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NATIONAL RADIO ASTRONOMY OBSERVATORY

POST OFFICE BOX O SOCORRO, NEW MEXICO 87801-0387
TELEPHONE 505 772-4011 TWX 910 988-1710

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Donald W. Brown
TDA Engineering
MS264-803
JPL/CALTECH
4800 OAK GROVE DR.
PASADENA, CA 91109

REF: VLA-GDSCC Telemetry Array Project

Dear Mr. Brown;

Her are six copies of the Quarterly Report for October-December 1985. I leave the distribution of copies within JPL to you.

Sincerely yours,

William D. Brundage

William D. Brundage
VLA-Voyager Preparation
Manager and Project
Engineer

WDB/bmg

CC:W/REPORT:

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R. BARKER
L. BENO
J. CAMPBELL
W. dELGIUDICE
R. DORR
R. EKERS
P. LILIE
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NATIONAL RADIO ASTRONOMY OBSERVATORY

VLA-GDSCC TELEMETRY ARRAY PROJECT

VLA-JPL VOYAGER 2 AT NEPTUNE

QUARTERLY REPORT

OCTOBER - DECEMBER 1985

During this fourth quarter of calendar year 1985, JPL and VLA staff continued testing the two antennas operating at X-band. After a two-month spending hiatus, NRAO continued procuring materials to construct front-ends and receivers in 1986.

CDL

The Central Development Laboratory assembled the first two production front-ends with cooled GaAs FET LNA's. Testing began in December and should finish by the end of January with delivery to the VLA then. Fabrication of subassemblies for the next four units and ordering of the remaining materials for thirty front-ends began this quarter.

TESTS

Each month JPL staff used four to six hours of scheduled array test time to examine the phase stability of the "phased-up" array of 27 antennas. They also measured the performance of the two X-band antennas in pointing at radio sources, pointing and tracking the Voyager II spacecraft, feed efficiency and system noise at low elevation angles. JPL issued several test reports.

SCHEDULE

The accelerated 1986 schedule for front-end production and installation decelerated somewhat because late NASA funds for FY 86 delayed purchase of materials. The current schedule has at least ten front-ends delivered to the VLA and six of them installed on antennas in CY86

FEEDS

Two more antennas had feed support towers installed. Now one antenna has a preliminary feed, one a production feed and four have towers waiting for production feeds. JPL will test the second production feed in late January 1986 and ship it to the VLA in February.

RECEIVER SYSTEM

The two installed systems received minor maintenance. Ordering of materials for eight receiver systems began this quarter. Staff designed a new monitor/control interface to match the production front-ends and started assembling a F-rack and bins for an antenna vertex room.

ANALOG SUM

The JPL telemetry demodulating receiver will connect to the VLA at the output of an analog sum system which combines the digitized phased-up baseband IFs from all 27 antennas. Tests by JPL and VLA staff confirmed adequately low spurious signal levels ($\leq$-94 dBm in 6 to 25 MHz) in the analog output of the prototype unit when operated with

some shielding and with its own power supplies. After repackaging the prototype unit and verification tests in early 1986, VLA staff will build three more units - one for each of the four polarization IFs.

RELIABILITY OF ELECTRIC POWER

The JPL power line monitor provided to VLA and JPL much useful data on voltage sags, spikes and failures. JPL received and will evaluate two VLA reports on major site power failures. Monitoring and joint JPL and VLA evaluation will continue through 1986 and 1987. Preliminary conclusions indicate on-site power generation will be required for the 1989 encounter.

RELIABILITY OF COMMON SYSTEM

If one or two out of the 27 antenna/receivers in the array should fail for short periods during the Neptune encounter, degredation of the telemetry singal will be tolerable. However, if any component of the "common system" fails, the telemetry signal would fail totally for the duration of diagnosis, repair or substitution, and re-start. Preliminary evaluations of the common system, especially considering the new on-line control computers and software planned for early 1987, indicate VLA and JPL should investigate further. If JPL concludes the projected failure rate is unacceptable for the Neptune encounter, VLA and JPL will have to determine what additional hardware, software and funds will be needed to achieve acceptable reliability.

WORKSHOP

VLA Preparation Manager W. Brundage attended the October 24 and 25 VGTA workshop and review at JPL. It was a good means to get-acquainted with JPL people and planning.

FUNDS

In order to minimize a hiatus in planned expenditures in October-November of 1986 as occurred in 1985, we will budget our 1986 calendar year with the 1986 fiscal year NASA funds presently in hand. When we receive NASA FY 1987 funds, our CY 1986 budget will return to that in Appendix A of the Management Plan. At present, expenditures conform to the Management Plan.

WDB/bmg
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