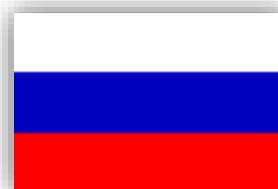

Russian Diplomatic & Intelligence stations

***M42, M42b, F01,
F06, F06a, X06***

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Chapter 1: Description and designators

Although the number of numbers station decreased since 1989, the Russians still operate a lot of them. It is hard, if not impossible, to find out if the transmissions are actually related to espionage activities. Some of them are probably spy stations, or at least used by the secret services to communicate with their operatives outside Russia. Some are definitely linked to governmental communications (embassy traffic etc.), and a lot of them are military stations, either GRU related or just plain military activity (tactical nets, naval stations, etc.). The military stations are however not the scope of this document and are therefore omitted.

Designators for the Russian diplomatic stations, intelligence stations and government stations described in this document:

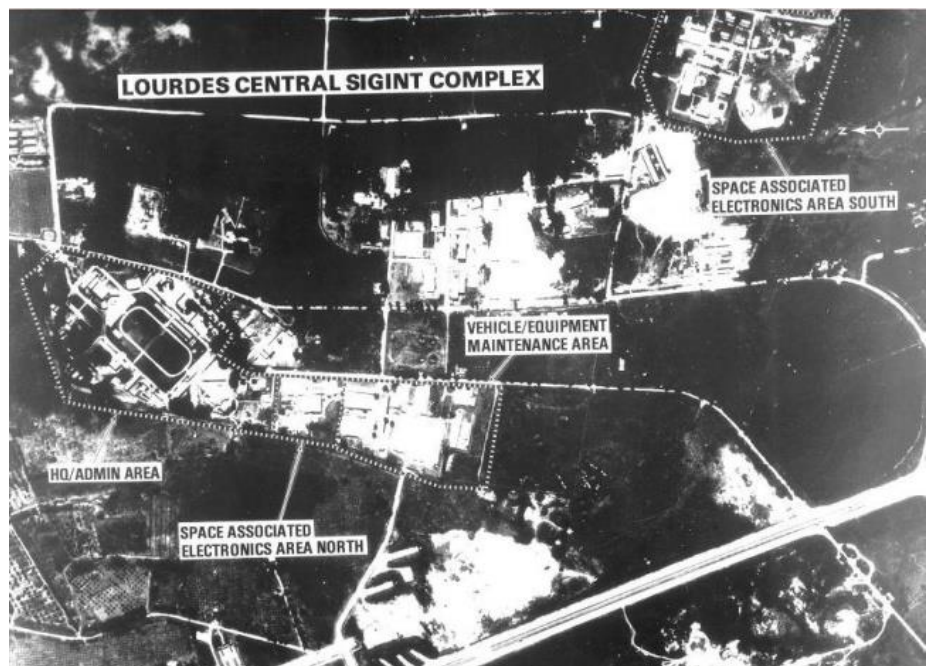
1. Enigma/N&O/Priyam designators: F01, F06, F06a, M42, M42b, X06
2. Enigma codes for Israeli nets including Moscow: M43 (see also the separate M43 document)

Note:

M42 is not only used for the diplomatic and intelligence services, but also for other government related networks. Most of the alleged government owned point-to-point stations are coded as M42b.



Ministry of Foreign Affairs at
32 Smolenskaya-Sennaya Square, Moscow



Lourdes SIGINT complex. Cuba

Chapter 2: History

The Russian diplomatic/intelligence digital modes networks have been monitored by a large number of dxers since the early 1980's and even before that time when they were using Morse only. When we first discovered these networks we didn't know who they were, so we nicknamed them "the Brotherhood". A couple of years and a lot of work later we know that these nets are in fact Soviet (now Russian) governmental/intelligence networks. In the 1990's a new name was used to identify them. According to several sources the main user of the net was Soud, so this name replaced "the Brotherhood". If Soud really was involved is questionable. Soud traffic was probably sent through the same channel, along with all other traffic, but I seriously doubt that Soud was the main user. Later we called the net "FAPSI".

Why FAPSI?

In 1995 by decree of President Boris Yeltsin all cryptographic systems except those licensed by FAPSI were forbidden in the Russian Federation. There are widespread rumors that all systems licensed by FAPSI have backdoors allowing the agency to freely access the encrypted information. Since 1998 FAPSI required that all Internet providers in Russia had to install their hardware named SORM (COPM - Система Оперативно-Розыскных Мероприятий, System of Operative Investigative Actions) that allows filtering and remote control of internet traffic from the FAPSI headquarters.

FAPSI was also responsible for maintaining both the governmental and presidential information systems and telecommunication lines. The agency controlled Russia's physical communications systems, including government telephone lines, high-frequency communications, and cryptography services. FAPSI initially maintained communications lines for the Russian President and security services. Basically they were responsible for the actual transmissions. Following a reorganisation in 2003 FAPSI was dissolved and its functions, personnel and infrastructure has been distributed between the FSB and the Ministry of Defense.

One of the other names that was used after FAPSI is DOSC, Department of State Communications, a name that is more appropriate than the ones used before that. To simplify it even more we now use Russian Diplo/Intel, Russian Intel. or Russian Diplo when the transmission is recognized as a diplomatic transmission.

The first encounters in the USA with the Russian diplo/intelligence stations were in the late 1970's when they still used high speed CW (ca. 32 WPM). Most of the early CW stations (PSN, BPA, SPK, WNY, YBU) were still active in the late 1990's. "ROL" however disappeared completely. In the mid 1980's the RTTY transmissions started. The speed used was 50bd. Messages to YBU were the most common ones in those days. Also messages to PSN were monitored. The callup was different from the system that is used nowadays:

VVV PSN PSN PSN 2/245 VVV PSN PSN 2/245

NW NW

NR 271 GR 135

+ 5L or 5F groups

Then, in the mid 1980's they started to use preambles consisting of five 5-figure groups, very similar to the ones that are used today. But the link designators were different back then, although some re-appeared in 2017.

The WFO/MIG link was the only known 2-way link in the Americas. The station sending WFO was definitely the Russian embassy in Managua, Nicaragua. The other end, MIG, was the Russian embassy in Havana, Cuba.

In the late 1980's the European network of RTTY stations popped up, similar to the network that was active in the America's. The master station in Europe was "RCF". Several frequency guides listed "RCF" as Ministry for Foreign Affairs in Moscow. After the disintegration of the USSR, the "RCF" callsign disappeared. The new master station was as powerful as "RCF" was and one thing is for sure: this station was located in or very near Moscow as well. The station was DFed many times and every time Moscow appeared to be the source of the signal. Whether the master station or "RCF" really was MFA Moscow is not 100% sure but it definitely was a diplo station and the net a diplo network. Whenever something hot was happening in the 1990's, like the Chechenya actions, the stations in this net were making overtime, even on Sundays, while there were normally no transmissions on Sundays. The only station that was often heard on Sundays was "BFR", which was an indication that it was possibly located in an Islamic country or in Israel. Later we learned that BFR is the Russian embassy, Damascus, Syria.

The MFA transmitted online and offline encrypted messages to the other stations. There were fixed schedules for a couple of stations while others are reported less frequently. During the time that "RCF" was still in place they used a traffic list system. In the 1990's the traffic list system was replaced and each link now had one or two fixed schedules on an assigned frequency pair. The auto-broadcasts to amongst others KUL, VKX, RAU and RKD were probably just circulars or routine traffic sent to the specific networks. They were transmitted blind and therefore repeated throughout the day on several frequencies. They also QSLed received messages.

RTTY was their major system. Later-on Serdolik MFSK-34 became the most popular diplo mode. Nowadays both RTTY and Serdolik MFSK-34 are still being used. The callups and messages can be divided into two groups: the most common one for the America's and Europe was: "46464646464646 KUL KUL KUL KUL 1/226". Note that 46's are transmitted instead of RY's, then the callsign of the recipient and the number of messages/number of 5-letter or 5-figure groups in this message. The other one was only noted in Europe but might have been expanded to other areas by now. These transmissions started with a selcal of 6-tones (the selcal system is called Mazielka), followed by the callsign of the recipient sent in CW, then into RTTY where the preamble is handkeyed while the other system had an automated preamble.

X06 - Mazielka

The Mazielka is a selcal system that was used by the master station to wake up a station outside the normal fixed sked. It was probably only used to catch the operators attention, not to start the equipment remotely. The fact that they switched to CW after the Mazielka was a sure sign that the operator had to prepare the equipment before they could start the transmission. The use of non-error correcting RTTY systems made it practically impossible to establish a link automatically. The Mazielka was never used during the normal schedule times. Nowadays system seems to be more structured and even has more or less fixed schedules. The MFA in Moscow broadcasts the selcal while waiting for the embassy to initiate a point-to-point link. In case no link has been established, X06 will move to a new frequency until a link has been initiated.

We have found several facts regarding the preambles of the link system that are valid today. Let's take a closer look at the preambles. Each message starts with a preamble that consists of 5 groups, followed by the message itself. A typical preamble looks like this: 11177 00142 23687 05012 01109.

- 1st group: The message identifier, stating what kind of message it is. This might also be a priority code. 11144, 11166, 11177 and 11199 are the combinations heard so far. The most common are 11177 and 11199. The latter is being used for QSL purposes.
- 2nd group: The link-identifier, each link has its own id, except for stations who have a two-way link, in that case both stations have the same link-id.
- 3rd group: Could be related to the key. Most of the time a 5-figure group but also "00000" was regularly noted.
- 4th group: The first two digits are the date and the last three are the message number.
- 5th group: The first four digits represent the number of groups in the message + 1. The extra group is most likely the key (3rd group of the preamble). The last digit is either a "1" or a "9".

Note:

The message header info above dates back to the mid-1990's. The headers have slightly changed and are further described in chapter 10.

After the messages have been sent, the operators sometimes have a little chat. In the America's the conversations were often in poor English while on the European side they often chatted in Cyrillic.

As I mentioned earlier, they also sent QSL messages. The QSL messages were transmitted on other frequencies and even on other days than the day the original messages were sent. These QSL messages are no longer transmitted, as far as I know.

Note that the first group of the QSL preamble is always 11199 and the messages always started with 55555 followed by 77011, while the last groups represent the QSLed message number. A typical QSL preamble and message looks like this:

11199 00142 00000 18010 00069
55555 77011 00089 00090 00091



KGB shield

Various RTTY speeds were used on this net in the 1990's. The most common were Baudot 50Bd, 75Bd and 100Bd with 500Hz shift. Besides RTTY also Serdolik MFSK-34 and Morse have been used. Today a host of digital modes are being used by the supposed Russian Governmental and Intelligence stations.

In the past many Direction Finding activities were conducted with good results. The European master station is located in the Moscow region, while the now defunct WFO/MIG link was the link between Nicaragua and Cuba. Station GMN could have been located in Mexico City. Most transmissions came from either Moscow or Cuba. Only a few other locations are known. See further the callsign list at the end of this document.

Moscow sent messages to many other stations, most likely governmental stations like embassies and consulates. The transmissions from Cuba were to BAR, BPA, HZW, JMS, KAC, NDO, PSN, SPK, WFO, WNY, YBU; all unid locations except for WFO.

There is a very significant feature to the 5-letter traffic. The last group of every message is a simple substitution which indicates the date the message was composed and the group count which is always 3 less than the group count shown in the preamble.

The substitution is:

O I U Z T R E W A P
0 1 2 3 4 5 6 7 8 9

For example:

11177 00148 57477 26811 00609

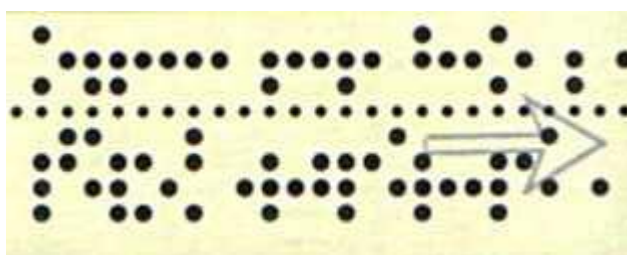
5LGs QKANG XOBJZ VEVXX UEORW

The last group translates to 26057 -- 26th of the month, 57 groups

TIKAS and SEE

After the RTTY transmissions or during the broadcasts of the schedules we often saw operator's chats. The words 'TIKAS' and 'SEE' were often used, most of the times when the operators had a 'technical' chat. 'TIKAS' probably comes from Ticai or Tikat which means 'to tick' in various Slavic languages. So TIKAS probably means 'ticker' or 'telex operator / telex / telegram / telex machine' or whatever. The use of SEE in "OM AS SEE A UR PER?" indicates this translation as well (see below for KUA traffic). In this case it would be used as "OM wait, look at your tape"

VNR 05 GR 314
NR 05 GR 314
TIKAS
FOR PTF KUA -AFTER QKY QRZ
ZKUUUUUUUKKKKKAEEX
TIKAS
FOR PTF KUA -AFTER QKY QRZ
QRU SK QRU SK



Telewriter tape

TIKAS in this sense, probably refers to telegram traffic on hand for 'PTF' and 'KUA'. The following chat was heard on link 10163 on 16008 kHz at 0920 UTC, 24-08-1994

H QJU K
OK SEE
OK ASM

11177 10163 05870~,2.?KB660KK 004(9
CFM
64646464

VVV
OM 4TO NE NRAWITS QB ?
ASM QSA BD
063 RPT
WQXKVK OK NOT 23 BD ?
MNQSP ?
UR OP 1 ?
OK SEE HR ALL CFM PSE QSP TIKAS PBL ILI QRZ OP 1

RYYRYRYRYRYRYRYRYRY
OM PSE SA QSP ?
GR ? GR ? PBL GR 1 2 3 4 5 ?
PSE NRYVR MNI WRK VY QRL
OK ASM EE SEE
PSE QSP TIKAS HR ALL CFM
SEE AGN
05870 PSE K
ASM

HW
GMAGVL QSP VY PSE QSP UR K
OP 1 QRL ?
OK VY OM 4TO NE TAK ?
UR NEW OP ?
OM PSE QSL MY QTC TAK OK ?
OP 1 ALL QSP AFTER ILI PSE QRZ AFTER
OK ?
HR A WRK OP 1 HR ALL CFM OK ?
CFM TKS QSL 1 K

Chapter 3: Transcripts and examples

A very popular station in the 1990's was the master station in Moscow that sent blind routine messages to KUL, VKX and several others at a fixed daily schedule. Note the "46" test slip instead of "RY". "KUL" is the callsign of the recipient, there are 3 messages with a total of 535 5-letter groups. (messages are shortened)

KUL KUL KUL 3/535 KUL KUL KUL 3/535 KUL KUL KUL 3/535
KUL KUL KUL 3/535 KUL KUL KUL 3/535 KUL KUL KUL 3/535

11177 00142 33972 29181 01479
POFRE XHTWL EWPXU GARRV PEIFE DFHFB SDSTT BEWPH JXQZN UHLWO
LUKHY MAVLA BGWMU VVHMO TZPTW SSXRX IBSHO JOZND GRDLO NMXYF
QSPSI EXVHM HACFJ KQZFC NYLDC SZDQV TVWVPV CNOTP OZAPG ORIIF

11177 00142 17790 29182 01459
UODKH MTAUY SSFNC CZANV CAECR SCYIV YCCPI KQQHI QVVUB QURSM
UOZJZ ARRIR ZUTZN ZUBFY XJZPG OZYDY MXGDK CGSEC CERBK JVMZC
QBOZZ BGSSZ YJJKY GUGLV AVRAE YFYPO AVJUX SXFIS NIHOI ZSGMB

11177 00142 04039 29183 02439
ENQKZ KJOAN RYVHN VUACC TVZUZ FCLCI ZFMSG PMJKW LGQPV AABAG
WQRML MDWUX PTENU DWIYA XSEZX ZEPPR FOMSX POCLZ PAFTK YTMYZ
YYDIX UJDBB XQPKJ FLUJK HBQOV TEMVJ NGFHZ WYNLY ONBMH IQDJT

QRU QRU SK SK

Another one on link 30022 with Ops chat at the end.

[illegible]

KDRUG ALMIV LPTAT EACKS YBVPF LSCXG AFJII XDAHJ RQMX YJJX FV
HAJME EJKMA XMXLE ADMSE DSYHQ ZVAIZ ORANL PEBPI EHPGZ LTYFU
OSBBX DBWRM EKO OB NOZVX UPPPW ZVXHC OAE TV DQJBR ABQFD TCILT

QSL 4
QRU
CFM TKS GB SK

RYRYRYYYRYRYRYYYRYRYRYYYRYRYRYYYRYRYRYYYRYRYRRYRRYR
QSP QSP QSP TX QSP X ZLD ZLD
11177 30022 48526 20886 03859

MIPIYE KVMGG AOCHW RDJLJ FCMOO UORGV CFKYE PVSMLM YMOMY CYBUU
ZYTNE RTPRB QMBUA GKAUP GEMLK HPCVN ZPQYS ODTWT OXUTC UFWWC
SINUB RYXCV RDJWC VUNLX CMCMW VHUUK ZFHAJ NYZJO GBIST PXQMA

QRU QSL 4 ALL FM OM PSE DAWWAJ MEDU TXT ES PL PBL
OKOLO 15 RUSKIH REGISTROW OK ? TQVELO RABOTATX INA 4E OV??
TKS GB SK SK

Interesting are the schedules that were transmitted. Most of the times the schedules were transmitted after a regular broadcast. This one was sent by GSW.

OP TIKAS :
FM 1/9 TO 31/10
QSO 00.05 QSW 16320 / 14440
QSO 08.30 QSW 16320 / 13510
QWK QRR
FM 00.00 TO 07.00 QSW 16320 / 14440
FM 07.00 TO 09.00 QSW 16320 / 13510
FM 09.00 TO 12.00 QSW 11140 / 9320
FM 12.00 TO 22.00 QSW 9320 / 7310
FM 22.00 TO 24.00 QSW 13510 / 12130
QRU QRU SK SK

... and another one:

04.00-06.00
 QRG 1 18565/16058/15683/13466/12158/11028/10328/8487/8178/7537
 QRG 2 14578/11536/11134/8043/7867/7376/6888/5414/5858/5021
 06.00-14.00
 QRG 1 23170/22825/21860/18587/20071/18234/15683/14578/16337/12158
 QRG 2 18234/18573/18617/17488/18364/13466/11028/10218/8877/7833
 14.00-18.00
 QRG 1 12131/15733/17488/16337/18617/16184/18308/14486/16058/11614
 QRG 2 7814/10315/12188/11028/12188/11536/12131/8203/8843/5478
 18.00-04.00
 QRG 1 10512/10218/11068/8815/10707/8826/8487/7608/7885/5858
 QRG 2 6885/6888/7376/6884/6885/6888/5836/5015/5771/4526

OK ?
WRK FM 01 11 80 KWK QUW TO NEXT QWK
ALL OK?
PSE ALL QSP TIKAS
NIL
PSE QSL
CFM
K

Typical in this sample is the 020 sequence. The string is part of the link id of the receiving station (2nd group of the preamble) as you can see in the following sample.

020/020/020/020/020/020/...

ROP	ROP	ROP	QTC	ROP	ROP	ROP	QTC	ROP	ROP	ROP	QTC	ROP	ROP	ROP	QTC
464	464	464	464	464	464	464	464	464	464	464	464	464	464	464	464
ROP	ROP	ROP	QTC	ROP	ROP	ROP	QTC	ROP	ROP	ROP	QTC	ROP	ROP	ROP	QTC

Followed by the preamble 11100 00020 00000 08054 02509 and message
27833 01104 63436 19719 53579 56352 44915 87962 06845 66774

QSL messages always had 11199 as the first group in the preamble, and began with 55555. A startling message was sent by YBU. Here is the entire message.

```
11199 00148 00000 20269 01759
55555 77011 99641 99749 99736 99719 99726 99667 99635 99749
99736 99710 99750 99736 99751 99762 99640 99607 99749 99736
99748 99749 99736 44326 99736 99612 99721 99736 99705 99736
99678 99736 99688 99744 99641 99744 99641 99635 99696 99696
99641 99655 44326 99736 99607 99704 99737 99688 99744 99641
99744 99750 99750 99696 99641 99768 99655 44326 99736 99704
99664 99751 99688 99744 99641 99744 99750 99750 99696 99750
99635 99655 44326 99607 99751 99698 99737 99639 99744 99750
99721 99688 99721 99641 99750 99744 99750 99641 99636 99744
99736 99711 99649 99736 99635 99696 99736 99656 99736 99635
99641 99736 99749 99750 99749 99736 99719 99756 99740 99736
99687 99736 99612 99721 99736 99705 99736 99678 99749 99677
99736 99612 99736 99649 99635 99696 99736 99683 99696 99696
99639 99696 99750 99681 99736 99656 99736 99765 99635 99639
99765 99721 99681 99655 99736 99612 99736 99649 99635 99641
99683 99750 99768 99639 99750 99636 99681 99749 99765 99749
99736 99724 99742 99736 99725 99640 99647 99751 99676 99775
99747 99601 99747 99749
```

Analysis shows that starting at the third group, this message uses a trinomial (3-digit) code. When sent as 5F groups, the first two digits of each 5F group are nulls. All of the code groups begin with either a 6 or a 7 except for the one group (repeated three times in the message) which uses 44 as the nulls.

In 2011, at least one of the old preambles and message formats is still being used:

```
11100 80104 00000 12453 05009
followed by 5FGs or 5LGs.
```

Serdolik MFSK-34 (CROWD-36)

With the introduction of new systems the formats changed. There are quite a few different formats now. I am not sure if each type is linked to a specific user (i.e. diplo, military, intelligence). Messages nowadays consist of 5LGs, 5FGs, 17FGs, 18FGs or 20FGs.

On Serdolik MFSK-34 channels headers like these are quite common:

```
RXJZM ITQVB JHSMXV LGET
DJNFCKGZYPAOBG RMLAWWALMR E SIU
VNWGZXYDLU VCXRMWSDABHZJ
VGPLCRI12(@7 VGPLCRI12(@7
RNCTLHPOGMV DCWOX
```

Other formats on non Serdolik MFSK-34 channels:

Multifigure groups e.g. 422140226144418178=

Chapter 4: M42b

The stations listed as M42b are believed to be government owned point-to-point stations.

Traffic usually consists of operator chats in Morse and messages sent in Baudot ITA2 50Bd/500Hz. Sometimes other speeds are used. Most of the nets are duplex nets with more or less fixed schedules.

Traffic:

5112 kHz, operator chat in CW:

PLF3 PLF3 PLF3 DE KUWF KUWF K
R 567 0037 K

5112 kHz, FSK 50/500

RYRYRYRYRYRYRYRYRYRYRYRY

147 130 18 0000 2581
99468 97905 33626 94120 13801 41881 78236 04516 15977 87499
42425 58859 12747 56108 81599 47808 95339 80085 90984 63293
27597 66666 55300 50258 74884 46795 21393 27983 55097 04741
61761 13702 32582 82192 55056 78252 33601 93473 82762 14434
60167 96511 06688 77126 60858 29362 95223 91974 29089 06838 =50=
59056 98546 95117 53062 49367 26329 37065 87541 15859 52278
63799 73725 86584 08174 48023 99536 69950 02577 25375 99306
84706 09582 34329 52401 12662 35185 08178 99967 19361 31573
60646 89117 81890 68066 79518 86935 51517 11842 72653 62360
96149 94717 26099 92076 44000 59405 69375 29990 83882 79496 =100=
23026 07569 02860 50960 16596 86525 15029 64911 84590 56063
27986 68432 15929 90502 88649 89608 93503 48102 32936 84654
04468 46907 71033 59469 61376 97282 88637 49341 01426 79517
0018

Operator chat in CW:

CFM NL K. SK SK

The other station is on 5371 kHz. Its operator sends in CW:

KUWF DE PLF3

5112 kHz sends its second message in FSK 50/500

210 130 20 0000 3241
99468 97905 33626 94120 13801 41881 78236 04516 15977 87499
42425 58859 12747 56108 81599 47808 95339 80085 90984 63293
27597 66666 55300 50258 74884 46795 21393 27983 55097 04741
61761 13702 32582 82192 55056 78252 33601 93473 82762 14434
60167 96511 06688 77126 60858 29362 95223 91974 29089 06838 =50=
59056 98546 95117 53062 49367 26329 37065 87541 15859 52278
63799 73725 86584 08174 48023 99536 69950 02577 25375 99306
84706 09582 34329 52401 12662 35185 08178 99967 19361 31573
60646 89117 81890 68066 79518 86935 51517 11842 72653 62360
96149 94717 26099 92076 44000 59405 69375 29990 83882 79496 =100=
23026 07569 02860 50960 16596 86525 15029 64911 84590 56063
27986 68432 15929 90502 88649 89608 93503 48102 32936 84654
04468 46907 71033 59469 61376 97282 88637 49341 01426 79517
0019

Note the separators after 50 groups. They are typical for M42b traffic. The last 4 digits at the end of the message indicate the time.

F01 is based on the ITA2 alphabet. At the normal settings, it uses the speed of 200 bd, the shift of 500 Hz, 1.5 stop bits, the mark frequency of -250 Hz, and the space frequency of +250 Hz.

Block format

The payload, 5-digit groups, is packed into 25-character blocks, which are sent directly one after another without line breaks, of the following fixed structure:

```
=8251 65380484843868036  
=8462 30549583192393891  
=7853 29392548929506269  
=8554 549410102838013150  
=8635 516060140587158102  
...  
)69729 0608400000+++++237  
ABBBCCDDDDDEEEEEFFFFGGG
```

- A: Indicates the block type, and takes the form of one of the following characters:
 - '=' indicates that the message will continue in the next block.
 - ')' indicates that this is the last block of the message.
- B: Unknown. Related to error detection. Always 3 digits.
- C: Block number. Counted from 1. Padded with spaces from the right if shorter than 3 digits.
- D: First 5-digit group of the 3-group fragment contained by the block.
- E: Second 5-digit group of the 3-group fragment contained by the block.
- F: Third 5-digit group of the 3-group fragment contained by the block.
- G: Unknown. Related to error detection. Padded with spaces from the right if shorter than 3 digits.

If this is the last block of the message, the D, E, and/or F slots can be replaced by +++++ if there is no group to place in them. Decoding a message comes down to putting together the 3-group fragments from the blocks in the right order.

There is also an optional block of different format that precedes all the other blocks, and contains a 5-group header in the common Russian intelligence format:

```
(2111110009777423182507200839  
ABBBCCCCDDDDDEEEEEFFFFGGGGG
```

- A: Always '(' - matches ')' from the last block.
- B: Unknown. Related to error detection. Always 3 digits.
- C: First group of the header: message type. F01 usually uses 11177, sometimes 11100.
- D: Second group of the header: link ID, fixed per schedule.
- E: Third group of the header, unknown.
- F: Fourth group of the header. Contains the message date as day of the month in the first two digits, always zero as the third digit, and the serial number between 01 and 99 inclusive in the last two digits.
- G: Fifth group of the header: group count in the first 4 digits.

All blocks are repeated through the broadcast for 6-8 minutes for redundancy.

Null messages

Null messages are represented by this single block repeated for about 6 minutes:

```
=5761 00000+++++++162
```

Multiple messages

It is possible to transmit more than one message in the same broadcast with F01. In that case, the total group count is filled up with the group 00000 until it is a multiply of 10, then followed by the next message. If a full 5-group header was included, only the header of the first message in the TX is distinguished using a separate block, while in the following messages it is mixed with normal message groups.

See further: <http://priyom.org/number-stations/digital/f01/protocol>

Chapter 6: F01 messages

Null message: 5761 00000 +++++ +++++

Standard message:

=8731 735192767493453123	=85222 566858997034138124	=83743 760250284722550105
=8162 803474444136411984	=83923 89021853355983485	=82444 67063345689661681
=8273 955792213804033108	=84624 39073045838153753	=87445 53634183109327595
=8574 616742903078091146	=81525 52636611780117195	=86046 192239547889098123
=8005 92446726575694296	=89426 728334103213403144	=85747 42434781124048193
=8876 247087126047636103	=86127 669539212724861130	=84548 921667452354614103
=8387 976146312769393113	=87828 46587893029008374	=85949 648853175800868141
=8438 222975992964973145	=72029 000000000000000107	=80550 309078238965403110
=8449 56075733275503440	=72030 00000000000000067	=87051 293122216623632110
=81210 995462055135695143	=87031 57203390146269192	=83652 95101888724357491
=85511 764960329663211112	=87032 03824963958465485	=85953 899963008612305122
=84412 770566608277522116	=85733 32158218366162794	=86354 668845516588348124
=80413 278407772807388135	=81534 955505476397666103	=80355 12509462201286785
=81614 25237296578967095	=85335 656579426312142144	=85656 291401372417797121
=80515 144776311458855123	=78636 58612155394396581	=80557 94254335922344887
=81716 72898077276948915	=80737 346760421222134113	=77058 03263033507568984
=80917 643073279194075103	=78638 39761768787692449	=80859 56018713384398681
=81618 543194714106698149	=87539 922286301007718182	=75560 50755437809108967
=76919 938446205718862138	=88940 075097417303311107)57661 00000+++++++160
=87520 73312813344337998	=80041 39325522941301780	
=82621 037148322931375102	=83842 77857425126454190	

Same message in 5-figure group format

73519 27674 93453 80347 44441 36411 95579 22138 04033 61674
29030 78091 92446 72657 56942 24708 71260 47636 97614 63127
69393 22297 59929 64973 56075 73327 55034 99546 20551 35695
76496 03296 63211 77056 66082 77522 27840 77728 07388 25237
29657 89670 14477 63114 58855 72898 07727 69489 64307 32791
94075 54319 47141 06698 93844 62057 18862 73312 81334 43379
03714 83229 31375 56685 89970 34138 89021 85335 59834 39073
04583 81537 52636 61178 01171 72833 41032 13403 66953 92127
24861 46587 89302 90083 00000

57203 39014 62691 03824 96395 84654 32158 21836 61627 95550
54763 97666 65657 94263 12142 58612 15539 43965 34676 04212
22134 39761 76878 76924 22228 63010 07718 07509 74173 03311
39325 52294 13017 77857 42512 64541 76025 02847 22550 67063
34568 96616 53634 18310 93275 19223 95478 89098 42434 78112
40481 92166 74523 54614 64885 31758 00868 30907 82389 65403
29312 22166 23632 95101 88872 43574 89996 30086 12305 66884
55165 88348 12509 46220 12867 29140 13724 17797 94254 33592
23448 03263 03350 75689 56018 71338 43986 50755 43780 91089
00000 +++++ +++++

Chapter 7: F06 protocol

F06 is based on a proprietary synchronous BFSK mode. Its standard configuration is speed of 200 bd, shift of 1000 Hz, space (0) frequency at -500 Hz, and mark (1) frequency at +500 Hz. The binary fields of its protocol use big-endian bit and byte orders.

Block structure

All the data of the BFSK transmission is split and packed into consecutive ordered 288-bit blocks of the following fixed structure: (hexadecimal/binary representations)

Sync sequence	Block index with ECC		Interleaved payload with ECC	
7d12b0e6	0033		1f2ab981ebe994c78a5900eb32bb5ded40dd1d4f7fa2f0c603a56bbf64cd	
32-bit constant, always 0x7d12b0e6	00000000001	10011	1f2ab981ebe994c78a5900eb32bb5ded40dd	1d4f7fa2f0c603a56bbf64cd
	11-bit raw block index	5-bit ECC data	Interleaved 144-bit raw payload with CRC	Interleaved 96-bit ECC data

The Error-Correcting Code for the block index is not understood, but expected values can be easily acquired empirically, allowing to still use the ECC data to detect corrupted block indices.

The payload is composed of 4 pieces, each separately encoded with ECC and containing 36 bits of raw original data followed by 24 bits of corresponding ECC data (the ECC algorithm is not known). These 4 pieces are interleaved together (a common FEC practice), 4 bits at a time, in the following manner:

	Raw original data, 36 bits/piece	ECC data, 24 bits/piece
Interleaved payload	AJS1BKT2CLU3DMV4ENW5FOX6GPY7HQZ8IR09	agmsbhntcioudjpvekqwflrx
Piece 1	ABCDEFGH I	abcdef
Piece 2	JKLMNOPQR	ghijkl
Piece 3	STUVWXYZ0	mnopqr
Piece 4	123456789	stuvwx
Deinterleaved payload	ABCDEFGH IJKLMNOPQRSTU VWXYZ0123456789	

The deinterleaved 144-bit payload then actually contains, at the end, a 16-bit CRC of the previous 128-bit data. The CRC algorithm is the standard CRC-16-CCITT. This can be used to check and reject corrupted block payloads.

Deinterleaved 144-bit payload with CRC	
1be980354f9b4a02d028ec5ebeda1979bbdd	
1be980354f9b4a02d028ec5ebeda1979	bbdd
128-bit block payload	16-bit CRC

There are two types of block, and the interpretation of the payload of a block depends on its type.

Metadata blocks

The blocks with indices divisible by 16, including zero (#0, #16, #32, #48, #64, #80, ...) are metadata blocks. They are sent at regular intervals through the broadcast and report information on the numbers of blocks and messages contained in the broadcast, and the position where, in which block, to find the start of each message. The 128-bit metadata payload is spread out over eight 16-bit groups, as follows:

Block and message counts		Position of message 1		Position of message 2		Position of message 3		*	Position of message 7	
Hexa-decimal	0862	0020		02c0		0000		.	0000	
Binary	00001000011	00010	00000000001	00000	00000010110	00000	00000000000	00000	.	00000000000 00000
Decimal	67	2	1	0	22	0	0	0	.	0 0
	11-bit block count	5-bit message count	11-bit start block index	5 bits, unused, always 0	11-bit start block index	5 bits, unused, always 0	11-bit start block index	5 bits, unused, always 0		11-bit start block index 5 bits, unused, always 0

* Position of messages 4, 5 and 6

For example, this broadcast contains 67 blocks, on which 2 messages are mapped: the first message starts with block #1, and the second message starts with block #22.

This provides for up to seven messages in a broadcast. Most of the time there is only one or maybe two messages in the broadcast, and the remaining, unused message fields are simply set to 0. A block is never shared between two messages; messages always start with the beginning of a block. In practice, the position of the first message always equals 1. The block count includes block #0.

Message blocks

Message blocks are blocks whose indices, unlike metadata blocks, are not divisible by 16. Each of them is part of one of the possibly several messages in the broadcast. A message can use one of two known encodings for the payload of its blocks:

- Raw binary - the 128 bits or 16 bytes of the payload are simply taken as they are and put together to form a binary message, left to further interpretation. This is used for usual test transmissions, and for rare broadcasts such as F06a.
- A custom encoding used for normal messages based on typical 5-figure groups, mapping binary to decimal digits. 10-bit pieces of the payload are mapped to 3 digits each. A 10-bit value can range from 0 to 1023 ($2^{10}-1$), and is mapped to a 3-digit string ranging from 000 to 999, with simplicity, efficiency and very little wasted entropy. 4-digit 10-bit values from 1000 to 1023 are believed to be invalid, and should not be encountered during decoding. The first 120 bits of the 128-bit payload are encoded through these 10-bit pieces. The remaining 8 bits at the end are divided into two 4-bit pieces. In a similar way, a 4-bit value can range from 0 to 15 (2^4-1), and is mapped to a single digit from 0 to 9, while values from 10 to 15 are unused.

	Bits 1-10	Bits 11-20	Bits 21-30	Bits 31-40	.	Bits 101-110	Bits 111-120	Bits 121-124	Bits 125-128
Binary	0001101111	1010010100	0000000101	0100101001	.	1111000001	0011010110	0101	1000
Decimal digits	111	660	005	297	.	961	214	5	8

The decoded payload yields 12 successive 3-digit strings, and 2 extra digits at the end, for a total of 38 digits per block. These digits can be used to reconstitute 5-figure groups only after being all put together from the different blocks into the whole message, as 5-figure group boundaries are not aligned with block boundaries, and a 5-figure group is often split across two successive blocks.

Separator block

A separator block contains the normal 32-bit synchronization constant 0x7d12b0e6 followed by 256 zero bits. It is not a valid block, and trying to decode it will result in a block #0 with an incorrect payload CRC, which should be rejected as corrupted. Although its purpose may seem intuitive, it is not known which actual technical constraints, if any, it is supposed to satisfy.

Broadcast structure

The broadcasts consist of all the blocks in index order, followed by a separator block, repeated over and over for 6 to 8 minutes. Decoding a message comes down to the following steps:

1. Decoding a metadata block to know the number of message blocks to recover and map each message with an ordered list of message block. Any metadata block whose integrity was verified will do.
2. Decoding message blocks to obtain a copy, whose integrity was verified, of the payload of each message block. They don't have to be received or processed in order, and can be taken from any repeated portion of the broadcast; corrupted or already-received blocks can be ignored, until all blocks were decoded.
3. For each message in the broadcast, checking the payload of its first block to determine the payload encoding of this message. (In practice, no instance has been observed of multiple messages using different payload encoding methods inside a single broadcast.)
4. Decoding the payload of every block part of each message. Each payload must be decoded separately, block by block, not as a whole.
5. Putting the decoded payloads back together, in block index order, to reconstitute the messages.

See further <http://priyom.org/number-stations/digital/f06/protocol>

Null message:

11166 80214 34567 08062 00049 00000 00000 00000 00000

Standard message:

11166 40122 85236 10024 03029
83417 43455 97957 01538 97274 02556 74084 43014 97448 10265
61191 93125 79766 75090 23660 58028 71271 88566 75784 67272
85121 18514 41800 42695 08794 68798 48430 29906 05276 04032
42144 53311 31926 62649 48303 80609 06708 06810 14392 07701
76470 82543 04520 99932 66962 88592 37381 50648 19280 77385
84852 42940 42422 36570 73431 25576 36650 24556 55687 39019
67333 58495 43923 52478 93970 78147 23233 97937 84078 34051
86136 12093 66622 73460 55987 22141 04698 22467 91338 36340
92124 87746 88446 25313 03665 26386 24117 04994 53536 57198
06062 57180 41912 11987 22967 48618 94102 50190 11456 34562
22098 85340 82128 57743 63156 96774 71880 78682 75137 25039
14669 98295 93259 74422 47929 58716 77968 71055 96821 33279
08609 50014 03498 41602 02583 69863 93571 50703 64682 78082
96992 48090 96292 75803 65491 97762 19136 55305 53798 15053
93259 08701 56824 21268 33951 31249 19979 64035 57263 67734
64825 14326 08839 75355 97249 76061 55729 01549 90343 69267
45882 00192 59177 72688 64999 34627 69658 36826 45437 40935
48651 03312 06855 49905 87566 91573 33280 91122 56585 38720
16294 27639 71718 03592 19009 94634 81885 70899 40549 40524
68201 16408 85688 93945 72656 19087 69367 05060 98378 31173
10750 34609 48665 42079 96526 89165 96972 97090 18139 26005
05051 56781 12615 76052 31405 08095 61714 58329 97285 63016
29052 84338 02378 05786 39900 75836 07387 74578 33359 44414
25711 88603 41575 06334 91375 56537 75689 31060 95430 27259
23230 46919 07990 68792 86596 52317 28102 86417 17363 05977
28644 15878 26058 94599 88416 52622 72126 01420 28641 03018
63750 24065 96028 68478 22227 15179 59632 98432 90573 44230
13641 73083 91072 03950 03329 01889 61419 09839 16337 48702
24175 66178 06464 19509 69203 96978 42175 73701 53792 65310
97000 44823 50128 29449 24017 81725 94830 09278 81596 46073
24300 00000



FAPSI SIGINT site near Pskov, Russia

Chapter 9: F06a structure

F06a is a variant of the Russian intelligence broadcast system F06. While it mostly uses the same modem protocol, the encoded payload is completely different - it sends an ASCII text file. However, no plaintext has been encountered, only 5-digit and -letter groups. This variant is rare and has only been heard in unscheduled transmissions.

Payload structure

Instead of the normal encoding for 5-figure groups, the payload of F06a message blocks is raw binary. The recomposed message payload contains the binary contents of a file, preceded by a 20-byte binary metadata header and followed by some padding.

	File size	File name	CRC	File contents	End of file	Padding
Hexadecimal	00000621	00 00 30 30 32 32 35 33 2e 54 4c 47	c2452b33	31 31 31 30 30 20 31 30 30 39 37 20 33 36 39 38 37... 33 32 31 37 39	00	99 99 99 99 99 99 99 99 99 99
Decode	1569	002253.TLG		11100 10097 36987... 32179		
	32-bit byte count of file contents	12-byte ASCII string, <u>8.3 short file name</u> padded on the left with NUL characters	32-bit CRC of file contents	Variable-length, raw binary file contents	0x00-byte marker	Variable number of 0x99 padding bytes

In practice, the first 10 bits of the file size field are always 0000000000, whereas 5-figure group messages always use 0001101111, which allows to detect and identify this payload type. The CRC algorithm seems to be the bitwise NOT of the standard CRC-32.

File contents

Although this payload structure seems able to carry any kind of file, in reports so far all files transmitted contained 8-bit ASCII text with 5-figure/letter group encrypted contents like in typical Russian intelligence cryptograms. For example:

```
11100 10097 36987 15002 02533
89993 42710 53704 65567 33602 63598 18747 25742 68953 11062
01317 23342 73178 75721 54292 96655 82229 34867 26791 79634
[22 lines skipped...]
26225 98404 91176 79583 95169 19865 97310 80099 25382 01179
15578 32179
```

Like normal F06 messages, they start with a 5-group header. It uses message type 11100, possibly because the transmissions are unscheduled. 5-figure group messages don't include a serial number, group count postamble. The messages appear to be always one group shorter than the group count in the header.

The layout of the text is always the same. Groups are separated by single space characters. The 5-group header is on its own on the first line, and followed by an empty line before the body of the message, formatted with 10 groups on each line. The line breaks used have mostly been [CRLF](#). The file ends with no end-of-line character at the end of the last line.

File names follow the [8.3 format](#). Names longer than eight characters are truncated down to the first six, with the rest replaced with ~1; this is how the Windows operating systems represent long file names to old MS-DOS programs. Most file names, with very few exceptions, follow a 6-digit structure exhibiting the serial number and group count of the message inside, and use the TLG type extension, which could stand for *telegram*.

Example: 002253.TLG

Meaning: 002 = Serial number; 253 = group count; File type extension is TLG or TXT

Besides the ASCII-encoded files, other unidentified binary files are sent. The file names begin with 044 or 444 + a 2-digit serial number. The files have no extension.

See further: <http://priyom.org/number-stations/digital/f06a>

Transmission schedules

F01 and F06 operate in regular schedules. Each schedule consists of three identical transmissions, spaced 10 minutes apart. Each takes place on a different frequency, usually in descending order. When traffic is sent on a schedule, the transmissions may repeat also 24 hours later at the same times and frequencies.

Message header

Header:	11166 40122 96741 10025 02999
1st group:	This group consists of two components: 111 and the message type. 111 text message or 444 binary message (seldom used) Precedence 00 - drill Precedence 44 - flash message Precedence 66 - urgent message Precedence 77 - standard message Precedence 99 - was used in the past for a two-way link QSL message
2nd group:	Link id, representing the addressee being a service and a person representing the Government, FSB, GRU, military attaché, etc. at embassies, consulates, UN, etc.
3rd group:	Crypto variant, where to start the OTP key
4th group:	Date (day) + message number
5th group:	Group count (total message, including the last two groups) + 9, 3 or 1 (message origin) 9 - message origin is Moscow 3 - message to Moscow, origin is an embassy, consulate, etc. 1 - ??? unknown origin

Notes

- F01, F06 and similar M42 messages are sent to embassies, consulates, UN delegates, and other official representatives only.
- Group 2 = 00000 is a broadcast to all stations
- Group 1 = 11100 + group 2 = 00000 is a drill message.
- Group 3 = 00000 should be a general broadcast, but there is no 100% proof of that.
- Diplo or Intelligence origin? Generally the messages consisting of 5-letter groups are related to the diplomatic services while messages consisting of 5-figure groups belong to other services.

Serial number / group count

The serial number and group count can be found just before the end-of-message group. Here is an example of the message number and group count in the header and at the end of the message:

11177 00117 81694 160**25 01759** (**25** is the message number and **175** is the group count, *including the last two groups*)
93543 64319 10945 62591 77411 91387 49313 87938 84008 68238
etc etc etc
11401 18578 51609 12490 14432 51326 06968 08675 44605 53915
04967 43096 60458 **25173 00000**

25173 is the message number followed by the number of groups of the message itself, so *minus the last two groups*.
00000 means "end of message."

Null messages / Command messages

This kind of message is a null message, meaning that no message will follow. It does however include the command to change the OTP mentioned in group three. (OTP = One Time Pad).

Example: 11166 10053 56248 13001 00049 00000 00000 00000 00000

Triple timestamp

The triple timestamp is the third and deepest known common metadata element. It resides inside the encrypted data of the message. This part (at least) of the message is only encrypted with a key that gets reused message after message, producing visibly similar 5-figure groups across messages within schedules where this header appears. This allowed us to figure out its existence and contents. The triple timestamp has been seen in several F01 and F06 schedules, and even in the E06 ID 832 replacement of F06 ID 50046.

This header comprises the first 12 5-figure groups of the message. It appears that the same clear text 20 digits, containing the timestamp of the message, are simply repeated 3 times in succession.

	First copy		Second copy		Third copy	
Encrypted	47749 49093 92903	40530	04816 63673 33608 57196		42964 90189 82228 70902	
Cleartext	30261 00026 05174	00000	30261 00000 00026 05174		30261 00026 00000 05174	
	15-digit timestamp, see below	Almost always the same value, assumed to be 00000. Occasionally 12345 instead.	Timestamp 00000 or 12345		Timestamp 00000 or 12345	

The message timestamp encodes on 15 digits the date and possibly the time of the writing of the message, following a XX-YY-HH-ZZ-dd-mm-yy-w format, where the meaning of XX, YY and ZZ fields are still uncertain: it could be SS:MM:HH ZZ dd-mm-yy w, or XX:YY HH:MM dd-mm-yy w.

15-digit message timestamp							
30	26	10	00	26	05	17	4
00-59 value, possibly seconds	00-59 value, possibly minutes	Hours, ranging between 09 and 15	Almost always the same value, assumed to be 00. Occasionally different, within a big range. Alternate possibility for minutes.	Day of month	Month	Year	Day of week

Layering

Each of the metadata elements described above may or may not be present in a transmission. It depends on the habits and characteristics of the mode used, and can even depend on the particular schedule. When several of these elements are present, they naturally layer on top of one another: from outermost to innermost, 5-group header, serial-GC postamble and triple timestamp. The message date and serial number are the same in the different metadata elements, however the group counts slightly differ.

The payload of a 5-group header is a message which may or may not feature a serial-GC postamble. When both are present, the payload of the serial-GC postamble is only the inner message. So the group count in the 5-group header is always greater than the one in the serial-GC postamble, by a couple groups, to account for the serial-GC postamble and outro groups.

Example F06 message featuring all of 5-group header, serial-GC postamble and triple timestamp:

11166 70147 63294 26057 00509
52605 93102 97678 58128 38271 73989 80470 94306 44065 67310
85734 84902 91173 41859 43065 66564 60299 57864 93228 08612
85432 55311 16512 34995 23980 50211 42834 10893 26924 13369
24193 96424 67191 83939 98695 78643 06343 90805 71813 58085
17286 38424 35603 51866 49878 13945 98213 73551 57048 00000

Note: thanks for the Priyom team for the Triple Time Stamp and Layering information. See for further information

<http://priyom.org/number-stations/digital/russian-intelligence-common-metadata>

<http://priyom.org/number-stations/digital/russian-intelligence-common-metadata#triple-timestamp>

The diplomatic network that we monitor transmits a mixture of intelligence, diplomatic and military traffic. In the past most of the transmissions were in AM, USB, CW and RTTY. The first Serdolik MFSK-34 logs are from late 1999 and after that the Russians introduced a host of digital modes. The Mazielka selcal system however, is still being used.

Mazielka

See chapter 12.

Serdolik MFSK-34 (CROWD-36)

Serdolik MFSK-34 is a Soviet MFSK duplex system using 36 tones based on British Piccolo MK1. It is also known as CROWD-36, CIS/Russian Piccolo, URS 18 multitones, CIS 10-11-11 MFSK or CIS-36. This system was replaced in 2018.

Serdolik version 2

Links are established by scanning 3 duplex channels in a loop, for 30 seconds each, until a timely response is received. On each frequency, a sequence of two tones is transmitted, representing the calling station's numeric address. By default, an established link is in the *command* state, using 35-tone 40 Bd MFSK modulation. This state is used only briefly to switch between the different traffic speeds. In the *traffic* state, 9 different speeds are supported. 200 to 1200 bit/s use MFSK modulation, while 2400 bit/s and up use OFDM instead. The symbol rate of all waveforms is 40 Bd.

Perelivt

Links are established using a single-tone 3000 Bd 8PSK waveform. Perelivt scans through 3 duplex channels in a loop, calling on each frequency until a timely response is received. There are 2 calling modes: a short one that transmits 4 PSK bursts, changes the frequency after 18 seconds and a long one that transmits 17 PSK bursts, changes the frequency after 60 seconds. After a link is established, full duplex communication is made using one of 3 successively faster waveforms: 66-tone MFSK (default), 128-tone OFDM, 3 kHz wide, or 128-tone OFDM, 6 kHz wide. The signal generated by Perelivt is approximately 10 kHz wide. Note that the dial frequency is the center of the 10 kHz passband.

Note:

Perelivt is a code name created by Priyom to unambiguously refer to all four waveforms as part of a single system. Like "serdolik" (сердолик), "perelivt" (переливт) is a cryptocrystalline mineral. The actual name of the system is unknown.

45-tone OFDM & 112-tone OFDM

Two groups of waveforms of a proprietary full duplex HF communication system. They are used on links with some Russian diplomatic missions, as well as domestic links between transmission centers. The system doesn't support automatic channel scanning. Instead, each link has a pre-defined set of up to 4 duplex channels, which the master station tries for a few minutes each, in order from the highest to the lowest. The system transmits on the upper sideband. Each group is associated with a distinct link establishment system (the bursts).

45-tone OFDM

- 45 carriers, 33.33 Bd, 62.5 Hz, BPSK
- 45 carriers, 40 Bd, 62.5 Hz, BPSK
- 45 carriers, 40 Bd, 62.5 Hz, QPSK
- 60 carriers, 35.56 Bd, 44.44 Hz, 8PSK

112-tone OFDM

- 112 carriers, 22.22 Bd, 25.64 Hz, BPSK
- 112 carriers, 22.22 Bd, 25.64 Hz, QPSK
- 112 carriers, 22.22 Bd, 25.64 Hz, 8PSK

Chapter 12: X06 - Mazielka

X06 a.k.a. Mazielka is a 6-tones diplomatic selcall system used by the MFA in Moscow. Moscow broadcasts the selcal while waiting for the embassy to initiate a point-to-point link. In case no link has been established, X06 will move to a new frequency until a link has been initiated.

Mazielka tone sequences:

Tone (Hz)	Number
815	1
845	2
875	3
910	4
950	5
990	6

Variants:

1 tone, 2 tones and 6 tones. 1 and 2 tones are used for tests.

Test sequences:

123456, 111666, 161616, 111111, 121212, etc. These are usually sent an hour before transmissions of family 7 stations (E07, F07, M12, P07, XPA1, XPA2, XPB1)

Note that the actual name of the selcal system is unknown. We call it Mazielka, which is a made up word invented in the 1980s by one of the Western military forces.

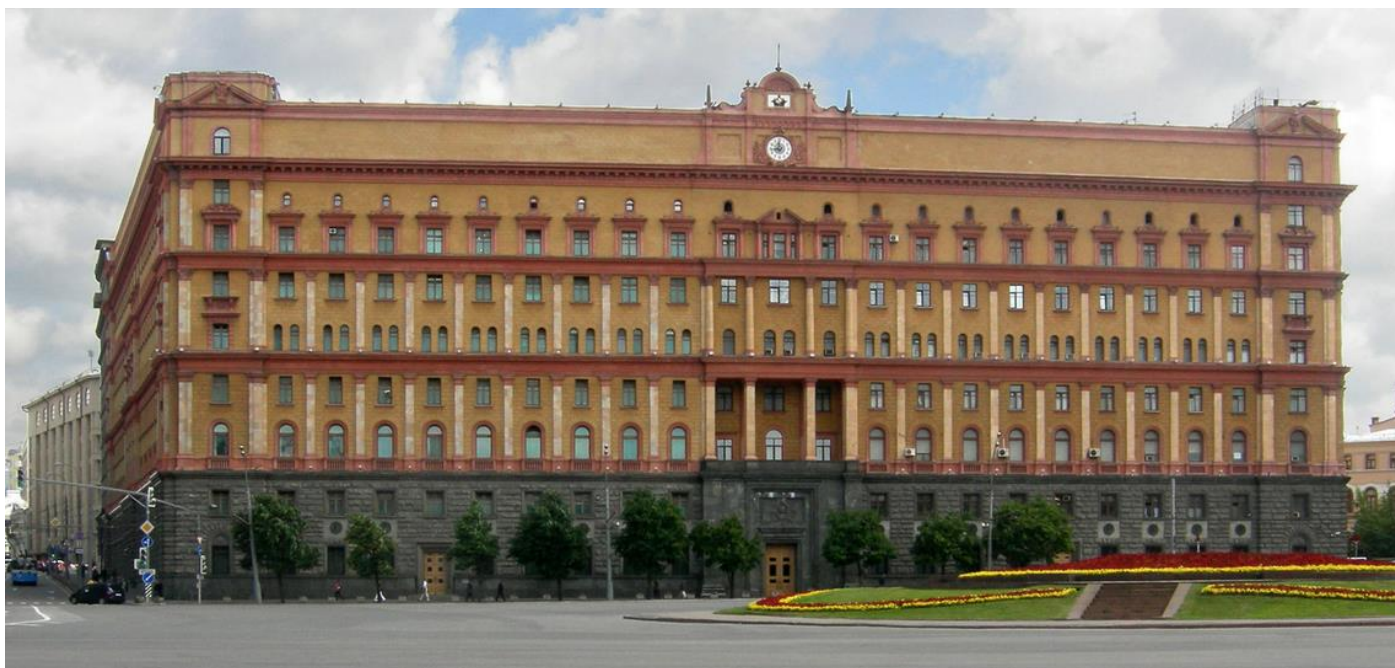
Below a list of known 6-tone selcalls. They are sent by MFA Moscow.

124356	Russian embassy Dushanbe	421635	Russian embassy Oslo
125643	Russian embassy Ulanbatar	431625	Russian embassy Warsaw
134265	Russian embassy Tunis	432516	Russian embassy Bern
145632	Russian embassy Algiers	435621	Russian embassy Maputo
153624	Russian embassy Damascus	436512	Russian embassy Harare
154263	Russian embassy Rome	452163	Russian embassy Kabul
156234	Russian embassy Kampala	463125	Russian embassy Rabat
162543	Russian embassy Nicosia	465132	Russian embassy Sofia
164253	Russian embassy Addis Ababa	521634	Russian embassy Bucharest
164532	Russian embassy Dublin	532614	Russian embassy Paris
165324	Russian embassy Vienna	534216	Russian embassy Baghdad
165423	Russian embassy Brussels	542136	Russian embassy Beijing
213546	Russian embassy Islamabad	561243	Russian embassy Helsinki
214356	Russian embassy Amman	564213	Russian Consulate General Bonn
215346	Russian Consulate General Mumbai	612534	Russian embassy Ashgabat
216354	Russian Consulate General Chennai	615243	Russian Permanent Mission to the UN, Geneva
216435	Russian embassy Dhaka	621543	Russian embassy Lisbon
231654	Russian embassy Abuja	625413	Russian embassy Tel Aviv
241563	Russian Consulate General Karachi	641523	Russian embassy Lusaka
246531	Russian embassy Accra	645321	Russian Consulate General Ho Chi Minh City
256134	Russian embassy Abidjan	??????	Russian embassy Havana
256341	Russian embassy Beirut	152346	Unid
261453	Russian embassy Cairo	244566	Unid
263145	Russian embassy Prague	122433	Unid
314265	Russian embassy Antananarivo	416253	Unid
324615	Russian embassy Madrid	624153	Unid
325614	Russian embassy Nairobi	214365	Unid
351264	Russian embassy Abu Dhabi	316245	Unid
352416	Russian embassy Dar es Salaam	154632	Unid
356412	Russian embassy Berlin	145234	Unid
361245	Russian embassy Copenhagen	256234	Unid
362154	Russian embassy Athens	454545	Test
364152	Russian embassy New Delhi	436125	Unid
412356	Russian embassy Budapest	216531	Unid

Check the X06 logs database on our website: <http://numbersoddities.nl/X06-Logs-Database.zip>

Chapter 13: Frequencies

In earlier versions of this document we included a list of frequencies. As you see they are no longer included. These nets are using a very large pool of frequencies and they often add new frequencies, so it is almost impossible to keep track of them. The Russians regularly re-use old frequencies so if you need frequencies, I suggest that you look in the Numbers Logs and X06 databases on our website. A dump from the known frequencies of the M42 will also be available. This file however will only be updated once or twice per year. Check the files page on <http://numbersoddities.nl/files.html>



Former KGB building, Lubyanka, Moscow. Picture: Mark A. Wilson

Chapter 14: Link id's and callsigns

Serdolik MFSK-34 id's (last update 2016)

018 026 037 047 098 099 104 107 111 118 131 137 162 208 212 219 242 513 736 825 842 851 891

F01 link id's (updated Feb 2023)

00016 00017 both are transmitted from Cuba.

Active F06 link ID's (updated Feb 2023)

00000 10053 40023 40122 30154 60070 60146 70059 70202 80214

M42 stations with link ID (last updated in 2010)

Link	TX-call	TX location	RX-call	RX location	Remarks
00006					
00007					
00012					
00018					
00020			ROP		
00023					
00028					
00029		Moscow, Russia			
00030	BFR	Russian embassy, Damascus, Syria	RGA	Moscow, Russia	
00030	RGA	Moscow, Russia	BFR	Russian embassy, Damascus, Syria	
00031	LKF		WCD	Moscow, Russia	
00031	WCD	Moscow, Russia	LKF		
00035			PAO		
00041					
00050					
00051					
00052	NXQ	Moscow, Russia	YOA		
00052	YOA	Moscow, Russia	NQX	Moscow, Russia	
00054		Moscow, Russia	UDZ21		
00063		Moscow, Russia			
00068					
00070		Moscow, Russia	RAU		Changed to 60070
00074					
00075					
00079			UGO		
00089					
00090			GOD		
00096		Moscow, Russia	FWL		
00097		Moscow, Russia			
00098		Moscow, Russia	VTX		
00099		Moscow, Russia	RSZ		
00101			RKA		
00102			UFN		
00102			RFU		
00102	UAN		URG		
00102	URG		UAN		
00103			U1K		U1K noted once
00103	COY851	Cuba	YFC		
00103	YFC		COY851	Cuba	
00104			RPY		
00107					
00110			XQW		
00115					
00116		Cuba	BPA		
00117		Cuba	HZW		
00119		Russian embassy, Mexico City	GMN		

00125	MIG	Russian embassy, Havana, Cuba	WFO	Russian embassy, Managua, Nicaragua	
00125	WFO	Russian embassy, Managua, Nicaragua	MIG	Russian embassy, Havana, Cuba	
00127		Cuba	JMS		
00128		Cuba	KAC		
00132		Russian embassy Beograd, Yugoslavia	RNO		
00135		Cuba	BAR		
00139		Cuba	WNY		
00142		Moscow, Russia	KUL		
00148		Cuba	YBU		
00149	DZR		RVV	Moscow, Russia	
00149	RVV	Moscow, Russia	DZR		
00155			UMK		
00162					
00166		Moscow, Russia	VKX		
00168		Cuba	SPK		
00169			KMI		
00177			RSZ		RSZ's link ID is 00099. Noted once
00178			KRN		
00189					
00190	JSC	Moscow, Russia	POU		
00191					
00198		Moscow, Russia			
00209					
00213			RNS		
00224					
00701			UFO		
00918					
03861	PSN				
06019		Moscow, Russia			
07039		Moscow, Russia			
10020					
10024					
10042	AVK		RPR	Moscow, Russia	
10042	RPR	Moscow, Russia	AVK		
10047					
10053					
10064					
10075	RYS		ZND		
10075	ZND		RYS	Moscow, Russia	
10079					
10097					
10163		Moscow, Russia	UDZ27		
11063			RDT	Moscow, Russia	
11230		Moscow, Russia			
12311		Moscow, Russia			
13005					
20008					
20010					
20043		Moscow, Russia			
20054		Moscow, Russia			
20065					
20076					
20087	RBP71	Moscow, Russia	RVC47		
20087	RVC47		RBP71	Moscow, Russia	
20098					
20108					
30004					

30011		Moscow, Russia			
30022	KKK	Moscow, Russia	KUA	Russian embassy, Baghdad, Iraq	
30022	KUA	Russian embassy, Baghdad, Iraq	KKK	Moscow, Russia	Location unconfirmed
30044		Moscow, Russia			
30088		Moscow, Russia	RCX81		
30132					
40007		Moscow, Russia			
40023		Moscow, Russia			
40034	RLX	Moscow, Russia	UXW	Russian embassy, London, UK	
40034	UXW	Russian embassy, London, UK	RLX	Moscow, Russia	Location unconfirmed
40078					
40155					
40177					
40878					
43323		Moscow, Russia			
50002		Moscow, Russia	CAZ		
50035		Moscow, Russia	JUA		
50046					
50080					
50080					
50088					
50101					
50189					
60003					
60003		Moscow, Russia	FQX		
60015		Moscow, Russia			
60047	DCW		URO	Moscow, Russia	
60047	URO	Moscow, Russia	DCW		
60069		Moscow, Russia	EWZ42		
60070		Moscow, Russia	RAU		Former link id 00070
60089					
60179		Moscow, Russia			
60191					
70004		Moscow, Russia	NOB		
70026		Moscow, Russia			
70026					
70037		Moscow, Russia	RAD		
70060		Moscow, Russia	DKR		
73004					
80031					
80038		Moscow, Russia	RPO		
80050		Moscow, Russia			
80061	VNB	Moscow, Russia	WQL		
80061	WQL		VNB	Moscow, Russia	
80104					
83111					
90006					
90017					
90039		Moscow, Russia			
90039					
90051	RJA	Moscow, Russia	URS		
90051	URS		RJA	Moscow, Russia	
90057					
90215					
90223		Moscow, Russia			

M42 callsigns, unknown link ID

TX-call	TX location	RX-call
COY851	Cuba	TRO
DYFS		CIML
KLM		APW
KNY31	Russian embassy, New York, USA	LCU
PLM		
RBI		
RCF	MFA Moscow, USSR	
RCF45		
RDI		RQF
RDK		UBI, UCC, UCU, RGP
RGP		UBI, UCC, UCU, RDK
RHT42		
RKD	Moscow, Russia	
RKG	Moscow, Russia	
ROI		RCF2
ROK23		
ROK48		
RPD4		
RRA	Moscow, Russia	
RRR37		
RVR39		RTW54
RWA50		
RWV74		
SN7D		
UBI		UCC, UCU, RDK, RGP
UBW		
UCC		UBI, UCU, RDK, RGP
UCU		UBI, UCC, RDK, RGP
UGL		
		ACD
		BLA
		BNV
		BXL
		CMU
		CMU97
		DMA
		DPL
		DPU
		DSG
		EWZ40
		FJN
		FRU
		GLK
		GSW
		GVS
		KDN
		KNA
		LMS
		LSG
		NDO
		NMZ
		OBX
		OTD
		OWR
		PLM
		PSN
		PTF
		RCA

	RKG
	RKM
	RLJ
	RMM
	ROL
	RQO
	RSS
	RXX
	RZJ
	SCJ
	TRP
	UBW
	USN
	UXG
	WKL
	WNK

M42b Point-to-Point stations

TX-call	TX location	RX-call
2ÂNH		
6JI1		
7GZR		
BEMS		
BEZX		
BLZ26		
BOPK		
BUHN		
BV6K		
BZL26		
Churm		
ChYRP		
DEPS		
DHUP		
dlChs		
EBCW		
F8PW		
FILT		
FKLS		
FLJW		
G3WM		
G5OP		
GDVA		
GENP		
GFAR		
GLJX		
GONU		
GTGV		
HDKR		
HL7D		
HXMT		
IK7R		
JOXQ		
JXEN		
K4MT		NT9P
KBAN		
KE4T		
KOGW		
KOLV		

L2RS		
L47D		
LEQR		
LGDF		
LKDW		PRAT
LM7K		
LOPR		
LQDF		
M8TK		
MAST		
MERG		
MI4A		
MJFQ		
MNBV		
MSACh		
NLAT		
NQOR		
NT9P		K4MT
OBRA		
OCFN		
OREN		
P6OZ		
P8RK		
PLXW		
PRAT		LKDW
PRBO		
PZAK		
RBW43	Murmansk	
RDP5	Kirov	RMC27
RHM2		RWV72
RION		
RKD48	Moscow	RQS
RKV23	Tyumen	
RMA2		RGK2
RND70		RBW
RND72	Moscow	RWV73
RND79	Moscow area	RTF6
RND79	Moscow area	RBW
RNI2		RYF2
RNI2		RRQ6
RNSP		
RRL2	Western Russia	
RTK		RDI
RTW54		RVR39
RUU70		RRF30
RUU76		RUA41
RWI		RYF2
RWKJ		
RWV73		RND72
RXZ32	St Petersburg	
RZT71		RCZ32
RZT76		RHM2
RZYV		
S3MF		
S9IZ		
SFDZ		
SK8I		
SN7D		
SNC4		

SONG		
TC8D		
TI4O		
TKLI		
TZ9X		
TZBP		
UILG		
UL2G		
UOZG		
UTN7		UUD4
UTPR		
UUD4		UTN7
UW9M		
UZC2		UTN7
VBTW		
VGKE		NLAT
VGTR		
W7AD		
W9SP		
WDAK		
WPAD		
WS1C		
WVXZ		
WYGL		
Y4MY		
YDEW		
Z4NF		
ZE3Q		
ZE4K		
ZOLK		

Chapter 15: M43

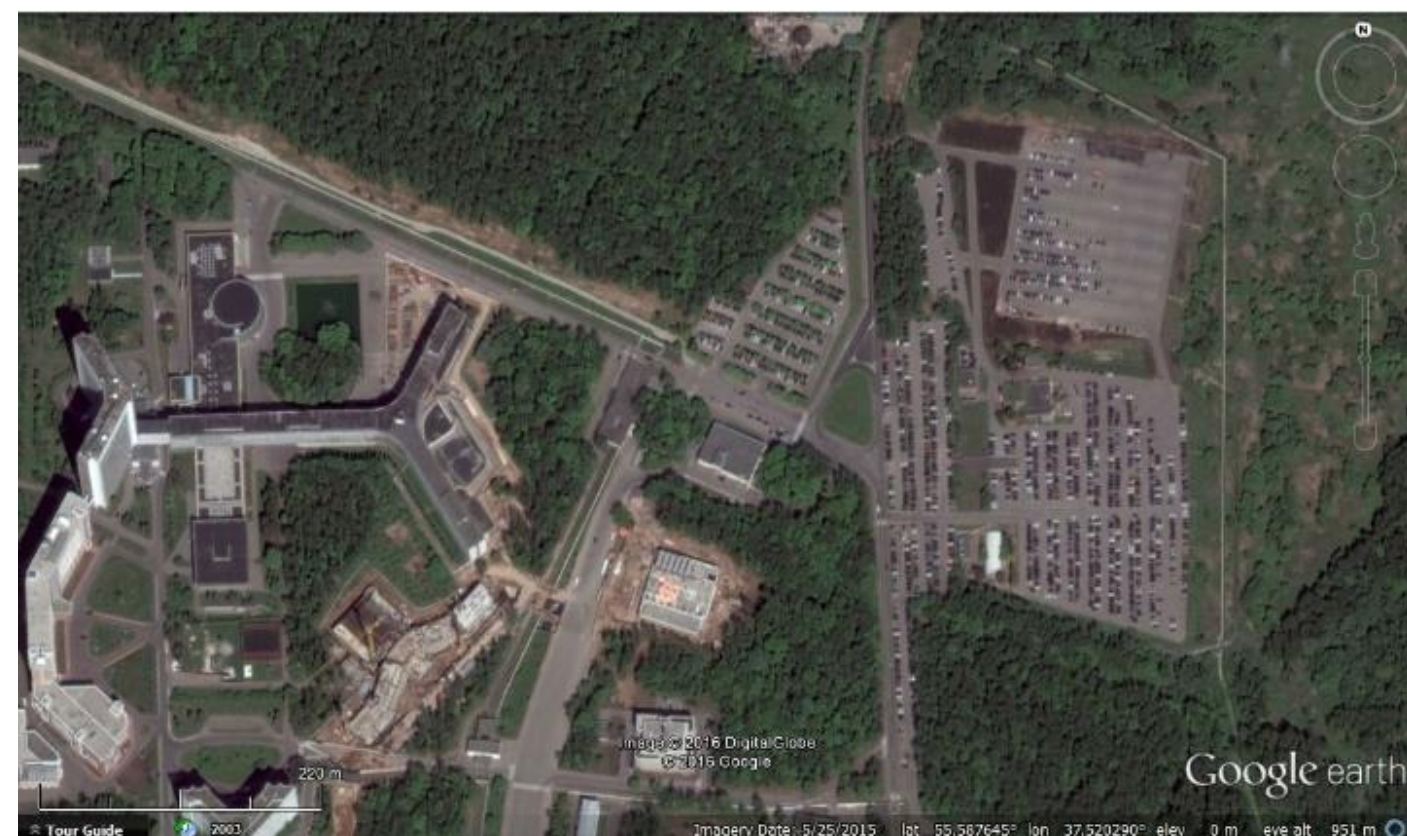
M43 was an international Israeli intelligence network that also included a link with Moscow. Moscow used callsign RK2 on this net. See for further info M43's separate profile, available from the [Numbers & Oddities website](#). Below is a typical example of M4W/RK2 traffic:

M4W M4W M4W RY
M4W M4W M4W RY
M4W M4W M4W RYRYRYRYRYRYRYR
OK OK QSA 4 QSA 4
I QRU TOO QRU QRU
PLS QSO QSO QSO
OK OK OK TKS TMXQS HAVE A NICE DAY
BYBYBYBY BY BY BY

AND THIS IS A RK2 TRANSMISSION:

RK2 RK2 RK2 46
RK2 RK2 RK2 46
RK2 RK2 RK2 46

HR QSA FB QSA 4
ONLY UR WRK QRG 16128 PLS NEXT QSO WRK QRG 16129 OKEJ ?
K OK GA PLS
I QRU QRU
INT QTC
GB GB QRU GB SK QSO
QSO WILL WRK
OK TKS GB SK SK
SK SK



The huge SVR complex outside Moscow

Chapter 16: Credits and links

All information in this document was submitted by independent radio monitors or has been obtained from public available sources and public sites on the web. Wherever data was obtained via the web or elsewhere, references and/or links to these sources have been noted.

I thank everyone who contributed to this document. Special thanks goes to the now defunct Worldwide Utility News club (WUN) and its members. They reported, collected and analyzed a huge amount of transmissions. WUN published its first Special Topics Report about M42 in March 1995. This team also included Don Schimmel who reported his findings not only on WUN but also in Popular Communications, books and his online column "Radio Intrigue with Don Schimmel". Many thanks to my major advisors and to the Priyom team for the F01, F06, F06a and Perelivt protocol data, and the triple timestamps and layering data; to Ian Wraith and other people for creating and updating the Rivet decoder.

The map of Russia is © CIA World Factbook.

The pictures of the FAPSI SIGINT site near Pskov, and SVR are © Google Earth.

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Relevant websites:

Utility DXers Forum	www.udxf.nl
Numbers & Oddities	www.numbersoddities.nl
Priyom	www.priyom.org
Enigma 2000	http://www.signalshed.com/
Rivet decoder	Decodes XPA, XPA2, F01, F06, F06a, T600 http://www.signalshed.com/rivet/index.html
Agentura	http://agentura.ru/
CIA World Factbook	https://www.cia.gov/library/publications/the-world-factbook/geos/rs.html
Min. of Foreign Affairs	http://www.mid.ru/en/main_en
FSB	http://www.fsb.ru/
SVR	http://svr.gov.ru/
DXing.com	http://www.dxing.com/intrigue.htm