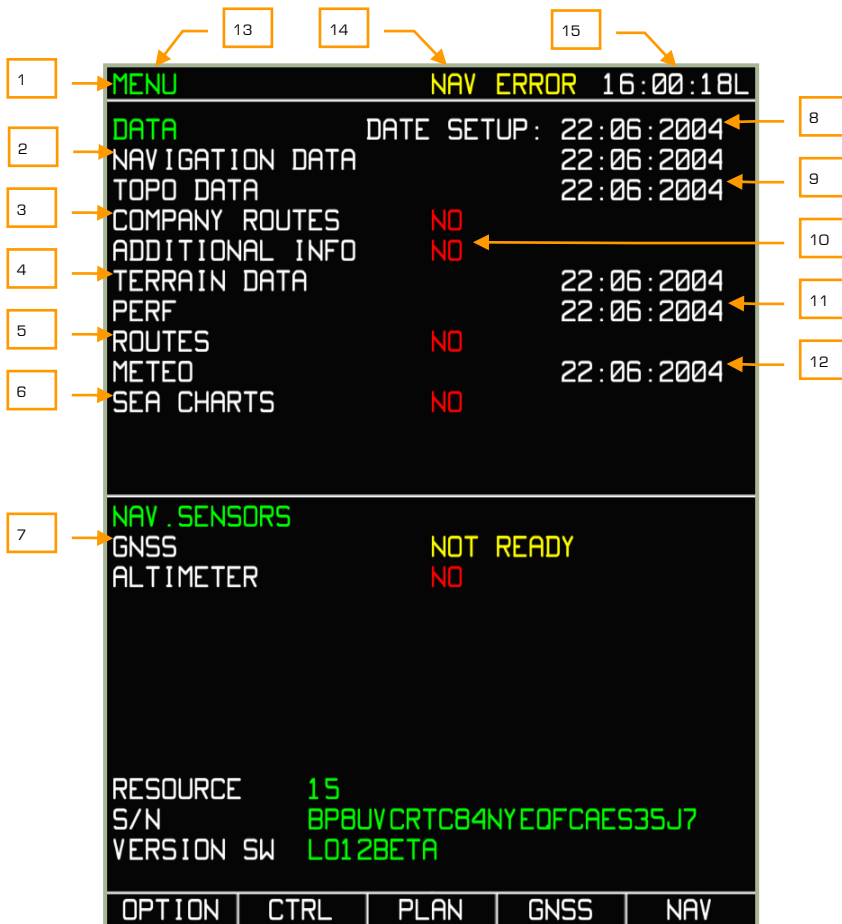


MENU Page



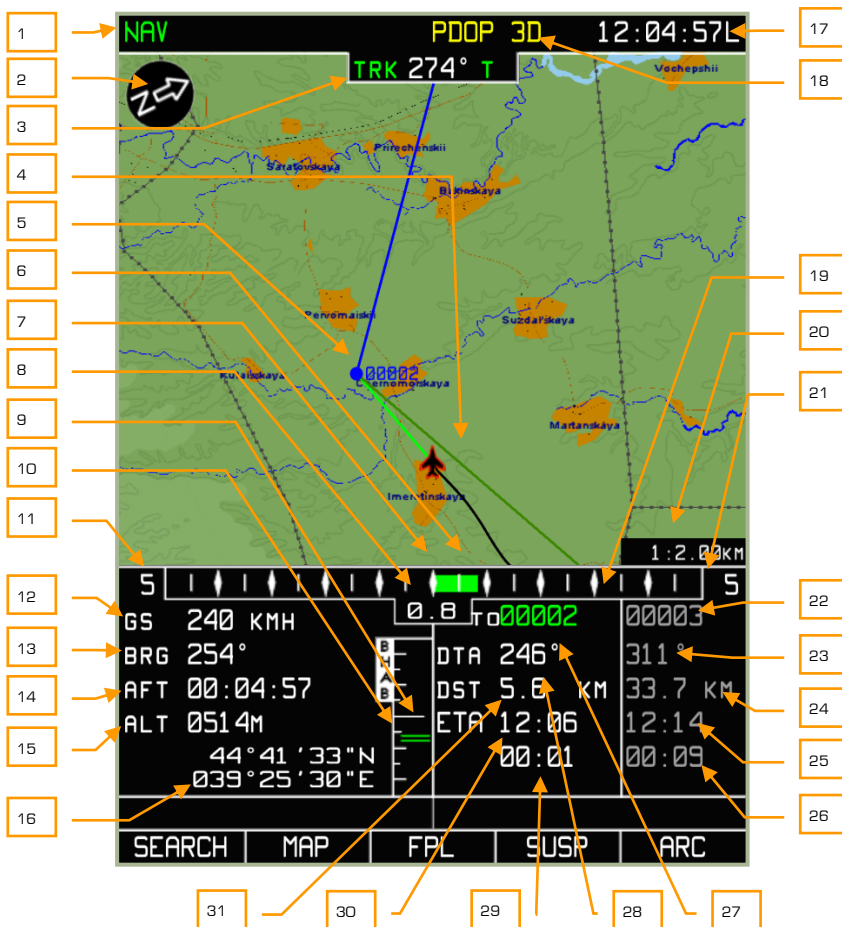
7-6: MENU

1. System bar
2. Aeronautical database expiration date
3. Default route of mission
4. Terrain information and database generation date
5. Number of user routes and date when latest was created
6. Sea charts, No function
7. Status of linked navigation sensors



8. Current date
9. Date when topographic data was created
10. User defined database
11. Date when data of aircraft performance characteristics was created
12. Date when METEO data was created
13. Operating mode name
14. Navigation sensors status
15. Current time

NAV Page



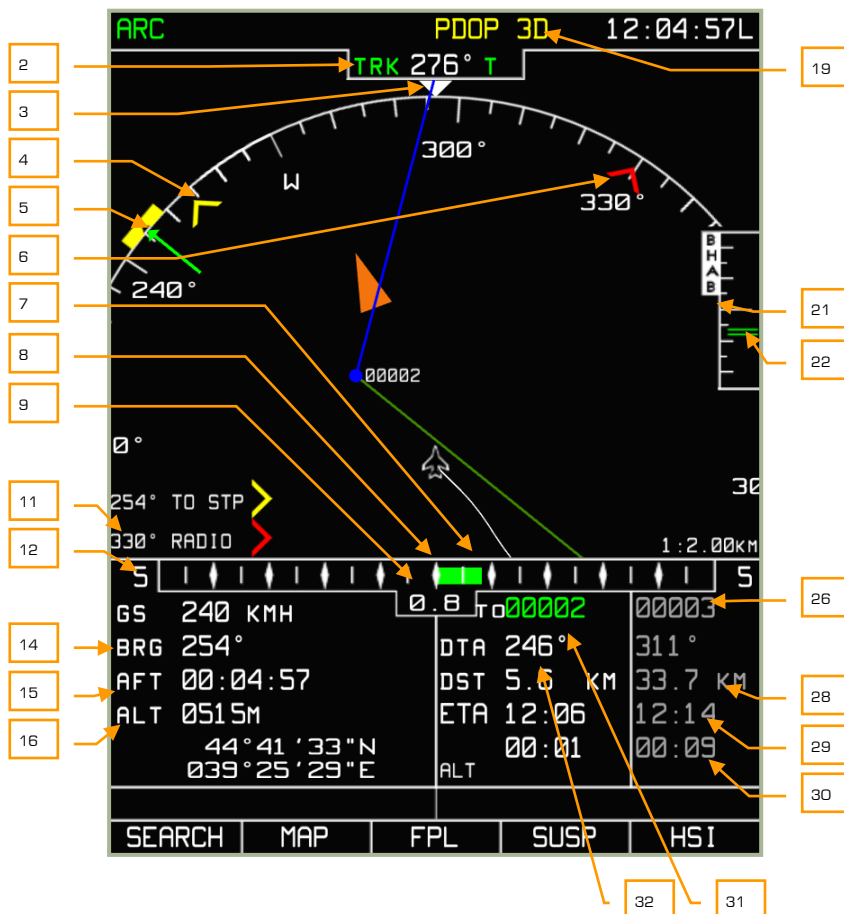
7-7: NAV page

1. Operating mode name
2. North arrow
3. Current track/heading. T – true or M – magnetic
4. Desired track (DTK) angle
5. Steerpoint
6. Graphical representation of lateral cross-track error (XTE)
7. XTE scale center point (on course)



8. Digital XTE level
9. Graphical representation of altitude deviation from flight plan
10. Vertical navigation scale
11. XTE scale
12. Ground speed
13. Bearing to steerpoint
14. Flight time
15. Current altitude
16. Current geographic coordinates
17. Current time
18. GNSS status
19. Current route leg combined data field
20. Map scale
21. Next route leg combined data field
22. Next Steerpoint callsign
23. Desired track angle (DTA) of next steerpoint
24. Next steerpoint leg distance
25. Next steerpoint estimated time of arrival (ETA)
26. Time left before reaching next steerpoint
27. Steerpoint callsign
28. Desired track angle (DTA)
29. Time late before reaching next steerpoint
30. Steerpoint estimated time of arrival (ETA)
31. Distance to go to steerpoint

ARC Page



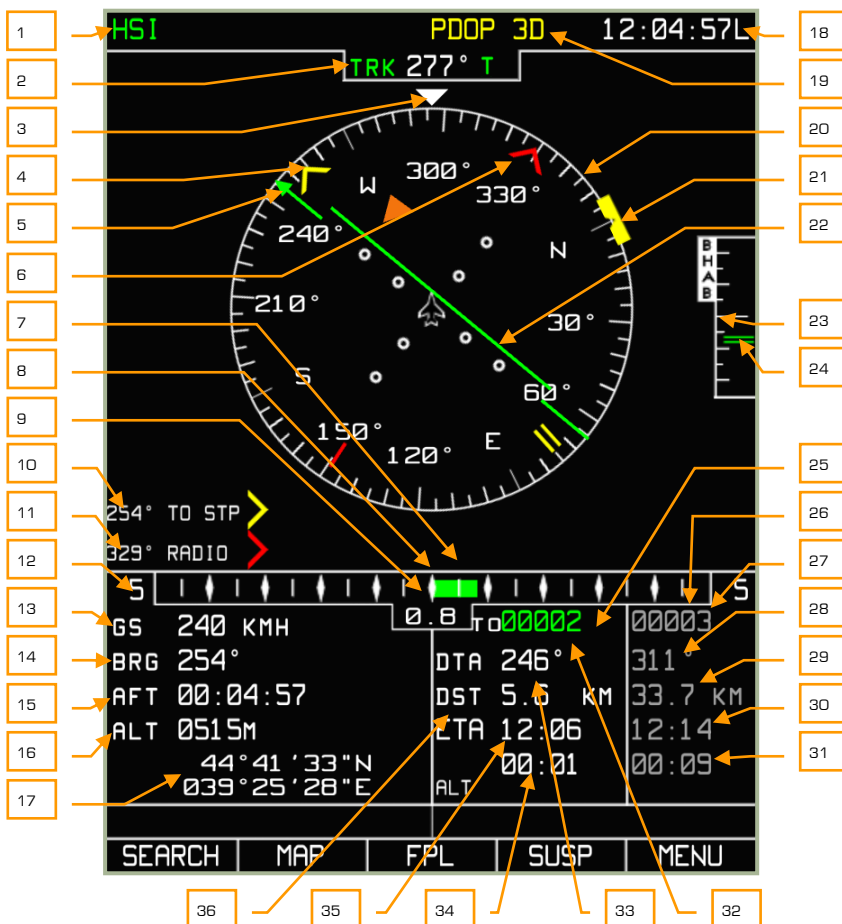
7-8: ARC page

1. Operating mode name
2. Current track/heading. T – true or M – magnetic
3. Actual track angle caret
4. RMI-1 - Bearing to steerpoint in this example
5. Desired track (DTK) angle
6. RMI-2 – Bearing to ADF radio beacon in this example
7. Graphical representation of cross track error (XTE)
8. XTE scale center point (on course)



9. Digital XTE value
10. RMI-1 – Digital bearing to steerpoint in this example
11. RMI-2 – Digital bearing to ADF radio beacon in this example
12. XTE scale
13. Ground speed
14. Bearing to steerpoint
15. Time enroute – actual flight time
16. Current altitude
17. Current geographic coordinates
18. Current time
19. GPS status
20. Heading scale arc
21. Vertical navigation scale
22. Graphical representation of altitude deviation from flight plan
23. Current route leg combined data field
24. Map scale
25. Next route leg combined data field
26. Callsign of next steerpoint
27. Desired track angle (DTA) for next steerpoint
28. Next leg distance
29. Next steerpoint estimated time of arrival (ETA)
30. Time late before reaching next steerpoint
31. Steerpoint callsign
32. Desired track angle (DTA)
33. Time left before reaching current steerpoint
34. Steerpoint estimated time of arrival (ETA)
35. Steerpoint distance

HSI Page



7-9: HSI page

1. Operating mode name
2. Current track/heading. T – true or M – magnetic
3. Actual track angle caret
4. RMI-1 - Bearing to steerpoint in this example
5. Desired track (DTK) angle
6. RMI-2 – Bearing to ADF radio beacon in this example
7. Graphical representation of cross track error (XTE)
8. XTE scale center point (no cross track error)



9. Digital XTE value
10. RMI-1 - Bearing to steerpoint in this example
11. RMI-2 - Bearing to ADF radio beacon in this example
12. XTE scale
13. Ground speed
14. Bearing to steerpoint
15. Time enroute – flight time
16. Current altitude
17. Current geographic coordinates
18. Current time
19. GPS status
20. Heading compass
21. Desired course mark
22. Graphical representation of cross track error (XTE)
23. Vertical navigation scale
24. Graphic indicator of vertical deviation from flight plan leg
25. Current route leg combined data field
26. Next route leg combined data field
27. Callsign of next steerpoint
28. Next desired track angle (DTA)
29. Next Leg distance
30. Next steerpoint estimated time of arrival (ETA)
31. Time late before reaching next steerpoint
32. Steerpoint name
33. Desired track angle (DTA)
34. Time left before reaching current steerpoint
35. Steerpoint estimated time of arrival (ETA)
36. Distance to steerpoint

When viewing the operating mode pages for NAV, ARC, and HSI, the following items are displayed:

Current track/heading (digital and graphical representation). The value varies between 0 and 359 degrees and is displayed with a precision of one degree. It is displayed over the compass scale and is supplemented with the letter (M) for magnetic or (T) for true. The value is displayed if information from the navigation sensor is available.

If no heading data has been supplied, the screen displays the track value received from the GNSS sensor, or the heading value is shown in yellow. The format of the number is: DDD. E.g., 023 – course value of 23-degrees.

Radio bearing (digital and graphical representation). The value varies between 0 and 359 degrees and is displayed with a precision of one degree. It is displayed on the outer-circle of the static HSI and ARC mode scales. If the value is outside the display scale, only the digital azimuth value is displayed. The format of reading is DDD°. E.g., 025° – radio bearing value of 25-degrees from the aircraft's longitudinal axis. The azimuth value is shown when RMI-1(RMI-2) option is activated on the MENU/OPTIONS page.

Desired track angle (digital and graphical representation). The value varies between 0 and 359 degrees and is displayed with a precision of one degree. It is displayed in the flight information area and on the compass azimuth card as a green arrow and line. The format is: DDD. E.g., 043 – heading value of 43-degrees.

Ground speed (digital representation). The ground speed value ranges from -200 km/h to +1,500 km/h. The ground speed value is displayed with a precision of the selected measurement input device. In the case of a negative ground speed value (flying backwards), a "-"minus sign is displayed. Ground speed can be displayed in either kilometers per hour (KH) or knots (KNOTS). The unit type of measurement is selected from the MENU/OPTIONS/UNITS sub-mode from pop-up window. The format of the number is: DDDD. E.g.: 123 – ground speed value of 123.

Cross track error (XTE) – digital and graphical representation. The XTE value can range from 0 to 999. The readout is in the unit of measurement selected from the MENU/OPTIONS/UNITS sub-menu that can be selected from the pop-up window. It should be noted that if the XTE is less than 10 measurement units, the value is shown with a digit after the decimal point (D.D format); if it is more or equal to 10 units of measurement, it is shown in whole numbers (DDD format). E.g., 3.4 (12) – the XTE is 3.4(12) km (nautical miles). This is displayed in the flight information area.

XTE scale. The XTE scale provides a graphical display of up to 20 measurement units with a level of precision according to the unit of measurement. It can be displayed in kilometers, statute miles, or nautical miles. The XTE display scale is changed automatically with the flight leg.

Altitude (digital presentation). Altitude is displayed in the flight information area and can vary from -600 to +48,000 feet. The altitude is displayed in meters – m or feet – ft. The unit of measurement is selected from the MENU/OPTIONS/SETUP/UNITS sub-mode.

Current leg route combined data field (digital and graphical representation). This is located in the bottom right of the display and is visible in the NAV, ARC, and HSI operating modes. It contains several information fields that provide the following data:

- Steerpoint callsign code (STP designation)
- Desired track angle that can vary between 0- and 359-degrees, and it is displayed with a precision of one degree
- Distance to steerpoint from the current aircraft position. This value can range between 0 and 9,999. It is displayed in kilometers – km or nautical miles – nm. The unit of measurement is selected from the MENU/OPTIONS/SETUP/UNITS sub-mode

- Steerpoint estimated time of arrival (ETA) can vary from 00:00 to 23:59. The time value is displayed with a precision of one minute when in route flight and it has a precision of up to one second when in the terminal area. If it is impossible to calculate the time value, the time field displays "--:--".
- Time late in reaching steerpoint can vary between 00:00 and 23:59 (MM : SS)

Next route leg combined data field. Similar to the current leg information field as described above, but this field is in regards to the next leg in the route. The difference is displayed as the "S" value that shows the distance between waypoints.



7-10: Current and next route leg combined information fields

- Current route leg information field
- Current steerpoint callsign
- Desired track angle
- Distance to steerpoint
- Estimated time of arrival at steerpoint
- Estimated time late at reaching steerpoint
- Next route leg information field
- Next steerpoint callsign
- DTA to next steerpoint
- Distance to the next route leg
- Estimate time of arrival at next steerpoint
- Estimated late time at reaching next steerpoint

Current geographic coordinates (graphical and digital representation). This displays the latitude and longitude of the aircraft's current position. Display format:

- For latitude: DD°MM.MM N(S) or DD°MM'SS"N(S)
- For longitude: DDD°MM.MM E(W) or DDD°MM'SS"E(W)

DDD indicates degrees, MM indicates minutes, SS indicates seconds, and N(S), E(W) for the hemisphere. The parameters are displayed so that the longitude degrees are exactly under latitude degrees, longitude minutes are under latitude minutes, and the longitude hemisphere letter is under the latitude hemisphere letter.

Map. The map is displayed in the map field. The set of objects displayed on the map depends on the map scale in use.

Map scale. The current scale of the map is displayed on the map field. Map scale is indicated by showing the centimeter/kilometer and centimeter/mile ratio. The following scales are used: 1:100 km; 1:50 km; 1:40 km; 1:30 km; 1:25 km; 1:20 km; 1:15 km; 1:12,5 km; 1:10 km; 1:7.5 km; 1:6 km; 1:5 km; 1:4 km; 1:3 km; 1:2,5 km; 1:2 km; 1:1.5 km; 1:1.25 km; 1:1 km; 1:0.75 km; 1:0.6 km; 1:0.5 km; 1:0.3 km; 1:0.25 km; 1:0.2 km; 1:0.15 km.

North arrow (graphical representation). The graphical representation shows an arrow pointing towards north and has the letter "N" on it.

Compass card (graphical representation). This is a schematic display of a compass card with digital designations every 30-degrees and degree marks with an interval of no more than 5-degrees. It is displayed in HSI and ARC modes.

Active route (graphical representation). The current route is displayed in the form of a blue line with a steerpoint symbol.

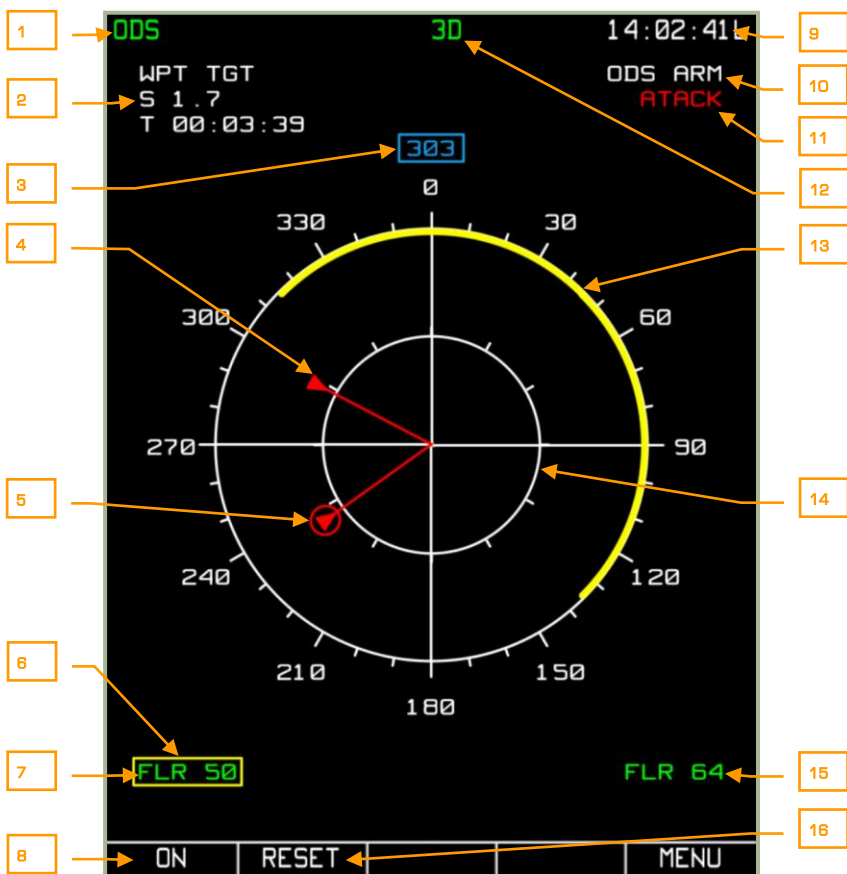
Value display formats in the ABRIS

Parameter	Format/Symbol	Color	Note
TK	DDD	Green	Actual track angle
DTK	DDD	White	Desired track angle
HDG	DDD	White	True/magnetic heading
GS	DDDD	White	Ground speed
TAS	DDDD	White	True airspeed
XTE	D.D or DDD	White	Cross track error
XTE SCALE	DD	White	XTE scale
ALT	DDDDD M(FT)	White	Altitude
STP name	CCCCC	Green	5 character steerpoint designation
PCT	DD.D or DDDD	White	Distance to go to STP
Twpt	HH:MM:SS	White	Estimated time of arrival at STP
	HH:MM:SS	White	Time to STP OVER
LAT	DD°MM.MM N(S) or DD°MM'SS" N(S)	White	Aircraft position latitude



LON	DDD°MM.MME(W) or DDD°MM'SS"E(W)	White	Aircraft position longitude
NAV, HSI. ARC		Green	Operating mode indication
NET NAV		Yellow	GNSS status indication
2D		Yellow	
3D		Green	
PDOP		Yellow	
NAV ERROR		Yellow	
RAIM		Yellow	RAIM status indication
		White	Map scale display

Onboard Defense System Page



7-10: Onboard Defense System page

1. System status bar (Mode indicator)
2. Navigational information:
 - Current WPT
 - Distance to WPT
 - ETA to WPT
3. Current heading.
4. Detected threat (missile).
5. Main threat indicator ring.
6. Countermeasures deployed (indicated by yellow frame)



7. Port-side countermeasures: type and remaining quantity
8. Defense system ON/OFF button.
9. Current time.
10. System status. Will reflect one of the following values: OFF, STANDBY, COMBAT.
11. Attack detection indicator.
12. GNSS location tracking status.
13. Laser illumination indicator. Covers four 90 degree sectors. A solid yellow arc indicates that the laser is in ranging mode, while a flashing yellow arc indicates that the laser is in weapon guidance mode.
14. Range circles with azimuth marks.
15. Starboard-side Countermeasures: type and remaining quantity
16. RESET button – resets the laser illumination indicator.

MENU Operating Mode

The Main MENU contains the following information and functions:

MENU		30	09:00:13L	
DATA		DATE SETUP: 22:06:2004		
NAVIGATION DATA		22:06:2004		
TOPO DATA		22:06:2004		
COMPANY ROUTES		1	22:06:2004	
ADDITIONAL INFO		2	22:06:2004	
TERRAIN DATA		22:06:2004		
PERF		22:06:2004		
ROUTES		2	22:06:2004	
METEO		22:06:2004		
SEA CHARTS		NO		
NAV. SENSORS				
GNSS		READY		
ALTIMETER		READY		

7-11: Main MENU page

- **System bar that includes:** name of the page, GNSS status, and current time
- **NAVIGATION DATA** – Navigation database and the expiration date of the database
- **TOPO DATA** – Topographic database and date that the data was created
- **COMPANY ROUTES** – Airline routes: number of recorded routes and the creation date of the most recent route
- **ADDITIONAL INFO** – User defined information and the date of the most recent modification (map points and lines)
- **TERRAIN DATA** – Terrain information and the date that the data was created
- **PERF** – Information date of the aircraft performance characteristics
- **ROUTES** – Number of recorded routes and the date that the most recent route was created
- **METEO** – Weather information and the date that the data was created
- **SEA CHARTS** – The date that the data was created, No function
- **NAV. SENSORS** – Displays the status of integrated navigational sensors (GNSS and radar ALTIMETER). To test the altimeter, press the test button on the radar altimeter gauge. This will also be checked after the K-041 self-test. This will take approximately 12 seconds

- **RESOURCES** - Servicing information that serves no role in the simulation
- **Serial number of ABRIS unit**
- **Main software version.** This will display your current version of "DCS: Black Shark"
- **Information bar on the database status:** When the aeronautical database is outdated, a DATABASE OUTDATED message is displayed in the bottom part of the page.

From the MENU page, you can select **OPTION**, **CTRL**, **PLAN**, and **GNSS** sub-modes. Below, we will discuss the functions of each of these sub-modes in detail. The right-most FSK button is used to cycle between the operating modes (MENU – NAV – ARC – HSI).

MENU/OPTION Sub-Mode

Selected by pressing the left-most FSK button when in the MENU operating mode, the OPTION sub-mode page affects all the modes of ABRIS operation and is stored in non-volatile memory. Options can have values selected from a list or from a defined digital range.

ATTENTION! It is advised that you do not change option values unless you are certain of the consequences on ABRIS functionality.

Modified OPTION values are saved at the time of exiting from the sub-mode – a press of the OPTION button.

Note that when entering data for coordinates, date, time, etc., that after selecting the line item and pressing the CHANGE FSK button that the bottom of the display will change to allow you to select the field you wish to edit, and by rotating the cursor manipulator control you select the value.

OPTION		30	09:00:19L
MAIN			
MAP MOTION		RELATIVE	
MAP ORIENTATION		HEADING	
MAP SCALE		USER	
TRACK/HEADING		TRUE	
ALTITUDE		GNSS	
LOCAL TIME		+3	
TIME SETUP		09:00:19	
DATE SETUP		22-06-04	
AFT START		AUTO	
FLIGHT RECORDER		S	
WPT SEQUENCE		AUTO	
WPT OVER		S	KM
XTE SCALE:			
MIN		S	KM
MAX		S	KM
RM11		TO STP	
RM12		FROM STP	
RAIM THRESHLD		100	M
SELECT THRESHLD		AUTO	
CHECK PSEUDORANGE		ON	
MAIN			
UNITS			
PERF			
SIGNAL			
CHARTS			
SETUP	✓	↖	CHANGE MENU

7-12: MENU/OPTION display with MAIN sub-mode selected

Procedure to Change ABRIS Settings

In the OPTION sub-mode, there are five sub-modes that can be displayed by pressing the SETUP FSK button. When this button is pressed, a pop-up menu is displayed with the following options:

- MAIN – Main options
- UNITS – Set the type of measurement units that are displayed
- PERF – Enter aircraft parameters in the non-volatile memory
- SIGNAL – Adjust time intervals for alert generation alarms
- CHARTS – Adjust map display content

You may then select one of the options by pressing the up and down arrow FSK buttons or by rotating the cursor manipulator. Once a line item has been selected (boxed in the menu), press the SETPUP FSK button again or press the cursor manipulator to display the page.

To change between the pre-determined option/values, use the CHANGE FSK button; to switch from one line-option to another in the menu, use FSK buttons with the ▽ or ▲ symbols or the cursor manipulator knob. The selected function is highlighted with a box.

MENU/OPTION/MAIN Sub-mode

The default page of the MENU/OPTION sub-mode is the MAIN sub-mode page. Using the sub-mode pop-up window, you may select MAIN to return to this page. The table below lists MAIN page options, possible values (values or formats) of options, and their effect on ABRIS functionality.

OPTION	30	09:00:27
MAIN		
MAP MOTION	RELATIVE	
MAP ORIENTATION	HEADING	
MAP SCALE	USER	
TRACK/HEADING	TRUE	
ALTITUDE	GNSS	
LOCAL TIME	+3	
TIME SETUP	09:00:27	
DATE SETUP	22-06-04	
AFT START	AUTO	
FLIGHT RECORDER	S	
WPT SEQUENCE	AUTO	
WPT OVER	S	KM
XTE SCALE:		
MIN	S	KM
MAX	S	KM
RM11	TO STP	
RM12	FROM STP	
RAIM THRSOLD	100	m
SELECT THRSOLD	AUTO	
CHECK PSEUDORANGE	ON	
SETUP	▽	/\
CHANGE	MENU	

7-13: MENU/OPTION/MAIN sub-mode page

List of options, possible values (values or formats) and their effect on ABRIS functionality in the MAIN sub-mode

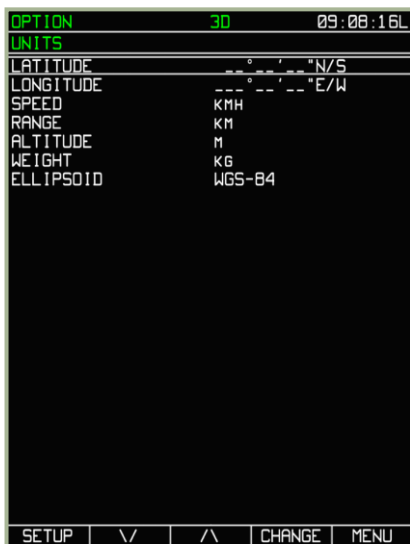
Option	Measurement units; format	Arguments	Effect on the ABRIS functionality
MAP MOTION		RELATIVE	The aircraft symbol is always located 20% up from the map's bottom edge
		TRUE	The aircraft symbol moves across the map and the map view update is performed automatically
MAP ORIENTATION		HEADING	Map orientation according to aircraft heading
		TRACK	Map orientation according to aircraft track angle
		NORTH	Map orientation in reference to North
SCALE		AUTO	Map display scale depends of aircraft altitude
		MANUALLY	Map scale is manually set by operator
TRACK/HEADING		TRUE	Displayed from the true meridian
		MAG	Displayed from the magnetic meridian
ALTITUDE		GNSS	From built-in GNSS sensor
		BARO	From barometric sensor
		RADIO	From radar altimeter
LOCAL TIME		+12/-12	Local time shift
TIME SETUP	HH:MM:SS		Current time
DATE SETUP	DD-MON-YY		Current date
AFT START		AUTO	Flight time logging is started when the aircraft attains a speed of 25 km/h
		USER	Flight time logging is manually initiated by the operator
FLIGHT RECORDER	Sec	1-60	Time length of flight recorder

WPT SEQUENCE		AUTO	Automatically switches from one waypoint to the next when the steerpoint has been reached
		USER	Cycling of waypoints is done manually by the operator
STP PASSED	km	0-10	Set the radius of a circle with the center being the steerpoint (STP). When this circle is crossed, a "STP PASSED" message is displayed (5 by default)
XTE SCALE MIN MAX	KM	1, 2, 5, 10, 20	Set the MIN and MAX XTE scale for automatic switching depending on the level of route error
RMI1		TO STP FROM STP VOR RADIO OFF	Symbol and digital display of the direction (yellow): from aircraft to STP from STP to aircraft to VOR to non-directional beacon no display
RMI2		TO STP FROM STP VOR RADIO OFF	Symbol and digital display of the direction (red): from aircraft to STP from STP to aircraft to VOR to non-directional beacon no display
RAIM THRSHLD	M	0-9999	Set the radius of a circle with the center based on the coordinates obtained after the processing of GNSS sensor data. This is then used to calculate the probability of the aircraft's actual coordinates being within this circle
SELECT THRSHLD		AUTO/USER	Option for selecting the threshold value of RAIM calculations

CHECK PSEUDORANGE		ON/OFF	To take into account (ignore) the pseudo-range values provided by the satellites in regards to RAIM calculations
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MENU/OPTION/UNITS Sub-mode

To adjust the type of units that will be used for measurement by the ABRIS, select the UNITS option from the SETUP pop-up menu.



7-14: MENU/OPTION/UNITS sub-mode page

The effect of the option values and their permissible ranges are described in the table below.

List of options, possible option values, and their effect on ABRIS functionality in the MENU/OPTION/UNITS sub-mode

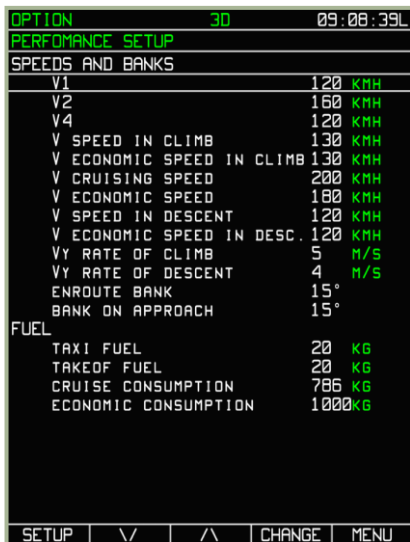
Option	Arguments	Effect on the AMMS functioning
LATITUDE/LONGITUDE	DDD*MM.MM DDD°MM SS	Display of lat-long geographic coordinates
SPEED	KMH M/S KNOTS	Use of measurement units for calculations. KMH – kilometers per hour; M/S – meters per second, and KNOTS - knots



RANGE	KM NM	Use of measurement units for calculations. KM – kilometers and NM – nautical miles
ALTITUDE	FT M	Use of measurement units for calculations. M – meters and F - feet
WEIGHT	KG LB	Use of measurement units for calculations. KG – kilograms and LB - pounds
ELLIPSOID	WGS-84/Krasowsky	Use of the ellipsoid model for calculations

MENU/OPTION/PERF Sub-menu

The PERF sub-menu is used to adjust ABRIS flight performance parameters.



7-15: MENU/OPTION/PERF sub-mode page

The effect of the option values and their permissible ranges are described in the table below.

List of options, possible option values and their effect on ABRIS functionality (PERFORMANCE SETUP sub-mode)

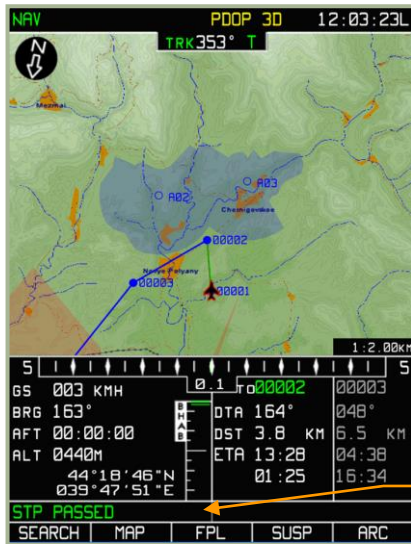
Option	Measurement units (format)	Range	Effect on the AMMS functioning
SPEEDS AND BANKS			Option parameters are used for calculations of the aircraft trajectory
V1. Not used in calculations, reference only.	km/h	0–350	
V2. Not used in calculations, reference only.	km/h	0–350	
V4. Not used in calculations, reference only.	km/h	0–350	
V SPEED IN CLIMB (normal). Not used in calculations, reference only.	km/h	0–350	

V ECONOMIC SPEED IN CLIMB. Not used in calculations, reference only.	km/h	0–350	
V CRUISING SPEED, normal. Not used in calculations, reference only.	km/h	0–350	
V ECONOMIC SPEED. Not used in calculations, reference only.	km/h	0–350	
V SPEED IN DESCENT, normal. Not used in calculations, reference only.	km/h	0–350	
V ECONOMIC SPEED IN DESCENT. Not used in calculations, reference only.	km/h	0–350	
Vy RATE OF CLIMB. If the vertical speed exceeds that programmed for the leg, this value will be colored yellow.	m/s	0–50	
Vy RATE OF DESCENT. If the vertical speed exceeds that programmed for the leg, this value will be colored yellow.	m/s	0–50	
ROUTE BANK. This is used for lead turn distance calculations. The larger the value, the smaller the lead turn distance will be. This value should not exceed 60 for a helicopter.	degrees	0–60	
BANK OF APPROACH. This is used for lead turn distance calculations. The larger the value, the smaller the lead turn distance will be. This value should not exceed 60 for a helicopter.	degrees	0–60	
FUEL			Option parameters are used for calculating fuel flow
TAXI FUEL. Used to calculate remaining fuel predictions.	kg	0–100	
TAKEOFF FUEL. Used to calculate remaining fuel predictions.	kg	0–100	

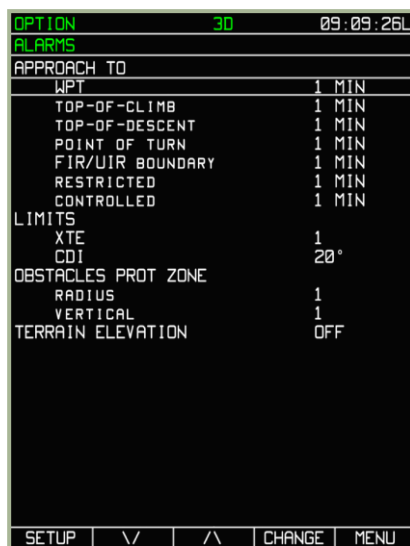
CRUISE CONSUMPTION. Used to calculate remaining fuel predictions.	kg	0-1500	
ECONOMIC CONSUMPTION. Used to calculate remaining fuel predictions.	kg	0-1500	

MENU/OPTION/SIGNAL Sub-mode

The SIGNAL page allows you to set the parameters that messages are displayed at the bottom of the ABRIS display. See the image below for a signal message example:



7-16: Example of SIGNAL message string



7-17: MENU/OPTION/SIGNAL sub-mode page

The effect of the option values and their permissible ranges are described in the table below.

List of options, possible option values and their effect on ABRIS functionality when in the SIGNAL sub-mode

Parameter	Measurement units	Range	Effect on the AMMS functioning
APPROACH TO:			
WPT	min	0-10	Time interval for warning about the approach to a route element. The message string will be displayed in yellow
TOP-OF-CLIMB CLIMB POINT. This marks the point at which a climb is initiated in the flight plan. (xx) Minutes prior to passing this waypoint that the warning message will appear.	min	0-10	
TOP-OF-DESCENT DESCENT POINT. This marks the point at which a descent is initiated in the flight plan. (xx) Minutes prior to passing this waypoint, the warning message will appear.	min	0-10	



POINT OF TURN. This message indicates the start of the turn point between waypoints. This is selected from the WPT OVER option. FIR/UIR BOUNDARY. No function RESTRICTED AIRSPACE BOUNDARY. No function CONTROLLED ATC AREA BOUNDARY. No function	min	0-10	
	min	0-10	
	min	0-10	
	min	0-10	
LIMIT: XTE CDI BY TRACK ANGLE OBSTACLES PROT ZONE: RADIUS VERTICAL TERRAIN ELEVATION	km	0-20	When these values are exceeded, cautions are provided. The message string will be displayed in yellow
	degrees	0-99	
		1	No function
		1	
		OFF	

MENU/OPTION/CHARTS Sub-mode

The CHARTS page allows you to filter the information that is displayed on the moving map. Select the item you wish to edit and then use the CHANGE FSK button to toggle it on or off (+ or -).



7-18: MENU.OPTION/CHARTS sub-mode page

List of possible options and their effect on ABRIS when in the NAV operating mode.

Parameter	Options	Effect on the AMMS functioning
MAP	ALL SEL OFF	Aeronautical information displayed on the map. Compound option, determines option values in all items: ALL – all "+" SEL – selected by user OFF – all "-"
AIRPORTS	+,-	Airports
RUNWAY	+,-	Runways
AIRPORT COMM	+,-	Communication frequency in terminal areas
ILS	+,-	Instrumental landing system
ILS MARKERS	+,-	Instrumental landing system markers

TERMINAL NDB	+, -	Terminal non-directional radio beacon
VHF NAVAID	+, -	Very high frequency navigation aids
NDB	+, -	Non-directional beacon navigation aid
ROUTE AIRWAYS	+, -	Route airways
FAN MARKERS	+, -	Fan markers (not implemented)
ROUTE WAYPOINTS	+, -	Intermediate route WPT's
HOLDING PATTERNS	+, -	Holding patterns
ROUTE COMM	+, -	Communication frequencies
RESTRICTED AIRSPACE	+, -	Restricted airspace
TACTICAL SITUATION	+, -	Tactical information. Wingman's symbols and target icons
POPULATION PLACES	+, -	Inhabited locality shown on the map as a built-up area
LAKES	+, -	Lakes
RIVERS	+, -	Rivers
RAILWAYS	+, -	Railways
ROADS	+, -	Roads
CABLE/PIPELINES	+, -	Cable lines/power transmission lines
TEXT	+, -	Text information and signs
LINE OBJECTS	+, -	Line objects plotted by user

The selected OPTION values are saved when the mode is exited by pressing NAV button.

MENU/CONTROL Sub-mode

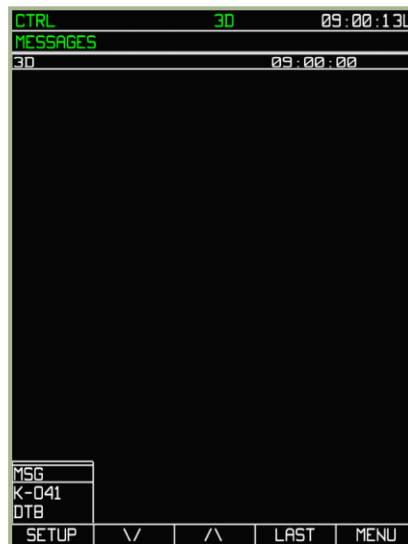
To select the CONTROL sub-mode page, press the "CTRL" FSK button from the MENU operating mode page.

The CONTROL sub-mode is indicated on the system message line with the indicator "CTRL".

From the CONTROL sub-mode page you can switch to the following sub-modes: MSG (messages), K-041 (targeting system), and DTB (database). To select the sub-page pop-up window, click on the SETUP FSK button. When the pop-up window is visible, you can cycle through sub-mode choices by using the up and down arrow FSK buttons (Δ , ∇) or by rotating the cursor manipulator. Once you have made your selection, press the SETUP FSK button again to display the page.

The selected page is indicated by its name below the system bar, under the current mode display position.

MENU/CONTROL/MESSAGES Sub-mode



7-19: MENU/CONTROL/MESSAGES sub-mode page

To switch to the MESSAGE page, select the MSG line in the pop-up menu. This page displays the last 20 messages generated by the system or received via the data link. To switch to another page, press the SETUP FSK button and the pop-up menu will appear.

MENU/CONTROL/K-041 Sub-mode

CTRL	30	09:00:20L
K-041		
MODE	WORK	
TIME OUT	279	
LATITUDE	44°58'15"N	
LONGITUDE	038°00'51"E	
HONG	140.4	
TRK	0.0	
SPEED	0.0	
SETUP		CHANGE MENU

7-20: MENU/CONTROL/K-041 sub-mode page

The K-041 page is used to check the status of the K-041 navigation and targeting system. When in "WORK" MODE, a countdown timer in seconds is displayed next to the TIME OUT field. This indicates the time until the next INS navigation fix from GNSS. Current aircraft coordinates; heading, track angle, and speed are also displayed here.

MENU/CONTROL/DTB Sub-mode

CTRL	3D	09:00:36L
ONBOARD LOADER		
NAVIGATION DATA	NO	
TOPO DATA	NO	
COMPANY ROUTES	NO	
ADDITIONAL INFO	2	22:06:2004
TERRAIN DATA	NO	
PERF	NO	
ROUTES	2	22:06:2004
METEO	NO	
SEA CHARTS	NO	
ONBOARD STORAGE		
NAVIGATION DATA		22:06:2004
TOPO DATA		22:06:2004
COMPANY ROUTES	1	22:06:2004
ADDITIONAL INFO	2	22:06:2004
TERRAIN DATA		22:06:2004
PERF		22:06:2004
ROUTES	2	22:06:2004
METEO		22:06:2004
SEA CHARTS	NO	
SETUP LOAD SAVE MENU		

7-21: MENU/CONTROL/DTB sub-mode page

Database information displayed on this page is similar to the display on the MENU operating mode page. Indications of information status/availability in data storage are based on the same principle.

You may save data on your PC storage device (script files) by editing these available strings:

- **NAVIGATION DATA** – Navigation database, navigation points and map objects and other navigation information.
- **ADDITIONAL INFO** – Point and Line objects entered by user.
- **ROUTES** – Routes entered by user.

Saving Route Plans to ABRIS Database

Although you can save route plans into the ABRIS system RAM through the PLAN sub-mode pages, you can also save a route plan into the ABRIS permanent database (i.e. your hard drive). If you do so, you will have the ability to load it the next time you fly the same mission. To do so:

1. Select the MENU operating mode and press the **CTRL** FSK button.
2. Press the SETUP FSK button. This will display a pop-up menu. Using the **Δ-Δ** FSK buttons or cursor manipulator control, select the DTB (DATABASE) option and press the SETUP FSK button again.
3. Press the SAVE FSK button and this will box NAVIGATION DATA in the ONBOARD STORAGE section.
4. Press the SAVE FSK button again and this will save the route plan in the navigation database.
5. Move the cursor to ROUTES and press the **SAVE FSK button**. This will save all the flight plan data.
6. Finally, once everything is saved, press the MENU FSK button to go back to **MENU** operating page.

CTRL	TRSLD	12:00:49M
ONBOARD LOADER		
NAVIGATION DATA	NO	
TOPO DATA	NO	
COMPANY ROUTES	NO	
ADDITIONAL INFO	1	22:06:2004
TERRAIN DATA	NO	
PERF	NO	
ROUTES	1	22:06:2004
METEO	NO	
SEA CHARTS	NO	
ONBOARD STORAGE		
NAVIGATION DATA		22:06:2004
TOPO DATA		22:06:2004
COMPANY ROUTES	1	22:06:2004
ADDITIONAL INFO	1	22:06:2004
TERRAIN DATA		22:06:2004
PERF		22:06:2004
ROUTES	1	22:06:2004
METEO		22:06:2004
SEA CHARTS	NO	
<div> <div>SETUP</div> <div>√</div> <div>∧</div> <div>SAVE</div> <div>MENU</div> </div>		

CTRL	TRSLD	12:01:15M
ONBOARD LOADER		
NAVIGATION DATA	NO	
TOPO DATA	NO	
COMPANY ROUTES	NO	
ADDITIONAL INFO	1	22:06:2004
TERRAIN DATA	NO	
PERF	NO	
ROUTES	1	22:06:2004
METEO	NO	
SEA CHARTS	NO	
ONBOARD STORAGE		
NAVIGATION DATA		22:06:2004
TOPO DATA		22:06:2004
COMPANY ROUTES	1	22:06:2004
ADDITIONAL INFO	1	22:06:2004
TERRAIN DATA		22:06:2004
PERF		22:06:2004
ROUTES	1	22:06:2004
METEO		22:06:2004
SEA CHARTS	NO	
<div> <div>SETUP</div> <div>√</div> <div>∧</div> <div>SAVE</div> <div>MENU</div> </div>		

7-22: To save NAVIGATION DATA

7-23: To save ROUTE

This saves all flight routes to a script file that will be associated with the mission. Next time you start this mission you will be able to load the flight plan using the ABRIS **PLAN** page.

Saving Map Points and Map Lines to ABRIS Database

To save map points and lines to ABRIS permanent storage (i.e. your hard drive), with the ability to load them the next time you fly the same mission, please do the following:

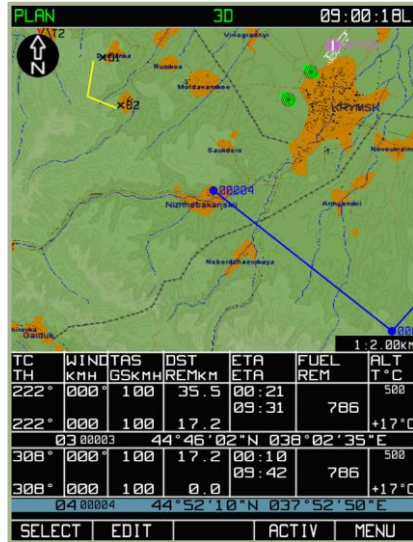
1. Select the MENU operating mode and press the **CTRL** FSK button.
2. Press the SETUP FSK button. This will display a pop-up menu. Using the **▲-▲** FSK buttons or cursor manipulator control, select the DTB (DATABASE) option and press the SETUP FSK button again.
3. On the **CTRL** page, press the SAVE button and this will display a box-cursor in the ONBOARD STORAGE section.
4. Move the cursor to the ADDITIONAL INFO entry and press the SAVE FSK button. This will save map points and lines.
5. Once everything is saved, press the MENU FSK button to go back to the **MENU** operating page.

CTRL		TRSLD	12:01:02M
ONBOARD LOADER			
NAVIGATION DATA	NO		
TOPO DATA	NO		
COMPANY ROUTES	NO		
ADDITIONAL INFO	1	22:06:2004	
TERRAIN DATA	NO		
PERF	NO		
ROUTES	1	22:06:2004	
METEO	NO		
SEA CHARTS	NO		
ONBOARD STORAGE			
NAVIGATION DATA		22:06:2004	
TOPO DATA		22:06:2004	
COMPANY ROUTES	1	22:06:2004	
ADDITIONAL INFO	1	22:06:2004	
TERRAIN DATA		22:06:2004	
PERF		22:06:2004	
ROUTES	1	22:06:2004	
METEO		22:06:2004	
SEA CHARTS	NO		
SETUP \ / / \ SAVE MENU			

7-24: Saving map points and lines in ADDITIONAL INFO

MENU/PLAN Sub-mode

The **PLAN** sub-mode is used for route planning and correction and is a useful tool for when you need to modify the flight plan after new intelligence on enemy positions becomes available. **PLAN** sub-mode is selected by pressing the **PLAN** FSK button on the main **MENU** operating mode page.



7-25: MENU/PLAN sub-mode page

After the **PLAN** sub-mode FSK button has been selected, the ABRIS display will appear as shown above. Note that the display is static and may not accurately represent the aircraft's current position and state. It may be helpful to think of this as an in-cockpit mission editor.

Route Handling

One of the most important functions of the **PLAN** sub-mode is the ability to edit and create new flight plans in ABRIS. **PLAN** mode offers the following functions to support this:

- Creation of a route in either manual or automatic mode with the use of waypoint (WPT) callsigns.
- Storage of routes in the ABRIS database with the capability to save, load, and delete routes from the database.
- Automated route calculations based on entered parameters: true airspeed, altitude, weather information, distance between waypoint legs, fuel level, and fuel flow data.

Enhanced ABRIS capabilities are provided by the implementation of a number of additional functions:

- Manual input of WPTs not available in the loaded ABRIS database.
- Manual input of line type objects: points, boundaries, area object contours, etc.

A route created in ABRIS consists of an airfield departure point, a set of waypoints, and an airfield destination (terminal) point. To provide flight plan (FPL) calculations, the route may include TAS data, flight altitude, weather information, fuel loading, and fuel flow in different sortie phases.

After pressing the PLAN FSK button, the main **PLAN** sub-mode page will display the active route.



7-26: MENU/PLAN sub-mode

Unload Active Route


To unload the current route displayed on the ABRIS and create a new route, press the **SELECT** FSK button and then select the **UNLOAD** option from the pop-up menu. In doing so, you will erase the route that was created in the mission editor. The **DRAW** FSK button will now be visible next to the **SELECT** FSK button and provide you the ability to draw a new flight route. It is important to understand that you must unload the current route before creating a new one.



7-27: UNLOAD route selected from pop-up menu

7-28: View of the PLAN sub-mode after unloading of current plan

Manual Waypoint Entry

A route consists of two or more waypoints joined sequentially. As such, we'll first need to learn how to place waypoints. After unloading the current plan, press the **DRAW FSK** button. The ABRIS map will now display a green-colored box . In the example below, the box is centered over the starting airfield. Additionally, a grey field with information appears in the flight information area.



7-29: MENU/PLAN display when waypoint entry mode is entered

The new waypoint information field (grey box) includes the following data:

1. **01** – Waypoint number in the route. This number is automatically assigned.
2. **NEW STP** – A conventional name of the steerpoint is added to the route; a yellow color indicates that if the steerpoint is included in the route, the field value will have to be changed (or it will be changed automatically). This is an editable field.
3. **Waypoint-over option.** Allows three options to determine how steering information will be provided between waypoints (FBY, OVR, or FIN)
4. **MVR** – The magnetic declination value for the area where the active marker is positioned.
5. **Active marker's coordinates.** Displayed as latitude and longitude values, this field indicates the coordinates on the map of the green box marker.

To add a waypoint to a route, press ADD button:

Before performing this operation, it may be necessary to change the coordinates of the waypoint to be entered. In doing so, it may be best to change the scale of the map by pressing the SCALE+ or SCALE- FSK buttons the necessary number of times. The current map scale value is displayed in the bottom right corner of the map.

After the map scale has been appropriately set, use the cursor manipulator to move the cursor to the map coordinate/object where you wish to place the waypoint. In the case of a first waypoint, this should be an airfield. Left click on the cursor manipulator knob to toggle between horizontal marker movement and vertical marker movement. Note that when the marker is moved that the coordinates are updated on the left side of the flight information area. When objects already plotted on the map are used to place a waypoint, the marker should be placed on top of the map object to be used (waypoints, airdromes,

beacons, etc.). A precise placement is not required (the available object will be entered into the waypoint input field by pressing the ADD FSK button), but the marker center is required to be over the map object.

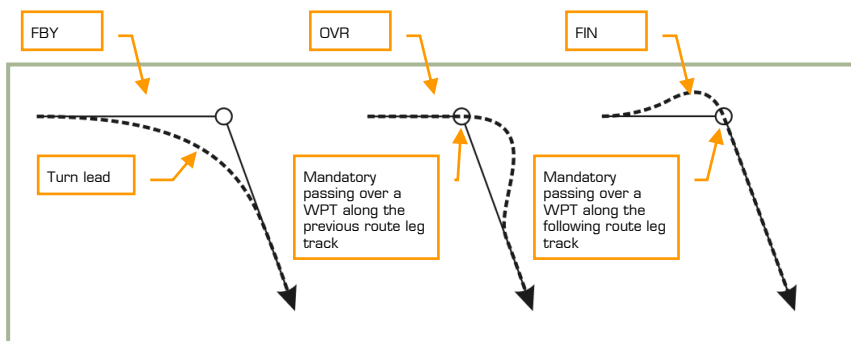
After a waypoint has been added to the route, the following options are possible:

If there is no map object point under the active marker when the waypoint was created, the WPT conventional number in the route plan is assigned automatically and cannot be changed. Within the flight information area, a white colored box indicates the field to be edited; by default it is the waypoint name field. Information field values can be changed using the cursor manipulator knob. To cycle between the fields to be edited, press the ►► FSK button:

- **WPT name field** – To edit this field, rotate the cursor manipulator; right clicking the knob cycles to the next character space. Cycling to a different field enters the name.
- **WPT OVER** option – Determines the passing order of the aircraft turn. The permissible field values and their characteristics are shown in the table below.

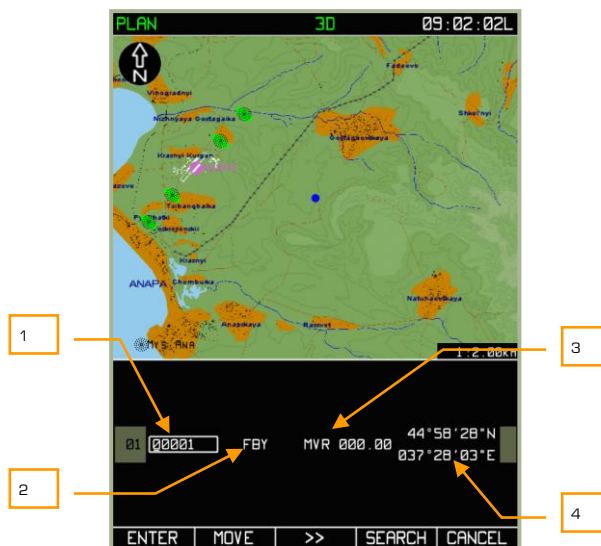
Values of WPT OVER option field

Displayed symbols	Value in the route calculations
FBY	Mandatory passing of a WPT with a FIN turn lead distance
OVR	Mandatory passing over a WPT along the previous route leg track
FIN	Mandatory passing over a WPT along the following route leg track



7-30: Examples of the WPT OVER options

- **Magnetic declination field** – The value can be changed by using the cursor manipulator control and the permissible value is +/- 90.
- **WPT coordinate field** – This value is automatically changed by using the cursor manipulator control.



7-31: View of MENU/PLAN display after a WPT is entered at an arbitrary map point

1. WPT name
2. WPT OVER option
3. Magnetic declination field
4. WPT coordinates

When there is an aeronautical point under the active maker:

When the marker has been placed over a map object creating a waypoint, the waypoint information fields have values similar to those described above, the difference being an additional field: AERONAUTICAL POINT TYPE. This displays the object type stored in the ABRIS database as white symbols against black background next to the WPT OVER field. The possible fields and their characteristics are shown in the table below:

AERONAUTICAL POINT TYPE data fields

Displayed symbols	Value in the route calculations
A	Airport
N	Non-directional radio beacon (NDB)
V	VOR
I	Unmarked aeronautical point or an aeronautical point determined by the operator



7-32: MENU/PLAN display after a waypoint is created over a map point

Only the WPT OVER options and MAGNETIC DECLINATION data fields are active in this case. The values of the other fields are determined by values stored in the aeronautical database for the map point: WPT name, AERONAUTICAL POINT TYPE, GEOGRAPHIC COORDINATES.

To complete the procedure for adding a WPT to the route:

Once the waypoint has been created, press the **Enter** FSK button. After this is done, the screen will display a blue ● WPT marker on the map. To cancel addition of a WPT to the route, press the **CANCEL** FSK button.

Enter Waypoint by Callsign

The ABRIS includes a database of navigational points that can be fed to the **PLAN** sub-mode using the **SEARCH** FSK button. The **SEARCH** FSK is available from the **PLAN** sub-mode after you have added a waypoint to a route.


A search in the navigational point database is made according to callsign. To enter a callsign search, press the **SEARCH** FSK button and then enter a callsign name in the field. As the first character of the WPT callsign is entered (by default, a 00001 string is used for the callsign), the field is cleared. To switch to the next character position, right click the cursor manipulator.

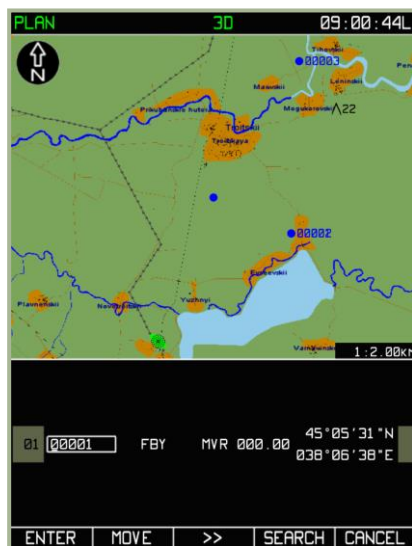
Attention! To correctly select the WPT from the database, it may be necessary to enter ALL the callsign characters!

If you have switched from the first character position to the next without changing it, the field you are editing will be left intact. When a WPT is selected in this manner, only the

WPT OVER field can be edited in the flight information area. Press the **SEARCH** FSK button a second time to save the WPT.

Use the following procedure to add a WPT by use of callsign:

1. Press the **DRAW** FSK button and the screen will display the map with a green colored box marker on it - , a grey field with WPT information appears in the flight information area.
2. Press the **ADD** FSK button after moving the marker with the cursor manipulator control. If there is a navigational point under the marker, it will be automatically included in the route. In case of an unintentional WPT input, press the **CANCEL** button.



7-33: MENU/PLAN sub-mode with available SEARCH function

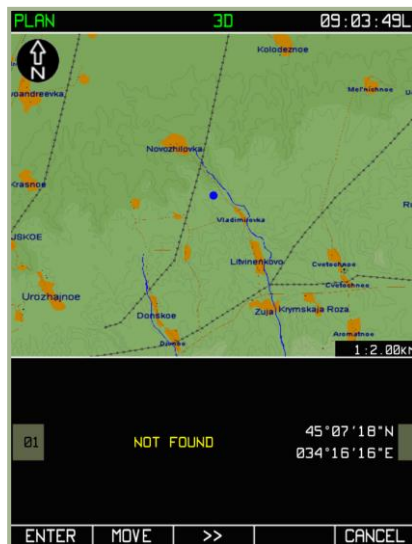
3. Press the **SEARCH** FSK button and in the WPT (name) callsign field (box with blinking cursor) enter a full callsign.



-

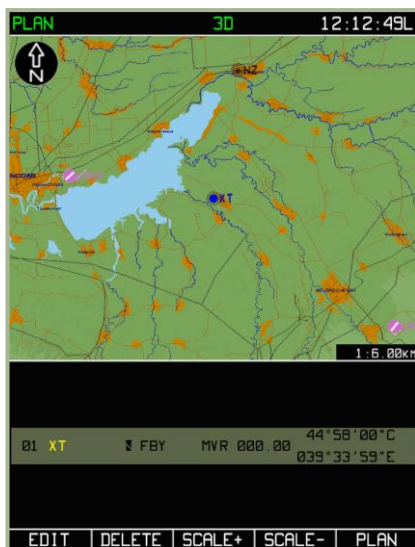
7-35: MENU/PLAN sub-mode display after successfully completing a navigational point search by use of callsign

- The navigational point was not found. In this case, the screen displays "NOT FOUND" message. The appearance of the message could be the result of the callsign not existing in the navigational point database or an error in the callsign input.



7-36: MENU/PLAN sub-mode display when callsign is not found in database

5. To complete the procedure of adding a WPT, press the **ENTER** FSK button.



7-37: MENU/PLAN sub-mode after waypoint has been saved

Editing a waypoint's properties:

After you have created a waypoint and entered it, you can always go back and edit its parameters. To do so, select the waypoint and press the **EDIT** FSK button. This will display the pop-up window; from this, select the **EDIT** option by rotating the cursor manipulator to the **DRAW** option. Upon doing so, you will be returned to the editing page for that waypoint.

In addition to editing the initial properties, you can also select **SPEED**, **VNAV**, **METEO** and **FUEL** from the **EDIT** sub-menus.


When you have a route consisting of multiple waypoints, you may rotate the cursor manipulator to cycle between the waypoints. The currently selected waypoint will have its entry line shaded in blue.



7-38: MENU/PLAN/EDIT sub-mode

Editing a waypoint's location:

If you wish to adjust the coordinates of a waypoint, use the following procedure:

- From the main **PLAN** sub-mode page, press the **EDIT** FSK and then select the **DRAW** option from the pop-up menu.
- Select the waypoint you wish to edit (rotate cursor manipulator control when you have more than one waypoint in the route).
- Press the **EDIT** FSK button and then select the **EDIT** sub-mode option.
- Press **MOVE** FSK button. At this stage, a cursor in the form of a green box will appear over the waypoint you have selected .
- Use the cursor manipulator to adjust the coordinates of the waypoint. Note that green lines will connect the new waypoint position to the waypoints before and after it in the route.
- When you adjusted the waypoint's location to your satisfaction, press the **ENTER FSK** button to finalize the adjustment.

The coordinates of new position WPT and ranges are calculated automatically.

If it is necessary to correct parameters of another route point (leg), repeat the procedure detailed above.

Note that this function will not work for waypoints assigned to airfields or beacons

Deleting a waypoint:

After you have added a waypoint to a route, you can always delete it. To do so:

- From the **PLAN** sub-mode page, press the **EDIT** FSK and then select the **DRAW** option from the pop-up menu.
- Select the waypoint you wish to delete (rotate cursor manipulator when you have more than one waypoint in the route).
- Press the **Delete** FSK button to remove the selected waypoint from the route.

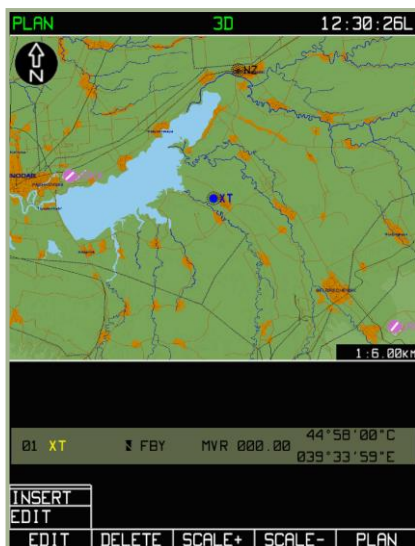
After this is done, the selected waypoint point will be deleted from the route and its graphic representation will disappear from the map. The graphic representation of the route will change to suit the new succession of waypoints.

If it is necessary to delete several route points, repeat the operations described above.

Inserting a new waypoint in route:

Whereas a WPT is a single geographic point, a route is a collection of two or more waypoints linked together sequentially. Each WPT is represented by a blue dot and connecting them will be a blue line. This is the course line between them.

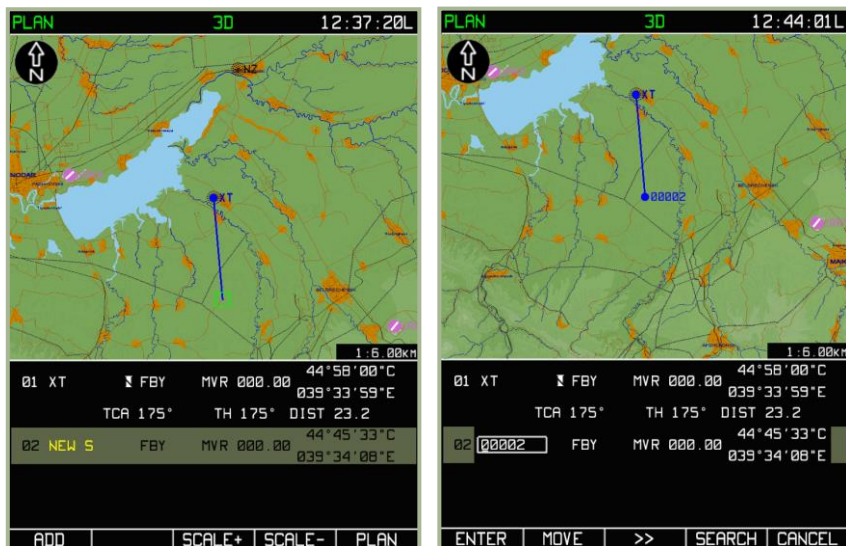
Once you have created your first WPT as described above, you now need to add a second to make an actual route. To do so, first press the **EDIT** FSK button from the **PLAN** sub-mode page and then select **DRAW** from the pop-up window. Next, press the **EDIT** FSK button and then select the **Insert** option from the pop-up menu. This will allow you to add a waypoint in succession after the waypoint you currently have selected.



7-39: MENU/PLAN/EDIT sub-mode to add a new waypoint to route

After you select the **Insert** sub-mode option, you will see a green box over the currently selected waypoint. Use the cursor manipulator control to move the box. The location of this box will determine the coordinates of the new waypoint you are inserting into the route. If the new waypoint is entered in the middle part of a route, the previous waypoint will shift upwards. Note that a blue line will connect the current waypoint to the green marker box. When you have placed the marker at the desired location of the next waypoint, press the **ADD** FSK button.

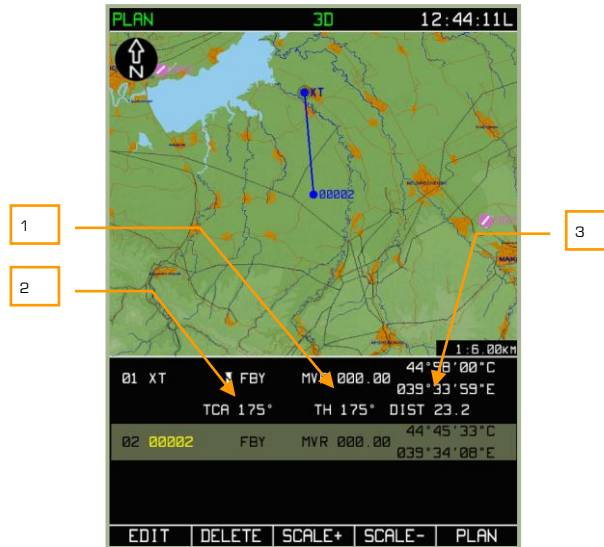
After having placed the new waypoint, you can then assign it its properties.



7-40: Inserting new WPT in the MENU/PLAN sub-mode

7-41: Editing new WPT in the MENU/PLAN sub-mode

Pressing the **ENTER** FSK will return you to the initial waypoint insertion list. You may rotate the cursor manipulator to cycle selection of all the waypoints in the route. In this manner, you may repeatedly add waypoints to a route to create a route plan from start to finish. You can also go back at any time and select any of the route waypoints for edit.



7-42: MENU/PLAN sub-mode view after WPT has been added to route

When there is more than one waypoint in a route, the ABRIS will provide additional information concerning legs and the entire route.

1. ACFT True Heading on the route leg - TH
2. True Track Angle - TCA
3. DiStance between the WPT - DST

When the next WPT is entered in the middle part of the flight information, the previous one is shifted upwards. An additional information line appears between them and contains TCA, TH, and DST.

Return to the Initially Activated Route

If the route is altered during a sortie (the mission editor-created route is corrected or replaced with a new one), and it becomes necessary to return to the mission editor route, you can use the following procedure:

- Select the **PLAN** sub-mode page and press the **SELECT** FSK button
- From the pop-up menu, select the **REVISE** option and press the **SELECT** button again
- Press the **ACTIV** FSK button



7-43: Return to the Initially Activated Route

Editing a waypoint's data for route calculations

In addition to setting a waypoint's initial properties such as name, WPT OVER type, magnetic declination, point type and coordinate, you may also enter data to assist in route calculations. This includes:

- Time of departure from the IWP and the aircraft's true airspeed on the route legs.
- Flight altitude on the route leg (flight altitude on the route leg and distance from/to the WPT).
- Weather information on the route legs (wind speed and direction, air temperature on the planned flight level).
- Data on the amount of fuel and fuel flow on the route legs.

MENU/PLAN/SPEED Sub-mode

For prepared route legs, press the **EDIT** FSK button from the **PLAN** sub-mode page, and from the pop-up menu, select the **SPEED** option. Then press the **EDIT** FSK button. The screen will now display information fields containing data on each of the flight legs:

- Waypoint number that marks the start of each leg
- Waypoint callsign
- True airspeed on the flight leg
- Route leg length

- Time enroute on the route leg
- Estimated time of arrival at each waypoint



7-44: MENU/PLAN/SPEED sub-mode menu



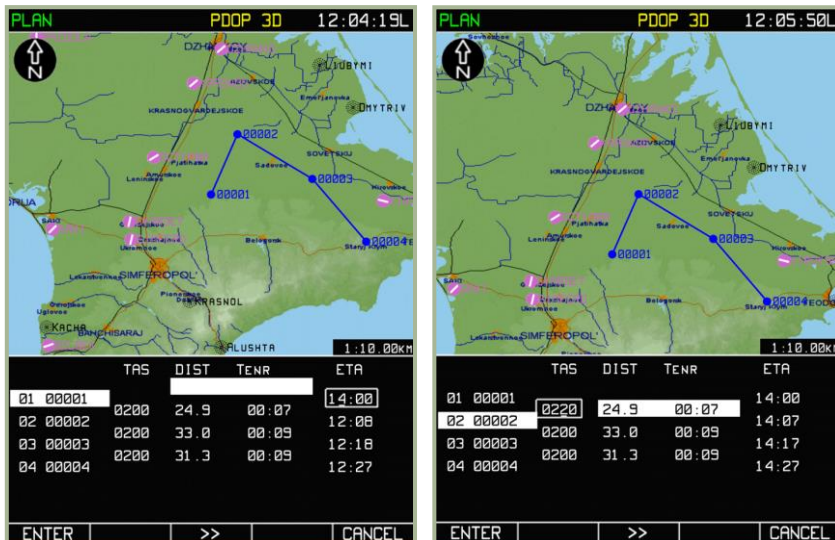
7-45: Entering the time of departure from the IWP and true airspeed

1. TAS

2. WPT callsign
3. WPT number
4. Leg length
5. WPT time flight
6. Departure time / Predicted WPT OVER time

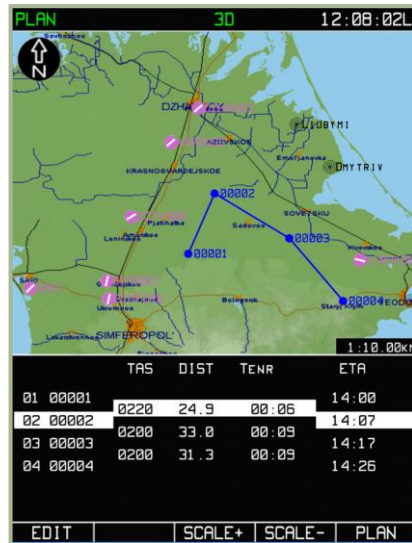
To cycle between legs, rotate the cursor manipulator. When you have selected the leg you wish to edit, press the **EDIT** FSK button. To change the value of the departure time for the IWP or TAS on the route leg, rotate the cursor manipulator (to select a parameter, press the knob axially or use the **EDIT** button). To save the leg edits, press the **ENTER** FSK button. To exit from the **SPEED** sub-mode, press **PLAN** FSK button.

The automatically calculated values are re-calculated after each value change. As the TAS value is changed on one of the route legs, the ETA value is automatically adjusted for all of the later legs.



7-46: Entering time of departure from the IWP

7-47: Setting TAS values for 01 to 02 leg

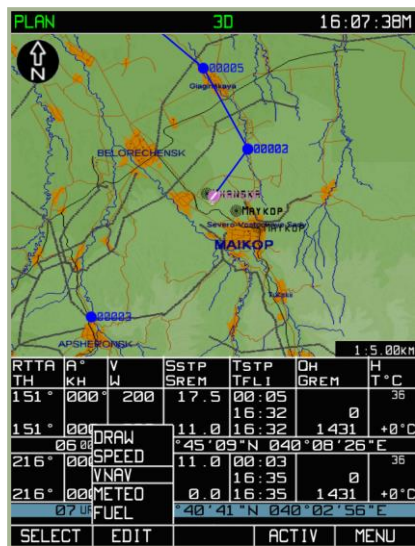


7-48: View SPEED sub-mode with values entered for time of departure and TAS for route legs

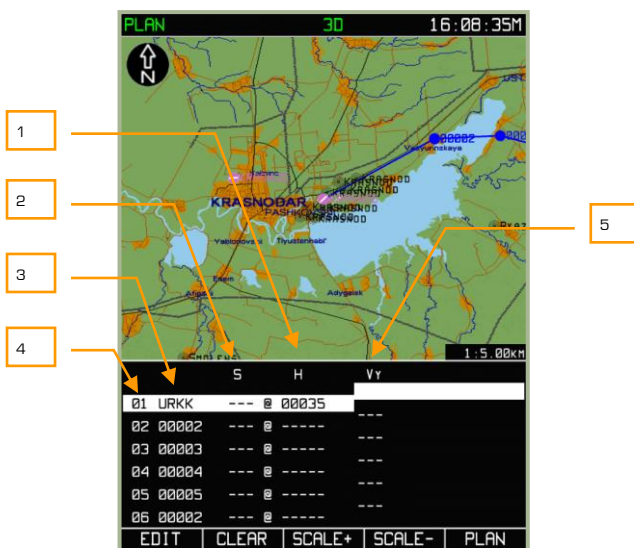
MENU/PLAN/VNAV Sub-mode

This sub-mode allows you to set the aircraft's leg vertical airspeed (in meters per second $-V_y$ m/s), altitude of leg, (in meters - H_m), and the leg distance to/from the waypoint (in kilometers - S_{km}).

To access the **VNAV** sub-mode page, press the **EDIT** FSK button from the main **PLAN** sub-mode page and select the **VNAV** option from the pop-up menu. Press the **EDIT** FSK button again to enter the page. The bottom part of the screen will display information boxes for entering the altitude values and distances from waypoints.



7-49: Selecting MENU/PLAN/VNAV sub-mode



7-50: MENU/PLAN/VNAV sub-mode page

- Waypoint altitude
- Distance from/to WPT. ("-" to reach the altitude "S" km before the WPT, "+" to reach the altitude "S" km after the WPT OVER
- WPT callsign
- WPT number
- Vertical speed

The information field displays the following boxes:

- Information** – Waypoint number and callsign
- Entered by the operator** – Distance from waypoint and route leg altitude
- Automatically calculated from entered values** – Aircraft vertical speed

As values are entered, the ABRIS automatically plots a rectilinear profile of climb or descent from the leg start WPT to the leg end WPT. The start point is the initial leg WPT where the flight altitude is set (H_k). The end point is the terminal leg WPT, the distance from/to it (S_{km}) and the sign of this distance ("-" to reach the altitude "S" km before the WPT, "+" to reach the altitude "S" km after the WPT OVER) is taken into account. A profile with a permanent gradient is plotted from the start point to the end point. After pressing the **ENTER** FSK button, the ACFT VERTICAL SPEED - V_y m/s, is automatically calculated and displayed – white if the value does not exceed the rated value set in the ACFT PERF and yellow if the value is exceeded.

The entered flight information is used in the VERTICAL NAVIGATION sub-mode for calculating the CLIMB and DESCENT points. This sub-mode is available in-flight from the FPL mode.

Use the following procedure for entering values:

To enter S_{km} and H_m values, use the cursor manipulator to select a line for editing, either press the cursor manipulator axially or press the **EDIT** FSK button. To switch to the next character, press the cursor manipulator axially, and to start editing of the next field, press the **►►** FSK button. The value is recorded in the plan after pressing the **ENTER** FSK button. After this is done, the flight altitude fields are filled in automatically, from the current field to the route terminal point.



7-51: Entering flight altitude values for the first waypoint

7-52: Results of automatic filling in of flight altitude fields on the route legs

This mode enables you to reach an altitude (at a constant vertical speed) over several waypoints without using a stepped process. To reach an altitude at a constant vertical speed, follow these steps:

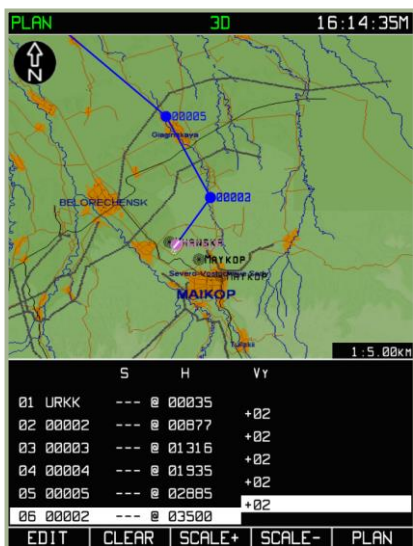
1. Enter a value in the H_m field of the route leg that you wish to start the altitude planning from.
2. Use the cursor manipulator to switch the active field to the next leg and press the **CLEAR** FSK button. Perform this operation successively for the entire intermediate route legs that require altitude planning.
3. For a route leg where the set altitude will be reached, enter its value.
4. Press the **ENTER** FSK button and the screen will display the calculated flight altitudes for the route legs and vertical speeds.



7-53: Clearing flight altitude values for the intermediate altitudes

7-54: Input of the final desired altitude

This will result in calculating the vertical speed needed to reach a desired altitude. If the aircraft PERF values are exceeded, the altitude values will be shown in yellow.



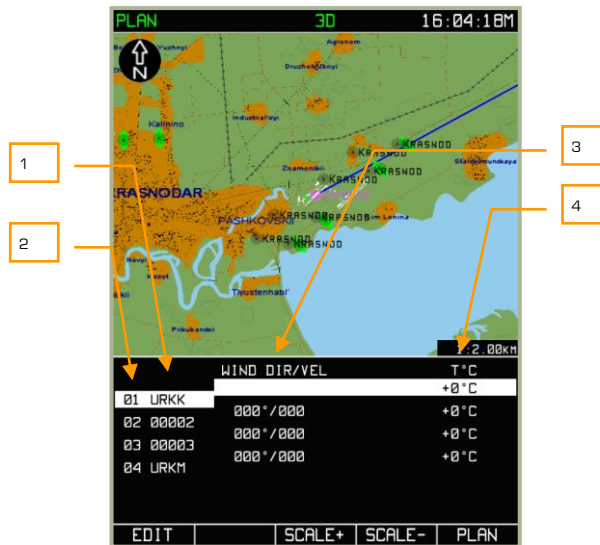
7-55: Results of automatically reaching the set altitude without steps

MENU/PLAN/METEO Sub-mode

This PLAN/METEO sub-mode is intended for entering weather data along the planned route. The entered values are used to calculate the predicted aircraft ground speed and flight time between legs of the route. To view this sub-mode, select the PLAN sub-mode and press the **EDIT** FSK button. Select **METEO** from the pop-up menu and press the **EDIT** FSK button.



7-56: Selecting the METEO sub-mode from MENU/PLAN sub-mode



7-57: MENU/PLAN/METEO sub-mode page

1. WPT callsign
2. WPT number
3. Wind direction / speed
4. Ambient air temperature

In the data fields, you may enter the wind direction, wind speed, and ambient air temperature T°C for each of the route legs. To edit a route leg, select a waypoint with the cursor manipulator and press the **EDIT** FSK button (or axial press on the cursor manipulator knob). To change the values of a leg, you can use the ►► FSK button to cycle between fields, press the cursor manipulator to cycle between characters within the field, and then rotate the cursor manipulator to adjust the character values. Once you have made all your edits to a leg, press the **ENTER** FSK to enter your changes.

To exit from the **METEO** sub-mode, press **PLAN** FSK button.



7-58: Example of entering ambient temperature value

7-59: Result of modifying METEO data value in MENU/PLAN/FUEL Sub-mode

MENU/PLAN/FUEL Sub-mode

The FUEL sub-mode allows you to input data on the fuel quantity and fuel flow during the flight along the planned route. The entered values are used to calculate remaining fuel after each leg in the route is passed. To view this sub-mode, press the **EDIT** FSK button from the main **PLAN** operating page, and then select the **FUEL** option from the pop-up menu. With **FUEL** selected, press the **EDIT** FSK a second time or press the cursor manipulator.

The flight information area displays leg-lines containing the following fields:

- **Information:** WPT number, WPT callsign, and time enroute on the leg.
- **Editable:** Fuel quantity at the IWP (REM kg - kilogram) and predicted fuel consumption on the route legs (FUEL CON - kilograms per hour).
- **Calculated:** Predicted fuel remaining when passing a WPT (REM kg - kilogram).

With the input of data on the amount of fuel at the IWP and predicted fuel flow on the first leg of the route, the following calculations are performed:

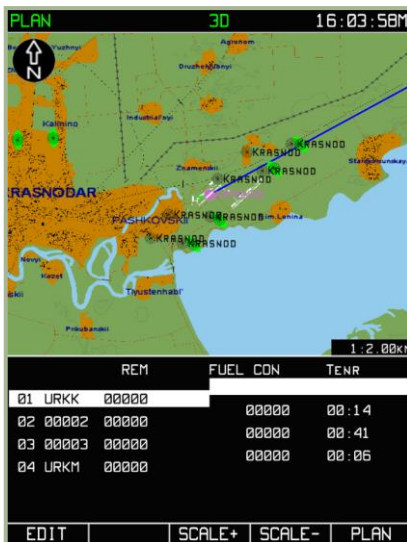
- All the FUEL CON boxes of all the route legs are automatically filled in.
- Fuel remaining is calculated for the passing of each WPT.

If it is necessary to specify the predicted fuel flow for the route legs, the remaining fuel for each WPT cannot be edited. A yellow color is used to display zero calculated values of fuel remaining.

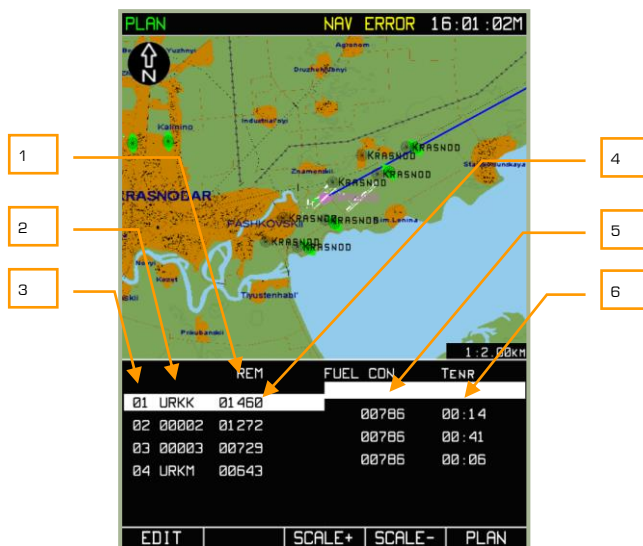
Rotate the cursor manipulator to select a leg-line and then press the **EDIT** FSK button to enter values. To cycle characters within an edit field, right click the cursor manipulator and rotate it to cycle character values. When you have finished your edits to a leg-line, press the **ENTER** FSK button to enter your changes. To exit the **FUEL** sub-mode, press the **PLAN** FSK button.



7-60: Selecting FUEL sub-mode from MENU/PLAN/FUEL



7-61: FUEL sub-mode



7-62: MENU/PLAN/FUEL sub-mode after being updated with fuel quantity and predicted flow

1. Fuel quantity in the IWP
2. WPT callsign
3. WPT number
4. Predicted remaining fuel residual after passing of WPT
5. Predicted fuel flow on the route leg
6. Time enroute on leg

Saving a route to ABRIS RAM

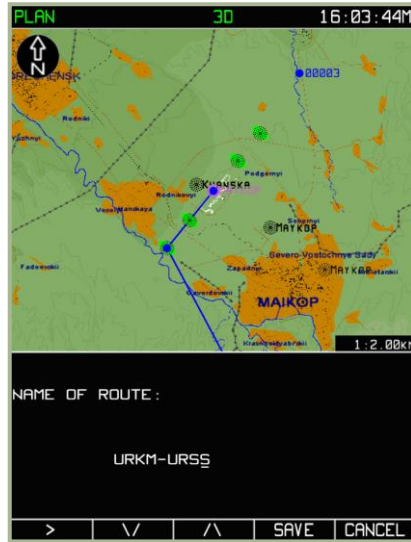
ABRIS RAM stores a route consisting of:

- Route WPT's (IWP's, FWP's, WPT's)
- True airspeed values, flight altitudes, fuel quantity, and fuel flow per leg

Use the following procedure to save a route:

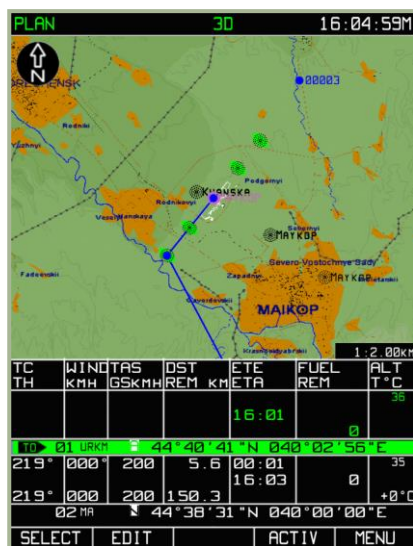
1. When you wish to save a newly created or modified route, press the **SELECT** FSK button from the **PLAN** sub-page.
2. By rotating the cursor manipulator knob, highlight the **SAVE** option and press the **SELECT** FSK button.
3. At the bottom of the display, "NAME OF ROUTE" is shown. Below that is a field in which you can enter a name for the route.

4. Use the cursor manipulator, Δ , ∇ buttons and \triangleright to enter the ROUTE NAME as you wish.
5. Press the **SAVE** FSK button to commit the route to the ABRIS RAM memory. The screen will switch to the **PLAN** sub-mode page where a saved navigation table appears below the map. The active marker will be positioned on the IWP.



7-63: Selecting SAVE sub-mode

7-64: View of the display with changes made in the ROUTE NAME



7-65: View of the display after the end of the ROUTE saving procedure

The above **SAVE** procedure will save the route plan into ABRIS RAM memory. If however you save the route plan into the ABRIS permanent database (i.e. your hard drive), you will have the ability to load it the next time you fly the same mission. To do so, please see the previous section of this manual regarding MENU/CTRL/SETUP/DTB.

Route activation (ACTIV)

A newly created, modified, or loaded from the database route needs to be ACTIVATED if it is to be used in current navigation calculations.

To switch from planning (PLAN) mode to flight mode (the mode whereby the current navigational information is calculated, displayed and outputted to the interfaced systems, after the route has been prepared and loaded), you should:

1. In the **PLAN** sub-mode page press, press the **ACTIV** FSK button. The ABRIS will then switch to the **NAV** operating mode.
2. The **NAV** page displays the following:
 - Current route on the map (initial leg with the IWP).
 - Current navigational parameters in the left part of the flight information area.



7-66: MENU/PLAN sub-mode view prior to activation

Route Loading

The ABRIS database can store routes prepared by operators using the ABRIS while on board the aircraft. To load a route, use the following procedure:

Select the **PLAN** sub-mode and press the **SELECT** FSK button. A pop-up menu containing available route handling operations will appear over the button.

Attention! Before loading a route, be sure to use the **UNLOAD** option to remove the current route. Remember to press the **SELECT** FSK button after selecting **UNLOAD** to clear the route.

After the current route has been unloaded, use the cursor manipulator to highlight the **LOAD** option and then press the **LOAD** FSK button. The screen will display a list of routes saved in the database. Note that routes can only be saved to the database through the MENU/CONTROL/SETUP/DTB process discussed earlier.

Use the cursor manipulator to highlight the name of the route to be loaded.

Press the **LOAD** FSK button and the route will be loaded from the ABRIS database.

After the route has been loaded for viewing, the IWP will be centered on the map, and in the route table located below the map, the line corresponding to the IWP and the first route leg will be highlighted. When the cursor manipulator is rotated, the next WPT will be selected and this will move the center of the map to correspond with that waypoint location.

Attention!
Before using a loaded route as your operating one, remember to first activate it.



7-67: Selecting MENU/PLAN/LOAD sub-mode

7-68: Selecting route to load

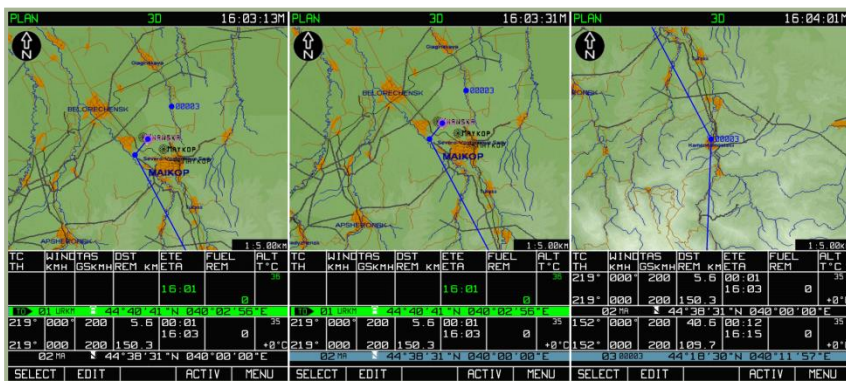


7-69: PLAN sub-mode after route is loaded

Route Viewing

A prepared or loaded route is always available for viewing. To do this, use the following procedure:

1. Press the **PLAN** FSK button when in the **MENU** operating mode. If the viewing is done when a route is active, the active plan is automatically loaded for viewing.
2. To view waypoints included in the route, move the active marker by using the cursor manipulator control. It is possible review the entire route, waypoint by waypoint (from the route initial to the route terminal point), checking the following for each route leg:
 - Point location on the map
 - Topographic and aeronautical terrain features along the route
 - Text (numeric) parameters of the route points and legs



7-70: Viewing first three waypoints of route

In this mode, it is possible to edit the route. If the route being viewed has been edited, it is advisable to record a new route version to the system database.

To exit the **PLAN** sub-mode, press the **MENU** FSK button.

Inverting a Route

Inverting a route allows you to swap the route terminal and initial points. Route inverting is only applicable to a non-activated route.

To invert a route:

1. Press the **SELECT** FSK button from the **PLAN** sub-mode.
2. Use the cursor manipulator to select the **INVERT** option and then press the **SELECT** FSK button.
3. The display will then display the inverted route.



7-71: Loaded route before inverting

7-72: Selecting MENU/PLAN/INVERT sub-mode



7-73: Result of inverting route

The inverted route can be subjected to all the operations for route editing and saving in the ABRIS database.

Deleting a Route

Routes that are deemed of no further use can be deleted from the database. To do so:



7-74: Selecting MENU/PLAN/Delete function

7-75: Selecting route for deleting

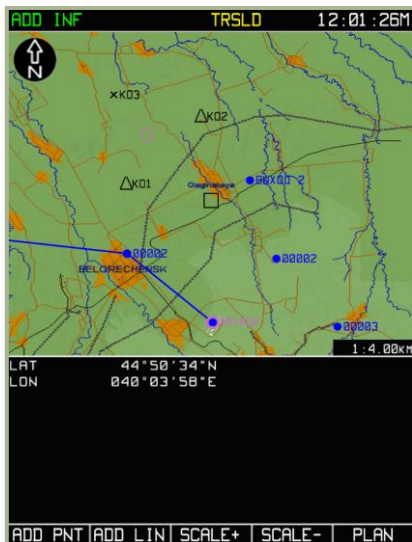
1. Press the **SELECT** FSK button from the **PLAN** sub-mode.
2. Use the cursor manipulator to select the **Delete** option and then press the **SELECT** FSK button.
3. From the **Delete** sub-mode page, use the ∇ , Δ FSK buttons or the cursor manipulator control to select the route to be deleted with the active marker and press the **Delete** FSK button. Should it become unnecessary to delete the route, press the **CANCEL** FSK button instead of **Delete**.
4. To exit the **Delete** sub-mode page, press the **CANCEL** FSK button.

Adding and editing map points (DIRECTLY mode)

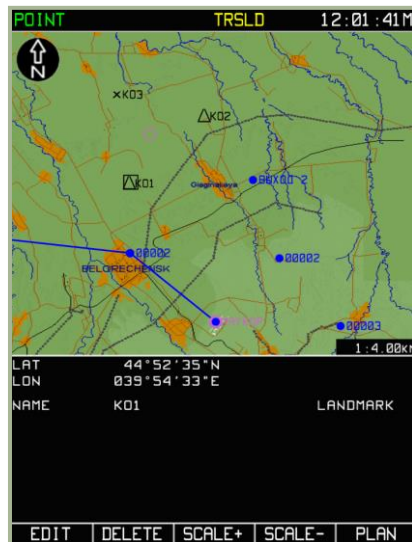
To help denote important point locations on the moving map like targets, landmarks, airfields, etc., you may add map points with labels to the map. This can be a useful tool for marking friendly positions, enemy positions, and battle positions (BP) prior to taking off.

To add and edit map points, press the **SELECT** FSK button from the **PLAN** sub-mode and then select the **ADD INF** (add information) option from the pop-up menu.

Move the black box marker to the location you wish to place a map point and then press the **ADD PNT** FSK button. From the pop-up menu, select **DIRECTLY** and press the **ADD PNT** FSK again or press the cursor manipulator control. If the cursor is over an existing map point, an **EDIT** FSK button will be displayed instead. By pressing the **EDIT** FSK button, you can modify the data entered for an existing map point.



7-76: Marker positioned to create a new map point



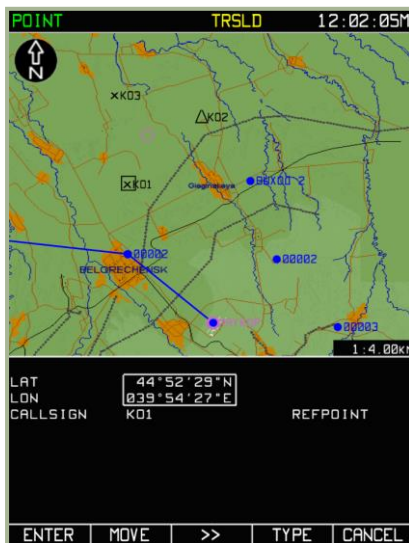
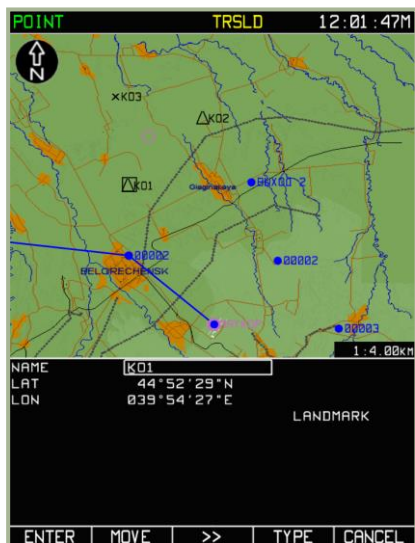
7-77: Marker positioned to edit an existing map point

To change type of map point, press the **TYPE** FSK button to cycle through your choices – AIRPORT, NDB, LANDMARK, OBSTACLE, REFPOINT, or VOR.

PARAMETER	POINT TYPE					
	VOR	ARP	NDB	LANDMARK	OBSTACLE	INT
Name	+	+	+	+	+	
Latitude	+	+	+	+	+	+
Longitude	+	+	+	+	+	+
Callsign	+		+			+
Band	+		+			
Altitude	+	+	+		+	
Display symbol	V	A	N			I

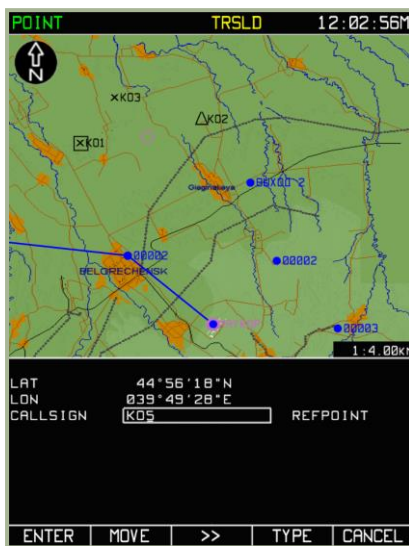
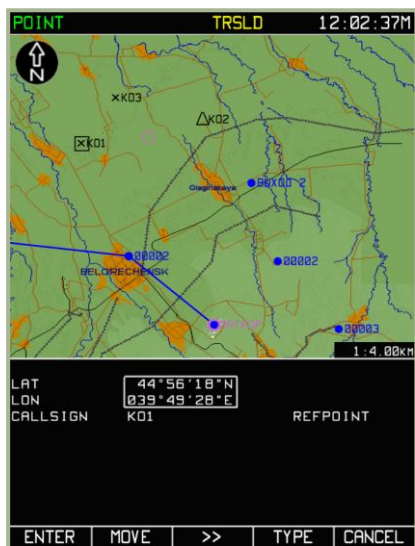
Note: Plus (+) sign is used for marking parameters characterizing concrete point types.

Below the map are three fields that you can edit. Use the ►► FSK button to cycle between the three fields – NAME, Coordinate, and ALTITUDE. Use the cursor manipulator to edit the active line.



7-78: Entering name of map point

7-79: Entering coordinate of map point



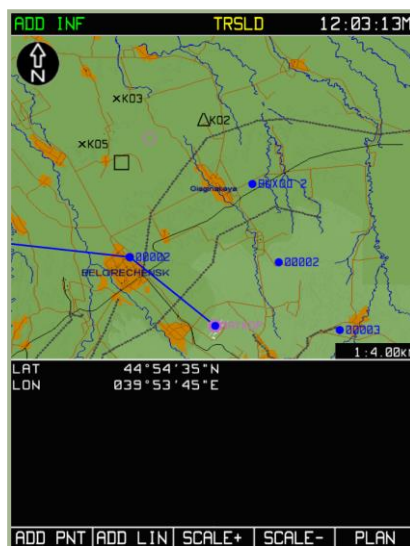
7-80: Moving a map point

7-81: Editing callsign

In map point **EDIT** mode, a **MOVE** FSK button is available. To move a map point, press the **MOVE** FSK button and move the map point with the cursor manipulator.

To delete a map point, place the cursor over the map point you wish to remove and press the **Delete** FSK button.

Once you have finished creating a new map point, or editing an existing one, press the **ENTER** FSK button.



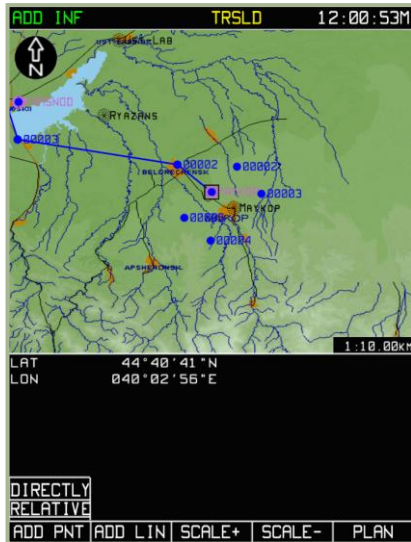
7-82: ADD INF sub-mode page after pressing ENTER FSK button

Adding and editing map points (RELATIVE mode)

To save map points into the ABRIS database, please review the earlier section of this manual regarding the MENU/CTRL/SETUP/DTB functions. You can add map points using known bearing and range (RELATIVE mode).

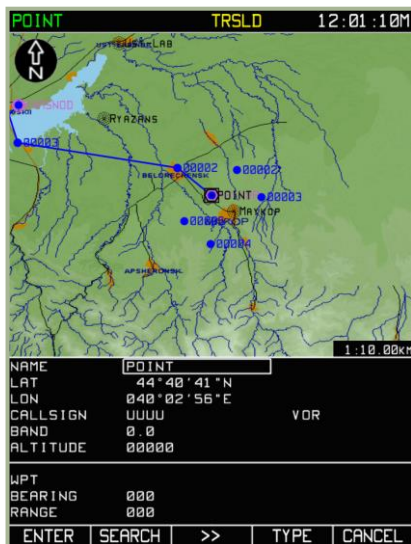
This mode is used to create a navigation point from the database that's bearing and ranges are known.

From the **ADD INF** sub-mode option, press the **ADD PNT** FSK button. Use the cursor manipulator to highlight the **RELATIVE** option line and then press the **ADD PNT** FSK button. The flight information area will be displayed and divided into top and bottom parts. The top part contains information on the new navigation, whereas the bottom part shows information on a point available in the database.



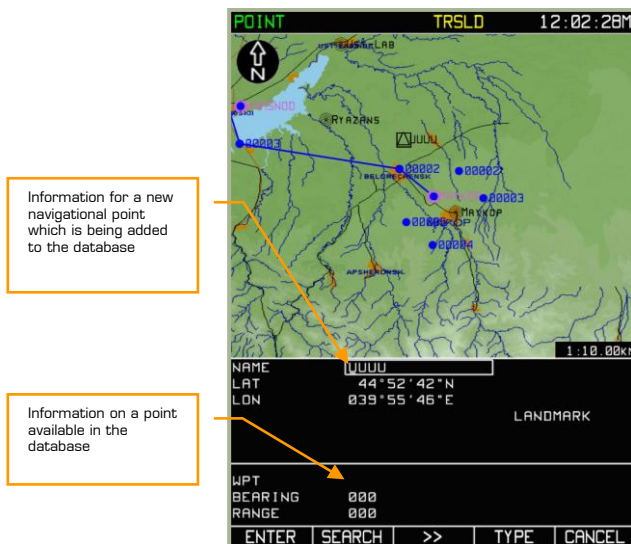
7-83: Plot point by known azimuth and range (RELATIVE) mode

Use the **TYPE** FSK button to select the point type. Then use the ►► FSK button to cycle between the active lines for the new navigation point properties and use the cursor manipulator control to adjust the values.

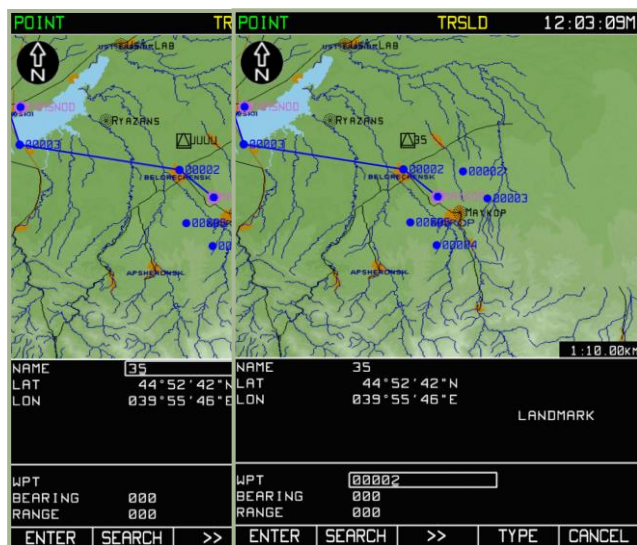


7-84: Selecting navigation point with TYPE button

Use the ►► FSK button to switch to the WPT line in the bottom section of the information window and enter a name of the WPT that you will be setting BEARING and RANGE from to calculate the point coordinates. Use the ►► FSK button and the cursor manipulator to enter values from the selected point in the BEARING and RANGE data boxes. When entering the bearing and range values, pay attention to the measurement units (i.e., if the BEARING is true or magnetic, if the RANGE uses kilometers or miles).

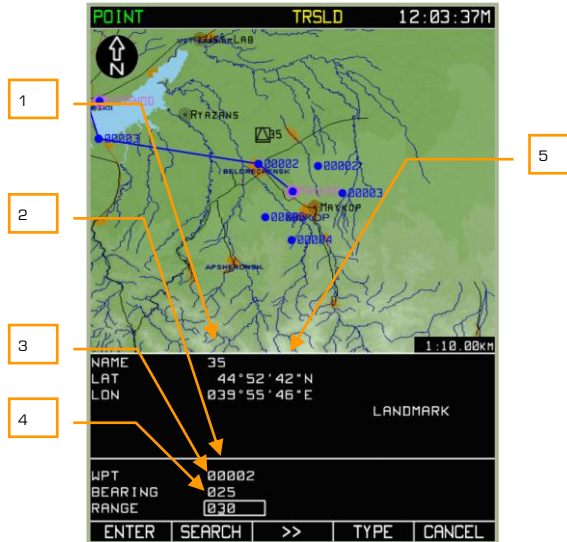


7-85: Active lines for filling



7-86: Entering callsign of a new (added) navigation point

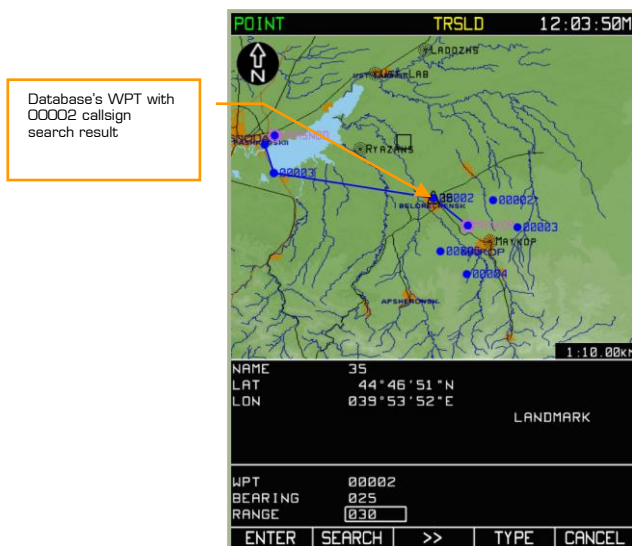
7-87: Input callsign of a navigation point available in the database



7-88: Entering values of BEARING and RANGE from the navigation point available in the database

1. Name of new point
2. Callsign of database reference point for plotting of new point with entering bearing and range
3. Bearing from reference point
4. Range from reference point
5. Coordinates of cursor

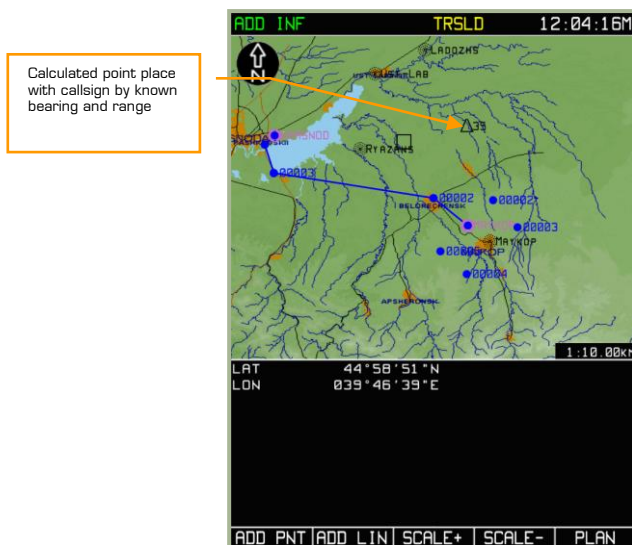
Press the **SEARCH** FSK button. If the wrong WPT was found, continue pressing the SEARCH button until the desired WPT is found.



7-89: Result of searching the database point for plotting of new point with entered bearing and range

A current marker of the point will be placed over the searched database point.

Press the **ENTER** FSK button and a marker of the point with its callsign will appear on the map at the calculated location corresponding to bearing and range.



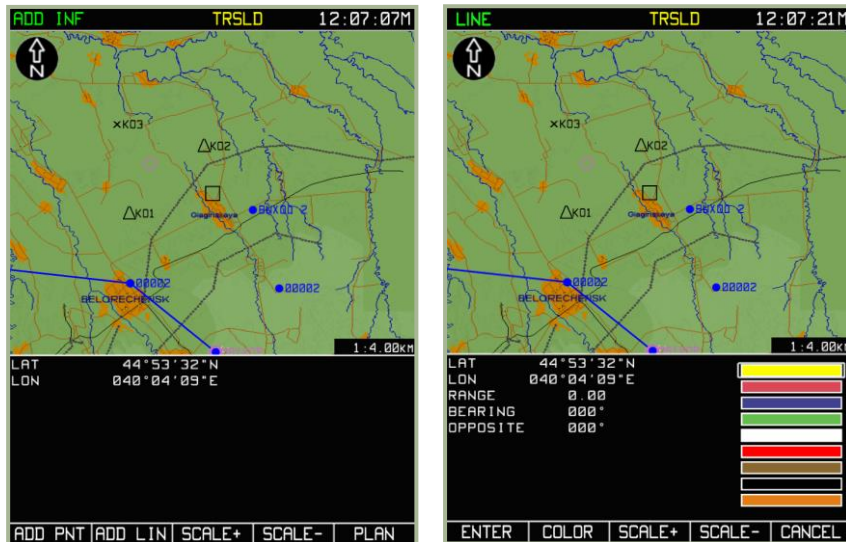
7-90: Display of calculated point by known bearing and range

Adding and editing map lines

Lines can be plotted on the map to denote phase lines, free-fire areas, FEBA, etc.

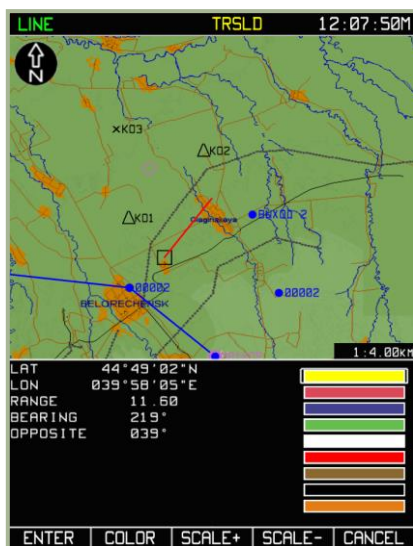
To create a map line, or geometric figure formed by straight line segments, use the following procedure:

1. Press the **SELECT** FSK button from the **PLAN** sub-mode page and select the **ADD INF** option from the menu. Press the **SELECT** FSK button again.
2. Use the cursor manipulator to move the black square cursor to the map location where you want the line to start and press the **ADD LIN** FSK button.
3. The screen will now display the **LINE** page and the flight information area will display the line start coordinates, parameters characterizing the line to be plotted, and the line color list. By pressing the **COLOR** FSK button, you can select the line color.
4. Using the cursor manipulator control, move the cursor to where you want the line to end and press the **ENTER** FSK button. A line will now be drawn between the two ends. You can repeat this process to create multi-jointed lines or polygons.
5. If you wish to exit the mode without entering data into the database, press the **CANCEL** FSK button without pressing the **ENTER** button.

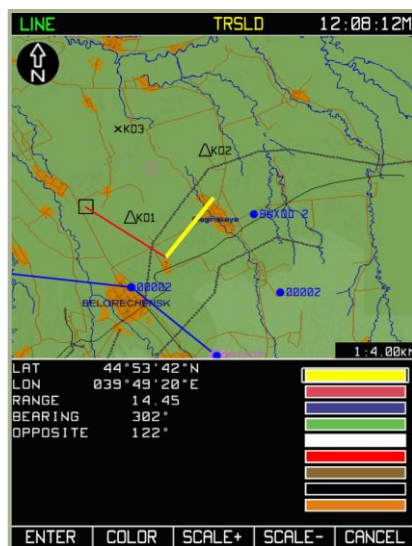


7-91: Selecting ADD LINE function

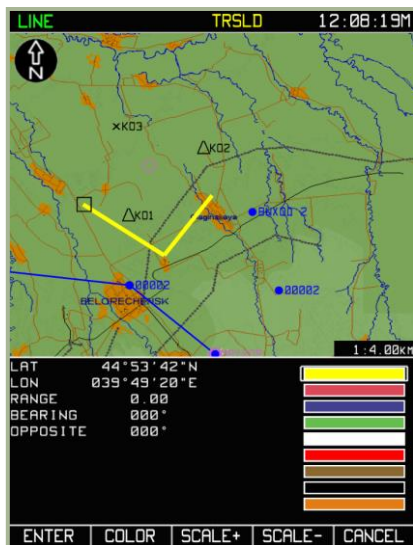
7-92: View of LINE page



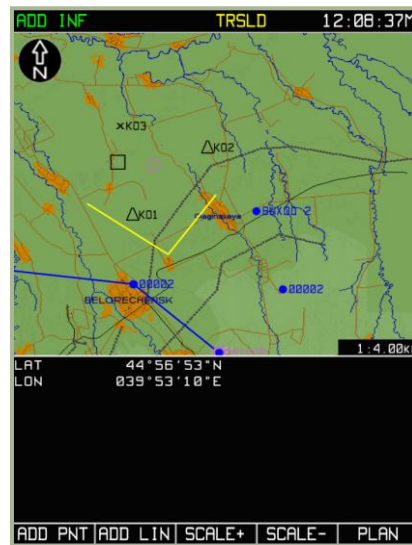
7-93: Plotting first line segment



7-94: Plotting second line segment



7-95: Press ENTER button after second line segment plotted



7-96: End of line plot, after CANCEL button

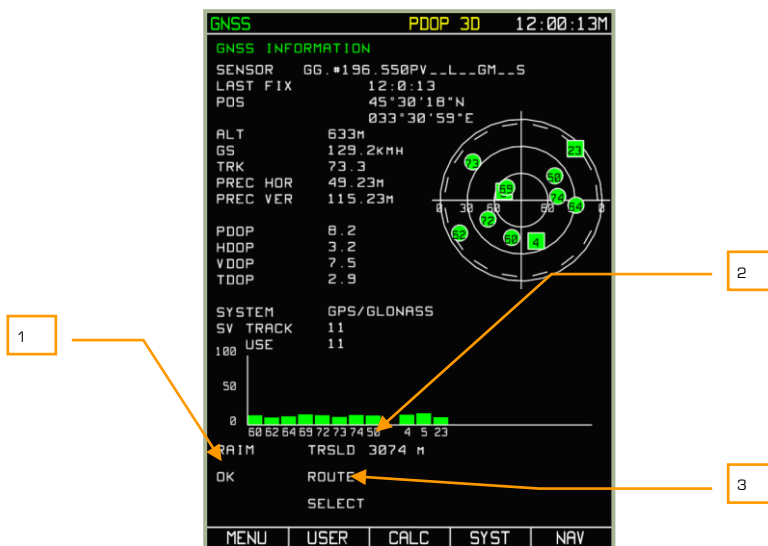
When it is necessary to plot several lines that are not connected with each other, perform the procedure for plotting one line; press the **CANCEL** FSK button, and repeat the procedure for the second line, press **CANCEL** button, etc.

To save map lines into the ABRIS database, please review the earlier section of this manual regarding the MENU/CTRL/SETUP/DTB functions.

MENU/GNSS Sub-mode



The Global Navigation Satellite System (**GNSS**) sub-mode of the **MENU** operating mode is intended to assess the status of the satellite navigational system (number of tracked and processed satellites, geometric factor, signal/noise ratio for each of the processed satellites, etc.). In this sub-mode, the following is shown on the display:

- Current time
- Type and serial number of the NAVSTAR/GLONASS sensor
- Time value received from the satellite constellation
- Geographic coordinates
- Ellipsoid height
- Ground speed
- Actual track angle
- Predicted absolute accuracy of aircraft position along the horizontal and vertical components
- Probability characteristics of aircraft position accuracy
- Information on the satellite constellation and the current satellite usage mode
- Position of satellites shown graphically and a graphic presentation of the signal/noise ratio from the satellites in use
- Receiver Autonomous Integrity Monitoring (RAIM) status that includes a qualitative assessment of the positioning accuracy and the results of assessing the satellite constellation status by the built-in GNSS sensor monitoring system. This is the threshold value used for calculating the probability assessment of the positioning accuracy. The RAIM assessment is in regards to the current flight phase.



7-97: MENU/GNSS sub-mode display

1. Qualitative assessment of the positioning accuracy and the result of an assessment of the satellite constellation status by the built-in GNSS sensor monitoring system.
2. The RAIM threshold value used to evaluate position accuracy. If the actual RAIM value exceeds the threshold value, the position data is not deemed reliable/accurate and a different satellite may be used.
3. The current flight phase that the RAIM assessment is in regards to.

Within the satellite constellation, GLONASS satellites are displayed with a square symbol , and NAVSTAR are displayed with a round symbol - . Satellites used for calculations are green colored and those that have been excluded from calculations are colored gray. The number in the symbol corresponds to the satellite number within the constellation.

You can manually set the required RAIM threshold value in the **MENU→OPTIONS** page on RAIM THRS line. To change the value, rotate the cursor manipulator to select the RAIM THRS line item and then press the **CHANGE** FSK button. Then use the > and < FSK buttons to select the character to change and rotate the cursor manipulator to change the character value. Press the **ENTER** FSK button when done. This new value will only be used when the RAIM threshold mode is set to **USER**.

To change the RAIM threshold mode, select the **SELECT THRS** line item and then press the **CHANGE** FSK button to toggle between **USER** and **AUTO**. This can also be done by toggling the **AUTO/USER** FSK button on the **GNSS** page.

When the RAIM threshold mode is set to **AUTO**, the following RAIM threshold values are used:

- In the airfield area (landing approach, takeoff) - 370 m (0.3 NM)

- ROUTE – 3,704 m (2 NM)



7-98: Determining RAIM threshold set by the user

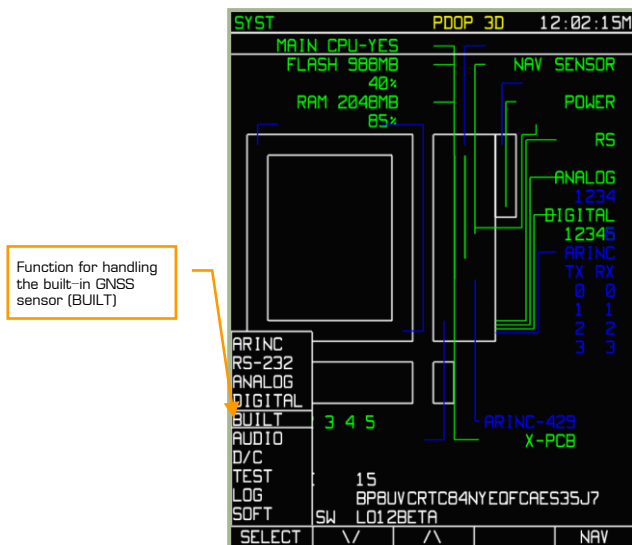
ATTENTION! Changing the factory RS-232C setting parameters may result in a protocol disagreement between the GNSS and ABRIS. The list of factory settings is listed below:

Factory RS-232C port settings for interaction with the built-in GNSS sensor

Parameter	Value
SENSOR	ASHTECH GG12
PORT	BUILT IN
SPEED	19,200
DATA BIT	8
PARITY	NONE
STOP BIT	1
MONITORING	WITH HW FACILITIES
SYSTEM	GPS/GLONASS
PDOP MASK	4.0
RETURN MASK	5 ⁰
EXCL SV	0

If one of the satellites is providing inaccurate data (perhaps due to terrain masking between aircraft and satellite), you can use the following procedure to exclude (or include) satellites from (or into) the group for use:

- Press the **SYST** FSK button from the **GNSS** sub-mode page and the system status page will be displayed.



7-99: Selection of function for handling the unit SETUP

- Select the **SETUP** pop-up menu by pressing the **SETUP** FSK button.
- Use the up and down arrow FSK buttons or rotate the cursor manipulator control to select the built-in GNSS sensor (**BUILT**) sub-mode option. After selected, press the **SELECT** FSK button.
- The screen will now display the SYST with parameter settings for the built-in GNSS sensor – BUILT-IN SENSOR SETUP.
- Use the up and down arrow FSK buttons or rotate the cursor manipulator control to select the EXCLUDE SV line with the highlight box. This line displays the number of the satellite excluded from constellation use. If the value is 0, all the currently visible satellites are used.
- Press the **CHANGE** FSK button and enter the number of the satellite to exclude from calculations. To do so, press the cursor manipulator control to cycle between characters in the field and rotate the control to adjust the value of each character. This number should correspond to one of the satellites visible in the constellation. To exclude the satellite from use in calculations press the **ENTER** FSK button.



7-100: View of the display during the procedure for excluding a satellite from calculations

- Satellites will not be excluded from calculations until you save the values; to do so, select the SAVE AND TEST line by using the cursor manipulator or up and down arrow FSK buttons. The name of the **ENTER** FSK button will change to **TEST**. Press the **TEST** FSK button and in the bottom part of the display, commands for the exchange between the ABRIS and GNSS sensor will be seen. The EXCL indication of a satellite being excluded from calculations appears in the principal operating modes.
- After the test has run for a little while and the change saved, press the **STOP** FSK button.



7-101: SYST page during testing of the GNSS sensor and its communication channel

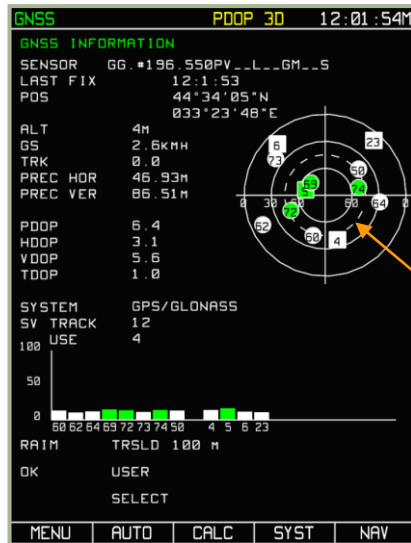
7-102: GNSS page after excluding satellite 73 from calculations

Satellites located below the elevation mask are colored grey, and the elevation mask is indicated on the display as a gray-dashed circle. Satellites located outside this circle are deemed to be masked by terrain elevation.

Use the following procedure to adjust the elevation mask:

- Select the **SETUP** pop-up menu by pressing the **SETUP** FSK button.
- Use the up and down arrow FSK buttons or rotate the cursor manipulator control to select the built-in GNSS sensor (**BUILT**) option. After selected, press the **SELECT** FSK button.
- The screen will now display the SYST with parameter settings for the built-in GNSS sensor – BUILT-IN SENSOR SETUP.
- Use the up and down arrow FSK buttons or rotate the cursor manipulator control to select the **ELEV MASK** line with the highlight box.
- Press the **CHANGE** FSK button and use the cursor manipulator and the ∇ , Δ FSK buttons to set the elevation mask angle. For example, in very mountainous terrain, you may wish to use a narrow angle. Note though that your positioning may revert to 2D from 3D when angle is so wide that too many satellites are being blocked by terrain masking.

The mask value will not be used in calculations until you **SAVE & TEST** the item – **SAVE AND TEST**



Changing the elevation mask to 45 degrees

7-103: GNSS page after changing elevation mask angle

MENU/GNSS/CALC Sub-mode

Calculations (**CALC**) sub-mode is intended to make predictive calculations of RAIM status in regards to navigational route points available through the ABRIS database. The **CALC** sub-mode will compare route points to the satellite constellation expected to be over those points.

Predictive calculation of RAIM status for navigational points through the ABRIS database and viewing of the satellite group almanac is available:

- For current aircraft position (viewing of satellite group almanac only).
- For the airfield destination with prediction of RAIM status taken into account.
- For any airfield available in the ABRIS database.

To view the **CALC** sub-mode page, press the **CALC** FSK button on **MENU/GNSS** sub-page. In **CALC** mode, the display presents information fields similar to that of the **GNSS** sub-page with some exceptions:

- **DESTINATION AIRDROME** – navigational point that the RAIM prediction calculations will be derived for.
- **Estimated Time of Arrival (ETA)** – This field allows you to input the time that the calculations for RAIM prediction should be made for, UTC – stands for Greenwich Time.
- **Position (POS)** – This field displays the geographic coordinates of the aircraft's position that the calculations of RAIM prediction should be made for

(filled in automatically after the navigational point has been found in the ABRIS database).

- **PRAIM ETA** – This field displays the time that the calculations RAIM prediction has been made for (filled in after the calculations have been completed), and it provides a qualitative assessment of the RAIM prediction (YES/NO).

The notation +/- 15 MIN refers to the RAIM prediction table located below. In the calculations, the status of the satellite group is assessed at the moment of arrival at the airfield, and from this moment ± 15 minutes with steps of 5 minutes. The data is displayed in the form of a table. The table cells are filled in with either a green + (plus symbol, in the case of a favorable prediction), or with a yellow - (minus) symbol if the RAIM prediction is unfavorable.

Satellite orbit data in reference to the current aircraft position is performed in the absence of an active route. To view, press the **CALC** FSK button. The following data will be displayed on the screen:

- Indication of constellation viewing in the SENSOR information field.
- Graphic representation of the predicted satellite arrangement from constellation almanac data.

Viewing of the constellation almanac (what satellites will be over a specified coordinate at a given time) for the airfield of arrival, the predictive RAIM status takes into account the entered flight parameters if the following conditions are fulfilled:

- Availability of an active route.
- Availability, among the parameters, of predicted time of departure and predicted true airspeed on the route legs.



7-104: Automatic preparation of data for viewing of the almanac and making RAIM prediction calculations for the airfield of destination

7-105: Viewing the almanac and RAIM prediction for the airfield of destination

If all these conditions are fulfilled, pressing the **CALC** FSK button will display a window for viewing the almanac and making calculations with completed fields. To make these calculations, press the **ENTER** FSK button. The completion of the calculation is indicated by the CALCULATIONS DONE message in yellow at the bottom of the page.

To change the calculation performance time, press the **►►** FSK button and specify the time in the box (only the current date is taken into account), and press the **ENTER** FSK.

The display of the almanac (satellite constellation graphic) and calculations of RAIM prediction for any airfield available in the ABRIS database can be performed in the predictive RAIM mode for the current aircraft position or in the case of RAIM prediction for the airfield of arrival.

To make such calculations, press the **►►** FSK button and switch to the callsign input window. Use the cursor manipulator to enter the callsign of the navigation point you wish to make the prediction for. To select the calculation performance time, press the **►►** FSK button, and in the editing box specify the time (only the current date is taken into account).

For example: Data preparation and calculations for Anapa airfield (URKA) is shown below. In this example, the selected predicted time of arrival is 14:15. Calculations are made after a press of the **ENTER** FSK button. If the source data (navigation point callsign) is correct, the screen will display the results of RAIM predicted calculations. If the navigation point is not found in the ABRIS database, an appropriate yellow NOT FOUND message will be displayed.



7-106: Preparation of data and performance of calculations for Anapa airfield



7-107: Error message that callsign (RRRR) is not a valid ABRIS callsign

In the **CALC** sub-mode, the FSK buttons have the following meanings:

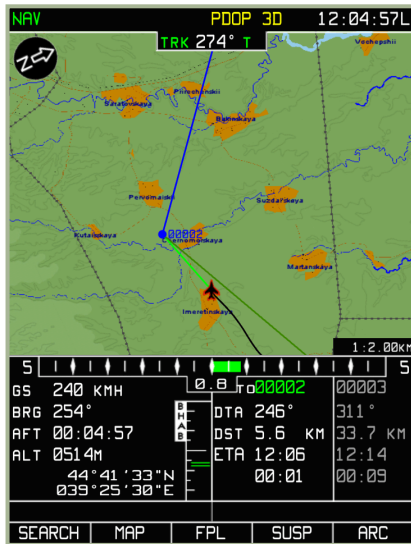
- MENU, GNSS, NAV – Switches to the respective modes; in this case, the almanac use mode is automatically turned off, the GNSS sensor switches to the operating mode.
- ENTER – Executes calculating RAIM prediction for the selected airfield of arrival.
- ►► – Switches between fields for entering the destination airfield and time of arrival.

Active Route Modes and Functions

While the MENU operating mode is generally devoted to setting up the ABRIS system and assists in sortie planning, the three active flight operating modes (NAV, ARC and HSI) share a common set of functions that are most useful while flying the mission.

You can cycle between the main operating modes by pressing the right most FSK button.

NAV Operating Mode



7-108: NAV operating mode

In the **NAV** operating mode, a moving map with the following navigational information is displayed:

- System bar showing the selected mode, GNSS status, and current time (UTC or local)
- North arrow
- Current track/heading (digital and graphical representation)
- Desired track angle
- Ground speed (digital presentation)
- Cross track error - XTE (digital and graphical representation)
- XTE scale
- Bearing to steerpoint
- Flight time

- Aircraft altitude
- Information on the current and next route leg: WPT name, distance to go to the WPT in the current route leg information field, estimated time of arrival at the steerpoint, time to WPT OVER, and for the next route leg – calculated flight time from the current position to the WPT OVER.
- Current geographic aircraft coordinates
- Moving map display scale
- Route selected for navigation (graphic presentation)

ARC Operating Mode



7-109: ARC operating mode

In ARC mode, the screen displays the system bar and the following navigational information:

- Current track/heading (digital and graphical representation)
- Compass card (at least 90° shown)
- Route selected for navigation (graphical representation)
- Aeronautical information
- Desired track angle
- Desired track angle/heading (set by the cursor manipulator knob)
- Ground speed (digital representation)

- Cross track error - XTE (digital and graphical representation)
- XTE scale
- Difference between the current and desired heading values (graphical representation)
- Aircraft altitude
- Information on the current and next route leg: WPT name, distance to go to the steerpoint in the current route leg information field, desired track angle, estimated time of arrival at the given WPT, time to WPT OVER, and for the next route leg – calculated flight time from the current position to the WPT OVER).
- Current geographic aircraft coordinates
- Display scale
- RMI-1 (digital and graphical representation)
- RMI-2 (digital and graphical representation)

No topographical map information is displayed in this mode.

HCI Operating Mode



7-110: HSI operating mode

In HSI mode, the screen displays the system bar, navigational information, imitation of a standard horizon situation indicator (HSI), and flight route information as follows:

- Current track/heading (digital and graphical representation)



- Desired track angle (digital and graphical representation)
- Desired track angle/heading
- Compass card (360°)
- Vertical navigation scale
- Ground speed (digital representation)
- Cross track error - XTE (digital and graphical representation)
- Difference between the current and desired heading values (graphical representation)
- Aircraft altitude
- Information on the current and next route leg: WPT name, distance to go to the steerpoint in the current route leg information field, desired track angle, estimated time of arrival at the given WPT, time to WPT OVER, and for the next route leg – calculated flight time from the current position to the WPT OVER).
- Current geographic aircraft coordinates
- RMI-1 (digital and graphical representation)
- RMI-2 (digital and graphical representation)

Common Function Select Keys (FSK) buttons

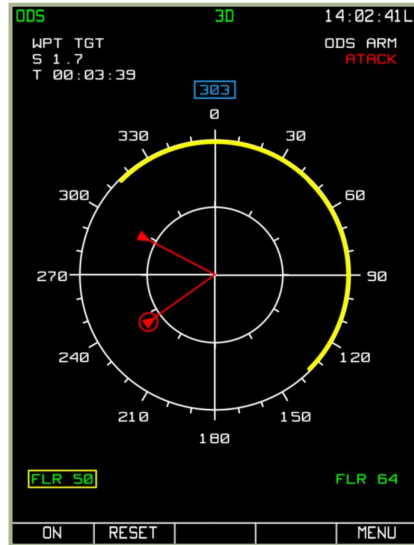
At the bottom of each of these three modes, a common set of FSK buttons are displayed. The exception is the right-most button that indicates the operating mode that will be directed to if the FSK is pressed.

The other four common FSK buttons are:

1. **SEARCH** – to switch to **SEARCH** mode
2. **MAP** – to switch to **MAP** mode
3. **FPL** – to switch to Flight Plan (**FPL**) mode
4. **SUSP** – to switch **WPT** (current steerpoint) manually

What follows are detailed descriptions of the sub-modes associated with these four FSKs.

Onboard Defense System Mode



7-19: Onboard Defense System mode

Whenever the system is switched on, it must first undergo a 3-minute long built-in test prior to normal operation with the sign "ODS NOT READY" shown in upper-right corner of the ABRIS page. Once the built-in test has completed, the system will automatically switch to the operation mode selected via the **ODS** (Onboard Defense System) [LCtrl + L] switch located at the left-hand side of the instrument panel.

The Onboard Defense System has two modes of operation: **ODS ON** and **STBY**.

- In **ODS ON** (Combat) mode, the system will automatically bring up the onboard defense system page on the ABRIS display as soon as a missile launch or laser illumination is detected by the sensors. The pilot will hear a voice warning regarding the threat, which will be indicated (along with its azimuth marks) on the display panel's range circle. When a missile launch is detected, a voice warning will sound to alert the pilot, and the system will automatically begin to deploy IR countermeasures.
- In **STBY** (Standby) mode, unlike in combat mode, there is no automatic deployment of the IR countermeasures. The deployment of the IR countermeasures has to be carried out manually by the pilot.

The release mode for IR countermeasures can be modified via the UV-26 settings panel, located in the right-hand side of the upper instrument panel.

When executing a combat mission or entering a combat zone, set the system to **ON** mode by using the **ODS** selector switch located at the left-hand side of the instrument panel.

When set to **ODS ON** mode, the system will automatically launch IR countermeasures depending on the position of the UV-26 settings panel PORT/STBD selector switch.

If the UV-26 panel switch is set to the middle position, the system will automatically select which side it will deploy the IR countermeasures (port or starboard.) If a missile is incoming from either the front or rear hemisphere (within a range of ± 30 degrees from the helicopter axis,) the system will deploy IR countermeasures from both port and starboard simultaneously.

If the switch is set to the left or right side, then the system will deploy IR countermeasures from port or starboard, respectively.

The NAV page also displays an overlay with the same information displayed on the Onboard Defense System Page.



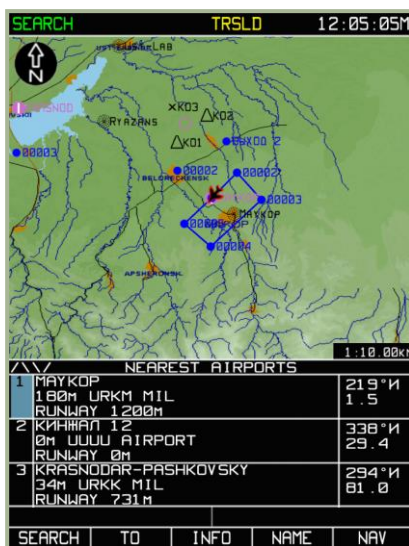
7-20: ODS overlay on the NAV page

This mode is intended for use in emergencies. The mode allows you to locate a specified AIRPORT, VOR, NDB, WPT, or TOWN (geographic point or navigational points). When using this mode, searches are all done using callsign names.

[illegible]

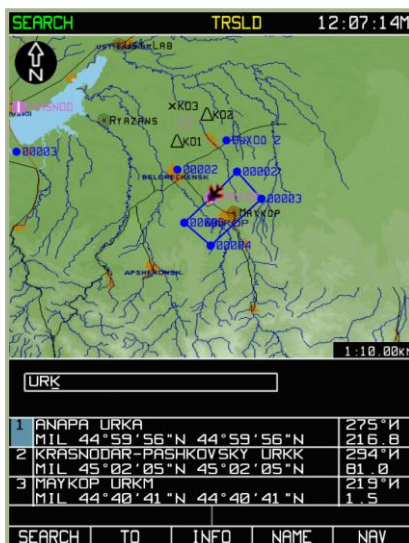
7-111: Selecting object type for search

After the search is complete, you may rotate the cursor manipulator to scroll through the search results. The nearest objects of the search type will be listed from top to bottom. The selected entry will have its entry number colored blue.



7-112: Search for closest AIRPORTS

If you wish to search for an object by its name, press the **NAME** FSK button on the search result page and enter the object name by using the cursor manipulator. When entering the letters of an object's name, the automatic search function will try to match the entry to an item in the database.



7-113: Entering an object name for a NAME search