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October 1964



17 Pages

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PHOTOGRAPHIC INTERPRETATION REPORT

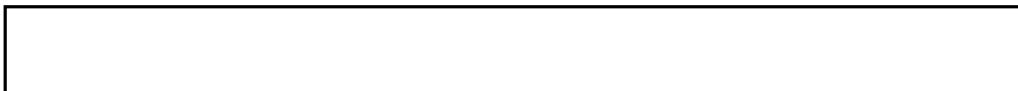
UNUSUALLY CONFIGURED ANTENNAS AT FACILITIES NEAR TALDOM AND NIKOLAYEV, USSR



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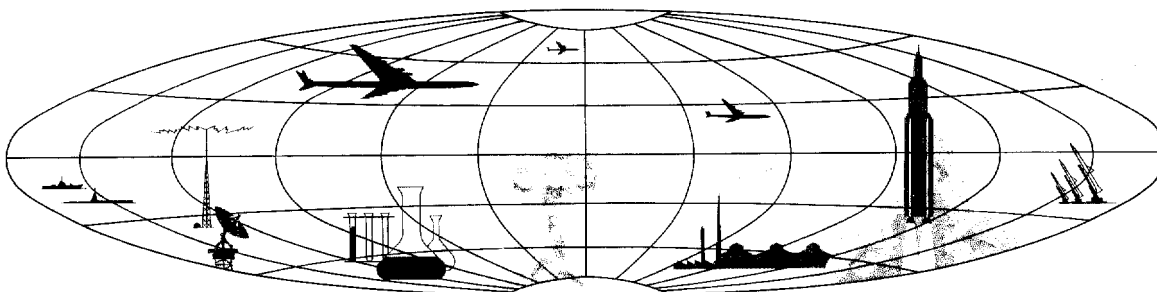
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INTRODUCTION

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An examination of photography of [redacted] and [redacted] located six antennas of an unusual configuration at broadcast/communications facilities near Taldom and Nikolayev (Figure 1). This report contains a general description of each facility and a detailed consideration of the antennas in which various aspects of their physical arrangement, engineering design, and probable correspondents are discussed, together with some comment on the methodology utilized in developing this information. The layout of each antenna's compo-

nents is shown graphically on the appropriate figure for each facility; dimensions have been collected in Table 1 for purposes of comparison.

Age of Facilities and Antennas

Although only recently noted, the antennas are not new, their detection at this time being largely a result of the steadily improving quality of [redacted] photography, a development that not only makes possible the present detailed analysis of the antennas [redacted]

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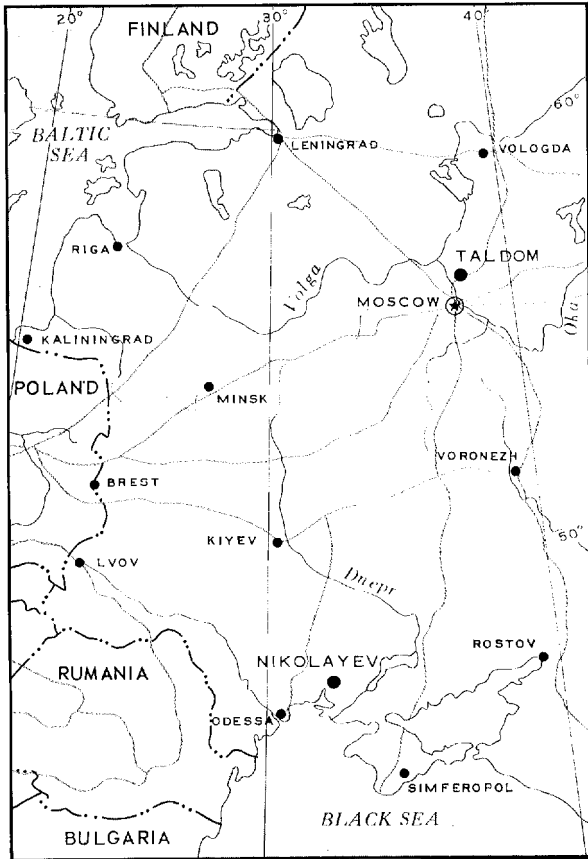


FIGURE 1. LOCATION MAP.

[redacted]

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[redacted] There is no coverage available to establish negation dates or chronologies of previous construction progress; recent photography [redacted] has revealed a number of double rhombic antennas under construction at the Nikolayev facility.

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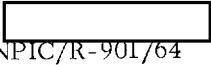
Comparison of Facilities

The two facilities have certain similarities, particularly the unusually configured antennas of which the larger and more complex Taldom facility has four and the smaller Nikolayev facility only two. Other, less important similarities existing between the two facilities include both being fenced and both having rhombic high-frequency (HF) communications antennas arranged for the most part in day-night pairs.

Differences occur in that at Taldom the rhombic antennas are apparently older and are within the fenced limits of the facility, while at Nikolayev the rhombic antennas are still under construction and are outside the fenced limits

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of the facility. Other items not found at both facilities include several curtain arrays noted only at Nikolayev and two tower-mounted reflectors observed only at Taldom.

A final noteworthy similarity between the facilities is that both also contain in addition to so-called standard control buildings--cleanly designed, rectangular structures with adjacent cooling ponds/tanks--other probable control buildings of a distinctly unique appearance. These buildings, one of which is situated in the immediate vicinity of each unusually configured

antenna (there is also a seventh, seemingly extra building at Taldom for which no corresponding antenna can be located), consist of a relatively small, generally rectangular end structure with from two to four long, narrow wings or linear cells, lower than the end structure and most often attached to and perpendicular to it, but in some cases apparently not connected, and in one instance placed at an angle. (A perspective view of one of these probable control buildings appears at the foot of the single tower in Figure 9.)

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TALDOM BROADCAST/COMMUNICATIONS FACILITY

The Taldom broadcast/communications facility is situated at 56-44-25N 37-36-00E, an area of slight relief 2.3 nautical miles (nm) east-northeast of the center of the town of Taldom (Figure 2). The approximate elevation of the facility is 475 feet, with reasonably heavy vegetation covering a major portion of its fenced area (Figure 3). Elec-

tronic components in the operations area of the facility (Figure 4) include 4 of the previously mentioned antennas of unusual configuration, 11 HIF rhombic antennas, 2 antenna reflectors with probable feed towers, a probable vertical radiator antenna tower with a probable ground system, and at least 6 other unidentified towers.

The four unusually configured antennas are discussed in detail in a separate section of this report, below; their dimensions are given in Table 1.

The 11 rhombic antennas are grouped in the southeastern portion of the facility, 8 of them arranged as 4 day-night pairs. The azimuths

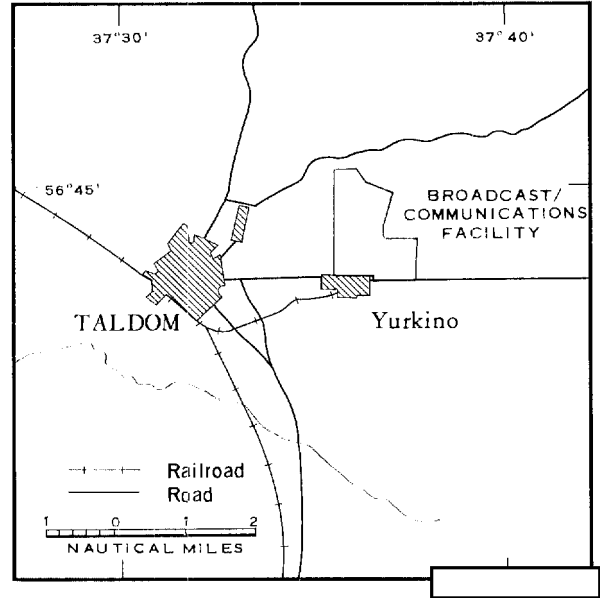
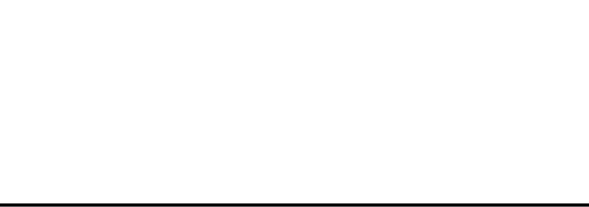


FIGURE 2. LOCATION OF TALDOM FACILITY.



The two antenna reflectors (Figure 5) are situated in the southeastern extension of the facility and are positioned side by side about 125 feet apart. Both have a 55-foot-wide rectangular shape and are tower mounted, placing the top of the reflector about 145 feet above

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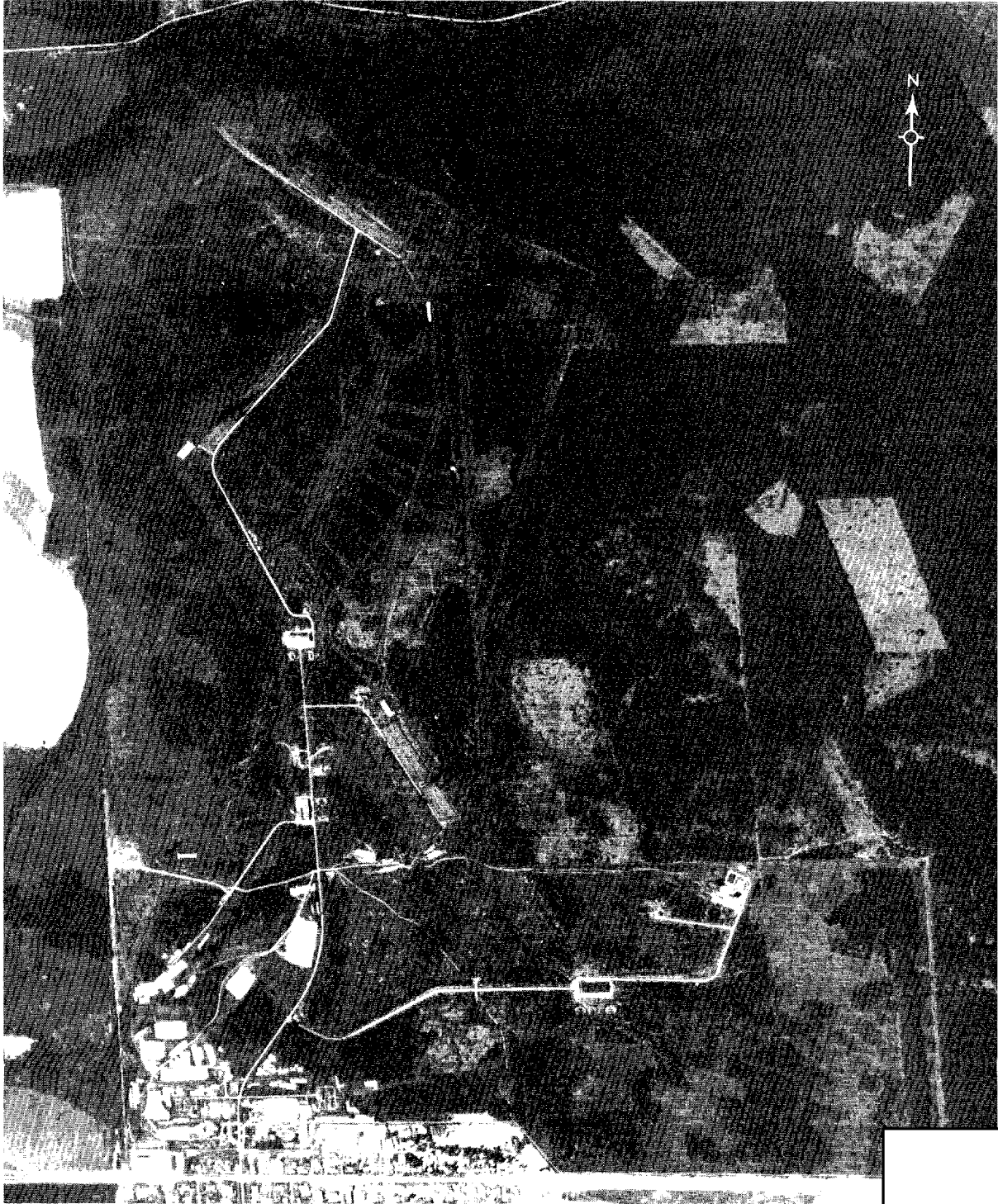
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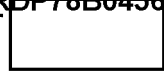
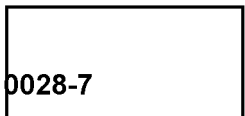
FIGURE 3. TALDOM BROADCAST/COMMUNICATIONS FACILITY.

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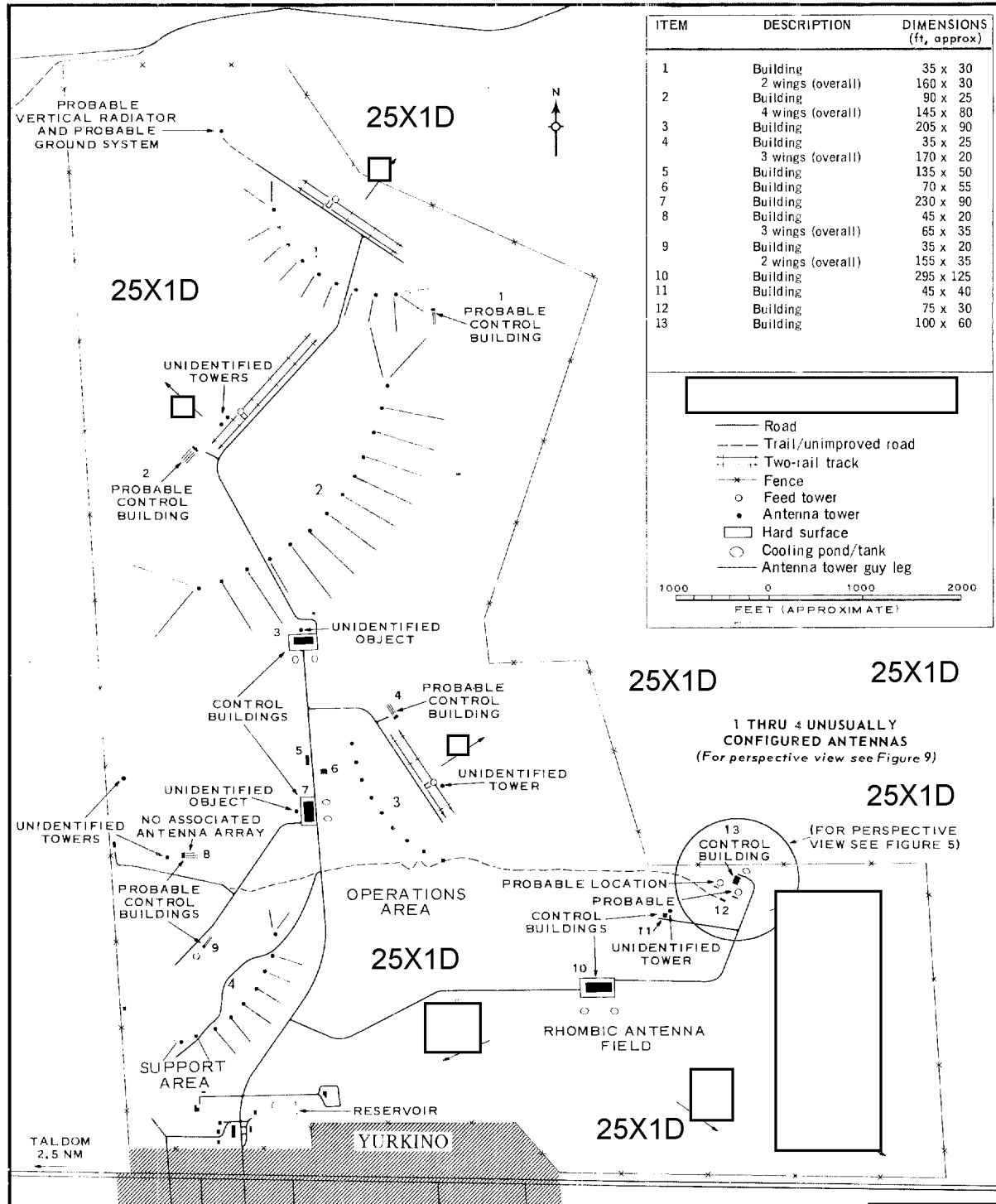


FIGURE 4. LAYOUT OF TALDOM BROADCAST/COMMUNICATIONS FACILITY.

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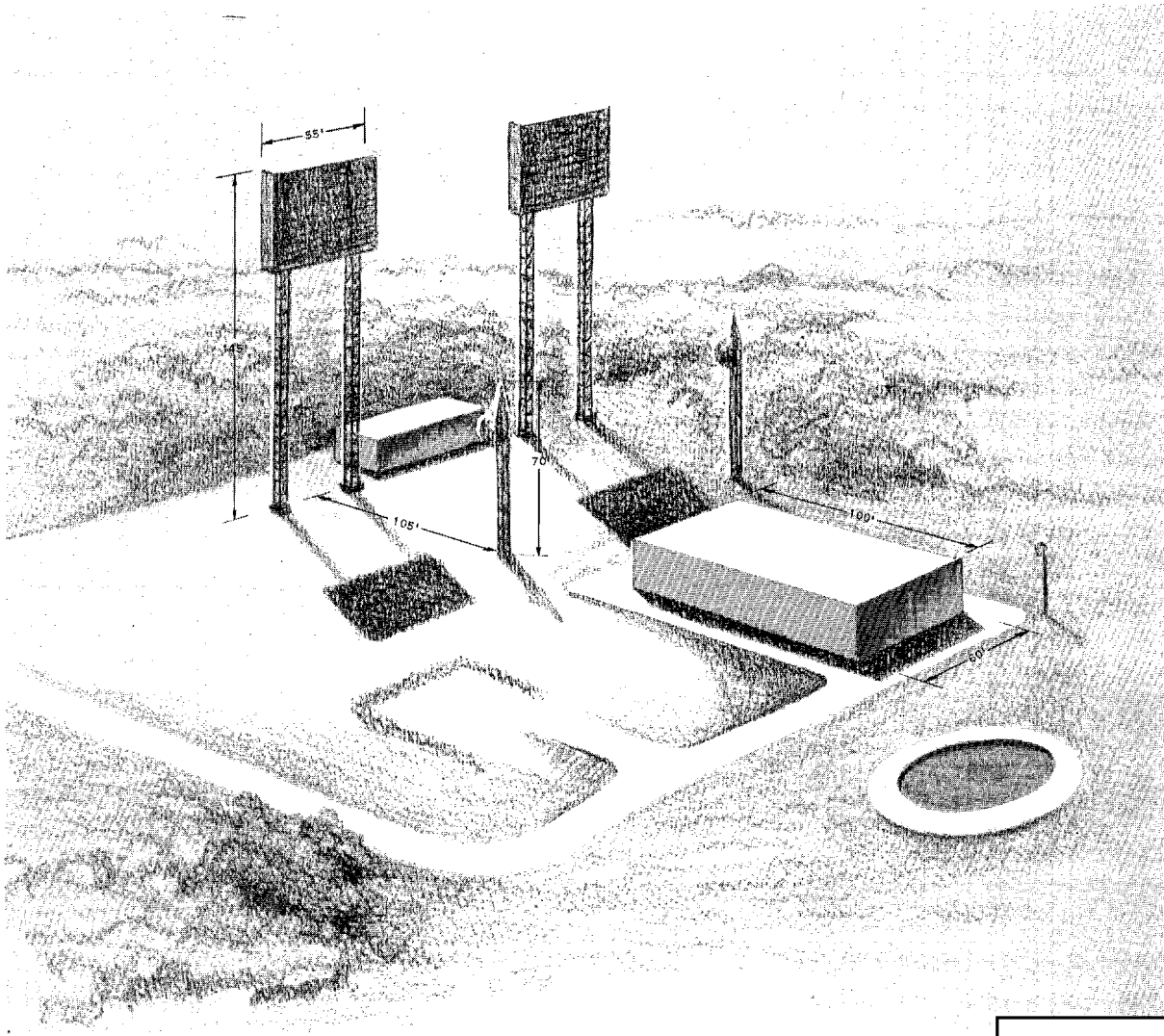


FIGURE 5. PERSPECTIVE VIEW OF TOWER-MOUNTED REFLECTORS AT TALDOM.

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ground level. One hundred and five feet north of the eastern antenna reflector is a 70-foot-high probable feed tower; in all likelihood a similar tower is situated in front of the western reflector, but ground shadows preclude its observation. Centered just north of the probable feed towers is a small control building with an adjacent cooling pond/tank.

Other standard-type control buildings, in

addition to the one just mentioned, include at least one other small and three larger ones, the latter all having adjacent cooling ponds/tanks. There are also five of the probable control buildings of unique appearance which have been described previously.

A small support area is situated in the extreme southern part of the facility, adjacent to the village of Yurkino.

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NIKOLAYEV BROADCAST/COMMUNICATIONS FACILITY

The Nikolayev broadcast/communications facility [redacted] is situated 12.5 nm southeast of the center of Nikolayev at 46-49-20N 32-12-50E (Figure 6) on virtually flat terrain at an elevation of approximately 150 feet. The facility (Figures 7 and 8) consists of separately fenced operations and support areas, with a number of rhombic antennas under construction to the south and west of the operations area fence.

The operations area includes two of the unusually configured antennas, one large and one small, which appear virtually identical in design to those at Taldom. However, the larger antenna has two fixed self-supporting feed towers, and the smaller antenna has its single feed tower mounted on a two-rail track which is somewhat wider than--although otherwise similar to--the three comparable tracks at

Taldom. Other antennas within the operations area include two curtain arrays (one 3-bay and one 2-bay), and a probable vertical radiator. Under construction outside the fence are 10 double rhombic antennas, 8 of which are arranged as 4 day-night pairs. The azimuths shown for these antennas on Figure 8 are only approximate. Control buildings in the area include 3 of the standard HF type, each having 2 adjacent cooling ponds/tanks, and 2 of the previously described probable control buildings of unique appearance, one associated with each unusually configured antenna. In the northwestern corner of the area is a large reservoir with several adjacent support buildings, and a few other support/control buildings are found throughout the area.

The support area, adjoining the northern limit of the operations area, contains over 20 barracks-type, administration, and general-purpose buildings.

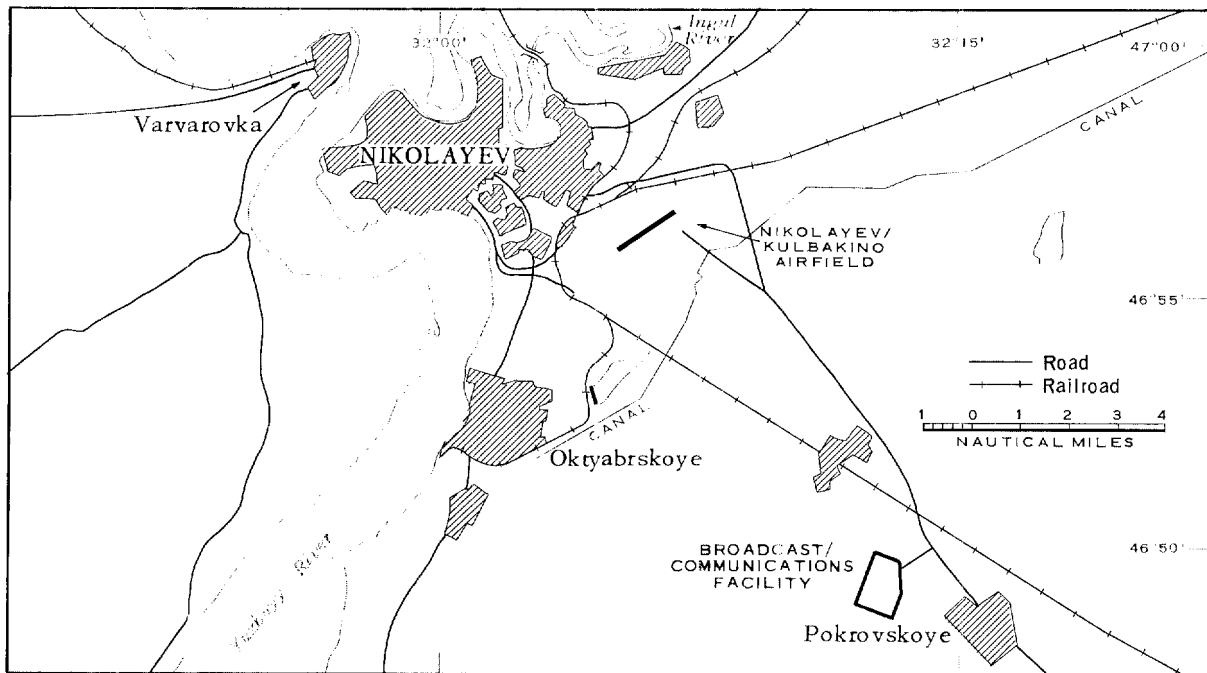


FIGURE 6. LOCATION OF NIKOLAYEV FACILITY.

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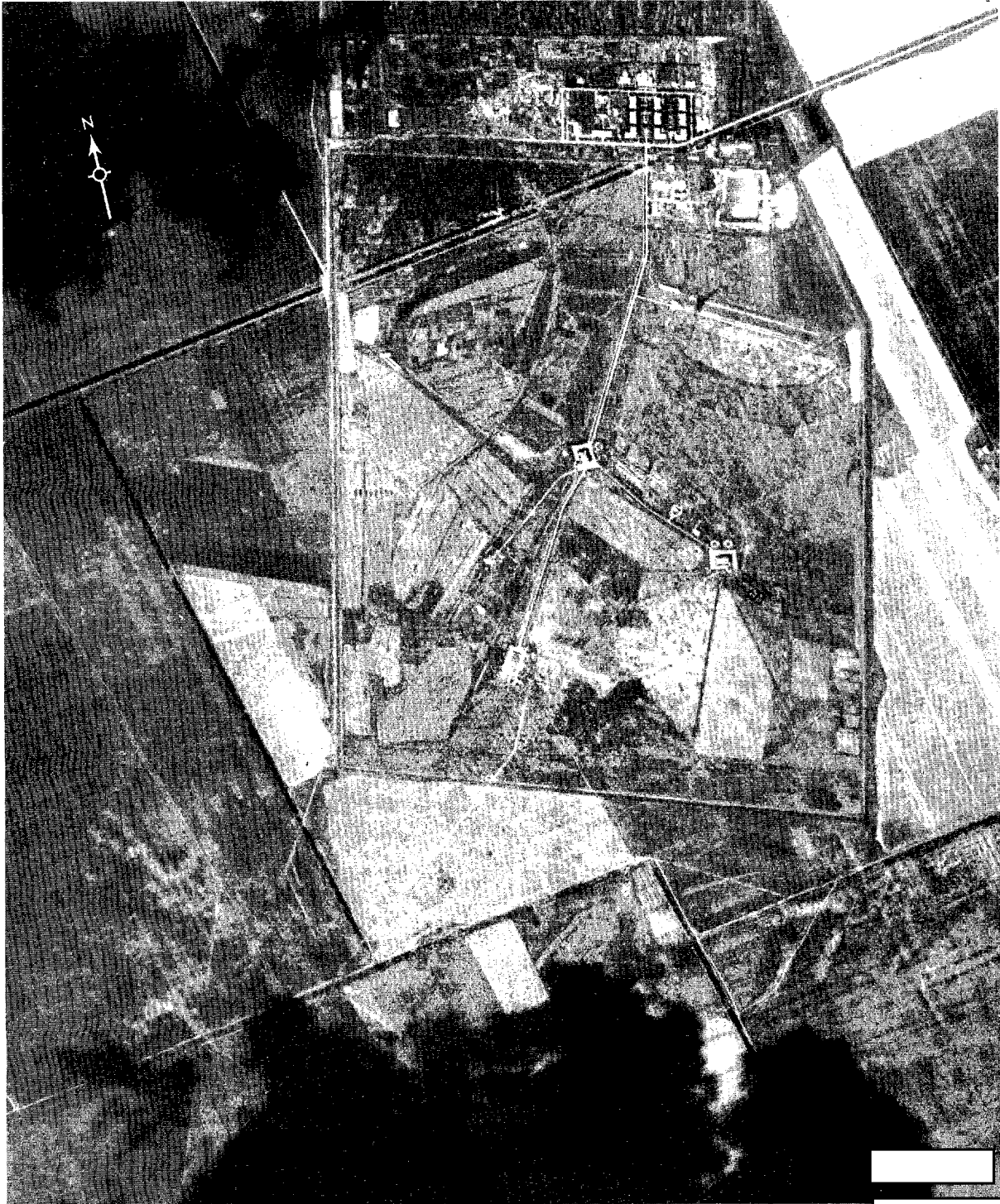


FIGURE 7. NIKOLAYEV BROADCAST/COMMUNICATIONS FACILITY.

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UNUSUALLY CONFIGURED ANTENNAS

General Description

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Basically, the antennas consist of either 9 or 13 guyed towers arranged in a slight arc that faces a self-supporting feed tower which is either fixed or mounted on a low gantry-like structure on a two-rail track laid out parallel to a line drawn between the end towers of the arc (the longest chord). These general characteristics are shown in the perspective view of Figure 9, and can be summarized as follows:

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However, the small scale of available photography precludes observation

[Redacted]

Design Considerations

[Redacted]

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Antenna Number (keyed to Figures 4 and 8)	Location of Antenna	Number of Towers in Arc	Mounting of Feed Tower
1	Taldom	9	Track
2	Taldom	13	Track *
3	Taldom	9	Track
4	Taldom	9	Fixed
5	Nikolayev	9	Track
6	Nikolayev	13	Fixed**

*Possibly two towers

**Two towers

Specific mensural data for each of the six antennas has been brought together in Table 1 for comparative purposes.

It is believed that these antennas are designed for HF broadcasting, a conclusion

[Redacted]

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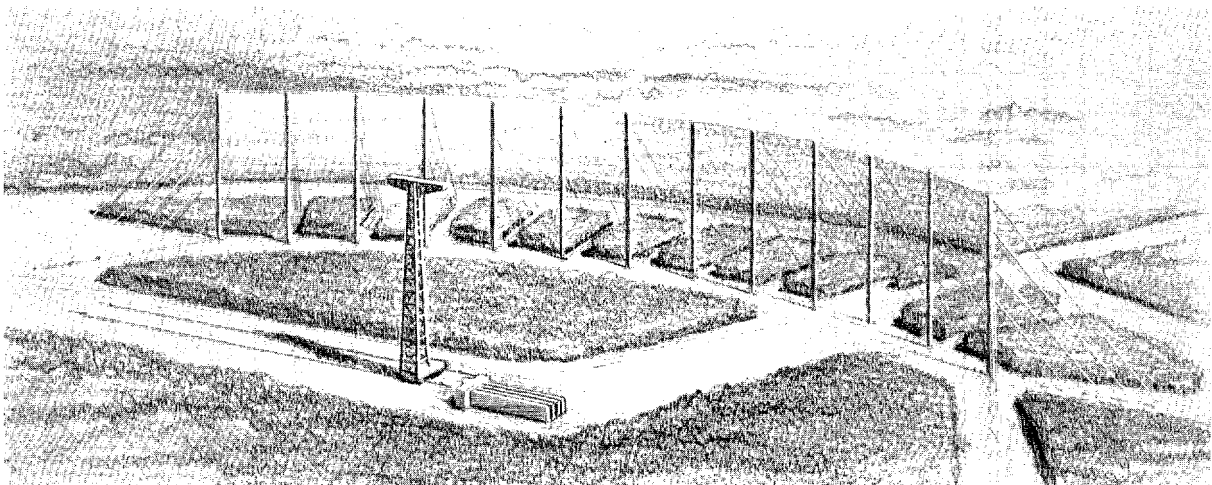


FIGURE 9. PERSPECTIVE VIEW OF UNUSUALLY CONFIGURED ANTENNA.

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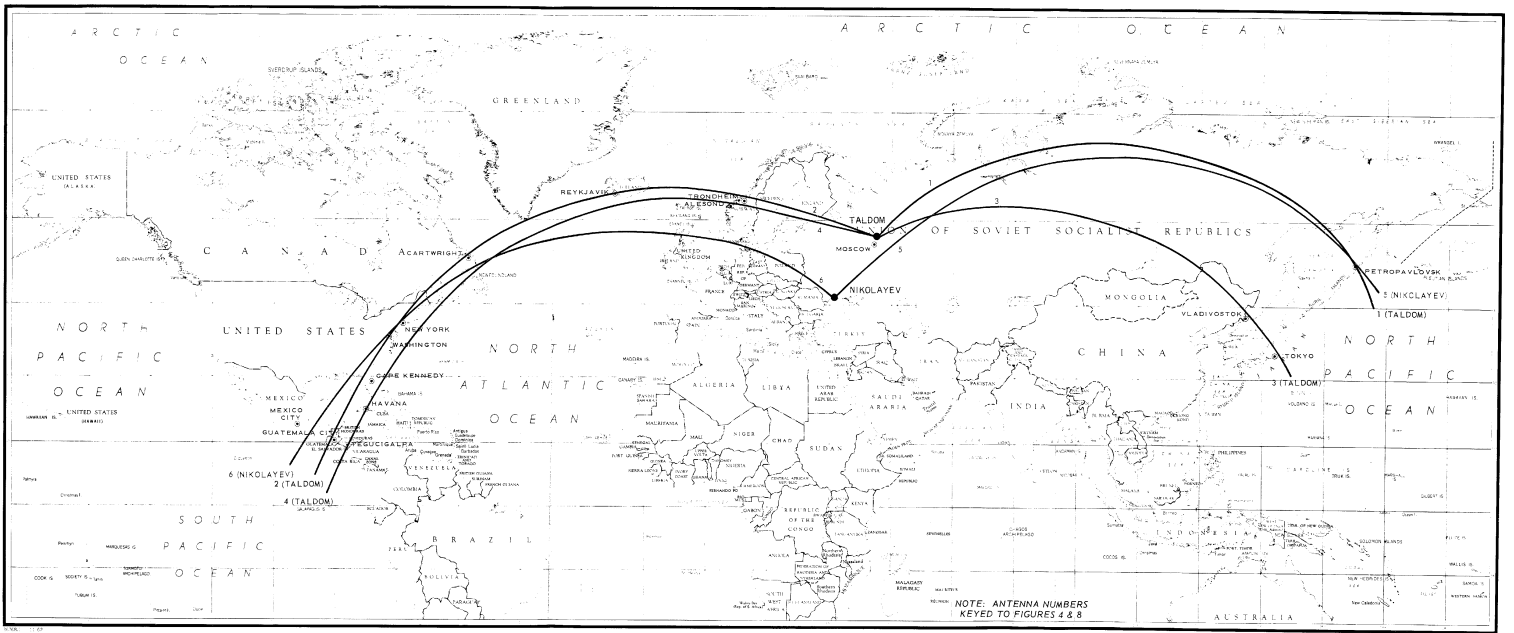
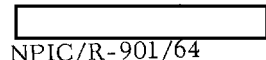
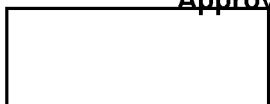


FIGURE 12. GREAT-CIRCLE PROJECTION OF ANTENNA PROPAGATION AZIMUTHS.

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REFERENCES

PHOTOGRAPHY



MAPS OR CHARTS

- DIA. US Air Target Chart, Series 200, Sheet 0250-9III, 3d ed, Apr 63, scale 1:200,000 (SECRET)
- DIA. US Air Target Chart, Series 200, Sheet 0154-23III, 2d ed, Apr 63, scale 1:200,000 (SECRET)

DOCUMENTS

1. Jasik, H. *Antenna Engineering Handbook*, New York, McGraw-Hill, 1961 (U)
2. Tanner, R.L. and Andreasen, M.G. *A Wire-Grid Lens Antenna of Wide Application*, Transactions on Antennas and Propagation, Institute of Electrical and Electronic Engineers, Vol AP 10 (pp 408-429), Jul 62 (U)
3. Berry, D.G. and Malech, R.G. *The Reflectarray Antenna*, Transactions on Antennas and Propagation, Institute of Electrical and Electronic Engineers, Vol AP 11 (pp 645-651), Jul 63 (U)
4. Barnett, R.I. and Tai, C.T. *The Effect of Conducting Half-plane Sheet on the Radiation Patterns of Dolph-Chebyshev Arrays*, Transactions on Antennas and Propagation, Institute of Electrical and Electronic Engineers, Vol AP 12 (pp 455-458), Jul 64 (U)
5. Schell, A.C. *The Diffraction Theory of Large Aperture Spherical Reflector Antennas*, Transactions on Antennas and Propagation, Institute of Electrical and Electronic Engineers, Vol AP 11 (pp 428-432), Jul 63 (U)
6. Searing, R.M. *An Analysis of Stationary Hemispherical Reflectors Used as Narrow Beam, Wide-Angle Scanning Antennas*, Sunnyvale, Calif., Lockheed Missiles and Space Company, 1959 (U)
7. NPIC. R-1519/63, *Cuban International Communication/Broadcast Stations*, Oct 63 (SECRET)

REQUIREMENTS

- NSA. P0432/R-94/64
- CIA. C-SI4-81,712

NPIC PROJECT

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