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BYE-052446-
1998

RADAR TYPES BY PERCENTAGES AS OF MARCH 1961

Type	Description	% of Total
	Modern set	33.8
	modern set	10.3
TOKEN	older set	19.3
STRIKE OUT,	older set	9.5
ROCK CAKE	older set	4.2
STONE CAKE	newer set	4.8
/variants	Search, anomalies of basic set	0.8
	New	0.1
	Friendly	2.8
	Friendly Fire Control Sets	0.2
	Friendly Airfield Surveillance	1.6
	Other Friendly radar	8.1
	Unidentified or miscellaneous	4.5

Signals not yet heard:

1. Soviet Fire Control radar
2. Older Moscow Defense Radar (GAGE,
3. Surface-to-air missile guidance radar (New YO-YO)

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SUMMARY OF INTELLIGENCE DERIVED

1. Summary and conclusions as they are related to the objectives of the project are outlined as follows:

a. Signal Environment in "S" band over Sino-Soviet Bloc

(1) High signal-density over the USSR. Examples are over 90 separate radars detected by the satellite within a minute at peak density and 30 - 40 per minute quite frequently. On an average density mission (e.g. Mission 905), 224 separate radars were intercepted. Only eleven of these radars were unidentified; 86% of total radars were Soviet Bloc sets.

(2) Variation in density. This was most significant as function of time with a greater activitty during daylight hours. Lower Soviet density was noted over west central Asia and Communist China. Highest densitty was observed along the Iron Curtain border in Europe, with lesser peaks indicated in the Black Sea and extreme southeastern Asia.

(3) Important peak [redacted] activity in Afghan - Pakistan border regions. A secondary concentration of [redacted] was noted along European borders of Bloc. This indicates importance of these areas to Soviet defense.

(4) Composition of Soviet radars. [redacted] appears to be the most common Soviet EW set. [redacted] are relatively common, with slight preference for the newer sets. Standard Soviet EW deployment shows about 60% preference for newer 375 pps radars compared compared to older sets. Although [redacted] radars are in reduced usage, about 25% of Soviet search radars observed were of [redacted] type. A few odd PRF variants of Soviet EW radars were noted, the lower PRF's possibly being radar range extension modifications beyond 200-mile current limitations.

(5) Lack of unidentified, new or unusual Soviet Bloc equipment. This was noted despite large numbers of Soviet radars employed and demonstrated interception capability against fire-control and naval radars. Such Soviet radars as [redacted] and [redacted] were not observed, indicating their

negligible contribution to current EW defenses. Lack of new equipment types is considered a significant finding.

b. Location of known types of operational military S-band emitters in Sino-Soviet Bloc:

(1) Ability to determine radar location dependent upon type of radar and depth of data. Computation on isolated emitters permit location to be determined on a single pass to within plus or minus 100 miles. If a given emitter can be identified on subsequent passes, location accuracy is substantially improved (plus or minus 50 miles has been achieved in test cases to date.) With [redacted] radars, which comprised about 25% of those intercepted, [redacted] computation should provide accuracy of location to within plus or minus 30 miles. This same technique may also have application to [redacted]

(2) Computer program potential. A computer program is fully tested to perform the location function when proper inputs are ready. To date the most comprehensive test of manual versus computer techniques (employed in a typical mission but limited to burst selection comparison) results in 85% correlation. Results on this same mission (905) indicate that at least 10% of the radars were intercepted on both the leading and trailing rims of the annulus.

(3) Substantial contribution of unique data to Electronic Order of Battle (EOB) assured. This demonstrated capability for coverage of the entire Sino-Soviet Bloc with considerable flexibility of time and area may ultimately afford an EOB of the interior of the Bloc for the first time. Mission 905 -- the first major pass thoroughly analyzed - detected 224 radars, of which 86% were of Soviet origin and reliably identified as such.

(4) Production of EOB to follow development of necessary data processing techniques. Inasmuch as both the volume of data and emitter location problems necessitate machine methods, priority of EOB production has been scheduled to come after development of the data analysis and processing techniques.

c. Location and major emission characteristics of unknown and unique S-band emitters in Sino-Soviet Bloc:

(1) Negative results: (To date) Although there were some unidentified signals found, [redacted] nknown and unique signals was characteristics of all missions (in Mission 905, all but eleven of the 224 signals were isolated). These unidentified signals are believed to be largely due to lack of scan rate, malfunctioning of equipment, unusual power sources or intentional variations from standard pulse rates to extend range.

(2) Potential. The satellite in detection of anomolies in friendly equipments demonstrates its potential in case such unique Soviet equipment exists.

d. Aid to development of more sophisticated processing techniques and intelligence applications.

(1) Significant advance in analytic state-of-the-art. The semi-automatic analytic methods, especially the analog presentations, being developed will greatly expand the potential and adaptability of present manual signal analysis. Experience being gained in computer programming for fully automatic processing of this project data will be an invaluable aseet in data handling problems of future collection systems. The complete manual readout of Mission 905 and its comparison with computer read-out has resulted in a more realistic definition of remaining problem areas.

(2) Importance of "in-house" capability. The ability to handle high volume intercept processing being developed "in-house" will afford a capability to apply effectively, rapidly and economically this potential to high priority and sensitive projects.

(3) Increased emphasis in high probability intercept equipment employment. The extensive implementation of high probability intercept equipment has been hampered in the past by the realization of the enormity of the data processing problem. Successful solution of this problem will expand such employment to better prevent technological surprise.

(4) Refinem[redacted]ta inputs in future collection systems. The potential available in the varied analytic aids being developed has strengthened the requirement for higher quality and more refined data in present and future

collection systems, not restricted to satellite platforms.

e. Interceptions of friendly radars:

(1) Signal density. The signal density study indicates western Europe apparently has more S-band radars active than the U. S. in the ZI. Coverage of friendly and neutral radars should be of technical as well as occasional strategic interest.

(2) Significant types identified. Malfunctions and irregularities in performance are easily detected. Conically scanned fire-control radars were recognized and shipborne radars were detected. French, British, U.S., and west German radar types were observed in many friendly areas.