DIMENSION® 2000
AND CUSTOM PBX

SCAN/DISTRIBUTOR TEST
(PROC 506)

CONTENTS

1.   GENERAL

1.1   This section provides information for interrogating PROC 506
in the event that the craftsperson is directed to this proce-
dure due to a NETWORK SCAN failure. Whenever this type of
failure occurs, the ALARM PANEL - NETWORK MAJOR AND SCAN led's
will be lit.

2.   RECORDS

2.1   Form SD 97 - 1313 is required for recording the results of
this test.

Printed in U.S.A.

3.   MAAP DISPLAY FIELDS (PROC 506 FORMAT)

3.1   The following describes each of the display fields for the NETWORK
            SCAN/distributor tests (PROC 506) format:

            FIELD   DESCRIPTION

              1   TEST NO - Displays active test number (maximum of 3)
                       per the following encodes

                       ENCODE   DESCRIPTION

                         1   Displays failure history detected
                                               by on - line maintenance.

                         2   Tests all circuits sequentially
                         3   Tests a particular circuit (as
                                               displayed in fields 2 and 3).

            2,3   SCAN/DISTRIBUTOR EQUIPMENT LOCATION (MODULE/CABINET)

                       -(TESTS 1, 2 and 3), for TESTS 1 and 2 displays fault
                       location. For TEST 3, displays test location. Allowable
                       enclodes are as follows:

                       ENCODE   DESCRIPTION

                       00 - MM   Allowable encodes for field 2, (MM =
                                              highest module number in system under test)

                        0 - C   Allowable encodes for field 3, (C =
                                              highest cabinet number in module under test).

            4- 6   S/D CIRCUIT (SCANNER/DISTRIBUTOR) EQUIPMENT LOCATION
                       (CARRIER/SLOT/TERMINAL) - For TESTS 1, 2 and 3, displays
                       LC46 (SCANNER/DISTRIBUTOR) equipment and terminal number where
                       fault was detected when applicable.

            7-9   BUFFER CIRCUIT EQUIPMENT LOCATION (CARRIER/SLOT/TERMINAL)
                       - For TESTS 1, 2 and 3, displays LC49 (DIGITAL NETWORK
                       BUFFER CIRCUIT) equipment and terminal number where fault
                       was detected when applicable.

            10   FAILURE CODE - For TEST 1, 2 and 3, displays code for type of
                       failure detected per the following encodes:

                       ENCODE   DESCRIPTION

                         0   Pass (TEST 3 only)

10 (CONT.)

ENCODE	DESCRIPTION
1	Scan addressing (in TEST 1 only a module number is displayed in field 2 when this type of failure is detected by on - line maintenance).
2	Internal LC46 failure or multiple failures
3	LC46 or LC49 terminal stuck low
4	LC46 or LC49 terminal stuck high

11   NUMBER OF SCANNER/DISTRIBUTOR CIRCUITS - For TESTS 1, 2 and 3, displays the total number of scanner/distributor circuits translated in the system.

12   NUMBER OF SCANNER/DISTRIBUTOR CIRCUIT FAILURES - For TEST 1, displays total number of failures detected by on - line maintenance. For TEST 2, displays total number of failures detected after TEST 2 has been executed.

13   FAILURE INDEX - (TESTS 1 and 2), displays an index number which either indicates:

A) Locations with highest number of failures in desending order (TEST 1), or B) Locations in order of detected failures (TEST 2). Index number "0" in TEST 1, indicates a display of the failure history totals. Index number "0", in TEST 2, indicates that no failures were detected. In TEST 1, a maximum of 6 failures can be displayed.

14   FAILURES PER HOUR/FAILURE HISTORY - For TEST 1, displays an average for the last two hours. (Maximum of 99).

15   FAILURES BEGAN - HOURS AGO/FAILURE HISTORY - in TEST 1, displays number of hours since failures started to the nearest hour (maximum of 17).

4.   MAAP CONTROL KEY SEQUENCE DEFINITIONS

4.1   PROC NO. 5, 0, 6, ENTER - Causes program for PROC 506 to be loaded
        into memory from tape for execution.

4.2   CLEAR DATA, EXECUTE - (TEST 1 only), clears failure history records
        stored in memory by on - line maintenance.

4.3   EXECUTE - Starts executing test number displayed in field 1.

4.4   NEXT CIRCUIT - (TESTS 1 and 2), displays next failure; (TEST 3),
        advances test to next circuit within the same module when TEST 3 is
        stopped.

4.5   NEXT TEST - Advances procedure to the next test.

4.6   NEXT UNIT - For TEST 3, advances test to the next module when TEST 3
        is stopped.

4.7   RESET - Resets the procedure to the beginning of TEST 1.

4.8   STOP - Stops TEST 3 from further testing. Note: This key must be
        operated before the NEXT CIRCUIT or NEXT UNIT key can be operated if
        TEST 3 is executing.

5.   REPAIR PROCEDURES

5.1   The following describes the repair procedures that
            should be used in the event of a NETWORK SCANNER/
            DISTRIBUTOR failure.

5.11   EXECUTE TEST 1 and record failure history generated
            by on - line maintenance.

5.12   EXECUTE TEST 2 and record the results. If there are
            no failures, use TEST 3 to continuously test each
            module/cabinet displayed in TEST 1 to check for
            intermittent failures. If failures occur either during
            TEST 2 or 3, use the following repair procedures:

            A) FAILURE CODE = 1 or 2 for a single scanner/
                    distributor circuit (LC46) in a module

                    FIRST   - Replace the LC46 in the module/cabinet
                              indicated and execute TEST 2. If TEST 2
                              passes go to step D, otherwise reinsert
                              old LC 46.

                    SECOND - Replace the associated LC124 and execute
                              TEST 2. If TEST 2 passes, go to step D,
                              otherwise reinsert old LC124.

                    THIRD   - Replace the associated LC123 and execute
                              TEST 2. If TEST 2 passes, go to Step D,
                              otherwise reinsert old LC123.

                    FOURTH - Replace LC121 (see ATTACHMENT 1) if
                              TEST 2 passes, go to step D.

                    FIFTH   - If none of the above clears the alarm,
                              replace all of the above circuit packs
                              and execute TEST 2. If TEST 2 passes, go
                              to step D, otherwise check for possible
                              wiring problem (see Paragraph 6 of this
                              section).

            B)   FAILURE CODE - 3 or 4 for a single SCANNER/
                    DISTRIBUTOR circuit in a module.

                    FIRST   - Replace LC46 in the indicated MODULE/
                              CABINET and execute TEST 2. If TEST
                              2 passes, go to step D, otherwise
                              reinsert old LC46.

SECOND - If a specific buffer circuit is displayed,
replace LC49 in that carrier and execute
TEST 2. If TEST 2 passes, go to step D,
otherwise reinsert old LC46.

THIRD - On a one at a time basis, disconnect the
remaining LC49's in the same and execute
TEST 2 each time. If TEST 2 passes, replace
the LC49 and execute TEST 2 after all the
disconnected LC49's have been reinserted. If
TEST 2 passes, go to step D.

FOURTH - If none of the above steps clears the failure,
investigate wiring (see Paragraph 6 and wiring
diagrams at the end of this section).

C)   FAILURE CODE - 1 for all SCANNER/DISTRIBUTOR circuits in a module.

FIRST - Refer to LC121 trouble-shooting flowchart at the end
of this section. If TEST 2 passes, go to step D,
otherwise investigate wiring.

D)   In the event that the NETWORK SCAN alarm is cleared, go to
TEST 1 and clear the fault records - use CLEAR DATA, EXECUTE keys.

6. <u>TROUBLESHOOTING AIDS</u>

6.1 GENERAL TEST INFORMATION

6.11 TEST 1 - TEST 1 is the default test when the procedure is first read in from the tape or when the MAAP - RESET key is operated. In either case, FIELD 1 will display a 1 and FIELD 11 will display the total number of NETWORK SCANNER/DISTRIBUTOR circuits. When the MAAP - EXECUTE key is operated, data accumulated by on - line maintenance is displayed on the MAAP. If there are no failures, FIELD 12 will display a "0", and if there are one or more failures, FIELD 12 will display the total number of failures detected. FIELD 13 will display a "0" (indicating a display of the failure history totals), FIELDS 2 - 10 will be dashed, and FIELDS 14 and 15 will display the appropriate failure information.

If failures were detected by on - line maintenance, operation of the MAAP - NEXT CIRCUIT key displays the SCANNER/ DISTRIBUTOR circuit with the highest number of detected failures. Continued operation of the MAAP - NEXT CIRCUIT key will display the remaining SCANNER/DISTRIBUTOR circuit failures in descending order until either a total of 6 (maximum), SCANNER/DISTRIBUTOR failures have been displayed or the last S/D circuit failure has been displayed. In either case, FIELDS 2 - 10 and 12 - 15 are dashed.

Operation of the MAAP - CLEAR DATA, EXECUTE keys clears the on - line maintenance network scanner/distributor failure records.

6.12 TEST 2 - The purpose of TEST 2 is to test all NETWORK SCANNER/DISTRIBUTOR circuits sequentially, to display all failed circuits and to control the ALARM PANEL MAJOR and NETWORK SCAN alarms.

TEST 2 is initiated when the MAAP - EXECUTE key is operated, which causes the MAAP - WAIT lamp to be turned on and causes a series of scan messages to be sent to each scanner/ distributor circuit (see TABLE A). Each of the messages are sent to a particular SCANNER/DISTRIBUTOR circuit (starting at the lowest numbered module and cabinet) until either a failure is detected or all messages have been completed successfully. If a failure is detected, the failure infor- mation is stored for future display and the test continues to the next SCANNER/DISTRIBUTOR circuit.

The above sequence is repeated until all NETWORK SCANNER/DISTRIBUTOR
circuits are tested and if there are no failures, FIELD 12 will
display a "0". If one or more failures were detected when the test
is completed, FIELDS 2 thru 10 will display the appropriate failure
information for the first failure detected, field 12 will display
the total number of circuit failures and field 13 will display a "1".

Repeated operation of the MAAP - NEXT CIRCUIT key will display the
other detected failures and if the last failure was displayed, opera-
tion of the NEXT CIRCUIT key will cause FIELDS 2 thru 10, and 12 thru
15 to be dashed.

If during the execution of this test, no failures are detected, the
ALARM PANEL MAJOR AND NETWORK SCAN lamps will be turned off if they
were on.

6.13   TEST 3 - The purpose of TEST 3 is to test a particular circuit con-
            tinuously and to turn the ALARM PANEL MAJOR AND NETWORK SCAN lamps
            on if a failure is detected. If a default circuit (last failure dis-
            played) is not displayed, the craftsperson must enter a circuit. If
            the displayed circuit is not the circuit desired, it can be changed by
            the CHANGE FIELD sequence, or by operating the NEXT CIRCUIT key (advances
            to the next circuit within the specified module), or by operating the
            NEXT UNIT key (advances to the next module).

            The test is started by operating the MAAP - EXECUTE key. The WAIT
            lamp is not turned on since the test is continuous. The failure code
            is flashed (60 IPM) in field 11 to indicate that the test is running.
            The test can be stopped by either operating the STOP key (which then
            allows a NEXT CIRCUIT or a NEXT UNIT key operation) or operating the
            NEXT TEST, RESET, or PROC NO keys.

6.2   GENERAL TROUBLE-SHOOTING INFORMATION

6.21   PROC 506 checks the NETWORK SCANNER/DISTRIBUTOR circuits by sending a
            series of scan command messages to each SCANNER/DISTRIBUTOR circuit
            and checking the results. The messages and leads that are checked are
            shown in TABLE A and FIGURE 1, respectively. If an error is detected,
            it is recorded and the next scanner/distributor circuit is tested (TEST
            2 only).

6.22   FIGURES 2 and 3, show the intra-carrier flat cable connections that are
            associated with the leads being tested. FIGURE 4 is a scan command
            waveform chart. An analysis of Table A will reveal that SCEN (0-8)*,
            SDA1*, SDA2*, SPTEN*, SCLK* are not checked for stuck at 1. This is due
            to the fact that the circuit design of the LC46 does not allow these
            leads to be checked for this condition during this test.

6.23   If replacement of the circuit packs does not cure a
              problem detected by this procedure, then a problem
              probably exists between the LC124 and LC46 wiring.
              A problem detected on one of the SAD(00-05)* or SAD10
              leads could possibly be due to one of the associated
   NA(00-05)* OR NA10* leads stuck high or stuck low.

TABLE A

MSG NBR	MSG. SENT	ADDR NA (15-$\emptyset\emptyset$)*	RESPONSE NDO (3-$\emptyset$)*	TEST FOR:
1	4FFF	3$\emptyset\emptyset\emptyset$	$\emptyset$	ND$\emptyset$ ($\emptyset$-3) For S-A-$\emptyset$
2	4FAF	3$\emptyset$4$\emptyset$	F	ND$\emptyset$ ($\emptyset$-3) For S-A-1
3	4B7F	348$\emptyset$	7	SAD1$\emptyset$ For S-A-1
4	4F7F	3$\emptyset$8$\emptyset$	F	SCEN8*, SDA(1-2)*, SAD1$\emptyset$ for S-A-$\emptyset$
5	4F3F	3$\emptyset$6$\emptyset$	F	SCEN(4-7)* For S-A-$\emptyset$
6	4EFF	31$\emptyset\emptyset$	F	SCEN($\emptyset$-3)* For S-A-$\emptyset$
7	4EAF	315$\emptyset$	D	SAD$\emptyset$5* For S-A-1
8	4E9F	316$\emptyset$	E	SAD$\emptyset$4* For S-A-1
9	4E8F	317$\emptyset$	F	SAD$\emptyset$4*, SAD$\emptyset$5*, SPTEN*, SCLK for S-A-$\emptyset$
10	4E78	3187	7	SAD$\emptyset$3* For S-A-1
11	4E74	318B	D	SAD$\emptyset$2* For S-A-1
12	4E72	318D	B	SAD$\emptyset$1* For S-A-1
13	4E71	318E	E	SAD$\emptyset\emptyset$* For S-A-1
14	4E7$\emptyset$	318F	F	SAD$\emptyset$ ($\emptyset$-3)* For S-A-$\emptyset$

PROCEDURE 506

SCAN/DISTRIBUTOR TEST
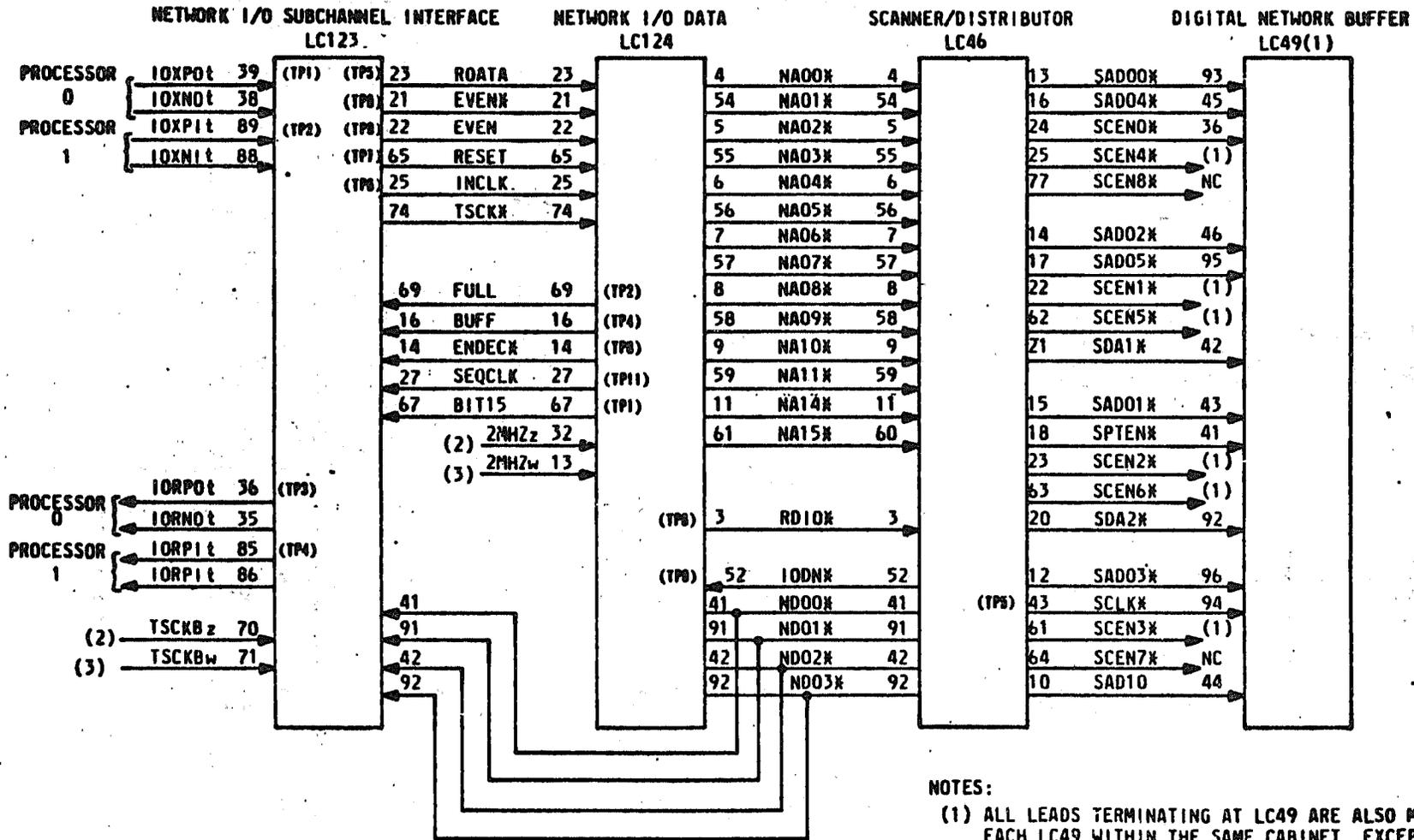
FIGURE 1

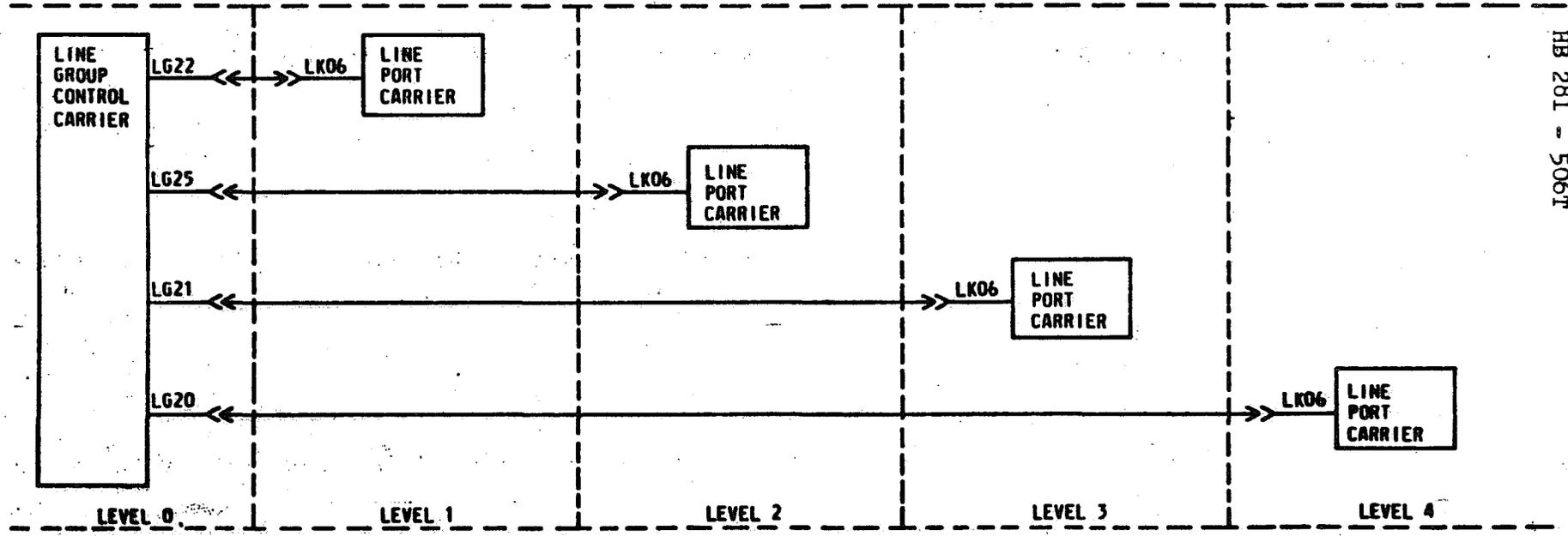NOTES:

(1) ALL LEADS TERMINATING AT LC49 ARE ALSO MULTIPLIED TO EACH LC49 WITHIN THE SAME CABINET, EXCEPT FOR THE SCEN(1-6)X LEADS WHICH ARE TERMINATED AT TERMINAL 36 (LC49) AT THE APPROPRIATE CARRIER. SCEN7X AND SCEN8X ARE NOT USED.

(2) TERMINATED AT LC121 IN CABINET 0.

(3) TERMINATED AT LC121 IN CABINET 1.

(4) (TP-) DESIGNATES TEST POINTS.

LINE GROUP CONTROL CARRIER		

LG22 ≪ ≫ LK06 LINE PORT CARRIER

LG25 ≪ ≫ LK06 LINE PORT CARRIER

LG21 ≪ ≫ LK06 LINE PORT CARRIER

LG20 ≪ ≫ LK06 LINE PORT CARRIER

LEVEL 0   LEVEL 1   LEVEL 2   LEVEL 3   LEVEL 4

| FLAT CABLE WIRING	
TERM	DESIG.
1	DGRD
2	SCEN(-)X
3	BB(-)2X
4	BB(-)0X
5	
6	
7	SRD(-)
8	SBI(-)X
9	SRCK(-)
10	DGRD
11	
12	BB(-)3X
13	BB(-)1X
14	SCBI(-)X
15	
16	SRDBUS(-)
17	WT(-)X
18	
19	TSCK(-)
20	

20 [ ] 10

11 [ ] 1
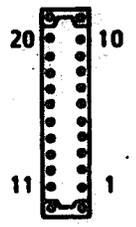
BACK VIEW OF FLAT CABLE
CARRIER CONNECTOR

NOTES: -( ) DENOTES SCEN(-)X LEAD
       -DESIGNATIONS LG22, LK06, ETC., DENOTE CARRIER
        BACKPLANE CONNECTORS
       -LEVEL (-) DENOTES POSITION OF CARRIER IN
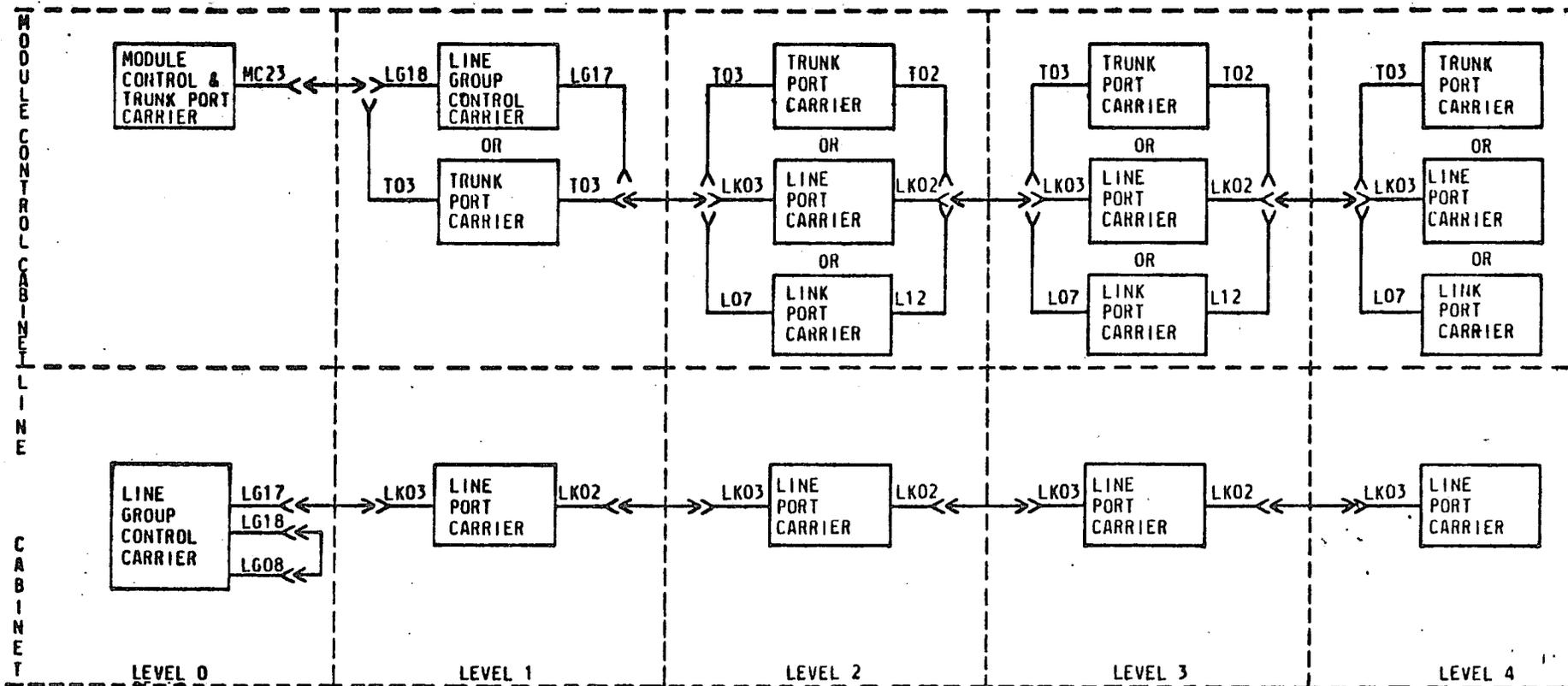   CABINET, LEVEL 0 = LOWEST LEVEL

FIGURE 2A

MODULE CONTROL CABINET
CABLING FOR SCEN-✱, SRD-, SBI-,
SRCK-, SCBI-, SRDBUS-, WT-,
TSCK- LEADS
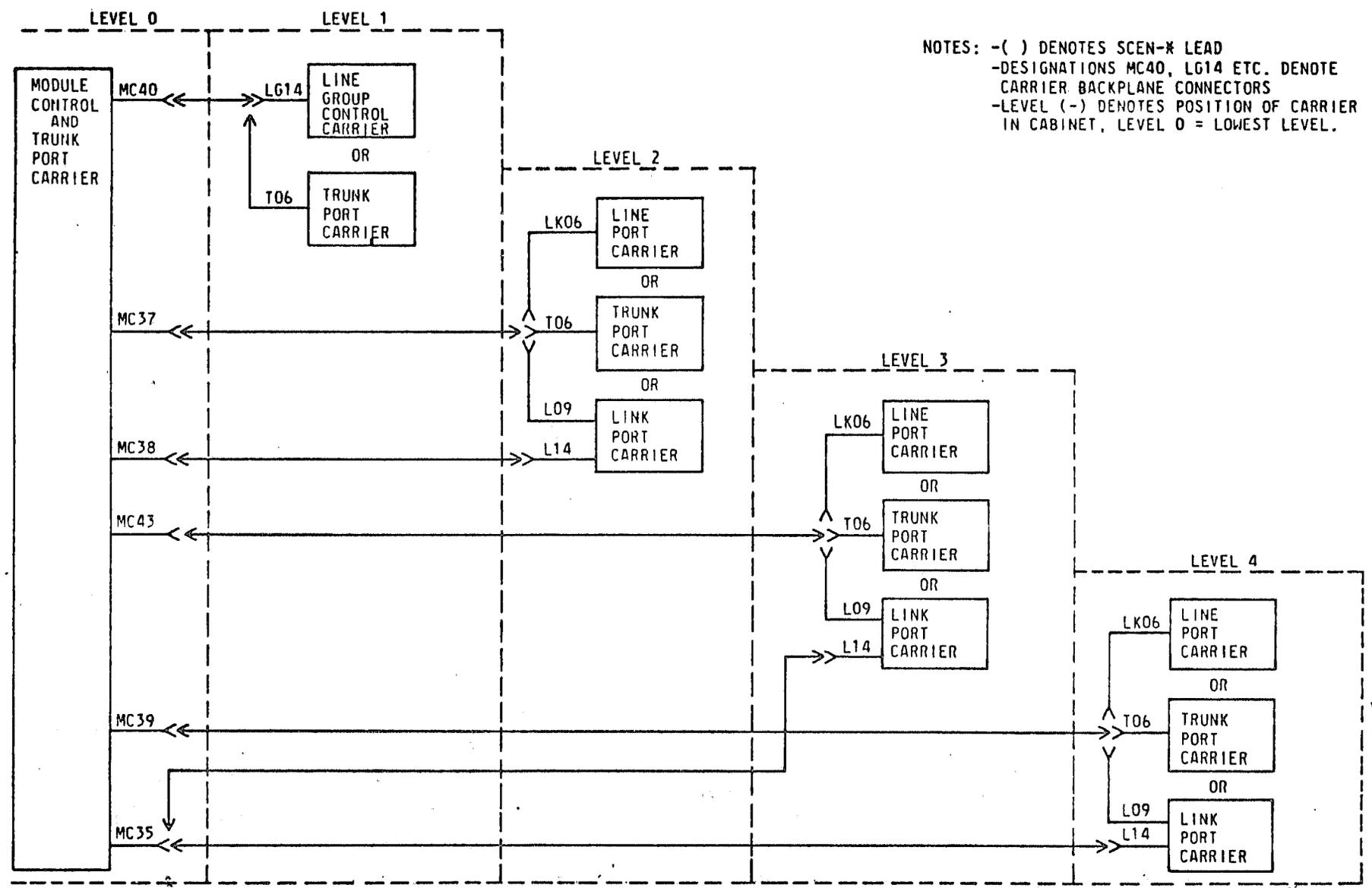
NOTES: -( ) DENOTES SCEN-✱ LEAD
-DESIGNATIONS MC40, LG14 ETC. DENOTE
 CARRIER BACKPLANE CONNECTORS
-LEVEL (-) DENOTES POSITION OF CARRIER
 IN CABINET, LEVEL 0 = LOWEST LEVEL.

FIGURE 2B

HB 281 - 506T

14.

MODULE CONTROL CABINET LINE CABINET

Module Control Cabinet Line Cabinet (top row):

MODULE CONTROL & TRUNK PORT CARRIER — MC23 ⟷ LG18 — LINE GROUP CONTROL CARRIER — LG17

OR

TO3 — TRUNK PORT CARRIER — TO3

TRUNK PORT CARRIER — TO3 / TO2

OR

LK03 — LINE PORT CARRIER — LKO2

OR

LO7 — LINK PORT CARRIER — L12

TRUNK PORT CARRIER — TO3 / TO2

OR

LK03 — LINE PORT CARRIER — LKO2

OR

LO7 — LINK PORT CARRIER — L12

TRUNK PORT CARRIER — TO3

OR

LK03 — LINE PORT CARRIER

OR

LO7 — LINK PORT CARRIER

Bottom row:

LINE GROUP CONTROL CARRIER — LG17, LG18, LG08

LKO3 — LINE PORT CARRIER — LKO2

LKO3 — LINE PORT CARRIER — LKO2

LKO3 — LINE PORT CARRIER — LKO2

LKO3 — LINE PORT CARRIER

LEVEL 0   LEVEL 1   LEVEL 2   LEVEL 3   LEVEL 4

FLAT CABLE WIRING	
TERM	DESIG.
1	GRD D
2	-
3	-
4	SPTENX
5	SDA1X
6	SAD01X
7	SAD10
8	SAD04X
9	SAD02X
10	DGRD
11	-
12	BUSELX
13	-
14	NPTENX
15	SDA2X
16	SAD00X
17	SCLKX
18	SAD05X
19	SAD03X
20	-

20 · · 10
11 · · 1

BACK VIEW OF
CARRIER CONNECTOR
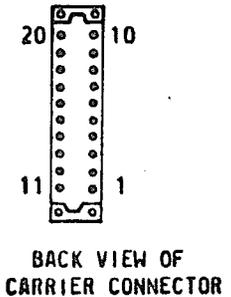
NOTES: LEVEL - REFERS TO CARRIER LEVEL IN CABINET,
LEVEL 0 = LOWEST LEVEL
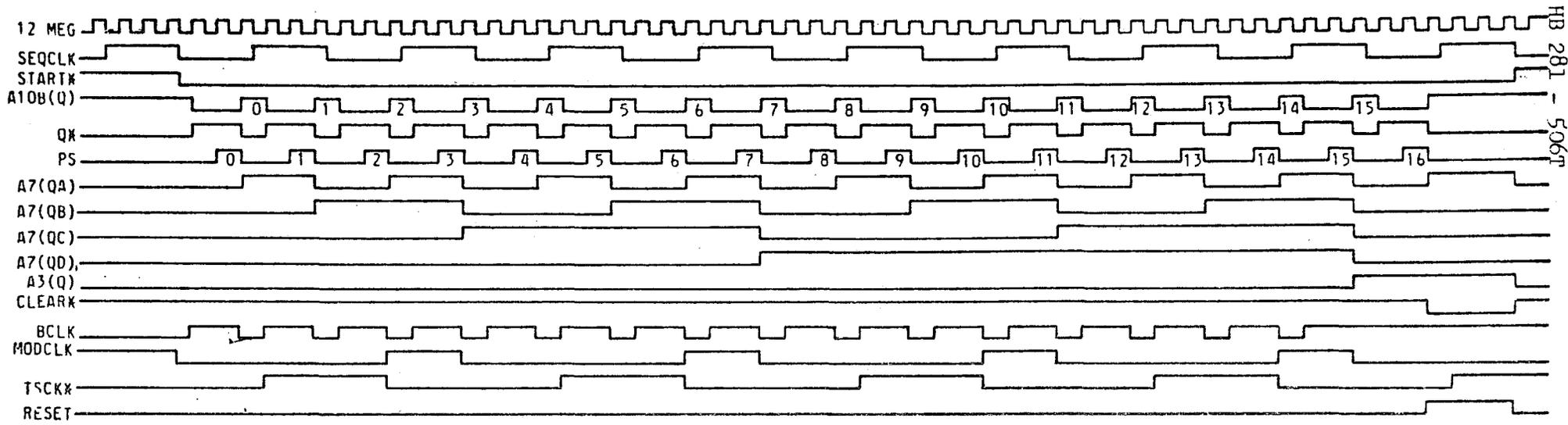DESIGNATIONS MC23, LG18, ETC. DENOTE CARRIER
BACKPLANE CONNECTORS

FIGURE 3

SCAN COMMAND

SEQCLK
TSCK*
BIT 15
CCLK

A11B(Q)
A8C
A10D

A2A(Q)
SCNR*
R10*
ADCLK
RD10*

SYNCLK* (TP6)
READC

SCAN
SOD

SCAN* (TP6)
SYNSCAN
LAEN

SORD
DEL SORD (TP1)
IODN*
N10DN*

BUFF
ENDEC*

SBUFF
START*
CLEAR*

RESET
BCLK

LC124
LC46
LC124
LC123
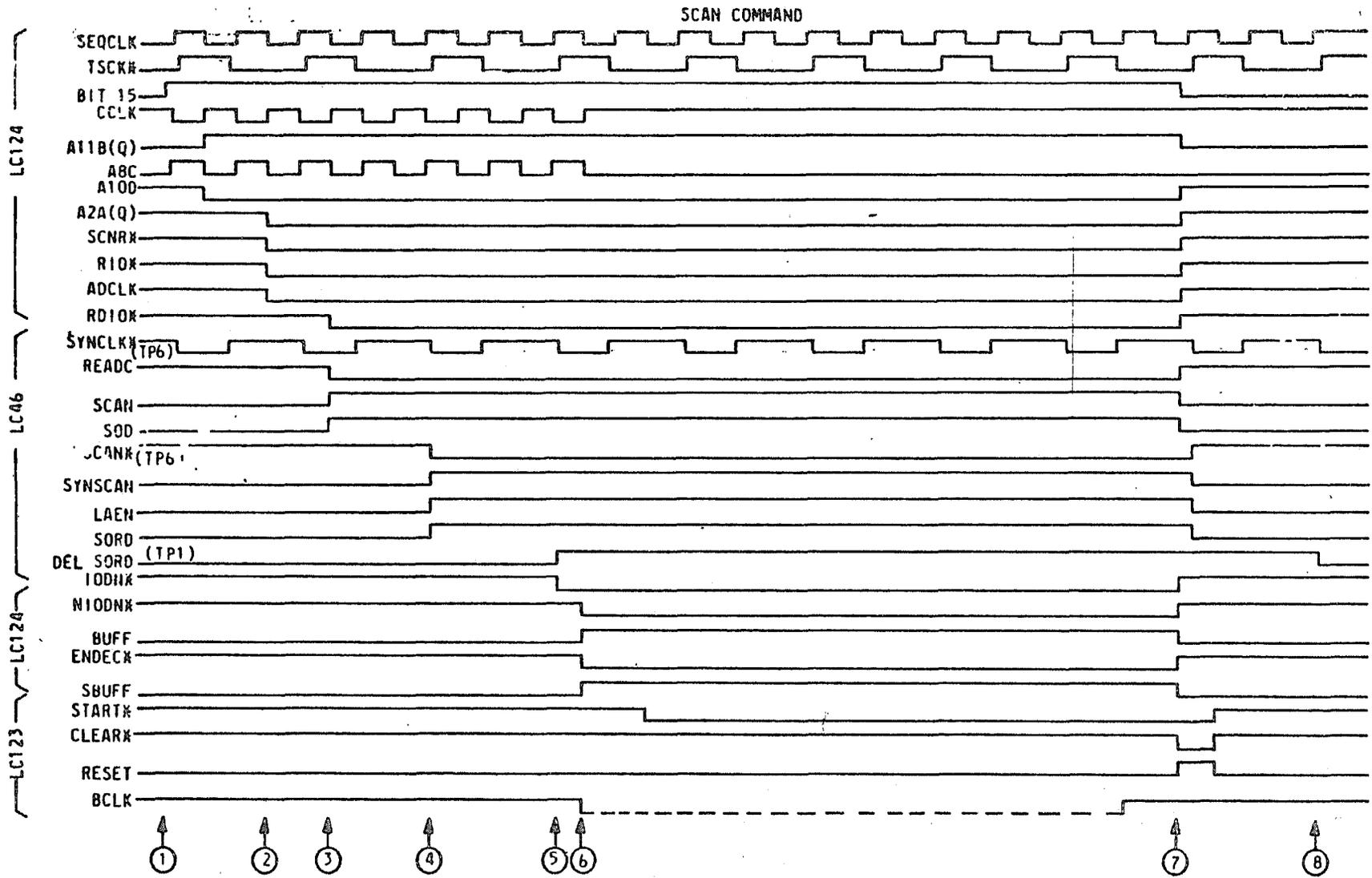
① BIT 15 ACTIVE INDICATES A MESSAGE HAS BEEN RECEIVED.
② SCNR* AND R10* ACTIVE INDICATES A SCAN COMMAND.
③ RD10* ACTIVE ENABLES LC46.
④ ADDRESS BUS NA(00-09)* INFORMATION LOADED INTO LC46 LATCHES.
⑤ IODN* ACTIVE INDICATES LC46 HAS COMPLETED ITS OPERATIONS.
⑥ RETURN OF SCANNING INFORMATION STARTED HERE.

⑦ RESET OCCURS HERE.
⑧ LC46 IS COMPLETELY RESET HERE.

FIGURE 4A
(FOR REFERENCE ONLY)

506T

SCAN COMMAND
SCNR*/R10*
SHEET 1 OF 2

12 MEG
SEQCLK
STARTX
A10B(Q)   0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
QX
PS   0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
A7(QA)
A7(QB)
A7(QC)
A7(QD),
A3(Q)
CLEARX
BCLK
MODCLK
TSCKX
RESET

LC123

HB 281-506T

16.

① STARTX - START OF RETURN MESSAGE BEGINS HERE.

② PARALLEL LOADING OF DATA OCCURS WHEN MODCLK IS ACTIVE AND BCLK GOES LOW.

③ PARITY BIT IS SHIFTED OUT (A3Q)

④ CLEARX CAUSES RESET PULSE.

MESSAGE RETURNED IS SCANNED INFORMATION FROM BOARD ADDRESSED PLUS THE
NEXT 3 PREVIOUS BOARDS.

FIGURE 4B

(FOR REFERENCE ONLY)

SCAN COMMAND
SCNRX/RIOX
TRANSMIT SUB CYCLE
SHEET 2 OF 2

Reason For Issue:
          New Section   Manager, Denver PBX PECC