# THE NASTRAN ERROR CORRECTION INFORMATION SYSTEM (ECIS)

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## SUMMARY

A new data management procedure, called Error Correction Information System (ECIS), is described.  The purpose of this system is to implement the rapid transmittal of error information between the NASTRAN Systems Management Office (NSMO) and the NASTRAN user community.  This paper summarizes the features of ECIS and its operational status.  The mode of operation for ECIS is compared to the previous error correction procedures.  It is shown how the user community can have access to error information much more rapidly when using ECIS.  Flow charts and time tables characterize the convenience and time-saving features of ECIS.

## INTRODUCTION

In the past, NASTRAN users have been severely restricted in their access to NASTRAN error information.  Access has been via telephone, correspondence, the NASTRAN Newsletter, and Software Problem Report (SPR) Log.  Although many times temporary and permanent fixes were given to the originator of the SPR, these fixes were frequently not available to the entire NASTRAN user community until a new version of NASTRAN was released.  In an effort to improve user access to NASTRAN error information, NSMO has initiated ECIS (ref. 1) on a commercial network, using an established data base management system (refs. 2 and 3).

## THE ERROR CORRECTION INFORMATION SYSTEM

ECIS is a positive step by the NSMO to provide the NASTRAN user community with an expedient information storage and retrieval system for SPR's.  This system will support the two-way transmittal of information and SPR fixes among the user community, NSMO, and the maintenance contractor on a daily basis.

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Organization

The system consists of two distinct data bases.  The first data base is the User Comment data base (Table 1).  The User Comment Data Base has three purposes The first and major purpose is for the two-way transmittal of information be- tween NSMO and the user community.  Through this data base the user can make general comments, describe difficulties, or submit an SPR.  The second purpose is bookkeeping.  Each time a user accesses this data base, the user's NAME, ORGANIZATION, DATE, and TIME OF DAY should be entered.  From this information, NSMO can compile statistics on use of the system.  The third purpose of this data base is for NSMO to respond to users.  NSMO accesses the User Comment Data Base daily, records the user comments or problems, and then updates the data base with an acknowledgment, a solution to the problem, or an explanation of NSMO's plans with respect to the user's specific problem.  Then the user can access the data base and learn that NSMO has received the data and what solu- tions or alternatives are available.

The second data base (Table 2), called ECIS, consists of information and updates pertinent to all active SPR's.  When a new SPR is discovered, it is given a number and all known information about the SPR (shown in Table 2) is entered into the data base in the same manner as in the SPR Log.  As the SPR is pro- cessed, a temporary fix, if available, and a permanent fix, when determined, are added to the SPR in the data base.  This gives all users simultaneous access to all active SPRs with their current updates.

The system is accessible by users through CYBERNET, a national computer net- work maintained by Control Data Corporation.  The resources needed to utilize ECIS are (1) a copy of NASA TM X-72651, (2) a desk-top, interactive computer terminal, and (3) a contract with Control Data Corporation for computer time on the CYBERNET System.

Querying ECIS

Software support for ECIS is a Data Base Management System called System 2000.  System 2000 manages all definition, accessing, updating, quering, and retrieving of information to and from the data base.  System 2000 organizes the data in a data base as an Element or a Repeating Group.  The element consists of a name standing for data within the data tables.  Each element has a name and a number which are synonymous as can be seen in Table 2.  For example, if the user wants an output statement which prints SPR number and user name, he types "PRINT SPR NUMBER, USER NAME" or "PRINT C1, C2".  SPR NUMBER is synonymous with C1 and USER NAME is synonymous with C2 in the ECIS data base.

The Repeating Group (RG) allows elements to take on multiple values.  For each SPR entered into the data base, there will be only one SPR NUMBER but there might be several SUBROUTINE data items entered indicating which subroutines need modification.  The name used for a Repeating Group is for definition only and

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bes not take on data values.  For example, in Table 2 the only function of the
epeating Group described as PERMANENT FIXES is to define PERM FIX IBM, PERM
IX CDC, and PERM FIX UNIVAC as elements which may have multiple values.

ECIS retrieval commands range from the very simple to the very complex.
he retrieval commands are in the form of PRINT (Something), or PRINT (Something)
HERE (Certain Conditions Exist).  The quantity and form of the output is con-
rolled entirely by the user through proper definition and ordering used in the
etrieval commands.

There are two general forms of output statement:  The first is of the form
RINT (Print Clause) and the second is of the form PRINT (Print Clause) WHERE
Condition Clause).

The print clause is the simplest form used in obtaining output from the
ata base.  The print clause is only a list of data base items the user wants
rinted.  The data can be printed in any order or number by listing in the print
lause each item wanted and in the order wanted.  The only restriction is that
ach item must be called by its proper name or element number as shown in the
efinition of the ECIS data base in Table 2.  If data from Repeating Groups (RG)
re included in the print clause, the name must be preceded with a (, BY ENTRY ,)
perator.

Examples:

                    PRINT SPR NUMBER:
                    PRINT SPR NUMBER, USER NAME, SUBROUTINE:
                    PRINT C2, SPR NUMBER, C3, LEVEL FOUND:
                    PRINT C1, BY ENTRY, SUBROUTINE:
                    PRINT C1, C3, C4, C2:

The condition clause can take many forms, such as AND, OR EQUAL (EQ), NOT
QUAL (NE), GREATER THAN (GT), LESS THAN (LT), LESS THAN OR EQUAL TO (LE),
REATER THAN OR EQUAL TO (GE), EXISTS, AND FAILS.  If data for repeating groups
s included in a where clause, it must be preceded by an ENTRY HAS operator.

Examples:

                    PRINT SPR NUMBER WHERE SPR NUMBER EQ 395:
                    PRINT C1 WHERE C7 EXISTS:
                    PRINT C1 WHERE LEVEL FOUND GE 15.1:
                    PRINT USER NAME WHERE SPR NUMBER LT 1000
                     OR SPR NUMBER GT 200, AND USER NAME NE
                     ROSSER, AND USER ORGANIZATION EXISTS:
                    PRINT C1, BY ENTRY, C34 WHERE C6 FAILS AND
                     ENTRY HAS MODULE EQ SDR2:

There are two special cases which may be needed by some users:  the PRINT
NTRY and the PRINT ENTRY WHERE (Condition Clause).  The PRINT ENTRY command
ill print out the entire data base.  This command however will cause excessive
rintout.  If all of this information is desired, it is suggested that the SPR

Log be purchased from COSMIC.  The PRINT ENTRY WHERE command can be used to print one or many entire entries with one command.  For instance, if one wanted the entire entries for all SPR's submitted by a particular user, he would type

PRINT ENTRY WHERE USER NAME EQ WALL, JAMES

Several sample problems with user entries and system responses are given in Appendix A.

## POTENTIAL OF ECIS

The old method of communicating and processing NASTRAN SPR's is diagramed in figure 1.  The process began by the user mailing an inconsistency and its documentation (listing, dump, deck, etc.) to NSMO.  NSMO then determined what caused the inconsistency.  It may have been a user error, a previously reported error, or an SPR.  NSMO then responded to the user by mail, possibly with a temporary fix.  If enough documentation was sent to aid in correcting the error, the SPR was forwarded to the maintenance contractor.  The maintenance contractor then recorded the error in the SPR Log, coded a fix, and implemented the fix into a new level of NASTRAN.

The disadvantage with this method was that there was no feasible way to rapidly distribute this error information to the entire user community.  The old system for distribution of error information included the NASTRAN Newsletter (once every 6 months), the NASTRAN SPR Log (once every 8 months), or a new level of NASTRAN (once every 12-24 months).  With over 1200 SPR's and 500 users on the mailing list, it was not feasible to mail a copy of the errors or fixes to each user as they became available.  Thus the time span for receipt of error correction information was quite long.  Minimum times are shown in figure 2.  Note that long periods of time elapsed between the determination of a fix and its availability to the user community.

The new process for handling NASTRAN SPR's, with ECIS, is diagramed in figure 3.  This method differs from the old method in that the user can immediately determine if the inconsistency is a reported SPR by examining ECIS.  If it is a reported SPR and a temporary or permanent fix exists, the user can implement the fix into NASTRAN.  If the SPR has not been reported, the user can report the error through ECIS and mail the appropriate documentation to NSMO.  This way, the entire user community will have knowledge that the error exists.  This method then proceeds the same as the old method except for one important difference.  With the new method, any time a temporary or permanent fix is found, it is immediately put into ECIS and becomes available to the entire user community.

Once ECIS is accepted by the NASTRAN user community, the time spans from submission of error to receipt of fix are expected to greatly decrease, as shown in figure 4.  With ECIS, all users could have knowledge of an SPR within one day, a temporary fix in one week, and a permanent fix in one month.  These time spans are minimum time spans and are not meant to imply that all SPR's will be solved within this new time frame.

This procedure does, however, give all users immediate knowledge of the existence of a new problem, therefore eliminating the time and effort of many users responding to an SPR which is already being worked on or solved. If a fix is available, the user will save both time and computer cost normally spent in debugging NASTRAN or redesigning the problem. Thus, significant savings in computer time and manpower is expected when ECIS becomes an integral part of NASTRAN.

## STATUS OF ECIS

ECIS was originally created by inputting all SPR's from the SPR Log into the data base. To reduce storage costs and extraneous material, all SPR's corrected before the release of Level 15 of NASTRAN were deleted from ECIS. Continuing efforts are being made to increase the readability and efficiency of ECIS. New SPR's, temporary fixes, and permanent fixes are frequently being added. The status of individual SPR's is updated as the SPR is fixed. When the code to implement a fix to an SPR is integrated into an archive version of NASTRAN, the number of that version is put into the LEVEL FIXED component of ECIS. Once that fix is verified as correct, the STATUS CODE component for that SPR is updated to FIN and the fix is placed in the PERM FIX components. At present, there have been 1202 SPR's reported to NSMO. The status of ECIS is:

- 587 SPR's
- 25 SPR's with permanent fixes
- 54 SPR's with temporary fixes
- 275 SPR's with a level fixed entry
- 164 SPR's with a status code of FIN
- 30 SPR's classified as previously reported errors

## CONCLUDING REMARKS

By utilizing an organized procedure for storing, updating, and retrieving large volumes of data, an Error Correction Information System (ECIS) has been developed for NASTRAN. This system supports the two-way transmittal of NASTRAN information, errors, and error corrections between the user and the NASTRAN Systems Management Office; ECIS can be accessed by telephone through any desktop interactive computer terminal.

ECIS shows promise of greatly reducing the long times that heretofore have been needed to disseminate error correction information to the user community. Users of ECIS will have all SPR's, user information, and updates available on demand and fixes will be installed in the ECIS data base as they are devised.

APPENDIX A

SAMPLE PROBLEMS

1.  Problem:   Print all information for a particular SPR.

    Entry:     Print entry where C1 EQ 1190:

    Response:  SPR NUMBER = 1190
               USER NAME = WINTER, RON
               USER ORGANIZATION = TENNESSEE EASTMAN
               COMPUTER = IBM 360
               LEVEL FOUND = 15.10
               DATE REPORTED = 04/02/1975
               OPERATING SYSTEM = OCC
               PRIORITY = 2.00
               RIGID FORMAT = 1,0

                   MODULE = RBMG2

                   SUBROUTINE = SDCOMP

                   STATUS CODE = CKC

                   ERROR CODE = SOFTWARE ERROR

                   DESCRIBE ERROR = SPILL PROBLEM IN RBMG2 CAUSES SYSTEM
                                    FAILURE

2.  Problem:   Find all SPR's associated with a particular user.

    Entry:     Print SPR number where user name EQ Walz, Joe:

    Response:  SPR NUMBER =   731
               SPR NUMBER =   954
               SPR NUMBER =   978
               SPR NUMBER = 1006
               SPR NUMBER = 1067
               SPR NUMBER = 1068

3.  Problem:   Same as example 2 with C values substituted for element names.

    Entry:     Print C1 where C2 EQ Walz, Joe:

Response:    SPR NUMBER =   731
             SPR NUMBER =   954
             SPR NUMBER =   978
             SPR NUMBER = 1006
             SPR NUMBER = 1067
             SPR NUMBER = 1068


Problem:    Find all SPR's reported in a particular time frame.

Entry:      Print SPR Number where C7 GE 01/01/69 and C7 LT 01/01/70:

Response:    SPR NUMBER =   13
             SPR NUMBER =   69
             SPR NUMBER = 115


Problem:    Find all SPR's reported between two levels of NASTRAN.

Entry:      Print C1 where C6 GT 15.5 and C6 LT 15.7:

Response:    SPR NUMBER =   528
             SPR NUMBER =   752
             SPR NUMBER =   777
             SPR NUMBER =   870
             SPR NUMBER =   881
             SPR NUMBER =   883
             SPR NUMBER =   884
             SPR NUMBER =   896
             SPR NUMBER =   973
             SPR NUMBER =   986
             SPR NUMBER =   987
             SPR NUMBER =   988
             SPR NUMBER =   989
             SPR NUMBER =   993
             SPR NUMBER = 1007
             SPR NUMBER = 1020
             SPR NUMBER = 1049
             SPR NUMBER = 1065


Problem:    Print the SPR number and the description of any SPR that failed
            in a particular subroutine of a particular module.

Entry:      Print C1, by entry, C34 where entry has C16 EQ TRHT and entry
            has C18 EQ TRHT1A:

Response:     SPR NUMBER = 986
        DESCRIBE ERROR = SEVERAL ERRORS ARE PRESENT WITH RESPECT
        DESCRIBE ERROR = TO THE USE OF QVECT CARDS IN HEAT TRANSFER
        DESCRIBE ERROR = ANALYSIS.
        DESCRIBE ERROR = FOR IDENTICAL BULK DATA, QVECT LOADS ARE
        DESCRIBE ERROR = APPLIED DURING A NON-LINEAR STEAD STATE
        DESCRIBE ERROR = ANALYSIS, BUT NOT DURING A TRANSIENT RUN.
        SPR NUMBER = 1044
        DESCRIBE ERROR = THIS PROBLEM RAN SUCCESSFULLY, FOLLOWING
        DESCRIBE ERROR = WHICH TWO OF THE TEMP CARDS USED TO DEFINE
        DESCRIBE ERROR = SET 500 WERE REMOVED, LEAVING ONLY THE
        DESCRIBE ERROR = TEMPD CARD TO DEFINE THE SET.
        SPR NUMBER = 1083
        DESCRIBE ERROR = A TRANSIENT HEAT TRANSFER PROBLEM STOPPED
        DESCRIBE ERROR = IN MODULE TRHT WITH A USER ABEND OF 680.
        DESCRIBE ERROR = SUBR. TRH1A WAS TO CONTAIN 3 ERRORS IN
        DESCRIBE ERROR = THE CODE.

7.   Problem:   Print the SPR number, description, and temporary fix for a particular module that has a temporary fix.

    Entry:   Print C1, by entry, C34, by entry, C36 where entry has C16 EQ SMP1 and entry has C36 exists:

    Response:   SPR NUMBER = 1001
        DESCRIBE ERROR = AN OMIT CARD WAS ADDED TO A PREVIOUSLY
        DESCRIBE ERROR = OPERATIONAL TRANSIENT PROBLEM, AND THE
        DESCRIBE ERROR = ABOVE ERROR OCCURRED.
        DESCRIBE TEMP FIX = ALTER 65,65
        DESCRIBE TEMP FIX = SMP1 HUSET, HKFF,,,/HGO, HKAA,HKOO,
        DESCRIBE TEMP FIX = HLOO,HUOO,,,,,$

8.   Problem:   Print the SPR number and permanent fix for a particular module that has a permanent fix.

    Entry:   Print C1, by entry, C39 where entry has C16 EQ XYTRAN and entry has C39 exists:

    Response:   SPR NUMBER = 1072
        PERM FIX CDC = TEST     ALTER FOR LEVEL 15.5
        PERM FIX CDC = CARD     *INDENT    S1072L79
        PERM FIX CDC = CARD     *INSERT    RAND5.222
        PERM FIX CDC = CARD         LLIST=LLIST-5*(II-ICDONE+1)
        PERM FIX CDC = CARD     *DELETE    RAND5.225
        PERM FIX CDC = CARD     *COMPLETE   RAND5

9.    Problem:    Find the number of SPR's now in ECIS

      Entry:      Tally/all/C1:

                  ************************
      Response:   ELEMENT-      SPR NUMBER
                  ************************
                  MINIMUM-      13
                  ----------------------
                  MAXIMUM-      9006
                  ----------------------
                     594 UNIQUE VALUES
                  ----------------------
                     594 OCCURRENCES
                  ----------------------

REFERENCES

1.  Rosser, David C., Jr.:  The Design and Use of an Error Correction Inform
        tion System for NASTRAN.  NASA TM X-72651, 1974.

2.  The Information Network Division of Computer Science Corporation:  Syste
        2000 Reference Manual, E00209-01, 1973.

3.  CYBERNET Service Control Data Corporation:  System 2000 Level 2 User In-
        formation Manual, 86604500, 1974.

TABLE 1

# DEFINITION OF USER COMMENT DATA BASE

1* USER NAME
2* USER ORGANIZATION
3* DATE
4* TIME OF DAY
5* USER COMMENTS (RG)
  6* COMMENTS
7* NSMO COMMENTS (RG)
  8* NSMO

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TABLE 2

## DEFINITION OF ECIS DATA BASE

THE DATA BASE IS COMPLETELY DEFINED BY THE FOLLOWING NUMBERED LIST OF COMPONENTS:

1* SPR NUMBER
2* USER NAME
3* USER ORGANIZATION
4* COMPUTER
5* LEVEL FOUND
6* LEVEL FIXED
7* DATE REPORTED
8* OPERATING SYSTEM
9* PRIORITY
10* RIGID FORMAT
11* R.F. SUBSET
12* ALTER
13* ERROR MESSAGE
14* PREVIOUS REPORTED BUG
15* MODULE NAME (RG)
16* MODULE
17* SUBROUTINE NAME (RG)
18* SUBROUTINE
19* DOCUMENTATION ERROR (RG)
20* DER NUMBER

TABLE 2 (CONT'D)

# DEFINITION OF ECIS DATA BASE (CONT'D)

21* MANUAL
22* PAGE DATE
23* SECTION
24* PAGE NUMBER (RG)
  25* PAGE
26* STATUS OF SPR (RG)
  27* WHOM ASSIGNED
  28* DATE ASSIGNED
  29* STATUS CODE
  30* ERROR CODE
  31* EXPECTED COMPLETION DATE
  32* STATUS COMMENTS
33* DESCRIPTION OF ERROR (RG)
  34* DESCRIBE ERROR
35* TEMPORARY FIXES (RG)
  36* DESCRIBE TEMP FIX
37* PERMANENT FIXES (RG)
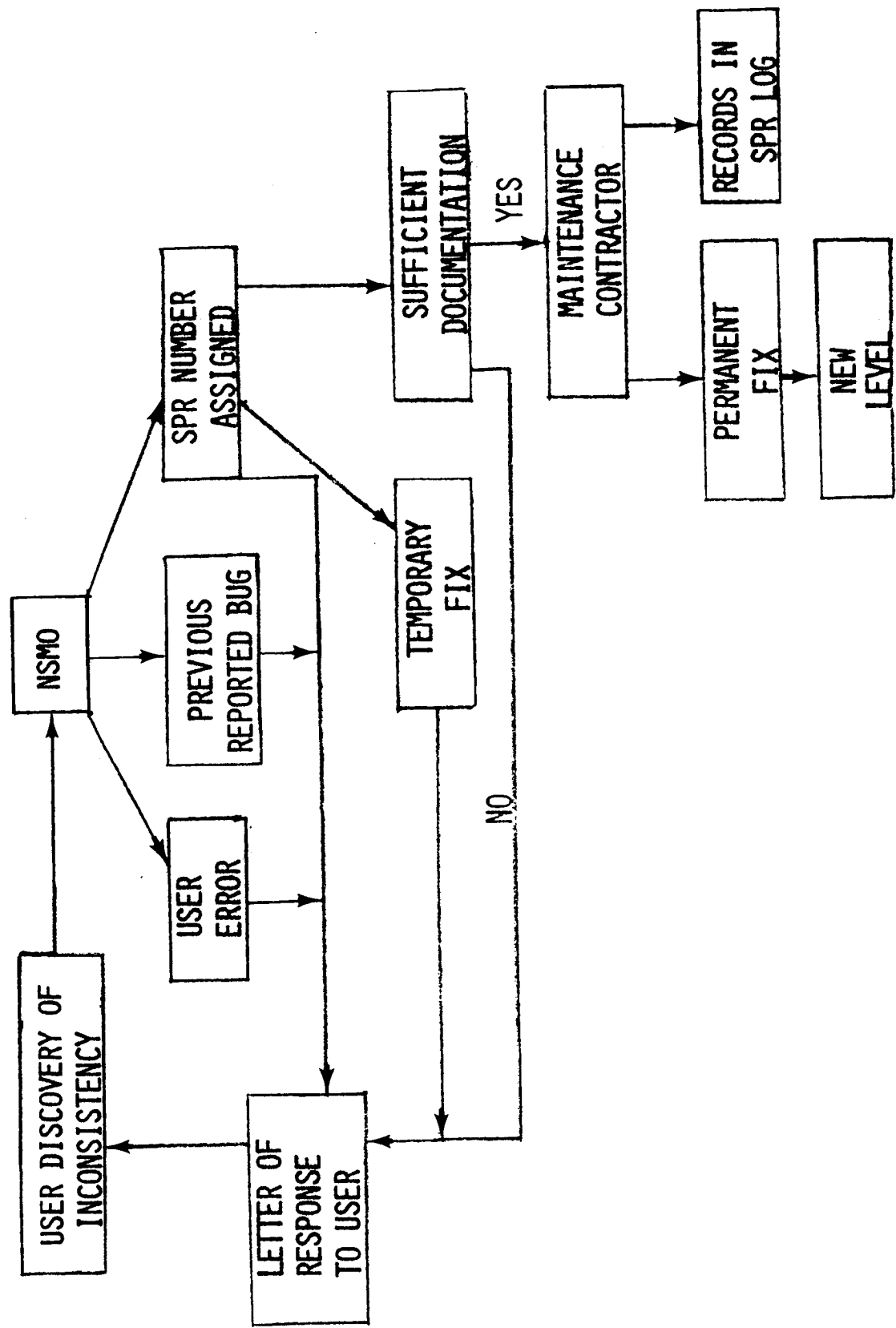  38* PERM FIX IBM
  39* PERM FIX CDC
  40* PERM FIX UNIVAC

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Figure 1 – Old Method for Handling NASTRAN SPR's
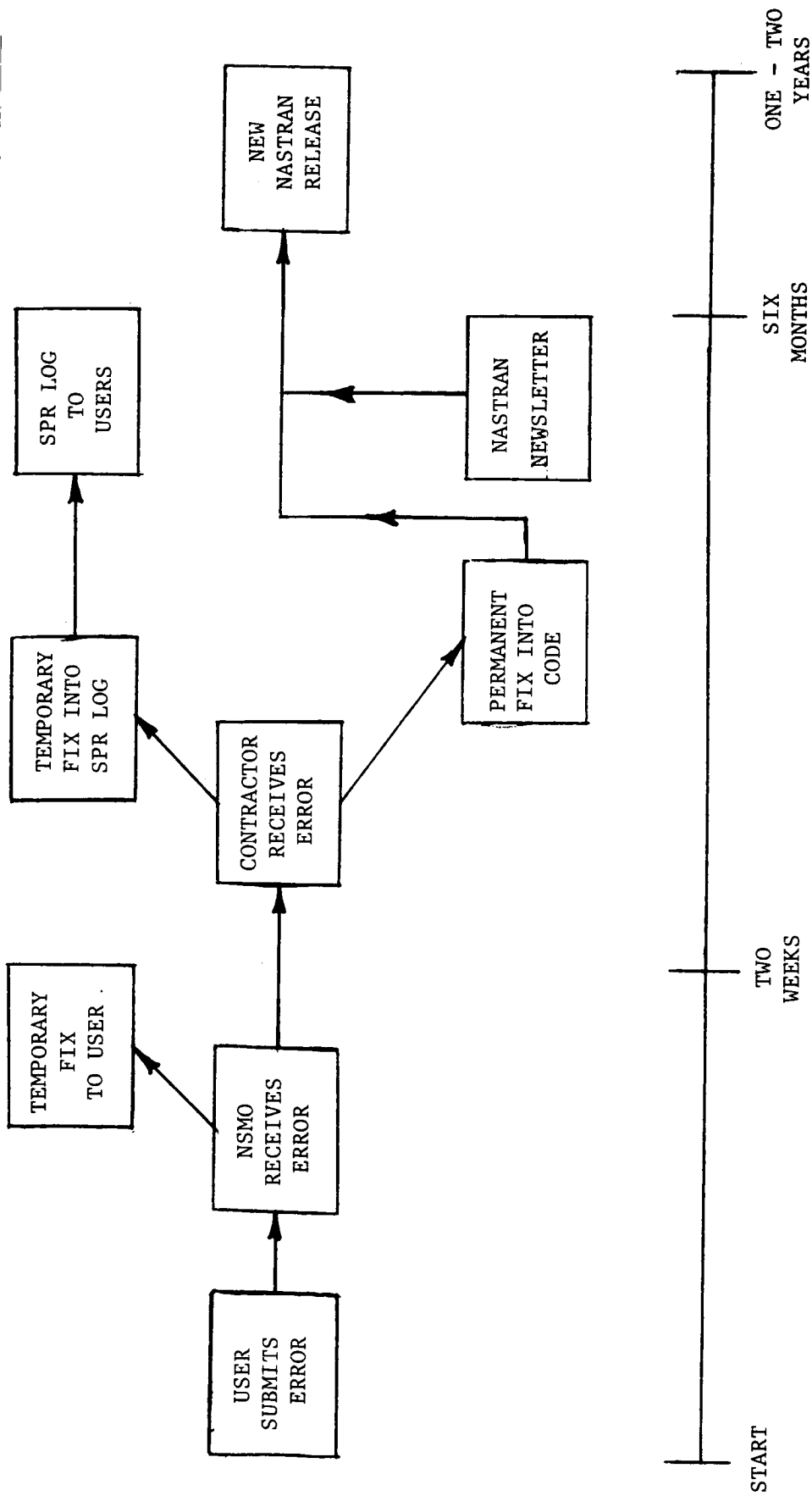
Figure 2 – Minimum Time Span for Old NASTRAN Method of Handling SPR's
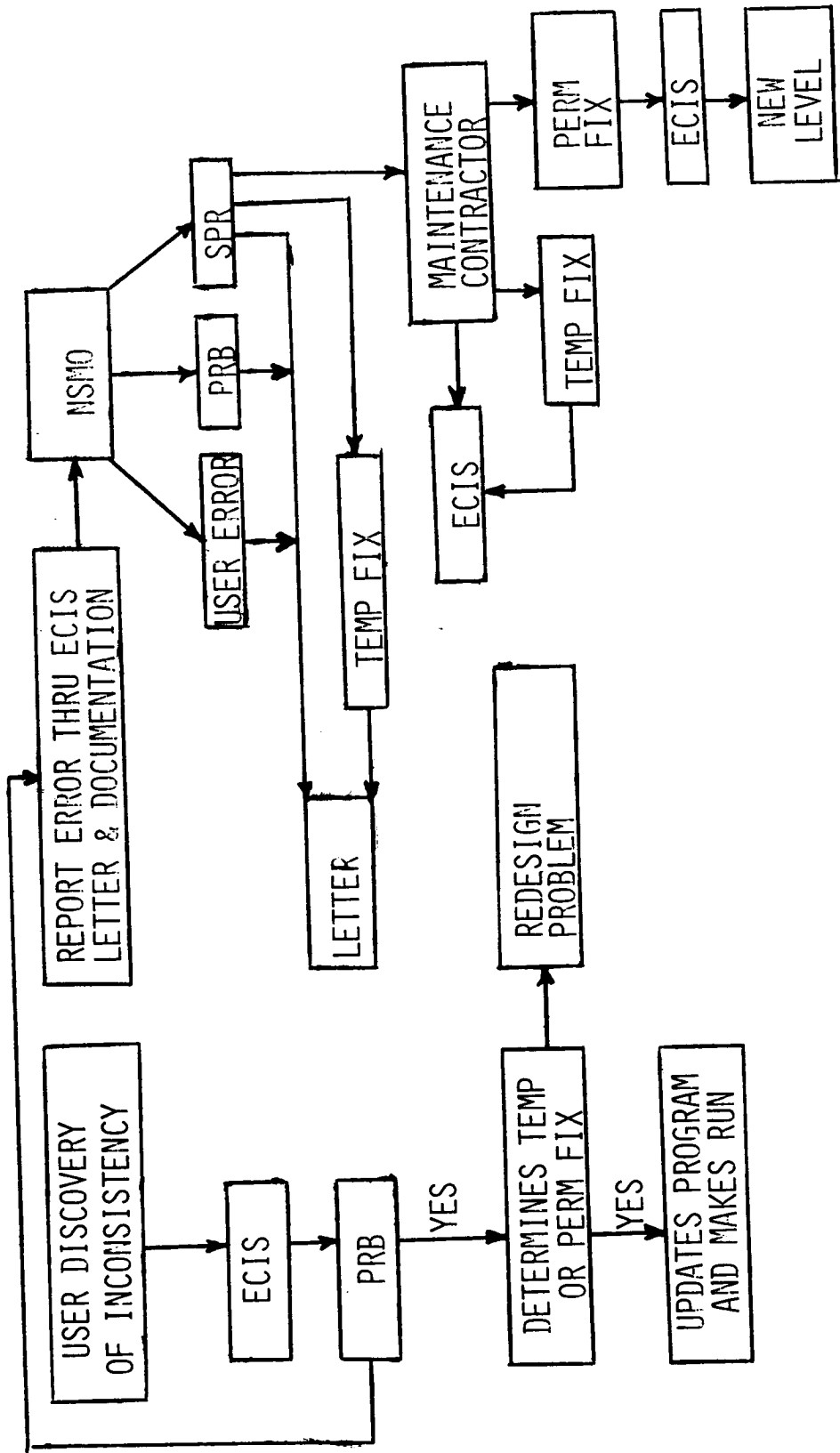
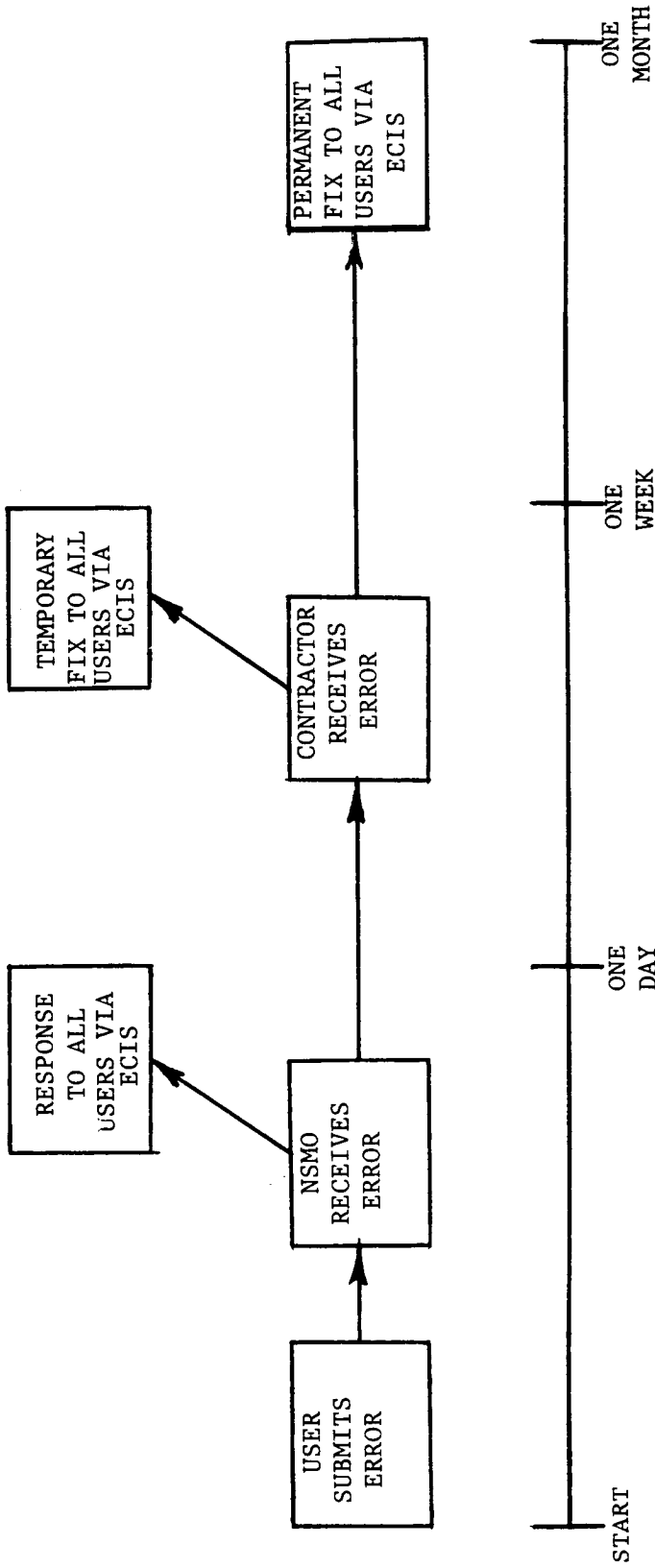508



Figure 3 – New Method for Handling NASTRAN SPR's With ECIS

Figure 4 - Minimum Time Span for Handling NASTRAN SPR's with ECIS