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To: VLBA Data Acquisition Group

From: Alan E.E. Rogers

Subject: Checkout of Baseband Converters

Dick Thompson, Erich Schlecht, Ed Childers and I met in Greenbank on 20, 21, and 22 February 1990 to review the problems in baseband converter checkout. We were joined by Rick Grenwis and Dave Dowgiallo of Interferometrics.

Filter boards

The filter board now appears relatively straightforward now that the critical capacitors are now all in hand. The adjustments which are needed are:

1] RC in the Q=2.56 stage   (see VLBA Acquisition Memo #176)

to optimize flatness of 4 MHz and narrower bandwidths

2] CC in Q=2.56 stage   (see VLBA Acquisition Memo #176)

for the 8 and 16 MHz bandwidths

It was also determined that the 8 MHz bandwidth code should be set to 6B and that 270 pf is a better starting point for the capacitors across the 51 ohms resistors. Other adjustments listed in VLBA Acquisition Memo #176 may occasionally be required.

SSB Mixer

Adjustment of the SSB mixers is difficult without some preselection of matched mixer pairs - but even without matched mixers we were able to achieve very close to 26 dB worst case image rejection. At present, there is a serious problem with a lack of high quality capacitors for the video phase shift networks. For some reason, purchasing has been unable to obtain the "J" tolerance capacitors specified in the parts list. Even better tolerance "G" tolerance capacitors have been ordered but have not been delivered. Some "J" tolerance capacitors have been sent from Haystack to allow the SSB mixer checkout to continue in the meantime. Adjustments which were needed without matched mixers were as follows:

1] Input line length adjustment   (see VLBA Acquisition Memo #162)

to balance mixer phase.

2] Input resistor   (see VLBA Acquisition Memo #162)

to balance mixer amplitude.

3] Hybrid load resistor   (see VLBA Acquisition Memo #162).

(Also, John Webber has found that it is advantageous to use microwave chip resistors rather than cylindrical resistors which have more stray inductance. Also the resistors should be placed as close as possible to the hybrid.)

4] Add some capacitance across one of the mixer outputs - by using a few square mm of copper tape.

Test Set-up

Erich Schlecht's software works well and Erich has agreed to continue making further improvements to help in the checkout. BBC test equipment, (like that in Drawing 54120K054), is sparse but the situation could be improved by optimizing the distribution of equipment. For example, the HP phase meter on loan to the VLA site from Haystack is being sent to Greenbank to speed up the mixer measurements needed to select matched pairs. Ed Chiders will let us know what check-out equipment improvements are needed as we see how the check-out work proceeds.

Missing Grounds on Digital Interface Board

While checking out converters at Greenbank it was discovered that Serial #18 had a problem of spurious resets to the synthesizer divider chain via the 1 second sync. line. I brought this converter to Haystack and discovered that the origin of the spurious resets was cross-talk between the MCB output and the sync to the divider submodule owing to a missing ground.

The missing ground can be made by connecting AJ250 to A1608. The circuit diagram and the wirelist files given to DataCon are correct - but somehow DataCon software must have a "bug" which failed to ground the wire net that connects the ground pins on AJ2. The missing ground is benign on the converters built at Haystack because the cable lengths connected to AJ2 are much shorter (compared with the Greenbank units which have cables longer than those given on Drawing 54120D049) and are grounded at the SMC connector ends. I recommend that DataCon be made aware of this error when more boards are wrapped so that it can be corrected. All existing converters with long cables on AJ2 should have the AJ250 to A1608 wire wrapped manually. Bob Simon found two other missing grounds which can be corrected with B3103 to B3110 and A4103 to A4110.