DIAL FACILITIES MANAGEMENT PRACTICES

ENGINEERING AND ADMINISTRATION DATA ACQUISITION SYSTEM

OPERATIONAL MAINTENANCE

FIGURES

DIAL FACILITIES MANAGEMENT PRACTICES

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OPERATIONAL MAINTENANCE

1. GENERAL

1.01 This practice covers the operational maintenance tasks required to run an Engineering and Administration Data Acquisition System (EADAS). This function is intended to present a different perspective than the historic plant maintenance responsibility. The latter responsibility is covered in BSP series 252-115-XXX. Included is a plan for an ongoing operational routine maintenance program, as well as certain aspects of an overall corrective maintenance function. It also provides reference to spare parts and test equipment.

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 References in this section to methods, planning, data requirements, service levels and equipment quantities are based on American Telephone and Telegraph Company recommendations.

1.04 The title for each figure includes a number(s) in parenthesis which identifies the paragraph(s) in which the figure is referenced.

1.05 A general description of EADAS can be found in TFP, Division B, Section 9a, January 1974.

2. SCOPE

2.01 This section presents a comprehensive plan for establishing an ongoing program of routine and corrective maintenance to be implemented by the Central Control Unit (CCU) operations personnel, and associated switcher location groups; certain system backup considerations, and selected items which may be accomplished by the switching location dial administrators to enhance data integrity. Where appropriate, it refers to plant type BSP's and other similarly substantive references.

2.02 Included is a description of the recommended CCU environmental conditions and corrective procedures should these become conditions abnormal.

2.03 The System Message Catalog, Appendix A to this section, is a comprehensive document which enumerates all the System Messages from EADAS with a suggested methodology on correcting the conditions which the respective messages have presented.

2.04 Finally, there is a reference to recommended lists of spare parts and test equipment for the CCU location, along with a proposed approach to the coordination of spare parts availability to field locations.

3. REFERENCES

3.01 The following documents are available to assist in establishing and implementing a comprehensive routine maintenance and corrective maintenance plan on the various components of EADAS. These are complemented by this entire DFMP series.

(a) Switching Machine location equipment.

    (1) BSP 212-203-501, Sender Attachment Delay Recorder (SADR) Tests for No. 4A & No. 4M Switching Systems.

    (2) BSP 212-340-501, Traffic Register Tests—No. 4A & No. 4M Machines.

    (3) BSP 252-101-501, Dial Tone Speed Register and Dial Tone Speed Indicating Circuit Tests.

    (4) BSP 252-115-102—Electronic Traffic Data Converter (ETDC).

    (5) BSP 252-115-103—Pollable Data Terminal 1A (PDT 1A)

    (6) BSP 252-115-512—Traffic Data Converter (TDC) Local Tests.

    (7) BSP 252-115-513—Traffic Data Converter (TDC) Trouble Location.

(8) BSP 252-115-514—Cross Conn. Verifier (Pulser)

(9) BSP 252-115-515—Cross Conn. Verifier (Test Set)

(10) BSP 252-115-521—PDT1A-Remote Tests (Future)

(11) BSP 252-115-521—PDT1A-Local Tests

(12) BSP 252-122-301—TUR SD-95738-01, Cross Connection and Assignment Forms.

(13) BSP 252-122-501—No. 4A TUR Optional Auxiliary Scanner Unit (Fast Scanner)

(14) BSP 252-122-502—No. 4A Traffic Usage Recorder (TUR) and Auxiliary Scanner Unit (Fast Scanner) using Connection Verifier Test Set—Test Set H400-430.

(15) BSP 252-123-501—Traffic Registers, Traffic Usage Recorders Nos. 2A, 3A and 3B.

(16) BSP 252-124-301 TUR connector Verifier—Test Set H400- 430 Method of Operation.

(17) BSP 822-115-150—Traffic Data Converter, TDRS1A, Equipment Design Requirements.

(18) BSP 984-503-100—4A Traffic Usage Recorder—General Description.

(b) Central Control Unit (CCU) location.

(1) Digital Equipment Co. (DEC) Manuals and Engineering Drawings

(2) BSP 252-115-301—Operator Procedures.

(3) BSP 252-115-302— CCU — Trouble Sectionalization.

(4) BSP 252-115-511—ETDC Remote Testing.

(5) A. T. & T. Accounting Letter M-465 House Service Oprns. in Data Processing Centers

(6) BSP 770-170-300 House Service Oprns. in Data Processing Centers

(7) BSP 034-311-301—Magnetic Tape Management.

(c) General references covering entire EADAS.

(1) TFP, Section 9a—General Description— EADAS

(2) TFP, Section 9b—Determination of Quantities—EADAS

(3) A. T. & T. GL:73-05-084, 5/16/73—Planning Letter for EADAS

(4) A. T. & T. GL:74-02-010, 2/5/74—Planning Letter for Maintenance

(5) BSP 252-115-011—Equipment Test List

(6) BSP 252-115-101—General Description— EADAS

(7) BSP 252-115-516—Channel Definition Validation

4. MAINTENANCE PLAN

4.01 In order to implement a productive maintenance plan, there are several significant questions which require corporate decisions prior to a consensus among the data team. An extensive, although not exhaustive, enumeration of some of these questions includes:

(a) If the CCU is to be located in commercial space, what force, security, and environmental considerations need to be resolved?

(b) Is power back-up available?

(c) What provisions are there for "plant" maintenance coverage for CCU?

(d) Is centralized plant maintenance for data collection apparatus (DCA) a viable plan for you? (Consider TDC, TUR, traffic registers, Dial Tone Speed (DTS) equipment, Sender Attachment Delay Recorder (SADR) equipment, PDT, etc.)

(e) If your company should opt for Contract Maintenance, what coverage do your users require?

(f) Has organizational accountability for maintenance—CCU and field devices, been clearly delineated?

(g) Is there a serving test center (STC) capability? What rapport has been established with them? Will they control all private (dedicated) facilities?

(h) Have spare parts/test equipment for the CCU and the field been provided? How will they be managed?

(i) Perhaps most importantly of all, has a clearly defined corporate policy on data collection priorities been established that is understood and practiced by all contributing interdepartmental groups.

4.02 In arriving at a feasible EADAS maintenance plan there is a point worthy of early resolution. Simply put, it is that "a critical part of planning for EADAS is the selection of the appropriate maintenance group and the creation of safeguards that will assure that the maintenance of EADAS is not relegated to a position of secondary importance."

4.03 Thus, if a policy decision on the assignment of the plant maintenance responsibility has not been agreed to previously, it is incumbent on the CCU administrator to reach an understanding early in the implementation stage with the plant maintenance group as to their commitment. (See paragraphs 4.01 & 4.02.)

4.04 The current system policy is to obtain outside vendor maintenance contracts for the non-Telco manufactured components of the CCU including the line printer. At this point, there are numerous studies and field trials reviewing various aspects of the feasibility of telco maintenance of the entire CCU. Among the cost considerations are recurring training requirements, coverage and availability of sufficient numbers of trained personnel, spare parts provision, updating of documentation and equipment, and the availability of an outside response to an emergency request for assistance when all else fails. Please keep in mind that maintenance costs associated with the CCU have been classified as traffic expense.

4.05 Regarding the plant maintenance of the DCA's, TUR's and other associated field data devices, it is similarly urgent that an early

decision be made regarding these specific maintenance responsibilities. It is recommended that all data device maintenance responsibility be centralized if possible. In other words, along with the CCU minicomputer maintenance, the central group would, depending on the geographical concentration of the switcher locations, be charged with field maintenance responsibility either on an on-site or telephonic basis. The central group could also monitor a centralized spare parts capability for the DCA's. This procedure has been used to good advantage in TDRS 1A.

4.06 It is recommended that this EADAS maintenance responsibility be integrated into an existing maintenance group for the purpose of supervision, proximity and back-up manpower. The two most important considerations in selecting this maintenance group are mobility and existing maintenance skills. Some of these requisite skills are:

(a) Use of an oscilloscope

(b) Use of teletypewriter

(c) Use of maintenance manuals

(d) Familiarity with circuit packs

(e) Use of standard drawings in trouble shooting

(f) Use of program documentation

(g) Knowledge of data transmission principles

(h) Have expertise in basic electronic principles

4.07 In order to enhance the utilization of EADAS and to maintain its data collection integrity, it is desirable for the plant maintenance center (presumably a 24 hour, seven day a week operation), to receive remotely the alarms provided by the CCU. If available, a Technical Assistance Center (TAC) or Switching Control Center (SCC) might be a logical location for these alarms.

4.08 Where Operating Companies have combined historic plant and traffic groups into a common organization, a data team may be conceived at the CCU location to accomplish the critical operational and maintenance functions under one operational organization.

4.09 If a combined organization of operational and maintenance employees is not practical, it is suggested (at the very least) that the CCU administrator and the maintenance organization establish mutual understanding such that maintenance priorities on availability of expertise, test equipment, spare parts and supervision are sufficient to ensure the integrity of the data collection system. This presumes the on-going periodic review of past and present operational maintenance relationships.

4.10 Regardless of the type of basic organization established at both the CCU and the DCA locations, it is essential that a local consensus be reached between the dial administrator and the respective maintenance support groups to confirm maintenance responsibilities. In addition, it seems good local practice to establish a "maintenance monitor" program. This includes coordination of routine maintenance items with the local maintenance force to ensure continuity of data collection and it establishes a means of communication such that the maintenance group is constructively aware of heavy collection periods. This allows an advance routine maintenance schedule to be implemented. The result is the maximization of maintenance effort and at the same time an economic, efficient use of the maintenance expertise while minimizing conflicts with scheduled study periods.

5. ROUTINE MAINTENANCE

5.01 In establishing a comprehensive operational plant routine maintenance program an early accumulation of all current documentation is essential. (See reference paragraph 3.01.) The overall dimension of the routine program is dependent upon whether the maintenance responsibilities are centralized or decentralized. In either case, frequency of attention, response time, and overall objectives should be comparable.

5.02 If DCA maintenance responsibility is decentralized, the CCU administrator should meet locally with the appropriate DA and maintenance group(s) responsible for the total DCA's in the switcher location to establish a clear understanding as to contacts, anticipated reaction time, out-of-hours responsiblities, spare parts availability, and other related matters. An objective of this meeting is to reinforce the attractiveness of establishing a data team in the switcher location as there is at the CCU site.

5.03 Similarly, if the maintenance function is centralized, the CCU administrator should be fully cognizant of the lines of communication which the respective field offices establish with the centralized maintenance organization regarding the satisfactory accomplishment of routine tasks.

UTILITY COMMANDS

5.04 In order to assist in diagnosing and determining the condition of the CCU and to afford remote testing capabilities of the ETDC from the CCU, EADAS has certain "utility commands." These are available to both the CCU administrator's group and the designated maintenance organization. These commands are normally utilized only at the CCU location. BSP references in section 3 provide a comprehensive "how to" for certain of these features; others are covered in position practices which are part of DFMP, Div. D, Sec. 4-e. These commands may be divided into 6 categories as follows: (Please note that the specific use of the letters included in the data field, ie., XX:XX: a, b, c, d, e, are completely detailed in Fig. 2 of DFMP, Div. D, Sec. 4-e.)

A. Test Commands

EADAS Traffic Data Converter Maintenance (TS:TC:a, b, c)

(a) Maintenance circuitry has been incorporated in the ETDC design to permit it to be remotely tested from the central unit. This test consists of a "pass/fail" test which determines if the TDC is equipped with those input cards specified in the channel definition. This is done by accomplishing a "busy/inhibit" test which makes all inputs to the TDC appear first as "no count," then as "count." The output of this test is printed on the line printer.

(b) For a single (nonconcentrated) ETDC, the maintenance test takes about 2 minutes to run. With concentration, it may take an extra minute.

(c) When maintenance is running, the CCU TTY cannot be used for other functions. Thus, the user must wait until maintenance is complete before making additional TTY requests. An attempted request during this period will result in an error message. However, one can stop maintenance by typing EX:TS:!

(d) Maintenance can be requested to be run on all ETDCs in sequence. During this procedure, a provision is made to suspend testing while some other TTY request is input. In this case, the maintenance is stopped by typing EX:TS:!

(e) When the Exit command (EX:) is acknowledged, other TTY requests may be entered.

(f) If the test program is to be restarted, type RS:TS:! for the ETDC. This will rerun the maintenance test in progress on the channel at the time testing was stopped and continue normally from there. Because the exit command restores the equipment to the normal condition, it is not necessary to restart the testing.

(g) Detailed analyses of test results are covered in BSP Section 252-115-511.

TUR Detector Tests (TS:TU: a, b)

(a) Detector tests can be run on TURs controlled by EADAS TDCs (ETDC) and TDRS No. 1A TUR converters (TURC). Tests may be initiated automatically on a scheduled basis while entering system parameters, or by test TUR command (TS:TU:) from the CCU TTY. This command causes the system to make a detector test on each TUR controlled on Channel a. After the command is given, the system asks "WHICH TDC." For each ETDC's connected directly to the CCU, the correct response is "H!". Detector tests may be performed on a single channel or on all channels simultaneously. On single channel requests for channels having ETDCs, only TURs associated with one TDC may be tested at a time. A special case arises where remote ETDC's are concentrated to a home ETDC. The system can perform detector tests on "home" controlled TUR's or individual "remote" controlled TUR's, but not both at the same time. For example, if the following situation occurs:
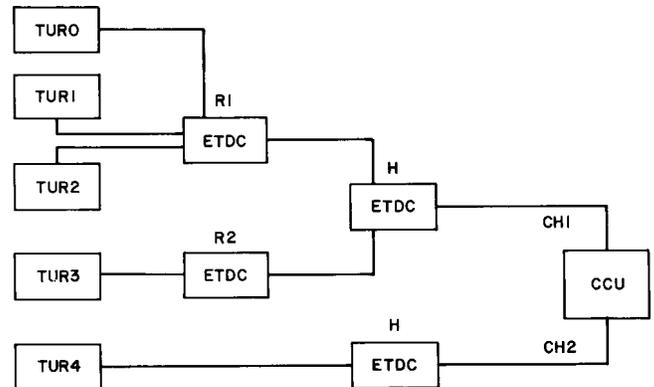
The combination "TS:TU:2!", WHICH TD "H!" will test TUR4 only. The same combination for channel 1 will test TURO, ie., "TS:TU:1!, "WHICH TDC-H!". In order to test TUR's 1 and 2, the sequence must be: (1) your command—TS:TU:1!; (2) EADAS Response—WHICH TDC; (3) your response—R1!. To test TUR3 the sequence would be: (1) TS:TU:1!; (2) EADAS response—WHICH TDC; (3) your answer—R2!

> *Note:* If a TUR is controlled by this channel and if it is on a TUR alarm may result when this command is executed.

(b) A single channel detector test requires a total of 503 seconds or 8 minutes and 23 seconds. An "ALL" channel test will take 1103 seconds or 18 minutes, 23 seconds to complete. In each case, EADAS expects a "full" configuration of equipment, thus requiring these times regardless of the actual lineup of associated equipment. For example in a single channel test, when the command to start the manual test is executed, EADAS takes 200 seconds (it assumes 200 second timing) to turn off the active TUR frames, 100 seconds to turn them on, and then 200 seconds to collect the detector test and finally 3 seconds for recording the results. In an "ALL" test, there is much the same basic timing, but here EADAS assumes a full concentrated ETDC configuration with 3 remote ETDC's, each taking 200 seconds to complete the test or another 600 seconds beyond the single channel requirement.

(c) When the device on one channel controls a TUR whose data is received via a different channel, both channel numbers must be specified (TS:TU:a, b!). The controlling channel number must be specified first (a), followed by the receiving channel number (b). Both channels

must be on line and be defined as having a TUR.

(d) Detector tests may only be initiated at times such that the test scans will not occur during a memory swap (either on a 15-minute or half-hour interval, depending on the system period). Attempts to begin tests at improper times are rejected with the system message "repeat later" (RL). For single channel tests, the test may not be requested between the ninth minute from the end of system period and the beginning of the last minute of the system period. Should there be a requirement for a complete system detector test (TS:TU:ALL:), unless the command is entered five minutes before the start of the next system period, the request will be rejected as indicated by the "RL" system response.

> *Note:* Experience has shown little, if any, practical application for the "ALL" manual detector test.

(e) Before a detector test is started, the corresponding active memory track for that channel is zeroed. After the test, the TURs are left in the off condition for the remainder of the system period. Thus, the data found in the registers assigned to TURs for that period will consist exclusively of test data. At the following memory swap, those TURs will be activated according to their schedules.

(f) Completion of testing is announced by the message TEST COMPLETE on the TTY and a bell ring.

(g) During detector tests, the CCU TTY may not be used for commands or requests. However, testing may be stopped at any time by typing "EX:!" This message causes all TURs involved to be turned off for the rest of the system period and the channel(s) returned to the normal condition.

Channel Interface On-Line Tests (TS:CI: a, b, c, d)

(a) The command (TS:CI:) initiates software controlled tests on channel interface circuitry. This command is used to test that portion on an EADAS channel which lies between the data link and the processor, that is, the data set at the CCU, and the associated computer interface.
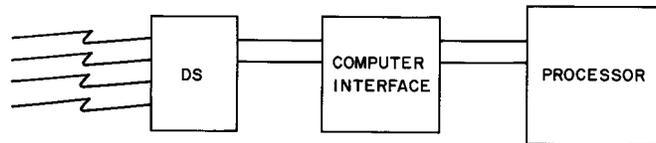
These tests are performed for one channel at a time while the rest of the system continues normal operation. Three possible tests are available in this mode. In all three cases, the channel specified as "a" is taken off-line (normal data collection is interrupted) upon receipt of the above command, and it is restored to its normal status upon completion of the test. The three modes are described in the following paragraphs.

Receive Only (RO)

(b) The receive only command (TS:CI:a, RO) is typed to initiate such a test. The program extracts data received from channel "a" interface and immediately prints it on the central unit TTY. However, since the teletype output speed is limited to 10 characters per second, it is possible that some of the data received will not be printed. When the EADAS test set (KS-21208, L1) is used in conjunction with this test mode, the data received will be the octal pattern preset on the test set. This test may be stopped by suspending the teletype print (by typing @) and then exiting the test mode (EX:).

Transmit Only (TO)

(c) The transmit only command (TS:CI:a,TO,c,d,) initiates this test, where "a" is the channel to be tested, "c" is the octal data to be sent to the interface, and "d" is the number of times data is to be transmitted. The data may also be sent to the interface continuously instead of at specified times. This is accomplished by omitting the "d" field from the command string. This test will complete automatically after having transmitted the data the specified number of times. The completion is indicated by TEST COMPLETE message. To exit the continuous transmit mode, one simply types exit command (EX:).

Transmit and Receive (TR)

(d) This loop-around test mode is accomplished by the transmit and receive command

(TS:CI:a,TR). The system instructs the user to operate the AL key on channel "a" data set to effect the loop-around to effect a loop through the CCUDS. The data path tested by the loop around test may be extended to include the central office (DCU), its data set and data link by operating the "RT" key on the DCU DS in lieu of the "AC" key on the CCU dataset. After having operated the key, one types "!" after which the actual test is started and the following header is printed

SENT   RECEIVED   EXPECTED

(e) The test consists of transmitting all possible data combinations, comparing the data received back from the interface with data expected (which may be different than the data sent), and printing all failing combinations in appropriate columns. An interface is considered to have passed the test only if there are no failing combinations, and therefore no data printed out under the headers.

(f) The completion of the test is indicated by the TEST COMPLETE acknowledgement. To stop the test at any point, one suspends any printout (with @) and then types the exit mode (EX:).

> *Note:* The transmit and receive test (TR) may be run only for channel interface types Y019 (electronic TDC), Y149, and Y163 (accumulated data), while the receive only (RO) and transmit only (TO) tests may be run for all other interfaces. Carrier failure warnings for the channel under test are inhibited during the entire duration of the test. All of the above tests may be initiated only at the CCU TTY which may not be used for commands or requests while a test is in progress. For more details see BSP Section 252-115-302.

B.   Dump Commands For Maintenance Purposes

Dumping a Calculation Block (DU:CB:a)

(a) This provides the ability to obtain a printout of a calculation block in octal either on the line printer or central unit TTY (only if the line printer is inoperative). For software debugging only.

Dumping Core (DU:CO:a,b)

(b) Any arbitrary number of core locations may be examined using this command. An octal printout is obtained on the line printer or channeled to the central unit TTY if the line printer is not in operation or a single core location is specified.

Dumping a Channel Header (DU:HD:a,A, or P)

(c) A combined octal and ASCII printout may be obtained on the line printer (or CCU TTY if line printer is inoperative) containing all channel information as internally stored on disc with every data block. For purposes of verification, a more explicit printout may be obtained by using the command VE:CH:a!

Dumping Keyword Tables (DU:KW:)

(d) Not generally used in maintenance procedures. See DFMP, Div. D, Sec. 4e for a description.

Dumping Registers (DU:RG:)

(e) The contents of one or all active or passive registers of a specified channel may be examined. The printout is decimal and appears on the line printer or CCU TTY if a single register is specified or the line printer is disabled. May be used in diagnosing failures of various descriptions. See zero register.

C.   Register Commands

Zero Register Contents (ZE:RG:a)

(a) This command sets those areas holding active register readings for the channel specified to zero. The command may be used to zero registers for diagnosis of "trouble" or testing. It may also be used with a subsequent dump register command to see if a previously malfunctioning register is now scoring.

Sum Registers (SU:RG:a, A or P)

(b) The sum register command causes the total number of counts received on a channel during the previous system period (*b* set to "P") or to present in the current system period (*b* set to "A") to be printed on the CCU teletype. The system will also print the contents of the parity register (register 1, the number of counts

not recorded because data words coming into the CCU were garbled), and the contents of the overflow register (register 0, a count of the number of times data were lost because of a word in the ETDC could not be written to the channel interface before the next word was passed to the ETDC). You might want to sum registers to check data link capacity or TDC capacity.

D. Tape Dump Command

(a) The tape dump command (EM:TA:) allows the user to examine the contents of all, or a portion, of any mag tape. This command may be used in diagnosing specific causes of data failures in either software or hardware. Like many system definition commands; "EM:TA:" is a mode command which asks questions to which you must respond. The sequence which is not included in a Position Practice is as follows:

QUESTION **RESPONSE**

ENTER DESIRED DATE?   Enter the date on which the desired information was written on tape.

FORMAT –

MM/DD/YY!

DEFAULTS (enter ! only)

All days on the tape mounted will be dumped.

ENTER START TIME
OF INTERVAL?   **RESPONSE** –

Enter the time when the collection of the desired data began.

ENTER DESIRED
DCU ID?

NOTE: If the mag tape writing interval is 60 minutes, the time entered must conform to the start time of a MT writing interval as well as the beginning of a system period.

FORMAT –

HH:MM!

DEFAULT (enter ! only)

All times on the date (if specified above) or on the tape will be dumped.

RESPONSE –

Enter the eleven character DCU ID associated with the channel from which the desired data were collected.

NOTE: If less than 11 characters are entered, all other DCUID whose first characters match those partially entered, ie., PHLA... will be deleted.

FORMAT –

XXXXXXXXXXX

DEFAULTS (enter ! only)

All DCU ID's on the tape within the date and times selected above.

(b) After all questions have been answered, EADAS will search the tape to try to satisfy the request. If it cannot, one of the following responses will appear. They are explained in Fig. 3 of DFMP, Div. D, Sec. 4g.

INVALID INPUT

SYSTEM TAPE STILL ON LINE MUST BE DISMOUNTED

TAPE UNIT 0 NOT READY TYPE CO WHEN READY

CANNOT LOCATE REQUESTED DATA

TAPE READ ERROR MTRD = XXXXXX

E. Obtaining Calculation Results Command

Output Calc Results (OP:CA: a, b, c, d, e)

(a) Calculation results and pass/fail information for the previous system period are available at any time for verification purposes. These may be obtained on request from either the CCU TTY or DA TTY. A dial administrator is restricted to only one calculation result if the entity being verified is not assigned to the administrator's TTY. If the request is made at the central unit, a single calculation result will be printed on the TTY, whereas "ALL" calculation results within an entity will be printed on the line printer. Up to 96 intervals may be obtained.

(b) This command is useful in several areas. Possibilities include:

● Defining a special study calculation, and never printing the results. OP:CA: may be used to obtain all results at one time.

● Checking the previous results of an exception calculation which has failed.

F. Print Messages—CCU and DA TTY

(a) EADAS provides the users at the CCU TTY and the DA TTY locations to send messages to each other by using the CCU as the message switcher. To transmit a message from the CCU to a DA TTY, use the command "PR:DA:TTY#, message!" Please note that the comma in the data field after the TTY# is essential! Conversely,

a DA TTY may be used to send a message to the CCU TTY by using the command "PR:CU: message !" In this instance, there is no TTY# requirement. Again, discretionary caution is urged in using the DA TTY to send to the CCU as a message will cause any in progress use of the CCU TTY to abort. This may be sufficient reason for the CCU administrator to request the DA TTY locations to utilize this feature only as a last choice communications path.

(b) If a DA TTY is in trouble, the command "OF:DA:TTY#!" may be used to disable it. To restore it, use the command "ON:DA:TTY#!"

G. TUR Controls From CCU TTY

(a) In addition to EADAS providing for automatic controls on TUR's, it includes a command feature via the CCU TTY to turn on or off individual or all TUR's. By using the command "OF:TU:," TUR's may be turned off for a system period if the turn off occurs during a TUR collection scheduled interval or until data collection is next scheduled. To restore the TUR's , individually or "ALL," use the command "ON:TU:". This capability is useful when TUR's need both routine as well as corrective maintenance. If they weren't turned off, alarms may result if surveillance calculations have been entered to reflect scan count performance.

H. Channel Control From CCU TTY

(a) To provide EADAS with channel activation capabilities, the command "OH:CH:" has been provided for turning up a channel. To turn down a channel for routine or corrective maintenance, use the command "OF:CH:".

Note: A channel must never be turned on unless its address selector is plugged into the interface drawer.

(b) The BSP references in Section 3 provide a comprehensive "how to" for certain of these features, others are covered in Position Practices which are part of DFMP, Div. D, Sec. 4e of this series.

5.05 At the switcher location there are several equipment components which require a routine maintenance plan to be constructed. Section 3.01 references include specific plant type maintenance

considerations for some of these. The actual DCA's will vary depending on the type of switcher. The local dial administrator and the responsible local maintenance group should arrive at a clearly defined understanding as to the routine maintenance schedule. Among the considerations in designing the maintenance plan are the review of scheduled collection intervals so that routines will not compromise collection of requested data. Since local schedules may be modified periodically, this might call for at least a semiannual review of local maintenance planning.

5.06 At the switcher locations, these are some of the specific data collection associated devices which should be included in a comprehensive routine maintenance plan.

    (a) ETDC

    (b) TDRS 1A—TDC—(PC)

    (c) TDRS 1A—TURC

    Note: TDC-PC and TURC may be referred to as "OTDC."

    (d) No. 1 ESS

    (e) Outside Vendor Data Terminals

    (f) PDT

    (g) Scan points on TURS and register leads

    (h) Sender Attachment Delay Recorder (SADR) and Dial Tone Speed (DTS) Machines

    (i) Data subsets and associated facilities

    (j) DA TTY

5.07 Part of the routine maintenance plan at the switcher location should include periodic TUR verification checks in which the DA and the local maintenance group confirm the integrity of the collected data. This specific test (see BSP 252-124-301) confirms the validity of the dial administrative terminal assignments as well as the accuracy of the plant cross connections. It consists of end to end data integrity checks including trunk equipment scan switches, register switches through the various distributing frames to the ETDC or OTDC. It is recommended that this check be run at least once a year and also after every significant office rearrangement such as a machine addition or a rehoming of the office.

5.08 At the CCU location, there is similarly a need for unanimity on the establishment of a routine maintenance plan. In the implementation phase of an EADAS the CCU administrator and the maintenance supervisor responsible for the CCU should completely document a comprehensive plan utilizing the appropriate references included in Paragraph 3.01 as well as any other sources which are helpful in this effort. Depending upon the organization relationship of the two groups, it may be desirable for the CCU administrator to maintain a record of maintenance activity for use in follow-up discussions. If both functions report to a common supervisor, this may not be necessary.

5.09 At the CCU there are numerous equipment items that require a routine maintenance plan. All of these involve the maintenance group and some, in certain respects, identified in subsequent paragraphs, involve the CCU administrator's group. They are:

    (a) Data subsets and facilities

    (b) Autocall if PDT is utilized

    (c) CCU TTY

    (d) Room environmental equipment

    (e) Power redundancy

    (f) Room environmental equipment

    (g) If provided, power redundancy

    Note: The outside vendor and the CCU Administrator need to have a clear agreement as to when the CCU components may be released for routine maintenance ie., during normal hours, out of hours, or on weekends.

5.10 In addition to the plant maintenance routines included for the equipment listed in 5.09, there are specific routine tasks which the CCU administrator's group can perform:

    (a) On the CCU processor, periodically check the proper operation and cleanliness of the fans and filters in all cabinets.

(b) On the tape drives and moving head disk, clean the heads, guides, and vacuum columns as required per DEC Manuals on the tape drive including the reel hub surfaces, pay particular attention to the area around the rubber ring.

(c) On the line printer and TTY, clean the type, glass covers, remove chaff from sprocket holes, keep paper available in machines, and properly dispose of used paper.

(d) When mag tape is stored for short periods of time, the surrounding atmospheric conditions should be controlled. Mylar tape should always be kept in a plastic reel case for protection from dust and physical damage. Regarding the integrity of stored tape, temperature and humidity limits should not fall outside the following parameters:

Temperature—60°F to 80°F

Humidity—20°RH to 80°RH

Note: If these limits are exceeded, the tape should be allowed to return to normal for a length of time equal to the time it exceeded these parameters up to 24 hours.

(e) If the end of the tape has been frayed, the frayed part should be cut back. The old load point reflector should be removed and a new one should be positioned a distance up the tape equal to the amount of the defective tape.

(f) Regarding the room environmental conditions, in order to maintain optimum operating conditions, and to avoid undue stress on the system components, it is recommended the following guidelines be followed:

(1) Keep the CCU room clean

(2) Prohibit smoking in the CCU area. However, if smoking is permitted, to minimize dust conditions, ashtrays should be located away from the CCU equipment and should be frequently emptied outside the room.

(3) Food of any description should not be allowed in the CCU area.

(4) Maintain minimum amounts of printouts in the room to enhance cleanliness and reduce "administrative clutter."

(5) Establish with the appropriate building services group the maintenance of a stable 70°F temperature and 45 to 55% relative humidity. There should be indicators available to monitor these as well as alarms in the CCU area and in a maintenance area. Knowledge of whether the CCU room controls are independent of the building's other support systems is increasingly important to planning for effective operations during periods of reduced energy supply

(6) Static electricity may be reduced by:

● Grounding equipment properly

● Wearing leather soled shoes

● Not waxing floors

6. SYSTEM BACKUP CONSIDERATIONS

6.01 In this context, system backup is intended to refer to the system features and recommended procedures to assist the CCU staff in recovering from software type problems. These may be caused by hardware failures but the effect is to cause basic problems in EADAS' ability to continue collecting data.

6.02 Software problems may be reflected by

(a) EADAS' generic and/or system definitions being lost to the CCU; or

(b) EADAS' inability to pass on collected data to various users.

6.03 Methods and procedures for insuring minimal impact on EADAS of either situation identified in 6.02 are included in DFMP, Div. D, Section 4e. This includes the suggested approach to retaining backup tapes for generic program and system definition restoration. It explains the purpose of SYSBAK and its role in reestablishing an operative EADAS.

7. CORRECTIVE MAINTENANCE

7.01　Generally, a standard procedure for reporting trouble to the appropriate maintenance group should be established when hardware problems are detected in the CCU or in the switching locations. If there are not already established local trouble referral methods, it is strongly urged that in the implementation stage a mutually agreeable system be conceived which provides for trouble reporting (serialization may be desirable) and a feedback/follow-up procedure with clear escalating steps predefined as an alternative option open to the reporting group. Fig. 1 has a suggested trouble ticket/report format which might be adopted if there isn't already an appropriate document available.

7.02　Previous data collection experiences have indicated it is desirable to record the specific troubles found, including the type of equipment required to fix the problem. Compilation of these data over a reasonable period may justify modification of the routine maintenance plan and also may justify obtaining additional spare parts to minimize future down time. It is suggested that all EADAS units within a Company might pool their trouble tickets in order to enhance this trouble pattern analysis.

7.03　These trouble records/logs are extremely important where an outside contractor is providing the repair capability. The records may be used to justify modification in the contractual detail as well as provide information for accounting considerations including potential penalty credits.

7.04　In EADAS there are several trouble indicators available to the data collection team. This data team consists of the CCU administrator and maintenance group, the switching location dial administrator and maintenance group, facilities testboards associated with EADAS data links, the downstream users and the data processing organization.

7.05　A detailed listing of every potential trouble at all points in EADAS is impractical but the following list of sources are generally available for diagnostic purposes. The specific procedure for resolving the trouble is dependent on the combination or sequence in which these indicators occur:

(a)　System Messages

(b)　Audible alarms

(c)　Visual alarms

(d)　Exception reports on EADAS components

(e)　Lack of anticipated Hourly Reports or exception reports

(f)　Referrals from accounting/users

(g)　Maintenance sources ie., testboards or switcher location TUR, DCA

(h)　Sensitivity to unusual sounds which could lead to early detection of a problem.

7.06　EADAS automatically reports system messages via the CCU TTY. These system messages are indicators of problems in processing which EADAS has encountered. The messages will be displayed on the TTY and will be interspersed with other system information such as commands and responses to commands. All messages will be set off from other text by a space equivalent to two lines, and most messages will be accompanied by an audible alarm, either major or minor.

7.07　System messages take priority over any other information being transmitted via the CCU TTY. If a system message occurs while the TTY is writing, that transaction will be interrupted in order to report the message, and the line of communication that was interrupted will be lost. However, the printing of a system message never wipes out more than one line of previously entered information.

7.08　In general, the Central Control Unit operator's first course of action, on receiving a system message, should be to retire the audible alarm, take corrective action, if appropriate, and then reset the alarm. See paragraph 7.13 for detailed instructions on alarm resetting.

7.09　The general format of a system message is:

TIME	CURRENT DATE	MESSAGE TYPE
a	a	b
09:00:30	2/23/75	T

PROGRAM ID	MESSAGE NUMBER	OPTIONAL FIELDS
c	c	e
PR	No	F1 F2 F3

(a) *TIME AND DATE*—Every system message will be preceded by the present system time expressed in hours, minutes, seconds, and the current date.

(b) *TYPE*—There are four types of system messages classified according to the severity of the problem and the requirement of the Central Control Unit operator to take some corrective action. The first character of a system message after time and date is an indication of the message type. The four types are:

(1) A—denotes Action Required. Usually operator intervention is required to perform some corrective procedures.

(2) F—denotes a Fatal Error. F indicates a serious system malfunction. (Hardware or Software)

(3) I—denotes Information. The I message types inform the operator of any abnormal situation. (No alarm)

(4) W—denotes Warning. The system has attempted unsuccessfully to perform one of its functions. (eg., write data to the disk)

This function is not immediately critical to system operation. Corrective action may be required if the problem persists.

(c) *PROGRAM IDENTIFICATION*

PR—denotes the program which has generated the system message, eg:

CA—(Calculations)

MT—(Mag. Tape)

HR—(Hourly Reports)

PF—(Power Failure)

MH—(Moving Head Disk)

FH—(Fixed Head Disk)

TP—(Trap)

DA—(Dial Administrator)

DT—(Detector Test)

CF—(Carrier Failure)

(d) *MESSAGE NUMBER*—Message number is a two character numeric field which is unique within the program identification.

(e) *OPTIONAL FIELDS*—"F1", "F2", and "F3" are optional fields which vary according to the message.

7.10 The *System Message Catalog*, Appendix A lists in alphabetical order (by type), all of the EADAS messages which print on the CCU TTY. It is intended that this catalog be used as an on-the-job reference by the CCU Administrator. Some situations will require that the operator restore the audible alarm system. If system problems occur repeatedly, then the appropriate group responsible for maintenance of the system should be notified and the circumstance reported. Each company is responsible for developing its own local trouble reporting procedures which would include interfaces between the CCU and inhouse maintenance, (Plant Department), maintenance engineering, or Digital Equipment Corporation (DEC).

7.11 The nature of the System Messages which print on the CCU teletype is such that the system operator cannot always correct the problem indicated. Messages which clearly indicate some malfunctioning of the equipment can often be handled by the Telco maintenance group or by an outside vendor. Messages relating to a failure of a program to execute an instruction should be referred to the Product Engineering Control Center (PECC) in Columbus, Ohio, for evaluation and possible BTL interraction if program changes are required. In all cases, the problem should first be examined by inhouse maintenance personnel before outside help is requested.

7.12 As discussed above, a malfunction of the system can cause some data to be lost. EADAS will automatically alert the dial administrators to suspect data in exception reports by printing "SD" before the header. Hourly reports which contain suspect data will be marked by the four characters "*SD*" on their last line. Other indicators of errors in the reports are flagged automatically by an asterisk followed by any of the following letters: A, M, S, T, or R. This indicates to the dial administrator that calculations have exceeded

their bounds (overflow) in the following arithmetic operations:

    A—Addition

    M—Multiplication

    S—Subtraction

    T—Terms exceed 16 Bits

    R—Results exceed 16 Bits

7.13   EADAS CCU ALARMS—In addition to the previously identified sources of trouble in EADAS, the CCU has available a combination of visual and audible alarms to assist in problem recognition. These indications of error conditions are detected by monitoring various hardware and software functions which are key factors regarding the CCU's ability to complete its mission. These errors are represented by a lamp which will indicate the type of error (major or minor), the cause of the error and activate an audible alarm.

7.14   Major Alarms are those which block the basic operation of the CCU such that it ceases to function or where a major portion of the CCU is inoperative. Here are the alarms which are categorized as major:

    (a) AC Low

    (b) DC Low

    (c) Software failure (see Appendix A, "F" type System Message)

    (d) 2600 Hz oscillator failure

    (e) Tip and ring power supply fuse alarm.

7.15   Minor alarms are those which do not directly affect a major portion of the CCU but cause a malfunction within a small area of operation. A printout using the "A" and "W" System Messages, (see Appendix A), on the CCU will identify one of numerous possible causes of this minor alarm.

7.16   The CCU has an alarm panel installed in the face of the B cabinet. Fig. 2 depicts this panel. As may be seen, there is one audible indicator for all major and minor alarm conditions. This is located in the upper center portion of the panel. Along with the audible is a switch labeled AUDIBLE ALARM. To silence the alarm, push the switch to retire. If at all possible, first correct the problem which triggered it. Then via the CCU TTY enter the reset alarm command (RS:AM:) and the alarm is normalized.

7.17   If the problem cannot be corrected immediately, the audible alarm can be retired temporarily so that it does not sound continuously.

7.18   Since alarm conditions within the CCU are generated during various processing intervals, EADAS provides the capability of removing the faulty device from on-line to off-line to prevent the generation of continuous alarms for the same condition. For example, the CCU operator must enter the command OF:LP:! to remove a faulty line printer from on-line. However, as in all cases of troubleshooting, alternative effects of an action should be fully weighed. In this instance if the printer is disabled, and/or placed off line, demand reports directed to it will be redirected by EADAS to the CCU TTY. Also, hourly reports and exception reports will not be printed. Finally, if the report is lengthy, the teletype may be tied up for quite some time. In order to stop a printed report (thus freeing the CCU TTY for other uses), the CCU Administrator should type a "@" on the teletype. This inhibits all printing on the teletype. He should next type "EX:!" which will make the teletype available for command input.

7.19   The visual lamps on the alarm (Fig. 2) are self-evident in their purpose. The upper right green lamp should always be on to indicate +24V. The two red lamps under the title ALARM STATUS are activated when either a major or minor indicator, as described in paragraphs 7.14 and 7.15, is received. Each lamp will remain lit until the trouble is fixed. Upon correcting the problem and utilizing the reset alarm command (RS:AM:) the light is extinguished. In the upper left there are two red lamps and two associated position switches to be used to disable the remote alarm indicators to another location, eg., a maintenance center. The switch in the up position will disable this remote feature and cause the lamp to be lighted. The final group of four visual (red) indicators is under the heading "ALARM." Each represents a major alarm condition. For further information on these alarms refer to BSP 252-115-302, Alarms.

7.20 In addition to the alarm panel described in the preceding paragraphs, there are two strips of lamps in the channel interface cabinet. The upper strip of green lamps, when lighted indicates specific channels which are active in EADAS. The green lamps indicate a positive condition. Immediately below each green lamp is a red lamp which normally is not lit. When it lights, there is a carrier failure on that channel. This should set off a minor alarm and cause a diagnostic system message to be output on the CCU TTY.

7.21 In identifying a specific problem in EADAS, use of exception reporting is considered a significant aid in ensuring that the data received is of high quality. This surveillance tool [see DFMP Division D Section 4h, paragraph 3.03 (2)] is valuable in indicating variances in:

(1) TUR scan counts

(2) DTS tests

(3) SADR tests

(4) ETDC cycle counts

(5) Parity and carrier failures

(6) Buffer overflows

Another use of exception reports in diagnosing trouble is where a report is anticipated but not received or with some data missing. Depending on the location of the omission, a specific trouble may be identified. This could indicate a TTY, either CCU or DA which is in trouble, the line printer may be inoperative or a previously unidentified DCA/carrier problem may be localized by this omission.

7.22 Another surveillance indicator of a system trouble is the lack of scheduled hourly report being received at the appropriate TTY. This might be caused by a software problem in the generic program or could be representative of a DCA, channel, etc., type problem.

7.23 A third surveillance indication of trouble is the system's inability to respond to demand reporting. For example, if any of the most recent 96 stored interval calculation results are requested

but EADAS doesn't respond appropriately, this might indicate another software problem.

7.24 An excellent source for identifying weaknesses in the EADAS system is the collective "downstream" data community. Included in this consideration are the Accounting (Comptroller's) data processing group and all of the various users of the reports which the finished EADAS mag tapes help to produce.

(a) The Accounting group may see data gaps in the EADAS data from TDAS type exception report analysis capability.

(b) The users of various TDAS reports, through qualitative analysis, may identify trouble spots in EADAS. This may be indicated by inaccurate or missing assignments in the DCU. Generally they should work initially with the appropriate dial administrator but the weakness may also require the specific involvement of the CCU data team.

(c) Where EADAS NM receives data from EADAS, the Network Management users may similarly be in a position to assist in localizing compromises in the overall collection system by ensuring that losses of data are not due to network failures. Thus, a data loss may be assumed to be within the data gathering system.

7.25 The EADAS software capabilities provide for a number of commands which may be used for routine maintenance as well as for problem recognition leading towards corrective maintenance. These are called utility commands. They are described in Part 5.04 which relates to routine maintenance.

8. OTHER SOURCES FOR ASSISTANCE IN TROUBLE RESOLUTION

8.01 There are also hardware and other peripheral problems in which EADAS trouble recognition feature described in Section 7 cannot provide sufficient assistance in resolving. A thorough knowledge of the contents of the BSP's listed in Section 3, SD and CD sheets, the TFP's and the DEC manuals should complete the on-site trouble shooting requirements for both the CCU as well as at the DCD locations.

8.02   Where the total assistance resources listed previously, coupled with job knowledge do not appear adequate to the task, contact your Western Electric Company's regional support organization. They, in turn, have direct access to their Product Engineering Control Center (PECC), or the appropriate support group in both AT&T and Bell Telephone Laboratories.

8.03   Where problems can only be resolved through a "non-standard" wiring change, an engineering complaint should be initiated. (See BSP 010-700-010.)

9.   EADAS SHUT DOWN PROCEDURES

9.01   There may be occasions when due to system failures or external reasons it becomes necessary to shut down an entire EADAS. BSP 252-115-302 states that all power supplies are generally located in the upper rear of each cabinet, except for the WECo. cabinets, and must have their "LOCAL/REMOTE" control switches set to REMOTE. In addition, the CCU administrator must constructively notify each originating data location either via the DA TTY network or by some other means of the timing and cause of the imminent system shut down. Finally, as soon as possible after the shut down, the CCU Staff is expected to notify the respective downstream users and the TDAS production people of the turndown. This will provide these groups with the ability to react accordingly.

9.02   Once you've determined that the console is unlocked, the following is the suggested sequential method of procedure to be used in shutting down an EADAS:

STEP	PROCEDURE
1	Follow the dismount mag tape instructions included in Task 3 of "Maintain Magnetic Tape for Downstream Processing" Position Practice, Appendix A to DFMP Div. D, Sec. 4-e.
2	Depress the HALT/ENABLE switch on the programmer's console to HALT.
3	Press the RUN/LOAD switch on the moving head disk drive to LOAD. In about 90 seconds the LOAD lamp will light.
4	When the LOAD lamp has come on, flip the ON/OFF switch on the rear of each drive to OFF.
5	Depress the PWR ON/PWR OFF switch on the tape drive(s) to PWR OFF.
6	Flip the main circuit breakers on the line printer down (off position).
7	Turn the switch on the CCU TTY to OFF.
8	Turn the OFF/START/POWER switch at the rear of each fixed head disk to OFF.
9	Turn the LOCAL/OFF/REMOTE switch in the WECo cabinet farthest from the processor from LOCAL to OFF. Flip the double barred circuit breaker to the down (off) position.

Note: This procedure will remove power from the data links to the DA teletypes and, if installed, the link to EADAS NM. Central office alarms for the data sets at the TTY and NM locations will be activated unless disabled through prior notification. |
| 10 | Turn the LOCAL/OFF/REMOTE switch in the WECO cabinet nearest to the processor from LOCAL TO OFF. Flip the double barred circuit breaker to the down (off) position.

Note: This procedure will remove power from the data links to EADAS' data collection equipment. Central Office alarms at all data collection locations will be activated unless previously disabled. |
| 11 | Turn the OFF/POWER/LOCK key on the processor to OFF. |

10. RECOVERY FROM POWER FAILURE

10.01 In the event of a power failure, the CCU will automatically save all register data including the address of the program currently executing. When power is restored, an automatic power restore sequence will restore all registers and start executing the preexistent program where it left off. However, it is necessary to restore the mag tape drive manually.

10.02 When a power failure occurs, the mag tape drive is automatically put in an "off-line" condition. The loss of vacuum on the tape drive will free you to reload the tape. Then, to manually restart the mag tape drive, the restart mag tape command (RS:MT:) is executed. This will cause the tape to rewind and spaces it forward past the good records which were written prior to the power failure.

10.03 If the power failure is other than momentary, it will be necessary to reset the system time (TI:).

10.04 The major and minor alarms resulting from the power failure may be retired through the use of the restore alarms command (RS:AM:).

10.05 The Position Practice, Load the EADAS Generic, Appendix A to DFMP, Div. D, Sec. 4e, TASK 2, describes the specific procedures to be followed in powering up an EADAS.

10.06 If, for some reason, the system is halted and the EADAS program is intact or disk, the system can be restarted by setting 773300 (octal) into the address register, depressing the LOAD ADDR switch and then the START key.

10.07 Finally, if when using SYSBAK, a system message is received, refer to Appendix A of this practice for further assistance.

11. ABNORMAL ENVIRONMENTAL CONDITIONS

11.01 The CCU administrator, the CCU and peripheral plant maintenance group and the building service maintenance group should develop an understanding on allocation of the various responsibilities regarding restoration of an unbalanced CCU environment.

11.02 In the "Routine Maintenance" portion of this document, paragraph 5.10 (d), guidelines have been suggested, that if followed, should materially reduce the frequency of problems in the environment caused by work functions and the people who accomplish them.

11.03 Although minicomputers are not particularly susceptible to failure from extremes of either temperature or humidity, many of the peripheral devices (tape and disk drives) may begin to generate large numbers of errors as temperature and humidity limits are exceeded.

11.04 It is therefore imperative that the CCU administrator should be thoroughly familiar with the location of the primary controls for the CCU's environmental support systems. In addition to the temperature and humidity controls, he should be completely conversant with the lighting and basic air conditioning controls. Implicit in this knowledge is the capability of power backup in the event of a commercial power loss. It is recommended that "dry runs" for testing this capability be coordinated with the appropriate maintenance groups to insure its adequacy if required.

11.05 With regard to climate parameters, the system recommendations included in TFP Division B, Section 9b, Fig. 3 provide for the minicomputer room to be maintained at 70°F temperature and relative humidity (RH) of 45%. If the temperature moves outside the range of 65° to 75°F and/or the relative humidity similarly ranges outside 35% to 60% RH; appropriate building maintenance groups should be notified. As suggested earlier, we urge that remote indicators be installed in maintenance quarters with 7 day—24 hour coverage capability. Along with these indicators, an MOP should be posted for maintenance forces to follow if a climate failure occurs "out of hours". This MOP should be essentially similar to the procedures outlined in 11.06.

11.06 When ranges of 60°F to 80°F and 30% to 75% RH are exceeded, a system failure is imminent. At this point, in order to protect data already written on a mag tape, execute the dismount mag tape command (DM:MT:), and remove the tape from the drive. To collect additional data until the system shuts down under the extreme climate situation, mount another tape (MO:MT:) to collect as much data as possible. If the minicomputer

begins to make data errors, system messages will be an early indicator. Should the available corrective maintenance be inadequate to arrest the problem, and the processor's action become erratic as a result, it is recommended that the CCU be shut down as described in DFMP Div. D, Section 4e. As soon as possible thereafter, notify all realtime user locations and then the DCA offices.

12. PROVISION OF SPARE PARTS, SUPPLIES AND TEST EQUIPMENT

12.01   Experience gained from various types of data systems have fully supported the desirability of maintaining certain quantities of spare parts for the CCU and the field DCA's as well as establishing minimum amounts of administrative supplies with reasonable supply reorder levels. Similar experience has indicated a need for reasonable redundancy of test equipment such that the maintenance group responsible may adequately perform any corrective maintenance resulting in minimum down time.

12.02   Consideration for the levels of CCU spare parts should include possible economies that multiple CCU installations may afford. For example a multi-EADAS center does not require a dual set of all spare parts. Similarly, the total area an EADAS covers as defined by an acceptable speed of delivery may afford flexibility in provision of spare parts for ETDC's or other DCA's. In addition, with regard to the DCD's there is a question of capital investment accountability if an EADAS serves more than one company where the spares are maintained centrally.

12.03   Section D of the EADAS questionnaire Form E-8109 which has been provided to WECO for installation purposes, includes a comprehensive list of spare parts which should, barring any other information, be provided for an EADAS system. The CCU administrator and maintenance supervisor would be well advised to review the actual provision as compared with this suggested list and take appropriate steps as soon as possible in coordination with appropriate engineering group, to ensure that proper parts will be available as required.

12.04   Similarly, BSP 252-115-302 includes a list of portable test equipment and tools necessary to perform routine and corrective maintenance. In addition to confirming that these items are available to the maintenance force, it is suggested that

backup test equipment primarily used in other systems be pinpointed for use if the dedicated equipment becomes inoperative.

12.05   Provision of spare administrative materials will depend upon the CCU's proximity to similar data processing centers and to general supplies. Actual use of various components of an EADAS will basically determine the amount necessary to maintain an active data system. Supply reorder (low limit) levels for each item should be established each on its own merits, at first arbitrarily, and then at a level which actual utilization justifies. The following items are unique with the minicomputer and its peripherals.

(a)   Mag tapes (see DFMP Division D, Section 4-e)

(b)   Disks and associated disk packs

(c)   Teletype Line Printer paper and ribbons.

Note 1:   Normal utilization indicates about one month's life for a line printer ribbon.

Note 2:   When DEC routine maintenance is required, there must be one each of (a) tape; (b) disk; and (c) a comprehensive set of DEC manuals.

13. OPTIONAL EQUIPMENT

13.01   System recommendations urge that an optional mag tape drive, and optional fixed and moving head disks be ordered in the original order. The desirability of having these critical components available is described in TFP Division B, Section 9a. When the 'on-line' components go into trouble necessitating their turndown, substitution of these units may provide almost continuous realtime data collection integrity. However, there are some constraints that should be understood in their utilization.

13.02   The spare mag tape drive may be simply substituted for the working unit by changing the thumbwheel setting on the working unit from 0 to 1 and vice versa on the off-line unit. This presumes that both units have been installed with power "ON" via the power bus system. When the thumbwheel settings have been changed as above, when a new mag tape has been mounted in the substitute unit and when the appropriate

software commands have been entered as provided in the Position Practice, the primary tape drive which is now "off-line" may be repaired. It should be kept in mind, that depending upon the EADAS system period, there may be up to 28 minutes of time available to repair the primary unit prior to the next scheduled writing on the mag tape. This may afford the CCU staff the time necessary to repair the problem and the above noted substitution will not be necessary.

13.03 The spare disks, moving head and fixed head, require specific cable changes by either your maintenance group or DEC and therefore will require a varying amount of down time of the CCU while the transition is taking place. It is suggested that dry run procedures regarding swapping disks be devised to minimize down time should a real failure occur.

EADAS TROUBLE REPORT

Form _____
9-74

| Retention Code |
| xxx-xxxxx |

EADAS Tx No. _____
Receiving Locn Tx No. _____

| Channel No. | Office | Date | Time |

Source of Trouble

Alarm ☐ Error Msg _____ Verbal Report ☐

DCA   Type _____   **CCU Component** _____

ETDC ☐   OTDC ☐ ESS ☐ Other ☐   Mag tape drive ☐ FH Disc ☐ MH Disc ☐
TUR ☐   Power Cab ☐   Chan IF ☐
                                          Data Subsets ☐   Auto Call ☐
                                          TTY ☐   Line Printer ☐

                                                            ☐ TELCO
Reported By: _____ Ref'd To _____   ☐ DEC
                             Phone No. _____   ☐ Other

Trouble Description _____

_____

_____

                                                            ☐ TELCO
Follow Up: Ref'd to _____ Phone No. _____ ☐ DEC
                                                               ☐ Other
            Date | | | | | Time | | | |

Trouble Found _____

_____

_____

Cleared By: _____ Date | | | | | Time | | | |
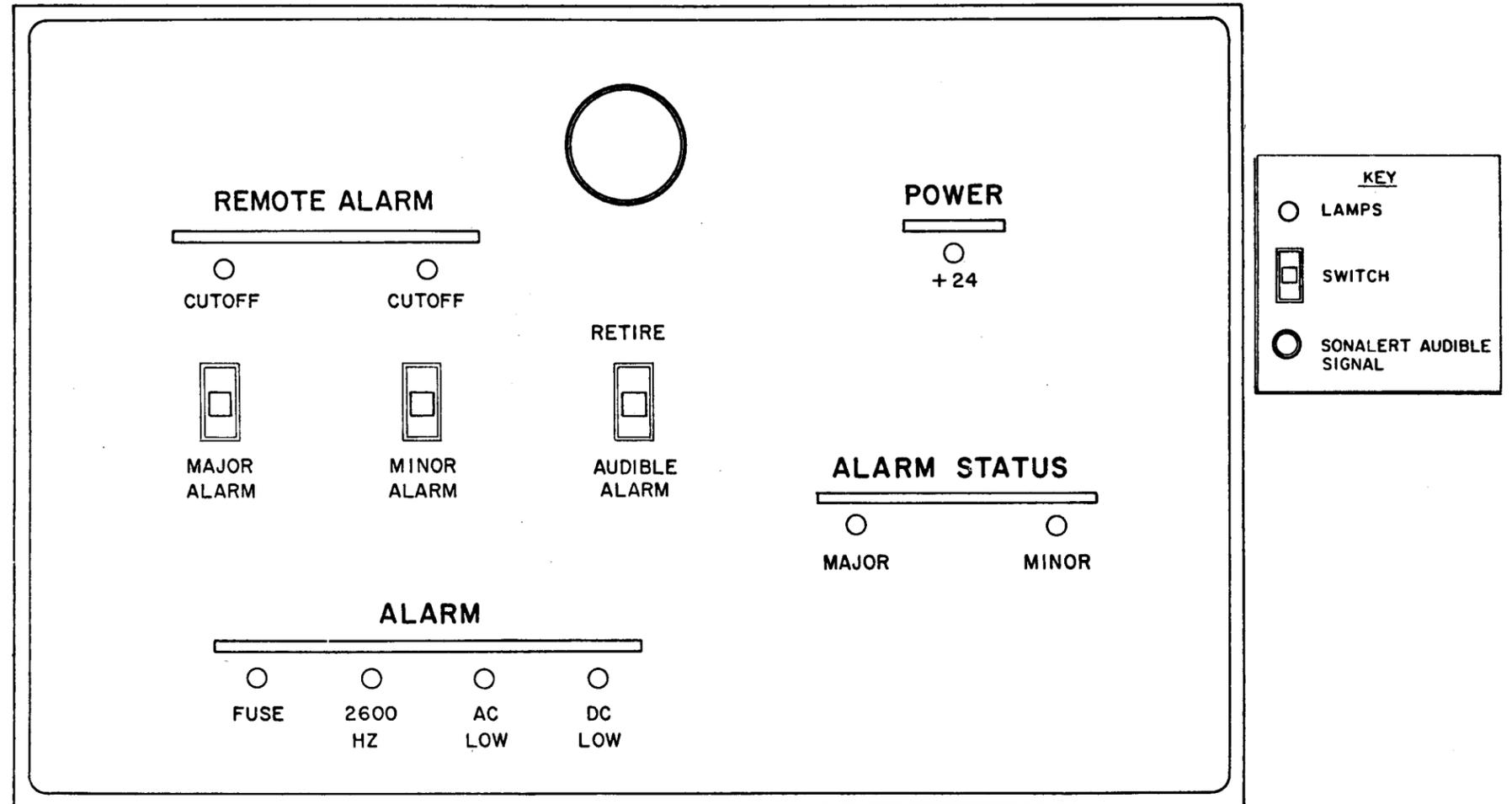
Fig. 1—Sample Trouble Report (7.01)

Fig. 2—Trouble Alarm Panel in Face of CCU (7.16, 7.19)