Equipment development approaches for GLONASS navigation signal simulation with the purpose of user navigation equipment testing

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The capability enhancement and refinement of user's navigation equipment (UNE) requires the development of innovative test and checkout equipment (TCE). Advanced TCE is designed for engineering and checkout of UNE installed on highly dynamic objects and operating with signals of several GNSS constellations in clutter and jamming environment both in autonomous mode and integrated with platformless inertial navigation systems (INS).
Range of working frequencies:  
1570...1615 MHZ.  
Length cable is from 20 to 112 m

Operating conditions:  
• range of operating temperatures for PA unit: from minus 60°C to plus 80°C;  
• range of operating temperatures for other units: from minus 40°C to plus 55°C;  
• external mechanical factors: in accordance with the requirements of GOST V 20.39.304-95 for equipment of group 1.1.

Power supply:  
220V 50 Hz AC or (23 – 32) V DC
PERFORMANCE CHARACTERISTICS:

- Types of simulated navigation signals: GPS, Glonass, SBAS
- Number of signals simulation channels: 24 in any combination
- Number of independent/similar RF power outputs: 2
- Signal power level: -120 dBm to -180 dBm with step: 0.25 dBm
- Mean square error:
  - Of pseudorange setting: < 0.1 m
  - Rate of pseudorange change: < 0.01 m/s
- Power supply: 220 V ± 10%
- Reference oscillator stability: $5 \times 10^{-11}$ per day
- Consumed power: 400 W
- Dimensions of simulation unit: 420 mm x 195 mm x 250 mm (W x H x D)
- Simulation unit weight: 10 kg
- Limit dynamic features:
  - Object's speed: 8000 m/s
  - Object's acceleration: ± 1000 m/s²
  - Object's rate of acceleration change (Jerk): ± 500 m/s³
Development of jamming-resistance test for radio-receiving equipment

**SPECIFICATIONS:**
- Interference: noise/tone jamming
- Noise bandwidth: 1-40 MHz
- Frequency range: L1, L2, L3
- Frequency step: 1 MHz
- Noise level in the power center: -10 — -100 dBm

GNSS constellation

Jammers

Radio remote control computer

Jam-resistant GNSS receiver