AIRBORNE EQUIPMENT
OF SATELLITE NAVIGATION

INTERFACE CONTROL DOCUMENT

Information output and receiving according to ARINC 429

1 Information output by the equipment according to ARINC 429

1.1 The equipment outputs the information to external consumers as serial bipolar code using asynchronous method in accordance with GOST 18977-79, PTM 1495-75 with amendment 3 (ARINC-429).

The equipment has 4 channels of digital information output:

- **channel 0** is designed for output in ACS of «Y -required» signal and output of auxiliary signals with 100 KHz frequency (contacts 29 and 30 of RICU «**X3**»);
- **channel 1** is designed for information output to MFD. Information output frequency is 100 KHz (contacts 33 and 34 of RICU **X3** connector);
- **channel 2** is designed for output of control words for airborne rangefinders with 12,5 KHz frequency (contacts 35 and 36 of RICU **X3** connector);
- **channel 3** is designed for output of navigation information words with 100 KHz frequency (contacts 39 and 40 of RICU **X3** connector);

1.2 Information delivered on the channel 0

List of information delivered on **channel 0** is given in Table 1.1.

Table 1.1

Parameter name	Address (octal)	Table number	Note
Y-required	121_8(BC)	1.28	10 Hz
Flight stage	132_8(DISCR)	1.31	Flight stage, system of coordinates, SNS type, 10 Hz
CH-4312 state	273_8 (DISCR)	1.43	Mode of operation, number of satellites, 10 Hz
Wind speed	315_8(BC)	1.52	10 Hz
Wind angle	316_8(BC)	1.53	10 Hz
Linear turn lead	062_8(BC)	1.11	10 Hz
Remaining distance to WPT along desired track	063_8(BC)	1.12	10 Hz
Header of data record	074(BC)	1.13	*, **
Active leg of the route	075(BDC)	1.14	*
Control sum	113(BC)	1.22	*
Message length	303(BC)	1.46	*
Identifier 1, 2, 3 symbols	304(BC)	1.47	WPT, RB identifier*
Identifier 4, 5, 6 symbols	305(BC)		
NP latitude	306(BC)	1.48	NP coordinates*
NP longitude	307(BC)		
Arc direction	330(BC)	1.55	*, ***
Arc radius	331(BC)	1.56	*, ***
Angle of arc heading alteration	332(BC)	1.57	*, ***

* It is output only if an active route is availabl Output period depends on the length of active route and is determined by the formula

(N+2)·0,1 sec. (1)

where N is WPT number in the rout

Data output is performed in two serial 100 ms intervals in step with data output in MFD on **channel 1** containing information about initial and final WPT of active leg of the rout In the first interval information is output on initial WPT of active leg of the route, in the second interval information is output on final WPT of active leg of the rout.

** It is output only in a sentence containing information on initial WPT;

*** It is output on arc leg having fixed radius.

1.3 Information output via channel 1

The equipment outputs information to MFD via **channel 1**.

The information delivered to MFD, is divided in dynamic and background on

Dynamic information includes all alternating parameters, such as aircraft position, time response of movement, angular parameters of movement etc. All dynamic information is integrated into one unit, dynamic information unit (DIU). The equipment delivers DIU 10 times a second.

DIU composition is given in Table 1.2.

Table 1.2

Parameter	**Address (octal)**	**Table number**
Desired Track angle	114(BC)	1.23
Desired heading	100 (BC)	E.1.16
Azimuth of point	115(BC)	1.24
Horizontal deviation from DT	116(BC)	1.25
Time (UTC)	125(BDC)	1.29
Magnetic declination	147(BC)	1.34
Current Greenwich time	150(BDC)	1.35
Remaining distance to the current WPT	251(BC)	1.40
Flight time to the next WPT	252(BC)	1.41
Date	260(BDC)	1.42
Current latitude	310(BC)	1.49
Current longitude	311(BC)	1.49
Ground speed	312(BC)	1.50
Path angle (true)	313(BC)	1.51
Magnetic heading	320(BC)	1.19
Angle of drift	321(BC)	E.1.16
LCTD scale	326(BC)	1.54
Remaining distance to the destination WPT	351(BC)	1.58
Time-to-go to the destination WPT	352(BC)	1.59

Background information includes the main navigation point specifications of flight plan. All background information is integrated into the background information unit (BIU). In its turn background information unit is divided into a series of sentences, each of which provides the information of a certain navigation point (WPT, RB etc.)

Word list which can be used for BIU sentence forming are given in Table 1.3.

Table 1.3

Parameter	**Address (octal)**	**Table number**	**Note**
Data record header	074(BC)	1.13	
Active leg of the route	075(BDC)	1.14	
Check sum	113(BC)	1.22	
Identifier 7, 8, 9 symbols	301(BC)	1.44	WP, RB identifier
Identifier 10, 11, 12 symbols	302(BC)		
Message length	303(BC)	1.46	
Identifier 1, 2, 3 symbols	304(BC)	1.47	WP, RB identifier
Identifier 4, 5, 6 symbols	305(BC)		
NP latitude	306(BC)	1.48	NP position
NP longitude	307(BC)		
Arc direction	330(BC)	1.55	
Arc radius	331(BC)	1.56	
Arc track change angle	332(BC)	1.57	

Words with addresses 074 and 075 shall be the first in BIU sentence, and the word with address 113 should be the last on

The equipment outputs DIU and one BIU sentence in each information output cycl

The sentences should be transmitted as follows:

- sentences describing WPTs from the first to the last one;

- sentences describing navigation references.

Cyclogram of dynamic and background information output is shown in Figure 1.1.

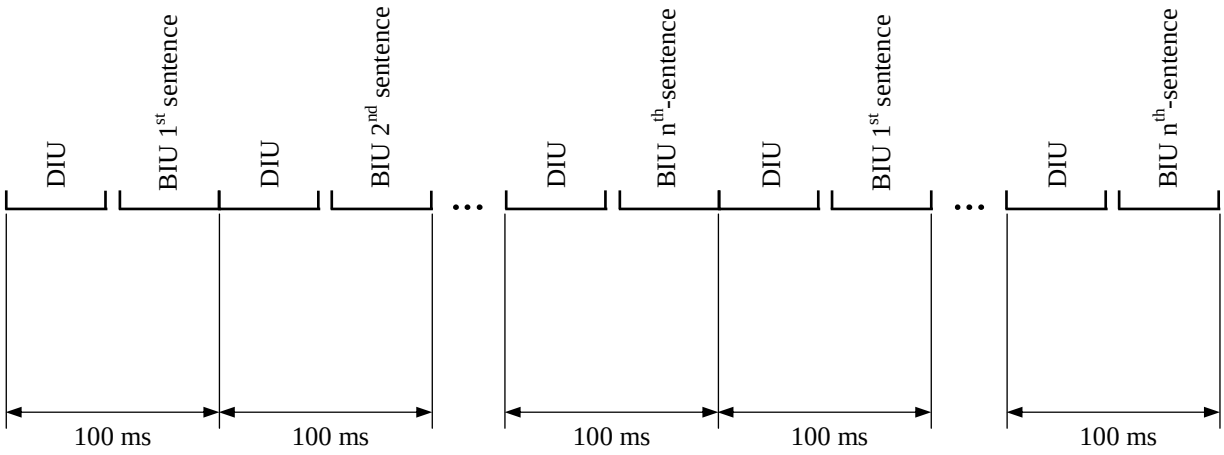

Figure 1.1

Routing line on MFD display is defined by the sequence of BIU output sentences. Its contouring is performed from the first WPT (BIU first sentence) to the last (BIU last sentence). Active leg of the route is marked with color. The airplane position is contoured in accordance with aircraft current position from the dynamic information unit.

Example of BIU data transfer

Example of BIU data transfer for active flight plan containing 29 WPTs, five nearest radio beacons and three nearest airports. The transfer of each sentence occurs at 0,1 s interval.

Sentence 1 (T = 0,0 c, WPT 1)

Address 74: Data record header

Address 75: Active leg of the route

Address 303: Message length

Address 304: Symbols 1 - 3

Address 305: Symbols 4 - 6

Address 306: NP latitude

Address 307: NP longitude

Address 113: Check sum

Sentence 2 (T = 0,1 s, WPT 2)

Address 74: Data record header

Address 75: Active route leg

Address 303: Message length

Address 304: Symbols 1 - 3

Address 305: Symbols 4 - 6

Address 306: NP latitude

Address 307: NP longitude

Address 113: Check sum

3-29 sentence transfer occurs similarly.

Sentence 30 (T = 2,9 s, RB 1)

Address 74: Data record header

Address 75: Active route leg

Address 303: Message length

Address 304: Symbols 1 - 3

Address 305: Symbols 4 - 6

Address 306: NP latitude

Address 307: NP longitude

Address 113: Check sum

31-34 sentence transfer occurs similarly.

Sentence 35 (T = 3,4 s, Airport 1)

Address 74: Data record header

Address 75: Active route leg

Address 303: Message length

Address 304: Symbols 1 - 3

Address 305: Symbols 4 - 6

Address 306: NP latitude

Address 307: NP longitude

Address 113: Check sum

36, 37 sentence transfer occurs similarly.

1.4 Information output via channel 2

The equipment outputs a command word 10 times per second via **channel 2** for DME beacon adjusting (word address 035_8), a command word for "Course-93M" navigation and landing system (word address 034_8), and "Required azimuth" word (word address 024_8).

024_8 word structure is given in Table 1.8.

034_8 word structure is given in Table 1.9.

035_8 word structure is given in Table 1.10.

1.5 Information output via channel 3

The equipment outputs information via **channel 3** 10 times per second. The list of information delivered via **channel 3** is given in the table 1.4.

Table 1.4

Parameter	Word address	Table number
Current latitude (precisely)	120_8	1.26
Current longitude (precisely)	121_8	1.27
Integrity alarm threshold	130_8	1.30
Vertical Figure of Merit (VFOM)	136_8	1.32
Current time UTC (precisely)	140_8	1.33
Current Greenwich time	150_8	1.35
Vertical speed	165_8	1.36
Ground speed component N/S value	166_8	1.37
Ground speed component E/W value	174_8	1.38
Horizontal Figure of Merit (HFOM)	247_8	1.39
Remaining distance to the current WPT	251_8	1.40
Time to go to the next WPT	252_8	1.41
Date	260_8	1.42
Magnetic track angle	317_8	1.19
Magnetic heading	320_8	1.19
Angle of drift	321_8	1.16
Deviation from DT in horizontal plane	116_8	1.25
Desired heading	100_8	1.16
Desired track angle	114_8	1.23
Desired magnetic track angle	057_8	1.23
Altitude over geoid	076_8	1.15
HDOP	101_8	1.17
VDOP	102_8	1.18
True path angle	103_8	1.19
Current latitude	110_8	1.20
Current longitude	111_8	1.20
Ground speed	112_8	1.21

Navigation information which is output via channels **0**, **1** and **3** during one 100 millisecond period, valid at the time specified by 260_8, 150_8, 140_8. The start of navigation data package

(navigation data package means words output in one 100 millisecond cycle) in **channel 3** is 076_8 word. All words from 076_8 to 100_8 meet the time indicated in 150_8 and 140_8 words sent in this package

1.6 Word structure output by the equipment according to ARINC 429

State matrix of words output and received by the equipment according to ARINC 429 are given in tables 1.5, 1.6, 1.7. Word structure output by the equipment according to ARINC 429 is given in tables 1.8 - 1.59.

Identifier in output words (digits 9, 10):

- #1 – means operation from the 1st RICU;

- #2 - means operation from the 2nd RICU.

Table 1.5 **–** State matrix (BC)

Bit		Value
31	30	
0	0	Failure warning
0	1	No calculated data
1	0	Functional test
1	1	Normal operation

Table 1.6 - State matrix (BDC)

Bit		Value
31	30	
0	0	Plus, North, East, right, to, above
0	1	No calculated data
1	0	Functional test
1	1	Minus, south, west, left, from, under

Table 1.7 – State matrix (Discr.)

Bit		Value
31	30	
0	0	Normal operation
0	1	No calculated data
1	0	Functional test
1	1	Not used

Table 1.8 – “Desired track angle” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 024_8	00 010 100
9 - 10	Source identifier	00 – all sets 10 – set #1

		01 – set #2 11 – set #3
11 - 18	Reserved	Zero
19 - 22	Ones of degrees	Desired track angle
23 - 26	Tens of degrees	
27 - 29	Hundreds of degrees	
30 - 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.9 - "Tuning frequency of navigation and landing system (command word)" word structure

Bit No.	Information content	Bit coding
1 - 8	Address 034_8	00 011 100
9 - 10	Source identifier	00 – all sets 10 – set #1 01 – set #2 11 – set #3
11	Operability of AFD	1 – AFD failure 0 – AFD operability
12	Reserved	Zero
13 - 14	Mode of operation	00 - VOR 01 – ILS 11 – CII-50
15 - 18	Hundredths of MHz	
19 - 22	Tenths of MHz	
23 - 26	Ones of MHz	
27 - 29	Tens of MHz	
30 - 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number
Note – *All frequencies have "1" in hundreds of MHz values.*		

Table 1.10 – “Tuning frequency of DME beacon (command word)” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 035_8	00 011 101
9 - 28	Identifier	00 - all 01 - #1 10 - #2 11 – not used
13 - 11	Operating mode	Bits 13, 12, 11 000 – not used 001 – frequency #1 010 – frequency #2 011 – frequency #3 100 – frequency #4 101 – frequency #5 110 – free scanning 111 – not used
15, 14	Coding of tuning frequency pairing	00 – paired with VOR 01 – paired with ILS 10 – paired with MLS 11 – not used
16	201_8 word output	1
17	Identification signal character	1
18	0.05 MHz	1 – 0.05 MHz 0 – 0.00 MHz
19 20 21 22	Tenths of MHz	0.1 MHz 0.2 MHz 0.4 MHz 0.8 MHz
23 24 25 26	Ones of MHz	1 MHz 2 MHz 4 MHz 8 MHz
27 28 29	Tens of MHz	10 MHz 20 MHz 40 MHz
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.11 – “Linear turn lead” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 062_8,	01 110 010
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range: ± 128 NM m.s. bit = 64 NM. Negative values are transmitted in additional code
29	Sign	0
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.12 – “Remaining distance to WPT along DT” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 063_8	00 110 011
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range: 4096 NM, m.s. bit 28 = 2048 NM
29	Sign	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.13 – “Data record header” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 074_8	00 111 100
9 - 15	Total number of records	Max. 127
16 - 20	Reserved	Zero
21	Updating of background information unit	1 - yes 0 - no
22 - 29	Reserved	Zero
30, 31	Status matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.14 – “Active route leg” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 075_8	00 111 101
9	Mode	1 – manual 0 – automatic (always 0)
10	Fly-over with preset angle	1 – true 0 – magnetic (always 1)
11	Reserved	Zero
12	Coordinates	1 – azimuth/distance 0 – longitude/latitude (always 0)
13 - 16	Most Significant part is of WPT number to which aircraft flies.	Tens
17 - 20	Most Significant part is of WPT number from which aircraft flies.	Tens
21 - 24	Least Significant part is of WPT number to which aircraft flies.	Ones
25 - 28	Least Significant part is of WPT number from which aircraft flies.	Ones
29	Reserved	Zero
30, 31	State matrix	In accordance with Table 1.6
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.15 – “Height above geoid” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 076_8	00 111 110
9 - 28	Significant part is 20 bits	Range: 131072 feet, m.s. bit 28 = 65536 feet Negative values are transmitted in additional code
29	Sign	1 – negative value of altitude 0 – positive value of altitude
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.16 – “Desired heading”, “Drift angle” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 100_8 321_8	01 000 000 11 010 001
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 16	Reserved	Zero
17 - 28	Significant part is, 12 bits	Range: 180°, m.s. bit 28 = 90° Negative values are transmitted in additional code
29	Sign	0 – from 0° to 180° 1 – from 180° to 360°
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.17 – “HDOP” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 113_8	01 001 011
9 - 29	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range: 1024 m.s. bit 28 = 512
29	Reserved	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.18 – “VDOP” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 102_8	01 000 010
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range: 1024 m.s. bit 28 = 512
29	Reserved	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.19 – “True track angle”, “Magnetic track angle”, “Magnetic heading” word structure

Bit No	Information content	Bit coding
1 - 8	Address 103_8 317_8 320_8	01 000 011 11 001 111 11 010 000
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range: 180° m.s. bit 28 = 90°. Negative values are transmitted in additional code
29	Sign	0 - from 0° to 180° 1 - from 180° to 360°
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.20 – “Current latitude”, “Current longitude” word structure

Bit No	Information content	Bit coding
1 - 8	Address 110_8 111_8	01 001 000 01 001 001
9 - 28	Significant part is 20 bits	Range: ±180°, m.s. bit 28 = 90°. Negative values are transmitted in additional code
29	Sign	1 – South, West 0 – North, East
30, 31	State matrix	In accordance with 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.21 – “Ground speed” word structure

Bit No	Information content	Bit coding
1 - 8	Address 112_8	01 001 010
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range: 4096 knots, m.s. bit. 28 = 2048 knots
29	Reserved	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.22 – “Check sum” word structure

Bit No	Information content	Bit coding
1 - 8	Address 113_8	01 001 011
9 - 29	Significant part is 21 bits	
30, 31	State matrix	In accordance with Table 1.5
32	Четность	0 – if sum of ones is odd number 1 – if sum of ones is even number

Check sum

A check sum of transmitted messages is sent in word 113_8. Check sum is calculated by summing words of message (bits from 9 to 29), beginning from word 303_8 «Message length» and finishing by word 113_8 «check sum», excluding word 113_8. Math check sum calculation of message may be expressed by the following formula:

$$SUM = \text{Mod } 2^{21} \sum_{i=1}^{n} \text{Word}(i), \qquad (2)$$

where n is a number of words in the sentenc

If SUM==-2097152 SUM

Else -SUM

Notes

1 Summing is algebraic binary addition of words, indicated by i index.

2 2^{21} module indicates that 21 less significant bits only participate in algebraic binary addition. This means that bit carry to the 21^{st} bit is ignored.

3 Check sum shall be calculated as a supplement-on--two of the 21-bit word of the binary sum received (-SUM), except special case when SUM = –2097152, being this check sum.

Table 1.23 – “Desired track angle”, “Desired magnetic track angle” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 114_8 057_8	01 001 100 00 101 111
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 16	Reserved	Zero
17 - 28	Significant part is 12 bits	Range: ±180° m.s. bit 28 = 90°. Negative values are transmitted in additional code
29	Sign	0 - from 0° to 180° 1 - from 180° to 360°
30, 31	Status matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.24 – “Azimuth to WPT” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 115_8	01 001 101
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 16	Reserved	Zero
17 - 28	Significant part is - 12 bits	Range: ±180° m.s. bit 28 = 90°. Negative values are transmitted in additional code
29	Sign	0 - from 0° to 180° 1 - from 180° to 360°
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.25 – “Deviation from DT in horizontal plane” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 116_8	01 001 110
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Flight stage	000 – en route 001 – terminal area 010 - approach
14 - 28	Significant part is 15 bits	Range: ±128 NM m.s. bit = 64 NM. Negative values are transmitted in additional code
29	Sign	1 - left° 0 - right
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.26 – “Current latitude (precisely)” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 120_8	01 010 000
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 17	Reserved	Zero
18 - 28	Significant part is - (less significant bits)	Range $\pm 17{,}2 \cdot E^{-5}$°, m.s. bit 28 = $8{,}6 \cdot E^{-5}$°. Negative values are transmitted in additional code
29	Sign	1 - South, 0 - North
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.27 – “Current longitude (precisely)” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 121_8	01 010 001
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 17	Reserved	Zero
18 - 28	Longitude value (less significant bits)	Range $\pm 17{,}2 \cdot E^{-5}$°, m.s. bit 28 = $8{,}6 \cdot E^{-5}$°. Negative values are transmitted in additional code
29	Sign	1 – West, 0 - East
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.28 – “Y – required” word structure

Bit No.	Information content	Bit coding
1-8	Address 121_8	01 010 001
9,10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11-14	Reserved	Zero
15-28	Significant part is 14 bits	Range: ±180°, m.s. bit 28 = 90°. Negative values are transmitted in additional code
29	Sign	1 – left, 0 – right
30-31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.29 – “UTC” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 125_8	01 010 101
9, 10	Identifier	00 – all 01 - #1 10 - #2 11 – not used
11 12 13 14	Tenths of minutes	0,1 min 0,2 min 0,4 min 0,8 min
15 16 17 18	Ones of minutes	1,0 min 2,0 min 4,0 min 8,0 min
19 20 21 22	Tens of minutes	10 min 20 min 40 min 80 min
23 24 25 26	Ones of hours	1,0 hr 2,0 hrs 4,0 hrs 8,0 hrs
27 28	Tens of hours	10,0 hrs 20,0 hrs
29	Reserved	Zero
30, 31	Status matrix	In accordance with Table 1.6
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.30 – “Integrity alarm threshold” word structure

Bit No.	Information ciontent	Bit coding
1 - 8	Address 130_8	01 011 000
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11	RAIM detected an unhealthy satellite	1 - yes, 0 - no
12 - 28	Significant part is 17 bits	Range: 16 NM, m.s. bit 28 = 8 NM
29	Reserved	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.31 – “Flight stage” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 132_8	01 011 010
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11	Integrity alarm threshold is set manually	0 – no 1 – yes
12-14	Flight stage	100 – en route 010 – terminal area 110 - approach
15, 16	Coordinate system	10 – WGS-84 01 – EP-90 11 – CS-42
17	Integrity alarm threshold set manually exceeds integrity alarm threshold of flight stage	0 – no 1 - yes
18 - 20	SNS type	000 – GLONASS+GPS 100 – GLONASS 010 - GPS
21 - 24	GPS satellite number used in calculations	
25 - 28	GLONASS satellite number used in calculations	
29	Reserved	
30, 31	Status matrix	In accordance with Table 1.7
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number
Note – By default the following is set: - En route flight stage; - WGS-84 coordinate system; - GLONASS+GPS SNS type		

Table 1.32 – “Vertical figure of merit (VFOM)” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 136_8	01 011 110
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 28	Significant part is 18 bits	Range: 32768 feet m.s. bit 28 = 16384 feet
29	Reserved	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.33 – “Current UTC (precisely)” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 140_8	01 100 000
9 - 28	Significant part is 20 bits	Range: 1s m.s. bit 28 = 0.5s.
29	Reserved	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.34 – “Magnetic declination” word structure

Bit No.	Function	Bit status
1 - 8	Address 147_8	01 100 111
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 16	Reserved	Zero
17 - 28	Significant part is 12 bits	Range: ±180°, m.s. bit 28 = 90° Negative values are transmitted in additional code
29	Sign	0 – from 0° to 180° 1 – from 180° to 360°
30, 31	Status matrix	In accordance with Table 1.6
32	Parity	0 – if sum of “1” is odd number 1 – if sum of “1” is even number

Table 1.35 – “Current Greenwich time” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 150_8	01 101 000
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11	Reserved	Zero
12 - 17	Seconds, Significant part is 6 bits	Range: 60 s, m.s. bit 17 = 30 s
18 - 23	Minutes, Significant part is 6 bits	Range: 60 min., m.s. bit 23 = 30 min.
24 - 28	Hours, Significant part is 5 bits	Range: 24 hours, m.s. bit 28 = 12 hours
29	Reserved	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.36 – “Vertical speed” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 165_8	01 110 101
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range: ±32768 feet/min., m.s. bit 28 = 16384 feet/min. Negative values are transmitted by additional code
29	Sign	0 - up 1 - down
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.37 – “Ground speed component, N/S value” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 166_8	01 110 110
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range ±4096 knots, m.s. bit 28 = 2048 knots. Negative values are transmitted in additional code
29	Sign	0 - North 1 - South
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.38 – “Ground speed component, E/W value” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 174_8	01 111 100
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range: ±4096 knots, m.s. bit 28 = 2048 knots Negative values are transmitted in addition code
29	Sign	0 – East 1 - West
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.39 – “Horizontal figure of merit (HFOM)” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 247_8	10 100 111
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 28	Significant part is 18 bits	Range 4096 NM sen. bit 28 = 2048 NM.
29	Sign	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.40 – “Distance remaining to the next WPT» word structure

Bit No.	Information content	Bit coding
1 - 8	Address 251_8	10 101 001
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range: 4096 NM, m.s. bit 28 = 2048 NM
29	Sign	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.41 – “Flight time to the next WPT”

Bit No.	Information content	Bit coding
1 - 8	Address 252_8	10 101 010
9, 10	Идентификатор	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range: 512 min., m.s. bit 28 = 256 min.
29	Sign	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Четность	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.42 – “Date” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 260_8	10 110 000
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 12 13 14	Ones of years	1 year 2 years 4 years 8 years
15 16 17 18	Tens of years	10 years 20 years 40 years 80 years
19 20 21 22	Ones of months	1 month 2 months 4 months 8 months
23	Tens of months	10 months
24 25 26 27	Ones of days	1 day 2 days 4 days 8 days
28 29	Tens of days	10 days 20 days
30, 31	State matrix	In accordance with Table 1.6
32	Parity	0 – if sum of “1” is odd number 1 – if sum of “1” is even number

Table 1.43 – “CHP-4312 status” word structure

<table>
<tr><th>Bit No</th><th>Information content</th><th colspan="8">Bit coding</th></tr>
<tr><td>1-8</td><td>Address 273_8</td><td colspan="8">10 111 011</td></tr>
<tr><td>9-10</td><td>Identifier</td><td colspan="8">00 - all
01 - #1
10 - #2
11 – not used</td></tr>
<tr><td>11</td><td>Number of visible NSV
(most significant bit)</td><td colspan="8">1 > 15,
0 ≤ 15</td></tr>
<tr><td>12, 13</td><td>Reserved</td><td colspan="8">Zero</td></tr>
<tr><td>14, 15</td><td>Operating modes (see below)</td><td colspan="8"></td></tr>
<tr><td>16-19</td><td>Number of visible NSV</td><td colspan="8">l.s. bit 16</td></tr>
<tr><td>20-23</td><td>Number of used NSV</td><td colspan="8">l.s. bit. 20</td></tr>
<tr><td rowspan="9">24-28</td><td rowspan="2">Operating mode</td><td colspan="7">Bit state</td></tr>
<tr><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>15</td><td>14</td></tr>
<tr><td>Self-controlling</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Search</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>SNS navigation</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>SBAS navigation</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>CBC navigation</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>DME/DME navigation</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>VOR/DME navigation</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>29</td><td>Number of used NSV (most significant bit)</td><td colspan="8">1 > 15,
0 ≤ 15</td></tr>
<tr><td>30 - 31</td><td>State matrix</td><td colspan="8">In accordance with Table 1.7</td></tr>
<tr><td>32</td><td>Parity</td><td colspan="8">0 – if sum of “1” is odd number
1 – if sum of “1” is even number</td></tr>
</table>

Table 1.44 – “Symbol 7, 8, 9 identifier”, “Symbol 10, 11, 12 identifier” word structure

Bit No	Information content	Bit coding
1 - 8	Address 301_8 302_8	11 000 001 11 000 010
9 - 15	7, 10 symbol	-
16 - 22	8, 11 symbol	-
23 - 29	9, 12 symbol	-
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of “1” is odd number 1 – if sum of “1” is even number

Letter coding of WPT, RB identifier is given in Table 1.45.

Table 1.45

Symbol number in identifier	**Bit No. of output word**							**Symbol number in identifier**	**Bit No. of output word**						
1, 4, 7, 10	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**1, 4, 7, 10**	**15**	**14**	**13**	**12**	**11**	**10**	**9**
2, 5, 8, 11	**22**	**21**	**20**	**19**	**18**	**17**	**16**	**2, 5, 8, 11**	**22**	**21**	**20**	**19**	**18**	**17**	**16**
3, 6, 9, 12	**29**	**28**	**27**	**26**	**25**	**24**	**23**	**3, 6, 9, 12**	**29**	**28**	**27**	**26**	**25**	**24**	**23**
A	1	0	0	0	0	0	1	T	1	0	1	0	1	0	0
B	1	0	0	0	0	1	0	U	1	0	1	0	1	0	1
C	1	0	0	0	0	1	1	V	1	0	1	0	1	1	0
D	1	0	0	0	1	0	0	W	1	0	1	0	1	1	1
E	1	0	0	0	1	0	1	X	1	0	1	1	0	0	0
F	1	0	0	0	1	1	0	Y	1	0	1	1	0	0	1
G	1	0	0	0	1	1	1	Z	1	0	1	1	0	1	0
H	1	0	0	1	0	0	0	,	0	1	0	1	1	0	0
I	1	0	0	1	0	0	1	.	0	1	0	1	1	1	0
J	1	0	0	1	0	1	0	space	0	0	0	0	0	0	0
K	1	0	0	1	0	1	1	0	0	1	1	0	0	0	0
L	1	0	0	1	1	0	0	1	0	1	1	0	0	0	1
M	1	0	0	1	1	0	1	2	0	1	1	0	0	1	0
N	1	0	0	1	1	1	0	3	0	1	1	0	0	1	1
O	1	0	0	1	1	1	1	4	0	1	1	0	1	0	0
P	1	0	1	0	0	0	0	5	0	1	1	0	1	0	1
Q	1	0	1	0	0	0	1	6	0	1	1	0	1	1	0
R	1	0	1	0	0	1	0	7	0	1	1	0	1	1	1
S	1	0	1	0	0	1	1	8	0	1	1	1	0	0	0
								9	0	1	1	1	0	0	1

Table 1.46 – “Message length” word structure

Bit No.	Information content	Bit coding			
1 - 8	Address 303_8	11 000 011			
9 - 12	Number of words in message	Max. 15			
13 - 15	Point type	Bit			Meaning
		15	14	13	
		0	0	0	User WPT
		0	0	1	Not used
		0	1	0	Airport
		0	1	1	NDB Beacon
		1	0	0	Not used
		1	0	1	Do not draw any symbol
		1	1	0	VOR
		1	1	1	Intersection
16	Belonging to the route	1 – en route 0 – not en route			
17 - 23	Point number	Max. 127			
24	FMS mode	1 - selected 0 – not selected (always 0)			
25	Point in route center	1 – in center 0 – not in center (always 0)			
26	Space	1 - set 0 – not set			
27	Graphics	1 - graphical 0 – not graphical			
28 - 29	Reserved	Zero			
30, 31	State matrix	In accordance with Table 1.5			
32	Parity	0 – if sum of “1” is odd number 1 – if sum of “1” is even number			
Note – *In the case when the arc should be depicted, whose original coordinates do not coincide with those of the last depicted point bit 26 shall be set in «1» for the time of this point representation and after that it shall be returned in «0» state at the arc original coordinate assignment.*					

Table 1.47 – “Symbols 1, 2, 3 identifier”, “Symbols 4, 5, 6 identifier” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 304_8 305_8	11 000 100 11 000 101
9 - 15	Symbol 1, 4	-
16 - 22	Symbol 2, 5	-
23 - 29	Symbol 3, 6	-
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of “1” is odd number 1 – if sum of “1” is even number

Table 1.48 – “Navigation point latitude”, “Navigation point longitude” word structure

Bit No.	Information content	Bit coding
1 – 8	Address 306_8 307_8	11 000 110 11 000 111
9 - 28	Significant part is 10 bits	Range: ±180º, m.s. bit 28 = 90º. Negative values are transmitted in additional code
29	Sign	1 - South, West, 0 - North, East
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of “1” is odd number 1 – if sum of “1” is even number

Table 1.49– “Current latitude”, “Current longitude” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 310_8 311_8	11 001 000 11 001 001
9 - 28	Significant part is 20 bits	Range: ±180º, m.s. bit 28 = 90º. Negative values are transmitted in additional code
29	Sign	0 - North, East, 1 - South, West
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.50 – “Ground speed” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 312_8	11 001 010
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range: 4096 knots, m.s. bit 28 = 2048 knots
29	Sign	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.51 – “Path angle (true)” word structure

Bit No.	Information content	Bit coding
1 – 8	Address 313_8	11 001 011
9 – 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 – 16	Reserved	Zero
17 - 28	Significant part is 12 bits	Range: ±180° m.s. bit 28 = 90°. Negative values are transmitted in additional code
29	Sign	0 - from 0° to 180° 1 - from 180° to 360°
30,31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.52 – “Wind speed” word structure

Bit No.	Information content	Bit coding
1 - 8	Адрес 315_8	11 001 101
9, 10	Идентификатор	00 - all 01 - #1 10 - #2 11 – not used
11 - 20	Reserved	Zero
21 - 28	Significant part is 8 bits	Range: 256 knots, m.s. bit 28 = 128 knots
29	Sign	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.53 – “Wind angle” word structure

Bit No.	Information content	Bit coding
1 – 8	Address 316_8	11 001 110
9 – 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 – 16	Reserved	Zero
17 - 28	Significant part is 12 bits	Range: ±180° m.s. bit 28 = 90°. Negative values are transmitted in additional code
29	Sign	0 - from 0° to 180° 1 - from 180° to 360°
30,31	Матрица состояния	In accordance with Table 1.5
32	Четность	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.54 – “LCTD scale range” word structure

Bit No.	Information content	Bit coding
1 – 8	Address 326_8	11 010 110
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11-13	Reserved	Zero
14- 28	Significant part is 15 bits	Range: 128 NM, m.s. bit 28 = 64 NM
29	Sign	Zero
30,31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.55 – “Arc direction” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 330_8	11 011 000
9, 10	Reserved	Zero
11	Arc direction	0 - clockwise 1 - counterclockwise
12, 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range ±180° m.s. bit 28 = 90°. Negative values are transmitted in additional code
29	Sign	0 - from 0° to 180° 1 - from 180° to 360°
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.56 – “Arc radius” word structure

Bit No.	Information content	Bit coding
1 – 8	Address 331_8	11 011 001
9 - 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range: 256 NM, m.s. bit 28 = 128 NM
29	Reserved	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.57 – “Angle of arc course change” word structure

Bit No.	Information content	Bit coding
1 – 8	Address 332_8	11 011 010
9 – 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range: ±180° m.s. bit 28 = 90°. Negative values are transmitted in additional code
29	Sign	0 - from 0° to 180° 1 - from 180° to 360°
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.58 – “Remaining distance to destination WPT» word structure

Bit No.	Information content	Bit coding
1 – 8	Address 351_8	11 101 001
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11- 28	Significant part is 18 bits	Range: 32768 NM, m.s. bit 28 = 16384 NM.
29	Sign	Zero
30,31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 1.59 – “Time to go to destination WPT” word structure

Bit No.	Information content	Bit coding
1 – 8	Address 352_8	11 101 010
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11-16	Reserved	Zero
17- 28	Significant part is 12 bits	Range: 4096 min, m.s. bit 2048 min
29	Sign	Zero
30,31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

2 Information received by the equipment according to ARINC 429

Words received by the equipment according to ARINC 429 are given in Table 2.1.

Word structure received by the equipment according to ARINC 429 is given in Tables 2.2-2.11. State matrices of words putting out and received by the equipment are given in Tables 1.5 - 1.7.

Table 2.1

Parameter	Word address	Putting out data device	Table number
Beacon adjustment frequency (affirmative character)	035_8	Rangefinder	2.2
Distance to beacon	202_8	Rangefinder	2.3
Barometric altitude (H_{abs})	203_8	AVPS	2.4
True airspeed (V_{true})	210_8	AVPS	2.5
Heading reception status word	270_8	Heading sensors	2.6
Gyromagnetic heading / gyro-semicompass heading	320_8	Heading sensors	2.7
Navigation and landing system adjustment frequency (affirmative character)	034_8	Navigation and landing system	2.8
Magnetic azimuth	222_8	Navigation and landing system	2.9
Mach number	205_8	AVPS	2.10
Outside air temperature (T_{oa})	213_8	AVPS	2.11

Table 2.2 – “Beacon adjustment frequency (affirmative character)” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 035_8	00 011 101
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Operating mode	Bits 13, 12, 11 000 – not used 001 – frequency #1 010 - frequency #2 011 - frequency #3 100 - frequency #4 101 - frequency #5 110 – free scanning 111 – not used
14, 15	Coding of adjustment frequency pairing	00 - paired with VOR
16	201_8 word output	1 – word is output, 0 – not available
17	Identification signal character	1
18	0,05 MHz	«1» - 0,05 MHz «0» - 0,00 MHz
19 20 21 22	Tenths of MHz	0,1 MHz 0,2 MHz 0,4 MHz 0,8 MHz
23 24 25 26	Ones of MHz	1 MHz 2 MHz 4 MHz 8 MHz
27 28 29	Tens of MHz	10 MHz 20 MHz 40 MHz
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number
Note – *“Normal operation” character in state matrix is a termination character of the beacon adjustment.*		

Table 2.3 – “Beacon distance” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 202_8	10 000 010
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11	Memory mode	1 - on 0 - off
12	Beacon in near-field region	1 – beacon is available, 0 - beacon is not available
13-28	Significant part is 14 bits	Range: 512 NM, m.s. bit=256 NM
29	Sign	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of “1” is odd number 1 – if sum of “1” is even number
Note – *“Normal operation” character in state matrix is a validity character of measured distanc*		

Table 2.4 – “Barometric altitude (H_{abs})” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 203_8	10 000 011
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11	Reserved	Zero
12-28	Significant part is 17 bits	Range: 131072 feet, m.s. bit = 65536 feet Negative values are transmitted by additional code
29	Sign	0 – positive altitude, 1 – negative altitude
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 2.5 - ”True airspeed (V_{true})” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 210_8	10 001 000
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Reserved	Zero
14 - 28	Significant part is 15 bits	Range: 2048 knots, m.s. bit 28=1024 knots
29	Sign	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 2.6 – “Heading reception state” word structure

Bit No.	Information content	Bit coding
1 - 8	Address 270_8	10 111 000
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11	Alignment/Operation mode	1 - alignment 0 - operation
12	Reserved	Zero
13	Normal/Basic mode*	1 - normal 0 - basic
14	GMH/GSMH mode**	1 – gyro-magnetic heading 0 - gyro-semicompass heading
15	Spatial position (vertical)	1 - failure 0 – normal operation
16	Autopilot heading locking	1 - failure 0 – normal operation
17	Reserved	Zero
18	True airspeed	1 - failure 0 – normal operation
19	Altitude heading reference unit (AHRU)	1 - failure 0 – normal operation
20 - 29	Reserved	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

*Normal operation is the mode when attitude-and-heading reference system uses true airspeed data and barometric altitude data from AVPS system.
Basic mode is the mode when data from AVPS are not available or invalid for some reason.
Transition from one mode to another and vice versa is performed automatically.
Bit 13 at the test control is equal to «0» (basic mode character).

** GMH mode– gyro-magnetic heading mode, GSMH mode – gyro-semicompass heading mode

Table 2.7 – "Gyromagnetic heading/gyro-semicompass heading» word structure

Bit No.	Information content	Bit coding
1 - 8	Address 320_8	11 010 000
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11-13	Reserved	Standard
14-28	Significant part is 15 bits	Range ±180° m.s. bit 28 = 90°. Negative values are transmitted in additional code
29	Sign	0 - from 0° to 180° 1 - from 180° to 360°
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 2.8 – "Adjustment frequency of navigation and landing system (affirmative character)" word structure

Bit No	Information content	Bit coding
1 - 8	Address 034_8	00 011 100
9 - 10	Identifier	00 - all 01 - №1 10 - №2 11 – not used
11	Operability of antenna feeder device (AFD)	1 – AFD failure 0 – AFD operability
12	Reserved	Zero
13 - 14	Operating mode	00 - VOR 01 - ILS 11 - СП-50
15 - 18	Hundredths of MHz	
19 - 22	Tenths of MHz	
23 - 26	Ones of MHz	
27 - 29	Tens of MHz	
30 - 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number
***Note** – All frequencies have ones in MHz hundred values.*		

Table 2.9 – “Magnetic azimuth” word structure

Bit No	Information content	Bit coding
1 - 8	Address 222_8	10 010 010
9 - 10	Source identifier	00 - all 01 - #1 10 - #2 11 – not used
11 - 13	Fly-by character of marker beacon	100 - far 010 – middle 001 - close
14 - 16	Reserved	
17 - 28	Magnetic azimuth (12 bits).	Range: ±180° m.s. bit 28 = 90°. Negative values are transmitted in additional code
29	Sign	0 – from 0° to 180°, 1 - from 180° to 360°
30 - 31	State matrix	In accordance with Table 1.5
32	Parity flag	

Table 2.10 “Mach number” word structure

Bit No	Information content	Bit coding
1 - 8	Address 205_8c	10.000.101
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11,12	Reserved	Zero
13-28	Significant part is 14 bits	Range: 4,096 m.s bit 28 = 2,048
29	Sign	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number

Table 2.11 “Outside air temperature (T_{oa})” word structure

Bit No	Information content	Bit coding
1 - 8	Address 213_8c	10.001.011
9, 10	Identifier	00 - all 01 - #1 10 - #2 11 – not used
11-17	Reserved	Zero
13-28	Significant part is 14 bits	Range: 512°C m.s. bit 28 = 256°C Negative values are transmitted in additional cod
29	Sign	Zero
30, 31	State matrix	In accordance with Table 1.5
32	Parity	0 – if sum of ones is odd number 1 – if sum of ones is even number