ELECTRONIC WARFARE, SURVEILLANCE AND TARGET DETECTION SYSTEMS

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80K6K1
3D AIR SURVEILLANCE RADAR

The mobile 3D air surveillance radar for low, medium and high altitudes with coordinate and track outputs, operating off-line or as a part of regional and national automatic control post (ACP) is designed to be used:
- as a part of anti-aircraft missile troops to issue targeting to anti-aircraft missile complexes;
- as an information link in the air forces and air defense units for air traffic control.

Main Specifications:

<table>
<thead>
<tr>
<th>Maximum radar operation limits:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>in range, km</td>
<td>400</td>
</tr>
<tr>
<td>in azimuth, deg</td>
<td>360</td>
</tr>
<tr>
<td>in elevation, deg</td>
<td>0...35, 0...55</td>
</tr>
<tr>
<td>in altitude, km</td>
<td>40</td>
</tr>
</tbody>
</table>

Target detection range, RCS=3-5 m² (at P=0.8 F=10⁻⁶):
- at flight altitude 10 km 200...250

Transmitter type: Multibeam klystron

- Transmitter peak power, kW: 130
- Number of beams: 12
- Clutter suppression, dB: 50
- Jamming cancelling, dB: 20
- Track throughput, more than: 300
- IFF equipment: built-in

The radar system provides:
- detection, tracking and measurement of the airborne target coordinates and their ground speed under conditions of no interference and of natural noise and active and passive jamming as well as under their combined effect;
- recognition of the aircraft IFF equipment, the individual and flight information gaining from friendly aircraft, data representation and issuing to users;
- jamming station direction finding in elevation and azimuth;
- data issuing to off-line display facilities and interaction with command posts of regional and higher national ACP.
Mobile Radar 80K6M designed to be used as a part of radio and anti-aircraft missile troops. The radar systems provides: detection, air objects three-coordinates and Doppler velocity measurement, air objects tracking; recognition of the aircraft IFF equipment; calculation of elevation and azimuth bearing at active jamming stations; data issuing to the radar workstations and the integrated systems.

Main Specifications:

- Detection range of aircraft with RCS 3-5m², km
  - At flight altitude 10 km: 200
  - At flight altitude 100 km: 40
- Elevation coverage area, deg (In mode 1): 0...35
- Elevation coverage area, deg (In mode 2): 0...55

Mobile 3D air surveillance radar with transistorized transmitter, intended for low, medium and high flying targets detection is designed to be used: as a part of anti-aircraft missile troops to issue targeting to anti-aircraft missile systems; as an information link in the air forces and air defense units for air traffic control. The radar can be transported by C-130 “Hercules” aircraft.

Main Specifications:

- Frequency range: 3
- Frequency q-ty: 6
- Indicator range, km: 400
- Scanning rate, sec: 5, 10

Target detection range, RCS=3 m² (at P=0.8 F=10⁻⁶):
- at flight altitude 10 km: 350

Maximum radar operation limits:
- in range, km: 500
- in azimuth, deg: 360
- in elevation, deg: 0...70
Detection range for low flying targets: RCS = 1-2 m²
- at flight altitude 100 m: 42 km
- at flight altitude 1000 m: 110 - 115 km
Azimuth coverage: 360°
Elevation coverage: 0.5°...30° in two rev.
RPM: >48 dB
Track capability: >256
Accuracy, range, m: 100
Accuracy, azimuth, min: 10...15
Accuracy, altitude, m: 400 AT < 70 KM
MTBF: 800 hours

The mobile 3D air space surveillance radar is intended for detection and target identification at the low and high height at the influence of active and passive jamming with the coordinate and track data output. Radar is designed to be used as a part of modern automated air defence systems and to provide target designation to air defence anti-missile systems.

Main Specifications:
- High probability of detection of small air targets, hovered helicopters including targets slowly moving tangentially to the radar.
- High-noise immunity.
- Capability of jammers bearings detection.
- Automatic association of echo-signals with return signals of the built-in IFF equipment.
- Capability to represent radar information and targeting over narrowband communication channels.
- High reliability.
- High mobility.
- Extreme stability of transmitter with true coherency.
- Unique doppler system of moving targets automatic detection.
RADAR STATIONS

The mobile air surveillance radars with coordinate and track outputs, operating off-line or as a part of regional and national automatic control posts (ACP) are designed to be used:

- as a part of radio technical air defense units for air traffic control;
- as a part of antiaircraft missile troops to issue targeting to antiaircraft missile complexes;
- as a part of radio technical air force units for aviation training support.

Main Specifications:

- Remote control for 36D6M, 80K6K1 radars
- Radar data collection and processing coming from radar with digital output as a part of AD radio communication unit and issuing the air situation picture to the command posts via wire and satellite communication channels
- Collecting the radar data from the remote posts and creation the integrated air situation picture
- Fighters’ pilot control
- Providing target designation to AAMC (option)

VHF
30
1+1
10 OR 20

Operating frequency Range:

Consumption power, kW:

Number of transport units:

Scanning interval, s:

Radar operation limits in range:

Minimum, km: 25
Maximum, km: 400
in azimuth, deg: 360
in elevation, deg: 0...45
in altitude, km: 40

MOBILE RADAR CONTROL POST

Construction is made on the basis of the van-vehicle of high cross-country capability KrAZ 6322 AF1. The van body is divided in two compartments.

Main specifications:

- Remote control for 36D6M, 80K6K1 radars
- Radar data collection and processing coming from radar with digital output as a part of AD radio communication unit and issuing the air situation picture to the command posts via wire and satellite communication channels
- Collecting the radar data from the remote posts and creation the integrated air situation picture
- Fighters’ pilot control
- Providing target designation to AAMC (option)
RSP-10MA
UPGRADED GROUND-CONTROLLED APPROACH SYSTEM

Is intended to ensure flight safety of aircraft and helicopters within terminal airspace, obtain positional information and guide aircraft to a safe landing in normal and adverse weather conditions. RSP-10MA consists of the surveillance radar (ASR) combining primary and secondary channels and Precision Approach Radar (PAR). Ground Controlled Approach System RSP-10MA is adopted by MoD of Ukraine for its Armed Forces.

Features:
- Metric band for “counter-Stealth” capability;
- Maximum use of COTS components;
- Option of containerized solution (two 20ft ISO);
- Stable, fail-soft, modular solid-state transmitter and receiver;
- Built-in test equipment;
- No special adjustments required during operation;
- Largely simplified maintenance;
- Engineered for minimum cost of ownership.

Upgraded P-14MA radar is adopted by MoD of Ukraine for its Armed Forces.

Main Specifications:

<table>
<thead>
<tr>
<th>Range of working frequencies, MHz</th>
<th>PSR</th>
<th>SSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of working frequencies, MHz</td>
<td>1250 – 1350, 250 frequencies with step 0.4 MHz</td>
<td>1030 – interrogation, 1090 – RBS response, 740 – Eastern IFF response</td>
</tr>
</tbody>
</table>

Detection range for a target with RCS of 2.5m²

| - minimum range | 1000 m | 2.7 km |
| - maximum range | 110 km | 150 km |

P-14MA
UPGRADE OF EARLY-WARNING VHF BAND RADAR

Offers the best (in terms of efficiency/cost ratio) alternative to restoration or repair of legacy prototypes.

Features:
- Metric band for “counter-Stealth” capability;
- Maximum use of COTS components;
- Option of containerized solution (two 20ft ISO);
- Stable, fail-soft, modular solid-state transmitter and receiver;
- Built-in test equipment;
- No special adjustments required during operation;
- Largely simplified maintenance;
- Engineered for minimum cost of ownership.

Upgraded P-14MA radar is adopted by MoD of Ukraine for its Armed Forces.

Main Specifications:

<table>
<thead>
<tr>
<th>Range of working frequencies, MHz</th>
<th>160-200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection range for a target with RCS of 2.5m²:</td>
<td></td>
</tr>
<tr>
<td>at altitude of H=100 m</td>
<td>37 km</td>
</tr>
<tr>
<td>at altitude of H=1000 m</td>
<td>130 km</td>
</tr>
<tr>
<td>at altitude of H=3000 m</td>
<td>220 km</td>
</tr>
<tr>
<td>at altitude of H=10000 m</td>
<td>400 km</td>
</tr>
</tbody>
</table>
RADAR STATIONS

**P-190MA**

Is offered as the modernized follow-on to its prototype, the analogue P-19. Features:

- Metric band for “counter-Stealth” capability;
- Maximum use of COTS components;
- Stable, fail-soft, modular solid-state transmitter and receiver;
- Built-in test equipment;
- No special adjustments required during operation;
- Largely simplified maintenance;
- Engineered for minimum cost of ownership.

Modernized P-190MA radar is adopted by MoD of Ukraine for its Armed Forces.

**Main Specifications:**

<table>
<thead>
<tr>
<th>Range of working frequencies, MHz</th>
<th>140-180</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection range for a target with RCS of 2.5m²:</td>
<td></td>
</tr>
<tr>
<td>at altitude of H=100 m</td>
<td>30/32 km</td>
</tr>
<tr>
<td>at altitude of H=1000 m</td>
<td>70/80 km</td>
</tr>
<tr>
<td>at altitude of H=3000 m</td>
<td>110/120 km</td>
</tr>
<tr>
<td>at altitude of H=10000 m</td>
<td>300/360 km</td>
</tr>
</tbody>
</table>

**P-18MA**

Is offered as the upgraded follow-on to its prototype, the analogue P-18. Features:

- Metric band for “counter-Stealth” capability;
- Maximum use of COTS components;
- Stable, fail-soft, modular solid-state transmitter and receiver;
- Built-in test equipment;
- No special adjustments required during operation;
- Largely simplified maintenance;
- Engineered for minimum cost of ownership.

Upgraded P-18MA radar is adopted by MoD of Ukraine for its Armed Forces.

**Main Specifications:**

<table>
<thead>
<tr>
<th>Range of working frequencies, MHz</th>
<th>140-180</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection range for a target with RCS of 2.5m²:</td>
<td></td>
</tr>
<tr>
<td>at altitude of H=100 m</td>
<td>30/32 km</td>
</tr>
<tr>
<td>at altitude of H=1000 m</td>
<td>70/80 km</td>
</tr>
<tr>
<td>at altitude of H=3000 m</td>
<td>110/120 km</td>
</tr>
<tr>
<td>at altitude of H=10000 m</td>
<td>300/360 km</td>
</tr>
</tbody>
</table>

**GROUND-BASED LONG-RANGE VHF BAND SURVEILLANCE RADAR**

**P-18MA**

**GROUND-BASED MOBILE UHF LOW, MEDIUM AND HIGH ALTITUDE SURVEILLANCE RADAR**

**Main Specifications:**

<table>
<thead>
<tr>
<th>Range of working frequencies, MHz</th>
<th>825-890</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection range for a target with RCS of 2.5m², P=0.5:</td>
<td></td>
</tr>
<tr>
<td>at altitude of H=100 m</td>
<td>35 km</td>
</tr>
<tr>
<td>at altitude of H=1000 m</td>
<td>90 km</td>
</tr>
<tr>
<td>at altitude of H=3000 m</td>
<td>150 km</td>
</tr>
<tr>
<td>at altitude of H=10000 m</td>
<td>300 km</td>
</tr>
</tbody>
</table>

ELECTRONIC WARFARE, SURVEILLANCE AND TARGET DETECTION SYSTEMS
**TRASSA-1**

**STAND-ALONE MOBILE SECONDARY RADAR**

The solid-state stand-alone mobile secondary radar with the phased antenna array operates under standards of both the NATO IFF system Mk XA (Mk XII), “Parol” identification system and international ATC system RBS. The radar is designed to issue radar data to units of radio-technical troops of air defense, air forces and AAMS as well as to ATC services.

**Main Specifications:**

<table>
<thead>
<tr>
<th>Maximum radar operation limits:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- in range, km</td>
<td>2…360</td>
</tr>
<tr>
<td>- in azimuth, deg</td>
<td>360</td>
</tr>
<tr>
<td>- in altitude, km</td>
<td>25</td>
</tr>
</tbody>
</table>

**MANDAT-B1E**

**RADIO COMMUNICATION JAMMING COMPLEX**

Complex “MANDAT-B1E” is intended for electronic environment monitoring and jamming radio communication channels within frequency range of 1.5-1000MHz.

The complex “MANDAT-B1E” provides for detection, determination of coordinates and setting time and frequency spot jamming against sources of emission operating either on fixed frequencies with any kind of modulation or frequency hopping (FH) with a hop rate amounting to 1000 hops per second.

**Main Specifications:**

<table>
<thead>
<tr>
<th>Name of the article</th>
<th>R-330RD</th>
<th>R-330KV1</th>
<th>R-330UV1</th>
<th>R-330UV2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>Automated reconnaissance station HF, UHF</td>
<td>Automated Jamming station HF</td>
<td>Automated Jamming station UHF1</td>
<td>Automated Jamming station UHF2</td>
</tr>
<tr>
<td>Operating frequency range, MHz</td>
<td>1.5 - 1000</td>
<td>1.5 - 30</td>
<td>30 - 230</td>
<td>225 - 1000</td>
</tr>
<tr>
<td>Coverage area (front / depth), km</td>
<td>up to 90 / up to 60</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**INTERROGATOR 69Н02**

Built-in radar interrogator 69Н02 meets the requirements of NATO (STANAG 4193) and ICAO standards.

**Main Specifications:**

- Pulse power of each transmitter is not less than 2000 W reducible by 12 dB at interval 3 dB: > 2000 W
- Receivers’ sensitivity is not less than: -126 dBW
- Pulse amplitude difference between side-lobe suppression channel and main channel: <1 dB
- Side-lobe suppression on response within dynamic range: 70 dB

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**POWER STATION**

The mobile body-type power station is designed to supply special-purpose products with three-phase alternating current, 400V, 50Hz, from diesel-generator set or 380 V, 50Hz, from supply mains.

Power station is equipped with a master and standby diesel-generator for the radar continuous operation.

**Output Parameters:**

<table>
<thead>
<tr>
<th>current</th>
<th>alternating, three-phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated power of master and standby diesel-generator, kW, no less</td>
<td>80</td>
</tr>
<tr>
<td>rated power of auxiliary diesel-generator (P1354), kW, no less</td>
<td>10</td>
</tr>
<tr>
<td>current frequency, Hz</td>
<td>50</td>
</tr>
<tr>
<td>rated current, A, no more</td>
<td>126</td>
</tr>
<tr>
<td>power factor</td>
<td>0,8</td>
</tr>
</tbody>
</table>
**DELTA-M**

**NAVAL 2D SURVEILLANCE LPI SOLID STATE RADAR**

“Delta-M” is modern naval two-dimensional pulse coherent solid-state radar for surface and air surveillance with low probability of interception of its electromagnetic radiation.

**MINERAL – ME**

**MULTIFUNCTIONAL TARGET DESIGNATION RADAR SYSTEM**

The complexes “Mineral–ME”, of marine and coastal basis, are the integrated multifunction information-and-control systems that are based on the usage of different information sensors (of active, passive, mobile surveillance posts) within one information field, provide the over-the-horizon detection of surface targets and deliver of targets designation data for full firing range of missile weapon.

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### Main Specifications:

<table>
<thead>
<tr>
<th>Radar</th>
<th>Active</th>
<th>Passive</th>
<th>MEI-MOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency band</td>
<td>X</td>
<td>X, G, E/F, D</td>
<td>X</td>
</tr>
<tr>
<td>Scanning zone</td>
<td>Through azimuth</td>
<td>360°</td>
<td>360°</td>
</tr>
<tr>
<td></td>
<td>Through range</td>
<td>up to 250 km</td>
<td>up to 450 km</td>
</tr>
</tbody>
</table>

---

**Main Specifications:**

Maximum detection range:
- small air target 8…20 km
- small surface target up to horizon

Accuracy:
- 20…40 m – range
- 4…6 mrad – at azimuth

Readiness time: up to 2 minutes
KASKAD is a modern system which is intended to collect and process information and to ensure ship armament control. The system is based on DELTA and ROSA radars. KASKAD performs collection, fusion, and identification of information on detected (within the ship’s zone of responsibility) targets. The system also ensures evaluation of the danger level degree (hazard analysis), output of the plan on formidable targets’ distribution, output of the target designation to the ship fire means’ control units and direct control of the ship artillery armament.

Main Specifications:

<table>
<thead>
<tr>
<th>Feature</th>
<th>DELTA-M radar</th>
<th>ROSA radar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>X (3 cm)</td>
<td>S (10 cm)</td>
</tr>
<tr>
<td>Coverage zone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- range, km</td>
<td>96</td>
<td>200</td>
</tr>
<tr>
<td>- azimuth, deg</td>
<td>0…360</td>
<td>0…360</td>
</tr>
<tr>
<td>- elevation angle, deg</td>
<td>from minus 10 up to plus 60</td>
<td>0…35</td>
</tr>
<tr>
<td>Range scale, km</td>
<td>12, 24, 48, 96</td>
<td>50, 100, 150, 200</td>
</tr>
<tr>
<td>Resolution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- range, m</td>
<td>50…60</td>
<td>40…60</td>
</tr>
<tr>
<td>- azimuth, deg</td>
<td>1.0…1.5</td>
<td>2.0…2.5</td>
</tr>
<tr>
<td>Maximum detection range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- small air targets, km</td>
<td>8</td>
<td>≥ 45</td>
</tr>
<tr>
<td>- air targets with RCS &gt; 10m²</td>
<td>20</td>
<td>≥ 100</td>
</tr>
<tr>
<td>- surface targets, km</td>
<td>radio horizon</td>
<td>radio horizon</td>
</tr>
<tr>
<td>Peak radiation power, W</td>
<td>from 8 up to 80</td>
<td>≥ 1500</td>
</tr>
<tr>
<td>Number of tracked targets</td>
<td>up to 50</td>
<td>up to 50</td>
</tr>
</tbody>
</table>

ROSA radar “Rosa” is up-to-date marine coherent-pulse, solid-state, two coordinate all-around surveillance radar, which is intended for the surveillance after the on-land, surface and air situation in the area of responsibility. Radar construction allows to place it on board of corvette, frigate etc.

Main Specifications:

<table>
<thead>
<tr>
<th>Feature</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum detection range (of airborne targets with the fly altitude of 1000m):</td>
<td></td>
</tr>
<tr>
<td>- with RCS&gt;10 m²</td>
<td>≥100 km</td>
</tr>
<tr>
<td>- with RCS&gt;2 m²</td>
<td>≥45 km</td>
</tr>
<tr>
<td>Maximum detection range of anti-crafts with RCS&gt;0.05 m² with the fly altitude of &gt;5m</td>
<td>&gt;12 km</td>
</tr>
<tr>
<td>Number of tracked targets</td>
<td>up to 50</td>
</tr>
</tbody>
</table>
IDPCS is the ship/land-based automated information-and-control system for data collection and complex data processing which is used when working with multiple information sources, and ensuring interaction with users. IDPCS is formed on the base of up-to-date apparatus means, advanced computer technologies and data processing methods.

Mission:
- data collection, storage and generalization on air and surface combat/tactical situation;
- situation assessment and prediction on decisions and plans on weapon application.

“Triada” – the universal fire control system for light armored vehicles, designed for surveillance, detection, automatic tracking of surface targets (armored vehicles, personnel), control the panoramic vision system “Pannorama-2P” targeting and armored personnel carrier module weapon control (IFV):
- automatic 30-mm machinegun cannon ZTM-1;
- automatic grenade launcher AGS-17;
- 7.62 mm machinegun PKT type;
- 212 antitank missile systems;
- smoke screens laying means.
For checking of measuring apparatus in places of its operation. Functionally it consists of two mobile complete sets YA2-4/A and YA2-4/B, developed on the basis of bodies-vans of KrAZ truck.

The laboratory is equipped by life-support systems, including support of a thermal mode (air-conditioning, heating, ventilation) which allow to maintain inside of a body-vans temperature \((20\pm5)\degree C\) in a range of temperatures of outside air from minus \(30\degree C\) to \(+40\degree C\).

The chassis of the all-wheel drive truck provides reliable moving of laboratory on roads of different categories.

**BK07-9200010-00**

**SPECIAL BODY FOR INSTALLATION ON A VEHICLE**

Special body BK07-9200010-00 is designed for personal, laboratory, workshop, field kitchen, electronic system, medical center and other accommodation type, with for beloved truck adjustable chassis.

- **Length, mm:** 4 600
- **Width, mm:** 2 500
- **Height, mm:** 2 300
- **Weight, kg:** 4 000

**Equipment:**
- Heating ventilation appliance
- Filter ventilation appliance

Version with some sound isolation and humidity absorption level is provided at the Customer’s request.
“Garant-M” product is designed for radio suppression of receiving sections of various radio technical facilities, radio communication channels of stationary, mobile and portable radio stations, radio telephones of cellular communication systems as well as for protection of mobile facilities (columns on the move and single combat and transport facilities) by preventing a radio-controlled explosion of explosive devices (mines, fougasses et al.).

**GARANT-M**

**CONTROL RADIO LINK SUPPRESSION SYSTEM**

Main Specifications:

<table>
<thead>
<tr>
<th>Type of noise</th>
<th>wide-band barrage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary integral output power of noise</td>
<td>not less than 700 W</td>
</tr>
<tr>
<td>Radio suppression distance</td>
<td>not less than 50 m</td>
</tr>
<tr>
<td>(depending on the parameters of radio lines)</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>from minus 40 °C to 50 °C</td>
</tr>
</tbody>
</table>

**BUREVESTNIK-1M**

**RADAR UNIT**

Purpose: installation on the sea-, river- and high-speed vessels, including those with the dynamic suspension, on the shore-based look-out stations.

Main Specifications:

<table>
<thead>
<tr>
<th>Maximum range of detection</th>
<th>6 miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>- average sea buoy</td>
<td></td>
</tr>
<tr>
<td>- vessel of the displacement of 5000 tons</td>
<td>40 miles</td>
</tr>
<tr>
<td>- beacons, motor boats</td>
<td>4 miles</td>
</tr>
<tr>
<td>Minimal range of detection with the aerial lifted over the sea level 10 meters</td>
<td>10 – 36 m</td>
</tr>
</tbody>
</table>
Portable jammer “ANKLAV” is intended to provide jamming navigation receivers GPS/GLONASS. It is an effective tool in combating drones and precision-guided weapons. Portable jammer “ANKLAV” is manufactured in portable and stationary version with directional antennas and omnidirectional ones.

Main Specifications:

<table>
<thead>
<tr>
<th>Jamming range, km:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- with directional antennas</td>
<td>40</td>
</tr>
<tr>
<td>- with omnidirectional antennas</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operation modes:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS jamming / GLONASS jamming / GPS/GLONASS jamming</td>
<td></td>
</tr>
</tbody>
</table>

Mobile System of surface recognition and ECM “JAB” is intended for detection, classification and identification of surface moving targets as well as low-speed low-flying air targets, target pointing with the aim to provide performance of tasks on security of wide areas and reconnaissance.

System provides:

- automatic detection (with radar) and receiving detail information (with visual channel) about surface moving targets geographically referenced and with output of the information to command center;
- automatic affixment of the system on the terrain with the help of satellite navigation systems; calculation and record route traffic at PC.

Main Specifications:

<table>
<thead>
<tr>
<th>Radar detection range, km:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- person</td>
<td>2.5</td>
</tr>
<tr>
<td>- vehicle</td>
<td>6.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IR channel detection range, km:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- person</td>
<td>2.4</td>
</tr>
<tr>
<td>- vehicle</td>
<td>6.4</td>
</tr>
</tbody>
</table>
**NAVIGATION EQUIPMENT**

**CH-3003M**

**NAVIGATION RECEIVER**

It provides automatic continuous setting of coordinates, speed and moving direction. It displays the current coordinates in systems of coordinates WGS-84, CK-42, PZ-90.02, SK-95, MGRS і UTM, line coordinates in Gauss chart projection, in system, parameters of which are specified by the user.

**Main Specifications:**

- **32 receiving channels**
- **GPS/GLONASS/SBAS, L1-range**
- **Algorithm of receiving channel selection**
  - All-in-view
- **Positional/altitude accuracy in off-line mode (RMS)**
  - 10/15 m
- **Operating temperatures**
  - from -20°C to +50°C
- **Operating increased humidity**
  - 100 % at 25 °C

**Dimensions, mm:**

- 170x75x44

**Power supply, V:**

- DC 10-30

**Power consumption, W:**

- 2.5

**Weight, kg:**

- 0.8

**CH-4215**

**NAVIGATION EQUIPMENT**

New equipment CH-4215 has been developed on the results of CH-3210 equipment operation for installation on ground military equipment mobile objects (having possibility of individual use) and has improved operational and physical characteristics. CH-4215 is intended to determine location coordinates, ground speed and time on radio signals of GLONASS SNS and GPS of SBAS functional addition as well as to solve control and service tasks of military units.

**Main Specifications:**

- **32 receiving channels**
  - GPS/GLONASS/SBAS, L1-range
- **Accuracy of coordinates determination**
  - 10 m
- **Operational temperature**
  - from minus 30 to plus 50 °C
- **Time of autonomous operation (from the batteries)**
  - not less than 3 hours
- **Interfaces**
  - RS 232/422, USB 2.0, Wi-Fi, DigiMesh, ETHERNET

**Overall dimensions, mm:**

- 218 x 191 x 57

**Power system, V:**

- 12, 24, 27

**Embedded memory, Gb:**

- 16

**Weight, kg:**

- 2.5
CH-3307
EQUIPMENT OF SATELLITE NAVIGATION GLONASS AND GPS SYSTEMS USERS

SNS CH-3307 user equipment is intended for interoperability with avionics of Su and MiG aircrafts in standalone and automatic modes.

Main Specifications:
- GPS / Glonass / SBAS: 24 channels
- Data updating frequency: 10 Hz
- Information field range of color LCD monitor: 78.7x53.6 mm
- User's data base: 1000 WPT and 90 routes

Supply voltage, V: 27
Power consumption, W: 30
Total weight, kg: 10.5

CH-4312
ON-BOARD SATELLITE NAVIGATION EQUIPMENT

CH-4312 equipment is intended for aircraft handling as a part of aircraft avionics system in all flight stages, including non-precision approaches.

CH-4312 provides problem solving of navigation, planning, trajectory prediction, aircraft equipment control and air navigation process control using P RNAV requirements with RNP 0.3, RNP 1, RNP 5 accuracy.

Main Specifications:
- Coordinates: 20 m
- Altitude: 30 m
- Current time: 1 µsec
- Ground speed vector: 0.2 m/sec
- UTC time mark: 100 nsec

Supply voltage, V: 27
Power consumption, W: 20
Navigation equipment CH-3101M is designed for use on ships and riverboats for convenience determination of navigation parameters of movement by the signals of global navigation satellite systems GLONASS / GPS/SBAS in absolute mode and in differential mode.

**CH-3101M**

**NAVIGATION EQUIPMENT**

- **Main Specifications:**
  - Quantity of receiving channels: 32
  - Positional accuracy: 10 m
  - Velocity accuracy: 0.2 knot
  - Operating temperatures: from minus 10 °C to plus 50 °C
  - Display, touch screen: SAW color, graphics, liquid crystal

**Main Specifications:**
- Range of measuring of distances: from 145 to 10000 m
- Accuracy of measuring of distances: ±10 m
- Corner of eyeshot in the mode of exposure: from 1° to 11° (6,7°)
- Time of realization of calculations: real time
- Time of readiness to the next measuring: 5 s

- **Dimensions, mm:** 218 x 187 x 89
- **Power supply, V:** ±DC 10-30
- **Onboard memory, Gb:** 16
- **Weight, kg:** 3

Automated complex of secret service of CH-4003 – intended for the navigation providing and determination of coordinates of points (reference-points, targets) on terrain. A complex provides the measuring of distance to the objects (aims) and determination of directions on them.

**CH-4003**

**AUTOMATED COMPLEX OF SECRET SERVICE**
Microwave modules UM 321001 employed with in receiver determination and accompanying channels of ZRC “OSA” instead vacuum devices УВ-67,УВ-75. Modules secure 30% increase in distance of finding and escorting small-dimensions targets.

Main Specifications:

- **Transmission factor, dB**: 33-39
- **Irregularity of transmission factor, dB**: 3.0
- **Noise factor, dB**: 3.0
- **Rate of adjustment of transmission factor (time-varied gain control) TVGC, dB**: 23
- **Service life, hrs**: 10000

**P-I-N ATTENUATOR**

P-i-n Attenuator M34702 (M34713) Coaxial waveguide controller attenuator designated for controlling the VHF-signals within waveguide leads in radar “Kolchuga” and air defence missile complex “Tor”.

Main Specifications:

- **Maximum Attenuation, dB**: 30
- **Start Attenuation, dB**: 1.0
Pulse klystron UA КИУ-7 intended for receiving of powerful amplifying signal in transmitter of RLS 79K6, 80K6.

Pulse amplifier klystron of centimeter waveband. The devices have magnet-equipped cabinets and are metal/ceramics type. The cooling type is compulsory, done by liquid.

**UA КИУ-7**
MULTIBEAM PULSED AMPLIFYING KLYSTRON

- **Heater voltage, V**: 12,6
- **Cathode voltage, kV**: 15-20
- **Voltage of Control Electrode, kV**: 4,0-6,0
- **Power Input, W**: 2
- **Cathode Current, pulse, A**: 30
- **Heating Current, A**: 6,0-8,0

**Main Specifications:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating Voltage, V</td>
<td>12,6</td>
</tr>
<tr>
<td>Cathode Voltage, kV</td>
<td>15-20</td>
</tr>
<tr>
<td>Voltage of Control Electrode, kV</td>
<td>4,0-6,0</td>
</tr>
<tr>
<td>Power Input, W</td>
<td>2</td>
</tr>
<tr>
<td>Cathode Current, pulse, A</td>
<td>30</td>
</tr>
<tr>
<td>Heating Current, A</td>
<td>6,0-8,0</td>
</tr>
</tbody>
</table>

**Dimensions, mm:**

- 600х230-307

**Weight, kg:**

- 50

**Main Specifications:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater voltage, V</td>
<td>12 - 14,7</td>
</tr>
<tr>
<td>Pulse cathode voltage, kV, not exceeding</td>
<td>50 - 55</td>
</tr>
<tr>
<td>Input power at pulse, kW</td>
<td>5 - 50</td>
</tr>
<tr>
<td>Output power at pulse, kW</td>
<td>355 - 525</td>
</tr>
<tr>
<td>Heater current, A</td>
<td>4 - 6</td>
</tr>
<tr>
<td>Cathode pulse current, A</td>
<td>19 - 24</td>
</tr>
</tbody>
</table>

**Dimensions, mm:**

- 256 x 870

**Weight, kg:**

- 35
**КГ-3Р, КУ-137Р, КИУ-43Р**

Klystrons

Restoration repair of generator-converter amplifier chain of klystron including КГ-3Р, КУ-137Р, КИУ-43Р for making up into S-300 PS Missile System.

Klystron КИУ 43Р-pulsed amplifier device of packaged and metal-ceramics type, input and output waveguide type, compulsory cooling by liquid (resonator and collector) and air (cathode) cooling. Operated on fixed frequency. Klystron КИУ-43Р - operated with intermediate converter-amplifier pulsed klystron КУ-137Р, packaged, metal-ceramics type with compulsory cooling by liquid. Klystron КГ-3Р-generator of continuous signal, fixed frequency.

**MI-119**

Magnetrons

Average capacity pulse magnetrons with precision tuning mechanism able to be re-tuned to any of the fixed preprogrammed cm-waveband frequencies. Employed within portable radars.

**Main Specifications:**

<table>
<thead>
<tr>
<th>Waveband, MHz</th>
<th>830-882</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater voltage, V</td>
<td>6-8</td>
</tr>
<tr>
<td>Heater current, A</td>
<td>12-16</td>
</tr>
<tr>
<td>Anode voltage, kV</td>
<td>23</td>
</tr>
<tr>
<td>Anode pulse current, A</td>
<td>22-32</td>
</tr>
<tr>
<td>Readiness time, sec</td>
<td>120</td>
</tr>
</tbody>
</table>

Dimensions, mm: 330 x 270 x 120

Weight, g: 7 000
DEMODULATOR

The demodulator was created and designed for functioning as a component part of a data receiving station from Earth Observation Satellites.

Main Specifications:

<table>
<thead>
<tr>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>modulation type</td>
<td>BPSK, QPSK, (S/O)QPSK, UQPSK, AQPSK, 8PSK</td>
</tr>
<tr>
<td>decoding type</td>
<td>convolutional (Viterbi algorithm), scrambling, differential</td>
</tr>
<tr>
<td>input signal frequency rate of change</td>
<td>up to 10 kHz/s (Doppler)</td>
</tr>
<tr>
<td>input signal level</td>
<td>minus 50…minus 10 dBm</td>
</tr>
<tr>
<td>data rate interface</td>
<td>PCI Express</td>
</tr>
</tbody>
</table>

The ground receiving station meets the modern requirements and provides:

- automated choice of station operating mode;
- data receiving possibility from satellites with different characteristics of the X-band downlink with the speed up to 500 Mbit/channel;
- operational retuning on different satellites;
- operational control and diagnostics of station work;
- check of received data availability and quality;
- received data ingestion, decompression and visualization.
The long-wavelength infrared (LWIR) Earth imager is designed to produce digital images of an Earth surface in long-wavelength infrared range. To provide high technical characteristics in the imager the photonic detector with cooling based on solid solutions of cadmium telluride and mercury is used (under development).

Main Specifications:

- Spectral range, µm: 7.5 – 9.0
- Power consumption, W: 30
- Weight, kg: 15
- Noise equivalent temperature difference (NETD): 35 mK
- Cooling method: Stirling microrefrigerator
- Pixel projection in nadir at the orbit 690 km: 96 m
- Frame area: 61 × 49 km
- Spectral channels range:
  - Panchromatic: 0.45 - 0.8 µm
  - Blue: 0.45 - 0.51 µm
  - Green: 0.52 - 0.59 µm
  - Red: 0.63 - 0.69 µm
  - Near infrared: 0.77 - 0.90 µm

The multiband Earth imager is designed to produce panchromatic and multispectral images of an Earth surface with resolution 2.0 m and measure of survey objects radiance. In order to improve image quality in the imager is used the photodetector array with the time delay integration mode.

Main Specifications:

- Power consumption, W: 65
- Weight, kg: 30
- Spectral channels range:
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