

CONFIDENTIALNAVAL AIR MATERIAL CENTER PHILADELPHIA  
NAVAL AIR EXPERIMENTAL STATIONU.S. Navy Yard, Phila. 12, Pa.  
14 Aug. 45MEMORANDUM

To: J. S. Kean, Head Engineer.

Subj: Tentative Proposal for Projects to be carried on  
at NAMC.

1. I believe it is evident to any sober-minded technical man that the events of 6 Aug. 45, et seq., should cause us carefully to re-examine all plans, proposals, and projects which obtained before that time. I propose to hit some high spots in what these unique events mean to NAMC and what future plans we should make.

2. In the first place, in the broad sense we are out of business, just as thoroughly out of business as were wooden ships after the battle of the Monitor and the Merrimac. On the other hand we need not be out of business if we reorient, see what may be done with our exceptional resources in the way of trained personnel and mechanical equipment, and then determine what we should do in the interest of the United States of America in particular and humanity in general. What task is there for which we are fitted and which would serve the culture we are committed to support?

3. I shall take up these two questions separately:

(a) Why we are out of business.

The atomic bomb is so overwhelmingly different from every previous weapon of war as to change the whole approach. I could expand that indefinitely but I am at loss for words--either a man sees it almost at once or he will never see it. But I will offer meager illustrations:

No more surface warships.

No more infantry.

No more reciprocating engines in military aircraft.

No more tanks.

Every type of craft or weapon abolished or changed beyond recognition because of the incredible changes in logistics and tactics.

Possibility of wars which last fifteen minutes instead of years.

No more aircraft carriers--and all which that implies.

It became quite evident at once that the greatest bomber in aviation history, the B-29, was not really up to

CONFIDENTIAL

the job of carrying the atomic bomb. It is much too slow, can't fly high enough, and is unnecessarily large. The atomic bomb should be carried by a rocket, manned or unmanned. Then the "parachute" would be unnecessary and the bomb could be placed with precision and with safety to the crew.

(b) What should we do?

This question needs to be approached with humility and with real desire to serve rather than simply with the idea of preserving a particular bureaucratic institution as a going concern. It may be conclusively assumed that, while war may possibly be successfully outlawed through the use or the threat of the use of the atomic bomb, the atomic bomb itself may no more be outlawed than sex or the silent stars. It's here, we've got it. It is a fait accompli. We must at all times be ready and willing to use it. If our culture is to survive we must contain that power with sober judgment and humanity. It is a simple fact that (1) we can not afford a war ever again, (2) the atomic bomb cannot be abolished, nor can it be indefinitely kept from other peoples. We must ride the lightning and ride it well. I conceive the atomic bomb as being the force behind the police power for a planetary peace. Perhaps the custodian will be called the "Armed Forces of the U.S." or perhaps the "Peace Forces of the United Nations",--or perhaps another title. No matter, such a force there must be if we are not to be ourselves destroyed.

Such a force must be properly equipped. NAMC can help to equip it.

4. I propose that NAMC undertake to develop a suitable passenger carrying rocket to be the "squad car" for the "planetary police". (No doubt the AAF will tackle it also. Fine !)

Nuclear physics is not our field. Craft which rise above the earth is our field. A new type is needed. Let's build it.

5. Time out for a slight sprinkling of pertinent data:

- (a) The balsa bomb is a man-carrying rocket.
- (b) The V-2 travelled in outer space at speeds around 3000 mph (reported).
- (c) Latest exhaust velocities are rather startling.

CONFIDENTIAL

(d) Rockets are almost independent of weather and can cruise beyond the atmosphere.

(e) Pressurization is well developed. BuShips submarine techniques also are suggestive.

(f) Electronic control mechanisms could handle much of the piloting.

(g) U-235 itself is an almost certain source of new and powerful rocket fuels. (Ef. elements 93 and 94.)

(h) The Navy now has an enormous backlog of rocket data, owned jointly by BuAer and BuOrd through Inyokern.

(i) No one yet has built a proper man-carrying rocket.

6. I propose a major project at NAF with numerous supporting projects at NAES to build such a rocket. A team should be set up consisting of a project engineer, several expert consultants (hired outside), engineers of many ratings including mechanical, ballistical, weight, electronic, and aero. The team should be large. The stages might be

(a) Indoctrination and study (at Inyokern, Wendover, etc.)

(b) Test stand engine work.

(c) Model tests, both wind tunnel and working.

(d) Mock up.

(e) Prototype

(f) Field tests (not at Phila.)

At stage (e) the team should start to shift to the wide open spaces. We would end up with a new and different organization, in two or more than one location, but we would end up with a rocket.

7. It is possible that the open development of a military rocket will meet strong emotional opposition in the next few years. It might be more feasible in peace time to carry on this job, a job of pure research, by selecting an objective non-military in character but which would with utter certainty provide the military results as well. For example we might propose to build a messenger rocket to the moon. Such a project is quite feasible and could be done with less than the present annual budget of AML (if all the money were spent on this one project--I am simply comparing figures). The

CONFIDENTIAL

public is now ready for such a project and precedent exists; e.g., U.S. Army arctic explorations in the late 19th century. (Entirely army projects, not like Admiral Byrd's private-and-public mixture.) The Station that built such a rocket would acquire the know-how to build any war rocket and such a rocket could not be built with available fuels, metals, and data, as a 2-stage rocket which would be unmanned and would leave a mark (explosive dispersed carbon black, or similar dodge) on the face of the moon--a useless thing in itself but parallel to the 1st flight at Kittyhawk, a conclusive demonstration that man can conquer space. The unique prestige which would accrue to the United States of America, to the U.S. Navy, and to NAMC in particular cannot be expressed. As an unpublicized side issue we would know how to build the perfect carrier for the A-bomb.

## 8. Some remarks on rockets:

(a) See Ley's "Rockets" for details of a messenger rocket. Ley is very conservative because his data are based on pre-war fuels.

(b) See the British Interplanetary Society's Moon Rocket plans in the files of the American Rocket Society.

(c) IBM and Rathion together should be able to build any needed control apparatus. Perhaps AIL and ARRL could do it but I think it should be farmed out.

(d) I suggest, as a basis for discussion, the following:

A-bomb rocket--2-passenger, speed 3000 mph in space but capable of cruising at 500 (perhaps with jet auxiliary). Capable of manual, semi-automatic, and automatic control. Normal landing automatic on a big field, using radar controlling an IBM robot in automatic setting. Emergency landing by ship parachute. Cruising radius to be determined by available fuels. Until satisfactory synthetic fuels are available it could be carried somewhat near its target (a few hundred miles) by a large bomber, a la balsa bomb.

Messenger Moon Rocket--A two-stage job with a 50 lb. pay load. It might be subjected to radio correction for the 1st 1000 miles and thereafter controlled by a radar target seeker and a robot, set for the moon, and acting through cams cut to this particular "problem of two bodies", but that would increase the original weight several fold and may not be necessary. I suggest that it be done even though unnecessary as it would automatically carry out several military projects necessary to the A-bomb carrier. (It must be noted that it is really much easier to build a successful Moon rocket than to build a proper war rocket. Nevertheless either problem can be used to solve the other--the choice between the two is a choice in diplomacy and politics, not in engineering.

CONFIDENTIAL

9. I could go on indefinitely. This is as good a place to stop as any. To you and my other colleagues, goodbye. I leave with very mixed emotions. If you get this project, I may be back, hat in hand, asking for a job!

Robert A. Heinlein