

# WR2300 WAVEGUIDE SHUTTER INSPECTION REPORT

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The WR2300 waveguide shutters installed in the APS 350MHz rf systems were visually inspected on January 11 and 12, 2005, under Work Request # 16365. This work included visual inspection of the waveguide interior of the shutters in fully-open, partially-open, and fully-closed shutter positions. Photographs were taken at all inspection points.

## RF 3/5 Waveguide Shutters

Mega s/n 27701 and Dielectric s/n D0001 are presently installed at the RF 3/5 location. Access to the interior of these shutters was made by removing the 90°-miter waveguide section adjacent to the Mega shutter, at waveguide flanges #368 and #369 (see figure 1):



Figure 1 – RF 3/5 Waveguide shutters  
(Note: Mega shutter is gray, Dielectric shutter is black)

The interior of both shutters showed no signs of arcing or excessive wear on the rf contacts, and were clean and free of foreign matter. The following figures are interior views of both shutters, with the Mega shutter in the foreground and the Dielectric shutter in the background:



Figure 2 – Mega shutter *fully closed*.



Figure 3 – Mega shutter *partially open*, Dielectric shutter *fully closed*.



Figure 4 – Mega shutter *fully open*, Dielectric shutter *fully closed*.

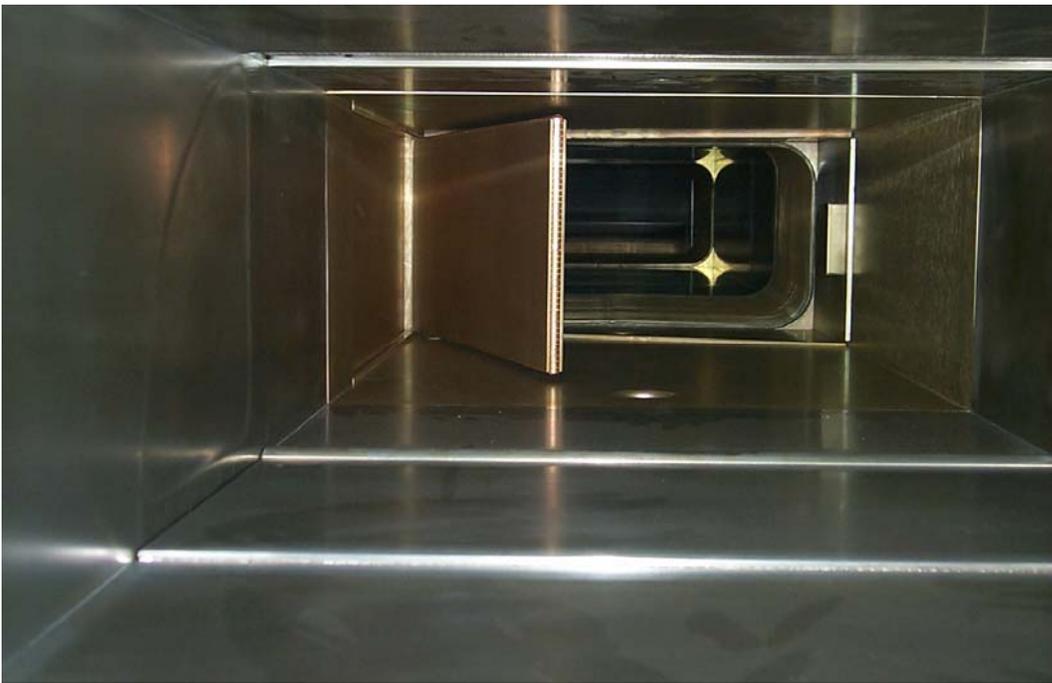


Figure 5 – Mega shutter *fully open*, Dielectric shutter *partially open*.



Figure 6 – Both shutters *fully open*.

### **350MHz RF Test Stand Waveguide Shutters**

Mega s/n 04332 and Dielectric s/n 4003-2 are presently installed at the 350MHz RF Test Stand location. Access to the interior of these shutters was made by removing the flexible waveguide section adjacent to the Mega shutter, at waveguide flanges #180 and #181 (see figure 7):



Figure 7 – 350MHz RF Test Stand Waveguide Shutters

Note: Due to concerns about stability of the waveguide system installation when flanges are un-bolted, the decision was made to perform the shutter interior visual inspection from a point looking into the Mega shutter at flange #180. Due to the orientation of the shutters, a view from flange #180 does not permit direct viewing of the rf contacts on the moveable vanes of either shutter. However, if arcing or overheating has occurred at the rf contacts, evidence of it should be visible on the mating waveguide wall rf contact points.

Supplemental waveguide support will be added to the waveguide run adjacent to the Dielectric shutter so that future visual inspections can be safely made from that direction, thus allowing a direct view of the rf contacts on the shutter vanes.

The interior of both shutters showed no signs of arcing or excessive wear on the rf contacts. There was a very small amount of “rubber-like” foreign material found inside the Mega shutter waveguide. Analysis of this material indicated it was identical to material previously found in all of the Mega shutters after repeated open/close operations. The material was removed from the waveguide.

*Note: Mega Industries engineers have stated that this material is coming from mechanical wear of an extruded silicone-rubber gasket which is used to reduce the amount of air pressure lost across the closed shutter vane, and that it poses no problem to shutter operation.*

The following figures are interior views of both shutters, with the Mega shutter in the foreground and the Dielectric shutter in the background:



Figure 8 – Mega shutter *fully closed*.



Figure 9 – Mega shutter fully closed, with *foreign material on waveguide surface.*

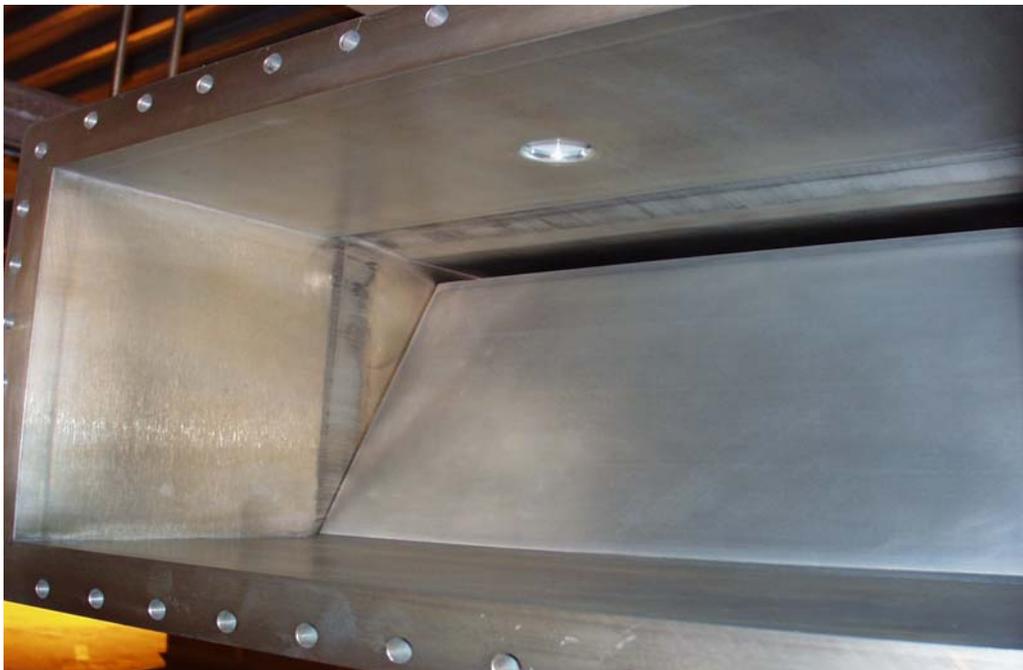


Figure 10 – Mega shutter *partially open, with rf contact surfaces visible.*

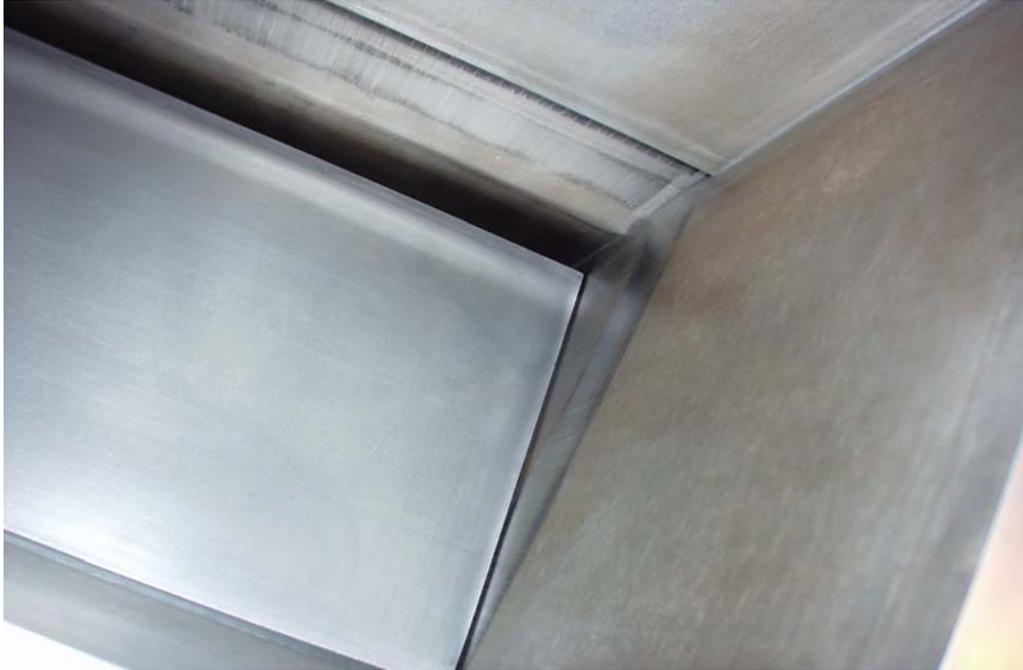


Figure 11 – Mega shutter partially open, *with rf contact surfaces visible.*



Figure 12 – Mega shutter fully open, *with rf contact surfaces visible.*



Figure 13 – Mega shutter fully open, *with rf contact surfaces visible.*



Figure 14 – Mega shutter *fully open*, Dielectric shutter *fully closed.*



Figure 15 – Mega shutter *fully open*, Dielectric shutter *partially open*.

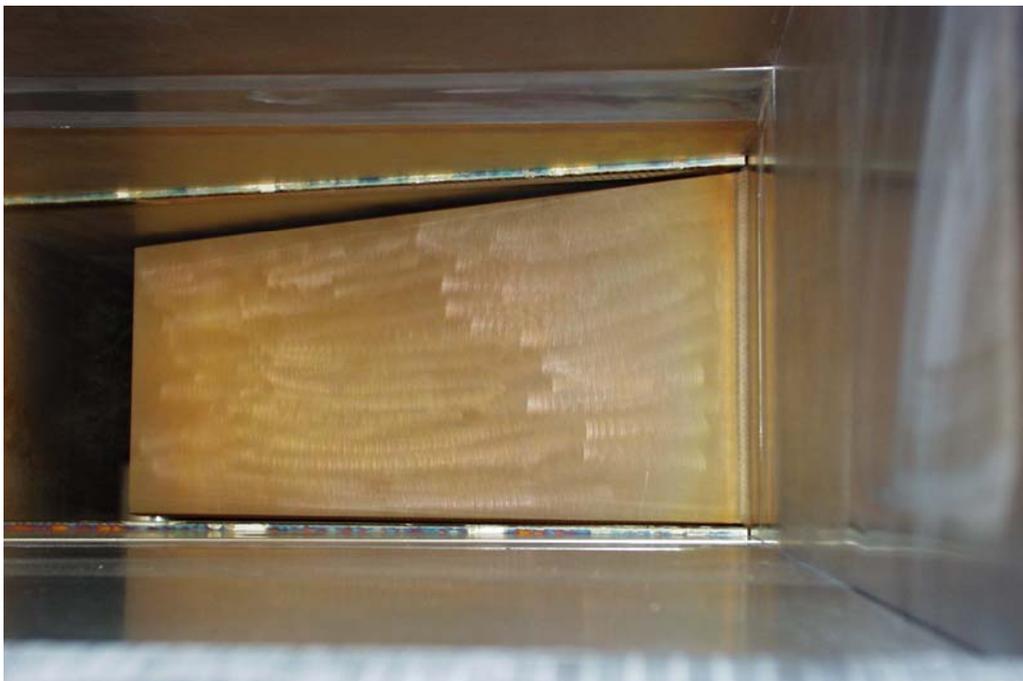


Figure 16 – Mega shutter *fully open*, Dielectric shutter *partially open*.  
(*closer view of rf contacts*)



Figure 17 – Both shutters *fully open*.