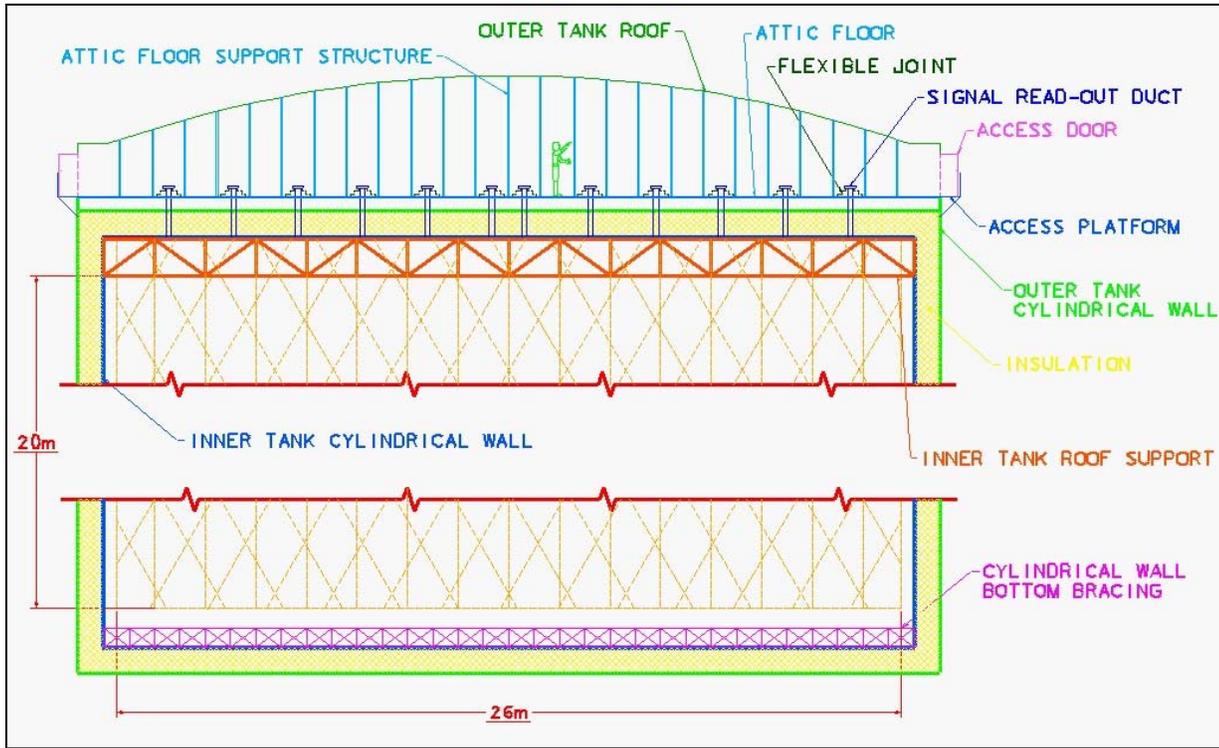
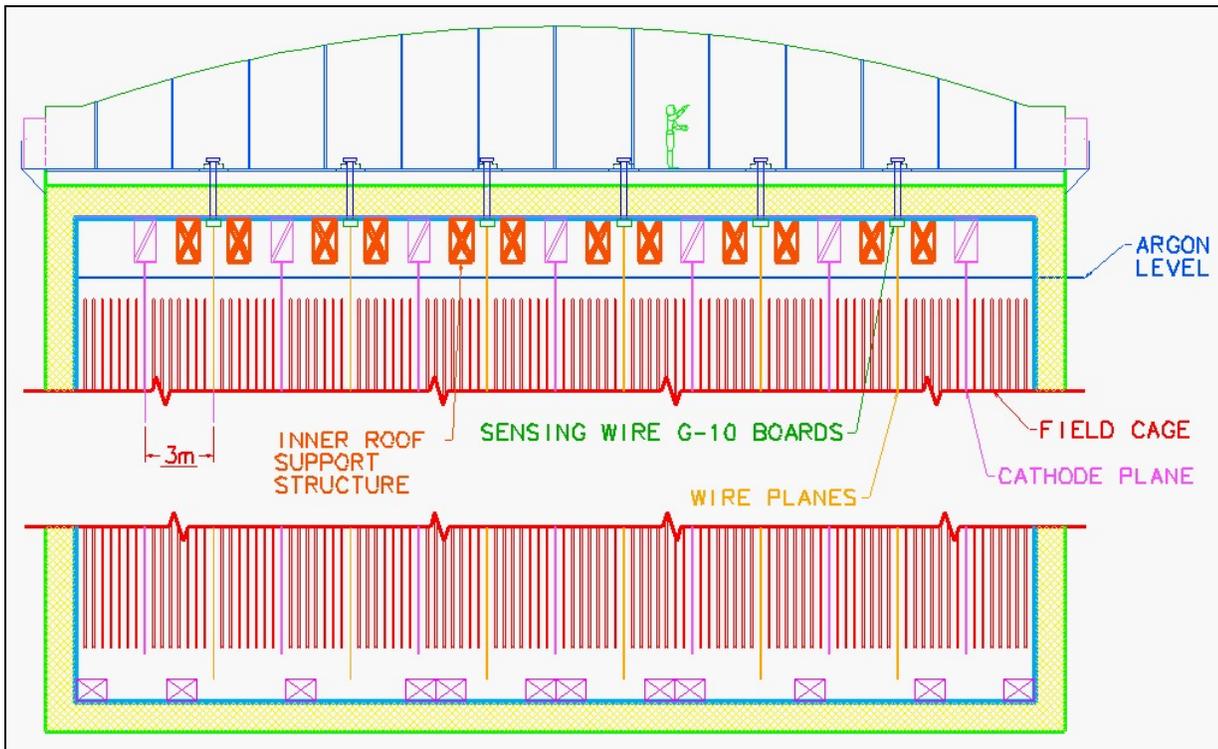


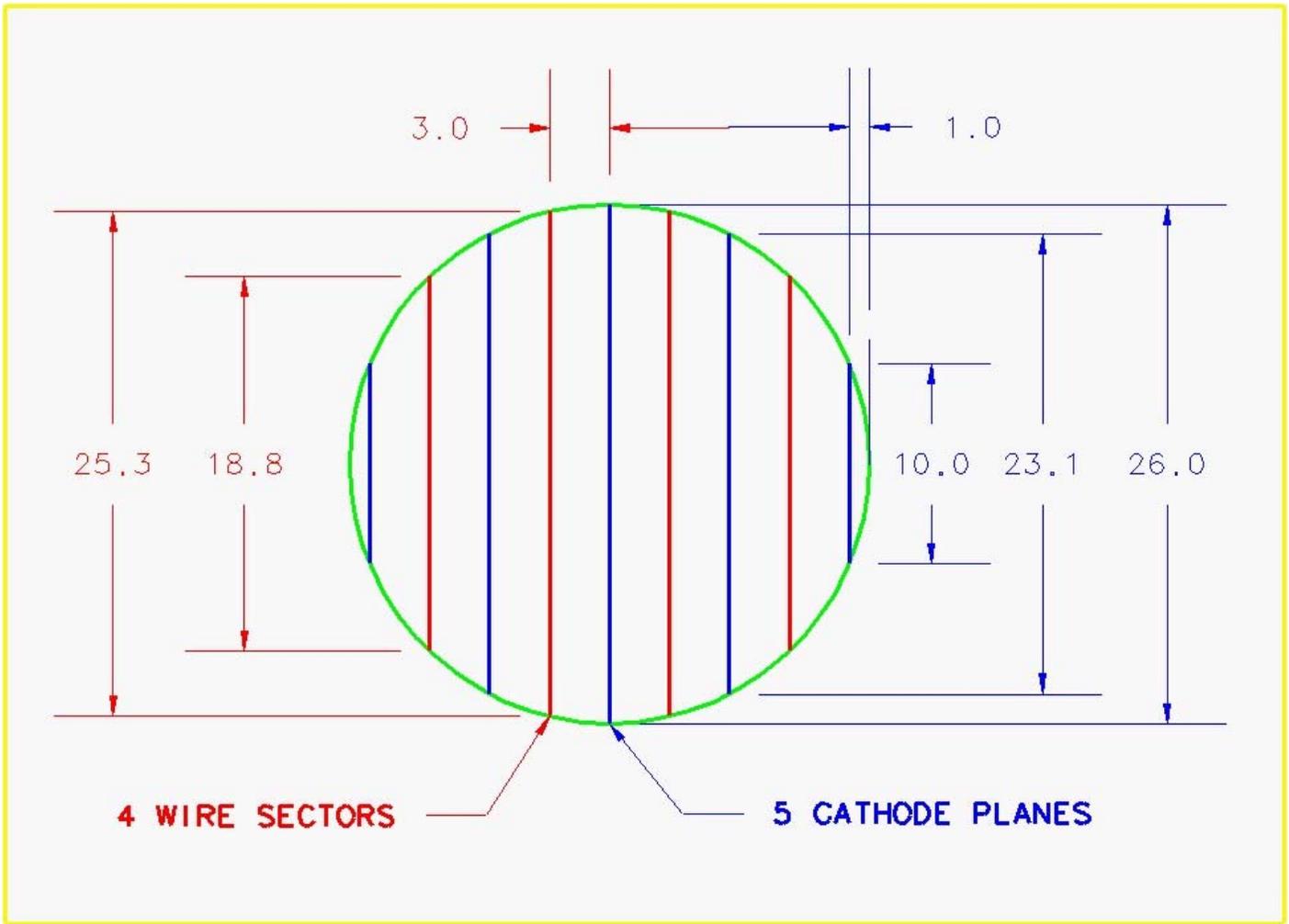
The two following pictures show the detector schematically:





With the inner tank diameter specified at 26m and the height at 20m, the detector will have:

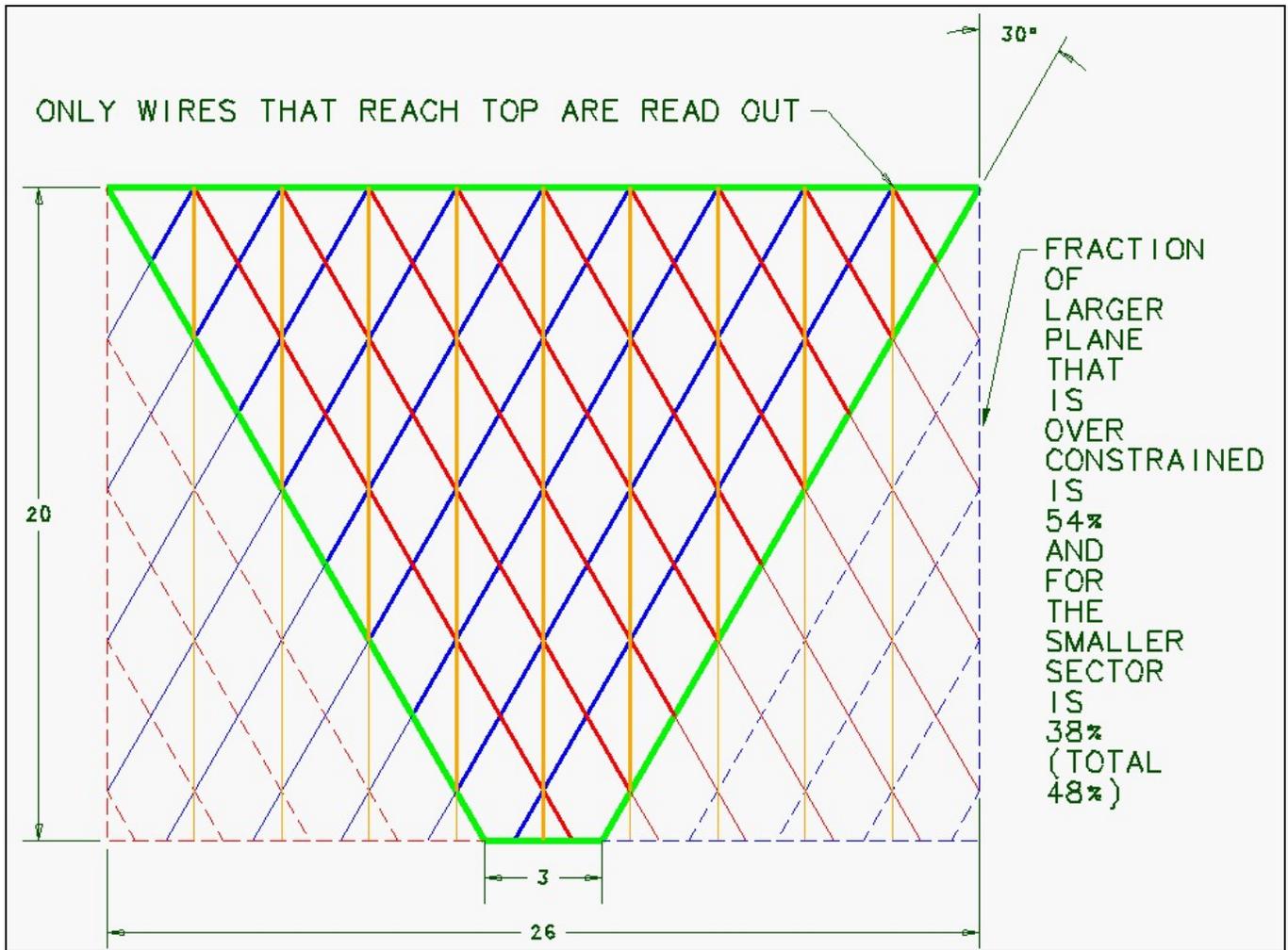
- 4 signal wire sectors, each containing 6 wire planes
- 5 cathode planes, and
- field shaping tubes in between them.



Each wire plane sector has 6 wire planes, oriented in the following fashion:

1/2 chamber :	+30°	→ induction
	-30°	→ induction
	vertical	→ collection
1/2 chamber :	vertical	→ collection
	-30°	→ induction
	+30°	→ induction

The wires that reach the top are read out:



Some wire sector numbers:

- Wire diameter = 150  $\mu\text{m}$
- Spacing between wires = 5 mm (perpendicular to wire)
- Spacing between planes = 5 mm
- Maximum wire length = 23 m
- Total amount of wires = 130,000
- Read-out wires = 96,000
- Total amount of wire = 1,600 km

General wire plane requirements:

- Robust, long life system, minimizing wire rupture possibility and consequences Wire position variations should occur smoothly and uniformly
- Laid out to provide short read-out cables
- Unobtrusive size and packaging
- Safe and time/cost efficient assembly
- Withstand tensioning and cooldown, including effects from the tank

The "Effects from the tank" are related to deformations caused by loads and temperature variations.

Roof truss max. vertical deflection:

- With own weight: - ? cm
- At max. capacity (900 kg/m): -? cm
- Add internal pressure (10 kPa): + ? cm

At Liquid Ar temperature (in equilibrium):

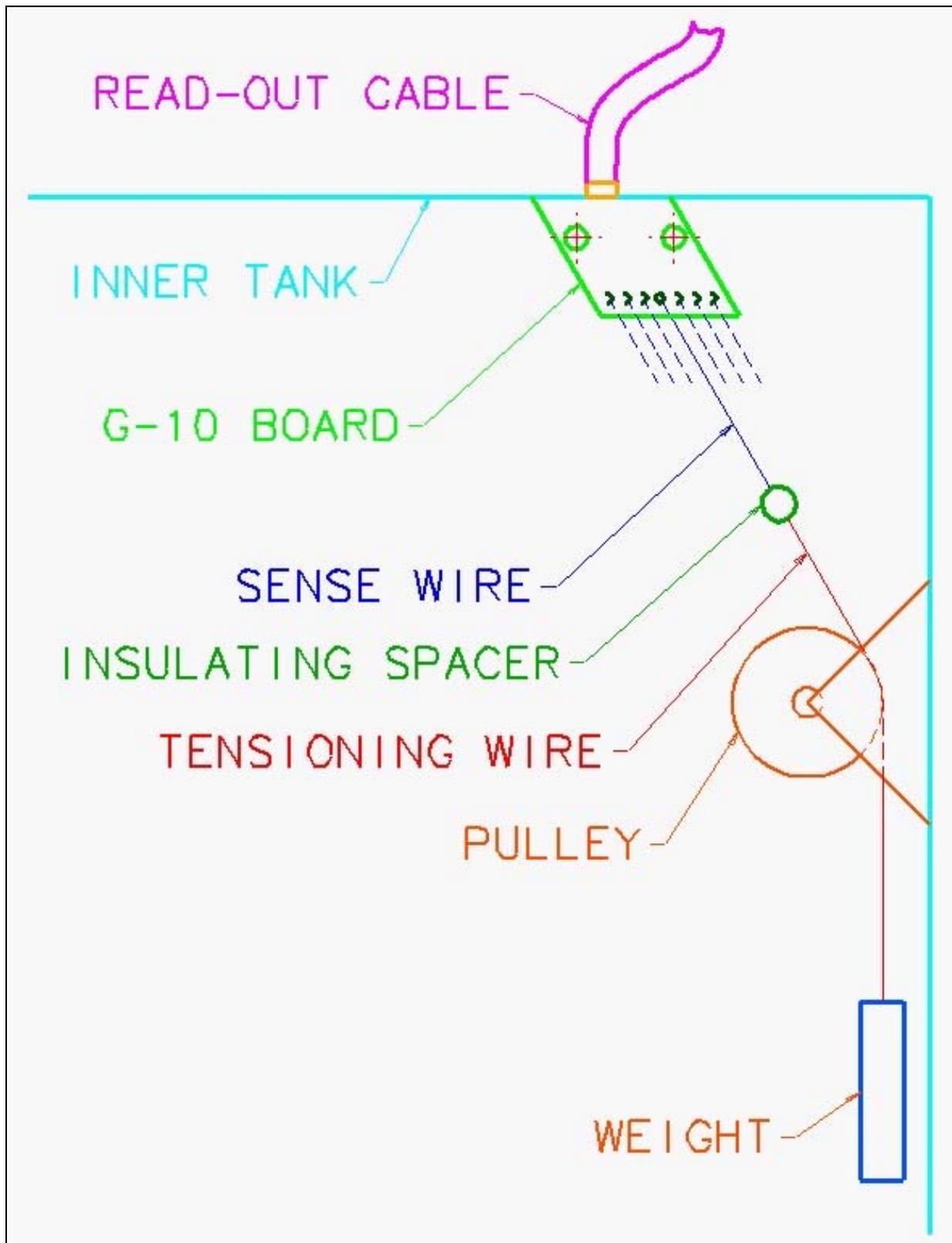
- No change in truss vertical deflection
- Radial contraction of tank: ? cm

Some wire numbers:

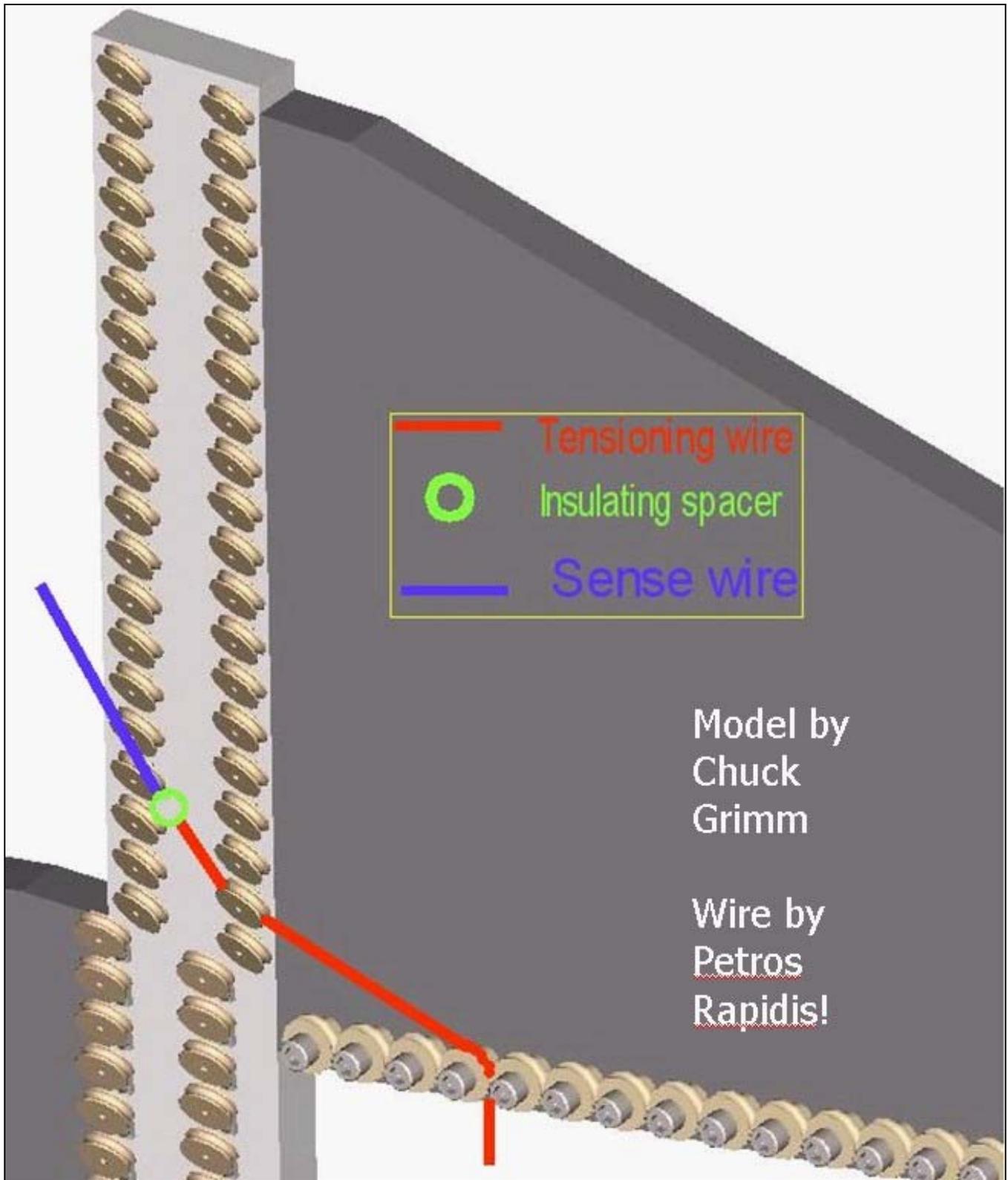
- Tensioning weight = 1.3 kg
- Max. elongation = 8 cm
- Max. thermal contraction = 8 cm
- Max. stereo wire sag = 7 mm

The following picture shows a generic layout for a stereo wire under tension.

- Top end is connected to a G-10 board and the other end is connected to a weight
- Pulleys are staggered and pre-assembled in groups to panels to be located by rails attached to the tank
- Prototype required

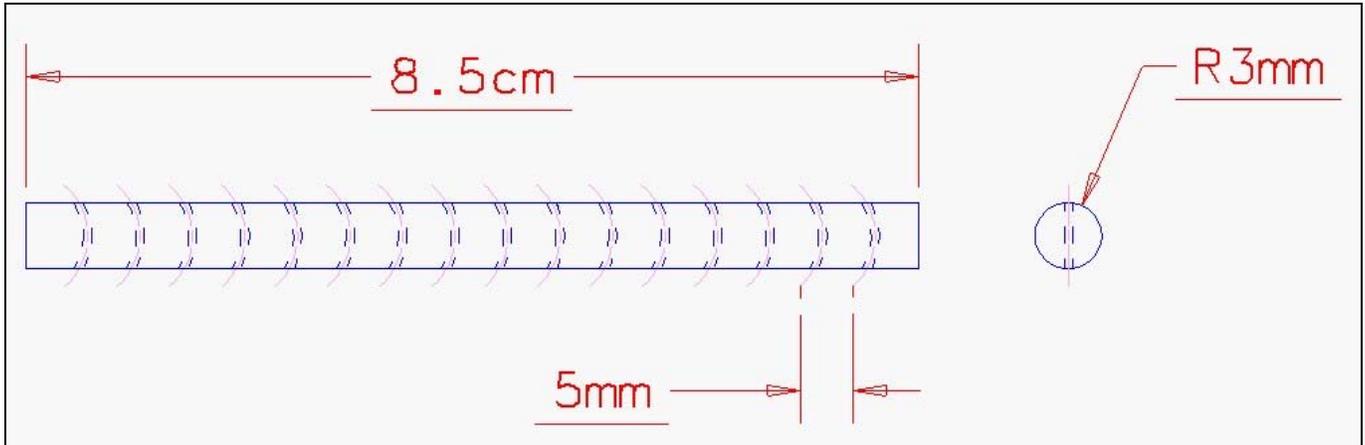


Both at the bottom and at the side walls, the pulleys have to be arranged so there is room to accommodate the weights and the wire movement. The following picture shows a possible arrangement of the pulleys on the side walls.



Depending on the results of friction tests with wires and pulleys, it may turn out unnecessary to use pulleys, if just plain rods suffice. In any case, wire spacers should be used:

- Placed every 3 m or less, prevent broken wires from touching cathode planes
- Make wire spacing uniform
- Relax requirements on wire tension uniformity
- Stabilize wires electrically
- Reduce areas affected by shorts in case of breakages

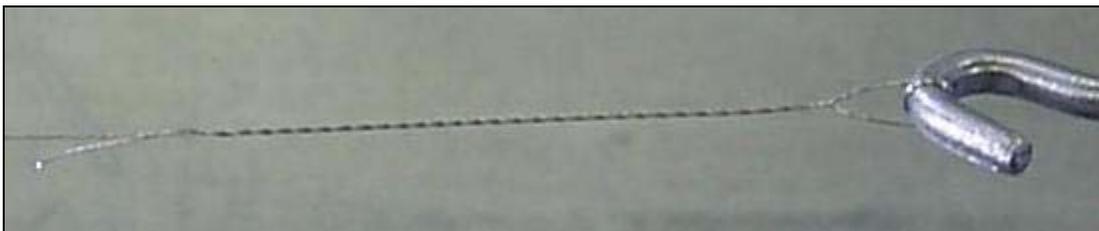


#### Wire Material:

- Same kind as used by Icarus
- Good candidate: vacuum re-melted (for internal defects) austenitic (304, 302) stainless steel, C.W. to 2 GPa tensile strength, 100% eddy-current tested (for external defects)
- Load tested, including after installation
- Cost is relatively low (~ 100 k\$ total)

#### Wire holding method

- Wires have looped ends, in the same fashion utilized by Icarus: wrapping the wire around itself. See picture below:

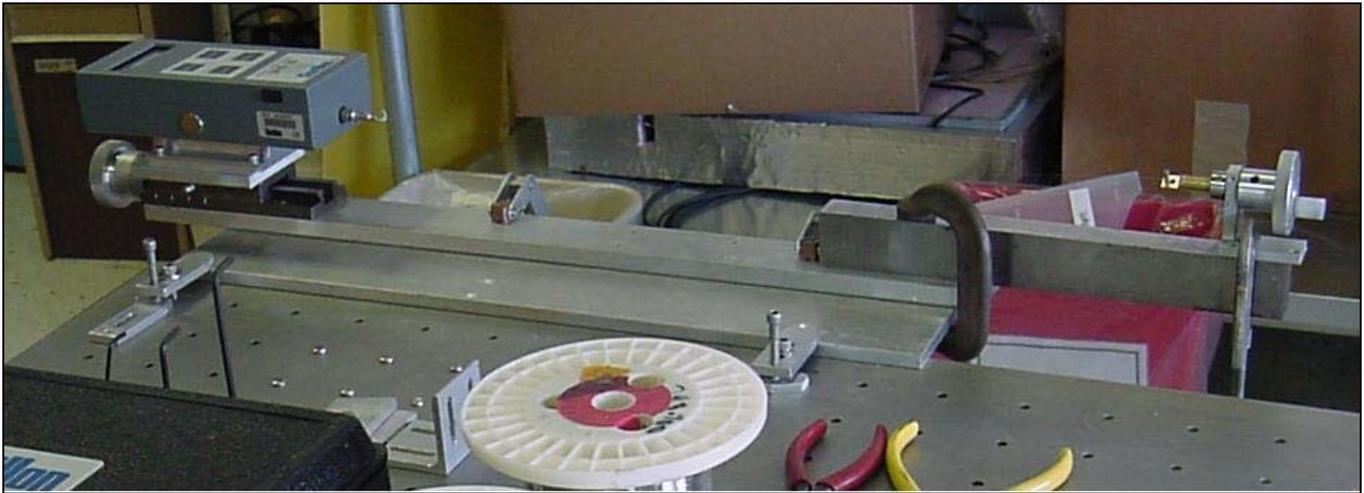


There are good indications that this method of holding the wire works:

- Icarus has 50,000 wires installed in this fashion
- They had no breakage or unwinding so far
- Good results in preliminary testing
- More testing required

Preliminary wire test results:

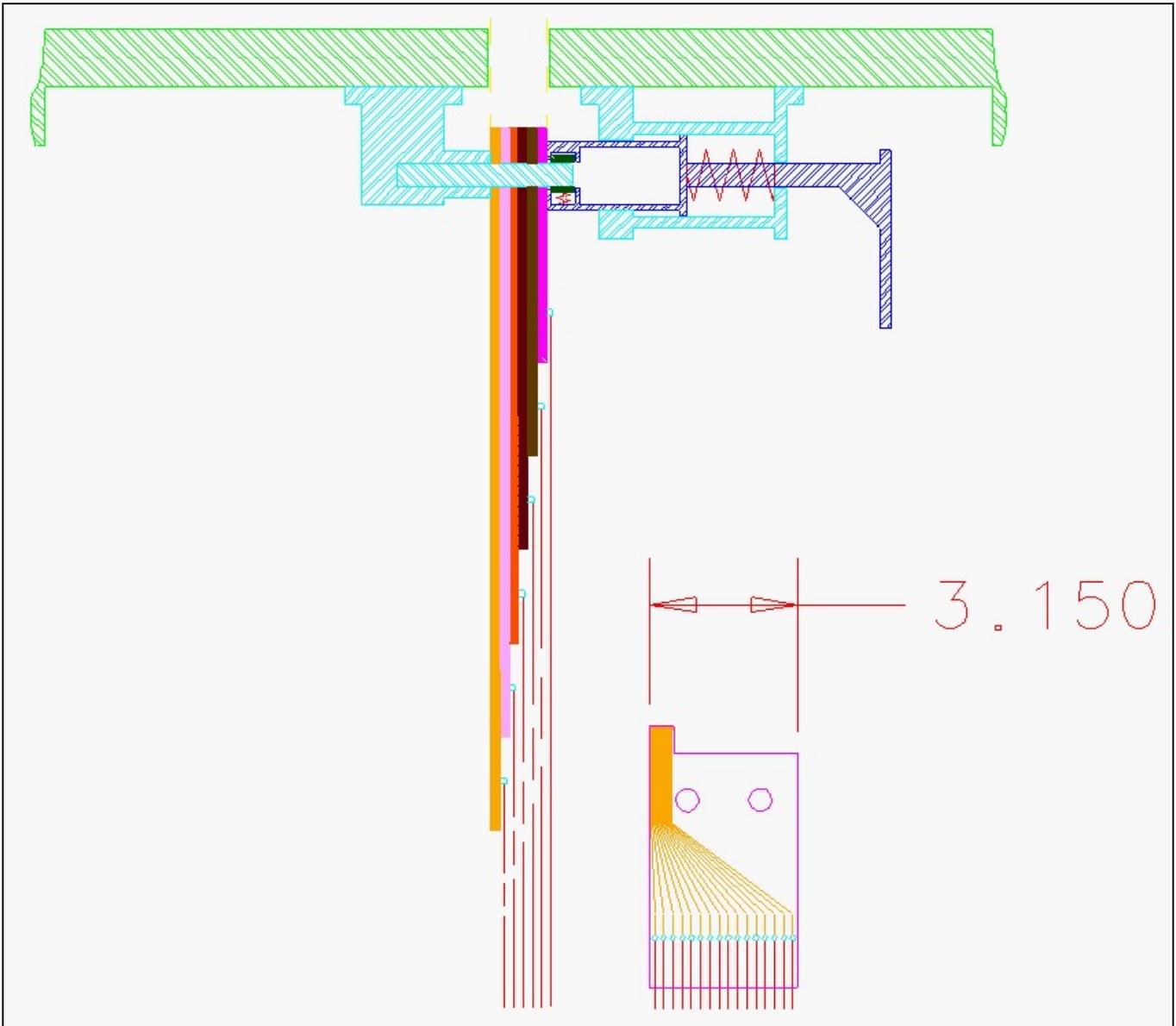
- 2 wraps around the pin and 4 wraps around itself were enough to prevent unwinding .
- Pulleys are a reliable and simple way to guide the wires - better than bare rods.



As far as the G-10 board holding mechanism, the requirements are:

- Prevent dropping of parts
- Minimize assembly mistakes
- Allow alignment
- Distribute load evenly
- Inexpensive

A concept of a spring loaded mechanism - which can possibly be replaced by a toggle clamp, is shown below:



Preliminary thoughts on assembly:

- It can be done sequentially, from one end to another or from the center out
- Welding should be done prior to wire installation as much as possible
- Cleanliness is essential
- Wires can be attached to G-10 boards and spooled into drums prior to assembly if assembly time is critical or assembled one by one
- Platforms built into the trusses maybe used for mounting the boards

Issues:

- No "show stopper" has been identified: much fewer uncertainties than CDF/COT had, for instance (mainly due to stringent wire positioning requirements)
- Cost is very sensitive to manufacturing processes due to high number of components
- Likewise, high number of components also makes a successful time schedule is very sensitive to adequacy of planning
- Prototyping and testing of individual components is the natural course of action.