

CAROT 2/GENERIC 3
CAROT/CMS INTERFACE DESCRIPTION
CENTRALIZED AUTOMATIC REPORTING ON TRUNKS (CAROT)

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I. Miscellaneous Messages	14	1.01 This section is intended to provide a single document of information on operating a Centralized Automatic Reporting on Trunks 2 (CAROT 2) controller in Circuit Maintenance System (CMS) environment. This section is not intended to eliminate the need for other CAROT sections on operations. It is intended to supplement and consolidate the operations information of a CAROT in a CMS environment. It may be used for controllers performing only CMS functions; ie, no local office or associated company testing, or in a combined CMS and associated company environment. This section should be of assistance to both CAROT and CMS per-	
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sonnel. It does, however, assume a knowledge of CAROT operation. Before reading this practice, it is recommended that Section 190-103-100 (CAROT 2, Generic 3, General Description) be read first.

1.02 This section is being reissued to include additions and changes. Equipment test lists are not affected. The following are the specific reasons for this reissue:

- (a) Add new information on CMSCAR parameter in paragraph 3.04
- (b) Add additional information on 710 update requests in paragraphs 3.08 and 3.09
- (c) Add additional information on update report file in paragraph 4.17
- (d) Add new information to Tables A and D.

2. CAROT/CMS INTERFACE DESCRIPTION

2.01 The CMS performs the circuit provision and maintenance administration for the No. 4 ESS* switch. A single CMS System can handle these functions for up to six separate No. 4 ESS switches. The CAROT 2 performs routine and demand trunk transmission testing for No. 4 ESS switches under the direction of CMS. See Section 190-103-100 for CAROT 2, Generic 3, General Description.

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2.02 The CAROT communicates with CMS via 1200-baud data links. By means of the data link, CMS personnel at test positions can initiate demand test requests of CAROT on trunks or trunk groups. The CAROT will perform the tests and return the results to CMS via the data link. Test requests may be made for trunks in either the preservice state or in the active (in-service) state. Thus, CAROT is a major precutover testing tool for CMS.

2.03 In addition, as trunks are turned up for service or disconnected on the No. 4 ESS switch, CMS personnel may initiate trunk updates to the CAROT data base via the data link. Once updated into the CAROT data base, trunks are routinely tested according to the test schedule code accompanying the trunk update record.

3. DATA LINK MANAGEMENT

3.01 A single CAROT controller can perform its functions for up to three different No. 4 ESS switches. However, a separate data link into CAROT is required for each No. 4 ESS switch. Since each CMS System can handle up to six No.4 ESS switches, any number of possible CAROT/CMS configurations may exist. Figure 1 shows an example.

3.02 Each data link is a 1200-baud dedicated link. At the CAROT controller, the links are connected to test processor input/output (I/O) slots 15, 17, and 20 (all octal numbers) of the test processor.

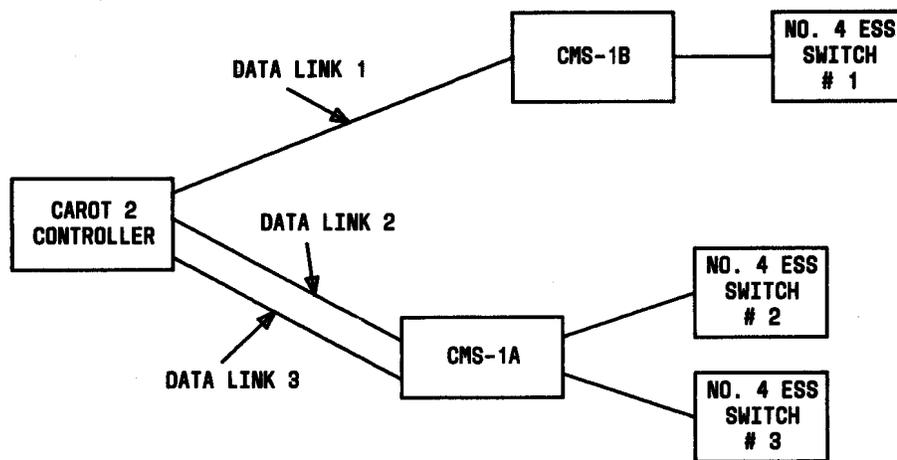


Fig. 1—Example of CAROT/CMS Configuration

During real-time data link transactions, CAROT keeps track of which data link each transaction was received on. The response to each transaction is then returned to CMS on the same data link.

3.03 Several commands are provided by the CAROT console program to manage the CMS data links. First, there are three SET/SHOW parameters: CMS1, CMS2, and CMS3. These are the logical link numbers of data links one, two, and three. They also indicate whether or not each data link is enabled. For example, if the parameter is negative, the corresponding data link is down (disabled). If it is positive, the data link is up (enabled). The **LUP:n** and **LDOWN:n** console commands cause data link *n* to be enabled or disabled. These are provided to permit maintenance activities to be carried out on the data link itself, or on CMS or CAROT without allowing either system to interrupt the other. Also note that a disabled link (as shown by the CMS1, CMS2, and CMS3 parameters), will cause CAROT to ignore all requests incoming from the CMS associated with the link.

Note: Never LUP a link that does not contain the link interface card in the respective I/O slot (paragraph 3.02). Attempts to use links without the proper hardware connected can cause the CAROT/CMS interface software to abort, thus causing controller operation problems.

3.04 Another SET/SHOW parameter, CMSCAR, is set to YES if data links exist between CAROT and one or more CMS sites. A NO means there are no existing data links between the CAROT controller and any CMS site. This parameter indicates the need for CMS error recovery within CAROT in the event of a system crash. If CMSCAR is set to NO, all links should be disabled, all LDN*n* parameters should be set to YES, and all LDIAG*n* parameters should be set to NO.

3.05 Another console command, **LCHECK:n**, performs a diagnostic on data link *n* to determine the state of the link. The diagnostic consists of sending a message to CMS which is echoed back to CAROT. If the echo is incorrectly received, a console message will so indicate. The data link protocol allows the diagnostic to determine three different conditions:

- (1) Data link to CMS operational and CMS operational (no data errors)
- (2) Data error received on data link

- (3) Data link not operational.

Note: The LCHECK should not be attempted unless the CMS is loaded with generic 7 or later software.

3.06 Upon controller bootup, CAROT checks three SET/SHOW parameters LDN1, LDN2, and LDN3 to see if links should be 'turned down' after bootup has been completed. If any of these parameters are set to YES, the corresponding link is disabled upon bootup. This prevents any incoming CMS requests during the bootup process. It is recommended a link that is enabled under normal operations should be disabled upon bootup. If an LDN*n* parameter is set to NO, the link will remain in its current state (enabled or disabled). If a normally operational link is disabled upon bootup, an **LUP** command followed by an **LCHECK** command must be done at the console before any CMS request will be processed by CAROT. Any CMS requests coming over a disabled link are ignored by the CAROT controller.

3.07 After the bootup procedure described in paragraph 3.06 is completed, CAROT checks the LDIAG1, LDIAG2 and LDIAG3 parameters. For each one that is equal to YES, CAROT will run a data link diagnostic (provided the link is enabled) and prepare to receive CMS requests. Once a data link is enabled, it will remain enabled (UP) even if a diagnostic detects a problem. The **LDOWN** command and LDN*n* set to YES upon bootup are the only ways of disabling a link. If a link has been disabled, it can only be reenabled by typing two commands: **LUP:n** followed by **LCHECK:n**. The LUP command will set the corresponding CMS1, CMS2, or CMS3 parameter to its positive value, but the **LCHECK** command is then required to insure that the data link is operational.

3.08 Once the data link is up, receipt of update requests (710s) from CMS can be accepted. Whenever a 710 is received from CMS, the controller checks the system parameter MTCOPY to see if a copy of the 710 request is to be saved on magnetic tape. If MTCOPY is set to YES, every update request is saved on a magnetic tape mounted on the tape drive. Be sure to set MTCOPY to NO if no magnetic tape is mounted.

3.09 Update requests saved on magnetic tape may be restored via the **RESTORE** command. The **RESTORE** command is used after a data base restore has been completed. The CMS update requests made

between the time the data base backup was made and the time of the system crash can be recovered via this backup method.

Note: System crashes which do not require data base restoral also do not require restoral of 710 requests.

3.10 During the CAROT update program and when CAROT is in the SLEEP mode, no CMS transactions are allowed. The data link is operational, but a wait message is returned to CMS in response to any test or update request. Note that this differs from the link disabled state, as described in paragraph 3.03. CAROT will return a diagnostic from CMS, whether in the SLEEP mode or not (provided the link is enabled). The CAROT **LCHECK** command, however, is not allowed while CAROT is in a SLEEP mode.

3.11 The possible error messages generated by data link transactions and their meaning are shown in Table A. Most of these error messages will be displayed on the console.

4. CAROT/CMS DATA LINK TRANSACTIONS

A. General

4.01 The following types of messages are processed over the CAROT/CMS data link:

- (1) Demand transmission test requests on single trunks which do not yet exist in the CAROT data base (CMS to CAROT)
- (2) Demand transmission test requests on single trunks or trunk groups which exist in the CAROT data base (CMS to CAROT)
- (3) Demand test results messages from CAROT to CMS
- (4) Message from CAROT to CMS indicating an immediate action trouble found during routine testing.
- (5) Data base update messages (710s) adding or deleting trunks, trunk groups, and facilities in the CAROT data base (CMS to CAROT)
- (6) Routine test results reports from CAROT to CMS
- (7) Update results report giving success or error indications on each 710 request (CAROT to CMS).

The following paragraphs discuss each of these message types.

B. Circuit Order Demand Tests (CMS to CAROT)

4.02 During the precutover testing phase of the installation of a No. 4 ESS switch office, CAROT is utilized to perform circuit order transmission tests on trunks. After the No. 4 ESS switch is in service, CAROT is still used to perform circuit order demand tests on trunks before they are placed in service. For these circuit order demand tests, CAROT has no individual trunk data in its data base. Therefore, the test request messages that CMS sends to CAROT over the data link contain the following information necessary to perform the test:

- (1) Far-end common language location code
- (2) Near-end common language location code
- (3) Priority code—always 1 (highest) for single trunk test request
- (4) Trunk location address (trunk appearance number [TAN])
- (5) Test pad loss
- (6) Impedance
- (7) Traffic usage
- (8) Which transmission tests to perform.

Note: Circuit order test results will be displayed at the CMS test position.



4.03 Each test request from CMS to CAROT indicates what transmission tests to perform. The possible combinations provided by the CAROT, Generic 3, and the CMS1, Generic 7, Systems are as follows:

- (1) The routine test set: 1000-Hz, 0 dBm loss and C-message noise
- (2) All tests allowed by the interface:
 - 1000-Hz, 0 dBm loss
 - C-message noise
 - C-notch noise

TABLE A

ERRORS GENERATED BY CMS TRANSACTIONS

ERROR MESSAGE	MEANING	ACTION
ERROR ON CMS LINK <i>nn</i>	An error condition has been found when trying to read or write to link <i>nn</i> . This message will appear for every error where the link number is known.	If a SHOW:CMS<i>n</i> results in a negative value, the CAROT operator should do an LUP:<i>n</i> and then do a LCHECK:<i>n</i> for the link with the error. Resubmit request at CMS.
INVALID MESSAGE TYPE	A message received from CMS does not have a correct header or first part. Possible link error. The message is ignored.	
CMSPK UNIT ERROR ON LINK <i>nn</i> RECEIVED FROM PROCESS <i>mm</i>	A message received in the data processor CMS programs from the test processor was routed incorrectly and may possibly not be from CMS. Possible internal software error. The message is ignored. <i>nn</i> = link number <i>mm</i> = test processor status code.	
OTCM UNIT ERROR FROM <i>nn</i> TO <i>mm</i>	A message received in the data processor CMS programs from the test processor was routed incorrectly and may possibly not be from CMS. Possible internal software error. The message is ignored. <i>nn</i> = link number <i>mm</i> = "4" = CMGR route code.	
MISSING PART OF A MULTI-PART MESSAGE	A message received from CMS is not complete. Possible link error. The message is ignored.	
WRONG DIRECTION OF READ/WRITE REQUEST ON LINK <i>nn</i>	A message received by the data processor CMS programs was routed in the wrong direction when trying to do a read or write to link <i>nn</i> . Possible internal software error.	

TABLE A (Contd)

ERRORS GENERATED BY CMS TRANSACTIONS

ERROR MESSAGE	MEANING	ACTION
UNORDERED/NONEXPECTED MESSAGE OR TYPE ON LINK <i>nn</i>	A message received from link <i>nn</i> is unexpected since either the link was presumed to be down or the message contains unexpected additional information. Possible link error.	If a SHOW:CMSn results in a negative value, the CAROT operator should do an LUP:n and then do a LCHECK:n for the link with the error. Resubmit request at CMS.
NON-NUMERIC CHARACTER IN NUMERIC FIELD	A field of a CMS message which was expected to contain a numeric value does not contain a numeric value. Possible link error. The message is ignored.	
UNIMPLEMENTED OPCODE SENT TO CAROT FROM CMS	The opcode field determining the type of CMS request is not one of those implemented in the interface. Possible link error. The message is ignored.	
LENGTH NOT EQUAL TO RECEIVED LENGTH	A part of a CMS message has a length value not equal to the length received. Internal software error. The message is ignored.	
TOTAL RECORD LENGTH NOT EQUAL TO RECEIVED LENGTH	The length of the whole message received from CMS is not equal to the given length. Internal software error. The message is ignored.	
PROBLEM WITH CMSVR — REQUEST NOT FOUND	The CMS Validation Record created for a CMS request is not found or cannot be accessed. Internal software error.	
CMS TEST REQUEST NOT COMPLETED — DEMAND TESTING PROBLEM	A CMS-621 test request cannot be done. A priority vector request returned an error status. Internal software error. The request is ignored.	
PROBLEM WITH CMSREP FILE	A problem was found in trying to access or read the CMS-710 Update Report file. The CMS program will attempt to finish reading the file and sending the update results.	

TABLE A (Contd)

ERRORS GENERATED BY CMS TRANSACTIONS

ERROR MESSAGE	MEANING	ACTION
CMS REQUEST NOT COMPLETED — SYSTEM IS ASLEEP	When a request is received during update or during SLEEP mode, this message is printed to let craft know that a message was received and discarded. A WAIT message is also sent to CMS.	No action to be taken by the CAROT operator. Wait an appropriate interval and re-submit the request at CMS.
NO AVAILABLE CMS VALIDATON RECORDS	There are too many requests in the system right now. CMS should try the request again shortly. This particular request will be ignored. A WAIT message is returned to CMS.	
CMS BOOT UP DIAG NOT SENT — SYSTEM ASLEEP*	All except the dispersal and possibly the CMSREP file messages should never be seen. If one or more of these errors appear, the machine may be in a bad state. Check the status and reboot if necessary. These messages will appear in the error file.	If this message happens repeatedly, CAROT must be rebooted. Otherwise, no action is necessary by the CAROT operator.
CMS LCHECK NOT SENT — SYSTEM ASLEEP*		
CMS Q2 MESSAGE NOT SENT — SYSTEM ASLEEP*		
CMS DISPERSAL NOT SENT — SYSTEM ASLEEP*		
CMS WAIT MESSAGE NOT SENT — SYSTEM ASLEEP*		
CMS TEST RESULTS NOT SENT — SYSTEM ASLEEP*		
CMS CMSREP FILE NOT SENT — SYSTEM ASLEEP*		
CMS STATUS NOT SENT — SYSTEM ASLEEP*		
CMS ERROR MESSAGE NOT SENT — SYSTEM ASLEEP*		

* These error messages appear in the error file and on the system console. All other error messages appear on the system console. Any messages going to the system console also appear on the line printer if COPY is set to YES.

TABLE A (Contd)

ERRORS GENERATED BY CMS TRANSACTIONS

ERROR MESSAGE	MEANING	ACTION
UNKNOWN MAIL BOX INPUT TO CMSPK PROGRAM	The CMSPK program received a message that was not from CMS and therefore routed wrong. Internal software error.	If this message happens repeatedly, CAROT must be rebooted. Otherwise, no action is necessary by the CAROT operator.
PROBLEM LOADING SEGMENT <i>nn</i>	A program was encountered when trying to load segment <i>nn</i> of the OTCM program. The CMS request causing the problem is ignored.	
PROBLEM WITH UTMS/DBMS CALL	A request to UTMS or DBMS was returned with an error status. This message sometimes follows a CRASH message given by the UTMS or DBMS program. Internal software error. The CMS message is ignored if results have not already been returned.	If no crash message results from UTMS or DBMS, no action is required from the CAROT operator and the request must be resubmitted at CMS provided no or incomplete results were returned by CAROT to CMS. If a DBMS or UTMS crash is present, the CAROT operator should take action based on this crash. The CMS request may be resubmitted depending on the action taken at the CAROT end.
NUMBER <i>x</i> LONGER THAN <i>n</i> CHARACTER FIELD	Trying to format a message with a number too large for its field. This does not prevent a message from being sent, but the message may contain some garbage. Internal software error. <i>x</i> = number being put into the message <i>n</i> = number of characters of space in message field.	No action is to be taken by the CAROT operator. Resubmit the CMS request if partial or no results were returned.
PROBLEM WITH CMS BATCH	A problem was found trying to read, write, or purge a BATCH created by a CMS-621 test request. Internal software error. The message is ignored if results are not already sent to CMS.	

TABLE A (Contd)

ERRORS GENERATED BY CMS TRANSACTIONS

ERROR MESSAGE	MEANING	ACTION
PROBLEM WITH \$IADCM FILE	A problem was found in trying to access/read the file containing the DISPERSAL file names for CMS. Internal software error. CMS dispersal will stop.	No action is required on either the CMS or CAROT ends.
PROBLEM WITH A DISPERSAL FILE TO CMS	A problem was encountered when trying to access, read, or send over a link one of the DISPERSAL files. That file will be skipped.	
CMS REPORT ON LINE PRINTER	When a link presumed up is found down, the CMS-710 Update Report is printed on the line printer, and this message will appear on the console.	
DISPERSAL TO CMS HAS BEGUN	This message signals the start of dispersal to CMS. The system should not be put into SLEEP mode until dispersal completes.	
DISPERSAL TO CMS NOT DONE PROBLEM OPENING \$IADCM FILE	CMS dispersal will not be done as there was a problem reading the dispersal interface file.	
DISPERSAL TO CMS HAS COMPLETED	This message signals the completion of dispersal to CMS.	
CMS ERROR RECOVERY HAS BEGUN	This message signals the start of CMS error recovery. This happens upon bootup when the system is not in SLEEP mode. The system should not be put into SLEEP mode until CMS error recovery completes.	
CMS ERROR RECOVERY HAS COMPLETED	This message signals the completion of CMS error recovery.	

TABLE A (Contd)

ERRORS GENERATED BY CMS TRANSACTIONS

ERROR MESSAGE	MEANING	ACTION
SENDING OF 710 RESULTS TO CMS HAS BEGUN	This message signals the start of sending the CMSREP file to CMS. The system should not be put into SLEEP mode until this completes.	No action is required on either the CMS or CAROT ends.
SENDING OF 710 RESULTS TO CMS HAS COMPLETED	This message signals the completion of sending the CMSREP file to CMS.	
PROBLEM WITH REAL-TIME Q2	An error condition was found in trying to send an Immediate Action Report for Q1s and Q2s to CMS. The message is not send to CMS.	
CMS LINK <i>nn</i> DOWN	The responses for the diagnostic performed on bootup or by console request (LCHECK: <i>nn</i>) take one of these forms. The DOWN message also appears when a CMS request comes over a disabled link or when the test processor incurs a link time-out (in which case, CAROT disables the link).	
CMS LINK <i>nn</i> OPERATIONAL		
CMS LINK <i>nn</i> OPERATIONAL — RESPONSE TIMEOUT		
DATA ERROR ON CMS LINK <i>nn</i>		
PROBLEM WITH CMS710 FILE	A problem was found in trying to open or create one of the CMS-710 input files. The 710 request is ignored.	Reboot if the problem occurs repeatedly.
MAG-TAPE NOT AVAILABLE CMS-710S TO FILE ONLY	MTCOPY is set to YES, but the tape drive is busy, down, or disabled. The tape might not be mounted.	Mount a tape if necessary, or set MTCOPY to NO if desired. If a tape was mounted, make sure the write ring is in, the tape drive is on-line, and the tape drive head is clean. If all else fails, try a different tape.

Gainslope

Balance—echo return loss (ERL), singing return loss (SRL), and singing return loss high (SRLH).

- (3) Any one test listed in (2).

4.04 Using this data, CAROT will first access its test equipment files and find the remote office test line (ROTL) telephone number from the near-end common language circuit identification (CLCI), or the far-end test line (FETL) telephone number from the far-end CLCI and the trunk traffic usage. The CAROT will then dial the ROTL, pass to it the priming information, perform the tests, and return the results to CMS.

C. Demand Tests on Trunks in CAROT Data Base

4.05 For trunks which have been updated into the CAROT data base, two types of demand test requests are provided: single trunk and trunk group. Since CAROT has in its data base all the test parameter and test equipment data necessary to test these trunks, the test request message need not contain this data. For a single trunk test, the data included in the request is as follows:

- (1) Common language circuit identification (CLCI).
- (2) Direction code; ie, A to Z office, or Z to A offices. In all cases, for CAROT, generic 3, the No. 4 ESS switch ROTL is used to access the trunk, whether it is the A or Z office of the CLCI.
- (3) Mode select code.
- (4) Traffic use.

Note: The test results of a single trunk demand test are displayed at the CMS test position.

4.06 For a trunk group test, the data included in the request is as follows:

- (1) Trunk group identification (ID)
- (2) Direction code
- (3) Mode select code
- (4) Traffic usage.

Note: The test results for a trunk group test are returned to the line printer at the CMS control area.

The same transmission test options are provided here as for circuit order tests.

D. Demand Test Results (CAROT to CMS)

4.07 Each request (test or update) from CMS to CAROT has a unique identifier called a "tag." The "tag" allows CMS to keep track of outstanding requests and pass the results back to the proper control office (test position). Upon receipt of a request from CMS, CAROT keeps track of which data link (1, 2, or 3) the request was received on, and also maintains the "tag" with each request as it is processed. Thus, after a demand test is performed, the results are returned over the correct data link, with the correct "tag" associated with each set of test results.

Note: Demand tests from CMS are performed with *no* deviation limit checking. The measurements are therefore returned without indicating any Q flags (Q1 or Q2). Whatever limit checking is done, it is performed by the CMS System or the CMS maintenance personnel.

4.08 In the event a test cannot be performed for some reason, an error message is returned to CMS instead of measurement results. Table B shows a list of possible error conditions.

4.09 More than one demand test request may be submitted simultaneously. However, since the remote test equipment is capable of performing several difference tests at once, one or more of the test requests are likely to result in a TRUNK BUSY disposition. This is because the first test request is already in progress.

E. Real-Time Q2 Reports

4.10 During routine testing, the following special actions are taken by CAROT when any trunk is found to exceed an immediate action (Q2) limit on loss or noise.

- (1) The trunk is retested on a later test pass to confirm the Q2.
- (2) If the Q2 is confirmed, and if the remote make-busy (RMBUSY) parameter is set to YES and

TABLE B

**ERROR CODES GENERATED BY CAROT AND SENT TO
CMS AS A RESULT OF CMS DEMAND TESTS**

ERROR CODE	MEANING
1	Far end busy
2	Milliwatt (1000 Hz)
4	Voice announcement
5	Three cycles and ring
6	Parking circuit time-out
7	Broadband
8	Data not found in CAROT
9	Trunk busy
11	High and dry
12	ROTL signaling error
14	Trunk priming error
15	ROTL responder N/A
16	No answer supervision from far end
17	Supervisory hit detected
18	Equipment failure or blockage
20	No test lines for trunk group
21	No requested test line
22	ROTL failure
23	Responder self-check failure
24	Failure to access ROTL
25	Update interval, request terminated
26	Disk error, request terminated
27	Analysis interval, request terminated
28	Two AR/VA's on trunk group

the make-busy flag in the data base ROTL record is set, then CAROT will request the No. 4 ESS switch to make the trunk busy. This is done with the standard make-busy security callback as for other ROTLs, and is not handled over the CMS data link.

(3) If the Q2 is confirmed, CAROT will send a message to CMS identifying the Q2 trunk and whether or not it was made busy.

4.11 The immediate action notices returned to the CMS (see item 3 of paragraph 4.10) can have two forms. In the first format, messages are sent on Q2s for loss and noise only. In the second form, messages may be sent on C-notch, terminal balance, or gainslope Q2s (as well as the loss and noise messages). System parameters CMSRT1, CMSRT2, and CMSRT3 indicate which form is to be sent over each

link. If the parameter is equal to NO, only loss and noise Q2s are reported. If the parameter is equal YES, Q2s for all five tests are reported. The CMS, generic 8 software is the first that can properly interpret the expanded immediate action notices. The CMS, generic 7 software can only process loss or noise Q2 notices.

F. Routine Test Results

4.12 Each morning following the completion of the analysis program, CAROT will send the routine testing results over the data link to CMS. However, for this to be accomplished, the control office for trunks (CT) record for each CMS control area must be correctly input to the data base. See Section 190-103-203 for instructions on entering the CT record data.

4.13 The test results are sent to CMS in a text mode which permits printout on a CMS line printer. The "tag" accompanying each set of results contains the control area and test position, allowing CMS to direct the printout to the appropriate line printer for each control area.

G. CMS Update Requests

4.14 The CMS has the capability of updating the trunk group, facility group, and trunk files of the CAROT data base. The process works as follows to add a new trunk to the data base.

- (1) A circuit order calling for a new trunk or trunk group is entered into the CMS data base.
- (2) The required work is performed at the No.4 ESS switch to effect the circuit order.
- (3) A demand test on the new trunk (not yet in the CAROT data base) is made by a CMS operator via CAROT. If the test passes circuit order limits, this fact is indicated for the new trunk in the CMS data base.
- (4) A 710 command is entered by a CMS operator at a test position. This command initiates an update (710) message sent across the data link to CAROT.

(5) The CAROT stores the 710 message in a special file for later processing by the update program. Note that the data base update is not done at the time the 710 is received but at a later time in the day. All 710s received since the last update are processed in a batch mode.

(6) The CAROT update program runs and processes the 710 file.

(7) At the conclusion of update, CAROT sends to CMS a report message on each 710 processed. The report message indicates either a successful update, or an error code for an unsuccessful update. A list of error codes is shown in Table C.

4.15 A similar process, except for the precompletion test, is followed for a delete (disconnect) of a trunk. The CMS can also delete trunk groups from the CAROT data base. However, facility groups are not deleted by CMS, and must be separately handled by CAROT personnel (see Section 190-103-201).

4.16 As an added security measure, the 710 requests can be stored on a magnetic tape by CAROT, in addition to storing them in a disc file. The magnetic tape can be used later if necessary to restore the 710 file following a CAROT controller crash (see paragraphs 3.08 and 3.09).

TABLE C

**UPDATE ERROR CODES GENERATED BY CAROT AS
A RESULT OF CMS-710 REQUESTS**

ERROR CODE	MEANING
	Errors for an Addition Request
0010	Facility group not found in CAROT data base
0100	Test group not found in CAROT data base
0101	Test and trunk groups not found in CAROT data base
0030	Attempt to enter duplicate trunk
0040	No more room in CAROT data base
	Errors for Deletion Requests
1030	Attempt to delete a nonexistent trunk or trunk group

H. Update Report File

4.17 As was stated in paragraph 4.14, following the update program, CAROT sends a series of messages to CMS giving a success flag or an error code. Depending on the number of 710s processed, this report may take several minutes to complete. The data link rate allows about one hundred 710 report messages per minute. If one or more links that should get update reports are not operational at the time update completes, the report will be saved until it can be sent successfully. No more 710s will be updated until the report is sent because the data in the report may be lost. One attempt is made to send the report every time update runs.

I. Miscellaneous Messages

4.18 The data link diagnostic message may be initiated by either CMS or CAROT, and was discussed in Part 3. Another message, the wait message, may be sent by CAROT to CMS, in response to a test or update request. This indicates to CMS that CAROT is temporarily busy or otherwise unable to accept a test or update request. Wait messages will be returned to CMS for any request made while CAROT is in the update or sleep mode.

5. CAROT DATA BASE REQUIREMENTS

A. General

5.01 The CAROT routine and demand test (RDT) data base is made up of three major areas:

- Administrative files
- Test equipment files
- Trunk and facility files.

For an understanding of the data base and update records, Section 190-103-203 must be consulted. However, a brief explanation of those update transactions necessary for a CAROT/CMS environment will be given here. A basic familiarity with the CAROT update record sequences is assumed.

5.02 As mentioned previously, the only update transactions handled over the data link are in the trunk group, facility group, and trunk files. The administrative and test equipment files must be input at the CAROT controller by other means. Fur-

ther, the equipment and administrative files must be built before the CAROT can be used for demand test or 710 requests.

B. Administrative Records

5.03 The first records to be input to the CAROT data base are the administrative office records:

- Company (CY)
- Area (AR)
- Department (DT)
- Division (DV)
- District (DS)
- Control office for trunks (CT)
- Control office for facilities (CF).

Control Office for Trunk

5.04 The usage of the CY, AR, DT, DV, and DS records are up to local practice. However, a CT record must be entered for each test position in the No. 4 ESS switch. The control office ID should correspond exactly with the naming convention established in the CMS data base. Information in the CT record is used by CAROT to determine over which data link to send routine test results. For this purpose, character 16 of the CT record should be set to zero (to indicate a CMS control office), and character 17 to the number of the data link (1, 2, or 3) connecting the particular No. 4 ESS switch to CAROT. The data link numbers are implemented as follows:

- (1) Data link 1 = test processor slot No. 15
- (2) Data link 2 = test processor slot No. 17
- (3) Data link 3 = test processor slot No. 20.

In this way, the logical link number (1, 2, or 3) is mapped into a physical I/O slot number (15, 17, or 20). Note that if character 16 of the CT record is left blank, no routine test results will be sent to the CMS. If character 16 is zero, then character 17 must be either the logical slot number or zero (blank defaults to zero). If it is zero, no routine test results are sent.

Control Office for Facilities

5.05 A control office for facilities (CF) record must also be entered for each test position in the No. 4 ESS switch. The naming convention should be exactly the same as for the CT records.

C. Test Equipment Records

5.06 In order to understand the necessary test equipment records to enter, the following information is helpful:

- (1) A No. 4 ESS switch may contain several ROTLs, each of which can access any outgoing trunk in the office.
- (2) Each ROTL has two "heads," which may be accessed by CAROT simultaneously.
- (3) Each ROTL is connected directly to its own responder.
- (4) The No. 4 ESS switch also has several responders dedicated to 105-type test lines. These responders are not usable by ROTLs, but each 105 test line can use any one of them.

5.07 The equipment records should be entered in the CAROT 2 data base as follows:

- (1) Enter one responder (RE) record containing data on one of the ROTL responders. (This is the only RE record to be entered for all ROTL responders in the office.)
- (2) Enter one ROTL (RO) record containing data on one of the ROTLs. The responder identification item entered in this record must contain the responder identification data entered above.

5.08 If the No. 4 ESS switch is to be used as a far-end office, the following additional transactions apply:

- (1) Enter an OD record containing the No. 4 ESS switch office ID.
- (2) Enter an RE record containing data on one of the 105 test line responders.
- (3) Enter one ID-ED record pair for each 105 test line. Each ED record should contain the iden-

tification of the 105 test line responder entered above.

- (4) Enter non-105 test lines associated with the No. 4 ESS switch in the standard manner; ie, the same as for 105-type test lines.

5.09 All FETL offices must be entered in the data base using an OD record for each. Each FETL is then entered as an ID-ED record pair. Note however, that for each responder ID used in the ED record, an RE record must previously have been entered.

5.10 Following the above transactions, a ROTL control office for trunks (RC) record must be entered for each test position in the No. 4 ESS switch. A companion RD record must also be entered. Each of these RC records (for the same No. 4 ESS switch) will have the same ROTL ID, but a different control office ID (one for each of the CT records input previously).

5.11 After the administrative and test equipment files have been updated, CAROT is ready to receive test and update requests from CMS.

6. CONTROLLER ADMINISTRATION

6.01 There are a number of guidelines to follow in administering the CAROT controller and its interface to CMS.

A. Data Link

6.02 As discussed in Part 3, the data links can remain operative at all times except during update. Therefore, update should be scheduled to avoid conflict with heavy CMS usage periods.

6.03 When indications of questionable link performance occur, such as console error messages, the first step should be to run the link diagnostic. If the link is bad, appropriate action should be taken to fix it (data set replacement, etc).

B. Update

6.04 There is no technical limit to the number of 710s that can be processed. However, update will take a correspondingly longer time for larger 710 files. The activities of the CMS locations (and any local telephone companies) using the controller should be coordinated to provide optimal use of update and testing time.

6.05 It is possible, by setting the CMS input (CMSIN) parameter to NO, to run update without processing the 710 file. This is done because it may be desired to run update without processing a sizable 710 file (eg, to perform a quick test line file update so No. 4 ESS switch personnel can finish circuit order testing). Following the update with CMSIN=NO, the parameter is automatically reset to the value of the UPDEF parameter (YES or NO).

6.06 In addition to the update results report sent back to CMS after update, the standard CAROT error message files are created for the CMS 710 updates. When errors do occur and 710s are rejected by update, it is generally advisable to inspect the CMS 710 error files for the precise reason for rejection. Often, the errors are additions of circuits or groups which are already in the data base or deletes which are not in the data base. This is no cause for alarm and is accepted by CMS as a valid response to the 710 request. Each CMS link has its own 710 error file. Their names are as follows:

- !CMSU1
- !CMSU2
- !CMSU3.

6.07 The CAROT has a feature which enables update to determine schedule codes and test limits for terminal balance on circuits added to the CAROT data base from CMS. To enable this process, parameters CMSBA1, CMSBA2, and CMSBA3 are set to YES for each data link on which inferred balance is desired. Also, the parameter CMSBSC is set to the

schedule code desired for testing terminal balance (eg, for monthly CMSBSC=030). For more information on the inferred terminal balance process, refer to Sections 190-103-201 and 190-103-202.

C. CMS Demand Testing

6.08 During routine testing, any demand test requests are handled as test ports become available. Therefore, if there is a heavy demand testing load, the routine testing program may not be able to test the number of trunks which were scheduled. To allow for this situation, a console parameter DONLY is provided. DONLY may be set to the number of test ports to be reserved for demand testing. DONLY must be set before update to insure that the scheduling program will use only the allowable number of test ports in its scheduling calculations. For example, if there were originally 14 test ports available and DONLY=4, scheduling will assume only 10 ports may be used for routine testing. A summary of console commands and parameters of importance for CMS applications is shown in Table D.

D. Data Base Audits

6.09 Western Electric has provided an audit program to run on a CMS computer, which will compare a magnetic tape of the CAROT trunk and facility files with the CMS data base. The audit program will create an update magnetic tape for CAROT, which will change the CAROT data base to conform exactly to CMS. The initial compare tape is produced by the CAROT SELEC program.

TABLE D

**CAROT CONSOLE COMMANDS AND PARAMETERS
RELATED TO CMS APPLICATIONS**

PARAMETERS	MEANING
CMS1 CMS2 CMS3	Shows the current status of data links 1, 2, or 3. The values may be -3, -2, -1, 1, 2, or 3. The number represents the data link assignment while the sign indicates the status — positive = enabled, negative = disabled. Their values are changed by use of the LUP and LDOWN commands.
CMSIN	Update parameter used to indicate if 710 requests will be processed during update.
CMSBA1 CMSBA2 CMSBA3	Indicates whether to do inferred balance on circuits received over the data link.
CMSBSC	Indicates the schedule code desired for inferred balance circuits.
CMSINP	Shows if there is 710 input to be processed (display only parameter).
CMSREP	Shows if an update report needs to be sent before more 710s may be processed (display only parameter).
DONLY	Number of test ports used for demand testing only. Value = 0 to 14.
UPDEF	Update default setting of DISKIN, CMSIN, and SCED.
LDIAG1 LDIAG2 LDIAG3	Indicate whether to do a link diagnostic upon bootup. (The link must also be enabled upon bootup). Value equals YES or NO.
LDN1 LDN2 LDN3	Indicates whether a link should be turned down or left in its current state after bootup. YES = turn link down, NO = leave in current state.
COMMAND	MEANING
LUP:n	Turn data link 1, 2, or 3 up for use. <i>n</i> = 1, 2, or 3.
LDOWN:n	Turn data link 1, 2, or 3 down. <i>n</i> = 1, 2, or 3.
LCHECK:n	Perform link diagnostic on data link 1, 2, or 3. <i>n</i> = 1, 2, or 3.
LFILE:filename	List user's file.