

FREGAT-Family

Radars



Mission

Fregat-family 3D radars are designed to detect air and surface targets, and provide target designation data to weapon systems. The radars are capable of performing effectively in intensive ECM environment the following tasks:

- Air/surface situation surveillance and display;
- Detection of air targets, including low-flying and small-size ones;
- Surface target detection;
- Target tracking and transmission of tracking data to command and control systems;
- Provision of primary radar information to firing units, ECM assets and data processing systems;
- Identification "friend-or-foe";
- Target tracking and provision of secondary radar information, if equipped with data processing systems, to command and control systems.

Fregat-family radars can be integrated with

other shipborne electronic equipment. They feature automatic programmed switch-on capability to exclude human errors, and automated test equipment to locate malfunctions and failures in line replaceable units.

Fregat-family radars differ in scanning range, number of microwave channels, and weight.

Depending on version, the radars can be mounted on various ships displacing 500-plus tonnes: Fregat-MAE – on small- and medium-displacement ships; Fregat-MAE-1 and Fregat-MAE-4k – on small-displacement ships; Fregat-MAE-2 – on medium-displacement ships; Fregat-MAE-3 and Fregat-MAE-5 – on medium- and large-displacement ships.



Basic specifications

	Fregat MAE	Fregat MAE-1	Fregat MAE-2	Fregat MAE-3	Fregat MAE-4k	Fregat MAE-5	Fregat M2EM
Frequency band	E	E	E	E	H	E	E
Number of radar channels	1	1	1	2	1	2	2
Scanning zone:							
in range, km	150	300	300	300	150	300	300
in azimuth, deg	360	360	360	360	360	360	360
in altitude, km	30	30	30	30	20	30	30
in elevation, deg	45 (55)*	30	45	55	40	55	45 (55)**
Detection range, km:							
fighter	130 (125)*	125	200	180	58	230	230
missile	30 (27)*	27	43	38	17	50	50
ship	line-of-sight range						
Min operational range, km	2	2	2	2	1.5	2	2
Measurement accuracy:							
range, m	120	120	120	120	120	120	120
azimuth, ang.min	24	24	24	24	14	24	24
elevation, min	26 (40)*	43	26	30	18	30	30
Max scan rate, sec	4	4	4	2.5	2	2.5	2.5
Number of targets tracked	-	-	-	-	40	40	-
Antenna rotation rate, rpm	15	15	15	12/6	30	12/6	12/6
Number of units	7	8	10	15	8	22	20
Area occupied, sq.m	16	16	24	34	20	51	48
Weight, t:							
equipment	2.9	3.1	4.56	6.6	2.60	9.6	9.25
antenna station	2.2	1.0	2.25	2.5	0.39	2.5	2.50
Power consumption, kW	30	30	60	45	30	90.3	90
Into-action time, min	5	5	5	5	3	5	5

* – parameters in parentheses are given for the low-frequency E-band version

** – the first and second channels respectively

PODBERYOZOVIK-Class

Radars



Mission

Podberyozevok-ET1 and Podberyozevok-ET2 3-D radars are designed to detect air and surface targets, and to designate them to weapon systems. The radars can be mounted on medium and large displacement ships with the purpose to:

- provide information on air/surface situation;

- detect surface and air targets, including low-flying and small-size ones;
- track targets and transmit tracking data to combat control systems;
- provide primary radar information to firing units, ECM and data processing systems;
- perform identification "friend-or-foe";
- track the detected targets and provide secondary radar information, if completed with

appropriate data processing equipment, to combat control systems.

Composition

- antenna assembly
- transmitter
- radar controls and displays

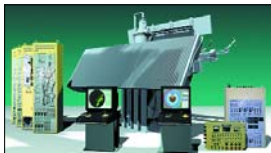
Features

The Podberyozevok-ET2 radar's vertical antenna aperture is two times smaller than that of Podberyozevok-ET1.

Both radars are equipped with automated built-in test equipment capable of locating malfunctions and failures in any line replaceable unit. Podberyozevok-class radars can be integrated easily with other shipborne electronic systems.

Basic specifications

	Podberyozevok-ET1	Podberyozevok-ET2
Frequency band	C	C
Number of coordinates measured	3	3
Scanned zone:		
in range, km	500	500
in altitude, km	40	40
in azimuth, deg	360	360
in elevation, deg	30	30
Detection range, km:		
fighter	300	240
missile	55	45
ship	line-of-sight	line-of-sight
Min operational range, km	5	5
Measurement accuracy:		
range, m	150	150
azimuth, ang.min	24	24
elevation, ang.min	30	60
Antenna rotation rate, rpm	12; 6	12; 6
Number of components	7	7
Area occupied, sq.m	30	30
Weight, t:		
equipment	3.2	3.2
antenna	4.7	2.9
Power consumption, kW	45	45
Into-action time, min	0.5	0.5



POZITIV-ME

Radars

Mission

Pozitiv-ME and Pozitiv-ME1.2 3D active radars are an integral self-contained part of multi-purpose radioelectronic systems of small- and medium-displacement ships. The radars are designed to detect and track air and surface targets.

Features

Pozitiv-family radars perform the following tasks:

- Air/surface situation surveillance and display;
- Automatic detection and tracking of surface and air targets, including small-size, low-flying, and diving ones;
- Target detection and tracking in preselected sectors with automated mode selection depending on the ECM environment;
- Target identification "friend-or-foe" by means of shipborne IFF equipment and built-in antennas;
- Target coordinates and motion parameters determination;
- Target classification by trajectory parameters;
- Target threat prioritisation;
- Automatic target distribution;
- Target distribution plan display with on-line correction possibility;
- Targeting data feed to cooperating ship's systems;
- Automatic operational modes selection;
- Automatic operability control and trouble-shooting;
- Interface with shipborne navigation systems;
- Recording of target data pro-

cessing output, worked-out solutions, and interfaced system status;

- Personnel training in simulated radar environment.

Thanks to use of high-speed rotation antenna with electronic elevation scanning, special target surveillance/lock-on/tracking/prioritisation modes and algorithms, automation of target designation and data distribution, Pozitiv radars feature short reaction time, high throughput capacity and target designation accuracy, thus enhancing combat capabilities of the conjugated weapon systems.

Basic specifications

	Pozitiv-ME1	Pozitiv-ME1.2
Operational frequency band	X (3 cm)	X (3 cm)
Target coordinates determined simultaneously	3 (bearing, range, elevation)	3 (bearing, range, elevation)
Aerial:		
type	flat phased array	flat phased array
directional diagram	multi-beam	multi-beam
directional diagram	frequency-position	frequency-position
elevation control		
revolution cycle, sec	2; 5; 10; 20	1; 2; 5
Scanned zone:		
in range, km	up to 150	up to 80
in altitude, km	up to 30	up to 20
in elevation, deg	up to 85	up to 85
in azimuth, deg	360	360
Max target detection range (w/o ECM, normal radar visibility, Sea State up to 3, 12-m high aerial, 0.5 probability per cycle), km:		
air target (RCS=1 sq.m, flight altitude - 1,000 m)	110	50
anti-ship missile (RCS=0.03 sq.m, flight altitude - 15 m)	15	13-15
surface target (RCS=10,000 sq.m)	0.9-0.95 radio horizon range	0.9-0.95 radio horizon range
Min detection range, m	1,000	1,000
Coordinates detection root-mean-square error:		
in range, m	20	20-40
in azimuth, mil	3-4	3-6
in elevation, mil	3-4	4-6
Lock on-to-designate reaction time, sec	3-5	2-4
Simultaneously tracked targets	3-5	up to 40
Weight, kg:		
antenna station	1,460	750
underdeck equipment	1,740	1,400
Power consumption, kW	max 45	45
Into-action time, min	3	3