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TO : PIPELINE GROUP

FROM : R PAYNE *R. Payne*

SUBJECT : CLEAN

There are at least two reasons for reorganizing the PDP11 CLEAN program at this time. First it is the most important program to rewrite to use the new MAPIO routines. Secondly it needs to be interfaced with the more efficient mapping routines of Wim Brouw. There are also several bugs in the current CLEAN which should be fixed.

Here is a short summary of the design I am following in reorganizing CLEAN for the pipeline. Any comments about the design or its efficiency are welcome.

#### The MAPCON CONNECTION

CLEAN will be controlled as it is at present by the MAPCON control task. The CLEAN program at the moment will requeue itself after every 10 major cycles or 400 iterations. I propose to turn off this retry or else to increase the numbers to maybe 20 major cycles and 4000 iterations. There is a second mode of control which is not working at the moment but which would allow the program to be suspended after any major cycle. I propose to turn on this option and to make PROBE capable of suspending CLEAN after any major cycle. This seems better to me than the automatic retry which is currently implemented.

The inputs to CLEAN come from the MAPCON MIX record. This record includes the usual cleaning parameters (gain, iteration limit etc.) as well as the mapnames for the dirty map and beam and optionally a components file.

The error logging of CLEAN problems will be improved and written into a user log.

#### The CLEAN routines

The main program is called CLEAN and it is divided into 10 major subprograms.

CLNINP : This routine reads the MAPCON MIX record.

CLNINI : This routine opens the dirty map in the MIX header using the MAPIO package. It rewrites the map in real format and sets any indefinite pixels to zero.

CLNIN2 : This routine opens the dirty beam using the MAPIO package. It writes the beam patch file and calculates the beam parameters if requested to do so. It also generates the grid data file for making the transfer function and spawns the CLNFFT routine for generating the transfer file.

CLNIN3 : This routine opens any specified components file and rewrites it into a new components file.

CLNSUM : This routine takes the internal dirty map file and adds it to the model map to make a residual map. On the first cycle it simply copies the dirty map into the residual file. It also calculates the residual map histogram.

CLNCMP : This routine reads the residual map file and does the subtraction using the beam patch. It updates the components file and sets the termination flag.

CLNGRD : This routine reads the components file and the transfer function to generate a model grid file. It spawns CLNFFT to make the model map from the grid file.

CLNFIN : Deletes all temporary files and catalogs the final restored map using MAPIO.

CLNFFT : This is a new program which will take a gridded data file and produce a real map. It is spawned by CLNGRD or CLNIN2 and will interface with Wim Brouw's mapping software.

Most of the design is that of Barry's original program. There is a lot of reorganizing and rewriting of existing code but only one completely new routine which is a new CLNFFT.

The following are the suggested changes to the current CLEAN:

- 1 all internal files will be stored in real format
- 2 the beam histogram will be done once and stored in common
- 3 the CLNSUM routine will calculate the map histogram and the subroutine CLNHIS will disappear
- 4 CLEAN can be queued after any major cycle
- 5 MAPIO will be used for initial reading and final writing of cataloged maps
- 6 CLNFFT will use the Wim Brouw mapping routines
- 7 XFR files will not be generated by the mapping routines but will be created from the beam files and deleted at the end as is done in AIPS
- 8 user logging of CLEAN errors or messages will be improved
- 9 history and component files will be added to the MAPIO package

- 10 default boxes to inner quarter of map if not specified
- 11 follow the AIPS procedure of saving the grid file  
and adding the components from the current cycle

#### Other COMMENTS

The CLNFFT can be developed separately from the rest of the CLEAN program and until its working the current MAPPER version can be used to test the other modifications to the CLEAN program.

The most significant improvement to CLEAN will come from using the more efficient mapping routines. I don't see at the moment how any significant improvement can be made to the rest of the clean algorithm to take advantage of the transpose memory or multiple AP pages.

The map database structure should allow for a history file and components file to be associated with the clean map. I suppose that accessing these files should be a part of MAPIO but I haven't written any of that yet.

The current mapping routines do not make XFR files. The need for these files should disappear when we go to the real format for maps and beams. The only reason for not making real format maps now is that the current clean will not accept them.