General Staff of the Armed Forces of Ukraine
Main Directorate for Operational Supplies

Use of EW Complexes by Russian Federation in the ATO Region in East Ukraine

Col. Petro Kulbida

53rd Annual International Symposium and Convention, AOC

Structure of EW Independent Company
in 1st and 2nd Corps of LDNR

EWCO

Control platoon	Jamming platoon (HF radio)	Jamming platoon (VHF radio)	Jamming platoon
Leyer 3 – 2 units	Р-378БМВ – 2 units	Р-330БМВ – 2 units	Р-330Ж – 2 units РП-377Л – 2 units РП-377УВ – 10 units

EW System *Leyer-3*

Controlled and jammed frequencies, MHz	**935-960, 1805-1880** **890-915, 1710-1785**

На території України

***Leyer-3* equipment truck in Donetsk, 2016**

Training of DNR 1st Corps units (May 2015). *Leyer-3* equipment truck shown on left (enframed)

Jamming Station Р-378БМВ
- a component of *Borisoglebsk-2* System

On Ukraine Territory

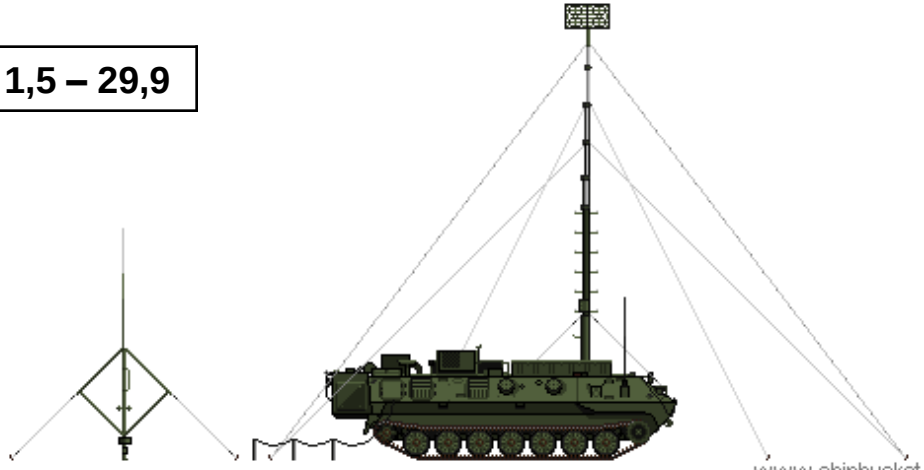
Photo taken on 12/18/2014, posted online on 05/08/2016

Jamming Station Р-378БМ
on provisionally occupied territory of Luhansk Oblast

На території України

Jamming station Р-378БМ deployed near Novodonbasskaya electric substation (city of Stakhanov)

Діапазон радіорозвідки та радіоподавлення, МГц	**1,5 – 29,9**



Jamming station Р-330БМВ

- a component of *Borisoglibsk-2* Complex

Р-330БМВ jamming station is being transported towards Ukraine border, in the area of Matveyev Kurgan, 05/26/2015

Radio reconnaissance and jamming range, MHz	**25 – 960**

Jamming station Р-330Ж “Zhitel”

On Ukraine territory

07/01/2015, Makiyivka (Donetsk Oblast), antennas of jamming station Р-330Ж seen in the back

Radio reconnaissance range, MHz	100 – 2000
Jamming range, MHz	1227,6; 1575,42; 1500 – 1900

An EW unit of Russian Federation Military Forces near Ukraine border line

Infauna EW System

РБ-531Б *Infauna*

06/22/2014, an EW unit convoy en route to Novoshakhtinsk towards Ukraine border line

Radio reconnaissance and jamming range, MHz	**25 – 2500**

EW *Lorandit* Complex

РП-377ЛА *Lorandit*

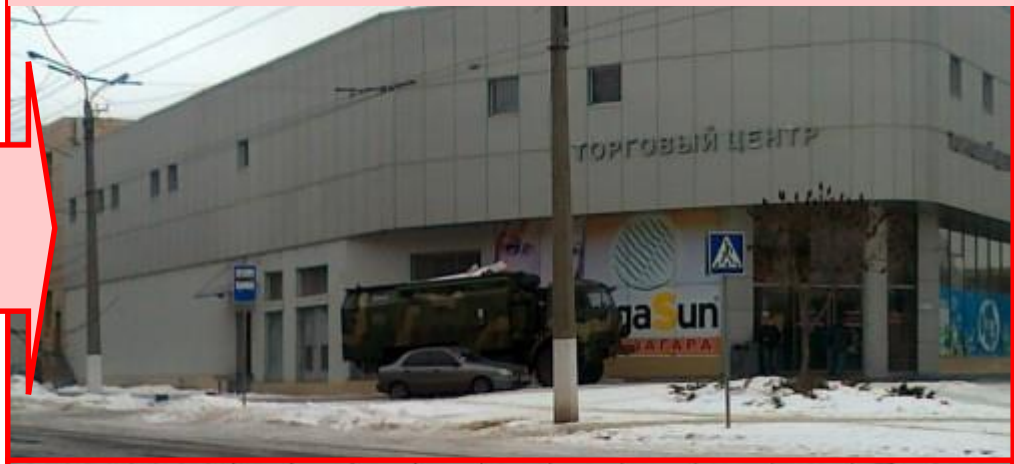
Radio recon range, MHz	**20 – 2000**
Radio jamming range, MHz	**137 – 174** **410 – 470** **100 – 500**

An EW unit convoy of the Russian military
(in Rostov Oblast, moving towards Ukraine border)

En route to Novoshaktinsk, 06/22/2014

Dzudoist - a mobile automated complex for radio and radio-engineering control

On Ukraine territory



01/16/2015, at 12:40 pm – *Dzudoist* complex spotted in Luhansk near Aurora Shopping Center

Jamming station Р-330БМВ
- a component of *Borisoglebsk-2* System

On Ukraine territory

02/03/2015 in Brianka, Luhansk Oblast

07/25/2015,
Rostov Highway,
en route towards
Ukraine border

Jamming station СПР-2М *Rtut-BM*
on provisionally occupied territory of Donbas

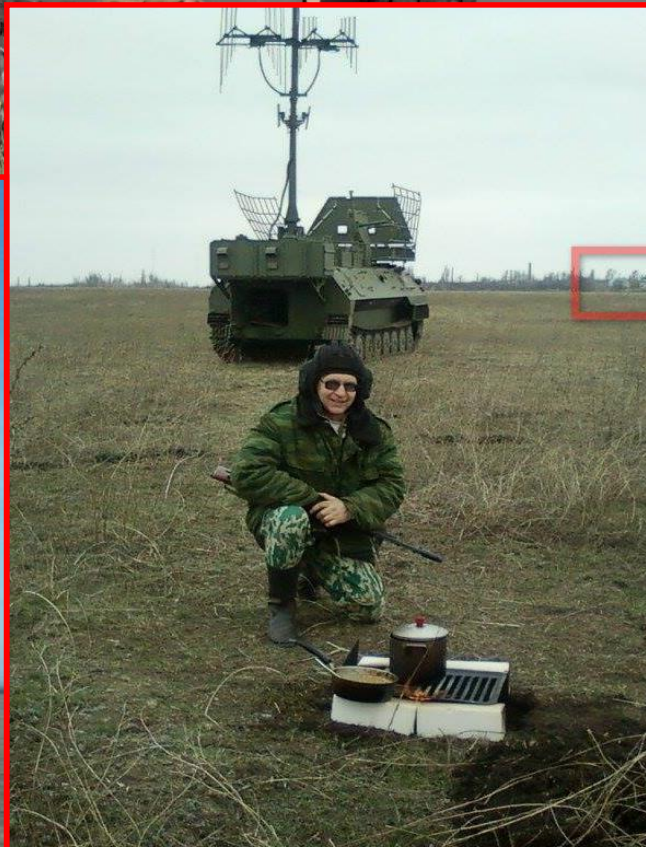
on Ukraine territory

Jamming station СПР-2М *Rtut-BM* on the premises of JSC "Topaz". Photo taken in July 2015, posted online on 08/16/2016. Tactical mark "25 in a diamond" had been assigned to independent EWCO (Outfit # 08821, city of Donetsk)

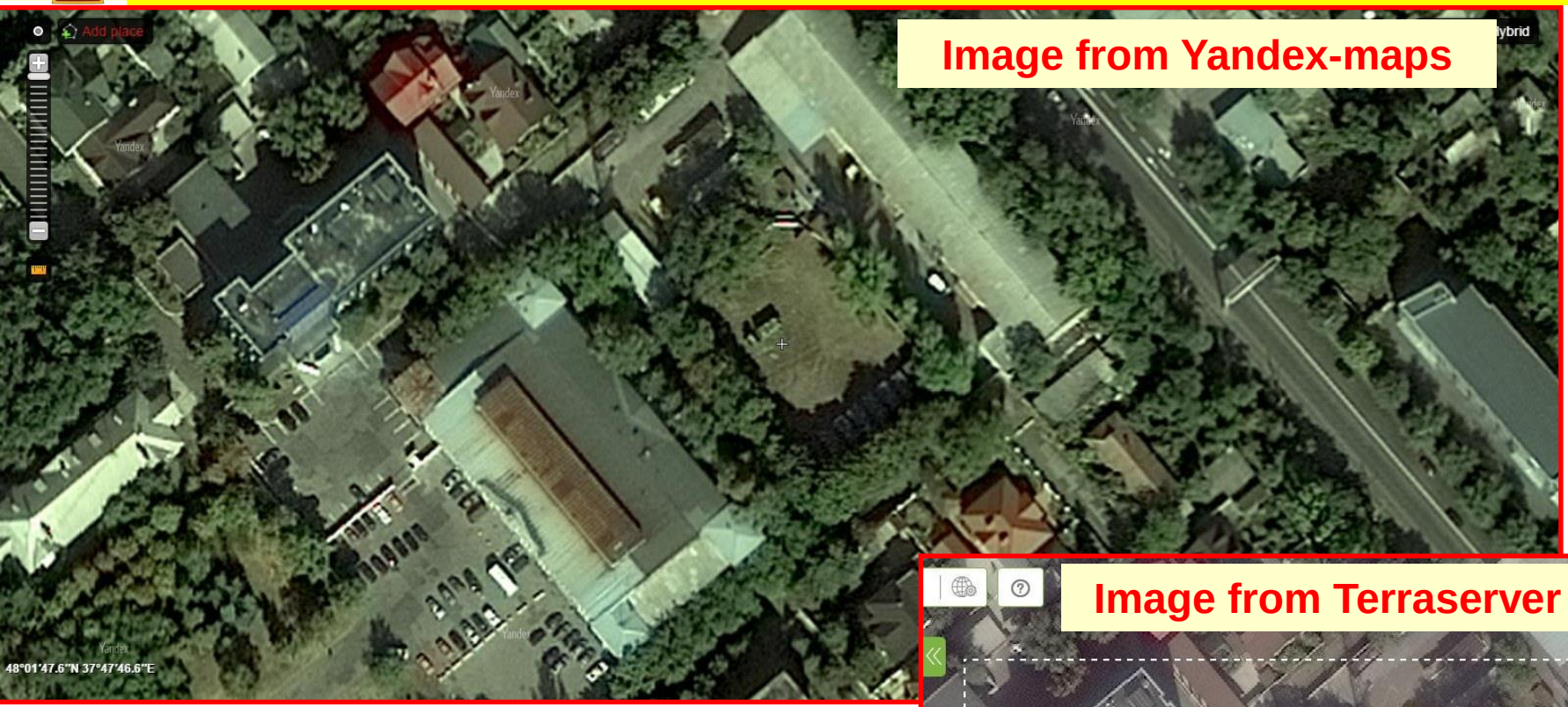
Jamming station СПР-2М *Rtut-BM*
on provisionally occupied territory of Luhansk Oblast

on Ukraine territory

Jamming station СПР-2М *Rtut-BM* near Luhansk Airport, 09/21/2016. Tactical mark “18 in a square” had been assigned to independent EWCO (Outfit # Л-05776, city of Luhansk)



Shypovnik-Aero EW Complex
on provisionally occupied territory of the Donbas



On Ukraine territory

07/22/2016 *Shypovnik-Aero* was spotted in a central area of Donetsk, stationed on a stadium soccer field.

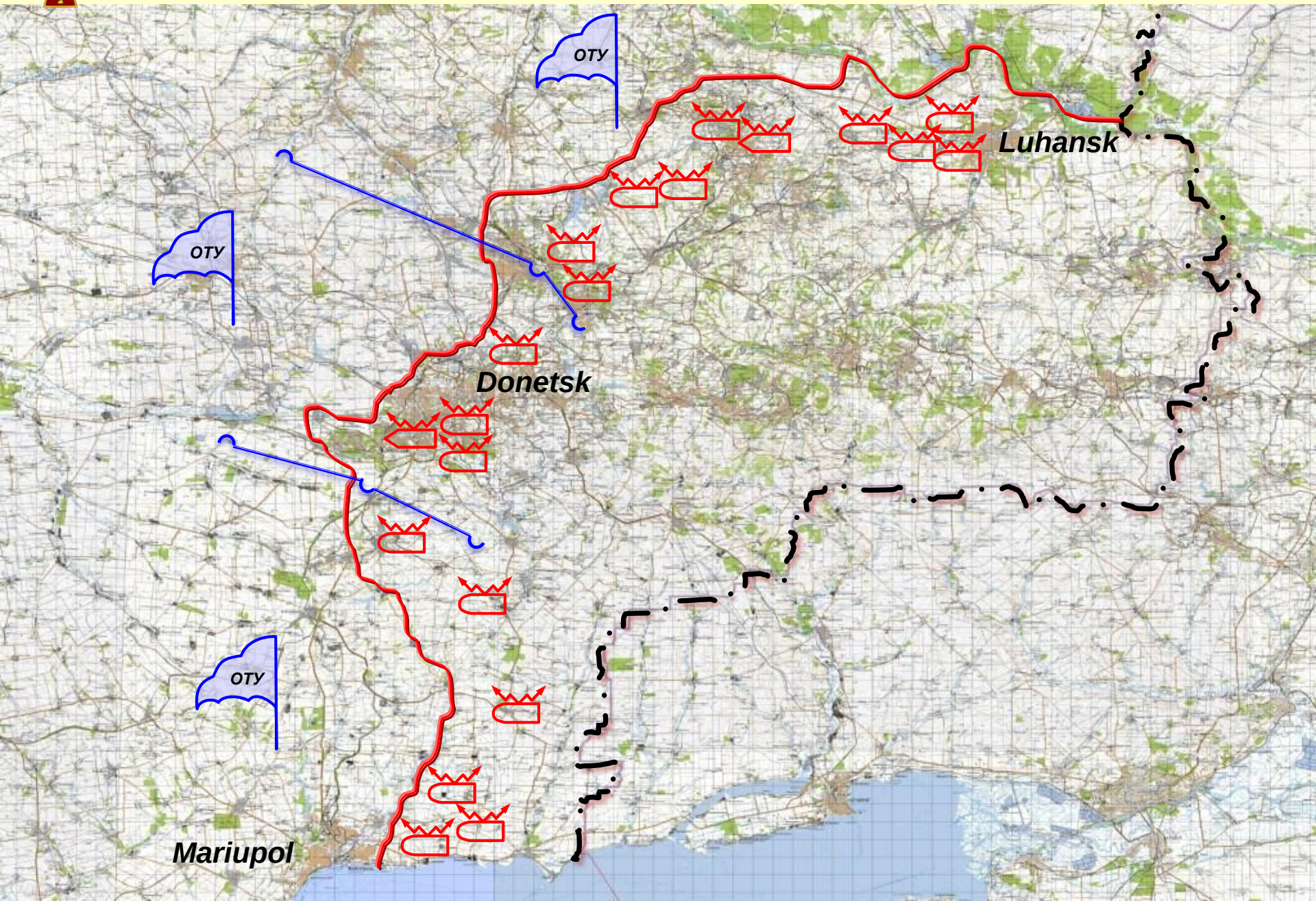
Svet-KU mobile complex
on provisionally occupied territories

03/09/2016
in Donetsk

Registration plate ЛК 4686 was assigned to 18th IEWCO (Outfit # Л-05776, city of Луганськ), 2nd Corps

08/19/2016
in Luhansk

Locations of enemy EW stations
(second half of 2016)

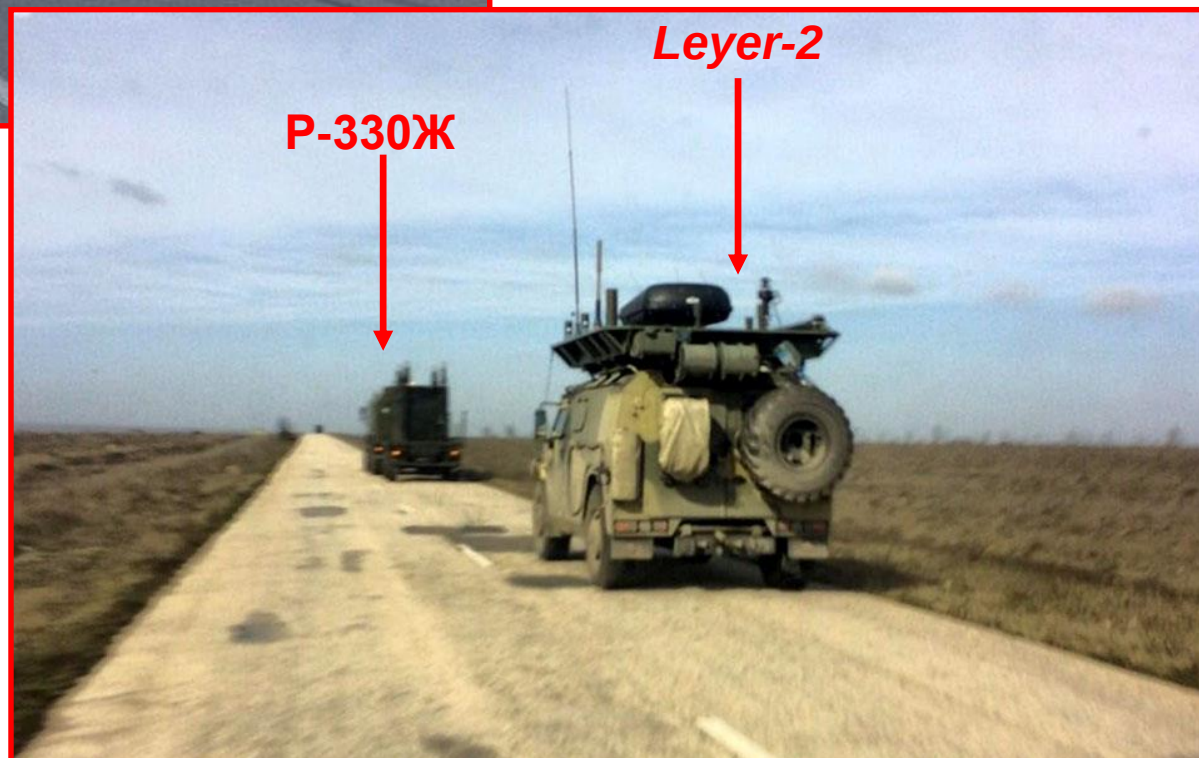


Locations of enemy EW equipment on provisionally occupied territories

OTU Luhansk		OTU Donetsk		OTU Mariupol	
Luhansk	*Leyer-3*	Horlivka	*Shypovnik-Aero*	Svobodne	*Leyer-2* *Dzudoist*
Smile-Donetsky	Р-330Ж Р-330БМВ *Infauna* Р-378Б	Donetsk-Makiivka-Torez	2 × Leyer-3 2 × Р-330Ж *Borysoglibsk-2* *Svet-KU*	Novoazovsk	*Dzudoist* *Leyer-3*
Pervomaisk	Р-330Ж	Donetsk	*Dzudoist* Р-330Ж, СПР-2М *Borysoglibsk-2* *Svet-KU* *Shypovnik-Aero* Р-378БМ, *Leyer-3*	Dokuchaivsk	*Dzudoist*
Krasny Luch	2 × Р-330Ж	Makiivka	Р-330Ж, *Leyer-3* *Dzudoist*		
Shishkove	Р-330Ж Р-934БМВ Р-378БМ				
Sokilnyky	Р-330Ж				

EW Equipment of Russian Federation Armed Forces

(in the Crimea, en route to Ukraine border)



EW Equipment of Russian Federation Armed Forces (in the Crimea, en route to Ukraine border)

Jam cast transmitter РП-333П

“Leyer-2”

Jamming station Р-330Ж
(near Makiivka, April 2016)

Jamming station Р-330Ж
(near Makiivka, April 2016)

Jamming stations Р-330Ж
(near Avdiivka, 07/14/2016)

Air traffic VHF radio jamming station

Jamming station Р-934УМВ

Radio recon range, MHz	100 – 2000
Radio jamming range, MHz	100 – 400

Jamming station Р-934БМВ

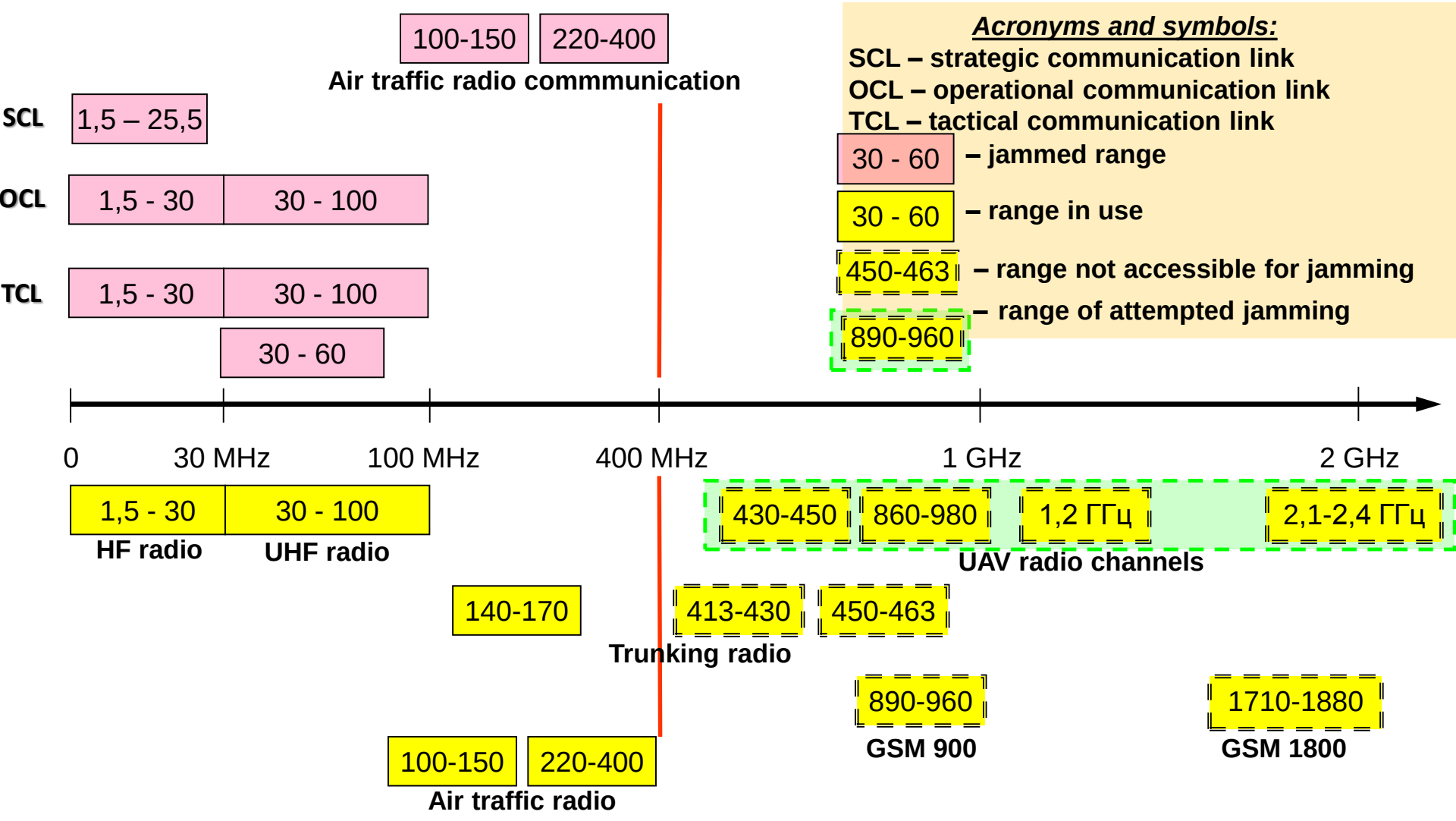
Radio recon range, MHz	100 – 400
Radio jamming range, MHz	100 – 150, 150 – 220, 220 – 400

Shypovnik-Aero mobile automated complex

Radio recon range, MHz	25 – 2500
Radio jamming range, MHz	20 – 100, 400 – 500, 800 – 925, 2400 – 2485

Combat capacity
of Ukraine Armed Forces in radio jamming

JAMMING CAPACITY IN FREQUENCY RANGES



FREQUENCIES USED BY ILLEGAL MILITANTS AND UNITS OF RUSSIAN MILITARY

Anti-UAV jam cast transmitters

***Bukovel*-AD**

Khmara

Nota

Anklav

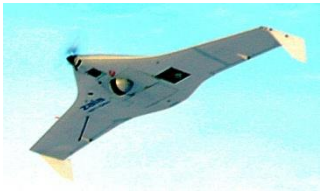
COMBAT CAPACITIES

required for EW units in modern military conflicts

NECESSARY COMBACT CAPACITIES FOR EW UNITS:

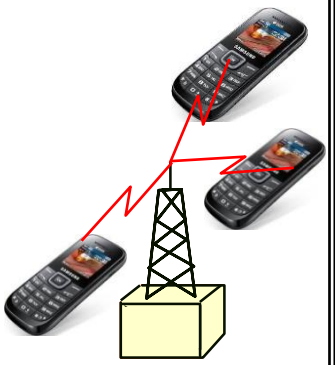
detection and jamming of -

UAV control radio signals

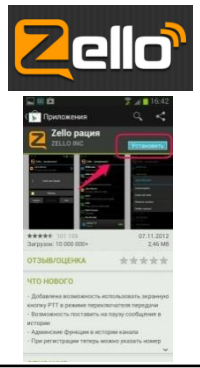


Trunked radio signals

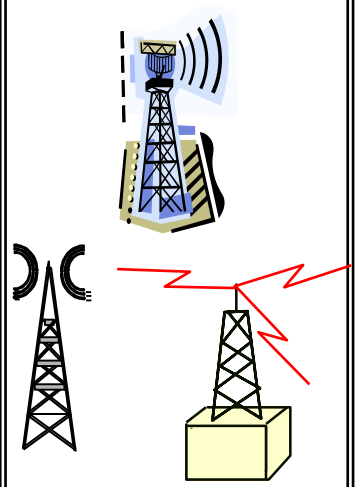
Cellular wireless signals



Wireless internet and Zello-type internet radios



Radio and TV broadcasting



NEW EW TECHNOLOGY

Antennas of illegally operating radios (HF)

City of Kostiantynivka

Antennas of illegally operating radios (HF)

City of Kostiantynivka

Antennas of illegally operating radios (HF)

City of Kostiantynivka

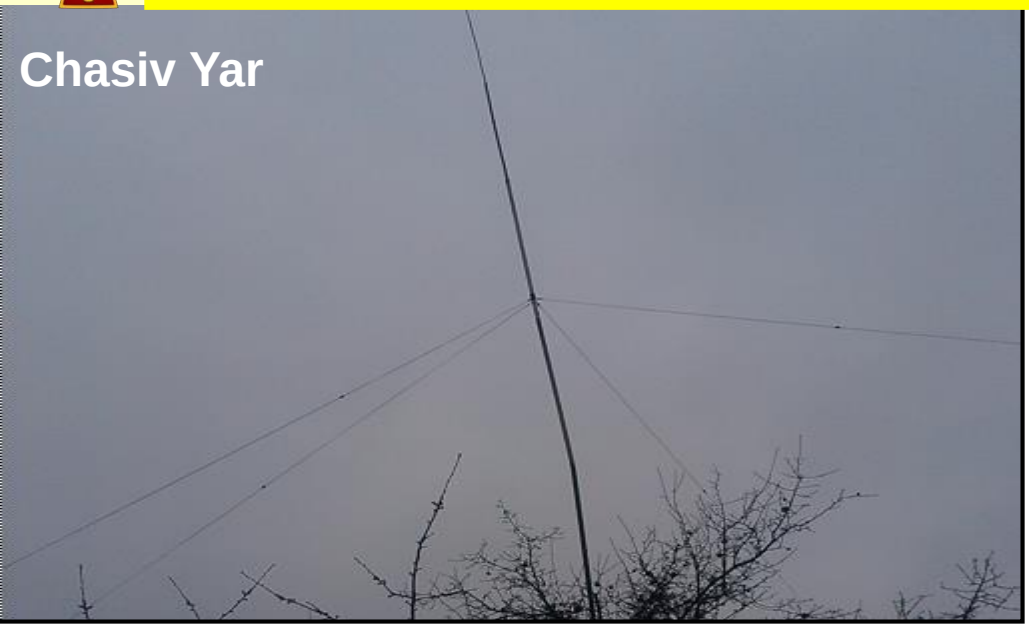
Antennas of illegally operating radios (HF)

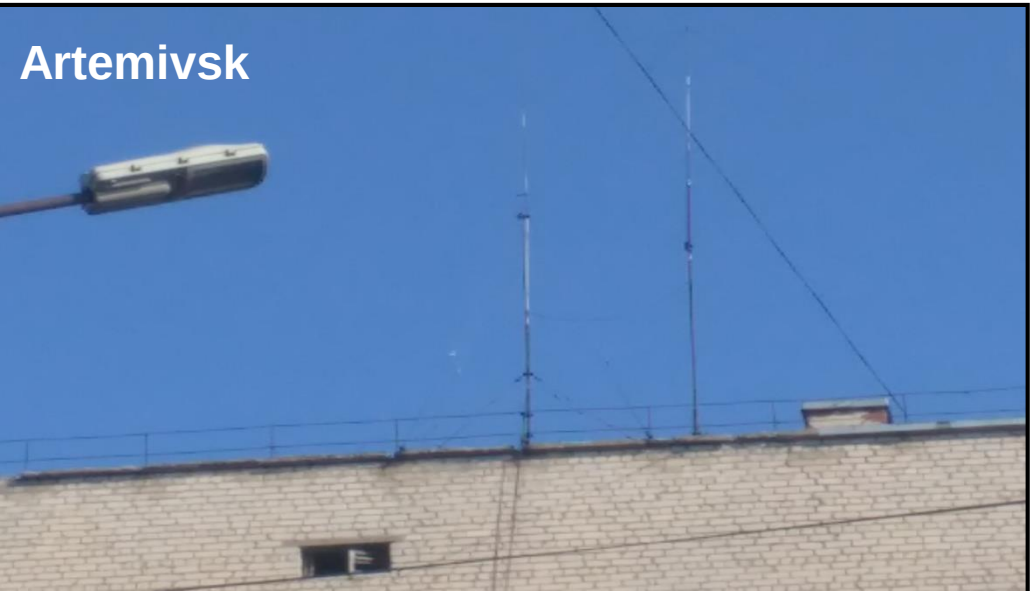
Myronivsky

Antennas of illegally operating radios (HF)

Myronivsky

Antennas of illegally operating radios (VHF)





Antennas of illegally operating radios (broad-band)

Illegally operating radio station
(City of Kramatorsk, 01/11/2016)

Radio station antenna
View from ground)

Radio station antenna
(view on roof)

Illegally operating radio station
(City of Kramatorsk, 01/11/2016)

Operator’s work place

Radio control equipment set
of State Center for Radio Frequencies (PM 1300-2P3)

Preparing for “information blockade”

Частоты любительских диапазонов

Частота	Дальность связей днем	Дальность связей ночью
80м 3500-3800 кГц	до 100-200 км	до 2000-3000 км
40м 7000-7200 кГц	до 2000-3000 км	от 100-200 км до любой точки планеты
20м 14000-14350 кГц	от 100-200 км до любой точки планеты	до 30-50 км
10м 28000-29700 кГц	до 50-100 км	до 10-20 км

Примечание:
1. Самый оживленный диапазон ночного времени - 80м, там больше всего радиолюбителей России и Украины, и 40м для связей со всем миром
2. Самый оживленный диапазон дневного времени по России и Украине - 40м, для свезей со всем миром - 20м.
3. Диапазон 10м используется преимущественно в дневное время для ближних связей по району, области
4. Приставка "от" - означает наличие мертвой зоны между вами и тем местом, откуда начинается радиосвязь. То есть в ночное время, на диапазоне 40м вы сможете слышать только те станции, которые расположены от вас на удалении от 100-200км и дальше.
5. На прохождение и дальность радиоволн влияет очень много факторов, поэтому все расстояния приведены условно-примерно.

Advice on preparing for "information blockade" (disconnected TV, Internet, etc.):

1. Create radio networks using equipment and frequencies of amateur radios (3.3 - 6.6 MHz);
2. Create HF radio networks for announcements;
3. Listen to "Voice of Russia" programs on AM radio

Частоты и время вещания радиостанции "Голос России", до 29 марта 2014г.

Время (мск)	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00
Украина, частоты, кГц(СВ/AM)	1548	1548, 999	1548, 999	1548, 999	999	999	999	999	999
Европа, частоты, кГц(СВ/AM)	1548	1548							
Время (мск)	**17:00**	**18:00**	**19:00**	**20:00**	**21:00**	**22:00**	**23:00**	**00:00**	**01:00**
Украина, частоты, кГц(СВ/AM)	999	999	999	999	999, 1548	1413, 999	1413		999
Европа, частоты, кГц(СВ/AM)				999	999, 1548	1413, 1143, 999	1413, 1143	1143	999

02:00, Украина, частота 999 кГц

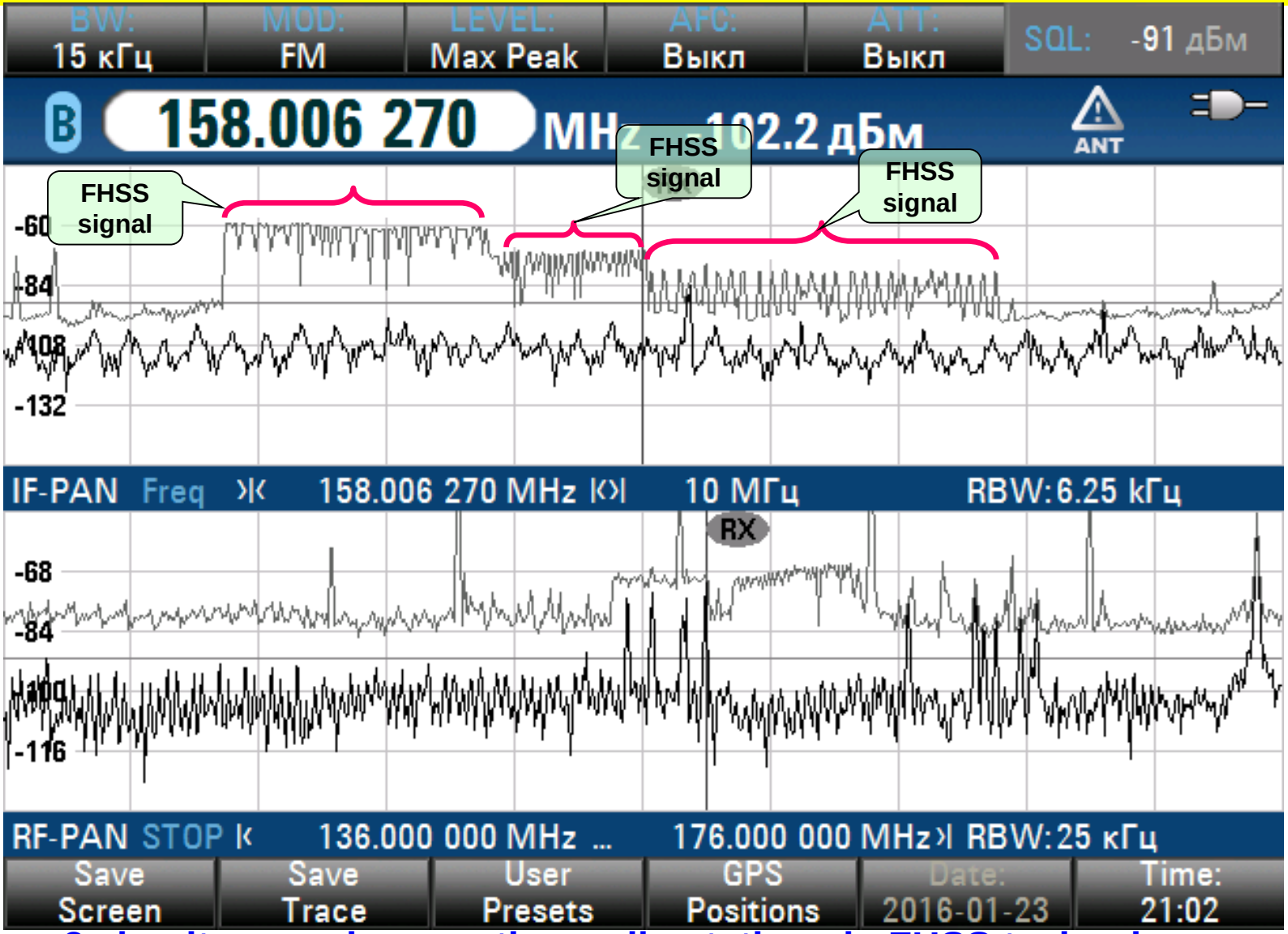
Примечание: Время указано московское

Вещание ведется на Средних волнах (СВ), на импортных приемниках этот диапазон называется AM

Radio Center of pro-Russian forces on Ukraine territory

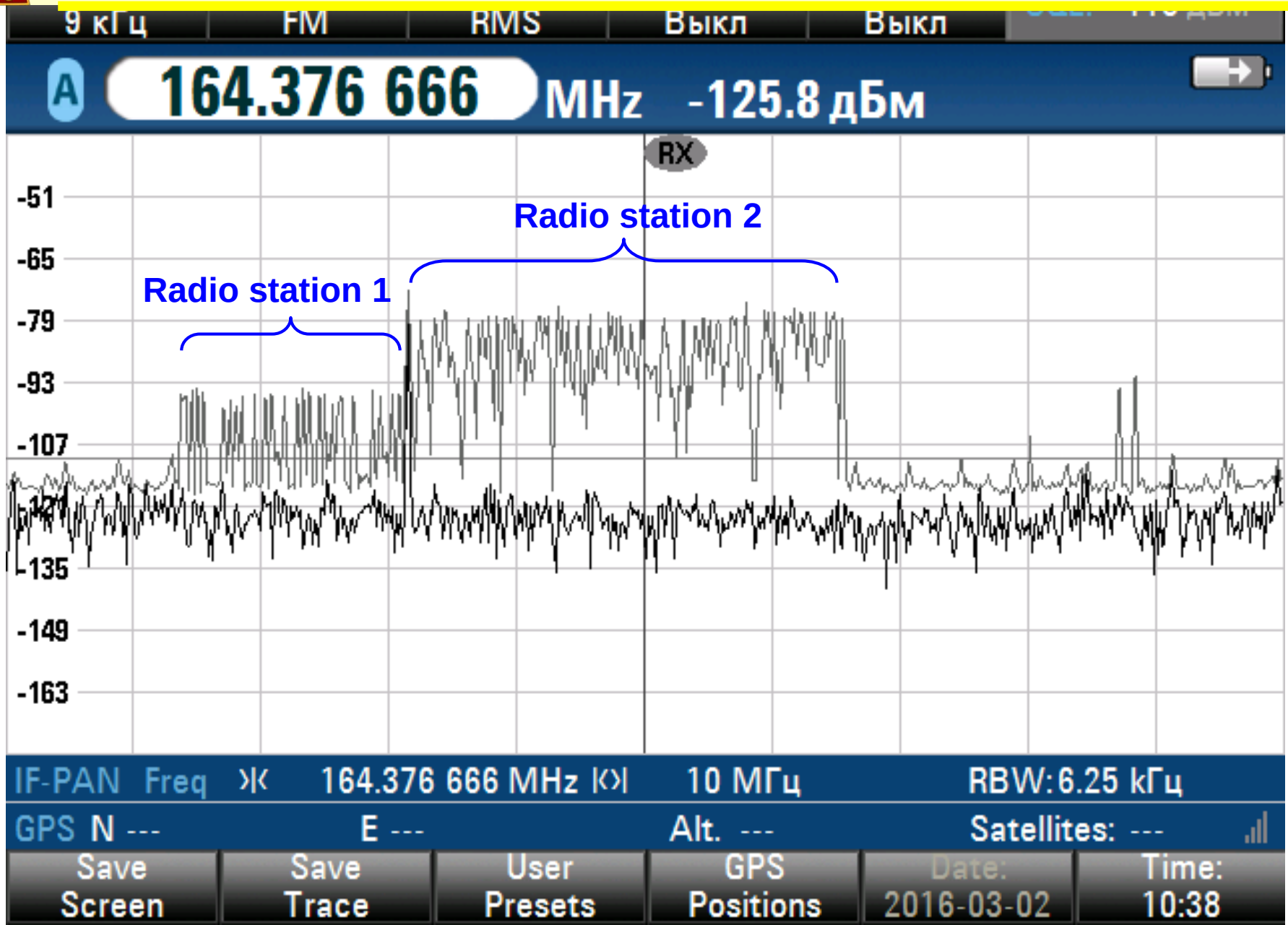
Stanytsia Luhanska, separatist radio center (registration and permits issued by Russian Federation authorities for communication oversight. 2/06/2015)

Enemy radios operating with FHSS technology (01/23/2016, Avdiivka)



3 simultaneously operating radio stations in FHSS technology, with varying signal capacity

Enemy radio signals with FHSS
(03/02/2016, city of Vidrodzhennia)



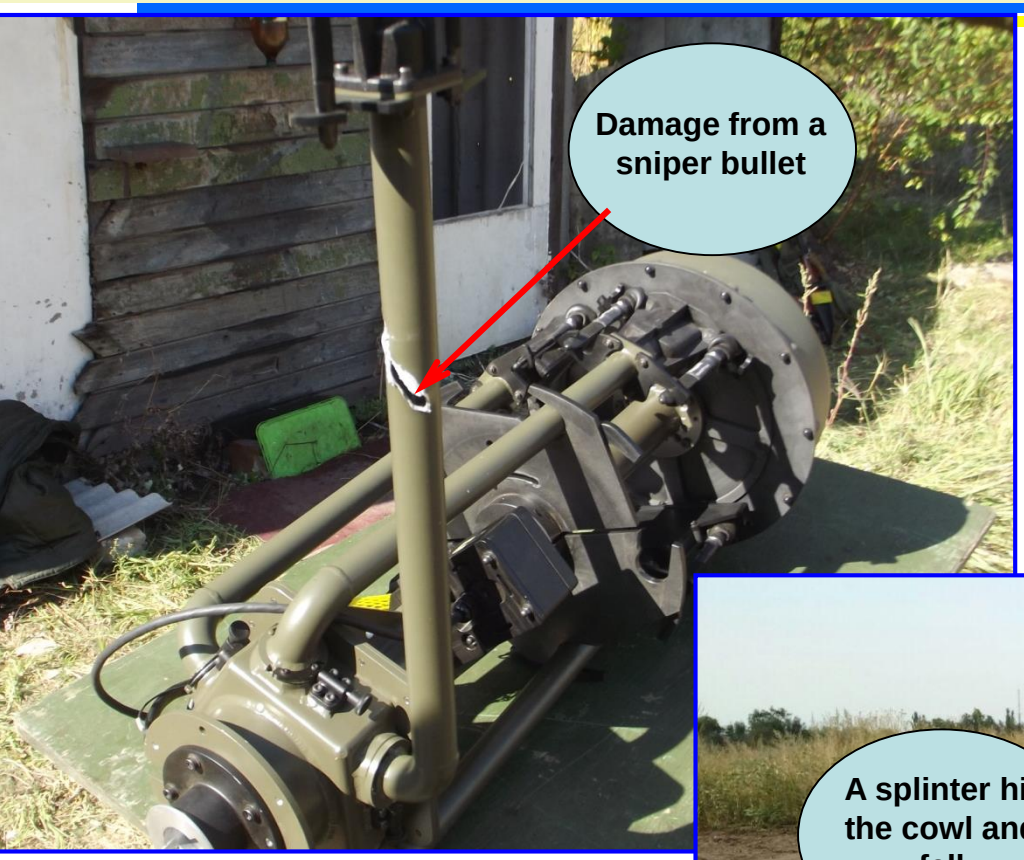
Special features of EW activities by military units of Russia

Distinctive traits:

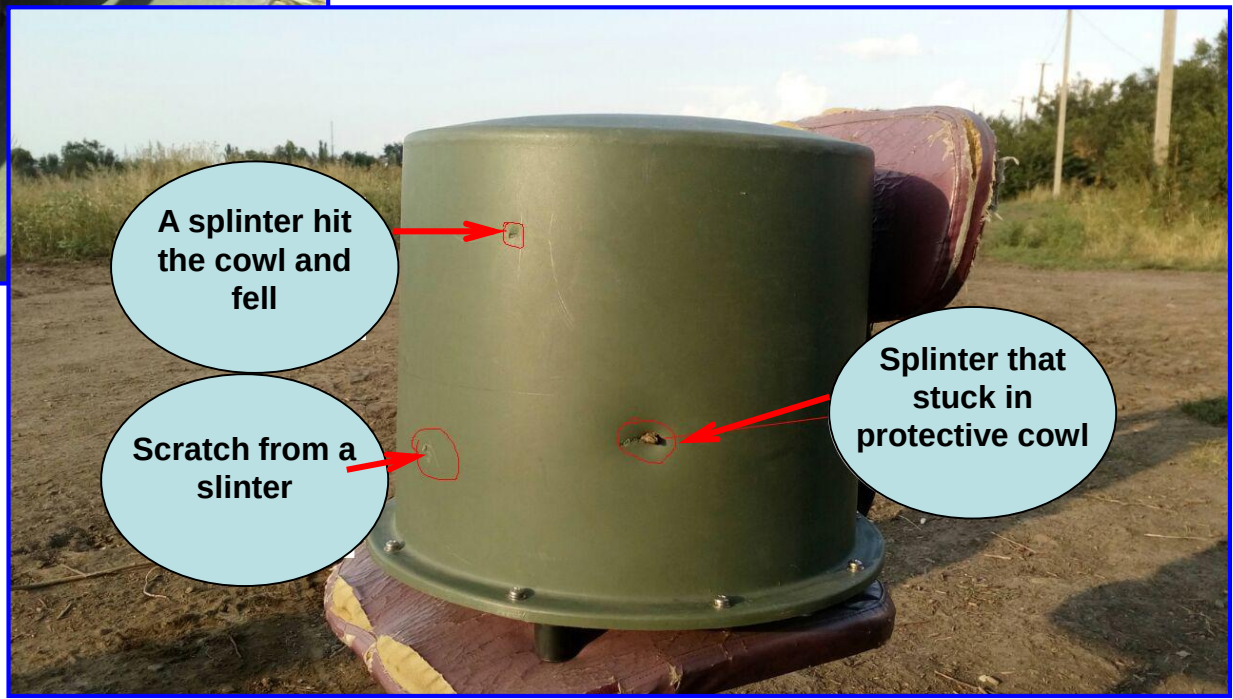
- **Concealed impact** of EW equipment on digital radios (unexplained loss of connectivity);
- **Text messages** are sent to personal phones of military servicemen instructing them to assemble at locations that are about to get hit with artillery strikes;
- **Cell phone connection gets blocked, then resumed** to identify access points, then **artillery strikes are made at areas of mass activation of cell phones**;
- EW technology is used to **detect locations of counter-battery radars,** followed by artillery strikes at them;
- **new concepts of physics are in use,** with equivalent effect to **electromagnetic weapons;** it incapacitates radio-electronic equipment (*Murmansk-BN* complex can radiate an interference signal of **400 kW capacity** that impacts HF receivers up to 5000 km away).

EW equipment destroyed by enemy
(ZiL-131 truck, jam cast transmitters set МПП-1)

Tactical EW devices damaged by enemy fire



Damaged bar on a TRC 6200DF unit



Damaged antenna cowl in a TCI 903S unit

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