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NEW TRENDS IN ELECTRONIC WARFARE ABROAD
(SPECIAL EDITION)

Research Institute No.29 Intelligenc Office Electronic Warfare Technology Text Selection and Editorial Department

Translation of "Guo Wai Dian Zi Zhan Zui Sin Dong Tai (Te Ji)"; Electronic Warfare Library 2, pp -1-, -2-, 18-33

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EXPLANATION OF PUBLICATION

This "Special Edition" is based on certain publications printed abroad at the end of 1992 (for example, "Aviation Week and Space Technology (Special Electronic Warfare Collection)", "DMS Electronic Warfare Forecast", "National Defense Review", "Electronic Defense Magazine", "Defense Electronics", and so on) as well as a number of other reliable information sources compiled and translated by organizational personnel of the intelligence office of research institute 29 of the ministry of machinery and electrical equipment. The contents are rich--involving an analysis of electronic warfare development trends in the new international situation, points of view and predictions associated with electronic warfare for various nations of the West after the Gulf War, electronic warfare projects which are on going at the moment, electronic warfare development trends, and so on. This "Special Edition" specializes in giving the performance and characteristics of part of the electronic warfare equipment of the former Soviet Union. The reader is able to understand from it the broad outlines of the electronic warfare capabilities of the former Soviet Union. Besides this, it also supplies a table of prices for foreign airborne electronic warfare equipment, providing references for relevent units and departments. Because time is short, the level is limited, and it is difficult to avoid shortcomings, it is respectfully requested that the readers not be stingy with their comments and advice.

We express our heartfelt thanks for the active support and hard work of all the personnel who participated in this "Special Edition".

Editor
January 1993

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PARTIAL ELECTRONIC WARFARE CAPABILITIES OF THE FORMER SOVIET UNION

Gu Yaoping He Ziqiang

In the areas of electronic warfare technology and capabilities, the former Soviet Union possesses an actual strength which is roughly equivalent to the U.S. Due to being in confrontation with the U.S., in order to maintain superiority, they adopted measures of absolute secrecy. Therefore, with regard to their actual electronic warfare strength, very little is known to the outside world. On the basis of reliable information sources, we supply to the reader a number of details associated with part of the electronic warfare equipment of the former Soviet Union, providing a reference.

GKP-1 JAMMER

--Jammer using phase control array antennas

This type of jammer is used in protecting area and point defense targets in order to prevent the detection of side looking radar, navigation radar, terrain avoidance/following radar, and air to ground fire control radars.

CHARACTERISTICS

* Single pulse principles (single pulses make reactions)
* 2-D wave lobe scan
* Digital processors make jammer functions optimal
* Independent, autonomous, or autocontroled methods of operation
* Threat placed in priority level catagory

TECHNICAL CHARACTERISTICS

* Operating frequency band.....2CM
* Instantaneous coverage
  Azimuth.....45 deg
  Elevationangle.....10(45)deg
* Search (tracking) Area
  Azimuth.....360deg
  Elevation angle.....60deg
* Detection range.....130-150KM
* Reaction time (quick frequency change radar).....less than 15μs
* Numbers of radars simultaneously jammed /19

Side looking radar.....1-2
Terrain following/avoidance.....1-2
Fire control.....as many as 6

* Delivery means.....Ural-375A truck
* Delivered equipment units.....3
(Antennas, control equipment, electric power sources)

GKP-2 JAMMER

----Jammer using phase control array radar

This type of jammer is used in protecting area and point defense targets in order to prevent the detection of side looking radar, navigation radar, terrain avoidance/following radar, and air to ground fire control radar.

CHARACTERISTICS

* Single pulse principles (single pulses make reactions)
* 2-D (two dimensional) wave lobe scanning
* Digital processors make jammer functions optimal
* Independent, autonomous, or autocontroled methods of operation
* Threat placed in priority level catagory

TECHNICAL CHARACTERISTICS

* Operating frequency band.....3CM
* Instantaneous coverage
Azimuth.....45 deg
Elevationangle.....10(45)deg
* Search (tracking) area
Azimuth.....360deg
Elevation angle.....60deg
Detectionrange.....150-200KM
* Reaction time (quick frequency change radar).....less than 15μs
* Numbers of radars simultaneously jammed
Side looking radar.....1-2
Terrain following/avoidance.....1-2
Fire control.....as many as 6
* Delivery means.....Ural-375A truck
* Delivered equipment units.....3 /20
(Antennas, control equipment, electric power sources)

GKP-3 HIGH POWER JAMMING SYSTEM

This type of high power jamming system is used in carrying out side lobe jamming against AN/APY-1(2) early warning radars.

CHARACTERISTICS

* Single pulse principles (single pulses make reactions)
* High precision frequency measurements and signal reproduction capabilities
* Digital processors make jammer functions optimal

TECHNICAL CHARACTERISTICS

* Operating frequency band.....3CM
* Coverage
  Azimuth.....0-36deg
  Elevationangle.....-1-+25deg
* Number of measurement parameters.....6
* Operating capabilities (number of simultaneously suppressed targets).....2
* Operating range.....over 250KM
* Delivery means.....4 trailers

GKP-4 JAMMING SYSTEM

----surface proximity burst fuse jamming system

This system is used in protecting personnel and equipment. It makes warheads explode prematurely or causes them to operate in direct contact detonation modes.

TECHNICAL CHARACTERISTICS

* Defense area.....over 20 hectares
* Operating frequency band.....VHF
* Set up/take down time.....under 4 minutes
* Continuous operating time.....over 6 hours
* Electric power sources
  Motive electric power source.....electric generating station
  Back up electric power source.....vehicle borne electric generators

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GKP-5 JAMMER SET

This jammer set is used in carrying out multiple mode jamming against AN/APY-1(2) radars. It is carried out through the radiation direction diagrams associated with main lobes.

This jammer set includes 6 jammer units as well as a maintenance and control station mounted on a KAMAZ truck.

TECHNICAL CHARACTERISTICS

* Operating frequency band.....10CM
* Operating capability (number of targets simultaneously suppressed).....2
* Coverage
  Azimuth.....60 deg
* Angle of elevation.....1-6 deg
* Equipment weight (includes back up batteries, control receivers, and decoding equipment).....less than 120KG

GKP-6 ESM SYSTEM

----Surface ESM system

This system detects the signals of side looking, fire control, and terrain avoidance/following airborne radars. In conjunction with this, data is outputed to automatic jamming stations (GKP-7 system).

This system is also capable of detecting JSTAR radar signals.

The electronics equipment in question is inside a K1.4310 vehicle box mounted on a Ural-4320 truck.

TECHNICAL CHARACTERISTICS

* Operating frequency band.....2/3CM
* Detection range (detection probability = 0.8)
  Against AN/APQ-120 model side radar.....over 80KM
  Against AN/APQ-144,-120 model fire control radars.over 100KM
  Against AN/APQ-128 terrain avoidance/following radar.....over 40KM
* Number of aerial targets automatically detected within 5-10 seconds.....60
* Coverage
  Azimuth.....360 deg
  Elevation angle.....3 deg
* AOA (arrival direction angle) measurement precision
  Azimuth.....0.5 deg
  Elevation angle.....3 deg/22
* Continuous operating time.....24 hours
* Digital signal processing

GKP-7 CONTROL SYSTEM

----Automatic comprehensive type jamming control and information management system

This system controls GKP-1/2 surface jammers. In conjunction with this, it processes information coming from GKP-6 ESM systems, other radars, and ELINT signal processing assets.

TECHNICAL CHARACTERISTICS

* Number of GKP jammers capable of control.....as many as 27
* Number of aerial targets simultaneously assigned..as many as 50
* Operating range.....up to 20-40KM
* Transport: Two Ural-4320 trucks with cargo boxes and one Ural-375 truck with cargo box

GKP-8 JAMMER

This type of jammer is used in jamming AN/APQ-125 model early warning radars.

CHARACTERISTICS

"RAZVEDKA" (intelligence) modes are capable of searching for, detecting, and separating signals of AN/APQ-125 radars. They are also able to direction find and measure other signal parameters.

"PODAVLENIE" (jamming) modes are capable of producing and transmiting jamming signals. They are also able to carry out automatic or manual azimuth tracking against suppressed radars within an angular range of +/-80 degrees.

TECHNICAL CHARACTERISTICS

* Frequency range.....VHF
* Operating range.....over 200KM
* Set up/take down time.....under 2 hours
* Delivery means.....GAZ-69 model truck
* P = 1KW
* Sensitivity = 90dB

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GKP-9 JAMMER

This system is used in jamming "TACAN" aerial guidance systems. It is capable of searching for and identifying TACAN command signals. In conjunction with this, its operating frequencies are used to carry out jamming against surface signal beacons. It is capable of simultaneously jamming range and azimuth signal channels and data communications circuitry--being able to jam all the aircraft located within a suppression zone and using a signal channel.

This type of jamming station is capable of using automatic modes of operation. It is also capable of carrying out operations on the basis of control center commands.

TECHNICAL CHARACTERISTICS

* Operating modes:
  ----Automatic search for TACAN command signals using visible methods to display detected signals.
  ----Automatic search for TACAN command signals after which use is made of the operating frequencies to jam surface signal beacons when signals are detected.
  ----Jamming surface signal beacons on given operating frequencies.
* Operating range.....not less than 300KM
* Transport.....ZIL-131 truck

GKP-10 GROUND TO GROUND MISSILES CARRYING PASSIVE COUNTER RADAR HOMING HEADS

----Used in dealing with operating search radars.

TECHNICAL CHARACTERISTICS

* Operating frequency band.....CM
* Missile maximum range.....70KM
* Radar lock range.....not less than 15KM

GKP-11 AIRBORNE ACTIVE JAMMING SYSTEM

This system is used in protecting front line aircraft.

TECHNICAL CHARACTERISTICS

* Operating frequency band.....3CM
* Coverage (foward and rearward protection) /24
  Azimuth.....+/-60deg
  Elevationangle.....+/-30deg
* Weight.....73KG

GKP-13 COUNTER NOISE SYSTEM

GKP-13 is a system used in protecting radars and dealing with background noise. The system in question is used in improving the visibility for radars in background noise produced by ocean waves, precipitation, foil strips, and mutual radar interference.
Radar operations are not influenced by this system.

TECHNICAL CHARACTERISTICS

* System weight.....less than

3KG

* Electrical consumption.....15KW
* Amount of signal to noise ratio improvement.....12dB

GKP-14

This carries out power noise against advanced radars and surveillance and target attack radars (STAS). Improved models of SPN-30M surface stations associated with quasi continuous wave jamming are used in protecting military and civilian industrial targets--dealing with monitoring and precision weapon attacks.

The main targets of jamming are:

----"JSTARS" STAS radar
----ACAPC-2 model side looking radar
----multiple function radar on tactical aircraft

TECHNICAL CHARACTERISTICS

* Operating frequency band.....3CM
* Coverage
  Azimuth.....0-360deg
  Elevation angle.....as high as 78 deg
* Number of simultaneous jamming targets.....as high as 5
* Antenna form.....reflector
* Transport.....3 Ural-375 model trucks

GKP-15 JAMMER

----Nacelle installed jammer opting for the use of multiple beam antenna systems.

This type of jammer is capable of jamming fire control radar. It is used in the protection of single aircraft, mutual protection between aircraft, and the protection of groups of aircraft. /25 It deals with ground, airborne, and shipborne weapons.

GKP-15 jammers are capable of

----search, detection, and classification of targets (detection ranges are not smaller than fire control radar operating ranges within operating frequency bands)
----on the basis of stored ELINT/ESM information, detecting directions of possible attacks in order to suppress threats associated with the highest priority level
----jamming radars operating in the CM wave band.

Jammers can simultaneously supply protection front and rear. Blanket ranges protected within each direction are

-90 degrees
-60 degrees

As far as the production of jamming signals by jammers on radar frequencies is concerned, it disrupts the range, speed, and

angular signal channels associated with suppressed fire control radars. Jamming signals are produced from stored information and digital analysis based on radar signal parameter data.

Jamming equipment is installed in two nacelles.

* Equipment weight (in one nacelle).....75KG

GKP-D ACTIVE JAMMING SYSTEM

This is an improved performance model of SPS-141,-141M jamming systems. It is capable of destroying radar target intercept ranges.

This system is used in jamming the reaiming of missiles which can be carried out by radars on F-14, -15, -16, and Mirage 2000 fighters. (Surface)

TECHNICAL CHARACTERISTICS

The same.

GKV-1 AUTOMATIC COMMUNICATION JAMMING SYSTEM

GKV-1 automatically jams operational--tactical and tactical control communications systems (automatic communications jamming system).

This system is used in detecting radar sources, carrying out information processing. In conjunction with that, jamming is carried out with regard to automatic control system communications and data transmission circuitry operating in quick frequency change modes.

The system in question includes:

HF range jamming stations.....as high as 10 units

VHF range jamming stations.....as high as 6 units

Stations control centers.....1 unit

System delivery equipment.....1 truck or ARC

GKV-2 AUTOMATIC COMMUNICATIONS JAMMING SYSTEM

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The system in question is used in detecting radar sources and carrying out information processing. In conjunction with this, jamming is carried out against communications and data transmission circuitry associated with operations in quick frequency change modes. Moreover, it is also capable of carrying out jamming against transtropospheric relay communications lines as well as "JTIDS" and "PARS" radio communications circuitry.

This system includes:

Intercept and identification surface stations.....2

Long range jamming stations.....1
High frequency (HF) surface stations.....2
Very high frequency (VHF) surface stations.....2
Jamming station control units.....1

GKSH PHOTOELECTRIC JAMMING SYSTEM

This system is used in protecting tanks from meeting with attacks associated with surface or helicopter borne AT missiles, bombs, or infrared and laser guided missiles (for example, such missiles as DRAGON, MILAN, NOD, SWANGFIRE, and so on).

Photoelectric jamming systems cause target protection capabilities to increase 4-5 times, making military equipment damage associated with weapons decrease over 2 fold.

The system in question includes launchers associated with the firing of 12 aerosol rounds mounted on a truck.

GKK-1 ANTIRADAR MISSILES

Airborne ARM (antiradar missiles) are used in suppressing operating surface radars.

* Operating frequency band.....3 CM
* Maximum range.....100 KM

GKK-2 ANTIRADAR MISSILES

Airborne antiradar missiles used in suppressing operating surface radars.

This type of missile tracking and destruction operates on radars associated with quick frequency change modes or short shut down period modes.

* Operating frequency band.....3CM or 5CM or 10CM or 20CM
* Maximum range.....200 KM

M-17P JAMMING HELICOPTER

This type of helicopter carries out protection of groups of aircraft through the jamming of early warning radars, target acquisition radars, intercept control radars, as well as AN/APS-125 model AWACS radars.

TECHNICAL CHARACTERISTICS

* Operating frequency bands.....10,20,70 CM
* Antenna switches are capable of causing interference to be carried out in any direction on the two sides. /27
* Total weight.....750 KG

M-8PS JAMMING HELICOPTERS

This type of helicopter is used in defense penetration jamming of radars associated with improved HAWK, SAM (surface to air missile) radars, and F-14, -15, -16, and -18, as well as Mirage 2000 fighter radars.

Jamming systems include a phase control array.

TECHNICAL CHARACTERISTICS

* Number of jamming signal channels.....as many as 4
* Coverage
  Azimuth.....20-25 deg
  Elevation angle.....8-10 deg
* Total weight.....900-1000KG
* Price.....8.5 mil U.S $

Mi-8 PRP JAMMING HELICOPTERS

Helicopters make use of phase control array jamming systems.

This type of helicopter is used in protecting surface and aerial targets in order to deal with fire control radars, search radars, and Patriot missile radar homing systems. It carries out jamming from aerial cruising zones against these radars.

In radar suppression directions, phase control arrays provide high power jamming. ESM subsystems detect radar signals within 24x10 degree (grad) defense fan sectors. The detection range of these subsystems is not less than 120% of radar operating ranges.

Based on different tactical situations, jammers provide range and speed deception jamming (RGPO and RGPO) (capable of reaching as many as 64 false targets). Jamming is aimed type noise and barrage type noise. Jamming signals are produced as digital repoductions of detected signals obtained on the basis of digital signal processing. Digital methods are capable of taking received signals and carrying out comparisions with a priori data--identifying the threat.

High sensitivities and high powers as well as effective utilization of output powers are capable of carrying out radar detection and jamming through main lobes and side lobes associated with radiation direction diagrams.

Mi-8 PPR JAMMING HELICOPTERS

The helicopters in question carry out jamming against early warning radars, acquisition radars, and interceptor control radars. They are used in protecting groups of aircraft and helicopters.

They are used to suppress homing heads associated with TV information sent from target aircraft toward control centers or to

suppress TV weapons.

* Operating frequency band.....CM
* Antenna switches supply jamming for any area on the two sides of aircraft /28

Mi-8 PRR JAMMING HELICOPTERS

The helicopters in question include a phase control array jamming system.

These helicopters are used in protecting surface and airborne targets from meeting with the attacks of low altitude SAM missiles guided by fire control radars, search radars, and radar homing devices. Protection measures are to lay down high power jamming from aerial cruising zones against these radars.

The phase control array in question supplies high power jamming in the direction of suppressed radars.

The ESM subsystems provide detection with regard to radar signals in 24X10 gradient (grad) defense fan sectors. Subsystem detection ranges are not smaller than 120% of radar operating ranges.

On the basis of different tactical situations, jammers supply range and speed deception jamming (RGPO and RGPO) (capable of reaching as high as 64 false targets). Jamming is aimed mode noise and barrage mode noise. Jamming signals are produced as digital copies of detected signals obtained on the basis of digital signal processing. Digital methods are capable of taking received signals and carrying out comparisons with a priori data, identifying threats.

High sensitivities and high powers as well as effective utilization of output powers are capable of carrying out radar detection and jamming through main lobes and side lobes of radiation direction diagrams.

Mi-8 PHP JAMMING HELICOPTERS

The helicopters make use of jamming systems that have phase control arrays.

This type of helicopter is used in protecting surface and aerial targets as well as to deal with fire control radars, search radars, and radar homing systems of Hawk missiles. It carries out jamming from aerial cruising zones against these radars.

Phase control arrays supply high power jamming in the directions of suppressed radars. ESM subsystems detect radar signals within 24X10 degree (grad) defense fan sectors. The detection ranges of these subsystems are not smaller than 120% of radar operating ranges.

On the basis of different tactical situations, jammers supply range and speed deception jamming (RGPO and RGPO) (can reach as many as 64 false targets). Jamming is aimed mode noise and barrage mode noise. Jamming signals are produced as digital copies of detected signals obtained on the basis of digital signal processing. Digital methods are capable of taking received signals

and carrying out comparisons with a priori data to identify threats.

High sensitivities and high powers as well as effective utilization of output power is capable of carrying out radar detection and jamming through main lobes and side lobes of radiation direction diagrams.

Mi-8PI JAMMERS

Mi-8MT helicopter borne jammers are used in order to protect groups of aircraft through the jamming of early warning radars, target designation radars, and interceptor control radars. Jammers include multiple beam arrays, digital signal processors, and jamming signal formation systems. Antenna switches provide the capability to carry out jamming from either of the two sides of the helicopters.

* Operating frequency band.....25CM
* Weight.....800KG

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Mi-8U CONTROL SYSTEMS

These helicopter borne systems (control centers) carry out control functions associated with surface jammers and helicopter borne jammers.

The control centers in question provide collection and processing within the radio horizon (line of sight) with regard to electromagnetic radiation intelligence. ELINT/ESM processing is carried out by operator personnel making use of on board computers. They are capable of processing as many as 100 radar signals at the same time.

After doing processing on radar signals, the control centers in question carry out target assignments to ground and helicopter borne EW systems in order to provide suppression of enemy radars.

Control systems carry out suppression by making use of optimal EW assets and providing them for the most important threats.

Mi-26 PA JAMMING HELICOPTERS

The helicopters in question provide protection for groups of aircraft through jamming search radars, target indicator radars, and AN/APY-1(2) model early warning radars.

* Operating frequency band.....10 CM
* Antenna switches provide jamming for either of the two sides of aircraft.

SETKA SHIPBORNE COUNTERMEASURE SYSTEM

The system in question is used in jamming fire control radars of warhips and aircraft. It is also capable of jamming HARPON, OTPMAT, CORMORAN, and EXOCET models of antiship missile radar homing devices.

It is also conceived for use in the defense of small model

warships of up to 2000 ton displacements.

TECHNICAL CHARACTERISTICS

* Operating frequency band.....2 and 3 CM
* Coverage
  Azimuth.....0-360 deg
  Elevation angle.....1-10 deg

This system includes radar alarm receivers and jamming equipment.

GKCH-01 SHIPBORNE COUNTERMEASURE SYSTEM

This is an automatic ECM system used in protecting small model warships (displacement of 1000-3000 tons).

The system in question is used in:

----Tactical electronic support measures (ESM)

----Implementation of active and passive jamming against target acquisition radars and fire control radars

----Jamming centimeter wave band (2 and 3 CM) antiwarship missile homing devices. Jamming probabilities not less than 0.5.

The system in question is capable of operating as an integrated entity with continuous fire guided missile launching air defense weapons systems on warships as well as passive ECM laying devices.

Speaking in terms of structure, this system is designed to be able to simultaneously or independently operate in 3 overlaping frequency subbands.

GKCH-02 SHIPBORNE COUNTERMEASURE SYSTEM
(SHIPBORNE SELF-DEFENSE JAMMING SYSTEM)

The system in question is used in protecting small model warships. It includes:

----Carrying out detection against target acquisition radar, fire control radar, and radar homing devices associated with antiship missiles

----Automatic threat classification

----Implementation of active and passive jamming against HARPOON, OTOMAT, and EXOCET antiship guided missiles in order to lower their hit probabilities

----Providing, for fire control systems, data output associated with target designation (assignment) status.

FEATURES AND TECHNICAL CHARACTERISTICS

* Operating frequency band.....CM
* Jamming effect probabilities not less than 0.9
* Automatic control of active and passive ECM measures

GKCH-03 SHIPBORNE COUNTERMEASURE SYSTEM (SHIPBORNE SELF-DEFENSE JAMMING SYSTEM)

The system in question is used in protecting small model warships. It includes:

----Carrying out detection against target acquisition radars, fire control radars, and antiship missile radar homing devices

----Automatic threat identification and classification

----Implementing active and passive jamming against HARPOON, OTOMAT, and EXOCET antiship guided missiles in order to lower their hit probabilities

----Supplying data output associated with target designation (assignment) statuses for fire control systems.

FEATURES AND TECHNICAL CHARACTERISTICS

* Operating frequency band.....CM
* Jamming effect probabilities not less than 0.7
* Automatic control of active and passive ECM measures

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GKCH-05 ESM MODULE (DETAILED ANALYSIS MODULE POSSESSING TACTICAL ESM SYSTEM CONNECTIONS)

The module component in question is installed on small model specialized warships.

This ESM module supplies:

----Supplying electromagnetic environment analysis for countermeasures

----Radar identification

----Measurement, display, and recording of all detailed signal parameters.

On the basis of differences in signal analysis wave bands (10-500 MHz), the component in question is capable of having three types of module model.

TECHNICAL CHARACTERISTICS

* Acquisition probability (with regard to various types of models).....notless than 0.7-0.9
* Weight (with regard to various types of models)...150 KG, 400 KG, 750 KG

GKB-01 NACELLE MODEL JAMMER

This airborne jammer is used in jamming acquisition radars, GCI radars, target designation radars, and AWACS model early

warning radars.

The system in question supplies:

----Real time monitoring and analysis of received signals

----Simultaneous production of up to 8 jamming signals forward and backward.

FEATURES AND TECHNICAL CHARACTERISTICS

* Digital type signal processing and jamming signal production technology
* Operating frequency band.....M and DM (meter wave and decimeter wave)
* Coverage
  Azimuth.....+/-45 deg
  Elevation angle.....from 5 degrees to -45 degrees
* Power consumption (220V,400HZ electric power source) .....not greater than 5KVA
* Cooling system.....air cooled--liquid cooled
* Equipment weight (including cooling system).....not greater than 210KG
* Jamming nacelles are capable of installation on SU-24, SU-27, and TY-22 model aircraft. /32

GKB-02 AIRBORNE ECM SYSTEM

This new model ECM system is used in independent/or mutual protection with regard to defense penetration aircraft to avoid meeting with attacks associated with ground and aerial weapons carrying radar and infrared guidance. The ECM system in question is capable of providing:

----Monitoring and analysis with regard to received signals as well as identification and classification with regard to types of threats and levels of threat importance

----As far as jamming fire control systems carrying radar and infrared guidance forward and backward are concerned, a capability to use dropable type jamming devices without any necessity for their use either.

TECHNICAL CHARACTERISTICS

* Operating frequency band.....CM
* Coverage
  Azimuth.....360 deg
  Elevation angle.....+/-30 deg
* ECM Methods
  Azimuth.....+/-60 deg
  Elevation angle.....+/-30 deg
  (Forward and backward)
* Weight.....not larger than470 KG

GKB-03 NACELLE MODEL JAMMER

The airborne jammer in question is used in jamming acquistion radar, GCI radar, target designation radar, and HAWKEYE model early warning radar.

This jamming system provides:

----Real time monitoring and analysis of received signals

----Simultaneous production of up to 4 jamming signals forward and backward.

FEATURES AND TECHNICAL CHARACTERISITCS

* Digital type signal processor and jamming signal production technology
* Operating frequency band.....M and DM (meter wave and decimeter wave)
* Coverage
  Azimuth.....+/-45 deg
  Elevation angle.....from 10 degrees to -45 degrees
* Power consumption (220V,400Hz electric power source) .....not greater than 3KVA
* Cooling system.....air cooled--liquid cooled
* Equipment weight (including cooling system).....not greater than

200KG /33

* Jamming nacelles capable of installation on SU-24, SU-27, and TY-22 model aircraft.

GKB-04 ESM SYSTEM
(AIRBORNE ELECTRONIC SUPPORT MEASURE (ESM) SYSTEM)

The system in question is used in monitoring surface and shipborne radars. In conjunction with that, ESM data is transmited to surface control centers.

This ESM system includes detailed analysis stations and intelligence data transmission circuitry.

The system supplies detection and analysis with regard to radiation station signals. Received intelligence data is stored in information carriers, supplying later processing. In conjunction with this, there is transmission to surface centers.

The surface centers in question include data reception stations and computer controled intelligence data processing.

TECHNICAL CHARACTERISTICS

* Operating frequency bands.....DM,CM
* Coverage (equivalent to aircraft transverse axis) .....+/-45 gradient (GRAD)
* ESM system capable of installation on Mig-25 RB model aircraft.
* Equipment weight.....not greater than 400 KG

FAINT DANGER SIGNALS APPEAR IN A NUMBER OF KEY ELECTRONIC WARFARE PROJECTS

In the electronic warfare market, several things have recently appeared which make people think back to the traditional "good news/bad news joke". However, speaking in terms of a good number of U.S. Air Force and Navy flight personnel, the possible outcomes are still no joking matter. Examples would be as follows.

* The U.S. Air Force has recently decided that it cannot undertake the costs associated with using missile approach warning system (MAWS) equipment on F-15 or F-16 aircraft. MAWS is capable of protecting aircraft by avoiding their running into attacks from infrared guided missiles. During "Operation Desert Storm", most of the U.S. Air Force losses were all created by this type of missile.

Besides the F-22 fighter, which has already been planned, the Air Force will stop all MAWS technology research projects. The good news is that it is estimated that the Navy (showing deep interest in MAWS) will be designated as the lead service branch, developing a series of systems for application in multiple services.

* Reports by the Pentagon's chief of operational testing and evaluation say that, "The U.S. Navy's new ALQ-165 airborne self-defense jammer was not able to get through test flights associated with combat tests and evaluations. The ALQ-165 is planned for use in replacing a type of obsolete 1970's jammer mounted on the F/A-18 and other aircraft. However, this conclusion is running into opposition by the Navy.

* In the fiscal 1993 national defense appropriations bill, B-1B improvements are allocated 86.4 million U.S. dollars. However, it is clearly explained that, among these funds, none can be used in "research work relating to the reduction of risk and correcting of inadequacies associated with electronic countermeasure systems on this type of aircaft"--unless Congressional approval is obtained. However, already approved funds can be used in "carrying out research and analysis on paper relating to the correction of ECM inadequacies."

* In operational tests, the new model ALR-56M radar warning receiver used with the Air Force's new model F-16 and other aircraft [text incomplete] /59

JAMMING THREATS GIVE RISE TO DOUBTS IN PEOPLE ABOUT GPS

Li Yongqiang (Trans.) He Ziqiang (Ed.)

Translation of "Gan Rao Wei Xie Qi Le Ren Men Dui GPS De Huai Yi"; New Trends in Electronic Warfare Abroad (Special Edition), January 1993, pp 59-60

As far as civilian global positioning receivers are concerned, during test measurements carried out by the U.K. defense research agency, it was revealed that they have the weak point of being easily subject to terrorist jamming. This causes people to put forward questions with regard to using GPS in association with auxilliary equipment to make bad weather landings.

The U.K.'s Farnboroagh research institute opted for the use of BAC-111 to carry out flight tests which verified this type of large effect in association with low power jammers. Test reports written in regard to flight and surface jamming by J.I.R. Owen have been recently declassified.

On the basis of the Owen reports, one FM noise jammer unit radiating 1W in the GPS 1.6GHz frequency band causes civilian GPS receivers to no longer be effective outside a maximum of 22km (13.7 English miles). /60

Because, for every 6dB increase in transmiter power, effective jamming ranges then expand 1 fold, the Owen report believes that the manufacture of a small model jammer capable of jamming civilian GPS receivers outside 50km (31 English miles) is possible.

In the early period of the GPS project, the Pentagon understood then the potential weakness of its being easily subject to jamming. As a result, the majority of military aircraft and warships were all equiped with advanced antennas capable of automatically changing antenna radiation direction diagrams used in order to "clear up" strong jamming signals.

In "Catagory 1" situations, making civilian GPS capable of use in order to do the differential GPS required for auxilliary equipment to accurately enter airfields, there is also an easy susceptibility to terrorist jamming. The differential (calibration) signals are precisely determined by a surface system located in the vicinity of the airfield. Surface systems are then dependent on receiving GPS signals. However, this type of differential GPS equipment is capable of installing antennas having designs so as to clear up jamming signals.

In reports, Owen points out that measurement results during flight test periods clearly show that aircraft GPS receivers "will lose encoding signals during periods when jamming signals are between 125dBw and -130dBw. Moreover, there is loss of lock on

functions with regard to satellite signal carrier waves. However, when electrical levels are higher than -130dBw, before satellite signals are completely lost, we will then be able to discover performance drops associated with this navigation design. This will lead to receivers being completely useless."