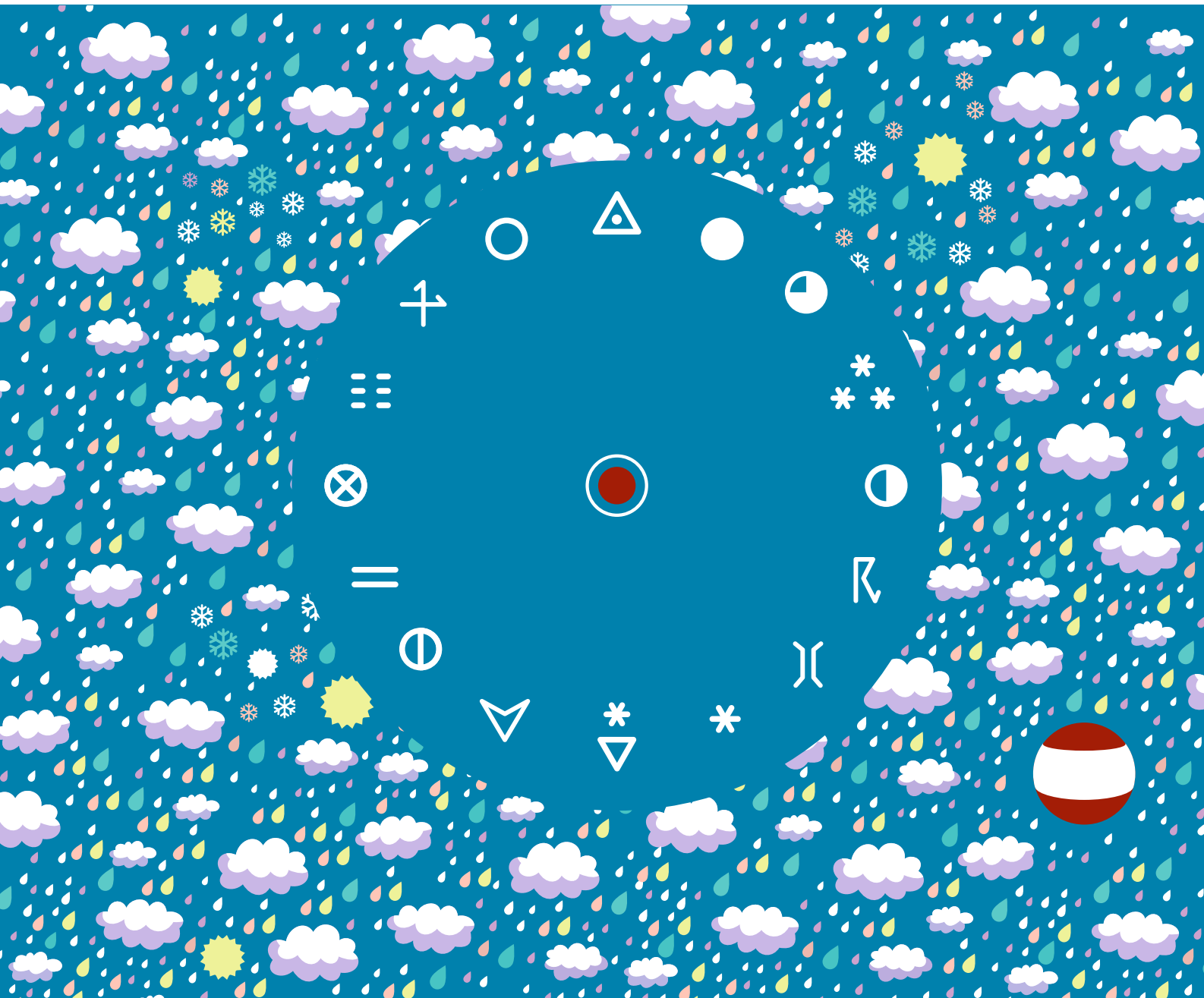


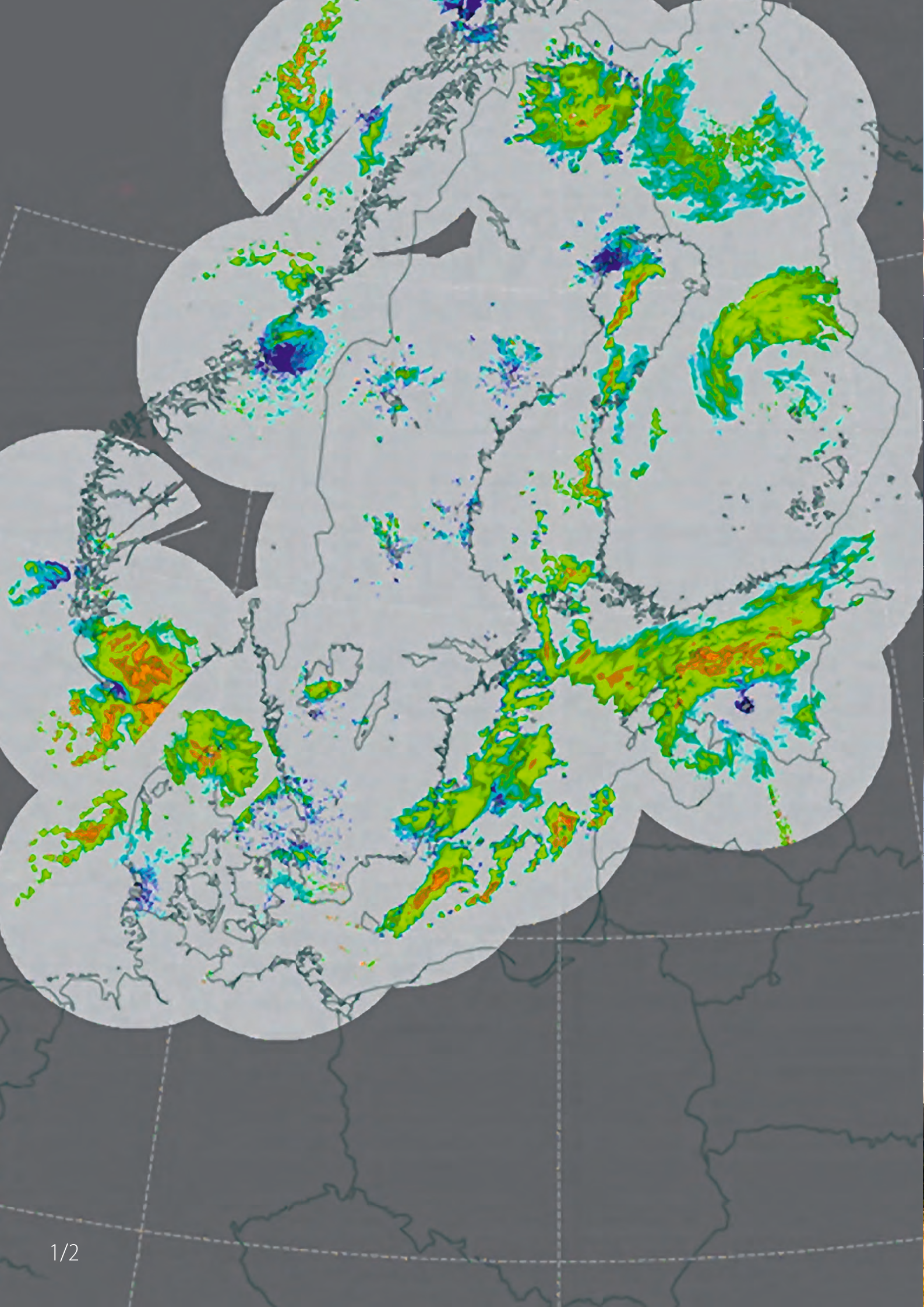


AIR TRAFFIC MANAGEMENT
SYSTEMS AND AIDS
SINCE 1946

Weather Radar Systems

MRL-700C DOPPLER METEO RADAR







VNIIRA. AIR TRAFFIC MANAGEMENT
SYSTEMS AND AIDS

Information about the Company:

All-Russian Scientific Research Institute of Radio Equipment (JSC VNIIRA) has specialized in the development, production, commissioning and maintenance of navigation and landing systems and aids, air traffic control automation, airborne equipment and weather radars.

Areas of activity

- | automated ATC and ATM systems and facilities for various control areas and for large regions and separate countries;
- | simulator systems for AT controllers;
- | surveillance, approach control, secondary, and weather radars;
- | ground and airborne equipment of short-range radio navigation systems and instrument landing systems;
- | airborne equipment of range measuring, aircraft (A/C) collision avoidance, and early ground proximity warning systems, and transponders;
- | onboard integrated navigation and landing systems;
- | ground and airborne aids of the Automatic Dependent Surveillance-Broadcast (ADS-B).

In 2004 JSC VNIIRA has joined «Almaz - Antey» Corp.»

When working out a solution, VNIIRA specialists prove again and again that they are capable of achieving more, inasmuch as each follow-on development surpasses the previous one. The long experience and our Customers' acknowledgements confirm it.

VNIIRA is far more than:

- | 70 years of the successful performance for the benefit of air safety;
- | 150 prototypes of radio-technical systems and the complex of ground and airborne radio instruments;
- | 1 300 Inventor's Certificates;
- | 60 complexes of ATC automation systems and facilities for airports and regional centers of Russia and other countries;
- | 100 types of home-produced aircrafts and helicopters employ the airborne equipment, navigation and landing facilities developed by VNIIRA;
- | 1 600 employees including 11 Doctors of Engineering Science and 68 Candidates of Engineering Science.

VNIRA has developed several generations of weather radars



VNIIRA has developed several generations of weather radars. The first domestically produced weather radar MRL-1 was developed by VNIIRA in 1961. Then it was re-designed into simplified unipolarized variant MRL-2. VNIIRA developed the second generation of radars MRL-5 in the middle seventies. The radars developed by VNIIRA became widely used in meteorological service system, civil aviation airports and air force airdromes, hydro meteorological service, regional observatory, antihail service. More than 600 radars were produced and more than 200 exported to Europe, Asia, Africa, South America with one MRL-5 fitted in Antarctic. The antenna electronic regulation system for MRL-5 developed by Institute made it possible to locate the radar on the ship.

*MRL-700C is a state-of-the-art product
fully prepared for serial production*

Principal physics to determine conditions of weather phenomena have been known for long now. Currently our job is to create weather radars offering better quality and reliability at lower costs. VNIIRA developed MRL-700C Doppler weather radar of new generation in 2011.

MRL-700C is a state-of-the-art product by VNIIRA fully prepared for serial production. Modern production methods were applied for manufacturing process of MRL-700C and made it possible to offer the radar that meets all performance specifications of Customer and has sufficient price advantage. MRL-700C is the solution offered by reliable manufacturer that has wide scientific and technical experience and the development expected by market specialists in view of modern technologies use.

MRL-700C is a state-of-the-art product fully prepared for serial production.

MRL-700C

WHAT CUSTOMER ISSUES

MRL-700C SOLVES

The MRL-700C Doppler weather radar, 5,3 cm waveband, is designed to obtain, process, capture, and transfer information regarding cloud fields, precipitations and resultant hazardous weather phenomena, wind parameters in clouds and hazardous weather phenomena produced by wind to different consumers provided operation in moderate and sub-tropical climate to different consumers.



MRL-700C

IS USED BY

METEOROLOGICAL SERVICE

Weather affects many aspects of social and economic activity of modern society. The main purpose of Meteorological service is to provide accurate information for activity planning considering weather phenomena: improvement of meteorological service for different branches of national economy including precipitation data, dangerous weather phenomena as well as for making real-time forecasts for large areas.

ANTIHAIL SERVICE

High data accuracy and enhanced precipitation estimation make it possible to use such radar for more detailed study and forecasting of separate weather phenomena. Longstanding cooperation with Hail hit service made it possible to develop the radar that meets specific requirements of this service.

AIR TRAFFIC OPERATION CONTROL

The radar provides meteorological radio-locating information on dangerous weather phenomena, particularly, storm, heavy rains, turbulence arising close to air routes and in the landing/takeoff zones of aircrafts to aviation forecasters. The radar provides air surveillance in case of small elevation that is necessary for wind shear measurement in landing zones.

MILITARY

The radar fully complies with all MD requirements of Russian Federation (RF). It can be installed on the aerodromes of state aviation, on military ranges of all kinds of RF forces. The stable engineering decisions and experience of developers make it possible to work out the arrangement on aircrafts, water aerodromes, and mobile floating bases of Navy.

EMERGENCY SITUATION PREVENTION SERVICE

The radar provides accurate and opportune data on forthcoming emergency situations to emergency situation prevention service in order to provide rescue and repair works. The parameters of this radar make it optimal for using in the most meteo dangerous areas of the country: coastal and mountainous areas.

LAND AND WATER TRANSPORT CONTROL SERVICE

Actual meteorological forecast for land and water transport control service provides real-time monitoring as well as provides information for opportune traffic control and traffic collapse prevention.

HYDROMETEOROLOGICAL INSTITUTES AND CLIMATE SCIENCE INSTITUTES

The radar makes it possible to perform the wide-scale research works in climate change by scientific-research institutes involved in the study of environment events.

OTHER BRANCHES

Agricultural companies
Industrial plants, producing plants, fuel and energy complex enterprises, public utilities.

FOREIGN CUSTOMERS

Secondary processing system supposes the full compliance with individual requirements of the customer. Particularly, text information display is performed on customer language and all images comply with all "standards" (patterns) in this country.





THE MRL-700C DOPPLER WEATHER RADAR

Proven technical decisions and innovations

- Powerful coaxial magnetron (250 kW) is a reliable and economically sufficient solution.
- Solid modulator provides stable and clear monochrome signal.
- MRL-700C - it is for the first time that antenna is produced of composite materials and combines supreme characteristics and levity of construction. The weight of construction is reduced on 40%.

Accuracy and functionality

- Doppler processor SIGMET with the range 2048 bin provides spectral processing for estimating dangerous weather phenomena.

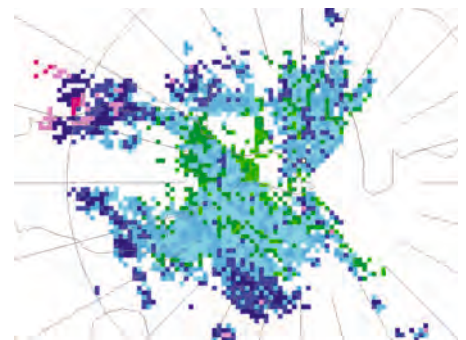
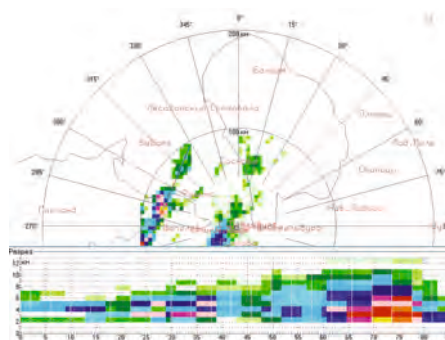
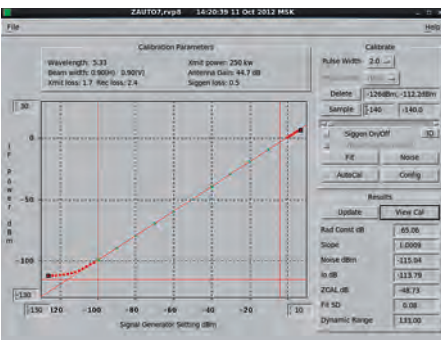
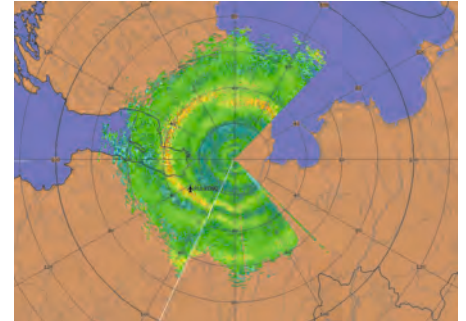
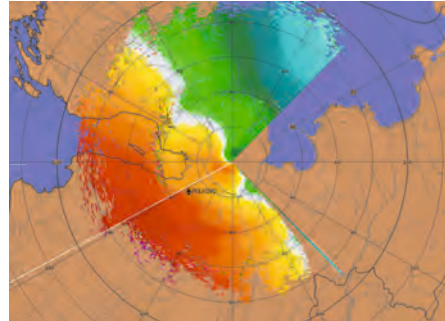
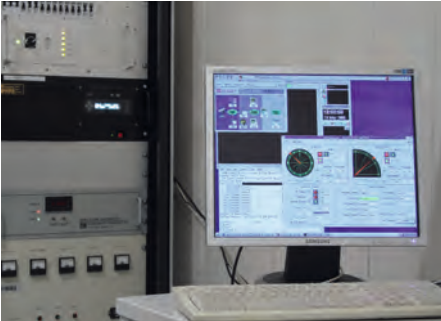
- High resolution on distance (75 m) combined with high power makes it possible to "see" the detailed meteorological situation for heavy rain, hail, and storm. The minimum space survey lasts 3,5 minutes.
- The structure of MRL-700C signal – is a short impulse and high power – provide the simplicity of information processing.
- High-speed scanning (up to 6 rev/min) in elevation plane provides the display of quick changing dangerous weather phenomena.
- There is an opportunity to equip by dual polarization.
- Signal emission duration of 0,8 or 0,5 μ s in comparison to 1 or 2 μ s increases the functionality of the radar.
- The way the radar is controlled and display of information are the same as MRL-5 has – forecasters need minimum additional education.

High performance

- Intellectual integrated continuous monitoring system (BITE) forecasts the possible failures.
- Remote monitoring and management don't require the maintenance personnel inside the radar (Radar).
- Antenna windproof cover has low losses in microwave signals.

Ease of installation

- Complete assembly and adjustment at plant provide required accuracy and exclude the common practice of antenna adjustment at site. The antenna column and radome arrangement on the container reduces assembly time up to several days.
- Container-type radar reduces assembly time and simplifies works at site. It is delivered at site in almost built-up condition.



Competitive sales conditions and maintenance

- Cost reduction of unit while keeping outstanding accuracy and reliability.
- Serial production of radars together with individual approach to every customer.
- Possibility to deliver separate radar elements as well as performing the full complex of work.
- There are no borders for VNIIRA: radar can be delivered to any location worldwide.
- Warranty and post-warranty service. Post-warranty service provides prompt component replacement (if applicable): spare parts always available and replaced in the shortest time possible.

Form of information display

Information is provided to consumers on color displays in the form of charts in horizontal, vertical and oblique sections through the space:

- Reflectability
- Radial Doppler speeds in oblique sections at different angles of slope
- Cloud heights
- Hazardous weather phenomena
- Precipitation rates
- Precipitations within any period of time
- Visibility in precipitations and other information according to Customer request.

Secondary processing system supposes the full conformity to individual customer requirements. Particularly, text information display is performed on customer lan-

guage and all images comply with all «standards» (patterns) in this country. It's developed at the Voeikov main geophysical observatory (Russian Federation). Convenient and plain presentation on color displays in the form of charts in horizontal, vertical and oblique sections through the space.

Modernization of MRL-5

If the condition of antenna and Radar MRL-5 is satisfying and there is a necessity to modernize the radar, VNIIRA specialists are ready to perform the complex of modernization works. The radar will be transferred into C-range. In case of modernization the receiver-transmitter and radio locating processing system as well as gear motor, antenna drive control sensors, drive control system and plow will be changed.

Technical characteristics

Operating modes	«Reflectability» / «Speed»
Cloud field detection range, km	
working	250
Weather phenomena identification range, including	
wind speed and atmospheric turbulence, km	125
Max range to positively identify radial wind speed,	
m/sec	±50
Operating conditions	
ambient temperature	Between minus 50 to +50
Antenna beam width in vertical and horizontal	
planes, degrees	1,0x1,0
Sidelobe level, dB, at most	Minus 30
Reflector aperture diameter, m	4,4
Polarization	Horizontal
Coverage	
Azimuth	Circular rotation
Angle of slope, degree	From -2 to 92
Antenna scan rate, degree/sec	From 0 to 36
Antenna rocking rate, degree/sec	18
Atatic mean square error of antenna drive in azimuth	
and angle of slope, degree, at most	±0,1
Carrier frequency, MHz	5625 ±25
Type of output transmitter device	magnetron
Output pulse power of transmitter, kW, minimum	250
Repetition frequency of sounding pulses, Hz in	
«Reflectability» / «Speed» mode	250/1000
Length of sounding pulse in «Reflectability» /	
«Speed» mode	2,0/0,5; 1,0
Receiver sensibility, dB/W, not worse than	-142
Dynamic range of receiver, dB, not less than	105





RAIN
STORM



HAIL

SNOW

MELTED SNOW



CLOUDY

RAIN

VNIIRA.

AIR TRAFFIC MANAGEMENT
SYSTEMS AND AIDS

Complexes of Air Traffic
Control Automation Aids

Airspace Surveillance Facilities

Navigation and
Landing Radio Systems

Weather Radar Systems

Airborne Navigation and
Landing Equipment

Antenna and Feeder
Systems and Devices

Automated Flight
Test System (ASLK)

ATC Training Systems



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