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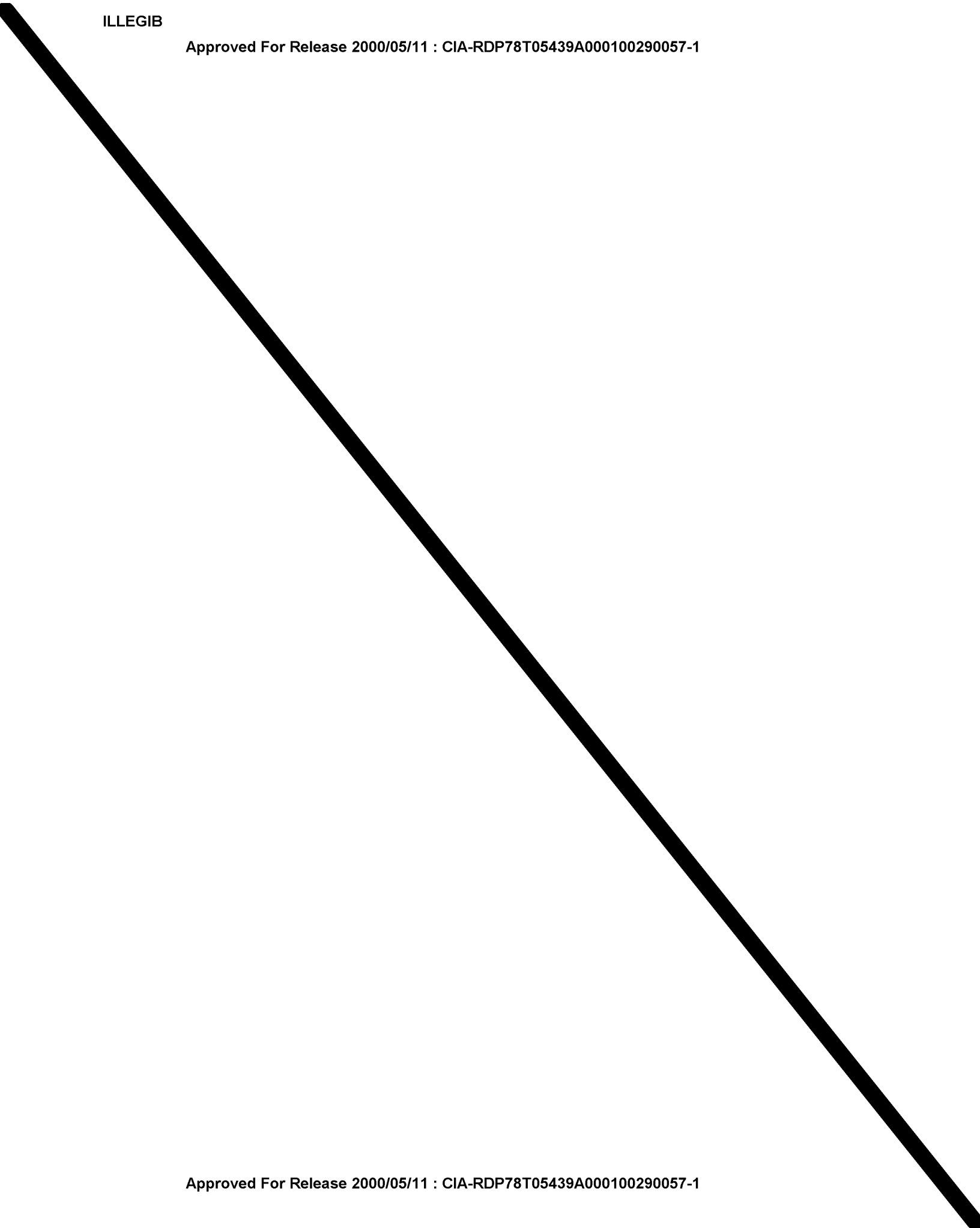

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COMMUNICATIONS IN THE KOMSOMOLSK AREA, USSR

Declassification Review by NIMA/DoD

PIC / JR-6 / 60
APRIL 1960

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PREFACE

This joint photographic intelligence report has been prepared by the Army and the Central Intelligence Agency in response to CIA requirements RR/E/R-91/58 and SI/R-19/58, and Army SRI-10E-1-59. Its scope is intended to fulfill the combined requirements of the Intelligence Community on the communications facilities in and near the city of Komsomolsk, USSR. This report has been prepared primarily to provide a comprehensive photographic intelligence treatment of these important installations, and secondly to facilitate future photo interpretation research and analysis by having under one cover as much information concerning them as was possible to glean from available photography, Russian textbooks, and consultant authorities in the field of electronics.

Komsomolsk and its environs were covered only by Mission [redacted] dated [redacted] The photography was of fair to good quality; however, snow coverage and obliquity precluded interpretation to the degree requested in some instances. The inability to retain image quality of a sufficient degree to obtain workable prints after rectification, necessitated obtaining azimuths and measurements from oblique photography, and thus they must be considered only approximations.

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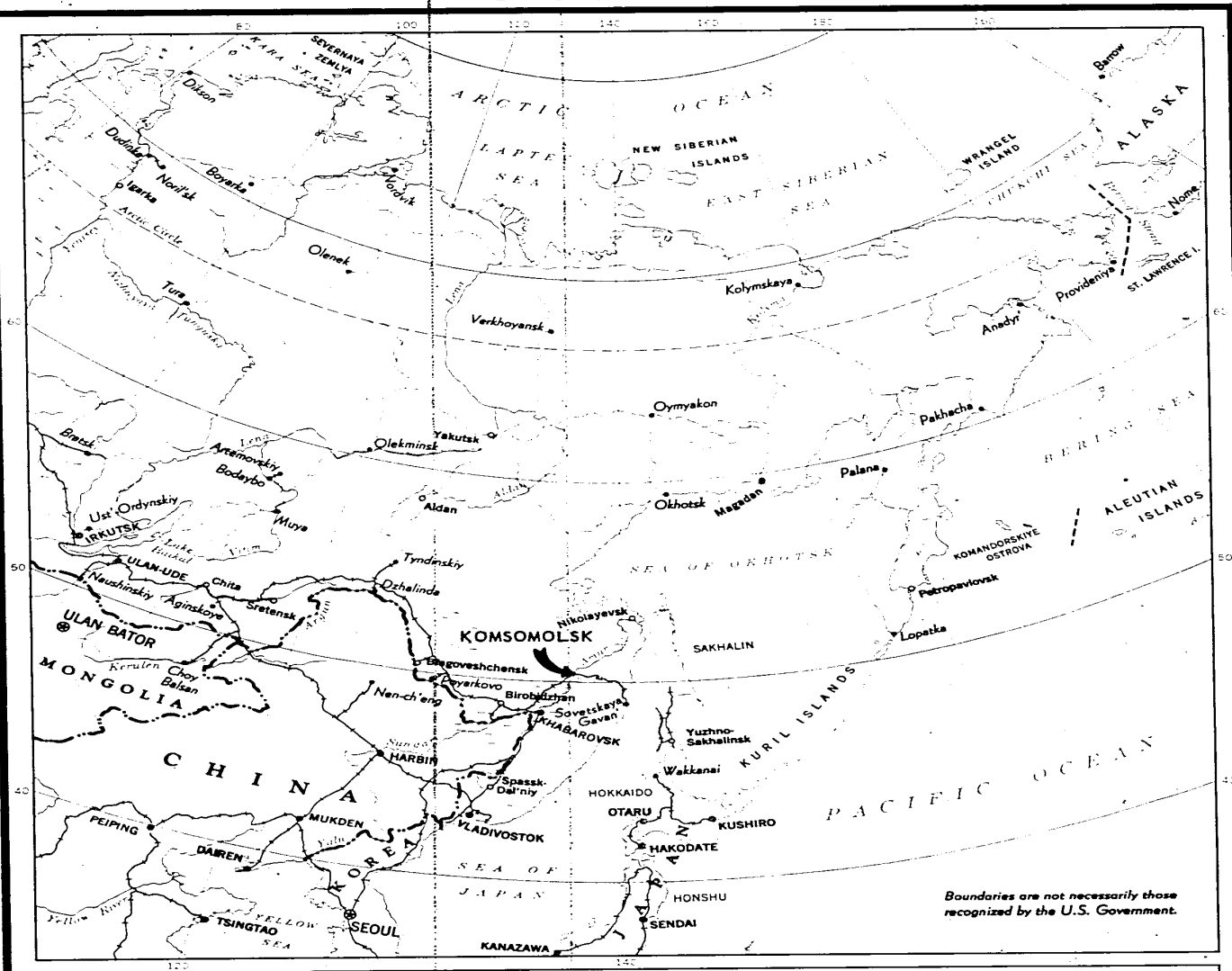
TABLE OF CONTENTS



U. S. S. R.

SOVIET FAR EAST

FIGURE 1. GENERAL ORIENTATION MAP

International boundary · National capital · Road (selected) · Trail (selected) · Railroad (selected)

Scale 1:28,000,000

0 200 400 600 800 1000 Miles

0 200 400 600 800 1000 Kilometers

BASE 11898 3-52

INTRODUCTION

Komsomolsk is located on the left bank of the Amur River in the Soviet Far East, 482 nautical miles (nm) north-northeast of Vladivostok, 207 nm southwest of Nikolayevsk, and 158 nm northwest of Sovetskaya Gavan (Figure 1). The narrow marshlands of the Bolshaya Silinskaya River, which flows southeast into the Amur River at Komsomolsk, divide the city into two built-up areas. These two areas extend 8 nm northeast-southwest along the Amur River and average 3 nm in width. The terrain is generally flat and marshy, with elevations ranging from 100 feet at the Amur River to 150 feet at the north limits of the target complex. The foothills of the Bureya Range are to the northwest.

A total of six communications installations, hereafter referred to as Installations A-F, are located in the vicinity of Komsomolsk (Figure 2). A large communications center consisting of four of the six installations is located approximately 5 nm north-northwest of the city; the fifth installation is on the southern edge of the city, and the sixth is 5 nm southwest of the city.

KOMSOMOLSK COMMUNICATIONS CENTER

The large communications center, consisting of four separate installations (Installations A-D), is located approximately 5 nm north-northwest of Komsomolsk. Indications are that three of these installations are military, while the fourth, a radio broadcasting station, is civil.

The guardhouses at the main entrance gates to all four sites appear active. However, the security fences of two of the installations (B and D) appear to be in disrepair, and a third (Installation A), besides having a small gap in the wall, has guard towers at its four corners which appear

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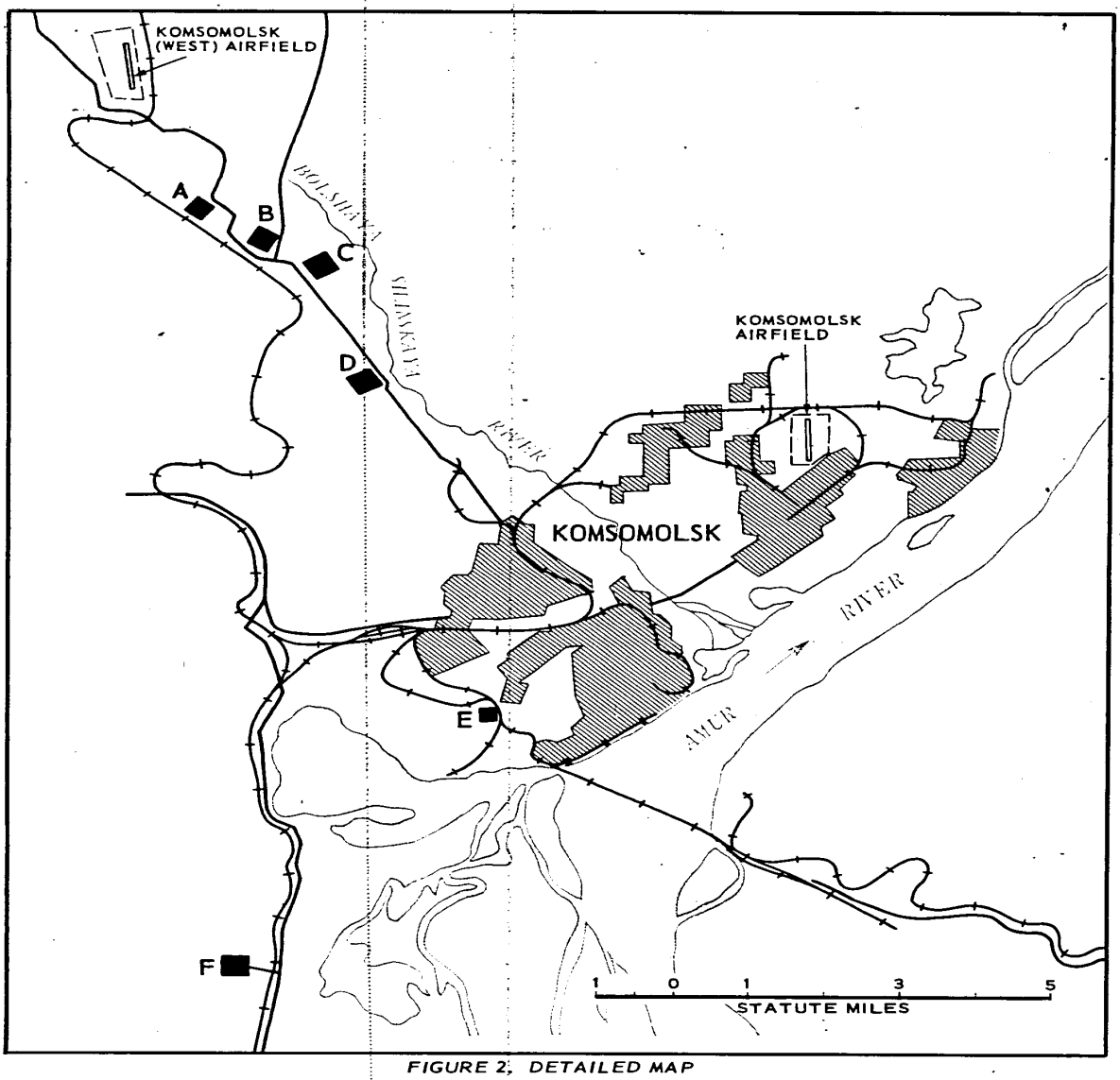

FIGURE 2. DETAILED MAP

unoccupied. This contradiction of security measures possibly indicates that expansion of communications facilities was under way at the time of the photography. This supposition is slightly supported by the presence of possible mast footings outside the fenced area of Installation D and evidence of positional changes of the rhombics in Installation B.

All four installations have independent operations facilities consisting of transmitter/control buildings, cooling ponds, and other associated facilities. The power supply for the normal operation appears to be derived from two power plants located in Komsomolsk. Power is transmitted from the plants via two power lines to transformer yards located within Installations C and D. Installations A and B are then probably supplied with power by single-pole distribution lines. Snow-covered mounds, probably buried fuel tanks, at each of the installations indicate the existence of reported auxiliary diesel generators.

A two-lane all-weather road serves all four installations and connects them with Komsomolsk. In addition, a spur from the Komsomolsk-Duri railroad serves Installation B.

Radio Broadcasting Station, Installation A

This installation (Figures 3 and 4) which is wall-secured and roughly rectangular in shape, covers an area of approximately 40 acres. Two box lattice towers 465 feet high and 575 feet apart are the only evidences of antennas found within the installation. The existence of an antenna arrangement between these two towers could not be determined from available photography.

A small support area consisting of two barracks-type buildings, one administrative-type building, and numerous small houses is located immediately southeast of the installation. The type of construction and general lack of uniformity of the support area indicate that the installation is probably civil rather than military.

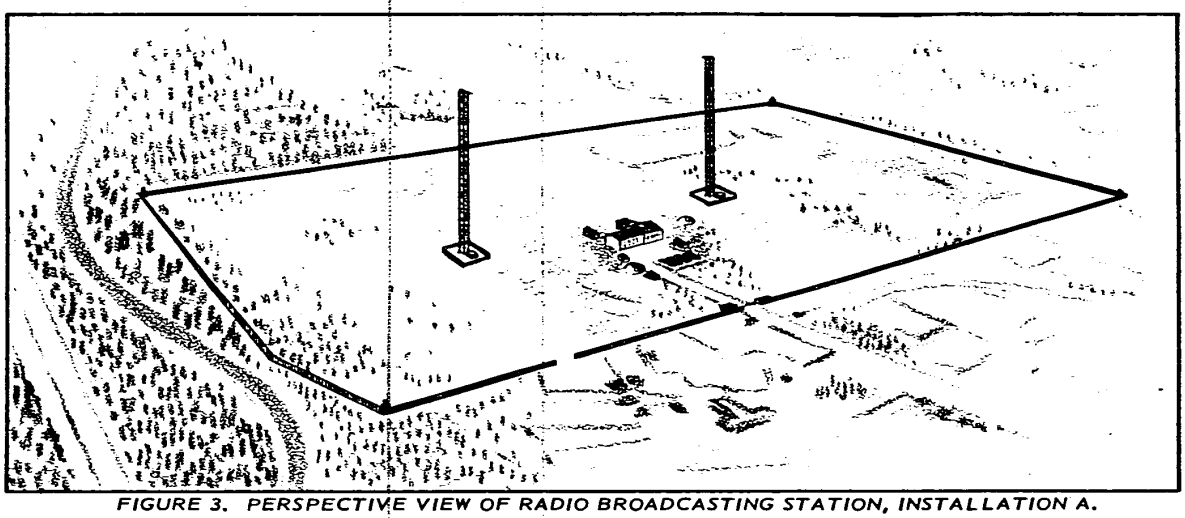

FIGURE 3. PERSPECTIVE VIEW OF RADIO BROADCASTING STATION, INSTALLATION A.

Table 1. Structures Identified In the Support Area, Installation A.

Item No*	Description/Probable Use**	Dimensions (ft)
1	Auxiliary-generator building; possibly connected to Building 3	25 x 20
2	Tuning house	20 x 20
3	Two-story transmitter/control building with single-story attachment	80 x 25 50 x 30
4	Unidentified building	15 x 15
5	Unidentified building	40 x 20
6	Guardhouse	20 x 20
7	Rectangular Cooling Ponds	50 x 25
8	Unidentified building	35 x 15
9	T-shaped administration building	75 x 30 50 x 35
10	Apartment house	100 x 40
11	Apartment house	75 x 40

* Item numbers are keyed to Figure 4.
** Except as noted, all buildings are single-story.

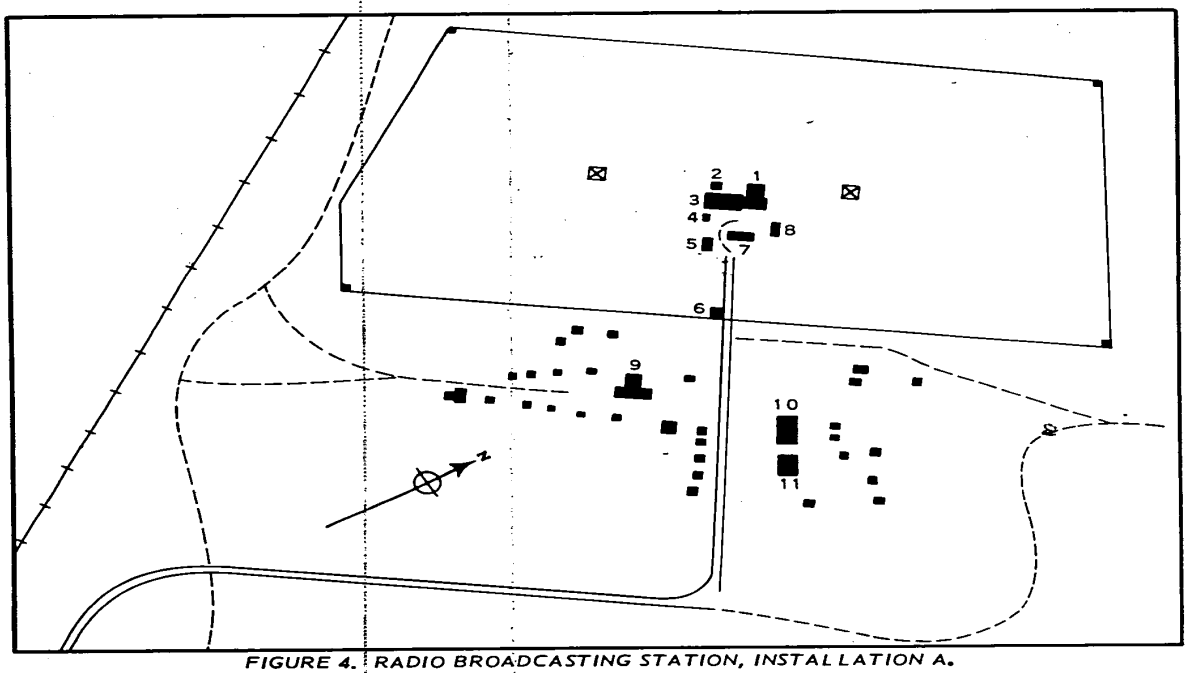

FIGURE 4. RADIO BROADCASTING STATION, INSTALLATION A.

High-Frequency Point-To-Point Communication Station, Installation B

This installation (Figures 5 and 6), partially wall-secured, occupies approximately 140 acres and is located 1,600 feet southeast of Installation A. It contains 13 rhombic antennas, and seven pairs of self-supporting lattice-type towers with stacked parasitic arrays. Dissipation lines of the four rhombics in the northern corner of the installation could not be determined, and it is possible that these four are either in a state of construction or are not operational. Of these two possibilities, numerous old mast footings which were found within this area led to the conclusion that they were in a state of construction at the time of the photography.

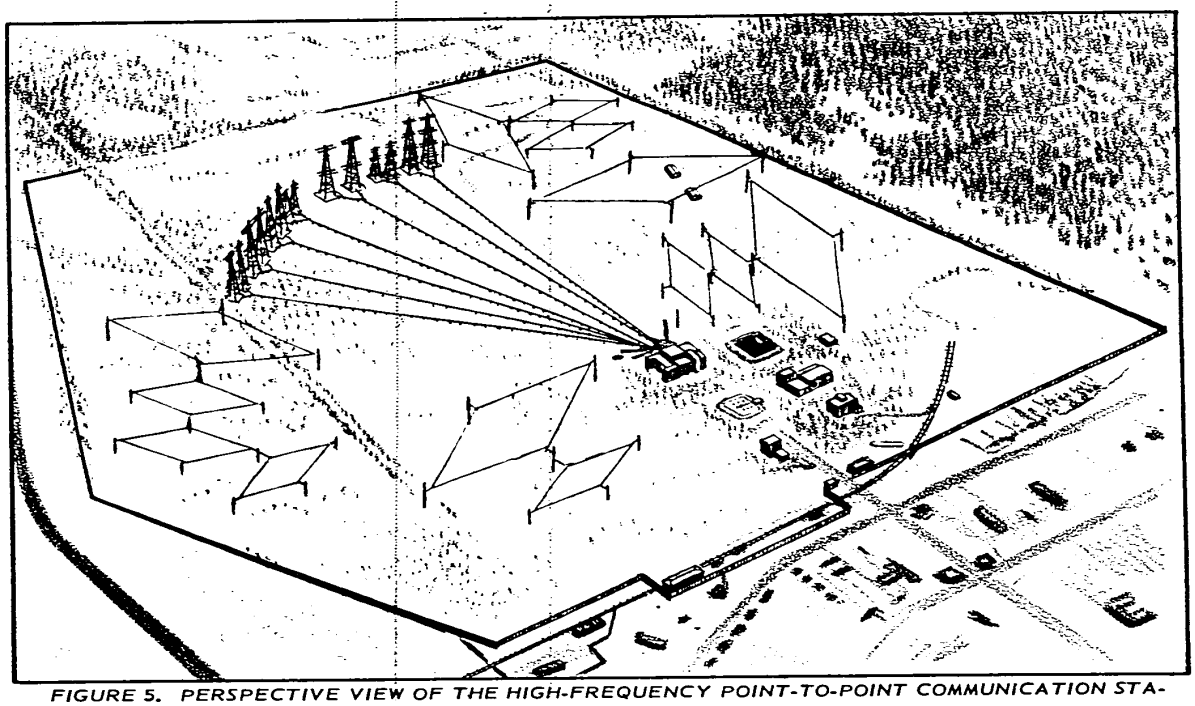

FIGURE 5. PERSPECTIVE VIEW OF THE HIGH-FREQUENCY POINT-TO-POINT COMMUNICATION STATION, INSTALLATION B.

Table 2. Measured values (pole to pole) of the rhombics, Installation B.

Item No*	Major Axis (ft)	Minor Axis (ft)	Leg (ft)	Antenna Height (ft)	Leg/Height Ratio
1	720	385	410	95	4:1
2***	395	210	225	55	4:1
3	395	210	225	55	4:1
4	720	385	410	95	4:1
5	395	210	225	55	4:1
6***	395	210	225	55	4:1
7	720	385	410	95	4:1
8	735	295	405	70	6:1
9***	395	210	225	55	4:1
10	720	385	410	95	4:1

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*Item numbers are keyed to Figure 6.
**For graphical portrayal of azimuths, see Figure 10.
***Paired double rhombics; measurements are identical for both rhombics.

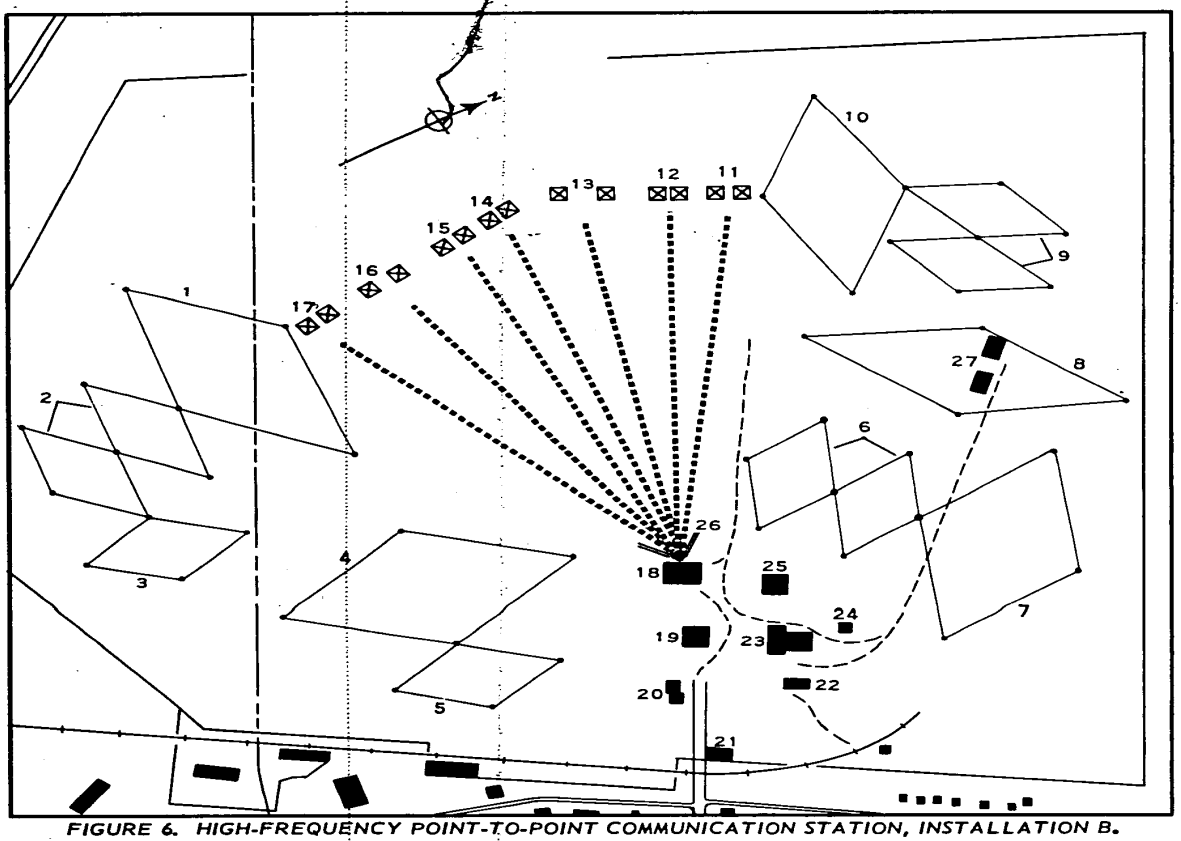

FIGURE 6. HIGH-FREQUENCY POINT-TO-POINT COMMUNICATION STATION, INSTALLATION B.

A large housing and support area (Figure 14) located between Installations B and C is jointly utilized by both. This area is described in detail under Installation C.

Measurements of the rhombics as shown in Table 2 led to some confusion as the side apex angles were different from the side apex angles of many rhombics previously encountered in the USSR.

A possible explanation of the above differences in side apex angles

was found in a Russian Text - (Antenna, A. A. Pistolkors, 1947, Sec. 5, pp. 343-355) which described a double rhombic utilizing single end-poles. The following graphic, Figure 7, which was taken from the above-mentioned text, depicts a rhombic of this type.

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Assuming that the rhombics in Installation B are of the same type as above, and utilizing the ratio of λ as shown, a different set of values can be computed and are shown in Table 3. The following drawing (Figure 8)

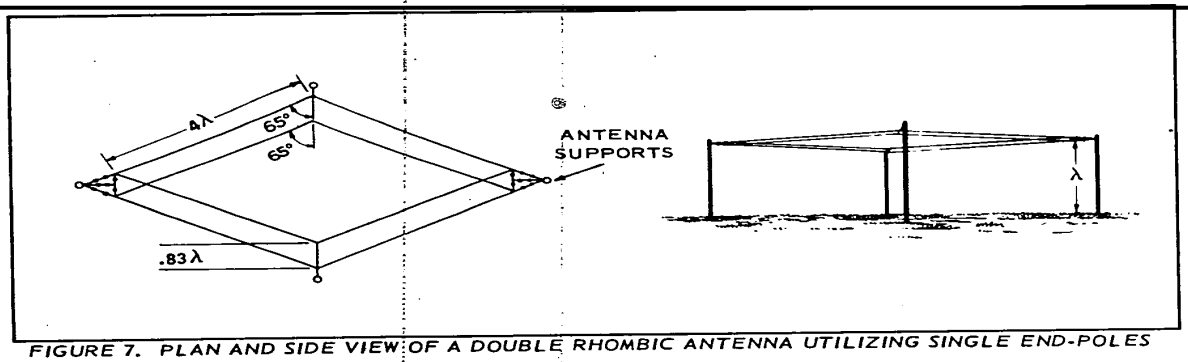

FIGURE 7. PLAN AND SIDE VIEW OF A DOUBLE RHOMBIC ANTENNA UTILIZING SINGLE END-POLES (After Pistolkors).

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depicts how the two different values may be obtained from the original measurements.

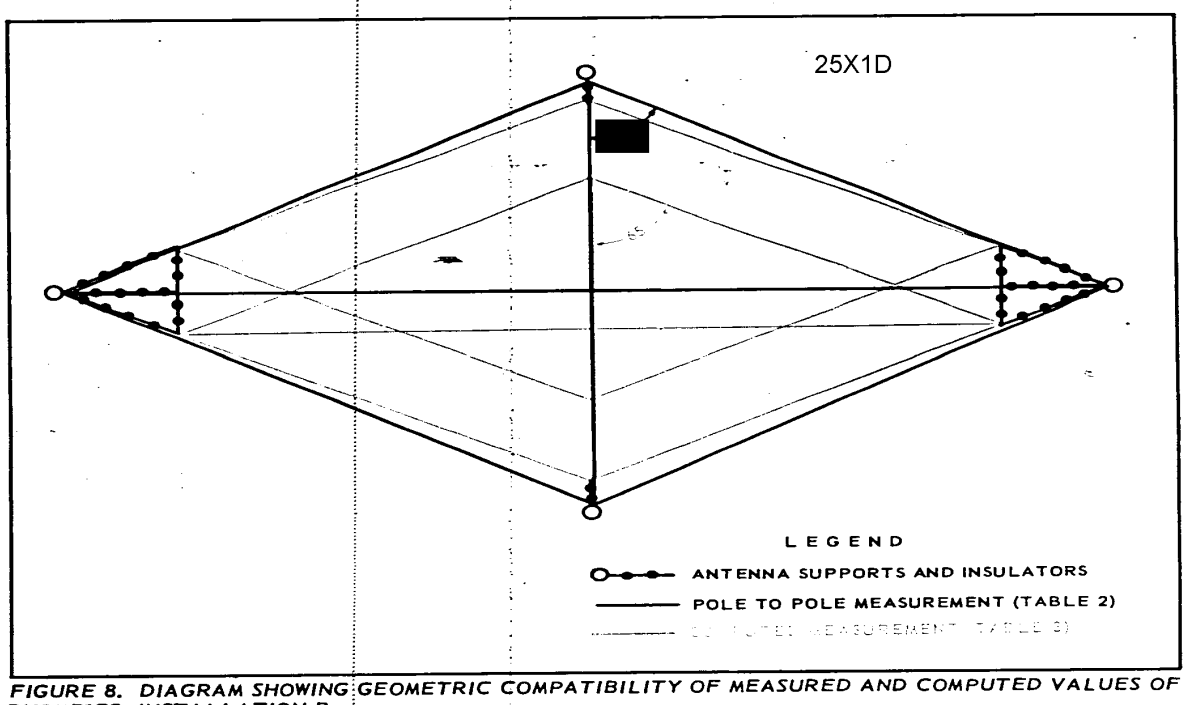

FIGURE 8. DIAGRAM SHOWING GEOMETRIC COMPATIBILITY OF MEASURED AND COMPUTED VALUES OF RHOMBICS, INSTALLATION B.

The measured values of the seven pairs of self-supporting towers (Figure 9) is shown in Table 4. These values were derived by taking numerous measurements, and then averaging them. It was then found that the towers fell into groups according to heights, and so they were grouped again and a second average measurement was obtained.

The identification of the parasitic arrays was based upon a comparison of the measured values and the translation of Section 3 of the Russian text mentioned previously. This section described a broadcasting center in

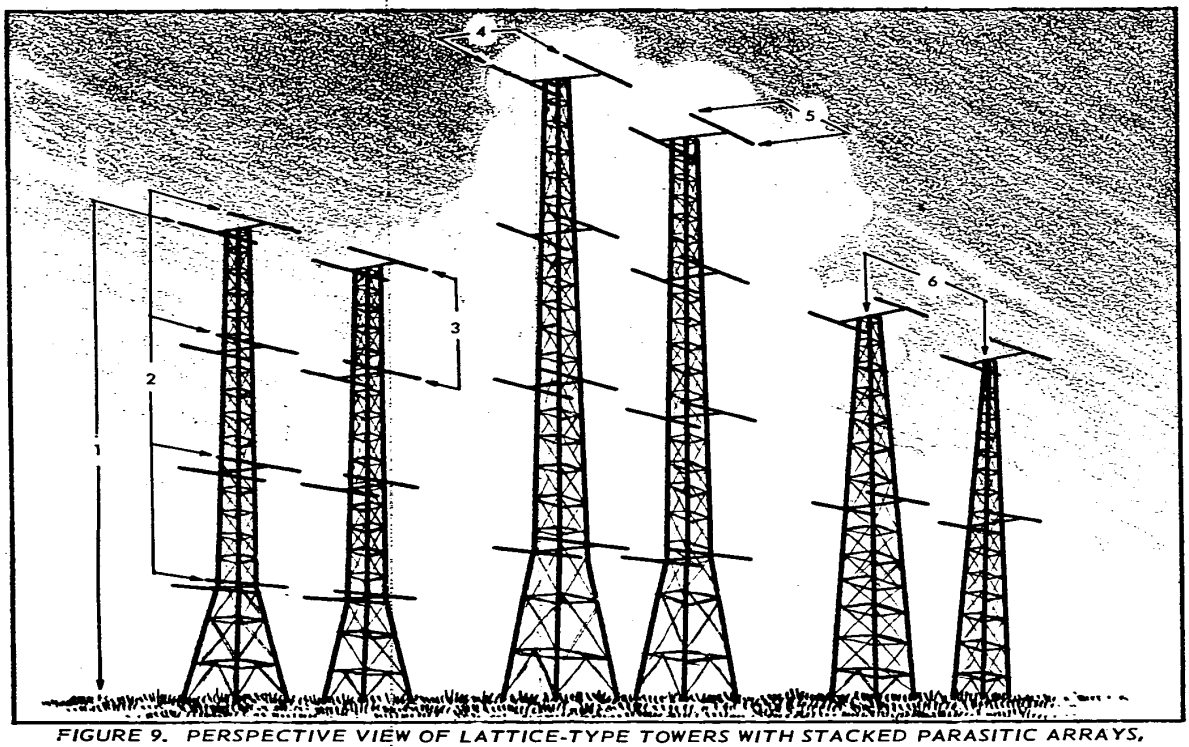

FIGURE 9. PERSPECTIVE VIEW OF LATTICE-TYPE TOWERS WITH STACKED PARASITIC ARRAYS, INSTALLATION B. Numbers shown on the graphic correspond to the column numbers in Table 4.

Table 4. Measured values of towers and parasitic arrays, Installation B.

Item No*	1 Height of Tower (ft)	2 No of Arrays	3 Distance Between Arrays (ft)
11	180	4	45
12	125	4	35
13	170	2	75
14	125	4	35
15	180	4	45
16	170	2	75
17	180	4	45

[redacted]

*Item numbers are keyed to Figure 6.
**For graphical portrayal of azimuths, see Figure 10.

25X1D

Moscow and explained that the towers were arranged three fourths of a wave length apart, and the drivers, either two or four pairs, were arranged one above the other at half wave lengths. The distance between the driver and parasitic reflector was given as 0.2 of a wave length, and the length of the driver as 0.5 of a wave length.

The equation L = 492/f -- when L is the length in feet of a half wave length for a frequency, f, given in megacycles -- was used in determining the frequency as shown in Table 4.

A description of structures identified in Installation B is presented in Table 5.

Table 5. Structures identified in Installation B.

Item No*	Description/Probable Use**	Dimensions (ft)
18	Two-story transmitter/control building, irregular shape	110 x 70
19	Rectangular cooling pond (not operational)	70 x 50
20	Two-story auxiliary-generator building with single-story attachment	30 x 30 40 x 30
21	Guardhouse	55 x 25
22	Two-story equipment-storage/repair building	60 x 35
23	Two-story transmitter/control building, irregular shape	110 x 50
24	Junction house	30 x 20
25	Rectangular cooling pond	50 x 50
26	Mast	90 (high)
27	Two unidentified buildings	70 x 30

* Items numbers are keyed to Figure 6.
** Except as noted, all buildings are single-story.

High-Frequency Broadcasting Station, Installation C

This installation (Figures 11 and 12), covering approximately 185 acres, is located 1,150 feet south of Installation B. It consists of 13 self-supporting lattice-type towers, arranged in 2 rows, which probably support high-frequency curtain arrays; a transmitter/control building with asso-

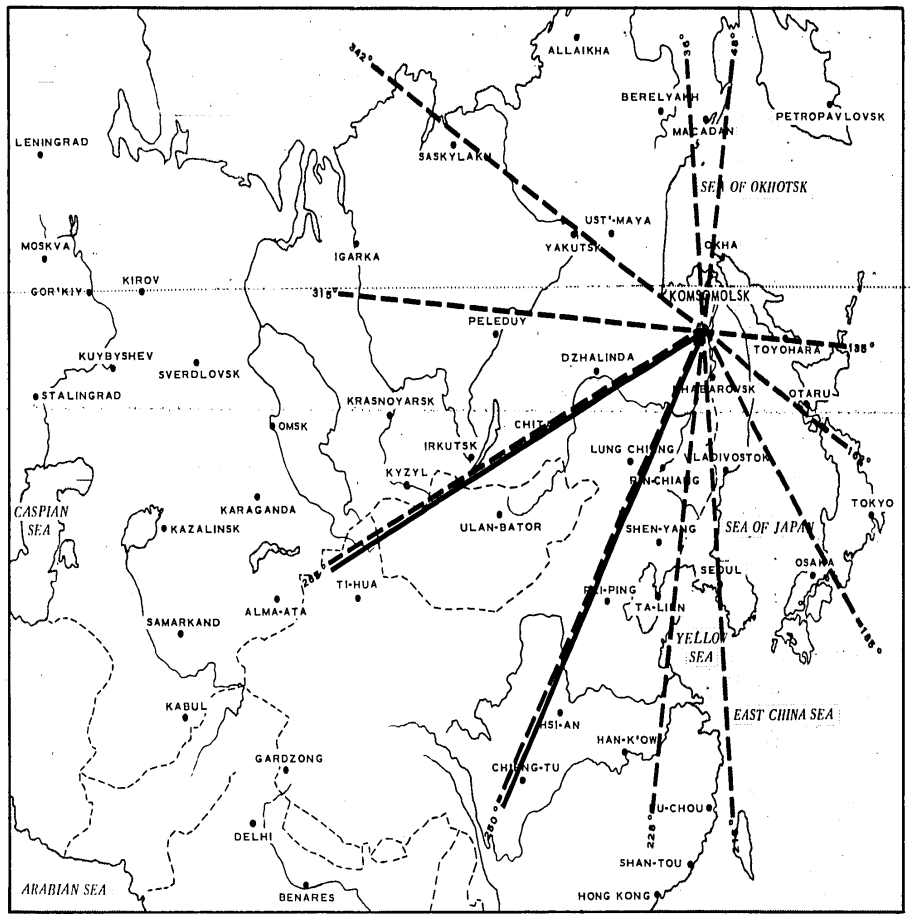

FIGURE 10. GNOMONIC PROJECTION MAP SHOWING AREAS COVERED BY ANTENNAS AT INSTALLATION B.

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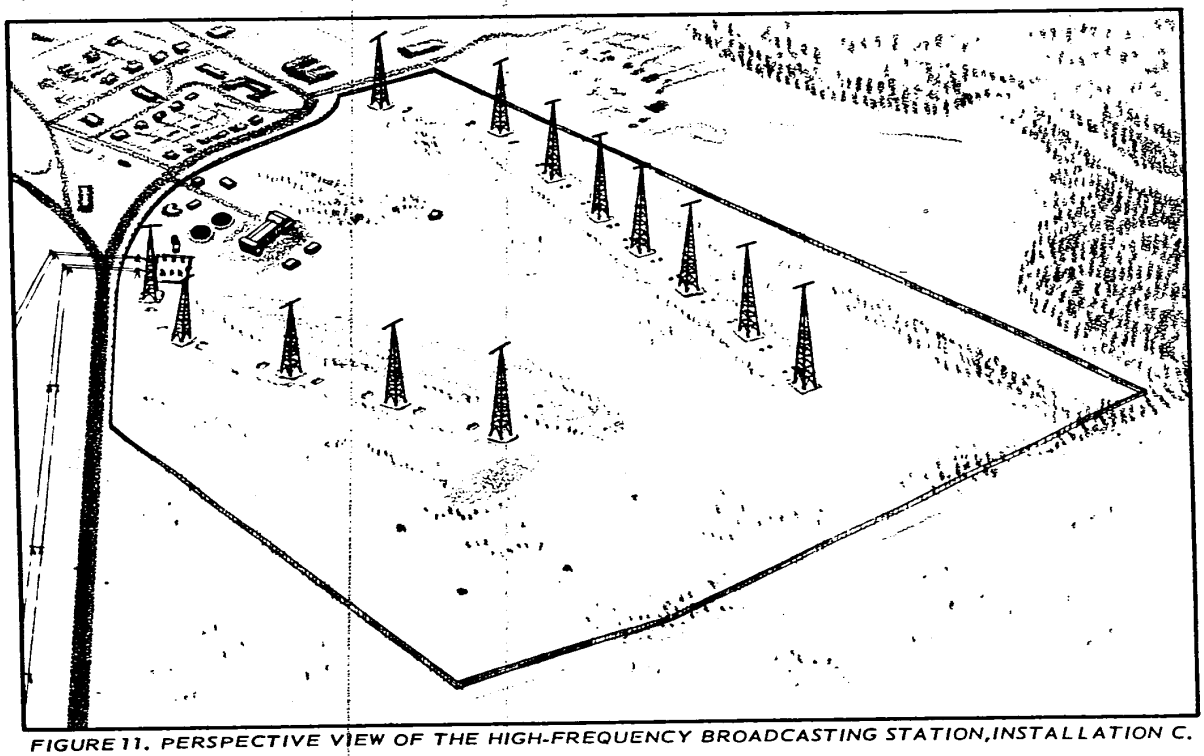

FIGURE 11. PERSPECTIVE VIEW OF THE HIGH-FREQUENCY BROADCASTING STATION, INSTALLATION C.

ciated cooling ponds; junction houses; and a transformer yard. A large housing and support area located between Installations B and C, is jointly utilized by both. Further details of the operations area associated with this installation can be found in PIC/JR-29/59, dated December 1959.

Housing and Support Area Associated With Installations B And C

The housing and support area located immediately south of Installation B, and north of Installation C, is probably utilized by both (Figure 14). It

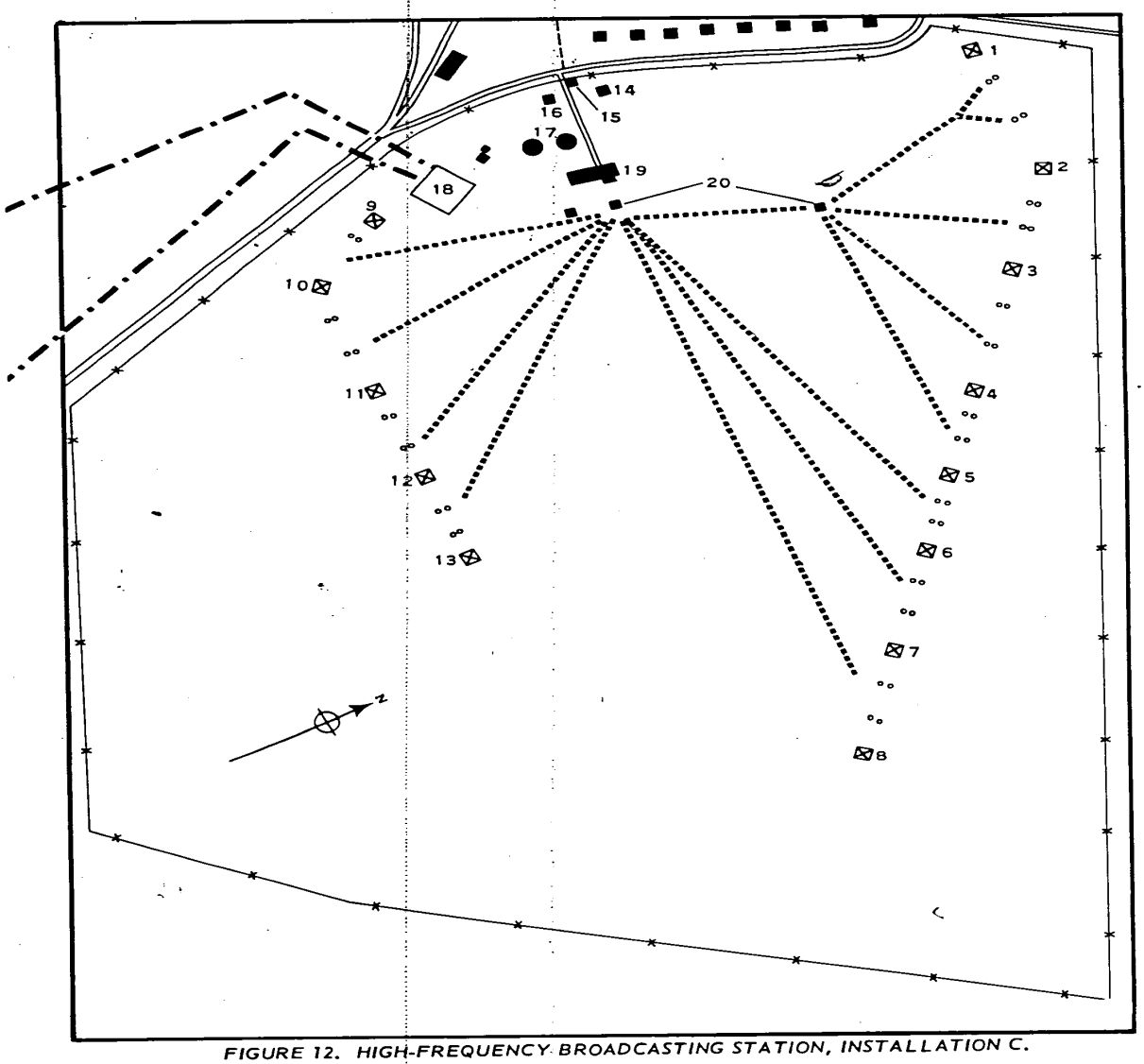

FIGURE 12. HIGH-FREQUENCY BROADCASTING STATION, INSTALLATION C.

Table 6. Measured values of the towers, Installation C.

Item No*	Height Of Tower (ft)	Crossarm, Length & Width (ft)	Distance Between Towers (ft)	Perpendicular Azimuth** (°)
1	260	20 x 5	435	[redacted]
2	260	20 x 5	375	
3	260	20 x 5	305	
4	260	20 x 5	275	
5	260	20 x 5	370	
6	330	35 x 10	345	
7	330	35 x 10	430	
8	330	35 x 10		
9	260	20 x 5	270	
10	330	35 x 10	375	
11	330	35 x 10	310	
12	260	20 x 5	285	
13	260	20 x 5		

25X1D

*Items numbers are keyed to Figure 12.
**For graphical portrayal of azimuths, see Figure 13.

Table 7. Structures identified in the operations area, Installation C.

Item No*	Description/Probable Use**	Dimensions (ft)
14	Unidentified building	30 x 25
15	Guardhouse	15 x 15
16	Auxiliary-generator building	30 x 20
17	Two circular cooling ponds	40 (diameter)
18	Transformer	140 x 105
19	Transmitter/control building, irregular shape, with north end two-story	100 x 40 30 x 30
20	Two tuning houses	15 x 10

* Item numbers are keyed to Figure 12.
** Except as noted, all buildings are single-story.

consists of 6 barracks-type buildings, 2 administrative-type buildings, a motor pool, and numerous miscellaneous buildings probably used for storage and housing, including at least 23 single or duplex housing units.

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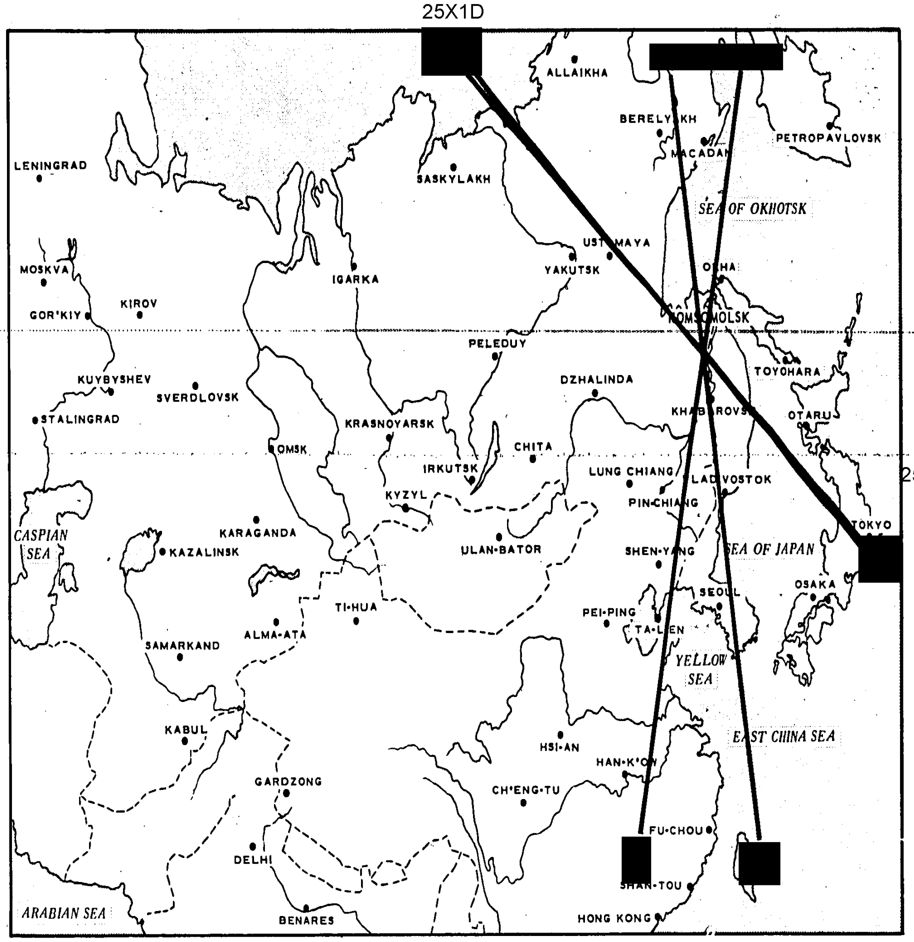

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FIGURE 13. GNOMONIC PROJECTION MAP SHOWING AREAS COVERED BY ANTENNAS AT INSTALLATION C.

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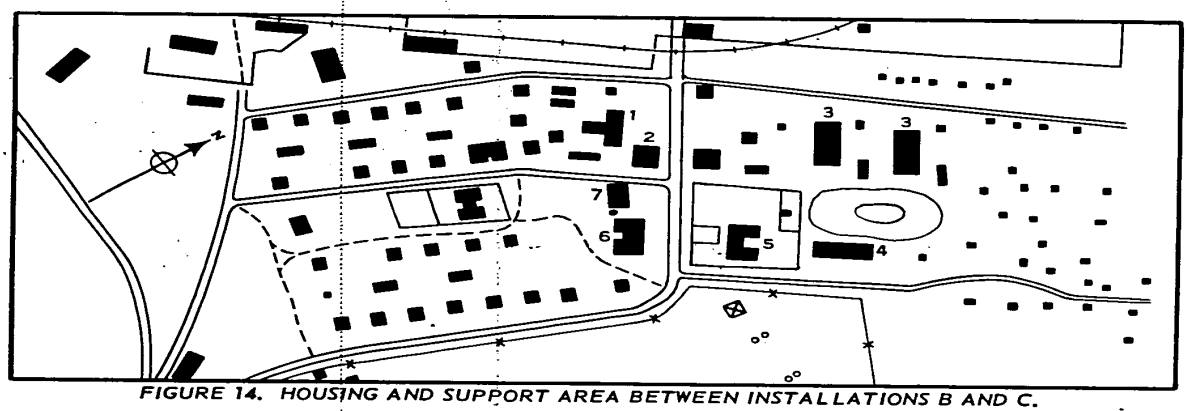

FIGURE 14. HOUSING AND SUPPORT AREA BETWEEN INSTALLATIONS B AND C.

Table 8. Structures identified in the housing and support area between Installations B and C.

Item No *	Description/Probable Use**	Dimensions (ft)
1	T-shaped administration building	95 x 35 110 x 30
2	Two barracks	70 x 60
3	Two barracks	125 x 55
4	Barracks	125 x 55
5	U-shaped administration building	110 x 35 35 x 35
6	U-shaped administration building	120 x 40 35 x 35
7	Motor pool with storage/maintenance building	110 x 35

* Item numbers are keyed to Figure 14.
** Except as noted, all buildings are single-story.

Rhombic Antenna Farm, Installation D

This installation (Figures 15 and 16), which is wall-secured, occupies approximately 340 acres and is located 7,100 feet south of Installation C. It contains 18 rhombics, 17 of which are double rhombics. Snow cover prevented the determination of type of rhombics, whether transmitting or receiving, as dissipation lines were obscured.

25X1D

Table 9. Measured values of the rhombics, Installation D.

Item No*	Major Axis (ft)	Minor Axis (ft)**	Leg (ft)	Distance Between End-Poles (ft)	Antenna Height (ft)	Leg/ Height Ratio	Computed Tilt Angle (°)
1****	455	215	250	60	65	4:1	65
2****	455	215	250	60	65	4:1	65
3	455	215	250	60	65	4:1	65
4	300	140	165	40	40	4:1	65
5	565	265	310	70	75	4:1	65
6	565	265	310	70	75	4:1	65
7	565	265	310	--	75	4:1	65
8****	880	415	485	115	120	4:1	65
9	880	415	485	115	120	4:1	65
10	680	320	375	85	90	4:1	65
11	680	320	375	85	90	4:1	65
12	880	415	485	115	120	4:1	65
13	680	320	375	85	90	4:1	65
14	500	235	275	65	65	4:1	65
15	500	235	275	65	65	4:1	65

[redacted]

*Item numbers are keyed to Figure 15.
**Distance between end-poles has been subtracted from the distance between side-poles to obtain the minor axis of the rhomboid.
***For graphical portrayal of azimuths, see Figure 17.
****Paired double rhombics; measurements are identical for both rhombics.

Table 10. Structures identified in Installation D.

Item No*	Description/Probable Use**	Dimensions (ft)
16	Three-story transmitter/control building with single-story attachment	125 x 55 125 x 30
17	Two rectangular cooling ponds	75 x 70
18	Three masts	70 (high)
19	Unidentified building	40 x 40
20	Two-story auxiliary-generator building, irregular shape	60 x 50
21	Storage building with two attachments	20 x 20 10 x 10
22	Unidentified building	60 x 40
23	Transformer yard with building	180 x 90 90 x 25
24	Administration building	100 x 50
25	Two-story L-shaped administration building	100 x 30 70 x 30
26	Two two-story barracks	130 x 40
27	Two two-story barracks, with dormers	130 x 40
28	Two-story barracks, with dormers	190 x 60
29	Two-story barracks, with dormers	120 x 40

*Item numbers are keyed to Figure 15.
**Except as noted, all buildings are single-story.

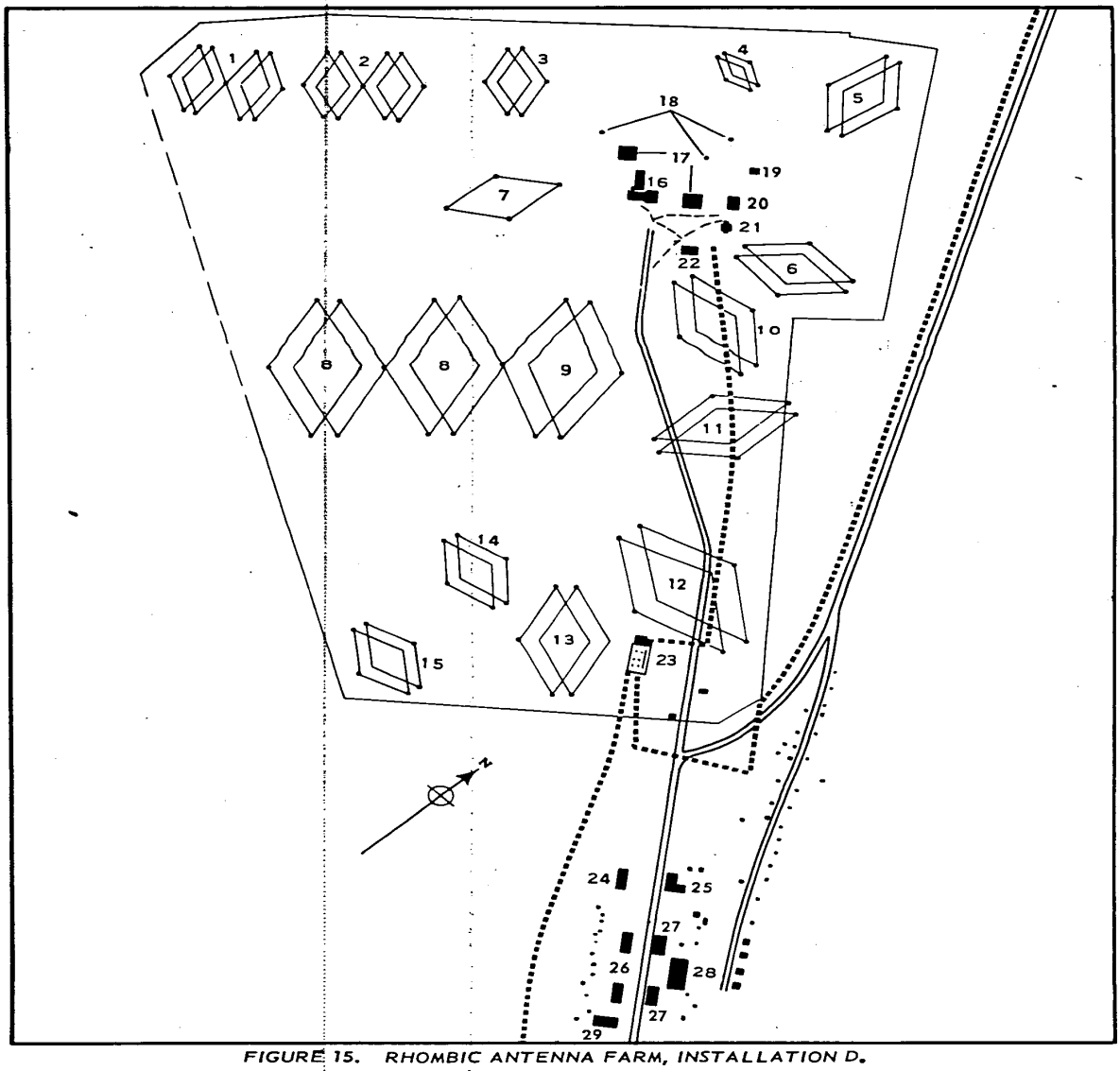

FIGURE 15. RHOMBIC ANTENNA FARM, INSTALLATION D.

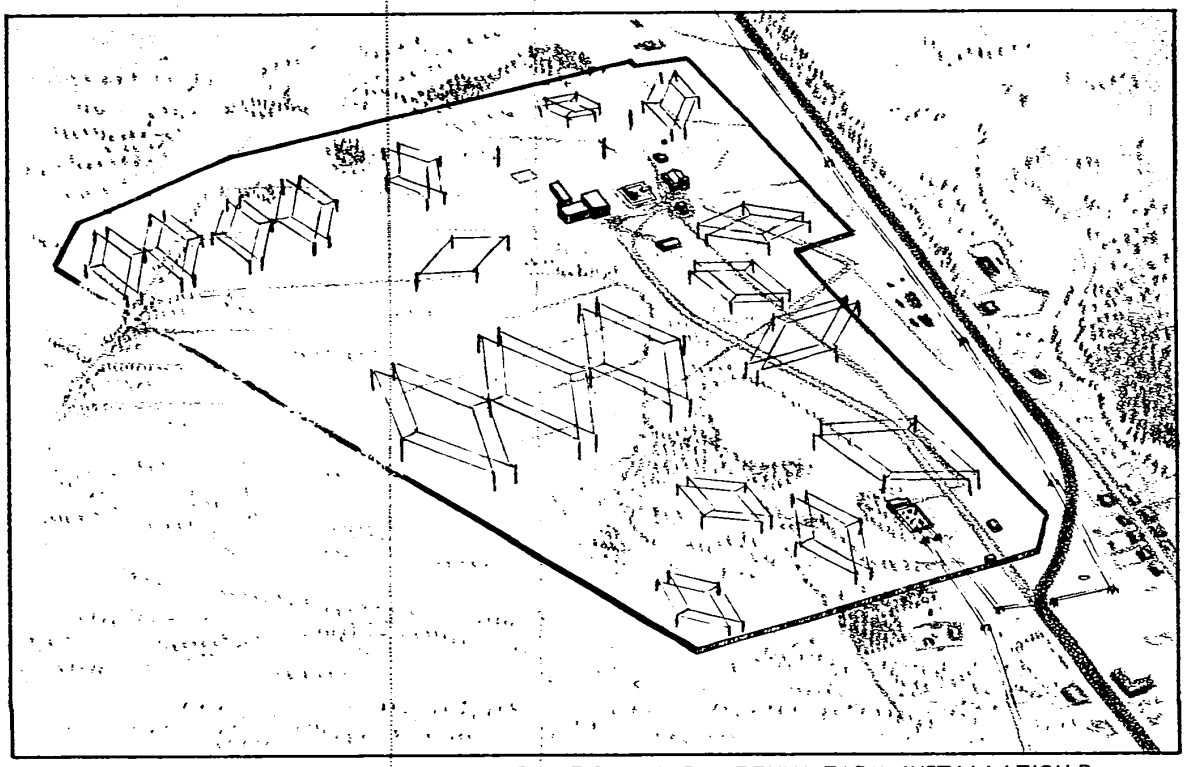

FIGURE 16. PERSPECTIVE VIEW OF THE RHOMBIC ANTENNA FARM, INSTALLATION D.

A support area consisting of barracks and administration buildings is located immediately south of the installation.

The design parameters of the rhombics in this area were computed using G. Z. Ajzenberg's theory of double rhombics (Antennas for Trunkline Radio Communications, Svyazizdat, 1948, pp 284-289). Figure 18 diagrams Ajzenberg's theory on the double rhombics, which consist of two rhomboids placed one above the other and displaced one to the other in the direction of the minor axis by a distance on the order of .8-1.0λ.

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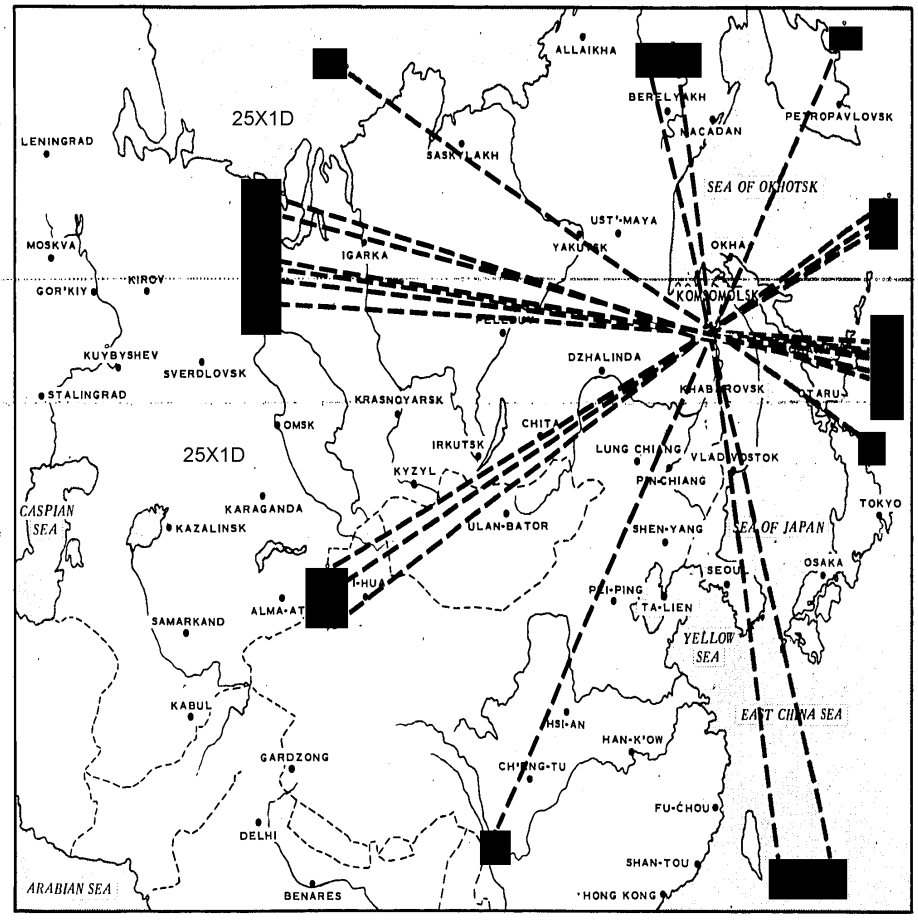

FIGURE 17. GNOMONIC PROJECTION MAP SHOWING AREAS COVERED BY ANTENNAS AT INSTALLATION D.

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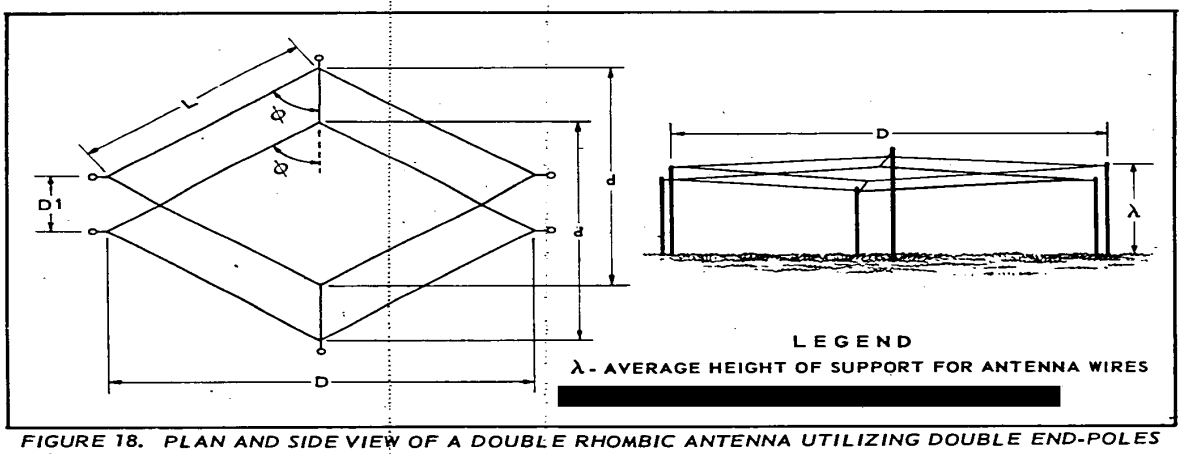

FIGURE 18. PLAN AND SIDE VIEW OF A DOUBLE RHOMBIC ANTENNA UTILIZING DOUBLE END-POLES (After Ajzenberg).

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PROBABLE COMMUNICATIONS STATION, INSTALLATION E

A small fenced and guarded installation covering approximately 5 acres is located on the southwestern edge of the city of Komsomolsk (Figures 19

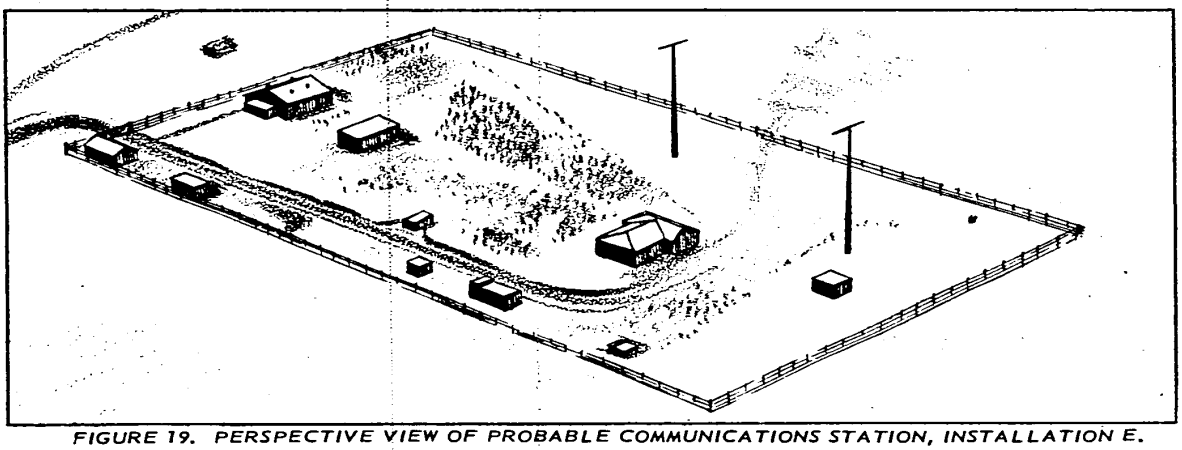

FIGURE 19. PERSPECTIVE VIEW OF PROBABLE COMMUNICATIONS STATION, INSTALLATION E.

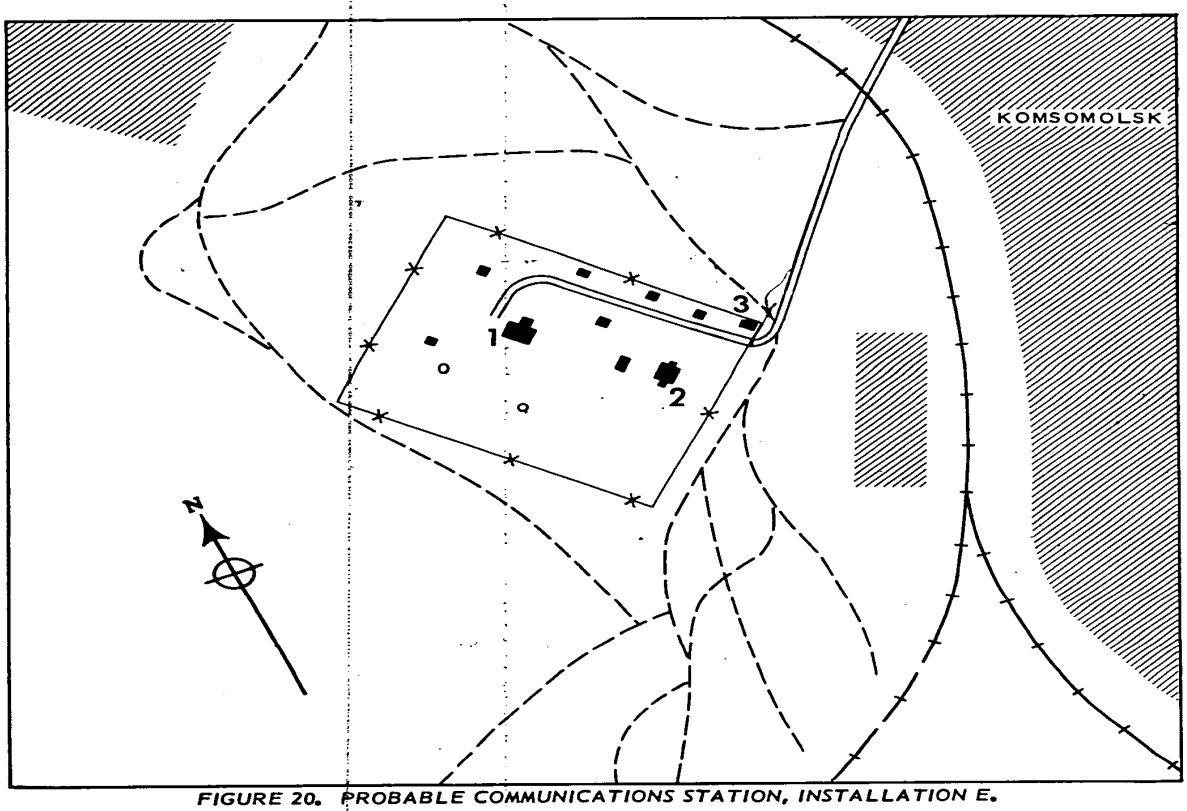

FIGURE 20. PROBABLE COMMUNICATIONS STATION, INSTALLATION E.

Table 11. Structures identified in Installation E.

Item No*	Description/Probable Use**	Dimensions (ft)
1	T-shaped transmitter/control building	75 x 35 45 x 35
2	Administration building with two shed attachments	45 x 40 20 x 10
3	Guardhouse	30 x 30

*Item numbers are keyed to Figure 20.
** All buildings are single-story. Six other small single-story buildings are situated in the area.

and 20). The presence of two 75-foot stick masts 190 feet apart indicates that this may be a communications station. The existence of an antenna arrangement between these two masts could not be determined from available photography, but crossarms on the masts, and their orientation, indicate that some type of antenna is probably supported between them.

RECEIVING RHOMBIC ANTENNA FARM, INSTALLATION F

This installation (Figure 21), which covers an area of approximately 175 acres, is located approximately 5 nm southwest of Komsomolsk. In general appearance, it is quite similar to those installations discussed previously in this report. The control area, which is wall-secured, contains a control building, possible auxiliary generator building, a guardhouse, and an earthen mound which is probably a buried diesel fuel tank. Three double rhombics and eight 90-foot masts were found in and around the control area.

The major difference noted was the apparent lack of cooling facilities. This factor, plus the complete lack of rhombic dissipation lines, led to the assumption that this was a receiving rather than a transmitting site. Another major difference between sites is that approximately 115 acres, in

Table 12. Measured values of the rhombics, Installation F.

Item No*	Major Axis (ft)	Minor Axis (ft)	Leg (ft)	Distance Between End-Poles (ft)	Antenna Height (ft)	Leg/ Height Ratio	Computed Tilt Angle (°)
1	660	310	365	90	90	4:1	65
2	660	310	365	90	90	4:1	65
3	660	310	365	90	90	4:1	65

[redacted]

*Item numbers are keyed to Figure 21.
**For graphical portrayal of azimuths, see Figure 22.

25X1D

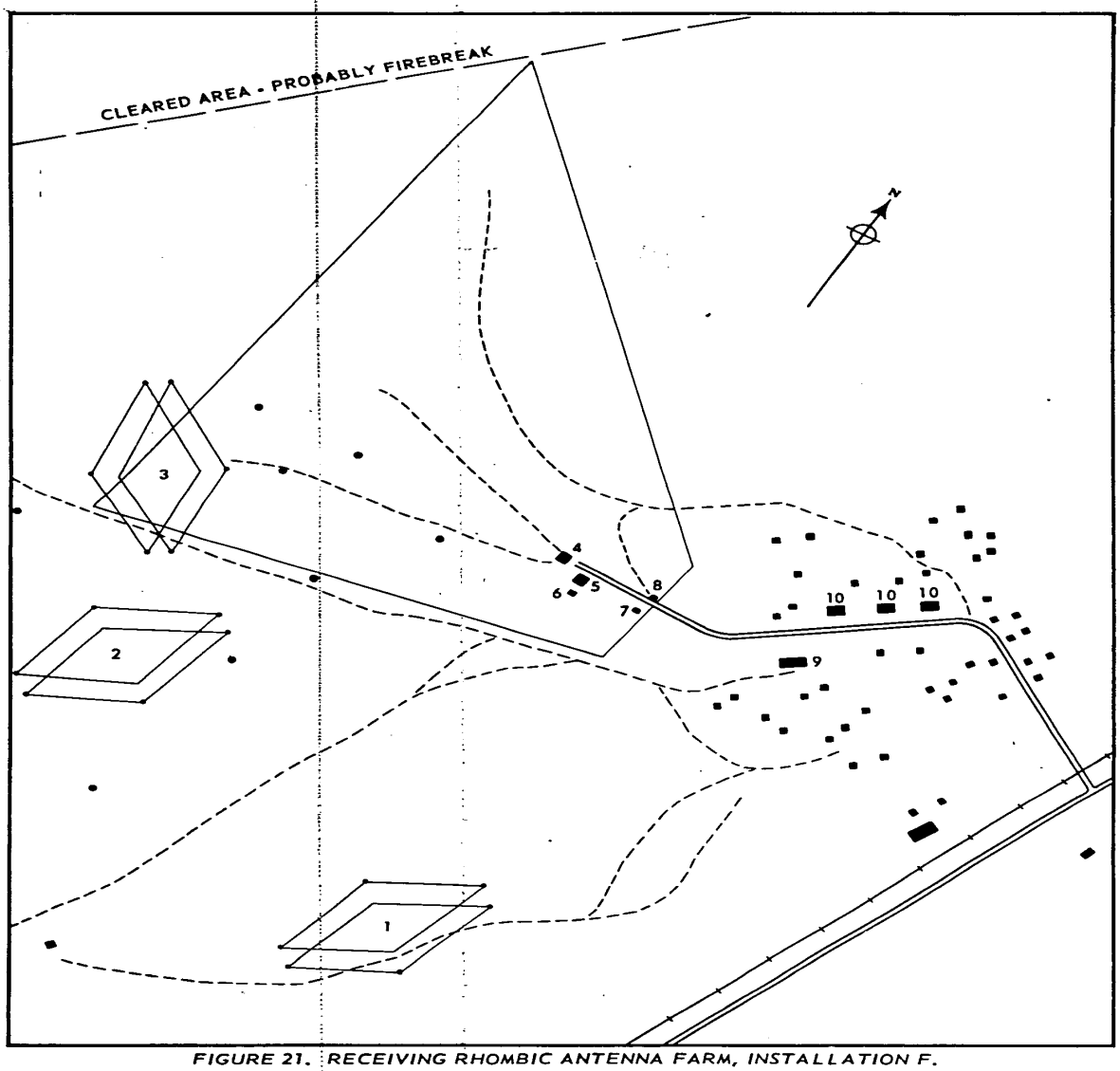

FIGURE 21. RECEIVING RHOMBIC ANTENNA FARM, INSTALLATION F.

PIC/JR-6/60

25X1D

25X1D

25X1D

25X1D

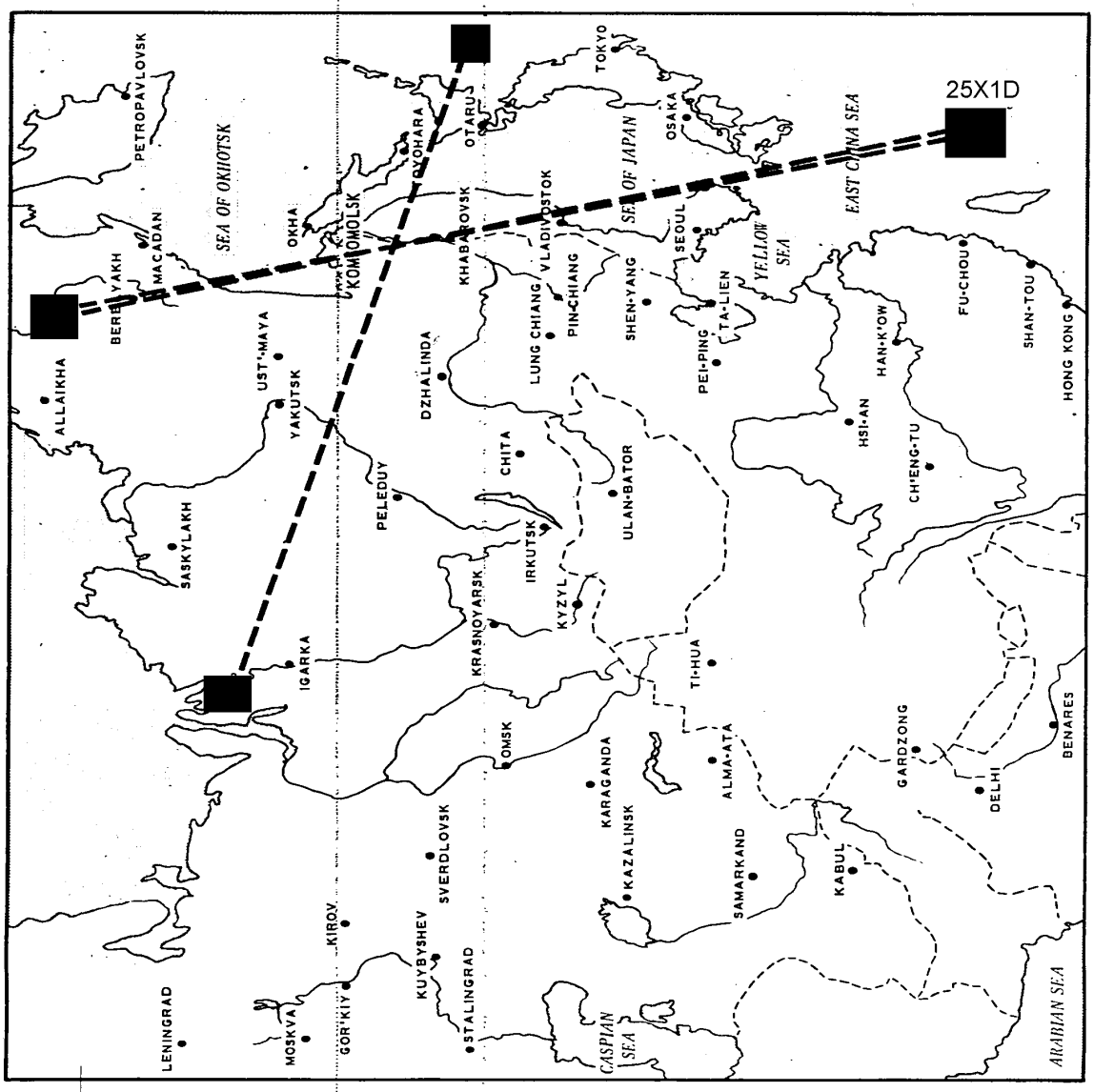

FIGURE 22. GNOMONIC PROJECTION MAP SHOWING AREAS COVERED BY ANTENNAS AT INSTALLATION F.

Table 13. Structures identified in Installation F.

Item No*	Description/Probable Use**	Dimensions (ft)
4	Control building	55 x 35
5	Auxiliary-generator building with two-story north end	55 x 30 30 x 15
6	Storage building	25 x 15
7	Guardhouse	30 x 20
8	Guard posts	10 x 10
9	Barracks building	80 x 40
10	Three barracks buildings	70 x 35

* Item numbers are keyed to Figure 21.

** Except as noted, all buildings are single-story. Approximately 40 other single-story buildings are in the area.

which the major portion of the antennas was found, was apparently unsecured.

The installation and an associated support area, which is located adjacent to and east of the control area, is served by a two-lane improved road.

PIC/JR-6/60

PHOTO DATA: 25X1D

Mission	Camera	Frames	Date	Scale
[redacted]				

MAP DATA:

WAC 204
Special Report No. 78, Far East Town Plan Series, Komsomolsk, USSR (S), with text supplement (C)

US Air Target Chart - Series 200, 0204-8A, 1st ed., Nov 1958 (S)

US Air Target Chart - Series 100, 0204-9998-100A, 2nd ed., Dec 1953 (S)

US Air Force Special Gnomonic Tracking Chart, GT 44 S (E), 1:22,000,000, revised Feb 1957 (C)

COORDINATES:

Installation A - 50°39'N 136°54'E
Installation B - 50°39'N 136°55'E
Installation C - 50°38'N 136°55'E
Installation D - 50°37'N 136°56'E
Installation E - 50°32'N 136°59'E
Installation F - 50°28'N 136°54'E