

NATIONAL RADIO ASTRONOMY OBSERVATORY
Charlottesville, Virginia

June 14, 1985

TO: VLBA Electronics Group

FROM: Dick Thompson

SUBJECT: VLBA Electronics Meeting, June 13, 1985

Attendees: Bagri, Balister, Beale, Bradley, Brundage, Campbell,
Mauzy, Moffet, Norrod, Schlecht, Simon, Thompson,
Walker, Weber, Weinreb.

Front Ends

S. Weinreb reported upon tests of 23 GHz FET amplifiers made by Hughes Aircraft Corporation for the VLA. These have not achieved the performance expected, and the noise temperature (uncooled) is about 200 K. There is some hope of better performance by using Al gate transistors, some of which gave better performance in early lists. The present transistors have Au gates. The effect on the VLBA is the conclusion that since amplifiers for the 23 GHz band are not yet satisfactorily developed, 15 GHz should remain the highest frequency in the group A receivers for the first four antennas. One prototype 23 GHz front end may be constructed during 1985-6.

R. Norrod reported that in the first cooldown test of the 1.5 GHz front end with the model 350 refrigerator the amplifiers cooled to 14 K in seven hours and the polarizer cooled to about 60 K in 13 hours. A better thermal connection for the polarizer is being made. The cooling times are approximately half those obtained with the model 22 refrigerator on the first 1.5 GHz prototype front end.

Local Oscillator

R. Mauzy reported that the breadboard model of the 2-16 GHz synthesizer locks at all required points, but the margin of wanted locks over unwanted harmonic locks is not large. This can be improved by using a YIG oscillator with a built-in YIG filter at the output, which increases the price of the oscillator by \$450. The frequencies at which the synthesizer locks are equal to $(N \times 500 \pm 100)$ MHz. There was some discussion of front panel indicators and controls on this unit. It was agreed that since there will be a computer terminal in the vertex room there is no need for frequency control or numerical readout on the front panel. There should, however, be front panel monitor points for the output signal, the IF waveform of the loop, and the tuning voltage from the D/A converter. LED indicators should show lock or no lock, high or low lock, and the five interface activity indicators described in the interface specification.

Electronics Packaging Standards

1. It was agreed that the dimensions of bins and modules should be the same as those used on the VLA, and that any adjustment for spacing of the connectors on the bin and module should be accomplished by shimming the connector blocks. This point arose because Alan Rogers has experienced problems with mating of the Amp connector pins in units used in MK III systems.
2. Shielded modules should be used for digital circuitry such as the monitor and control interface. Unshielded modules are suitable for components in metal boxes with coaxial signal connections such as mixers, amplifiers, etc., and for power supplies.
3. For the 2-16 GHz synthesizer module, R. Mauzy is using an RFI gasket material which has dimensions 1/16 x 1/8 inches and is made of woven wire over a neoprene core. This fits into a slot 1/16 inch wide by 1/10 inch deep. The small width would be helpful mechanically in cases where screw holes must be close to the slot. Assuming that tests of the module show this type of gasket to be effective, it is recommended that it be regarded as the preferred type for the VLBA. This will help to avoid proliferation of different gasket types. The type number is 2010-2010-0005, manufactured by EMC shielding.
4. J. Campbell strongly recommended the use of OSP connectors rather than SMA for coaxial connections to 0.141 cable at the backs of modules. It was decided to re-examine this question. OSP connectors are being used on some new modules for the VLA. It was claimed that the OSP connectors are satisfactory with respect to RF leakage. However, it is not clear that their phase stability will be as good as that of SMA connectors.

Power Supplies

It was generally agreed that switching power supplies should be used for digital circuitry. They may also be acceptable for analog circuits. For circuits where the highest stability is required it was generally agreed that a voltage stabilizing circuit should be used in the individual modules, to eliminate voltage variations and pickup in the rack wiring. It was also felt that the power supply voltages should be the standard $\pm 5V$, $\pm 15V$, and 28 V and that the drop in the local stabilizing circuits should be tolerated, rather than accommodated by using higher supply voltages.

Monitor and Control Software

The monitor and control group will provide test programs suitable for Compac or IBM-PC compatible computers.