

**Date:** April 15, 2004

**Subj:** APS drawings [25030101-00011](#) PAR stripline chamber S-2  
[25030101-300000](#) PAR spare chamber SP-2 (spool pc)

**Spare status:** Spare S-2 chamber: vacuum certified and stored at bldg 382  
Spare chamber SP-2: design complete, beam tube fabrication in process



Fig. 1: Storage location of S-2 chamber in 382 (open cabinets on mezzanine)

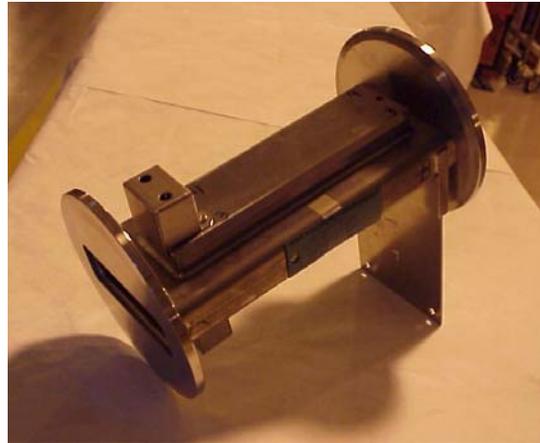


Fig. 2: Spare S-2 chamber (feedthroughs covered)

#### 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-2 Stripline Chamber (APS drawing [25030101-00011](#))**

This chamber is installed in PAR in eight places as shown in Fig. 3. It is provided with a stripline BPM only.

During the original fabrication/installation of PAR, one identical spare S-2 chamber was fabricated. This chamber is stored at bldg 382 and is vacuum certified. It may be used as a direct replacement.

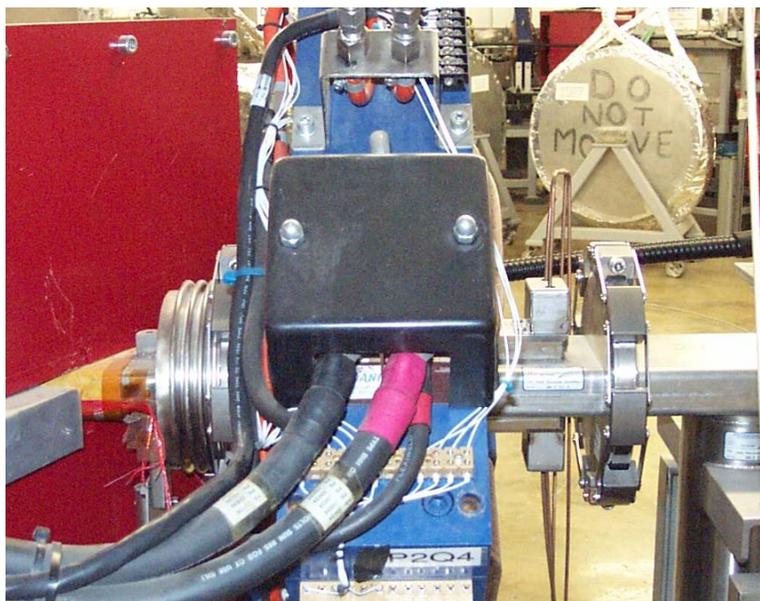


Fig. 3: S-2 stripline chamber installed in PAR

- **SP-2 Spare Chamber (APS drawing [25030101-300000](#))**

Since the ceramic feedthroughs are so sensitive to breakage, a spool piece replacement spare is being fabricated. This chamber is tagged SP-2 and is detailed on APS drawing [25030101-300000](#).