17 Jan 1983

To: Pipeline Software Group

From: R Payne

Subject: Mapio routines

The recent update on MAPPER and SORTER forced by the various system crashes has impressed upon me the need to do something about the MAPIO question.

In fact we have in the library the IMPS CATIO routines. What we do not have is the IMPS MAPIO routines. The MAPIO does exist on MAPPER for the ACTPLT program. Also the FITS routines does map io is some fashion.

We also have a system new area containing some code for the MIO system of map io designed by Eric Graham.

The IMPSIO is basically a sound system however there are several reasons why its current form is not quite adequate as the standard io package:
1. it is line orientated and cannot handle large maps
    nor does it allow reading multiple lines for
    small maps
2. it is very low level type coding and is heavely
    dependent on the map database format currently used
3. the application program needs to know too many details
    about the IMPSIO assumptions
4. only the simplest changes to the map database would
    be transparent to application programs.

The MIO package is very much better at hiding the detailed format of the catalog amd map database structure from the application task. The only reason for not using the MIO routines is that they are not debugged and sufficiently tested. They make use of DECNET and spawned tasks in a manner we haven't used before. Moreover they are a significant departure from our currectly existing programs and could require a lot of changes to existing programs. Also the suggested catalog format is a radical departure from our existing formats.

I propose to modify the IMPS Catio and Mapio routines. The line mode of io would be eliminated in favor of a x,y,z location and a pixel count. The io routines themselves would not print out error messages but simply return the file error status instead.

A higher level set of MIO routines will be implemented using the new system CATIO amd MAPIO routines described above.

All applications programs should use the MIO routines and not the low level MAPIO and CATIO routines. The CATIO and MAPIO routines are too closely linked to a specific database structure which may be radically revisied at some future time. The MIO routines will be transparent to database changes. Since the MIO routines are written in terms of the

current Catio and Mapio routines the current IMPS software will work until the database structure is significantly changed.
The following MIO routines will be supported:

```
CALL SETPPN(PPN,MID,ERR)
        PPN - INTEGER USER NUMBER FROM DEC10
            MUST BE SET ONCE FOR EACH MID USED
            RANGE LIMITED TO 8 THRU 10000
        MID - INTEGER ARRAY FOR MAP ID
        ERR - LOGICAL ERROR RETURN WILL BE SET IF MID IN USE
            OR PPN OUT OF RANGE


CALL SETLUN(LUN,MID,ERR)
        LUN - LOGICAL UNIT NUMBER TO ASSOCIATE WITH THIS MID
            MUST BE DIFFERENT FOR EACH OPEN MID
            RANGE LIMITED TO 1 THRU 30
        MID - INTEGER ARRAY FOR MAP ID
        ERR - LOGICAL ERROR RETURN WILL BE SET IF MID IN USE
            OR OUT OF RANGE


CALL OPNMIO(MID,NAME,MODE,ERR)
        MID - INTEGER ARRAY (382) WORDS FOR IO ROUTINES
            IT CONTAINS THE MAP ID AND OVERHEAD FOR MAP IO
        NAME - ASCII STRING FOR MAPNAME
        MODE - 'I' OR 'O'
        ERR - LOGICAL ERROR STATUS


CALL CATMIO(MID,RECNO,HDR,ERR)
        MID - INTEGER MAP ID MUST HAVE LUN AND PPN SET
        RECNO - INTEGER RECORD NUMBER ON INPUT WILL GET THE
            NEXT CATALOG RECORD AFTER RECNO BUT ON OUTPUT
            WILL CONTAIN THE RECORD NUMBER OF HDR RETURNED
            -1 INDICATES END OF CATALOG DETECTED
        HDR - RETURNED CATALOG HEADER
        ERR - LOGICAL ERROR RETURN


CALL CLMIO(MID,ERR)
        MID - INTEGER ARRAY FOR OPENED MAP ID
            CLOSES THE MAP FILE AND FREES THE MID FOR OTHER USE
            LUN AND PPN FOR MID ARE NOT CHANGED
        ERR - LOGICAL ERROR STATUS


CALL DELMIO(MID,ERR)
        MID - INTEGER ARRAY FOR MAP ID
            DELETES THE MAP AND ITS CATALOG ENTRY AND ANY
            ASSOCIATED FILES, LUN AND PPN ARE NOT CHANGED
        ERR - LOGICAL ERROR STATUS


CALL RDMIO(MID,BUF,NUM,IX,IY,IZ,FMT,ERR)
        MID - INTEGER ARRAY FOR MAP ID
            MID MUST BE SET BY CATMIO OR OPNMIO CALL
        BUF - BUFFER TO RECEIVE DATA FROM MAP READ CONVERTED TO
            FORMAT SPECIFIED BY FMT
```

```
           NUM - NUMBER OF PIXELS TO READ IN FROM START POSITION
           IX - START PIXEL LOCATION X DIMENSION
           IY - START PIXEL LOCATION Y DIMENSION
           IZ - START PIXEL LOCATION Z DIMENSION
           FMT - FORMAT FOR DATA RETURNED IN BUF
                 'REAL','INTEGER', 'BYTE' OR 'BIT'


     CALL WRMIO(MID,BUF,NUM,IX,IY,IZ,FMT,ERR)
           MID - INTEGER ARRAY FOR MAP ID
                 MID MUST BE SET BY OPNMIO AND SETHDR CALLS
           BUF - BUFFER TO RECEIVE DATA FROM MAP READ CONVERTED TO
                 FORMAT SPECIFIED BY FMT
           NUM - NUMBER OF PIXELS TO READ IN FROM START POSITION
           IX - START PIXEL LOCATION X DIMENSION
           IY - START PIXEL LOCATION Y DIMENSION
           IZ - START PIXEL LOCATION Z DIMENSION
           FMT - FORMAT FOR DATA RETURNED IN BUF
                 'REAL','INTEGER', 'BYTE' OR 'BIT'
                 MAP DATA FORMAT SPECIFIED IN HEADER


     CALL ERRMIO(MID)
           MID - INTEGER ARRAY FOR MAP ID
                 INTERPRETS ERROR CONDITION FOR ALL MIO ROUTINES


     CALL SETHDR(MID,HDR,ERR)
           MID - INTEGER ARRAY FOR MAP ID
           HDR - CATALOG HEADER WITH APPROPRIATE VALUES SET
           ERR - LOGICAL ERROR RETURN
                 WILL BE SET IF MID IN USE


     CALL GETHDR(MID,HDR,ERR)
           MID - INTEGER ARRAY FOR OPEN MAP
           HDR - CATALOG HEADER FOR THE OPEN MAP
           ERR - LOGICAL ERROR RETURN
                 WILL BE SET IF MID NOT OPEN


     CALL DELCAT(MID,ERR)
           MID - INTEGER ARRAY FOR MAP ID
                 MUST HAVE PPN AND LUN SET
                 THIS ROUTINE DELETES A USER CATALOG AND ALL
                 ASSOCIATED MAPS
           ERR - LOGICAL ERROR RETURN
```

MIO
NEW MAPIO ROUTINES

```
-----------------
!               !
!    M I O      !
!               !
-----------------
```

VERSION 1.0

THIS IS A SET OF ROUTINES FOR DOING MAPIO
IT IS DESIGNED TO READ MAP DATASETS ON THE
PIPELINE SYSTEM
ITS DESIGN IS TAKEN FROM THE MIO ROUTINES WRITTEN BY ERIC GRAHAM
AND THE IMPSIO ROUTINES

R PAYNE   JAN 1983

SETPPN
ROUTINE TO THE SET THE USER PPN FOR MAPIO

```
-------------------
!                 !
!    S E T P P N  !
!                 !
-------------------
```

VERSION 1.0
AUTHOR   R PAYNE
DATE   JAN 1983

THIS ROUTINE SETS THE USER DEC10 PPN IN THE MID BLOCK USED
TO ACCESS MAPS. THIS PPN MUST BE SET BEFORE ANY OTHER MIO
ROUTINES CAN BE CALLED WITH THE MID.

LIMITATIONS   PPN MUST BE BETWEEN 8 AND 10000

SUBROUTINE SETPPN(MID,PPN,ERR)

SETLUN
ROUTINE TO SET THE LOGICAL UNIT NUMBER FOR MIO

```
-------------------
!                 !
!   S E T L U N   !
!                 !
-------------------
```

VERSION 1.0
AUTHOR   R PAYNE
DATE   JAN 1983

THIS ROUTINE SETS THE LOGICAL UNIT NUMBER IN THE MID BLOCK USED
TO ACCESS MAPS. THIS LUN MUST BE SET BEFORE ANY OTHER MIO
ROUTINES CAN BE CALLED WITH THE MID.

LIMITATIONS   LUN MUST BE BETWEEN 1 AND 30

SUBROUTINE SETLUN(MID,LUN,ERR)

OPMIO
ROUTINE TO OPEN MAP FILES

```
-------------------
!                 !
!    O P M I O    !
!                 !
-------------------
```

VERSION 1.0
AUTHOR   R PAYNE
DATE   JAN 1983

THIS ROUTINE OPENS MAPS GIVEN THE MAP NAME
THE MID MUST BE INITIALIZED WITH THE USER ID AND LOGICAL UNIT NUMBER
THE MID MUST NOT BE CURRENTLY OPEN FOR ANOTHER MAP

LIMITATIONS

SUBROUTINE OPMIO(MID,NAME,MODE,ERR)

RDMIO
ROUTINE FOR READING OPEN MAP FILES

```
---------------
!             !
!   R D M I O  !
!             !
---------------
```

VERSION 1.0
AUTHOR   R PAYNE
DATE   JAN 1983

THIS ROUTINE READS THE USER MAP OPEN ON MID

LIMITATIONS

SUBROUTINE RDMIO(MID,BUF,NUM,IX,IY,IZ,FMT,IEFN,ERR)

WRMIO
ROUTINE FOR WRITING OPEN MAP FILES

```
---------------
!             !
!   W R M I O  !
!             !
---------------
```

VERSION 1.0
AUTHOR   R PAYNE
DATE   JAN 1983

THIS ROUTINE WRITES THE USER MAP OPEN ON MID

LIMITATIONS

SUBROUTINE WRMIO(MID,BUF,NUM,IX,IY,IZ,FMT,IEFN,ERR)

WTMIO
ROUTINE THAT WAITS FOR QUEUED IO REQUEST

```
---------------
!             !
!   W T M I O  !
!             !
---------------
```

VERSION 1.0
AUTHOR   R PAYNE
DATE   JAN 1983

THIS ROUTINE WAITS FOR THE QUEUED IO REQUEST (RDMIO OR WRMIO)
TO FINISH

LIMITATIONS

SUBROUTINE WTMIO(MID,ERR)

CLMIO
ROUTINE FOR CLOSING MAP FILE

```
---------------
!             !
!  C L M I O  !
!             !
---------------
```

VERSION 1.0
AUTHOR   R PAYNE
DATE   JAN 1983

THIS ROUTINE CLOSES THE MAP FILE
THE MID MUST BE INITIALIZED WITH THE UER ID AND LOGICAL UNIT NUMBER

LIMITATIONS

SUBROUTINE CLMIO(MID,ERR)

DLMIO
ROUTINE FOR DELETING A MAP FILE

```
---------------
!             !
!  D L M A P  !
!             !
---------------
```

VERSION 1.0
AUTHOR   R PAYNE
DATE   JAN 1983

THIS ROUTINE DELETES THE USER MAP AND ALL ASSOCIATED FILES
FOR THE CATALOG RECORD SET IN THE MID
THE MID MUST BE INITIALIZED WITH THE USER ID AND LOGICAL UNIT NUMBER

LIMITATIONS

SUBROUTINE DLMAP(MID,ERR)

GETHDR
ROUTINE FOR GET MAP HEADER INFORMATION

```
---------------
!             !
! G E T H D R !
!             !
---------------
```

VERSION 1.0
AUTHOR   R PAYNE
DATE   JAN 1983

THIS ROUTINE RETURNS THE MAP HEADER FOR THE MAP LAST
OPENED OR ACCESSED WITH THIS MID
IT CAN FOLLOW A OPMIO OR A CATMIO OPERATION

LIMITATIONS

SUBROUTINE GETHDR(MID,HDR,ERR)

SETHDR
ROUTINE FOR SET MAP HEADER INFORMATION

```
---------------
!             !
! S E T H D R !
!             !
---------------
```

VERSION 1.0
AUTHOR R PAYNE
DATE   JAN 1983

THIS ROUTINE SETS THE MAP HEADER FOR THE MAP OPEN ON MID
THE CURRENT MAP HEADER IS DEFINED BY THE CATREC.DCL IN
[210,10]. IN ORDER TO WRITE A MAP IT IS NECESSARY TO SET A
CERTAIN NUMBER OR VALUES IN THAT HEADER.
ALL OF THE HEADER INFORMATION SHOULD BE SET IF POSSIBLE
THE FOLLOWING ARE NECESSARY:
        MAPNX - THE X DIMENSION
        MAPNY - THE Y DIMENSION
        NCHANS - THE Z DIMENSION
        CELFMT - THE FORMAT FOR THE DATA (REAL,INTEGER,BYTE)
        MAPSCL - THE SCALE FACTOR FOR INTEGER MAPS
        PSCALE - THE SCALE FACTOR FOR BYTE MAPS
        IMAX - MAP MAXMUM
        IMIN - MAP MINIMUM
        DATTYP - TYPE OF DATA
        MAPTYP - TYPE OF MAP

THE MAPNAME IS SET SET BY THE OPMIO ROUTINE BUT ALL OF
THESE OTHER PARAMETERS ARE SET BY THE SETHDR ROUTINE.

LIMITATIONS

SUBROUTINE SETHDR(MID,HDR,ERR)

CATMIO
ROUTINE FOR READING MAP CATALOGS

```
---------------
!             !
! C A T M I O !
!             !
---------------
```

VERSION 1.0
AUTHOR   R PAYNE
DATE   JAN 1983

THIS ROUTINE READS THE USER MAP CATALOG AND RETURNS THE NEXT
CATALOG RECORD
THE CATMIO AND DLCAT ROUTINES ARE SOMEWHAT SPECIFIC TO OUR
CURRENT DATABASE STRUCTURE
THE MID MUST BE INITIALIZED WITH THE USER ID AND LOGICAL UNIT NUMBER
ON INPUT THE NEXT CATALOG RECORD AFTER RECNO IS RETURNED IN HDR
ON RETURN THE RECNO IS SET TO THE RECNO OF THE SELECTED HEADER
A -1 IS RETURNED FOR END OF CATALOG

LIMITATIONS

SUBROUTINE CATMIO(MID,RECNO,HDR,ERR)

DLCAT
ROUTINE TO DELETE USER'S CATALOG AND MAPS

```
---------------
!             !
!  D L C A T  !
!             !
---------------
```

VERSION 1.0
AUTHOR   R PAYNE
DATE   JAN 1983

THIS ROUTINE DELETES THE USER'S CATALOG AND ALL ASSOCIATED
        MAPS AND FILES

LIMITATIONS

SUBROUTINE DLCAT(MID,ERR)