



FEDERAL SPACE AGENCY



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MULTISYSTEM USER NAVIGATION EQUIPMENT



Key fields of user equipment application

Special application

1. *Emergency elimination (EMERCOM)*
2. *Timing of communications and electrical power engineering*
3. *Construction*

Geoinformation systems

1. *Geodesy and cartography*
2. *Scientific work*
3. *Environment protection*
4. *Agriculture*
5. *Construction works*

Transport

1. *Aviation*
2. *Navy and inland water transport*
3. *Railway transport*
4. *Public conveyance*
5. *Freighting*

Civil application services

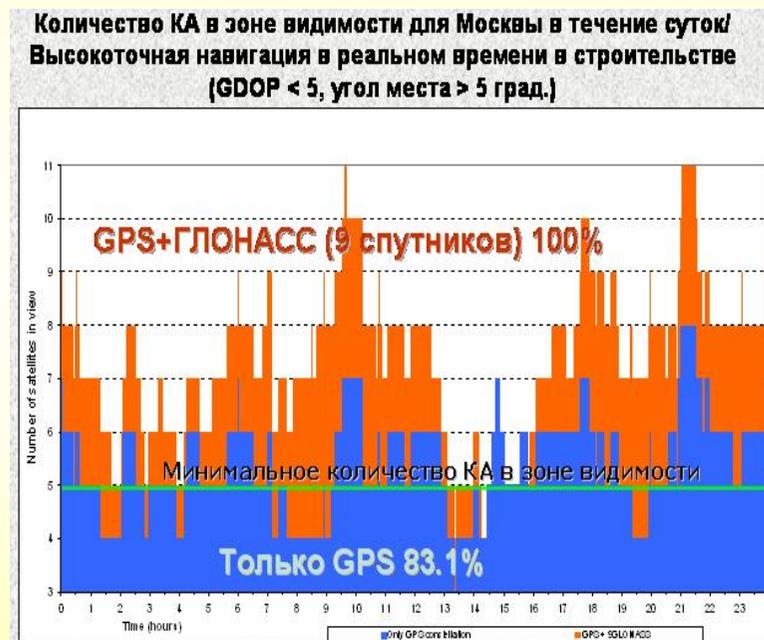
1. *Tourism*
2. *Search&Rescue systems*
3. *Security system*
4. *Communication devices (cellular phones, wireless stations)*



Advantages of GNSS joint use

- Increased navigation availability in city jungles and mountainous terrains
- Increased interference resistance to industrial noise
- Reduced political dependence on a single GNSS provider

Example of improved SVs visibility in Moscow with joint GPS/GLONASS use (daily)



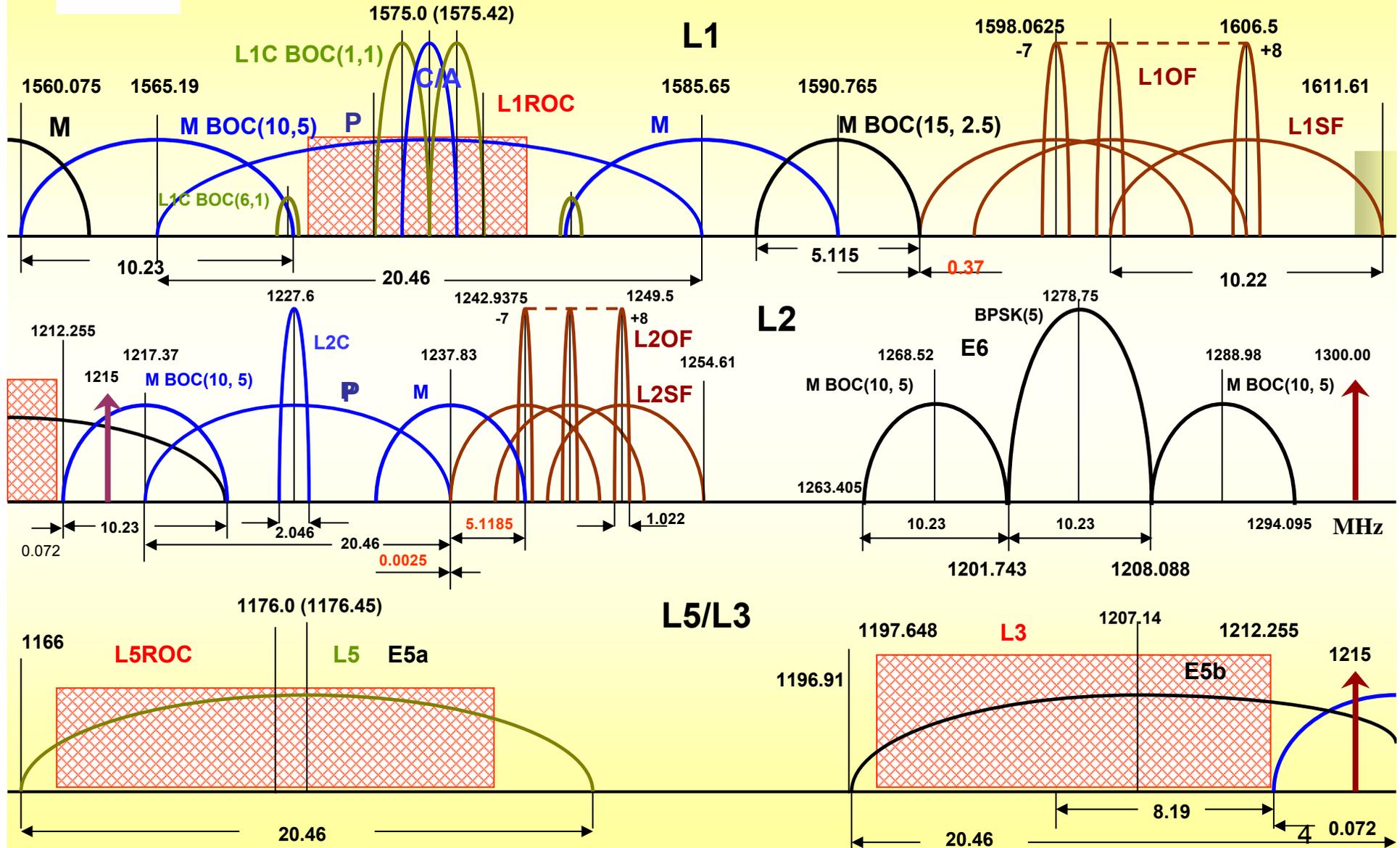
Improved reliability to solve navigation task



GNSS signals spectra

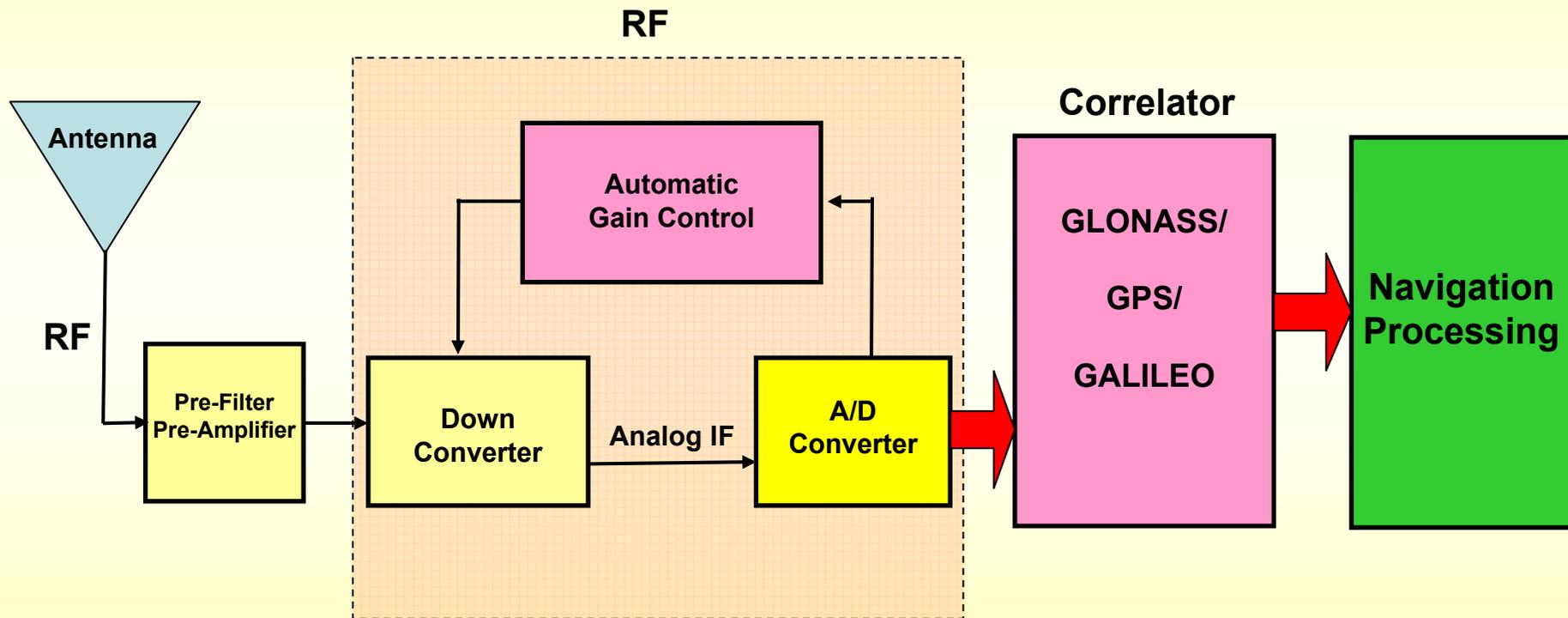


— GPS — GLONASS — N. GLONASS — GPS/GALILEO — GALILEO





GPS, GLONASS, GALILEO receiver: different center frequencies





User equipment

- Boards and modules of the GLONASS/GPS navigation receivers
- Navigation equipment
 - For individual users
 - Aviation
 - Marine
 - Geodetic
- Integrated navigation-information systems



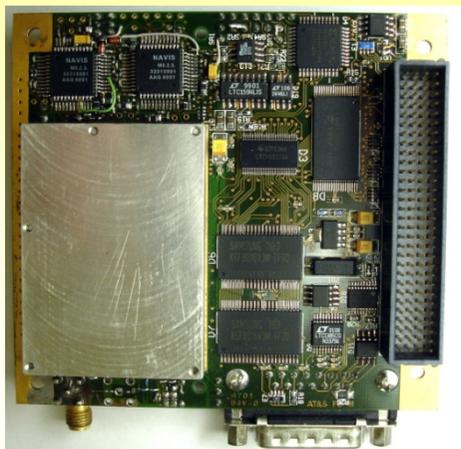


GLONASS/GPS navigation uniform module

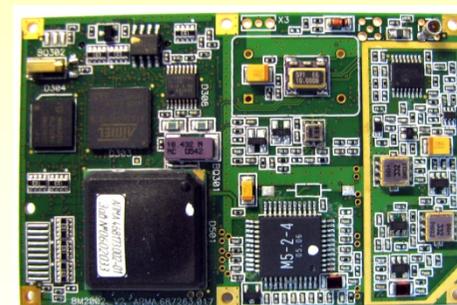


| Specification / Boards | НП12К |
|--|--------------------------------|
| Accuracy of positioning/accuracy (RMS error), m: | 3-10 / 10-20 dif.mode 3 / 5 |
| Number of independent (parallel) receiving channels | 12 |
| Initial determination time at cold/hot start no more than, s | 180 / 100 |
| Data exchange interface with external users | 2 ports RS-232 |
| Data exchange rate, bit/sk | 2400... 9600 |
| Reference UTC(SU) scale accuracy, ns | 200 |
| Coordinate data update rate, Hz | 1 |
| Power supply voltage, V | 5-7 |
| Power consumed, W | 3,0 |
| Mass, g | 110 |
| Dimensions, mm | 142x62x16 |
| Operating temperature range, °C | - 40 . . . + 60 |
| Issue year, y | 1999 |

Key module types



**GNSS
module**



**CH4701
module**

1. Frequency band of the channels received – L1 (1,6 GHz).
2. Type of satellite signals used – GLONASS (standard accuracy code), GPS (C/A-code).
3. Number of independent (parallel) receiving channels – 16.
4. First determination moment – no more than 1 min.
5. Coordinate update rate – 1 s.
6. Coordinate systems used: ПЗ–90, WGS–84, СК–42 and the Baltic sea level.
7. Determination errors when operated with GLONASS at rest (in motion):
 - positioning coordinates – 10 (15) m;
 - velocity vector component – 0,05 m/s
8. Functions:
 - option of the navigation satellite GLONASS and/or GPS automatically or by an operator's request;
 - automatic reception of service information transmitted from NS;
 - operation via NS GLONASS and/or GPS;
 - automatic calculation, indication and output to external users the positioning, velocity and current time capability.
9. Service tasks solution:
10. Data exchange interface with external users – two RS-232 ports





NP24K navigation receiver module for GLONASS/GPS civil application

Operation with the two radio signals of the GLONASS and/or GPS GNSS

Positioning, time and velocity determination

Navigation task solution quality rating



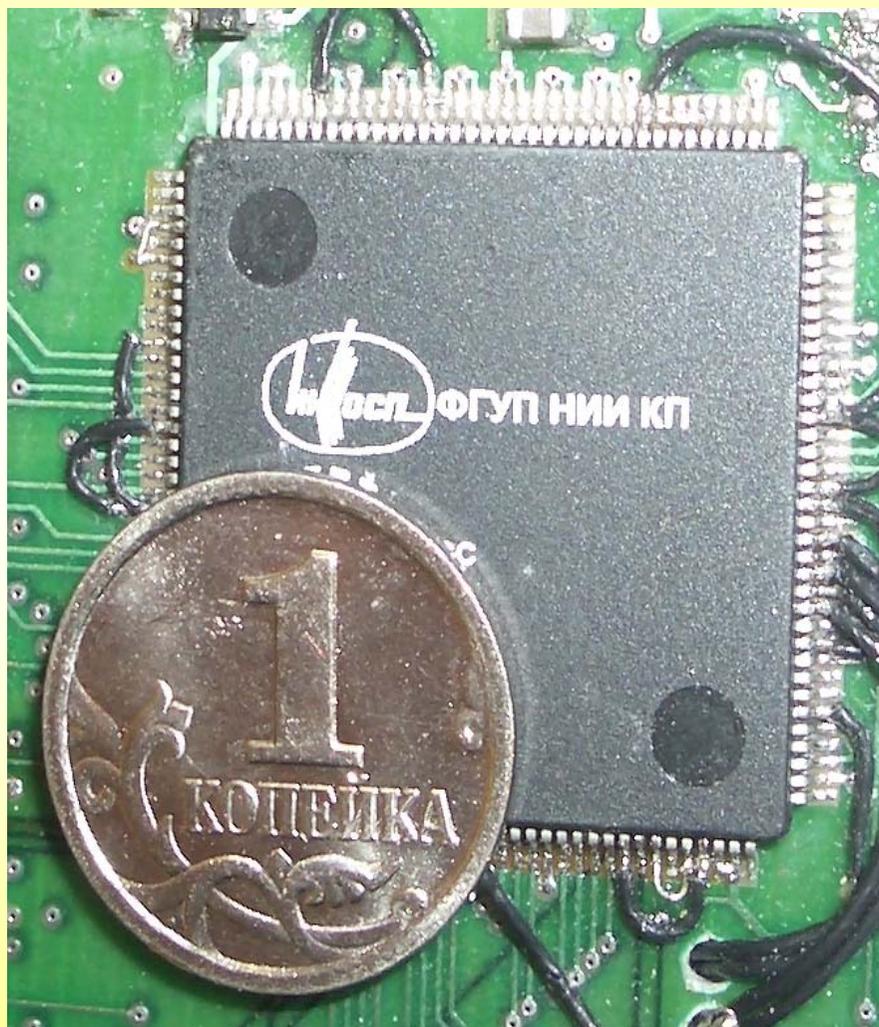
Data representation in alternative coordinate systems

Operation under severe climatic and physical conditions: shocks, vibration, temperature, humidity

| | | | |
|--|---|--|--|
| Bands | GLONASS L1, GPS L1 | Initial determination time under cold start | - no more than 50 s |
| 24 parallel receiving channels (all-in-view) provided with the capability to independently configure each reception channel | - GPS C/A-code, - SA-code GLONASS, - codes WAAS/EGNOS | Navigation task solution recommencement after the satellite's short signal outage | - no more than 5 s |
| Positioning/altitude determination accuracy under autonomous behavior (RMS) | - GLONASS 10 / 20 m - GPS 10 / 20 m | Navigation data updating rate | - 1...10 Hz |
| Velocity vector determination accuracy | - GLONASS 0,03 m/s - GPS 0,03 m/s | Coordinate systems: capability of a user ellipsoid determination | П3-90, CK-42, CK-95, WGS-84, WGS-72 and others (64 totally) |
| Positioning/altitude determination accuracy in differential mode (RMS) | 1-3 / 2-5 m | Operating temperature Storage temperature Ambient humidity | - 60 to + 80°C - 98% (at 25°C) - 40 to + 70°C |
| Built-in RAIM algorithm | | Indication of the time tag synchronized with the GLONASS, GPS UTC time scales | |
| The three serial ports RS232/RS422 - NMEA0183 symbol protocol for data reception and transmission; - RTCM SC104 reception and differential corrections readout | | Navigation data issue: BLH geodetic reference system, XYZ rectangular geocentric coordinates, XYH Gauss-Kruger projection | |
| Power consumed | - no more than 1 W (without antenna) | Power supply | 10V – 30V |



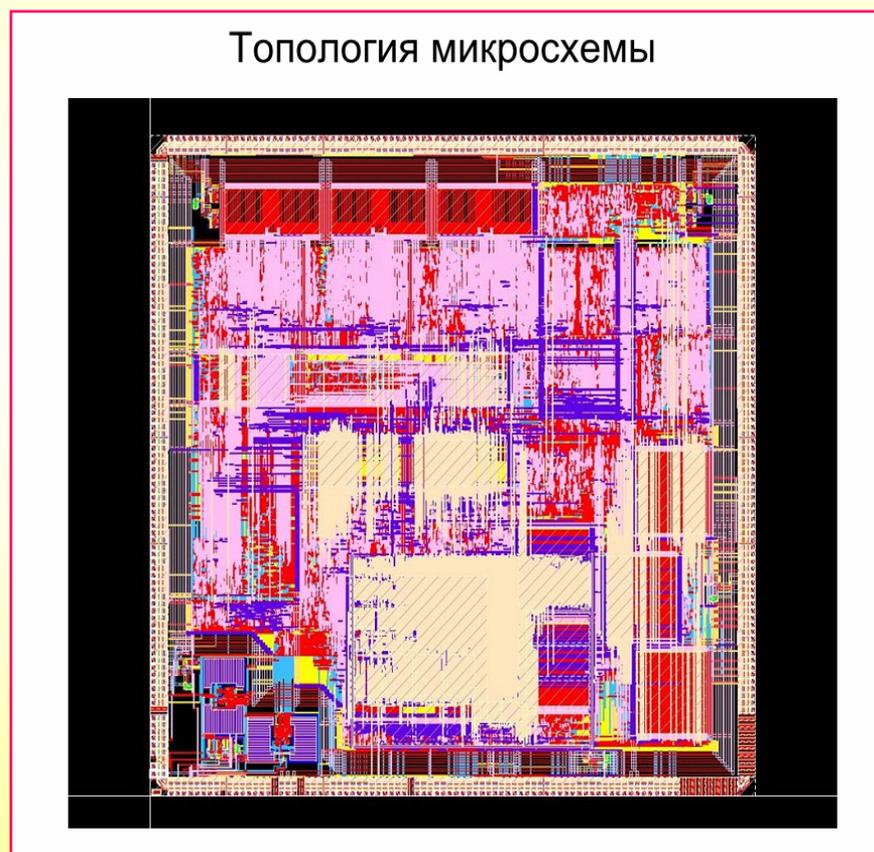
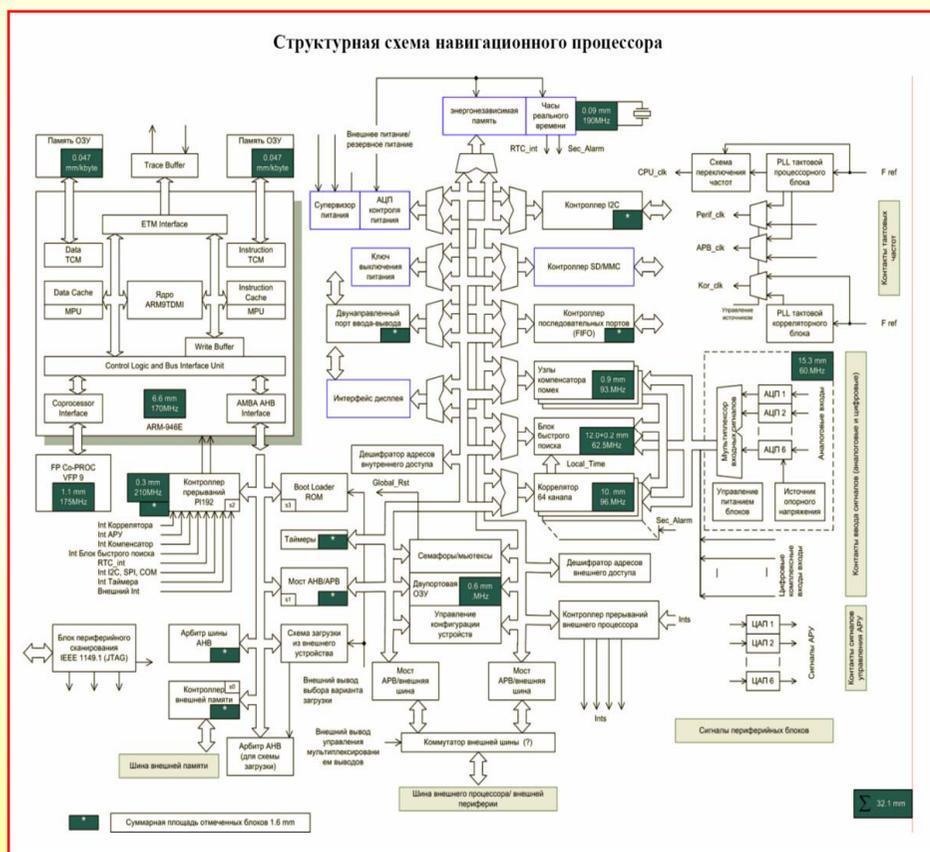
Digital chip КФ1187ХК1



Digital chip

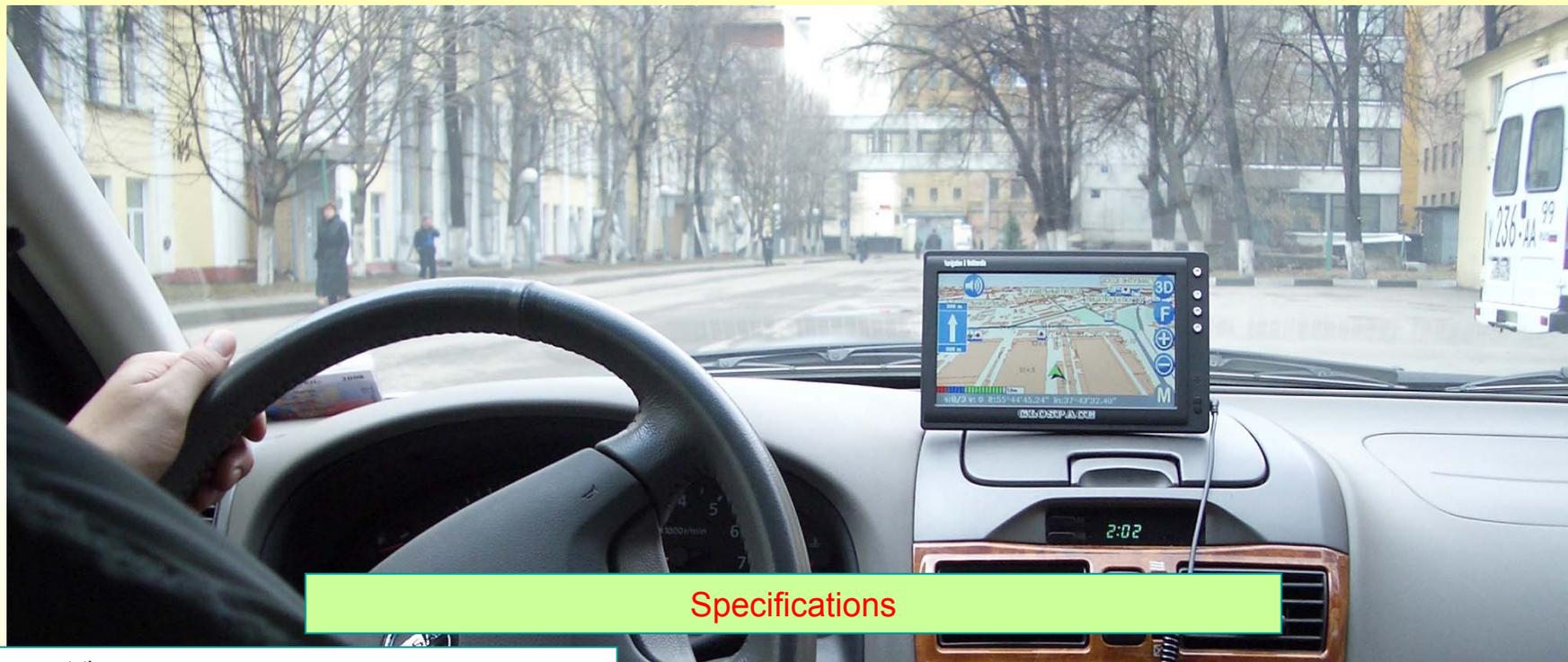
Block-diagram of navigation processor (32 channels)

Topology of navigation processor (0,18 μm)





Car multimedia navigator GLOSPACE SGK-70



Specifications

Type: stationary.

Application: car.

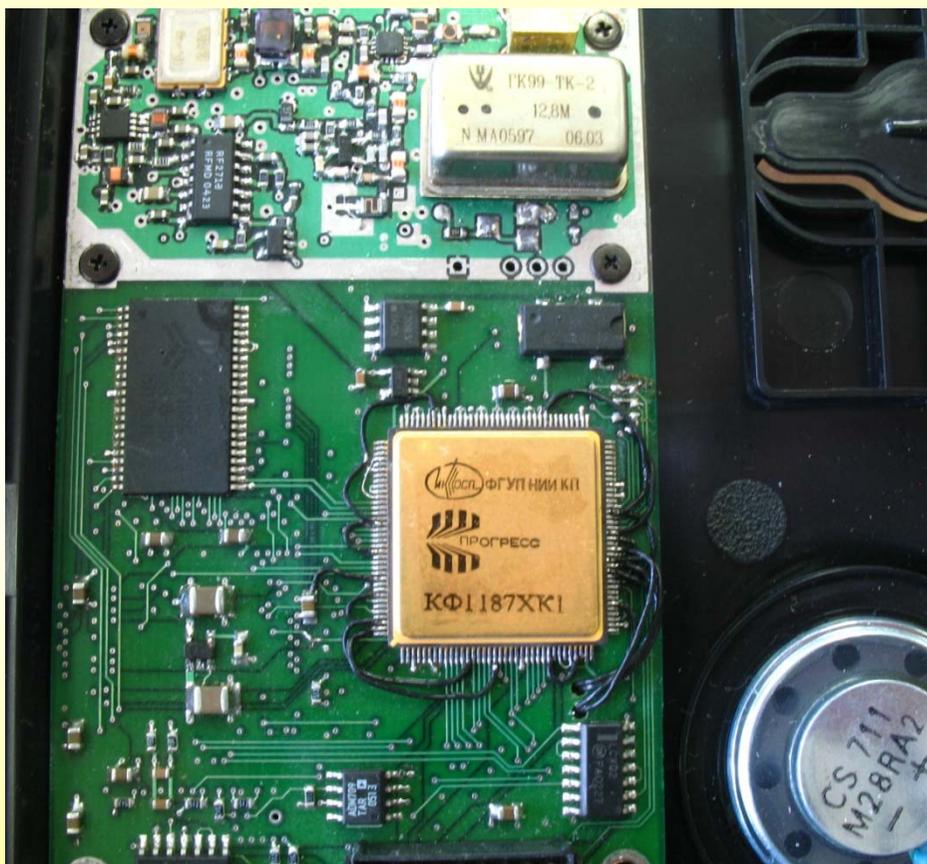
- * Colour touch TFT LCD screen of the size 7" (17,5 cm)
- * Screen resolution 480x234 pixels (16 : 9)
- * Brightness 450 kd/m
- * Processor Samsung S3C2440 (400MHz)
- * Built-in memory 64 Mbyte (SDRAM)
- * OC MS Windows CE 5.0
- * Memory map SD
- * Memory 1 Gbyte complete with micro SD card
- * GLONASS Receiver 12 channels
- * GPS Receiver 20 channels
- * Built-in / remote antenna
- * USB interface: USB1.1 Host, USB 1.1 Client
- * AV-IN input
- * Adapter for ear-phones
- * Power supply 12 V 2 A
- * Dimensions/weight 188x120x35 mm / 400 g

Functions:

- * Contains preloaded maps. A map of Moscow complete with a near Moscow region map (for sale in Moscow)
 - * Compatible with a pager SMILINK to display traffic jams of roads in real time
 - * Features pre-programmed points-of-interest considering traffic jams
 - * Screen brightness adjustable
 - * Voice guidance
 - * Built-in MP3 / MPEG4 player:
 - Video VideoFile (AVI, DIVX), MPEG4 File (MP4, M4A),
 - MPEG Movie File (MPEG, MPG, MPV, DTA)
 - Multi Media Format :
 - MPEG Audio File (MP1, MP2, MP3, MPA), Matroska File (MKV, MKA), Ogg Vorbis File (OGG, OGM) Audio
 - * Images JPG, TIF, PNG
 - * FM-receiver (option)
 - * Built-in computer games
- Operation manual, network adapter 220 V,
car adapter 12 V, bracket to mount on a windshield, commutation cords



Car multimedia navigator GLOSPACE SGK-70





GLOSPACE Modifications

SGK-72NV



- GLONASS/GPS module
- 24 channels
- L1 Glonass ПТ, GPS C/A
- Colour touch TFT LCD screen of the size 4,3 (7) "
- Resolution 480x272
- Built-in GSM (GPRS) module

SGK-43





GLOSPACE digital map





COSPAS-SARSAT search&rescue radio beacons



Automatic portable radio beacons APM-406P1



Personal radio beacons

ПРМ-406Н



ПАРМ-406



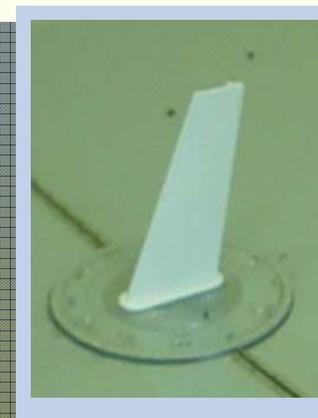
Testers to check the radio beacons COSPAS-SARSAT



Survival radio beacons APM-406AC1



Test bench for radio beacons



Antenna for aviation radio beacons COSPAS-SARSAT

