Memorandum

To: G. Ediss, R. Groves, A. R. Kerr, D. Koller, G. Lauria, M. Lambeth, S. -K. Pan

cc: J. Webber

From: J. Effland, K. Crady

Revisions:		
2001-07-10	jee	Figure 2 and Figure 3 updated to match wiring drawing and now include X3 multiplier, added temperature sensor lines.
2001-07-09	jee	ARK's comments: Removed extra IF amp SKP's comments: Added lens, horn, and lens holder
2001-06-26	jee & wck	Initial

Subject: JT-1 Test Dewar Configuration

The demand for SIS mixer and ancillary receiver component testing has increased to the point that two test Dewars are essential for maintaining realistic development schedules. Consequently, SIS lab efforts will focus on construction of the JT-1 Dewar in the shortest possible time. Figure 1 shows all the fundamental mixer configurations that require testing, but to expedite the construction schedule, JT-1 will initially instrumented to measure only a subset of these different types. This memo documents the tasks required to reach this initial measurement capability.

The JT-1 Dewar will be able to measure balanced, double sideband mixers using the configuration shown in Figure 2. Wiring will be included to support the components drawn with dashed lines, but measurements with these components will not be supported initially. The Dewar will also be configured to measure single mixer/preamp combinations as shown in Figure 3.

This initial requirements for the JT-1 Dewar are:

1. Support for two mixers
2. Wide-band IF only (no L-band) consisting of a single balanced amplifier. We now believe that the mixer/preamps and balanced amps will contain TRW devices resulting in > 35 dB gain so that no additional gain is required inside the Dewar.
3. Two bias pod connectors will be used to provide bias for up to two mixers. These bias connectors and their pin configurations will be identical to those in JT-2. Thus, the existing bias supplies can be used with JT-1 until the new bias supplies are completed.
4. Different wiring harnesses are required inside the Dewar for the various mixer configurations, and we plan to use MDF connectors (*i.e.* like those used for MAP) on the 4-K stage. Wiring common to both configurations will be routed from the Dewar wall, through heat sinks on the radiation shield to the heat sinks on the 4-K plate. All wiring between stages at different temperatures will be phosphor-bronze 36 AWG, available from

Lakeshore. The wiring continues from the 4-K heat sinks to the MDF connectors, also on the 4-K stage. Different wiring harnesses are required to connect the MDF connectors to appropriate amplifier and mixer configurations. Multicolor insulated stranded copper wire available from Nanonics for their connectors can be used for wiring from the 4-K plate heat sinks to the MDF connectors. Insulated silver plated copper weld wiring from Microtech can be used between the MDF connectors and the mixer/amps.

5. The magnets may require two sets of wires to carry the required currents.

The following lists the tasks required to bring JT-1 to operational status

Overall:
- Add MDF connector interface to wiring diagrams.
- Generate prioritized costing for all components and give to John Webber.

Dewar:
- Internal IF plate: configure for 4-12 GHz balanced amp as necessary and install.
- Radiation shield and 300K plates:
  - Design/fabricate pass-thru's in radiation shield for thermal break wiring
  - Modify 2nd 300K side cover for pods 7 & 8.
  - Fabricate pod assembly for mixers 1&2
  - Order filter capacitors
  - Fabricate pod blank for pos. 4
  - Assemble/wire pods with connectors and filter capacitors
  - Assemble Nanonics wiring and design wire route to 4K plate
  - MDF connectors -- order, wire, and install in Dewar
- Waveguide inputs
  - modify Dewar side wall and radiation shield for w/g input
  - fabricate Dewar rear plate and radiation shield for w/g input
  - assemble windows with w/g inputs to Dewar
  - fabricate/attach internal heat straps to w/g
- Lens/Horn
  - Fabricate lens
  - Fabricate horn
  - Fabricate lens holder
- Coaxial interfaces
  - fabricate/install internal 0.085" stainless steel cables – radiation shield to Radiall switch
  - fabricate/install internal 0.085" stainless steel cables from 300K inputs to radiation shield

Rack:
- Fabricate all pod cables
- Cables for NRAO bias monitoring switch box: assemble and connect cables between scopes and Natl. Instr. computer interface box
- Cables for Synchronous detector box: fabricate/install IF in, clock in, detector out, power cables
- Cables for coax driver switcher box: fabricate and connect power cable, cable from computer interface box
- 4-stage bias supplies (2 more required)
  - Check for InP protection circuit
  - assemble
  - test
  - install
  - cable
- 12 GHz IF plate control box
  - Add port transfer switching capability
  - fabricate chassis
  - test with existing IF plate
  - install
  - fabricate digital cable to computer control box

- Cryo/vac connection: run LN2 line to backfill port; repair pump
- Warm IF plate
  - order/acquire parts
  - assemble plate
  - fabricate IF control box interface cable
- Chopper wheel
  - Cost/order controller
  - Fabricate
  - Test

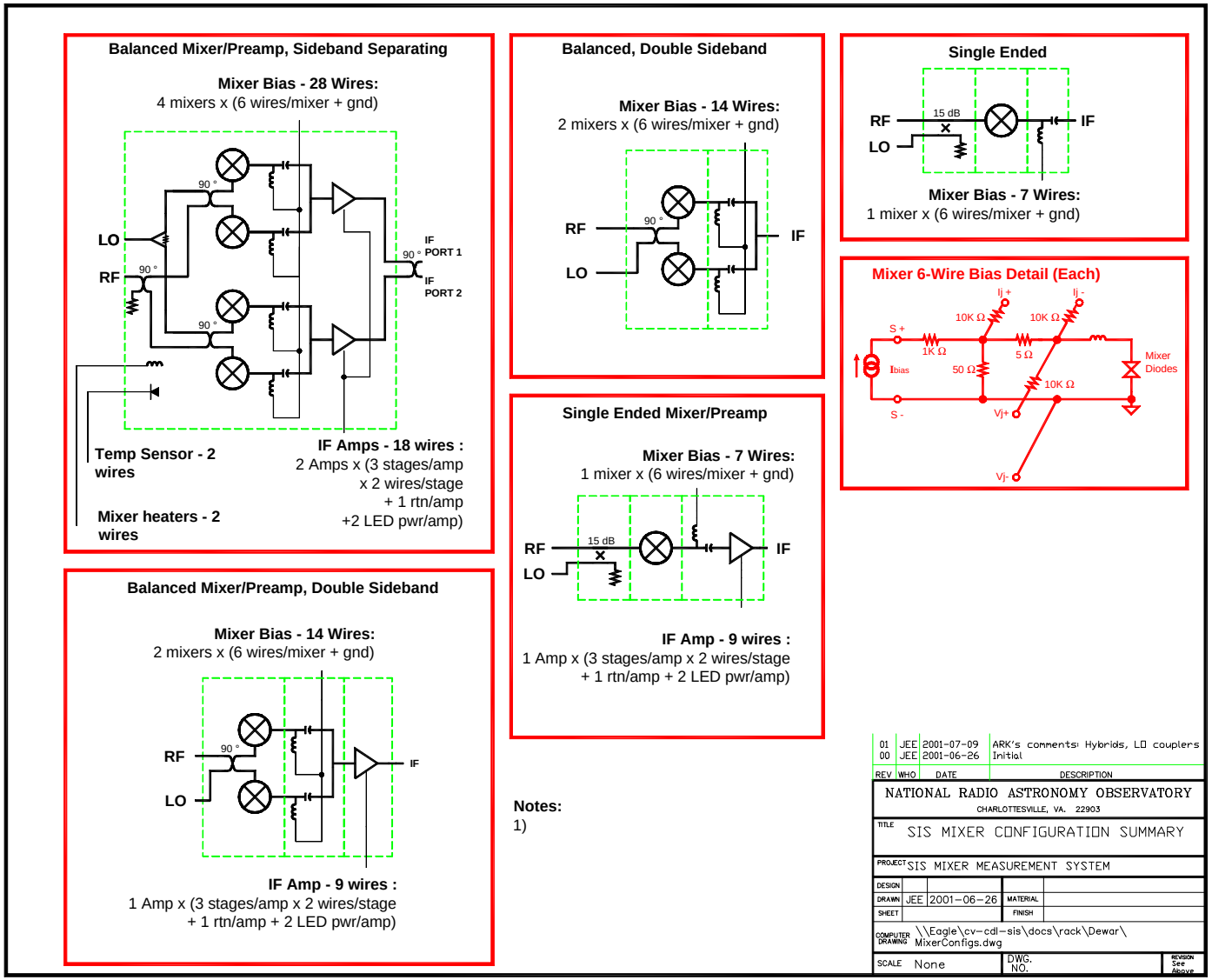

Figure 1: Mixer Test Configurations

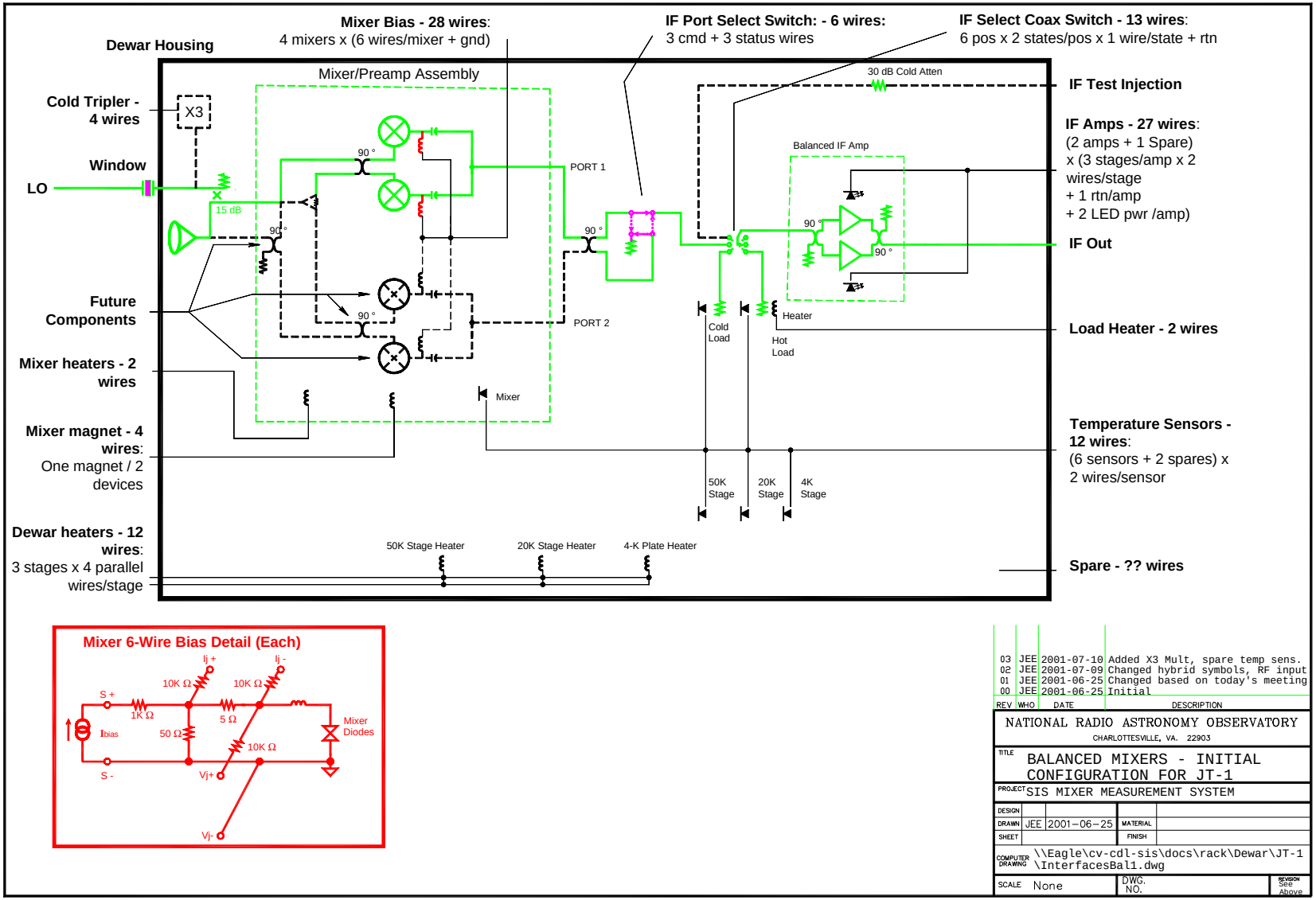

Figure 2: JT-1 Dewar Interfaces - Balanced, Double Sideband Mixer

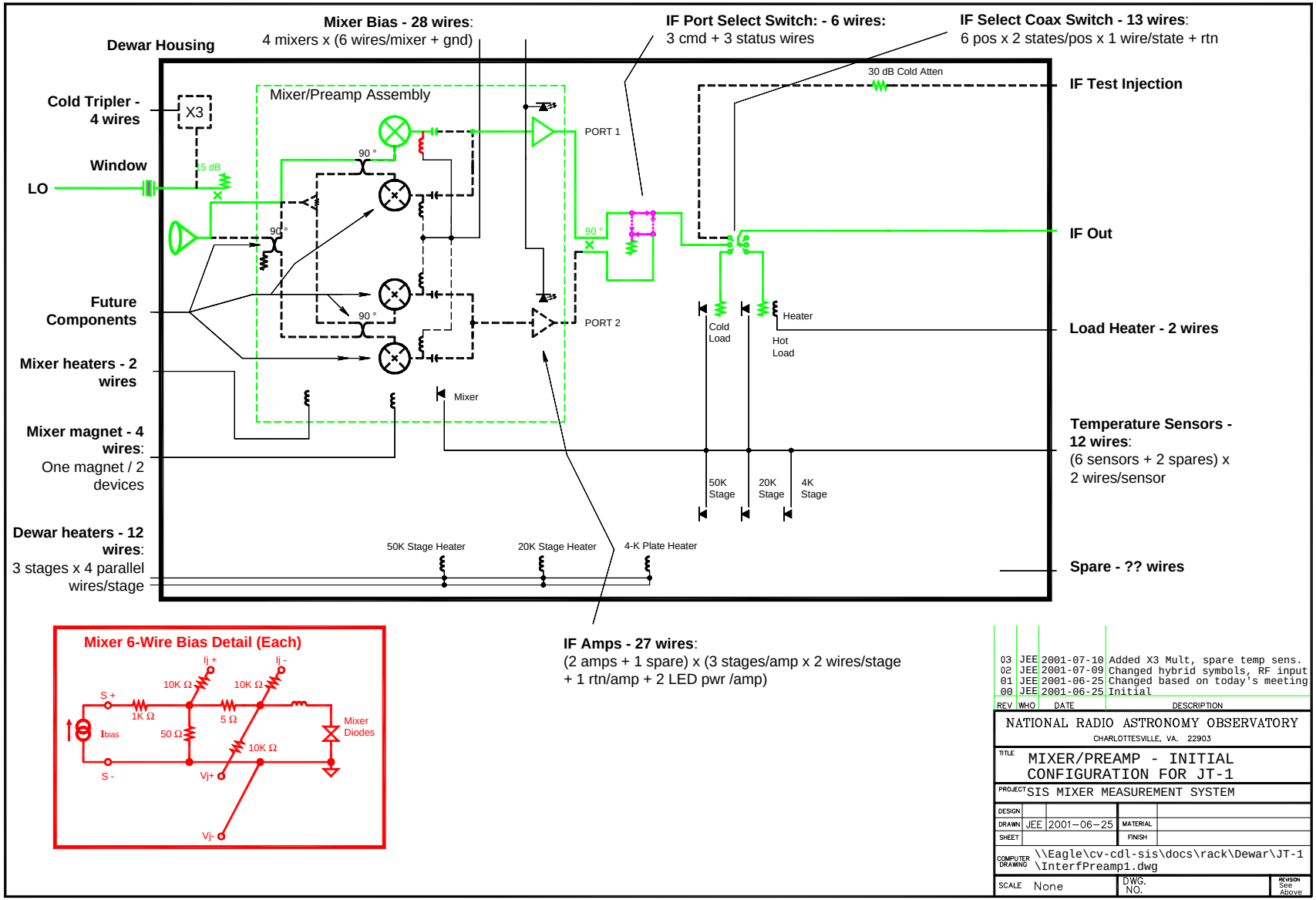

Figure 3: JT-1 Dewar Interfaces - Single Mixer/Preamp Configuration