# MAINTENANCE CONTROL
# SOFTWARE SUBSYSTEM DESCRIPTION
# 2-WIRE NO. 1 AND NO. 1A ELECTRONIC SWITCHING SYSTEMS

CONTENTS PAGE



FIGURES



TABLES



## 1. GENERAL

### INTRODUCTION

1.01 This section provides an introduction to the maintenance control software operating in a

No. 1 or No. 1A electronic switching system (ESS) central office. Information unique to No. 1A ESS application is so noted. Applications which are unique to No. 1 ESS are not described in this document. See Table A for system application.

**1.02** When this section is reissued, the reason for reissue will be given in this paragraph.

**1.03** Part 8 of this section provides a defined list of the abbreviations and acronyms used in this section.

**PURPOSE OF THE MAINTENANCE CONTROL SOFTWARE SUBSYSTEM (NO. 1A ESS ONLY)**

**1.04** The maintenance control software subsystem is a centralized control scheme for the scheduling and execution control of the various diagnostic, routine exercise, and audit programs. Maintenance control also administers the execution of generic utilities, system update programs, Maintenance Control Center administration, Switching Control Center administration, and a library control program. The services provided to these client programs include memory scratch in call store (CS), segmentation control, program paging, timing, and other common service routines.

**SCOPE OF SECTION**

**1.05** The information provided in this section includes a description of:

(a) The administration of the peripheral maintenance software.

(b) The operation of the programs which administer the peripheral maintenance software.

**2. PIDENTS DESCRIBED IN SECTION**

**2.01** This section provides system level operational descriptions of or interfaces with the following PIDENTs:

- Maintenance Control Program—1A Processor (MACP). MACP is the executive maintenance control program for the No. 1A processor. MACP is a common program for both No. 1A ESS and No. 4 ESS.
- Maintenance Control Program—1A ESS application (MACR). MACR is the No. 1A ESS local office application peripheral maintenance control program.
- No. 1A ESS Audit Scheduler (MACA).
- No. 1A ESS Maintenance Control Tables (MTBL, MJTB).
- No. 1A ESS MAC Audit Control and MAC Application Routines (MAPL).
- Centrex Maintenance Supervisory Program (CXMS).
- Dictionary Trouble Number Production (DOCT).
- Processor-Application Interface Routines (PAIRLOCL).

**2.02** Table A provides a PIDENT-program listing cross-reference.

TABLE A

PIDENT-PROGRAM LISTING CROSS-REFERENCE

| PIDENT-NAME PROGRAM | PROGRAM LISTING NO. 1 ESS | PROGRAM LISTING NO. 1A ESS |
|---|---|---|
| MACP* — Maintenance Control Program — 1A Processor | NA | |
| MACPAUD1 | | 5A201 |
| MACPGTIM | | 5A202 |
| MACPJCT1 | | 5A203 |
| MACPJSH1 | | 5A204 |
| MACPRJOB | | 5A205 |
| MACPROUT | | 5A206 |
| MACR — Maintenance Control Program — 1A ESS Application | NA | 6A005 |
| MACA — 1A ESS Audit Scheduler | NA | 6A221 |
| DOCT — Dictionary Trouble Number Production | 1A014 | 6A014 |
| CXMS — Centrex Maintenance Supervisory | 1A057 | 6A057 |
| PAIRLOCL — Processor-Application Interface Routines | NA | 6A216 |

*MACP is not described in detail in this document. Refer to Section 254-280-220.

## 3. MAINTENANCE CONTROL SUBSYSTEM FUNCTIONAL DESCRIPTION (NO. 1A ESS ONLY)

### GENERAL

**3.01** In order to maintain a high degree of continuous and reliable service, the No. 1 and 1A ESSs provide duplicated equipment units, circuits (which detect troubles and provide diagnostic access), and maintenance programs. The No. 1A ESS maintenance programs (Fig. 1) detect and localize system troubles as well as control the system configuration. In general, there are four basic types of maintenance programs which may be associated with each type of equipment. They are:

- Fault recognition (FOR)
- Deferred fault recognition
- Diagnostics (DIAG)
- Routine exercises (REX) include demand type requests from the routine request tables and automatically scheduled routine exercises.

**3.02** ***FOR programs*** attempt to recover the call processing ability of the system by establishing a working configuration of office equipment when a trouble is detected. These programs are nondeferrable and are of the highest priority in the hierarchy of the maintenance programs. In general, FOR programs are initiated as a maintenance interrupt when trouble is detected. The FOR program runs to completion during the interrupt after which call processing is allowed to continue undisturbed. The primary function of the FOR is to determine whether the faulty unit, as detected, has permanently affected the system operation or whether substitution of a duplicate

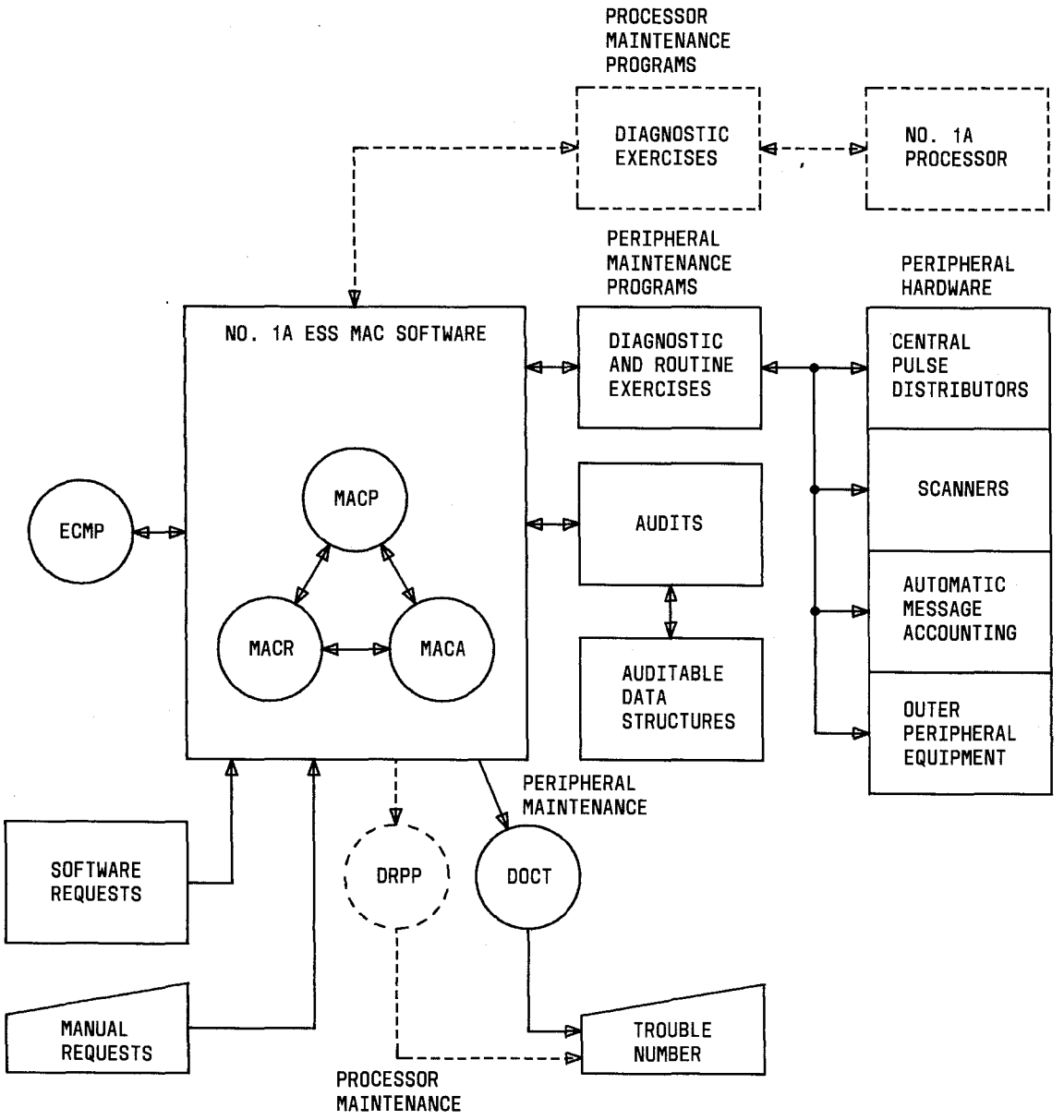


**Fig. 1—No. 1A ESS Peripheral Maintenance System**

unit is necessary to restore normal operation. The maintenance control (MAC) software has no part in the execution of FORs other than to recognize that an interrupt has occurred and to remove any related MAC client presently using the scratch pad (MAP2PM). The FOR may request MAC to run a DIAG during normal base level testing.

**3.03** ***DIAGs*** are the second highest priority maintenance programs handled by MAC. DIAGs attempt to localize a trouble within a faulty unit down to the smallest possible number of replaceable circuit packs. A DIAG consists of a series of sequential tests which are executed against the faulty equipment type. Results from the tests are converted into a teletypewriter (TTY) output message (OM) by the dictionary programs. The resulting OM provides a trouble number which is used as an index into a trouble locating manual (TLM). The TLM provides a list of circuit packs which, if faulty, could have produced the trouble number.

**3.04** The ***REX*** programs consist of both the scheduled automatic routine exercise programs (AEX) and demand request routine exercise programs. The REX programs are designed to check for faults that might otherwise go undetected, to search for uncorrected errors, to check the trouble detection circuits, and to exercise infrequently used hardware.

## NO. 1A ESS MAC

### A. MACP

**3.05** In the No. 1A ESS, MACP schedules and controls the execution of deferrable base level maintenance programs, eg, hardware diagnostic and routine exercise programs as well as other nonmaintenance programs. Specifically, all paged programs are executed under MACP control. MACP interfaces with the paging program (PAGS) (Reference E) to accomplish the run time loading and execution of paged programs.

**3.06** MACP consists of a group of common (to both No. 1A and No. 4 ESS) program units which use ***application*** dependent job tables (MTBL, MJTB) to perform job scheduling for a particular application. These job tables specify the MACP resources and client jobs and, thus, define the MACP environment for the application system. A set of macros and subroutines (MAPL) is provided by MACP which can be used by client programs for delay timing, inhibiting maintenance interrupts, etc. Section 254-280-210 (Reference D) provides a detailed description of the individual MACP program units.

### B. Base Level Scheduled Maintenance

**3.07** All non-interrupt maintenance in the No. 1A ESS peripheral (ie, not processor) area is initiated by an entry to MACRMAIN in PIDENT MACA (Fig. 2). This entry is scheduled as one of the class E jobs in the executive control main program (ECMP) base level task dispenser. Routine MACP01 in PIDENT MACR is called to initialize MACR to be equivalent to No. 1 ESS. MACP01 is the equivalent of MACRMAIN in No. 1 ESS and is used to set up the correct return to the ECMP and to check for interfering MACR jobs in a multi-MAC environment. MACA then checks a counter to see if trunk maintenance should be done (Reference C). If not, a check is then made to see if audit work should be done. Scheduled routine audits are run in ***parallel*** with other No. 1A ESS maintenance. During the normal base level cycling, audits are run every third pass through this routine. If it is not time for audit work, control is passed to the job control routine (MACPJCT1) in MACP. MACP will then continue a client already in progress at the client's next segment address or, depending on the scheduling algorithm, look for other maintenance work.

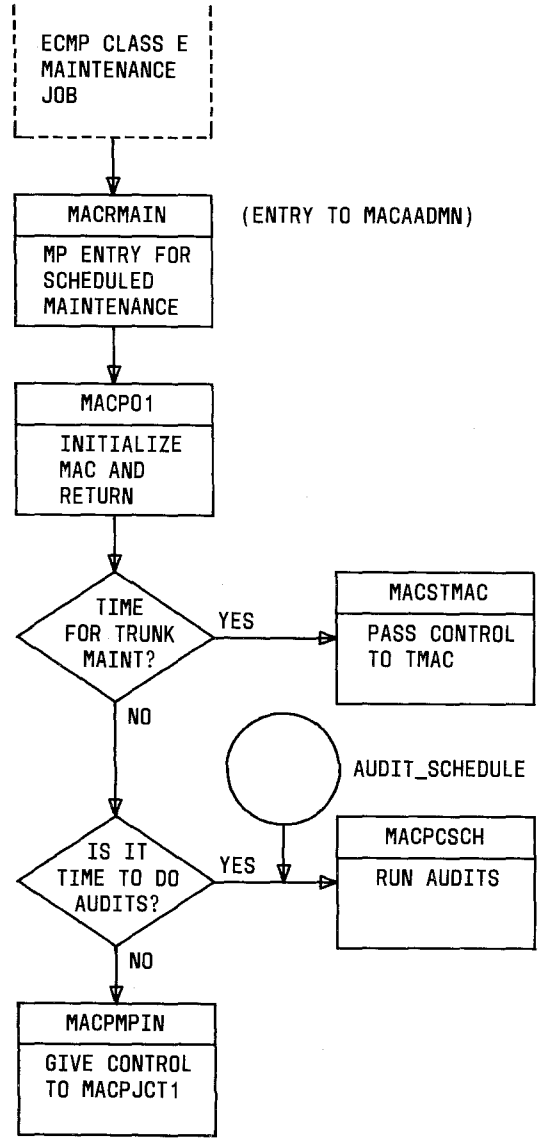


**Fig. 2—Base Level Class E Scheduled Maintenance**

**3.08** ***MACR*** provides the following four global entries from which all routine peripheral maintenance is started.

- MACSDIAG (Fig. 3)
- MACSRRTA (Fig. 4)
- MACSRRTB (Fig. 5)
- MACSREXS (Fig. 6)

MACP enters MACR to start peripheral maintenance as described below.

#### Diagnostic Requests

**3.09** MACP enters MACR at global MACSDIAG when looking for diagnostic requests. Checks are made by CHECK_MACPCLIENT to see if MACR is currently busy in the other maintenance class. MACR, as a client of MACP, runs out of the ***maintenance*** class, subclass 0 or subclass 1. MACR can only run one peripheral maintenance job at a time; ie, if MACR is busy in subclass 0, a new job cannot be started in subclass 1. If upon entry, MACR finds itself busy in the "other class" (Fig. 3), then control is passed back to MACP to abort the job. If MACR is available to start the diagnostic, MACPABAD is used to provide MACP with a common abort address. Should MACP abort the job, this common abort address would be given to the peripheral maintenance client in progress. MACR will then hunt for diagnostic requests using routine GHNT. Valid diagnostic requests are handled by MKTW; "no diagnostic" requests are handled by NODIAGS. Refer to the MACR program listing at global entry MACSDIAG for a detailed account of diagnostic request proccessing.

#### Routine Request Table Requests

**3.10** The routine request tables store requests (from the maintenance craft force or other maintenance programs) to start a particular peripheral maintenance program. The routine request table (RRT) is divided into two levels: RRTA and RRTB. Manual requests are stored in RRTA; requests from other programs are stored in RRTB.

**3.11** MACR provides three global entries for loading the RRTs. MACS06 loads level A of the RRT. MACS08 enters requests into level B of the RRT. A fail return to the client is made if there are no available entries in the RRTs. MACS07 is a guaranteed entry into the top slot in level B; ie, all previous entries are pushed down one entry. The lowest entry may be destroyed. Each entry loaded into level A or B using MACS06 or MACS08 is loaded following any previous entry. Requests to run jobs are answered starting at the top of each RRT level, thus providing a first-in, first-out sequence. For each job, MACR will schedule a peripheral maintenance search of the RRT from MACP via a RUNJOB.

**3.12** To process a job requested in RRTA, MACP enters MACR at global MACSRRTA (Fig. 4) under control of the job scheduler routines in MACP. CHECK_MACPCLIENT again checks to see if MACR is available. Note that the same initial checks were made for the MACSDIAG entry. MACP06 checks for entries in RRTA. As entries are processed out of RRTA, the remaining entries are moved up one position. MACP is entered to run the job.

**3.13** For job requests in RRTB, MACP enters MACR at global MACSRRTB (Fig. 5). The initialization checks are identical to those described earlier, down to the point where TRIB examines RRTB for requests.

#### AEX Job Requests

**3.14** The AEX jobs are run on a fixed schedule, eg, per half-hour on the half-hour and hour, per hour on the hour or half-hour, every three hours, or daily at midnight. MACR controls two classes of AEXs, ie, class II routine exercises and class III routine exercises. The class II jobs are run out of the AEX2J1 and AEX2J2 job tables. Individual jobs are turned on by corresponding bits in flag words M4FLG1 and M4FLG2, respectively. These jobs are scheduled by global MACS33 which is entered every half-hour by the ECMP.

**3.15** The jobs in the AEX2J1 table are nonhardware testing programs and routines. Their basic functions are information reporting and auditing or verification. The jobs in the AEX2J2 table are solely concerned with hardware testing. Refer to PR-6A005 (PIDENT MACR).

**3.16** The class III routine exercise programs are the lowest priority programs in the ESS peripheral maintenance software structure. These jobs, run out of the MACR AEX3JB job table, are executed during spare time when no other AEX (class II) jobs are waiting. The AEX3JB jobs are turned on by a corresponding bit in M4AEX3; these bits are also set by ECMP visits to MACS33.

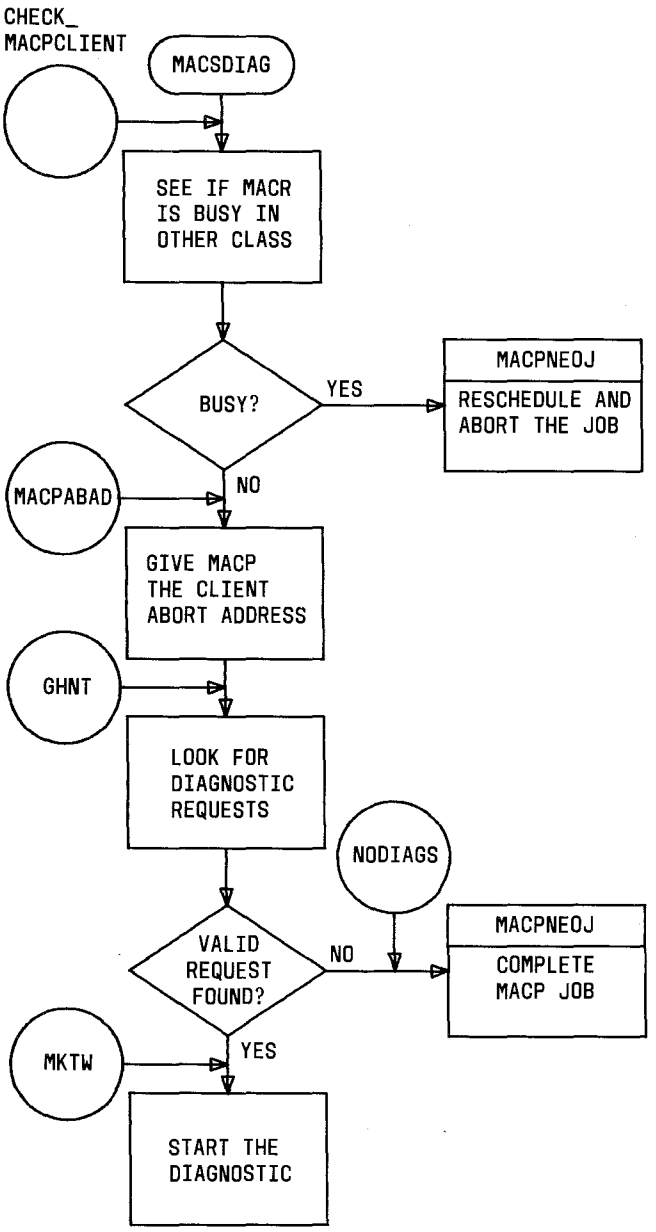


Fig. 3—Peripheral Diagnostic Request

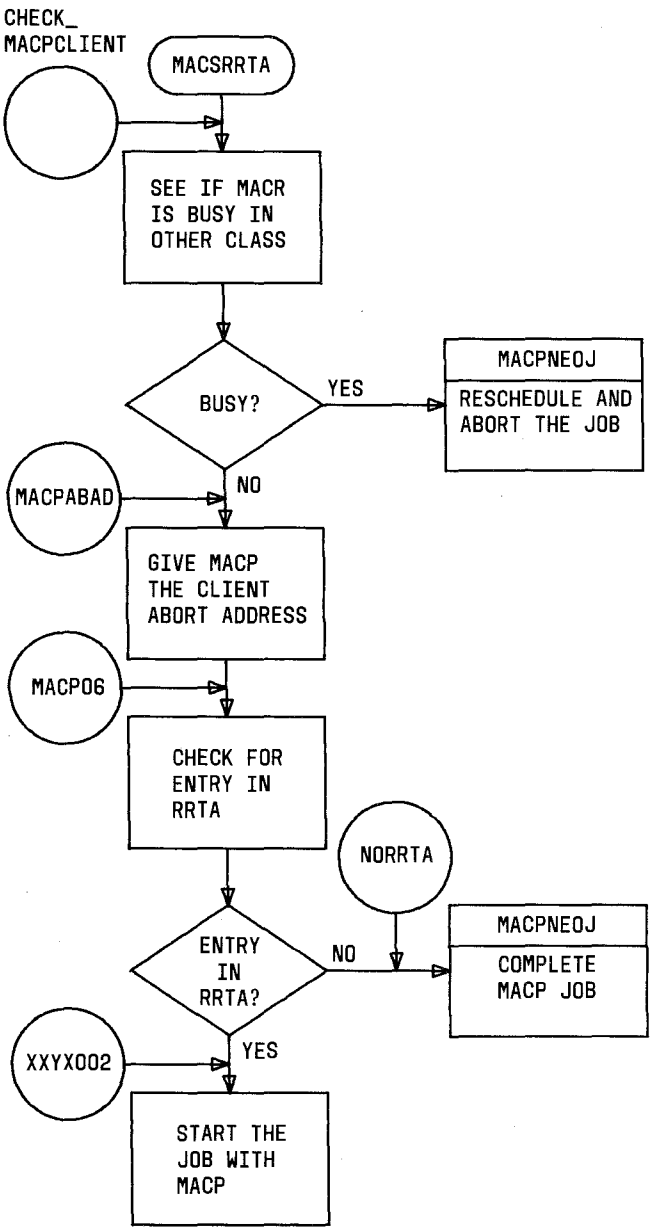


Fig. 4—Job Request from Routine Request Table A

**3.17** To start a job in AEX2J1, AEX2J2, or AEX3JB, MACP enters MACR at the global entry MACSREXS (Fig. 6). As is with the other peripheral maintenance global entries described earlier, checks are made to see if MACR is busy, and if not, an abort address is given to MACP. Routine MACP07 looks for the job requests. For a detailed analysis of AEX job control, refer to PR-6A005 (PIDENT MACR).

### C. Fill Maintenance

**3.18** During periods of exceptionally light traffic, the ECMP base level task dispenser may run out of work to do. Rather than waste time looking for work that is not yet scheduled, the available time is used running audits as "filler". As shown in Fig. 7, if there are no main program (MP) flags set in EX2CONTROL, MAC_FILL checks

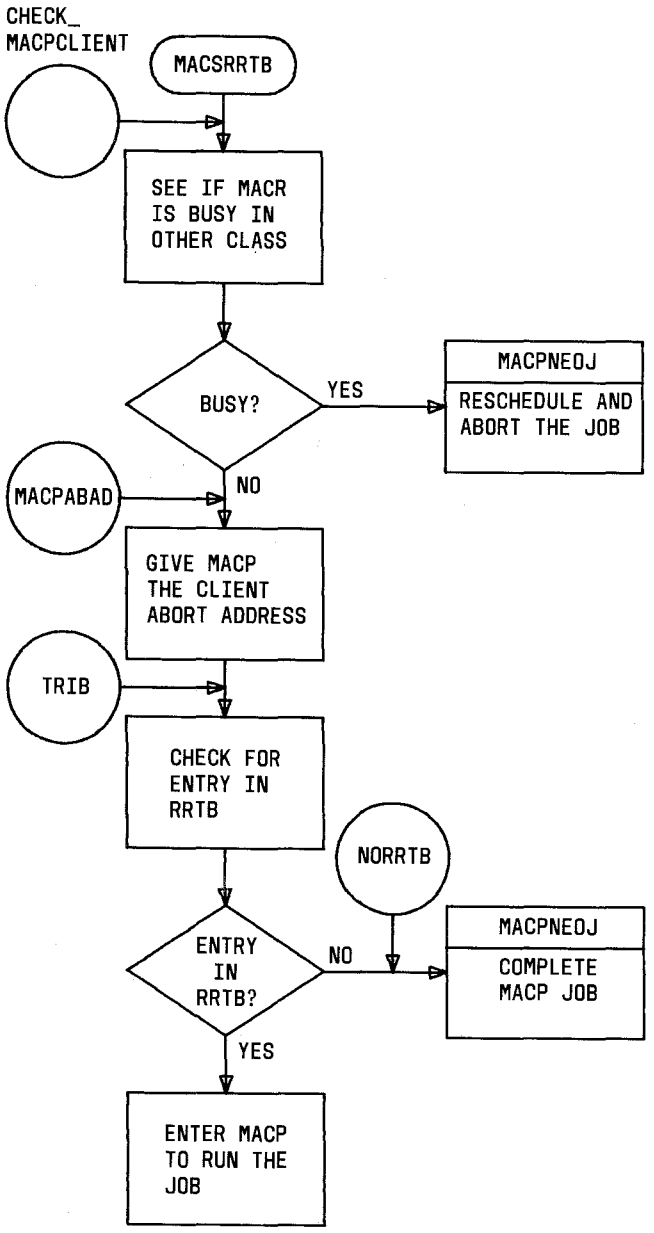


**Fig. 5—Job Request from Routine Request Table B**

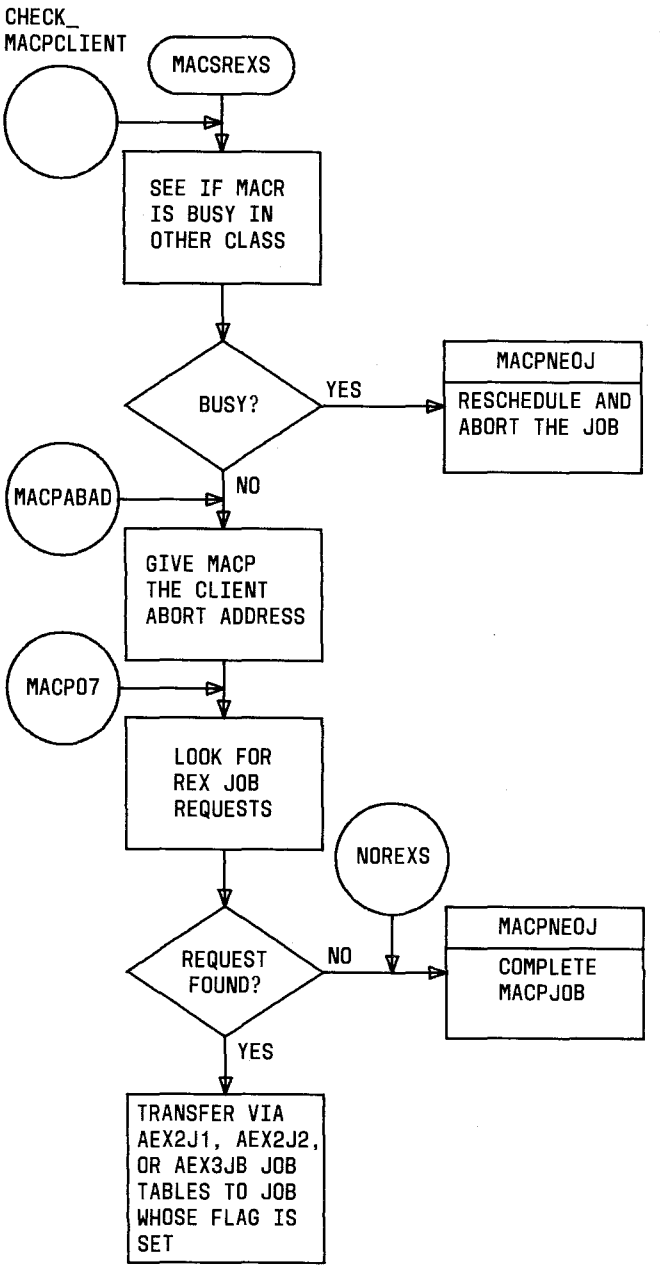


**Fig. 6—Routine Exercise Job Request**

for input/output (I/O) work and, finding none, gives control to MACRFILL in PIDENT MACA. Audits are then executed as if a normally scheduled entry to audit control had occurred. Refer to

Section 231-045-215 (Reference A) and PR-6A221 (PIDENT MACA).

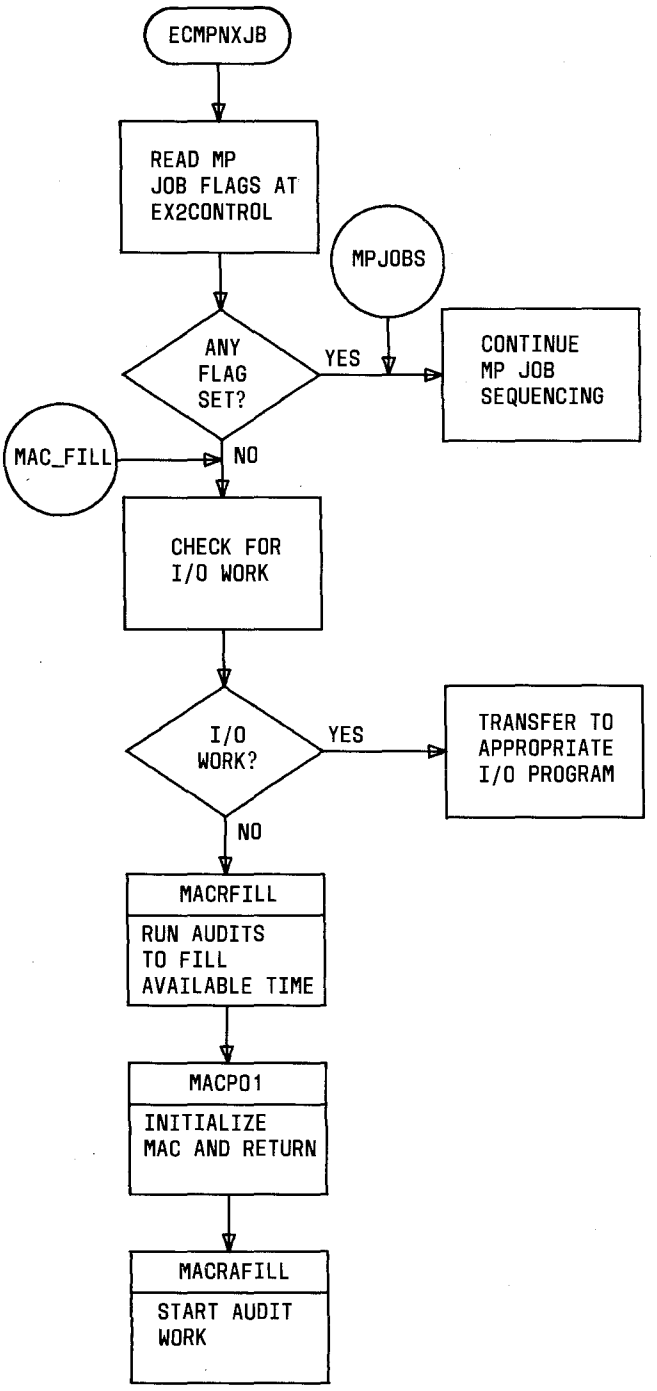


**Fig. 7—Run Audits in Fill Mode**

## D. Processor-Application Audit and Timing Interface

**3.19** PIDENT MAPLADMN has three program units comprising:

(a) A set of delay timing subroutines

(b) The multi-MAC job blocking tables

(c) A transfer vector table used by PIDENT MIRA when changing hardware configurations.

### Delay Timing

**3.20** Delay timing is available to MACP clients upon request. Subroutines in MAPLADMN can provide delay intervals of up to 31 timing units of 100 msec, 1 sec, or 6 sec. While timing is in progress, the timing flag in MACP control is set to block the client from running. Upon timeout, the timing flag is reset so that the client can be started at its next segment address (stored in MACP control memory). Entries to the timing routines are shown below.

| GLOBAL | FUNCTION |
|---|---|
| MAPLDLT1 | Request 100 msec timing |
| MAPLDLT2 | Request 1 sec timing |
| MAPLDLT3 | Request 6 sec timing |
| MAPLDLT0 | Reset MACP timing flag |
| MAPLCDT1 | Cancel 100 msec timing |
| MAPLCDT2 | Cancel 1 sec timing |
| MAPLCDT3 | Cancel 6 sec timing |

### Multi-MAC Blocking Tables

**3.21** The multi-MAC blocking tables supply the blocking information used by MACP to determine MACP job interference due to maintenance interrupts-interjects or other MACP jobs. There are three types of blocking tables (described below).

**3.22** In the ***interrupt interference table*** (MAPLINTB), each entry corresponds to an interrupt-interject level on base level maintenance and contains the set of blocking flags corresponding

to unit types that could be affected by the particular interrupt level.

**3.23** In the ***fault recognition program entry interference table*** (MAPLIFRB), each entry corresponds to an entry to a particular FOR program occurring as a result of a maintenance interrupt-interject or base level maintenance. The associated blocking flags correspond to unit types which could be affected by the actions to be taken by the particular FOR program. This table supplements the interrupt interference table in determining the MACP jobs which are interrupt sensitive.

**3.24** The ***unit type blocking table*** (MAPLUBKT) has a four-word entry corresponding to each particular unit type. In each entry, the first word contains the unit type number and the displacement and right-adjusted mask of the blocking counter (flags) associated with that unit type. The second word contains the set of blocking flags of unit types that interfere with the given unit type. The third and fourth words are instructions to read and write, respectively, the unit type blockage counter.

**3.25** Additionally, global MAPLAUDS is the entry to the controlling subroutine for the MACP audit. The ECMP provides an entry to MACP (once per second) which, in turn, enters here to run a segment of the MACP audit. The actual audit segment is run via a call to MACPAUDT; refer to Section 254-280-210.

#### Configuration Change Vector Table

**3.26** This program unit (global MACPLMACE) provides MACP with a vector to the proper configuration program required when the manual input request administration (MIRA) has detected a configuration change request. The entry here occurs when MIRA has identified an input as a request for removal or unconditional restoral of a unit (central control, call store, program store, etc).

### E. Maintenance Job Tables and Non-Maintenance Job Table

**3.27** MTBLADMN and MJTBADMN are the No. 1A ESS local applications PIDENTs which define the system resources and/or operating environment to MACP. These two PIDENTs form the data base from which MACP (which is a 1A processor common program) operates. Information provided by this data base includes: scratch pad addresses, control block addresses, paging area addresses, and job subclass assignments. MTBLADMN defines the maintenance environment; MJTBADMN defines the non-maintenance environment (ie, library, utilities, etc).

## 4. PROCESSING OF DIAGNOSTIC RESULTS (NO. 1A ESS PERIPHERAL AND NO. 1 ESS)

**4.01** The maintenance personnel in a No. 1 or No. 1A ESS office use trouble-locating manuals to interpret diagnostic printouts from the TTY. These TLMs provide an ordered list of 12-digit decimal numbers with one or more circuit packs associated with each number. After the diagnostic programs have diagnosed a faulty unit, the DOCT program reduces the raw data of the diagnostic results to a 12-digit decimal number. This number, referred to as a trouble number (TN), appears as part of the TTY OM identifying the system component and unit. The maintenance personnel can then select the proper TLM according to the system and unit specified by the printout, and look up the TN. The circuit packs associated with the given TN may then be determined.

**4.02** An additional set of phase TNs will also be printed out with the overall TN. These numbers provide a backup, although more difficult, means of fault resolution and will only be used if the procedure designed for the overall TN is unsuccessful.

**4.03** Each diagnostic program independently translating its results into a TN would be redundant; therefore, the subroutine DOCT is provided. In addition to TN generation, the subroutine DOCT also allows its clients, the diagnostic programs, to request some special services (eg, raw data may be printed for examination by the maintenance personnel). Special patterns of apparent failures may be interpreted as All Tests Pass and special actions taken to compute TNs in cases where a unit cannot be fully tested because an associated bus is out of service.

**4.04** ***Number Generation:*** Raw data diagnostic results may be over 5000 bits long. The reduction of this long number to a 12-digit decimal number is accomplished in two stages. The first is called ***bin loading ;*** it reduces the raw data to a number that can be stored in 20 or less call store locations. The second stage is a set of three

***scrambling*** routines that operates on the bin of 20 (or less) locations to produce three 4-digit decimal numbers. The set of three 4-digit numbers is the TN.

**4.05** ***Phase Number Generation:*** The diagnostic tests are made up of groups of tests called phases. The phase number generation is done in the same manner as the number generation (but only each failing phase of data is used), and a 12-digit TN is produced for the phase.

**4.06** ***Bin Loading:*** The bin loading routine searches the raw data for failures (1s). When it finds a failure, it computes its position in the overall string of raw data. It now has a number, the address of the failure. The address of the first test of the first phase of a diagnosis is 0. In the beginning, the answer bin (which will be the input to the scrambling routine) contains all 0s. The bin loading routine examines the address of the first failure. If bit 0 of the address is 1, the routine increments the first location of the bin. If not, it increments the eleventh. If bit 1 is a 1, it increments the second bin location; if not, it increments the twelfth. The routine continues in the above manner until all ten pairs of bin locations have been properly adjusted. It then finds the next 1 in the raw data and repeats the bin loading operation. In the calculation of phase TNs an additional bin is used (PHBN). At the end of each failing phase the bin is scrambled and the resulting 12-digit number is printed under the appropriate phase heading.

**4.07** ***Scrambling:*** At the end of each phase (of phase number generations) and at the end of the last phase (for overall number generation), the bin is delivered to the scrambling routine, which performs a series of additions of successive bin locations, with a rotate operation performed on the sum after each addition. The summing is done three times, each with a different rotation of the partial sums. The three results are the final TN.

**4.08** These processing routines are simply a means of transforming large binary diagnostic results into small decimal numbers in such a way as to minimize the probability that two different diagnostic results will yield the same 12-digit decimal number.

**4.09** DOCT also performs the following special services for clients when so requested:

(a) Prints raw data results

(b) Generates special TNs when communication buses are out of service

(c) Permits diagnostic restarts

(d) Checks for special All Tests Pass situations

(e) Provides extra scratch memory

(f) Generates 10-cell TNs.

## 5. CENTREX MAINTENANCE SUPERVISORY PROGRAM

**5.01** The CXMS program provides a variety of functions necessary for the proper supervision and maintenance of the hardware and software associated with the centrex data link. These functions can be arranged into five general areas as described below.

**5.02** Entries for ***emergency action*** (EA) and ***recovery*** purposes are provided by globals CXRCEA and CXEAI, respectively. Phase 3 (or above) hardware initialization routines are provided to set to the proper state the data links and customer console equipment. Since the normal I/O program for the centrex data link employs buried enable addresses and addresses of enable addresses, a routine is provided for D-level, F-level, and K-level interrupts to update and correct this critical data. A similar activity is performed in a phase 1 recovery program; however, this program aborts certain flagged centrex maintenance jobs.

**5.03** The ***console verification*** routines operate under audit control to determine the state of the NIGHT and POSITION BUSY lamps, and the console headset on every equipped console. The centrex audit uses this data. In addition, an emergency power indicator for the customer and equipment is interrogated.

**5.04** CXMS provides a variety of ***features for controlling the data link.*** These features are accessed by the maintenance personnel at the maintenance TTY. The features provided include the ability either to initiate a diagnosis of a data link or to place the link in override states (either in- or out-of-service) and the ability to

remove or restore a link to service. In addition, this portion of CXMS provides the TTY output interface for the data link diagnostic programs (Reference B).

**5.05** The ***data link maintenance activity control*** routines regulate diagnostic activity on the link. An important feature of this system is the periodic diagnosis of out-of-service links. Since this equipment is unduplicated, an attempt is made to diagnose an out-of-service link every eight minutes. The link is automatically restored to service if it passes. Further, if the diagnostic flag is not answered for eight minutes by MAC, the link is restored. The other main feature is an upper limit placed on the number of performances of a diagnosis. Also, an error count is maintained on those links displaying a high error rate. These error counts are printed hourly on the TTY. Lists of links in override states or on emergency power are also printed hourly. Finally, each day all available links are diagnosed automatically. Available links are those that have their customers on night service.

**5.06** An ***error trapping*** routine for the centrex data links is also provided by CXMS. The routine may be initiated on one or all links by the appropriate TTY message. Refer to Input Message Manual, IM-6A001 (Reference G). When error trapping is in progress and an all-seems-well (ASW) error occurs on a link, a TTY message giving the failing lamp order is printed. If a key signal error occurs, a TTY message giving the illegal key code and console is printed. Also, the trap status can be determined in response to a TTY IM.

**5.07** CXMS also provides the ability to remove or restore a single console to service. This permits the centrex console demand exercises (PD-1A058, No. 1 ESS; PR-6A058, No. 1A ESS) to perform console maintenance. With the proper TTY message (IM-6A001), the office maintenance personnel may change the night service state of any console group. If the primary console and its data link are in service, a lamp order is sent to set the night lamp to the appropriate state.

## 6. PROCESSOR-APPLICATION INTERFACE ROUTINES

**6.01** PIDENT PAIRLOCL consists of several short dummy routines which serve to make the No. 1A ESS common programs compatible with the local office application programs. PAIRLOCL also provides a definition of the No. 1A ESS processor applications transfer table (PATT) vectors, ie, entry point, PIDENT, function, inputs, returns, etc. For detailed information refer to PR-6A216.

## 7. GLOSSARY

| | |
|---|---|
| Client | Refers to the program that is currently requesting service from other programs or routines. |
| Flag | Usually a bit that, when set, indicates a request for service. |
| Global | A program entry point normally referenced through a vector table. |
| Macro | A high level statement that the assembly program interprets and expands into a predefined sequence of instructions or data. |
| Multi-MAC | Refers to the ability of MACP to run concurrent jobs. |
| Page | One or more file store resident program sections, each of which is functionally complete, including the subroutines called by the program sections. |
| Paging | The operation required to bring a paged program from file store into core memory before execution can begin. |
| Scratch Pad | A memory area allocated to the program for temporary data storage. |

## 8. ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| AEX | Automatic Routine Exercise |
| ASW | All Seems Well |
| CS | Call Store |
| CXMS | Centrex Maintenance Supervisory Program |
| DIAG | Diagnostic |

| | |
|---|---|
| DOCT | Dictionary Trouble Number Production |
| EA | Emergency Action |
| ECMP | Executive Control Main Program (see MP) |
| ESS | Electronic Switching System |
| FOR | Fault Recognition |
| I/O | Input Output |
| MAC | Maintenance Control |
| MACA | No. 1A ESS Audit Scheduler |
| MACP | Maintenance Control Program—1A Processor |
| MACR | Maintenance Control Program—1A ESS Application |
| MAPLADMN | Processor-Application Audit and Timing Interface Program |
| MJTBADMN | Non-Maintenance Job Tables |
| MP | Main Program (same as ECMP) |
| MTBLADMN | Maintenance Job Tables |
| OM | Output message |
| PAIRLOCL | Processor-Application Interface Routines |
| PAGS | Paging Program |
| PATT | Processor-Applications Transfer Table |
| REX | Routine Exercise |
| RRT | Routine Request Table |
| TLM | Trouble Locating Manual |
| TN | Trouble Number |
| TTY | Teletypewriter |

## 9. REFERENCES

A. Section 231-045-215—Audits Software Subsystem Description

B. Section 231-045-225—Centrex and AIOD Diagnostic and Exercise Software Subsystem Description

C. Section 231-045-230—Trunk and Service Circuit Maintenance

D. Section 254-280-210—Maintenance Control Program-Description 1A Processor

E. Section 254-280-211—Paging Program Description 1A Processor

F. MAC System Program Listing (See Table A)

G. IM-6A001—Input Message Manual

H. OM-6A001—Output Message Manual