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April 1961

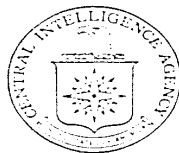
JOINT PHOTOGRAPHIC INTELLIGENCE REPORT

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HIGH-FREQUENCY BROADCAST/BROADCAST-RELAY STATION KUYBYSHEV, USSR



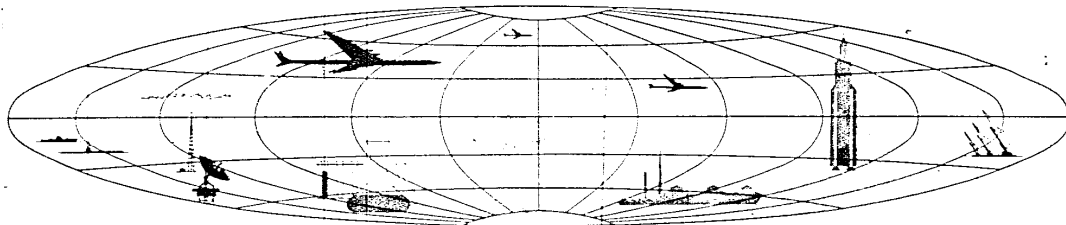
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PREFACE

This joint photographic intelligence report has been prepared by the Navy and Central Intelligence Agency and fully answers their requests for a detailed photographic analysis of the Kuybyshev High-Frequency Broadcast/Broadcast-Relay Station, USSR.

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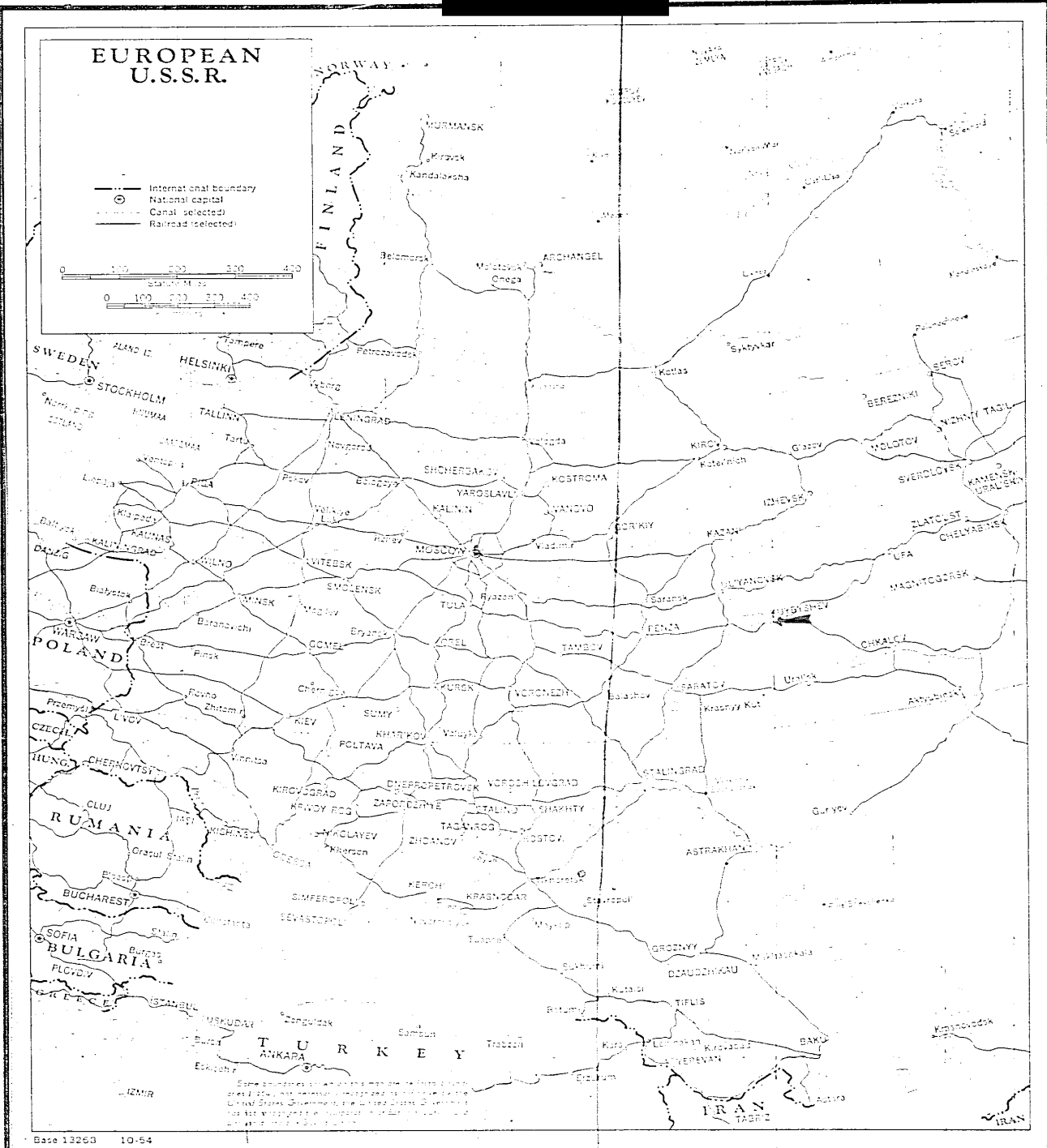
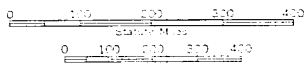
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EUROPEAN U.S.S.R.

- International boundary
- ⊙ National capital
- - - Canal (selected)
- Railroad (selected)



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INTRODUCTION

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The Kuybyshev High-Frequency Broadcast/Broadcast-Relay Station, covered by photography of [REDACTED] is located at 53-17N 50-15E, 6 nautical miles north-northeast of Kuybyshev, USSR (see Figure 1). The station is situated on rolling upland etched by gullies, approximately 600 feet above sea level. It includes a fenced operations area and a support complex made up of a housing and administration area, a maintenance area, and a storage area (see Figures 2 and 3). A 25-foot-wide paved road serves the station and connects with the main road leading north from the Kuybyshev urban area. Operational facilities at the station appeared to be undergoing modernization at the time of the photography.

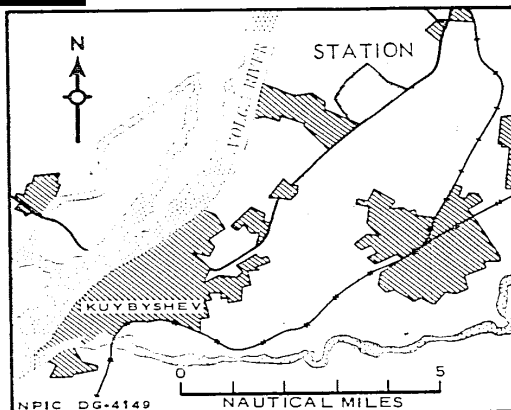


FIGURE 1. LOCATION OF KUYBYSHEV STATION.

OPERATIONS AREA 25X1D

The operations area is roughly rectangular and covers approximately 580 acres (maximum dimensions of 6,500 by 4,900 feet). The entire area is secured by a wire fence supported on [REDACTED] line poles. A large portion of the operations area (approximately 200 acres) is covered by dense mature timber. The area contains 39 curtain antennas supported by 43 quadrupedal lattice towers, 3 dual horizontal rhombic antennas, 2 center-fed horizontal dipole antennas, one microwave tower, 4 transmitter buildings (one under construction), one antenna maintenance area, and a group of construction support buildings.

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FIGURE 2. KUYBYSHEV HIGH-FREQUENCY BROADCAST/BROADCAST-RELAY STATION. This station is 6 nm NNE of Kuybyshev, USSR. (Date of photography, [REDACTED])

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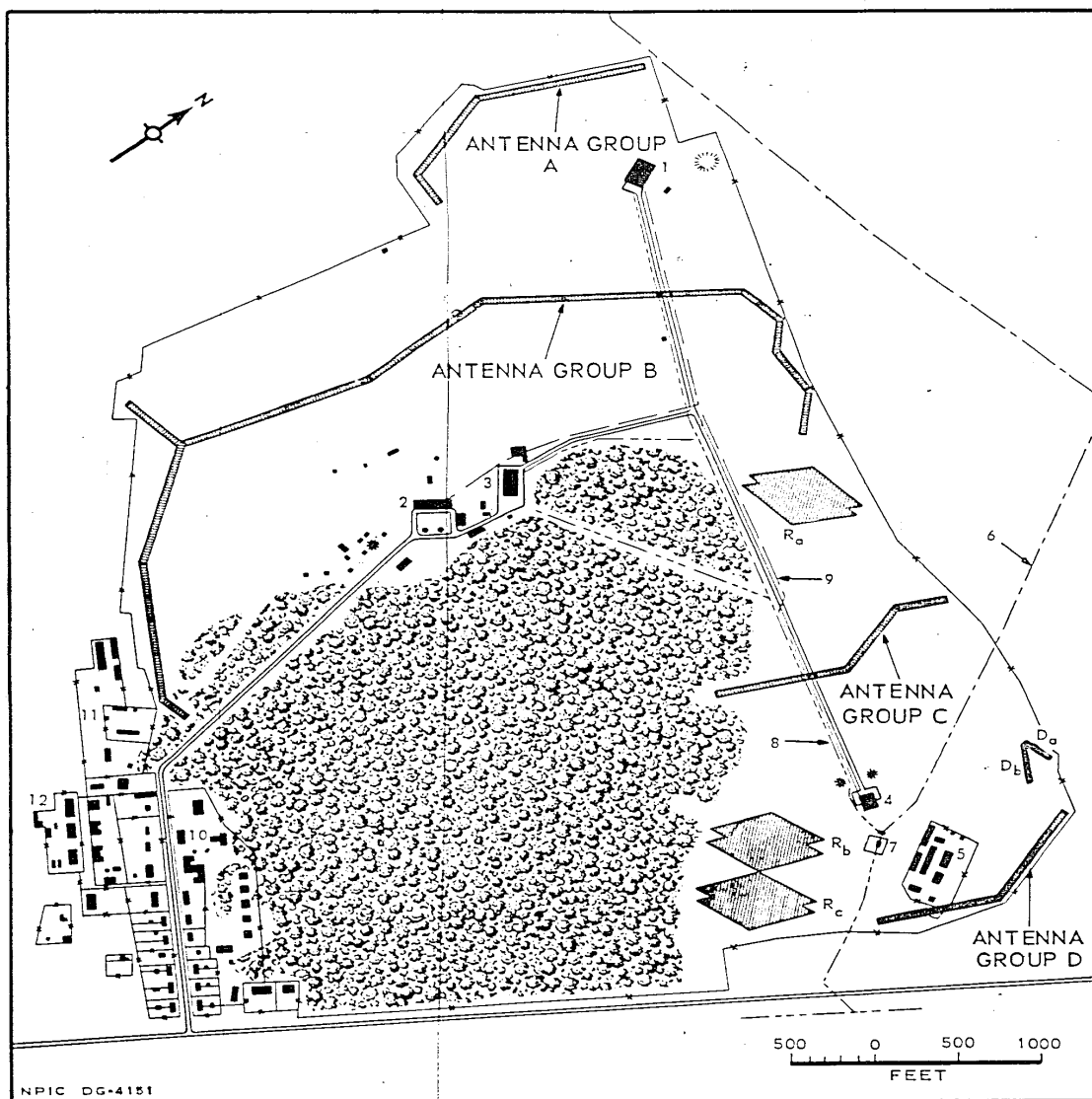


FIGURE 3. LAYOUT AND FACILITIES AT KUYBYSHEV STATION. Operational facilities were being modernized at the time of the photography.

The 39 curtain antennas are divided into four groups, designated Antenna Groups A, B, C, and D. The three dual horizontal rhombic antennas are designated R_a , R_b , and R_c . The two center-fed horizontal dipole antennas are designated D_a and D_b . The four transmitter buildings are designated transmitter buildings A, B, C, and D. Because of the complex feeding arrangements for the curtain antennas, these antennas are not described according to their group, but according to their association with specific transmitter buildings. In certain cases, an antenna is fed from two transmitter buildings.

Transmitter Building A and Associated Antennas

Transmitter building A is a modern structure measuring 210 by 95 and 30 feet high. It has a longitudinal monitor and four vents on the roof. The monitor measures 165 by 25 feet and each vent measures 15 by 10 feet. Feeders lead from the transmitter building to two outdoor multi-position switch yards measuring 260 by 110 feet and 140 by 50 feet, respectively (see Figure 4). All the curtain antennas in Antenna Group A and antenna p in Antenna Group B are fed solely from transmitter building A. Antennas e through j in Antenna Group B are fed from both transmitter building A and transmitter building B. Feed-line lengths from switch yard to antenna vary from 650 feet (antenna a, group A) to 3,250 feet (antenna p, group B). Pertinent information concerning the antennas is given in Tables 1 and 2.

Transmitter Building B and Associated Antennas

Transmitter building B is an old-type structure measuring 235 by 45 and 35 feet high. The roof supports numerous objects which appear to be ornamental rather than functional. A buried feed line leads northwest

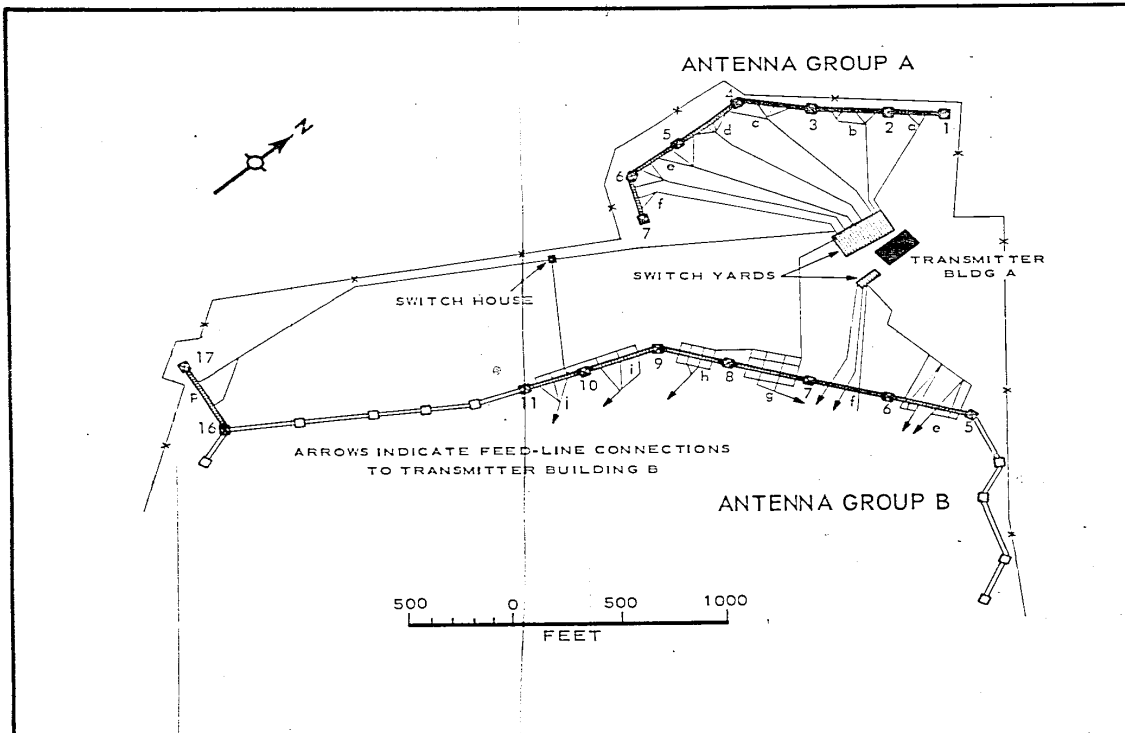


TABLE 1. DATA ON CURTAIN ANTENNAS, ANTENNA GROUP A

Tower Number	Tower Height * (ft)	Distance Between Tower Centers (ft)	Antenna Letter	Number of Feeds	Primary Radiation Orientation (°)
1	155	260	a	2	
2	-	375	b	4	
3	-	375	c	3	
4	-	375	d	6	
5	-	295	e	4	
6	-	260	f	3	
7	135				

* Not all tower heights are measurable.

NPIC DG-4152

FIGURE 4. TRANSMITTER BUILDING A AND ASSOCIATED ANTENNAS.

from the transmitter building to the main switch house measuring 60 by 20 and 20 feet high (see Figure 5).

Transmitter building B feeds all the antennas in Antenna Group B except antenna p (located between towers 16 and 17), which is fed only from transmitter building A. Six of the antennas in Antenna Group B (antennas e through j) are fed jointly by transmitter buildings A and B.

The feed-line lengths from the main switch house to the antennas in Antenna Group B vary from 800 feet (antenna k) to 2,700 feet (antenna a). All feed lines are aboveground wire lines with the exception of a portion of the feed to antennas l through n, which is buried. This buried feed line is of recent construction and may indicate future modernization of feed lines, since aboveground wire lines always create serious technical problems of winter maintenance. Three secondary switch houses, in addition to the main switch house, are utilized to handle the complex feeding arrangements for the antennas.

A 50-foot-high microwave tower, with two possible reflectors, is located south of transmitter building B. Pertinent information concerning the antennas in Antenna Group B is given in Table 2.

Transmitter Building C

Transmitter building C is similar to transmitter building A and measures 210 by 95 and 30 feet high (see Figure 5). It has a longitudinal monitor and four vents on the roof. The monitor measures 165 by 25 feet and each vent measures 15 by 10 feet. Externally, the structure appears complete, but as indicated by the absence of feed lines and the rough appearance of the ground surrounding the structure, the building is undergoing internal construction or equipment installation. The closeness of this transmitter building to transmitter building B suggests that the former might be intended to replace the latter.

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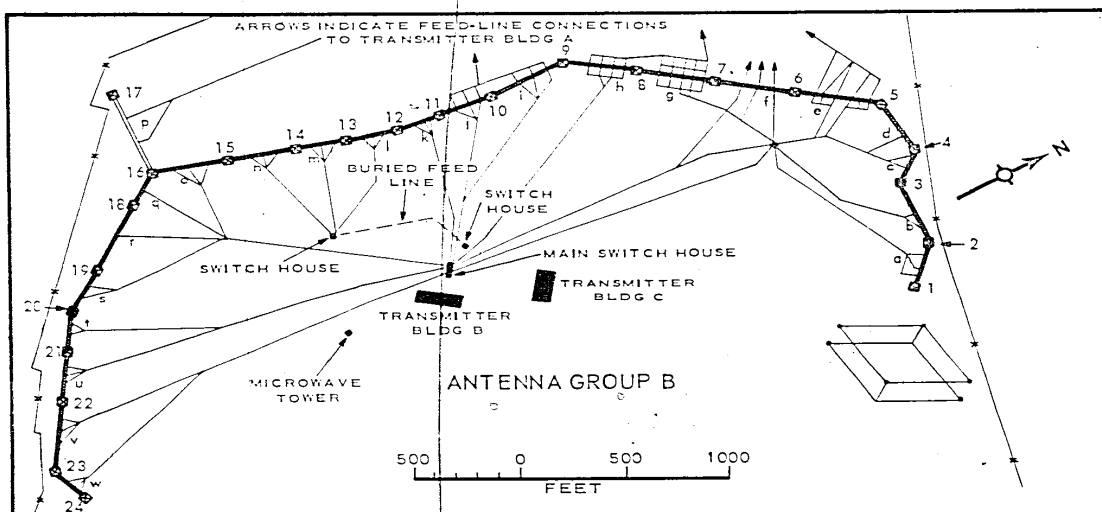


TABLE 2 DATA ON CURTAIN ANTENNAS

Tower Number	Tower Height (ft)	Distance Between Tower Centers (ft)	Antenna Letter	Number of Feeds	Primary Radiation Orientation (°)
1	300	260	a	3	[REDACTED]
2	300	375	b	2	
3	235	210	c	2	
4	300	295	d	1	
5	255	425	e	6	
6	350	390	f	3	
7	-	390	g	4	
8	-	375	h	4	
9	-	425	i	3	
10	350	425	j	3	
11	275	295	k	3	
12	210	210	l	3	
13	135	235	m	3	
14	210	355	n	3	
15	210	355	o	3	
16	350	425	p	2	
17**	350	210	q	1	
18	365	425	r	1	
19	-	295	s	2	
20	255	210	t	2	
21	255	295	u	3	
22	365	425	v	3	
23	365	210	w	3	
24	-	-	-	-	

Not all tower heights are measurable.
 ** Tower number 17 is on a separate projection off the main line of towers. Antenna o is between towers 15 and 16. Antenna p is between towers 16 and 17. Antenna q is between towers 16 and 18.
 NPIC DG-4153

FIGURE 5. TRANSMITTER BUILDING B AND ASSOCIATED ANTENNAS.

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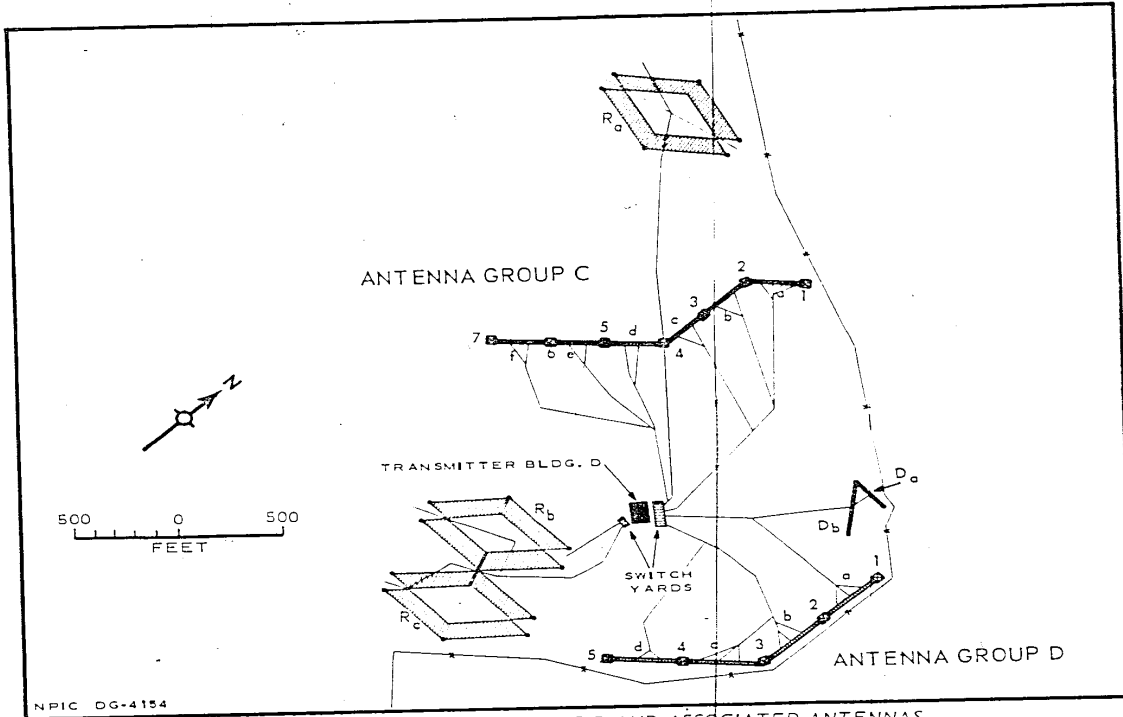


FIGURE 6. TRANSMITTER BUILDING D AND ASSOCIATED ANTENNAS.

Transmitter Building D and Associated Antennas

Transmitter building D is a modern structure measuring 120 by 80 and 15 feet high. It has a longitudinal monitor and two vents on the roof. The monitor measures 95 by 45 feet and each vent measures 10 by 5 feet. Feeders lead from the transmitter building to two outdoor switchyards measuring 130 by 25 feet and 45 by 25 feet, respectively (see Figure 6). All the curtain antennas in Antenna Groups C and D, as well as the three rhombics and the two horizontal dipoles, are fed solely from transmitter building D. Data on the curtain antennas are given in Tables 3 and 4 and data on the other antennas in Tables 5 and 6.

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TABLE 3. DATA ON CURTAIN ANTENNAS, ANTENNA GROUP C 25X1D

Tower Number	Tower Height* (ft)	Distance Between Tower Centers (ft)	Antenna Letter	Number of Feeds	Primary Radiation Orientation (°)
1	-	295	a	4	
2	-	260	b	2	
3	-	235	c	2	
4	-	260	d	2	
5	125	260	e	2	
6	-	295	f	2	
7	-				

* Not all tower heights are measurable.

TABLE 4. DATA ON CURTAIN ANTENNAS, ANTENNA GROUP D 25X1D

Tower Number	Tower Height* (ft)	Distance Between Tower Centers (ft)	Antenna Letter	Number of Feeds	Primary Radiation Orientation (°)
1	-	375	a	3	
2	-	375	b	3	
3	-	375	c	3	
4	210	375	d	2	
5	-				

* Not all tower heights are measurable.

TABLE 5. DATA ON DUAL HORIZONTAL RHOMBIC ANTENNAS 25X1D

Rhombic Letter	Major Axis (ft)	Minor Axis (ft)	Side Length (ft)	Distance Between End Poles (ft)	Pole Height (ft)	Computed Tilt Angle (°)	Orientation Azimuth (°)
R _a	750	330	410	105	105	65	
R _b	750	330	410	105	105	65	
R _c	750	330	410	105	105	65	

TABLE 6. DATA ON CENTER-FED HORIZONTAL DIPOLES 25X1D

Dipole Letter	Pole Height (ft)	Distance Between Poles (ft)	Orientation Azimuth (°)
D _a	65	200	
D _b	65	295	

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Antennas R_a , R_b , and R_c are dual horizontal rhombic antennas with optimal wave lengths in the upper limits of the high-frequency band. A dual horizontal rhombic antenna consists of two single rhombic antennas suspended in two horizontal planes and displaced along the small diagonal of the rhombus, the larger diagonals of the rhombuses remaining parallel.

Antenna R_a is a bidirectional transmitting rhombic with a centrally located transmission direction switch and an obliquely located absorbing (dissipation) line. Antennas R_b and R_c are graphically shown in Figure 6 as transmitting and receiving, respectively. Both antennas could be for transmitting or bidirectional transmitting, but this cannot be determined because the photographic image in this area is poor. The apparent parallel hookup also suggests a design to increase the coefficient of amplification.

Antennas D_a and D_b are high-frequency center-fed horizontal dipoles. Antenna D_a appears to be a standard doublet, while antenna D_b appears to be a delta-matched doublet.

Radiation Azimuths

The radiation azimuths shown in Figure 7 are calculated from perpendicular bisectors of the curtain antennas and horizontal dipoles and along the major axes of the rhombics. These azimuths represent the major radiation lobes, without regard to minor or secondary lobes. Both fore and aft azimuths are shown since director-reflector characteristics cannot be determined from the photography.

Operational Support Facilities

Transmitter building A (see Figure 3, item 1) has one small support structure and a possible earth-covered water-storage tank. No cooling facilities are evident. Transmitter building B (item 2) has two working

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cooling ponds, and transmitter building C (item 3) has two nearby probable cooling towers. Approximately 20 construction support structures and a possible earth-covered water-storage tank are in the vicinity of these two transmitter buildings. Transmitter building D (item 4) has two working cooling ponds. All the transmitter buildings are served by a paved road, and there are paved parking aprons in front of each building.

A fenced probable antenna maintenance area (item 5) contains ten structures and an area for open storage. Five major structures in this area are single-story gable-roofed buildings measuring 190 by 35 feet, 95 by 35 feet, 85 by 35 feet, 80 by 35 feet, and 60 by 35 feet, respectively.

High-voltage power (item 6) enters the eastern portion of the operations area from two separate grids to a fenced substation (item 7). The internal power network (item 8) appears to be in the final stages of conversion from aboveground wire lines to underground conduits. Aboveground probable telephone lines (item 9) interconnect the transmitter buildings.

SUPPORT COMPLEX

The support complex is located adjacent to and south of the operations area (see Figure 3). This complex consists of a housing and administration area with 30 major structures (item 10), a general maintenance area with 6 major structures (item 11), and a general storage area with 13 major structures (item 12).

CONCLUSIONS

At the time of photography, the Kuybyshev High-Frequency Broadcast/Broadcast-Relay Station appeared to be operational, as evidenced by the working cooling ponds. It also appeared to be an old station undergoing modernization, as indicated by recently constructed underground power

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and underground feed lines. Another indicator of this is the possible future replacement of transmitter building B by transmitter building C, still under construction. This station probably broadcasts programs which originate here as well as programs which originate elsewhere. The station also relays programs from one station to another.

REFERENCES

PHOTOGRAPHY

25X1D	<u>Acquisition Numbers</u>	<u>Date</u>	<u>Classification</u>	25X1C

MAPS or CHARTS

25X1C

WAC 165 (U)

AMS. Series N501, Sheet NN 39-8, 3d ed, Oct 57 (U)

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HIGH-FREQUENCY
BROADCAST/BROADCAST-RELAY STATION
KUYBYSHEV, USSR

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