Debuncher Microwave Absorber Tests of Jan 92

Purpose

This paper describes the tests performed on the microwave absorbers placed in the Debuncher to replace the existing microwave cutoffs.

Background

The purpose of the microwave cutoffs is to reduce the transmission of microwave energy through the beam pipe.

The old microwave cutoffs consisted of a stainless steel beam pipe of approximately 2.8 inches inside diameter into which a glass tube with an inside diameter of 1.835 inches was placed. The glass tube was coated with a thin coat of microwave absorbing material on its outside.

Three of these cutoffs were installed in the Debuncher at locations D6Q5, D1Q7, and D4Q10 (see Figure 1). However, the glass tube was removed from the cutoff at D4Q10 leaving only the metal beam pipe.

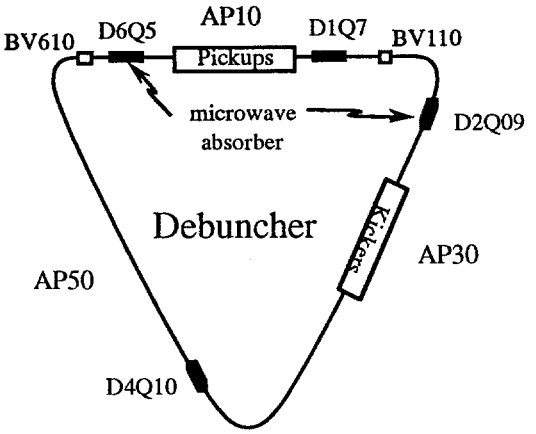


Figure 1

Please note that there was not an old style microwave cutoff installed at location D2Q09.

It was felt that the glass tube cutoff was an aperture restriction in the Debuncher with its small (1.8 inch) inside diameter. It was decided that new cutoffs would be needed that would increase the aperture.

The new microwave absorbers consist of a four inch stainless steel beam pipe into which eleven dielectric cores are inserted separated by

aluminum spacers. The spacing allows adjustment of the frequency response of the absorber assembly. The inside diameter is 3 inches thus providing an increase of 1.2 inches over the old cutoffs. The new absorbers will be installed at four locations as shown in Figure 1.

Debuncher Tests of the Microwave Absorbers

First, the old cutoffs were removed and replaced with empty four inch beam pipe at locations D6Q5, D1Q7, and D4Q10 (recall that there was not a cutoff at location DQ209.

Next, the three Debuncher stochastic cooling systems (momentum, Betatron H and V) the notch filters were turned off, and the power adjusted to about 1kW as read from D:DPPSUM, D:DHPSUM, and D:DVPSUM respectively. Then, using the network analyzer an open loop frequency response of each system was measured.

The following peaks were observed:

System	Freq [GHz]	dB
Momentum	2.4	-28
Momentum	4.1	-30
Vertical	3.9	-45
Horizontal	3.6	-50

The frequency response graphs are included at the end of the report.

Next, beam valve BV610 was closed (see Figure 1) and no change was observed. Then BV610 and BV110 were closed and all signals were better than - 50 dB. BV610 was opened and no change was observed. Finally BV100 was re-opened and the peaks in the response returned.

The conclusion from these tests were:

1. Only the momentum system had any large peaks.

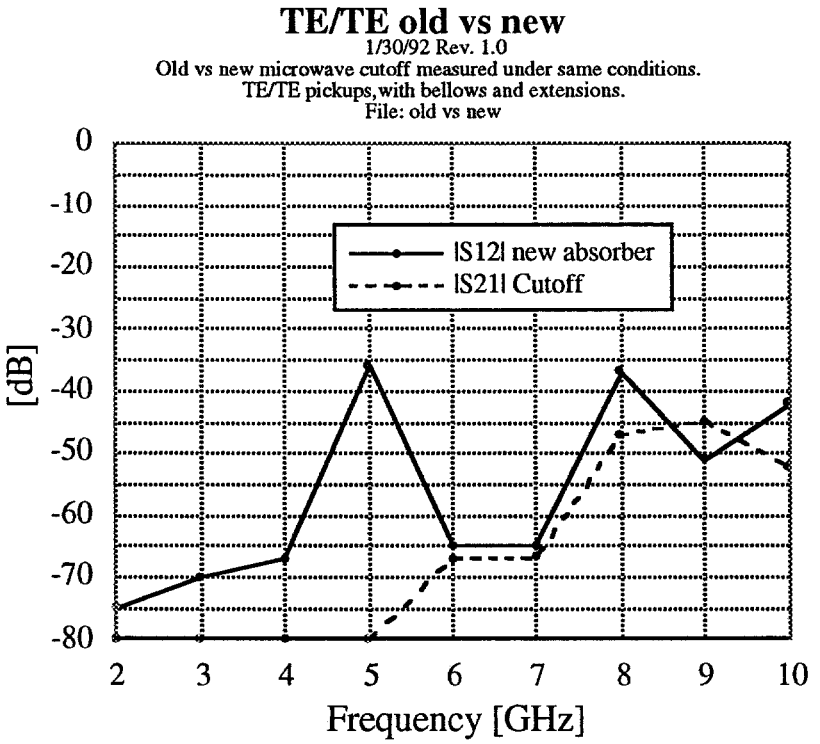
2. Propagation goes from the kickers to the pickups around the shorter side connecting the two.

Next, the beam pipe at location D1Q7 was removed and stuffed with cores. The momentum measurement was repeated and it appeared as if the beam valve had been closed illustrating that the new absorber was working.

A second absorber was filled at D6Q5 and no additional attenuation was observed.

Tests on Old Cutoff

After the old cutoffs were removed from the ring, their frequency response was measured and compared with the new absorbers. The results are shown in the following graph.



Conclusions

1. Only the momentum system had any large peaks in the open loop frequency response tests.

2. Since it was felt that there might be oscillations prior to installation of the original cutoffs, when they were removed it was expected that a gain around 0 dB would have been observed at some frequency; however this was not the case.

2. Propagation goes from the kickers to the pickups around the shorter side connecting the two.

3. The old cutoffs had much better attenuation accompanied with their smaller aperture than the new absorbers.