLCA	0086
Blank Page	0088
Board 01A-C2 Wiring (Transmission Mode and Rate)	0090
Physical Locations	0100
Blank Page	0105
Signal Flow and Wrap Test, General, Probing	2000
Blank Page	2010
Wrap Test, EIA Adapter Interface	2110
Wrap Test, EIA Adapter Interface Modem Clock	2120
Wrap Test, EIA Adapter Interface (continued)	2125
Wrap Test, EIA Adapter Interface CCA Clock	2130
Wrap Test, EIA Adapter Interface (continued)	2135
Wrap Test, EIA Adapter Interface Modem Clock	2140
Wrap Test, EIA Adapter Interface (continued)	2145

Wrap Test, EIA Adapter Interface CCA Clock	2150
Wrap Test, EIA Adapter Interface (continued)	2155
Wrap Test, EIA Adapter Interface Modem Clock	2160
Wrap Test, EIA Adapter Interface (continued)	2165
Wrap Test, EIA Adapter Interface CCA Clock	2170
Wrap Test, EIA Adapter Interface (continued)	2175
Blank Page	2177
Blank Page	2178
Wrap Test, EIA Adapter Interface Modem Clock	2180
Wrap Test, EIA Adapter Interface (continued)	2185
Card Wrap Test, Integrated Mod.Adapt.Interf.CCA Clock WT Switched	2200
Card Wrap Test, Integrated Mod.Adapt.Interf.(continued)	2205
Card Wrap Test, Integrated Mod.Adapt.Interf.CCA Clock WT Leased	2220
Card Wrap Test, Integrated Mod.Adapt.Interf.(continued)	2225
Card Wrap Test, Integrated Mod.Adapt.Interf.CCA Clock, US Switched	2240
Card Wrap Test, Integrated Mod.Adapt.Interf.CCA Clock, (continued)	2245
Card Wrap Test, Integrated Mod.Adapt.Interf.CCA Clock, US Leased	2260
Card Wrap Test, Integrated Mod.Adapt.Interf.CCA Clock, (continued)	2265
Card Wrap Test, Integrated Mod.Adapt.Interf.CCA Clock, US Leased	2280
Card Wrap Test, Integrated Mod.Adapt.Interf.CCA Clock, (continued)	2285
Card Wrap Test, V35 Adapter Interface, Modem Clock	2310
Card Wrap Test, V35 Adapter Interface (continued)	2315
Blank Page	2317
Blank Page	2318
Card Wrap Plug Test, V35 Adapter Interface, Modem Clock	2320
Card Wrap Plug Test, V35 Adapter Interface (continued)	2325
Modem Wrap Test, V35 Adapter Interface	2330
Modem Wrap Test, V35 Adapter Interface (continued)	2335
Card Wrap Test, DDSA Adapter Interface Card Clock	2410
Card Wrap Test, DDSA Adapter Interface Card Clock (continued)	2415
Wrap Plug Test, DDSA Adapter Interface Card Clock	2420
Wrap Plug Test, DDSA Adapter Interface Card Clock (continued)	2425
Wrap Test, Local Attachment Adapter Interface	2500
Card Wrap Test, Local Attachment Adapter Interface Card Clock	2510
Cable Plug Wrap Test, Local Attachm. Adapter interface Card Clock	2520
Cable Plug Wrap Test, Local Attachm. Adapter Interface Card Clock (continued)	2525
Card Wrap Test, Automatic Call Adapter 1 and 2 Interface	2600
Blank Page	2608
Cable Plug Wrap Test, Automatic Call Adapter 1 and 2 Interface	2610
Cable Plug Wrap Test, Automatic Call Adapter 1 and 2 Interface (continued)	2615
Card Wrap Test, XLCA Interface Card, DCE Clock	2630
Card Wrap Test, XLCA Interface Card, DCE Clock (continued)	2635
Self Test Switch Wrap Test, XLCA Interface Card, DCE Clock	2640
Self Test Switch Wrap Test, XLCA Interface Card, DCE Clock (continued)	2645
Blank Page	2647
CA Inline Test	3100
CA Inline Test Selection and Start	3102
CA Inline Test Stop Functions	3104
CA Inline Test Modes	3106
CA Inline Test FCN 22	3108
CA Inline Test FCN 23	3110
CA Inline Test FCN 24	3112
CA Trace General Function	3200
CA Trace Start	3202
CA Trace Stop	3204

# CA Data Flow (Boards 01A-B2/C2, Tailgate)



Only two ACA's can be connected.

This chart shows the data flow, and the board, card, and connector positions for the Communications Adapter (CA).

Depending on the line type and line speed, different types of CCA and I/F cards may be installed. All possible configurations are shown on page 0004.

The functions of the ACA, CCA and I/F cards are described on page 0002 and 0003.

Legend: ACC Adapter Common Card  
 CA-BA CA Bus Adapter  
 ACA Auto Call Adapter  
 ACU Auto Call Unit  
 CCA Communication Common Adapter  
 I/F Line Inter Face  
 SCA Standard Channel Adapter

# CA Data Flow

## Adapter Interface Card Overview

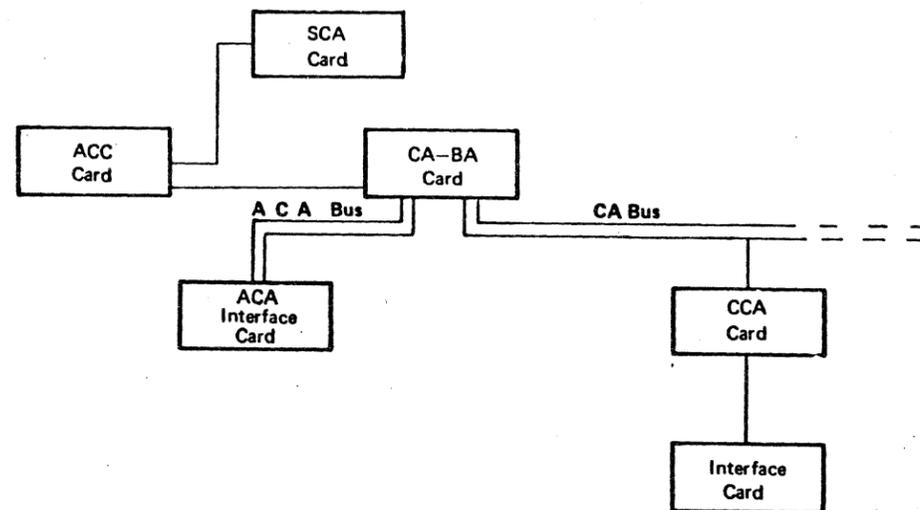
The general function of the I/F card is signal level conversion.

One of the following types of I/F card is used:

1. EIA--for details, see page 0060
  2. V35--for details, see page 0078
  3. DDS--for details, see page 0080
  4. Local attachment -for details, see page 0082
  5. Integrated modem -for details, see page 0062
  6. US SNA
  7. US LLSB
  8. US LLSM
  9. WT SNA
  10. WT LL
  11. X.21 XLCA (see page 0086)
- } see page 0064-0074

## ACA Card

The ACA card is the same card type as the EIA Interface Card. Its only function in the ACA interface is level conversion. For details, see page 0060.



## CCA-I/F Hardware Configuration (continued)

### Adapter Types

- INT. MOD : Integrated Modem, for details see page 0062
  - US-LL : Leased Line, US
  - US-SNA : Switched Network Auto Answer, US
  - US-LLSB : Leased Line, Switched Network Backup with Auto Answer, US
  - US-LLSM : Leased Line, Switched Network Backup with Manual Answer, US
  - WT-LL : Leased Line, WT
  - WT-SNA : Public Switched Network Auto Answer, WT
  - EIA/CCITT, V24 : Interface for External Modem, Low and Medium Speed, for details, see page 0060
  - V35 : Interface for External Modem High Speed, for details, see page 0078
  - DDS : Dataphone® Digital Service Adapter for External Modem, Medium and High Speed, for details, see page 0080
  - X.21 XLCA : Interface for general purpose data network, see page 0086
  - Local Attachment : Direct connection to a terminal with EIA/CCITT, V24 interface without modem, see page 082.
- Registered Trademark of AT&T Corp.

This chart shows all possible configurations of a CA line.

## CA Adapter Interface Chart

This chart is used to install the 4331 Communications Adapter. For each line interface installed, refer to the appropriate pages to configure and test the line.

Interface Type	Go To Binder	Interface Card Jumpers	Board 01A-C2 Wiring	Diagnostics	Configuration	Ext. Cables	
External Modem EIA, CCITT, V24	Vol 14, Page Vol 30, Page	0060 PC202	Notes: 1 8	0090 5 6 PC202 8	3102	4100 Vol 04, MAP88FF	0100 Vol 18, Page 2052
Integrated Modem 38LS	Vol 14, Page Vol 30, Page	0062-0076 PC202	2 3 8	0090 5 6 7 PC202 8	3102	4100 Vol 04, MAP88FF	0100 Vol 18, Page 2052
V35	Vol 14, Page Vol 30, Page	0078 PC202	1 3 8	0090 5 PC202 8	3102	4100 Vol 04, MAP88FF	0100 Vol 18, Page 2052
DDSA	Vol 14, Page Vol 30, Page	0080 PC202	4 8	0090 5 PC201	3102	4100 Vol 04, MAP88FF	0100 Vol 18, Page 2052
Local Attachment	Vol 14, Page Vol 30, Page	0082-0084 PC202	4 8	0090 5 PC201	3102	4100 Vol 04, MAP88FF	0100 Vol 18, Page 2052
Autocall (ACA)	Vol 14, Page Vol 30, Page	0060 PC202	3 8	Not Applicable	3102	4100 Vol 04, MAP88FF	0100 Vol 18, Page 2052
X.21 XLCA	Vol 14, Page Vol 30, Page	0086 PC202	8	Not Applicable	3102	4100 Vol 04, MAP88FF	0100 Vol 18, Page 2052

- Notes:**
- 1 Wrap Test Jumper Required
  - 2 Transmit Level Jumpers Required
  - 3 Personalization Jumpers Required
  - 4 Transmission Rate Jumpers Required
  - 5 Transmission Mode Wiring Required
  - 6 Transmission Rate Wiring Required If CCA Card Provides Clock
  - 7 2W/4W Wiring Required If Leased Line
  - 8 Page PC 202 shows the factory setup for the I/F cards. This page is shipped once as part of the initial shipment and will not be updated.

© Copyright International Business Machines Corporation 1979, 1980, 1981

EC 366334 22 Feb 80	EC 366388 23 Jan 81	EC 366493 26 Oct 81	P/N 8488680 Page 9 of 10	0 010 F
------------------------	------------------------	------------------------	-----------------------------	---------

CA

## CA-BA Test

### Test Handling - Actions

#### Prerequisites:

1. Power complete
2. IML
3. Diagnostic diskette inserted
4. PU/BSM test, IC-bus test run

#### How to Select the Test

1. Call M/S PROGRAM SELECTION. Hold down ALT key and press DIAG key. **A**
2. Key in selection for 'CENTRAL COMPLEX', press ENTER **B**
3. Select CA/BA TEST, press ENTER. **C**
4. Press ENTER to start test.

- Max. run time (8 lines installed) about 2 minutes.
- Test stops at test end, displaying STOPPED in. **B**
- If an error is detected the test also runs to the end and in addition to the message STOPPED, a reference code and at least 1 symptom code is shown **A** and **C**. By pressing ENTER a running test or routine can be stopped. Stop occurs always at routine end.

#### Run modes

The following parameters **D** can be specified

#### LOOP (Y/N)

N=default. If Y selected, the test or routine will loop until stopped.

#### RTN: 01 TO:..

- a. 01 TO..= default if no TO-routine is specified. Test runs from routine 01 to last routine.

- b. To run or loop a complete test, not starting with RTN01:  
Enter start routine number in the RTN-field, and start routine number minus 1 in the TO-field:  
RTN: 08 TO: 07
- c. To run or loop a specific routine:  
Enter the routine number in both fields:  
RTN: 05 TO: 05

*Note:* Routine 00 must not be entered. This is an auxiliary routine for special purposes.

#### ANALYSIS (Y/N):

Y=Default. If analysis is enabled (Y), symptom codes and a reference code are displayed in **C** and **A** in case of error.

Enter 'N' to suppress error analysis. This can be useful if 'loop a routine' is specified. In this case the routine loops under real-time conditions, that means, the analysis phase does not always interrupt the test execution.

#### ADAPT:X

The adapter number is displayed automatically. Do not change the adapter number. To test another adapter select the appropriate test from the CENTRAL COMPLEX menu.

If a valid adapter number would be entered, the test starts but generates false reference codes.

If an invalid number is entered, the message INV. INPUT is shown in **B**.

#### What to Do in Case of Error

If the test stops with a reference code displayed in **A**, use this reference code as an entry to the Reference Code Directory to find the appropriate MAP.

#### How to Terminate the Test

If you want to run another test return to M/S PROGRAM SELECTION. Select new test, otherwise perform the following steps:

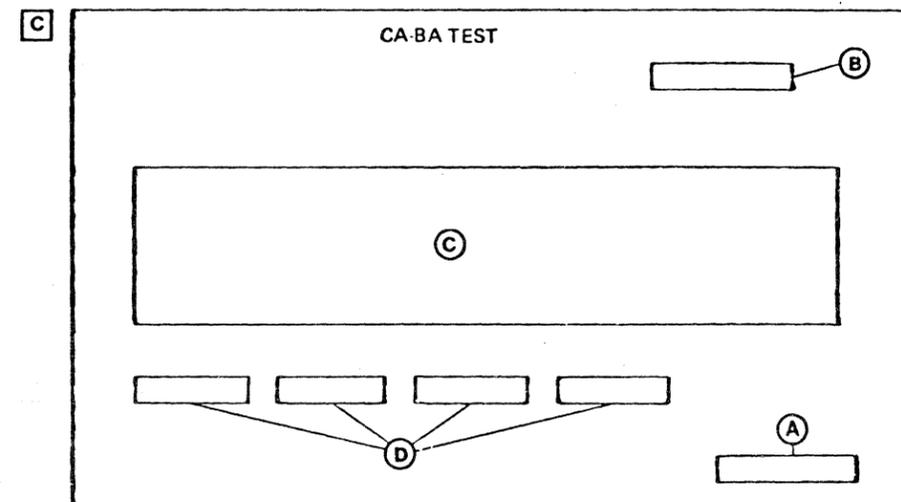
1. Press ENTER, to stop the test
2. Insert control diskette
3. Perform re-IML
4. Return machine

### Test Handling - Results

Screen displays:

**A** 'IBM MAINTENANCE AND SERVICE PROGRAM SELECTION'

**B** 'CENTRAL COMPLEX TEST SELECTION'



**A** Reference code

**C** Symptom code display field

**B** Status of test

**D** Run mode selection field

## CA Unit Check Log and Sense Byte Analysis

Use the CA Unit Check log display function to get the CA log entries displayed on the Operator's Console.

- Data checks and time outs are not logged for SS and BSC. For SDLC, only equipment checks and overruns are logged. Use the appropriate tool (e.g. EREP) - provided by the operation system being used - to get information about not logged unit checks (the operating system may have logged them).

Format of log entry:

LINE NBR	2nd SENSE BYTE	CMD	CHECK COUNT	TIME OF LAST ENTRY MO DY HR MI	CONFIG BYTE 2-3
XX	XX	XX	XXX	XX XX XX XX	XX XX

How to use the table on page 0042, 0043:

- Compare second sense byte value with value in table in column named: 'second sense byte'.
- Go from matching number to the right until a one is found in one of the six rows. The column head (A-F) is used to pick up (on facing page) the reason for the failure.
- Do recommended actions.
- If error not found go to number 2 (next time to 3), use column header to pick up (on facing page) the next failure reasons.
- Do recommended actions.

Example:

- 2nd sense byte shows 'C5'
- C5 shows as failure reason with highest probability (1) the column header (C)
- On the facing page (Problem Categories) the (C) shows 'modem interface' as reason for failure.
- Do recommended actions.
- If error not found, now 'C5' gives as next priority (2) column header (E). On facing page (E) shows 'CA circuitry'
- Do recommended actions.  
If failure is still existing after handling of lowest priority, call for assistance

© Copyright International Business Machines Corporation 1980, 1981

CA

### NOTES:

- Check Unit check description, starting with page 0044, for detailed error explanation.
- There is no Reference code log and log distribution statistic available for CA unit check logs. Therefore, a display of last log is not possible. To get the CA unit check logs, the CA unit check log display must be used.

LV: CA UNIT CHECK LOG DISPLAY PAGE:

LAST ERASE DATE:			FIRST LOG:		LAST LOG:	
LINE NBR	SENSE BYTE 2	CMD	CHECK COUNT	TIME-LAST ENTRY MO/DY/HR/MI	CONFIG BYTE 2-3	
32	06	00	002	00 00 00 00	18 20	
33	06	00	001	00 00 00 00	18 20	
33	E3	0C	001	00 00 00 00	18 20	

LAST REF. CODE: 89FFFF01 33E30C00

SELECTION: 2C      TIMER: TOD: SEC      PRESS ENTER FOR NEXT LOG      DATA: ADDR:

SENSE BYTE 2  
(from now on called '2nd sense byte') see page 0042-0058 for details.

CHECK COUNT  
Count of this kind of error (recorded since last erase date).

CMD  
See page 4316 for explanation of command codes for S/S; BSC and SDLC operation (First digit is always zero)

CONFIG BYTE 2-3  
For configuration byte 2 see page 4224  
For configuration byte 3 see page 4228

LAST REF. CODE:

89FFFF01  
REF. CODE  
(always this number)

33 E3 0C 00  
00  
Command  
2nd sense byte (Sense byte 2)  
Line address

## CA Unit Check Problem Categories

### (A) Program

The usual reason is a wrong channel program, such as a wrong command or wrong sequence of commands. An error may also occur when the hardware configuration does not match the configuration assumed by the channel program (e. g. a DIAL command is given to a non/switched line).

Action:

1. Correct program
2. Change configuration by using 'Update Configuration Table' tool.
3. Provide correct configuration by new installation.

### (B) Operator Handling

This kind of error can occur at both ends of the line. Typical errors are:

Mismatch in configuration, different speed selections (Board Modem Terminal), no matching line protocols etc. Another type of error is caused by handling errors during a setup which leads to a situation that no read type command is active at one end when the other end starts transmitting a message.

Actions:

1. Check local and remote modems and stations for matching strapping options. In case of mismatch repair and restart.
2. Check with remote operator what handling is required at both ends and restart in correct sequence.

### (C) Modem Interface

These errors show malfunctions on the protocol between the system and the modem (or auto call unit). The most common reason for this kind of problem is an unpowered modem.

Actions:

1. Power modem (or auto call unit) up.
2. For standalone modems and auto call units follow the appropriate modem checkout procedure.
3. Run ILT22 and 23 if possible for equipment and follow MAP if an error is indicated. The ILT in loop mode may give a reference code for intermitten failures. If ILT 22 is not available, follow MAP 8880 (Board or Cable error).

### (D) Line and Network

These errors are normally recovered by the operating system and do not represent a problem in general. The line quality determines the probability and frequency of these errors. In case of a DIAL command to an occupied line, the operator or operating system must do a retry. When - for switched lines - an already established connection is disconnected, the operator or operating system must retry.

Actions: None

### (E) CA Circuitry

These errors are caused by malfunctions in the CA circuitry (in case of integrated modems the modem interface problems are circuitry errors as defined for this category).

Actions: Run ILT's. If failure is intermitten, run ILT's in loop mode. If no error indication is given replace the CA circuitry in the following sequence: CCA, Interface card, External cable, Internal cable, Board C2.

### (F) System Load

These errors are normally retried by the operating system. If they occur frequently check whether either the CA data rate exceeds the maximum allowed data rate and if so, change the configuration. Check also the rest of the I/O configuration whether it may cause overruns on the CA.

## Unit Check Condition for BSC Lines Description (continued)

### Data Check (not logged)

**80** A BCC error (EBCDIC) or a LRC/VRC error (ASCII) is detected during the execution of a 'read' command. The command is allowed to continue to its normal end.

*Cause:* This failure is normally caused by noise on the transmission line. It can also be caused by an overrun condition.

The data check condition may also occur in ASCII as VRC check during execution of a 'poll' command but the unit check and data check sense bits will not appear until the succeeding 'read' command.

**84** A DLE character in transparent read operation is not followed by an ETB, ETX, ENQ, DLE, or SYN control character.

### Overrun

**A0** An overrun condition has been detected during execution of a 'read' command.

**A1** An underrun condition, has been detected during execution of a 'write' command. Intervention required is set together with overrun.

### Lost Data

**C0** A 'lost data' condition has been detected during 'read' command initiation, indicating that at least one full character was received and lost before the command was given. The command is allowed to continue to its normal end.

**C2** The ACU's 'present next digit' signal is active during initiation of a 'dial' command.

**C4** The ACU's 'distant station connected' signal is active during initiation of a 'dial' command.

**C5** The 'data set ready' or 'Distant Station Connected' modem I/F signal becomes active before all dial digits have been presented to the ACU during a 'dial' command execution.

**C6** 'Channel Stop', Program Check, or Protection Check has occurred during the execution of a 'read' command or an 'autopoll' in read state. The command is terminated immediately.

*Note:* 'Channel stop' is set during data transfer when the length count has been reduced to zero, without having received an ending character (assuming that chain data is not specified).

**C7** A 'halt I/O' instruction has been issued when the line attachment is executing a 'read command'.

*Note:* This is not an error condition.

### Timeout Complete (not logged)

**E3** The line attachment is executing a 'read' command and has not received two consecutive SYN characters within 3 seconds after the beginning of the command.

*Cause:* Failure in program or operator handling resulting in an out of sequence situation with the remote station.

**E4** The line attachment is executing a 'read' command and has not received SYN/non-SYN sequence within 3 seconds of the previous SYN/non-SYN while in text mode; or has not received DLE/SYN/non-DLE within 3 seconds from the previous DLE/SYN/non-DLE while in transparent text mode.

**E6** The ACU's 'abandon call and retry' (ACR) signal has become active during initiation of a 'dial' command.

**E7** The ACU's 'abandon call retry' (ACR) signal has become active during execution of a 'dial' command.  
*Cause:* The remote station has not answered the call.

**EA** The line attachment is operating as a control station on a data link and has been executed a 'poll' command. After the transmission of an autopoll sequence to the tributary station, the control station (in the autopoll receive state) waits for 3 seconds for an answer from the tributary station. If no answer has been received within 3 seconds, the 'poll' command is ended and chained to a 'read' command. During initiation of the 'read' command, the index byte is transferred to main storage and the 'read' command is then immediately ended with the timeout complete bit set in the sense byte.

**EB** A second 'write' command has been issued later than 3 seconds after the termination of the 'write' command that placed the line attachment in transparent wait state. This second 'write' ends immediately with the timeout complete bit set.

**EC** The 'data set ready' modem I/F signal is not de-activated by the modem within one second (not modems with CDSTL procedure), or 25 seconds (modems with CDSTL procedure) after the 'data terminal ready' modem signal has been dropped, during execution of a 'disable' command for a switched line.

## Unit Check Condition for Start/Stop Line Description (continued)

### Equipment Check

- 61 Overflow on the 'CCA B-STAT AVAILABLE' trap-counter.  
Cause: Noise on modem signals or a hanging situation in the CCA so that traps are continuously generated.
- 62 A CCA Machine Check has been detected indicating an error on the Processor Bus between BA and CCA.
- 63 The loss of the CCA-internal clock signal has been detected during the execution of a write or autopoll command.
- 64 No valid 'CCA B-STAT AVAILABLE' trap has been detected.

### Data Check (not logged)

- 80 An LRC error has been detected during execution of a 'read' or 'inhibit' command. The command continues until its normal end.  
Cause: This failure is normally caused by noise on the transmission line. If failure rate is too high check the transmission facilities. It can also be caused by an overrun condition.
- 82 A VRC error has been detected in a character fetched from program storage during execution of a 'write' or 'autopoll' command. The command is allowed to continue to its normal end.
- 84 A VRC error has been detected or the line was found to be at space level at stop bit time while receiving during a 'read', 'inhibit', or 'autopoll' command. The 'autopoll' command is terminated immediately but the other commands are allowed to continue to their normal ends.
- 85 The response to polling characters in an 'autopoll' command was neither circle N nor circle D. The command is terminated immediately.
- 86 Circle N was received in text-out mode, indicating that the remote terminal received data with incorrect parity or an LRC error. The command is terminated immediately.

### Overrun

- A0 A character overrun condition has been detected in the line attachment at stop bit time during execution of a 'read' or 'inhibit' command.

### Lost Data

- C0 A 'lost data' condition has been detected during 'read' or 'inhibit' command initiation, indicating that at least one full character was received and lost before the command was given. The command is allowed to continue to its normal end.
- C2 The ACU's 'present next digit' signal is active during initiation of a 'dial' command.
- C4 The ACU's 'distant station connected' signal is active during initiation of a 'dial' command.
- C5 The 'data set ready' modem I/F signal becomes active before all dial digits have been presented to the ACU during a 'dial' command execution.
- C6 'Channel Stop', Program Check, or Protection Check has occurred during the execution of a 'read', 'inhibit' command or an 'autopoll' in read state. The command is terminated immediately.

*Note:* Channel stop is set during data transfer when the length count has been reduced to zero, without having received an ending character (assuming that chain data is not specified).

- C7 A 'halt I/O' instruction has been issued when the line attachment is executing a 'read' or 'inhibit' command. *Note:* This is not an error condition and not logged.

### Timeout Complete (not logged)

- E2 The 'received data' modem signal was not stable (no level change) for the duration of one or two data characters before the end of the 28 second timeout. The timeout was started in 'read end sequence' during execution of a 'read' command.

- E5 The following cases apply:

1. A three second timeout occurs during execution of a 'read' or 'autopoll' command while still in control mode.
2. A 25 to 50 second timeout occurs during execution of a 'read' command while in text mode.  
Timeout is not set if 'data set ready' modem signal drops; intervention required is set instead. Similarly, if 'receive line signal detect' drops on a line which is connected to a switched network with 'permanent request to send' on, (that is, a duplex facility) intervention required is set, not timeout.  
Cause: Failure in program or operator handling resulting in out of sequence situation with the remote terminal.

- E6 The ACU's 'abandon call and retry (ACR)' signal turns on during initiation of a 'dial' command.
- E7 The ACU's 'abandon call and retry (ACR)' signal turns on during execution of a 'dial' command. Cause: The remote terminal has not answered the call.
- E8 The 'data set ready' modem signal did not fall before the end of 25 second timeout during execution of the 'disable' command on a line connected to a switched network.
- E9 The 'line signal detect' or 'clear to send' modem signal activated by the modem before the end of 25 second timeout initiated after 'data set ready' was activated during execution of a 'enable' command on a line connected to switched network with 'permanent request to send'.
- ED Space (break signal) received for more than 25 seconds and prepare command active.

## Unit Check Condition for SDLC-Line Description (continued)

'2E' Data Set Ready (DSR) not found on within 3 seconds after Data Terminal Ready (DTR) was presented during execution of ENABLE on a leased line.

'31' An ENABLE command was issued to an already enabled line (DTR found on), but the Data Set Ready (DSR) signal was not active, or DSR was found on during ENABLE to a switched line and DTR was found off.

### Equipment Check (Bit 3)

This bit is set when an error is detected in the communication adapter, the integrated modem or local attachment hardware. A detected equipment check causes immediate termination of the current command and Channel End, Device End, and Unit Check to be set in the CSW when stored at I/O interruptions. Logging will be performed. The conditions causing equipment check to be set are as follows:

'60' Unexpected trap occurred.

'61' If carry on B-STAT trapcounter, i.e a hanging situation has occurred so that B-STAT available traps are continuously generated for a line. The line will be disabled.

'62' A CCA Machine Check has been detected indicating an error on the PIO-bus. The line will be disabled.

'63' The loss of the internal clock signal has been detected during the execution of a READ type command or WRITE type command. The line will be disabled.

'64' No valid CCA-BSTAT. The line will be disabled.

'70' Data Set Ready (DSR) has been found off during the execution of a READ type or WRITE type command or during the line is idle after enabled. The line will be disabled.

'71' Data Set Ready (DSR) has been found off at command initiation of a READ type or WRITE type command. The line will be disabled.

'72' Clear To Send (CTS) has not been activated by the modem as a response to RTS on before the 3-second timeout ends either in WRITE type command initiation or an AUTOPOLL READ to AUTOPOLL WRITE turnaround. The line will be disabled.

'73' Clear To Send (CTS) has been found off during execution of a WRITE type command or in the AUTOPOLL WRITE state (provided Not Permanent Request to Send). The line will be disabled.

'74' In 'Switched Request To Send' operation (Not Permanent Request to Send), Clear To Send (CTS) has not been de-activated by the modem as a response to RTS off before the 1 second timeout expires either at WRITE/WRITE-PIU command termination or at AUTOPOLL WRITE to READ turnaround. The line will be disabled.

'75' Request To Send (RTS) down during line in out-bound in spite of Permanent Request To Send (PRTS). The line will be disabled.

'76' Data Terminal Ready (DTR) found off during line enabled. The line will be disabled.

### Data Check (Bit 4)

This bit is set in receive mode when commands are executed and FCS errors or format errors occur. No logging will be performed.

'90' An FCS error was detected during the execution of a READ command. The FCS check applies to both primary and secondary lines.

'91' Offset value in an SCB transferred to the line attachment is specified as 0 or 1 or any reserved fields are not zero.

'92' Any line received invalid frame (too short) or abort sequence during execution of a READ command. The invalid frame check applies to both primary and secondary lines.

'93' Invalid 'SDLC sequence' on inbound if READ cmd is active.

'95' Any reserved fields in the information provided by a 'SET MODE' command are not zero, or the line was specified as secondary station and the secondary station address was not provided.

'96' An 'NR out of range' was received.

### Overrun (Bit 5)

The overrun bit is set if the line attachment is too late to serve a request for data transfer from the associated hardware. Logging will be performed. The conditions under which this bit is set are as follows:

'A0' An overrun condition has been detected during execution of a READ type command.

'A1' An underrun condition has been detected during execution of a WRITE type command. Intervention Required is set together with overrun.

'A2' Data chaining specified in READ PIU or SENSE SCB.

'A3' Data chaining specified in WRITE PIU or CONTROL SCB or AUTOPOLL.

# Adapter Interface Cards

EIA/CCITT V24

## General Description

The EIA Interface Card is a 2W-3H Logic Card, which converts the VTL-levels of the CCA card to EIA/CCITT levels of the modem and vice versa. Eight VTL to EIA/CCITT level drivers and eight EIA/CCITT to VTL level drivers are provided.

## Transmission Rate

Transmission rates from 0 to 9600 bps are determined by the CCA card or the modem.

## Clocking

Either CCA card or the modem provides the clock. If the CCA card provides the clock, the speed is determined by board wiring. See page 0090.

## External Cable

Cable capacitance from the card socket to the using modem must not exceed 1500 pf for 9600 bps operation, and 2500 pf for 7200 bps operation and below. Max. cable length: 10,3 m

## Wrap Test

The card is personalized to respond to the Test Control Lead (Tab pin B05) in one of two ways:

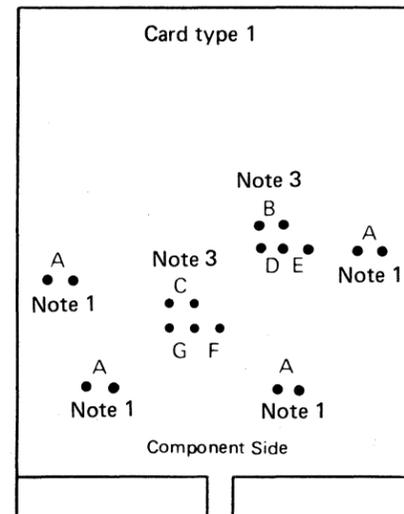
- Passes the signal through to an IBM modem which will go into wrap mode (modem wrap).
- Wraps selected interface leads at the VTL level on the EIA card wrap (card wrap).

If the modem used has the wrap facility, the modem wrap should be used. See jumper options.

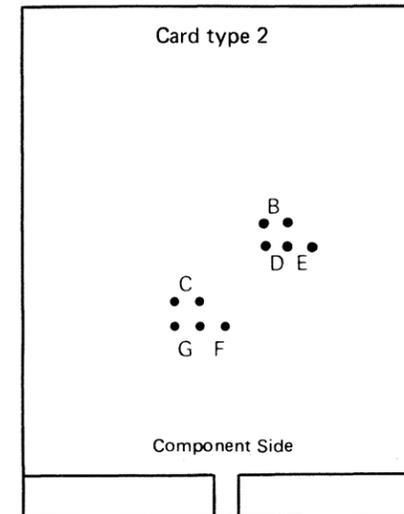
## Jumper Options

Wrap Options	JUMPERS						
	A	B	C	D	E	F	G
Modem Wrap	Note 1	Remove	Remove	Remove	Install	Install	Remove
Card Wrap	Note 1	Remove	Remove	Install	Remove	Install	Remove

*Note:* The clocking (modem or CCA clock) does not affect the jumpering.



Voltage: see Note 1



Voltage: Automatic voltage adaption.

Note 1: If 3 or less lines are installed and the A1 board is not installed, then jumpers A have to be removed. If 4 or more lines are installed or the A1 board is installed, then Jumpers A have to be installed.

Note 2: This cards are also used for ACA interface. In this case, Jumper F has to be removed and jumper G is to be installed. All other jumpering is the same.

Note 3: B and C are manufacturing test jumpers. Remove for normal operation.

For part numbers refer to plug list in binder M130.

This page has been  
intentionally left blank

# Adapter Interface Cards (continued)

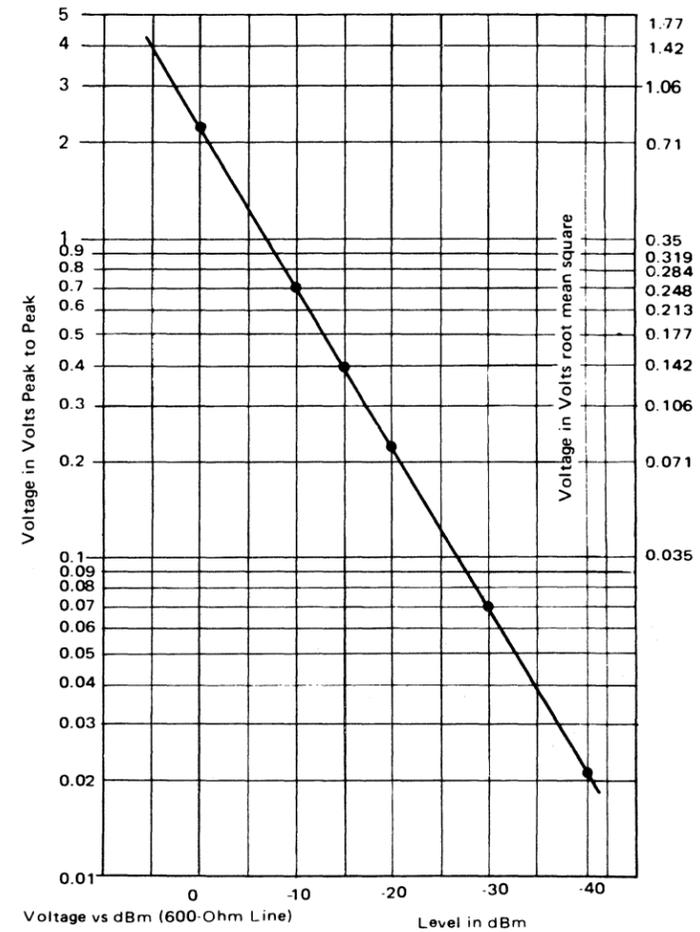
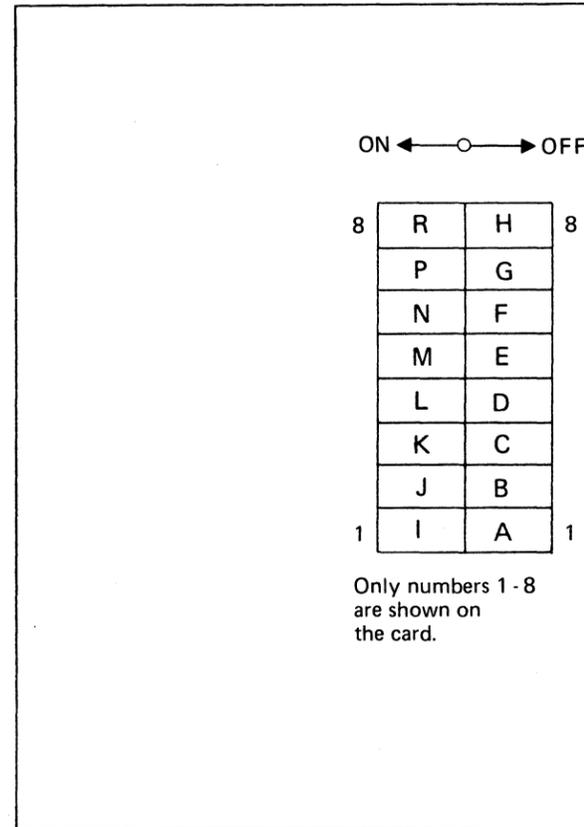
US and Canada Modems Adjustment (continued)

**TRANSMIT LEVEL SWITCHES**

	A	B	C	D	E	F	G	H
DBM 0								
-1								
-2								
-3								
-4								
-5								
-6								
-7								
-8								
-9								
-10								
-11								
-12								
-13								
-14								
-15								
-16								
-17								
-18								

1 = On  
blank = Off

**ROCKER SWITCH IDENTIFICATION**



If a 600 ohm communication line is used and dB meter is not available, the graph can be used to convert peak-to-peak voltage into dBm levels. Voltage from the top to the bottom of a waveshape is a peak-to-peak value. If a VOM is used, the voltage is read as a root mean square (rms) value. To convert rms to peak-to-peak, multiply by 2.83.

\* Peak-to-peak =

This page has been  
intentionally left blank

## Adapter Interface Cards (continued)

### WT MODEM ADJUSTMENTS (continued)

**Note 1:**  
Set the transmit level as specified by the PTT. See Figure 1 for adjustment. Contact your TP specialist for specific information for your installation.

The following are obtained automatically:

- 2-wire line connection
- Clear to send delay 230 ms
- Echo Clamp 150 ms
- Signal threshold for data carrier detect :  
on at -43 dBm (10-20 ms delay)  
off at -48 dBm (5-15 ms delay)

**Note 2:**  
Set the transmit level as specified by the PTT. See Figure 1 for adjustment. Contact your TP specialist for specific information for your installation.

The following are obtained automatically:

- Signal threshold for data carrier detect :  
on at -43 dBm (10-20 ms delay)  
off at -48 dBm (5-15 ms delay)

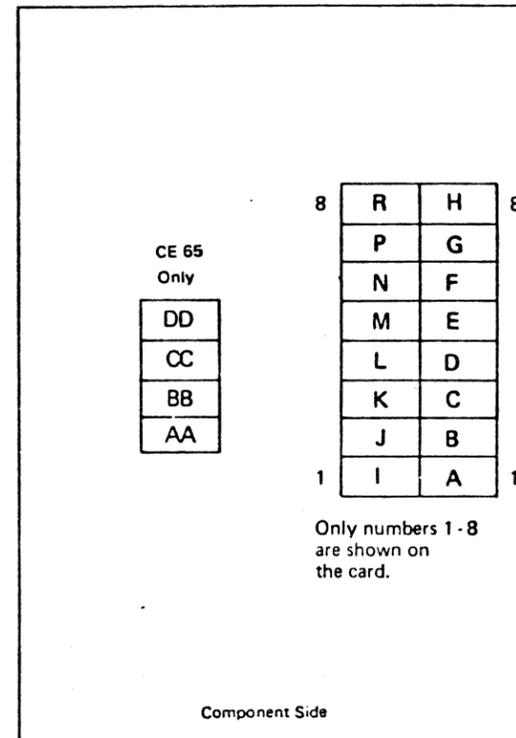
### TRANSMIT LEVEL SWITCHES

DBM	A	B	C	D	E	F	G	H	R
0									
-1									
-2									
-3									
-4									
-5									
-6									
-7									
-8									
-9									
-10									
-11									
-12									
-13									
-14									
-15									
-16									
-17									
-18									

1= On  
blank= Off

Figure 1

### ROCKER SWITCH IDENTIFICATION



For voltage - dBm table.  
See page 0070.

# Adapter Interface Cards

## DDSA Interface Card

DDSA = Data phone digital service adapter

### General Description

The DDSA interface card is a 2H-3W logic card which connects the communications adapter to AT&T's private line Dataphone® Digital Service via an AT&T Channel Service Unit (CSU).  
 (\* Registered Trademark of AT&T Corporation).

It can operate at transmission rates up to 56 kbps. The speed is determined by the connected CSU and jumper plugging on the DDSA card.

The DDSA card provides a clock for clocking data in and out of the DDSA.  
 For the highest speed (56 kbps) line address 30 must be used.

Due to the high transmission rate the data signals between the DDSA card and the CSU are transmitted as "bi-polar differential pulses". This requires two leads for each signal.

The DDSA card converts the signal levels as shown in figure 1.

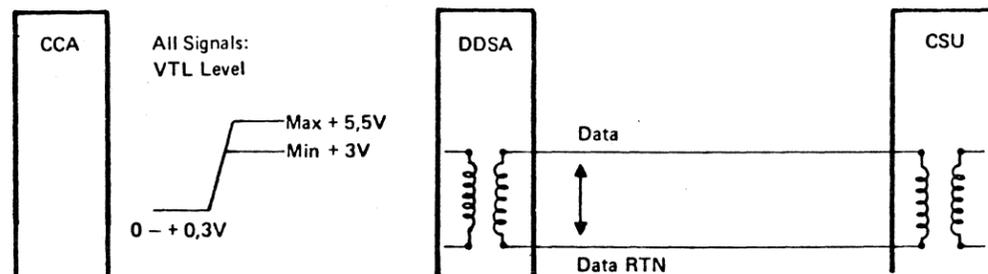


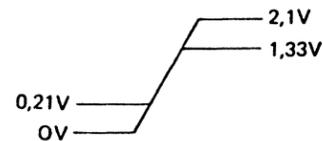
Figure 1

Transmission rates: 2400, 4800, 9600 and 56000

Clocking: The DDSA card provides the clock.

### Card Wrap Test

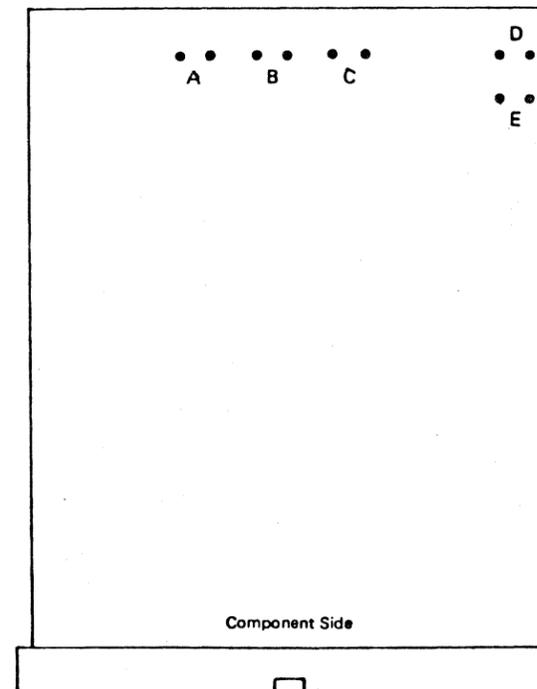
When the test control signal is active, the DDSA Card wraps selected interface signals from the CCA card back to the CCA card.



## Jumpers

Install the jumpers as follows:

TRANSMISSION RATE	JUMPERS				
	A	B	C	D	E
2400 bps	install	remove	remove	remove	install
4800 bps	remove	install	remove	remove	install
9600 bps	remove	remove	install	remove	install
56 kbps	remove	remove	remove	install	install



Note: Jumper cards as shown and remove any other Jumper.

For part number refer to plug list in binder M130.

## Adapter Interface Cards (continued)

### Local Attachment Interface Card (CONTINUED)

#### Card Wrap Test

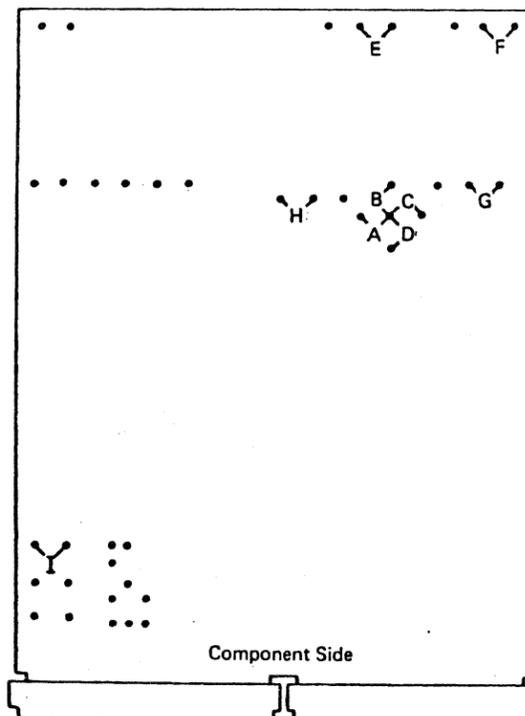
When the test control signal is active, the local attachment card wraps selected interface signals from the CCA card back to the CCA card.

#### Jumpers

Install the jumpers A, B, C, D to the center pin as follows:

Transmission Rate	Jumpers				
	A	B	C	D	EFGHI
1200 bps	install	remove	remove	remove	install
2400 bps	remove	install	remove	remove	install
4800 bps	remove	remove	install	remove	install
9600 bps	remove	remove	remove	install	install

Note: All other jumpers are for factory use only and must not be installed.



For part number see plug list in binder M130.

© Copyright International Business Machines Corporation 1980, 1981

CA

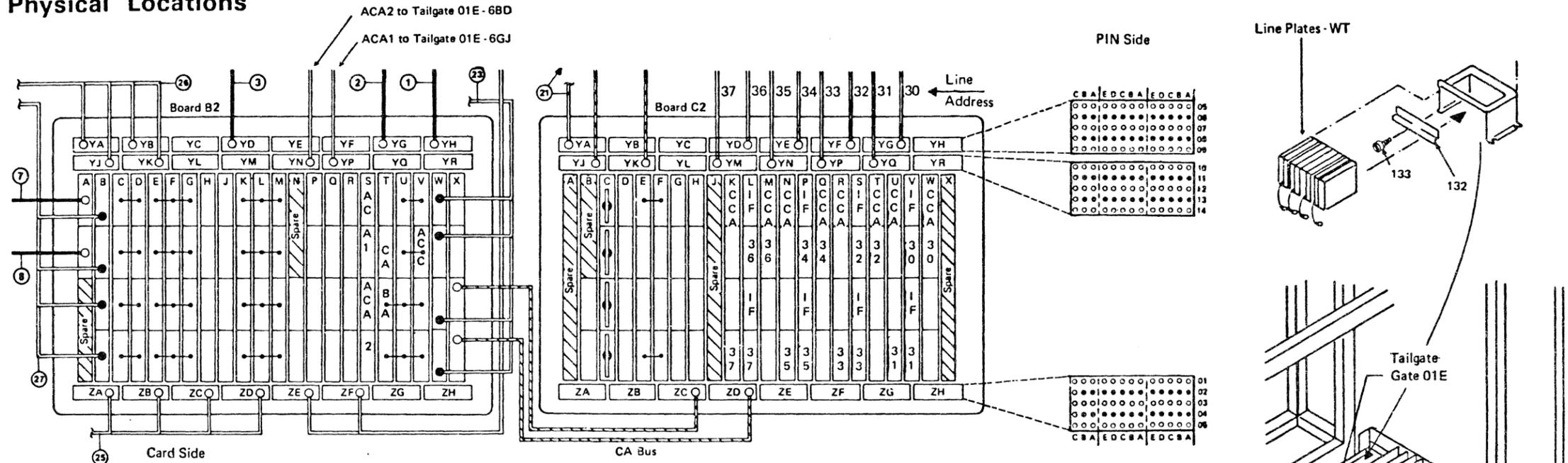
EC 366334 22 Feb 80	EC 366388 23 Jan 81	EC 366493 26 Oct 81	P/N 5683259 Page 5 of 10	0 084 F
------------------------	------------------------	------------------------	-----------------------------	---------

This page has been  
intentionally left blank

CA

EC 366334 22 Feb 80	EC 366388 23 Jan 81	EC 366493 26 Oct 81	P/N 5683259 Page 7 of 10	0 088 F
------------------------	------------------------	------------------------	-----------------------------	---------

# Physical Locations



Line addr.	CCA Card	I/F Card	Internal Cable	
			Board 01A-C2 Socket	Tailgate Socket
30	W2	C2 V2	C2 YG	1-GJ
31	U2	C2 V4	C2 YQ	2-BD
32	T2	C2 S2	C2 YF	2-GJ
33	R2	C2 S4	C2 YP	3-BD
34	Q2	C2 P2	C2 YE	3-GJ
35	N2	C2 P4	C2 YN	4-BD
36	M2	C2 L2	C2 YD	4-GJ
37	K2	C2 L4	C2 YM	5-BD
ACA 1		B2 S2	B2 YP	6-GJ
ACA 2		B2 S4	B2 YN	6-BD

A1	A2	A3	A4	A5	A6	A7	A8	A9
BD	BD	BD	BD	BD	BD	BD	BD	BD
REM Sup.	31 LN2	33 LN4	35 LN6	37 LN8	ACA 2	Spare or DAL 2	Spare or DAL 2	Spare
GJ	GJ	GJ	GJ	GJ	GJ	GJ	GJ	GJ
30 LN1	32 LN3	34 LN5	36 LN7	Spare	ACA 1	Spare or DAL 1	Spare or DAL 1	Spare

Gate seen from plugging side of the external cables.  
CA Line Connector Arrangement and Location  
Gate 01E

- ☐ = The number in the square box is the line address
- REM.SUP. = Remote Support
- LN = Communication adapter line
- ACA = Auto call adapter

## Safety Guidelines

If you are aware of the guidelines for working with electrical and mechanical equipment and practice these guidelines, you can work safely with this equipment.

*You need not fear electricity, but you must respect it.*

You should take every safety precaution possible and observe the following safety practices while maintaining IBM equipment.

1. You should not work alone under hazardous conditions or around equipment with dangerous voltage. Always advise your manager if this is a potential problem.
2. Remove all power before removing or assembling major components, working in the immediate area of power supplies, performing mechanical inspection of power supplies, or installing changes in machine circuitry.
3. Power supplies, pumps, blowers, motor generators, and other units with voltages which exceed 30V ac or 42.4V dc must not be serviced with power on when the unit is removed from its normal installed position within the machine, unless maintenance documentation clearly states otherwise. (This is done to ensure that proper grounding is maintained.)
4. Unplug the power supply cord whenever possible before working on the machine. The wall box switch when turned off should be locked in the off position or tagged with a DO NOT OPERATE tag (form Z229-0237). Be aware that a non-IBM attachment to an IBM machine may be powered from another source and be controlled by a different disconnect or circuit breaker.
5. When it is absolutely necessary to work on equipment having exposed live electrical circuitry, observe the following precautions:
  - a. Another person familiar with power off controls must be in immediate vicinity. (Someone must be there to turn off power if it should become necessary.)
  - b. Do not wear any jewelry, chains, metallic frame eyeglasses, or metal cuff links. (In the event of contact, there will be more current flowing because of the greater contact area afforded by the metal.)
  - c. Use only insulated pliers, screwdrivers, and appropriate probe tips/ extenders. (Remember, worn or cracked insulation is unsafe.)
6. Follow special safety instructions when working with extremely high voltages. These instructions are outlined in CEMs and the safety portion of maintenance documentation. Use extreme care when checking high voltage.
7. Avoid use of tools and test equipment that have not been approved by IBM. (Electrical hand tools [wire wrap guns, drills, etc.] should be inspected periodically.)
8. Replace worn or broken tools and test equipment.
9. After maintenance, restore all safety devices, such as guards, shields, signs, and ground leads. Replace any safety device that is worn or defective. (These safety devices are there to protect you from a hazard. Don't defeat their purpose by not replacing them at the completion of the service call.)
10. Safety glasses must be worn when:
  - Using a hammer to drive pins, etc.
  - Power hand drilling.
  - Using spring hooks, attaching springs.
  - Soldering, wire cutting, removing steel bands.
  - Parts cleaning, using solvents, chemicals, and cleaners.
  - All other conditions which might be hazardous to your eyes.
11. Never assume that a circuit is deenergized. (Check it first.)
12. Always be alert to potential hazards in your working environment (i.e., damp floors, nongrounded extension cords, power surges, missing safety grounds, etc.)
13. Do not touch live electrical circuits with the surface of the plastic dental mirrors. The surface of the dental mirror is conductive and can result in machine damage and personal injury.
14. Four steps that should be taken in the event of an electrical accident:
  - a. **USE CAUTION - DON'T BE A VICTIM YOURSELF.**
  - b. **TURN POWER OFF.**
  - c. **HAVE SOMEONE ELSE GET MEDICAL HELP.**
  - d. **ADMINISTER RESCUE BREATHING IF VICTIM IS NOT BREATHING.**
15. Do not use solvents, cleaners, or oils that have not been approved by IBM.
16. Lift by standing or pushing up with stronger leg muscles. This takes strain off back muscles. Do not lift any equipment or parts which you feel uncomfortable with.
17. Each customer engineer is responsible to be certain that no action on his/her part renders the product unsafe or exposes hazards to customer personnel.
18. Place removed machine covers in a safe out-of-the-way location while servicing the machine. These covers must be in place on the machine before the machine is returned to the customer.
19. Always place CE tool kit away from walk areas where no one can trip over it (i.e., under desk to table.)
20. Avoid wearing loose clothing that may be caught in machinery. Shirt sleeves must be left buttoned or rolled up above the elbow. Long hair and scarves must be secured.
21. Ties must be tucked in shirt or have a tie clasp (preferably non-conductive) approximately three inches from the end when servicing a machine.
22. Before starting equipment, make sure that fellow CEs and customer personnel are not in a hazardous position.
23. Maintain good housekeeping in the area of the machines while performing and after completing maintenance.
24. Avoid touching moving mechanical parts when lubricating, checking for play, etc.

*Prevention* is the key to electrical safety. You should always be conscious of electrical safety. Follow the Safety Guidelines and practice good habits such as:

- Making certain that the customer's power receptacle meets IBM equipment requirements.
- Inspect line cords and plugs. Check for loose, damaged or worn parts.
- Before removing a component which can retain a charge from the machine, review the procedure in the maintenance documentation. **CAREFULLY** discharge the necessary component exactly as directed by the service procedure.
- Do not use an ordinary lamp as an extension trouble light.

## Signal Flow and Wrap Test

### General

These charts show the signal flow and wrap test facilities for each adapter type. They should be used in conjunction with the MAP's when you are told to check a failing interface signal.

### Probing Procedure

When a failing signal is to be checked, the MAP's give the following information:

1. The reference page in this manual 'Supplement to MAPs' ( Features) that shows where to find the signal flow, for the wrap test facility being used.
2. The name of the failing signal.
3. Testpoint to probe.

The pin (testpoint) to probe is found on the referenced page by means of the signal name and the testpoint (see example).

The probe level is found in table 'A' on the referenced page. (See example).

### Example

Line address 30 is being tested.  
Failing signal: 'receive line signal detect' (obtained from the map).

The signal flow shows that the signal is wrapped.  
Therefore, four testpoints are available:

Testpoint in MAP	Physical Pin in Signal Flow
A - IN	S04 - CCA Card
B - OUT	B12 - I/F Card
B - IN	D02 - I/F Card At the other side of the wrap
A - OUT	S10 - CCA Card

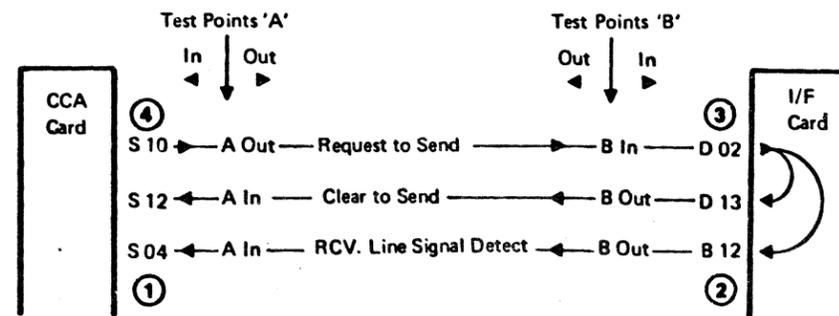
#### MAP Statement:

Probe the failing signal at testpoint 'A-IN'

#### CE Action:

In the chart find the signal 'receive line signal detect' and put the probe at the pin corresponding to the testpoint 'A-IN'.

Pin probed: S04 at the CCA card.



Before probing wait 2 minutes. The pin must be probed up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level). Due to the test timings a signal may have the same level for 18 seconds.

1. Probe the failing signal at testpoint 'A-IN' (S04 at CCA card)

Signal OK  
Yes No  
Compare the probed level with the 'Signal OK' level in table 'A'.

2. Probe the failing signal at testpoint 'B-OUT' (B12 at I/F card)

Signal OK

Yes No

3. Probe the failing signal at testpoint 'B-IN' (D02 at I/F card)

Signal OK

Yes No

4. Probe the failing signal at testpoint 'A-OUT' (S10 at CCA card)

Signal OK

Yes No

Failing FRU:  
CCA card

TABLE 'A'

Signal Name	CE Probe Indication if Signal is OK 'Signal OK Level'
Request to Send	A level change must be observed
RCV Line Signal Detect	A level change must be observed
Clear to Send	A level change must be observed

# Signal Flow and Wrap Test

## EIA Adapter Interface

EIA card wrap test, CCA clock

Configuration byte 2 = 18

### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

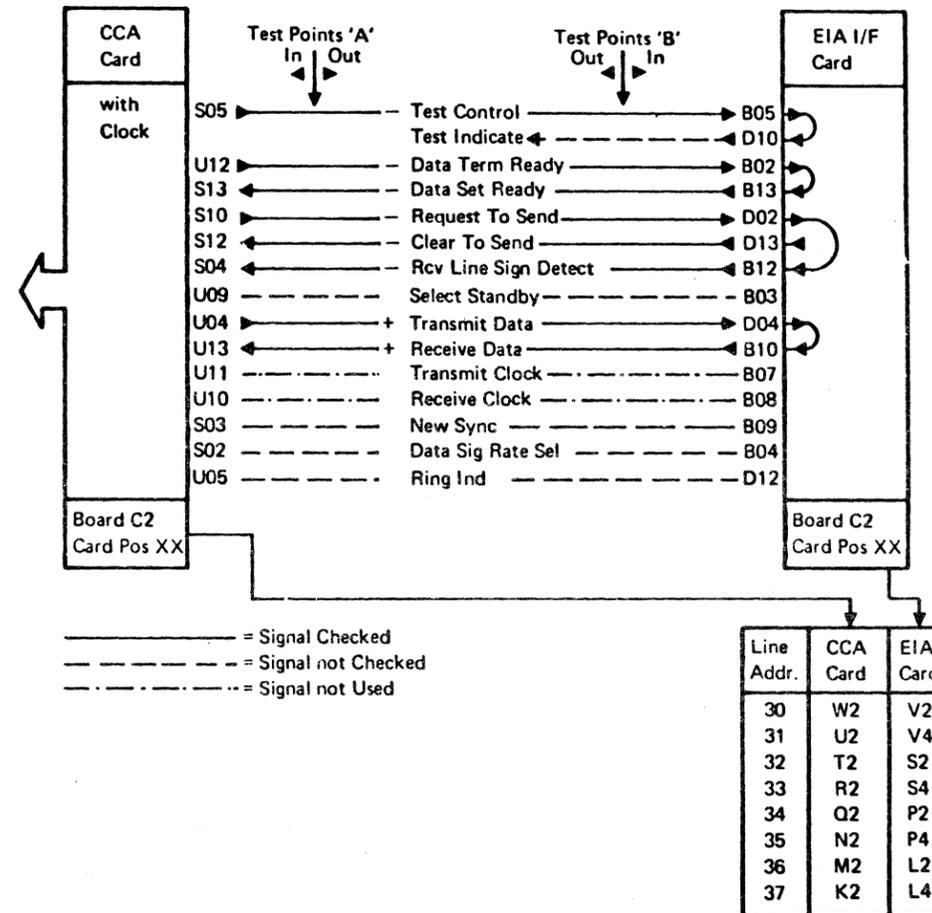
Before probing wait two minutes. The pin must be probed for up to 20 seconds to observe a level change (from up - level to down - level or from down - level to up - level).  
Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
For All Signals	A level change must be observed
Test Control	Always down level

### Jumpering

- Wrap options see page 0060.
- Transmission mode/rate see page 0090.



## Signal Flow and Wrap Test EIA Adapter Interface (continued)

### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes.  
The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).  
Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
For All Signals	A level change must be observed
Test Control	Always down level

### Jumping

- Wrap options see page 0060.
- Transmission mode/rate see page 0090.

## Signal Flow and Wrap Test EIA Adapter Interface (continued)

### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).  
Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
For All Signals	A level change must be observed
Test Control	Always down level

### Jumpering

- Wrap options see page 0060.
- Transmission mode/rate see page 0090.

# Signal Flow and Wrap Test EIA Adapter Interface (continued)

## Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
For All Signals	A level change must be observed
Test Control	Always down level

## Jumpering

- Wrap options see page 0060.
- Transmission mode/rate 0090.

## Signal Flow and Wrap Test EIA Adapter Interface (continued)

### Signal Checking

- Find the failing signal (given in the MAP) in the chart. See Note.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
Test Control	Always up level
For all other signals	A level change must be observed

### Jumping

- Wrap options see page 0060.
- Transmission mode/rate see page 0090.

Note : The failing signal may change its name if it is probed over the wrap point.  
Example :  
Failing signal is CLEAR TO SEND.  
After the wrap point it is called Request TO SEND.

## Signal Flow and Wrap Test EIA Adapter Interface(continued)

### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
Test Control	Always up level
For all other signals	A level change must be observed

### Jumping

- Wrap options see page 0060.
- Transmission mode/rate see page 0090.

## Signal Flow and Wrap Test EIA Adapter Interface (continued)

### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait two minutes. The pin must be probed for up to 20 seconds to observe a level change (from up - level to down - level or from down - level to up - level).  
Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
Test Control	Always up level
For all other Signals	A level change must be observed

This page has been  
intentionally left blank

CA

EC 366390 10 Apr 81	EC 366493 26 Oct 81		P/N 5683260 Page 1 of 16	2 178 F
------------------------	------------------------	--	-----------------------------	---------

## Signal Flow and Wrap Test EIA Adapter Interface (continued)

### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).  
Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
Test Control	Always up Level
For all other Signals	A level change must be observed

# Signal Flow and Wrap Test Integrated Modem Adapter Interface (continued)

## Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
For All Signals	A level change must be observed
Test Control	Always down level

For transmission mode/rate see page 0090.  
For description see page 0062.  
For transmission level switches and rocker switches see page 0074 and 0076.

## Jumper Setting on PSN Feature (Line Plate)

On the PSN (Public Switched Network) the jumpers A, G, K, M, and N must be plugged.

*Note on Jumper A:* The normal telephone DC voltage level supplied ranges from 26-50 V.

*Note on Jumper G:* If no telephone set is installed, plug jumper H instead of G.

Connect the DC voltmeter to TP1 and TP2 on the line plate, see Figure 1, to check the DC voltage.

If the supplied DC voltage deviates from the 'normal' range replug jumper A according to the table, Figure 2.

Line Plate

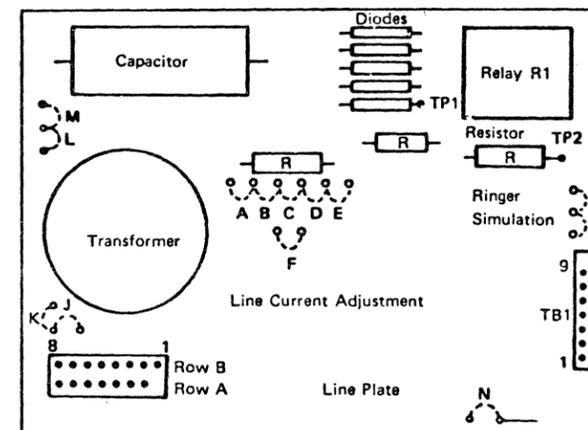


Figure 1

Voltage Level (V)	Jumper Setting
0.5 - 2	F
2 - 3.5	E
3.5 - 4	E
4 - 6	E
6 - 8	C
8 - 9	C
9 - 14	D
14 - 26	B
26 - 37	A ) Normal
37 - 50	A )

Figure 2

# Signal Flow and Wrap Test Integrated Modem Adapter Interface (continued)

## Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes.

The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
Data Set ready	Always down level.
Test Control	Always down level
For All Other Signals	A level change must be observed.

For Transmission mode/rate see page 0090.

For description see page 0062.

For transmission level switches and rocker switches see page 0074 and 0076.

## Signal Flow and Wrap Test Integrated Modem Adapter Interface (continued)

### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
Data set ready	A level change must be observed.
Test Control	Always down level
For all other signals	A level change must be observed

For transmission mode/rate see page 0090.

For transmission level see page 0062.

For setting of rocker switches see pages 0068, 0070, 0074, 0076.

## Signal Flow and Wrap Test Integrated Modem Adapter Interface (continued)

### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
Data Set Ready	Always down Level
Test Control	Always down level
For All Other Signals	A level change must be observed

For transmission mode/rate see page 0090.

For description see page 0064.

For rocker switches setting see page 0068 and 0070.

## Signal Flow and Wrap Test Integrated Modem Adapter Interface (continued)

### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
For All Signals	A level change must be observed
Test Control	Always down level

For transmission mode/rate see page 0090.

For description see page 0064.

For rocker switches setting see page 0068 and 0070.

## Signal Flow and Wrap Test

### V35 Adapter Interface (continued)

#### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).  
Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
For All Signals	A level change must be observed
Test Control	Always down level

Information about the interface card is found on page 0078.

Information about board wiring is found on page 0078.

This page has been  
intentionally left blank

CA

EC 366334 22 Feb 80	EC 366493 26 Oct 81		P/N 5683261 Page 1 of 14	2 318	F
------------------------	------------------------	--	-----------------------------	-------	---

## Signal Flow and Wrap Test V35 Adapter Interface (continued)

### Signal Checking

- Find the failing signal (given in the MAP) in the chart
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE probe indication if signal is OK "Signal OK Level"
Test control	Always up level
For all other signals	A level change must be observed

Information about the interface card is found on page 0078.

Information about board wiring is found on page 0078.

## Signal Flow and Wrap Test V35 Adapter Interface (continued)

### Signal Checking

- Find the falling signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if signal is OK "Signal OK Level"
Test Control	Always down level
For all other signals	A level change must be observed

Information about the interface card is found on page 0078.

Information about board wiring is found on page 0078.

# Signal Flow and Wrap Test

## Dataphone\* Digital Service Adapter Interface (DDSA) (continued)

\* Registered trade mark of AT&T.

### Signal Checking

- Find the falling signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe indication if signal is OK "Signal OK Level"
Data Set Ready	Always down level
Test Control	Always down level
For all other Signals	A level change must be observed

Information about the interface card is found on page 0080.

Information about board wiring is found on page 0090.

## Signal Flow and Wrap Test Dataphone\* Digital Service Adapter Interface (DDSA) (continued)

\* Registered trademark of AT&T

### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if signal is OK "Signal OK Level"
Test Control	Always up level
Data set ready	Always down level
For all other signals	A level change must be observed

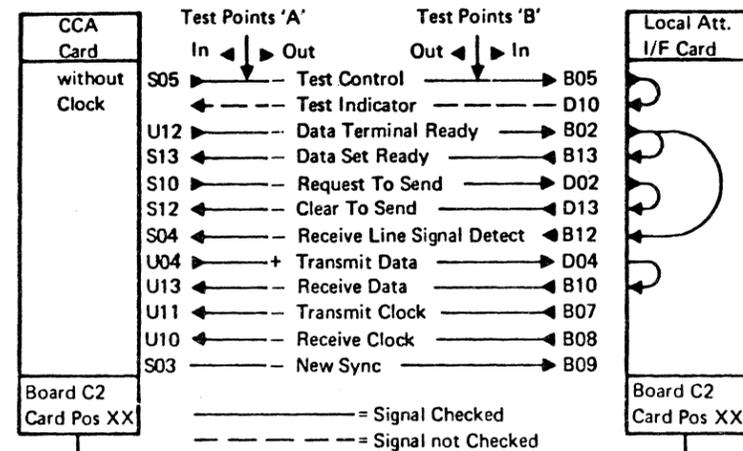
Information about the interface card is found on page 0080.

Information about board wiring is found on page 0090.

# Signal Flow and Wrap Test

## Local Attachment Adapter Interface

Local Attachment Card Wrap Test, Local Attachment Card Clock  
Configuration byte 2 = '90'



Note:  
The local attachment card clock is directly gated to the transmit/receive clock. For this reason, the signal 'NEW SYNC' is always at up level.

Line Addr.	CCA Card	Local Att. Card
30	W2	V2
31	U2	V4
32	T2	S2
33	R2	S4
34	Q2	P2
35	N2	P4
36	M2	L2
37	K2	L4

### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up - level to down - level or from down-level to up - level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
New Sync	Always up level
Test Control	Always down level
For all other Signals	A level change must be observed

Information about the interface card is found on page 0082.

Information about board wiring is found on page 0084 and 0090.

## Signal Flow and Wrap Test Local Attachment Adapter Interface (continued)

### Cable Plug Wrap Test, Local Attachment Card Clock

#### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait two minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe Indication if Signal is OK. "Signal OK Level"
Test Control	Always up level
New Sync	Always down
For all other Signals	A level change must be observed.

Information about the interface card is found on page 0082.

Information about board wiring is found on page 0084 and 0090.

This page has been  
intentionally left blank

EC 366334 22 Feb 80	EC 366388 23 Jan 81		P/N 5683262 Page 1 of 8	2 608 F
------------------------	------------------------	--	----------------------------	---------

# Signal Flow And Wrap Test

## Automatic Call Adapter 1 and 2 (ACA1 and 2) Interface (continued)

### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

### TABLE "A"

Note:  
 Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level). Due to the test timings, a signal may have the same level for 18 seconds.

Signal Name	CE Probe Indication if Signal is OK "Signal OK Level"
Test Control	Always Up Level
For All Signals	A level change must be observed

Information about the interface card is found on page 0060.

## Signal Flow and Wraptest (continued)

### X21 Adapter Interface (XLCA)

#### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe indication if signal is OK "Signal OK Level"
Data Set Ready	Always down level
For all other Signals	A level change must be observed

Information about the interface card is found on page 0086.

Information about board wiring is found on page 0090.

## Signal Flow and Wraptest (continued)

### X21 Adapter Interface (XLCA)

#### Signal Checking

- Find the failing signal (given in the MAP) in the chart.
- Put the probe at the pin corresponding to the test point given in the MAP.
- Compare the probed level with the "signal OK" level in table "A".

Before probing wait 2 minutes. The pin must be probed for up to 20 seconds to observe a level change (from up-level to down-level or from down-level to up-level).

Due to the test timings, a signal may have the same level for 18 seconds.

TABLE "A"

Signal Name	CE Probe indication if signal is OK "Signal OK Level"
Data Set Ready	Always down level
For all other Signals	A level change must be observed

Information about the interface card is found on page 0086.

Information about board wiring is found on page 0090.

## CA INLINE TEST

### General

The CA Inline Test aids the CE to isolate failures of the CA hardware. They also assist in isolating failures of the communication lines.

The Inline Test can be run against only one line at a time. When running an CA Inline Test, the customer program must not access the line tested. If the user program tries to access the communication line being used by the Inline Test, the command will be terminated and a busy condition shown.

The CA Inline Test is activated via the System Maintenance Selection Picture. After selection of '9' in that picture, the CA Inline Test Selection Picture is displayed and further selection can take place. Before a test is started the actual circuits to be checked are displayed. Information for the display is fetched from the CA Configuration Table.

#### IBM MAINTENANCE AND SERVICE PROGRAM SELECTION

LOG	TEST	TOOL
0 = LOG MODE	5 = POWER	B = MANUAL OPERATIONS
1 = REFERENCE CODE LOG	6 = CENTRAL COMPLEX	C = UTILITIES/REMOTE
2 = DETAILED LOG DISPLAY	7 = 5424	D = COMMUNICATION ADAPTER
3 = LAST DETAILED LOG	8 = DISK/TAPE INLINE	- = FRIEND
- = OTHERS	9 = CA INLINE	F = OTHERS
	- = OTHERS	

SELECTION: - = NOT AVAILABLE

MAN VSC TIMER: OFF DATA: 0000 ADDR: 000000  
TOD:SEC ANSWER

## CA Inline Test

### How to Stop (Terminate) an CA Inline Test

If the test is looping (Mode : E, EC, EI, EA, L, LI, LA) then:

1. Press the Alternate key and hold it down and press the Mode Select key.
2. Enter 9 and press ENTER.
3. Enter P and press ENTER.

The test is now stopped.

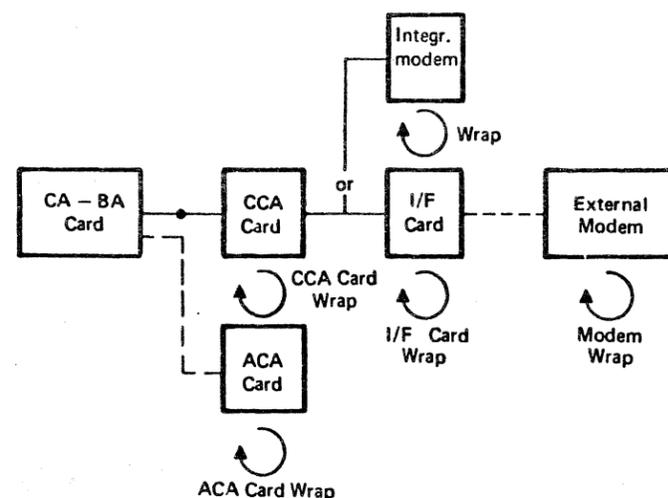
#### CA ILT Functions and Modes

Any error detected by the ILT on the CA-bus, or pre-CA-BA circuitry causes the test to stop before entering the different test steps of functions 21 to 24. In this case the reference code recommends normally to run the BA off-line diagnostics.

#### FCN = 20 - CA ILT menu

Function 20 displays the four 'test-functions':

- FCN 21 line interface test without wrap plug
- FCN 22 line interface test with wrap plug
- FCN 23 modem data stress test
- FCN 24 special wrap test



The desired function can now be selected together with the line address and mode.

#### FCN = 21 - line interface test without wrap plug.

Function 21 tests the line interface using either the interface (I/F) card wrap facility or the modem wrap facility, whichever is installed.

If the autocal adapter (ACA) is installed. It will be tested when the proper mode is selected.

Function 21 consists of the following steps:

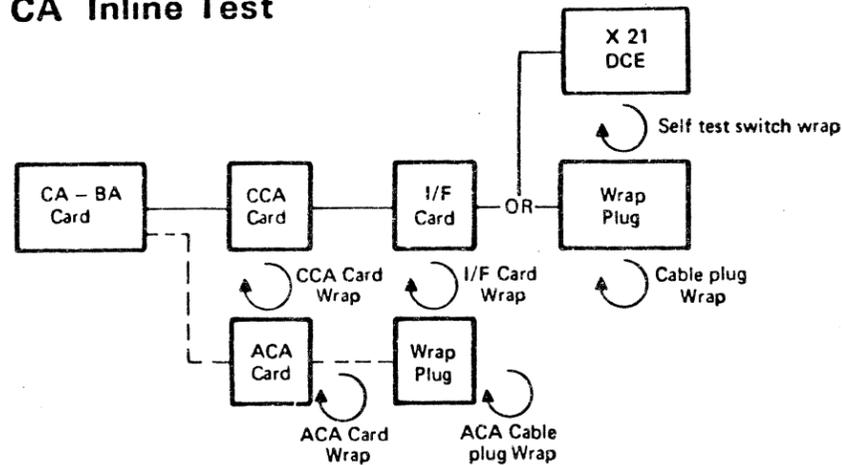
- CCA card static test
- CCA card wrap test
- I/F card wrap test (if I/F card wrap is installed)
- Modem wrap test (if modem wrap is installed)
- ACA card wrap test (if ACA is installed)

```

CA INLINE
-----
FCN: 20 INLINE TESTS          MODE: S = SINGLE RUN (DEFAULT)
    60 TRACE / DYNAMIC DISPLAY  P = STOP ACTIVE INLINE
    A0 LINE EXERCISER          E/EC/EI/EA = LOOP UNTIL FIRST ERROR
                                L/LI/LA = SCOPE LOOP
-----
THE FOLLOWING TEST ROUTINE(S) WILL BE EXECUTED
- CCA FUNCTIONAL TEST
- CCA WRAP TEST
- EIA CARD WRAP TEST
- EIA/ACA CARD WRAP TEST

PRESS ENTER TO START TEST OR PF3 TO EXIT
INPUT:FCN 21 LINE 30 MODE S
-----
S Y S T E M   A R E A
    
```

## CA Inline Test



FCN = 22 Line Interface test with wrap plug (for X21 interface, see Note).

Function 22 tests the line interface using the I/F card wrap facility and the cable wrap plug. To run this test the cable wrap plug must be connected (for X21 interface, see Note).

If the autocal adapter (ACA) is installed, it will be tested when a proper mode is selected. ACA cable wrap plug must be connected.

Function 22 consists of the following steps:

- CCA card static test
- CCA card wrap test
- I/F card wrap test (if I/F card wrap is installed)
- Cable wrap plug test (for X21 interface, see Note)
- ACA card wrap test (if ACA is installed)
- ACA cable wrap plug test (if ACA is installed)

Mode Explanation

**S** This mode is the default (mode S is assumed if no mode is specified). All applicable steps (see above) are executed once, and then the test stops, if error-free.

In case of error, the test stops when the error occurs, and a reference code is displayed.

**E** The following steps are executed and repeated until an error occurs:

- CCA card static test
- CCA card wrap test
- I/F card wrap test (if I/F card wrap is installed)
- Cable wrap plug test
- ACA card wrap test (if ACA is installed)
- ACA cable wrap plug test (if ACA is installed)

Note: For testing of X21 interface the selftest switch or the wrap test tool must be used instead of the wrap plug.

In case of error, the test stops when the error occurs, and a reference code is displayed.

If the test is error-free, it continues looping and must be stopped by pressing mode P (see: how to stop a CA ILT page 3104).

**EC** The following steps are executed and repeated until an error occurs:

- CCA card static test
- CCA card wrap test

In case of error, the test stops when the error occurs, and a reference code is displayed.

If the test is error-free, it continues looping and must be stopped by pressing mode P (see: how to stop a CA ILT page 3104).

**EI** The following steps are executed and repeated until an error occurs:

- CCA card static test
- CCA card wrap test
- I/F card wrap test (if I/F card wrap is installed)
- Cable wrap plug test

In case of error, the test stops when the error occurs, and a reference code is displayed.

If the test is error-free, it continues looping and must be stopped by pressing mode P (see: how to stop a CA ILT page 3104).

```

CA INLINE
-----
FCN: 20 INLINE TESTS          MODE: S = SINGLE RUN (DEFAULT)
    60 TRACE / DYNAMIC DISPLAY    F = STOP ACTIVE INLINE
    A0 LINE EXERCISER            E/EC/EI/EA = LOOP UNTIL FIRST ERROR
                                L/LI/LA = SCOPE LOOP
-----
THE FOLLOWING TEST ROUTINE(S) WILL BE EXECUTED
- CCA FUNCTIONAL TEST
- CCA WRAP TEST
- EIA CARD WRAP TEST
- EIA MODEM CABLE PLUG WRAP TEST
- EIA/ACA CARD WRAP TEST
- ACA I/F PLUG WRAP TEST

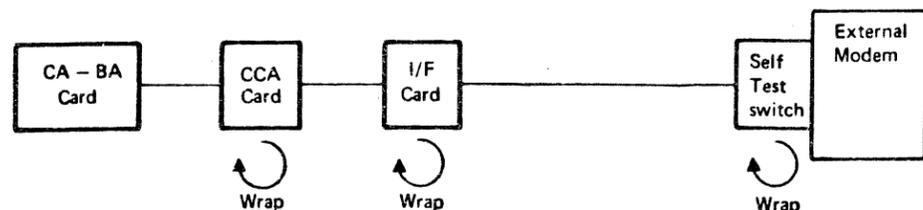
INSERT EIA MODEM CABLE WRAP PLUG AND ACA I/F WRAP PLUG

PRESS ENTER TO START TEST OR PF3 TO EXIT

INPUT:FCN 22 LINE 30 MODE S
    
```

## CA Inline Test

FCN = 24 - Special Wrap Test



If the external cable has P/N 8 482 351 (no Self Test Switch), use Function 22.

Function 24 tests the line interface using the I/F card wrap facility (if installed) and the self test switch facility.

*Note:* Self test switch is a special wrap facility for Japan only, implemented on the external cable required for NTT modem attachment to EIA interface.

The switch on the self test plug must be in test mode.

If the modem provides the clock, the modem must be connected and have power on.

Function 24 consists of the following steps:

CCA card static test  
CCA card wrap test  
I/F card wrap test (if I/F card wrap is installed)  
Self test plug wrap

```

CA INLINE
-----
FCN: 20 INLINE TESTS          MODE: S = SINGLE RUN (DEFAULT)
 60 TRACE / DYNAMIC DISPLAY   P = STOP ACTIVE INLINE
 A0 LINE EXERCISER           E/EC/EI/EA = LOOP UNTIL FIRST ERROR
                             L/LI/LA = SCOPE LOOP
-----
THE FOLLOWING TEST ROUTINE (S) WILL BE EXECUTED
- CCA FUNCTIONAL TEST
- CCA WRAP TEST
- EIA CARD WRAP TEST
- EIA MODEM CABLE SPECIAL WRAP TEST
-----
ASSURE THAT SPECIAL WRAP CAPABILITY IS ACTIVATED
PRESS ENTER TO START TEST OR PF3 TO EXIT
INPUT:FCN 24 LINE 30 MODE S
  
```

© Copyright International Business Machines Corporation 1979, 1980, 1981

### Mode Explanation

**S** This mode is the default (mode S is assumed if no mode is specified). All applicable steps (see above) are executed once, and then the test stops, if error-free.

In case of error, the test stops when the error occurs, and a reference code is displayed.

**E** The following steps are executed and repeated until an error occurs:

CCA card static test  
CCA card wrap test  
I/F card wrap test (if I/F card wrap is installed)  
Self test plug wrap

In case of error, the test stops when the error occurs and a reference code is displayed.

If the test is error-free, it continues looping and must be stopped by pressing mode P (see: how to stop an CA ILT page 3104).

**EC** Same as mode E

**EI** Same as mode E

**EA** Same as mode E

**L** The following steps are executed and then the last step loops (regardless of error) until the test is stopped by pressing mode P. (See: how to stop an CA ILT page 3104.) See Note.

CCA card static test  
CCA card wrap test  
I/F card wrap test (if I/F card wrap is installed)  
Self test plug wrap test

**LI** Same as mode L. See Note.

**LA** Same as mode L. See Note.

*Note:* If any error is detected before the last step is entered the ILT stops with an appropriate reference code indication.

EC 366390 10 Apr 81	EC 366493 26 Oct 81	P/N 8488682 Page 7 of 10	3 112 F
------------------------	------------------------	-----------------------------	---------

CA

## CA Trace

### How to Start and Stop the CA Trace

#### How to Start the Trace

1. Press the Alternate key and hold it down and press the Mode Select Key.  
The maintenance selection picture is displayed. Under the heading "test", option 9 specifies CA Inline.

2. Enter 9 and press ENTER  
The CA Inline Selection picture is displayed.

*Note:* If another ILT is active, a self-explanatory message is displayed. The CE must now leave the selection procedure by either pressing PF3 or by entering mode P.

The CA inline selection picture displays:

FCN: 60 trace/dynamic display

3. Enter 60 and press ENTER  
This displays the CA line trace and dynamic display function codes.

61 start standard line trace  
62 start extended line trace  
63 start dynamic display  
64 invoke/start dynamic trace

4. Enter function (FCN) 61 or 62 and the address(es) for the line(s) to be traced and press ENTER

The line trace is now active and the screen is given to the customer program.

FCN 64 without line address is for DYNAMIC TRACE invoke. This is the prerequisite for use of a operating system controlled trace program (e.g. DYNADUMP under DOS/VSE). The line to be traced will be selected by the trace program which starts and stops the trace activities dynamically.

FCN 64 with one line address is for DYNAMIC TRACE invoke and start. By using this option, the collection of trace data for the specified line starts immediately. The trace program should not use the start option before the stop option in this case.

The trace remains active until stopped by pressing mode P (see: how to stop the trace).

# CA Dynamic Display

## General

The CA dynamic display displays information about one CA line at the system console display. The information is continuously updated and the line operation is not impacted. There will, however, be some impact on the total system performance.

## How to Start the Dynamic Display

1. Press the Alternate key and hold it down and press the Mode Select key.

The maintenance selection picture is displayed. The heading 'test' specifies the option:

9 CA inline

2. Enter 9 and press ENTER

The CA Inline selection picture is displayed. The function codes for the CA inlines are shown. The trace/dynamic display has FCN = 60.

*Note:* If another ILT is active, a self-explanatory message is displayed. The CE must now leave the selection procedure by either pressing PF3 or by entering mode P.

3. Enter 60 and press ENTER

This displays the function codes for the traces and the dynamic display

FCN : 61 start standard line trace  
 FCN : 62 start extended line trace  
 FCN : 63 start dynamic display

4. Enter function (FCN) 63 and desired line address.

Press ENTER

The dynamic display is now active.

## How to stop the CA dynamic display

1. Press the Alternate key and hold it down and press the Mode Select key.
2. Enter 9 and press ENTER
3. Enter P and press ENTER

The dynamic display is now stopped.

## Display Format

```

                                I63AA BCC DDEE FG H JK L MN
                                | | | | | | | | | |
ID OF THE DYNAMIC DISPLAY --> I63
LINE ADDRESS ----->AA |
COMMAND CODE ----->B |
DATA CHARACTER ----->CC |
FIRST SENSE BYTE -----> DD |
SECOND SENSE BYTE ----->EE |
RM - RECEIVE MODE ----->F |
TM - TRANSMIT MODE ----->G |
RI - RING INDICATOR -----> H |
DTR - DATA TERMINAL READY -----> J |
DSR - DATA SET READY ----->K |
CD - CARRIER DETECT -----> L |
RTS - REQUEST TO SEND ----->M |
CTS - CLEAR TO SEND -----> N |
    
```

*Note:* For detailed information about command code, (first and second sense byte). See CA tools (display trace data) page 4304.

## CA Line Exerciser

### FCN = A1 - Invoke

(See page 3404 - 3408 for details.)

This function must be selected when the CE wants to create a CCW chain.

The commands and necessary data are entered in the input field - one command at a time. When the command and data are complete, ENTER is pressed. The command and data are then placed at line 8-17 in the sequence entered with the sequence number in front of the command.

The CCW chain can contain a maximum of 10 commands including the execute command. For SDLC only XID, SNRM, TS or TE is to be entered.

The execute command is the last command entered. The CE is prompted to select trace or not trace.

If trace is selected the extended trace facility will be used.

### FCN = A2 - Display CCW's/Data (Note:)

This function displays the CCW chain - for S/S and BSC or the XID, SNRM, TS or TE function (no CCW's) for SDLC - including any received data. All data, including the dial number, is presented in hex notation. If the information to be displayed requires more than one line, 'more' appears at the end of the line. If, in read type commands, the length count is higher than the received message, zeros are shown in the remaining positions on the screen. Zeros are also shown with control type commands where no data transfer is done.

### FCN = A3 - Repeat last chain (Note:)

This function is entered if the CE wants to run the same CCW chain again or to modify it before restarting.

The present CCW chain - for S/S and BSC or the XID 'SNRM' TS or TE function for SDLC - will be displayed and the CE can now change it as described under function A1 (for S/S and BSC only).

To change the line, mode or trace specifications, enter X (execute command).

If XY or XN is entered, the old specifications for line, mode and trace are used.

Note: The CCW chains are lost when trace data is displayed.

© Copyright International Business Machines Corporation 1980, 1981

```

CA INLINE
-----
FCN: 20 INLINE TESTS          MODE: S = SINGLE RUN (DEFAULT)
    60 TRACE / DYNAMIC DISPLAY  P = STOP ACTIVE INLINE
    A0 LINE EXERCISER          E/EC/EI/EA = LOOP UNTIL FIRST ERROR
                                L/LI/LA = SCOPE LOOP
-----
INPUT: _
  
```

```

CA INLINE
-----
FCN: 20 INLINE TESTS          MODE: S = SINGLE RUN (DEFAULT)
    60 TRACE / DYNAMIC DISPLAY  P = STOP ACTIVE INLINE
    A0 LINE EXERCISER          E/EC/EI/EA = LOOP UNTIL FIRST ERROR
                                L/LI/LA = SCOPE LOOP
-----
CCW01 = 27003128 60000001 DATA = 00
CCW02 = 01003129 60000001 DATA = 2D
CCW03 = 0200312A 60000002 DATA = 1070
CCW04 = 0100312C 60000016 DATA = 025C5C5C 4040F0F1 F2F3F4F5 F6F7F8F9 40405C5C
                                5C03
CCW05 = 02003169 60000002 DATA = 1061
CCW06 = 0100316B 60000001 DATA = 37
CCW07 = 2F00316C 20000001 DATA = 00
-----
CCW07 END U0C C00 RC00 SNS0000
INPUT:FCN A2 LINE  MODE
  
```

```

CA INLINE
-----
FCN: 20 INLINE TESTS          MODE: S = SINGLE RUN (DEFAULT)
    60 TRACE / DYNAMIC DISPLAY  P = STOP ACTIVE INLINE
    A0 LINE EXERCISER          E/EC/EI/EA = LOOP UNTIL FIRST ERROR
                                L/LI/LA = SCOPE LOOP
-----
|01 E
|02 W2D
|03 R02
|04 W025C5C5C4040F0F1F2F3F4F5F6F7F8F940405C5C03
|05 R02
|06 W37
|07 D
-----
INPUT: _
  
```

EC 366390  
10 Apr 81

EC 366493  
26 Oct 81

P/N 5683263  
Page 3 of 16

3 402 F

CA

## CA Line Exerciser (continued)

### Break

The Break command stops transmission from a remote terminal.

Data must be specified.

The data itself is not used, but the lengthcount, generated by the program, is used when the CA sends the Break characters. I.e. the number of break characters transmitted is equal to the number of data characters.

*Note:* The Break command must only be used if the remote terminal has a receive interrupt feature.

### TIC

The TIC command is a branch command which can be used to create a loop in the CCW chain.

*Example:* TIC XX

The next CCW command to be executed is number XX.

### SDLC

The SDLC exerciser functions use the Set Mode command which changes the line status.

General Initialization CCW sequence for TS, TE, XID, SNRM.

Disable

Set mode

Enable (if Autocall feature is installed, the Enable CCW is replaced by the DIAL CCW. In this case, the CE will be prompted for the dialing number.

The Disable, Enable and Dial commands are described under S/S and BSC commands.

The Set Mode command takes care about 8 bytes which will be set to the following values:

### Byte

- 0 = '00' No change of data poll and contact poll index
- 1 = '00' Data poll index
- 2 = '00' Contact poll index
- 3 = '00' Contact poll frequency
- 4 = '1E' Service seeking pause (3 seconds)
- 5 = '00' If operating as secondary station - TE on leased line - Receive time out is infinite.
- '0A' If operating as primary station - TS and XID - 1 second idle detect time out.
- '03' If operating as secondary station - TE on SWNW - 3 seconds nonproductive time out.
- 6 = '00' Line is operating as primary station (TS, SNRM and XID functions)
- '80' Line is operating as secondary station (TE function)
- 7 = SDLC address as secondary station (TE function). The CE will be prompted for this value.

### Execute (S/S, BSC and SDLC)

The Execute command must be the last command in the chain. It is used to start the execution of the CCW chain. XY, XN or X may be entered.

- XY - Starts execution of the CCW chain with the Trace function active. Extended Trace and the Line Exerciser will run on the same line. Information about the line activity will be recorded in the CA. Trace area (see Trace description for more details).
- XN - Starts execution of the CCW chain without Trace.
- X - If only X is entered, the CE will be prompted for Trace (Y/N) specification. He also has the option to respecify line and mode. Execution starts when Y and N for trace is entered.

## CA Line Exerciser

### Data Syntac A-Dial,W-Write,B-Break Commands

- a. Data can be entered in hex code or - if quoted - in 'directly readable' form.
- b. /XX indicates repetition XX (hex) times of the previous character.
- c. Quoted blanks are treated as data.
- d. The first unquoted blank is treated as 'End of data'.
- e. Maximum 3F (decimal 63) data characters in one CCW.
- f. Quotes and slashes (if used as data) must be entered in hex notation.

#### Examples

- a. Data can be entered in hex code or - if quoted - in 'directly readable' form.

means:                   W 02 5C5C5C5C5C 03  
WRITE STX \*\*\*\*\* ETX to a BSC Terminal.

Data can be entered in 'directly readable' form if quoted.  
For a BSC line

is the same as           W 02' \*\*\*\*\*'03  
W 025C5C5C5C5C 03

For an SS line

is the same as           W16' \*\*\*\*\*'3D  
W 16 9090909090 3D

*Note:* For all commands but Dial the Line Exerciser converts 'directly readable' data to PTTC/EBCD code - 2740/2741, if the line specified is defined as an S/S line. For a BSC line, 'directly readable' data is treated as ordinary EBCDIC.

- b. /XX indicates repetition XX (hex) times of the previous character.  
By entering /XX after a character - where XX is a hex figure - the character will be repeated XX times.

is teh same as           W02 5C /04 03  
or                        W02 5C6C5C 5C 5C 03  
or                        W02' ..... 03  
or                        W02' /0403

- c. Quoted blanks are teated as data. All blanks in a data string must be witin quotes

                          W02 ' \* \* \* \*'  
'bb0123456789bb \* \* \* \*' 03  
b = blank

- d. The first unquoted blank is treated as 'End of data'.

The data string is terminated simply by the first unquoted blank

W 02 ' \* \* \* \*' 03  
W 025C5C5C

*Note:* An entered command is normally displayed in expanded form on line 8-17.

Entered command:   W 02 '\*' /04 03  
Displayed:           &W 025C5c5c5c5c 03  
The compressed form is used only if the expnaded one takes more than one line.

Length count (R - Read, P - Prepare, I - Inhibit - Commands)

The length count is specified by a double figure in hex.

ROA means: Read 10 characters  
R01 means: Read 1 character (minimum count)  
R3F means: Read 63 characters (maximum count)  
The lengthcount must be equal or greater than the number of characters received.

## CA Line Exerciser

### Error Messages

An error in the input field causes an error message on line 19. The cursor will normally be positioned where correction is necessary. Correct the error and re-enter.

Examples of error messages:

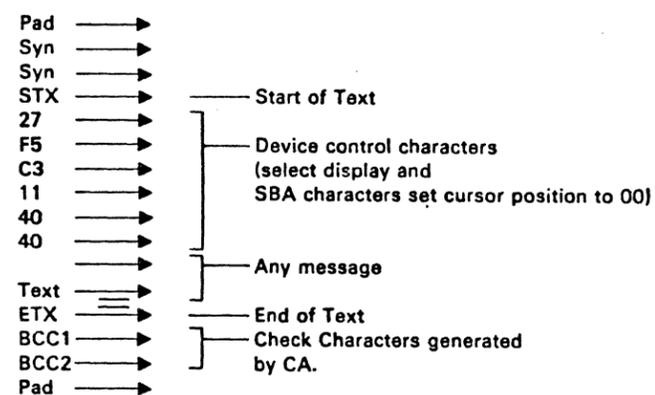
Message	Explanation
Invalid Line Invalid Mode	Line not installed Valid modes: S,E,L NOTE: Mode P valid only if a chain is already looping
Invalid Command Invalid SDLC command sequence	Valid S/S-BSC commands: E,D,A,W,R,P,I,B,T,X,REP,INS,DEL,CANCEL Valid SDLC commands: TS,TE,XID,SNRM,X,CANCEL TE can be used only as single operation
No Command(s) entered Too many Commands entered	X entered as first command Maximum 10 commands in a CCW chain. (S/S and BSC) Maximum 2 SDLC commands in one sequence
X or CANCEL is valid only	No command additions or changes are allowed if the A3 function (repeat last chain) is used for a SDLC line.
Command Requires Data Maximum Data Fid Length exceeded	A,W, and B commands require data. (S/S and BSC) Max. Length for S/S and BSC X'3F' for SDLC X'20'
Invalid Repeat Count Invalid Data Syntax	Valid count: hex 00-3F (for S/S and BSC for SDLC X'00'-'20' Unpaired hex digit or a character other than / (slash) or ' (quotes) outside quotes.
Unpaired Quotes Length count(01-3F) Required Length count Invalid - Must be 01-3F.	The number of ' (quotes) should be even. For S/S and BSC For S/S and BSC
Invalid CCW Count for REP Invalid CCW Count for INS Invalid CCW Count for DEL	The CCW sequence number given in a REP, INS or DEL command must be equal to one of the sequence numbers already in use. } S/S and BSC
REP Currently not Possible INS Currently not Possible DEL Currently not Possible	Previous edit command not completed (S/S and BSC).
Invalid Trace Specification Line Busy or not disabled	Valid Trace Specifications are: Y or N. The line must not be busy due to normal functional business. In case of SDLC the line must be disabled.

Prompting Messages for SDLC

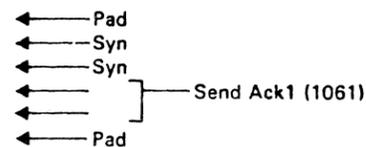
Message	Explanation
Enter secondary station address in hex	For TS and XID address of remote station is required For TE own address is required
ACU to be used (Y/N)	Decision if Autocall Adapter is installed. 'N' is to be entered if an Autocall Unit (ACU) is not available, not operational or line is specified as leased. 'Y' is to be entered if line should operate with ACU.
Enter Data	The TS function requires data (max. 32)
Enter Dial Number	The number to be called must be entered for autocall feature
Establish Line Connection	The line connection on a switched network manual dialing has to be established.
Enter command (SDLC)	TS, TE, XID, SNRM, X or CANCEL has to be entered

## CA Line Exerciser (continued)

05 • Write, Data = 0227F5C3114040..Text.03



06 • Read, DL = 2



07 • Write, Data = 37



## CA Line Exerciser (continued)

### 2 S/S Transmission Code

#### 2A Remote Terminals:

2741  
3767 in 2741 Mode  
Line connection: point to point

#### Operating Sequence

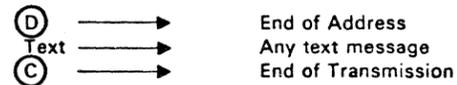
Writes and reads messages

01 E  
02 W 16'MESSAGE'1F  
03 I 3F  
04 T 02

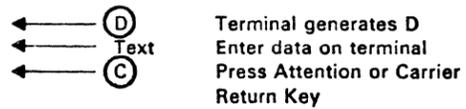
CA 2741 or 3767



01 • Enable  
02 • Write, Data = 16TEXT1F



03 • Inhibit, DL = 63



04 • TIC - 16 (Back to Write)

#### 2B Remote Terminal:

2740 Mod 1 or 2  
3767 in 2740 Mod 1 or 2 mode

#### Poll operation procedure

Polls a terminal and reads a message

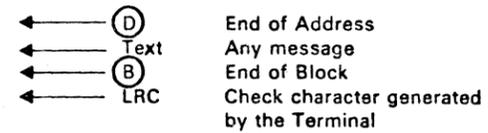
01 E  
02 W 1FYY01 (NOTE: YY = Terminal Address)  
03 R 63  
04 W 76  
05 R 01

CA 2740 or 3767

01 • Enable  
02 • Write, Data = 1FYY01



03 • Read, DL = 63 (data length)



04 • Write, Data = 76



05 • Read, DL = 1



# SDLC CCW Chains

## General Initialization CCW Sequence

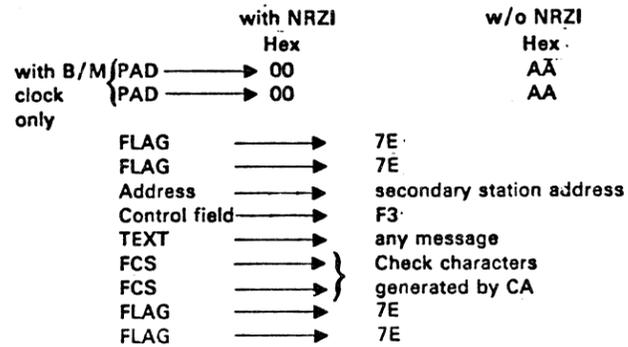
Leased line/SWNW-manual dialing

SWNW - Autocall

- |    |            |   |    |            |
|----|------------|---|----|------------|
| 01 | • Disable  | } Automatically set up before start of TS, TE, XID and SNRM | 01 | • Disable  |
| 02 | • Set Mode |   | 02 | • Set Mode |
| 03 | • Enable   |   | 03 | • DIAL     |

## TS

- 04 • Write Data=XX YY'TEXT'



- 05 • Read, DL=32

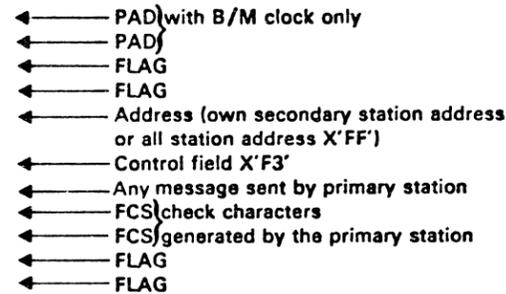
same sequence and data as for Write is expected, transmission will be done by the remote station.

Note: XX = secondary station Address (entered by CE)  
YY = Command (set automatically)

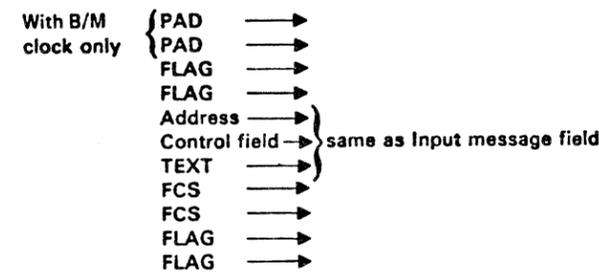
For TS, XID and SNRM an address of 'FF' (all station address) can be used. In that case the remote station will respond with its own station address. Only one secondary station must be powered on in a multipoint network when using the 'all station address' otherwise a data mix may be received.

## TE

- 04 • Read, DL=32

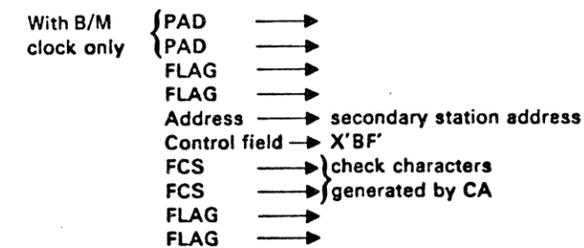


- 05 • Write, Data=Data of Input message field

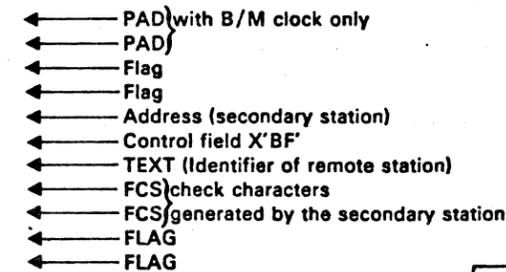


## XID

- 04 • Write, DL=2, Data=XXYY



- 05 • Read, DL=22



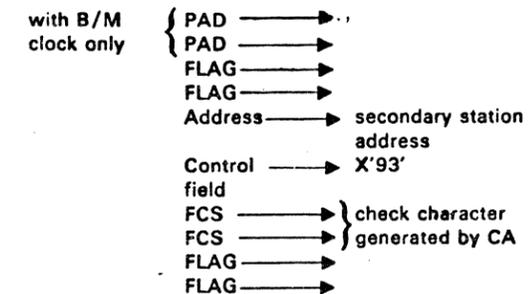
## General Ending CCW

- 06 • Disable

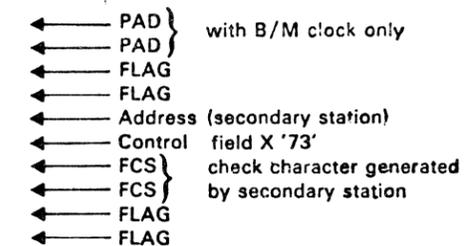
Note: If two SDLC functions are combined the CCW numbering is expanded to 06 and 07 for the second data transfer part and 08 for the Ending disable command.

## SNRM

- 04 • Write, DL=2, Data=XXYY



- 05 • Read, DL=2



## CA TOOLS

### General

CA Tools has three functions:

#### A = Update Configuration Table

This function is used when it is necessary to make changes in the configuration table.

#### B = UCW Display

This function is used to display the UCWs for all CA lines.

#### C = Display Trace Data

This function is used to display the data traced by the CA line trace.

### How to Select the CA Tools Functions

1. Press the alternate key and hold it down and press the mode select button.

The maintenance selection picture is displayed.

Below the heading 'Tool' the option displayed is:  
CA

2. Enter option CA and press ENTER.  
The CA tools selection picture will be displayed.  
The function codes for the CA tools are shown:

An Update configuration table  
B UCW display  
C Display trace data

3. Enter the desired function and press ENTER.

## FCN = A. Update Configuration Table

### General

The Configuration Table contains information on how each Line Adapter is operated. The table resides on the Control Program Diskette. Each CA line occupies 4 bytes (with some RPQ,s six (6) bytes. The information, based upon the feature codes, is set up by the link process in manufacturing. Some of the information can be changed in the field by the Configuration Table Update function.

The following parameters can be changed:

#### BSC Line Control

- a. Non-switched or switched
- b. Permanent request to send (duplex facility)
- c. EIA/V35 interface card wrap disabled (external modem wrap)
- d. Select Standby (for switched network backup)
- e. Integrated modem answer tone select (2125 or 2025 Hz)
- f. New Sync
- g. EIB mode
- h. Data signal rate select (low or high speed)
- i. High-speed operation (enables an extra transmit buffer to be used, line address 30 only)
- k. DTR (Data Terminal Ready) or CDSTL (Connect Data Set to Line) modem procedure
- l. EBCDIC or ASCII transmission code

*Note: Use of permanent RTS is recommended in Japan.*

### Start/Stop Line Control

- a. Non-switched or switched
- b. Permanent request to send (duplex facility)
- c. EIA interface card wrap disabled (external modem wrap)
- d. Select Standby (for switched network backup)
- e. Integrated modem answer tone select (2125 or 2025 Hz)
- f. Read interrupt
- g. Write interrupt
- h. Unit exception suppress
- i. Turnaround delay select
- k. Line speed (must correspond to the CCA clock strapping)

*SDLC Line Control, same as BSC except:*

- g. Not NRZI instead of EIB-mode
- l. Not used for SDLC

### Line Selection

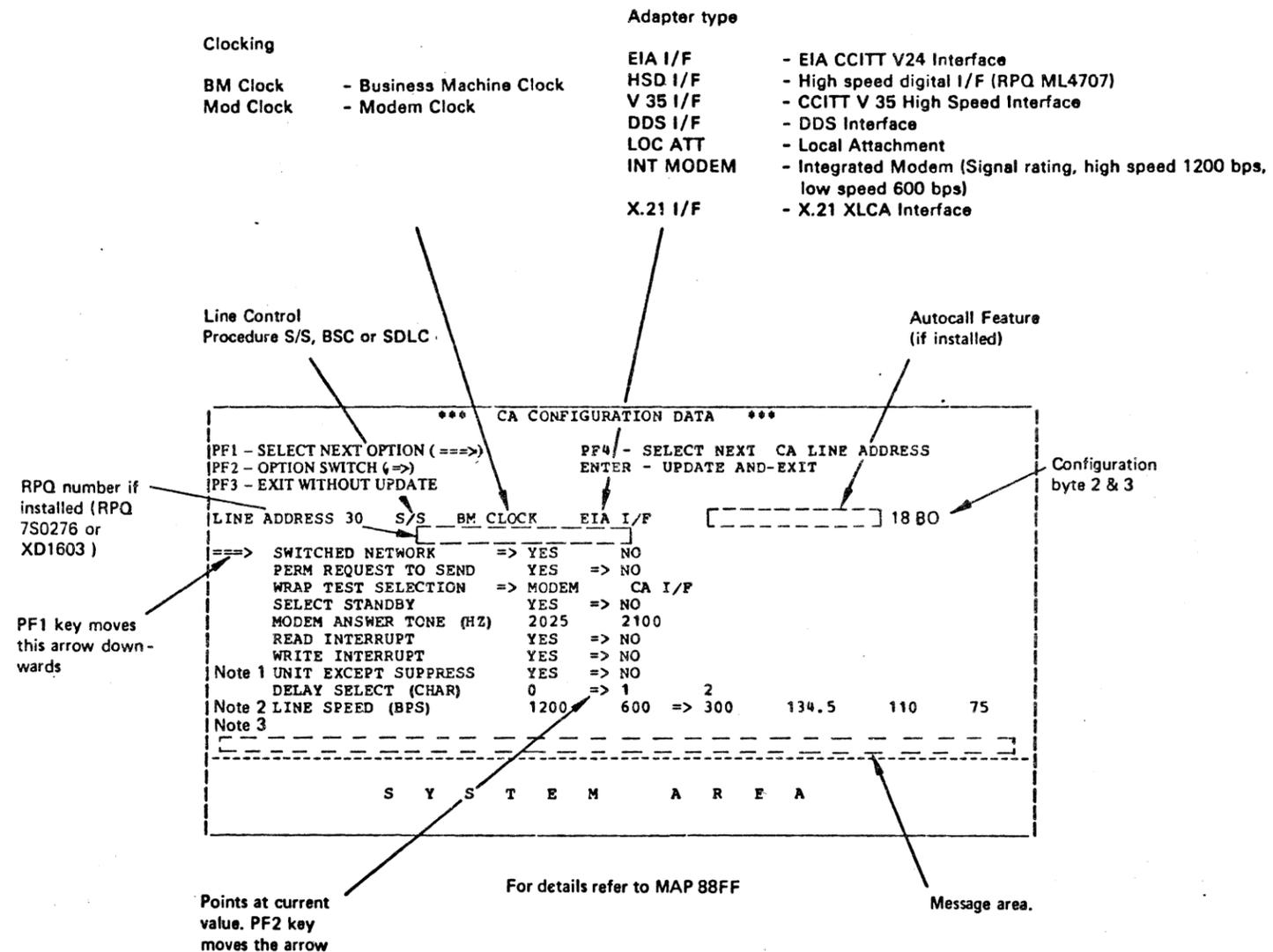
When function A is selected, the configuration for the first line (line address 30) is displayed. If the line is not installed, 'Line not installed' is displayed.

The PF4 key is used to swap to next line. When the last line (line address 37) is reached, PF4 swaps to the first line.

## CA Tools (continued)

### FCN = A. Update Configuration Table (continued)

Note: Use charts on pages 5010 to 5025.



### Updating

When the line address to be updated is displayed, the necessary changes for this line can be done.

1. Use the PF1 key to put the large arrow ==> in front of the parameter to be updated.
2. Use the PF2 key to put the small arrow => in front of the desired value.

Repeat steps 1-2 until all the parameters have the desired values. Then go to step 3.

Note: If the small arrow is missing, the parameter is not relevant to this configuration. Some combinations of parameter values are invalid. If such a combination is entered, a warning message is given and the change is rejected.

3. Use the PF4 key to select the next communication line to be updated.

Repeat steps 1-3 until all lines are updated. Then go to step 4.

4. Do you want to update the diskette with the new configuration table?

Yes: Go to step 5. No: Go to step 6.

5. Hit ENTER.

A warning message is displayed. If Enter is pressed again, the diskette is updated. The configuration table update routine is terminated.

A RE-IML is required after this update procedure.

6. Use the PF3 key.

The configuration table update routine is terminated. The diskette is not updated.

#### Notes:

1. If RPQ 7S0276 is installed then unit exception suppress is exchanged by: Stopbit(s) one ----> two
2. If RPQ 7S0276 is installed then line speed 2400 bps is added.
3. If RPQ 7S0276 is installed then the following option is added: CR AS LN CTRL CHAR yes ----> no

© Copyright International Business Machines Corporation 1980, 1981

CA

EC 366390 10 Apr 81	EC 366493 26 Oct 81	P/N 5683264 Page 3 of 14	4 210 F
------------------------	------------------------	-----------------------------	---------

## CA Tools (continued)

S/S

### BYTE 0

#### Bit 0 Permanent Request to Send

Specifies Request to Send to be permanently in effect to avoid turn-around delay in Duplex facility. This is used for: A four-wire leased line (non-switched); two-wire Duplex modems (switched or non-switched); break feature for 274X; or CPU is the master station in multipoint network.

#### Bit 1 Switched Line

Specifies Switched Line facility.

#### Bit 2 Unit Exception Suppress

Specifies that the Unit Exception bit in the Unit Status Byte (CCW 5 byte 0) will not be set if an EOT character is received. This bit must be active to allow chaining if the remote terminal is a 2741.

#### Bit 3 Write Interrupt

Indicates that the attachment can recognize a Break command (Stop communication) from the remote terminal. The line must have Duplex facility.

#### Bit 4 Read Interrupt

Specifies that the Break command can be used on this line. The remote terminal must have the Write Interrupt capability and the line must have Duplex facility.

#### Bit 5 and 6 Delay Select

These two bits specify the Termination Delay time for Read and Write type of operation. This delay is used to avoid picking up of noise during dropping of the carrier on the local or remote modem.

Bit:	5	6	Delay Selected
	0	0	No Delay
	0	1	One character time
	1	0	Two character time
	1	1	Two character time

- For READ type operations, the CA monitors receive data line to be quiet for the selected delay time before terminating the operation.
- For WRITE type operations, the CA waits for the selected delay time before terminating the operation after CTS has turned off.
- With Permanent RTS specified (byte 0, bit 0 = on), no delay is allowed to be specified except for multipoint configurations where the attached terminals operate in Switched RTS mode.
- The requirement for a one or two character time delay depends on the line and modem characteristic. It must be adjusted on a line specific base.

#### Bit 7 38 LS Manual Answer

Indicates Manual Answer Facility of specific 38 LS integrated modem types (Not changeable).

### SDLC

#### Byte 0

Bit 0-3 and 6-7 see S/S or BSC.  
Bit 4 is special indicator for under cover modem. (Equipment check instead of Intervention required).  
Bit 5 is not used.

This page has been  
intentionally left blank

CA

This page has been  
intentionally left blank

CA

EC 366390 10 Apr 81	EC 366493 26 Oct 81		P/N 5683264 Page 9 of 14	4 240 F
------------------------	------------------------	--	-----------------------------	---------

## CA Tools (continued)

### CCW Flags - Word 2, Byte 0

**Bit**

- 0 = Chain Data Flag
- 1 = Command Chaining
- 2 = Suppress Incorrect Length
- 3 = Skip
- 4 = Program Control Interrupt
- 5 = IDA -370 Mode Only
- 6 = Clear I/O Indicator
- 7 = Halt I/O Indicator

### Miscellaneous Control - Word 2, Byte 1

**Bit**

- 0 = |
- 1 = | - Count Field for immediate commands
- 2 = |
- 3 = 1
- 4 = 1
- 5 = Command Chaining Init.
- 6 = Command Chaining Request
- 7 = Length Count Zero Indication

### Subchannel State - Word 3, Byte 0

**Bit**

- 0 = Line not installed
- 1 = Subchannel Working
- 2 = Primary Interrupt Pending
- 3 = Logout Pending
- 4 = Not used
- 5 = Not used
- 6 = Not used
- 7 = CA Subchannel

# CA Tools UCW Display

## SCB (Station Control Block) Description

### Byte 0 Buffer offset

When data is transferred to main storage during the execution of a 'read-PIU' command, then this offset value is added to the data address of the CCW and the data is stored with this address as the starting point. Similarly, during a 'write-PIU' the data is transferred from main storage starting from an address, which is formed by adding the offset value to the CCW data address. The offset may have any value in the range 2 through 255.

If a SCB is transferred to the line attachment and its offset value is specified as 0 or 1, then the channel program terminates with data check.

**Note:** If during a 'read-PIU' command data is received, which is not an I-frame (this mechanism is primarily provided to handle I-frames) The same principle applies: the starting address for data in the buffer is determined with the use of the OFFSET field.

### Byte 1 SDLC station address

The CA uses the address field when building outbound I-Frames or poll frames. Inbound, the address field of frames received in response to poll are checked against ADDRESS. In case of a mismatch, a soft error indication is set if the CA is running as primary; the frame is ignored if running as secondary.

### Byte 2 Reserved field, must be zero.

### Byte 3 Control flags; bit definition:

SKIP	x... ..	1 = Inactive station, do not poll at all 0 = Active station, perform polling
AUTOP	.x... ..	1 = Datapoll this station during 'autopoll' commands. 0 = Contactpoll this station during 'autopoll' commands.
SLOWOUT	...x. ....	1 = Send 'RNR' poll 0 = Send 'RR' poll
SLOWIN	...x ....	1 = 'RNR' reply expected to poll. 0 = 'RR' reply expected to poll.

**Note:** Whenever the expected reply is received from a station, the Auto-poll operation continues; it terminates with the channel end, device end, and status modifier bits set to one when an unexpected reply is received.

RESERVED ....xxxx Reserved, must be zero.

© Copyright International Business Machines Corporation 1980,1981

CA

### Byte 4 Current SDLC number of sent I-frame.

This field contains the SDLC number (modulo 8 number) of the next I-frame to be sent. It is set into the I-frame control field during 'write-PIU' commands. NSCUR is incremented by one modulo 8 after each I-frame transmitted. If NSCUR becomes equal to NSACK this indicates that outstanding I-frames must be acknowledged before any more I-frames may be sent. Any further 'write-PIU' command is therefore terminated with command reject, unit check condition.

### Byte 5 Reserved byte; must be zero.

### Byte 6 SDLC Number of sent I-frame acknowledged

This field contains the SDLC number (modulo 8 number) of the latest sent I-frame, which is acknowledged by the remote station. Whenever a response containing a NR field is received from a station the line attachment uses it to update NSACK (i.e. set it to NR minus 1). The absolute difference (NR minus NSACK minus 1) is also set into the CFRS field. If the received Nr is outside the range from NSACK + 1 to NSCUR (modulo 8), Unit Check is presented with sense information indicating an unexpected NR field. (The control byte received is set into the CMDIN field of the SCB.)

### Byte 7 SDLC number of next I-frame to be received

This field contains the SDLC number plus one (modulo 8) of the last valid I-frame received.

The line attachment sets the contents of this field into the Nr part of the SDLC control field during polling and I-frame transmission. The NRACC field is also used when valid I-frames are received. The line attachment compares the received Ns field with the contents of NRACC.

The I-frame is accepted if they are equal. The NRACC field is then incremented by one modulo 8. If an invalid frame is received, NRACC will be frozen and no more I-Frames will be accepted until after a valid frame with the poll/final bit equal to one has been received or a timeout has occurred, whichever comes first. If the received Ns does not correspond with the NRACC value and the CA is not skipping invalid frames, then Unit Check is presented with sense information indicating that received I-frames were out of order. CMDIN will now contain the control field from the erroneous frame. The channel program is not terminated, however, until a valid frame with the poll/final bit equal to one is received or a timeout occurs.)

### Byte 8-11 Identification field

This field is used by the access method to identify each SCB-entry. It is passed without any change between the access method and the line attachment.

### Byte 12 Command received

The control byte in the frame received is stored in the CMDIN field for further examination by the access method. The control byte is stored in any case. Whether it is expected or unexpected is indicated by the CIUSE field. This is useful for NR or NS errors as it allows inspection of the improper value received.

### Byte 13 Reserved byte, must be zero.

### Byte 14 Count of frames sent and acknowledged.

This is a zero based field. When the line attachment changes NSACK based on a newly received NR, the absolute difference is accumulated into the CFRS-field. The contents of this field are used by the access method to release the appropriate 'write-PIU' buffers containing the frames acknowledged. If CFRS is not equal to the number of frames actually transmitted, the station missed some. The access method must now back NSCUR to NSACK + 1 and modify the channel program accordingly to retransmit the frames lost.

### Byte 15 Count of receive buffers used.

### Byte 16 Reserved byte, must be zero.

### Byte 17 Reserved byte, must be zero.

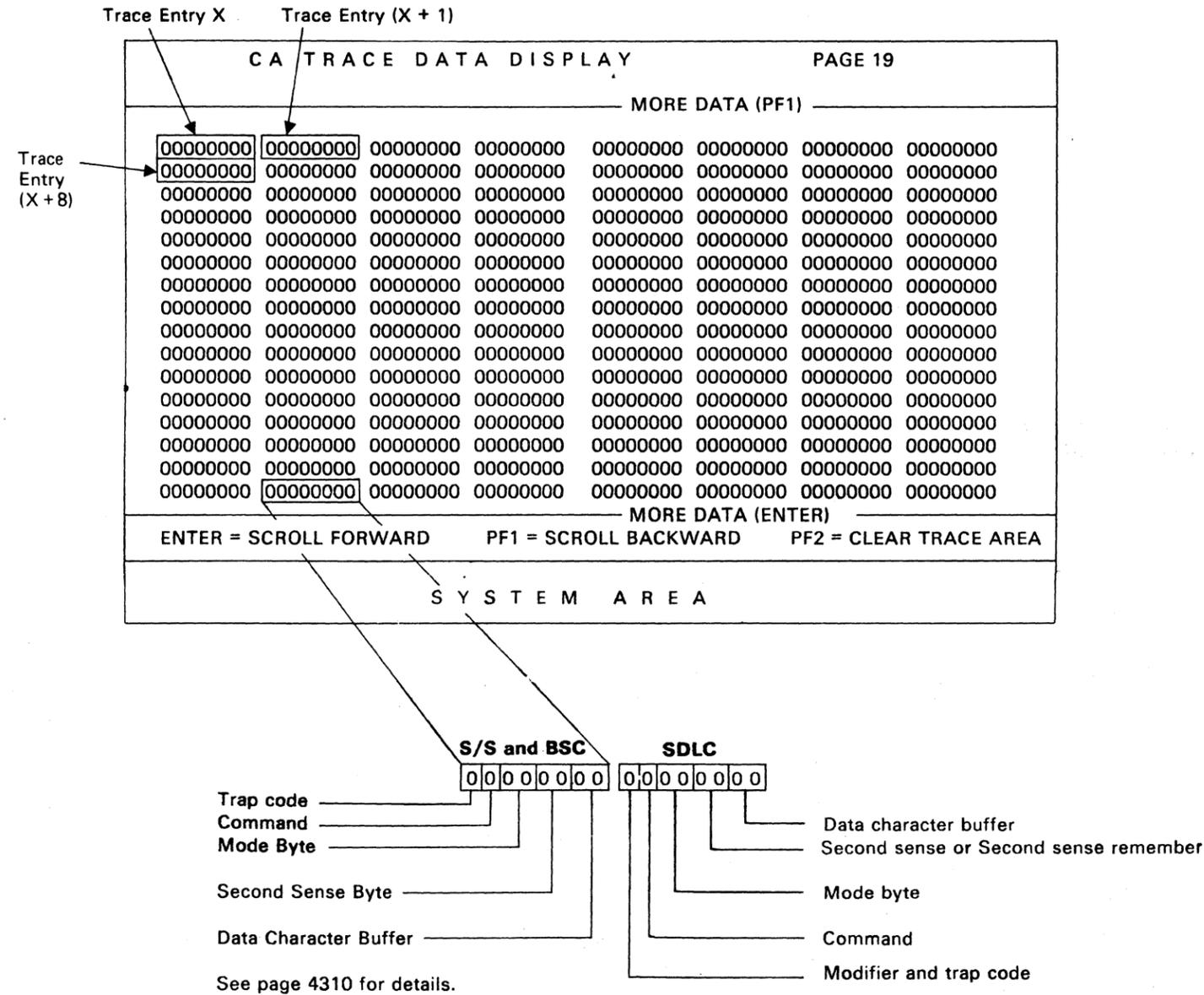
This page has been  
intentionally left blank

EC 366334 22 Feb 80	EC 366388 23 Jan 81	EC 366390 10 Apr 81	P/N 8488683 Page 1 of 16	4 270
------------------------	------------------------	------------------------	-----------------------------	-------

# CA Tools

## Display Format

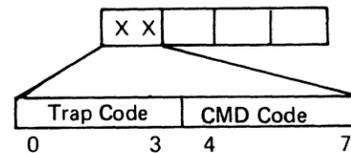
### Standard Trace/Dynamic Trace (four bytes)



## CA Tools

### STANDARD LINE TRACE and DYNAMIC TRACE DATA

First Byte (S/S and BSC)



#### • Trap Code

##### Bit 0123

- 0001 = TRD trap. Set in respond to TRD bit in CA-BA
- 0010 = I/O instruction complete trap
- 0100 = NIR trap. Set by BA-Stat. bit 0
- 0101 = NOR trap. Set by B-Stat. bit 1.
- 0110 = Active B-Status available trap. Set by B-Stat. bits 2-5

These bits are controlled by the diagnostic programs.

#### • Command Code

This is a 4 bits code of the 1 byte CCW command.

##### Bit 4567

- 0000 = No command active
- 0001 = NOP command
- 0010 = Sense, Sense I/O command
- 0011 = Set Mode, BSC only
- 0100 = Dial command
- 0101 = Enable command
- 0110 = Disable command
- 0111 = Invalid command
- 1000 = Inhibit command, S/S only
- 1001 = Prepare command
- 1010 = Poll command
- 1011 = Break command, S/S only
- 1100 = Read command
- 1101 = Write command
- 1110 = Address compare command (BSC only)
- 1111 = Spare

For details refer to Functional Characteristics.

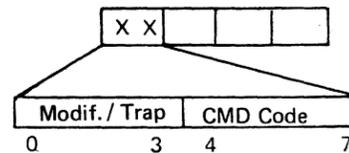
*Note:* The line must be enabled before issuing commands with bit 4=1. The line must be disabled before using a DIAL command.

© Copyright International Business Machines Corporation 1979, 1980, 1981

4331

CA

SDLC



#### • Modifier

##### Bit 0123

- 0XXX = Second sense byte is indicated
- 1XXX = Second sense byte remember is stored

#### • Trap Code

- X001 = TRD Trap
- X010 = PIO instruction complete trap
- X100 = NIR trap
- X101 = NOR trap
- X110 = B-Stat. available trap

#### • Command Code

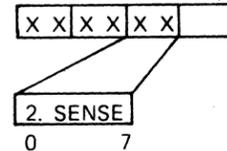
##### Bit 4567

- 0000 = No command
- 0001 = NOP
- 0010 = Sense, Sense I/O
- 0011 = Set mode
- 0100 = Dial
- 0101 = Enable
- 0110 = Disable
- 0111 = Invalid Command
- 1000 = Control SCB
- 1001 = Sense SCB
- 1010 = Autopoll
- 1011 = Poll
- 1100 = Read
- 1101 = Write
- 1110 = Read PIU
- 1111 = Write PIU

## CA Tools

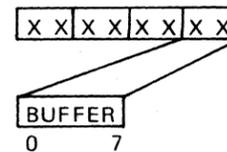
### STANDARD LINE TRACE and DYNAMIC TRACE DATA (continued)

Second Sense Byte (For S/S, BSC and Second Sense Byte or Second Sense Byte Remember for SDLC).



This byte holds an CA check code. Any bit on indicates an error. For detailed information refer to Unit Check Log page 0040

#### Character Buffer



The microcode uses this buffer when transferring characters from Main Storage to the line (Write command), and vice versa (Read command).

The CA generated SYN and PAD characters and flags and the second received SYN character also go through this buffer.

The character appearing in the buffer is the actual character transmitted or received on the line.

*Note:* In high speed (V35, DDS) the first generated SYN character does not use this buffer. Instead, a hardware buffer on the CA-BA card is used. In this case the last character transmitted will be a 'dummy' character.

In ASCII, the bit 0 (parity bit) is seen during a transmit operation but has been stripped - when it is entered in the TRACE - during a receive operation.

© Copyright International Business Machines Corporation 1979, 1980, 1981

4331

CA

EC 366334 22 Feb 80	EC 366388 23 Jan 81	EC 366390 10 Apr 81	P/N 8488683 Page 7 of 16	4 312	F
------------------------	------------------------	------------------------	-----------------------------	-------	---

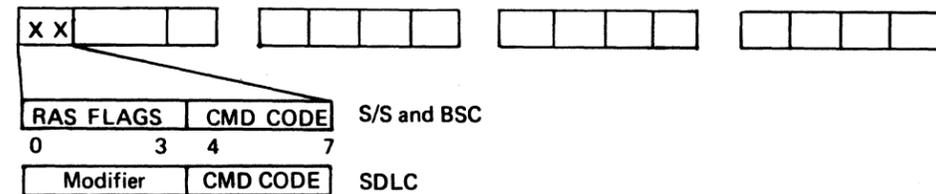
## CA Tools

### EXTENDED LINE TRACE DATA

The trace data collected in this mode is intended for detailed analysis of complex microcode/circuitry problems.

The use of this trace mode therefore is restricted to those cases where this type of information is requested by the product engineering group.

#### Command Byte



#### RAS Flags (S S and BSC)

Bit	0123
1001	Inline test active
0100	Extended trace active
0110	Standard trace active
1000	Line Exerciser active
1100	Line Exerciser and Trace active

These bits are controlled by the diagnostic programs.

#### • Command Code (S/S and BSC)

This is a 4 bit code of the 1 byte CCW command. For details refer to Functional Characteristics.

HEX	Bit	4567
'00'	0000	No command active
'01'	0001	NOP command
'02'	0010	Sense command or Sense I/O Cmd
'03'	0011	Set Mode, BSC only
'04'	0100	Dial command
'05'	0101	Enable command
'06'	0110	Disable command
'07'	0111	Invalid command
'08'	1000	Inhibit command S/S only
'09'	1001	Prepare command
'0A'	1010	Poll command
'0B'	1011	Break command, S/S only
'0C'	1100	Read command
'0D'	1101	Write command
'0E'	1110	Address prepare command (BSC only)

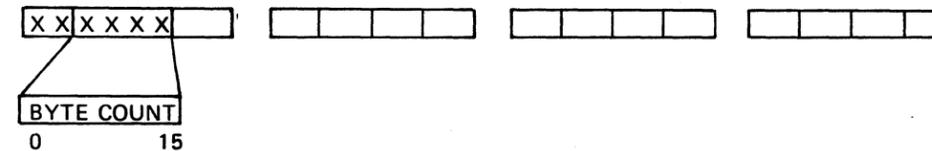
#### Modifier SDLC

Bit	0123
0XXX	2nd sense byte is stored
1XXX	2nd sense byte remember is stored

#### • Command Code (SDLC)

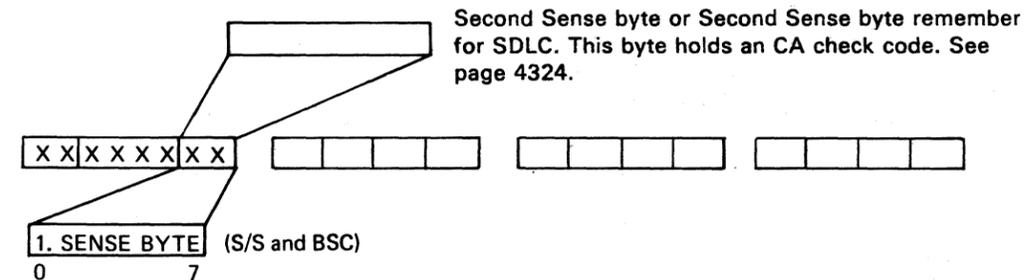
HEX	Bit	4567
'00'	0000	No command active
'01'	0001	NOP
'02'	0010	Sense, Sense I/O
'03'	0011	Set mode
'04'	0100	Dial
'05'	0101	Enable
'06'	0110	Disable
'07'	0111	Command reject
'08'	1000	Control SCB
'09'	1001	Sense SCB
'0A'	1010	Autopoll
'0B'	1011	Poll
'0C'	1100	Read
'0D'	1101	Write
'0E'	1110	Read PIU
'0F'	1111	Write PIU

#### CCW Byte Count



These two bytes contain the length count of the CCW (how many characters to be transmitted or received). It is decremented by one for each character transmitted or received.

#### First Sense Byte



This byte contains error information and is controlled by the contents of the Second Sense byte. For good operation this byte should be 0.

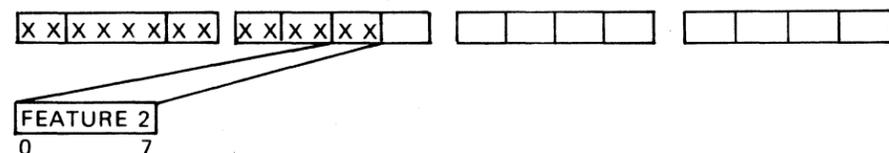
#### Bit assignment:

0	Command reject
1	Intervention required
2	Not used
3	Equipment check
4	Data check
5	Overrun
6	Lost data
7	Timeout

## CA Tools

### EXTENDED TRACE DATA (continued)

#### Feature 2

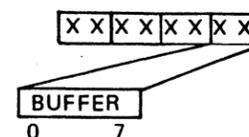


This is the last byte - byte 3 - in the Configuration Table. The bits are set in manufacturing. Some bits can, however, be changed in the field. See Configuration Table Update, page 4220 for details.

#### Bit assignment

SS			BSC			SDLC							
SS Line procedure - Bit on			= 0 =	Bit off Sync Control			= 0 =	Bit off - Sync Ctl					
Speed	000	75 BPS	= 1 =	Bit on = ASCII Code			= 1 =	Not NRZI					
	001	110 BPS		Bit off = EBCDIC Code				= 2 =	BM (CCA) clocking				
	010	134.5 BPS		BM (CCA) clocking					= 3 =	Secondary station			
	011	300 BPS		Not used						= 4 =	ACA 1 connected		
	100	600 BPS		Not used							= 5 =	ACA 2 connected	
101	1200 BPS	Not used			= 6 =	Answer tone 2025 Hz Integrated modem only							
ACA 1 connected			= 4 =	ACA 1 connected			= 4 =	ACA 1 connected					
ACA 2 connected			= 5 =	ACA 2 connected			= 5 =	ACA 2 connected					
Answer tone 2025 Hz Integrated modem only			= 6 =	Answer tone 2025 Hz Integrated modem only			= 6 =	Answer tone 2025 Hz Integrated modem only					
Not used			= 7 =	Bit off, BSC			= 7 =	Bit on SDLC					

#### Character Buffer



#### Character Buffer

##### S/S and BSC

The microcode uses this buffer when transferring characters from Main Storage to the line (Write command), and vice versa (Read command).

Likewise the CA generated SYN and PAD characters and the second received SYN character go through this buffer.

The character appearing in the buffer is the actual character transmitted or received on the line.

*Note:* In high speed (V35, DDS) the first generated SYN character does not use this buffer. Instead, a hardware buffer on the CA-BA card is used. In this case the last character transmitted will be a "dummy" character.

#### SDLC

This buffer contains the character of any outbound operation. In case of inbound operation this buffer takes the character from the 2nd buffer in UCW 7, byte 3.

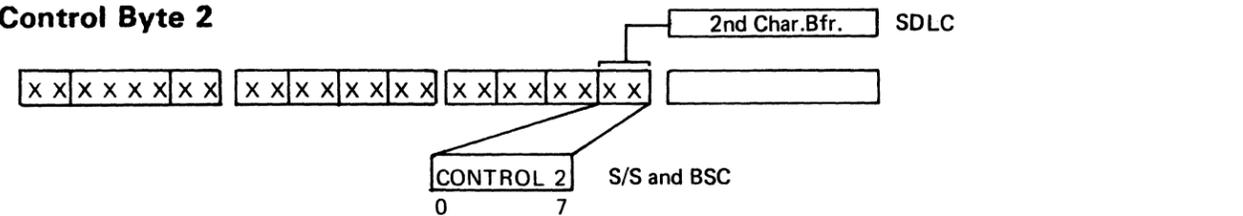
*Note:* In high speed (V35, DDS) the first generated SYN character does not use this buffer. Instead, a hardware buffer on the CA-BA card is used. In this case the last character transmitted will be a 'dummy' character.

In ASCII, the bit 0 (parity bit) is seen during a transmit operation but has been stripped - when it is entered in the TRACE - during a receive operation.

# CA Tools

## EXTENDED TRACE DATA (continued)

### Control Byte 2



### SS

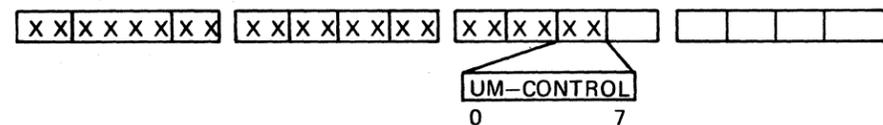
Character Indicator  
Monitor for CTS  
Write Initiate  
Line Quiet Initiate  
Line Quiet  
Upshift  
Text In  
Text Out

### BSC

= 0 = Poll Remember/Address prepare initial SYNC received  
= 1 = ITB Remember  
= 2 = SYN Remember  
= 3 = DLE Remember  
= 4 = Text Mode  
= 5 = Transparent Mode  
= 6 = Timer Remember  
= 7 = Read Command Active

These bits are set by the microcode and are used to control the microcode operations.

## UCW Modem Control



### Bit assignment:

0 = Data Terminal Ready  
1 = Request To Send  
2 = Wrap  
3 = Test  
4 = Select Standby  
5 = Select Half Speed  
6 = New Sync  
7 = DCE Interrupt Disable

These bits control the modem interface leads

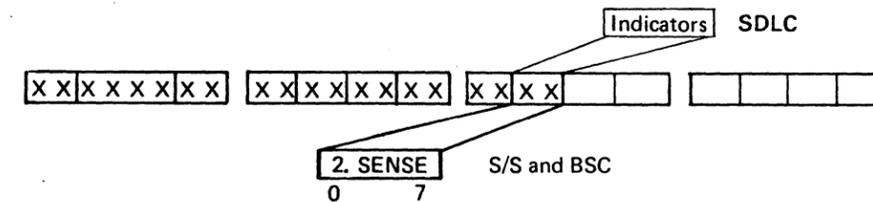
Used for internal control

© Copyright International Business Machines Corporation 1979, 1980, 1981

4331

CA

## Second Sense Byte/SDLC Indicators



### S/S and BSC

This byte holds an CA check code. Any bit on indicates an error.  
For details refer to Unit Check Log Mapcharts.

### SDLC

Bit assignment:

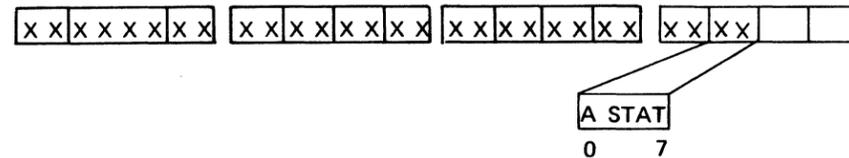
0 = Suppress DAX  
1 = Data Rec./Transmit Remember  
2 = Primary addr. mismatch  
3 = Idle time out remember  
4 = Lost data warning  
5 = Unit check remember  
6 = Skip remember/Autopoll active  
7 = Not used

EC 366334 22 Feb 80	EC 366388 23 Jan 81	EC 366390 10 Apr 81	P/N 8488683 Page 13 of 16	<b>4 324</b> F
------------------------	------------------------	------------------------	------------------------------	----------------

## CA Tools

### Extended Trace Data (continued)

#### Adapter Status

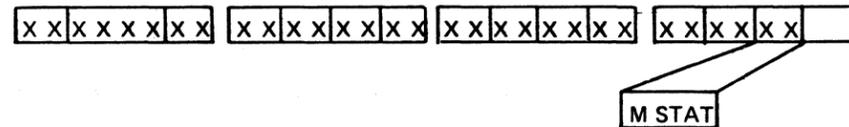


##### Bit assignment

- 0 - Overrun } bit on indicates error
  - 1 - Underrun }
  - 2 - Receive Clock Running (S/S)
  - 3 - Not used
  - 4 - Not used
  - 5 - Invalid Character - bit on indicates error
  - 7 - Adapter in Sync
- B - Stat bit 4 (Exception) is set

This is one of the registers on the CCA Card. All bits are set from the hardware. The Adapter Status, Basic Status and Modem Status Registers give the microcode the information about the CCA and the modem necessary to control the CCA functions.

#### Modem Status



##### Bit Assignment

- 0 - Data Set Ready
  - 1 - Clear to Send
  - 2 - Carrier Detector
  - 3 - Ring Indicator
  - 4 - Data Set Ready Transitioned
  - 5 - Not used
  - 6 - Received Line Signal Detector Transitioned
  - 7 - Clear to Send Transitioned
- B-Stat bit 2 (DCE interrupt) is set, a status change has occurred.

© Copyright International Business Machines Corporation 1979, 1980, 1981

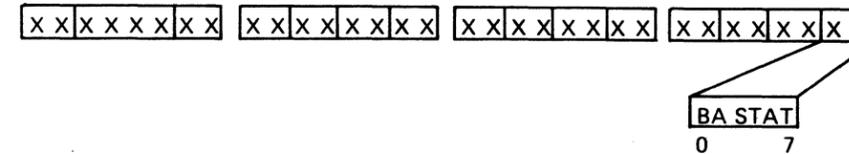
4331

CA

This is one of the registers on the CCA Card. All bits are set from the hardware. It holds information about the interface leads between the CCA Card and the Adapter Interface Card/Modem.

The Modem Status, Basic Status and Adapter Status can be sensed by the microcode which then obtain information necessary to control the CCA operation.

#### Bus Adapter Status



##### Bit Assignment

- Bit
- 0 Check Trap, indicates error
  - 1 } Trap code, normal traps
  - 2 }
  - 3 }
  - 4 Not used
  - 5 4 } Line addr.
  - 6 2 }
  - 7 1 }

This is a register on the CA-BA card. It gives information about the CA Bus Adapter to the microcode.

##### Bit Explanation

- Bit 0 - Check Trap - is set by the following error conditions:
  - Sense bus check
  - Common bus check
  - Processor bus parity check
  - Tag timeout
 When on, this bit generates a PU Trap Request.

- Bits 1,2,3 - Check Trap code
  - 001-TRD Trap - Set in respond to the TRD bit in the BA having been set by the microcode..
  - 010-I/O Instruction Complete Trap - Set when an I/O instruction is completed.
  - 100-Normal Input Trap - Set by B-Stat bit 0 (Input request).
  - 101-Normal Output Trap - Set by B-Stat bit 1 (Output Request).
  - 110-B-Status Available Trap - Set by B-Stat bits 2-5.

- Bits 5,6,7 holds the address of the CCA (line address) which caused the trap.

Address

- 000 = 30
- 001 = 31
- 010 = 32
- 011 = 33
- 100 = 34
- 101 = 35
- 110 = 36
- 111 = 37

# CA Customer Manual Operations (CMOs)

## General

### Customer Manual OPs have two functions:

- Temporary configuration change facility, which allows temporary changing of some of the configuration parameters.
- Tributary station address(es) for BSC lines. This function is used to specify tributary station address(es) for each installed BSC line.

#### How to Select the CA - CMOs:

1. Press the MODE SELECT button. The mode selection picture will be displayed.
2. Enter 'E' for option 'communication lines and press ENTER.

If at least one BSC line is installed, the CA-CMOs picture will be displayed showing the selection codes.

```
*** CA - CUSTOMER MANUAL OPs ***
A TEMPORARY CONFIGURATION CHANGE FACILITY
B TRIBUTARY STATION ADDRESS(ES) FOR BSC LINES
*** ENTER SELECTION ***

370 TIMER:OFF      DATA:  ADDR:
TOD:SEC
```

If no BSC line is installed, the picture for the temporary configuration change facility will be displayed directly.

3. If the CA-CMOs picture is displayed, enter the desired function and press ENTER.

### Temporary Configuration Change Facility

After selecting this facility, the changeable configuration parameters for the first line, line address 30, are displayed.

Updating of the displayed line address can now take place. See Updating.

© Copyright International Business Machines Corporation 1979, 1980  
4331

CA

If the line is not installed, a message is given, or if another line is to be updated, press PF4 key.

The next line is displayed.  
Use the PF4 key until the desired line is displayed.

### Updating

When the line address to be updated is displayed, make the necessary changes for this line.

1. Use the PF1 key to put the large arrow ==> in front of the parameter to be updated.
2. Use the PF2 key to put the small arrow => in front of the desired value.

Repeat steps 1-2 until all the parameters have the desired values. Then go to step 3.

If the small arrow is missing, the parameters is not relevant for this configuration.

3. Use the PF4 key to select the next line to be updated.

Repeat step 1-3 until all lines are updated.  
Then go to step 4.

4. Do you want to save the updates?

Yes: Go to step 5 No: Go to step 6

5. Hit ENTER.

The configuration updates are now saved. The temporary configuration change facility is terminated.

6. Hit the PF3 key.

The temporary configuration change facility is terminated.

EC 366272 31 Oct 79	EC 366334 22 Feb 80	P/N 8488684 Page 1 of 12	5 000 F
------------------------	------------------------	-----------------------------	---------

## CA Customer Manual Operations (CMOs)

### Tributary Station Address(es) for BSC Lines

Only lines specified for BSC line control are displayed.  
Two tributary station addresses can be specified for each BSC line. The default values are '40bb'.

```
*** TRIBUTARY STATION ADDRESS(ES) FOR BSC LINES ***  
  
ENTER TRIBUTARY STATION ADDRESS(ES) IN HEX:  
  
LINE 30 ** XXXX **  
LINE 31 ** XXXX **  
LINE 32 ** XXXX **  
LINE 33 ** XXXX **  
LINE 34 ** XXXX **  
LINE 35 ** XXXX **  
LINE 36 ** XXXX **  
LINE 37 ** XXXX **  
  
ENTER - ACTIVATE ADDRESS(ES) / PF3 - EXIT WITHOUT UPDATE  
370 TIMER:OFF DATA: ADDR:  
TOD:SEC
```

Any EBCDIC or ASCII character can be used to specify the address except the following:

SOH, STX, ETX, ETB, EOT, ENQ, DLE, NAK, SYN or ITB and characters with bit 2 on. The address specifying character is in hexadecimal notation.

*Note:* Bit 0 must be 'off' when line is specified for ASCII.

If the positions for the second address are left blank, the first address is used as the second address.

#### Updating

1. Enter the desired tributary station addresses for all required lines.
2. Press enter, 'UPDATE IN PROCESS' is displayed.
3. Upon completion of updating, 'UPDATE DONE' is displayed.  
The address updates are saved (diskette) and made available to the program. No IML is required.
4. Press PF3 key

The tributary station address updating is terminated.

© Copyright International Business Machines Corporation 1979, 1980

4331

CA

EC 366272 31 Oct 79	EC 366334 22 Feb 80	P N 8488684 Page 3 of 12	5 007 F
------------------------	------------------------	-----------------------------	---------

This page has been  
intentionally left blank

EC 366272 31 Oct 79	EC 366334 22 Feb 80		P/N 8488684 Page 5 of 12	5 012 F
------------------------	------------------------	--	-----------------------------	---------

This page has been  
intentionally left blank

This page has been  
intentionally left blank

© Copyright International Business Machines Corporation 1979, 1980

4331

CA

EC 366272 31 Oct 79	EC 366334 22 Feb 80		P/N 8488684 Page 9 of 12	5 022 F
------------------------	------------------------	--	-----------------------------	---------

This page has been  
intentionally left blank

EC 366272 31 Oct 79	EC 366334 22 Feb 80		P/N 8488684 Page 11 of 12	5 027
------------------------	------------------------	--	------------------------------	-------

READER'S  
COMMENT  
FORM

This form may be used to communicate your views about this publication.  
They will be sent to the author's department for whatever review and action, if any, is deemed appropriate.  
Comments may be written in your own language; use of English is not required.

IBM may use or distribute any of the information you supply in any way it believes appropriate  
without incurring any obligation whatever. You may, of course, continue to use the information you  
supply.

*Note: Copies of IBM publications are not stocked at the location to which this form is addressed.  
Please direct any requests for copies of publications, or for assistance in using your IBM system, to  
your IBM representative or to the IBM branch office serving your locality.*

Possible topics for comment are:

Clarity Accuracy Completeness Organization Coding Retrieval Legibility

If you wish a reply, give your name and mailing address:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Please fill in

Subject: \_\_\_\_\_ Page No.: \_\_\_\_\_

Document Title: \_\_\_\_\_ P/N: \_\_\_\_\_

Number of latest Technical Update (if any) concerning this publication (EC): \_\_\_\_\_

(REA): \_\_\_\_\_

Thank you for your cooperation. No postage stamp necessary if mailed in the U.S.A. (Elsewhere, an IBM  
office or representative will forward your comments.)

READER'S  
COMMENT  
FORM

This form may be used to communicate your views about this publication.  
They will be sent to the author's department for whatever review and action, if any, is deemed appropriate.  
Comments may be written in your own language; use of English is not required.

IBM may use or distribute any of the information you supply in any way it believes appropriate  
without incurring any obligation whatever. You may, of course, continue to use the information you  
supply.

*Note: Copies of IBM publications are not stocked at the location to which this form is addressed.  
Please direct any requests for copies of publications, or for assistance in using your IBM system, to  
your IBM representative or to the IBM branch office serving your locality.*

Possible topics for comment are:

Clarity Accuracy Completeness Organization Coding Retrieval Legibility

If you wish a reply, give your name and mailing address:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Please fill in

Subject: \_\_\_\_\_ Page No.: \_\_\_\_\_

Document Title: \_\_\_\_\_ P/N: \_\_\_\_\_

Number of latest Technical Update (if any) concerning this publication (EC): \_\_\_\_\_

(REA): \_\_\_\_\_

Thank you for your cooperation. No postage stamp necessary if mailed in the U.S.A. (Elsewhere, an IBM  
office or representative will forward your comments.)

EC 366272 31 Oct 79	EC 366582 13 Sep 82		P/N 8488441 Page 1 of 2	9 9 9 0	F
------------------------	------------------------	--	----------------------------	---------	---

Cut or Fold Along Line