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10 July 1956

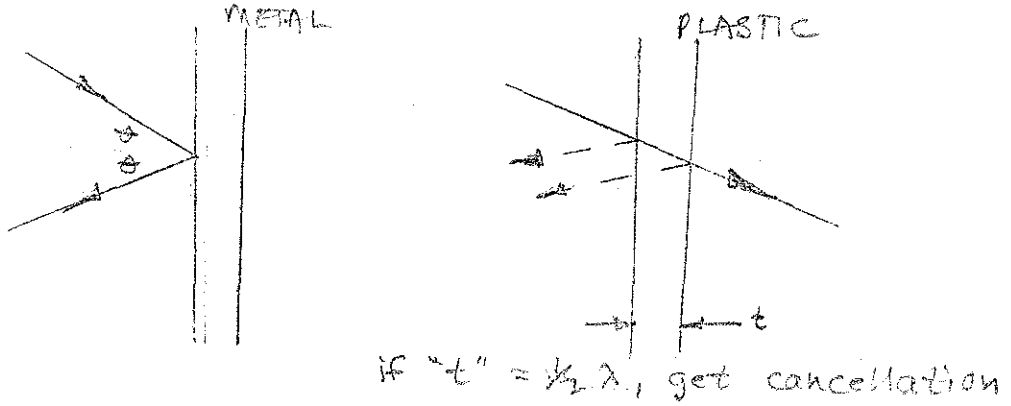
MEMORANDUM FOR: THE RECORD

SUBJECT : Radar Detectibility of Personnel Balloons

1. On 5 July 1956 the undersigned met with Dr. Wright of the Naval Research Lab concerning how radar worked, what its capability might be against a personnel balloon, and how to minimize the balloon and gondola as a radar target.

2. The return signal from radar is simply an electro-magnetic wave reflected from the target. The intensity of the wave is a function of the dielectric constant of the target material. A high dielectric constant (as in metals)gives a good return signal while a low dielectric constant (as of plastics) will tend to give a low return.

Plastic films may or may not give a good return, depending on the thickness of the film and the wave length being used against it. A film has two reflective surfaces and an additive or cancellation effect may result.



The frequency of radar used depends on the results desired. For high frequency radar (above 2500 megacycles) good resolution and short range result. By going to low frequency (200, 400 megacycles), long range "search" radar can be had.

3. Dr. Wright felt that a personnel balloon flying between the altitudes of 5000 to 12000 feet would not present a particularly good radar target. However, this would depend on the type of radar being used and the position of the balloon relative to the radar installation.

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The balloon itself would probably not present a particularly good radar target. The gondola with its wooden base would present a better target - as would the personnel and of course any equipment.

4. Dr. Wright did not feel it would be worthwhile trying to do anything to shield the balloon itself to minimize the radar detectibility. It might be worthwhile however to try to reduce the return from the gondola and perhaps, the personnel and equipment. This could be accomplished with a hair mat, which is commercially available through B.F. Goodrich, Sponge Products Division. For the higher frequencies (above 2000megacycles, the S,X, and K bonds) matting about 2 inches thick and weighing about 1/3 pound per square foot would reduce the return substantially. As the frequency goes down, the required thickness of the mat goes up - at 400 megacycles about 8 inches ofmat would be required.

Also, it might be possible to reduce the return from the gondola by substituting a plastic bottom for the present wooden base. Dr. Wright suggested that fiberglass honeycomb between 10 to 15 mil fiberglass sheets would probably be satisfactory except at high frequencies.

5. The question of anti-radar paints was discussed briefly. Thus far Dr. Wright has not found any thin films or coatings that effectively deny radar target.

6. Dr. Wright was questioned with regard to setting up tests to determine what the radar problem for personnel balloons was. Two things that struck him as important in any testing would be to get two balloons in the air simultaneously yet separated by a mile or so - one balloon unaltered and one modified to reduce detectibility. This would eliminate problems of atmospheric effects, timing, etc. in comparing results. Also he recommended that, if possible, the balloons be tested against several frequencies.

He mentioned that NRL has a Chesapeake Bay Annex (CBA) with extensive radar equipment. He did not know what the availability of the CBA installation might be for our tests. The man to see for this would be Lamont V. Blake of NRL.

7. As a passing remark, Dr. Wright mentioned that infrared, under specialized circumstances, could conceivable be used against personnel balloons.

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