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MC 262C/68(Final)
14 January 1969

FINAL DECISION ON MC 262C

A Report by the Military Committee

on

CURRENT SOVIET BLOC ELECTRONIC EQUIPMENT

Volume C: LANDBASED

1. The purpose of this agreed intelligence handbook on Current Soviet Bloc Electronic Equipment, Landbased, is to provide guidance to the Major NATO Commands and the International Military Staff and information to the NATO nations.

2. MC 262C/67, 12 February 1968, is superseded by this document.

FOR THE MILITARY COMMITTEE:

EZIO PISTOTTI
Lieutenant General, Italian Army
Director, International Military Staff

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This document consists of pages.

CURRENT SOVIET BLOC ELECTRONIC EQUIPMENT

-VOLUME C LANDBASED-

PREFACE

1. This is the third of three volumes concerning the function, description, characteristics and performance of current Soviet Bloc Electronic Equipment.

Volume A includes Shipborne Electronic Equipment of the Soviet Bloc.

Volume B includes Airborne Electronic Equipment of the Soviet Bloc.

2. Detailed information on the associated aircraft and missiles will be found in:

a. MC 260 "CURRENT SOVIET BLOC AIRCRAFT AND ASSOCIATED ARMAMENT."

b. MC 261 "CURRENT SOVIET GUIDED MISSILES."

3. This book has been produced to satisfy the planning requirements of NATO staffs and to assist Tactical Commanders.

TERMS AND ABBREVIATIONS

ARR	Antenna Rotation Rate
MAD	Magnetic Anomoly Detecting changes in the earth's magnetic field which occur in the vicinity of large metallic objects. Such devices are used for the detection of submerged submarines.
N/A	Not applicable
Pol	Polarization
PRF	Pulse Repetition Frequency
PW	Pulse Width
SSPM	Sector Scans per minute
SSR	Sector Scan Rate
TWS	Track While Scan. A TWS radar scans a solid sector and can automatically track objects within the sector. The number of objects (targets and/or missiles) which can be tracked is in practice limited only by the number of tracking circuits which are incorporated.
BSR	BLIP SCAN RATIO is considered as the ratio of the number of times that a particular target is observed (as a blip on a scope) at a particular range to the number of times it could have been observed (Scans). A 50% BSR implies that there is a 50% probability that a target will present a blip on any given scan by a radar.

CURRENT SOVIET BLOC ELECTRONIC EQUIPMENT

-LANDBASED-

TABLE OF CONTENTS

(Note: This index includes all entries for MC 262/A, B and C)

CHAPTER I

RADAR AND NAVIGATIONAL AIDS

Section A - EW/GCI ACQUISITION

1.	NICKNAME	BAR LOCK
2.	SOVIET DESIGNATION	P-35
3.	FUNCTION	High power search radar used for GCI and early warning since 1959. Provides excellent solid cover and is usually sited with SIDENET and SPONGE CAKE height finders and equipped with END BOX. Used on important GCI sites.
4.	DESCRIPTION	Mobile multi-beam radar with six transmitters feeding six wave guides, two horizontal reflectors of the same size as BIG MESH but with a new lighter construction. The reflectors are mounted on a rotating box-bodied vehicle. A recognition feature of the reflector is the pronounced horizontal box girder arrangement. Four vertical dipoles cut to approximately 660 MHz are disposed in a cruciform arrangement around the feed to the upper reflector. They are believed to provide built-in SRO-2 IFF facility.

5. TRANSMISSION CHARACTERISTICS

a. Frequency	2690 - 3120 MHz in six sub-bands (six frequencies, one selected in each of the six sub-bands below are designed for the six beams)

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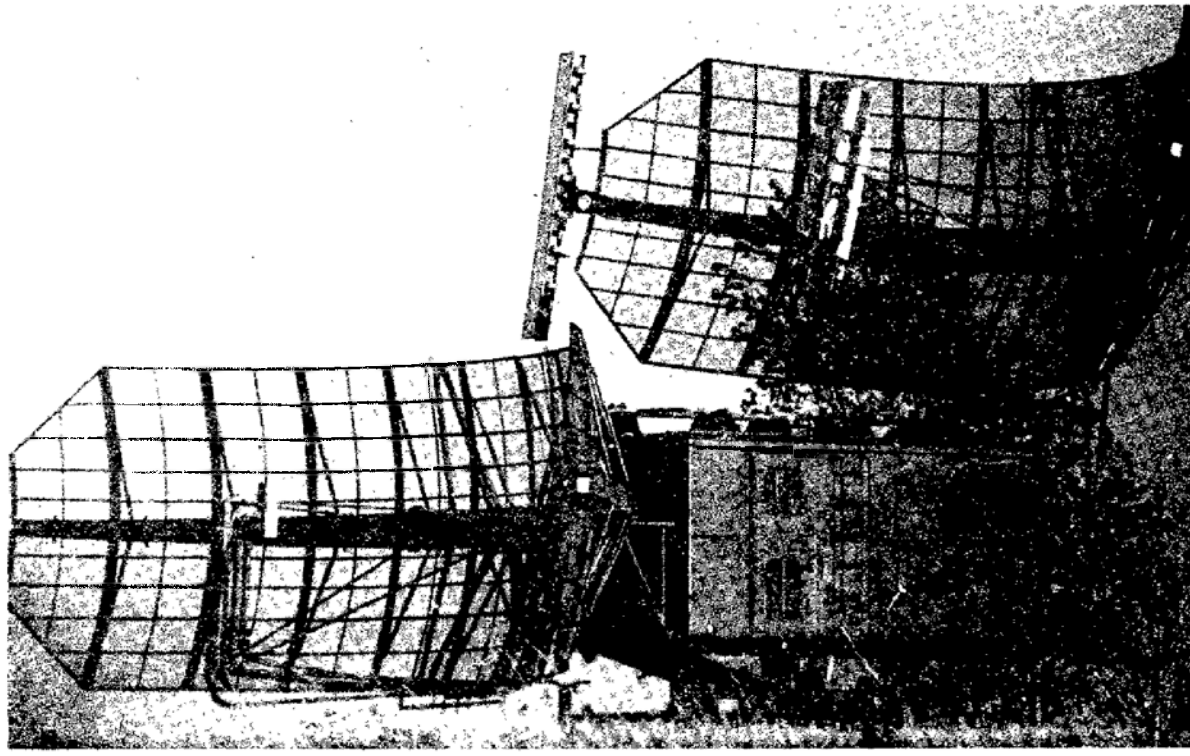
BAR LOCK

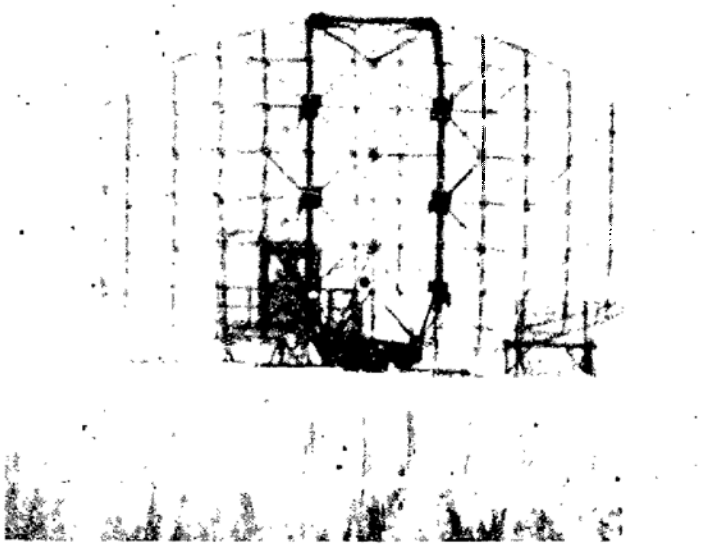


	2690 - 2720 MHz 2720 - 2750 MHz 2810 - 2845 MHz 2960 - 2990 MHz 2990 - 3025 MHz 3080 - 3120 MHz
b. P.R.F.	About 375 pps
c. P.W.	About 2.5 microseconds
d. Peak Power	About 1 mw per beam
e. A.R.R.	3 and 6 rpm
f. Pol.	Vertical
g. Beam width	Horizontal - 0.7° - 1.0° Vertical - 2.0° - 2.4° per beam

6. PERFORMANCE

a. Range	180 km (98 nm) vs 1 sq.m target at 18,000 m (60,000 ft) alt (50% BSR)
b. Height Finding Capability	Nil
c. Accuracy	
(1) Range	Approximately ± 900 m (0.5 nm)
(2) Azimuth	± 0.5°

1.	NICKNAME	BILL FOLD
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Air Defense/Traffic Control
4.	DESCRIPTION	Fully mobile L band search radar of Polish manufactures with an elliptically shaped mesh reflector mounted on a TATRA III vehicle.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	1300 - 1350 MHz
	b. P.R.F.	360 - 447 pps
	c. P.W.	2.4 - 3.6 microseconds
	d. Peak Power	650 Kw (est)
	e. A.R.R.	1.5 to 6 rpm
	f. Pol.	Horizontal
	g. Beam width	Horizontal - 1.2° Vertical - $Cosec^2$
6.	PERFORMANCE	
	a. Range	130 Km (70 nm) vs 1 sq.m target at 2500 m (8,000 ft) (50% BSR)
	b. Height Finding Capability	Nil
	c. Accuracy	
	(1) Range	$\pm$ 460 m (1,500 ft)
	(2) Azimuth	"$\pm 1^{\circ}$"
7.	REMARKS	BILL FOLD is widely used on Polish EW stations and at AAA sites for acquisition of low flying aircraft. Further, BILL FOLD in its mobile rôle could possibly serve as a traffic control radar at small tactical airstrips. Fixed installation of this equipment is known as LAND FALL.

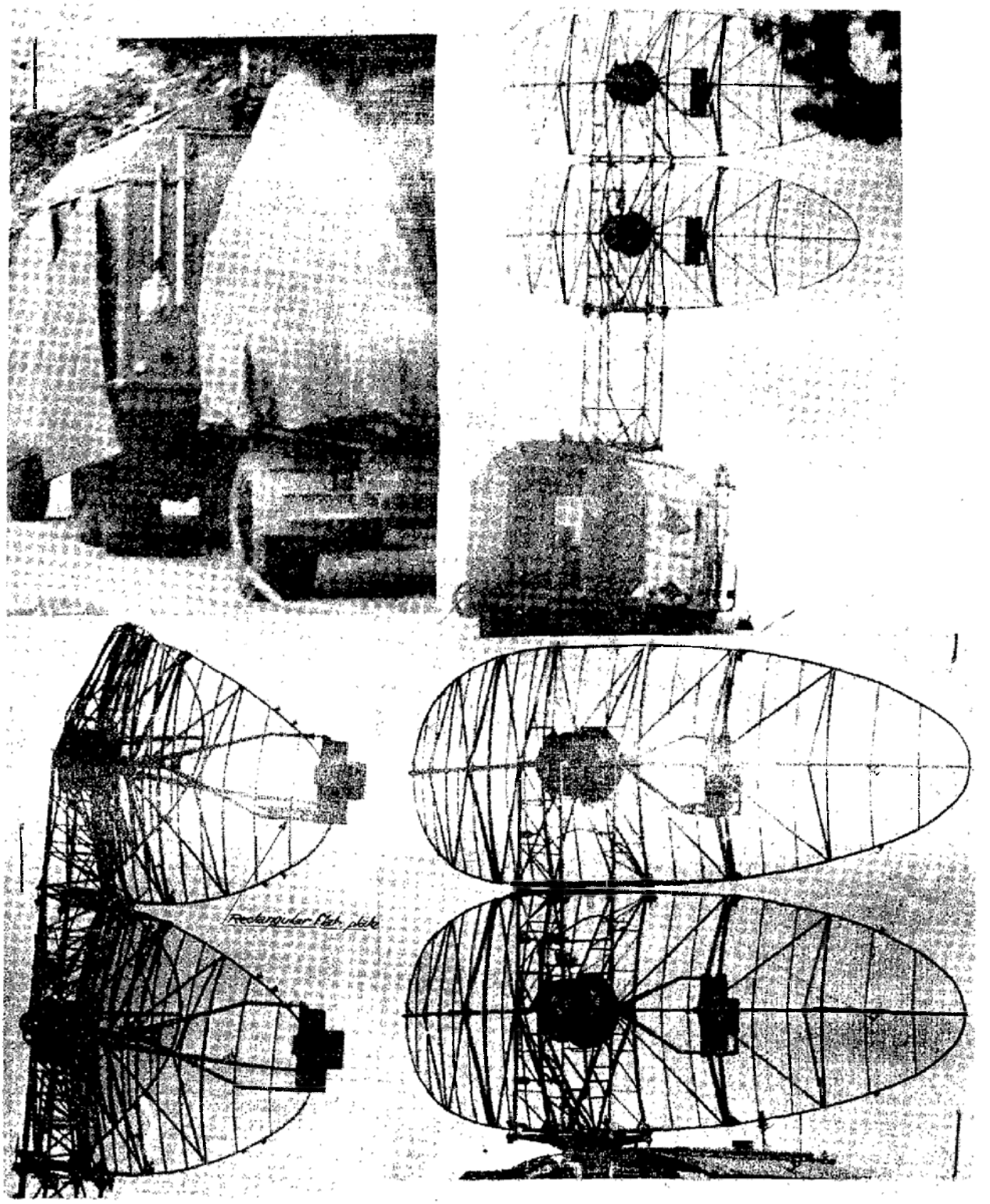


1.	NICKNAME	CROSS FORK
2.	SOVIET DESIGNATION	P-5
3.	FUNCTION	Tactical control for AA defense associated with WHIFF and FIRE CAN, and possibly used as surveillance radar for GCA systems. Owing to its highly mobile nature, it can be redeployed rapidly in an emergency.
4.	DESCRIPTION	Four Yagi arrays arranged in 2 bays and 2 stacks are mounted on a vehicle so that they can be rotated in azimuth.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	196 - 222 MHz
	b. P.R.F.	290 - 450 pps
	c. P.W.	1.5 - 5.0 miscroseconds
	d. Peak Power	200 kw (est)
	e. A.R.R.	6 rpm or manual
	f. Pol.	Horizontal
	g. Beam width	24°
6.	PERFORMANCE	
	a. Range	50 Km (27 nm) vs 1 sq.m target at 460 m (1,500 ft) (50% BSR)
	b. Accuracy	
	(1) Range	± 900 m (0.5 nm)
	(2) Azimuth	$\pm 2.0^{\circ}$
	(3) Height Finding	Nil
7.	REMARKS	The radar is a copy of the British AMES type 4 MK 3 or US SCR-602.

1.	NICKNAME	CROSS OUT
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	High power search radar. Apart from the use of BIG MESH type reflectors, it is identical to BAR LOCK. Frequently sited with STONE CAKE.
4.	DESCRIPTION	Mobile multi-beam radar using two BIG MESH reflectors both placed horizontally on a rotating box-bodied vehicle. May be placed on a tower.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	As for BAR LOCK
	b. P.R.F.	About 375 pps
	c. P.W.	About 2.5 microseconds
	d. Peak Power	1 MW per beam (estimated)
	e. A.R.R.	6 and possibly 3 rpm
	f. Pol.	Vertical
6.	PERFORMANCE	
	a. Range	180 Km (98 nm) vs 1 sq.m target at 18,000 m (60,000 ft) alt (50% BSR)
	b. Accuracy	
	(1) Range	Approximately ± 900 m (0.5 nm)
	(2) Azimuth	$\pm 0.5^{\circ}$

1.	NICKNAME	FLAT FACE
2.	SOVIET DESIGNATION	P-15
3.	FUNCTION	An extremely mobile surveillance radar used mainly to provide lower cover on multiple radar early warning GCI site, and for SA-3 acquisition.
4.	DESCRIPTION	Lightweight, mobile, search radar consisting of two elliptical parabolic reflectors mounted one above the other on a ZIL-151 vehicle via a turning motor. Reflector sizes approximately 6 x 2.15 m (18 x 6.5 ft).
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	760 - 980 MHz
	b. P.R.F.	445 - 800 pps
	c. P.W.	1.4 - 2.4 microseconds
	d. Peak Power	500 kw per antenna
	e. A.R.R.	6 - 8 rpm, 12 rpm also possible
	f. Pol.	Horizontal
	g. Beam width	Horizontal - 5.0° Vertical - 13°
6.	PERFORMANCE	
	a. Range	230 Km (124 nm) vs 1 sq.m target at 5,500 m (18,000 ft) (50% BSR)
	b. Accuracy	
	(1) Range	Approximately ± 1.8 Km (1 nm)
	(2)	± 0.5°

FLAT FACE



7. REMARKS

The rectangular flat plate directly in front of, and below the upper feed horn is approximately 0.4 x 0.6 inches and is believed to divert some of the radiated energy upward to provide better coverage at higher altitudes. The vertical pattern can be changed by adjusting the plate of the upper feed.
A new variant of FLAT FACE is SQUAT EYE, which is believed to employ the active electronics of FLAT FACE.

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1.	NICKNAME	SQUAT EYE
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Early warning/SAM acquisition
4.	DESCRIPTION	The SQUAT EYE is only an antenna and mast variation of FLAT FACE. The reflector is rotating and supported by a fixed mast meaasuring approximately up to 30 m (100 ft). The upper section of the antenna has a rotary joint coaxial cable and an antenna driving motor. The dimensions of the reflector are approximately 7.8 m (26 ft) x 3.00 m (10 ft). The RF horn antenna feed is offset 15° similar to FLAT FACE. Individual mast sections measure approximately 1.5 m (5 ft). The antenna has been erected in as little as 15 minutes.

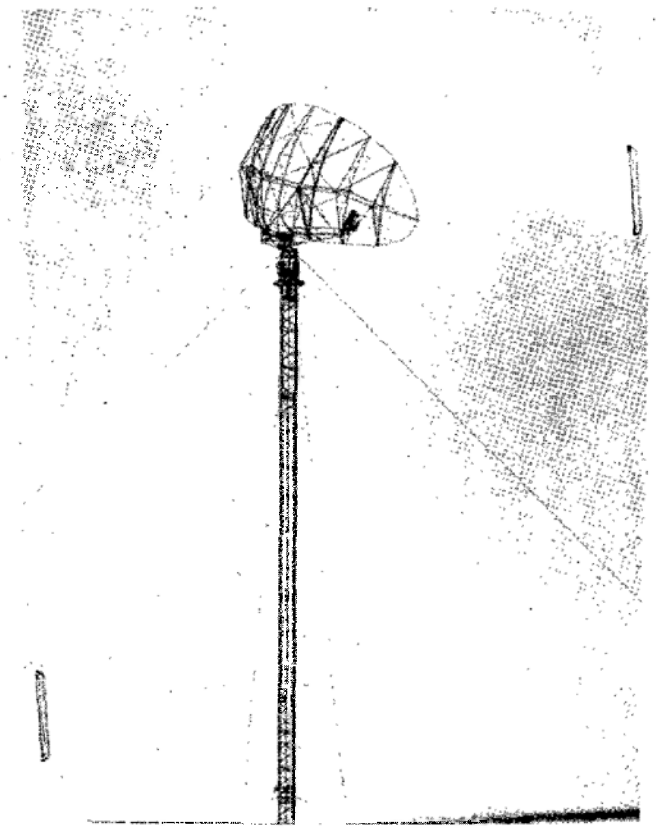
5. TRANSMISSION CHARACTERISTICS

a. Frequency	760 - 980 MHz
b. P.R.F.	445 - 800 pps
c. P.W.	1.4 - 2.4 microseconds
d. Peak Power	500 KW (est)
e. A.R.R.	6 - 7.5 rpm
f. Pol.	Horizontal
g. Beam width	Horizontal 3°

6. PERFORMANCE

a. Range	200 km (110 nm) vs 1 sq.m target at 3,000 m (10,000 ft) (50% BSR)

SQUAT EYE



b. Accuracy

(1) ± 1.8 Km (1 nm)

(2) ± 900 m (0.5 nm)

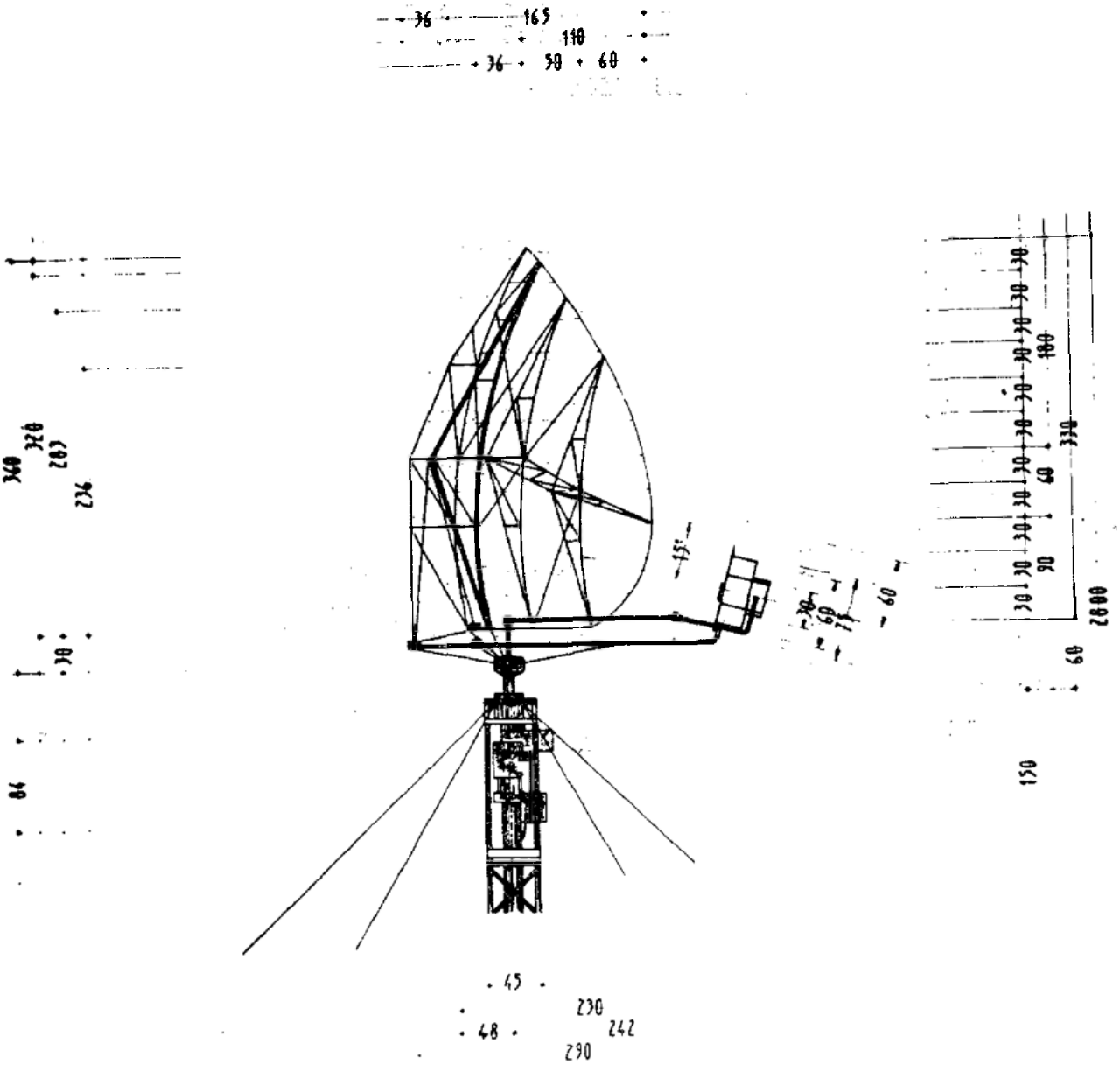
7. REMARKS

It is believed that SQUAT EYE has a slightly better low altitude capability than FLAT FACE. However, the low altitude detection range will be strongly dependent on the magnitude and the local terrain masking.

SQUAT EYE

SQUAT-EYE

CONFIDENTIEL DÉFENSE

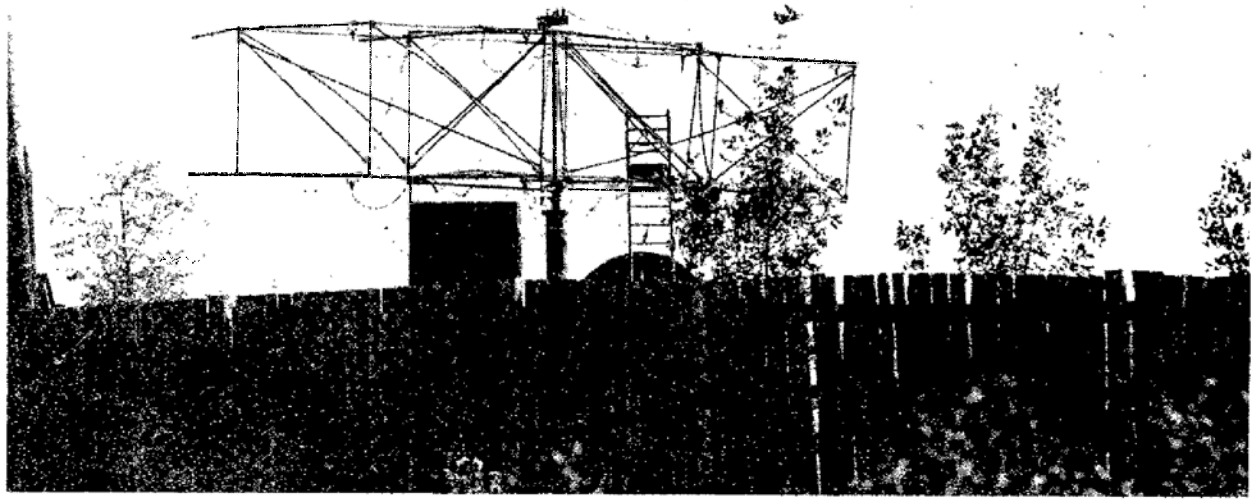


CONFIDENTIEL DÉFENSE

VUE DE PROFIL

1.	NICKNAME	FOUR STACK
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Airfield surveillance/ Air Traffic Control
4.	DESCRIPTION	Eight 11 element Yagi arrays are arranged in four bays, two stacks. The aerial is mounted on the roof of a building and can rotate. Probably obsolete.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	204 - 212 MHz
	b. P.R.F.	370 - 416 pps
	c. P.W.	2 - 5 microseconds
	d. Peak Power	200 KW (est)
	e. A.R.R.	4 - 9 rpm, manual
	f. Pol.	Horizontal
	g. Beam width	Horizontal 6° to 8°
6.	PERFORMANCE	
	a. Range	About 185 Km (100 nm) for any aircraft at 12,000 m (40,000 ft)
	b. Accuracy	
	(1) Range	$\pm$ 3.1 Km (2 nm)
	(2) Azimuth	$\pm 3^{\circ}$

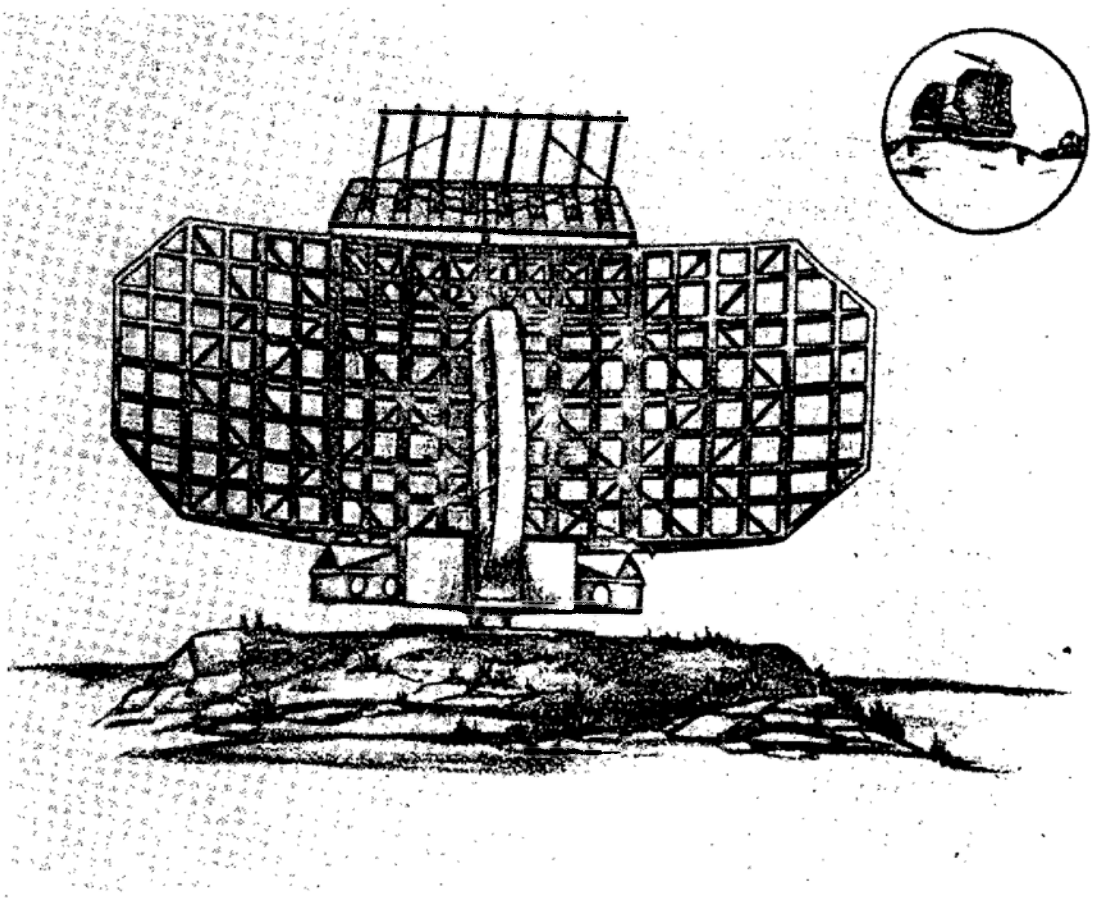
FOUR STACK



1.	NICKNAME	GAGE
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Search radar, probably integrated in Moscow air defense systems.
4.	DESCRIPTION	Static, azimuthal search radar about 10.5 x 4.6 m (37 x 15 ft). Utilizes an unusually large feed.*
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	2615 - 2855 MHz
	b. P.R.F.	495 - 505 pps
	c. P.W.	2.75 - 3.0 microseconds
	d. Peak Power	2 MW (est)
	e. A.R.R.	1.2 - 6 rpm
	f. Pol.	Vertical
	g. Beam width	Horizontal - 0.8° Vertical - $Cosec^2$
6.	PERFORMANCE	
	a. Range	180 Km (98 nm) vs 1 sq.m target at 5,500 m (18,000 ft) (50% BSR)
	b. Accuracy	
	(1) Range	± 900 m (0.5 nm)
	(2) Azimuth	± 0.4° (estimated)

*NOTE: Probably obsolescent.

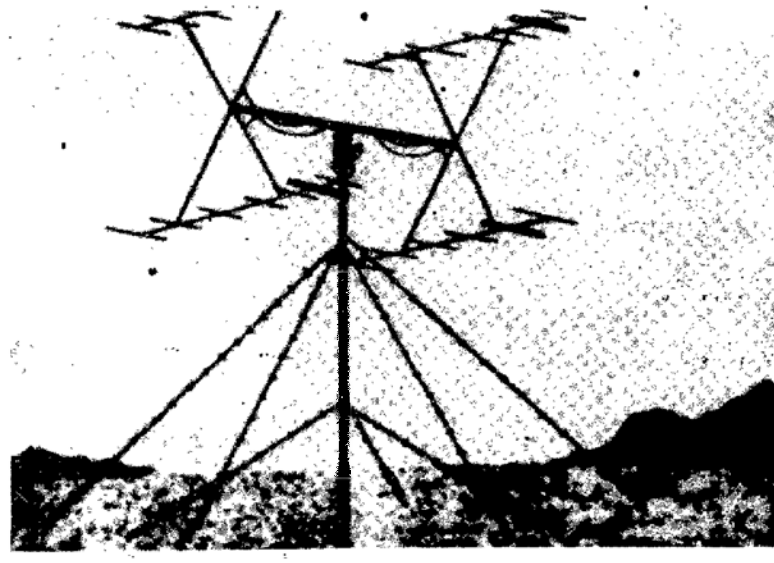
GAGE



1.	NICKNAME	KNIFE REST A
2.	SOVIET DESIGNATION	P-8
3.	FUNCTION	Early warning and acquisition radar. It is also deployed as an area surveillance radar for air traffic control purposes. Associated with FISH NET IFF antenna.
4.	DESCRIPTION	Four seven-element Yagi arrays arranged in two bays and two stacks. Mounted on a tubular mast fixed to the ground.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	67 - 75 MHz
	b. P.R.F.	40 - 64 and possibly 100 pps
	c. P.W.	4 - 12 microseconds
	d. Peak Power	100 kw (est)
	e. A.R.R.	1 - 6 rpm, manual
	f. Pol.	Horizontal
	g. Beam width	Horizontal 25°
6.	PERFORMANCE	
	a. Range*	163 Km (88 nm) vs 1 sq.m at 9,000 m (30,000 ft) (50% BSR)
	b. Height Finding Capability	Very poor
	c. Accuracy	
	(1) Range	± 3.7 Km (2 nm)
	(2) Azimuth	± 2°
	(3) Height Finding	Unknown

*Antenna Height 23 m (75 ft)

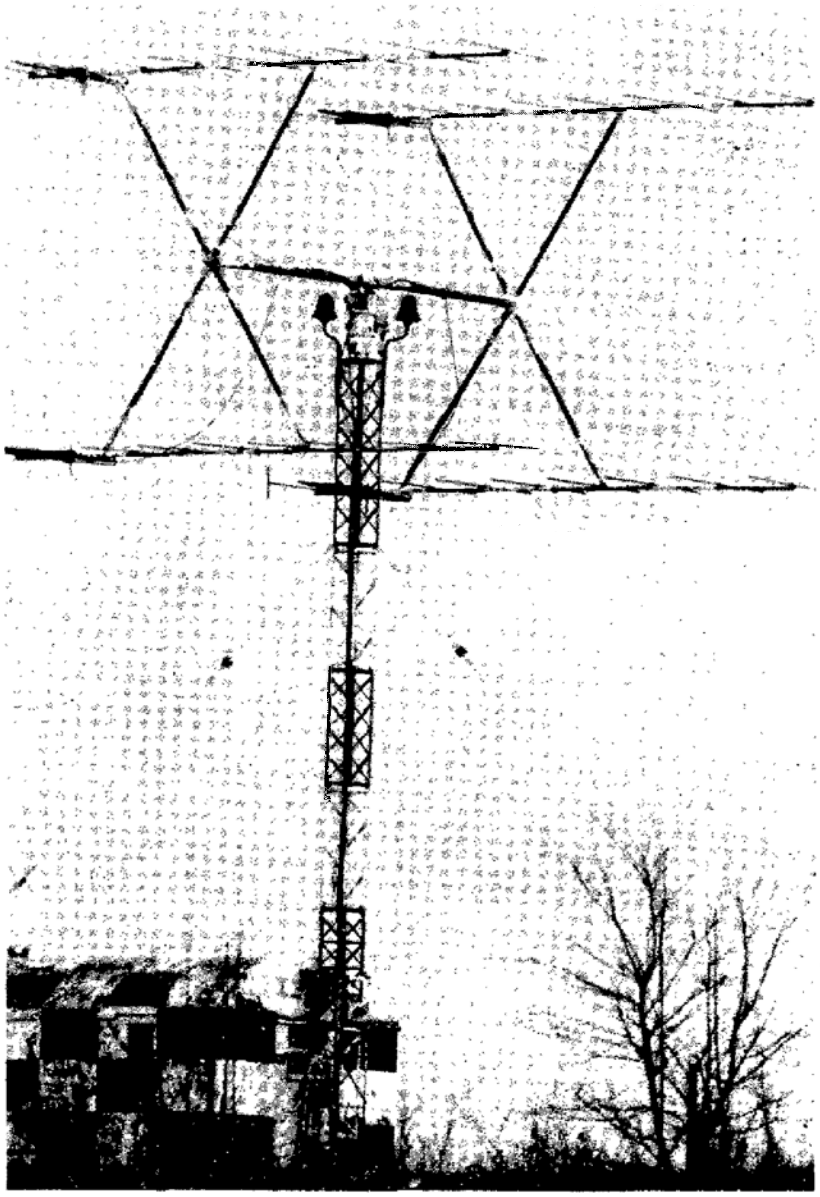
KNIFE REST A



1.	NICKNAME	KNIFE REST B
2.	SOVIET DESIGNATION	P-10
3.	FUNCTION	Early warning and acquisition radar. It can also be used as an area surveillance radar for air traffic control purposes.
4.	DESCRIPTION	KNIFE REST B is considered to be a modification of KNIFE REST A with four, nine element Yagi arrays arranged in two bays and two stacks. Mounted on a lattice mast on a ZIL 151 truck.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	80 - 96.5 HMz
	b. P.R.F.	90 - 120 pps
	c. P.W.	5 - 12 microseconds
	d. Peak Power	100 kw (est)
	e. A.R.R.	1 - 6 rpm
	f. Pol.	Horizontal
	g. Beam width	Horizontal - 19°
6.	PERFORMANCE	
	a. Range *	193 Km (104 nm) 1 sq.m target at 9,000 m (30,000 ft) (50% BSR)
	b. Height Finding Capability	Very poor
	c. Accuracy	
	(1) Range	± 3.7 Km (2 nm)
	(2) Azimuth	± 2°
	(3) Height Finding	Very Poor

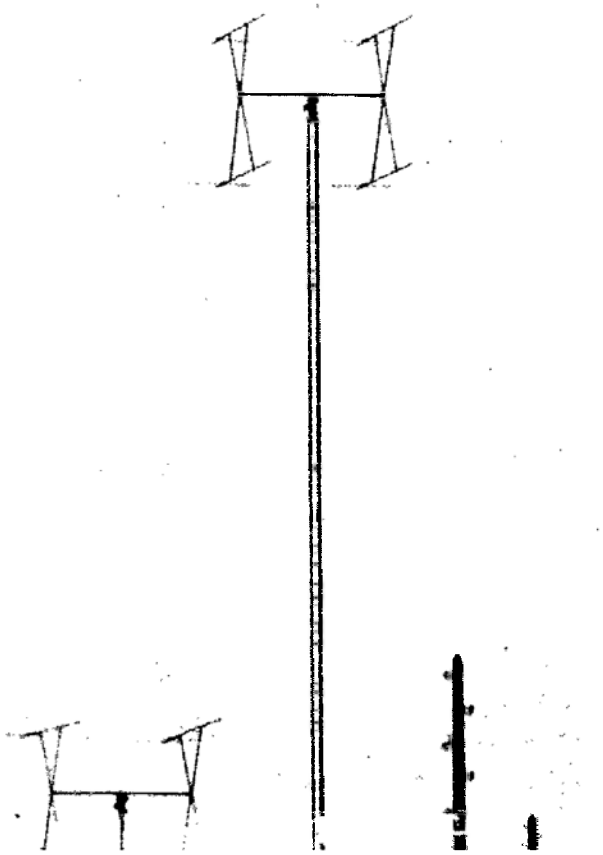
*Antenna Height 23 m (75 ft)

KNIFE REST B

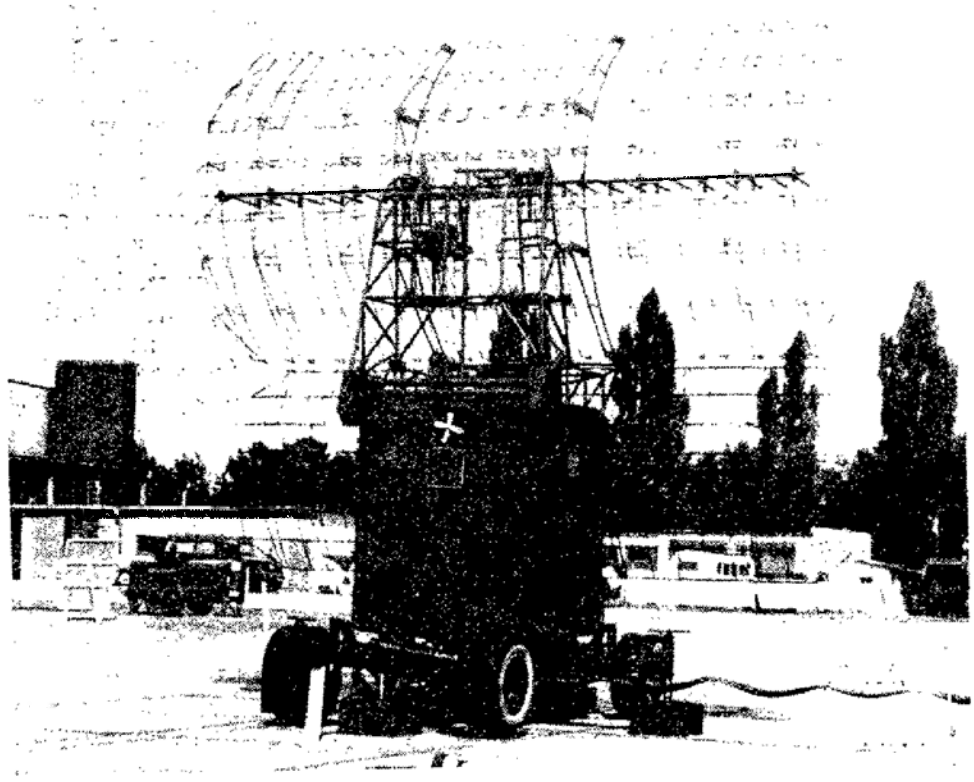


1.	NICKNAME	KNIFE REST C
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Early warning and acquisition radar giving lower altitude coverage than KNIFE REST A or B
4.	DESCRIPTION	Probably uses a KNIFE REST A or B aerial head but is mounted on a high mast up to 36 m (120 ft).
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	67 - 75 MHz (A) 81 - 96.5 MHz (B)
	b. P.R.F.	40 - 64 pps (A) 90 - 120 pps (B)
	c. P.W.	4 - 12 microseconds
	d. Peak Power	100 Kw (est)
	e. A.R.R.	1 - 6 rpm
	f. Pol.	Horizontal
6.	PERFORMANCE	
	a. Range	163 Km (88 nm) vs 1 sq.m target at 6,000 m (20,000 ft) (50% BSR) (A) 190 Km (102 nm) vs 1 sq.m target at 6,000 m (20,000 ft) (50% BSR) (B)
	b. Height Finding Capability	Very poor
	c. Accuracy	
	(1) Range	± 3.7 Km (2 nm)
	(2) Azimuth	± 2°

KNIFE REST C



1.	NICKNAME	None
2.	SOVIET DESIGNATION	NYSA C
3.	FUNCTION	Search radar used with NYSA B height finder on GCI/early warning sites.
4.	DESCRIPTION	Mobile search radar using two parabolic cylindrical reflectors mounted one above and in front of the other on a cabin trailer and each fed by 26 dipoles in a line
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	570 - 610 MHz (Dual Frequency separated by 10 - 30 MHz)
	b. P.R.F.	180 - 210 pps
	c. P.W.	3.0 - 8.0 microseconds
	d. Peak Power	350 Kw (per beam) (est)
	e. A.R.R.	1 - 6 rpm
	f. Pol.	Horizontal
	g. Beam width	Horizontal - 4.0°
6.	PERFORMANCE	
	a. Search Range	100 Km (55 nm) vs 1 sq.m target (50% BSR)
	b. Accuracy	
	(1) Range	± 3.7 Km (2 nm)
	(2) Azimuth	± 2°
7.	REMARKS	Polish design NYSA C is an improved version of NYSA A, which was based on the US radar AN/TPS-3. The NYSA A equipment had a 3.3 m (10 ft) diameter parabolic dish, but very few of these radars were produced.

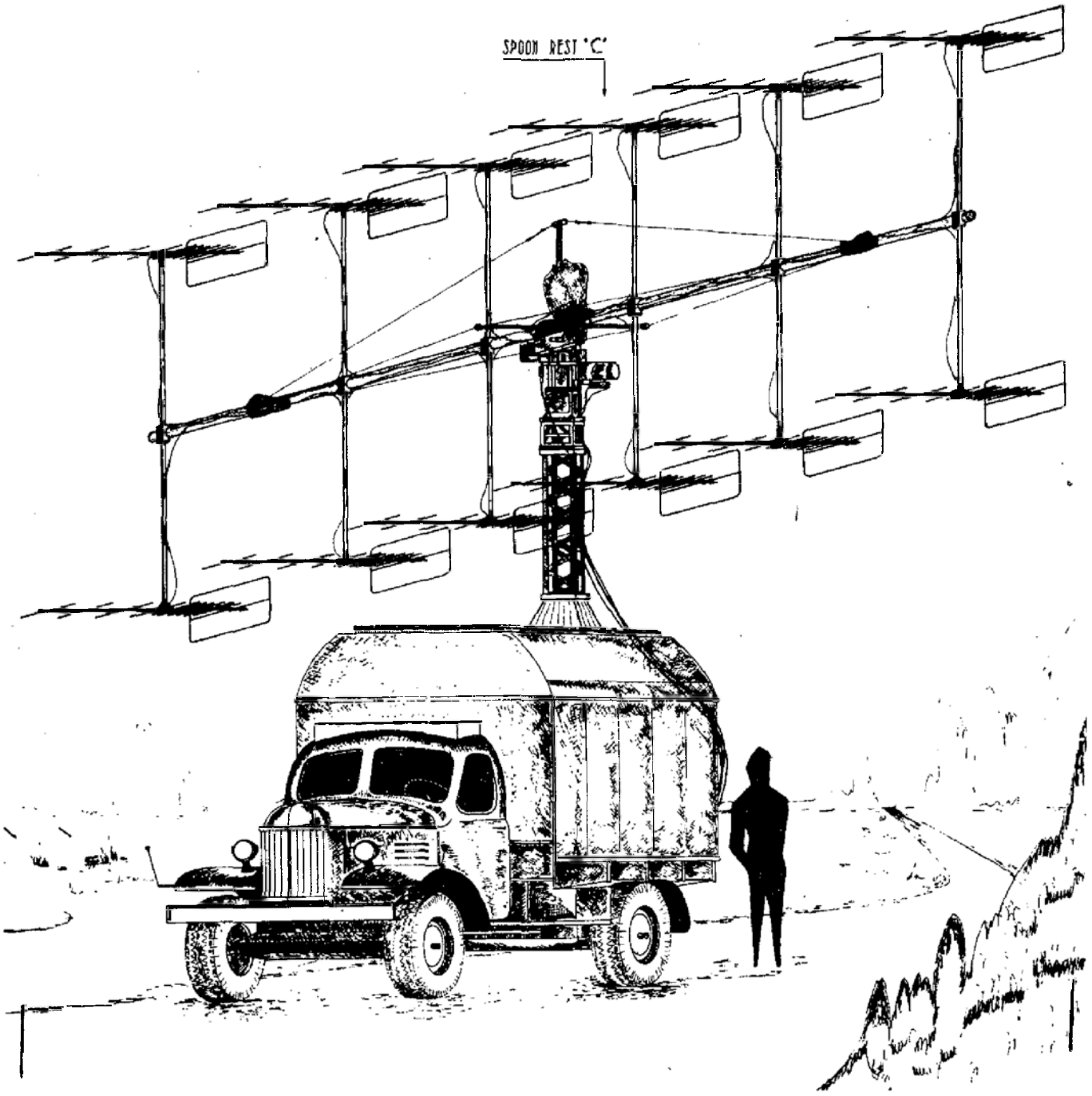


1.	NICKNAME	SPOON REST A/C
2.	SOVIET DESIGNATION	P-12
3.	FUNCTION	Mobile, metric surveillance radar used on early warning sites and acquisition radar for SA-2 sites.
4.	DESCRIPTION	The Yagis consist of 11 elements including a large rectangular reflector 1.32 m (4 ft) x 0.46 m (1.40 ft) a half wave element 0.87 m (2.8 ft) and three directors 0.95 m (3.0 ft) approximately. Between the feed elements and the rectangular reflector, there are six larger passive elements for reduction of the back lobe. Three have a mean value of 1.02 m (3.25 ft). There are two versions of this radar, one with the antenna mounted on a trailer van (version A), and the other on a self-propelled ZIL vehicle (version C) (See Figure on next page).

5. TRANSMISSION CHARACTERISTICS

a. Frequency	142 - 163 MHz
b. P.R.F.	300 - 400 pps
c. P.W.	4.0 - 7.0 microseconds
d. Peak Power	250 kw (est)
e. A.R.R.	1 - 6 rpm
f. Pol.	Horizontal
g. Beam width	5 - 10°
h. Antenna Mode	The SPOON REST antenna has been observed tilted both above and below the horizontal approximately 10°.

SPOON REST C



6. PERFORMANCE

a. Range	151 Km (85 nm) vs 1 sq.m target at 12,000 m (40,000 ft) (50% BSR)
b. Height Finding Capability	Possibly has a limited height finding capability using a lobe comparison technique.
c. Accuracy	
(1) Range	Approximately ± 1.8 Km (1 nm)
(2) Asimuth	Approximately ± 1°

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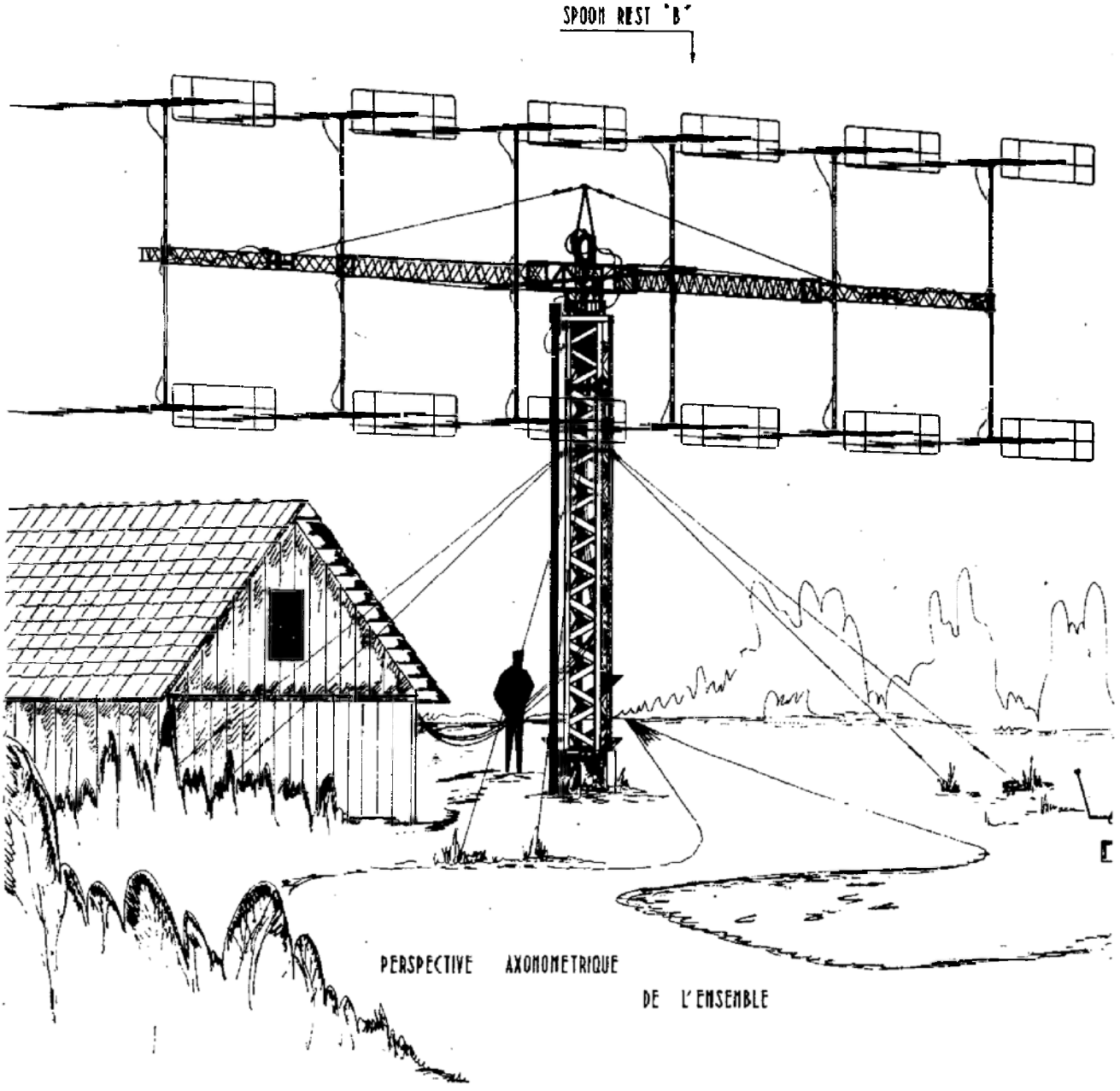
1.	NICKNAME	SPOON REST B
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	General purpose surveillance radar
4.	DESCRIPTION	Similar in configuration to SPOON REST A but differs from it in the following details: a. The main boom is of girder, instead of tubular, construction. b. The mast is mounted on an open trailer. c. The spacing between the bays follows the pattern a-a-b-a-a instead of a-b-b-b-a. d. Each reflector frame has an additional vertical support on each edge. e. In most dimensions, it is approximately 1.6 times larger than SPOON REST A.

5. TRANSMISSION CHARACTERISTICS (Probably)

a. Frequency	81 - 86 MHz
b. P.R.F.	134 - 230 pps
c. P.W.	5 - 11 microseconds
d. Peak Power	500 kw (est)
e. A.R.R.	1 to 6 rpm
f. Pol.	Horizontal
g. Beam width	8°

SPOON REST B



6. PERFORMANCE

a. Range	166 Km (90 nm) vs 1 sq.m target at 12,000 m (40,000 ft) (50% BSR)
b. Accuracy	
(1) Range	± 1.8 Km (1 nm)
(2) Azimuth	± 1°

1.	NICKNAME	STRIKE OUT
2.	SOVIET DESIGNATION	Probably P-25
3.	FUNCTION	Early warning search radar, sited with the height finder ROCK CAKE or STONE CAKE. Gives good solid cover but has no height finding capability.
4.	DESCRIPTION	Multibeam radar modification of TOKEN, bas both aerials mounted horizontally, otherwise the same construction. This equipment is largely obsolescent.

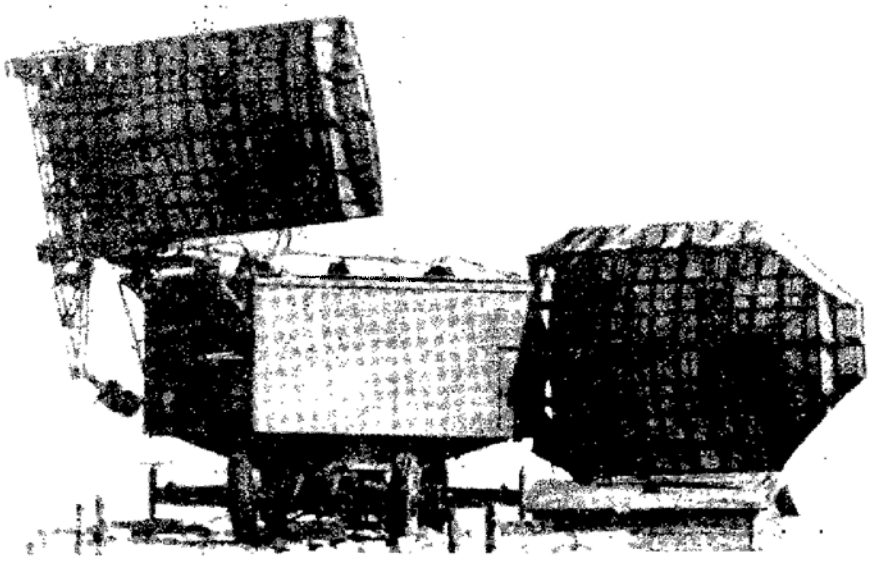
5. TRANSMISSION CHARACTERISTICS

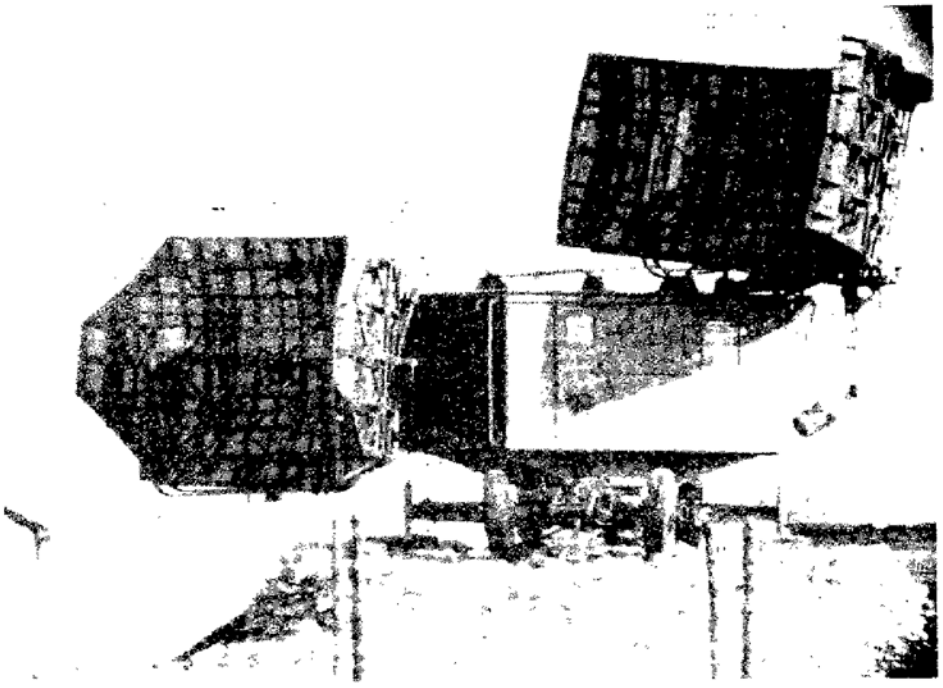
a. Frequency	*2700 - 3100 MHz in five sub-bands (five frequencies, one selected in each of the five sub-bands below are used for the five beams). 2695 - 2720, 2725 - 2740, 2820 - 2840, 2965 - 2995, and 3000 - 3021 MHz
b. P.R.F.	About 340 pps
c. P.W.	About 1 microsecond
d. Peak Power	750 kw (est)
e. A.R.R.	3 or 6 rpm
f. Pol.	Vertical
g. Beam width	Horizontal - 0.8 - 1.5°

6. PERFORMANCE

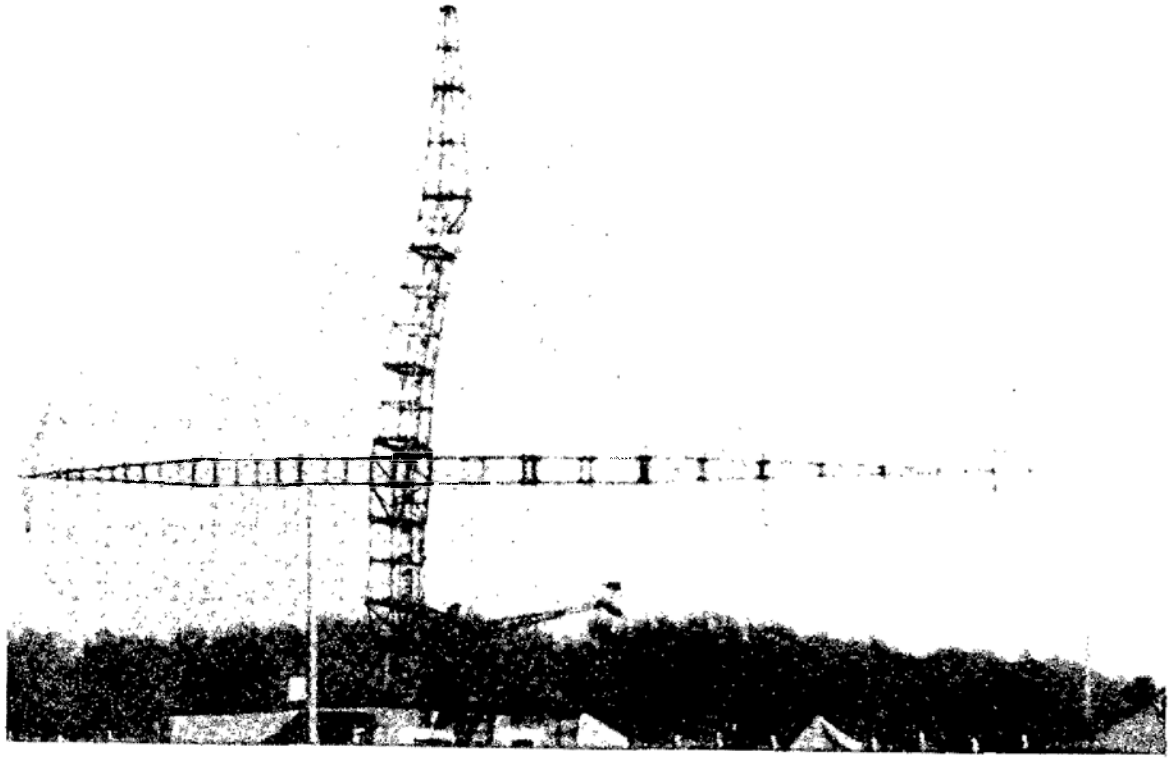
a. Range	120 Km (65 nm) vs 1 sq.m target at 9,000mm (30,000 ft) (50% BSR)
c. Accuracy	
(1) Range	± 900 m (0.5 nm) (estimated)
(2) Azimuth	± 0.5°

* STRIKE OUT has been observed with the 2725 - 2740 MHz range replaced by 3085 - 3120 MHz





1.	NICKNAME	TALL KING
2.	SOVIET DESIGNATION	P-14
3.	FUNCTION	Long range early warning radar with good performance against high altitude small area targets. Associsted with SCORE BOARD B.
4.	DESCRIPTION	Fixed ground radar utilizing a very large antenna approximately 31 m x 12 m (110 ft x 40 ft). It is fed by two primary R.F. sources This antenna has a built-in electrical de-icing system.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	160 - 180 MHz
	b. P.R.F.	185 - 210 pps
	c. P.W.	7 - 12 microseconds
	d. Peak Power	1 MW (est)
	e. A.R.R.	2 - 6 rpm
	f. Pol.	Horizontal
	g. Beam width	Horizontal - approximately 4°
		Vertical - unknown
6.	PERFORMANCE	
	a. Range	370 Km (200 nm) vs 1 sq.m target at 12,000 m (40,000 ft) (50% BSR) 740 Km (400 nm) vs 2 sq.m target at 42 Km (140,000 ft) (50% BSR)
	b. Accuracy	
	(1) Range	± 1.8 Km (1 nm)
	(2) Azimuth	± 1.0°



1.	NICKNAME	BACK NET
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Mobile early warning search radar
4.	DESCRIPTION	Uses two back-to-back reflectors, one apparently parabolic and the other possibly $Cosec^2$ in shape, positioned in either side of the long axis of a van. Both reflectors are approximately 13.7 m (45 ft) long x 43 m (14.0 ft) high at the widest points. Has been seen on the sites associated with the radar height finder SIDE NET.

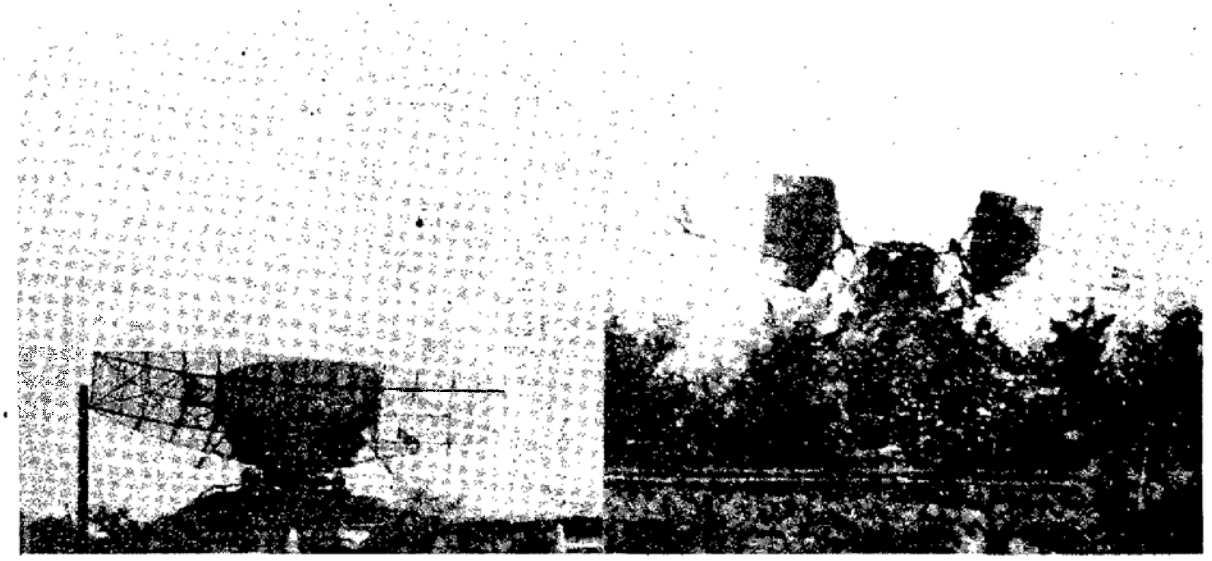
5. TRANSMISSION CHARACTERISTICS

a. Frequency	Three frequencies in the band 1600 to 2500 MHz with possible ability to switch instantaneously to up to three alternative frequencies within the same band.
b. P.R.F.	280 - 740 pps
c. P.W.	1 - 8 microseconds
d. Peak Power	2 MW per beam (est)
e. A.R.R.	3 and 6 rpm
f. Pol.	Vertical
g. Beam width	1.3°

6. PERFORMANCE

a. Range	324 Km (175 nm) vs 1 sq.m target at 12,000 m (40,000 ft) (50% BSR)
b. Accuracy	
(1) Range	± 1.8 Km (1 nm)
(2) Azimuth	$\pm 1^{\circ}$

BACK NET



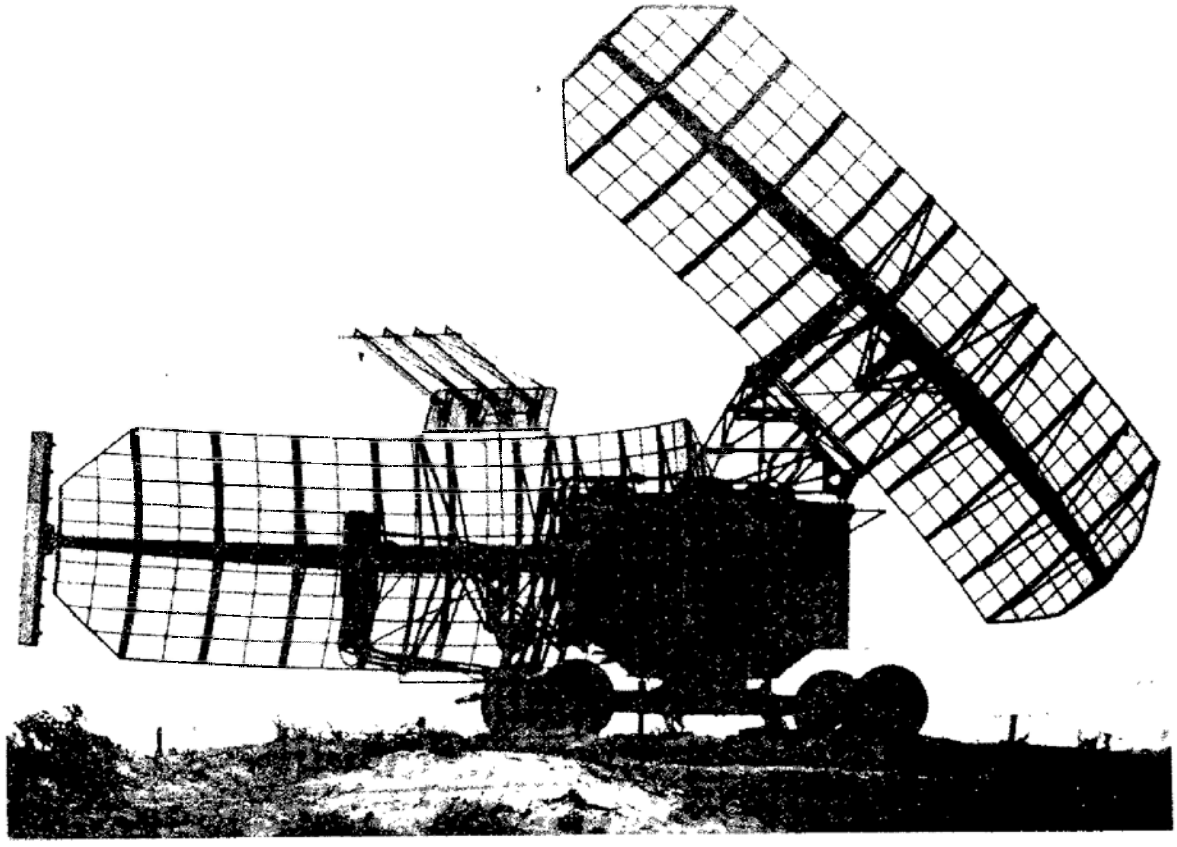
1.	NICKNAME	DOG HOUSE
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	An electronic facility which could be an electronically scanned detection and tracking radar, used for the detection of ballistic missiles and satellites, which could presumably serve a B MEWS function of early warning.
4.	DESCRIPTION	A large fixed antenna constructed in the shape of an inverted "V" structure. Estimated phased array antenna. Dimensions of the antenna cannot be determined at this time. However, the estimated dimensions are 90 x 120 m (300 ft x 400 ft). Both sides appear identical.
5.	TRANSMISSION CHARACTERISTICS	Unknown

DOG HOUSE

1.	NICKNAME	BIG BAR A
2.	SOVIET DESIGNATION	P-30 Series
3.	FUNCTION	Mobile GCI search radar with integral height finding capability.
4.	DESCRIPTION	Mobile V - beam radar with two reflectors approximately 3.10 x 10.5 m (10.4 x 35 ft). Apart from the use of BAR LOCK type aerials, it is identical to BIG MESH.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	Five S-Band frequencies in band 2700 - 3100 MHz and one L-Band frequency about 570 MHz.
	b. P.R.F.	375 pps
	c. P.W.	About 2.5 microseconds
	d. Peak Power	Estimated 1 MW per beam
	e. A.R.R.	6 or 3 rpm
	f. Pol.	
	(1) S-Band	Vertical and Slant at 45°
	(2) L-Band	Horizontal
	g. Beam width	Horizontal - L-Band 3.5° S-Band 0.7° Vertical - L-Band 11.9° S-Band 2.35°
6.	PERFORMANCE	
	a. Search Range	170 Km (92 nm) vs 1 sq.m at 6,000 m (20,000 ft) (50% BSR)
	b. Height Finding	Poor
	c. Accuracy	
	(1) Range	± 900 m (0.5 nm)
	(2) Azimuth	± 1.7° - L-Band
	(3) Height Finding	± 610 m (2,000 ft) at 9,000 m (30,000 ft)

NATO SECRET

BIG BAR A



7. REMARKS

Some BIG BAR have been seen with an END BOX on the upper reflector in which case the lower one did not have an END BOX. There are also versions with two END BOX. The BIG BAR in the photograph has a WITCH FOUR IFF interrogator antenna on top of the lower reflector (see sector C-I-D-9).

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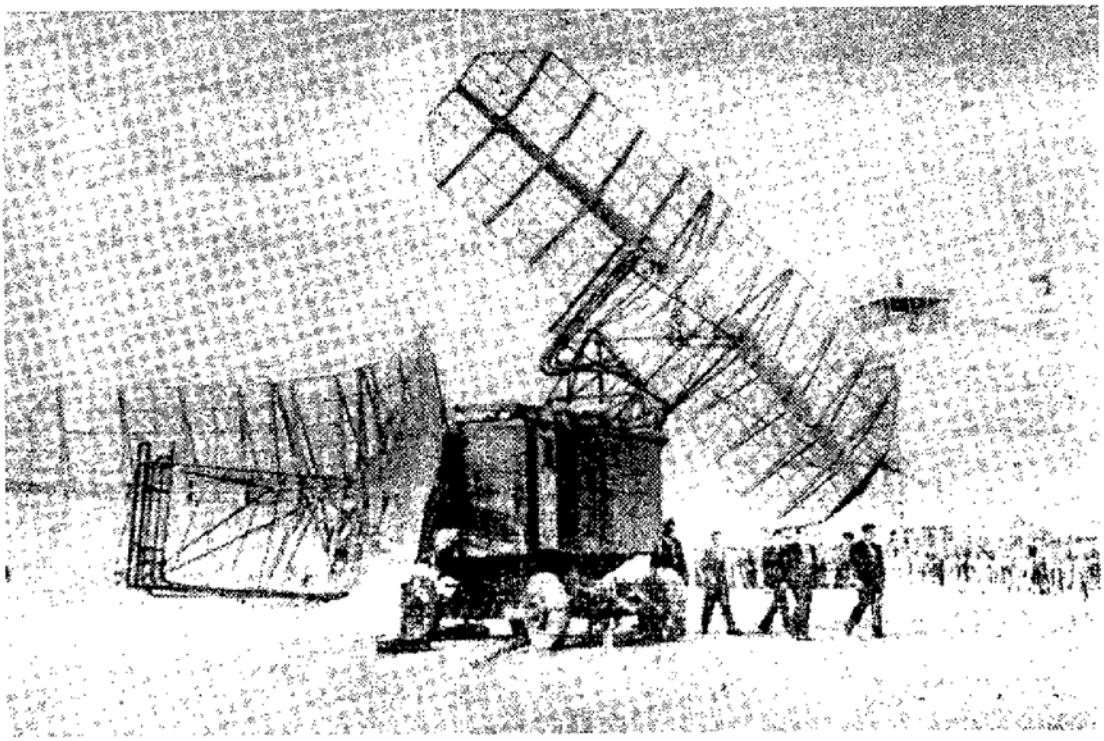
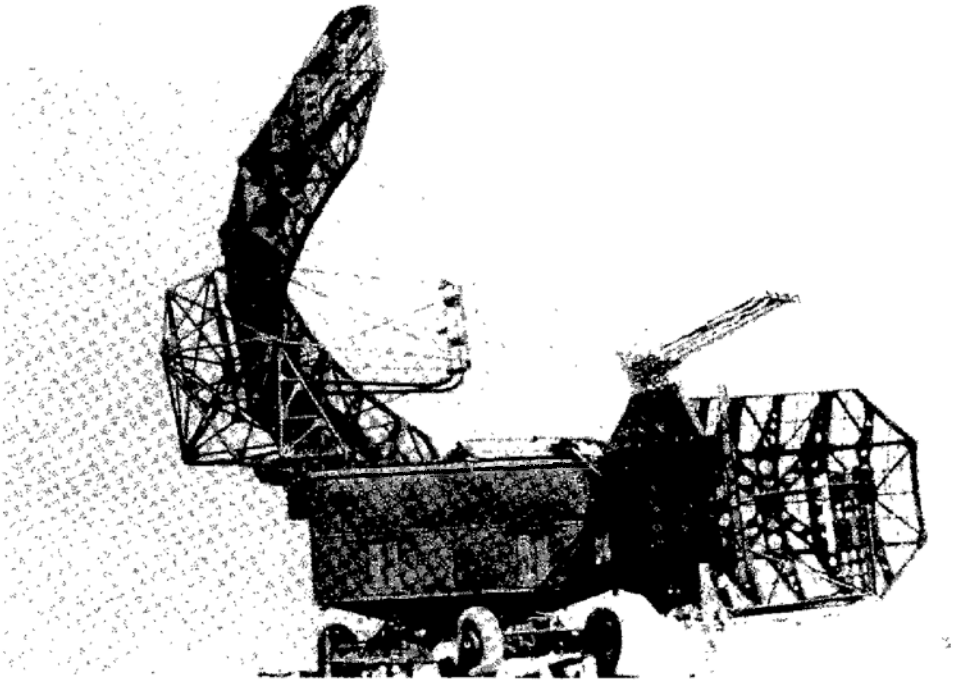
1.	NICKNAME	BIG BAR B
2.	SOVIET DESIGNATION	P-30 Series
3.	FUNCTION	Mobile GCI search radar with integral height finding capability.
4.	DESCRIPTION	Apparently identical to BIG BAR A except that the L band facility is removed and replaced by another S-Band facility; END BOX and the IFF dipoles are also removed. The radar appears to have been prepared for use by emergent nations friendly to but not part of the Soviet Bloc.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	Six S-band frequencies in the band 2690 - 3120 MHz in six sub bands (one for each beam). 2690 - 2720 MHz 2720 - 2750 MHz 2810 - 2845 MHz 2960 - 2990 MHz 2990 - 3025 MHz 3080 - 3120 MHz
	b. Probably the same as BIG BAR A	
	c. Probably the same as BIG BAR A	
	d. Probably the same as BIG BAR A	
	e. Probably the same as BIG BAR A	
	f. Pol.	Vertical (Lower reflector) Slant (Upper reflector)
6.	PERFORMANCE	Probably the same as BIG BAR A

BIG BAR B



1.	NICKNAME	BIG MESH
2.	SOVIET DESIGNATION	Probably P-30 Series
3.	FUNCTION	Mobile GCI search radar with integral height finding capability. Replaces TOKEN on GCI sites, and possibly on early warning sites.
4.	DESCRIPTION	Mobile multi V beam radar with two reflectors approximately 11 x 3.5 m (35 x 11 ft). Improved version of TOKEN.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	Five S-band frequencies in band 2700 - 3130 MHz 2700 - 2730 MHz 2810 - 2855 MHz 2950 - 3000 MHz 3000 - 3030 MHz 3060 - 3130 MHz and one L-band frequency about 570 MHz
	b. P.R.F.	375 pps
	c. P.W.	Approximately 3 microseconds
	d. Peak Power	1 MW per beam (est)
	e. A.R.R.	Approximately 3 or 6 rpm
	f. Pol.	S band - Vertical and Slant L band - Horizontal
	g. Beam width	Horizontal - L-band - 3.5° S-band - 0.7° Vertical - 1 band - 11.9° S-band - 2.37°
6.	PERFORMANCE	
	a. Range	176 Km (95 nm) vs 1 sq.m target at 7,600 m (25,000 ft) (50% BSR)

BIG MESH



b. Height Finding Capability	Poor
c. Accuracy	
(1) Range	Approximately 1,100 m (0.6 nm)
(2) Azimuth	± 1.7 - L band ± 0.5 - S band
(3) Height Finding	± 610 m (2,000 ft) at 9,000 m (30,000 ft)

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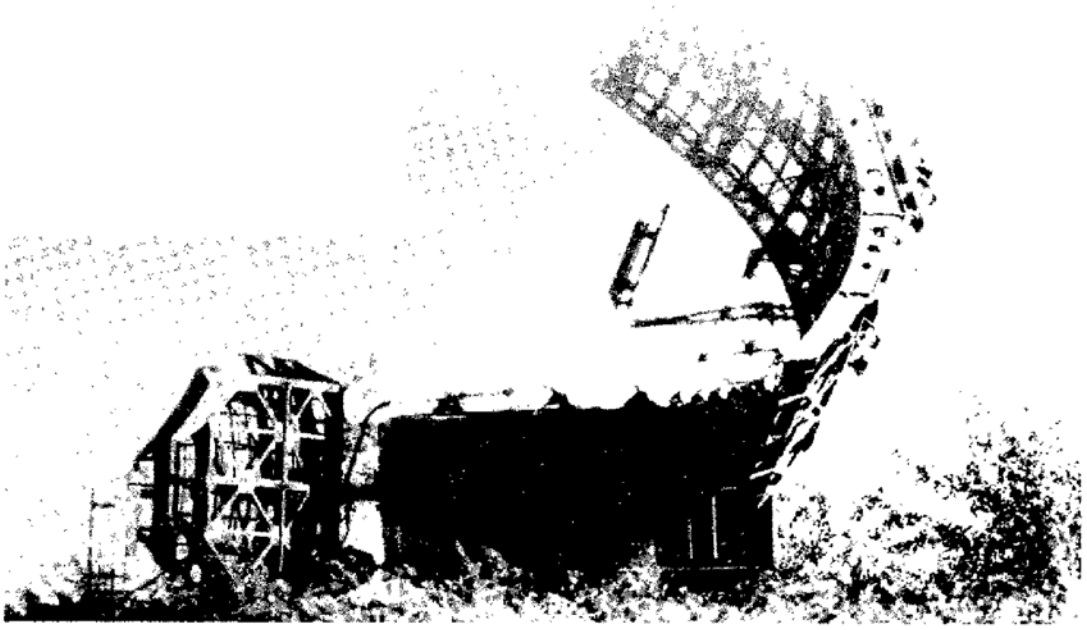
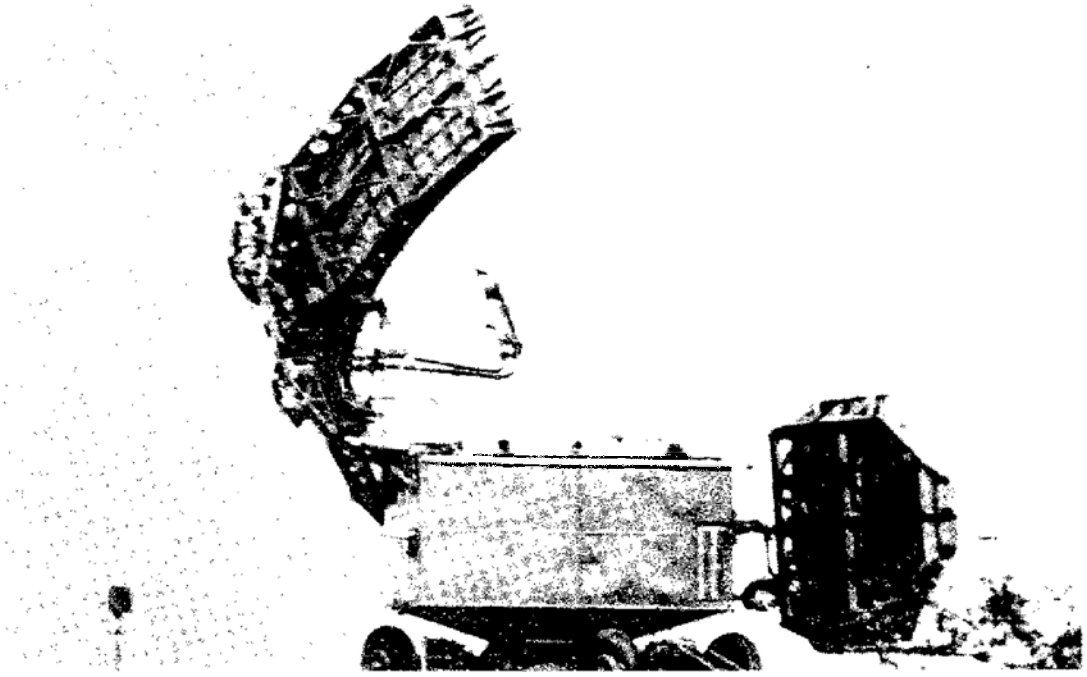
1.	NICKNAME	TOKEN
2.	SOVIET DESIGNATION	P-1 or P-20
3.	FUNCTION	Early warning and GCI search radar using the V beam system of height finding. It is still used but is now being replaced by the more modern radars.
4.	DESCRIPTION	Mobile, V beam, S band radar. Reflectors approximately 8 m (25 ft) long mounted on a rotating cabin. Originally derived from US AN/CPS-6.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	Five frequencies in band 2690 - 3130 MHz
	b. P.R.F.	Approximately 340 pps
	c. P.W.	Approximately 1 microsecond
	d. Peak Power	750 kw per beam (est)
	e. A.R.R.	3 or 6 rpm
	f. Pol.	Vertical and slant
	g. Beam width	Horizontal - 1°
6.	PERFORMANCE	
	a. Range	117 Km (63 nm) vs 1 sq.m target at 3,000 m (10,000 ft) (50% BSR)
	b. Height Finding Capability	Poor
	c. Accuracy	
	(1) Range	± 900 m (0.5 nm)
	(2) Azimuth	$\pm 0.5^{\circ}$
	(3) Height Finding	± 610 m (2,000 ft) at 9,000 m (30,000 ft)



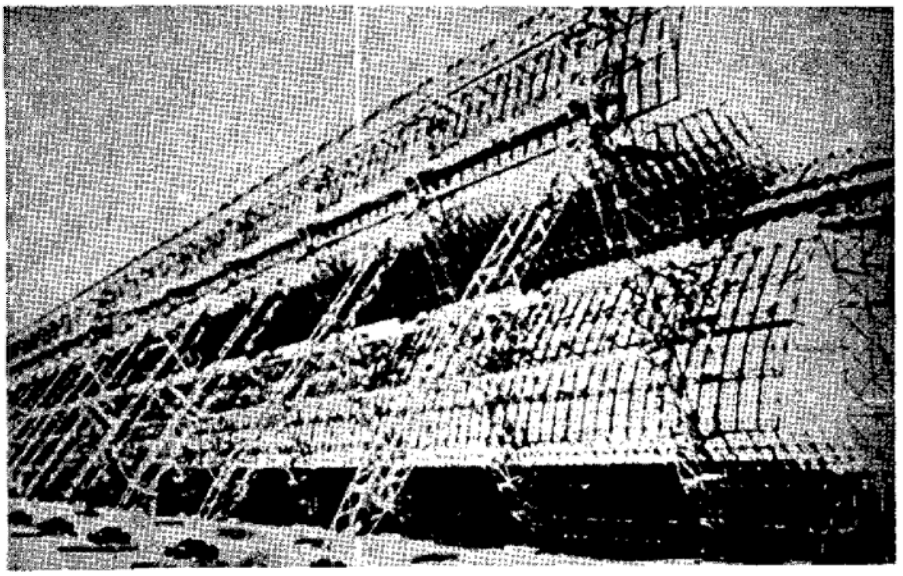


1.	NICKNAME	FARM GATE
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Surveillance
4.	DESCRIPTION	Polish surveillance radar in production since 1968. The antenna is a truncated paraboloid.
5.	TECHNICAL CHARACTERISTICS	
	Frequency	Possibly L-band
6.	PERFORMANCE	Unknown

No Photograph available

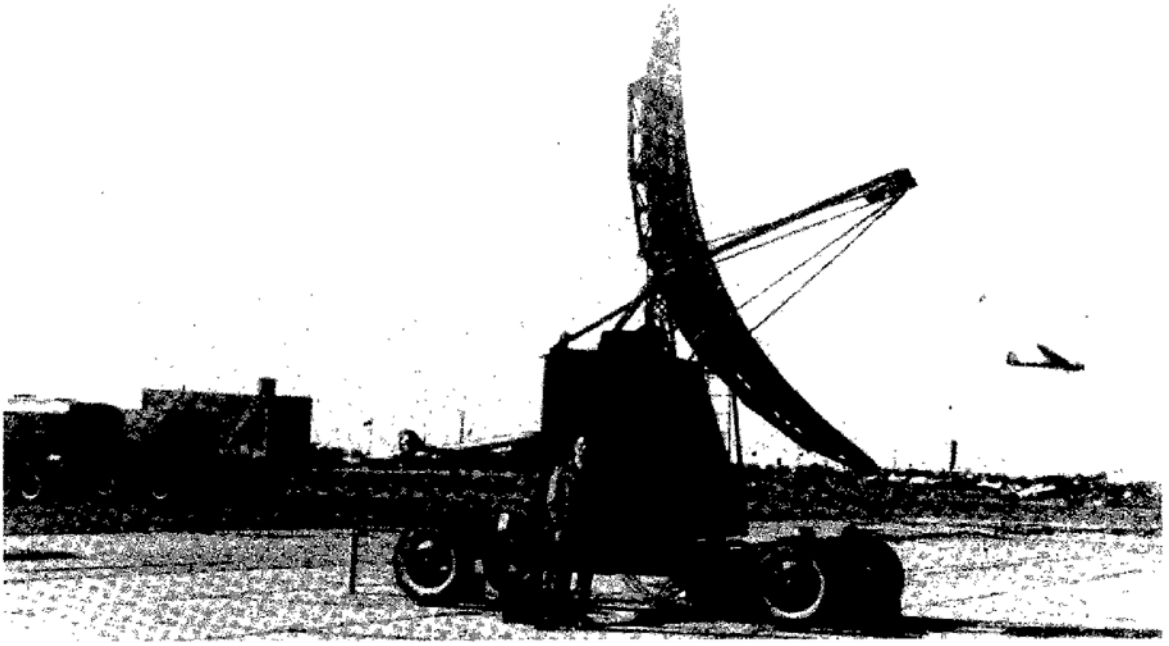
1.	NICKNAME	HEN HOUSE
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Ballistic Missile Early Warning
4.	DESCRIPTION	Two arrays that perform electronic scan.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	153 - 163 MHz
	b. P.R.F.	97.6 - 97.7 and 48 and 24 pps
	c. P.W.	40 - 280 and 900 - 1,000 microseconds.
6.	PERFORMANCE	Unknown

HEN HOUSE



Section B - Heightfinder

1.	NICKNAME	None
2.	SOVIET DESIGNATION	NYSA B
3.	FUNCTION	Mobile height finder. It is associated with the search radars BILL FOLD and NYSA C on Polish GCI and EW sites.
4.	DESCRIPTION	Utilizes a reflector and feed system, both of which nod. Reflector is approximately 6 m x 1.6 m (18 ft x 5 ft).
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	2728 - 2745 MHz
	b. P.R.F.	187 - 202 pps
	c. P.W.	0.8 - 1.5 microseconds
	d. Peak Power	1 MW (est)
	e. A.R.R.	N/A
	f. Pol.	Horizontal
	g. Nodding Rate	15 cpm and up to 30 cpm
	h. Beam width	Horizontal 5.5°, Vertical 1.5° (est)
6.	PERFORMANCE	
	a. Range	72 Km (39 nm) vs 1 sq.m target at 2° elev (50% BSR)
	b. Accuracy	
	(1) Range	± 1.8 Km (1 nm)
	(2) Height Finding	± 460 m (1,500 ft) at 139 Km (75 nm)



1.	NICKNAME	PATTY CAKE
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Height finding, used in association with GAGE.
4.	DESCRIPTION	Two vertical paraboloids mounted back to back. They are probably about 1.5 x 4.6 m (5 ft x 15 ft) and nod in synchronization about a horizontal axis. The feeds remain stationary.

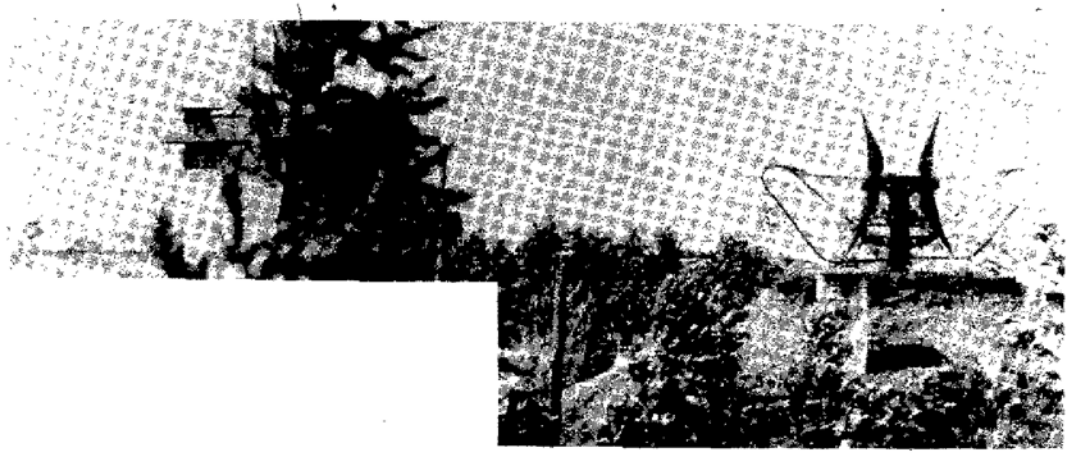
5. TRANSMISSION CHARACTERISTICS

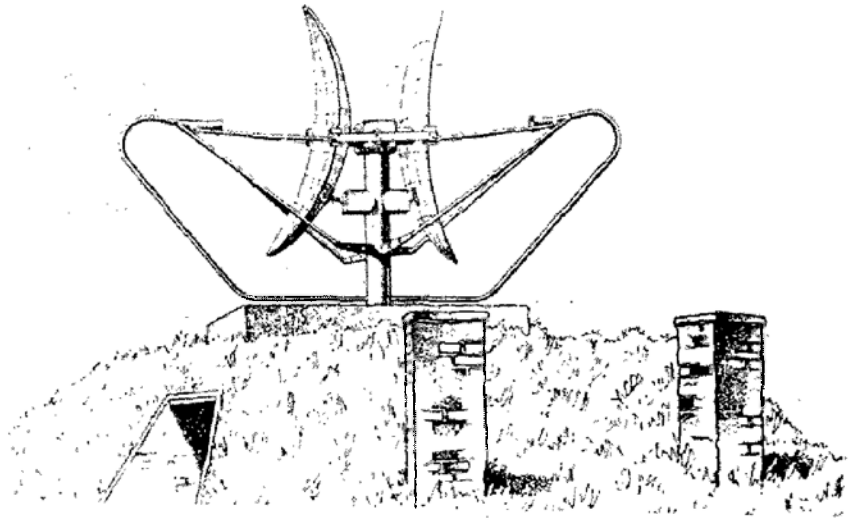
a. Frequency	2615 - 2720 MHz
b. P.R.F.	About 500 pps
c. P.W.	About 1.0 microsecond
d. Peak Power	1 - 3 MW (est)
e. Pol.	Vertical
f. Nodding Rate	About 86 - 116 cpm through a 30° sector.
g. Beam width	Horizontal 6.5°, Vertical 2° (est)

6. PERFORMANCE

a. Range	55 Km (30 nm) vs 1 sq.m target at 2° elev (50% BSR)
b. Accuracy	
(1) Range	± 1.8 Km (1 nm) (est)
(2) Height Finding	± 380 m (1,250 ft) at 111 Km (60 nm) (est)

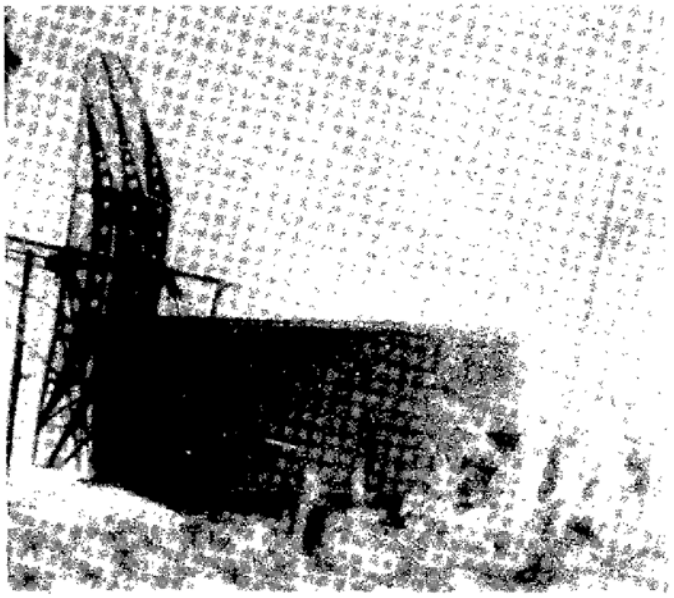
PATTY CAKE

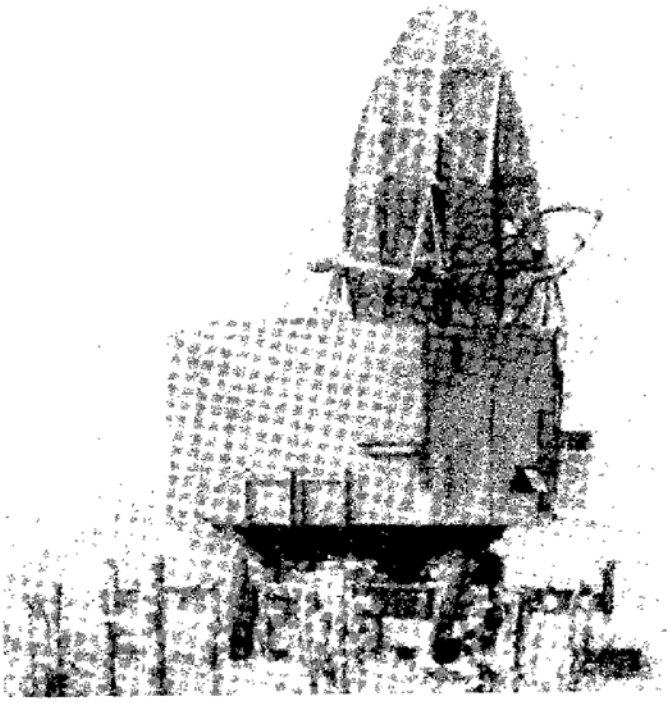




1.	NICKNAME	ROCK CAKE
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Mobile nodding height finder. Deployed with the various air surveillance radars.
4.	DESCRIPTION	A mobile height finder of the nodding reflector type. The reflector is about 4.9 m (16 ft) high and 2 m (6 ft) wide at its center line. It is fed by a stationary waveguide and horn.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	2610 - 2650 MHz
	b. P.R.F.	186 - 216, 330 - 340 and 360 - 460 pps variable when operating in synchronization with early warning radar.
	c. P.W.	2.0 - 3.5 microseconds
	d. Peak Power	1 - 3 MW (est)
	e. Pol.	Horizontal
	f. Nodding Rate	About 30 - 40 cpm through a sector of 30°
	g. Beam width	Vertical 1.8°, Horizontal 4.7° (est)
6.	PERFORMANCE	
	a. Range	100 Km (54 nm) vs 1 sq.m target at 2° elev (50% BSR)
	b. Accuracy	
	(1) Range	± 1.8 Km (1.0 nm) (est)
	(2) Height Finding	± 366 m (1,200 ft) at 90 Km (50 nm) (est)
7.	REMARKS	Transmission characteristics similar to STONE CAKE.

ROCK CAKE





1. NICKNAME — SIDE NET

2. SOVIET DESIGNATION — Unknown

3. FUNCTION — Mobile height finder with better performance than any previous Soviet equipment. Height finder in EW and GCI sites associated with TALL KING, BACK NET and BAR LOCK.

4. DESCRIPTION — SIDE NET has the antenna mounted on the side rather than on the end of a standard electronics van. The elliptical parabolic antenna 9.5 x 3.05 m (30 x 11 ft) is of very light construction and is mounted on the braces which places the nod axis approximately 2.13 m (7 ft) above the van. The feed horn is fastened to the antenna and remains at the focal point of the reflector during the nod cycle.

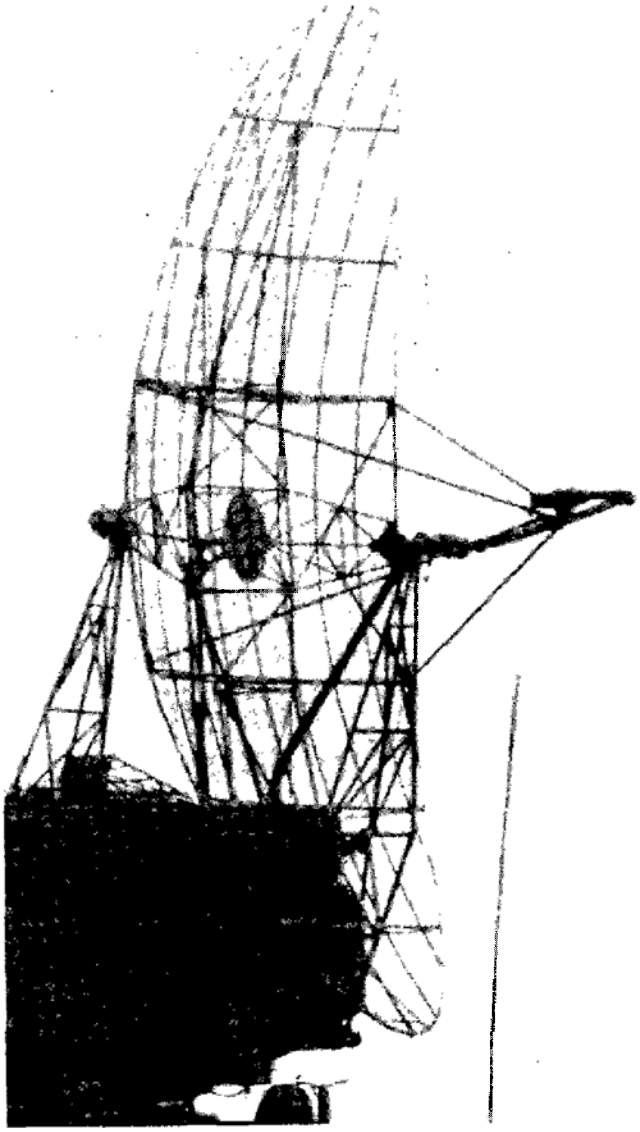
5. TRANSMISSION CHARACTERISTICS

a. Frequency	2610 - 2640 MHz
b. P.R.F.	192 - 241, 298 - 400 and 654 - 750 pps
c. P.W.	2.2 - 3.5 usec
d. Peak Power	1 - 3 MW (est)
e. Pol.	Horizontal
f. Beam width	V = 1.0°
g. Nodding Rate	About 10 - 30 cpm

6. PERFORMANCE

a. Range	195 Km (105 nm) vs 1 sq.m target at 2° elev (50% BSR)
b. Accuracy	
(1) Range	± 1.8 Km (1 nm)
(2) Height Finding	± 460 m (1,500 ft) at 185 Km (100 nm)

SIDE NET



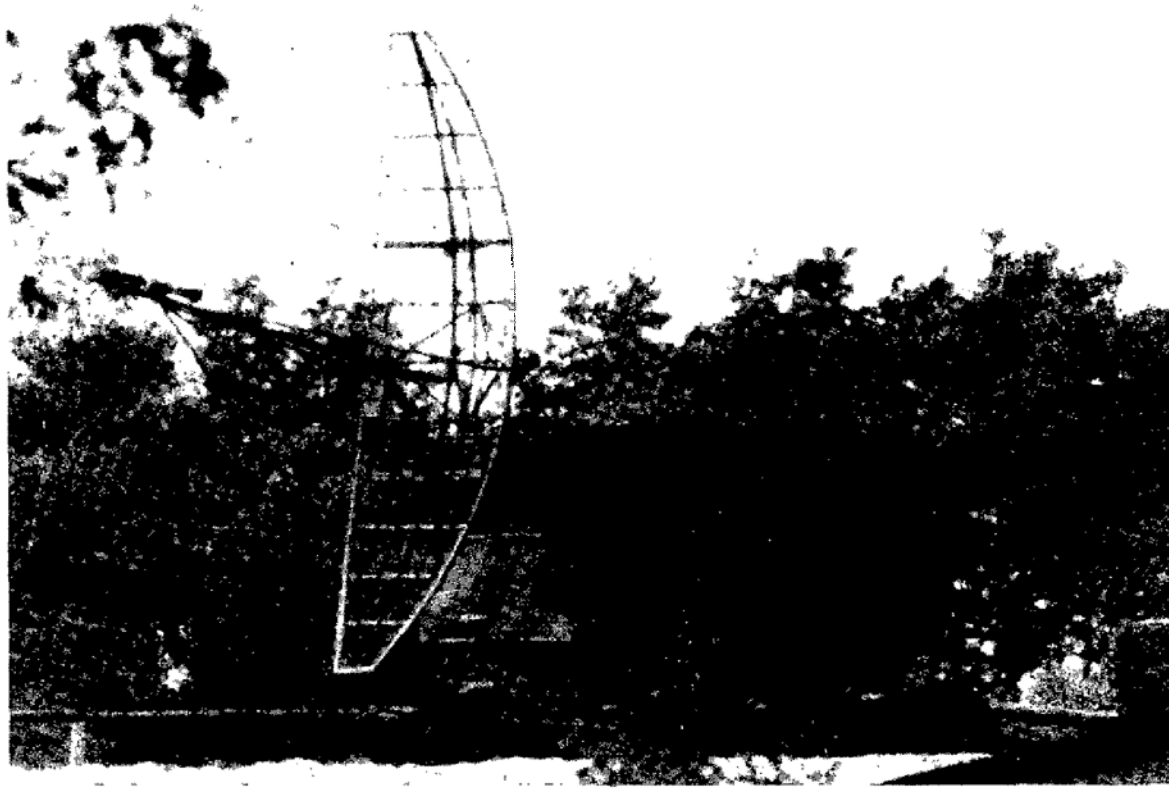
1.	NICKNAME	SPONGE CAKE
2.	SOVIET DESIGNATION	PRW-11
3.	FUNCTION	Height Finder
4.	DESCRIPTION	A mobile, nodding height finder similar to STONE CAKE, except that the reflector is of lighter construction. Antenna dimensions approximately as STONE CAKE. SPONGE CAKE is used with all types of Soviet EW and GCI Radars, particularly BAR LOCK.

5. TRANSMISSION CHARACTERISTICS

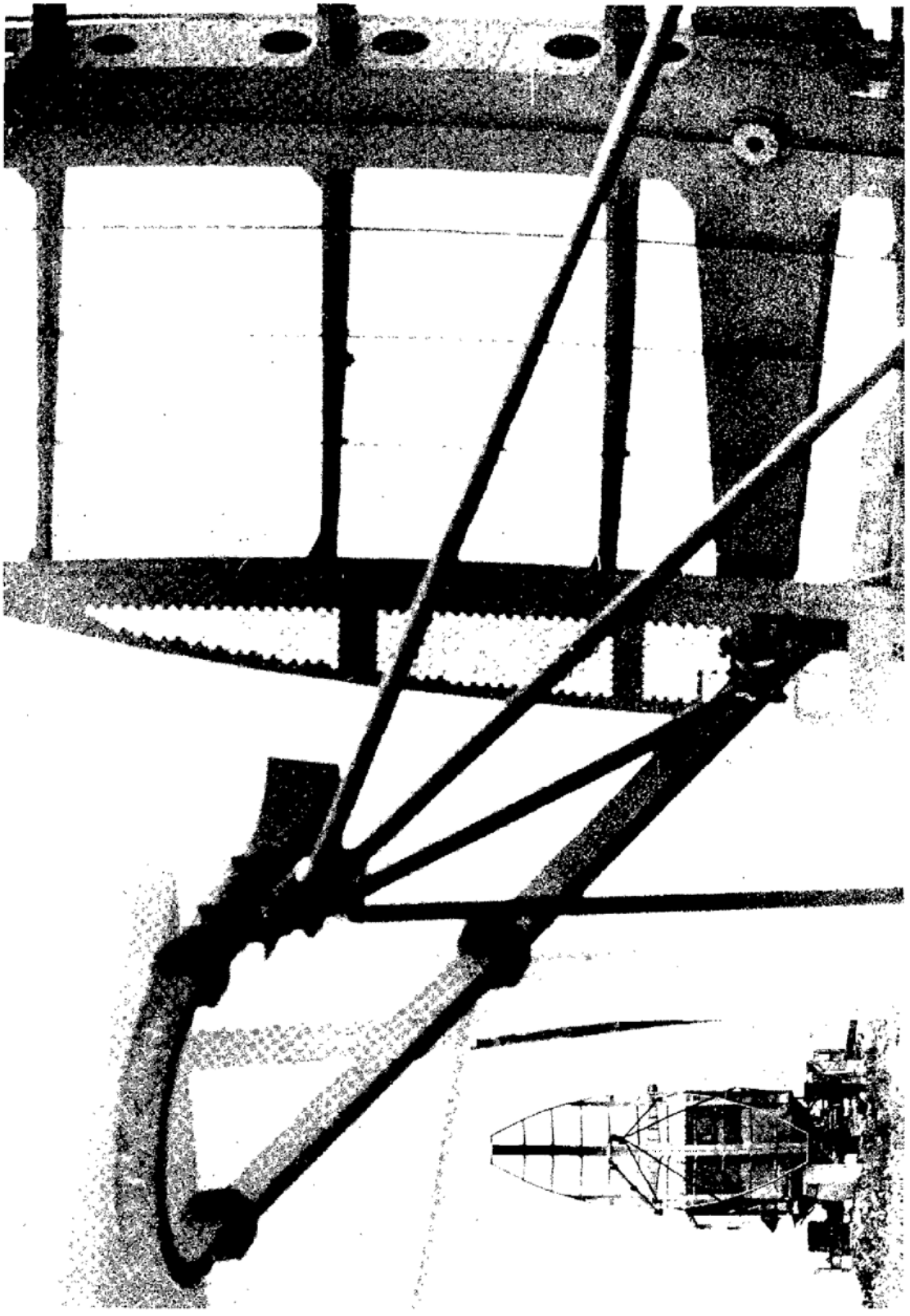
a. Frequency	2625 - 2995 MHz
b. P.R.F.	370 - 390 and 410 - 440 pps and has been noted in pulse synthronism with BAR LOCK.
c. P.W.	1.8 - 3.5 microseconds
d. Peak Power	1 - 2 MW (est)
e. Pol.	Horizontal
f. Nodding Rate	30 - 40 cpm
g. Beam width	V = 1.4°

6. PERFORMANCE

a. Range	130 Km (70 nm) vs 1 sq.m target at 2° elev (50% BSR)
b. Accuracy	
(1) Range	± 1.8 Km (1 nm) (est)
(2) Height Finding	± 360 m (1,300 ft) at 130 Km (70 nm) (est)

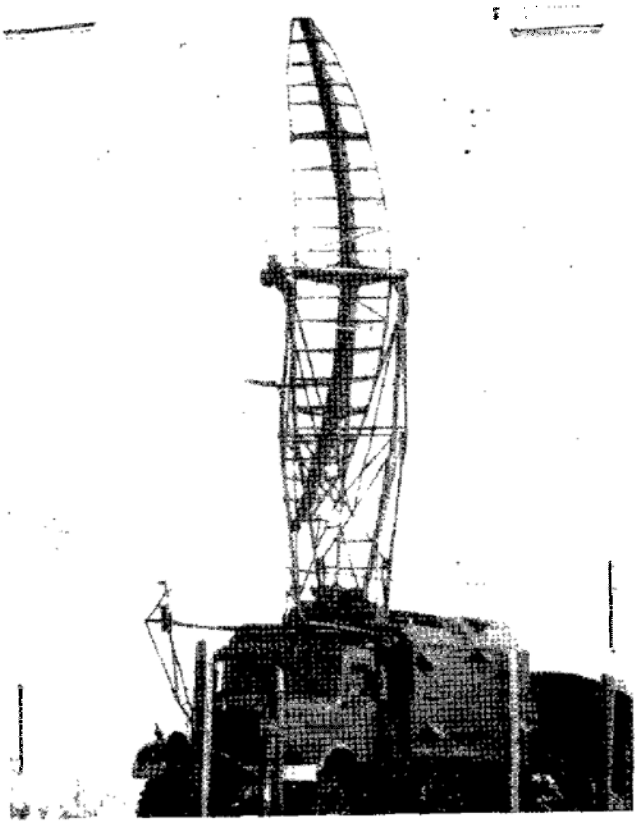


1.	NICKNAME	STONE CAKE
2.	SOVIET DESIGNATION	KONUS / PRW - 10
3.	FUNCTION	Height finder with better performance than ROCK CAKE.
4.	DESCRIPTION	A mobile nodding height finder similar to ROCK CAKE but with a larger reflector about 5.7 x 2.2 m (17 x 6.6 ft). It is fed by a fixed waveguide and horn.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	2600 - 2640 MHz
	b. P.R.F.	186 - 216, 330 - 340, and 360 - 440 pps variable when operating in synchronization with early warning radars.
	c. P.W.	2 - 3.5 microseconds
	d. Peak Power	1 - 2 MW (est)
	e. Pol.	Horizontal
	f. Nodding Rate	About 30 - 40 cpm through a sector of 30°.
	g. Beam width	V = 1.4°
6.	PERFORMANCE	
	a. Range	130 Km (70 nm) vs 1 sq.m target at 2° elev (50% BSR)
	b. Accuracy	
	(1) Range	± 1.8 Km (1 nm) (est)
	(2) Height Finding	± 400 m (1,300 ft) at 130 Km (70 nm) (est)
7.	REMARKS	Transmission characteristics similar to ROCK CAKE.



1.	NICKNAME	THIN SKIN A/B
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Mobile height finder probably used against low level targets. Associated with FLAT FACE and SQUAT EYE on EW sites.
4.	DESCRIPTION	The antenna is about 8.00 m (26 ft) long and 1.40 m (4.6 ft) wide. It is mounted on a tower 5.4 m (17.5 ft) high. The tower and antenna rotate independent of the box on which they are mounted. The tower and antenna can be stored easily. THIN SKIN A is trailer mounted, THIN SKIN B is mounted on a KRAZ - 214 prime mover.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	5340 - 5500 MHz 6460 - 6600 MHz
	b. P.R.F.	380 - 420 pps 785 - 822 pps
	c. P.W.	1.0 - 2.2 usec
	d. Peak Power	1 - 3 MW (est)
	e. Pol.	Horizontal
	f. Beam width	V = 0.5°
	g. Nodding rate	15 - 25 cpm
6.	PERFORMANCE	
	a. Range	176 Km (95 nm) vs 1 sq.m target at 2° elev (50% BSR)
	b. Accuracy	
	(1) Range	± 1.8 Km (1 nm)
	(2) Height Finding	± 200 m (600 ft) at 176 Km (95 nm)

THIN SKIN



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Section C - Weapons Control

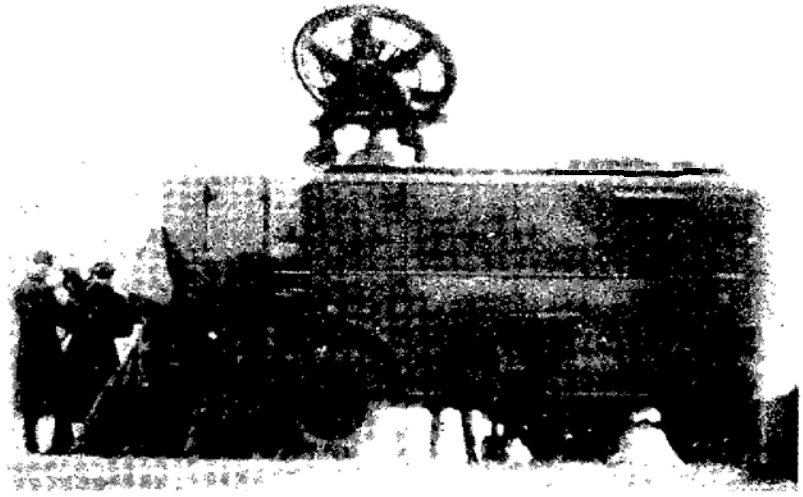
1.	NICKNAME	FIRE CAN
2.	SOVIET DESIGNATION	SON-9(1) SON-9A(2) and SON-9B
3.	FUNCTION	AAA fire control radar with PUAZO-6 (Ranger) as an integrated fire control unit associated with KNIFE REST A or B or FLAT FACE for preliminary acquisition. FIRE CAN is used with 57 mm AA guns.
4.	DESCRIPTION	Similar in appearance to WHIFF but of lighter construction and equipped with a parabolic reflector 1.5 m (5.0 ft) diameter, with rotating dipole on the cabine of the two-axle trailer. The reflector has 5 strong radial bracings. During movements it can be folded to the roof and covered.

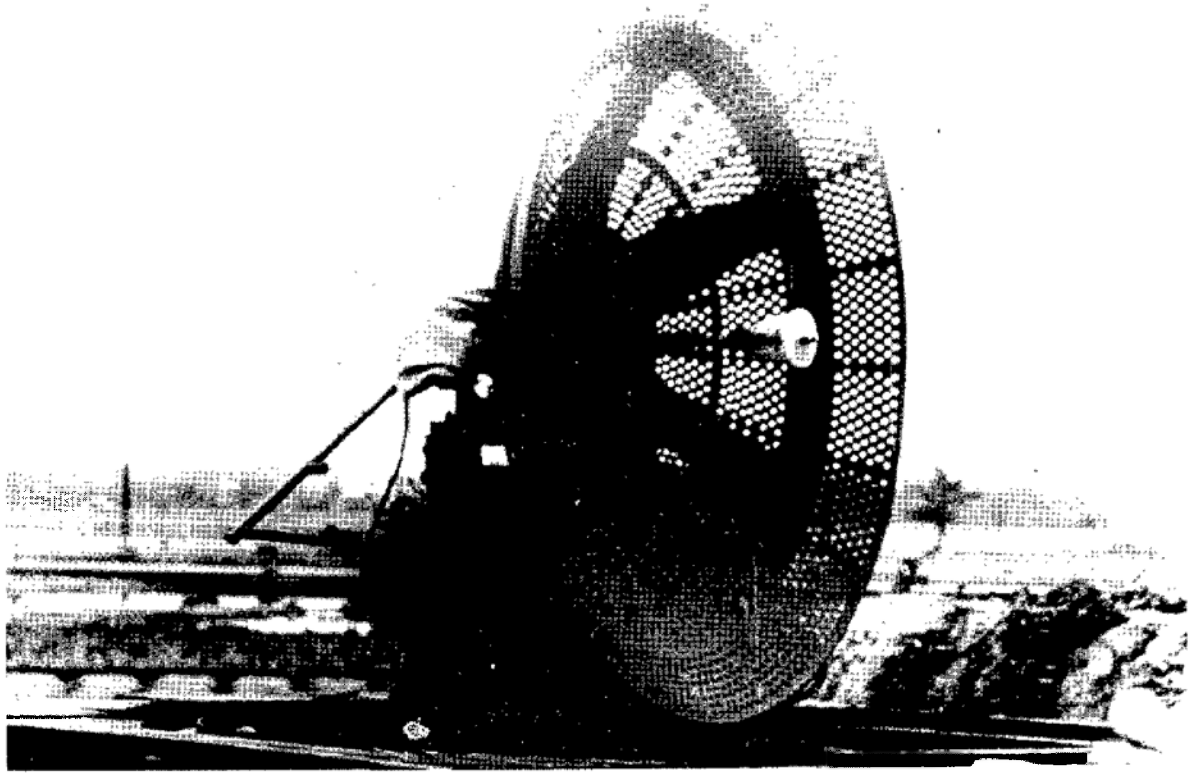
5. TRANSMISSION CHARACTERISTICS

a. Frequency	2650 - 2900 MHz
b. P.R.F.	1850 - 1890 pps
c. P.W.	0.3 - 0.8 microseconds
d. Peak Power	250 kw (est)
e. A.R.R.	5 - 15 rpm
f. Method of Illumination	
(1) Search mode	Helical scan at 5 Hz
(2) Tracking mode	Conical scan at 24 Hz
g. Pol.	Rotating

(1) NOTE: SON-9 includes 4 - 6 magnetrons, switchable in about 40 minutes, in the range of 180 MHz.

(2) NOTE: The version 9A supposedly has IFF built in and a fast frequency change capability. Another unknown version - possibly the 9B - has a tunable magnetron and is able to conduct a continuous frequency shifting at 10%.





h. Beam width	5.0°

6. PERFORMANCE

a. Search Range	SON-9 60 km (32.4 nm)
	SON-9A 80 km (43.2 nm)
b. Maximum Tracking Range	SON-9 35 km (17.9 nm)
	SON-9A 45 km (24.3 nm)
c. Accuracy	
(1) Range	$\pm$ 15 - 20 m (45 - 60 ft)
(2) Asimuth and Elevation	$\pm 0.2^{\circ}$

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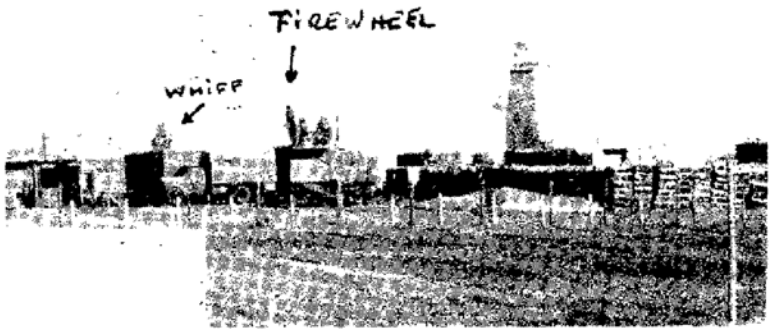
1.	NICKNAME	FIRE WHEEL
2.	SOVIET DESIGNATION	SON-30
3.	FUNCTION	Mobile AAA fire control radar in 130 mm AAA sites.
4.	DESCRIPTION	The parabolic reflector 3 m (9.84 ft) in diameter is mounted near the cabin end of two-axle trailer and has 8 radial and 8 semi-radial bracings. The associated IFF equipment on one side of the reflector is called FOIL TWO.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	2695 - 3020 MHz with possible frequency change capability as in SON-9A.
	b. P.R.F.	840 - 1040
	c. P.W.	0.3 - 0.8
	d. Peak Power	400 kw (est)
	e. A.R.R.	16 - 28 rpm
	f. Method of Illumination	
	(1) Search mode	3.5 sec / rev. circular
	(2) Search mode	3.0 sec / cycl. spiral
	(3) Tracking mode	Conical 37 - 42 Hz
	g. Pol.	Rotating
	h. Beam width	2.7°
6.	PERFORMANCE	
	a. Maximum Search Range	76 km (41 nm) vs 1 sq.m target at 7.5° elev (50% BSR)
	b. Maximum Track Range	About 70 km (38 nm)

c. Accuracy

(1) Range	± 15 m (45 ft)
(2) Azimuth and Elevation	± 0.2°



1. NICKNAME — WHIFF

2. SOVIET DESIGNATION — SON-4

3. FUNCTION — Mobile AA fire control radar is employed in a few sites only, these being associated with CROSS FORK and KNIFE REST A. Utilized at 57 mm AA gun sites.

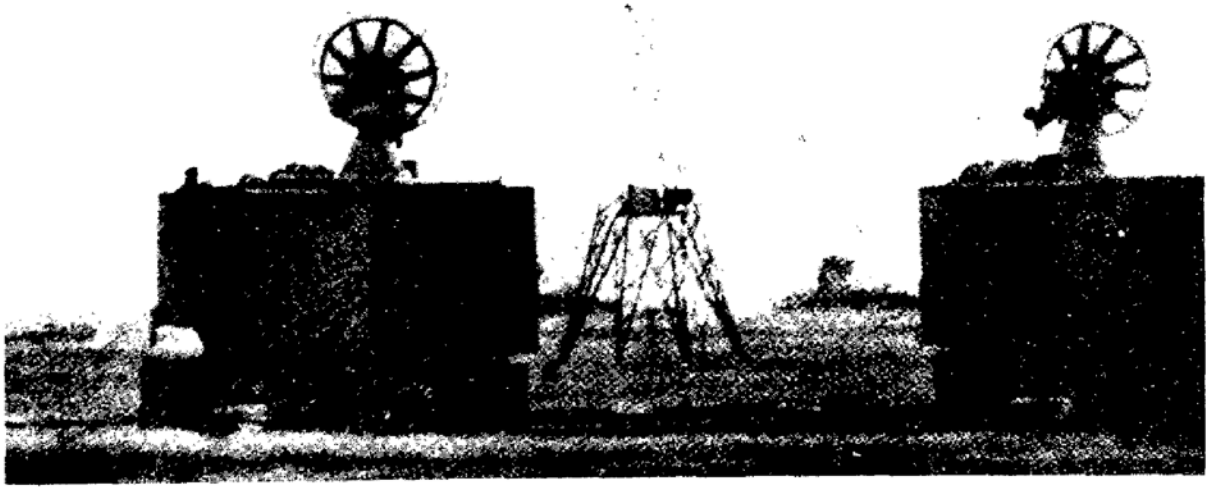
4. DESCRIPTION — WHIFF is a Soviet version of the US SCR-584 fire control radar. Its trailer is larger than the US counterpart. The antenna consists of parabolic mesh reflector 1.8 m (5.4 ft) in diameter with a rotating dipole on the rear cabin end of a two axle trailer. The reflector has 10 strong radial bracings. During movements it can be folded to the roof and covered like FIRE CAN.

5. TRANSMISSION CHARACTERISTICS

a. Frequency	2700 - 2960 MHz
b. P.R.F.	940 and 1250 pps
c. P.W.	0.4 - 1.0 microseconds
d. Peak Power	250 kw
e. A.R.R.	6 rpm
f. Method of Illumination	Conical 22 - 27 Hz
g. Pol.	Rotating
h. Beam width	4°

6. PERFORMANCE

a. Maximum Search Range	43 km (23 nm) vs 1 sq.m target at 7.5 elev (50% BSR)
b. Maximum Track Range	40 km (19 nm) display limited

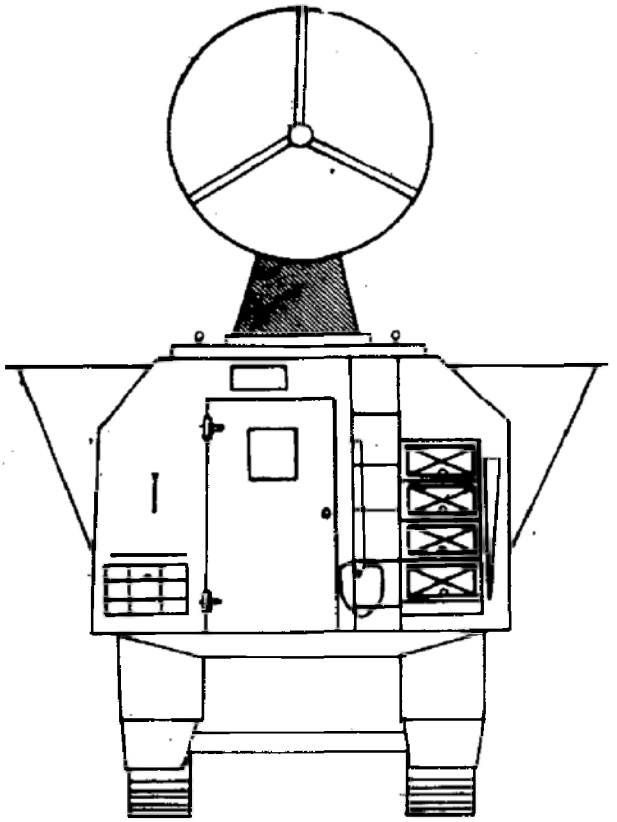


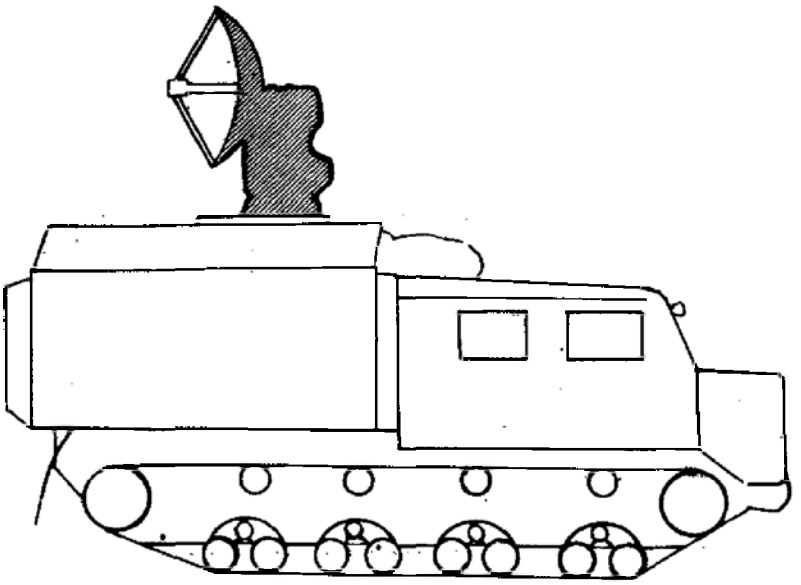
c. Tracking Accuracy

(1) Range	± 14 m (45 ft)
(2) Azimuth and Elevation	± 0.2°

1.	NICKNAME	FLAP TRACK
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Unknown (possibly AA-artillery associsted)
4.	DESCRIPTION	The equipment is housed in a chamfered box body mounted on an AT-s medium artillery tractor chassis. The fully retractable parabolic dish antenna, approximately 1.5 m 59 in.) in diameter, is centrally located somewhat toward the forward end of the box. The antenna feed has 3 radial supports running to the edge of the dish. When in operation two flaps are opened up on either side of the box.
5.	TRANSMISSION CHARACTERISTICS	Unknown

FLAP TRACK

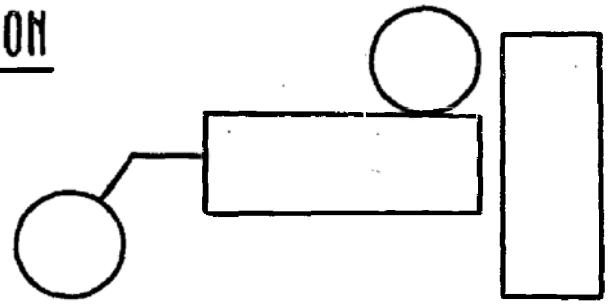




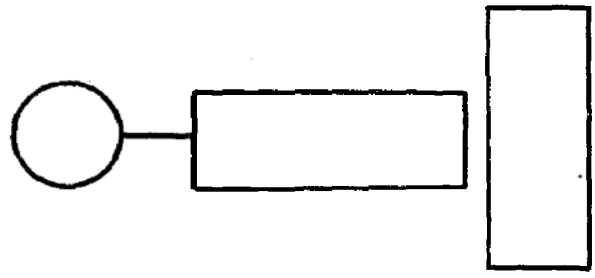
O B S E R V A T I O N S - FANG SONG Series

A	Missile control radar used on SA-2 sites. Has two trough shaped antennas and two parabolic dish reflectors. The entire antenna system is mounted on a box-bodied vehicle which is capable of rotation through 360°.
B	Missile control radar. Has two trough shaped antennas and a single parabolic dish reflector mounted at the end of the horizontal trough. The antenna system is mounted on a box bodied vehicle and is capable of rotation through 360°.
C	Missile control radar. Description same as FAN SONG B but physically the waveguides are different.
D	Function unknown. FAN SONG D has two trough shaped antennas and one parabolic dish mounted on the horizontal trough.
E	Missile control radar. This radar is similar to FAN SONG C except that it has two large dishes mounted on the horizontal trough similar in construction to FIRE WHEEL dishes, but apparently fed by waveguides.

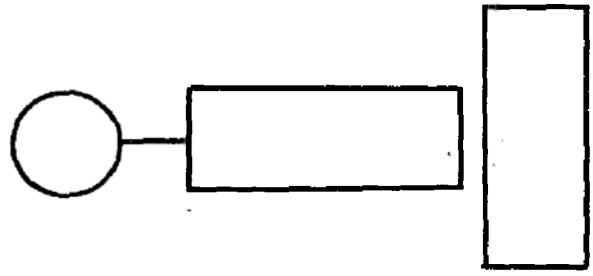
CONFIGURATION OF FAN SONG RADARS



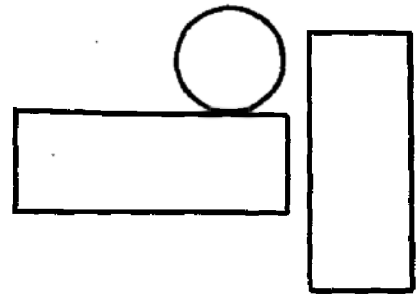
(A) S-Band



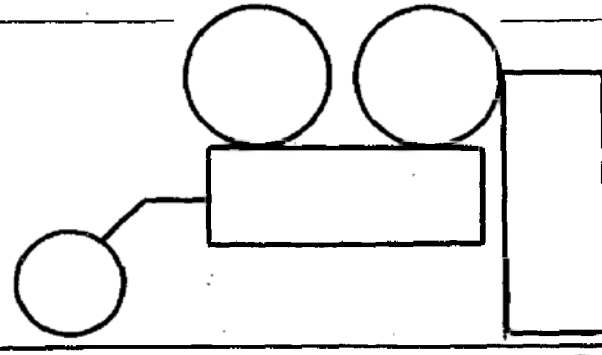
(B) S-Band



(C) C-Band



(D) S-Band



(E) C-Band

1. NICKNAME — FAN SONG A

2. SOVIET DESIGNATION — Unknown

3. FUNCTION — Missile control radar used on SA-2 sites

4. DESCRIPTION — FAN SON A has two trough shaped ansennas and two parabolic dish reflectors. One trough is horizontal and has one dish on top and one dish at the end. The end dish has no apparent electronic purpose. The second trough is vertically mounted.

5. TRANSMISSION CHARACTERISTICS

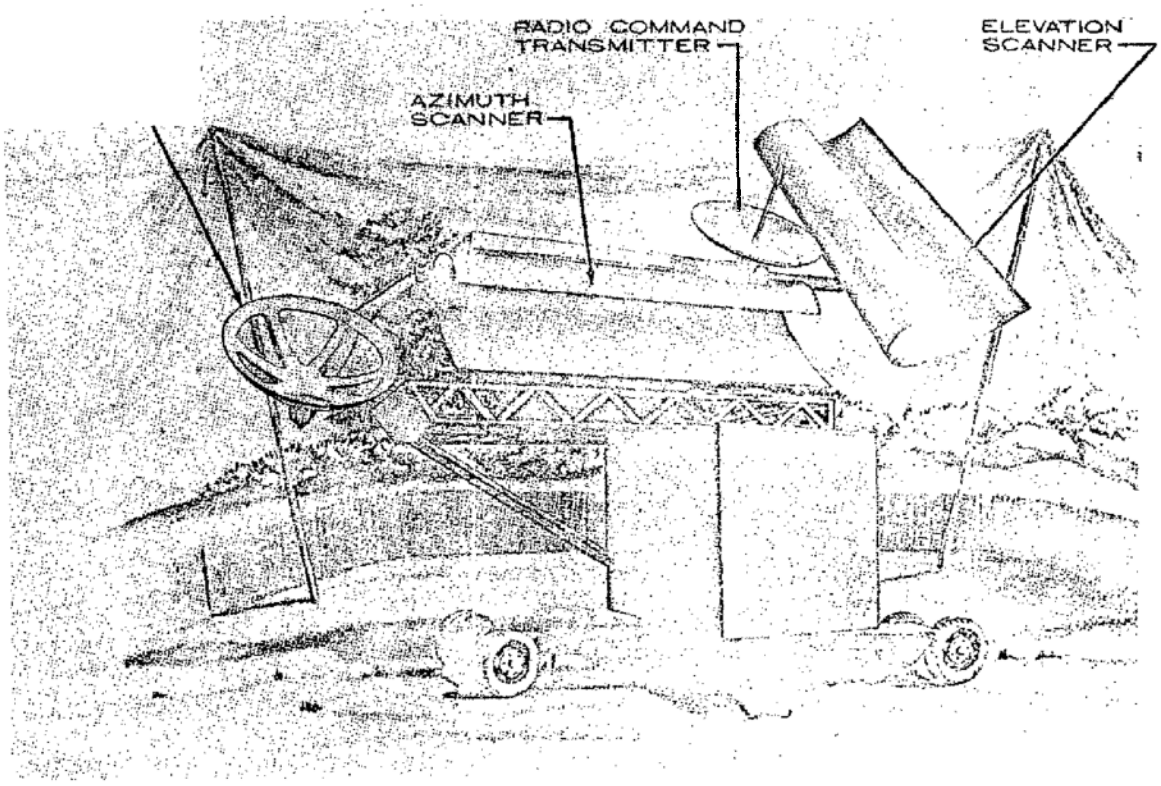
a. Frequency
(1) Troughs
Horizontal about 2970 MHz
Vertical about 3030 MHz
(2) Dish
Approximately 740 MHz

b. P.R.F.
(1) Trough
1100 to 1250 pps or 2200 to 2500 pps
(2) Dish
2500 pps and 42 - 44 groups/sec train (consists of 7 triple pulses in each group).

c. P.W.
(1) Trough
0.6 - 1.0 and 0.3 - 0.5 microseconds
(2) Dish
0.3 - 0.5 microseconds for beacon in interrogator. 1.0 - 1.1 microseconds (pulses within triple pulse groups of 44 groups/sec train) in guidance/arming mode.

a. 7 triple pulse groups/frame for guidance.
b. Additional 4 triple pulse groups/frame for arming.

FAN SONG A



d. Peak Power — Possible 600 KW per beam

e. Type of Illumination
(1) Troughs
Possible LEWIS type scanners giving a $10^{\circ} \times 2^{\circ}$ beam, one scanning vertically and the other horizontally at approximately 16 Hz.
(2) Dish
Missile guidance dish probably using conventional command guidance techniques. Beacon and guidance/arming mode time share dish transmission.

f. Pol.
(1) Troughs
Horizontal - vertically pol.
Vertical - horizontally pol.
(2) Dish
Probably circularly pol.

6. PERFORMANCE

(a) Maximum track range
(1) Low PRF, 118 Km (64 nm) (PRF limited)
(2) High PRF, 74 Km (40 nm) (PRF limited)

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1. NICKNAME — FAN SONG B

2. SOVIET DESIGNATION — Unknown

3. FUNCTION — Missile control radar

4. DESCRIPTION — FAN SONG B has two trough-shaped antennas and a single parabolic dish reflector mounted at the end of the horizontal trough. The aerial system is mounted on a box-bodied vehicle and is capable of rotation through 360°.

5. TRANSMISSION CHARACTERISTICS

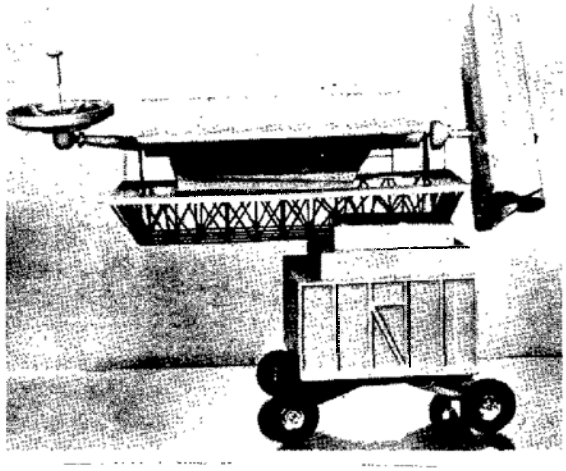
a. Frequency
(1) Troughs
Horizontal - about 2970 MHz
Vertical - about 3030 MHz
(2) Dish
Approximately 740 MHz

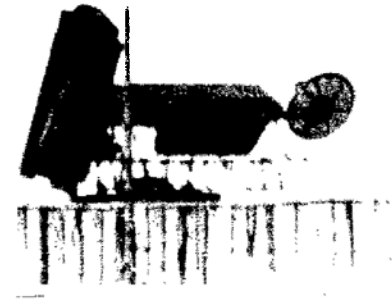
b. P.R.F.
(1) Troughs
1100 - 1250 pps or 2200 - 2500 pps
(2) Dish
2500 pps and 42 - 44 groups/sec train (consists of 7 triple pulses in each group).

c. P.W.
(1) Troughs
0.6 - 1.0 and 0.3 - 0.5 microseconds
(2) Dish
0.3 - 0.5 microseconds for beacon interrogator.
1.0 - 1.1 microseconds (pulses within triple pulse groups of 44 groups/sec train) in guidance/arming mode.

a. 7 triple pulse groups/frame for guidance.
b. Additional 4 triple pulse groups/frame for arming.

FAN SONG B

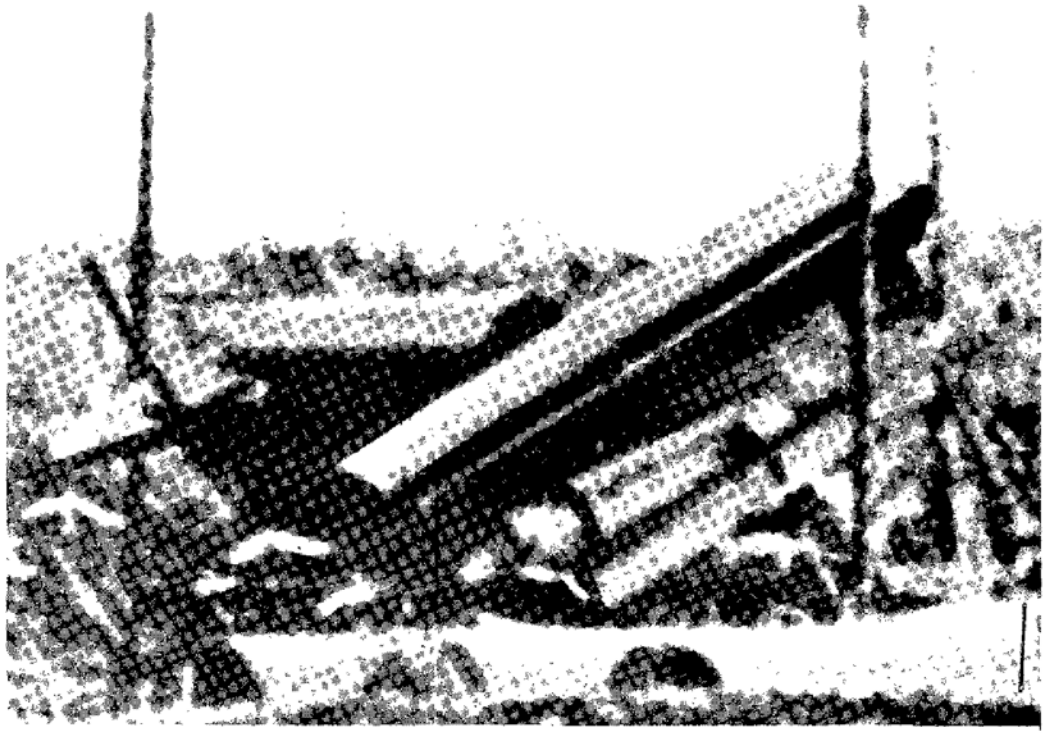




d. Peak Power	Possibly 600 KW per beam.
e. Type of Illumination	(1) Troughs Possible LEWIS type scanners giving a $10^{\circ} \times 2^{\circ}$ beam, one scanning vertically and the other horizontally at approximately 16 Hz. (2) Dish Missile guidance dish probably using convential command guidance techniques. Beacon and guidance/arming mode time share dish transmission.
f. Pol.	(1) Troughs Horizontal - vertically pol. Vertical -- horizontally pol. (2) Dish Circularly polarized.

6. PERFORMANCE

Maximum track range	(1) Low PRF, 118 Km (64 nm) (PRF limited) (2) High PRF, 74 Km (64 nm) (PRF limited)



1. NICKNAME — FAN SONG C

2. SOVIET DESIGNATION — Unknown

3. FUNCTION — Missile control radar

4. DESCRIPTION — Same as FAN SONG B but physically wave guides are different.

5. TRANSMISSION CHARACTERISTICS

a. Frequency
(1) Troughs
Horizontal - about 4950 MHz
Vertical - about 5050 MHz
(2) Dish
Approximately 740 MHz

b. P.R.F.
(1) Troughs
1000 or 2000 pps
(2) Dish
1000 or 2000 pps and 42 - 44 groups/sec train (consists of 7 triple pulses in each group).

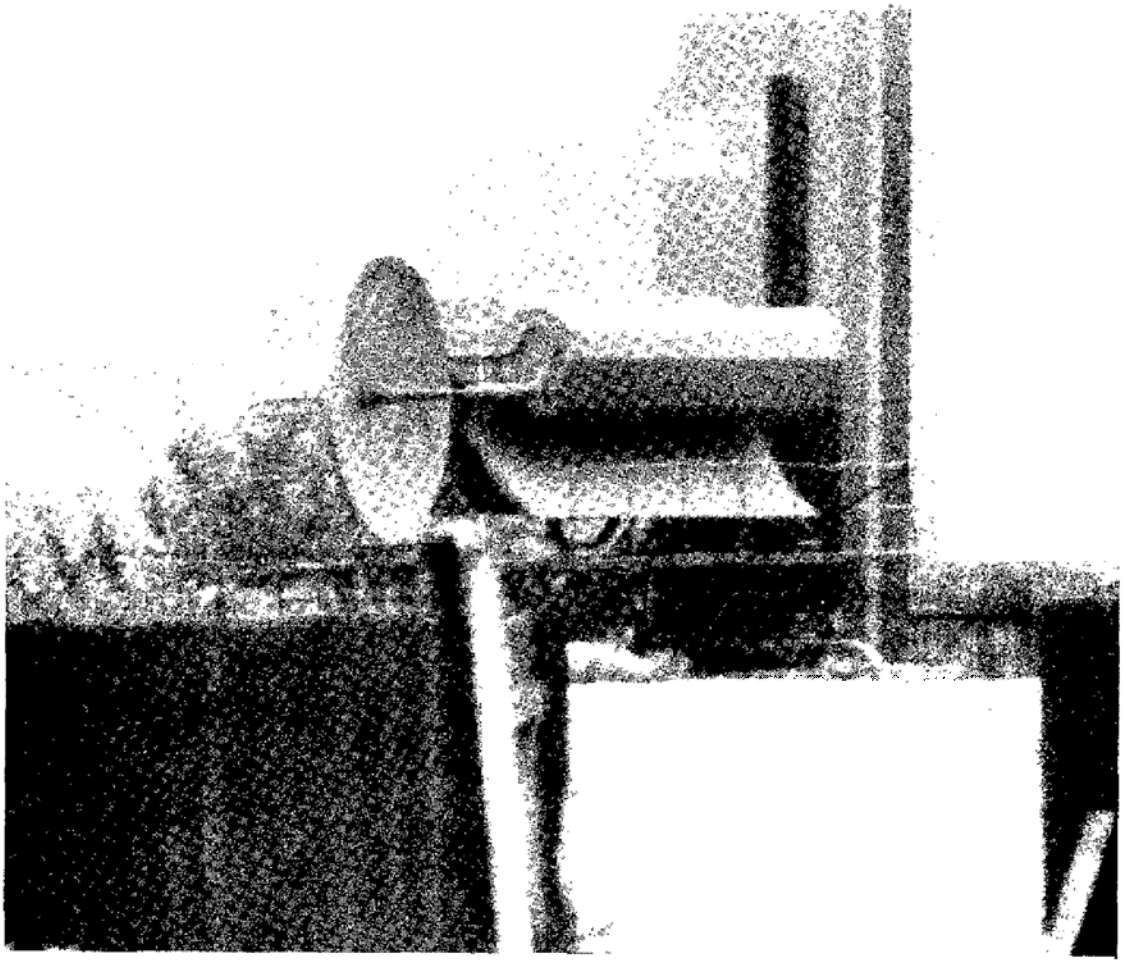
c. P.W.
(1) Troughs
0.8 and 0.4 microseconds
(2) Dish
0.2 and 0.4 microseconds. 1.0 microsecond (pulses within triple pulse groups of 44 groups/sec train).

d. Peak Power
Possibly 1.5 MW per beam.

e. Type of Illumination
(1) Troughs
Possible LEWIS type scan giving a $9.3^{\circ} \times 0.9^{\circ}$ beam, one scanning vertically and the other horizontally at approximately 16 Hz.
(2) Dish
Missile guidance dish probably using conventional command guidance techniques.

NATO SECRET

FAN SONG C



f. Pol.	(1) Troughs Horizontal - vertically pol. Vertical - horizontally pol. (2) Dish Circular pol.

6. PERFORMANCE

a. Maximum track range	(1) Low PRF, 148 Km (80 nm) (PRF limited) (2) High PRF, 74 Km (40 nm) (PRF limited)
b. Accuracy	Unknown

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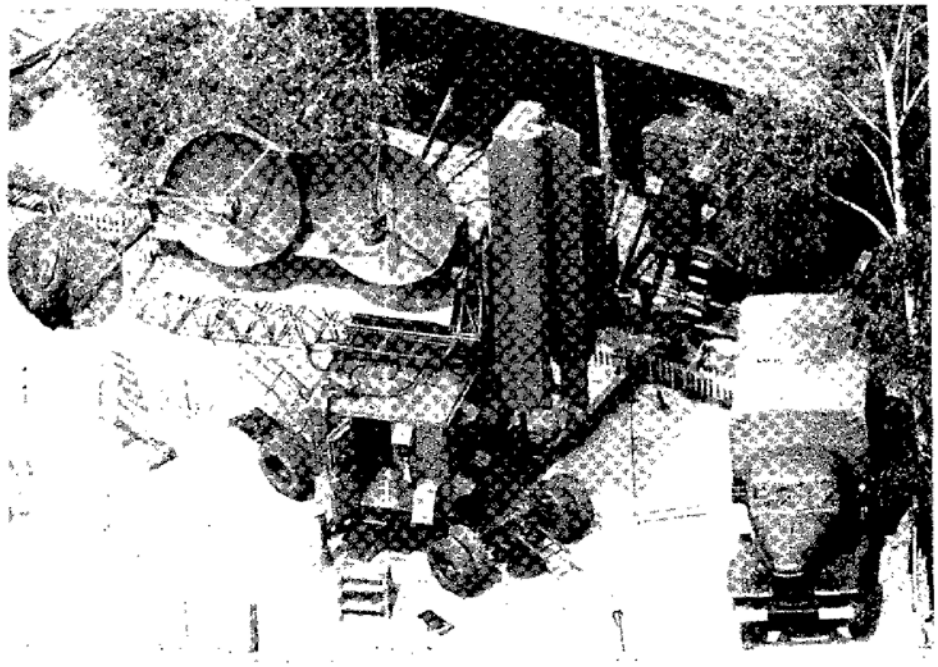
1.	NICKNAME	FAN SONG D
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Missile control radar
4.	DESCRIPTION	FAN SONG D has two trough-shaped antennas and one parabolic dish mounted on the horizontal trough. The antennas seem smaller than FAN SONG A.
5.	TRANSMISSION CHARACTERISTICS	Unknown - probably similar to FAN SONG A.

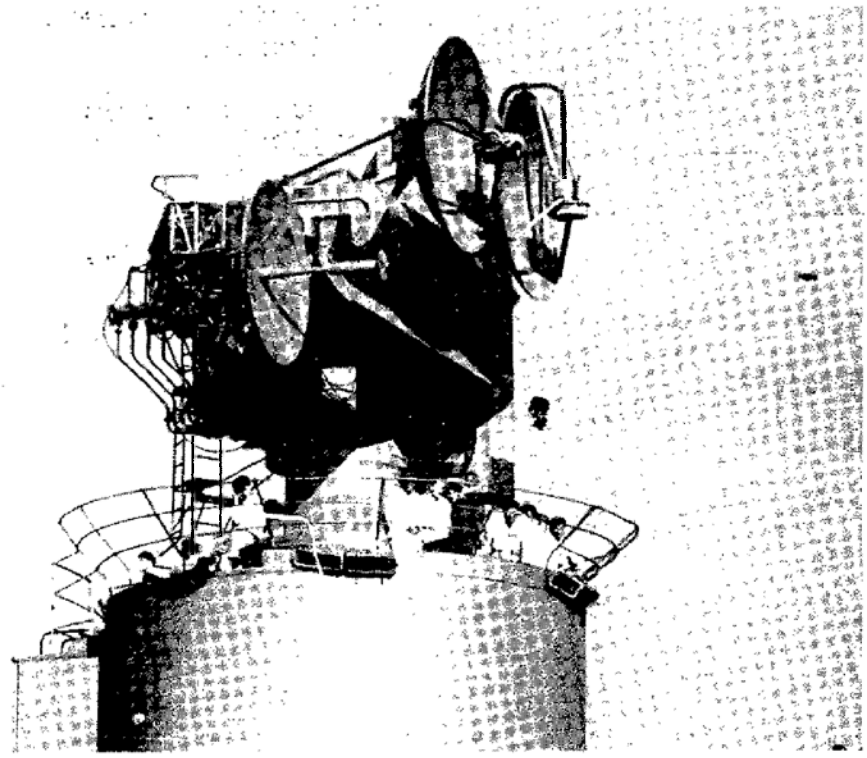
NOTE: The existence of this radar is doubtful.

FAN SONG D

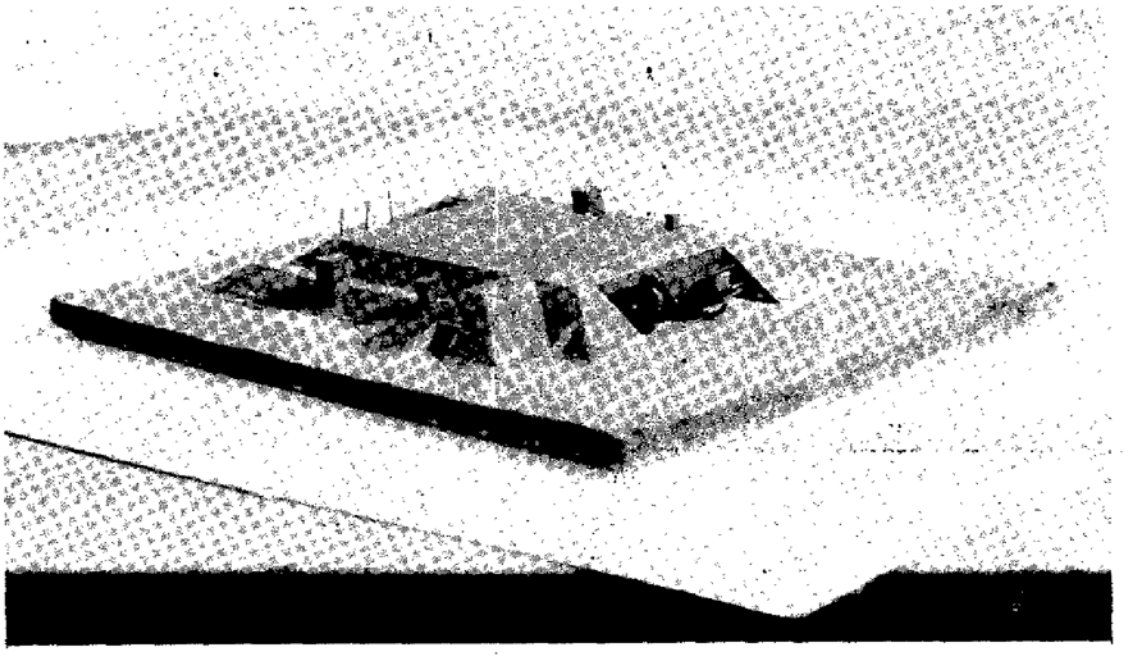
1.	NICKNAME	FAN SONG E
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Missile control radar
4.	DESCRIPTION	This radar is similar to FAN SONG C except that it has two large dishes 2.4 m (8 ft) in diameter mounted on the horizontal trough. They are similar in appearance to FIRE WHEEL dishes, but are apparently fed by waveguides. The trough antennas are 5.3 m (17 ft) long. A version has been seen on the cruiser "DZERJINSKI".
5.	TRANSMISSION CHARACTERISTICS	(Probably similar to FAN SONG C)

FAN SONG E

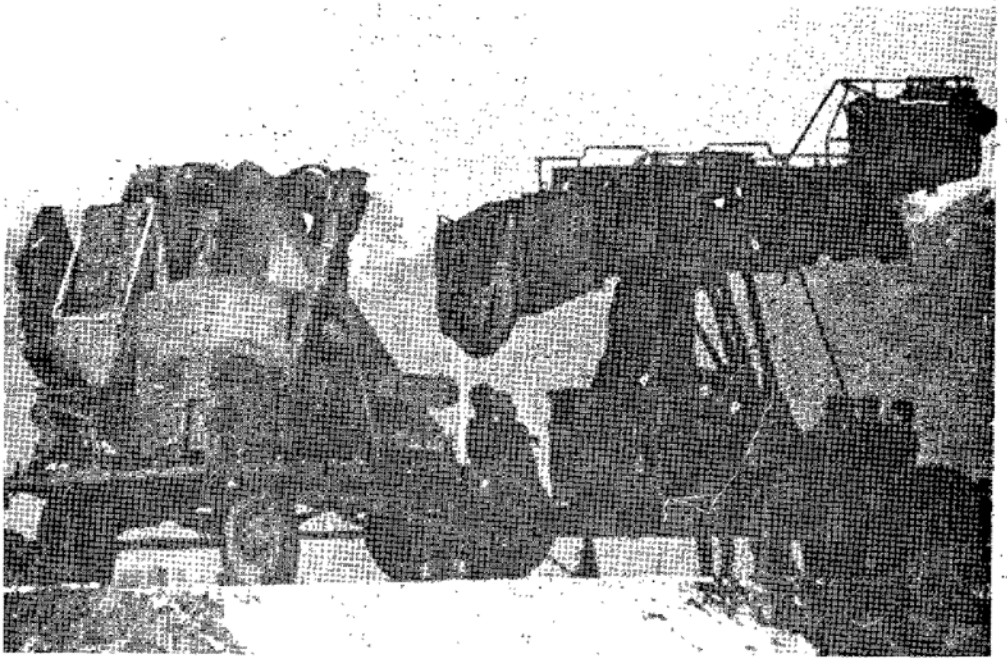


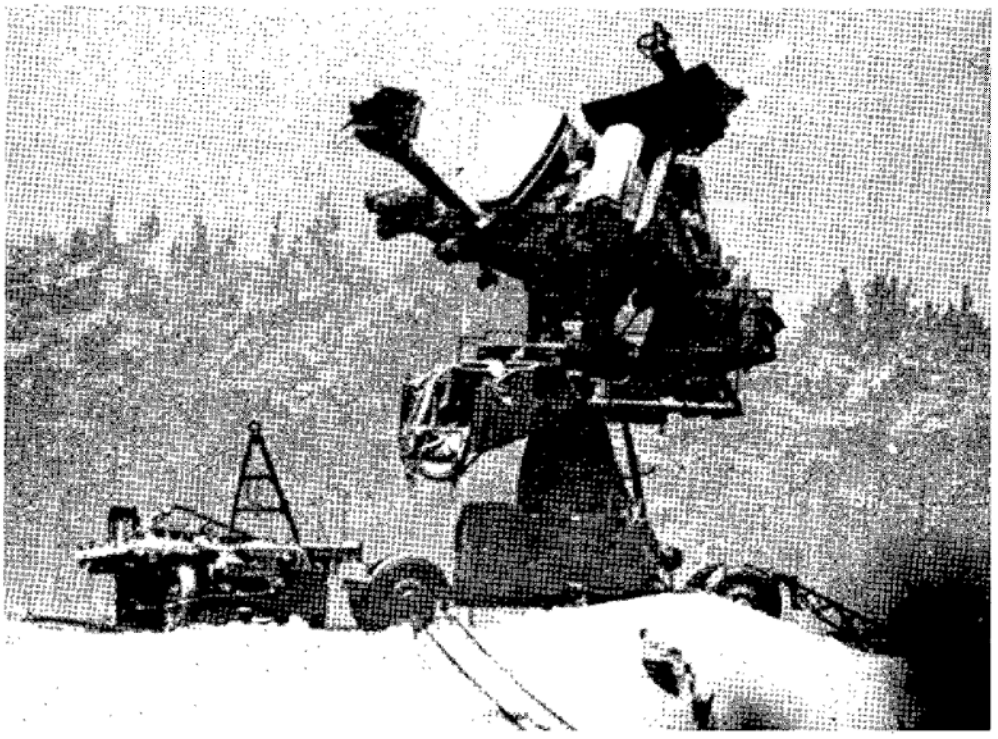


1.	NICKNAME	YO-YO
2.	SOVIET DESIGNATION	B-200
3.	FUNCTION	Missile control track-while-scan radar associated with the static Moscow (SA-1) system.
4.	DESCRIPTION	The system consists of two assemblies each comprising six cheese type aerials.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	3170 - 3280 MHz
	b. P.R.F.	2000 pps
	c. P.W.	0.5 - 1.0 microseconds
	d. Peak Power	2 MW
	e. Type of Illumination	Mechanical rotation giving 5 scans per second over a 54° sector.
	f. Pol.	(1) Elevation scanner: horizontal (2) Azimuth scanner: vertical
6.	PERFORMANCE	
	a. Range	74 m (40 nm) (PRF limited)
	b. Accuracy (estimated)	
	(1) Azimuth	± 1°
	(2) Range	± 900 m (0.5 nm)



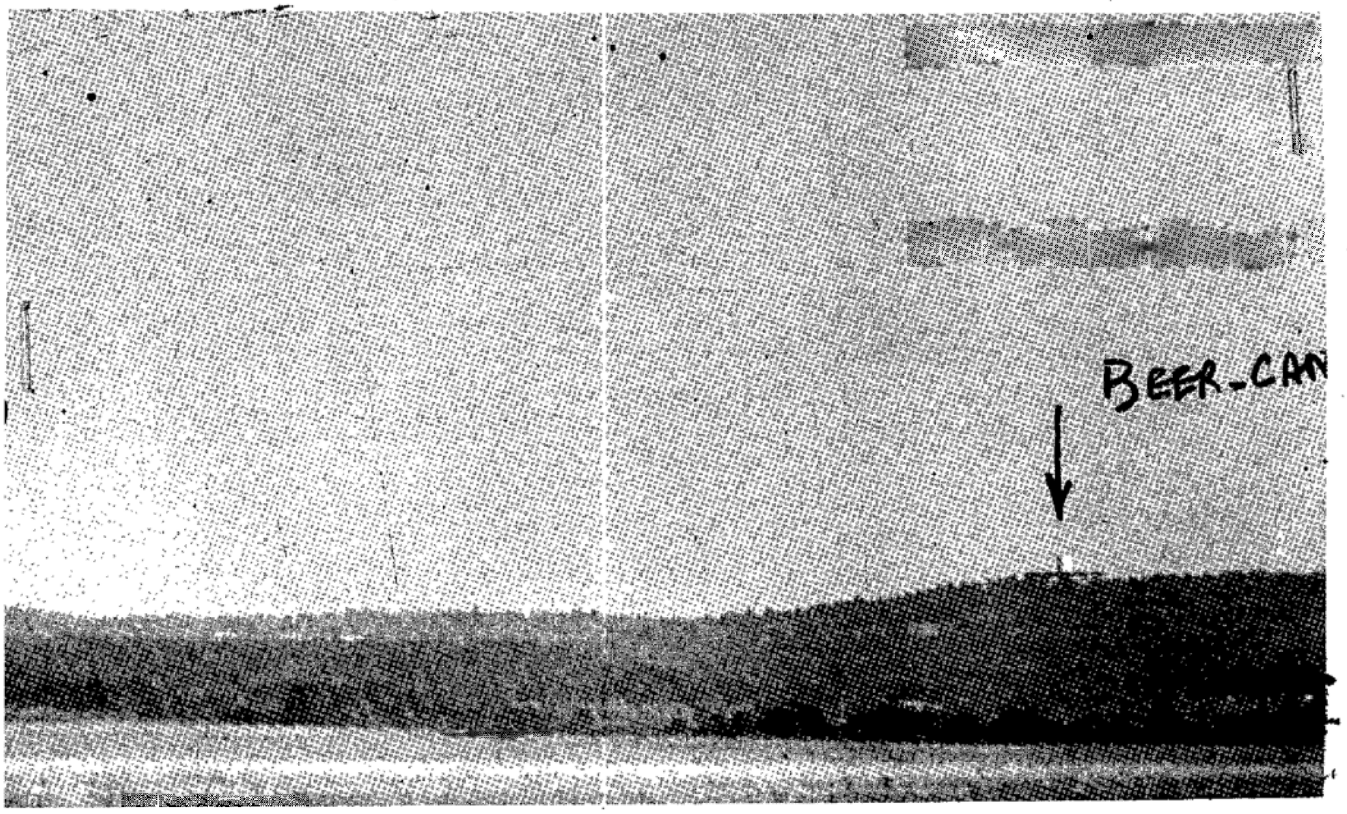
1.	NICKNAME	LOW BLOW
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Target tracking and Missile Guidance Radar of the SA-3 Surface to air missile System. Associated acquisition radar is FLAT FACE.
4.	DESCRIPTION	The LOW BLOW radar consists of two troughs and two dish Antenna. The troughs are mounted at 90° to one another and at 45° to the vertical. The troughs are believed to be unrolled LEWIS Scanners. The upper dish is probably used for transmission of the guidance signal.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	TWS: 9100 - 9500 MHz Guidance: 1000 - 1100 MHz (Likely)
	b. PRF	TWS: Approximately 1700 and 3500 Guidance: Approximately 3500
	c. P.W.	About 0.27 microseconds
	d. Scan	TWS: Unidirectional sector at 25Hz; and steady. Guidance: Unknown
	e. Peak Power	Unknown
	f. Polarization	Unknown
6.	PERFORMANCE	
	a. Maximum Range	Unambiguous ranges of 24 and 48 nm are available.



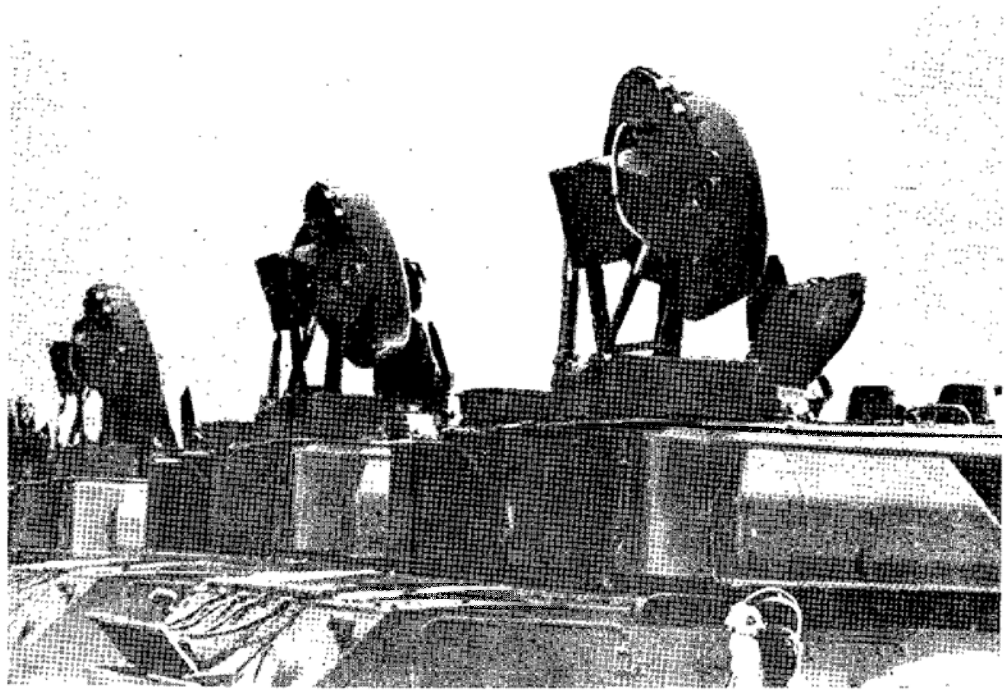


1.	NICKNAME	BEER CAN
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Unknown (Possibly associated with ABM system)
4.	DESCRIPTION	A tall cylindrical structure with co-axial ground plane. The cylinder is approximately 8.5 m (28 ft) in diameter and 32 m (100 ft) high. The ground plane is approximately 45 m (140 ft) in diameter, 23 m (70 ft) above ground and supported by vertical and diagonal struts.
5.	TRANSMISSION CHARACTERISTICS	Unknown

BEER CAN



1.	NICKNAME	GUN DISH
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Fire Control
4.	DESCRIPTION	GUN DISH is the on board fire control radar of the quad 23 mm SPAA weapon designated ZSU 23-4. Utilized against low flying acft and possible ground targets.
5.	SIGNAL CHARACTERISTICS (estimated)	
	a. Frequency	8500 - 10000 MHz
	b. P.R.F.	8000 - 9000 pps
	c. P.W.	Less than 0.1 microsecond
	d. Scan	Uncertain
6.	PERFORMANCE	Unknown



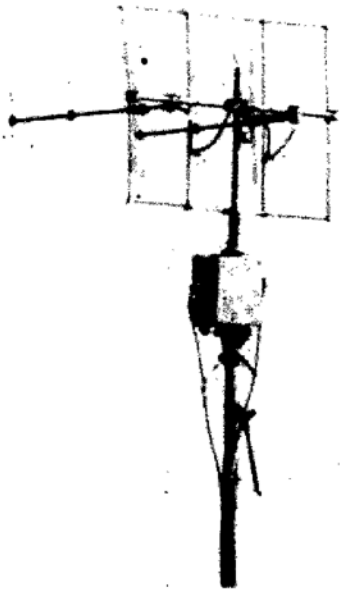
1.	NICKNAME	FLAP WHEEL
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Fire Control for 57 mm AAA
4.	DESCRIPTION	A 1.5 m dish antenna mounted on top of a URAL 375 box body van. It is believed to be a development of the rarely observed FLAP TRACK. A two-element yagi IFF antenna is mounted on FLAP WHEEL.
5.	SIGNAL CHARACTERISTICS (estimated)	
	a. Frequency	9160 - 9200 MHz
	b. P.R.F.	1785 - 1810 pps 2315 - 2330 pps
	c. P.W.	0.5 - 1.5 microsecond
	d. Scan	Steady, Sector 24 - 27 Hz
6.	PERFORMANCE	Unknown

Photograph not available

Section D - IFF

1.	NICKNAME	FISH NET
2.	SOVIET DESIGNATION	NRZ-1
3.	FUNCTION	IFF interrogator which operates in conjunction with the airborne transponder SRO - 1. It is now being replaced by ground equipments for the 660 MHz IFF systems. It is also to be seen on some air traffic control buildings, and also on ships which are or were fitted with KNIFE REST.
4.	DESCRIPTION	Two 3-element Yagi arrays backed by a rectangular mesh reflector.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	In the band 157 - 187 MHz
	b. P.R.F.	Pulsed by parent radar
	c. P.W.	4 - 5 microseconds
	d. Peak Power	500 watts (est)
	e. A.R.R.	Same speed as associated early warning radar on manual tracking.
	f. Pol.	Vertical
	g. Beam width	Horizontal 65°, Vertical 30° (est)
6.	PERFORMANCE	
	a. Range	Line of sight

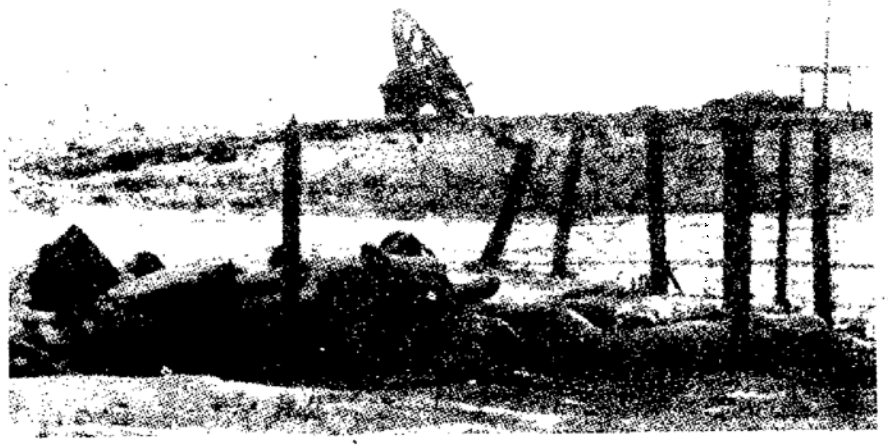
FISH NET



1.	NICKNAME	FOIL TWO
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	One of several antennas associated with the 660 MHz IFF system (SRO-2)
4.	DESCRIPTION	Two small Yagi antennas mounted one above the other on the edge of the FIRE WHEEL dish. The Yagi consists of fixed dipole elements oriented vertically and mounted in front of a circular reflector.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	650 - 685 MHz
	b. P.R.F.	Same as for parent radar
	c. P.W.	0.8 - 1.2 microseconds
	d. Peak Power	2 KW (est)
	e. A.R.R.	Same as for parent radar
	f. Pol.	Vertical
	g. Beam width	Vertical 40°, Horizontal 65° (est)
6.	PERFORMANCE	
	Range	Line of sight

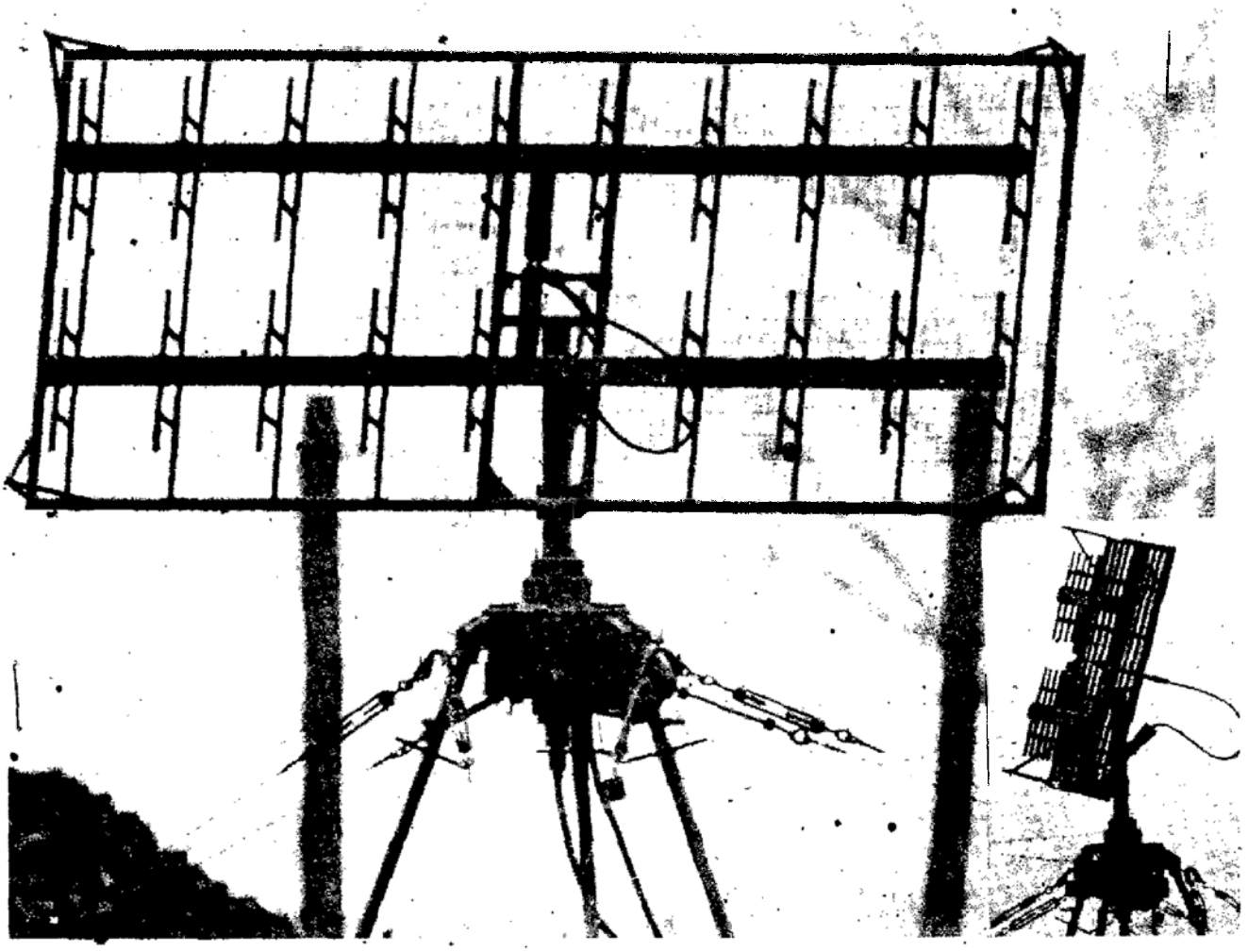
FOIL TWO

Project



1.	NICKNAME	SCORE BOARD A
2.	SOVIET DESIGNATION	Possibly NRZ-8
3.	FUNCTION	One of several IFF antennas associated with the 660 mcs IFF system (SRO-2). Associated with KNIFE REST and SPOON REST.
4.	DESCRIPTION	A broadside array of 20 vertical dipoles arranged in a 10-bay 2-stack configuration, backed by a mesh reflector 2.17 m wide x .93 m high (7 x 3 ft). The aerial is mounted on a tripod via a turning motor.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	660 - 690 MHz
	b. P.R.F.	Same as parent radar
	c. P.W.	0.8 - 1.2 microseconds
	d. Peak Power	2 KW (est)
	e. A.R.R.	Rotates in synchronization with a search radar
	f. Pol.	Vertical
	g. Beam width	Horizontal 11°, vertical 25° (est)
6.	PERFORMANCE	
	a. Range	Line of sight

SCORE BOARD A



1.	NICKNAME	SCORE BOARD B
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	SRO-2 IFF interrogator associated with TALL KING.
4.	DESCRIPTION	Resembles a double SCORE BOARD. It consists of 10 bays of 4 pairs of vertically polarized, end fed, dipoles mounted on a vertical wire mesh frame measuring 3.75 m (12.3 ft) high by 1.75 m (5.7 ft) wide. The array is tilted about 10° - 15° from the vertical mounted on a lattice mast and has a turning motor.

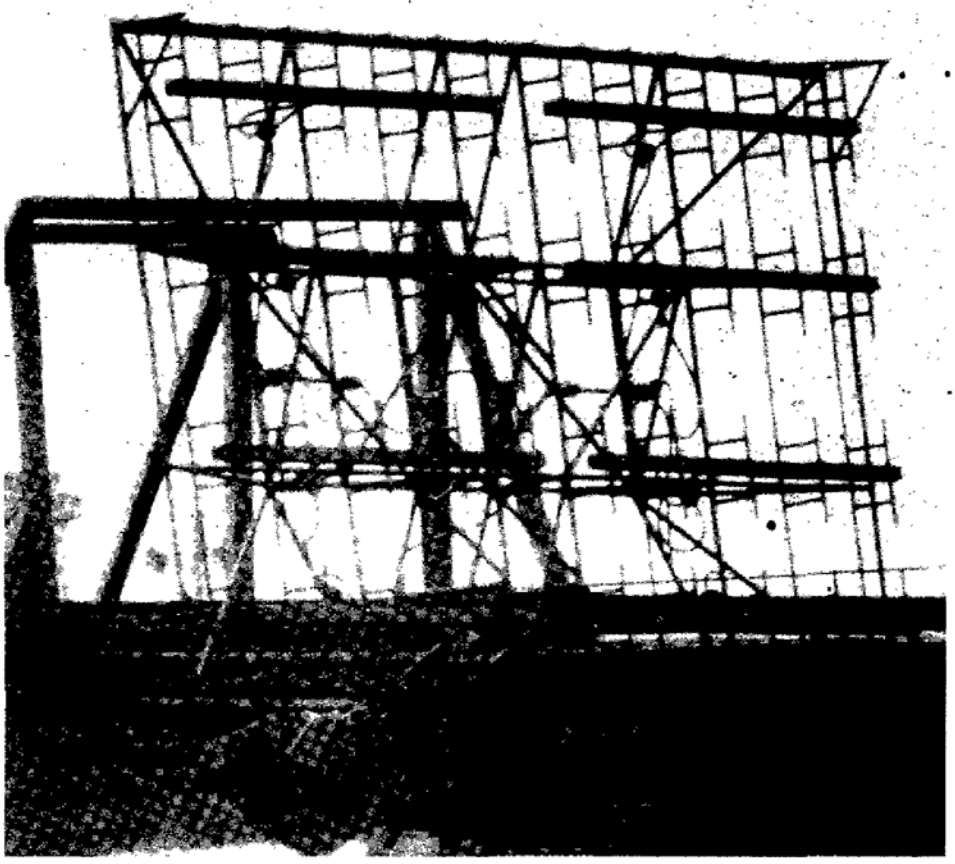
5. TRANSMISSION CHARACTERISTICS

a. Frequency	660 - 680 MHz
b. P.R.F.	Same as parent radar
c. P.W.	0.8 - 1.2 microseconds
d. Peak Power	2 KW (est)
e. A.R.R.	Same as parent radar
f. Pol.	Vertical
g. Beam width	Horizontal 11° Vertical 12°

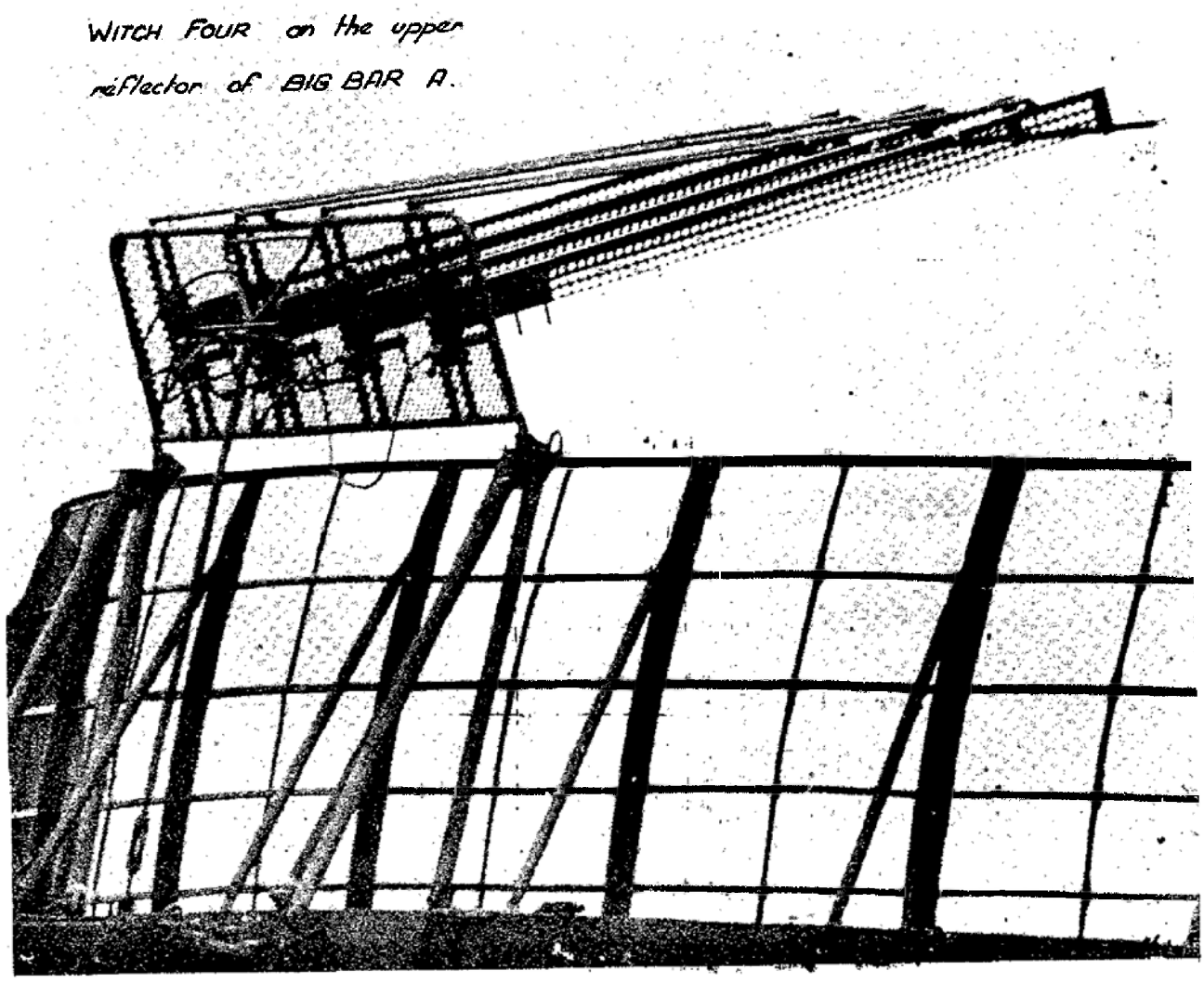
6. PERFORMANCE

a. Range	Line of sight

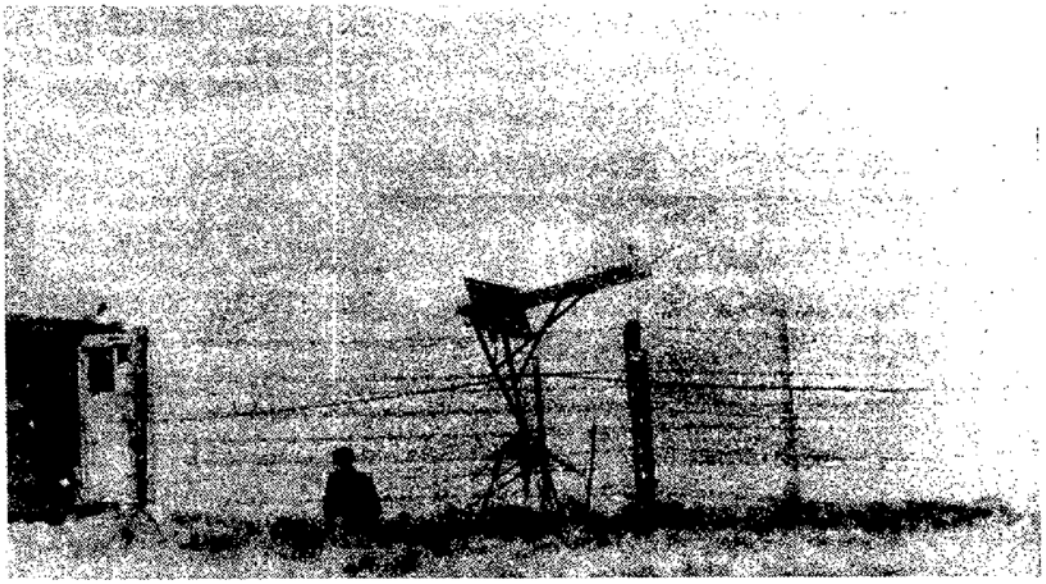
SCORE BOARD B



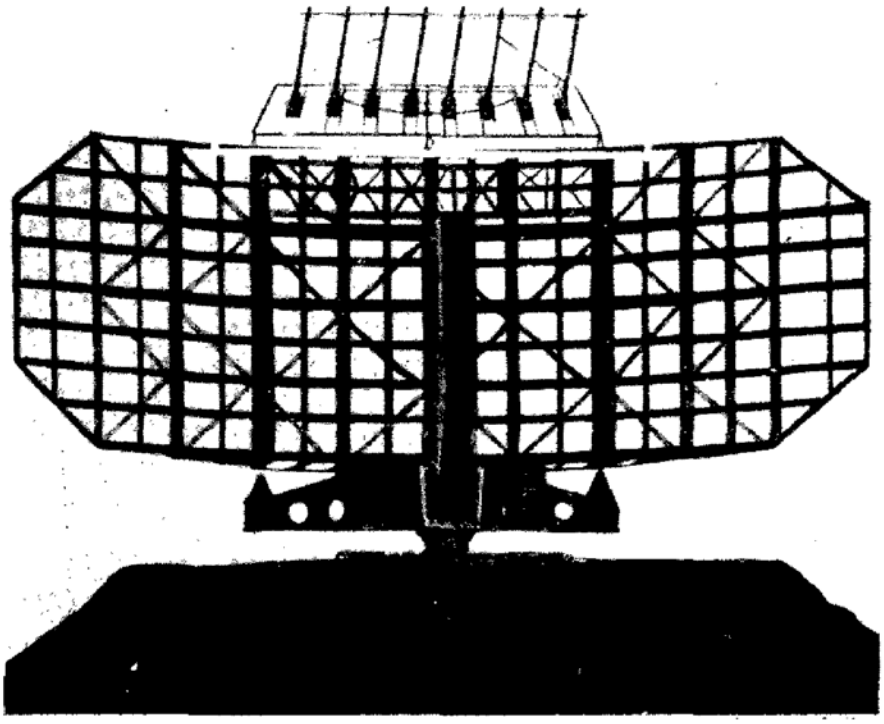
1.	NICKNAME	WITCH FOUR
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	One of several antennas associated with the 660 mcs IFF system (SRO-2)
4.	DESCRIPTION	An array of four end-fire aerials backed by a mesh reflector. Used with BIG MESH, STRIKE OUT, BIG BAR A and TOKEN radars.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	650 - 685 MHz
	b. P.R.F.	Locked to the parent radar, but can run free at 320 - 400 pps
	c. P.W.	0.8 - 1.2 microseconds
	d. Peak Power	2 KW (est)
	e. A.R.R.	The same as for parent radar.
	f. Pol.	Vertical
	g. Beam width	Horizontal 13° (est)
6.	PERFORMANCE	
	a. Range	Line of sight



1.	NICKNAME	WITCH FIVE
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	One of the antennas associated with the 660 MHz SRO-2. Warships with KNIFE REST B are usually fitted with WITCH FIVE.
4.	DESCRIPTION	An array of five, 9-element Yagi aerials backed by a mesh reflector and mounted on a tripod via a turning motor. It is associated with radars not having a built-in IFF capability. Used with KNIFE REST, TOKEN, STRIKE OUT, CROSS OUT, and FLAT FACE radars.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	660 - 680 MHz
	b. P.R.F.	should be the same as for parent radar.
	c. P.W.	0.8 - 1.2 microseconds
	d. Peak Power	2 KW (est)
	e. A.R.R.	The same as for parent radar.
	f. Pol.	Vertical
	g. Beam width	Horizontal 11° (est)
6.	PERFORMANCE	
	a. Range	Line of sight



1.	NICKNAME	WITCH EIGHT
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	One of the antennas associated with the IFF system on 660 MHz (SRO-2)
4.	DESCRIPTION	An array of 8 end-fire aerials backed by a mesh reflector. It has only been seen attached to GAGE.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	Probably 660 - 690 MHz
	b. P.R.F.	Should be the same as for parent radar.
	c. P.W.	0.8 - 1.2 microseconds
	d. Peak Power	2 KW (est)
	e. A.R.R.	The same as for parent radar.
	f. Pol.	Vertical
	g. Beam width	Horizontal 6° (est)
6.	PERFORMANCE	
	a. Range	Line of sight



1.	NICKNAME	TWIN FOIL
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Possibly IFF Interrogator
4.	DESCRIPTION	TWIN FOIL is a dual dipole antenna system mounted on opposite sides of the S-band feed in the FIRE CAN reflector.
5.	SIGNAL CHARACTERISTICS	
	a. Frequency	655 - 685 MHz (est)
	b. P.R.F.	Same as parent radar (est)
	c. P.W.	Unknown
	d. Peak Power	2 KW (est)
	e. Pol.	Vertical
6.	PERFORMANCE CHARACTERISTICS	
	a. Range	Line of sight

TWIN FOIL

Section E - Airfield Surveillance, GCA and PAR

1.	NICKNAME	HOME TALK
2.	SOVIET DESIGNATION	PRL-4*
3.	FUNCTION	Precision approach radar for use in GCA systems. It is at present installed at many airfields in Russia and the Satellites.
4.	DESCRIPTION	Mobile radar having two antennas, one vertical and one horizontal. Each is fed from a compressible waveguide fitted with dipoles. The radar is similar to the AN/MPN-1.

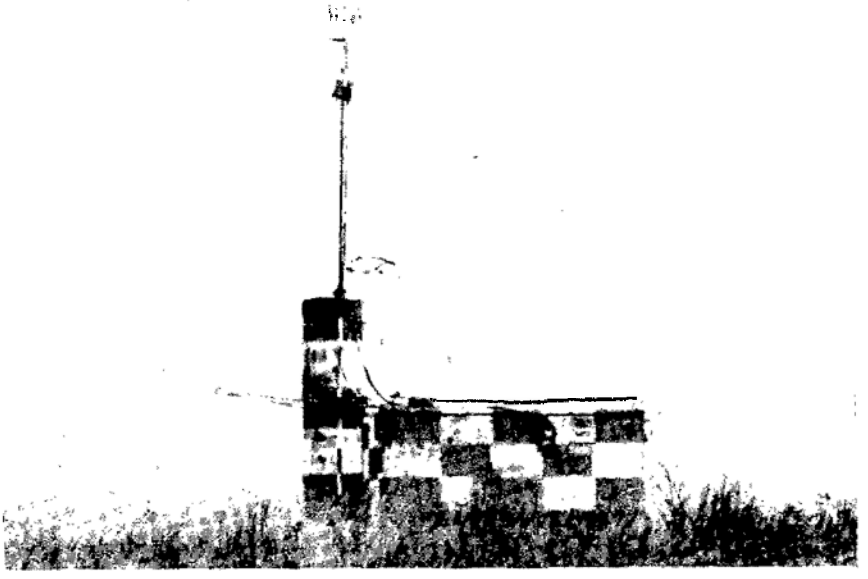
5. TRANSMISSION CHARACTERISTICS

a. Frequency	9250 - 9450 MHz
b. P.R.F.	1950 - 2350 pps
c. P.W.	0.3 - 0.8 microseconds
d. Peak Power	15 - 20 kw (est)
e. SSR	Horizontal (15°) and vertical (5° - 60°) sectors 1.7 - 2.1 seconds - per complete scan
f. Pol.	Horizontal and vertical switched
g. Beam width	Horizontal Ant: 0.86°(H) x 2.0° (V) Vertical Ant: 0.5° (V) x 3.5° (H)

6. PERFORMANCE

a. Range	18.5 Km (10 nm)
b. Height finding Capability	Good

*HOME TALK (PRL-4), LONG EYE (DRL-4), as well as SMALL CROSS (ARP-1/ARP-4) are associated with the Soviet GCA-system RSP-4.



c. Accuracy

(1) Range	± 100 m (300 ft) at 18.5 Km (10 nm)
(2) Azimuth	± 0.5° Horizontal Antenna
(3) Elevation	± 0.25° Vertical Antenna

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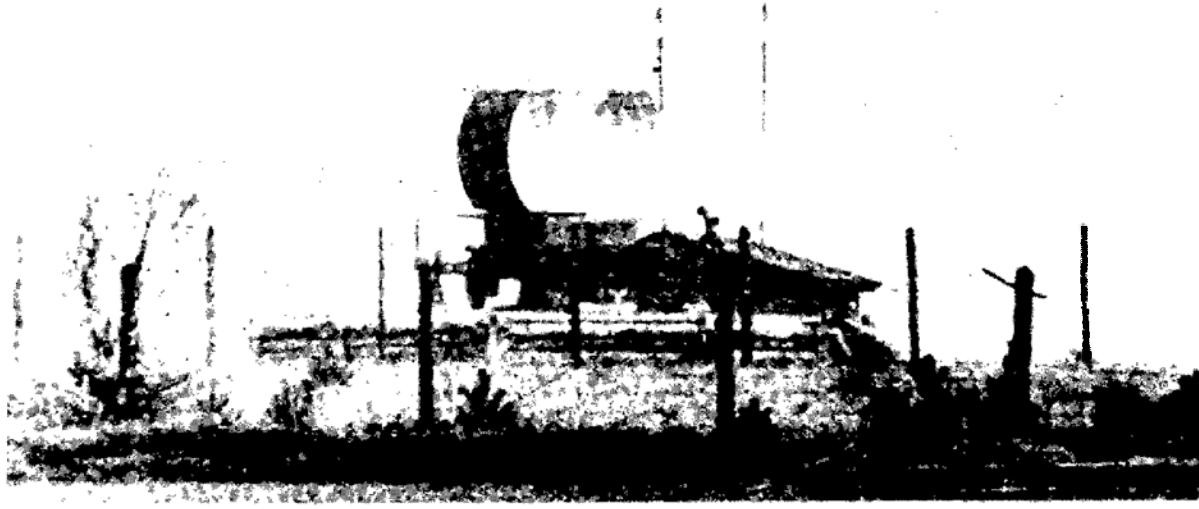
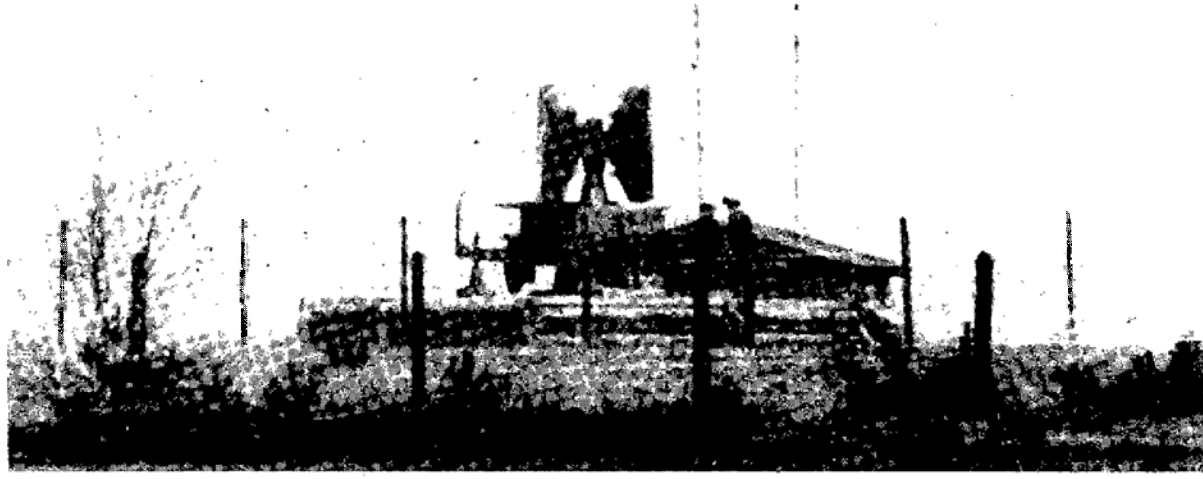
1.	NICKNAME	LONG EYE
2.	SOVIET DESIGNATION	DRL-4
3.	FUNCTION	GCA search radar or airfield surveillance radar.
4.	DESCRIPTION	Trailer mounted radar consisting of two truncated paraboloids mounted back-to-back approximately 2 x 3.3 m (8 x 11 ft).
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	9245 - 9570 MHz
	b. P.R.F.	1640 - 2350 pps
	c. P.W.	0.3 - 0.8 microseconds
	d. Peak Power	50 - 60 kw
	e. A.R.R.	Produces 4-level 360° cover. The whole assembly rotates continuously at 15 - 30 rpm. Each antenna sweeps two "levels" alternately, each sweep lasting 11/20 revolutions.
	f. Pol.	Horizontal
	g. Beam width	Horizontal 0.7°
6.	PERFORMANCE	
	a. Range	74 Km (40 nm) against fighter aircraft
	b. Accuracy	
	(1) Range	± 200 m (600 ft) at 37 Km (20 nm)
	(2) Azimuth	± 0.35°
	(3) Elevation	± 0.45°





1. NICKNAME — LONG TALK

2. SOVIET DESIGNATION — Unknown

3. FUNCTION — GCA system including search function

4. DESCRIPTION — A Ground Control Approach (GCA) system comprising a precision approach radar (PAR), an air surveillance radar (ASR) and a VHF communications system all of which are installed in a single mobile van. The search antenna is an elliptical parabolic reflector approximately 9.1 x 3.8 m (29.6 x 12.5 ft) with END BOX attached. The PAR antennas have truncated parabolic reflectors. The horizontal one is 3.5 x 1.0 m (11.5 x 3.0 ft) and the vertical one 4.7 x 0.6 m (14.2 x 1.8 ft). Attached to these two antennas there are additional reflectors 0.4 x 1.0 m (1.2 x 3.0 ft).

5. TRANSMISSION CHARACTERISTICS

a. Frequency

(1) Search — ASR: 815 - 850 and 840 - 890 MHz

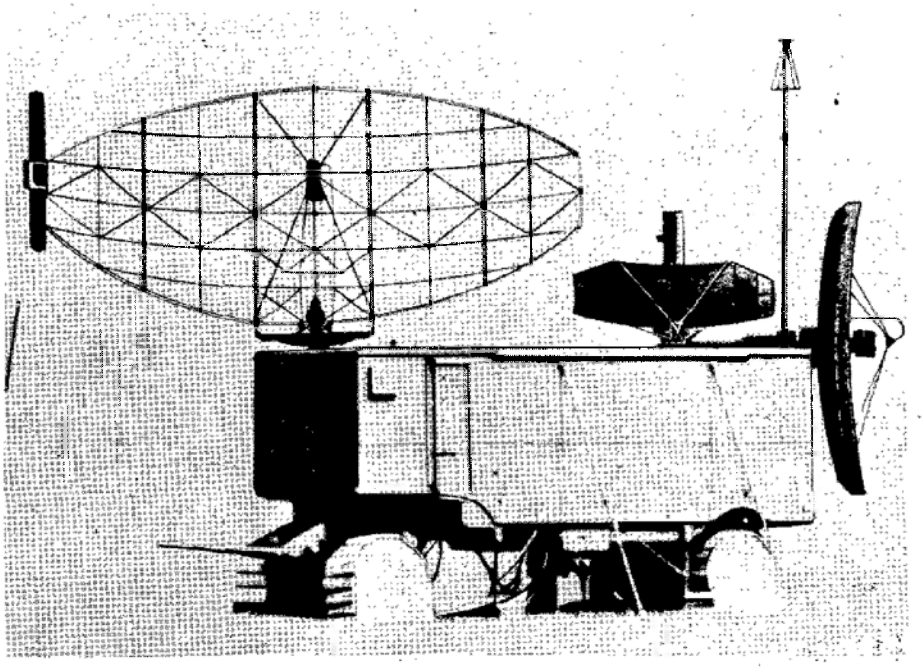
(2) PAR — PAR: 9090 - 9150 and 9295 - 9310 MHz

b. P.R.F. — ASR: 460 - 510 pps, 600 - 680 pps, 1000 - 1020 pps, 1200 - 1220 pps

PAR: 2440 - 2510, switching to 2950 - 2970 pps

c. P.W. — ASR: 0.6 - 1.2 and 1.8 - 2.5 microseconds

PAR: 0.2 - 0.5 microseconds



d. Peak Power	ASR: 700 - 500 kw (est)
	PAR: 150 - 200 kw (est)
e. S.S.R.	ASR: 10 - 20 rpm in azimuth
	PAR: Sector scan at approx. 26 cpm
f. Pol.	ASR: Horizontal
	PAR: Horizontal/vertical (2 reflectors)
g. Beam width	ASR: 2.2°
	PAR: Horizontal 0.64 Vertical 0.45

6. PERFORMANCE

a. Range	ASR: 230 Km (125 nm)
	PAR: 37 Km (20 nm)
b. Accuracy	
(1) Range	ASR: ± 1140 m (3750 ft) (Max)
	PAR: ± 180 m (600 ft) (Max)
(2) Azimuth	ASR: ± 1.1°
	PAR: 0.32°
(3) Elevation	ASR: ± 2.1°
	PAR: 0.22°

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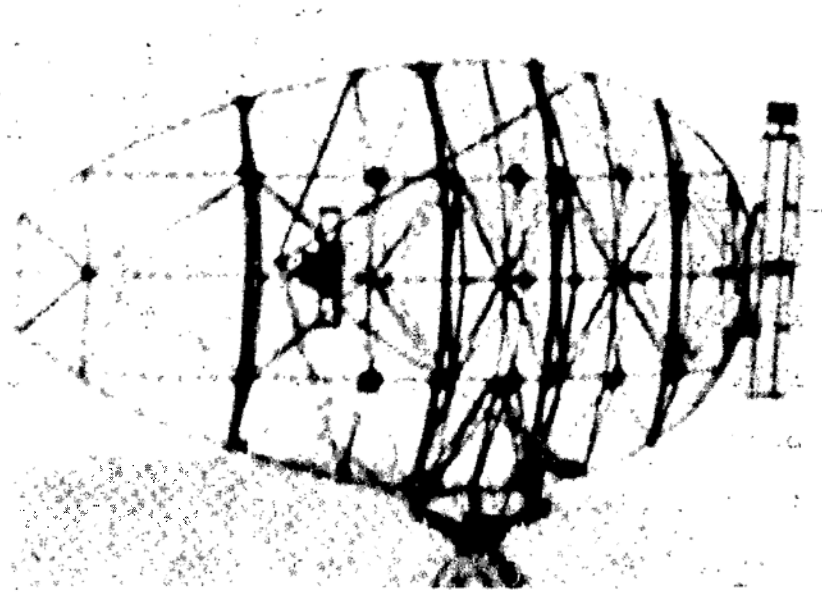
1.	NICKNAME	ONE EYE
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Airfield area surveillance radar, deployed with HOME TALK and TWO SPOT.
4.	DESCRIPTION	A truncated elliptical paraboloid reflector approximately 6.8 m (22 ft) wide x 3.0 m (10 ft) high mounted on a four-feet pedestal. It is equipped with an antenna similar to END BOX.

5. TRANSMISSION CHARACTERISTICS

a. Frequency	815 - 895 MHz
b. P.R.F.	440 - 580 pps 670 - 700 pps 790 - 810 pps 905 - 920 pps 1025 - 1080 pps
c. P.W.	0.6 - 2.5 microseconds
d. Peak Power	500 kw (est)
e. A.R.R.	360° rotation at 12 rpm
f. Pol.	Horizontal
g. Beam width	Horizontal 4°

6. PERFORMANCE

a. Range	185 Km (100 nm)
b. Accuracy	
(1) Range	± 100 m (300 ft) at 18.5 Km (10 nm)
(2) Azimuth	± 2.0°
(3) Elevation	± 4.2°



1. NICKNAME — TWO SPOT

2. SOVIET DESIGNATION — PRL-7*

3. FUNCTION — Precision Approach Radar

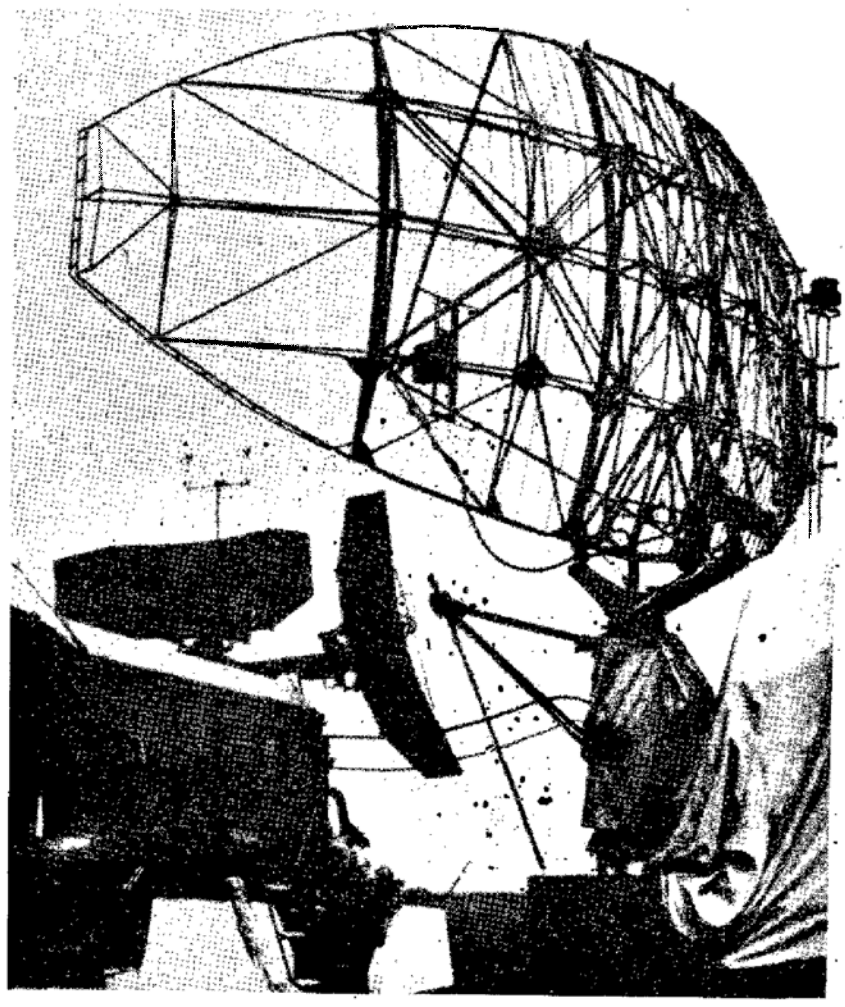
4. DESCRIPTION — The antenna consists of two parabolic reflectors mounted on a ZIL-151/157 vehicle. The horizontally oriented reflector is approximately 3.0 m (10 ft) long and 1.0 m (39") high. The vertically oriented reflector is approximately 2.9 m (9.4 ft) wide. Also mounted on the rear of the vehicle is a vertical antenna 1.7 m (5.5 ft) long. This radar is usually located with ONE EYE to form a GCA system.

5. TRANSMISSION CHARACTERISTICS

a. Frequency	9060 - 9470 MHz
b. P.R.F.	2440 - 2990 pps
c. P.W.	0.2 - 0.5 microseconds
d. Scan	
(1) Circular	10 - 12 rpm
(2) Sector	Horizontal and Vertical 24 - 33 cpm (Sectors interlaced)
e. Pol.	Vertical/horizontal (2 reflectors)
f. B.W.	Horizontal Ant: $0.7^{\circ} \times 2.4^{\circ}$ Vertical Ant: $0.8^{\circ} \times 3.5^{\circ}$
g. Peak Power	150 kw (est)

*NOTE: A new version designated PRL-FM of same appearance but with mechanical refinements to the antenna.

TWO SPOT



6. PERFORMANCE

a. Range	ASR: 55 Km (30 nm) PAR: 18.5 Km (10 nm)
b. Accuracy	
(1) Range	± 100 m (300 ft) at 18.5 Km (10 nm) or ± 300 m (900 ft) at 55 Km (30 nm)
(2) Azimuth	± 0.4° Horizontal Ant.
(3) Elevation	± 0.4° Vertical Ant.

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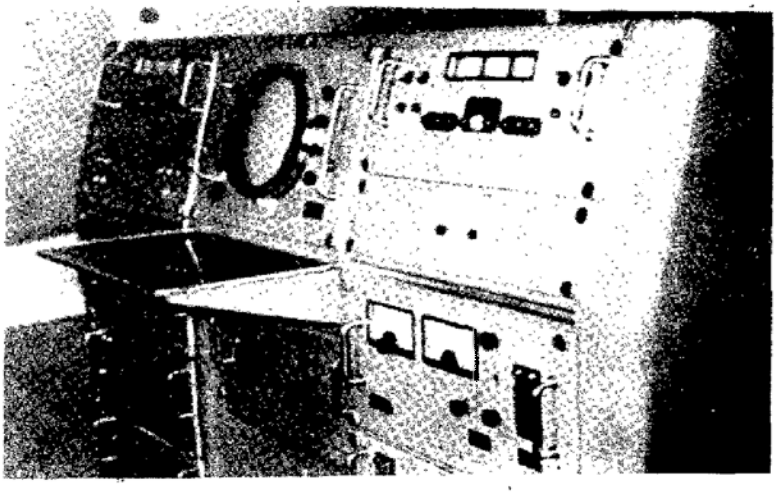
1.	NICKNAME	None
2.	SOVIET DESIGNATION (CZECH)	OR-2
3.	FUNCTION	Regional traffic control radar.
4.	DESCRIPTION	Reflector size 7.5 x 3.8 m (25 x 12 ft)
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	2600 - 2940 MHz
	b. P.R.F.	586 - 610 pps
	c. P.W.	1.4 - 2.4 microseconds
	d. Peak Power	700 - 800 kw
	e. Pol.	Horizontal or circular
	f. A.R.R.	5 - 10 rpm circular, sector 30°, 60°, 120°
	g. Beam width	Horizontal 1°, Vertical cosec^2
	h. Antenna	Tilt 5° - 15°
6.	PERFORMANCE	
	a. Search Range	139 Km (75 nm)
	b. Accuracy	
	(1) Range	± 670 m (2250 ft) at 139 Km (75 nm) (est)
	(2) Azimuth	± 0.5° (est)
	(3) Elevation	± 1° (est)

OR-2



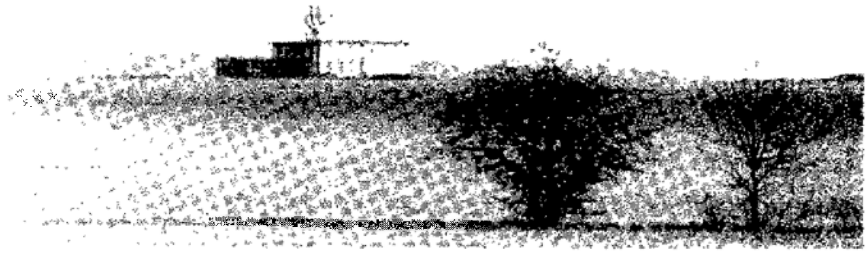
1.	NICKNAME	None
2.	SOVIET DESIGNATION (CZECH)	RL-2D
3.	FUNCTION	Airfield surveillance radar.
4.	DESCRIPTION	Possible trailer mounted radar. Aerial size 1.6 x 3.0 m (5.3 x 10 ft). There exist two versions, a fixed and a mobile one. In the fixed version, an electronic component with transforming circuits and receivers is installed together with the feed unit in one building. The operation is remote controlled up to 3 Km (1.8 nm).

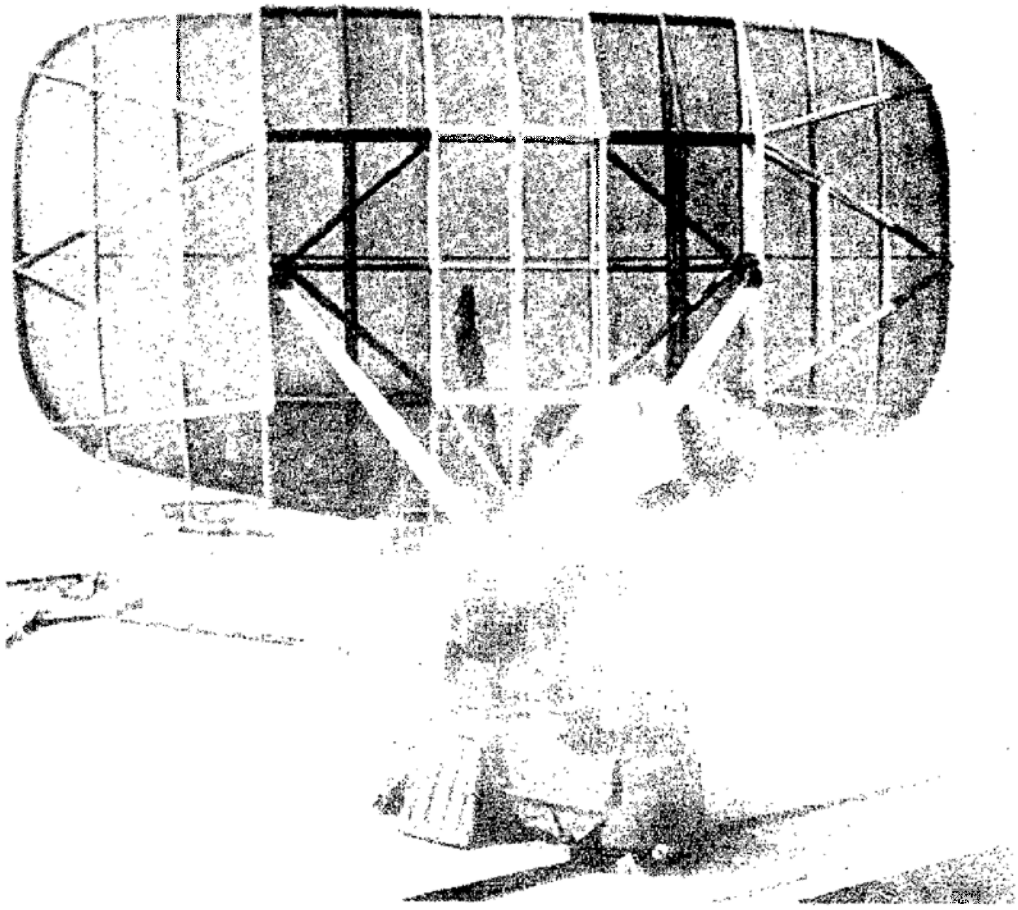
5. TRANSMISSION CHARACTERISTICS

a. Frequency	9400 - 9600 MHz
b. P.R.F.	825 - 1030 pps or 1800 - 2005 pps
c. P.W.	0.3 - 1.2 microseconds
d. Peak Power	150 - 200 kw
e. A.R.R.	7.5 or 15 rpm
f. Antenna	Antenna tilt from + 2° - + 10°
g. Pol.	Horizontal or elliptical
h. Beam width	Horizontal 0.7^{o}, Vertical $cosec^{2}$

6. PERFORMANCE

a. Search Range	37 Km (20 nm) at 3000 m (10,000 ft) height, max 50 Km (27 nm).





b. Accuracy

(1) Range	± 225 m (750 ft) at 46 Km (25 nm) (est)
(2) Azimuth	± 0.4°

NOTE: One version RL-3 is operating in the S-band and has continuously adjustable polarization (linear, elliptical, and circular). It is an effective means against clutter. RL-3 has a non-sophisticated MTI-system.

Range up to 200 Km (110 nm)

Accuracy:

(1) Range: ± 1% of setted range
(2) Azimuth: ± 1.5°

Another version, RL-3A, with the same range but improved display accuracy and better antenna characteristics, is in production by TESLA.

A modified RL-2 is in use as weather radar and has a range of 200 Km (110 nm).

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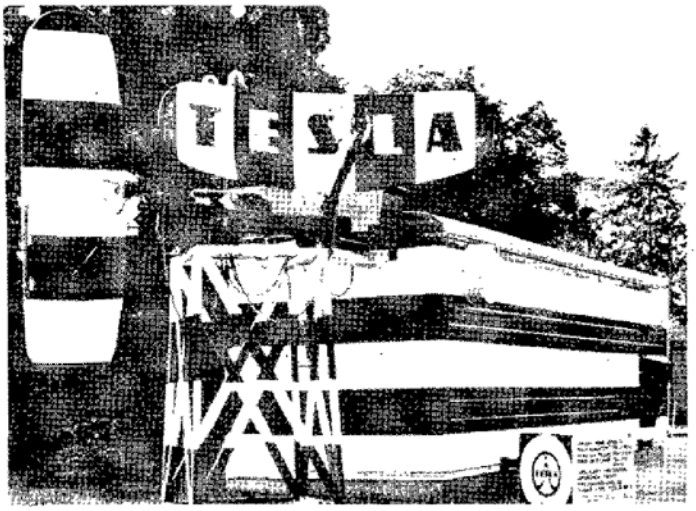
1.	NICKNAME	None
2.	SOVIET DESIGNATION	RP-2 Series
3.	FUNCTION	Precision approach radar for use in GCA systems of Czech production (TESLA). Presently deployed in large numbers in CSSR and USSR.
4.	DESCRIPTION	The equipment is available in a mobile version, too, with all the related components in an air-conditioned van. There are two antenna systems, each with two antennas.

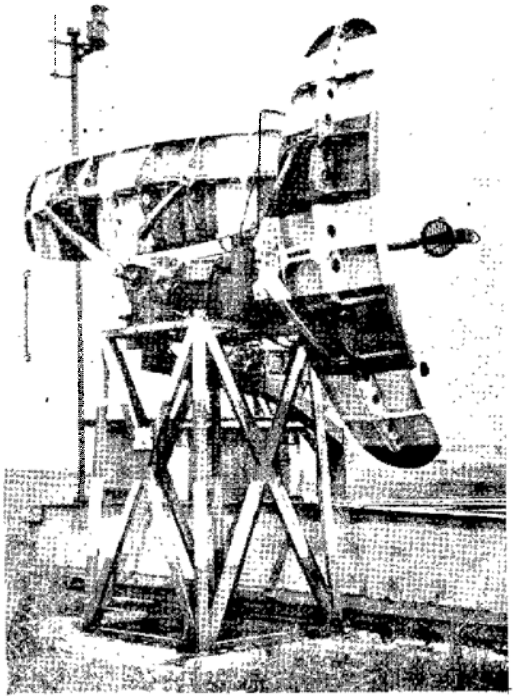
5. TRANSMISSION CHARACTERISTICS (For RP-2E)

a. Frequency	9300 - 9600 MHz
b. P.R.F.	1800 - 2000 pps
c. P.W.	0.3 - 0.7 microseconds
d. Peak Power	150 - 200 kw
e. S.S.R.	1 cps in both planes
f. Beam width	Azimuth antenna H = 1°, V = 4° Angle coverage - 10° - + 20° Elevation antenna H = 4°, V = 1° Angle coverage - 1° - + 9°
g. Pol.	Linear or elliptical or possibly circular

6. PERFORMANCE

a. Search Range	18.5 Km (10 nm) against fighter aircraft





b. Accuracy

(1) Range	± 30 m (90 ft) minimum
(2) Azimuth	Better than 0.6° (± 9 m (30 ft) from approach line minimum)
(3) Elevation	± 6 m (20 ft) from the approach line

NOTE: RP-2F is the new improved version of RP-2E with adjustable polarization for optimal clutter suppression and MTI using a staggered P.R.F. of 2000/2400 pps.

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1.	NICKNAME	WOOD GAGE
2.	SOVIET DESIGNATION	OR-1 (Civilian Version)
3.	FUNCTION	Search radar used mainly as an airfield surveillance radar, possibly for use in the early warning defenses or as an area control radar.
4.	DESCRIPTION	This Czechoslovakian radar consists of a truncated paraboloid mounted on the cabin of a trailer, fed by two horns. The reflector is approximately 5.5 x 1.8 m (18 x 6 ft).

5. TRANSMISSION CHARACTERISTICS

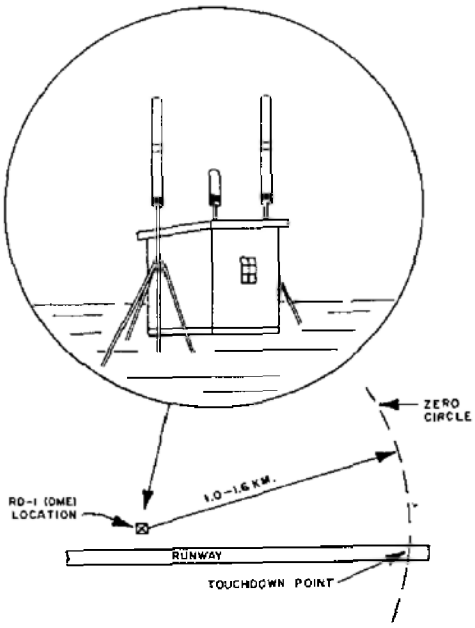
a. Frequency	Two frequencies in the band 2795 - 2915 MHz.
b. P.R.F.	About 280 - 300 pps
c. P.W.	2 microseconds
d. Peak Power	500 kw (est)
e. A.R.R.	4 - 5 rpm
f. Pol.	Vertical
g. Beam width	Horizontal 1°, Vertical 15°

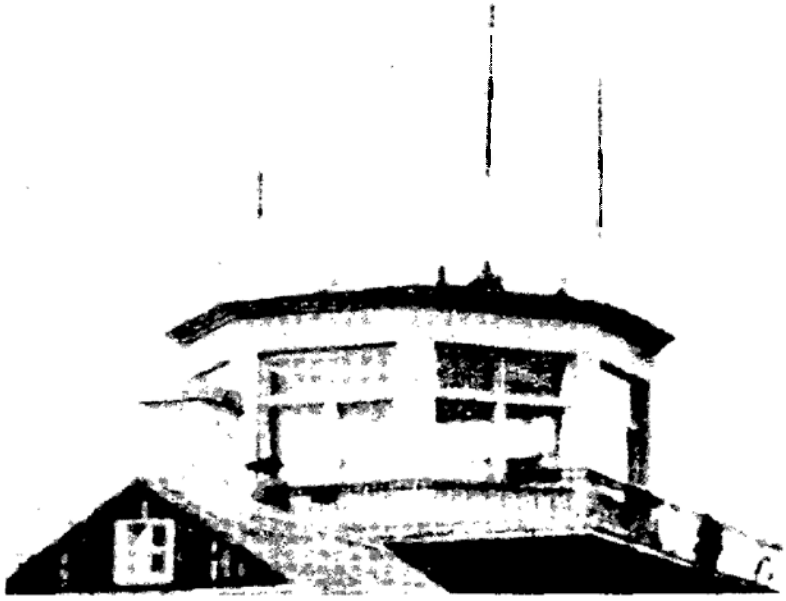
6. PERFORMANCE

a. Search Range	78 Km (42 nm) vs 1 m^2 target (50% BSR)
b. Accuracy	
(1) Range	$\pm$ 900 m (0.5 nm)
(2) Azimuth	$\pm$ 1.0^{o}

Section F - Navigational Aids

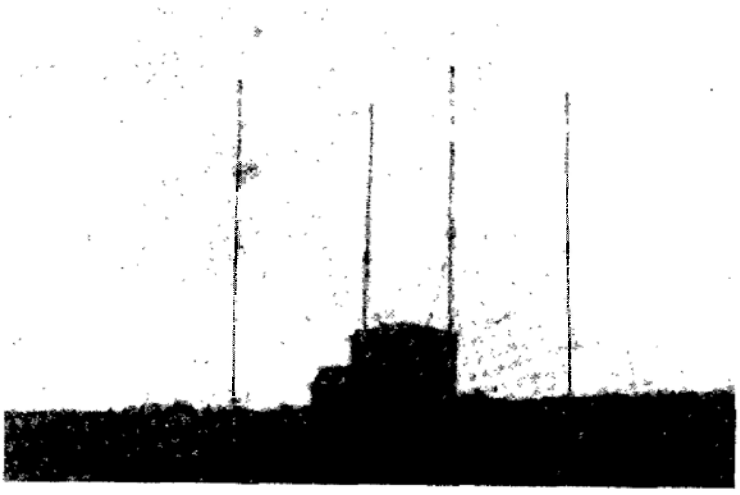
1.	NICKNAME	None
2.	SOVIET DESIGNATION	RD-1 / DALNOMER
3.	FUNCTION	Transponder, a ground component of the DME, fitted to most transport and bomber a/c and some fighter aircraft. Used to find the distance from an airfield, to orbit an airfield at a prescribed distance, and to find distance from touchdown in conjunction with ILS max capacity: 45 aircraft simultaneously.
4.	DESCRIPTION	The antenna system consists of three dipoles (picture - see next page) - two split furled flag antennas along with an u/i short antenna.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	895 mcs
	b. P.R.F.	100 ± 8 pulse pairs per second. Selected spacings of 2.1, 4.2 and 6.3 microseconds
	c. P.W.	1.0 microseconds
	d. Peak Power	10 kw
	e. Pol.	Vertical
6.	PERFORMANCE	
	a. Measuring Range	
	(1)	0 - 28 Km (15 nm)
	(2)	0 - 148 Km (80 nm)
	b. Accuracy	
	(1)	± 300 m (900 ft) (0 - 28 Km (15 nm))
	(2)	± 1350 Km (4500 ft) (0 - 148 Km (80 nm))





1.	NICKNAME	FIX Series (HF/DF) (See also pages I-F-27 - I-F-29)
2.	SOVIET DESIGNATION	PKV-45 (FIX FOUR only)
3.	FUNCTION	Direction finding of HF transmissions used for navigation or airfield approach.
4.	DESCRIPTION	PKV-45 is a four-masted HF/DF system based on the Adcock array, which is used in the transportable role. Static and mobile installations and systems using 6 and 8 masts are also in use. These two latter are nicknamed FIX SIX and FIX EIGHT.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	1.5 - 16 MHz
	b. Pol.	Vertical
6.	PERFORMANCE	
	a. Accuracy	3° - 4°

FIX Series (HF/DF)



1. NICKNAME — HAY RICK/HAY WAIN/ HAY POLE/HAY RING, system designation HAY series.

2. SOVIET DESIGNATION — RSBN-2N

3. FUNCTION — Associated with airborne RSBN-2S equipment to provide a medium range navigation aid giving range and bearing from a single beacon installation.

4. DESCRIPTION

a. The HAY RICK vehicle has a 12-sided box covered with canvas, resembling a flat bell tent, mounted on its aft end which is partially supported by an outrigged framework. It also has a vertical cylindrical antenna approximately 1.8 m (6 ft) long.

b. This component gives azimuth information. HAY POLE with two mast-mounted vertical cylinders approximately 2 m (6.5 ft) high gives range information.

c. The HAY WAIN vehicle has mounted on it:

(1) A truncated paraboloid approximately 3.5 m (11.6 ft) high x 2.3 m (7.6 ft) wide which appears to have a split feed. This component probably gives the glide path information. The Soviet designation is PRMG-4.

(2) A vertical cylinder approximately 1.2 m (4 ft) long similar to a Soviet DME aerial and

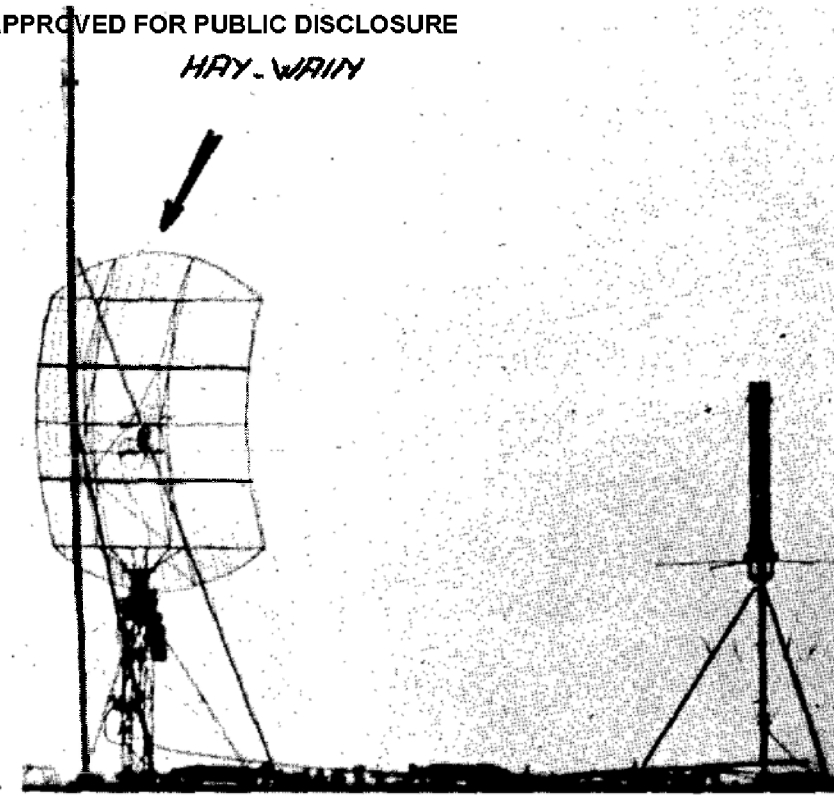
(3) A discone.

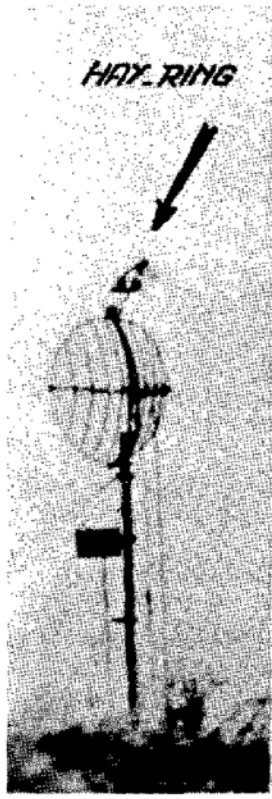
HAY RING

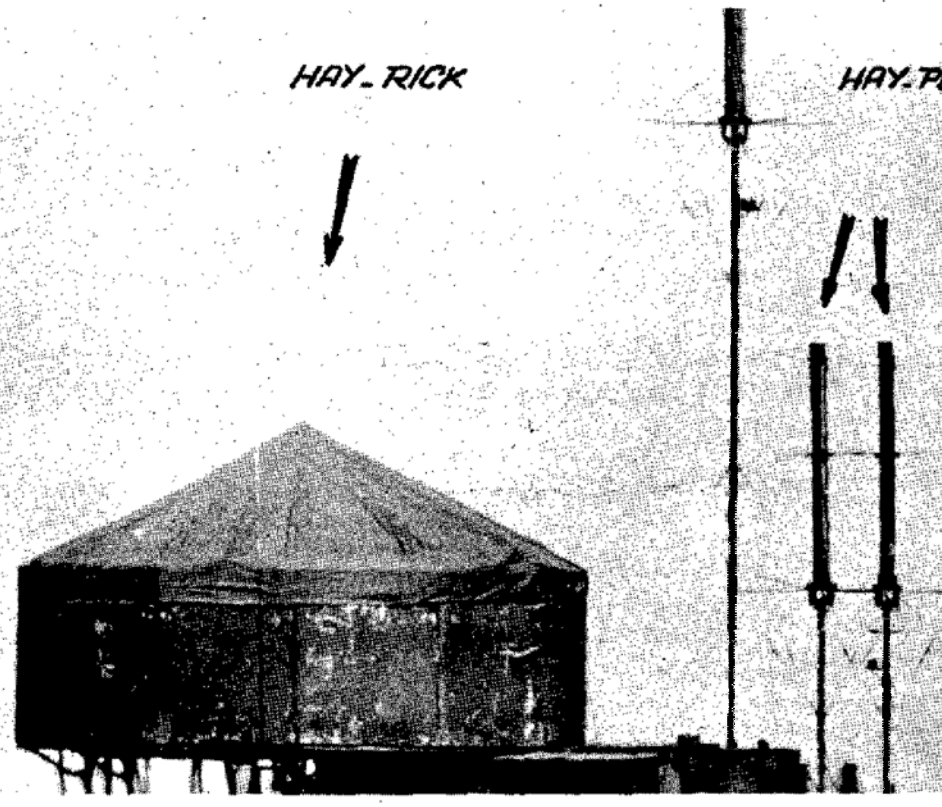
HAY RICK

HAY POLE

HAY WAIN







d. In one instance a mast-mounted paraboloid reflector (HAY RING) was associated with the installation, possibly for remote data presentation communications.

5. TRANSMISSION CHARACTERISTICS

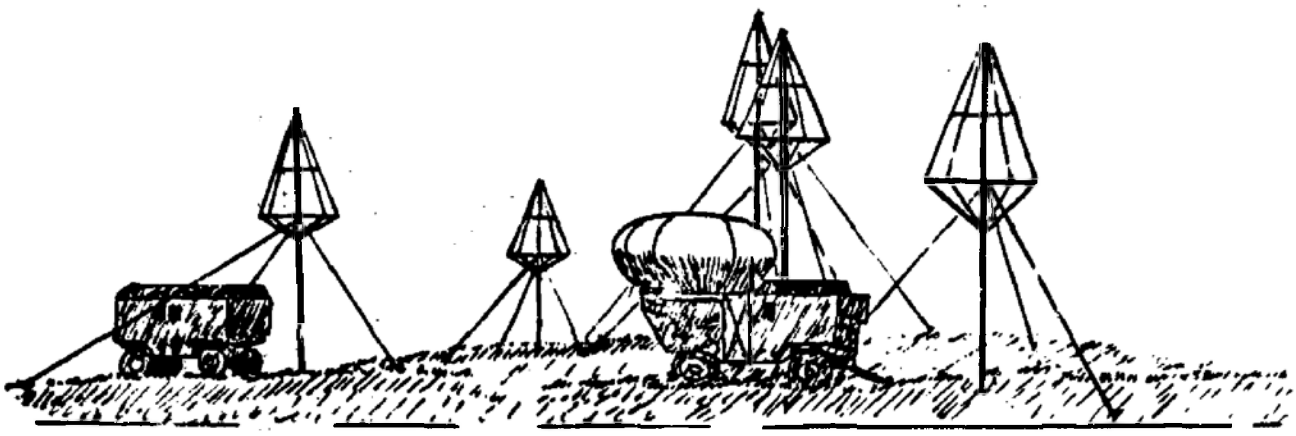
a. Frequency	3 frequencies simultaneously between 750 - 950 MHz.
b. P.R.F.	
(1) Range	30 and 100 pps
(2) Azimuth	Complex secondary radar 300 pps
c. Accuracy	
(1) Range	± 200 m (656 ft)
(2) Azimuth	± 0.25°

6. PERFORMANCE

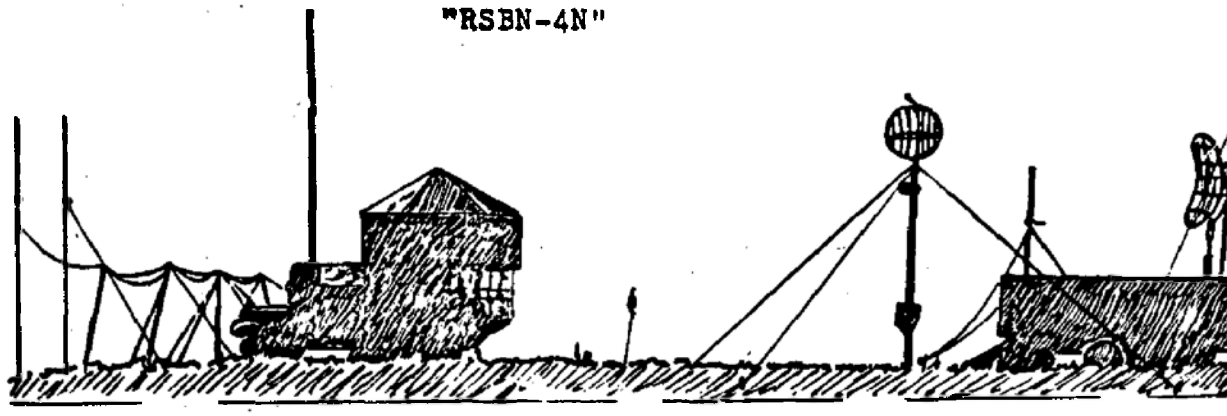
a. Range	463 Km (250 nm) at 12,000 m (40,000 ft)
b. Handling capacity	100 plus aircraft simultaneously
c. Accuracy	
(1) Range	± 182 m (200 yards)
(2) Azimuth	± 0.25°

NOTE: A new version designated RSBN-4N has been seen in operation and uses different antennas. A comparative sketch can be seen on the opposite page.

HAY SERIES- -Systems



"RSBN-4N"



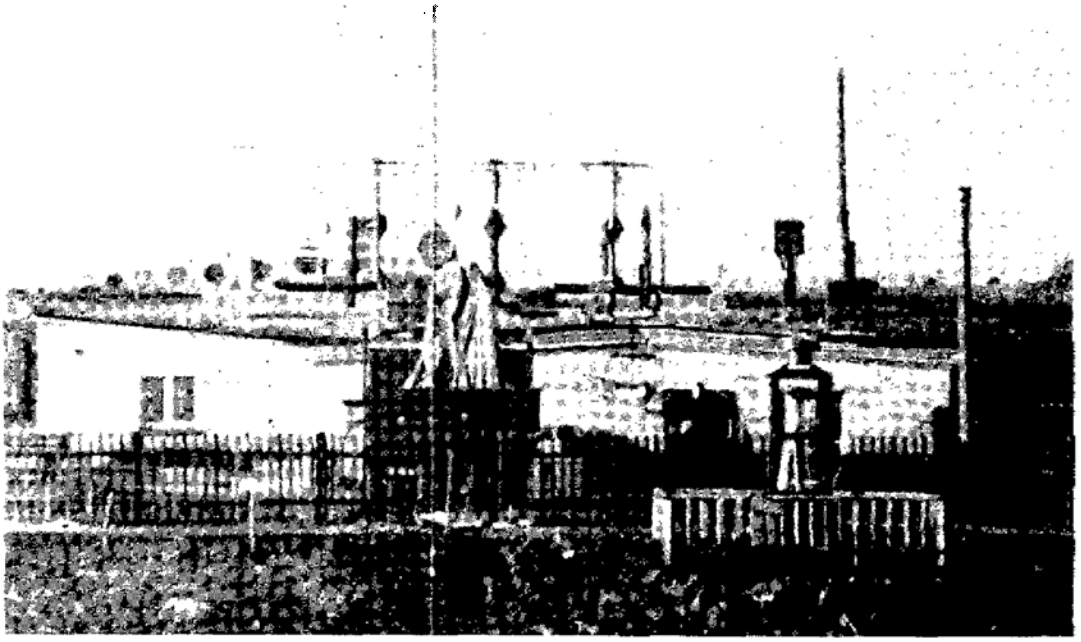
"RSBN-2N"

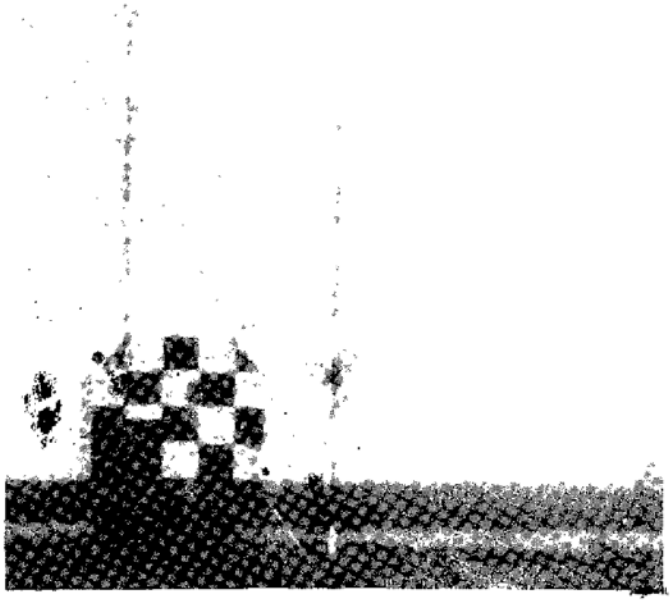
1.	NICKNAME	HOME GUIDE (Localizer) HOME RUN (Glide Path)
2.	SOVIET DESIGNATION	MATERIK SP-50 Glide Path GRM-1 Localizer KRM-1 KRM-2
3.	FUNCTION	Instrument Landing System
4.	DESCRIPTION	The glide path transmitter uses dipole antennas fitted in front of corner reflectors. The glide path trailer is normally located near the touch-down point and the localizer is about 1 Km (0.6 nm) beyond the end of the runway. The antenna system of the localizer consists of three Yagi arrays. The outer arrays are slightly offset from the center and directed upwind over the runway.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	Localizer 108 - 112 MHz Glide Path 330 - 350 MHz
	b. Power Output (avg)	Localizer 200 watts Glide Path 40 watts
	c. Modulation	Localizer 1000 Hz (AM) and 60 Hz (FM) Glide Path 90 Hz (AM) and 150 Hz (AM)
	d. Pol.	Horizontal
6.	PERFORMANCE	
	a. Range	Localizer 55 Km (30 nm) Glide Path 28 Km (15 nm)
	b. Accuracy	Localizer $\pm 1^{\circ}$ (est) Glide Path $\pm 0.35^{\circ}$ (est)

NATO SECRET

HOME GUIDE (Localizer)

HOME RUN (Glide Path)

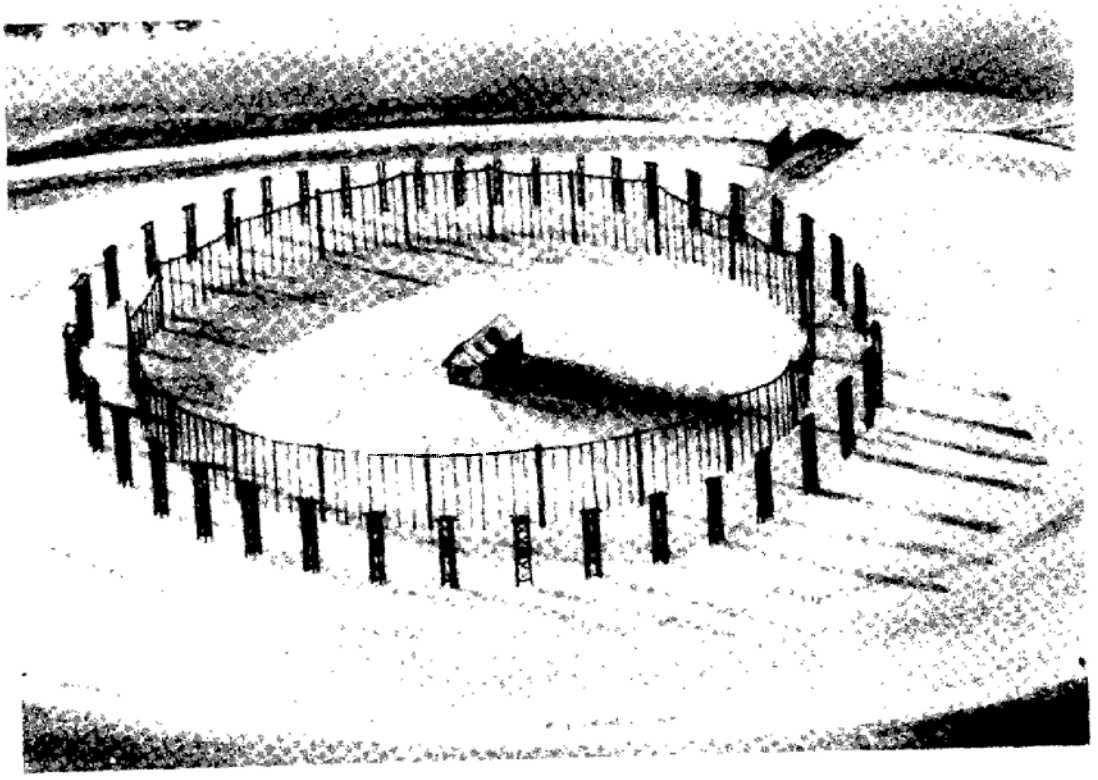




1.	NICKNAME	None
2.	SOVIET DESIGNATION	KRUG
3.	FUNCTION	Fast and very accurate direction finding of HF transmissions with automatic sensing.
4.	DESCRIPTION	40 vertical antennas are placed around a circle of 120 m (393.6 ft) diameter, and are backed by a concentric reflector of 108 m (354.2 ft) diameter made of numerous vertical grounded cables.
5.	RECEIVER CHARACTERISTICS	
	a. Frequency	2 - 20 MHz (est)
	b. Pol.	Unknown
6.	PERFORMANCE	
	a. Range	15,000 Km (8,000 nm) or more
	b. Accuracy: Azimuth	$\pm$ 1.7° - 2.2° depending upon propagation and mode of indication.
7.	REMARKS	2 to 5 MHz direction finding capability probably augmented by colocated or nearby systems of the FIX FOUR, FIX SIX, FIX EIGHT, and particularly THICK EIGHT.

NATO SECRET

KRUG



1. NICKNAME — None

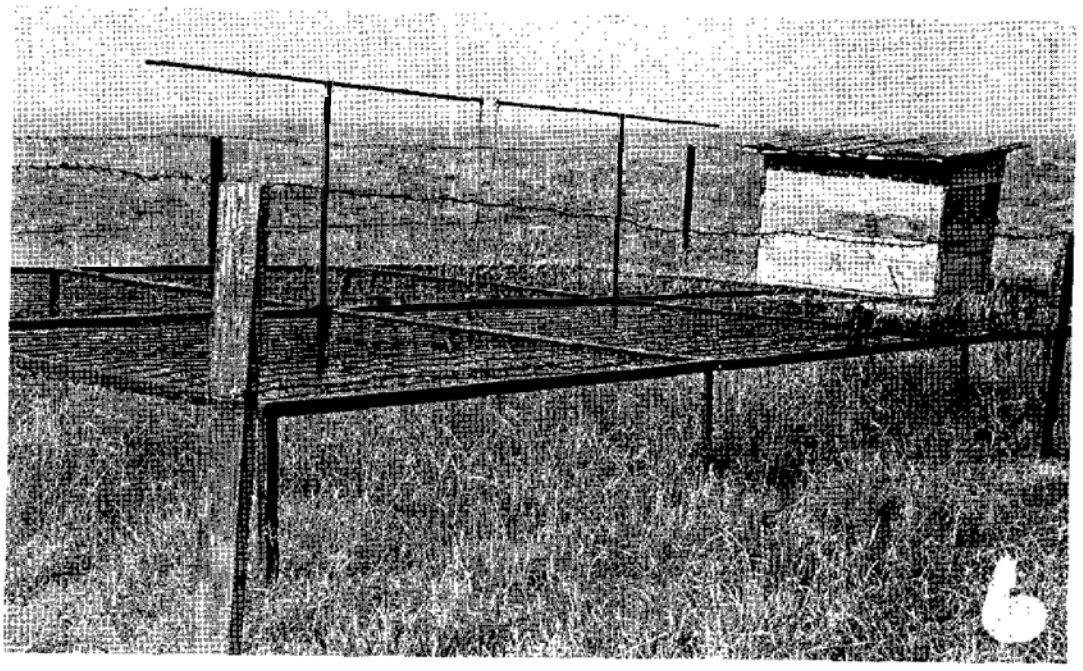
2. SOVIET DESIGNATION — MRM-48

3. FUNCTION — Marker Beacon Transmitter.

4. DESCRIPTION — The antenna consists of a horizontal full wave dipole (center fed) mounted above a wire mesh or perforated metal ground plane. It is usually placed at points 1 Km and 4 Km (0.6 nm and 2.5 nm) from the end of runways and along flight routes.

5. TRANSMISSION CHARACTERISTICS

a. Frequency	75 MHz
b. Pol.	Horizontal
c. Modulation	AM.400, 1300 and 3000 cps (keyed tone)
d. Power Output	12 ± 3 watts



1. NICKNAME — None

2. SOVIET DESIGNATION — Type PAR

3. FUNCTION — A radio beacon to provide transmissions for airborne radio compasses.

4. DESCRIPTION — Ground transmitters on MF bands are provided to operate in conjunction with the radio compass. One type uses a cage or tee antenna mounted between two masts. Another, usually at inner beacon sites, has a conical array of wires slung radically from the top of the mast to the ground. A third type, located at the inner market site of some airfields in close proximity to the conical array, consists of 6 short poles about 2 m (6 ft) high with wires strung from them to the center feeding pole.

5. TRANSMISSION CHARACTERISTICS

a. Frequency — 150 - 1300 KHz

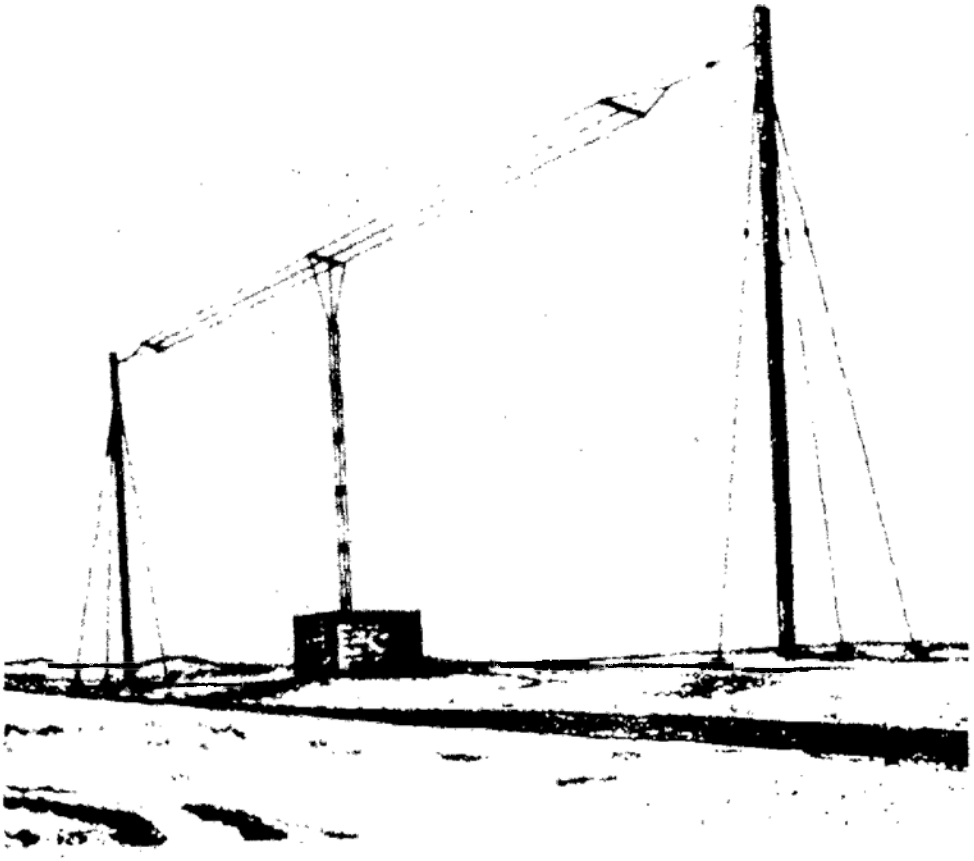
b. Modulation — 500 Hz, keyed identifiers

6. PERFORMANCE

Range — Outer marker beacon, about 370 Km (200 nm) (medium power)

Inner marker beacon, about 46 Km (25 nm) (low power).

Type PAR



7. REMARKS

(a) The frequencies for the inner and outer markers are so selected that it is only necessary to change the frequency range switch on the radio compass receiver when passing from the outer to the inner beacon.

(b) "One pair of medium frequency beacons type PAR and one pair of VHF beacons MRM-48 form the airborne self bearing and landing system OSP-48 for aircraft not equipped with ILS 'MATERIK SP-50'."

(c) The transmitter may be vehicle mounted.

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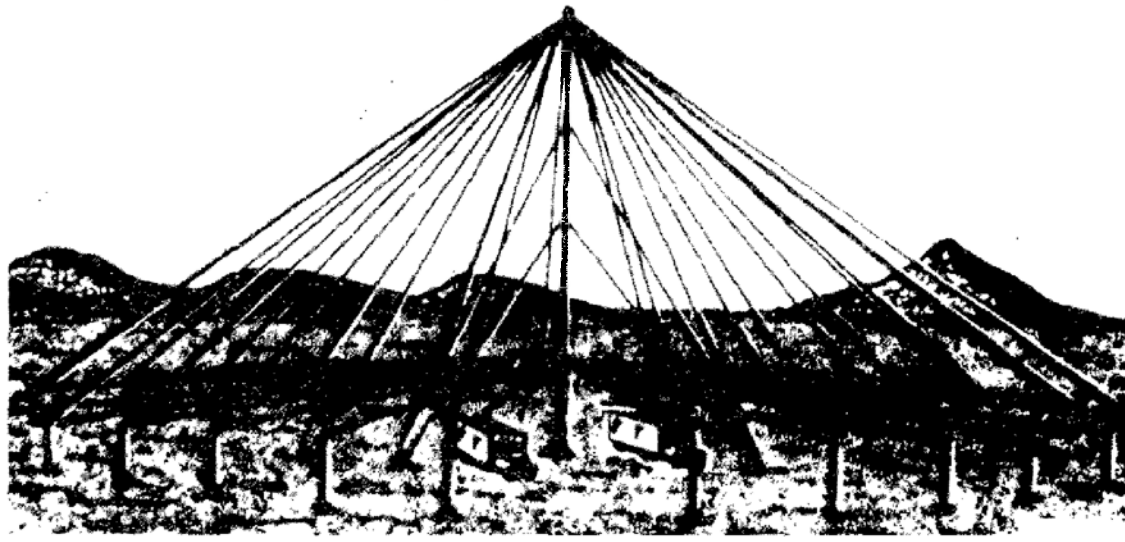
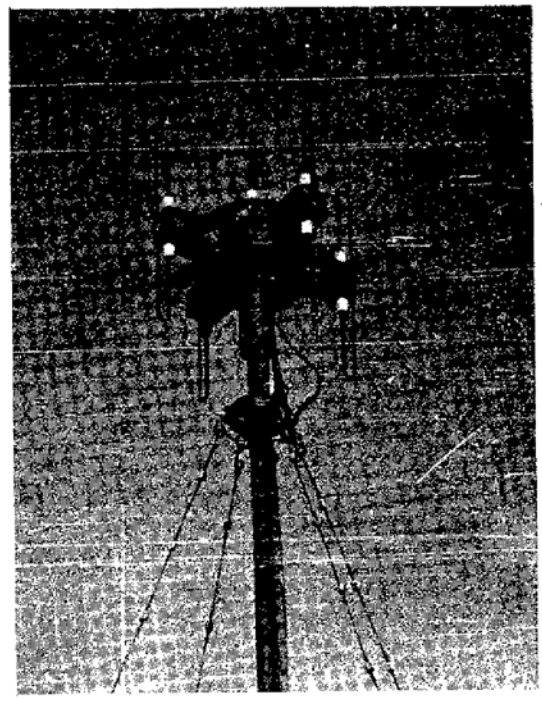
1.	NICKNAME	ROTATING ROSE (unofficial)
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	A radio beacon to provide directional transmissions to aircraft.
4.	DESCRIPTION	The ROTATING ROSE radio beacon transmits coded characteristics in 16 fixed directions. The ground antenna array consists of 16 individually excited loops arranged symmetrically about an outer mast.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	10 - 150 KHz
	b. Pol.	Vertical
	c. Modulation	Coded, tone-modulated CW
	d. Power Output	Unknown
6.	PERFORMANCE	
	a. Range	460 Km (250 nm)
	b. Accuracy	$\pm 8^{\circ}$ (180° ambiguity)

NOTE: Ordinary communications equipment and charts are all that are required to determine direction.

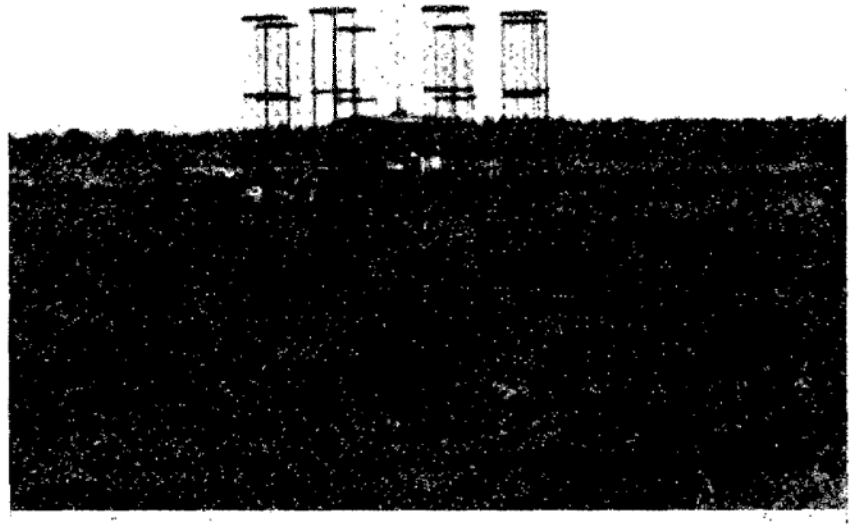
ROTATING ROSE



1. NICKNAME	SMALL CROSS
2. SOVIET DESIGNATION	ARP-1 (fixed) and ARP-4 (mobile)
3. FUNCTION	Direction finding on VHF transmissions.
4. DESCRIPTION	A VHF/DF equipment which uses four dipoles placed in a square with another at the center. It is used in conjunction with a cathode ray tube display. It is possible that this aerial can be housed in a box cover if necessary. Both static and mobile versions exist.
5. RECEIVER CHARACTERISTICS	
a. Frequency	100 - 150 MHz (est)
b. Pol.	Vertical
6. PERFORMANCE	
a. Range	320 Km (180 nm) at 10,000 m (30,000 ft)
b. Accuracy	Approximately $\pm 1^{\circ}$ to $\pm 2^{\circ}$



1.	NICKNAME	THICK EIGHT A
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Wide band HF/DF system
4.	DESCRIPTION	Eight vertical cylindrical cage antennas placed symmetrically around a sense aerial fixed on a small hut.
5.	RECEIVER CHARACTERISTICS	
	a. Frequency	2 - 20 MHz (est)
	b. Pol.	Vertical
6.	PERFORMANCE	
	a. Range	Unknown
	b. Accuracy	2° - 3°



1. NICKNAME — THICK EIGHT B

2. SOVIET DESIGNATION — Unknown

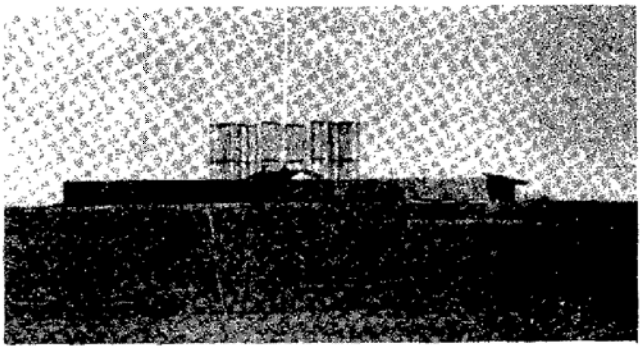
3. FUNCTION — D/F receiver array

4. DESCRIPTION — A modified form of the THICK EIGHT A with apparently the same cylindrical cage elements but with each element having the centrally positioned vertical rod extended above it by approximately half the height of the cage. The vertical members of the cage are joined by wires to the central rod at approximately the center of the projecting portion. The radius of the circle on which the cage elements are spaced around the sense aerial is about twice that of THICK EIGHT A.

5. RECEIVER CHARACTERISTICS

a. Frequency — Low HF band covering approximately 0.5 - 5.0 MHz

b. Accuracy — $\pm 2^{\circ}$ to 3°



1. NICKNAME — FIX SIX A

2. SOVIET DESIGNATION — Unknown

3. FUNCTION — D/F receiver array

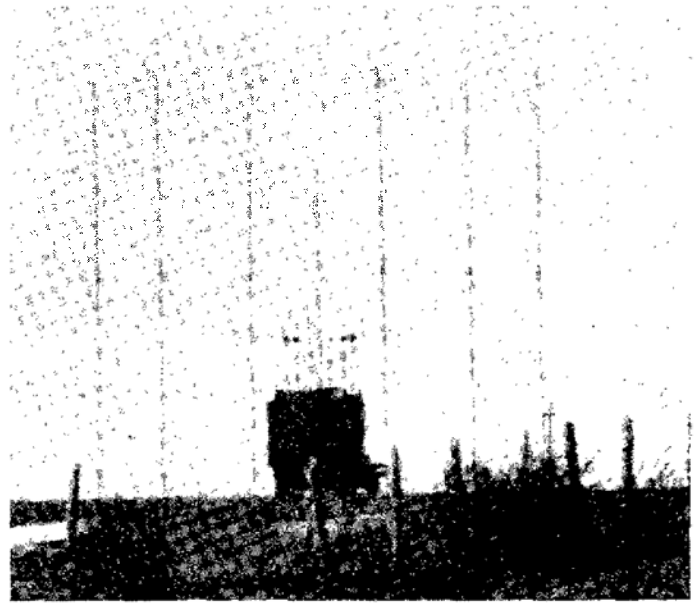
4. DESCRIPTION — An antenna array consisting of six vertical center fed half wave dipoles approximately 12 m (40 ft) high arranged symmetrically in a circle of approximately 13.5 m (45 ft) diameter around a ZIL-151 or 157 box-bodied vehicle on which is mounted a whip sense antenna.

5. RECEIVER CHARACTERISTICS

a. Frequency — 2 - 20 MHz

b. Accuracy — $\pm 2^{\circ} - 3^{\circ}$

FIX SIX A



1. NICKNAME — FIX SIX B

2. SOVIET DESIGNATION — Unknown

3. FUNCTION — D/F receiver array

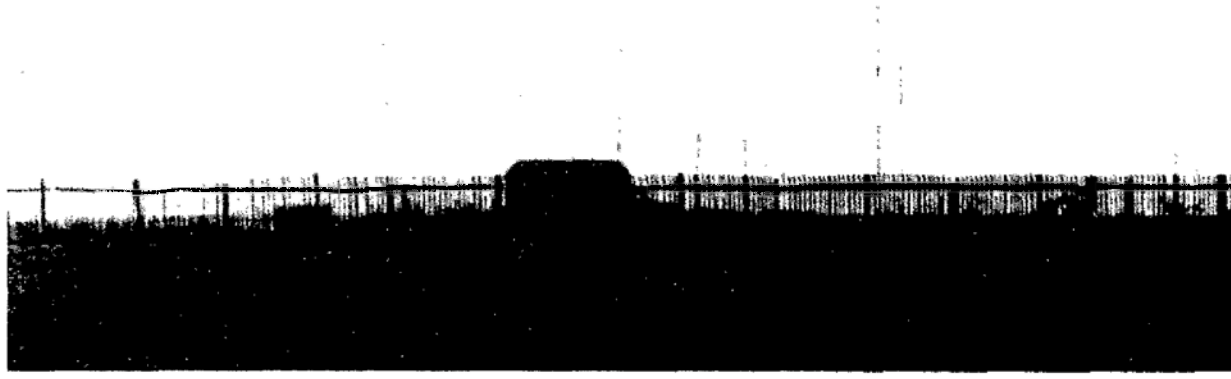
4. DESCRIPTION — An antenna consisting of bottom-fed quarter wave monopoles approximately 15 m (50 ft) high arranged symmetrically in a circle of approximately 43 m (140 ft) diameter around a ZIL-151 or 157 box-bodied vehicle on which is mounted a rod sense antenna approximately 8.8 m (29 ft) high.

5. RECEIVER CHARACTERISTICS

a. Frequency — MF band

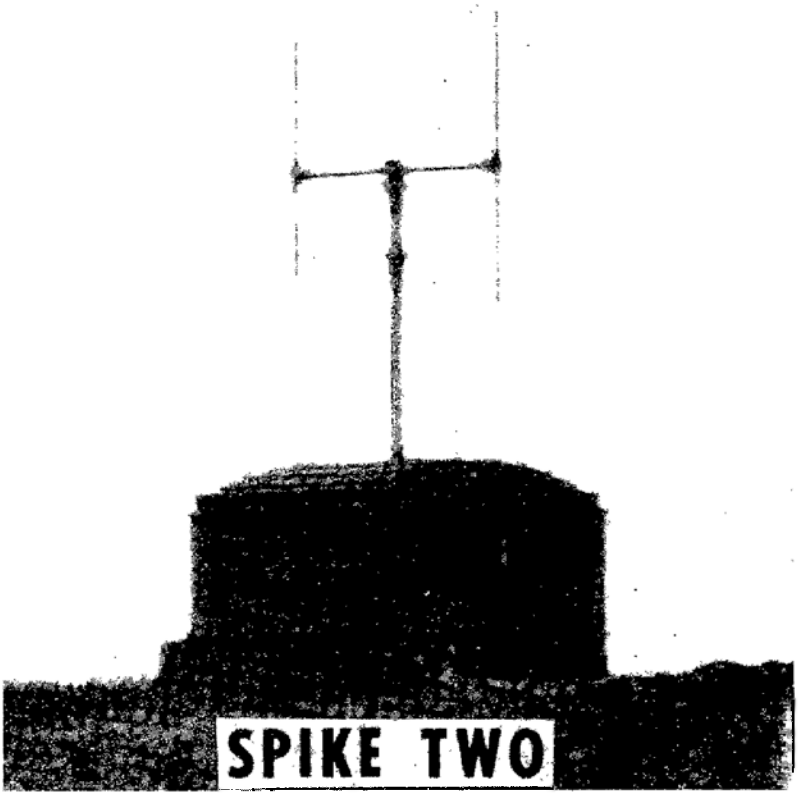
b. Accuracy — $\pm 2^{\circ} - 3^{\circ}$

FIX SIX B



1.	NICKNAME	SPIKE TWO
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	D/F receiver array
4.	DESCRIPTION	Rotating Adcock system mounted on a single axle box-bodied trailer with a curved heavily reinforced roof. Also mounted on GAZ-51 or 63 chassis.
5.	RECEIVER CHARACTERISTICS	
	a. Frequency	Covers low VHF band centering at approximately 60 MHz.
	b. Pol.	Vertical
	c. Accuracy	$\pm 3^{\circ} - 6^{\circ}$

SPIKE TWO



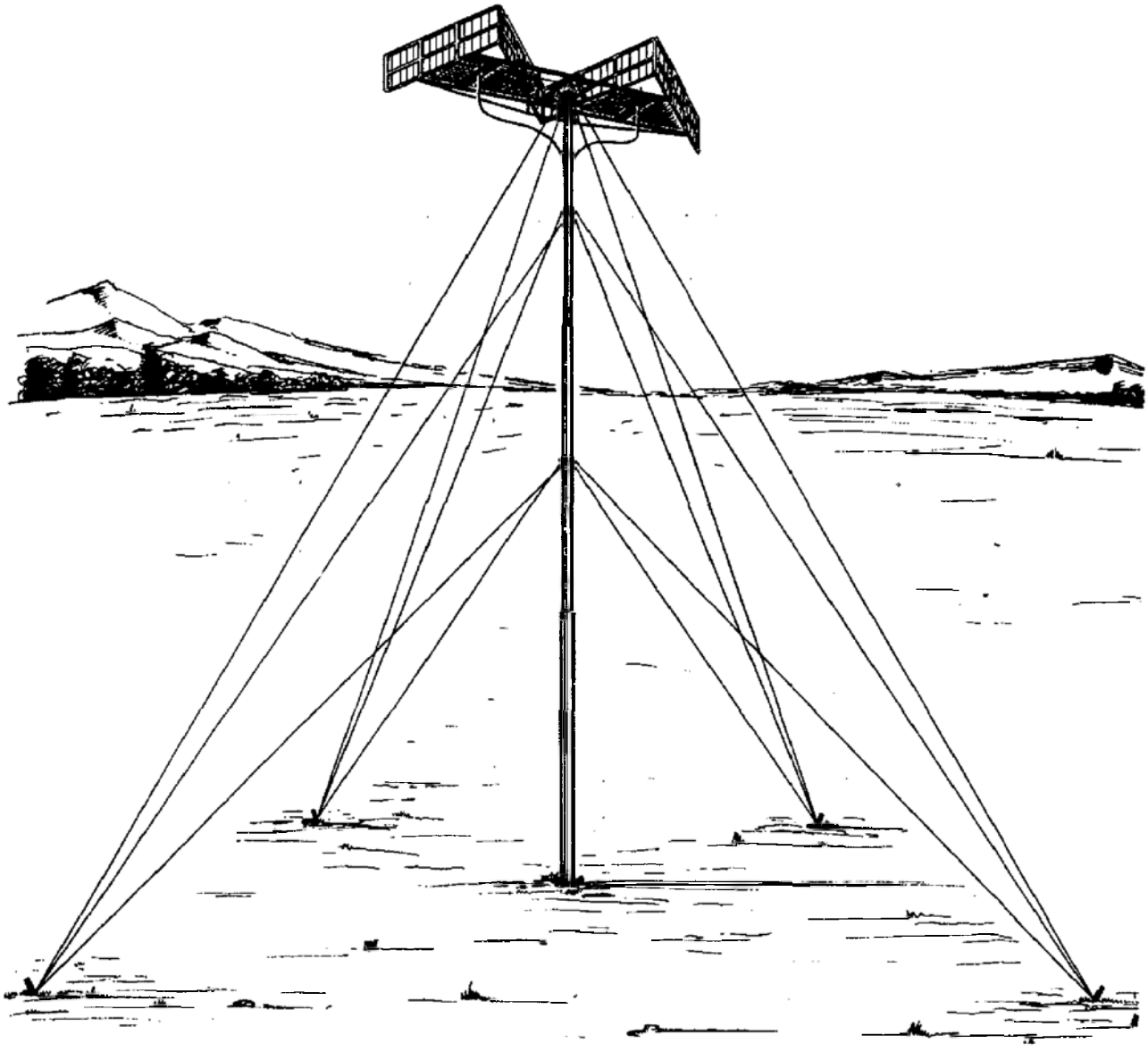
1. NICKNAME — SHORE WALK

2. SOVIET DESIGNATION — Probably Ground - RYM-B; Air - RYM-S

3. FUNCTION — Short range navigation and bombing aid. SHORE WALK is installed in BEAGLE aircraft and in medium bombers as alternative to MUSHROOM. SHORE WALK is similar to the US SHORAN - navigation and precision bombing system AN/CPN-2. A version of SHORE WALK has been observed in BREWER aircraft since April 1964.

4. DESCRIPTION — SHORE WALK can be used by aircraft as a tactical bombing aid using a pair of 30 cm (11 in) stub antennas. One ground system (2 ground responder stations) can serve about 20 aircraft. The airborne portion of the system is relatively light, about 160 kg (330 lb), and can easily and rapidly be calibrated. If the position of the target relative to the ground stations is known, no geographic reference to the target itself is required. SHORE WALK's range could be increased by placing the ground stations on high, unobstructed terrain. It might also be practicable to elevate the fixed-position transmitter - ordinarily used at the ground stations - by using helicopters. Naval forces also use ground based SHORE WALK for mine laying and navigational purposes.

SHORE WALK Array



5. GROUND TRANSMISSION CHARACTERISTICS

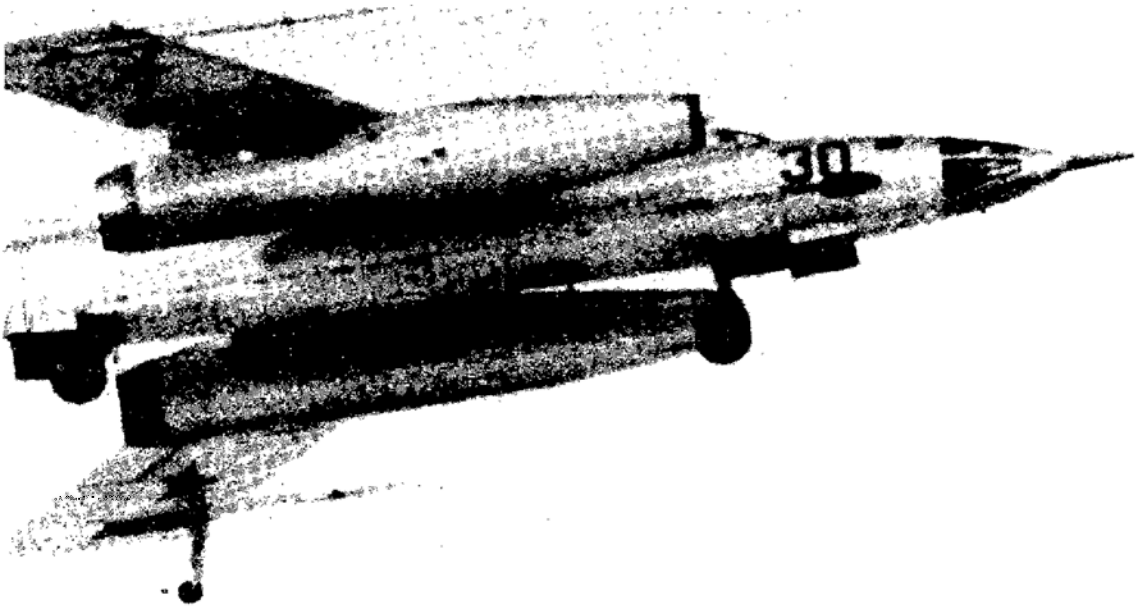
a. Frequency	290 - 330 MHz
b. P.R.F.	740 - 760 pps
c. P.W.	2 microseconds
d. Peak Power	30 kw
e. Pol.	Vertical

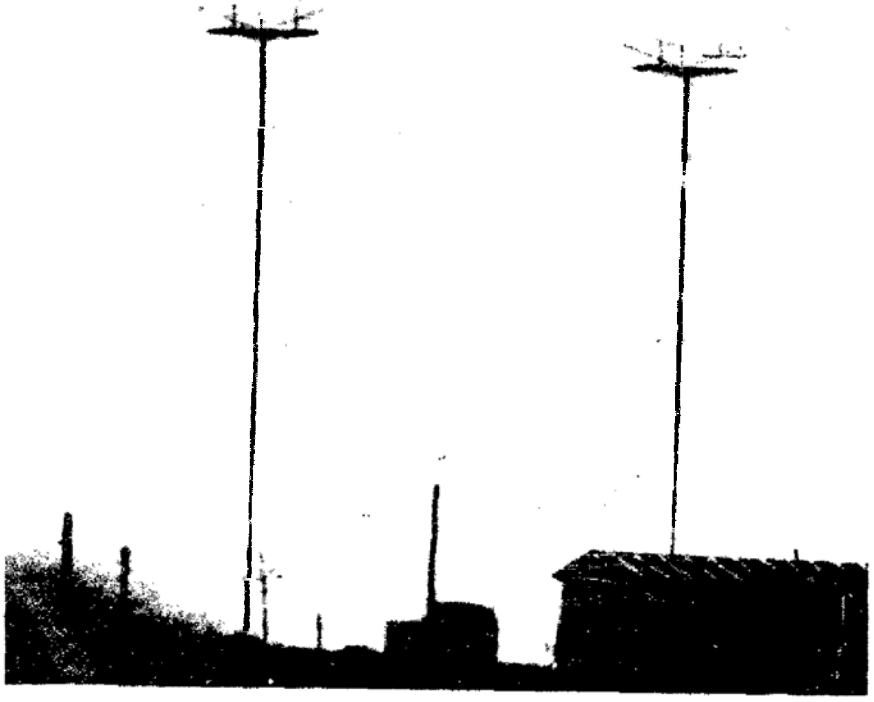
6. AIRBORNE TRANSMISSION CHARACTERISTICS

a. Frequency	220 - 270 MHz
b. P.R.F.	Same as ground
c. P.W.	0.3 - 2.5 microseconds
d. Peak Power	Unknown
e. Pol.	Vertical

7. PERFORMANCE

a. Range	About 280 Km (150 nm) at 1950 m (6,500 ft)
b. Accuracy	± 30 m (99 ft)





1. NICKNAME — SHORE WALK (Variant)

2. SOVIET DESIGNATION — Ground - RYM-B
Airborne - RYM-S

3. FUNCTION — Short range navigation and bombing aid in BREWER B associated with RSBN-2S, and BREWER C with LOOK TWO or SHORT HORN and RSBN-2S.

4. DESCRIPTION — Similar to SHORE WALK, however, the modified system has been completed by additional devices, so that 8 beacons can be operated simultaneously, and the pilot can choose the most suitable pair of beacons for determination of aircraft position. The method of triangulation is the same as in the SHORE WALK system. In the modified system, the beacons are not distinguishable by frequency but by pulse combinations, consisting of two frame pulses and until now of two information pulses. These second and third pulses can be positioned anywhere in 3 usec-steps within a 27 usec interval. Possibly the beacon response is coded.

5. AIRBORNE AND GROUND TRANSMISSION CHARACTERISTICS

a. Frequency	258 - 273 MHz
b. P.R.F.	700 - 800 pps
c. P.W.	0,3 - 1,0 usec
d. Peak Power	30 kw
e. Pol.	Vertical

6. PERFORMANCE

a. Range	About 280 Km (150 nm) at 1,950 m (6,500 ft)
b. Accuracy	±30 m (99 %)

SHORE WALK (Variant)

Photograph not available

1. NICKNAME — SQUARE FOUR

2. SOVIET DESIGNATION — Unknown

3. FUNCTION — D/F receiver array

4. DESCRIPTION — An array consisting of four crossed self-supporting square loops approximately 5.9 m (19.5 ft) high, point mounted on short pedestals, approximately 1.5 m (5 ft) high, installed at the corners of a square (estimated diagonal approximately 23.5 m (77.5 ft)) with the planes of the loops parellel to the diagonals of the square. The loops are wire braced horizontally and vertically. A small junction box is located on the ground at the center of the square, to which each antenna is connected. The junction box is cabled to a ZIL-157 box-bodied vehicle of the order of 135 m (445 ft) distant located midway between this array and a TALL RODS array similarly cabled to the vehicle. Variations in these distances may be seen.

5. RECEIVER CHARACTERISTICS

a. Frequency — MF/Low HF band (C)

b. Pol. — Vertical

6. PERFORMANCE

a. Range — Unknown

b. Accuracy — Unknown

No Photograph available

1. NICKNAME — TALL RODS

2. SOVIET DESIGNATION — Unknown

3. FUNCTION — D/F receiver array

4. DESCRIPTION — An array consisting of 8 bottom fed guyed masts, approximately 10.7 m (35.3 ft) high, arranged symmetrically in a circle of approximately 9.3 m (30.7 ft) diameter around a junction box, on the ground, approximately 70 cm (2.3 ft) wide and 40 cm (1.2 ft) high. The junction box is cabled to a ZIL-157 box-bodied vehicle of the order of 135 m (445 ft) distant located midway between this array and a SQUARE FOUR array similarly cabled to the vehicle. Variation in these distances may be seen.

5. RECEIVER CHARACTERISTICS

a. Frequency — HF band (C)

b. Pol. — Vertical

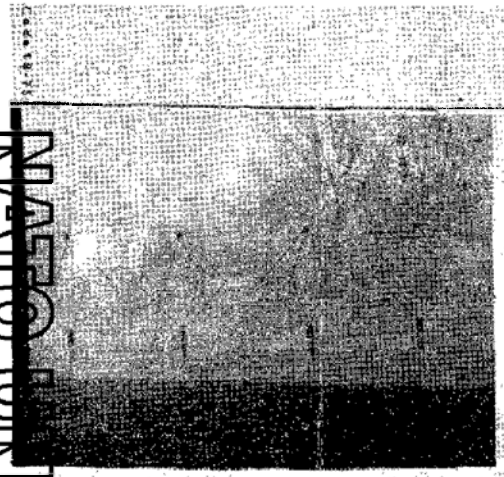
6. PERFORMANCE

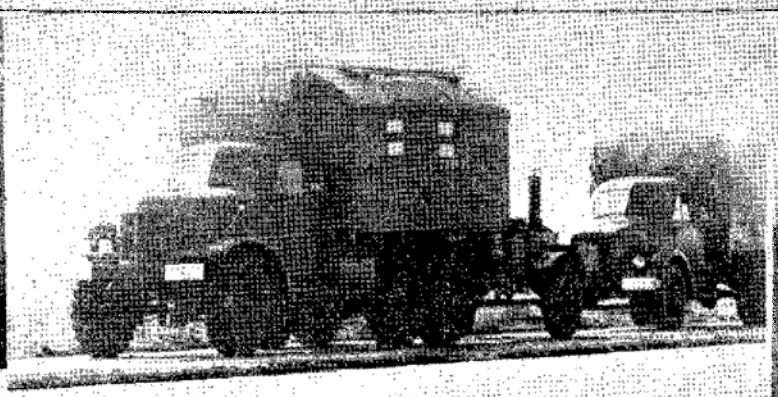
a. Range — Unknown

b. Accuracy — Unknown

No photograph available

1.	NICKNAME	FULL HOUSE
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	D/F receiver array
4.	DESCRIPTION	A combination of a SQUARE FOUR and a TALL RODS of the order of 270 m (890 ft) apart and cabled to a ZIL-157 box-bodied vehicle situated midway between them. Variations in these distances may be seen.
5.	RECEIVER CHARACTERISTICS	
	a. Frequency	MF/HF band
	b. Pol.	Vertical
6.	PERFORMANCE	
	a. Range	Unknown
	b. Accuracy	Unknown



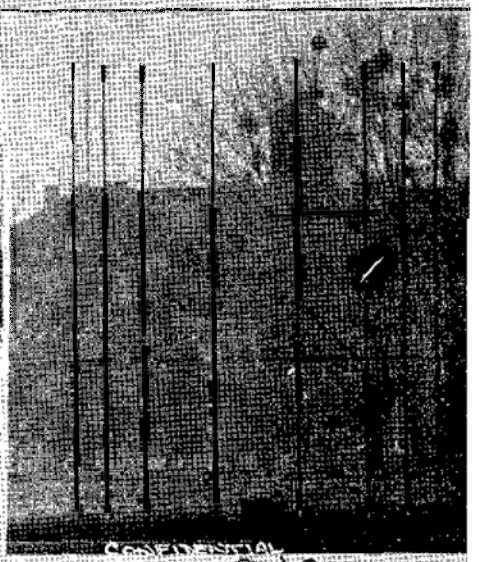


SQUARE FOUR

Overall Height of Antenna Approx 7·4m

Height of Pedestal " 1·5m.

Side of Antenna Frame " 4·1m.

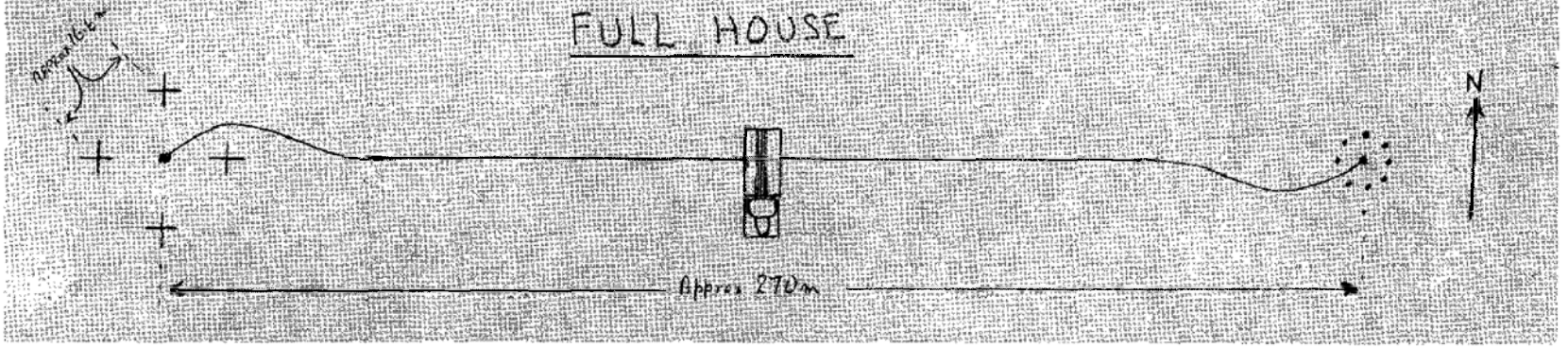


TALL RODS

Height of Masts Approx 10·7m.

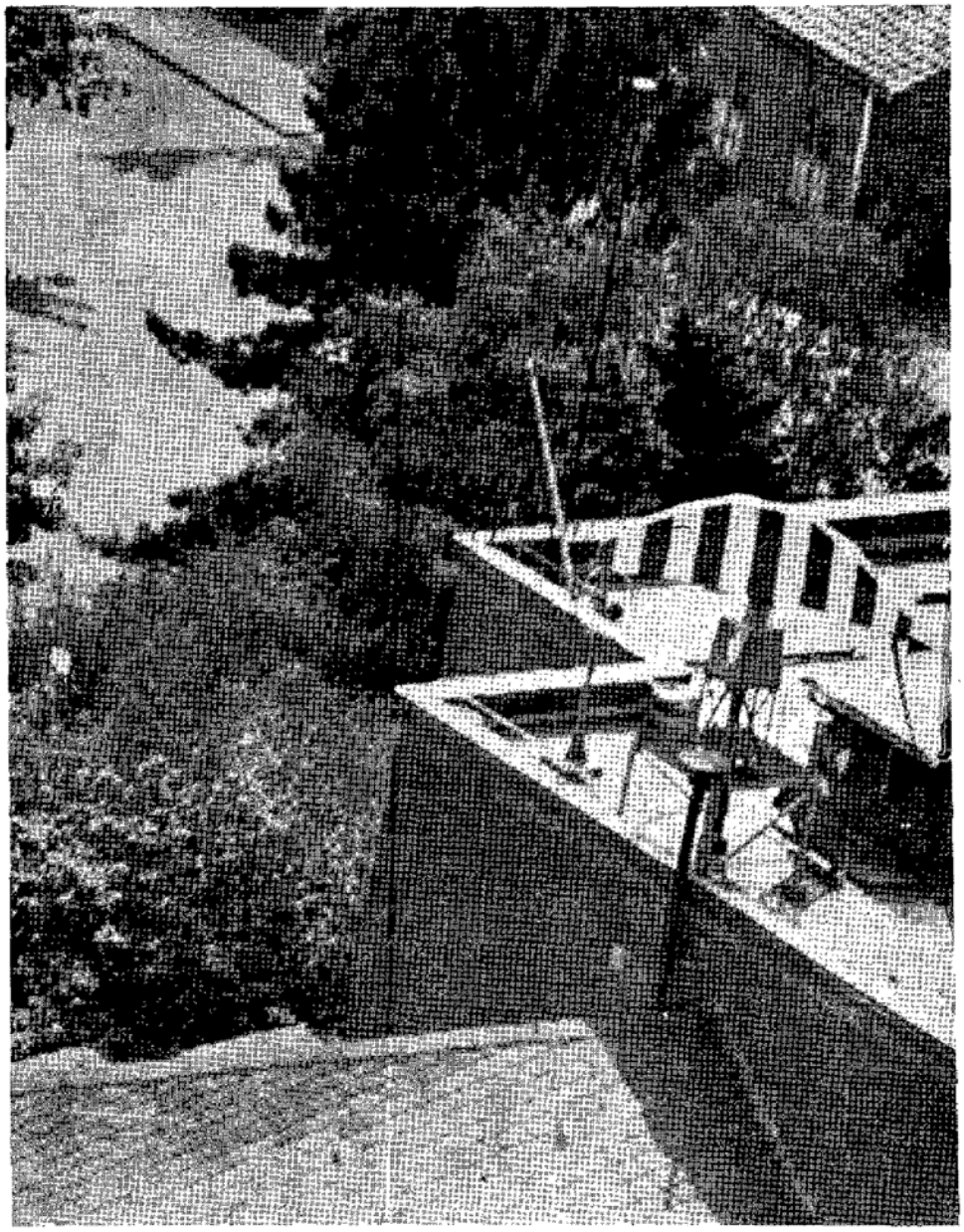
Diameter of Circle " 9·3m.

FULL HOUSE



Section G - Meteorology Radar

1.	NICKNAME	None
2.	SOZG DESIGNATION	BWR-X-12 (Boden WETTER RADARANLAGE)
3.	FUNCTION	Weather radar
4.	DESCRIPTION	A parabolic truncated reflector. The upper part being truncated on the four sides and the lower part being elliptical.
5.	TRANSMISSION CHARACTERISTICS	
	a. Frequency	9.375 MHz ± 30
	b. P.R.F.	210 and 420 pps
	c. P.W.	2 Microseconds
	d. Peak Power	40 kw
	e. A.R.R.	6 rpm
	f. Pol.	Linear and circular
	g. Beam width	Horizontal - 0.65° Vertical - 1.7° Antenna scanning in elev from - 2° to + 20°
6.	PERFORMANCE	
	Range	Max 400 Km (215 nm)
7.	REMARKS	The BWR-X-10 seems to be an earlier version of BWR-X-12 with a single PRF of 420 pps. The BWR-X-10 has been observed in a coastal surviellance rôle.

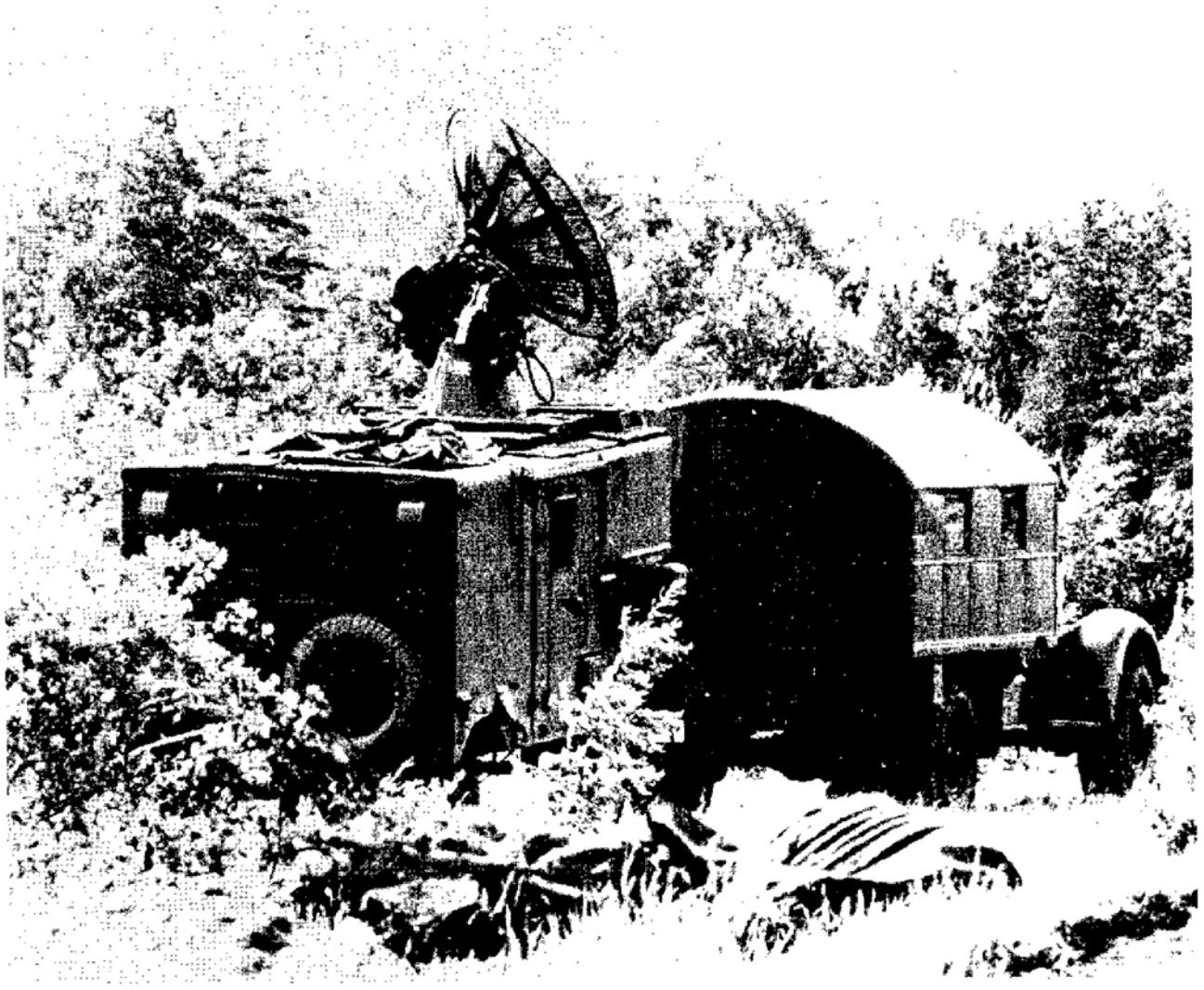


1.	NICKNAME	END TRAY
2.	SOVIET DESIGNATION	RMS-1
3.	FUNCTION	Meteorological radar
4.	DESCRIPTION	END TRAY consists of a parabolic dish, two meters in diameter mounted on one of two special box-bodied trucks of the MAZ-502 and ZIL-157 types, with a towed trailer-mounted generator. END TRAY is used by meteorological units to provide accurate data for tube artillery and missile artillery support.

5. TECHNICAL CHARACTERISTICS

a. Frequency	1770 - 1805 MHz
b. P.R.F.	Approximately 700 and 833 pps
c. P.W.	0.5 - 1.6 microseconds
d. Scan	Conical 24 - 33 Hz
e. Pol.	Vertical
f. Beam width	6.5°
g. Peak Power	250 kw (est)

END TRAY



1.	NICKNAME	BREAD BIN
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Meteorological radar
4.	DESCRIPTION	A mobile meteorological station normally associated with Artillery units equipped with FROG.
5.	TRANSMISSION CHARACTERISTICS	Signal is possibly the same as END TRAY.

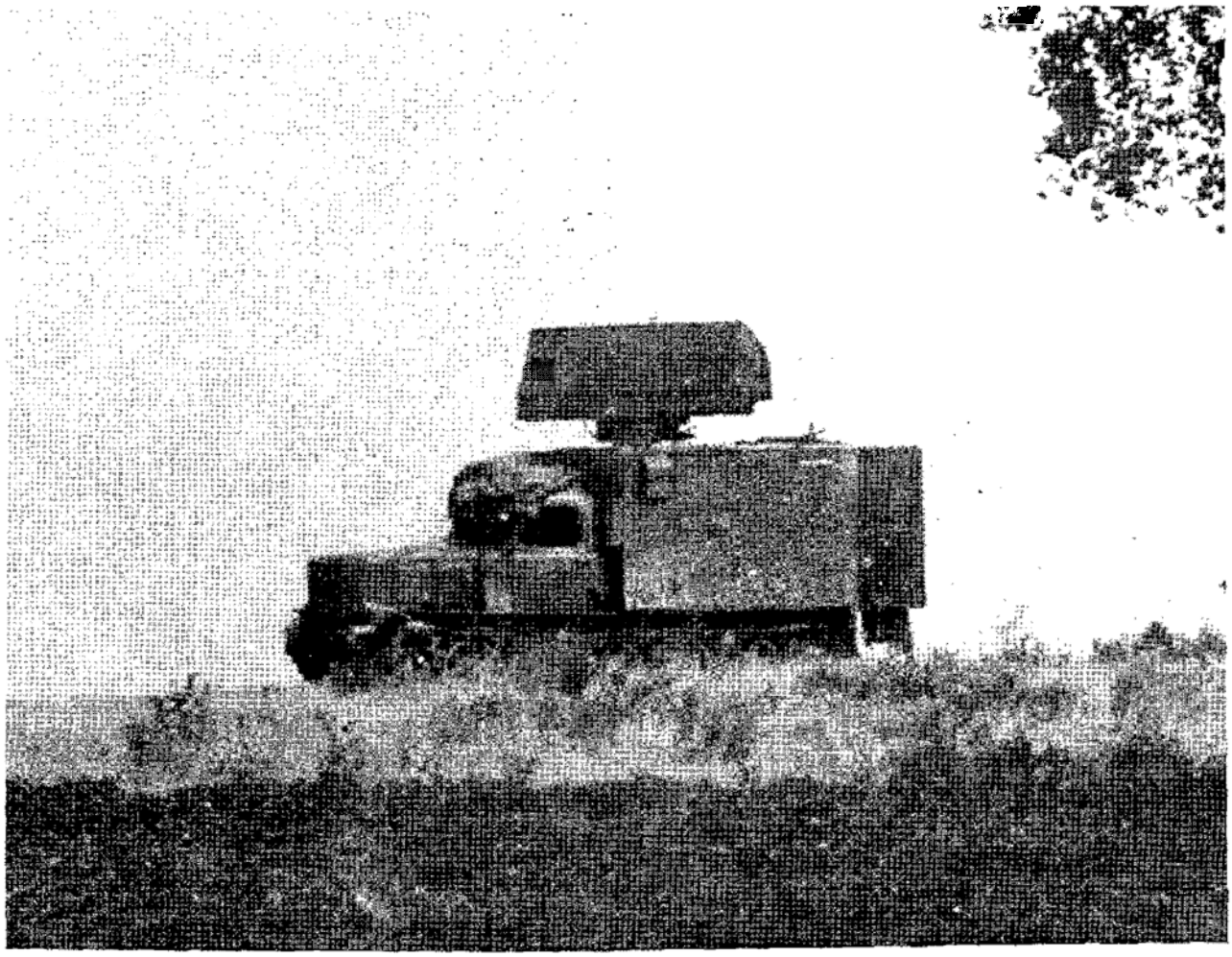
BREAD BIN

No photograph available

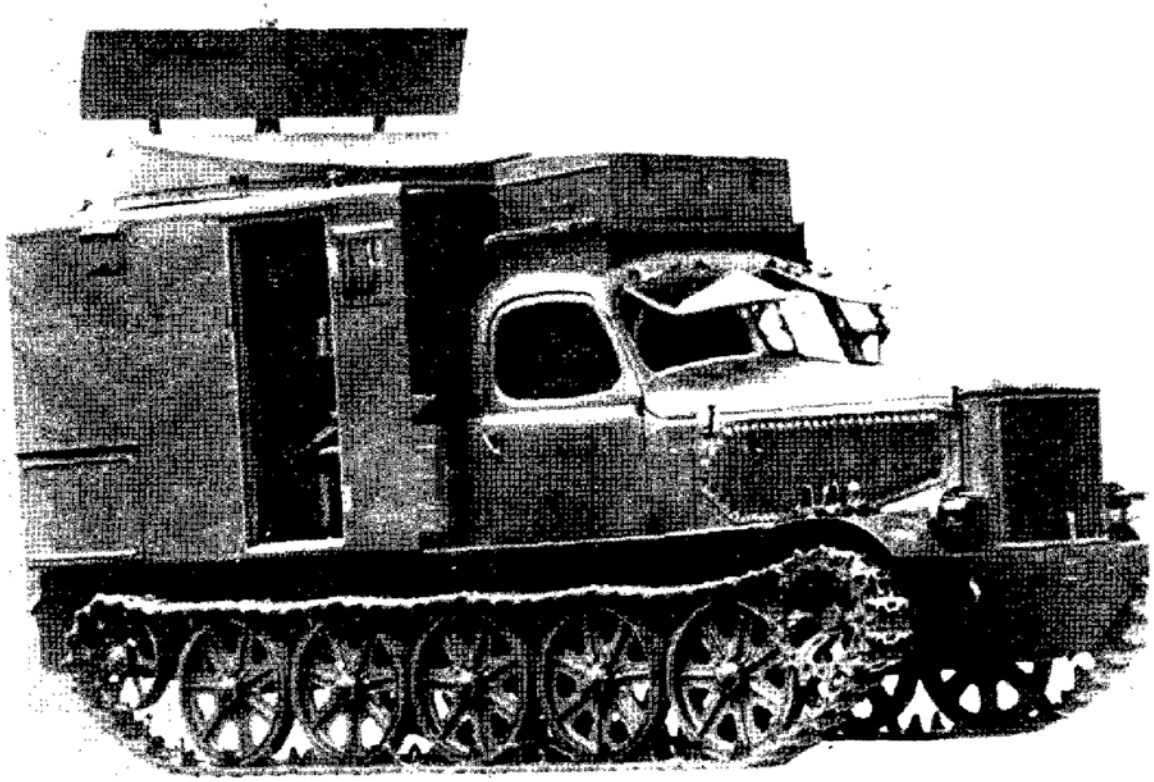
Section H - Battlefield Radar

1.	NICKNAME	LONG TROUGH
2.	SOVIET DESIGNATION	SNAR-1
3.	FUNCTION	Surveillance
4.	DESCRIPTION	LONG TROUGH is an obsolescent combat surveillance radar which is being replaced by PORK TROUGH and perhaps FLAP TRACK. It is utilized for the detection of vehicles, tanks, troop movements and other ground targets within line of sight.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	9300 - 9500 MHz
	b. P.R.F.	5800 or lower (estimated)
	c. P.W.	0.1 - 0.5 microseconds (estimated)
	d. Scan	30° horizontal sector in 1 sec
	e. Peak Power	Unknown
	f. Beam Width	3° horizontal
6.	PERFORMANCE	
	Range	10 Km (5.5 nm)
7.	REMARKS	LONG TROUGH has always been associated with artillery units. It was first observed in EAST GERMANY in 1956.

LONG TROUGH



1.	NICKNAME	PORK TROUGH
2.	SOVIET DESIGNATION	SNAR-2
3.	FUNCTION	Surveillance/Fire control
4.	DESCRIPTION	This radar is used to locate fixed or moving surface targets and to adjust fire of artillery weapons firing 122 mm or larger caliber ammunition.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	9200 - 9500 MHz
	b. P.R.F.	3000, 6000 pps
	c. P.W.	0.3, 0.15, microseconds
	d. Scan	Rate: 11 Hz Type: Sectoral (25°)
	e. Pol.	Vertical
	f. Beam Width	1° (H) x 4.5° (V)
	g. Peak Power	60 - 90 Kw (estimated)
6.	PERFORMANCE	
	Range	Approximately 40 Km (21 nm)
7.	REMARKS	PORK TROUGH was first observed in the Soviet Union late in 1958 and may be seen in company with SMALL YAWN, both supporting an artillery unit.

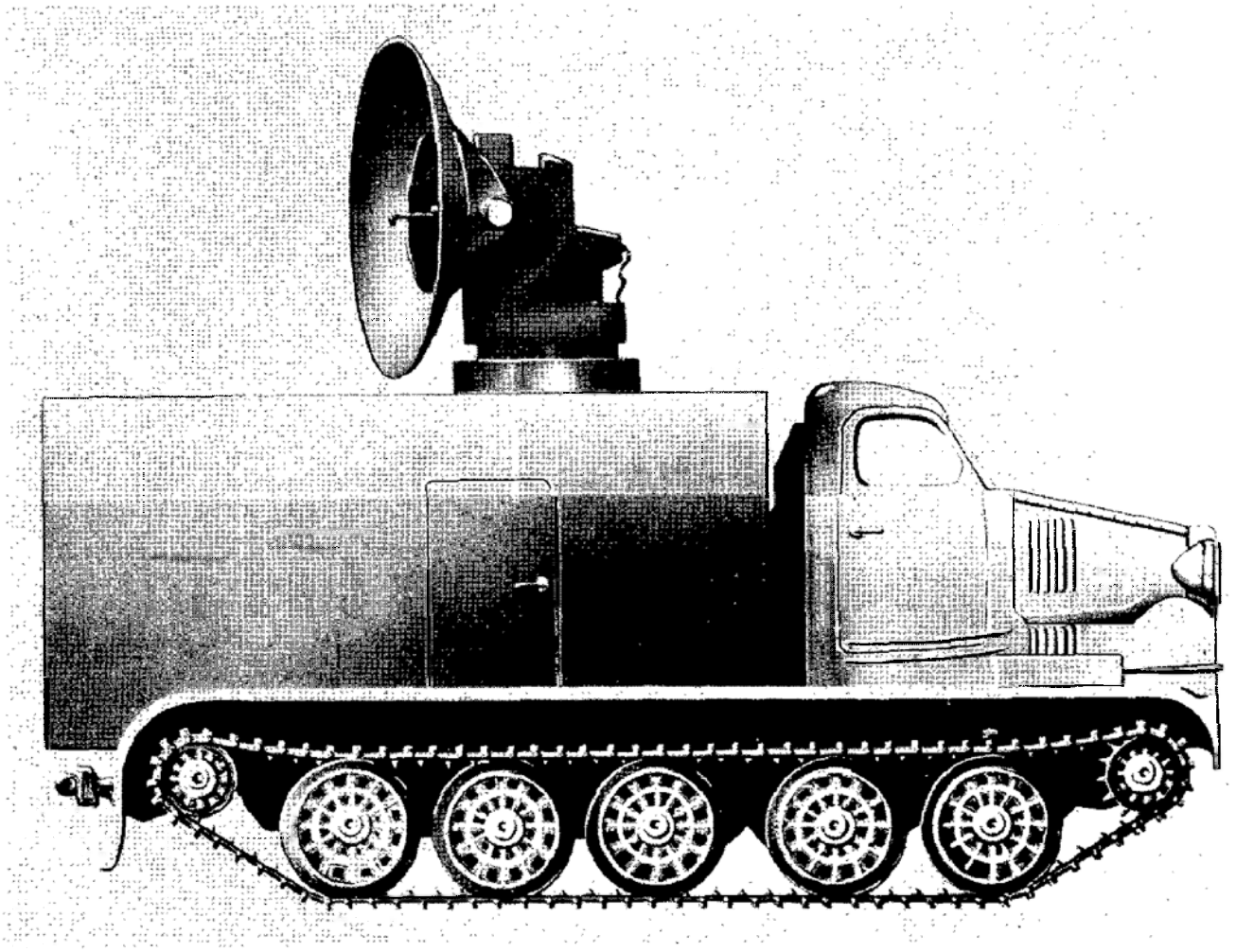


1.	NICKNAME	TRACK DISH
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Countermortar/ Counterbattery
4.	DESCRIPTION	TRACK DISH is a mobile countermortar radar mounted on a Soviet AT-T heavy tracked artillery tractor. The pedestal-mounted, retractable antenna resembles that of WHIFF. TRACK DISH is believed to be obsolete and has, to a large extent, been replaced by SMALL YAWN.
5.	TECHNICAL CHARACTERISTICS (Estimated)	
	a. Frequency	2700 - 2850 MHz
	b. P.R.F.	2430 - 2690 pps
	c. P.W.	0.2 - 0.8 microseconds
	d. Scan	Rate: 23 - 30 Hz Type: Fast conical scan superimposed on a slower two-bar raster scan (est)
	e. Pol	Rotating
	f. Beam Width	4.5°
	g. Peak Power	250 Kw
6.	PERFORMANCE	
	Range	10 Km (5.5 nm)
7.	REMARKS	TRACK DISH was first observed in East Germany in 1956.

TRACK DISH

1.	NICKNAME	SMALL YAWN
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Countermortar/ Counterbattery
4.	DESCRIPTION	SMALL YAWN was introducted into the Soviet army in 1959 as a replacement for TRACK DISH which is obsolete. SMALL YAWN is a mortar-projectile tracking radar which is mounted in a shelter on an AT-L self-propelled, fully tracked chassis. It is used to locate mortar and artillery emplacements by tracking and extrapolating the ballistic trajectories back to the source.
5.	TECHNICAL CHARACTERISTICS (Estimated)	
	a. Frequency	9300 - 9500 MHz
	b. P.R.F.	1600, 1900, 2100 pps
	c. P.W.	0.3 - 0.5 microseconds
	d. Scan	Rate: 22 - 24 Hz and 48 - 50 Hz Type: Complex, conical plus sector
	e. Pol	Rotating
	f. Beam Width	2.5°
	g. Peak Power	100 Kw
6.	PERFORMANCE	Unknown

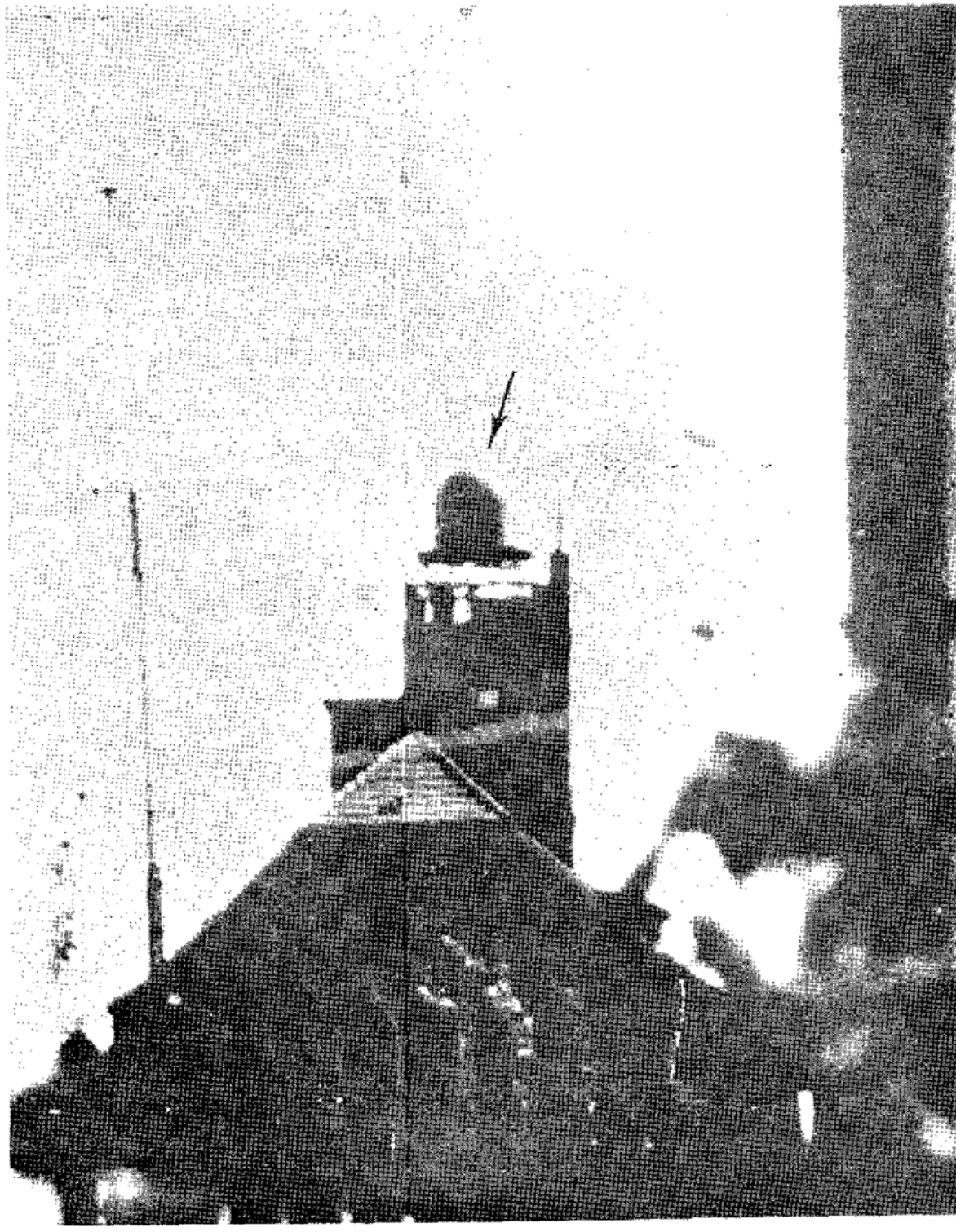
SMALL YAWN



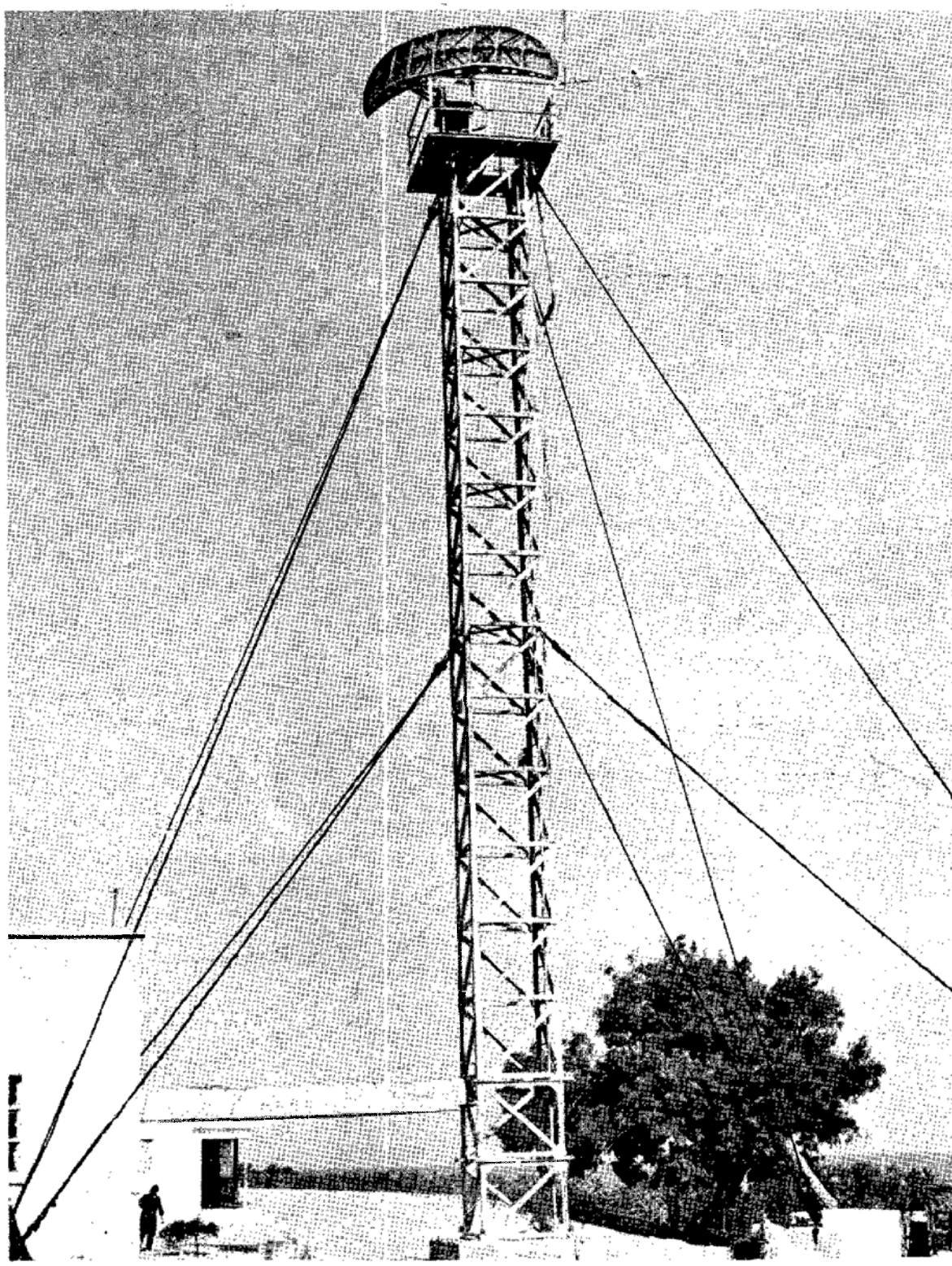
Section I Costal Radars

1.	NICKNAME	BEE HOUSE
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Landbased Coast-Watch Radar
4.	DESCRIPTION	BEE HOUSE is believed similar to the US SCR 682A equipment which the Soviets received through lend-lease. Soviet versions have been observed mounted on approximately 30 ft towers sited along the Baltic Coast. These radars have been mostly dropped from service and are being replaced at most sites by other radars, particularly LOW SIEVE, SHEET CURVE, SKIN HEAD or the still more modern SHEET BEND.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	2790 - 3000 MHz
	b. P.R.F.	360 - 420 pps
	c. P.W.	1 - 2 microseconds
	d. A.R.R.	6 - 10 rpm
	e. Pol	Horizontal
	f. Beam width	Horizontal 6° Vertical 6°
	g. Peak Power	225 kw
6.	PERFORMANCE	
	Range	Believed capable of detecting a Destroyer up to 35 km (19 nm)

BEE HOUSE

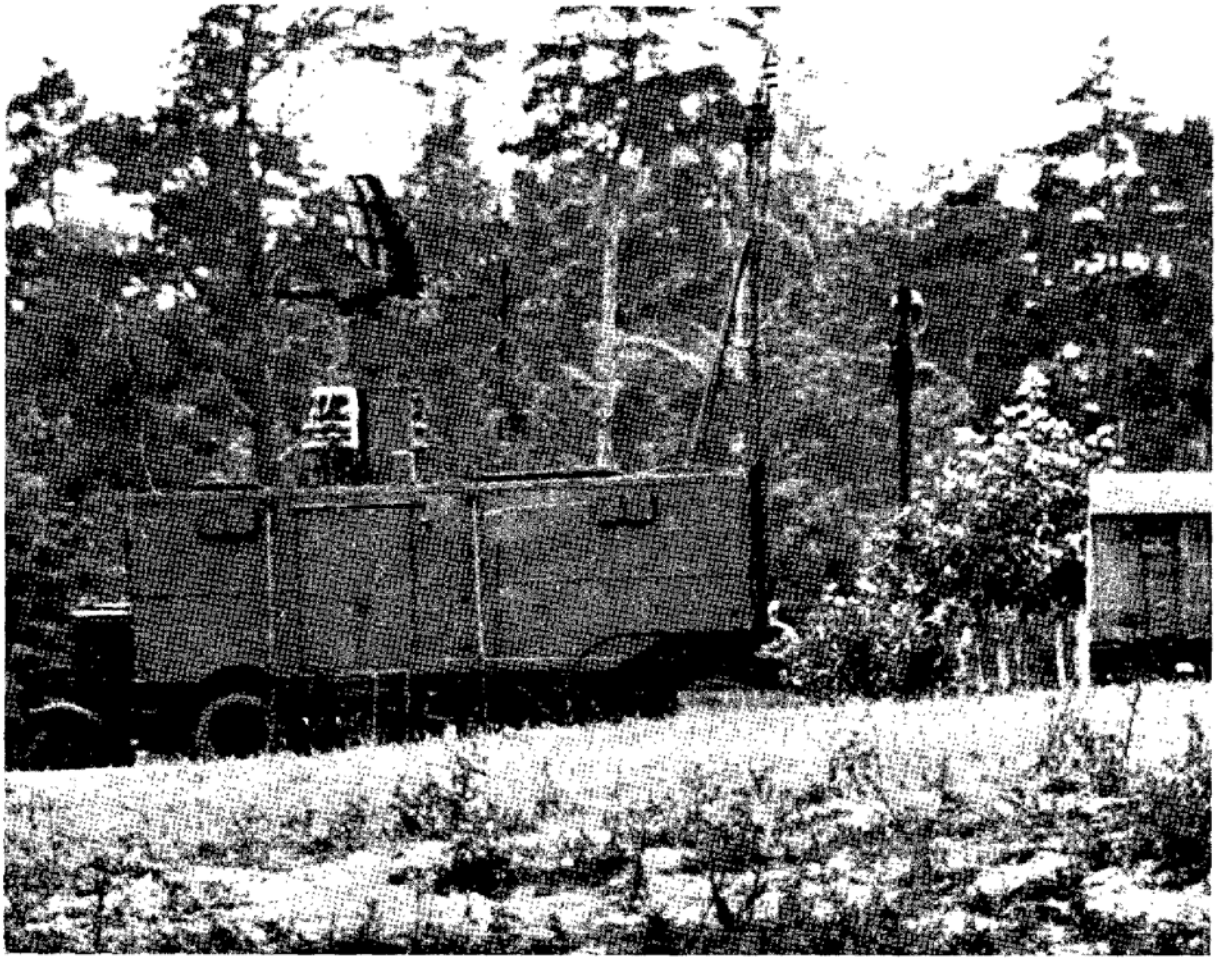


1.	NICKNAME	LOW SIEVE (Coastal Application)
2.	SOVIET DESIGNATION	LOT-(When used at Coastal Stations)
3.	FUNCTION	Surface Search
4.	DESCRIPTION	Typical coastal LOW SIEVE is mounted on a platform surmounting a lattice tower. This also supports the IFF interrogator antenna SQUARE HEAD. LOW SIEVE may also serve as the target acquisition radar for the TOP BOW radar used to control 130 mm antiship guns.
5.	TECHNICAL CHARACTERISTICS	Believed to be the same as the shipborne version.
6.	PERFORAMCE	
	a. Range	Range against a destroyer size target 28 - 41 Km (15 - 22 nm)
	b. Accuracy	
	(1) Range	± 50 m (150 ft)
	(2) Azimuth	± 1.5°

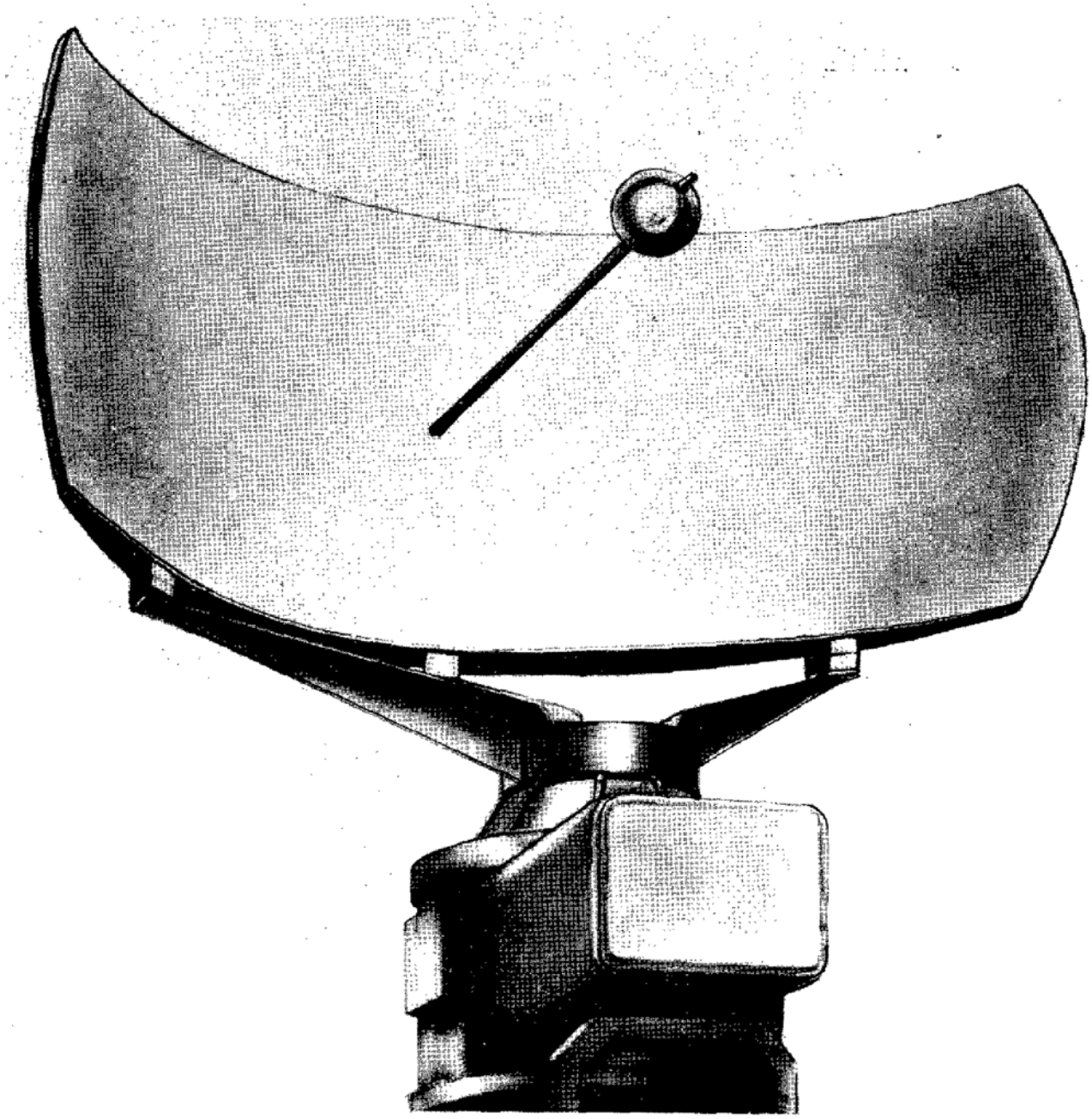


1.	NICKNAME	SHEET BEND
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Coastal Surveillance/ Target Acquisition
4.	DESCRIPTION	SHEET BEND is a solid reflector, approximately 3.05 x 1.1 m (10.5 x 3.6 ft) and canted 15 - 22°. It has been seen mounted on a box bodied trailer.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	8945 - 9450, 9540 - 9775 MHz
	b. P.R.F.	520 - 590, 1024 - 1415, 1456 - 1584 pps
	c. P.W.	0.2 - 0.7 microseconds
	d. A.R.R.	5 - 8 rpm
	e. Pol	Vertical
	f. Beam width	1.0°
	g. Peak Power	250K (est)
6.	PERFORMANCE	Unknown
7.	REMARKS	SHEET BEND is known to be associated with the SAMLET, and possibly also with the SALISH missile system.

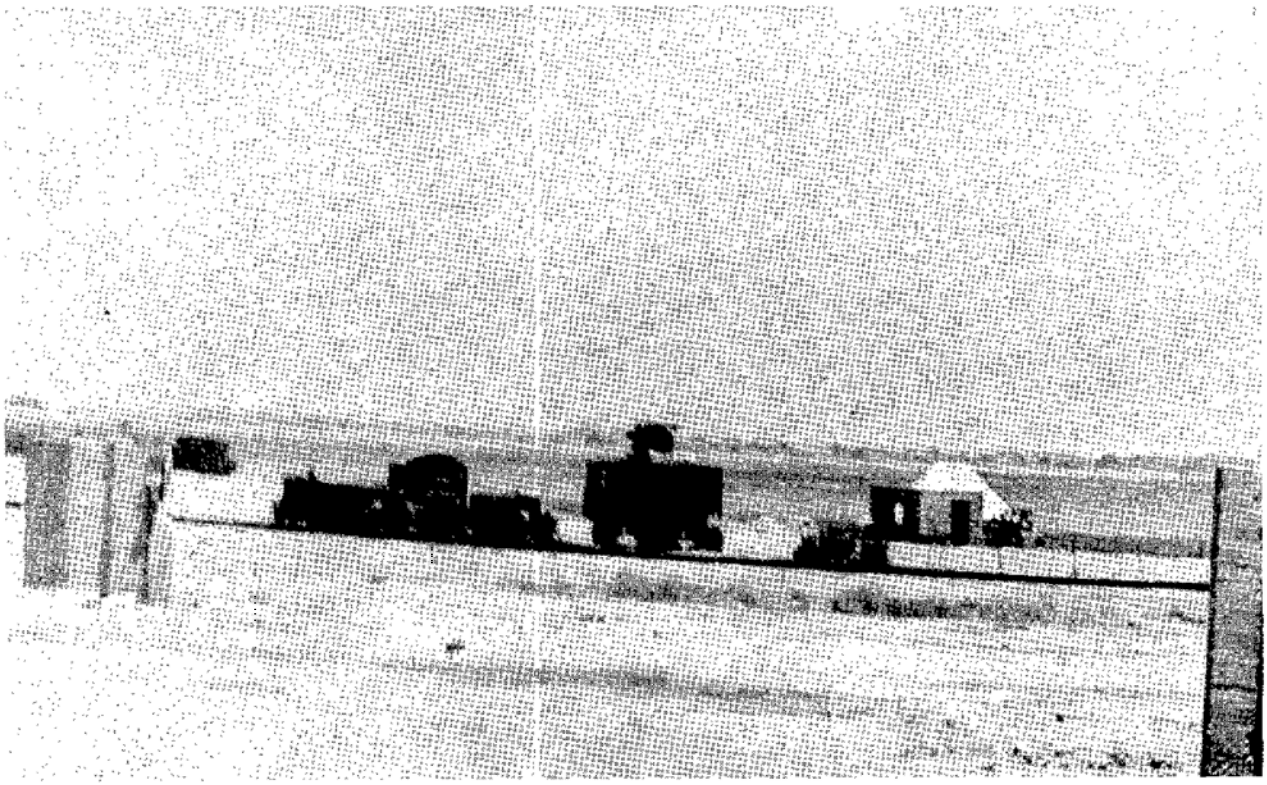
SHEET BEND



1.	NICKNAME	SHEET CURVE
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Coastal Surveillance Radar
4.	DESCRIPTION	SHEET CURVE has been seen at coastal installation, some time mounted with YARD RAKE or, on lattice mast with SQUARE HEAD. SHEET CURVE may be phased out by either LOW SIEVE or SHEET BEND.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	2950 - 3050 MHz
	b. P.R.F.	400 - 460 pps
	c. P.W.	0.5 - 2.0 microseconds
	d. A.R.R.	6 rpm
	e. Pol	Horizontal
	f. Beam width	4 - 6 Horizontal
	g. Peak Power	200 kw (est)
6.	PERFORMANCE	
	a. Range	28 - 46 Km (15 - 25 nm) against a destroyer type target.
	b. Accuracy	
	(1) Range	± 50 m (150 ft)
	(2) Azimuth	± 2°



1.	NICKNAME	TOP BOW (Coastal Type)
2.	SOVIET DESIGNATION	ZALP for shipboard type
3.	FUNCTION	FIRE CONTROL for antiship gunnery
4.	DESCRIPTION	TOP BOW is used for control of 130 mm Antiship gunnery.
5.	TECHNICAL CHARACTERISTICS	Believed similar to shipborne version
6.	PERFORMANCE	Believed similar to shipborne version



CHAPTER II

Communications-Ground Forces

Section A - Voice, Key and Teleprinter Radio Sets/Stations

1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-102 (Transmitter only)
3.	FUNCTION	Used by ground forces for communications from a front to a subordinate army, and between fronts and armies. Also used by Tactical Air Armies.
4.	DESCRIPTION	A high-power, high frequency (HF) radio station consisting of transmitter (R-102), two general-purpose HF receivers (R-311), one radio-teleprinter receiver (AMUR-2 or R-154), two teleprinters, two dieselpowered motor generator sets, and auxiliary equipment such as antennas, batteries, and terminal equipment all housed in dissimilar shelters mounted on either a ZIL-151 or ZIL-157 vehicle chassis; entire station is carried in two ZIL-157 trucks.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	1 - 20 MHz
	b. Emission Modes	Manual morse (CW), AM voice, frequency shift key (FSK), double-frequency shift key (DFSK), or composite.
	c. Power Output	1000 watts CW, 400 watts voice, 600 watts RATT (FSK)

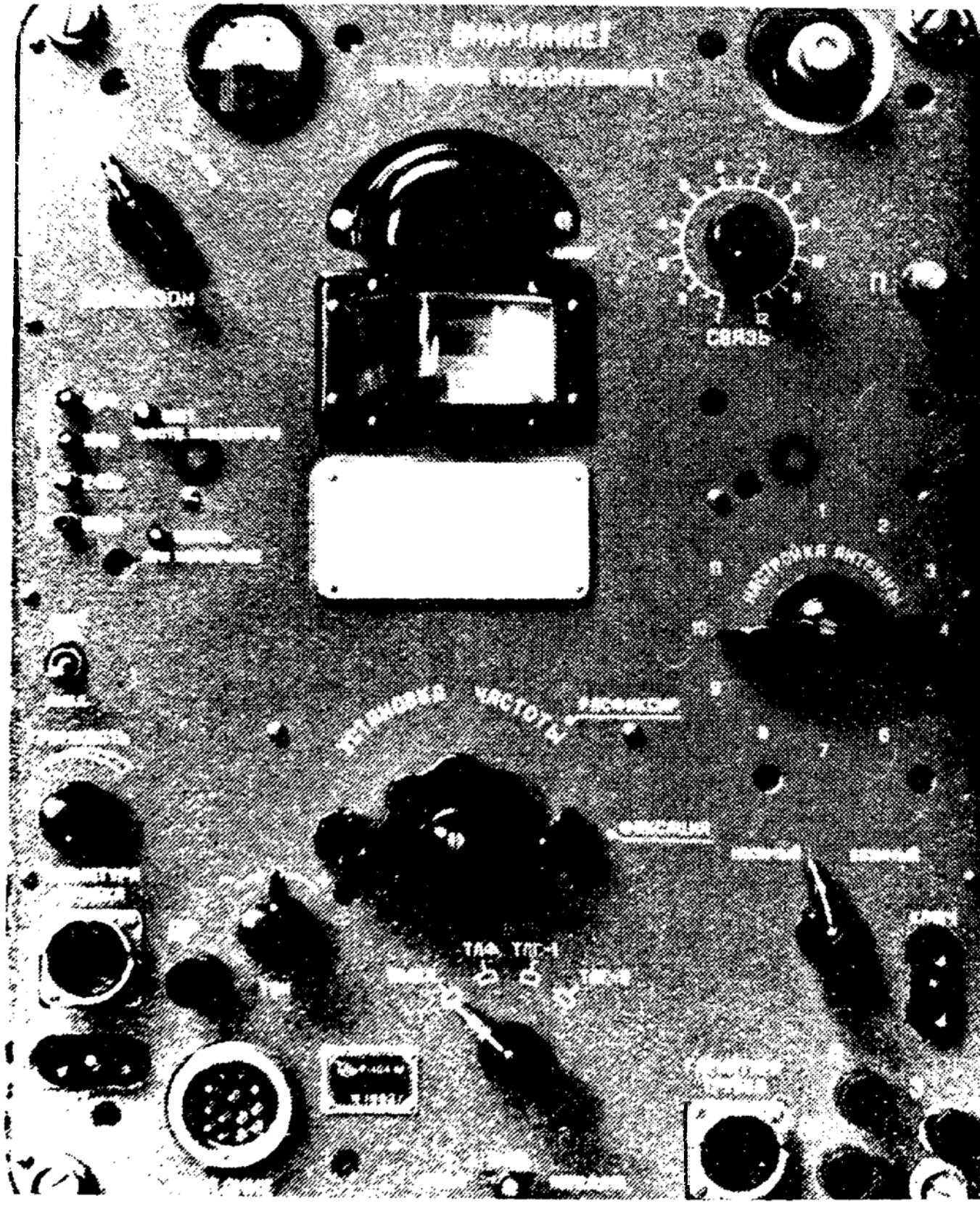
No photograph available

d. RF Channels	Continuous tuning
e. Power Source	3.5 kw diesel or commercial power
f. Antenna	Doublet, whip, long-wire, inverted L
g. Weight	About 265 kg (580 lbs)
h. Remote control	8 Km (4.3 nm)
6. PERFORMANCE	About 2000 Km (1080 nm) in CW mode depending on conditions.
7. INTERCOMMUNICATION WITH	R-103, R-104, R-110, R-118

1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-103 (Transmitter only)
3.	FUNCTION	Used by ground forces to communicate from a field army to the subordinate Divisions and Regiments.
4.	DESCRIPTION	A high-power, high frequency (HF) radio station consisting of transmitter (R-103) one or two general-purpose HF receivers (R-311) one radio-teleprinter receiver (AMUR-2), one or two teleprinters and auxiliary equipment mounted in one ZIL-157 truck.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	1 - 24 MHz
	b. Emission Modes	Manual morse (CW), AM voice, frequency shift key (FSK) double-frequency shift key (DFSK)
	c. Power Output	400 watts CW, 250 watts AM voice.
6.	INTERCOMMUNICATION WITH	R-102, R-104 series, R-110, R-112, R-118

Photograph not available

1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-104, R-104 M, R-104 UM, R-104 AM
3.	FUNCTION	R-104 series are the basic all arms high frequency sets used by Divisions and Regiments for command - reconnaissance - and administration communications and also in air-defense nets.
4.	DESCRIPTION	Low power, high frequency (HF) radio station; two main radio, man-pack or light vehicle. Station R-104 AM is a combination of a R-104 M, a R-105 D and a UM-1 amplifier mounted on a light vehicle.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	R-104 1.5 - 4.25 MHz (AM) - replaced by R-104 M R-104 M 1.5 - 4.25 MHz (AM) R-104 UM 1.5 - 4.25 MHz (AM) R-104 AM 1.5 - 4.25 MHz (AM) 36.0 - 46.1 MHz (FM)
	b. Emission modes	AM voice. Manual morse (CW) for 104 M only.
	c. Power Output	R-104 1 - 10 watts R-104 M 1 - 3.5 watts man-pack R-104 UM 1 - 3.5 watts man-pack 10 watts vehicular (voice) 20 watts vehicular (CW)
	d. Range	R-104 M 20 - 30 Km (11 - 16 nm) R-104 UM 20 - 30 Km (11 - 16 nm) man-pack 30 - 50 Km (16 - 27 nm) vehicular



e. RF Channels	275 at 10 KHz interval probably 10 preset channels.
f. Antenna	Kulikov, whip or long-wire.
6. INTERCOMMUNICATION WITH	R-102, R-103, R-105, R-112, R-118.

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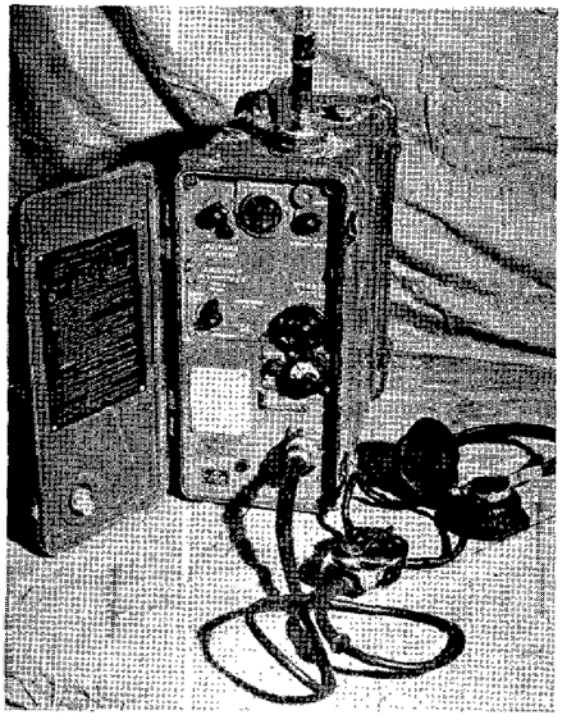
1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-105d, R-108d, R-109d (see Note). (U)
3.	FUNCTION	Utilised respectively by the Infantry (R-105D), Artillery (R-108D) and Air Defence Artillery, Anti-tank, surface-to-surface missile units and border command troops (R-109d), throughout the Division from Coy (Bty) HQ rearwards.
4.	DESCRIPTION	Low-power man-pack or vehicular VHF transmitter-receivers identical except for tuning range. In their vehicular rôle they are very frequently co-mounted with HF radios to form multiple radio set installations. (See R-104AM and R-125 etc). A range of RF Amplifiers are used with them to obtain the greater ranges required in their various rôles. These are the UM-3 (50 watts), UM-1 (18 - 20 watts) and the man-pack UM-2 (10 watts).
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	R-105d : 36.0 to 46.1 MHz R-108d : 28.0 to 36.5 MHz R-109d : 21.5 to 28.5 MHz
	b. Emission Modes	FM voice
	c. Power Output	1.3 watts
	d. RF Channels	Continuous tuning. Dial markings at 50 kHz spacing to give respectively 203, 171 and 141 channels.

R-105D

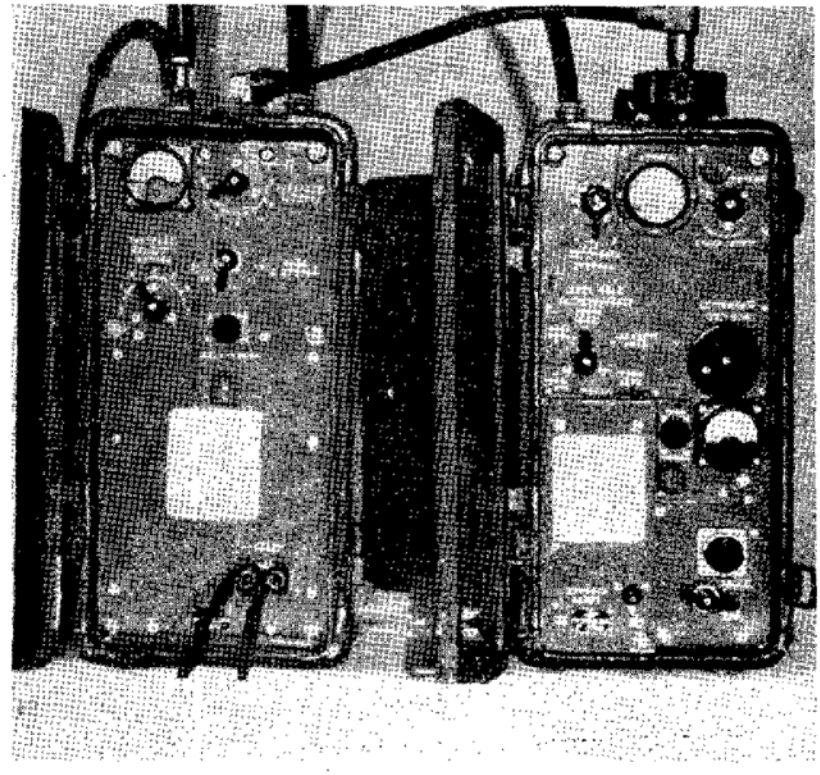


e. Power Source	Two 2NKN-24 nickel-cadmium batteries and built-in vibro-pack.
f. Antenna	KULIKOV, whip or long-wire.
g. Weight	20.5 Kg

6. PERFORMANCE (see page II-A-15)

Note: Early modes were designated R-105, R-108 and R-109, these were subsequently modified in production and those at present in service are the R-105Д, R-108Д and R-109Д. In their writings however the Soviets frequently omit the "Д".

R-105d AND UM-1 AMPLIFIER

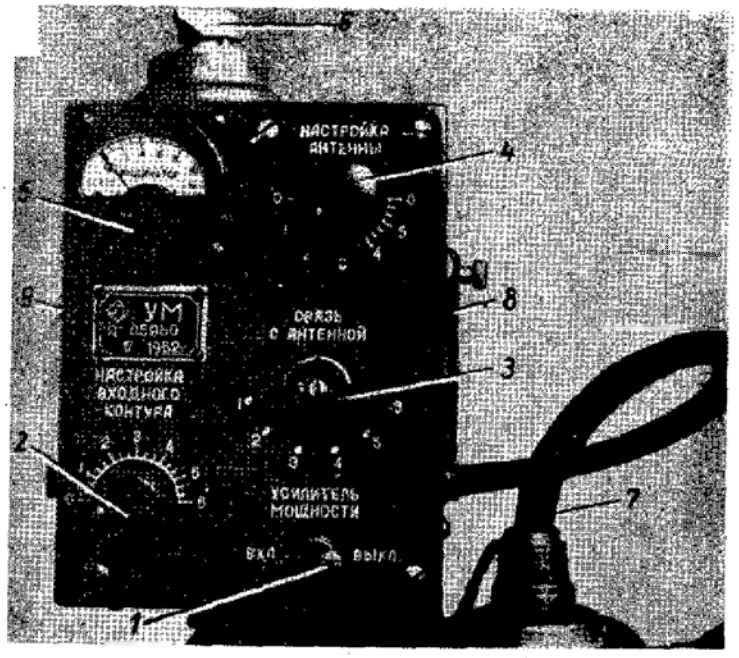


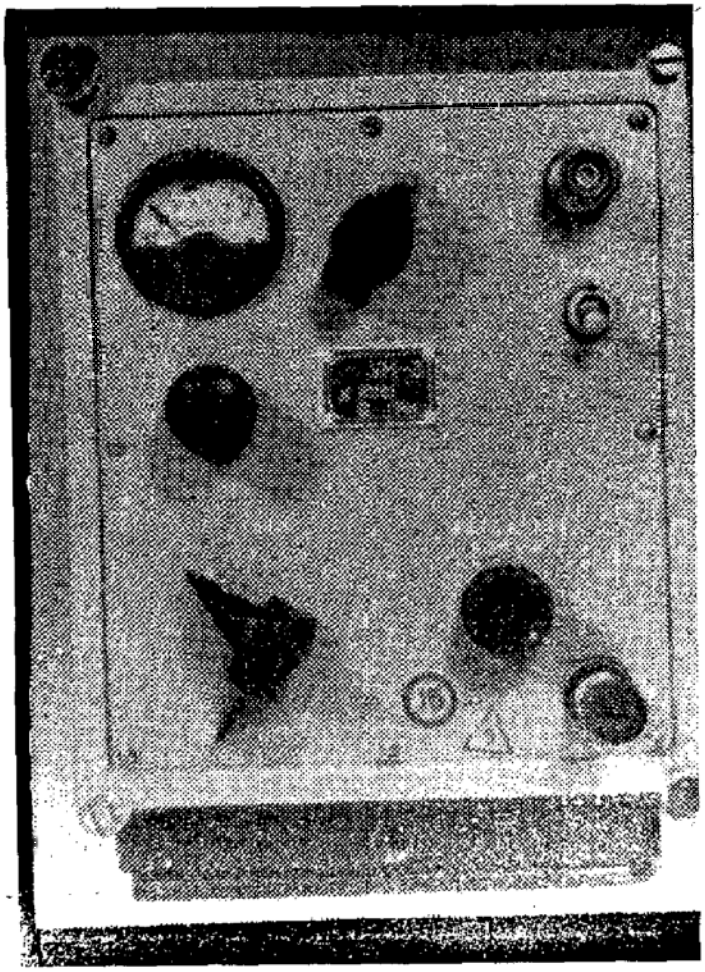
UM-1 R-105d

R-105D. R-108D. R-109D

STATION & ANTENNA	AMPLIFIER IN USE	RANGE IN KILOMETRES	
		MOVING	STATIONARY
Man-pack and Ground Station			
KULIKOV	-	6	6
KULIKOV with extension rods (max length 2.5 m) and counterpoise	-	-	8 - 10
" "	UM-2	-	12
LONG WIRE	-	-	15 - 20
" "	UM-2	-	25 - 30
Vehicular Station			
4 metre whip	-	8	8
" "	UM-2	15	15
" "	UM-1	20	20
" "	UM-3	25	25
KULIKOV on 11 metre telescopic mast	-	-	20
" "	UM-1	-	40
" "	UM-3	-	50

UM - Amplifier

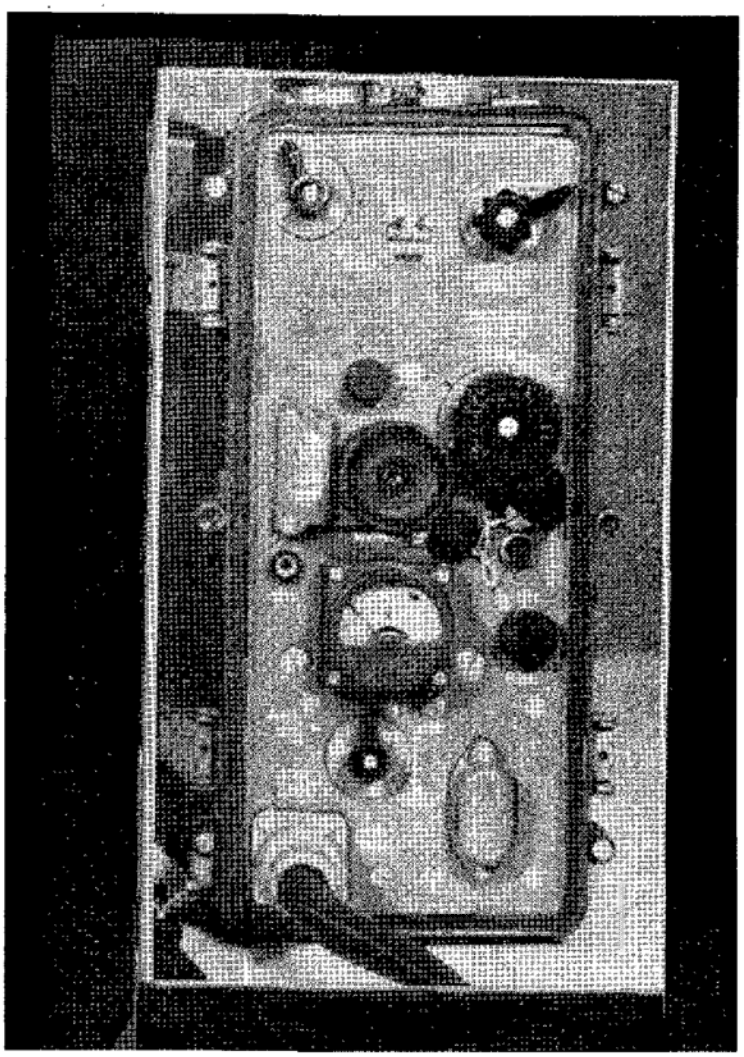




1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-105M, R-108M, R-109M
3.	FUNCTION	Same as R-105D, R-108D, R-109D (II-A-3) which they are replacing.
4.	DESCRIPTION	"Modernised" versions of the R-105D, R-108D and R-109D and similar in shape but smaller and lighter. An RF Amplifier the UM-3 (50 watts) is used with them to obtain greater ranges.

5. TECHNICAL CHARACTERISTICS

a. Frequency Range	R-105M 36.0 to 46.1 MHz R-108M 28.0 to 36.5 MHz R-108M 21.5 to 28.5 MHz
b. Emission Modes	FM voice
c. Power Output	1.3 watts
d. RF Channels	Continuous tuning (Dial markings at 25 kHz spacing).
e. Power source	Two 2NKN-14 nickel-cadmium batteries, and in-built transistor power pack.
f. Antenna	KULIKOV, whip or long wire.
g. Weight	14 kg



6. PERFORMANCE

Ranges are expected to be the same as those quoted for the R-105d, R-108d and R-109d without any amplifier and with the UM amplifier. It is not known whether "modernised" versions of the UM-1 and UM-2 amplifier exist but neither of these (nor the UM) can be used with the R-105M, R-108M as inter-connecting plugs and sockets are incompatible.

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1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-106
3.	FUNCTION	Used to provide voice communication from battalions to company for all arms satellite country us only.
4.	DESCRIPTION	A VHF, low power ruggedly constructed AM radio; man-packed or vehicle mounted.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	46.1 - 48.6 MHz (AM)
	b. Emission Mode	AM voice
	c. Power Output	0.75 watts
	d. Antenna	KULIKOV 1.5 m (5 ft)
	e. Transmission Range	3 Km (1.6 AM)
6.	INTERCOMMUNICATION WITH	R-126

Photograph not available

1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-107
3.	FUNCTION	Used for voice communications probably on regimental level.
4.	DESCRIPTION	VHF FM radio

Photograph not available

1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-110 (Transmitter only)
3.	FUNCTION	Used by ground forces for long range communications from Theater and Front Headquarters.
4.	DESCRIPTION	Largest and most powerful high frequency (HF) radio station in use in the Soviet ground forces. Station is mounted in 5 communication vans or trucks ZIL-151.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	3 - 24 MHz
	b. Emission Modes	Manual morse (CW) AM voice, frequency shift keying (FSK) double frequency shift keying (DFSK)
	c. Power Output	15 KW
	d. RF Channels	Continuous tuning
	e. Remote Control	Up to 20 Km (11 nm)
6.	PERFORMANCE	Up to 6000 Km (3240 nm) in CW mode depending on conditions.
7.	INTERCOMMUNICATION WITH	R-102, R-103, R-113; AMUR - 2 or R-154.

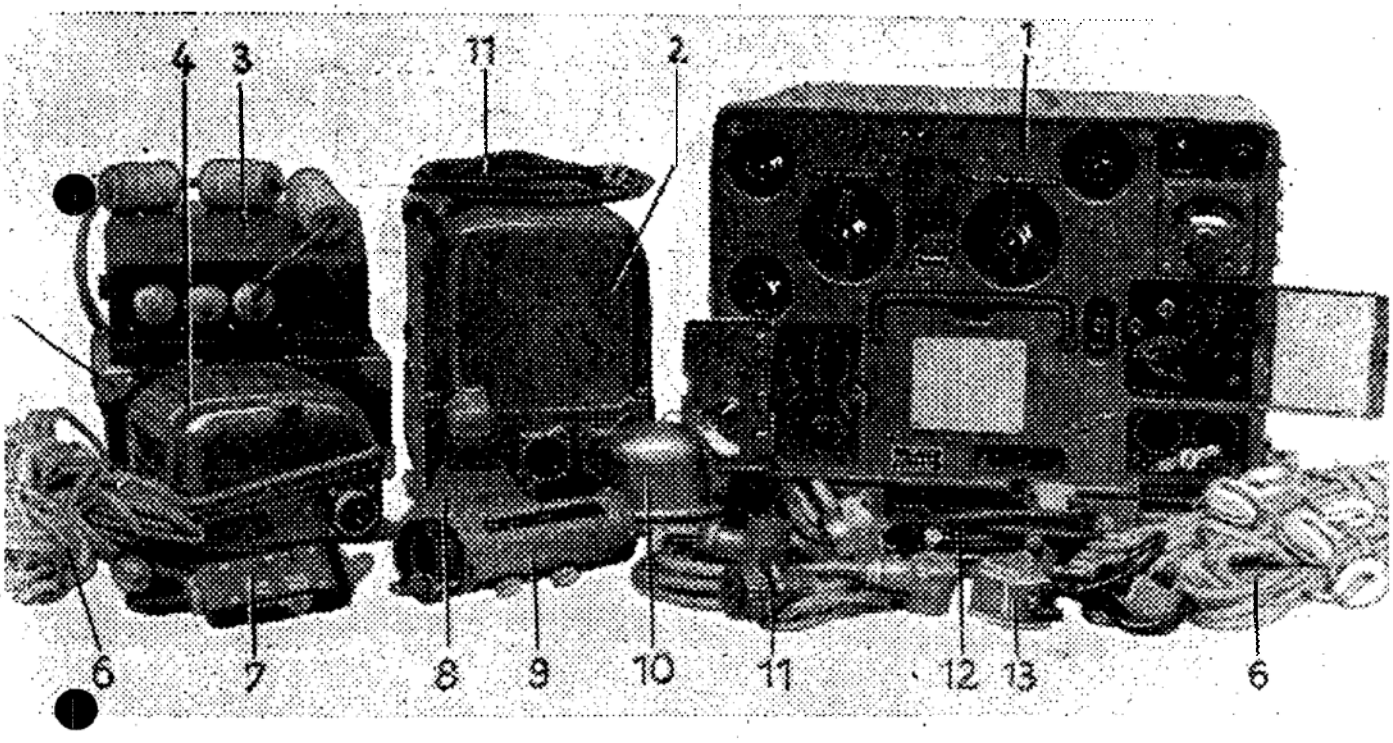
Photograph not available

1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-111
3.	FUNCTION	Used by artillery units of the EGA for HF communication from the regiment HQ to the 3 battalions.
4.	DESCRIPTION	An HF, medium - power (?) AM radio station.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	2.6 - 12 MHz
	b. Emission Modes	Manual morse (CW) and AM voice.
	c. Antenna	Whip
6.	PERFORMANCE	Approximately 35 Km (19 nm) with a 3 m (10 ft) whip antenna.

Photograph not available

1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-112
3.	FUNCTION	Utilized for armored formation command communications (Division, Regiment and Battalion), normally mounted in those armored vehicles used by commanders as mobile command posts. Replaces 10RT.
4.	DESCRIPTION	An HF, medium-power, ruggedly constructed AM radio. Consisting of transceiver dual dynamotors, antenna tuning unit, and necessary auxiliary equipment such as antenna, headset, power source, and spare parts.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	2.8 - 4.99 MHz
	b. Emission Modes	AM voice or manual morse (CW)
	c. Power Output	50 watts CW (with amplifier UM-3) 25 watts voice (with amplifier UM-3) 0.75 watts (without amplifier)
	d. RF Channels	220 at 10 KHz intervals probably crystal controlled detent selected - using 32 crystals.
	e. Power Source	26 VDC only
	f. Antenna	4 m (13 ft) whip or 10 m (33 ft) "half" telescopic
	g. Weight	Complete set 89 kg 195 lbs)

- dem Sender und Empfänger (mit Federung und Segeltuchhül



6.8 *Gesamtansicht der Geräte*

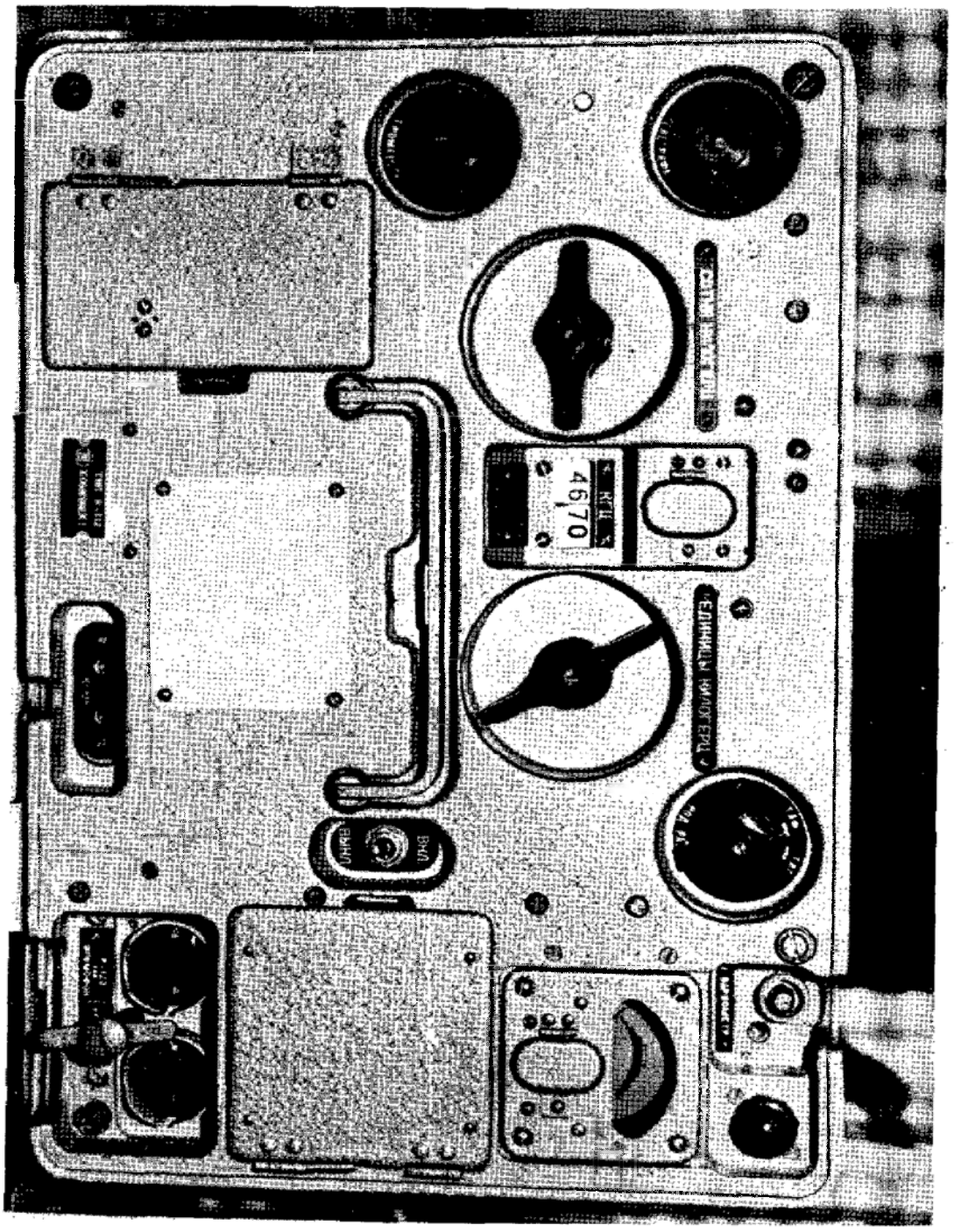
Sender und Empfänger; 2 – Senderumformer; 3 – Antennenvariometer; 4

6. PERFORMANCE

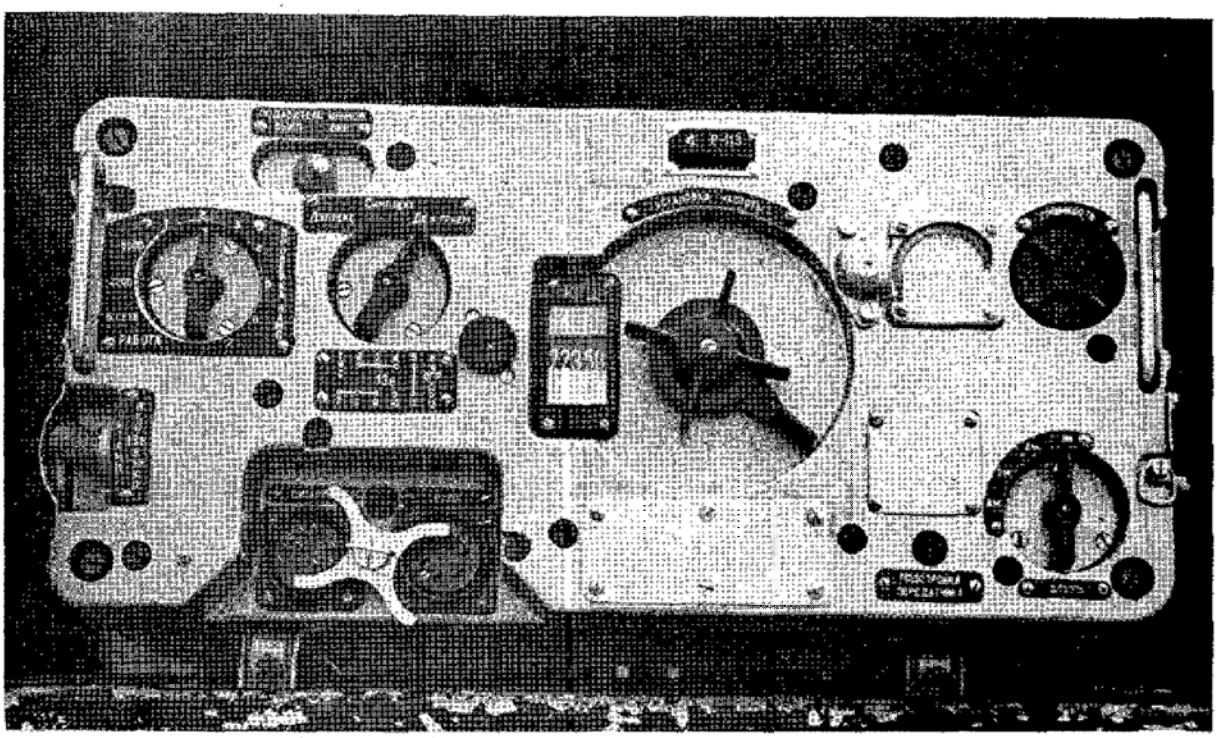
R-112

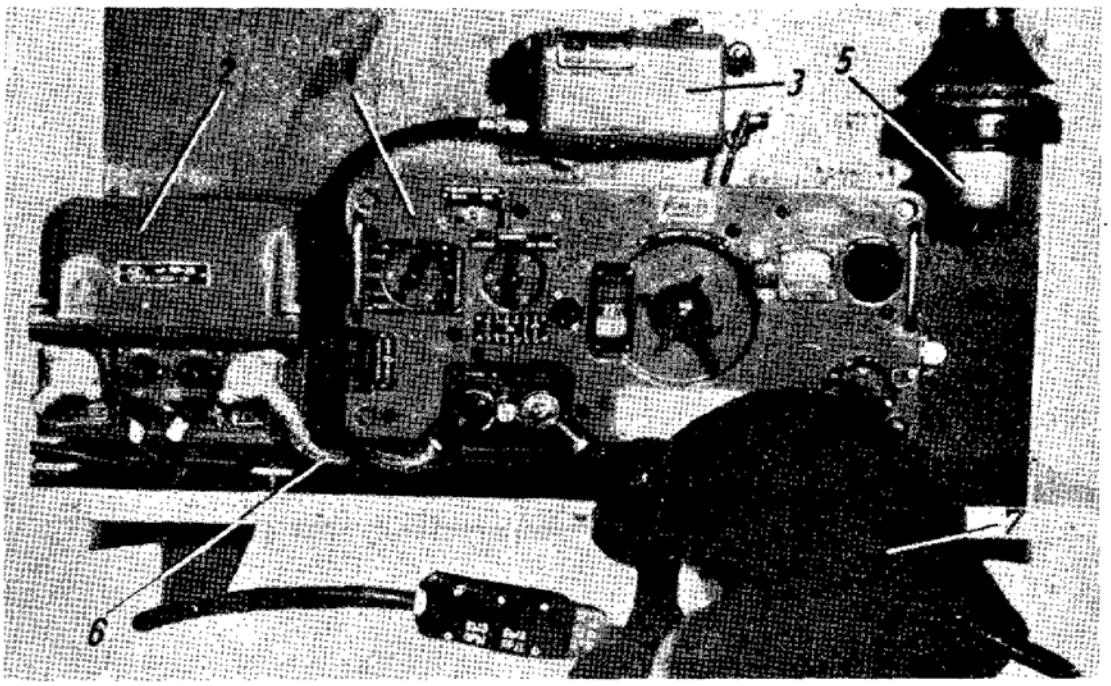
Type of Aerial	Mode	Range in Km			
		Day		Night	
		Station-ary	Moving	Station-ary	Moving
4 m whip	voice CW	25 50	20 -	11-12 50	11-12 -
10 m "Half-telescopic"	voice CW	40 100	- -	40 100	- -

7. INTERCOMMUNICATION WITH R-102, R-103, R-104, R-110 and R-118.



1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-113
3.	FUNCTION	Designed for use in all types of armored vehicles, where it serves primarily for combat control purposes. It is the standard Soviet armor radio set.
4.	DESCRIPTION	An HF voice only radio consisting of transceiver, dual dynamotors, antenna tuning unit, and necessary auxiliary equipment such as antenna, headset, power source, and spare parts.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	20 - 22.375 MHz
	b. Emission Modes	FM voice
	c. Power Output	16 watts
	d. RF Channels	96, detent selection, crystal controlled.
	e. Power Source	Either 13 or 26 VDC
	f. Antenna	4 m (13 ft) whip
	g. Weight	Complete station 42 kg (92 lbs).
6.	PERFORMANCE	
	Range	
	a. With "SQUELCH" control operated	10 Km (6 nm)
	b. Without "SQUELCH" control	20 Km (12 nm)
7.	INTERCOMMUNICATION WITH	R-109 and R-114

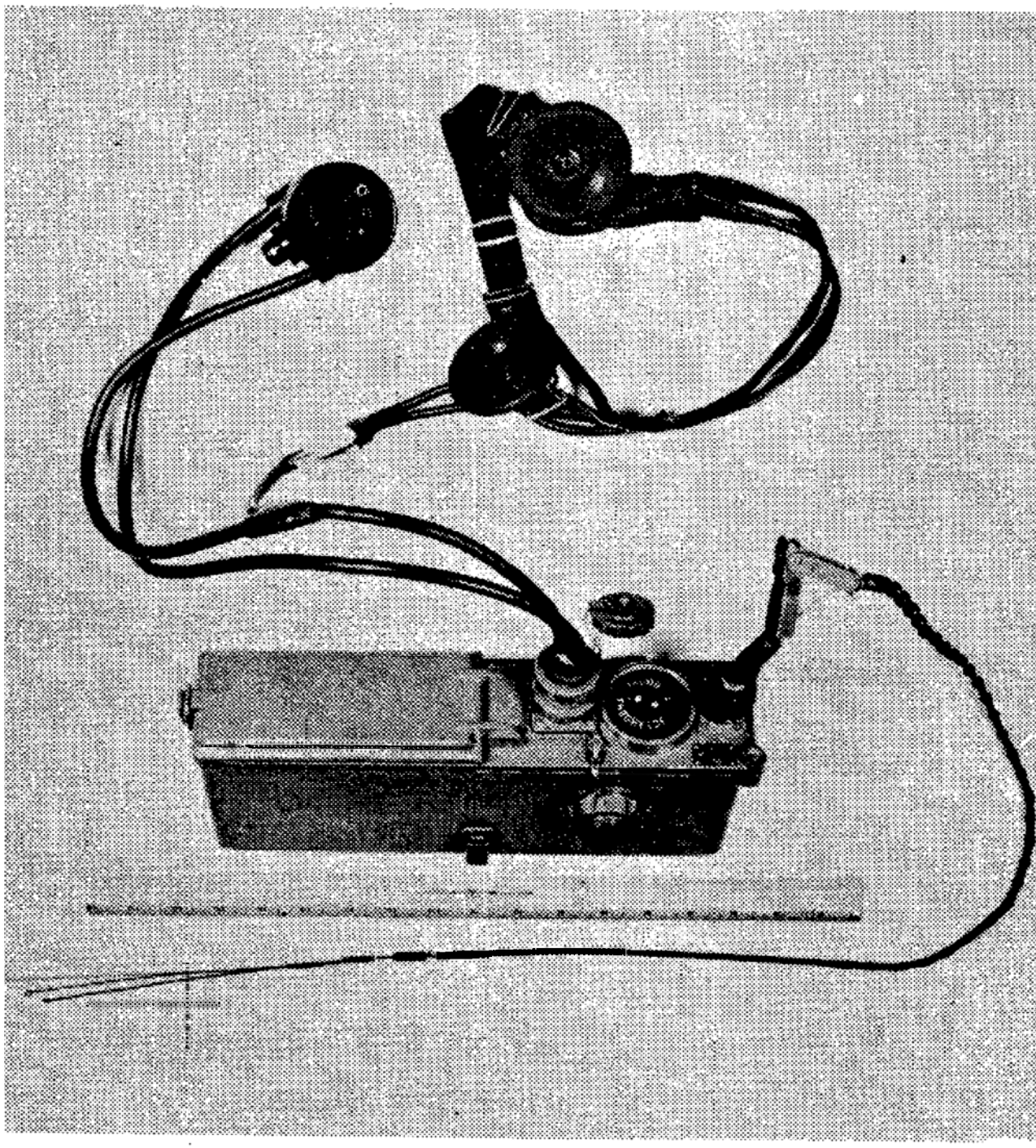




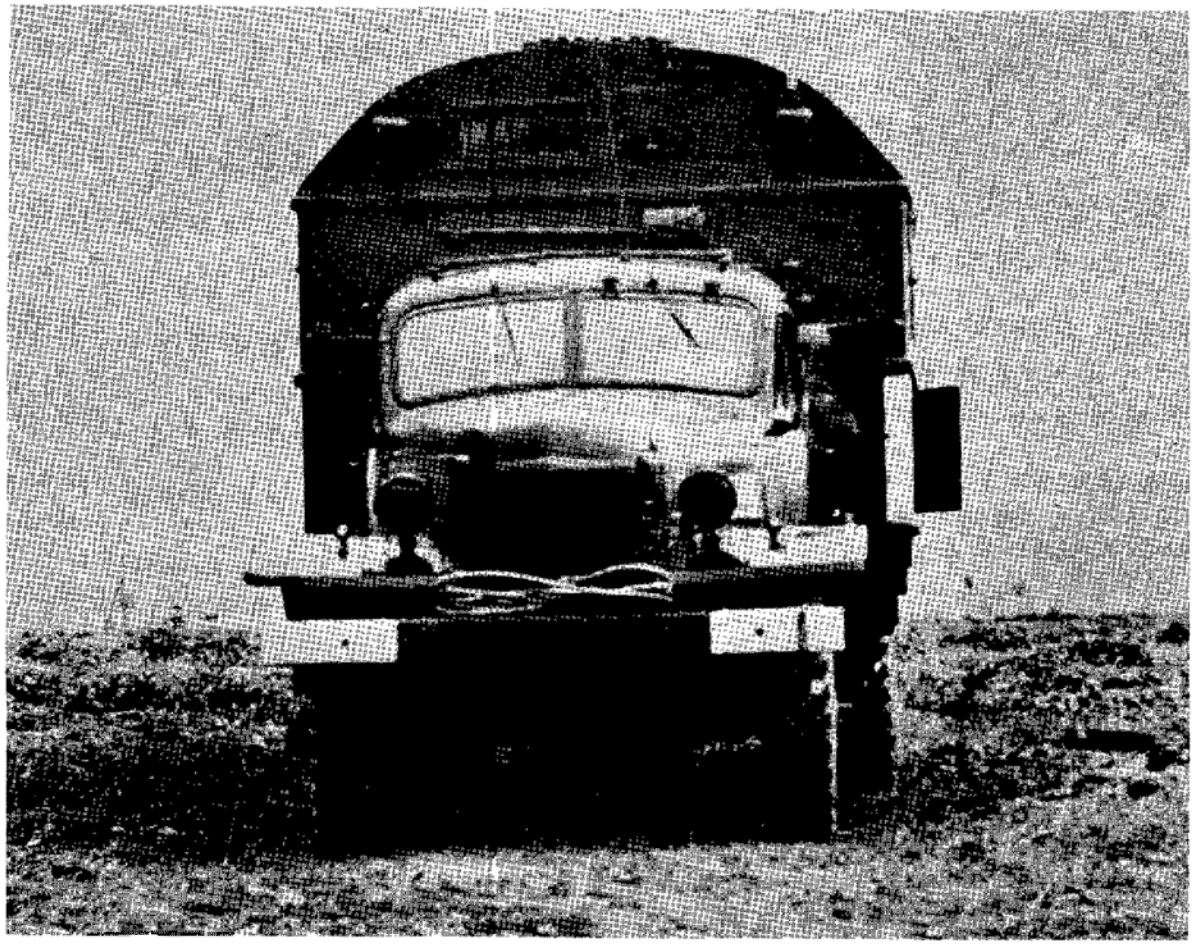
1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-114
3.	FUNCTION	R-114 is used for armored units command communications.
4.	DESCRIPTION	The R-114 is physically identical with R-105, R-108 and R-109 except for tuning range. They are basically man-pack but also mounted on vehicles to serve as very high frequency (VHF) components of multiple radio set vehicular installations.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	22 - 36.5 KHz
	b. Emission Modes	FM voice
	c. Power Output	1.3 watts; 50 watts (with amplifier UM-3)
	d. RF Channels	R-114 290 at 50 KHz intervals
	e. Power source	2-NKN-24 nickel cadmium batteries
	f. Antenna	1.5 m (5 ft) KULIKOV, 1 - 4 m (4 - 13 ft) whip, or long-wire
	g. Transmission range	5 (2.7 nm) - 8 Km (4.3 nm) up to 25 Km (17.5 nm) with amplifier UM-3
	h. Remote Control	2 Km (1.1 nm)
6.	INTERCOMMUNICATION WITH	R-114 - R-105, R-108, R-109, R-113, R-125.

Photograph not available

1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-116
3.	FUNCTION	Used to provide voice communications between infantry platoons; is being phased out in favor of the R-126. R-116 is in use in satellite countries.
4.	DESCRIPTION	The R-116 is a front- or back-packed AM VHF radio set, and is the smallest and least sophisticated of the R-100 series sets.
5.	TECHNICAL DESCRIPTION	
	a. Frequency Range	48.6 - 51.3 MHz
	b. Emission Modes	AM voice
	c. Power Output	200 - 300 milli-watt
	d. RF Channels	10 at 270 KHz intervals
	e. Power Source	Dry battery pack
	f. Antenna	KULIKOV
	g. Weight	4 kgs (8.8 lbs)
6.	PERFORMANCE	2 - 3 Km (1.1 - 1.6 nm)
7.	INTERCOMMUNICATION WITH	R-106 and R-126



1.	NICKNAME	NONE
2.	SOVIET DESIGNATION	R-118 (transmitter only)
3.	FUNCTION	Used by all arms and servies of ground forces from regimental level to divisions, armies, fronts. Also used in air defense communications, is widely deployed in Warsaw Pact countries.
4.	DESCRIPTION	An HF, medium-power, heavy mobile radio station (mounted on ZIL-151, ZIL-157 or 1BTR-152) consisting of transmitter (R-118) receiver (R-311), RATT receiver (AMUR-2 or R-154), two gasoline-powered motor-generator sets, control equipment, two radio teleprinters, and necessary auxiliary equipment. Can be remotely controlled up to 4 Km (2.18 nm).
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	1.0 - 7.5 MHz
	b. Emission Modes	Manual morse (CW), AM voice, FSK, DFSK, composite.
	c. Power Output	250 watts CW 150 watts voice
	d. RF Channels	2875 in FSK and composite, continuous tuning in CW and voice.
	e. Power Source	220 VAC 50 Hz single phase; normally provided by built-in gasoline generators but commercial power may be used.
	f. Antennas	10 m (33 ft) half-telescopic, whips, doublets, inverted L.

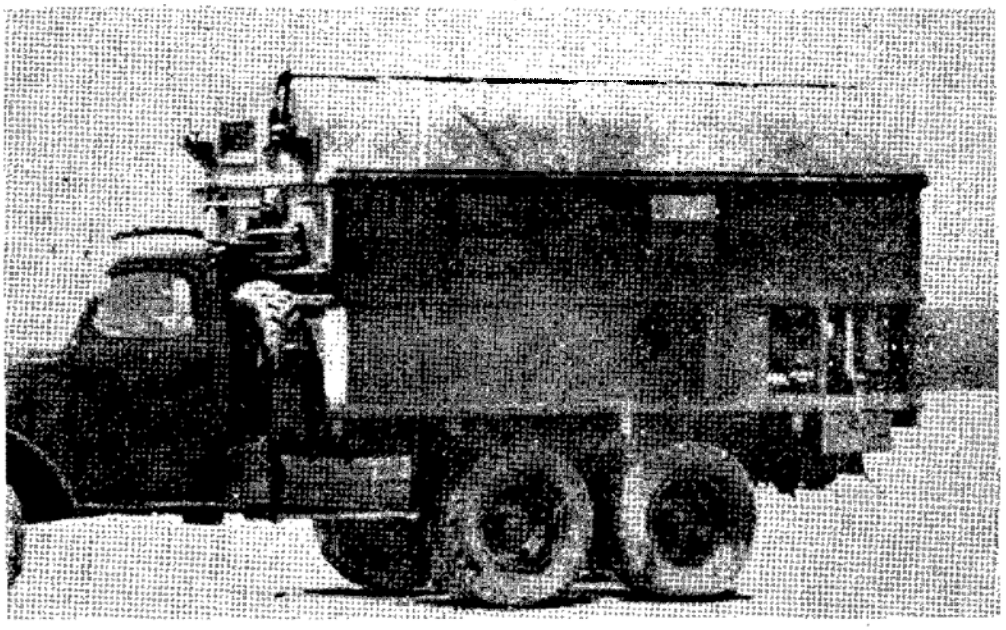


6. PERFORMANCE

Range

a. Moving (voice only)	30 Km (16 nm)
b. Stationary (all modes)	
1 - 2 MHz	100 Km (64 nm)
2 - 7.5 MHz	Up to 600 Km (384 nm)
c. Stationary (voice only) Whip	80 Km (15 nm)

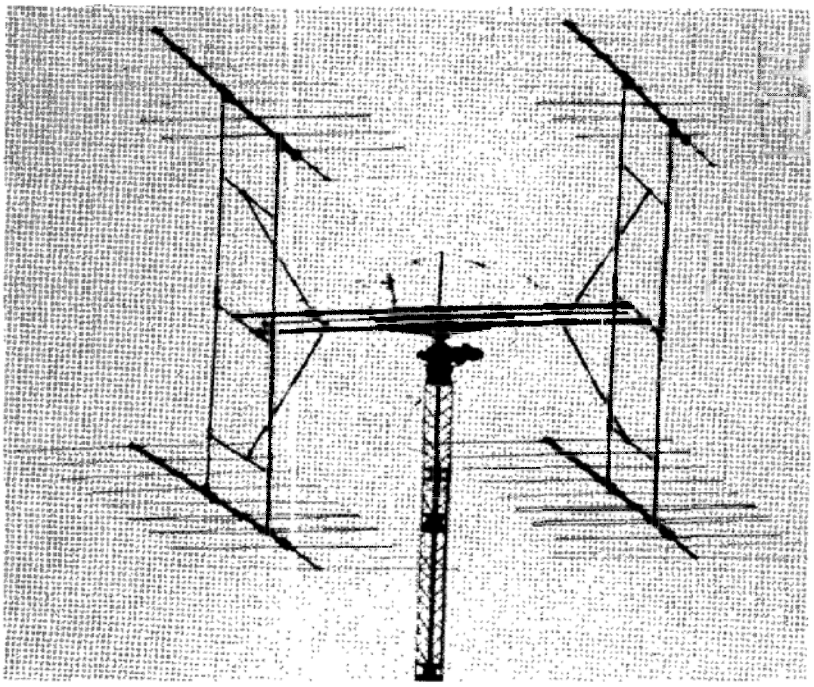
7. INTERCOMMUNICATION WITH — R-102, R-103, R-104 series, R-110 and R-112.

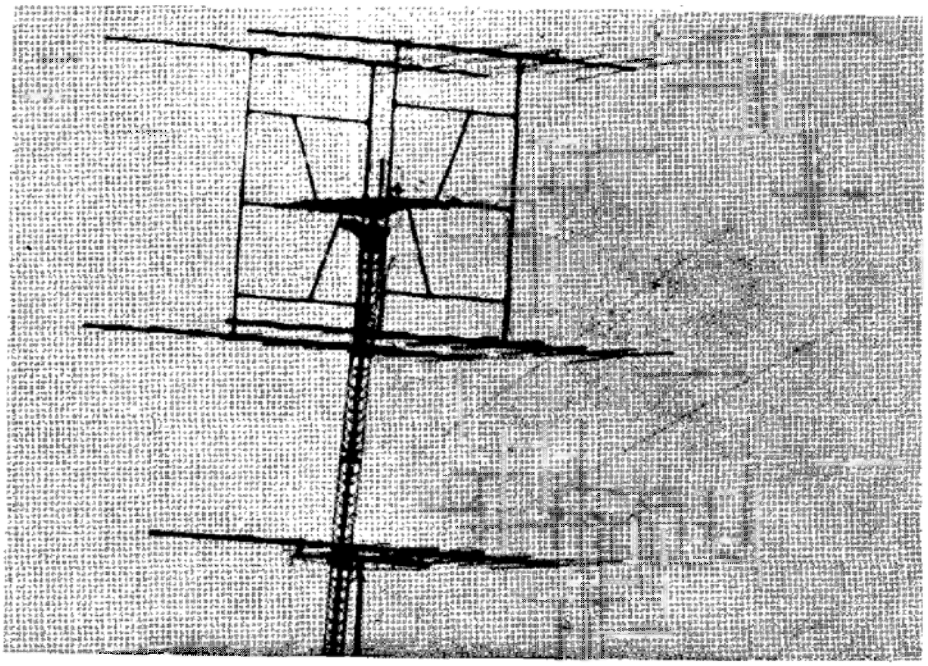


1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-122
3.	FUNCTION	Used for VHF communications on radar-sites in the Soviet Air Defense. Also used in the CSSR and Poland as Radio Relay back-up for surface-to-surface wire communications in the VP-1 System.
4.	DESCRIPTION	A VHF, medium-power radio station which uses the FORK REST, PRONG REST and perhaps other Yagi antennas. Up to 11 FORK REST antennas were observed on one radar-site.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	30 - 50 MHz
	b. Emission Modes	Manual morse (CW), AM voice, FSK and DFSK.
	c. Power Output	Approximately 15 watts
	d. RF Channels	2
	e. Power Source	220 V 50 Hz
	f. Antennas	FORK REST, PRONG REST and perhaps other Yagi antennas which may be mounted on an EYZENBERG tower.
6.	PERFORMANCE	Unknown
7.	REMARKS	FORK REST was formerly believed to be a metric search radar.

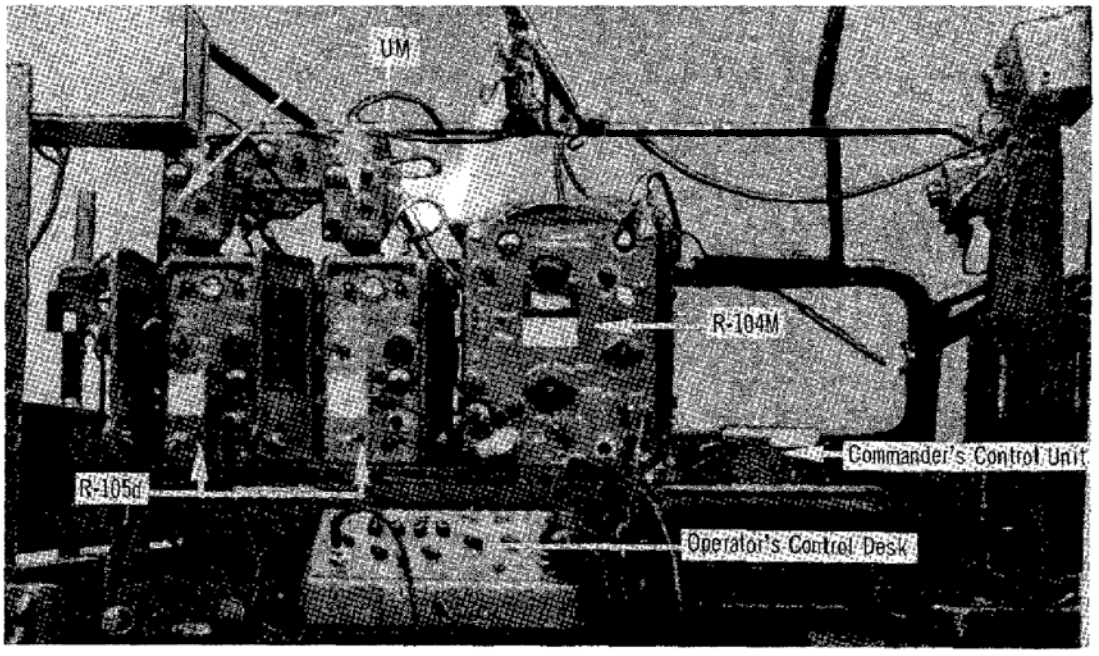
R-122 Antennas

FORK REST



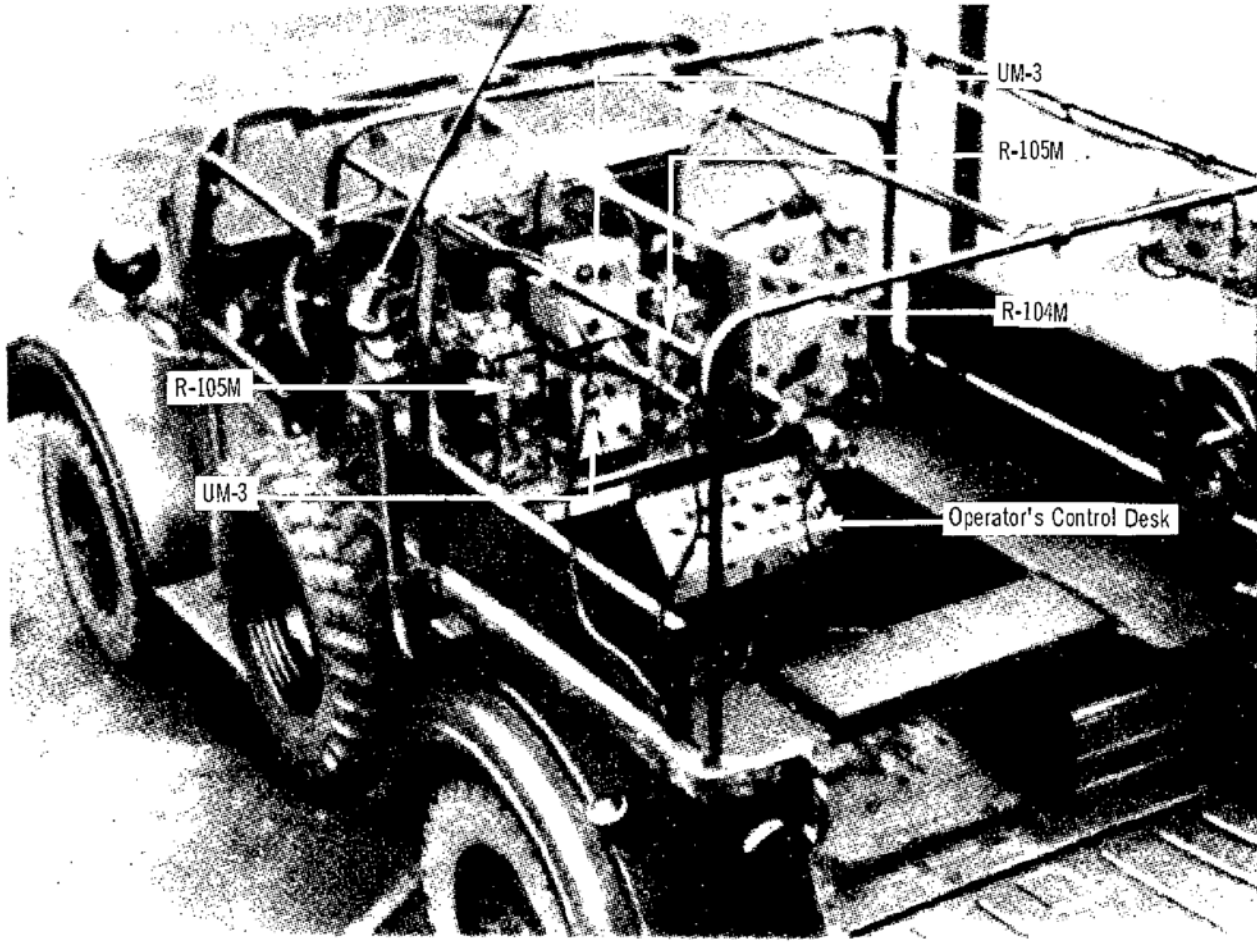


1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-125, R-125A, R-125P
3.	FUNCTION	Utilised respectively by Infantry, Artillery and Air Defence Artillery units and formations for control and relay purposes.
4.	DESCRIPTION	Multiple radio set vehicular installations mounted on UAZ-69 vehicles and consisting of two VHF radios each with a UM aplifier (50 watts), one HF radio, an Operators Control Desk, a Commanders Control Unit, and other auxiliary items: R-125: Two R-105d and One R-104M R-125A: Two R-108d and One R-104M R-125P: Two R-109d and One R-104M
5.	TECHNICAL CHARACTERISTICS	As for R-104M, R-105d, R-108d and R-109d.
6.	PERFORMANCE	As for R-104M, R-105d, R-108d and R-109d.
7.	INTERCOMMUNICATION WITH	R-102, R-103, R-104, R-105, R-108, R-109, R-112, R-113, R-114, R-118.



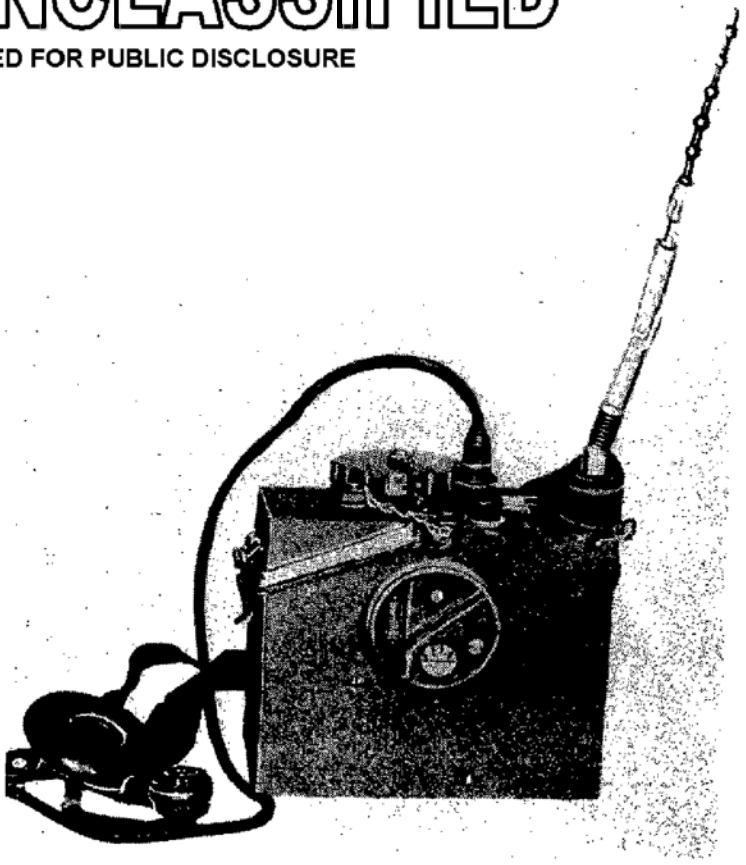
R-125 IN UAZ-69

1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-125M, R-125AM, R-125PM
3.	FUNCTION	Utilised respectively by Infantry, Artillery and Air Defense Artillery units and formations, replacing R-125, R-125A and R-125P, for control and relay purposes.
4.	DESCRIPTION	Multiple radio set vehicular installations mounted on UAZ-69 vehicles and consisting of two VHF radios each with a UM-3 amplifier (50 watts), one HF radio, an Operators Control Desk, a Commanders Control Unit and other auxiliary items: R-125M : Two R-105M and one R-104M R-125AM : Two R-108M and one R-104M R-125PM : Two R-109M and one R-104M
5.	TECHNICAL CHARACTERISTICS	As for R-104M, R-105M, R-108M and R-109M.
6.	PERFORMANCE	As for R-104M, R-105M, R-108M and R-109M vehicular stations.



R-125M IN UAZ-69

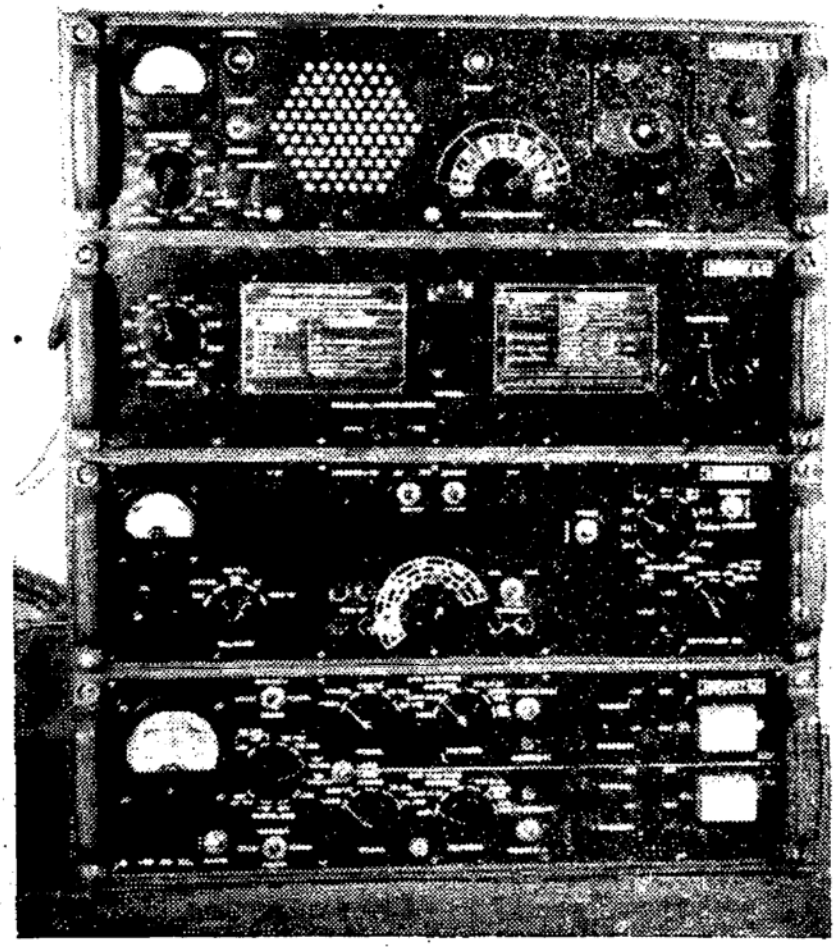
1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-126
3.	FUNCTION	Used for infantry-company-platoon communications nets, replacing R-116.
4.	DESCRIPTION	A small man-pack VHF transceiver.
5.	TECHNICAL DESCRIPTION	
	a. Frequency Range	48.5 - 51.5 MHz
	b. Emission Modes	FM voice
	c. Power Output	0.3 watts
	d. RF Channels	Single channel; ~~continuous tuning~~ dial markings spaced at 100 KHz, to give 34 channels
	e. Power Source	3 volt silver-zinc battery and built-in transistor power pack.
	f. Antenna	KULIKOV, same as R-116.
6.	PERFORMANCE	About 1.5 Km (0.8 nm)
7.	INTERCOMMUNICATION WITH	R-106 and R-116



1.	NICKNAME	None
2.	SOVIET DESIGNATION	AMUR-2
3.	FUNCTION	Used with Medium and High Power Radio Stations (e.g. R-118) for Voice and Radio Teleprinter reception. Being replaced by R-154.
4.	DESCRIPTION	AM HF receiver
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	1 - 8 MHz
	b. Intermediate Frequency	
	c. Receiption Modes	AM-Voice CW-ON/OFF Keying FSK and DFSK - RATT FSK plus AM Voice
	d. Sensitivity	
	e. Power Source	Mains or motor-generator 127/220V 50 Hz
	f. Antenna	Rod, doublet or long-wire.
	g. Weight	118 kg (260 lbs)

Photograph not available

1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-154 (receiver only)
3.	FUNCTION	Used with Medium and High Power Radio Stations (e.g. R-118) for Voice and Radio Teleprinter reception in replacement for AMUR-2. Used by all arms and services of ground forces for communications from regimental level up to fronts.
4.	DESCRIPTION	AM HF receiver vehicle mounted.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	1 - 12 MHz
	b. Intermediate frequency	Unknown
	c. Reception Modes	AM-Voice CW-Telegraphy FSK and DFSK - RATT FSK and DFSK plus AM Voice
	d. Sensitivity	Unknown
	e. Power Source	Mains or motor-generator 127/220V, 50 Hz
	f. Antenna	Rod, doublet or long wire.
	g. Weight	Unknown
6.	PERFORMANCE	Unknown
7.	INTERCOMMUNICATION WITH	R-102, R-103, R-110 and R-118.

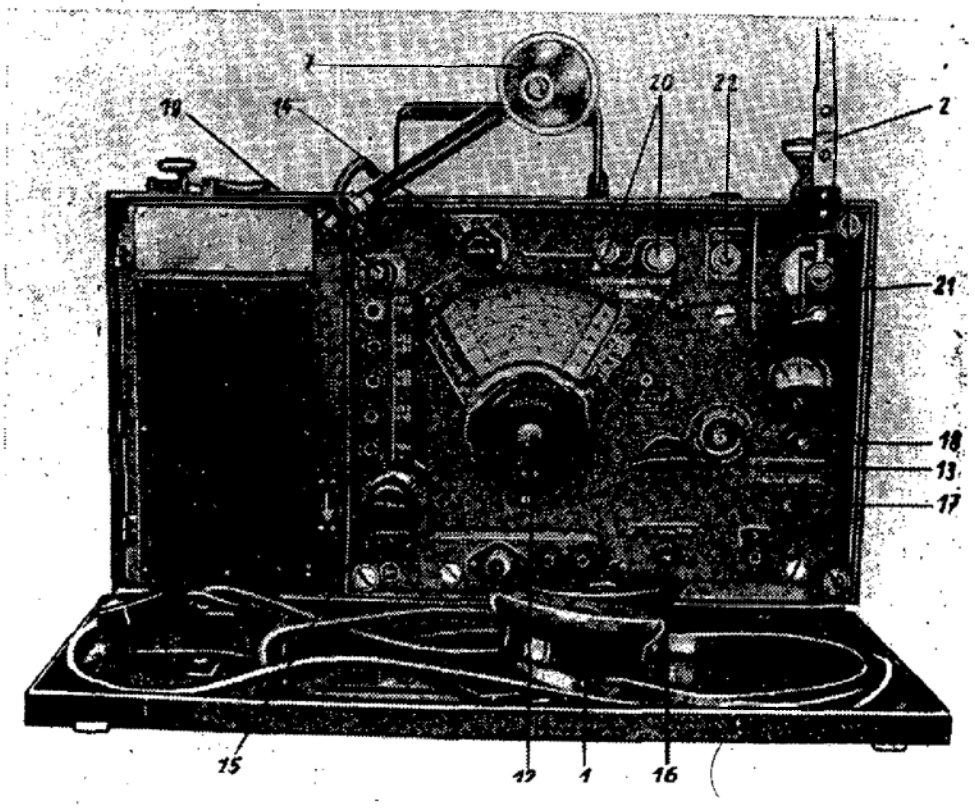


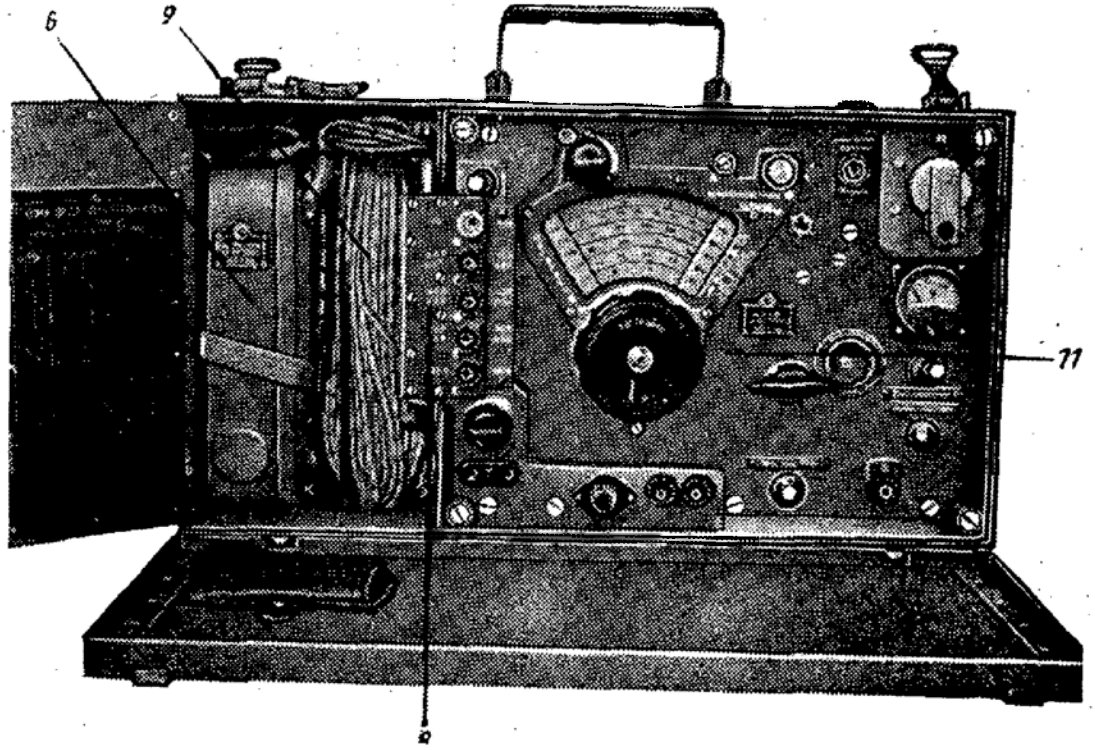
1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-250 (R-250 M)
3.	FUNCTION	Used within Medium and High Power HF Radio Stations for Voice, Morse, Radio Teleprinter and Facsimile reception.
4.	DESCRIPTION	AM HF receiver
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	1.5 - 25.5 MHz
	b. Intermediate frequency	1st IF 1.5 - 3.5 MHz (tunable) 2nd IF 215 KHz
	c. Reception Modes	AM Voice CW Telegraphy With supplementary attachments: FSK - RATT Facsimile
	d. Sensitivity	2 microvolts for 10 db signal to noise ratio.
	e. Power Source	Mains or motor-generator 127/220v 50 Hz. 12 Volt battery and vibro-pack.
	f. Antenna	Rod, doublet or long-wire. Dual or triple diversity spaced antennas.
	g. Weight	95 kg (210 lbs)

Photograph not available

1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-311
3.	FUNCTION	Used within Medium and High Power HF Radio Stations (e.g. R-118) and as a general purpose broadcast receiver for Voice and Morse reception.
4.	DESCRIPTION	A rugged portable AM HF receiver.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	1 - 15 MHz
	b. Intermediate Frequency	465 KHz
	c. Reception Modes	AM-Voice CW-Telegraphy
	d. Sensitivity	7.5 microvolts Voice 3 microvolts Telegraphy
	e. Power Source	One 2 NKN-24 battery and vibro-pack or Dry battery.
	f. Antenna	KULIKOV, whip or long-wire.
	g. Weight	Approximately 21 kg (46 lbs)

R-311



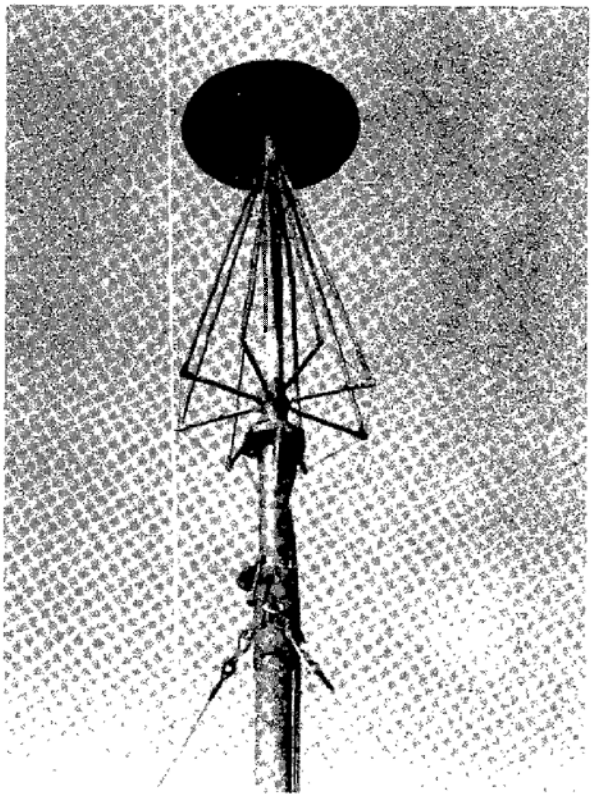


1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-312
3.	FUNCTION	Monitoring
4.	DESCRIPTION	A rugged portable AM/FM, HF/VHF receiver.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	15 - 60 MHz
	b. Intermediate Frequency	3 MHz
	c. Receiption Modes	AM/FM Voice CW Telegraphy MCS Telegraphy
	d. Sensitivity	7 microvolts Voice 3 microvolts CW
	e. Power Source	One 2 NKN-24 battery and vibro-pack or Dry battery.
	f. Antenna	KULIKOV, whip or long-wire.
	g. Weight	Approximately 19 kg (42 lbs)

Photograph not available

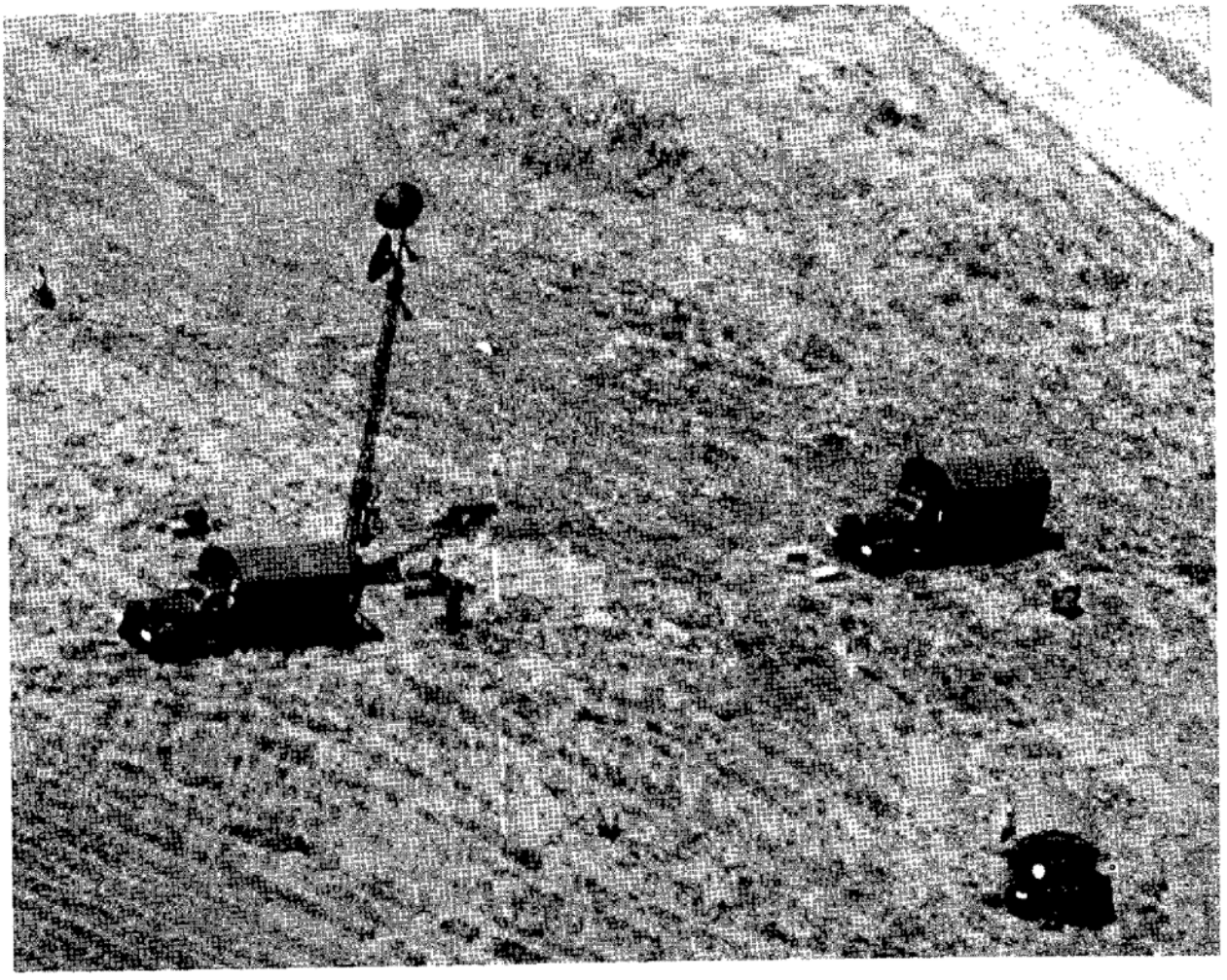
1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-824 (previously RAS-UKV)
3.	FUNCTION	Ground-to-air VHF communications.
4.	DESCRIPTION	The R-824 is widely used by Soviet and East European Forces for ground-to-air communications employing DISC CONE antenna. The DISC CONE antenna is a broad bond VHF unipole antenna used for ground-to-air communications. R-824 is used stationary as well as mounted in a ZIL-151 vehicle.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	100 - 150 MHz
	b. Emission Modes	Unknown
	c. Power Output	Unknown
	d. RF Channels	6 preset channels (600 channels available).
	e. Power Source	Unknown
	f. Antenna	DISC CONE and other omni-directional VHF antennas.

R-824 DISC CONE - Antenna



Section B Radio Relay

1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-400, R-400M and R-400M2 (RRL-6 Civilian) and R-402.
3.	FUNCTION	Heavy mobile radio relay equipment used to provide truck circuits from the Ministry of Defense to Groups of Forces (fronts), Air Defense districts, and from fronts to subordinate armies in the field.
4.	DESCRIPTION	The R-400 and R-402 is a pulse-position-modulated (PMM) radio relay equipment mounted in 2 - 5 ZIL-151 or ZIL-157 vehicles. R-400 is the relay station and R-402 is the terminal station.
5.	TECHNICAL DESCRIPTION	
	a. Frequency Range	1550 - 1750 MHz R-400, R-400M, and R-402. 1500 - 1800 MHz R-400M2.
	b. Communication Modes	Voice, data, facsimile, radioprinter.
	c. Power Output	8 - 10 watts
	d. RF Channels	20 at 10 MHz intervals (R-400, R-400M and R-402) 30 at 10 MHz intervals (R-400M2)
	e. Communication Channels	6 (R-400 and R-402) 6 or 12 (R-400M) 12 (R-400M2)
	f. Power Source	Generator



g. Antenna	Parabolic reflector; horizontally and vertically polarized dipoles for transmitting and receiving. A R-400 station has two dishes, whereas a R-402 station has one dish antenna.

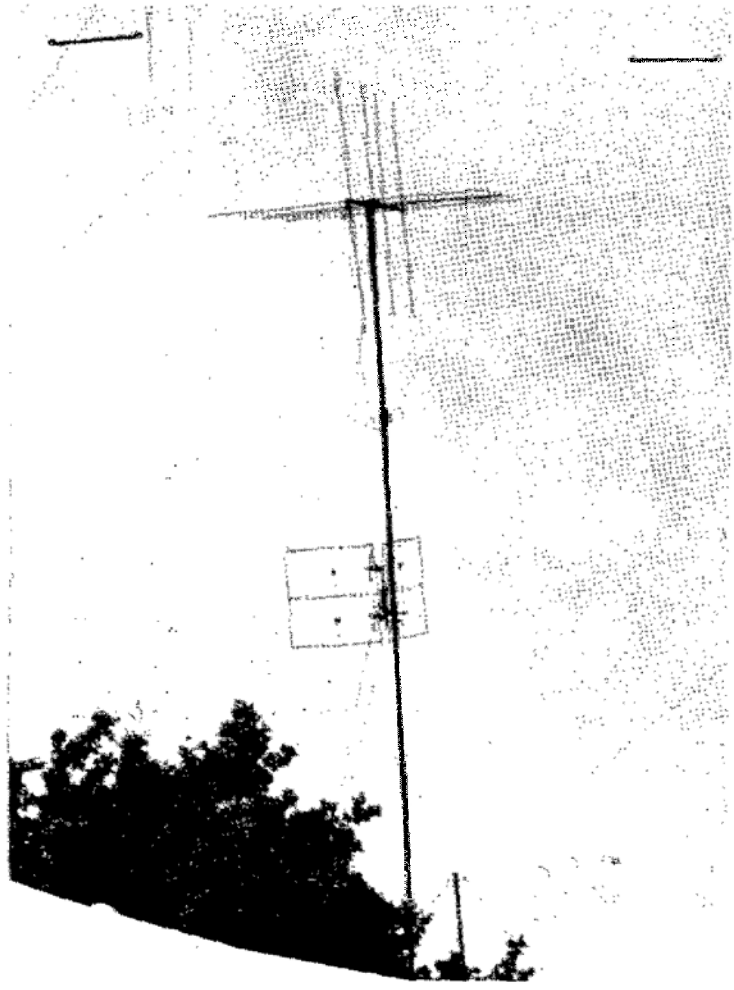
1. NICKNAME — None

2. SOVIET DESIGNATION — R-401M and R-403M (MILITARY) RRS-1M (CIVILIAN)

3. FUNCTION — A mobile VHF radio-relay system for communications from a division command post to lateral divisions, and back to the parent army headquarters. In addition this equipment is used within the Air Defense systems.

4. DESCRIPTION — An R-401M station is the relay and comprises two racks, or "Half-sets", each with one R-401M transmitter/receiver, operating on 134 fixed frequencies in the 60 - 69.975 MHz band, a multiplexing/de-multiplexing unit for two duplex voice channels and a multiplexing unit for two telegraph channels. A 25 watt RF Amplifier is also provided. Utilizes a pair of 4-element Yagi antenna mounted in a cross formation on a 14.5 m high pole mast. A vertical vehicle-mounted, rod antenna is also provided for single channel simplex voice communications on the move. Normally installed in a GAZ 63 box-bodied vehicle but is sometimes seen in a ZIL-157 box-bodied vehicle. The designation R-403M is given to a radio-relay terminal station comprising a single rack, a "half-set", of R-401M equipment.

R-401M and R-403M Antenna (MERCURY GRASS)



Upper: Antenna for Mercury Grass

Lower: Antenna for Coin Grass

It is installed in a GAZ 69 vehicle and the armored command post vehicle BTR 50 PU. It can be used as a terminal station only.

5. TECHNICAL CHARACTERISTICS

a. Frequency Range	60 - 69.975 MHz
b. Communication Modes	FM voice, data, radioprinter, and facsimile.
c. Power Output	2 - 5 watts (into antenna)
d. RF Channels	134 at 75 KHz intervals
e. Communication Channels	4 voice; 2 voice and 2 teleprinters, and with a TF multiplexer 5 voice and 3 teleprinters
f. Power Source	110/220 VAC 50 Hz, or 5-NKN-45 nickel-cadmium storage batteries.
g. Antenna	Nicknamed MERCURY GRASS; it is a double Yagi with about a 6 db gain polarized vertically and horizontally.

6. PERFORMANCE

a. Without amplifiers. Up to 45 km (18 miles) between two stations, or a total route length of 120 km (75 miles), with two relays.

b. With amplifiers. Up to 65 km (40 miles) between stations, or a total route length of 180 km (112 miles).

c. Up to 25 km (15 miles) between a moving station using a rod antenna and a fixed station using a Yagi antenna.

R-401M and R-403M Vehicle

1.	NICKNAME	None
2.	SOVIET DESIGNATION	R-404
3.	FUNCTION	Used to provide radio-relay communications from Theater headquarters and/or Front headquarters forward.
4.	DESCRIPTION	The R-404 is a pulse-position-modulated (PPM) radio-relay equipment providing voice, radio-printer, data, facsimile communications.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	1530 - 2030 MHz
	b. Communication Modes	Voice, radioprinter, data and facsimile.
	c. Power Output	Unknown
	d. RF Channels	Unknown
	e. Communication Channels	24 voice
	f. Power Source	Unknown
	g. Antenna	Unknown
6.	PERFORMANCE	Unknown
7.	INTERCOMMUNICATION WITH	R-400, R-402

Photograph not available

1. NICKNAME — None

2. SOVIET DESIGNATION — R-405

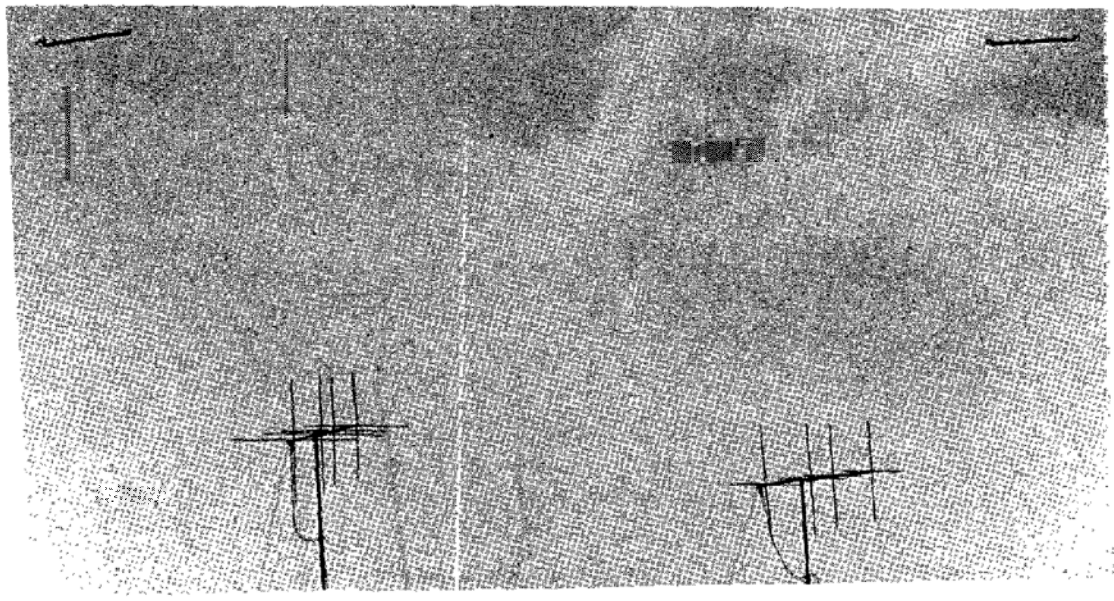
3. FUNCTION — A mobile VHF/UHF radio-relay equipment for voice and telegraph ground-to-ground communications

4. DESCRIPTION — Comprises two racks of R-401M equipment each with an additional transmitter/receiver operating at about 400 MHz. Can operate either entirely on VHF or on VHF in one direction and UHF in the other, or entirely on UHF. Utilizes the normal MERCURY GRASS antenna on VHF and a pair of vertically stacked dipoles on a corner reflector, nicknamed COIN GRASS, on UHF. The COIN GRASS antenna can be mounted either individually on pole masts or on the same mast as the MERCURY GRASS antenna (as illustrated). Normally installed in the same type of GAZ 63 box-bodied vehicle as the R-401M station.

5. TECHNICAL CHARACTERISTICS

a. Frequency	UHF: About 390 - 420 MHz VHF: Same as R-401M
b. Communication Modes	UHF: At least the same as VHF VHF: Same as R-401M
c. Power Output	UHF: 10 watts (est) VHF: 2 - 5 watts (into antenna)
d. RF Channels	UHF: Unknown VHF: Same as R-401M

R-405 Antenna (COIN GRASS and MERCURY GRASS)



e. Communication Channels	UHF: 12 (est) VHF: Same as R-401M
f. Power Source	Unknown
g. Antenna	UHF: COIN GRASS VHF: MERCURY GRASS
6. PERFORMANCE	UHF: Unknown VHF: Same as R-401M

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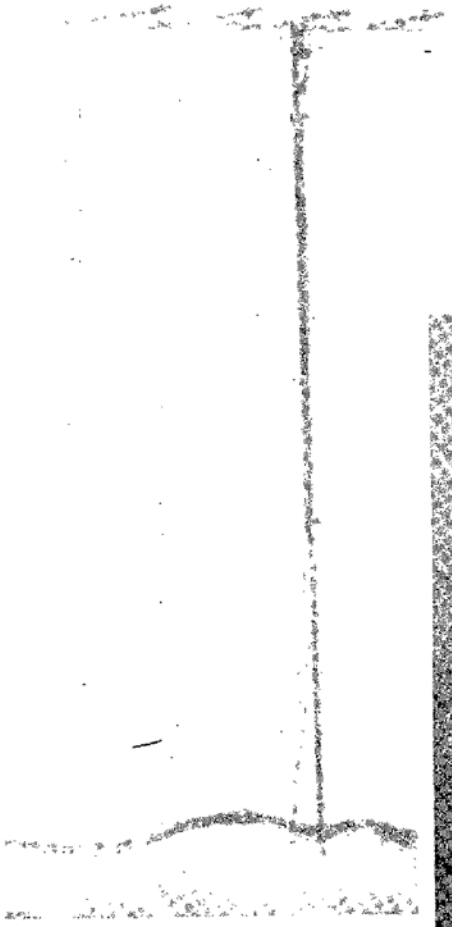
1.	NICKNAME	Unknown
2.	SOVIET DESIGNATION	R-600 (VESNA)
3.	FUNCTION	Fixed radio-relay system used in USSR and satellite countries.
4.	DESCRIPTION	Unknown
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	3700 - 4200 MHz
	b. Emission Mode	Not available
	c. Power Output	Unknown
	d. RF Channels	Unknown
	e. Communication Channels	Unknown
	f. Power Source	Unknown
	g. Antenna	Unknown

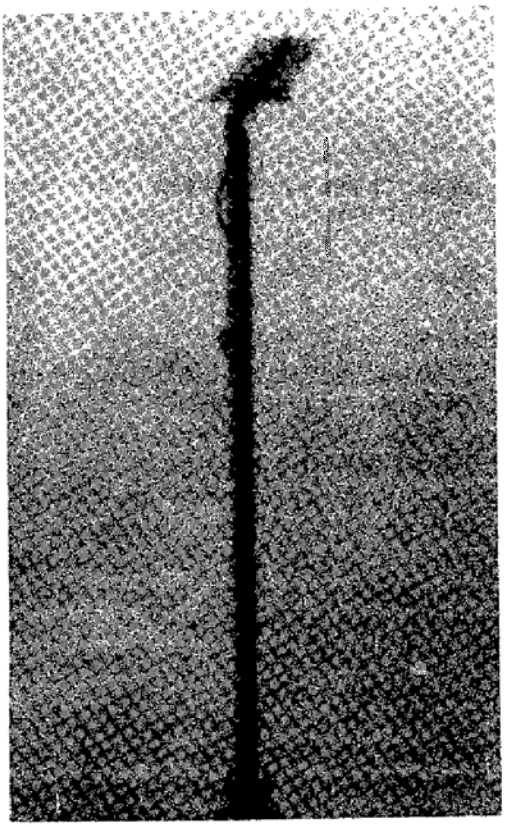
No photograph available

Section C - Data Link including Video and Facsimile

1.	NICKNAME	None
2.	SOVIET DESIGNATION	RL-30, Polish Designation FAZA.
3.	FUNCTION	Video remoting system for passing radar PPI scope information from radar sites to GCI and air traffic controllers.
4.	DESCRIPTION	The system comprises transmitting equipment, transmitting cabinet, primary rotation repeaters, modulator unit, two channel transmitter and rectifier units, a receiving station (receiving cabinet, two channel receiver unit, secondary rotation repeater unit and servo mechanizm) power plant and remote distribution board. The HAT RACK, DRY RACK, and TWICE UP antennas are associated with the system.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency Range	600 - 625 MHz
	b. Emission Modes	Estimated to be double sideband, full carrier.
	c. Power Output	Estimated 2 watts
	d. Antennas	DRY RACK, HAT RACK and TWICE UP
6.	PERFORMANCE	15 - 20 Km (8 - 11 nm)

RL-30 Antennas (DRY RACK, and HAT RACK)





1. NICKNAME — None

2. SOVIET DESIGNATION — "VP-1"

3. FUNCTION — Van-mounted Soviet fighter-interceptor guidance system involving partial-automatic air situation radar data processing and reporting, as well as interceptor control features. The system is designed to operate as an adjunct to all modern EW and GCI radars of the Soviet bloc.

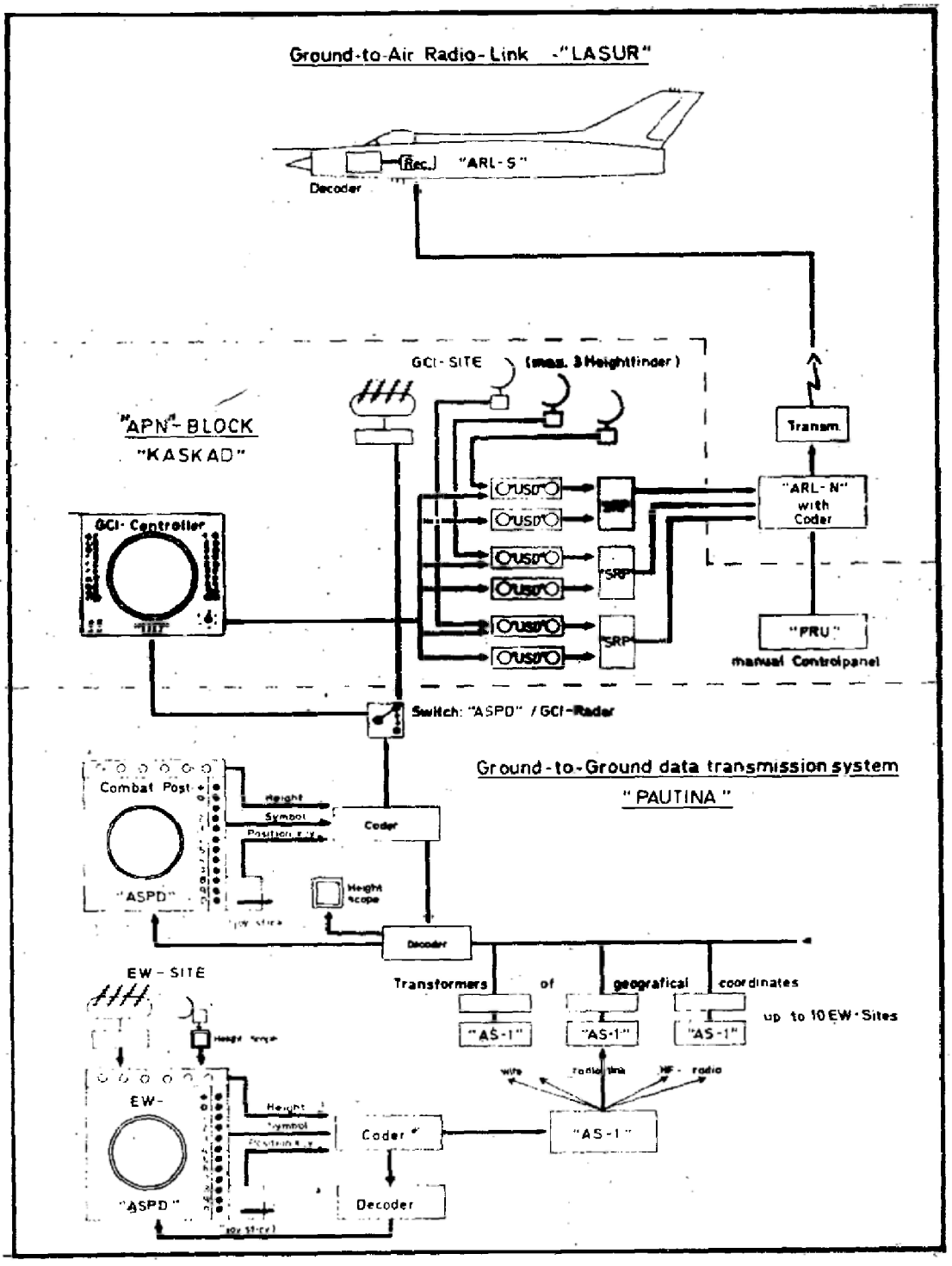
The VP-1 system includes the following components:

A. ASPD = APPARATURA SKHEMY I PEREDATSCHI DANNYCH, the data transformation and transmission equipment, Soviet nickname PAUTINA. This is the system for receiving, transforming, displaying, and transmitting data from EW - and heightfinding radars at EW sites - Filter centers - Combat posts.

B. APN = APPARATURA PRIBORNOGO NAWEDENIJA, the instrument control system, Soviet nickname KASKAD, is the overall system in GCI sites, composed of:

(1) UD = USTROJSTWO DEMONSTRAZII, the Plan Position Indicator (PPI) scope, on which position and related data are displayed.

"VP-1" - General Survey



(2) USD = USTROJSTWO SKHEMY DENNYCH, the data transformation device a two-scope system for tracking targets and intercept aircraft.

(3) SRP = STSCHETNO-RESCHAJUSCHTSCHIJ PRIBOR, an electromechanical computer.

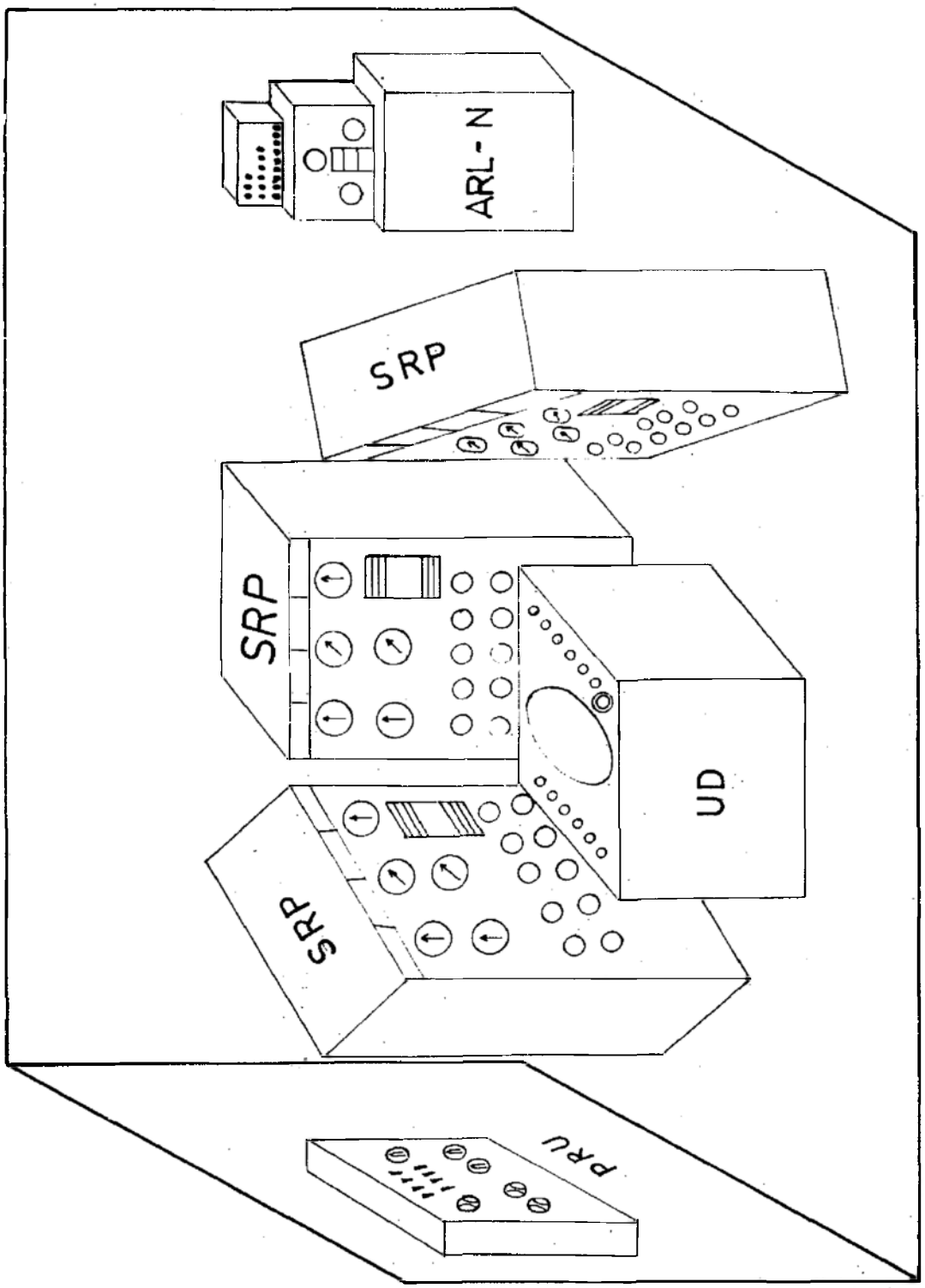
C. ARL = AWTOMATIT-SCHESKAJA RADIOLINIJA, the automatic radio link (Soviet nickname LASUR) with the components:

ARL-N, N = NASEMNYJ = ground equipment for automatic radio link at GCI sites.
ARLS-S, S = SAMOLETNYJ = airborne equipment for automatic radio link in the fighter-interceptor.

D. PRU = PUL RUTSCHNO?O UPRAWLENIJA. Manual control panel for transmitting data to the aircraft, alternate to the automatic equipment in the GCI site.

E. AS = APPARATURA SWJASI, the communications system at EW - GCI - sites, Filter centers and Combat posts.

VP-1 - Operator Van



F. EOP = ELEKTRO-OPTITSCHESKIJ PLANSCHET, the electro-optical planchette, a cathode ray tube storage device used to store transmitted data at Combat posts.

4. EVALUATION OF THE SYSTEM COMPONENTS

a. PAUTINA

An average operator with good training may be able to handle five different aircraft (max) during one antenna rotation of BAR LOCK in the EW-mode (20 sec). But during this time he can only mark one aircraft with a data-number of four digits. So we can assume that the operator sends a message each 2.2 sec. Compared with transmission by telephone this capacity is an increase. However, the technical expenditure seems to be much higher.

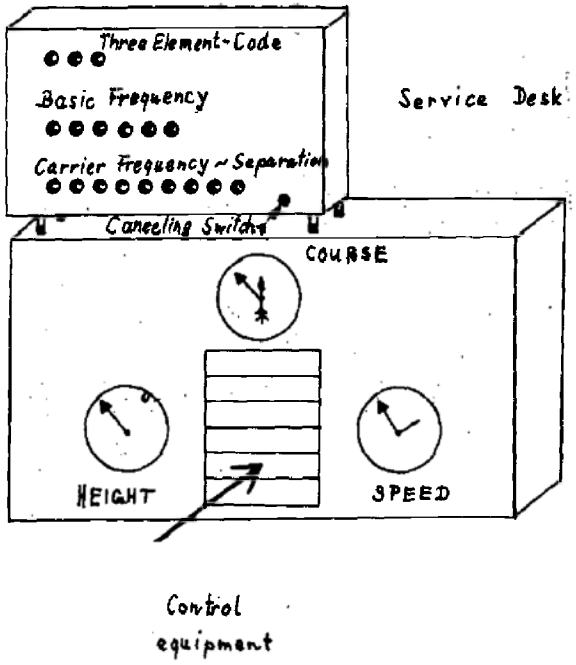
b. KASKAD(APN)

Any final decisions must be made by the Chief of Soviet Air Defense Echelons. The system does not offer alternate solutions. Since the system is only partially automated, the operator must provide manual help. If the operators are trained well, one can consider this a quasi-automatic mode. The technical solutions of the design of 1956 are not incompetent considering that transistorized digital computers were not available. The

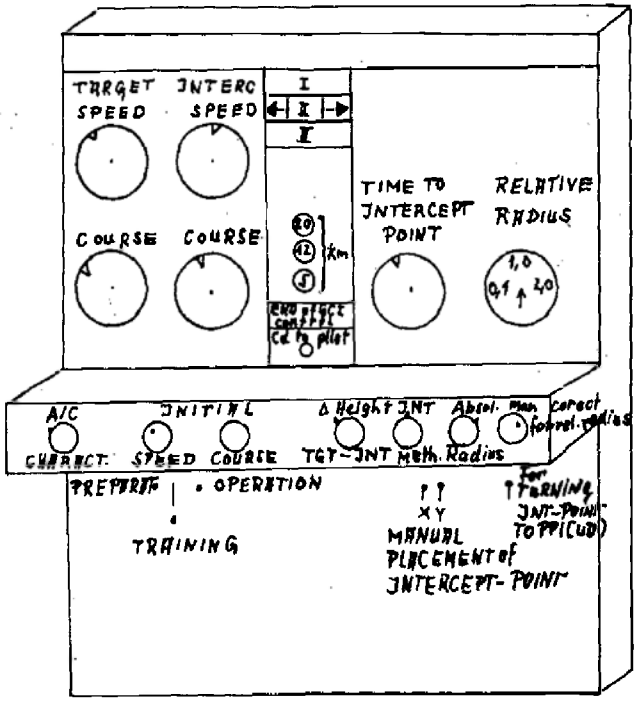
VP-1 - Frequency and Coding Knobes

Frequency and Coding Knob

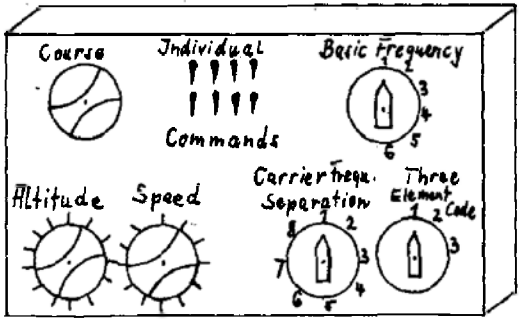
Ground Radio Link "ARL-N"



"SRP"



"PRU"



system had to be an electro-mechanical analogous computer with the radar data input in an analog mode. The operators had to extract data manually.

c. LAZUR

Coding, transmission and display of the intercept are completed automatically. Transmission is continuous and the commands are displayed so that they can be read immediately and at any time; this means less memorizing for the pilot. LAZUR is "voiceless" and facilitates the control of mixed speaking units.

NOTE: Indications exist that the overall system will not be changed significantly over the next few years. The main features of the system will probably be continued until a new system is introduced which will operate in a digital mode. It is believed that no new system will be introduced during the coming 3 to 5 years.

The system is limited to three simultaneous operations; however, it is possible that more than one such system may be included at a single GCI site.

The success of the GCI operation depends on the proficiency of the chief controller who must make many manual decisions during the GCI operations.

Photograph not available

CHAPTER III

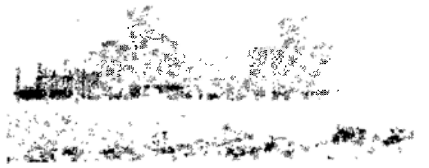
ELECTRONIC WARFARE

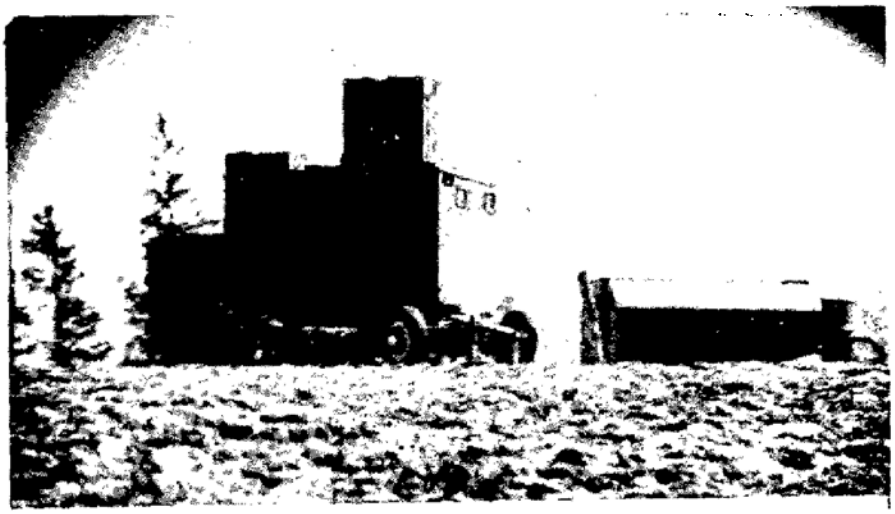
Section A - Passive Electronic Countermeasures

1.	NICKNAME	BOX BRICK
2.	SOVIET DESIGNATION	POST 1
3.	FUNCTION	Interception of radio transmissions probably on X, L and S bands with DF capability (bearing determination and tracking). May have a secondary rôle of a passive location device to back up the electronic warfare system during conditions of jamming.
4.	DESCRIPTION	A cabin trailer similar to that of TOKEN is fitted with a box-like superstructure. It is believed to house equipment for intercepting transmissions, possible up through and including X and S bands. It is normally associated with BRICK ROUND AND BRICK SQUARE.
5.	TECHNICAL CHARACTERISTICS	
6.	PERFORMANCE	Unknown
	Range (Search)	Line of sight

NOTE: May detect signals below horizon as far as 150 nm by sensing troposcatter reflections. Two or more BOX BRICK equipments are necessary to determine location of target.

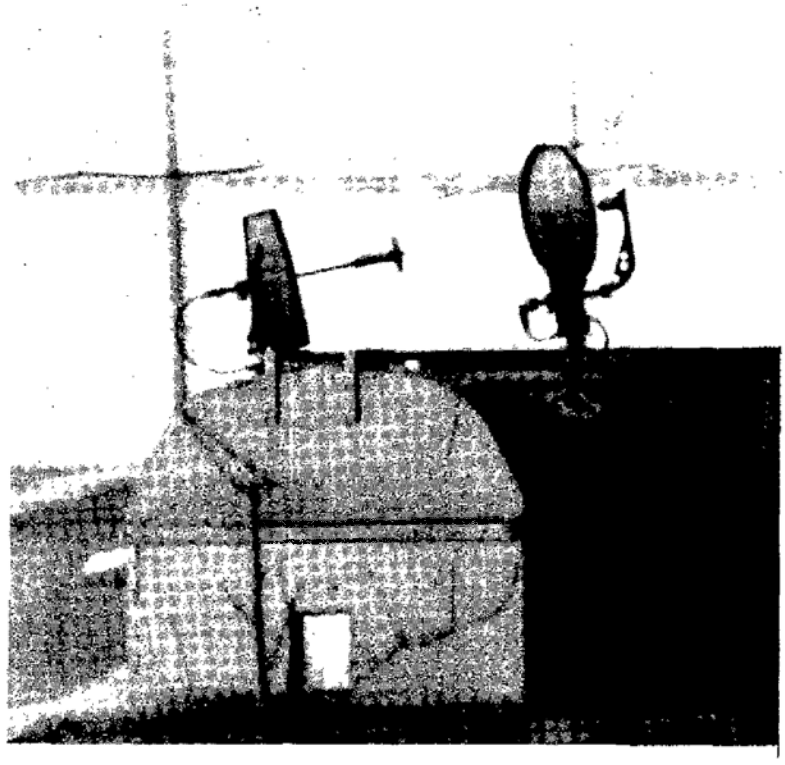
BOX BRICK





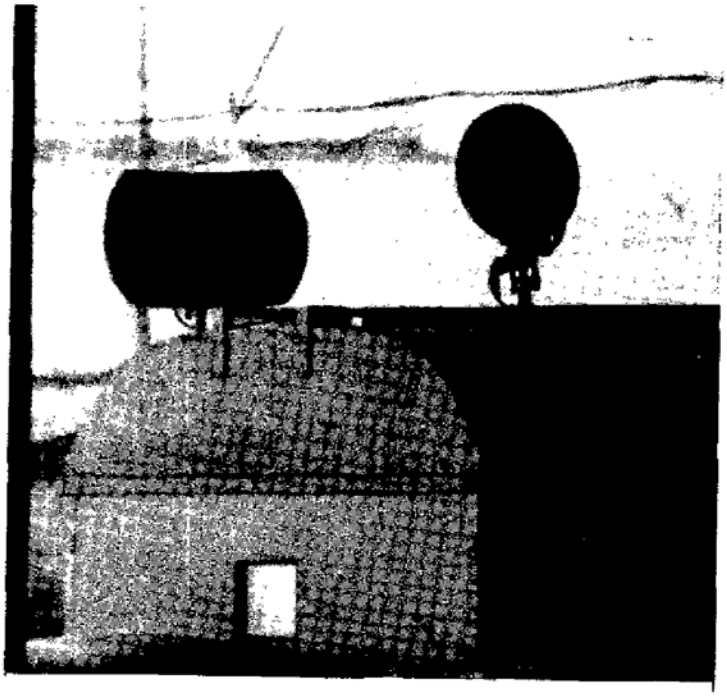
1.	NICKNAME	BRICK ROUND
2.	SOVIET DESIGNATION	RPS-1
3.	FUNCTION	Intercept, analysis and direction finding of radio transmissions on centimeter wave lengths. It is also occasionally seen in Soviet warships and in specially fitted trawlers.
4.	DESCRIPTION	Circular parabolic dish antenna used to receive radio transmissions in X and possibly S and C bands. The antenna is rotated about a vertical axis, probably manually. It is believed that several versions of different sizes exist.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	3,800 - 10,000 MHz
	b. Antenna	Parabolic dish 50 cm (19 in) in diameter
6.	PERFORMANCE	
	Range	Line of sight

BRICK ROUND

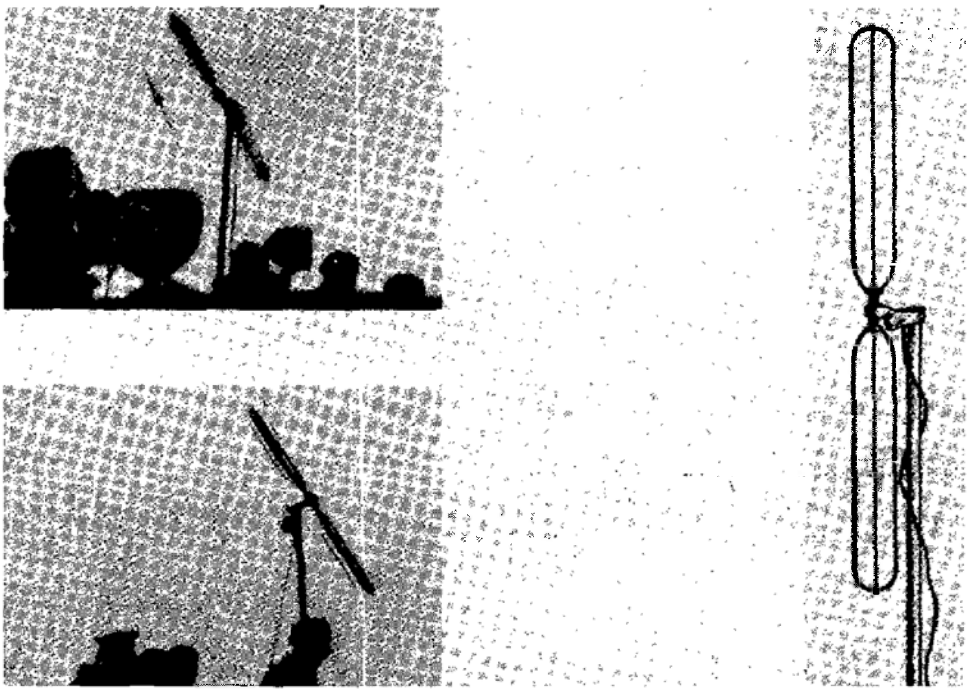


1.	NICKNAME	BRICK SQUARE
2.	SOVIET DESIGNATION	ARS-1
3.	FUNCTION	Intercept, analysis and direction finding of radio transmissions in L and S bands. It is also occasionally seen on Soviet warships and on specially fitted trawlers.
4.	DESCRIPTION	A cut parabolic antenna which can be manually rotated around a vertical axis. There are two versions of BRICK SQUARE which are centered on 1200 MHz and 300 MHz. Dimensionally different but otherwise identical. Associated BOX BRICK and BRICK ROUND.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	750 - 3750 MHz
	b. Antenna	Cut parabolic dish 41 cm (16 in) high by 55 cm (20 in) long (two different sizes exist).
	c. Accuracy	About 1° - 6° depending on frequency.
6.	PERFORMANCE	
	Range	Line of sight.

BRICK SQUARE



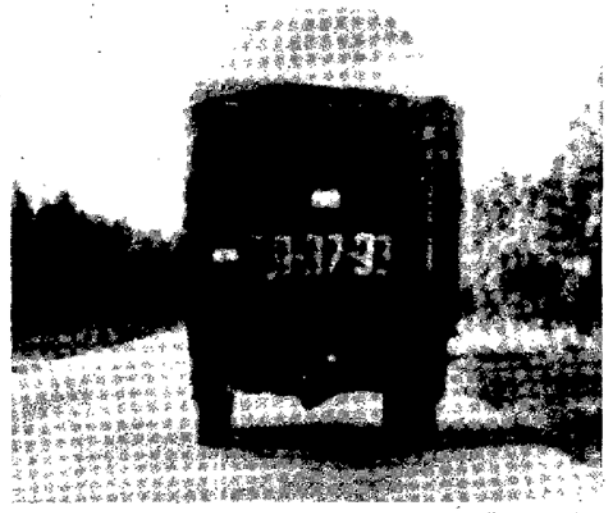
1.	NICKNAME	CHUCK LUCK
2.	SOVIET DESIGNATION	PMD-3
3.	FUNCTION	Radio intercept antenna for VHF/UHF bands observed on sites associated with BOX BRICK, BRICK ROUND and BRICK SQUARE, and on naval vessels.
4.	DESCRIPTION	Folded dipole on caged dipole type antenna. Several versions of different size exist.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	Probably 60 - 150 MHz and 225 - 400 MHz
	b. Pol.	Antennas are rotatable to detect vertical, horizontal and slant polarization as required.
6.	PERFORMANCE	
	a. Range	Line of sight

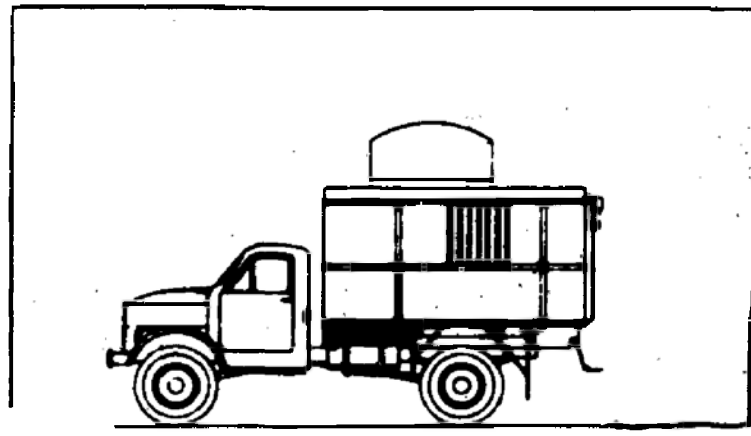


1.	NICKNAME	DOME BRICK
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Interception of radio transmissions in S, C and X bands for warning and electronic warfare purposes. In connection with CHEESE BRICK and MOUND BRICK.
4.	DESCRIPTION	A GAZ 63 prime mover surmounted by a dome with a slightly convex top. The dome is 1.4 m (4.6 ft) in diameter and .75 m (2.6 ft) high. Has been seen associated with CHEESE BRICK and MOUND BRICK.
5.	TECHNICAL CHARACTERISTICS	Unknown
6.	PERFORMANCE	
	. Range (Search)	Line of sight

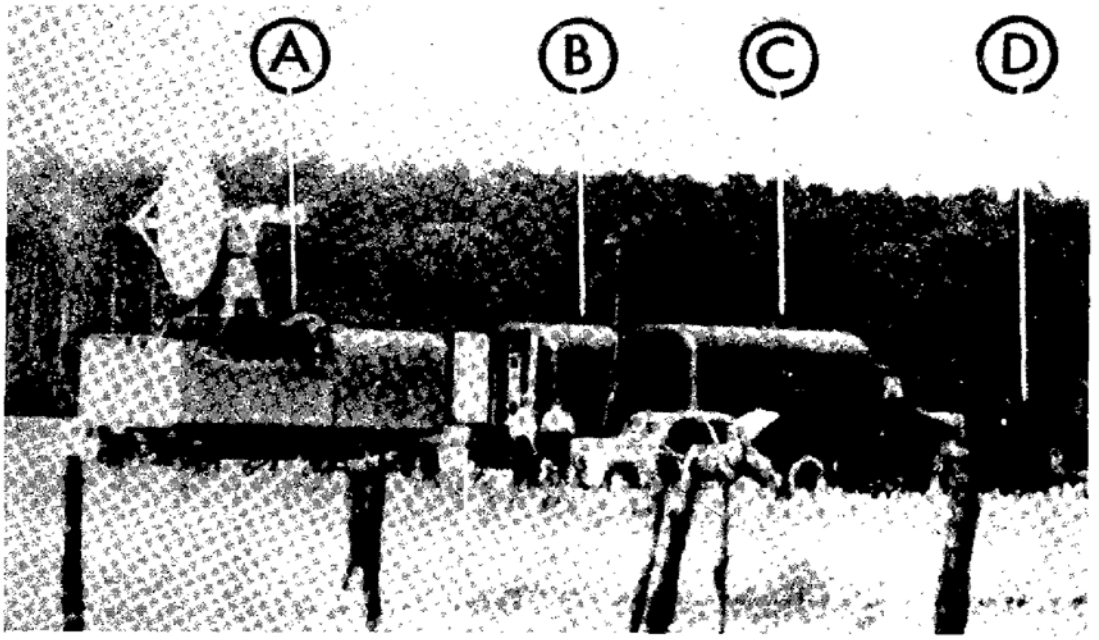
NATO SECRET

DOME BRICK





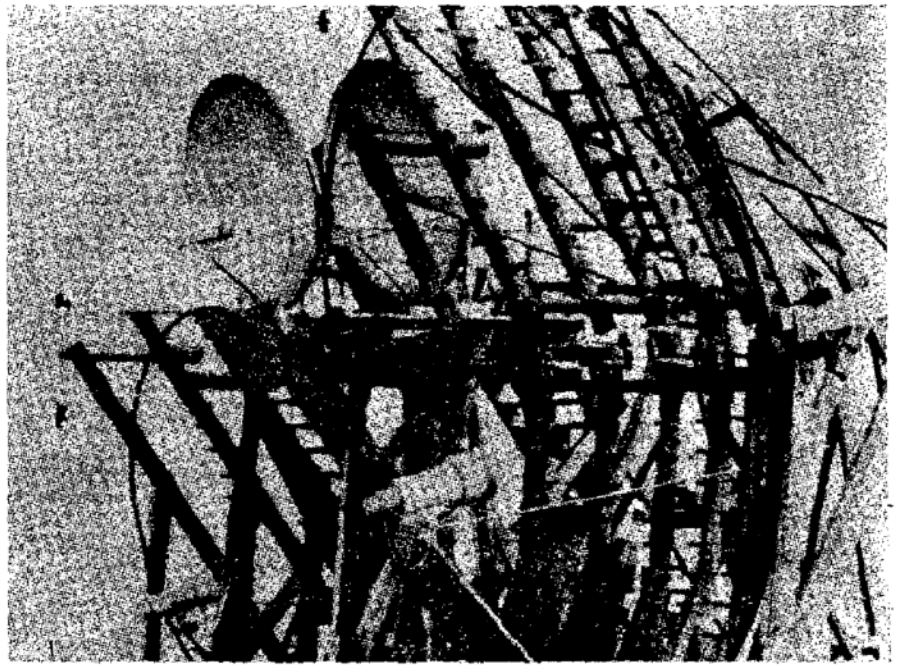
1.	NICKNAME	HORNET 3
2.	SOVIET DESIGNATION (EAST GERMAN)	HORNISSE 3
3.	FUNCTION	Intercept, analysis and direction finding of radio signals in the band of 1,000 - 10,000 MHz. Provides general search over 270° and sector search. Search range 300 Km (162 nm).
4.	DESCRIPTION	Mobile equipment of East German manufacture consisting of two vehicles. One bears a mounted main aerial with a parabolic dish reflector 2 m (6.5 ft) in diameter and a smaller rectangular 35.6 x 10.2 m (14 x 4 in) horn aerial mounted on the side of the reflector. The other one contains measuring devices.
5.	TECHNICAL CHARACTERISTICS	
	Frequency	1,000 - 1,500 MHz 1,500 - 2,000 MHz 2,000 - 3,000 MHz 3,000 - 4,000 MHz 4,000 - 5,000 MHz 5,000 - 7,900 MHz 7,900 - 10,000 MHz
6.	PERFORMANCE	This equipment is designed to measure: a. Bearing ± 0.5° b. Signal Strength c. Frequency ± 10 MHz d. Modulation - Type e. Pol. f. PRF



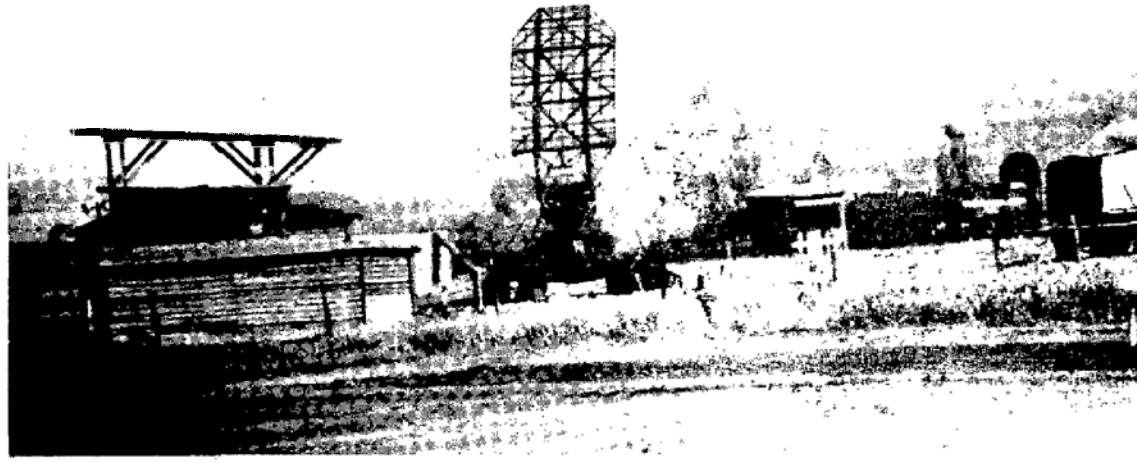
j. ARR/SSR ± 0.1 sec/scan

k. PW ± 0.025 microseconds

NOTE: Until now, ranges up to 300 Km (162 nm) have been achieved. One version of the HORNISSE 3 consists of four parabolic antennas of different diameter, which are mounted on a special vehicle (see photograph). It has been observed under test in the same area with HORNISSE 3. Designation possibly FBA-60 (see photograph).



1.	NICKNAME	MESH BRICK
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Antenna for interception of radio transmissions on L and S bands, bearing determination and passive tracking.
4.	DESCRIPTION	The instalation consists of the first three sections of a BIG MESH reflector mounted vertically on a four wheel bogie. The reflector is illuminated by three conical elements which are probably polyrods. The elements vary in size and are located in the focal plane of the reflector. The antenna is capable of rotation.
5.	TECHNICAL CHARACTERISTICS	Unknown
6.	PERFORMANCE	
	Range (Search)	Line of sight



1. NICKNAME — SQUARE PICK

2. SOVIET DESIGNATION — Unknown

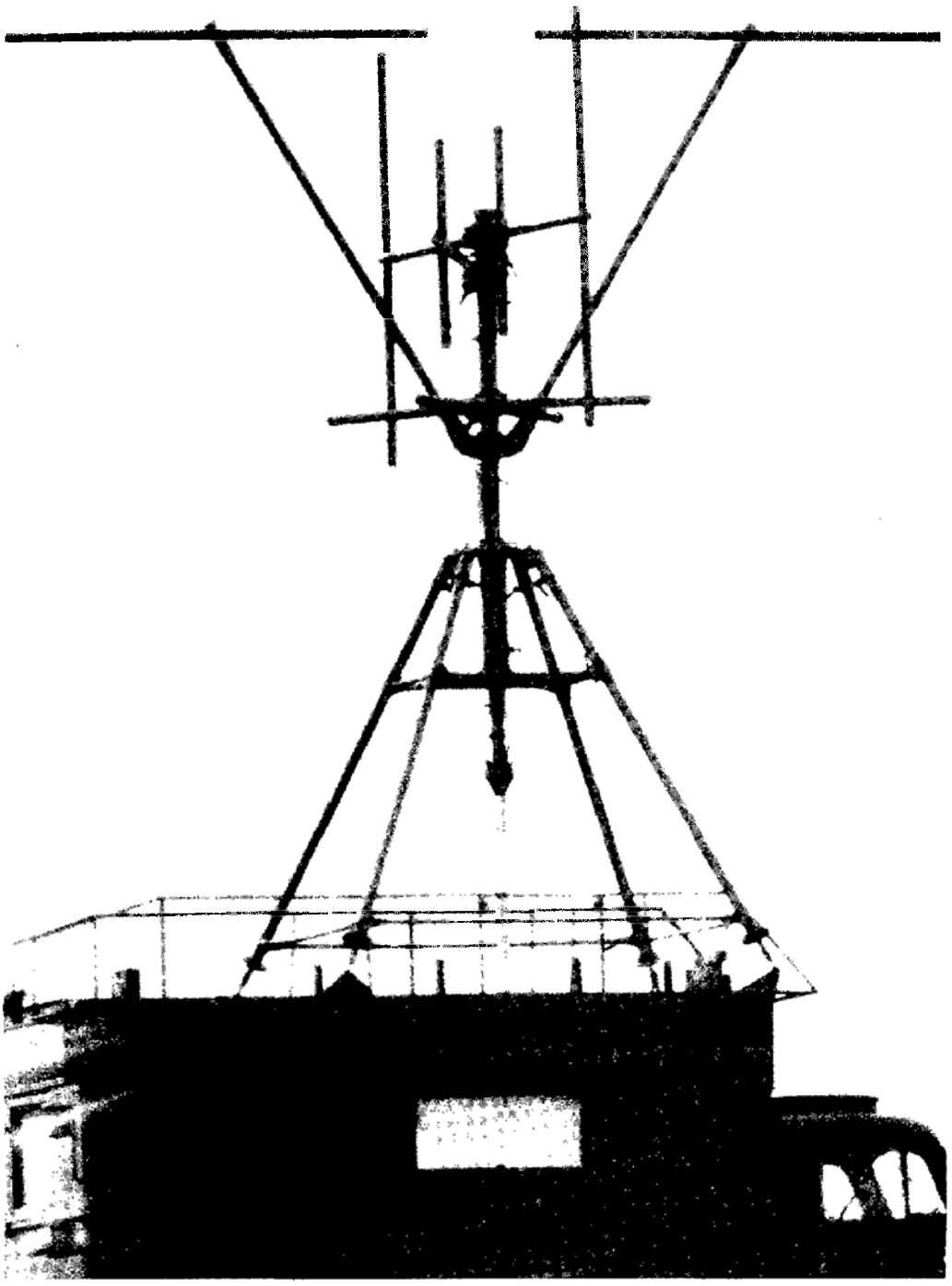
3. FUNCTION — Unknown, but possibly passive interception equipment.

4. DESCRIPTION — A multi-element array, mounted on a vertical shaft supported by a quadruped approximately 2 m (6 ft 7 in) high on the roof of a box-bodied, probably 2-axled vehicle (possibly GARANT 304). The vertical shaft extends downwards to the roof of the vehicle and may be rotatable from inside. The array, the top elements of which are approximately 4.5 m (14 ft 3 in) above the roof of the vehicle, consists of:

(1) Two pairs of vertical dipoles, measuring 2 m and 1 m (6 ft 7 in and 3 ft 3 in) long and 2.5 m and 1.25 m (8 ft 7 in and 4 ft 1 in) apart, respectively, attached at the center of their cross arms close to the top of the vertical shaft.

(2) Four horizontal rods, approximately 0.8 m (2 ft 1 in) long in cruciform shape. Attached to the vertical shaft slightly above the level of the larger X.

SQUARE PICK



(3) Two horizontal dipoles, probably co-linear, measuring approximately 2 m (6 ft 7 in) and 2.7 m (8 ft 7 in) separation between their centers, above the level of the upper ends of the larger H.

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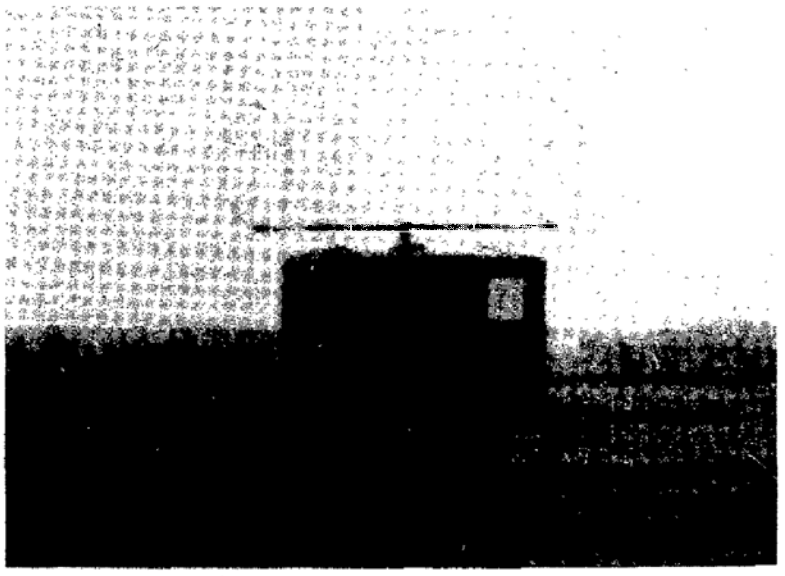
1. NICKNAME — RING TWO

2. SOVIET DESIGNATION — Unknown

3. FUNCTION — Probable D/F antenna associated with FIX SIX or FIX EIGHT.

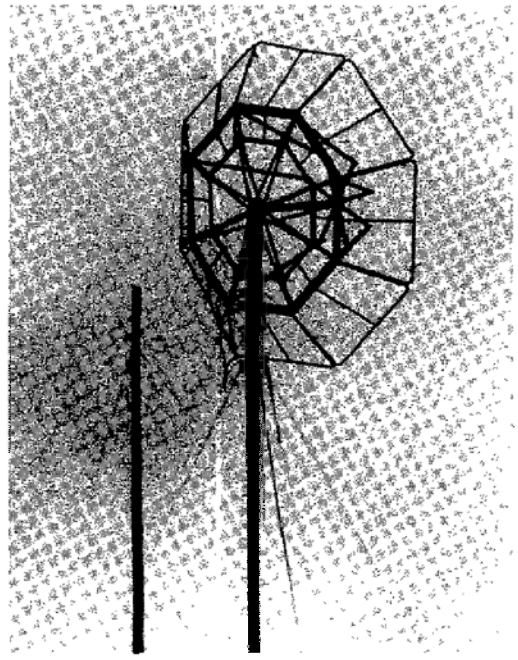
4. DESCRIPTION — A rotating spaced loop antenna mounted on a single-axle box-bodied trailer with a very slightly curved roof. The antenna consists of two circular loops, about 59 inches in diameter, mounted in two parallel vertical planes and attached at their lowest point to each end of a horizontal tubular beam supported at its mid-point on a short stub about 7.9 inches high projecting from the center of the roof of the box-body.

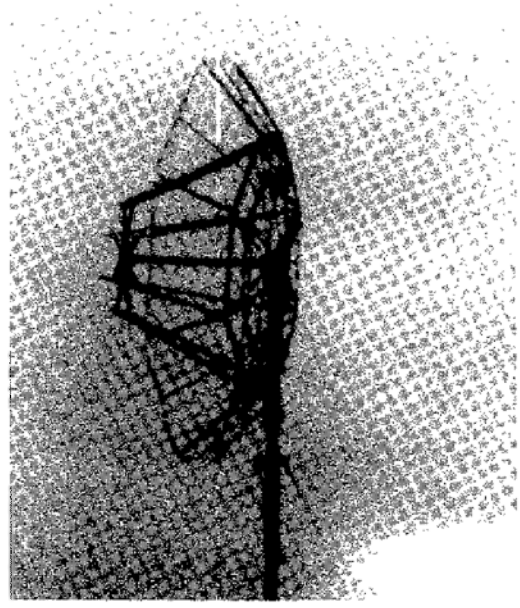
RING TWO



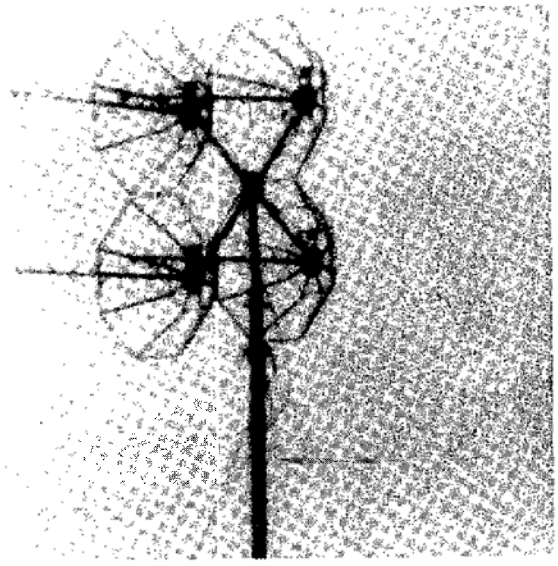
1.	NICKNAME	CRAB POT
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Direction finding antenna.
4.	DESCRIPTION	A fixed antenna mounted on a tubular mast. The feed is on a truncated conical helix frame having a diameter of approximately 115 cm (45 in) maximum and 48 cm (19 in) minimum protruding approximately 70 cm (28 in) from the center of an 8-sided concave mesh reflector of 175 cm (69 in) diameter.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	30 - 150 MHz

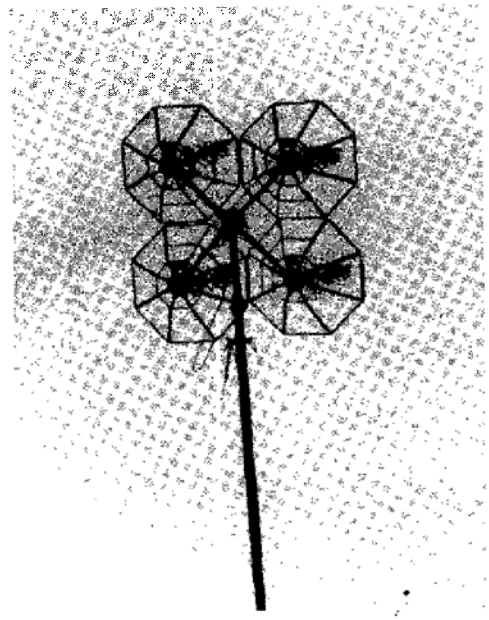
CRAB POT





1.	NICKNAME	QUAD SPRING
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Direction finding antenna.
4.	DESCRIPTION	Fixed antenna array mounted on a tubular mast. The array consists of two pairs of truncated conical helical aerials superimposed one above the other. Each helix which has a diameter of approximately 7.5 cm - 15 cm (3 in - 6 in) protrudes approximately 80 cm (31 in) from the center of a (approximately) 70 cm (27 in) diameter concave mesh reflector.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	250 - 400 MHz
6.	PERFORMANCE	Unknown





1. NICKNAME — LOOP THREE

2. SOVIET DESIGNATION — Unknown

3. FUNCTION — Direction finding antenna.

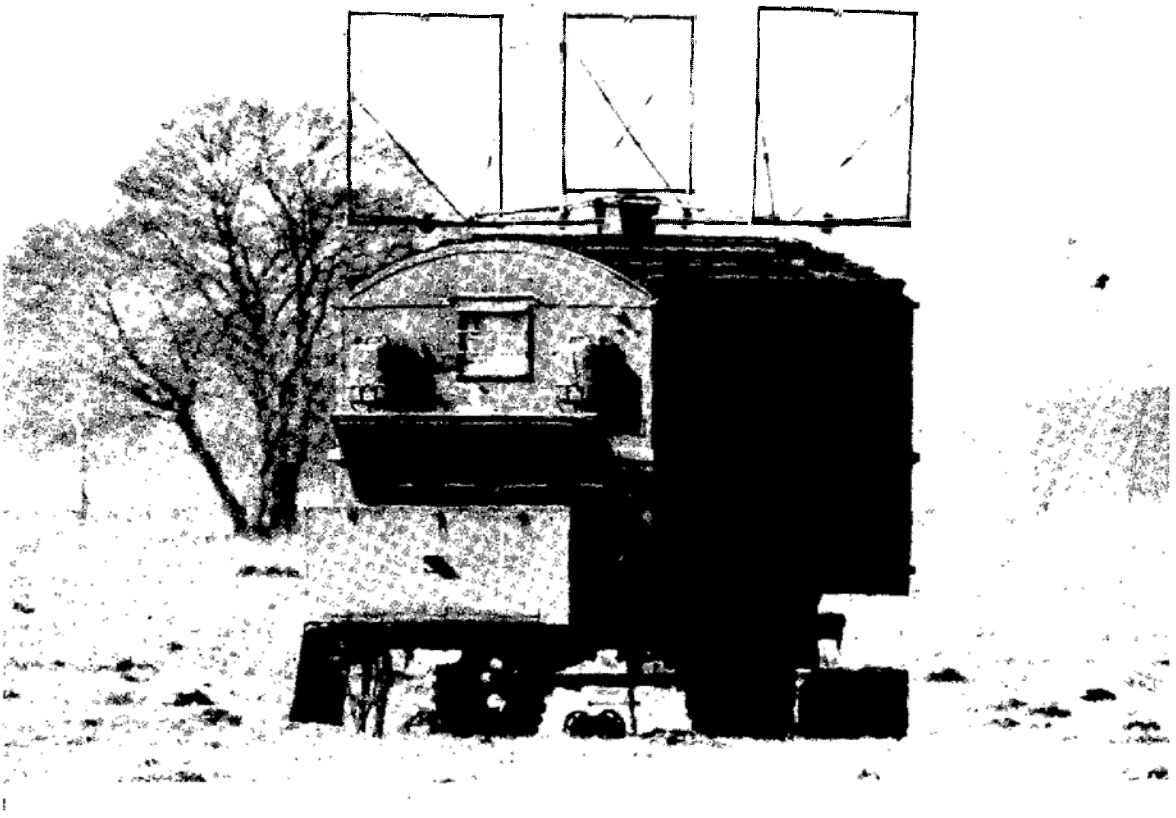
4. DESCRIPTION — A spaced loop antenna mounted on a box-bodied trailer similar to the SPIKE TWO trailer. The antenna comprises three square loops mounted in three parallel vertical planes. Two of them, with sides measuring about 52 inches are mounted at the mid-point of their bottom members on the ends of a horizontal tubular supporting beam some 10 ft long, which can rotate about its mid-point in a horizontal plane. The third loop has sides about 44 inches long and is similarly attached to the mid-point of the supporting beam. The loops are braced in position by a number of struts which turn-buckle adjustments.

5. TECHNICAL CHARACTERISTICS

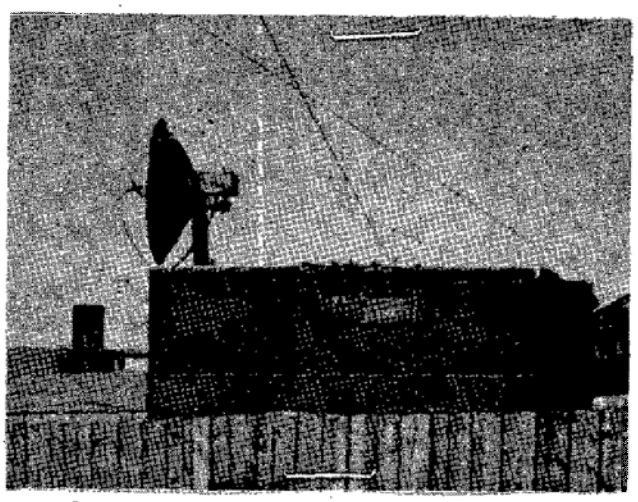
Frequency	Below 50 MHz

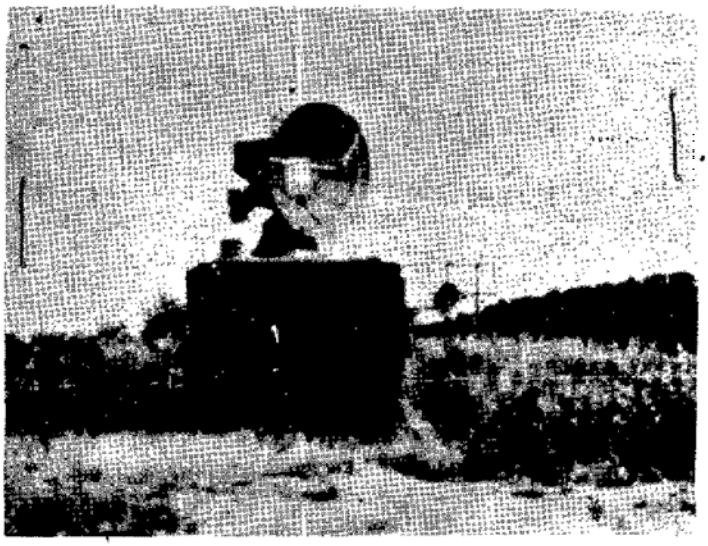
6. PERFORMANCE — Unknown

LOOP THREE

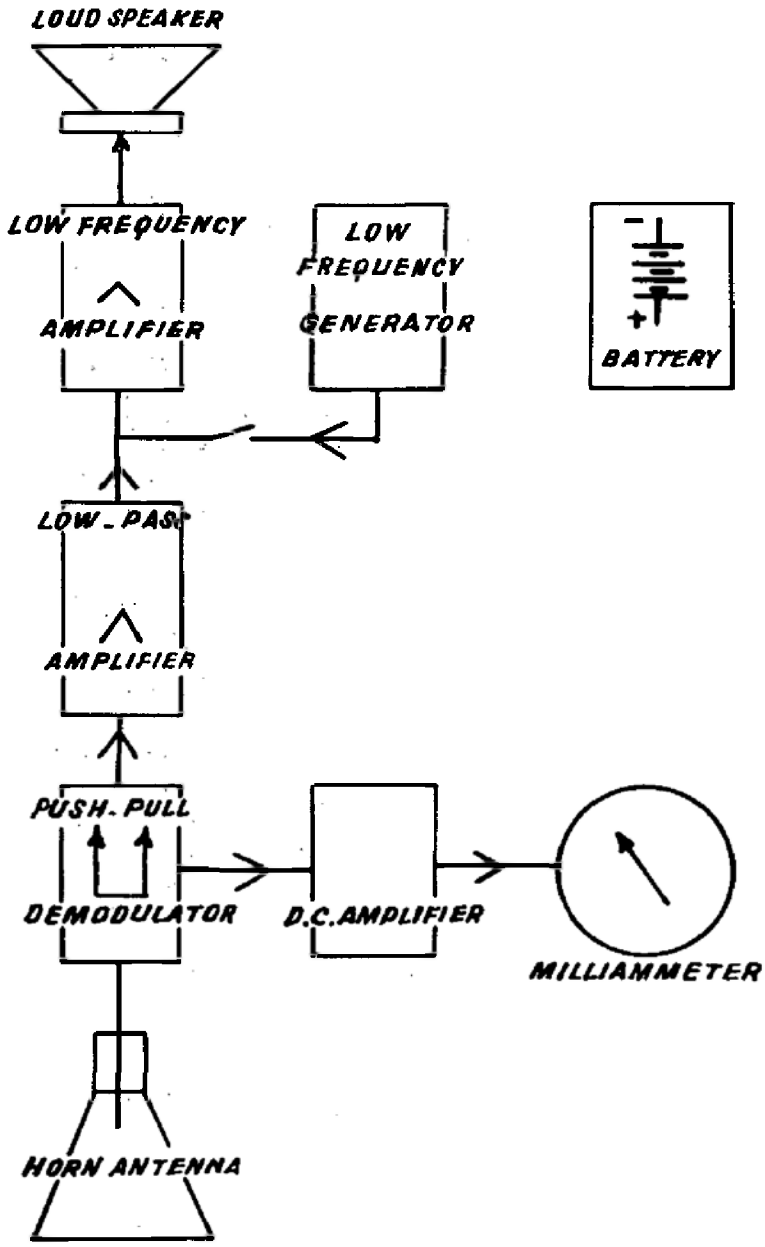


1. NICKNAME	WHIFF BRICK
2. SOVIET DESIGNATION	Unknown
3. FUNCTION	Mobile direction finder, Passive Intercept, associated with BRICK ROUND and BRICK SQUARE.
4. DESCRIPTION	The WHIFF BRICK antenna has been designed so that it receives signals only. A box located at the rear of the antenna is very likely a preamplifier enabling tracking of very weak signal sources or distant targets. The antenna is of parabolic design with a DF capability in azimuth and elevation; probably modified "SON-4" antenna, which was observed on AAA sites.
5. TECHNICAL CHARACTERISTICS	
a. Frequency	2,500 - 3,500 MHz and 8,500 - 11,000 MHz (est)
6. PERFORMANCE	DF Accuracy: AZ and EL 1° - 2° (est)

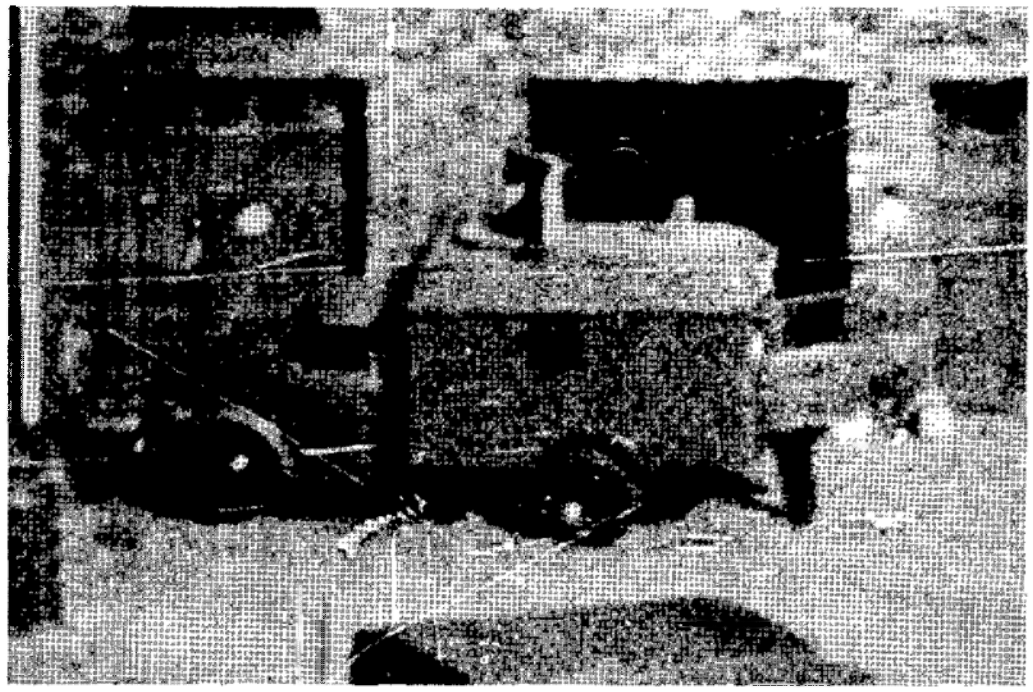




1.	NICKNAME	None
2.	SOVIET DESIGNATION (EAST GERMAN)	Portable WESPE
3.	FUNCTION	Interception of radar, probably on X band.
4.	DESCRIPTION	Probably equipment of East German manufacture consisting of a wide band horn type antenna, transistorized video receiver, loud speaker and power supply. Receiver and power supply are contained in a 71 x 51 cm (28 x 20 in) box, weighing 8.2 kg (18 lbs). Rough frequency PRF and direction of detected signal can be transmitted by associated GO-4 transmitter.
5.	TECHNICAL CHARACTERISTICS	
	Frequency	1000 - 4000 MHz
6.	PERFORMANCE	Unknown



1.	NICKNAME	HIGH BRICK
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Unknown. It is normally seen in company with ECM equipment. May possibly be passive intercept.
4.	DESCRIPTION	A box-bodied GAZ-51 truck with a rectangular canvas covered structure on the roof. The canvas structure is 1.22 m (4 ft) high and the same size as the box-body. The truck normally tows a two-wheeled canvas covered generator trailer. HIGH BRICK is sometimes seen without the canvas cover, when two roof hatches are normally visible. The HIGH BRICK aerial system is interpreted as being a horn fed truncated parabolic or cylindrical reflector approximately 0.61 m (2 ft) high on a .915 - 1.01 m (36 - 40 in) circular base. The base and aerial are adjudged capable of rotation through 360°. A possible second aerial appears in the position of the rear hatch in the form of a probable blade some 0.38 m (15 in) high.
5.	TECHNICAL CHARACTERISTICS	Unknown
6.	PERFORMANCE	Unknown



Direction finders included elsewhere

FIX SERIES

KRUG

SMALL CROSS

SPIKE TWO

FULL HOUSE

SQUARE FOUR

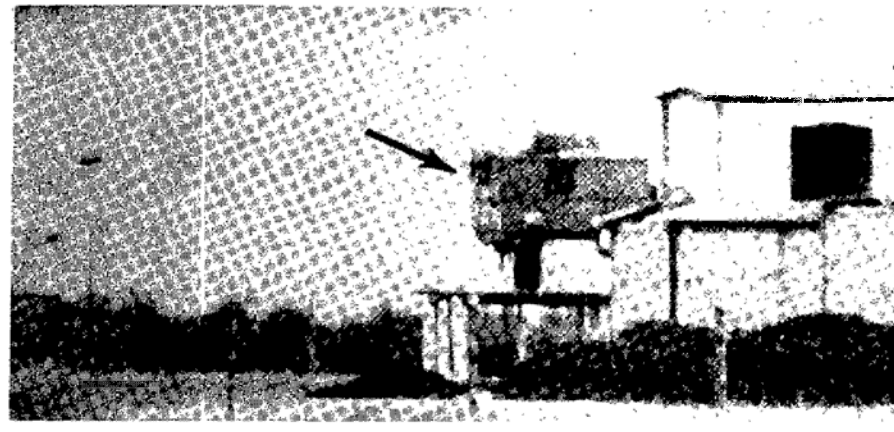
TALL RODS

See Section F - Navigational Aids or index

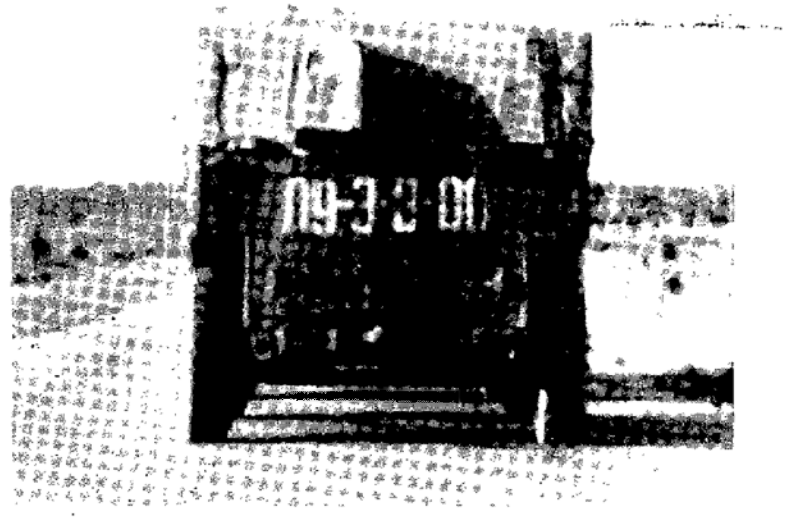
Section B - Active Electronic Countermeasures

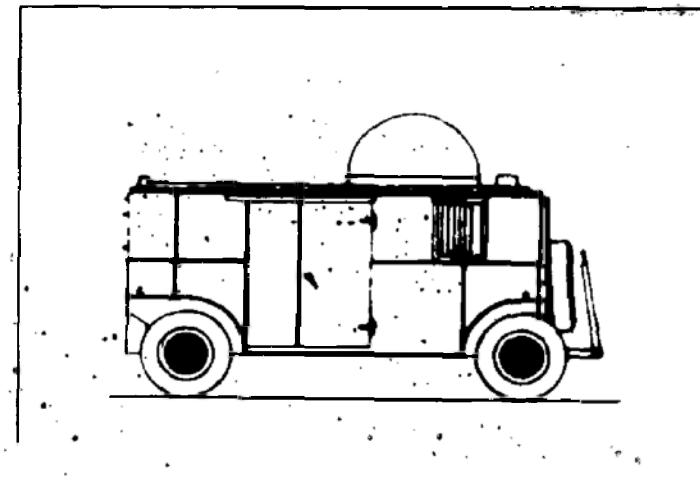
1.	NICKNAME	CHEESE BRICK
2.	SOVIET DESIGNATION	SPB-1
3.	FUNCTION	X band intercept receiving and jamming equipment against airborne bombing and navigation radar. Used in ECM sites associated with MOUND BRICK, TUB BRICK and DOME BRICK.
4.	TECHNICAL CHARACTERISTICS	Unknown
5.	PERFORMANCE	Unknown
6.	REMARKS	CHEESE BRICK consists of a GAZ 63 box-bodied vehicle which is believed to house the intercept receiving equipment. The system is believed to include portable jamming transmitters which may be located at a distance of up to 165 m (540 ft) from the receiving aerials.

CHEESE BRICK



1.	NICKNAME	MOUND BRICK
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Probably a jammer associated with CHEESE BRICK, used to provide false target indications. It is frequently seen with DOME BRICK and TUB BRICK.
4.	DESCRIPTION	A cabin trailer surmounted by a hemispherical dome, 1.7 m (5.6 ft) in diameter and 0.9 m (2.96 ft) high. The dome is offset towards the front end of the trailer.
5.	TECHNICAL CHARACTERISTICS	
	a. Frequency	8,600 - 10,000 MHz
	b. Modulation	Noise and possibly false targets.
	c. Output	400 watts
6.	PERFORMANCE	
	Range	Line of sight





1.	NICKNAME	HAT BRICK
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Probably radar intercept, possibly a jammer.
4.	DESCRIPTION	Equipment consists of a probable radome 66 cm (26 in) in diameter and 59 cm (23 in) high mounted on a base which can be elevated on a tubular mast. The mast is mounted on the roof of a GAZ 69A. In transit the radome is carried on the roof of the GAZ 69 and covered with a tarpaulin. The equipment has been sighted in company with FOLD PLATE.
5.	TECHNICAL CHARACTERISTICS	Unknown
6.	PERFORMANCE	Unknown

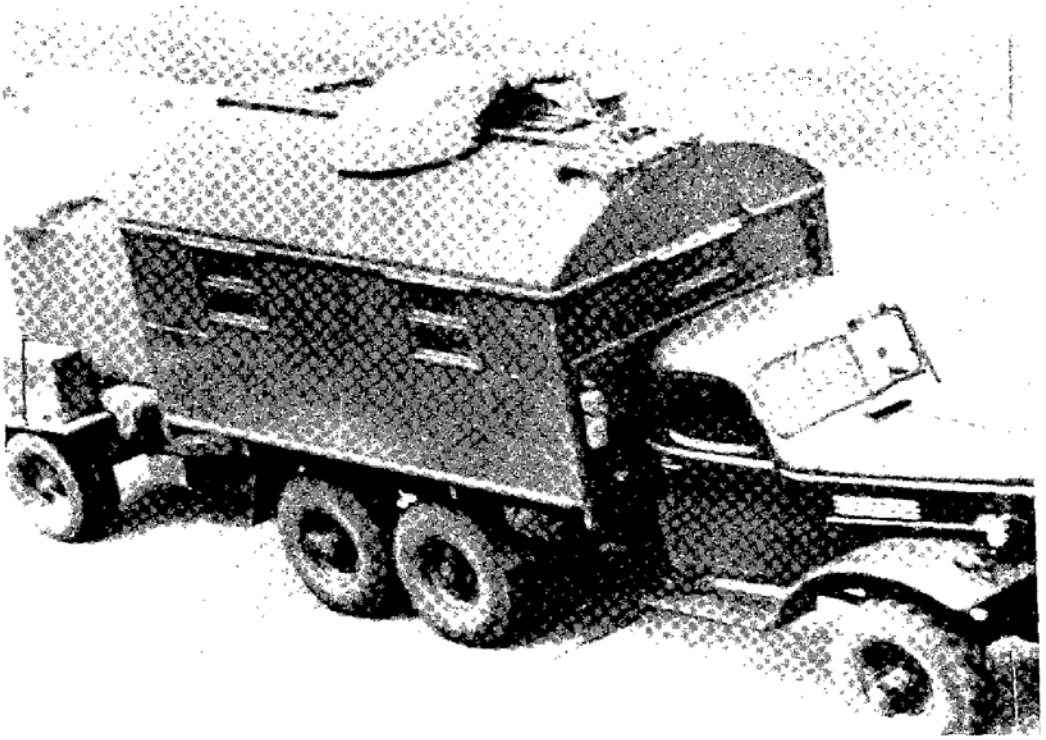
HAT BRICK

NO PHOTOGRAPHS AVAILABLE

1.	NICKNAME	TUB BRICK
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Radar intercept and/ or jamming equipment. It is usually seen in association with CHEESE BRICK and MOUND BRICK.
4.	DESCRIPTION	Pill box type of radome is mounted on a 4-wheeled SON-9 type trailer usually towed by a MAZ 502 truck. The radome is similar to CHEESE BRICK but it is 1.8 m (5.9 ft) in diameter and projects 0.9 m (3 ft) above the trailer roof.
5.	TECHNICAL CHARACTERISTICS	Unknown, but may be X band.
6.	PERFORMANCE	Unknown

Photo not available

1.	NICKNAME	FOLD PLATE
2.	SOVIET DESIGNATION	Unknown
3.	FUNCTION	Possible ECM or Radar Equipment
4.	DESCRIPTION	Mounted in a ZIL-157 box-bodied vehicle. The antenna appears to be an elliptical paraboloid approximately 1.8 m (6 ft) in width and 1.35 m (4 ft 6 in) high and is mounted on the front end of the vehicle roof. The antenna pedestal, approximately 1.2 m (4 ft) in height is hinged so as to allow the antenna to rest on the roof in the travelling position.
5.	TECHNICAL CHARACTERISTICS	Unknown
6.	PERFORMANCE	Unknown



CHAPTER IV

SPECIAL DEVICES

Section A - Infrared

1. NICKNAME — None

2. EAST GERMAN DESIGNATION — AT-2 infrared scope

3. FUNCTION — Used with the AT-2 Reconnaissance Theodolite to detect infrared emissions.

4. DESCRIPTION

The infrared scope for use with the AT-2 Reconnaissance Theodolite is a night viewing device which will detect infrared emissions. Its components are an infrared telescope including an image converter and a power unit for providing high voltage to the image converter.

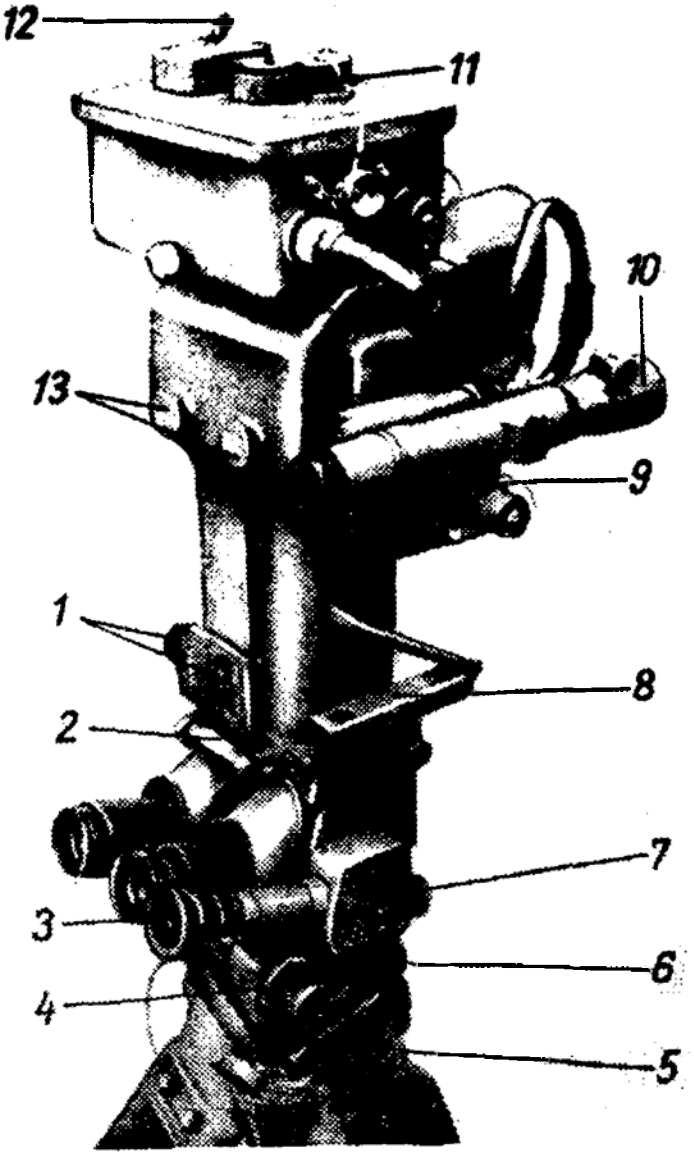
The scope may be operated as a passive device to locate infrared illuminators of friendly forces for making geodetic and artillery surveys. It can also operate passively to detect infrared searchlights being used by hostile forces. When used for this purpose, azimuth and vertical angle to the searchlights may be determined, but not range.

When used passively, distant sources of infrared radiation, when detected, appear as bright flashes in the scope.

When used as an active infrared viewing device with an adjacent infrared searchlight, the target at which the searchlight is aimed appears as an image in the image converter. An infrared searchlight specifically designed for use with this scope has not been indicated.

The AT-2 theodolite with which the scope is used is a tripod-mounted instrument which may be installed in bunkers and vehicles.

AT-2 INFRARED SCOPE



5. TECHNICAL CHARACTERISTICS

a. Type	Infrared-Passive-Active
b. Range	Variable
c. Optics	Unknown
d. Detector	Image Converter
e. Source	See Remarks
f. Resolution	Unknown
g. Field of view	Unknown
h. Spectral response	0.75 - 1.0 microns
i. Sensitivity	Unknown
j. Scan	Manual
k. Display	Phosphorescent Screen
l. Power-source	Batteries
m. -consumption	Unknown
n. Dimensions	Unknown
o. Weight	Unknown

REMARKS

Item 5c Distant infrared sources when used passively. Adjacent infrared search light when used actively.

6. PERFORMANCE Unknown

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1. NICKNAME — None

2. EAST GERMAN DESIGNATION — Unknown

3. FUNCTION — To provide clandestine voice communications.

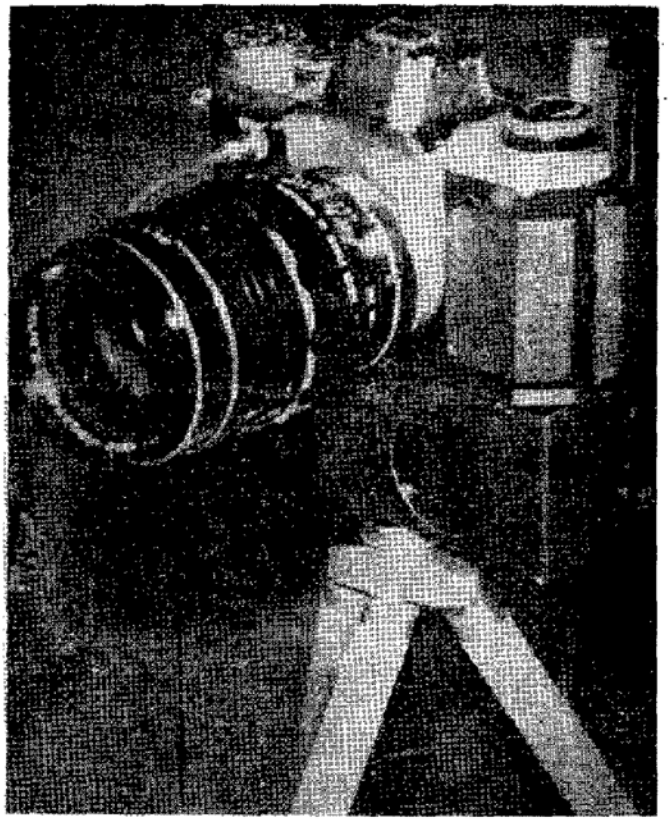
4. DESCRIPTION

This device was developed by the East Germans for clandestine voice communications. However, it has possible application for the special forces type of operations and for field army use. When packed for transport the system is placed in packages designed not to arouse suspicion. Such packages include a flashlight box to hold the battery, a camera case, a telephoto lens case to hold the special lens, a slide rule case, and the shell of a household appliance for the necessary electronic gear to operate the system.

Both incoming and outgoing signals pass through the lens of the camera. An outgoing signal comes from a voice modulator unit into the transceiver box where it is converted into an amplitude modulated light signal, and transmitted through the lens by a 45° mirror or prism. An incoming signal comes into the lens and is reflected into the transceiver where it is converted into an audio signal, and passed into the earphone. One of the three jacks on the modulator unit will probably accept a teletype or telegraph key input. This system probably operates in the simplex mode.

The telephone system operates on a line-of-sight basis and the view-finder on the camera body is used solely to aline the two communicating stations. The small box under the camera contains both the light source and the detector.

INFRARED COMMUNICATION SYSTEM DISGUISED AS CAMERA



5. TECHNICAL CHARACTERISTICS

a. Type	Active infrared communications system
b. Range	1 - 2 Km (0.55 - 1.1 nm)
c. Optics	See remarks
d. Detector	Photo-missive detector
e. Source	Infrared lamp
f. Spectral response	0.8 - 1.0 microns
g. Audio bandwidth	Unknown
h. Channels - Nr.	One channel (est)
i. Special capabilities	Teletype or telepraph (est)
j. Modes of operation	Simplex only (est)
k. Beam width	Unknown
l. Signal-to-noise ratio	Unknown
m. Power-source	Battery
n. Dimensions	Unknown
o. Weight	Unknown

REMARKS

Item 5c The special lens is similar to a conventional telephot lens. The camera has a 45° mirror or prism in its focal plane which reflects the signal to and from the transceiver box.

6. PERFORMANCE

Range may be diminished by poor atmospheric conditions.

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1. NICKNAME — None

2. EAST GERMAN DESIGNATION — DF 7X40

3. FUNCTION — Night Reconnaissance

4. DESCRIPTION

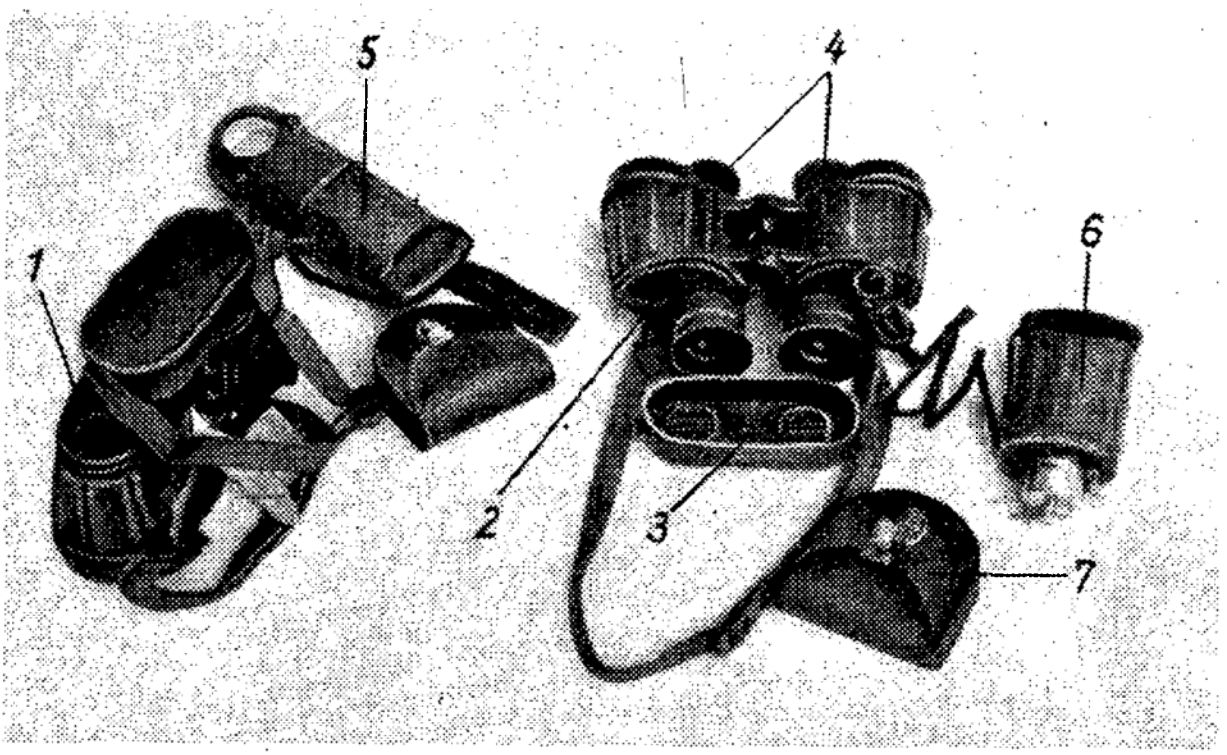
The DF 7X40 binocular, manufactured by the Carl Zeiss factory at Jena, East Germany, is for use in reconnaissance by the individual soldier.

Special features of the instrument are: Oculars suitable for use with protective masks; illuminated reticle for estimating horizontal and vertical angles; retractable infrared indicator in the left telescope making the detection of infrared light source possible; light filters that can be fitted to the instrument; and rims of the objective and ocular lenses fitted with rubber shock absorbers and the binoculars so well constructed that carrying case is not required.

East German army adoption of these binoculars as a standard field glass has considerably reduced the multiplicity of binocular instruments formerly in use. Manufacture of binoculars has been simplified and the number of spare parts required for quick and easy repairs has been reduced.

The DF 7X40 probably is a versatile daylight set of binoculars with the added capability of a nonimage forming detector (phosphorescent disc) capable of detecting an active infrared light source.

DF 7X40 Binoculars



5. TECHNICAL CHARACTERISTICS

a. Type	Passive
b. Range	See remarks
c. Optics	7 power
d. Detector	Phosphorescent disc
e. Source	None
f. Resolution	Unknown
g. Field of view	8° 30 minutes of arc
h. Spectral response	0.75 - 1.0 microns
i. Sensitivity	Unknown
j. Scan	Does not apply
k. Display	Phosphorescent disc
l. Power-source	See remarks
m. Dimensions	10.5 cm (4.1 in) long 21 cm (8.3 in) wide
n. Weight	1 kg (2.3 lbs) (est)

REMARKS

Item 5b Daytime range determined by terrain and weather. The range of passive night detection of hostile infrared illuminators depends on the intensity of the illuminator.

Item 5l The phosphorescent disc is activated by bright sunlight in 10 minutes and by cloudy daylight sky or vehicle headlight in 20 minutes.

6. PERFORMANCE — Satisfactory and reliable. The phosphorescent disc is energized each day by exposure to sunlight or artificial illumination filtered through an ultraviolet filter.

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1. NICKNAME — None

2. EAST GERMAN DESIGNATION — Weimar 3

3. FUNCTION — Observation aid for detection of infrared searchlights.

4. DESCRIPTION

The "Weimar 3" unit is an observation aid for detection of infrared searchlights which radiate toward the post of the observer.

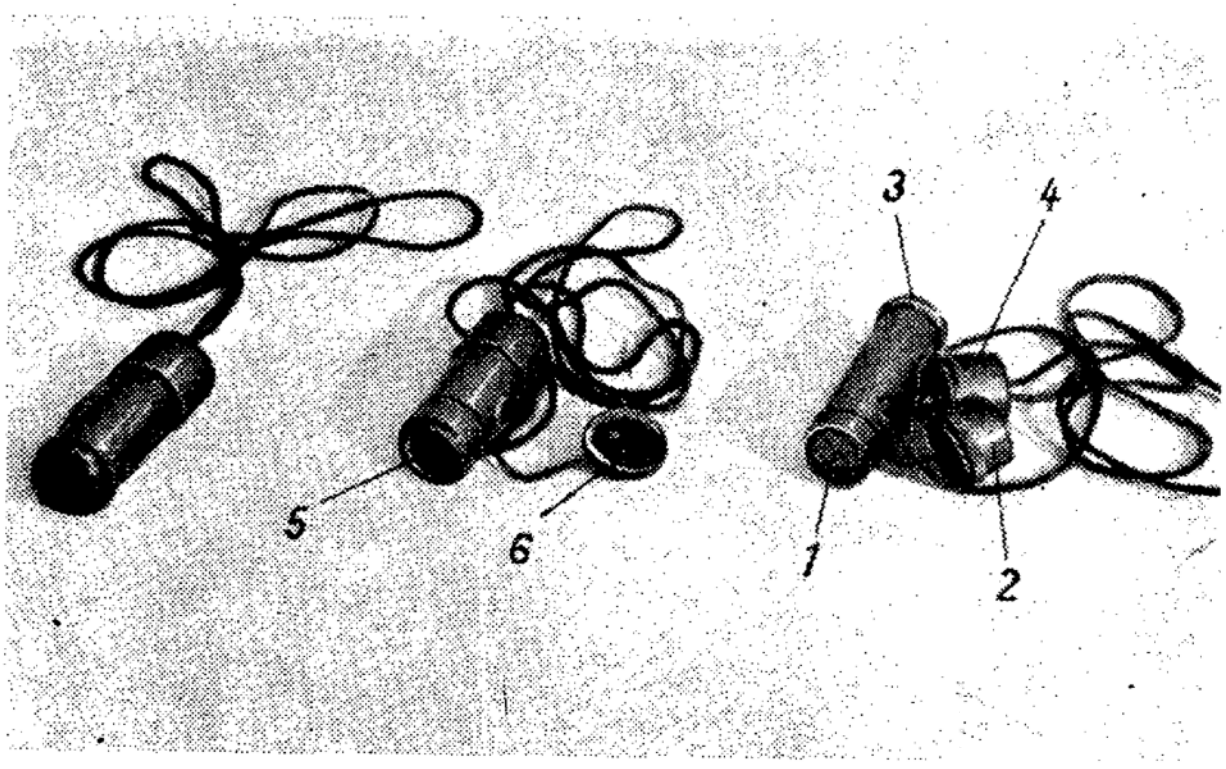
The body of the metascope is made up of two telescoping plastic tubes, one of which fits into the other. When extended, the metascope is 78 mm in length and when telescoped, 63 mm. The maximum outside diameter is 26 mm.

The device operates passively without any inherent radiation created in the equipment itself and does not require any power source. Its effectiveness is based on the fact that certain substances have the property of visibly lighting up when exposed to infrared light. However, these luminous substances must first be activated by being irradiated with ultraviolet (UV) light.

Infrared rays which hit the luminous screen deactivate the luminous substance and the screen must, therefore, be protected against any strong infrared light, such as daylight. In daylight or when not in use at night, the lenses in the metascope must be covered with protective caps to prevent exposure of the luminous screen to infrared rays. A cap which covers the viewing lens is fitted with a UV filter for use during activation of the screen. It can be activated in 10 - 20 minutes in sunlight or 20 - 30 minutes in overcast. It can also be activated by a 50-W automobile headlight at a distance of about 10 cm in 20 - 30 minutes.

The "Weimar 3", developed by the East German firm VEB Carl Zeiss, Jena, in 1961, appears to be in production in the USSR.

METASCOPE, WEIMAR 3



5. TECHNICAL CHARACTERISTICS

a. Type	Passive infrared
b. Range	Variable
c. Optics	See remarks
d. Detector	See remarks
e. Source	Hostile active infrared device
f. Resolution	Does not apply
g. Field of view	Unknown
h. Spectral response	0.75 - 1.0 microns
i. Sensitivity	Unknown
j. Scan	None
k. Display	See remarks
l. Power-source	See remarks
m. -consumption	Unknown
n. Dimensions	See remarks
o. Weight	112 grams (0.25 lb)

REMARKS

Item 5c. Evidence of anachromatic lenses of 2x magnification.

5d. Probably photo emissive detector of alkaline-earth sulphide.

5k. A white flash of light is seen when the device is pointed toward an infrared source. The Weimar 3 cannot form an image.

5l. The device is activated by being exposed through a UV filter to the sun, or an incandescent light, for 10 - 20 minutes, or to a 50 watt automobile headlight for 20 - 30 minutes. After activation, the metascope can be used for about 2 hours at night.

5n. Extended - 78 m. Telescoped - 63 m. Max Diameter 26 mm.

6. PERFORMANCE Unknown

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1. NICKNAME — None

2. POLISH DESIGNATION — T6-P

3. FUNCTION — Designed for measuring vertical and horizontal angles, determining the azimuth from sun and star observations and for measuring distance with the use of stadia.

4. DESCRIPTION

The T6-P theodolite based on the T6 theodolite, is a geodetic instrument built in Poland during 1961/62. It is designed for measuring vertical and horizontal angles, determing the azimuth from sun and star observations and for measuring distance with the use of stadia. It can be used during daylight as well as at night for many geodetic functions.

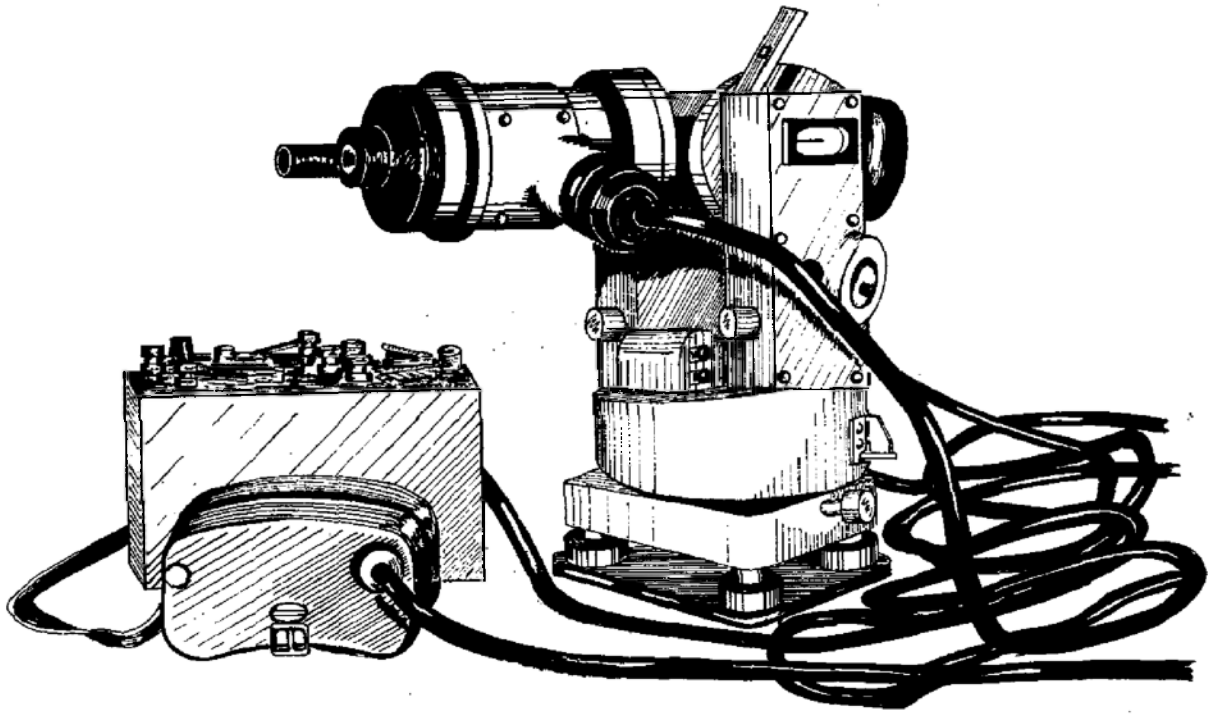
The theodolite with night vision telescope is basically a passive infrared system. It can operate by using infrared radiation emitted by the target and also as an active infrared system by the addition of a source of infrared light to illuminate the target.

The components of the system are a telescope equipped with an electro-optical image converter and reading microscope, a 12 volt battery and a high voltage power transformer. 12 volt power is converted through the transformer to high voltage to energize the image converter. When used as an active infrared system a source of infrared light is added. This light is directed so as to illuminate the observed object, which in turn, reflects a stream of infrared energy back to the detector.

In order to protect the electro-optical converter from damage caused by strong light, an adjustable opening has been installed in front of the objective.

When T6-P is used as a passive system, the range is determined by the intensity of radiation from the distant infrared illumination. The range of the active system is determined by the intensity of radiation of the nearby infrared illuminator. A very concentrated narrow illuminating beam provides greater range than a wide angle illuminator.

INFRARED THEODOLITE T6-P



5. TECHNICAL CHARACTERISTICS

a. Type	Passive and Active Infrared
b. Spectral response	0.75 - 1.0 microns
c. Range	Unknown
d. Accuracy	Unknown
e. Output	Unknown
f. Modulation	Unknown
g. Power supply	Battery - see remarks
h. Light source	Infrared lamp
i. Dimensions	See remarks

REMARKS

Item 5g. In addition to a 12 volt silver-zinc storage battery there is a high voltage transformer to change the 12 vdc to 18,000 vdc.

5i. Overall length of telescope - 268 mm
Diameter of objective - 58 mm.

6. PERFORMANCE Unknown

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1. NICKNAME — None

2. SOVIET DESIGNATION — PPN-2

3. FUNCTION — Infrared night sighting for machineguns.

4. DESCRIPTION

The East German periodical Arme Rundschau of January 1967, a Czechoslovak gunnery manual, and the Czechoslovak periodical Zapisnik of 2nd April, 1966 give brief descriptions of the Soviet PPN-2 infrared instrument for machinegun firing at night.

Components of the system include a light source (infrared emitter), an optical system (which includes an image converter), and a powerpack. The powerpack provides suitable current for operation of the infrared emitter and the image converter.

The instrument operates on the principle that infrared rays reflect from a target back into the optical system where they can be converted into a visible picture by the image converter.

The system may be used for firing a machinegun from a ground position or from an armored personnel carrier without fixed mount.

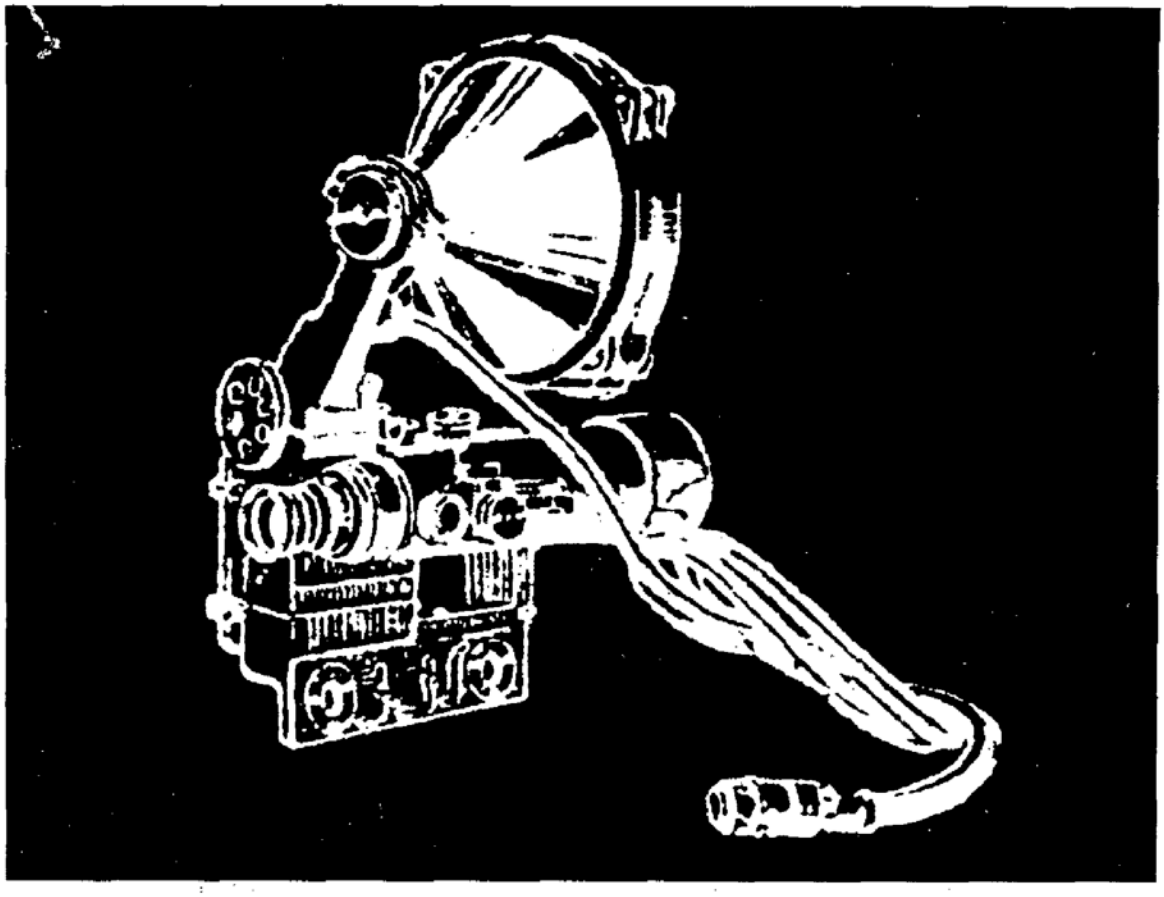
Aiming information listed in the Czechoslovak gunnery manual cites ranges of from 100 - 500 m. The manual indicates that best results are obtained from 200 - 500 m.

5. TECHNICAL CHARACTERISTICS

a. Type	Active
b. Range	500 m
c. Optics	Unknown
d. Detector	Image-converter tube
e. Source	Infrared lamp
f. Resolution	Unknown
g. Field of view	Unknown
h. Spectral response	0.75 - 1.0 microns
i. Sensitivity	Unknown
j. Scan	Manual
k. Display	Image-converter tube
l. Power-source	Batteries

6. PERFORMANCE — Effective, reliable

INFRARED SIGHTING SYSTEM PPN-2



1. NICKNAME — None

2. SOVIET DESIGNATION — RT-2

3. FUNCTION — Used to obtain direction and elevation of infrared targets at night.

4. DESCRIPTION

The reconnaissance theodolite, RT-2, was developed by the USSR to aid in locating infrared targets at night. Used to determine both the azimuth and the height of a hostile infrared-emitting target, it is similar to a conventional surveyor's transit.

5. TECHNICAL CHARACTERISTICS

a. Type	Passive near-infrared azimuth and height finder
b. Range	Variable
c. Optics	Unknown
d. Detector	Probably a photo-missive detection
e. Source	Hostile infrared
f. Resolution	Unknown
g. Field of view	Unknown
h. Spectral response	0.75 - 1.0 microns
i. Sensitivity	Unknown
j. Scan	Manual
k. Display	See remarks
l. Power-source	Battery
m. -consumption	Unknown
n. Dimensions	Unknown
o. Weight	Unknown

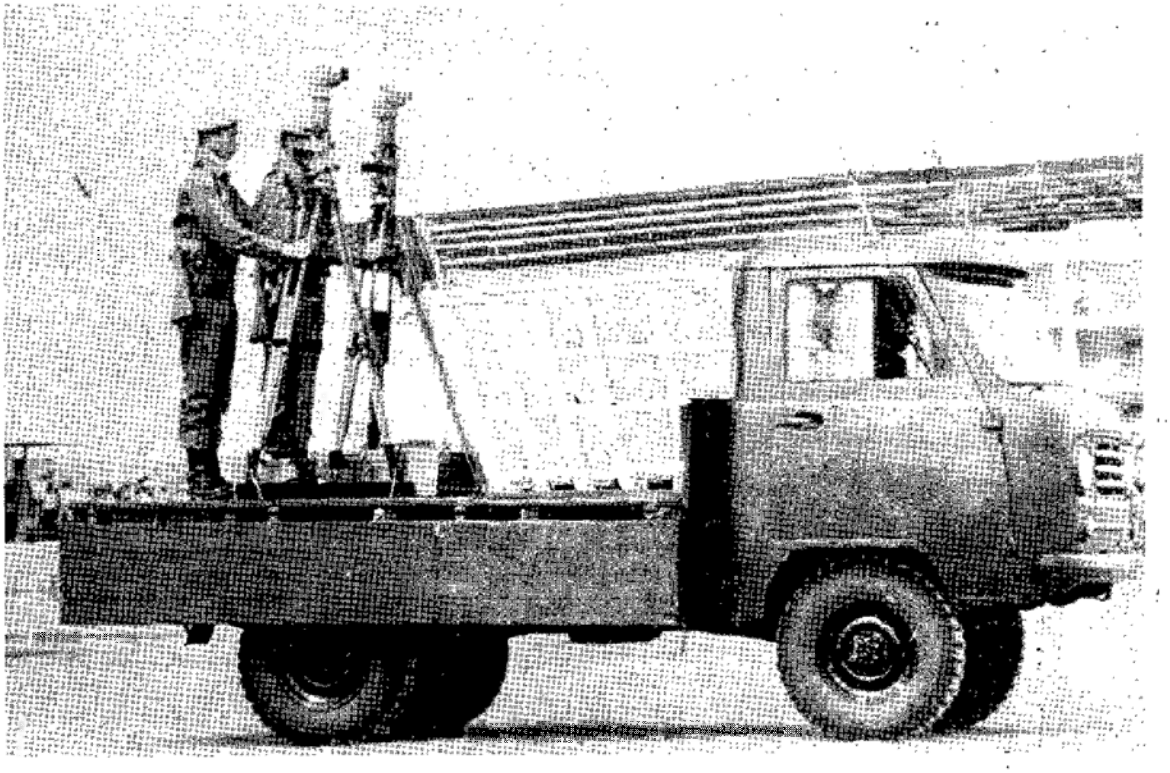
REMARKS

Item 5k. Probably on small phosphorescent disk.

6. PERFORMANCE — Unknown

NATO SECRET

RECONNAISANCE THEODOLITE RT-2



1. NICKNAME — None

2. SOVIET DESIGNATION — TKN-1

3. FUNCTION — For surveillance at night by commanders of armored vehicles.

4. DESCRIPTION

This infrared observation system was developed by the USSR and is presently used by most Eurasian Communist countries. The system is used on T-54, T-55, and T-62 medium tanks; T-10M heavy tanks; ASU-85 gun; and the BTR-60p APC.

The system consists of three major components: (1) searchlight, a filtered incandescent light located on vehicle cupola; (a) periscope viewing device; and (3) power supply, run by the main engine of the vehicle, which provides the necessary power to operate the periscope image converter. The system is used by the commander to observe in all directions, and to control vehicle movement at night.

5. TECHNICAL CHARATERISTICS

a. Type	See remarks
b. Range	500 m (0.27 nm)
c. Optics	Periscope
d. Detector	See remarks
e. Source	Infrared searchlight
f. Resolution	Unknown
g. Field of view	Unknown
h. Spectral response	0.75 - 1.0 microns
i. Sensitivity	Unknown
j. Scan	See remarks
k. Display	See remarks
l. Power-source	Vehicle main engine
m. Dimensions	See remarks
n. Weight	Unknown

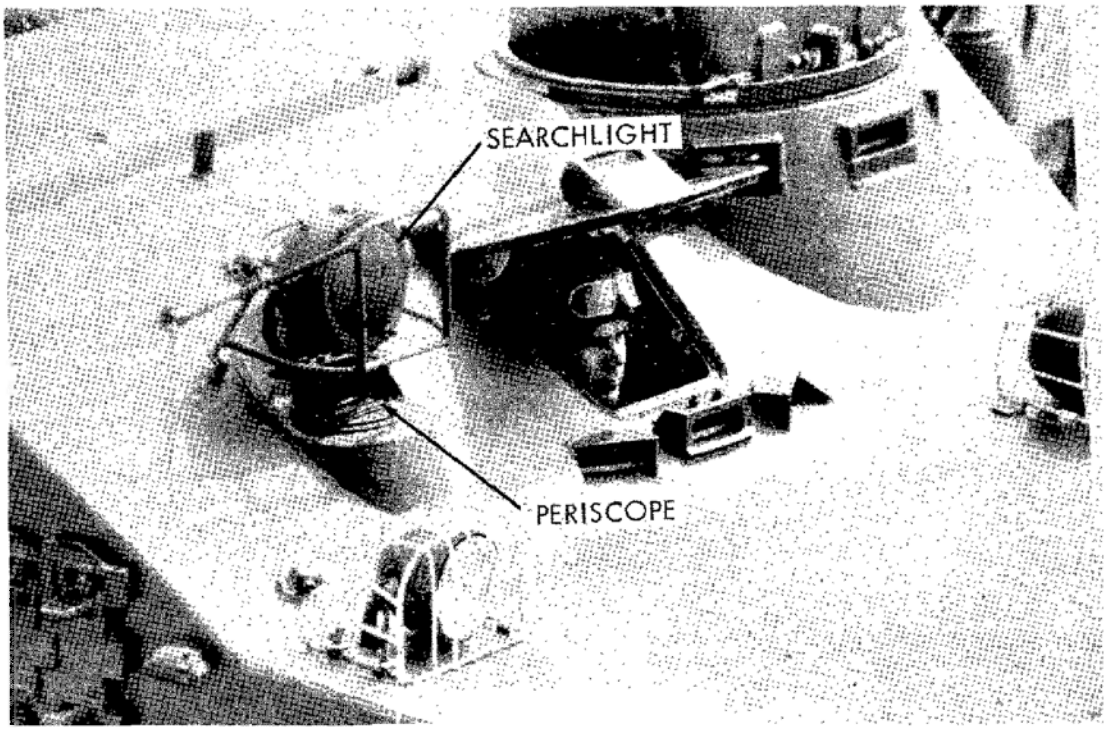
REMARKS

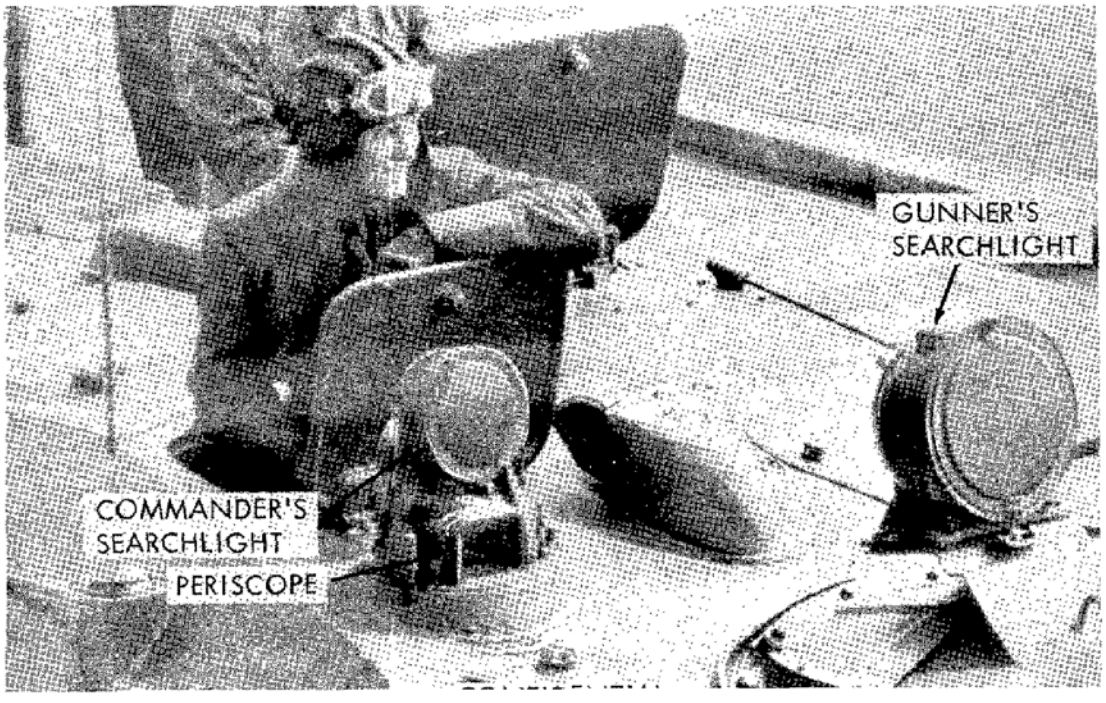
Item 5a. Active near-infrared combat surveillance system.

5d. Probably a photo-missive image-converter tube.

5j. TPN-1 on tanks rotates with the commander's cupolar on self-propelled guns and armored personnel carriers, TPN-1 has a fixed field of view.

INFRARED OBSERVATION SYSTEM TKN-1





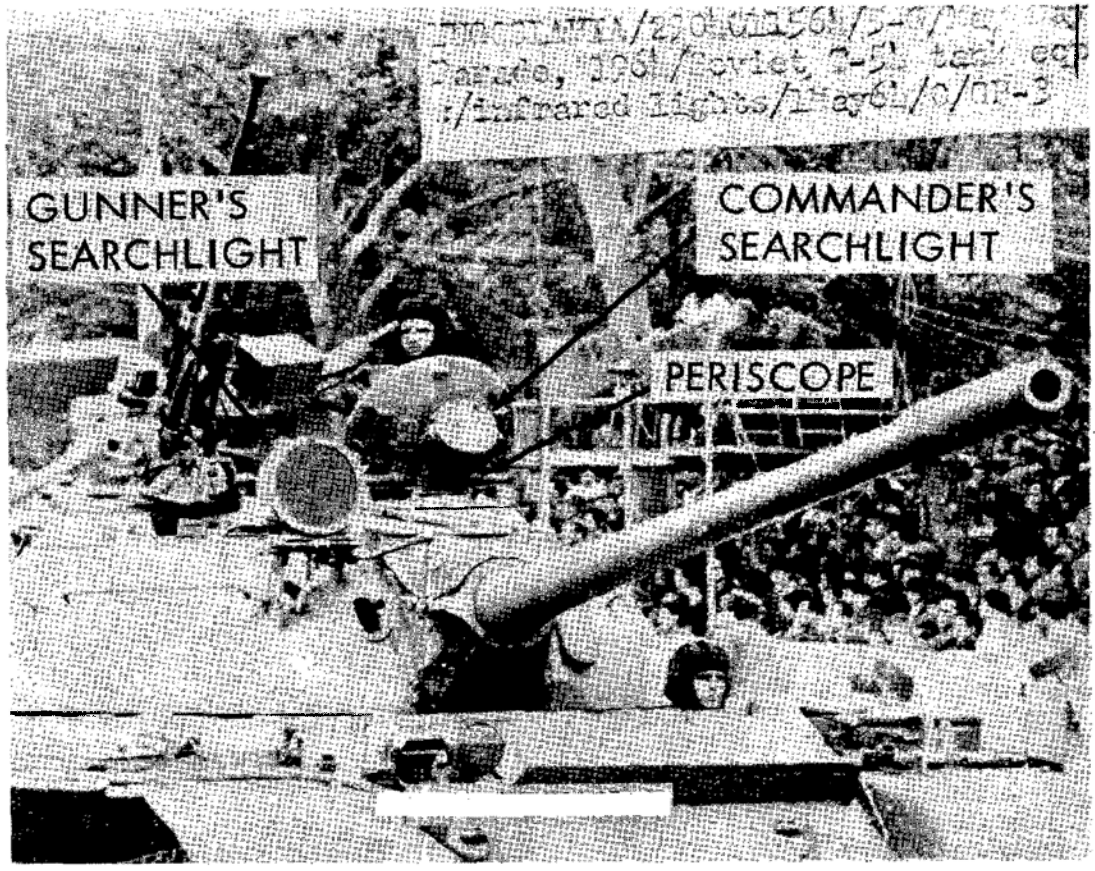
REMARKS continued

Item 5k. Probably on small screen of image-converter tube.

5m. Searchlight: diameter 21 cm (8.3 in); depth 18 cm (7.2 in).

6. PERFORMANCE — Effective and reliable. Moving tank-sized targets can be detected at 500 m (0.27 nm).

INFRARED OBSERVATION SYSTEM TKN-1



1. NICKNAME — None

2. SOVIET DESIGNATION — TPN-1

3. FUNCTION — Used by gunners on tanks and self-propelled assault guns for night sighting.

4. DESCRIPTION

The Soviet TPN-1 night sighting system is used by gunners on tanks and on self-propelled assault guns.

The equipment consists of an infrared searchlight, a periscope, and a power supply unit.

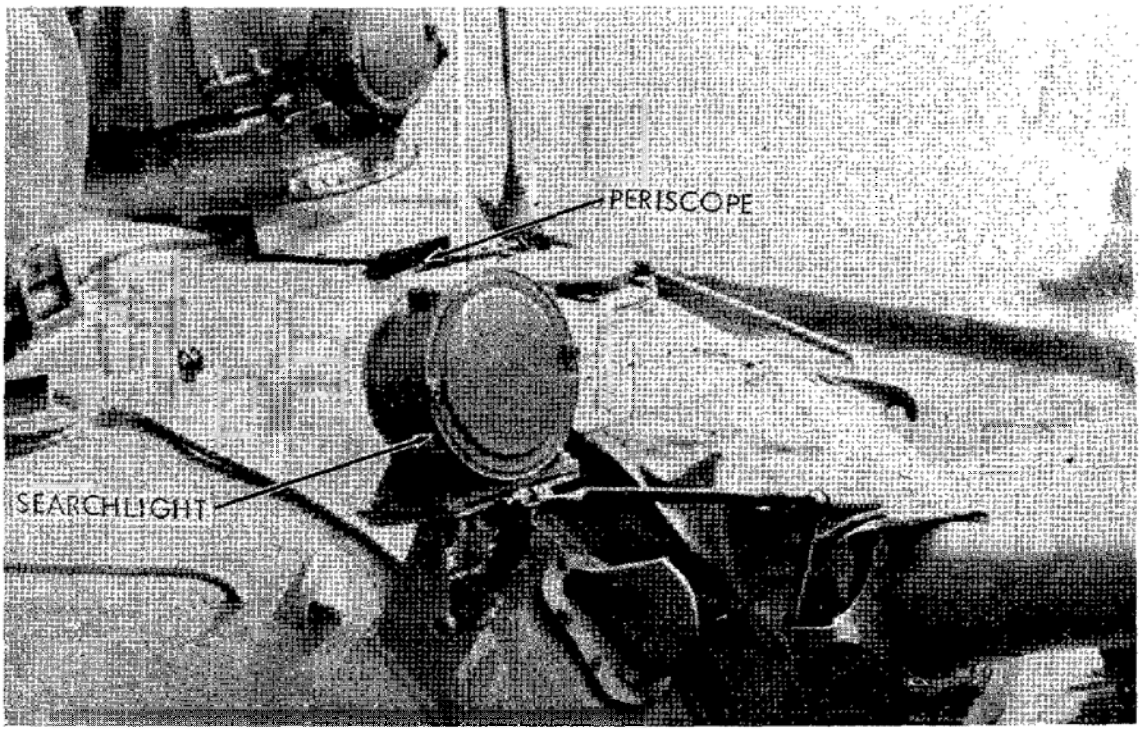
The searchlight is mounted on a tank so that the area to which the gun is pointed is automatically illuminated. This night vision system permits the gunner to detect a moving tank-size target at about 1000 m.

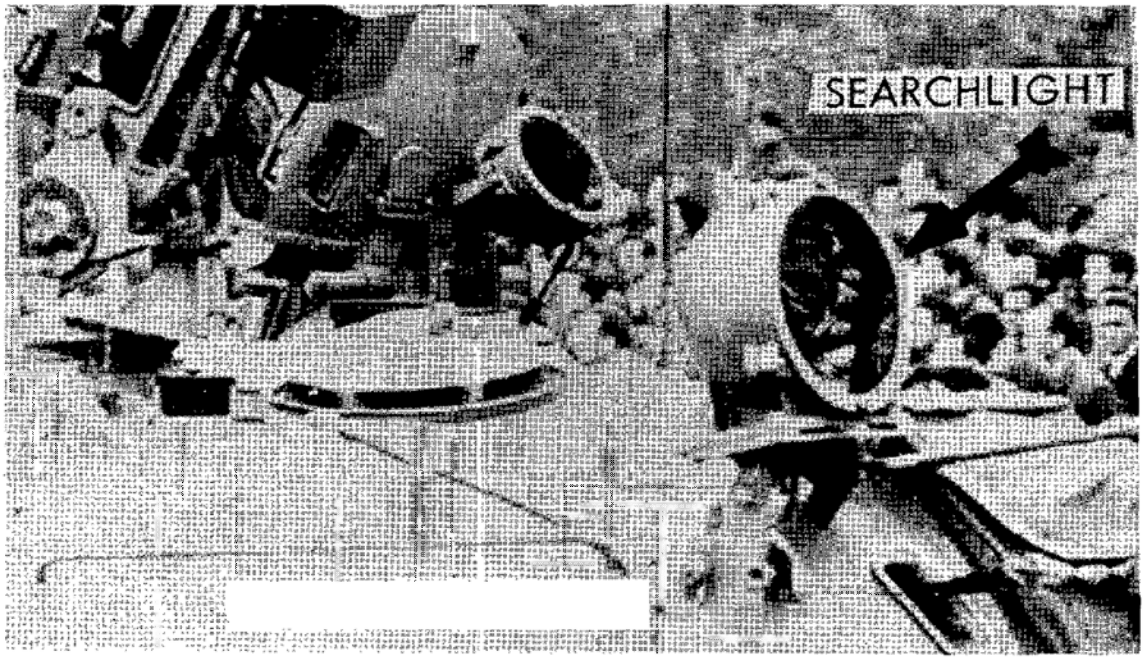
In approximately 1955, the Soviet Union began mass production and instsllation of infrared sighting systems for tank guns. The equipment has been installed on medium tanks (T-54b, T-55, and T-62) and self-propelled assault guns (ASU-85); it also has been retrofitted on some T-54a medium tanks and T-10 and T-10M heavy tanks.

5. TECHNICAL CHARACTERISTICS

a. Type	Active
b. Range	1000 m (0.54 nm)
c. Optics	Periscope
d. Detector	Infrared image-converter tubes
e. Source	Searchlight covered by infrared filter
f. Resolution	Unknown
g. Field of view	Unknown
h. Spectral response	0.75 - 1.0 microns
i. Sensitivity	Unknown
j. Scan	None
k. Display	Luminescent screen
l. Power-source	Vehicle battery
m. -consumption	Unknown
n. Dimensions	Searchlight - 35 cm (13.75 in) diameter
o. Weight	Unknown

INFRARED GUN SIGHT TPN-1



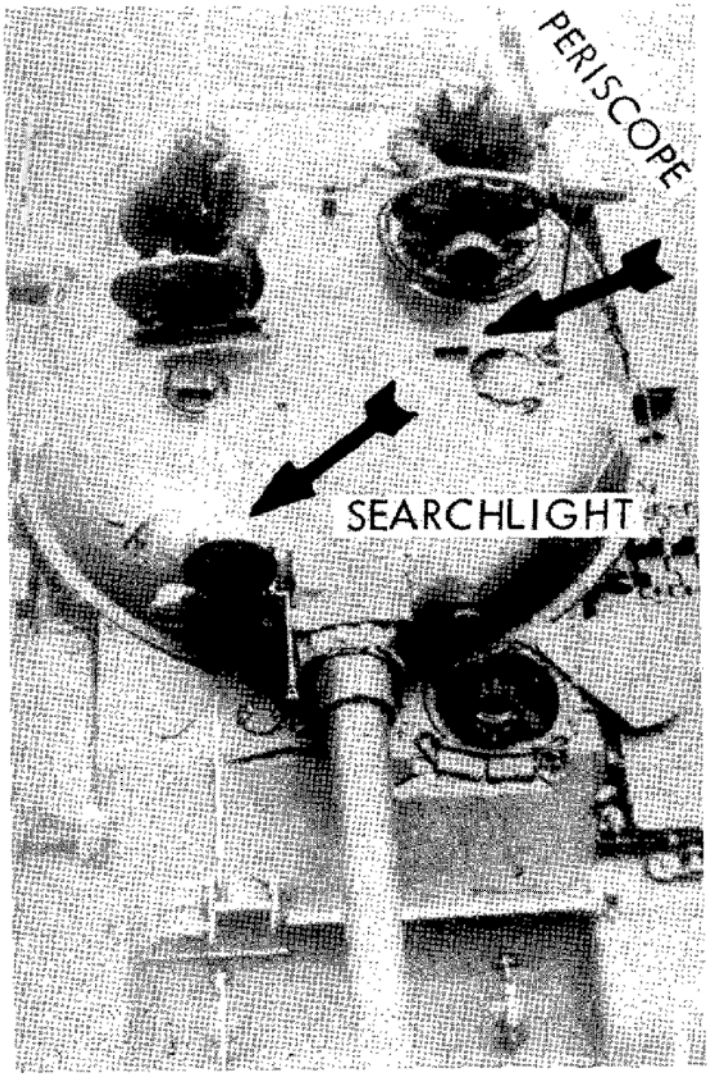


6. PERFORMANCE

Effective and reliable. Under ideal conditions of terrain, weather and well trained observers, a moving tank-sized target can be detected up to a range of 1000 m. At about 900 m the target can be recognized as a tank or other vehicle. At about 800 m the target can be identified.

NATO SECRET

INFRARED GUN SIGHT TPN-1



1. NICKNAME — None

2. SOVIET DESIGNATION — DSM - 0.9

3. FUNCTION — Rangefinder, with infrared detector

4. DESCRIPTION

The DSM-0.9 is used by day as an artillery rangefinder. It contains an infrared detector, probably a phosphorescent disc, in at least one ocular. The device may be used to detect hostile infrared illuminators and may be used to determine range at night.

5. TECHNICAL CHARACTERISTICS

a. Type	Rangefinder with passive infrared detector
b. Range	Variable
c. Optics	Similar to conventional rangefinder
d. Detector	See remarks
e. Source	Hostile infrared equipment
f. Resolution	Unknown
g. Field of view	Unknown
h. Spectral response	0.75 - 1.0 microns
i. Sensitivity	Unknown
j. Scan	Manual
k. Display	Unknown
l. Power-source	Unknown
m. Dimensions	See remarks
n. Weight	Unknown

REMARKS

Item 5d. Probably a phosphorescent disc

5m. Similar to a conventional rangefinder. Arm length is about 1 m (3.3 ft).

6. PERFORMANCE — Unknown

RANGEFINDER DSM-0.9

1. NICKNAME None

2. SOVIET DESIGNATION TVN-1

3. FUNCTION Night driving aid

4. DESCRIPTION

Developed by the USSR, the infrared night-driving system TVN-1 (and the similar TVN-2 system) is now being used by most Warsaw Pact Countries and some neutral nations. The system has been installed on the following Soviet armored vehicles: PT-76 amphibious tanks; T-54, T-55, and T-62 medium tanks; T-10 and T-10M heavy tanks; ASU-57 and ASU-85 self-propelled assault guns; ZSU-57-2 self-propelled, twin, 57-mm antiaircraft guns; BTR-40, BTR-50P, BTR-60P, and BTR-152 armored personnel carriers; and BRDM amphibious armored reconnaissance vehicles.

The system consists of one or two headlights fitted with infrared filters and a binocular periscope containing an infrared image-converter tube. It also has an electric powerpack for transforming and rectifying the vehicular electrical system voltage from 12 or 24 V DC to 15,000 - 20,000 V AC for use in the image-converter tube.

The image-converter tube is vulnerable to severe permanent damage from either intense infrared radiation from 0.75 - 1.0 microns in wavelength or visible light from 0.3 - 0.75 microns in wavelength. The periscopes are equipped with a manually controlled shutter, but a sudden emission of light from a powerful light source, such as a searchlight or a nearby pyrotechnic flare, could disable the image-converter tube before the shutter could be closed.

TVN-1 also being manufactured in Czechoslovakia for use by Warsaw Pact Countries.

INFRARED DRIVING AID TVN-1

5. TECHNICAL CHARACTERISTICS

a. Type	Active, near infrared
b. Range	50 m (164 ft)
c. Optics	Periscope
d. Detector	See remarks
e. Source	Infrared headlight
f. Resolution	Unknown
g. Field of view	See remarks
h. Spectral response	0.75 - 1.0 microns
i. Sensitivity	Unknown
j. Scan	Does not apply
k. Display	See remarks
l. Power-source	Vibrator supply from vehicle main engine
m. Dimensions	See remarks
n. Weight	Unknown

REMARKS

Item 5d. The detector is a photo-missive image-converter tube.

5g. The field of view is 53°, horizontal; 11° - 17°, vertical.

5k. The display is on the screen of an image-converter tube.

5m. Headlight dimensions are: diameter, 16 cm (6.3 in); depth, 11.5 cm (4.5 in)

6. PERFORMANCE

Fairly effective for night viewing at distances of 10 - 50 m. The area about 5 - 10 m immediately in front of the driver is viewed in a distorted manner. This distortion necessitates careful training of drivers.

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1. NICKNAME — None

2. HUNGARIAN DESIGNATION — NSzP-2

3. FUNCTION — To provide night viewing for reconnaissance and observation.

4. DESCRIPTION

The Hungarian snooperscope is a small, lightweight, tactical, night-viewing device for reconnaissance and observation.

The system consists of an infrared source (probably a tungsten-filament, incandescent bulb behind an infrared filter), an infrared telescope, and a power supply.

5. TECHNICAL CHARACTERISTICS

a. Type	Active near-infrared observation system
b. Range	200 m (655 ft)
c. Optics	Unknown
d. Detector	See remarks
e. Source	See remarks
f. Resolution	Unknown
g. Field of view	Unknown
h. Spectral response	0.75 - 1.0 microns
i. Sensitivity	Unknown
j. Scan	Manual
k. Display	See remarks
l. Power-source	Battery
m. Dimensions	Source 14.5 cm (5.7 in) diameter
n. Weight	3.6 kg (7.9 lbs)

REMARKS

Item 5d. The detector is probably a photo-missive image-converter tube.

5e. The source is an attached infrared lamp (probably with a tungsten filament).

5k. The display is on the luminescent screen of an image-coverter tube.

6. PERFORMANCE — Unknown

NIGHT OBSERVATION SYSTEM NSzP-2

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This Index contains referencees to all equipments listed in MC 262/A, B and C. The reference numbers are in the following order: Volume - Chapter - Section - Page; for example: A-II-C-11 refers to MC 262/A, Chapter II, Section C, Page 11.

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