CATALOGUE
RADAR, RADIO COMMUNICATION AND AIR DEFENCE SYSTEMS

YOUR RELIABLE PARTNER IN THE WORLD OF DEFENCE

UKROBORONPROM
Ukrainian Defence Industry
Scientists and engineers of 31 Ukroboronprom design bureaus make remarkable contributions to scientific and technological progress of the country. Near 80000 of highly trained employees both in production and engineering are working for Ukroboronprom in 5 major defence industry sectors. 40%+ high-level specialists with degrees in engineering, applied math, physics, etc. The top management understands the need to attract skilled and educated professionals to move forward, that is why we expand long-term cooperation with the best universities of Ukraine.

Ukroboronprom was established in 2011 for improving coordination and performance of the military-industrial complex of Ukraine. Ukroboronprom is the largest state defence holding company in Ukraine, uniting 130+ enterprises, some of which have more than 70 years of experience in the field of defence and security.

OUR VALUES:
- We value and protect human life as a main priority
- We are constantly searching for new ideas to ensure peace and security
- We put quality as the basis of our production
- We enhance Ukraine’s defence capability, preventing new threats

OUR MISSION:
HELP OUR CUSTOMERS SOLVE COMPLEX TASKS USING ADVANCED TECHNOLOGIES AND INNOVATIVE APPROACH

OUR VISION:
TO BE A RELIABLE PARTNER IN THE WORLD OF DEFENCE

RADAR, RADIO COMMUNICATION AND AIR DEFENCE SYSTEMS
Ukroboronprom management has developed a promising model of industry-specific clusters with clear specialization. We are proud that Ukraine is one of the few countries in the world that has great technological knowledge in the industry and a full production cycle.
GOVERNMENT-AUTHORIZED EXPORTERS

UKRINMASH
UKRSPACE
SPETSTECHNOEXPORT

PROMOBORONEXPORT
UKROBORONSERVICE
PROGRESS

GOVERNMENT-AUTHORIZED EXPORTERS TO CARRY OUT EXPORT AND IMPORT OF MILITARY AND DOUBLE USE PRODUCTS WITH 20+ YEARS OF EXPERIENCE IN 90+ COUNTRIES WORLDWIDE:

- weapons and ammunition
- military and special purpose equipment
- dual-use materials and technologies
- maintenance of military and dual-purpose products

Being the part of Ukroboronprom, exporters ensure and facilitate trade of military and double-use products across the border, acting as intermediate agents for Ministry of Defence, Armed Forces, Emergency Situations Service, as well as other companies in Ukraine, specialized in development, production, maintenance and repair for defense/military purposes.

RADAR, RADIO COMMUNICATION AND AIR DEFENCE SYSTEMS
RADAR, RADIO COMMUNICATION AND AIR DEFENCE SYSTEMS

DETECTION WHEREVER YOU ARE

Ukroboronprom specialists are engaged in development and manufacture of a wide range of modern radar systems, electronic reconnaissance equipment and electronic warfare systems.

WE DO:
- production of air defence systems
- repair and modernization of air defence equipment, communications
- design and production of radars, electronic warfare stations and optical electronic countermeasure stations
80K6T
MOBILE 3D AIR SURVEILLANCE RADAR

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 complexes 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:
- **Target detection range, RCS=3 m² (at P=0.8 F=10⁻⁶):**
  - at flight altitude 10 km: 350
  - at flight altitude 100 km: 40

### Technical Parameters:
- **Frequency range:**
  - 5, 10, 20
- **Scanning interval:**
  - 5, 10, 20
- **Number of transport units:**
  - 15 - 20
- **Deployment/closing time, min:**
  - 0...70
- **Maximum radar operation limits:**
  - in range, km: 500
  - in azimuth, deg: 360
  - in elevation, deg: 0...70

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80K6M
MOBILE 3D AIR SURVEILLANCE RADAR

Mobile Radar 80K6M designed to be used as a part of radio and anti-aircraft missile troops.

The radar systems provide:
- 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 3-5 m², km:**
  - At flight altitude 10 km: 200
  - At flight altitude 100 km: 40

### Technical Parameters:
- **Frequency range:**
  - 5, 10
- **Scanning interval:**
  - 5, 10
- **Elevation coverage area, deg (in mode 1):**
  - 0...35
- **Elevation coverage area, deg (in mode 2):**
  - 0...55

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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:
- **Maximum radar operation limits:**
  - in range, km: 400
  - in azimuth, deg: 360
  - in elevation, deg: 0...35, 0...55
  - in altitude, km: 40

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

### Technical Data:
- **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

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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.
**36D6-M2**
3D AIR SURVEILLANCE RADAR

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:**
- **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

**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)**

**RCP1M**
MOBILE RADAR CONTROL POST

**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;
- 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>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of working frequencies, MHz</td>
<td>1250 – 1350, 250 frequencies with step 0.4 MHz</td>
</tr>
<tr>
<td>Minimum range</td>
<td>1000 m</td>
</tr>
<tr>
<td>Maximum range</td>
<td>110 m</td>
</tr>
<tr>
<td>Power consumption, kW</td>
<td>1.5</td>
</tr>
<tr>
<td>Start-up time, min</td>
<td>15</td>
</tr>
</tbody>
</table>

**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>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of working frequencies, MHz</td>
<td>140-180</td>
</tr>
<tr>
<td>Detection range for a target with RCS of 2.5 m²:</td>
<td></td>
</tr>
<tr>
<td>at altitude of H=100 m</td>
<td>37 km</td>
</tr>
<tr>
<td>at altitude of H=1,000 m</td>
<td>130 km</td>
</tr>
<tr>
<td>at altitude of H=3,000 m</td>
<td>220 km</td>
</tr>
<tr>
<td>at altitude of H=10,000 m</td>
<td>400 km</td>
</tr>
</tbody>
</table>

**P-19MA**

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

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

P-19MA radar 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.

Modified P-19MA radar is adopted by MoD of Ukraine for its Armed Forces.

### Main Specifications:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of working frequencies, MHz</td>
<td>825-890</td>
</tr>
<tr>
<td>Detection range for a target with RCS of 2.5 m², 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=1,000 m</td>
<td>90 km</td>
</tr>
<tr>
<td>at altitude of H=3,000 m</td>
<td>150 km</td>
</tr>
<tr>
<td>at altitude of H=10,000 m</td>
<td>300 km</td>
</tr>
</tbody>
</table>
**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:**

- **Maximum radar operation limits:**
  - in range, km: 2…360
  - in azimuth, deg: 360
  - in altitude, km: 25

**INTERROGATOR 69Л02**

**BUILT-IN RADAR INTERROGATOR OF SYSTEM MK-XA, MK-XII AND RBS**

Built-in radar interrogator 69Л02 meets the requirements of NATO (STANAG 4193) and ICAO standards.

**Main Specifications:**

- Power supply system:
  - Power, kW: no more 2000
  - Voltage, V: 27
  - Consumption current, А: no more 380
  - Time of turn-on, min: less than 3
  - Weight, kg: 165

**3Э80**

**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.

**Main Specifications:**

- Power consumed, W: up to 1000 kVA
- Consumption current, А: up to 126
- Turn-on time, min: 1
- Power factor: 0.8
- Operating frequency range, MHz: up to 1000
- Coverage area (front / depth), km: up to 90 / up to 60
**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.

**KASKAD**

**SHIP SELF-DEFENCE SYSTEM**

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.

**ROSA**

**2D COHERENT-PULSE SOLID-STATE SURVEILLANCE RADAR**

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.
INTTEGRATED DATA PROCESSING AND CONTROL SYSTEM

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
OPTOELECTRONIC FIRE CONTROL SYSTEM

“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 (PV):
- 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.

Coverage zone (limited by the parameters of the information sources)
- at range, km: 400
- at azimuth, deg: 0...360
- at elevation angle, deg: 85
- at height, km: 30

Number of simultaneously processed targets up to 400
Number of information sources Up to 16
Number of information users Up to 10
Cycle of exchange by data of targets designation, ms: 20
Modes of targets designation: automatic, semi-automatic
Modes of targets distribution: centralized, autonomous
Number of operator’s console 1 with 2 displays (up to 5)
To output of targets designation, s ≤ 0,5

Main Specifications:
- Detection range in the daytime not less than 5000 m
- Detection range in the night time not less than 800 m
- Power supply: 27 V
- Weight up to 70 kg

MLME
MOBILE LABORATORY OF MEASURING EQUIPMENT

For checking of measuring apparatus in places of its operation. Functionally it consists of two mobile complete sets YA2-4/A and YA2-4/6, 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±5°C) in a range of temperatures of outside air from minus 30°C to +40°C.

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

SPECIAL BODY FOR INSTALLATION ON A VEHICLE

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.

Equipment:
- Heating ventilation appliance
- Filter ventilation appliance

Version with some sound isolation and humidity absorption level is provided at the Customer’s request.
PORTABLE RADAR AND DEFENCE SYSTEMS

GARANT-M
CONTROL RADIO LINK SUPPRESSION SYSTEM

“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.).

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:
- Frequency range of noise radiation, MHz: 20–4000
- Maximum range of detection, km: - average sea buoy 6 miles - vessel of the displacement of 5000 tons 40 miles - beacons, motor boats 4 miles
- Minimal range of detection with the aerial lifted over the sea level 10 meters: 10 - 36 m

BUREVESTNIK-1M
RADAR UNIT

Type of noise: wide-band barrage
Summary integral output power of noise: not less than 700 W
Radio suppression distance (depending on the parameters of radio lines): not less than 50 m
Ambient temperature: from minus 40 °С to 50 °С

PORTABLE RADAR AND DEFENCE SYSTEMS

JAB
MOBILE SYSTEM OF SURFACE RECOGNITION AND ECM

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, target movement with the aim to provide performance of tasks on security of wide areas and reconnaissance.
- automatic affixment of the system on the terrain with the help of satellite navigation systems; calculation and record route traffic at PC.

Main Specifications:
- Radar detection range, km: - person 2.5 - vehicle 6.4
- IR channel detection range, km: - person 2.4 - vehicle 6.4

ANKLAV
PORTABLE JAMMER GPS/GLONASS

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:
- Jamming range, km: - with directional antennas 40 - with omnidirectional antennas 20
- Operation modes: GPS jamming / GLONASS jamming / GPS/GLONASS jamming

Main Specifications:
- Power supply, V: 24
- Power consumed, kW: 1.0
- Frequency range of noise radiation, MHz: 20-4000
- Operation modes: GPS jamming / GLONASS jamming / GPS/GLONASS jamming

PORTABLE RADAR AND DEFENCE SYSTEMS
СН-4312 equipment is intended for aircraft handling as a part of aircraft avionics system in all flight stages, including non-precision approaches. СН-4312 provides problem solving of navigation, planning, trajectory prediction, aircraft equipment control and air navigation process control using RNAV requirements with RNP 0.3, RNP 1, RNP 5 accuracy.

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

Нew equipment СН-4215 has been developed on the results of СH-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:
- **Receiver 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

### Technical Specifications:

<table>
<thead>
<tr>
<th>Power source</th>
<th>Voltage, V</th>
<th>Current consumption, A</th>
<th>Brightness, cd/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC 10-30</td>
<td>2.5</td>
<td>27</td>
<td>0.8</td>
</tr>
</tbody>
</table>

### Dimensions, mm:
- **Overall dimensions:** 170х75х44
- **Overall weight:** 2.5 kg
- **Supply voltage:** 12, 24, 27 V
- **Power consumption:** 2.5 W

### Operational temperature
- from minus 30 to plus 50 °C

### Time of autonomous operation (from the batteries)
- not less than 3 hours

### Interface
- RS 232/422, USB 2.0, Wi-Fi, DigiMesh, ETHERNET
**Navigation and Other Equipment**

**CH-3101M Navigation Equipment**

- **Description:** 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.

**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:** color, graphics, liquid crystal

**CH-4003 Automated Complex of Secret Service**

- **Description:** 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.

**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

**UM 321001 Low Noise Transistor Amplifiers**

- **Description:** Microwave modules UM 321001 employed with in receiver determination and accompanying channels of ZRC "OCA" instead vacuum devices УВ-67, УВ-75. Modules secure 30% increase in distance of finding and escorting small-dimensions targets.

**Specifications:**

- **Transmission factor:** 33-39 dB
- **Irregularity of transmission factor:** 3,0 dB
- **Noise factor:** 3,0 dB
- **Rate of adjustment of transmission factor (time-varied gain control):** 23 dB
- **Service life, hrs:** 10000

**P-i-n Attenuator M34702**

- **Description:** P-i-n Attenuator M34702 (M34713) Coaxial waveguide controller attenuator designated for controlling the VHF-signals within waveguide leads in radar "Kotchug" and air defence missile complex "Tor".

**Specifications:**

- **Maximum Attenuation:** 30 dB
- **Start Attenuation:** 1,0 dB
### UA КИУ-7

**Multibeam Pulsed Amplifying Klystron**

Pulse klystron UA КIУ-7 intended for receiving of powerful amplifying signal in transmitter of RLS 79К6, 80К6.

**Main Specifications:**
- Heating 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

### UA КIУ-5

**Pulse Amplifier Klystron**

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.

**Main Specifications:**
- Heater voltage, V: 12 - 14,7
- Pulse cathode voltage, kV, not exceeding: 50 - 55
- Input power at pulse, kW: 5 - 50
- Output power at pulse, kW: 85 - 125
- Heater current, A: 4 - 6
- Cathode current, A: 19 - 24

### КГ-3Р, КУ-137Р, КIУ-43Р

**Klystrons**

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

Klystron KIУ-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 KIУ-43Р - operated with intermediate converter-amplifier pulsed klystron КU-137Р, packaged, metal-ceramics type with compulsory cooling by liquid. Klystron КГ-3Р-generator of continuous signal, fixed frequency.

**Main Specifications:**
- Waveband, MHz: 830-862
- Heater voltage, V: 6-8
- Heater current, A: 12-16
- Anode voltage, kV: 23
- Anode pulse current, A: 22-32
- Readiness time, sec: 120

### 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:**
- Dimensions, mm: 330 x 270 x 120
- Weight, kg: 7 000
**DEMODULATOR**

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

- **Modulation types:** BPSK, QPSK, (SO)QPSK, UQPSK, AQPSK, 8PSK
- **Decoding types:** convolutional (Viterbi algorithm), scrambling, differential
- **Input signal frequency rate of change:** up to 10 kHz/s (Doppler)
- **Input signal level:** minus 50 to minus 10 dBm
- **Data rate interface:** PCI Express

**Main Specifications:**
- **Transmission data rate:** 1...500 Mbit/channel
- **Input frequency range:** 270...1100 MHz
- **Input signal level:** minus 50 dBm

**DATA RECEIVING STATION OF EARTH REMOTE SENSING**

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.

**Main Specifications:**
- **Transmission data rate:** 1...500 Mbit/channel
- **Input frequency range:** 600...1200 MHz
- **Input signal level:** minus 50 dBm
- **Data rate interface:** PCI Express

**INFRARED EARTH IMAGER**

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 is based on solid solutions of cadmium telluride and mercury is used (under development).

**Main Specifications:**
- **Pixel projection in nadir at the orbit 690 km:** 96 m
- **Frame area:** 61x49 km
- **Noise equivalent temperature difference (NETD):** 35 mK
- **Cooling method:** Stirling microrefrigerator

**MULTIBAND EARTH IMAGER**

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 the photodetector array with the time delay integration mode is used.

**Main Specifications:**
- **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