55-1

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

2 NOV 1971

ADMINISTRATION

MEMORANDUM FOR THE DIRECTOR, NATIONAL RECONNAISSANCE OFFICE

SUBJECT: Response To Comments On The NIRB ELINT Study

I have attached Max Oldham's response to NRO's comments on the NIRB ELINT Study. The responses and comments are arranged to facilitate a paragraph-by-paragraph association. Bronson Tweedy and I have reviewed and concur with the response. We both believe the dialogue following the report's publication to be as meaningful as the report itself. We hope that this dialogue will be maintained, and solicit your support toward that end.

With your help, and that of others who have expressed interest in this work, we can expect continued improvement in the intelligence resource decision process.

Harold G. Bowen, Jr.
Vice Admiral, USN
Deputy Assistant Secretary
of Defense (Intelligence)

Attachments

1 of 3

~~TSI~~ NATIONAL RECONNAISSANCE OFFICE
WASHINGTON, D.C.

OFFICE OF THE DEPUTY DIRECTOR

1 June 1971

MEMORANDUM FOR VICE ADMIRAL BOWEN, DASD(I)

SUBJECT: DASD(I)/NIPE ELINT Study

REFERENCE: Letter of 27 April from DASD(I) to DNRO requesting comments on subject study

In accordance with your request of 27 April we have reviewed the subject study. Our reaction is, in general, very favorable. The specific results of this study might be questioned on the basis of the input value judgments and assumptions, but the nature of the results is reasonable and the study methodology seems fairly sound.

In this regard, this latest application of "network" methodology shows there has been considerable maturing since its original application in the Pilot ELINT and ABM studies, and our analysis staff has been in communication with Dr. Oldham on possible refined applications of the methodology for NRO use. Because of the difficulty of incorporating such things as detailed operational factors, collector interactions, and dynamic value sets (based upon on-going collection, processing and analysis results), the methodology probably will have to be restricted to use as a highly aggregated indicator of the trends which resource allocations should take.

Some specific comments of the NRO Staff are attached.

Bob

F. Robert Naka

Attachment
Comments

[redacted] ~~EARPOP~~

50X1

HANDLE VIA BYEMAN CONTROL SYSTEM

~~TOP SECRET~~

EXCLUDED FROM AUTOMATIC REGRADING DOD DIRECTIVE 5200.10 DOES NOT APPLY

CONTROL NO BYE-12857-71
COPY 1 OF 2 COPIES
PAGE 1 OF 1 PAGES

COMMENTS ON NIPE/DASD(I) ELINT STUDY

A. The Study and Its Conclusions. The study members have done a very effective job on the difficult problem of performing a wide-scale cross-program analysis on an analytical basis. They deserve particular credit for (1) developing and qualifying their value sets - a troublesome task, (2) fully explaining their assumptions and methodology, (3) using an excellent technique for displaying the "unique" and "total" effectiveness of systems and systems mixes, and (4) generally resisting the temptation to read too much into the study outputs. In regard to the later conservatism, however, the study members have softened their conclusions (except the last) to the point where no study really was required. Those conclusions are repeated here - verbatim from pages I-13 and I-14 - with our parenthetical comments:

Conclusions

1. The effectiveness results show that by 1972 the capability in ELINT collection/processing will be appreciably greater than it was in 1970. (This conclusion is reasonable [redacted].) 50X1

2. Selective reductions in the ELINT program for 1972 and beyond could be made while maintaining today's capability. (This conclusion follows from the previous conclusion.)

3. Adjustments in the mix and quantities of the several systems could bring about a higher degree of efficiency than will be achieved by the programs now scheduled for 1972 and beyond; that is, the same capability could be achieved at significantly lower costs. (Since the 1972 systems were not selected with the particular study criteria in mind, it was unavoidable that some cost reduction potential would appear from the study.)

4. The introduction of new and perhaps more difficult tasks into the national ELINT requirements could have an impact on overall performance, on which systems should be selected, and on the configuration of these systems. (This conclusion is obvious.)

5. The specific, complete and detailed definition of the current ELINT tasks can be a useful yardstick against which to measure alternative programs, alternative configurations of systems, and, in fact, how systems should be utilized or tasked. (This conclusion has been verified by the study. Properly applied, the study methodology might prove to be a very useful tool in our analyses.)

B. Specific Comments.

1. The study purpose "...to provide information on the effectiveness and cost-effectiveness of ELINT systems that will be useful for resource decisions" (i-1), was achieved in a very general way. Because of the analytical limitations of the network methodology and the very judgmental nature of some of the study assumptions, specific resource decisions would require additional study work. It probably would be more accurate to say that the usefulness of the study approach and methodology as an aid to decision-making had been demonstrated.

2. Target Values. The four target value sets developed for the study - Composite, Operations, R&D, and Special - were wide-ranging within the scope of the study's interpretation of ELINT needs, but these needs were very restrictive and were based on a peacetime national-level collection situation. Only static values for general search (GS), electronic order of battle (EOB), and technical intelligence (TI) were considered together with the frequencies of collection and data accuracies required. The values of determining operational patterns (e.g., the monitoring of Soviet ABM operations and other special events - [redacted]), obtaining simultaneous signals, and so forth, were not included. In addition, the study excluded some important ELINT collection areas including the Middle East, Cuba, North Vietnam and North Korea. 50X1

Regarding the static values mentioned above, target values ideally should be dynamic and change as a function of prior collection, processing and analysis results. It is somewhat difficult to build this capability into a computer model, and it normally would not be required if one were

merely comparing relative collection/processing capabilities of alternative systems. It becomes important, however, when comparisons are made of the total values of data collected by various systems or mixes over long time periods. That is the case with the present study.

A final point - the data base value shouldn't really drop to zero (A-14) if the collection/processing time interval is exceeded. The characteristics of deployed emitters, for example, aren't going to change frequently and there is still value in the outdated information. On the other hand, there should be a way to assign values to redundant data which might improve an analyst's confidence in his study results. Such values would apply, for example, to SAC EOB collection (ELINT & Imagery).

3. Collector interactions such as improvements in collector effectiveness deriving from tip-off or stimulation exercises could not be handled by the static emitter/collector models of the study. The impact of this shortcoming could not be assessed.

4. The cost-effectiveness routines used for the study don't account for the fact that collectors must be purchased as units. As a result, all of the cost-cost and cost-effectiveness curves of the study are smooth functions involving fractional buys whereas they actually should be step functions reflecting unit buys.

5. The apparent improvement of the 1972 collector ensemble against the baseline Composite value set (66.9 percent effectiveness versus 55.7 percent) may be somewhat inflated due to the study interpretation of the GS collection criterion and the study assignment of GS data weighting. First, the 1970 ensemble's capability against GS was pegged very low - only 20 percent of the possible value. This lack of effectiveness - compared to 63 percent for EOB and 84 percent for TI - doesn't agree with experience, and also is acknowledged in the study to result from a collection criterion which is, perhaps, overly stringent (I-3, III-A-11). With the introduction of the 1972 ensemble (particularly the [redacted] this unusually low GS capability easily 50X1

was doubled (to 41 percent). Second, the overall weighting of the value of GS data in the Composite set relative to weightings for EOB and TI (33, 33, and 34 percent of total ELINT value, respectively) may be too high. The maximum GS weighting assigned by the other three value sets of the study is only 20 percent (Operations set) and the average of the three is 16 percent - less than half of the Composite weighting. No reason could be found for this inflation. Finally, since the stated improvements in GS capability with the 1972 ensemble account for most of the increase in total ensemble effectiveness (6.9 percent of the 11.2 percent increase), any "artificial" enhancement of GS capabilities resulting from an overly stringent collection criterion combined with an inflated GS weighting factor has inflated this total effectiveness correspondingly.

6. Low Altitude Satellites. The study indicates that low altitude ELINT satellites should be cut back in favor of other collectors - particularly [redacted] This is a reasonable conclusion, but there are some benefits of low altitude programs which might be important to retain. These include a world-wide responsiveness capability (e.g., URSALA), a main beam collector capability (e.g., MABELI on ABM) and, presently, a collection capability covering the 8-18 GHz frequency band which (1) contains numerous important radars, (2) is being increasingly used by the Soviets, and (3) has a resultant higher USIB priority for coverage. In these latter cases it may be that [redacted] This potential capability should be studied. 50X1

7. Costs. It would be very difficult to properly identify and prorate collection/production costs for the various systems against the restricted study ELINT target set.

The problem is, mainly, that each "ELINT" system has some important collection functions other than those presented by this particular model. As a compromise, the study took [redacted] ELINT-equivalent imagery and second- and third-party ground stations as "free," and charged the full amounts for the other systems. This is satisfactory for a very rough comparison of systems' relative cost-effectiveness, but some cost proration would have to be done for any systems comparisons which might lead to specific resource allocation decisions.

8. Outcast Systems. These systems, which failed the cost-effectiveness test, deserve special mention.

URSALA. The conclusion that URSALA is not cost-effective (compared to TRIPOS/SOUSEA) is an example where the geographic limits of the study affect the results. URSALA is more costly than TRIPOS/SOUSEA partially because it has an attitude control system which allows it to be used world-wide - a capability that TRIPOS/SOUSEA does not have. Additionally, URSALA is more costly than TRIPOS/SOUSEA because all the intercept data will be digitized. This makes URSALA considerably more responsive to crisis events, but the ELINT study model does not assign any value to this additional capability.

MABELI. The study indicates that MABELI will make a negligible contribution to ELINT collection. However, MABELI has a unique ABM main beam parameter measurement capability that no other collector (particularly satellite) has. This capability is rated very highly by ABM ELINT analysts.

DOD Aircraft. Operational ELINT's main contribution is in its fusion potential with other source information to determine the defensive environment of certain areas. This data is not always important when treated in isolation. In the case of the Navy, the VQ squadron is an integral part of fleet operations and satisfies national requirements only as a by-product.

HANDLE VIA BYEMAN CHANNELS

8 July 1971

Response to NRO Comments on the NIRB ELINT Study

1. On the whole the NRO comments on the ELINT Study are constructive and helpful. Some detailed discussion of the various points raised has already taken place during briefings to the NRO Staff and the RPG.

2. Of the points raised several do deserve comment here. First the idea that the tasks for ELINT collection are dynamic, that is, they change with time, with previous collection and with environmental status. These changes do occur and do affect the relative values but primarily they impact the day-to-day tasking--given that the potential for change has been recognized (and the magnitude estimated) and enough tasking flexibility built into systems to respond to the changes. Thus for future procurement the dynamic nature of the tasks should cause preference to be given flexible systems over single purpose inflexible systems. In the short term such changes should cause the initiation of fast response procedures in tasking to accommodate the changes.

3. The second point has to do mainly with results for individual systems. The reason for the negligible contribution of MABELI has to do

~~EARPOP~~
~~TOP SECRET~~

BYE 123-71
Copy # 4

with the relatively low value attached to ABM main beam parameter measurements, especially those that can be measured only by MABELI. The problem with MABELI is characteristic of many systems developed under such concepts as directed search or quality ELINT, where specialization so restricts the number of targets accessed that only a very low value can accrue, even from 100% success.

4. Whether or not the world-wide capability of URSULA is important with respect to results depends directly on the portion of ELINT collection value outside the study area and also on the portion of the value world-wide that is accessible to [redacted] other low-altitude satellites. Without arguing that a world-wide capability is better than a less than world-wide one, it is just not yet clear how much better. To answer that question takes a little analysis, not an assertion. With respect to crisis events, only recently have these been addressed by SORS and even now in sort of a tasking mode as opposed to the more formal requirements documentation. To the degree that digitalizing URSULA data reduces the reporting time, there might be some detectable change in the results were crisis reporting times a part of the study. Unless the crisis data were assigned very high relative values, it is not likely that URSULA would look better than TRIPOS-SOUSEA. In my view--and we are testing this--the only factor that will make URSULA look good is to increase its

50X1

looks per day from the current 1.1 to about 3, a figure which may well be a better estimate of the true operational URSULA capability.

5. The DoD aircraft, to a degree, do work against non-national requirements. But so also could the other collectors, in many cases in a more cost-effective way. As I understand tactical needs the emphasis is on near real-time reporting and high sampling rates, neither of which are by any means characteristic of aircraft. The fusion process is in reality analytical. For those ELINT targets ultimately to be used in this analytical process, the relative values already assigned are believed to include their potential contribution to fusion as well as other analytical tasks such as weapon system characteristics. The key question is whether multisensor data must be collected simultaneously and at the same point in space, or can such data be collected by sensors distributed in time and on other platforms. My feeling now is that there really has not been a quantitatively sound case developed for time and space simultaneity. This feeling also applies to the frequently raised question of defense stimulation. Some people think it is good but I have seen no analysis as to how good, or as to alternative ways of achieving stimulation if it is indeed proved better.