PIPELINE USER'S MANUAL

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To: PIPELINE people

From: Ed Fomalont

Concerning: First draft of PIPELINE User's Manual

Enclosed is a first draft of the PIPELINE USER'S MANUAL. It is meant to be a bare minimum manual and it assumes that the ORM will contain detailed information on all of the tasks and will be kept up-to-date. Some items to think about are:

1) Is this the correct level for the documentation of the PIPELINE over the next 6 months to one year?

2) Is the overall organization of the manual reasonable.

3) How will this manual evolve? Will it become part of some other manual(s).

4) Please correct errors and misconceptions in this draft. I have not been able to exercize all of the PIPELINE options.

5) Section 11, When things go wrong, should be significantly increased. What do people suggest?

6) When should this manual be released? When R PIPELN is fixed? When UVFITS and on-line filler is working? When GRIDER is more reliable?

The PIPELINE is now available for use. The system is still being debugged and improved but we recommend it for many projects. A complete description of the PIPELINE system is given by R. Duquet in SPG memo No. 33, which is available from Alison Patrick. The use of the PIPELINE for spectral line projects avoids the problem of generating EXPORT tapes to carry to AIPS. The PIPELINE can also make large maps (up to 4096 on a side) and can clean them more quickly than AIPS.

~~At the present time~~ The PIPELINE is limited to mapping and cleaning. _will always be true!_ All data editing and calibration must be done on the DEC-10; selfcalibration and all necessary mapping and cleaning must be done on AIPS; and further map analysis must be done on ~~IMPS~~ _DISPLAY_ or AIPS.

1. INITIAL EDITING AND CALIBRATION

Use the DEC-10 to obtain fully calibrated and edited data in the usual manner. No special considerations are necessary at this stage of reduction for continuum or spectral line projects in order to use the PIPELINE for mapping.

2. HOW TO USE THE PIPELINE

Remain logged onto the DEC-10 to use the PIPELINE. Some programs are resident in the DEC-10 and are accessed by
          <R PROGRAM>
Others reside in the PIPELINE and are accessed from the DEC-10 by typing
          <R PIPELN(PROGRAM)>
Some display software of PIPELINE data is available on ~~IMPS~~ _the DISPLAY computer_. You must go into the ~~IMPS~~ _DISPLAY_ room in order to use these displays. The commands will be discussed in Section 5.

3. SUMMARY OF PIPELINE SOFTWARE CURRENTLY AVAILABLE

The following is a list of PIPELINE-oriented software now available. Because the software is constantly changing, check the ORM for the latest information about the following programs.

TASK	PROGRAM
Make maps from u-v data	R GRIDER
Make baseline-time maps for data display	R BTMAP
Clean maps	R PIPELN(CLNMAP)
List clean components	R CATLST
List maps in PIPELINE or ~~IMPS~~ DISPLAY	R CATLST
List an index of a map in PIPELINE or IMPS	R CATLST
Delete maps from PIPELINE or ~~IMP~~ DISPLAY	R CATLST
Copy PIPELINE or ~~IMPS~~ DISPLAY maps to DEC-10	R CATLST
Copy PIPELINE maps to/from tape	R PIPELN(FITS)
Interrogate disk space for visibility data	R PIPELN(DSKSPACE)
List status of PIPELINE	R PROBE
Hold, release or kill PIPELINE job	R PROBE

The following tasks run from ~~the IMPS system~~ DISPLAY

List maps of PIPELINE	RUN CATLST
Load PIPELINE maps directly onto the TV display	RUN TVLOD
Modify TV display	RUN TVDIS
~~Copy map from PIPELINE to IMPS DIS~~	~~RUN GETMAP~~
Copy IMPS maps to/from tape	RUN FITS
~~Run IMPS software package~~	~~RUN IMPS~~

4. MAKING MAPS

From any DEC-10 terminal type

<R GRIDER>

See the inputs, help on-line documentation and the Observer's Reference Manual for more details. A few hints are:

a.   system=SORTER:SYSTEM

b.   mapsize. If aliasing might be a problem make your maps twice as large as necessary but save only the inner quarter area. The default is to save only the inner quarter area.

c.   bastim = NO. Use the special program BTMAP for this option.

d.   Do not exit from GRIDER until you have submitted all of the jobs associated with one data base on the DEC-10. It takes a while to transmit the data to the PIPELINE so you should transfer all mapping requests before leaving GRIDER.

It takes about 20 minutes to transmit 10,000 blocks of DEC-10 data to the the PIPELINE. To check on the progress of your mapping request type,

<R PROBE>

<GO LIST>

to determine the state of the computer. PROBE will let you know if the data is being transmitted or if the map is being made. When your maps are completed, ~~the index record~~ your catalog can be listed by typing

<R CATLST>

<GO LIST>   to see your entire catalog

<GO INDEX n>   to see the index of map n in catalog

5. DISPLAYING MAPS

Before further processing you should display the map and beam in order to make sure that you mapping parameters were correct and that the PIPELINE has generated error-free maps. Occasionally, some of the maps will be obviously in error. Please report these problems to Bob Payne (X294) as soon as possible. Remapping does not always produce the correct map. The simplest way to display the maps is as follows:

a.   Go the the Display room (~~IMPS~~)

b.   You will use the ADDS terminal on the right side of the room

c.   If you see a prompt ✗ you are in monitor mode. ~~If the IMPS~~

         >

~~program is running, exit from IMPS to get back into monitor level.~~

d. Type

<SET /UIC=[300,20]>   ~~LOGIN~~ *HELLO* USER

to set up proper declarations

e. Type

<@NEWTV>

to connect to the PIPELINE disk

f. To search your catalog to see your map listing type

<RUN CATLST>

and follow directions.

g. To display a map on the CONRAC TV screen on the right, type

<RUN TVLOD>

and follow directions. Both CATLST and TVLOD use the standard
commands with inputs and help.

h. To change some of the image display characteristics, type

<RUN TVDIS>

Use the data tablet and the template display on the VT11 to
provide the display alterations.

IMPS will not be supported

More detailed analysis of the maps can be obtained from the IMPS
software package. However, the map in the PIPELINE must first be
copied to IMPS. This is done by typing

<RUN GETMAP>

and specifying the map to be transferred. When completed, type

<@IMPS>

<RUN IMPS>

to get into the IMPS package for further map analysis.

6. DISPLAYING VISIBILITY DATA

Visibility data can be displayed in two ways. First, the program
GRIDER can be used with typemap=(amplitude, phase, real, imaginary or cover)
to produce a map after the griding of the visibility data. If
uniform weighting has been specified, bad data can often be noticed from
a display of this grided visibility data.

0010E5.MAP = DSR8 (DFT)

0010E4.MAP = DSR7 (FFT)

A new display with baseline pair as the ordinate and time as the abscissa can be generated by typing in the DEC-10

        `<R BTMAP>`

with the appropriate commands. On execution the visibility data is put on a grid of 351 (if all antennas are specified) by 256, 512 or 1024 time bins, depending on the ratio of the timerange and the data sampling time. This 'map' can be then displayed on IMPS as described in Section 5 (or put on tape and carried to AIPS; see Section 9). Because this map is in time sequence, bad data can be recongnized easily. Software is now under development to use this display as a basis for editing visibility data in the PIPELINE.

7. CLEANING MAPS

From any DEC-10 terminal type

        `<R PIPELN(CLNMAP)>`

Set the standard commands in the usual way. The keywords in CLNMAP are somewhat different than the cleaning program in MAKMAP, which will be phased out, and somewhat similar to APCLN and PHCLN in the AIPS. Further changes are anticipated over the next six months. Some particular comments are:

    a.   The mapname must be entered. These are obtained by running CATLST, if you have forgotten them. The class and version are generally defaulted correctly.

    b.   PATCH=MINPATCH keyword used in AIPS. Default is okay.

    c.   SFACTOR = FACTOR used in APCLN. Keep at 0 in most cases.

    d.   SPIKE = OFFSET used in PHCLN.

After submitting CLNMAP, use PROBE to check on the status of the job. CATLST will show you the map in your catalog when the cleaning is completed. To inspect the clean components file use CATLST in the following way:

        `<R CATLST>`

        `<inmachine GRIDER>`

        `<GO LIST>`   and find the catalog number of the map

```
        <copy CMP>
        <GO LIST n>              where n is the catalog number
```

8. BACKING UP AND DELETING THE DATA AND MAPS FROM THE PIPELINE

When you are satisfied with the clean and dirty maps produced by the
PIPELINE, you should backup the maps on a FITS tape and delete the associated
visibility data which remains in the PIPELINE. To backup up your maps, type
from any DEC-10 terminal

```
        <R PIPELN(FITS)>
```

Go to the ~~IPS~~ *TELEX* 6250 drive in the back part of the DEC-10 room, near the
PIPELINE terminals (tape drive will have a label with SUBSYSTEM:GRIDER)
and mount a tape with the ring in. Make sure to unit is on-line and the
correct tape density has been designated.
Fill in the standard commands and run the program. At 1600 BPI density about
40 1024x1024 maps will fit on a 2400-ft reel. Use the VERIFY option to be
sure the tape is free from errors. Maps may be deleted by typing

```
        <R CATLST>
        <GO DELETE n:m>   where n:m specify the range of catalog
```

entries to be deleted.

To delete the visibility data on the PIPELINE which has been sent
from the DEC-10 in the mapping process, type

```
        <R PROBE>
```

find the request number M which generated the data transfer and then type

```
        <GO KILL M>
```

to delete the data set.

9. FURTHER ANALYSIS and DISPLAY

There are two reduction paths which you can now follow. The maps can
be transferred to IMPS by running GETMAP in the IMPS room as
described in Section 4. The full power of the IMPS software package can
now be used for further map analysis and display. If a large number of maps
are to be analysed, it is faster to transfer the maps from the PIPELINE to
IMPS using FITS tapes rather than GETMAP over a slow link. To run
FITS from IMPS, exit from IMPS, if necessary, then type

<RUN FITS>

Mount the tape on the TELEX DRIVE just behind the IMPS room. A white label
stating SUBSYSTEM:DISPLAY should be on the tape drive. Fill in the
the appropriate standard commands and run the program.

The AIPS systems on the VAX computers can also be used to further map
analysis and reduction. To use AIPS, generate a FITS tape from the maps
on the PIPELINE or IMPS and read this tape into AIPS using the task IMLOD.

10. WHEN NOT TO USE THE PIPELINE

If self-calibration is needed, then the AIPS system must be used for
mapping and cleaning, as well as self-calibration. The PIPELINE can, of
course, be used as a first pass in order to determine the quality of the
data and the need of self-calibration. In the future when the PIPELINE
and AIPS can communicate well enough, the self-calibration step will be
done with AIPS while the mapping and cleaning can be done in the PIPELINE.

If your data base spans over 12 hours, the PIPELINE will break the
data into separate data bases, each is then gridded separately and then
added before the FFT is taken. When using UNIFORM weighting, the resultant
maps have a peculiar weighting.

11. WHEN THINGS GO WRONG

DEC-10 to PIPELINE link problems:

Before using the PIPELINE or when you suspect that the link is broken,
type <R PROBE> on the DEC-10 to obtain the link status. If it is down,
check the computer maintainance schedule. Otherwise telephone.....
to determine the problem.

Diskspace:

You can check diskspace in the relevant systems as follows:

<R PIPELN(DSKSPACE)>

checks the disks associated with the visibility data. Dec-10 data bases
are sent to disk DB1:. If it is nearly full check with Bob Payne or Bob
Duquet.

Check space on disks containing PIPELINE maps-not implemented.

Check space on disks containing IMPS maps-not implemented.

R PIPELN hangups:

If there is no response after several minutes, the DEC-10 may be very busy so wait another few minutes. If there is still no response, DO NOT TYPE CNTR C. Instead type (CNTRL Wiggle) to get back to the DEC-10.

There is 'noise' on the link between the DEC-10 and the PIPELINE so do not despair if PIPELN hangs up occasionally. Try it again. Run PROBE to make sure the link is up.

What is this stuff?