Date: April 15, 2004

Subj:

APS drawings 25030101-00009	**PAR stripline chamber S-1**
25030101-000010	**PAR stripline chamber S-1A**
25030101-100020	**PAR stripline chamber S-1B**
25030101-100064	**PAR spare chamber SP-1 (spool pc)**
25030101-400000	**PAR spare chamber SP-1A (spool pc)**

Spare status: **Spare chamber SP-1: design complete, beam tube fabrication in process**
Spare chamber SP-1A: design complete, beam tube fabrication in process

Fig. 1: Eventual storage location of S-1 type spares in 382
(open cabinets on mezzanine)

Further details:

- **General information about stripline BPM spares**

  "Stripline" is the term given to beam position monitors (BPM's) used in PAR. One of the important features of all striplines is ceramic feedthroughs which carry the electrical signal from the stripline BPM to relevant instrumentation. The ceramic material is used as the feedthrough vacuum seal and electrical insulator for the signal. These feedthroughs are very sensitive to mechanical impact and are easily cracked. When a failure occurs, the result is often a vacuum leak.

  The striplines have been built as integral parts of vacuum chambers in PAR. This was dictated by the very limited space available between magnets. In fact, space is so limited that the striplines actually lie within the quadrupole magnets. For this reason, stripline housings are all made on Inconel 625 (non-magnetic).

  A few stripline ceramics have failed in fabrication, but none has been known to fail in the ring as yet.

Striplines are relatively difficult to make because they require electron beam welding methods as well as close tolerances. The level of difficulty of fabrication and the use of Inconel material makes stripline fabrication costs very high.

There are 18 striplines in PAR: one on each side of the eight dipole magnets and two others.

Since there are so many striplines installed relative to the short length of PAR, stripline spares have not been made. Rather, spares are comprised of simple beam tube with flanges (i.e. spool pieces), omitting the stripline BPM.

This approach was discussed with M. Borland (Ring Manager) who agreed that there were sufficient stripline BPM's installed that some of them could be removed without deleterious effect on operations. See the discussion presented in "Details" for APS drawing **25030101-121000.**

Dr. Borland, however, indicated that removal of stripline BPM's required the availability of certain fluorescent screens (flags) at all times. The number of spare flag chambers has been augmented as a result of removal of spare striplines. See details of APS drawing **25030101-121000** and all fluorescent screen (flag) chambers for more information.

The chambers discussed in this document cover three types of "S-1" stripline chamber: S-1, S-1A, and S-1B. These chambers all have stripline BPM's and the same overall length. However, they have different combinations of ion pump ports (or not) and ion gage ports (or not).

- **S-1 Stripline Chamber** (APS drawing **25030101-00009**)

This chamber is installed in two places in PAR as shown in Figure 2. It is provided with a stripline BPM, 4" diameter ion pump port and a 1.5" ion gage port.

Use spare vacuum chamber SP-1 (APS drawing **25030101-100064**) to replace the original S-1 chamber if necessary.

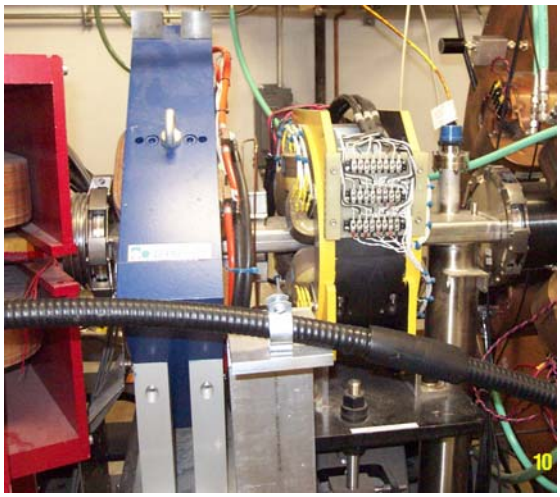

Fig. 2: S-1 stripline chamber installed in PAR

Note that the spare chamber (SP-1) is provided with removable support lugs at the top end of the pump tube. The lugs are to be removed when the spare chamber is used adjacent to the RF fundamental cavity as shown in Fig. 3. The lugs are to remain in place if the spare is used elsewhere.

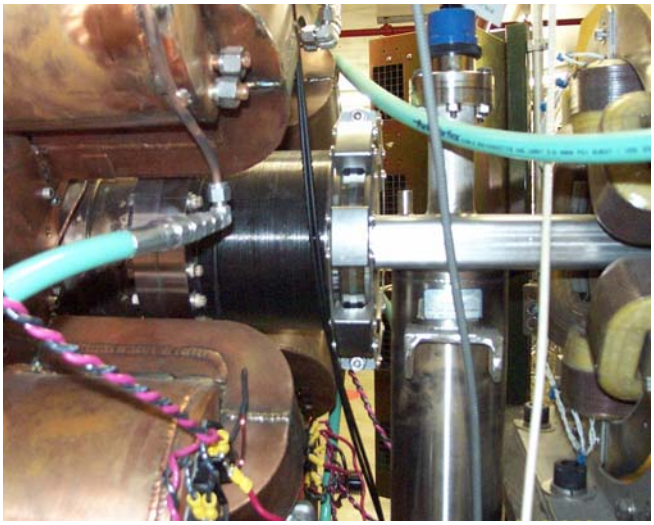

Fig. 3: Pump tube end of S-1 chamber
(note support lugs are removed permanently on pump port for this chamber)

- **S-1A Stripline Chamber (APS drawing 25030101-00010)**

Chamber S-1A is similar to chamber S-1 except that there is no ion pump port provided. The S-1A chamber is installed in three locations in PAR as shown in Fig. 4.

Use spare vacuum chamber SP-1A (APS drawing **25030101-400000**) to replace the original S-1A chamber if necessary.

Fig. 4: S-1A chamber installed in PAR.

- **S-1B Stripline Chamber (APS drawing 25030101-100020)**

  Chamber S-1B is identical to chamber S-1 except that there is no ion gage port provided. The S-1B chamber is installed in three locations in PAR as shown in Fig. 5.

  Use spare vacuum chamber SP-1 (APS drawing **25030101-100064**) to replace the original S-1B chamber if necessary. Use a blank flange to seal the redundant ion gage port.

  When installing the SP-1 chamber as a replacement for S-1B, the support lugs for the ion pump port must be left in place.

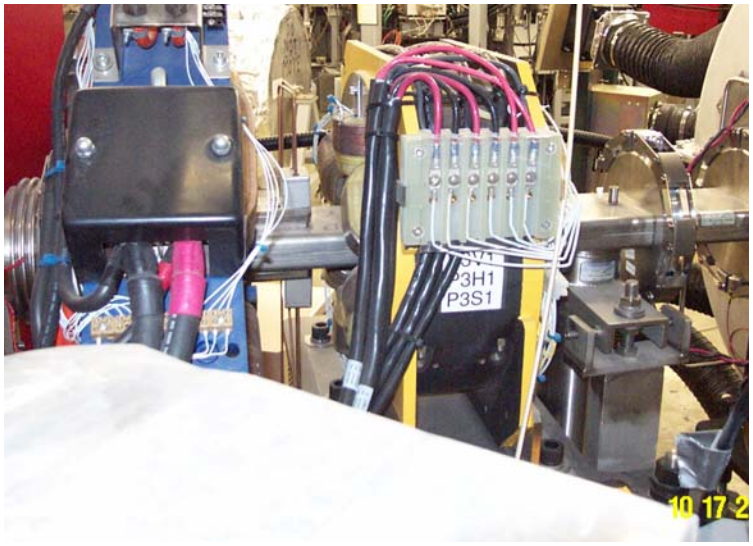

Fig. 5: S-1B chamber installed in PAR.