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THE BASIC DIRECTIONS OF APPLICATION OF SATELLITE NAVIGATION ON AIRCRAFT OF CIVIL AVIATION

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THE BASIC DOCUMENTS REGULATING USE OF SATELLITE NAVIGATION IN CIVIL AVIATION OF RUSSIA

- 1. The federal law « About navigating activity » from 04.02.2009**
- 2. The radionavigating plan of the Russian Federation. 2008**
- 3. FCP «Creation and development of Aeronavigation system of Russia» (2008 - 2015)**
- 4. FCP «Global navigation system» (2002 – 2011)**
- 5. The decree of the President of Russia from 18.05.2007 « About use of global navigating satellite system GLONASS in interests of social and economic development of the Russian Federation »**
- 6. The governmental order of the Russian Federation from 25.08.2008 №641 « About instrumentation of transport, technical means and systems of satellite navigation GLONASS or GLONASS/GPS »**
- 7. FAP « Preparation and performance of flights in CA of the Russian Federation », approved by the order of Ministry of Transport of Russia from 17.07.2008 №108.**
- 8. Aviation rules AR-23, AR-25, AR-27, AR-29.**



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APPLICATION OF SATELLITE NAVIGATION AT VARIOUS STAGES OF FLIGHT OF CA

Table 1

№	Stages of flight	Application
1	Navigation on a route	<p><u>At flights on:</u></p> <ul style="list-style-type: none">-the internal routes of CA,-the international routes of CA,-routes of RNAV:<ul style="list-style-type: none">a)B-RNAV in European region,b)RNP-10, RNP-5, RNP-4, RNP-1,c)RNAV-1, RNAV-2 according to concept PBN.-the organized tracks in air space MNPS of Northern Atlantic,-routes in districts without orientation (including Arctic regions and Antarctic)
2	Navigation in a zone of air station	<p><u>At flights:</u></p> <ul style="list-style-type: none">-in system of exact zone navigation P-RNAV in the European region under requirements RNP-1,-under standard plans of a start and arrival SID, STAR.



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Continuation of the table 1

№	Stages of flight	Application
3	Non-precision approaches on GNSS	(Samara, Tyumen, Yekaterinburg)
4	Exact landing approach on GNSS	<p style="text-align: center;"><u>Exact landing approach</u></p> <ul style="list-style-type: none">-on I categories ICAO:<ul style="list-style-type: none">a)on signals LCCS-A-2000 (GBAS)b)on signals SBAS-on II category ICAO at the international airports after 2010j.<ul style="list-style-type: none">a)on signals LCCS-A-2000 (GBAS)-on III category ICAO<ul style="list-style-type: none">a)on signals LCCS-A-2000 (GBAS)
5	Special application	TAWS, ADS-B.



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Condition of development and certification of the Russian equipment of satellite navigation GLONASS/GPS

Table 2

No	Name ASN	Appliance type	Developer	Subclass on KT-34-01	Number of the certificate or stage of SDD
1	The onboard receiver of satellite navigation	BPSN-2	«NAVIS»	C1	ADA-034-205- BPSN-2 from 03.08.2006
2	The onboard equipment of satellite navigation	SN-4312	«NAVIS»	A1, B1, C1	ADA-034-230-SN-4312 from 11.12.2007
3	Onboard multipurpose system	BMS-indicator	«VNIIRA-NAVIGATOR»	A1, B1, C1	ADA-034-225-BMS-indicator from 15.08.2007
4	The equipment of reception and transformation of differential data	VDB – receiver	«VNIIRA-NAVIGATOR»	QR-253	ADA-034-226-APDD from 15.08.2007

The note: ADA – appliance design approval



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Continuation of the table 2

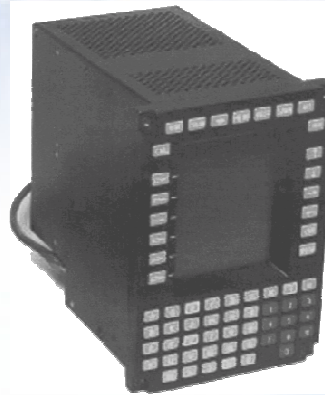
No	Name ASN	Appliance type	Developer	Subclass on KT-34-01	Number of the certificate or stage of SDD
5	The onboard indicator for maintenance differential landings	BMS-indicator with a differential mode	«VNIIRA-NAVIGATOR»	Landing on 1 category ICAO together with APDD	Are spent QT
6	The receiver-indicator for GNSS	PPI-2006	«MDB COMPAS»	A1, B1, C1	Are spent QT
7	Satellite receiver-indicator	TSS	«TRANZAS»	A1, B1, C1	Are spent QT
8	Small-sized satellite receiver-indicator	MPSA-A	«Izhevsk radiofactory»	A1, B1, C1	Are spent PT

The note: QT - qualifying tests
PT - preliminary tests



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The receiver-indicator PPI - 2006



The receiver-indicator BMS



The receiver-indicator SN - 4312



The receiver-indicator TSS



Figure 1. Appearance of perspective Russian-made receiver-indicators GLONASS/GPS

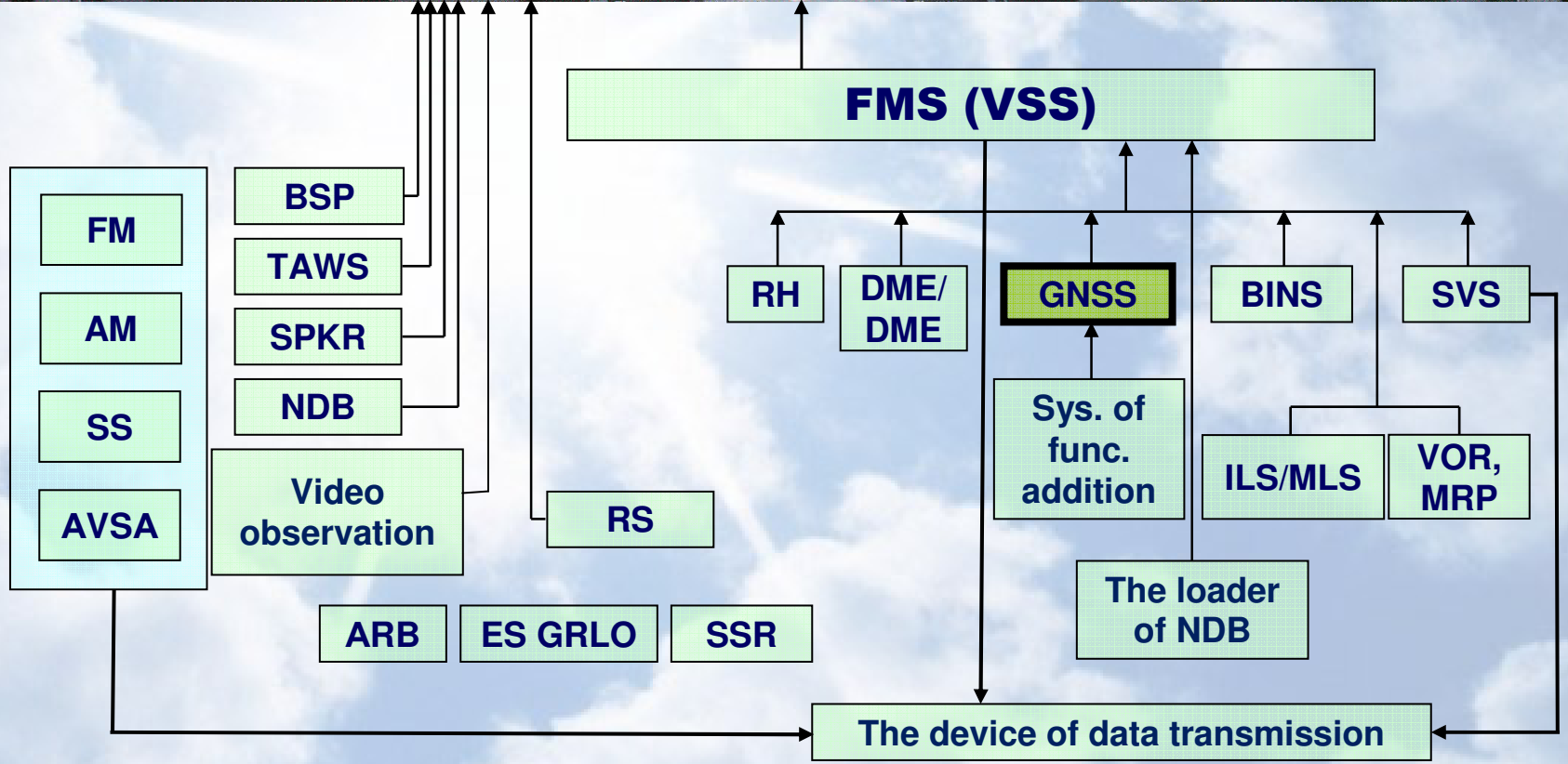


Figure 2. Scheme perspective digital flight-navigating a complex including aviation system of navigation GLONASS/GPS



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Condition of introduction on aircraft of CA the Russian-made equipment of satellite navigation GLONASS/GPS

Table 3

No	Type of aviation system of navigation	Amount of the made complete sets	Amount of the air vessels equipped by aviation systems of navigation	Types of air vessels on which the aviation system of navigation is established
1	«ABRIS»	80	75	An-124, Il-76TD, Mi-8AMT, Mi-8MTB, Mi-26T
2	NSI-2000	16	10	Il-76TD
3	NSI-2000MT	83	18	Be-200, Tu-334, Il-96-300, Il-96-400, Il-76VD
4	SN-3301	170	23	An-3T, An-38, An-140, Mi-8MTV-1
5	BPSN-2	74	16	Ka-226T, Mi-171, RRJ
6	BPSN-2-01	49	15	Tu-214, Tu-204, Il-114-300
7	SNS-2	72	20	Il-96-300, Tu-214, Tu-204, Tu-204-300, Il-114
8	SN-4312	44	8	Tu-154M, Tu-76TD An-74D
9	BMS-indicator	176	117	Tu-154M, Tu-134Б, Il-76ТД, Il-62M, Mi-26T, Mi-8AMT, Mi-8 MTV-1, Mi-8T, Mi-171
10	TSS	1	1	Tu-154M (tests)
SUMM:		765	303	



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Figure 3. Accommodation of aviation system of navigation “BMS-indicator” in a cabin of crew of plane Jak-42D



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Figure 4. Accommodation of two complete sets by aviation system of navigation SN-4312 in a cabin of the navigator of plane Il-76TD



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Figure 5. An example of indication of the navigating information acting from SN-4312 on MFI TDS-56D



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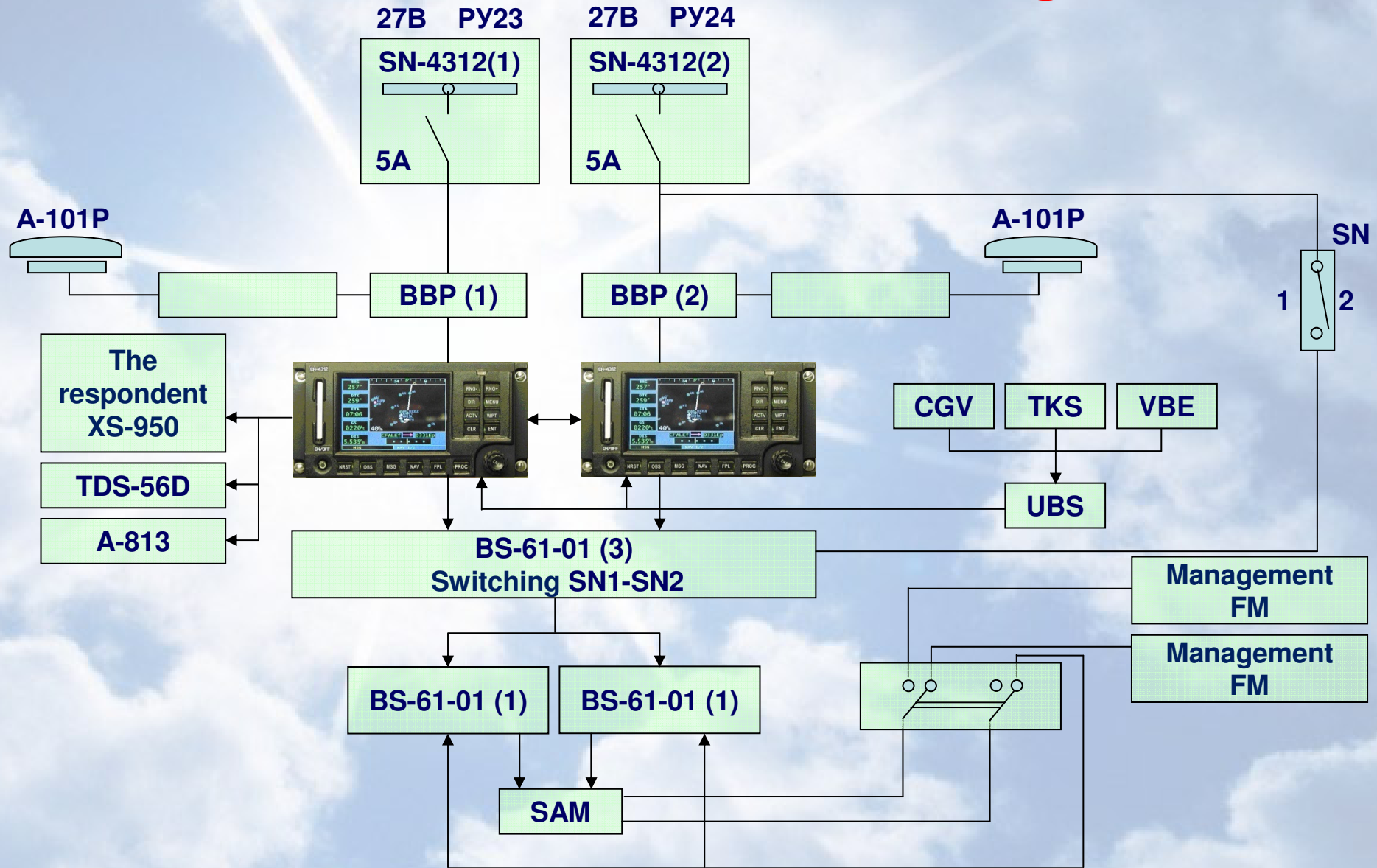


Figure 6. The plan of interaction of aviation system of navigation SN-4312 with the onboard equipment of plane Il-76TD



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Figure 7. Accommodation of two complete sets of aviation system of navigation «BMS-indicator» in a cabin of crew of helicopter Mi-8AmT