NATIONAL RADIO ASTRONOMY OBSERVATORY

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VLA COMPUTER MEMORANDUM #111

BOSS TIMEKEEPER - CLOCKB

Preliminary Specification

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The Boss Computer will be interupted by the 19.2 Hz VLA timing minor cycle. The resident task CLOCKB is connected directly to this interupt and is activated when this interupt is activated.

Most of the time, the chief action taken by CLOCKB is to increment the two interupt counters in the ARACB in global common. It also, however, uses the minor cycle counter, word four, to schedule other actions as follows:

After every interupt (every 52.08333... ms) the task GEOMDL is activated to run the delay lines.

After alternate interupts (every 104.16666... ms) the task GEOMA is activated to provide new antenna positions to the DCS.

After every 24 interupts (every 1.25 seconds) the system clock is read. The minor interupt count is compared with the incremental count as generated in word four of the ARACB, and if they differ, that is, if an interupt has been missed, the real-time abort is taken, and everything is reinitialized.

After every 192 interupts (every 10 seconds, the array major cycle) the various quantities in global common identified as "last 10 second interput" are replaced by those from the same quantity "next 10 second interput". The clock is read, and the clock BCD inputs are converted to days and interupts. Days and interupts replace words 0-3 of the ARACB (setting the correct time). Before replacement, they are compared, and, if an unexpected change occurs, a real time abend occurs. The task GEOM10 is activated to compute the geometric quantities for the next 10 second interupt. For GEOM10's convenience, the time in interupt counts now, ARACB words two and three, is also stored in words 47 and 48. One of the first things GEOM10 does, however, is to compare the current time with the stop time from the SCB, and, if it is exceeded, it will mark the SCB data surpressed and activate the non-resident INIT task.

Note that all of CLOCKB runs at hardware interupt level. It, in effect replaces the MAX III interval timer routines, and, in fact, in the interim period between the Modcomp delivery and the time we can interface to the hardware clock, we may substitute this routine as a timer scheduled routine at 50 ms intervals for checkout purposes. However, it should be noted that in the final version, the task running at interupt level must not use the REX scheduling service, but must find and activate the task RCB (resident control block) itself.

The rather specialized nature of real time computation consists in keeping the programs in synchronism with the tasks. If, due to an inoperable essential device or to improbable stacking of requests, this synchronism fails, the system falls into a very confused state, where it is unclear whether things have been done or not. When this happens, the system shall go back to the warm start state and spend the necessary few seconds getting reorganized, rather than scurrying around trying to figure out what has happened. To aid this operation, we shall provide a REX service for returning to the warm start point. This is global user REX,#44. The word following the REX is a cause code, four hexadecimal digits indicating the task and cause, which will be printed when the system uses this real time abort. A list of these abort codes is in the system documentation.

Although a clock malfunction (such as the BCD digit for tens of seconds exceeding 5) will eventually merely mark the system inoperative, to simplify communications at first, it will be first coded with a real time abort with code 0001.