

**Information represented here is incomplete and CANNOT BE USED as a source for the real world navigation.**

## Moscow Airspace Navigation

Navigation information (exp. Ramenskoe) was taken from "Aeroflot's" official pilot's navigation handbook  
(last revision date 08/1998)

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### I. **Moscow Airspace nav aids**

#### I.I **NDB list**

NAME	ID	ACTUAL FREQ.	ADJUSTED FREQ. <sup>(1)</sup>
AKSINYINO	QO	732	
<b>BITZA</b> <sup>(2)</sup>	<b>AT</b>	<b>398</b>	
BOGDANOVO	BD	360	
<b>BUZHAROVO*</b>	<b>AR</b>	<b>1080</b>	<b>480</b>
CHELOBITJEVO	BP	680	
CHERUSTI	SF	410	
DOBRYNSKOE	ZHA	307	
GAGARIN	FK	985	
<b>GLOTAEVO</b>	<b>DK</b>	<b>1020</b>	<b>420</b>
IVANOVSKOE	UM	405	
KAMENKA	VZ	230	
KARMANOVO	BG	745	
<b>KARTINO</b>	<b>VT</b>	<b>1215</b>	<b>615</b>
<b>KLIMOVSK</b>	<b>LO</b>	<b>1005</b>	<b>505</b>
KOSTINO	KN	642	
LARIONOVO	MF	478	
LJUBERTSY	UL	718	
MARJINO	RV	493	
NERL	NE	900	
OKTIABRSKI	FE	570	
OPALIKHA	KS	565	
<b>SAVELOVO</b>	<b>SV</b>	<b>1285</b>	<b>685</b>
SKURYGINO	DR	415	
STARITSA	AJ	430	
<b>SUKHOTINO</b>	<b>IN</b>	<b>1055</b>	<b>455</b>
<b>TUSHINO OPRS</b> <sup>(3)</sup>	<b>LB</b>	<b>330</b>	
VENEV	FZH	335	
ZAKHAROVKA	IP	688	
<b>MOSCOW</b>	<b>MK</b>	<b>263</b>	

#### I.II **VOR list**

NAME	ID	TYPE	FREQ	Magnetic deviation
SHEREMETYEVO	MR	VOR/DME	114.600	8.3 <sup>0</sup> E

#### REM:

##### 1) - Why adjusted?

As You know in MSFS You cannot use NDB's with freq. higher than 999kHz. I decided to correct this problem in easiest way - reducing freq. by 600 kHz (exp. KLIMOVSK NDB). And after it You CAN use them all.

##### 2) - Color marking:

**Nav aids with incorrect frequencies in "FS Global Upgrade"**

**Missed nav aids in "FS Global Upgrade"**

**Nav aids which does not exist in the real world (or in Aeroflot's navigation documents)**

**Adjusted frequency.**

##### 3) - Abbreviations:

**BPRM** - NDB is located at the Inner or middle marker

**DPRM** - NDB is located at the outer marker

**OPRS** - this abbreviation usually means NDB and can be translated as Separate Navigation Radio Station.  
Also it can be based on mobile platform (as Tushino OPRS).

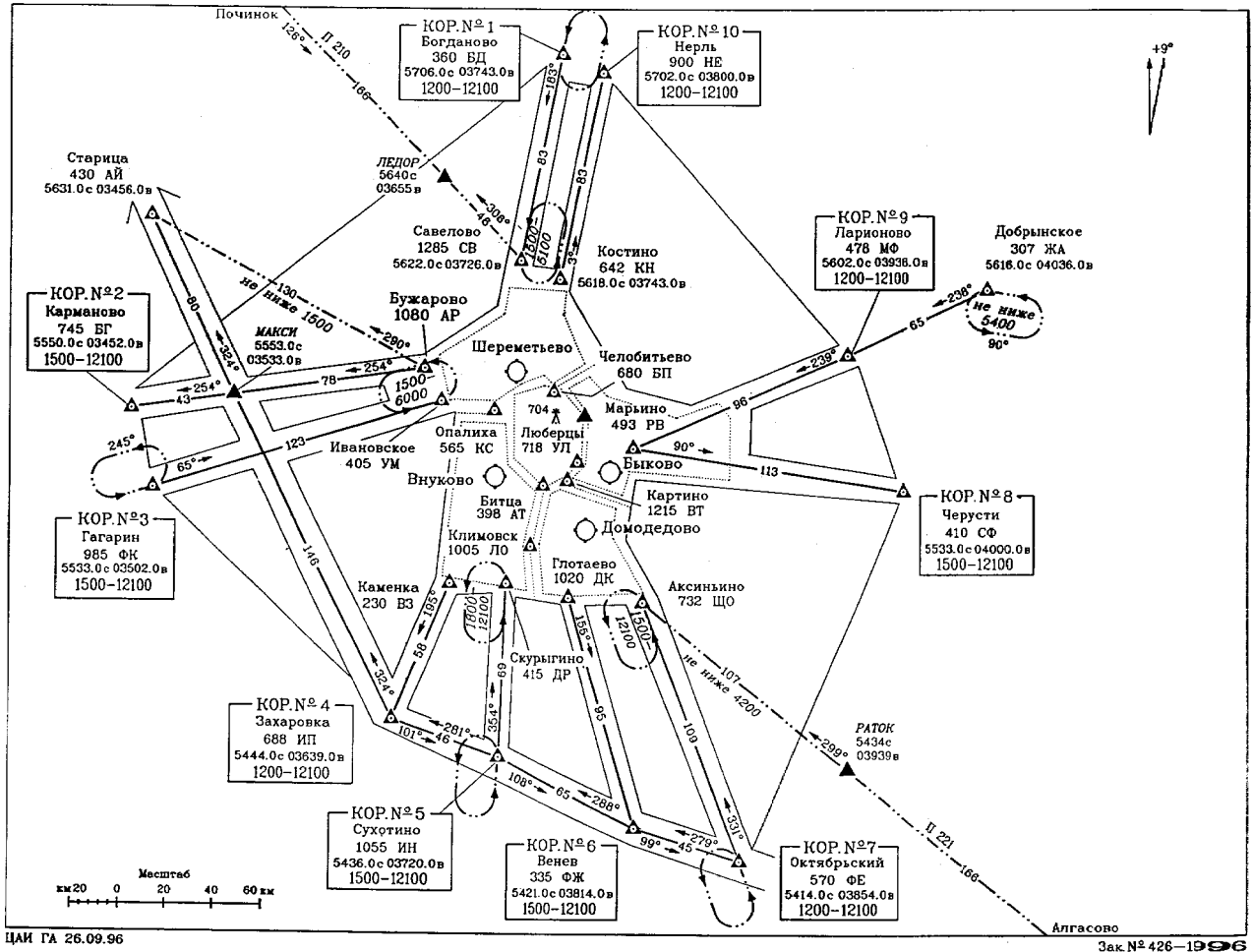
## II. Moscow Airspace information

Moscow airspace is rather complex - it has a lot of restrictions. It will be easier to say that Moscow airspace consist of restricted areas with some "corridors" in which you can operate. In general Moscow airspace is divided into two main parts: 1) Central part - covers more than 8,000 sq. km. and consist of Moscow city with airport's surrounded it. 2) Big restricted area surrounds Moscow as a ring and divided into 10 sectors by air corridors. It covers more than 40,000 sq. km. Here You can look at the original "Aeroflot's" navigation map:

Воздушная зона

МОСКВА

11-232



### Map legend:

- ▲ - Waypoint, where making radio contact is mandatory, with it's name and coordinates
- △ - Waypoint, where making radio contact is not mandatory, with it's name and coordinates
- ▲ - Navaid, where making radio contact is mandatory, with its name, frequency and ID
- ← 256°  
— 43 — - Standard route with direction and distance to the next point in kilometers.
- ..... - Responsibility zones border
- КОР. № 6  
Венеж  
335 ФЖ  
5421.0с 03814.0в  
1500-12100 - Name of the corridor with assigned NDB as entry or point of exit, with NDB name, frequency, ID, geographical coordinates and allowed altitudes in meters.
- Домодедово - Airport sign with its name
- .. — - Route that can be assigned by controller
- 1800  
12100 - Holding zone with allowed altitudes and NDB

This map has high resolution, in order to view it better - switch magnification to 200 - 300%.

***This map was valid as for October, 1998.***

The total number of the corridors is 11, they are named this way - Corridor 1, 2, 3 ... etc. Even corridors are for arrival routes, odd - for departure. But the last one has no name and number - it is starting from NDB ZAKHAROVKA and goes straight to NDB STARITSA. It is ONE-WAY transit corridor.

The Central part is divided into five pieces - four civil airport's zones, and Moscow town zone. Generally flying in Moscow town zone is forbidden and can be allowed only under special request (except special services).

### III. Moscow Airport's information, radio equipment & navaids

NAME	ID/CALLSIGN	Type	FREQ.	Magnetic HDG	Ref. Point Alt
<b>BYKOVO, Moscow</b>	<b>UUBB</b>				<b>129 m MSL</b>
<b>RW 10/28 - length 2210 m, width 40 m Asphalt</b>				<b>100 / 280</b>	
<b>RW 10/28 (south) - length 2210 m, width 80 m Grass/Mud</b>				<b>100 / 280</b>	
Bykovo ILS RW10	IQI	ILS	110.3	280	
Bykovo ILS RW28	IVJ	ILS	110.7	100	
Bykovo ATIS		COM	124.8		
Bykovo Tower	"Start"	COM	121.2		
Bykovo Approach	"Posadka"	COM	121.2		
Bykovo Ground	"Rulenie"	COM	121.8		
Bykovo Departure	"Transit"	COM	131.7		
Bykovo Control	"Krug-2"	COM	128.7		
DPRM UUBB RW10	QI	NDB	222		
BPRM UUBB RW10	Q	NDB	454		
DPRM UUBB RW28	VJ	NDB	222		
BPRM UUBB RW28	V	NDB	454		

#### NOTAM:

- 1) RW10/28 (south) can be used for emergency landings at the daytime only.
- 2) DPRM RW28 is shifted 81 m to the right from the axis of the runway.
- 3) RW10 Glideslope entry point - alt. 400 m AGL, 6.29 km from rwy threshold
- 4) RW28 Glideslope entry point - alt. 300 m AGL, 4.66 km from rwy threshold
- 5) **TA** (transition alt.) for the airport is 900 m, **PA** (pattern alt.) - 400 m.
- 6) Main RW10/28 - has no centerline lights
- 7) 1.5 km to the south from the main runway the restriction area border begins. Border heading 103 deg, length 10 km, with **restriction to fly at all altitudes**.

NAME	ID/CALLSIGN	Type	FREQ.	Magnetic HDG	Ref. Point Alt
<b>TUSHINO, Moscow</b>	<b>UUUS</b>				<b>128 m MSL</b>
<b>RW 11/29 - length 1300 m, width 60 m Grass/Mud</b>				<b>106 / 286</b>	
<b>RW 15/33 - length 1300 m, width 60 m Grass/Mud</b>				<b>148 / 328</b>	
<b>RW 11/29 (north) - length 1000 m, width 60 m Grass/Mud</b>				<b>106 / 286</b>	
Tushino (military copters)	"Podhod"	COM	124.0		
Tushino Tower	"Posadka"	COM	133.9		

#### NOTAM:

- 1) All RWs has no lights and radio equipment
- 2) Airport is in use generally for light airplanes, VFR at the daytime only
- 3) **TA** for Tushino airport - 600 m, **PA** -300 m

NAME	ID/CALLSIGN	Type	FREQ.	Magnetic HDG	Ref. Point Alt
<b>VNUKOVO, Moscow</b>	<b>UUWW</b>				<b>209 m MSL</b>
<b>RW 02/20 - length 3060 m, width 60 m Asph./Conc.</b>				<b>016 / 196</b>	
<b>RW 06/24 - length 3000 m, width 60 m Asph./Conc.</b>				<b>060 / 240</b>	
ILS RW24	IOB	ILS	111.1	240	
ILS RW06	IGG	ILS	108.9	060	
ILS RW02	IWM	ILS	111.7	016	
ILS RW20	ITQ	ILS	111.5	196	
Vnukovo ATIS (departure)		COM	121.7		
Vnukovo ATIS (arrival)		COM	125.875		
Vnukovo Tower	"Start"	COM	118.3		
Vnukovo Approach	"Posadka"	COM	118.3		
Vnukovo Ground	"Rulenie"	COM	119.0		

Vnukovo Departure	"Transit"	COM	131.8		
Vnukovo Departure	"Transit-2"	COM	131.875		
Vnukovo Control	"Control"	COM	122.875		
DPRM UUWW RW02	VM	NDB	468		
BPRM UUWW RW02	V	NDB	949		
DPRM UUWW RW06	GG	NDB	290		
BPRM UUWW RW06	G	NDB	595		
DPRM UUWW RW20	TQ	NDB	468		
BPRM UUWW RW20	T	NDB	949		
DPRM UUWW RW24	OB	NDB	290		
BPRM UUWW RW24	O	NDB	595		

**NOTAM:**

- 1) **TA** for Vnukovo airport - 1500 m, **PA** - RW06 - 600 m, RW24 - 600 m, RW02 - 600 m, RW20 - 900 m
- 2) All RWs has no centerline lights

NAME	ID/CALLSIGN	Type	FREQ.	Magnetic HDG	Ref. Point Alt
<b>DOMODEDOVO, Moscow</b>	<b>UDD</b>				<b>179 m MSL</b>
<b>RW14L/32R - length 3794 m, width 60 m Concrete</b>				<b>137 / 317</b>	
<b>RW14R/32L - length 3500 m, width 70 m Concrete</b>				<b>137 / 317</b>	
Domodedovo ILS RW32L	IDO	ILS	109.3	317	
Domodedovo ILS RW14R	IDM	ILS	110.1	137	
Domodedovo ILS RW32R	IDE	ILS	111.9	317	
Domodedovo ILS RW14L	IDV	ILS	108.5	137	
Domodedovo ATIS		COM	128.3		
Domodedovo Tower	"Start"	COM	118.6	(RW14R/32L)	
Domodedovo Tower	"Start"	COM	119.7	(RW14L/32R)	
Domodedovo Approach	"Posadka"	COM	118.6	(RW14R/32L)	
Domodedovo Approach	"Posadka"	COM	119.7	(RW14L/32R)	
Domodedovo Taxiing	"Rulenie"	COM	119.0		
Domodedovo Ground	"Transit-1"	COM	131.9		
Domodedovo Ground	"Transit-2"	COM	131.775		
Domodedovo Control	"Krug-2"	COM	128.7		
DPRM UDD RW14R	DM	NDB	659		
BPRM UDD RW14R	M	NDB	320		
DPRM UDD RW32L	DO	NDB	659		
BPRM UDD RW32L	O	NDB	320		
DPRM UDD RW14L	DV	NDB	437		
BPRM UDD RW14L	B	NDB	887		
DPRM UDD RW32R	DE	NDB	437		
BPRM UDD RW32R	E	NDB	887		

**NOTAM:**

- 1) RW14R/32L - has no centerline lights
- 2) For all RWs the first 100 m are not used for takeoff
- 3) **TA** for Domodedovo airport - 1200 m, **PA** - 400 m.
- 4) For all RWs Glideslope entry point - alt. 400 m AGL, 8.3 km from RW threshold

NAME	ID/CALLSIGN	Type	FREQ.	Magnetic HDG	Ref. Point Alt
<b>SHEREMETYEVO, Moscow</b>	<b>UUEE</b>				<b>209 m MSL</b>
<b>RW07R/25L - length 3700 m, width 60 m Concrete</b>				<b>067 / 247</b>	
<b>RW07L/25R - length 3550 m, width 60 m Concrete</b>				<b>067 / 247</b>	
Sheremetyevo ILS RW07R	INL	ILS	109.1	067	
Sheremetyevo ILS RW25L	IBW	ILS	110.5	247	
Sheremetyevo ILS RW07L	IMR	ILS	108.1	067	
Sheremetyevo ILS RW25R	IAD	ILS	111.3	247	
Sheremetyevo ATIS		COM	126.375		
Sheremetyevo Approach	"Posadka"	COM	131.5	(RW 07R/25L)	
Sheremetyevo Approach	"Posadka"	COM	120.7	(RW 07L/25R)	
Sheremetyevo Tower	"Start"	COM	131.5	(RW 07R/25L)	
Sheremetyevo Tower	"Start"	COM	120.7	(RW 07L/25R)	
Sheremetyevo-1 Taxiing	"Rulenie"	COM	119.0		

Sheremetyevo-2 Taxiing	"Rulenie"	COM	121.8		
Sheremetyevo-1 Ground	"Transit"		130.65		
Sheremetyevo-2 Ground	"Transit-1"		130.35		
Sheremetyevo-2 Ground	"Transit-2"		134.55		
Sheremetyevo Control	"Krug"		118.1		
Sheremetyevo Control	"Control"		131.925		
DPRM UUEE RW07L	MR	NDB	700		
BPRM UUEE RW07L	M	NDB	338		
DPRM UUEE RW07R	NL	NDB	380		
BPRM UUEE RW07R	N	NDB	770		
DPRM UUEE RW25L	BW	NDB	380		
BPRM UUEE RW25L	B	NDB	770		
DPRM UUEE RW25R	AD	NDB	700		
BPRM UUEE RW25R	A	NDB	338		

**NOTAM:**

- 1) **TA** - assigned by controller, **PA**: RW07L, 07R - 900 m; RW25L, 25R - 500 m
- 2) **Glideslope entry points**: RW07L - alt 900 m 17 km from RW threshold (14.5 km from VOR/DME); RW07R - alt 900 m 17.89 km from RW threshold (15.5 km from VOR/DME); RW25R - alt 500 m 9.3 km from RW threshold; RW25L - alt 500 m 9.8 km from RW threshold;

- 3) **Special procedures for noise reducing:**

**Takeoff:** After takeoff - gear to UP position, flaps remains configured for takeoff at  $10^0-30^0$ , depending on the type of the plane; climbing to 300 m with maximum climb rate at the safe speed  $V_2 + 20 \div + 40$  km/h (15-25 KIAS) and safe attitude. After 300 m AGL, while flaps remains at takeoff position reduce engines power to nominal and maintain the safe speed  $V_2 + 20 \div + 40$  km/h.

Keep maximum safe climb rate till 900 m. Accelerate to nominal speed for climb, keeping the alt 900 m with engines remained at the nominal power settings. After configuring flaps for normal flight proceed to climb at the most effective climb rate and speed depending on the type of the plane and payload.

**Landing (for 07L& 07R):** To the moment of reaching the distance of  $25 \pm 3$  km from touchdown point (TDP) the plane must be at the altitude 900 m AGL with IAS 390 km/h (210 KIAS). At the distance of 22 km from TDP speed must be reduced to  $340 \pm 20$  km/h (190-170 KIAS), while applying flaps to required position. At the distance 20 km from TDP - flaps configured to  $20^0-30^0$  and gear must be lowered down. After entering glideslope and to the moment of reaching 450 m AGL, speed must be reduced to  $290 \pm 20$  km/h (170 -145 KIAS), depending on the type of the plane and payload factor. To the altitude no lower than 450 m flaps must be totally configured for landing. To the altitude of 350 the plane must be fully stabilized at the final landing speed, pitch and attitude till touchdown.

**Special landing procedures are NOT applicable if:**

- a). The runway is icy, wet, dirty or dusty, oil or rubber on the runway etc.
- b). Visibility is less than 1800 m or measured ceiling is lower than 150 m.
- c). Crosswinds at the runway is stronger than 7 m/sec (13 knots), including gusting and turbulence component.
- d). If there is an information about weather severing in the nearest future - approaching thunderstorms etc.

NAME	ID/CALLSIGN	Type	FREQ.	Magnetic HDG	Ref. Point Alt
<b>RAMENSKOE, Zhukovski</b>	<b>N/A</b>				<b>123 m MSL</b>
<b>"Gromov Aircraft Testing and Research Institute" (military)</b>					
<b>RW12/30 - length 5400 m, width 120 m Concrete</b>				<b>122 / 302</b>	
<b>RW08/26 - length 2948 m, width 80 m Concrete</b>				<b>Not in use</b>	
<b>RW08/26 (south) - length - no info, width 60 m</b>				<b>Not in use</b>	
ILS RW30	IRT	ILS/DME	110.9	302	
Gordy Tower	"Start"	COM	124.0		
Gordy Approach	"Podhod"	COM	128.5		
Gordy Control	"Peleng"	COM	130.0		
Gorbunok Clearance	"Zapusk"	COM	131.0		
Gorbunok Control	No info	COM	125.25	(till 50 km)	
Gorbunok Control	No info	COM	124.25	(more than 50 km)	
DPRM RW12	DM	NDB	285		
BPRM RW12	D	NDB	581		
DPRM RW30	RT	NDB	370		
BPRM RW30	R	NDB	760		

**NOTAM:**

- 1) **TA** for the airport - 1800 m, **PA** - 500 m
- 2) RW12 - glideslope entry point - alt 500 m distance-?, glideslope alt - at the DPRM (OM) 350 m, at the BPRM (IM) 85 m.
- 3) RW30 - glideslope entry point - alt 500 m, 8.4 km from RW threshold

**REM:** At this airport most of Russian military aircrafts are testing. Here was tested the prototype of the Russian space shuttle "Buran" with it's unique ALS - automatic landing system. Now here is applying into life the Russian-USA joint project of the future supersonic airplane with making tests on Russian SST TU-144M, which can fly up to 22 km (72,000 ft) at Mach 2.5.

Rameskoe airport is the place where all Moscow International Aviasalons (MAKS) are held each two years.

#### IV. FAQ

**Q.** - Russian airports have NDB assigned to different ends of the RW but working at the same frequency, how can I use them?

**A.** - It's rather easy. At first - this NDBs are using ONLY to track landing pattern and for approach and NEVER for navigation in general. In the real world such NDB are switching on and off depending on which RW is in use according to the winds. But it is not so complicate to use such NDB WITHOUT switching them off. Typically You are entering pattern from the certain direction using another NDB. Let's take an example - landing to RW28 at Bykovo:

*We are in flight from Sheremetievo. After passing CHELOBITYEVO NDB (680kHz - BP) we are holding heading 115 deg. to MARYNO NDB (493kHz - RW) and descending to 400 m AGL. While passing altitude 900 m. we must adjust our altimeter to airport level pressure. From this moment our altimeter will indicate altitude AGL, referring to airport and we must begin configuring our plane for approach and landing. After passing MARYNO we must switch to DPRM RW28 (222kHz - VJ). Now we are very close to this NDB - only few miles away and ADF is indicating that magnetic vector to this DPRM is about 200 deg (in Russia this vectors are called **MPR** - **Magnetic Peleng** of the **Radiostation**). When MPR becomes 213 we are to begin entering landing pattern - turning base. Turn right to heading 190 and descend to 300 m. When MPR becomes 262 we must turn final. Glideslope entry point is located 4.66 km. from runway's threshold at the altitude 300 m AGL. To the moment of reaching glideslope entry point, it's better to have our plane totally configured for landing, because glideslope path is very short - only 4.6 km At the OM, we are checking altitude - it must be 225 m, at the IM (decision height) - 60 m.*

There can be situations when You cannot switch immediately to NDB you want to. But you must remember when you're tuned up to the freq. which is used by two different stations - MSFS will always point to the station that is CLOSER to you - even for a few meters.

With hope You'll enjoy flying in Russia.  
Feedback welcome: seid\_@hotmail.com  
Vladimir Shilnikov

