LIGO PROJECT

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FACSIMILE COVER SHEET

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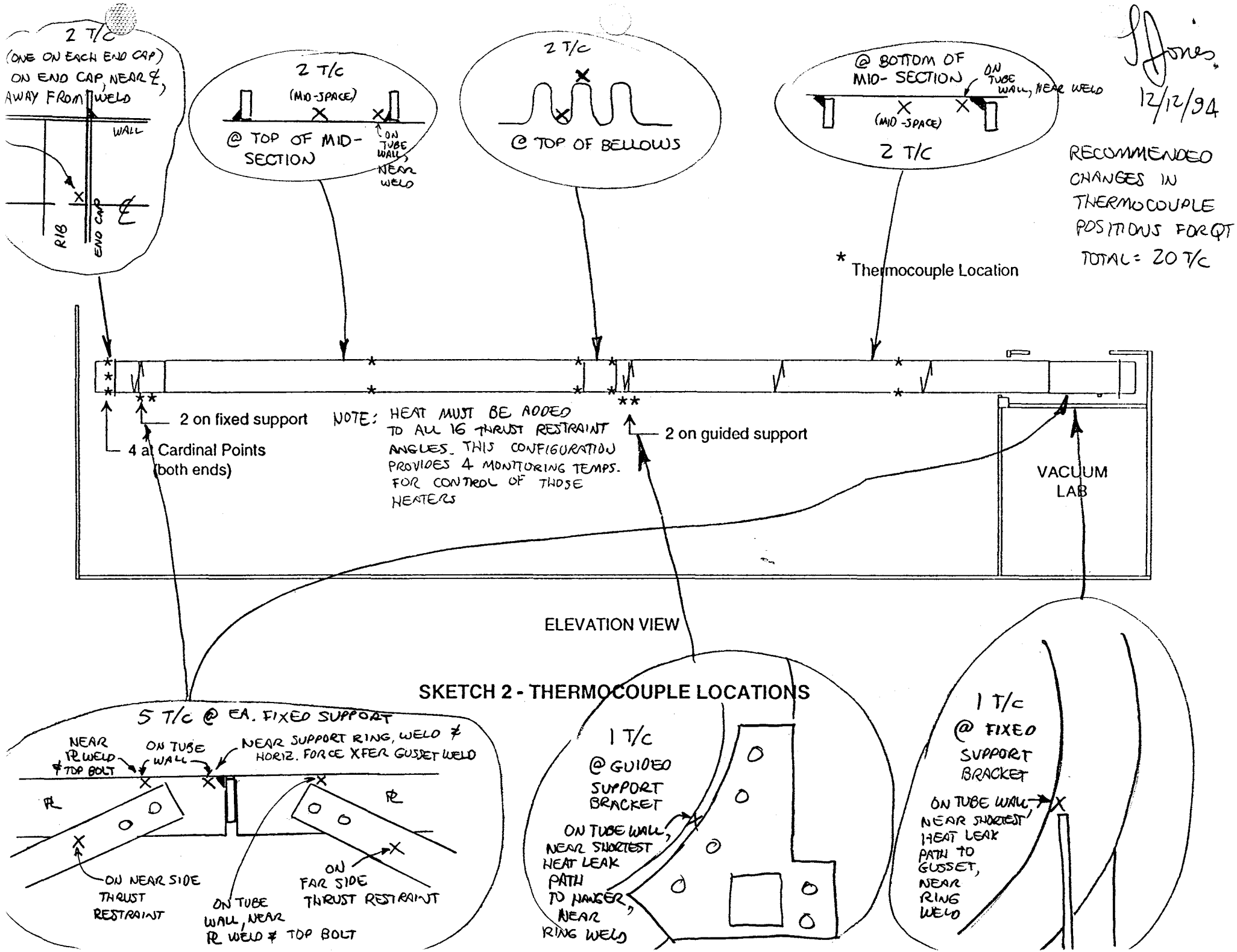
Attached are changes recommended for positioning thermocouples on the QT module. Total quantity is still 20. Criteria which led to these changes are:

1. Two of the locations are typical for the length of the module: at the top and the bottom of the tube sections, at mid length, halfway between stiffening rings. One of these is a likely control sensor.
2. We're looking for cold spots; some of the positions are chosen to represent likely heat leak paths: near stiffening ring and support ring welds, at the center of the end caps, and near support connection points.
3. The bellows would get hotter than the tube with equal insulation, since it's thinner and has more electrical resistance. I've estimated that a single 2" thickness of insulation will give about the same temperature; CBI should check this. The two bellows T/C positions shown will give a check on insulation calcs.
4. The thrust restraints required for the QT are heat leaks, and will each (all 16) need heaters installed to minimize leakage. Two thrust restraints on each end are instrumented to properly control the heating, and the nearby tube wall is sensed to confirm that the effects are as desired.


2 T/C
(ONE ON EACH END CAP)
ON END CAP, NEAR ℄, AWAY FROM WELD
WALL
RIB
END CAP
℄
2 T/C
(MID-SPACE)
@ TOP OF MID-SECTION
ON TUBE WALL, NEAR WELD
2 T/C
@ TOP OF BELLOWS
@ BOTTOM OF MID-SECTION
ON TUBE WALL, NEAR WELD
(MID-SPACE)
2 T/C
* Thermocouple Location
J. Jones
12/12/94
RECOMMENDED CHANGES IN THERMOCOUPLE POSITIONS FOR QT
TOTAL = 20 T/C
2 on fixed support
4 at Cardinal Points (both ends)
NOTE: HEAT MUST BE ADDED TO ALL 16 THRUST RESTRAINT ANGLES. THIS CONFIGURATION PROVIDES 4 MONITORING TEMPS. FOR CONTROL OF THOSE HEATERS
2 on guided support
VACUUM LAB
ELEVATION VIEW
SKETCH 2 - THERMOCOUPLE LOCATIONS
5 T/C @ EA. FIXED SUPPORT
NEAR ℞ WELD ≠ TOP BOLT
ON TUBE WALL
NEAR SUPPORT RING, WELD ≠ HORIZ. FORCE XFER GUSSET WELD
℞
℞
ON NEAR SIDE THRUST RESTRAINT
ON TUBE WALL, NEAR ℞ WELD ≠ TOP BOLT
ON FAR SIDE THRUST RESTRAINT
1 T/C @ GUIDED SUPPORT BRACKET
ON TUBE WALL, NEAR SHORTEST HEAT LEAK PATH TO HANGER, NEAR RING WELD
1 T/C @ FIXED SUPPORT BRACKET
ON TUBE WALL, NEAR SHORTEST HEAT LEAK PATH TO GUSSET, NEAR RING WELD