



State Enterprise  
«Scientific and Production Complex»

«ISKRA»

## Modernization of 19Zh6 (ST- 68U) Radar

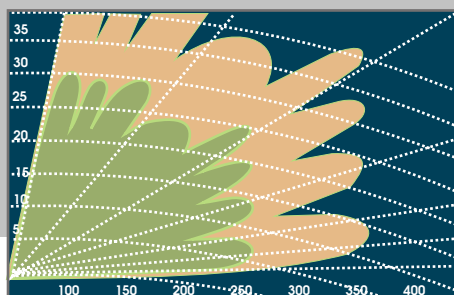
### MODERNIZATION ENABLES:

- **Increasing a detection range;**
- **Improving a coordinate measurement accuracy;**
- **Improving target detection against clutter and noise background;**
- **Automation of tracking and initialization processes;**
- **Adaptation of a rejection zone to interference situations;**
- **Applying color raster display workstations;**
- **Realization of various protocols, formats and standards for radar data issue;**
- **Applying electronic recording of the output data and radar operation modes;**
- **Providing operation at height up to 3000 m;**
- **Reducing the false plots during operation in mountainous terrain;**
- **Introducing the target identification channel or the international secondary channel (IFF channel MK-X type);**
- **Ensuring high effective trajectory processing algorithms by the new data processor;**
- **Increasing the klystron service life;**

### INCREASE

*To increase a range, a number of processed range bins has been increased in the processing equipment of the modernized Radar 19Zh6 (ST-68U) as well as a number of phase filters is enlarged from 8 to 16. It allowed to increase a radar coverage range from 150km to 180 km in the "rare" triggering mode, substantially improve target tracking under combined effect of clutter, passive and active jamming, realize a capability to determinate radial velocity of targets.*

*In order to detect large-size targets at the range up to 360 km, a new triggering mode has been introduced.*



### BUILDING-IN THE IFF SYSTEM COMPARTABLE WITH NATO STANDARDS

The upgraded radar antenna makes it possible to radiate the IFF signals in the range of 1030/1090MHz. Large vertical dimensions of the reflector permit to shape an elevation antenna pattern of Cosec<sup>2</sup> type with a sharp bottom edge 1,4dB/deg. The antenna pattern width in the azimuth plane is 6,5°.

The antenna system also provides realization of SLS modes in interrogation and response. The interrogator MK-X (MK- XII) type is set in the radar cabin. The interrogator control is accomplished from the radar workstations. In the processing equipment the IFF output signals are associated with echo-signals and tracking according to the IFF response signals is ensured. All data coming from the IFF is displayed on the workstations.



### RADAR OPERATION IN MOUNTAINOUS TERRAIN

For the radar operation in mountainous terrain the electric strength of the microwave channel is increased: the increased pressure in the output microwave channel is maintained; the new pulse transformer is installed in the transmitter; the new zone switch is installed in the antenna.

When the radar operates in a mountainous terrain the essential decrease of false plots level is achieved due to shaped out of oscillations of one stable generator.



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## MODERNIZATION OF SUCCESSFUL RADARS IS A KEY TO THEIR LONGEVITY

Improvement of technical and tactical radar characteristics is realized at the expense of::

- **Enhancement of sensitivity of the radar receiving channels by means of the transistor low-noise amplifiers ЭЛУ-3-30 in main and auxiliary channels instead of TWT low-noise amplifiers**
- **Improving the comfort level for personnel operation by installing a new low-noise conditioner of separate type**
- **Increasing the klystron service life by using the parts of stainless steel and titanium instead of the aluminum parts of the liquid cooling system**
- **Introduction a new detector and a new radar data processor on the basis of universal processor modules -COTS-products. These new facilities replace next cabinets 195ЛВ01, 195ПВ01, 195ПС02 & УЦ-10**



**In the processor there realized effective algorithms of trajectory processing, which allow tracking a great number of aircrafts, including maneuvering and moving as a group. Upon that, the automatic tracking initialization is provided. The integrated simulator of the radar plots enables creation a great number of training scripts and operator's training. Application of general-purpose computer facilities allows realization of various protocols and data interchange formats by means of software. The agreed protocols and formats can be realized either during modernization or operation.**

## NEW WORKSTATIONS



**New radar workstations are based on LCD. They permit displaying all radar data, radar status and map information.**  
**The radar is controlled from the workstations.**  
**Two lines (a twisted pair) carry out communication with the radar and workstations.**  
**Up to four workstations can be connected.**  
**Maximum radar remote distance is 300 m. If the workstations are power supplied from an independent power source, the remote distance is up to 500m.**  
**Data playback and analysis of the recorded data is possible at the workstation as well as control**

## UPDATE OF LIQUID COOLING SYSTEM

- **Protects the cooling channels against blocking by electrochemical corrosion products**
- **Improves endurance of the cooling devices (klystron, circulator, solenoid, equivalent).**

