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Russian/Soviet Airborne ECM (equipment and tactics)

<http://www.acig.info/forum/viewtopic.php?f=7&t=497>

by **Tom**

Posted: **Mon Mar 15, 2004 2:19 pm** Page 2 of 7

At some point in time some articles appeared in the Ukrainian/Russian press about the Iraqi Su-22M-4Ks equipped with SPS-141 ECM-pods being "undetectable" by USAF F-15s, in 1991.

Shortly after somebody asked here on the forum (but, I guess that was still on the old forum), if the Iranians have shot any down or not. At the time I knew about several cases where some were shot down - but none by Sparrows (or any other sort of SARH/ARH AAMs in Iranian arsenal, for that matter).

Well, the situation changed meanwhile: I have now found out about at least a single Sparrow-kill against an Iraqi Su-22M-4K. This occurred in May 1986, and the plane was shot down by an F-4E.

Note that the APQ-120 radar of the F-4E proved susceptible to different sorts of ECM used by the Iraqis: it could definitely be jammed by ECM-pods carried by French-supplied Mirage F.1EQs, and also by the Italian-built Selenia APQ-123 ECM-pod, as carried by Egyptian Mirage 5s when these were sent to Iraq, in March 1986. It could also certainly be carried by some more powerful Soviet systems, like those carried by Tu-16s and Tu-22s.

BUT, it was not jammed by the SPS-141: in the given case, which occurred on 11 May 1986, the F-4E in question had no problems to acquire the target and fire no less but three Sparrows at it: the first two "missed", because they were so-called "fell aways" - missiles that were ejected from their bays, but their motors never activated, so they simply fell down to the ground. The third Sparrow scored a direct hit, blowing the bomb-laden Sukhoi apart.

BTW, this kill was confirmed by quite a few "independent" sources: it happened actually over southern suburbs of Tehran, then the Sukhoi was from a formation that was about to strike the local Rey oil refinery.

by **Tom**

Posted: **Fri Apr 09, 2004 4:07 pm**

BTW, Overscan, as I'm putting a finishing touch to the "full version" of the Tu-22-article by Farzad, Arthur and me:

- have you learned anything new about SMALTA-3, -4, and -5 or Pelena systems?

by **overscan**

Posted: **Sat Apr 10, 2004 12:18 pm**

[http://groups.google.com/groups?q=an-12 ... edu&num=1](http://groups.google.com/groups?q=an-12...edu&num=1)

This posting quotes an article about the 1973 war from a Russian advisor to the Syrian AF, which refers to;

jamming radars and "Hawk" SAM sites with specially equipped planes An-12PP and ground complexes "Smal'ta"

Mi-8SMV is supposedly used for SAM-radar jamming, fitted with "Smalta-V" system. Smalta-V is obviously the helicopter version of the same basic equipment.

Smalta seems to be dedicated anti-SAM ECM, according to this article.

Other Soviet ECM systems of this period often comprised several versions covering specific frequencies. Almost certainly this is what the -3/4/5 refers to.

by **Tom**

Posted: **Sat Apr 24, 2004 8:50 am**

Overscan, from what I've learned now, there was SMALTA-1, 2, 3, 4, and 5, of which the later was the most powerfull (and it was mounted on Tu-16 bombers, not only on helicopters).

They should have indeed been primarily developed to jam different sorts of radars supporting the MIM-23 HAWK SAMs, but the last two were useful also against the F-4D/E-radars - and that with a success.

The "Pelena", however, was a radio-jammer!

I'm searching for more, and will let you know as soon as there is anything.

by **overscan**

Posted: **Wed Apr 28, 2004 11:10 am**

Something interesting; the Su-27IB is said to use a "Smalta-SK" jammer for mutual group protection.

I wonder if it has any relation to the older Smalta system?

by **FoverF**

Posted: **Wed May 05, 2004 12:41 am**

Does anyone have info on the newer Gardeniya wing-tip pods (whose complex designation number eludes me at the moment) on upgraded Russian Flankers?

All I've really heard is that they each have 2 indepedant phased-arrays, giving one passive and one active antenna facing both forward and aft.

Also, I read somewhere about these jammers (or possibly an entirely different system) sending directional radar signals towards the ground, and towards chaff.

This makes a lot of sense to me, obviously bouncing a nice juicy RF signal off of your chaff makes it a far more tempting target, and doing the same thing off of the ground sounds fairly clever to me as well.

So does anyone have any more info on this/these systems?

It sounds quite reasonable to me, since you wouldn't have too much trouble using your inertial system to figure out roughly where your chaff cloud is/will be, unless you're really maneuvering hard. And finding the ground is fairly easy as well.

by **pit**

Posted: **Wed May 05, 2004 2:56 pm**

Is Called Sorbsitya L-005S

Cross-Eye Jamming, Terrain Bouncing, and some noise modes...

I think that the early pods (those mounted during the 80s) were in fact a Gardeniya pod-based system similar to that of the MiG-29 9.13.

This toy (L-005S) seems to be a hell of advanced system with a VERY advanced architecture and

multi-beam jamming system...

A hell of jammer, let me see what can I find...

by **overscan**

Posted: **Mon Jan 10, 2005 10:52 pm**

I've got the user manual for the Gardeniya-1FUE ECM pod for the Su-27SK.

It is implemented as two separate pods, right hand being the receiver section and the left hand being the transmitter. They weigh 75kg each.

The ECM pod covers +-60 deg front and rear in azimuth and +-30 deg in elevation.

It can jam 2 different radars at once, which can be different frequencies etc.

The control panel is a common block with the L006LM RWR. There's a front hemisphere/rear hemisphere switch and a 9 position mode switch;

position 1 - complex interferences of radar and rocket seeker,
position 2, 3, 4 and 5 - different goal-directed complexes ensuring optimum interferences to the previously selected complexes of the interception of enemy
position 6 - "Blinking" interference (in flight of aircraft in the pair)
position 7 - interference by Doppler noise.
position 8 - high-frequency noise,
position 9 - interference of the type "antipode" (terrain bounce, to be used at the flight altitudes 50-600m)

It goes on to discuss in detail methods used like range gate pull-off, velocity gate pull-off and more, which I will have to spend some time on to translate.

by **FoverF**

Posted: **Wed Jan 12, 2005 6:37 pm**

sweet.

by **Booga**

Posted: **Sat Jan 15, 2005 6:56 pm**

Gardeniya-1FU is the jammer fitted on the Fulcrum C, so -1FUE for the Su-27SK obviously designates the export version of the same. The advantage of the podded version over the MiG-29 is that it can emit in the forward sector, whereas the Fulcrum C can only jam rearward, which is not really sound with a jammer optimised for Western SAM radars.. The podded jammer, however, has some restrictions when emitting forward so as not to disturb normal radar operation. The ECM control unit automatically prioritizes jamming as a function of radar mode and threat level, for example it won't emit in the forward sector when the radar is in track mode.

Development of the Gardeniya series of jammers was started in 1983 following the rout of Soviet fighters during the Bekaa battle. It was meant to be a universal jammer for all tactical aircraft and was developed very quickly - certainly too quickly as it is today acknowledged (by the Russian themselves) to be a pretty useless piece of equipment.

The Sorbtsiya is a whole different story, and AFAIK is not approved for export. The system is 4.2 m long and weight 190 kg. Unlike the podded Gardeniya, each pod includes a receiver and emitter but they cover different bands. The strong point of the system is its cooperative jamming mode, either with other Sorbtsiyas or with a Smalta acting as a master and several Sorbtsiyas as slaves. The Smalta coordinates jamming emissions from the Sorbtsiyas, with the illuminated aircraft keeping silent while the signal from active Sorbtsiyas "draws" the threat radar on them before shutting down in turn, making the radar "bounce" from target to target.

Booga

Photos?

by **heyjoe**

Posted: **Sun Jan 16, 2005 4:11 am**

Anyone got a photo?

by **overscan**

Posted: **Mon Jan 17, 2005 11:30 am**

I can post photos later; there are some on my site

<http://www.overscan.co.uk/Avionics.html>

Warning its a big page (300Kb or so)

Russian Avionics

by **heyjoe**

Posted: **Mon Jan 17, 2005 3:17 pm**

Wow! Very impressive; much obliged! You truly deserve your moniker of "correspondant"! HJ

by **overscan**

Posted: **Mon Jan 17, 2005 10:38 pm**

Gardeniya-1FUE Manual, pages 1-6 (translation ongoing)

Please credit avionics@overscan.co.uk if you redistribute

List of the abbreviations used

BANO - running lights

GSN - missile seeker

SA - the antiaircraft artillery

ZPS - rear hemisphere

ZUR - AA guided missiles

Article L203I - article of 10-L203I

KPA - checkout equipment

LBV - travelling-wave tube

Left container unit (L203I) - 10-L203IL

PVK - passage is waveguide-coaxial

PPS - forward hemisphere

Right container unit (L203I) - 10-L203IP

RLS - radar

SV - SHF (superhigh frequencies)

Station L203I - station L203I-E

SUO - control system of the weapon

UN - withdrawal back on the distance [Range Gate Pulloff?]

URU-M - unit of distribution and control

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AIRCRAFT STATION OF RECIPROCAL INTERFERENCES L203IE

1. GENERAL INFORMATION

1.1. Designation

The aircraft station of reciprocal interferences is intended for creating the interferences in the centimetric waveband for onboard or ground RLS, ZUR, ZA, and also for the protection of damage by the radio-controlled weapon "air-to-air" and "surface-to-air" of potential enemy station is the means of individual and mutual protection aircraft from the damage of radio-controlled by weapon during overcoming PVO [Air Defence] of enemy.

Station creates interferences with ground, ship and airborne RLS, and also to guidance and control systems of rockets with GSN for the purpose of reduction in the probability of kill of aircraft. Noise signal acts on RLS and GSN of rockets, hampering or completely excluding the possibility of seizure to automatic tracking and the determination of coordinates.

Station can accomplish retargeting GSN rockets to the earth. Station is placed in the containers, hung up on the points of suspension 7 and 8 at the ends of the outer planes of wing.

1. 2. Composition

In the composition of the receiving part of the station, established in by right container (fig.1), they enter:

the block of preliminary amplification, analysis and modulation - block L201-03M with the frame;

the block of short-term, memorization and reproduction of frequency - block L201-19;

the unit of distribution and control - URU-M;

the unit of control and programming (block of commutation) - the block L201-12;

the antenna A57 - 2 pcs;

the block of prolonged memorization and reproduction of frequency - the block L201-1

In the case of the failure of one alternator the nourishment of station is ensured by the second generator. In the case of the failure of both of the alternators or two rectifiers the station is disconnected.

2. BASIC TECHNICAL SPECIFICATIONS

Station creates interferences with continuous, pulse-modulated and quasi-continuous RLS and GSN in the front and rear sectors:

In azimuth $\pm 60^\circ$

In elevation $\pm 30^\circ$

Interference is created on the principal ray.

The effective capacity of reciprocal interference comprises, as a rule, not less than two RLS, which work at different frequencies, which irradiate aircraft from the side of the shielded sector. Creation of the taking away interferences on the speed and the distance practically it is not limited.

Station remains operable under the following operating conditions:

to the temperature of that surrounding medium, $^\circ\text{C}$ from minus 60 to plus 60

the relative humidity of air

at a temperature of $+35^\circ\text{C}$, up to 98%

the atmospheric pressure

mm Hg. 18-780

Burden of readiness, min 3-4

Time of continuous operation, h; up to 6

required power:

from the network of alternating current with a stress of $200\text{V} \pm 5\%$

frequency 380 - 420 Hz,

VA, not more than 1300

from the network of the direct current with a stress of $27 \text{ v} \pm 10\%$,

W, not more than 400

Mass station, kg, not more than 75

Note. Basic technical specifications of station are given in the flight manual.

3. DESCRIPTION

3.1. Block L201-03M

Block L201-03M is intended for the intensification, analysis and modulation of the taken TO SHF signals, which irradiate RLS (GSN), shaping of the modulating stresses and control SHF signal for the functional test of article.

Block is the collapsible construction, which consists of two panels (by front and rear), connected together by the vertical longitudinal wall, which separates the volume of block in two sections, the bottom, upper in two lateral covers, which are attached to the framework of block with the aid of screws.

They are located on the facial panel of block:

waveguide flanges ENTRANCE 1, ENTRANCE 2, OUTPUT 1, OUTPUT 2, of the hermetically sealed-adapters, the terminal groundings

the hooks of cover locks and two knobs for the transfer of block, removable cover closing PVK,

On the rear panel of block is arranged the low-frequency connecting joint YEl of the type RPKM -57 and two bushings under the pawls of block [Orig Russian: две втулки под фиксаторы блока].

3.2. Block L201-19

Block L201-19 is intended for the short-term memorization and reproduction of the pulse received; the quasi-continuous and pulse SHF signals of the formation of interferences of the type UN.

Furthermore, in the block is accomplished the selection of quasi-continuous SHF signals.

by **overscan**

Posted: **Mon Jan 17, 2005 10:41 pm**

Figure from page 3 (sorry, its 1024 pixels wide)



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All times are UTC+01:00
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