

redundancy, the spare parts or the logistics back-up we ordinarily have in an operational system. This has been at the root of a good many of our outages on the terminals. We simply don't have the back-up for the R. & D. effort.

Mr. ROBACK. Why have they been categorized as R. & D? Has this been a budget convenience?

General KLOCKO. No. It was originally designed as an R. & D. effort. Finding out, with the first system we had, it has been declared operational well in advance of the time it ordinarily would be. I don't think there were any particular budgetary restraints I know of.

Mr. ROBACK. In an earlier hearing, General Klocko, we reviewed among other problems the difficulties of terminal refrigeration. Is that an R. & D. problem which has been displaced? That is, are you re-designing systems without refrigeration?

Mr. BENINGTON. In the larger 40-foot terminal there is a cooled parametric amplifier and in the 18-foot terminal there is not. That means that you have fewer problems with respect to that element in the smaller 18-foot terminal than we do with the 40 foot.

PROBLEMS WITH AN/TSC-54

Dr. TUCKER. I think it is our judgment that the AN/TSC-54 is a good terminal with good electronics. It has suffered some problems which are within the power supply and these problems are correctible, and the performance of the electronics to date has been very good.

Mr. ROBACK. Are the problems of the power supply external to the design of the ground terminal?

Dr. TUCKER. Yes.

Mr. ROBACK. Is this because of the incidence of conventional power availability? That is, the kind of generators that might be available in the neighborhood?

Dr. TUCKER. This is Government-furnished equipment to accompany the terminals.

Mr. ROBACK. This is Government-furnished equipment which might have been designed for some other purpose and the hookup doesn't work out too well; is that the problem?

Mr. BENINGTON. It is a movable turbine-powered prime power supply that we use in the field and it is my understanding that one of the problems we are having is with respect to the training of people to maintain that. This is the sort of problem we expect in a program like this and we think we can fix it.

Mr. ROBACK. Is it a matter of improving the generator or improving the terminal?

Mr. BENINGTON. Not that we know of.

SUBSTITUTION OF SATELLITE LINKS

Mr. ROBACK. We discussed with General Klocko the role of satellite communications in displacing other systems and in effecting more efficient and more economical operations.

Can you give us any illumination on this subject? What are the possibilities?

Dr. TUCKER. I think that there are a number of possibilities, certainly. Our total communications system is made up of a diversity of