

National Radio Astronomy Observatory

Green Bank, West Virginia

To: Files

May 11, 1976

From: B. Peery

ENGINEERING MEMO #108

Subject: 140' Deformable Sub Reflector

W. Y. Wong and the writer visited prospective manufacturers of a deformable sub reflector to review with them our preliminary specifications and receive their comments and views.

April 27
Aeronutronics
3939 Fabain Way
Palo Alto, California 94303
Mr. David Kelley -- 415-494-7400

They thought the idea interesting and would like to review it further. They were interested in the deforming system also. They agreed they would review the specifications and would give us a budget estimate for:

1. Design and analysis of the deformable sub reflector.
2. Manufacture of the deformable sub reflector.
3. Design and manufacture of the deforming system.

They will give us a letter with this information within a week or so.

April 28
Milliflect
1242 Birchwood Drive
Sunnyvale, California 94086
Mr. Joe Rushow -- 408-734-0280

Mr. Rushow saw no problem to manufacturing the sub reflector. Did have questions that needed further study such as:

1. Would deforming cause delamination between fiber glass and honeycomb?
2. Would total glass fiber laminate work better than honeycomb and glass laminate?
3. Suggested independent flexure tests to determine best materials.
4. What size, type and location of pads for support points and deforming points?
5. Need method of accurately locating attachment points (.005")?
6. They could handle stress analysis but would have to secure outside help for deformation and dynamic analysis.
7. Did not appear to be interested in deforming system design or construction.
8. Thought no problem to meet weight specifications for sub reflector.
9. Suggested consideration of aluminum or magnesium rolled grid structure for back up to thin fiberglass panel.

10. Noted shear strength of epoxy used to make sub reflector very low.
11. Surfaces of .010 rms or better did not appear to be a problem.
12. They suggested the following budget figures.
 - a. \$2k flexure analysis.
 - b. \$2k dynamic analysis.
 - c. \$6k engineering and tooling.
 - d. \$13k manufacturing.

This was a small operation specializing in construction of fiberglass panels and sub reflectors and appeared very knowledgeable in these areas. Has done similar work for Aeronutronics, Raytheon, NASA, and JPL among others. We were impressed by their operation and apparent ability even though they were such a small operation.

April 29
Tech West
10601 Saratoga Sunnyville Road
Suite 209
Cupertino, California 94887
Mr. Wayne Heppler -- 408-252-4010

Antenna Systems, Inc.
672 Commercial Street
San Jose, California 95112
Mr. Dennis Murray

They saw no problem in manufacturing and thought weight specifications could be met. Basically their remarks were as follows:

1. Wanted to study some more, would write a letter next week or so, with estimates and further comments.
2. Would contract with outside consultant for all analysis and design work.
3. Thought sandwich construction would give best performance but had reservations as to just how it would respond to deformation.
4. Thickness was a trade off between weight, dampening characteristics, and deformation performance.
5. When manufacturing must have hole in electrical center approximately 3-1/4 inches in diameter for tooling.
6. Deforming points and support points should be dimensioned (located) from this center.
7. Thought the backup frame should be sent to factory to be installed before sub reflector is removed from the mold.
8. .010" rms or better surface no problem.
9. Were not particularly interested in designing the deforming system as they would have to have this done outside. Could have backup frame manufactured.
10. Shear strength of epoxy big problem.
11. Were not sure just how they would approach the pads for attachment points.

This shop also a small operation but they did have experience and knowledge of what our requirements were. They talked of work they had done for Philco and Rohr.