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GROUND RADAR HP-100M



1. INTRODUCTION

This Ground Radar HP-100M is designed to automatically detect moving ground targets, to identify them and to determine their co-ordinates at any time of year and at absence of optical visibility (presence of fog, dust, smoke, etc.). It can be used to protect sensitive sites (nuclear power stations, airports, warehouses), borders, pipelines, etc.

HP-100M is a man-portable, surveillance, Frequency Modulated Continuous Wave (FMCW) radar with Low probability of Intercept (LPI). Fast Fourier transformation (FFT) is used to automatically detect moving ground targets and to analyze their spectrum. Whenever the amplitudes of the spectrum ingredients exceed the adjustable thresholds, the system produces audio and visual alarms, which indicate detection of a target. The radar antenna scans automatically a sector selectable within 0°-360° and by detection range of up to 8km. Operator can select detection range, range resolution, sound volume through headphones, etc.

The ETHERNET interface built-in the radar unit permits several transceivers to be connected in a network and be controlled by one standard PC, as well as be integrated with other systems. The solid state components, low power transmission and consumption improve its reliability (MTBF) and reduces MTTR.

A GPS can optionally be built-in the radar in order to precisely determine self-location on the electronic map.

HP-100M can be transported by any means (ground, sea, air). Its weight and userfriendly interface enable one only operator to carry, quickly deploy and use it without long training required.

The main functions of HP-100M are as follows:

- Automatic surveillance;
- Automatic audio alarm for a target detected;
- Automatic classification of targets;
- Audio channel for target classification performed by Operator;
- Spot window to view spectrum of targets;
- Map related display - scale presentation;
- Magnification of the displayed area;
- Automatic tracking of one or more targets;
- Image ZOOM; and
- Quick and easy deployment/folding.

1.1 SYMBOLIC DESIGNATIONS

All units and modules of the radar are coded as follows:

Unit HP-01M	-	Transceiver
Unit HP-02M	-	Notebook
Unit HP-03	-	Tripod
Unit HP-01-1M	-	Combined Unit
Unit HP-11	-	Antenna

TECHNICAL SPECIFICATION

GROUND RADAR HP-100M

Unit HP-12M	-	Phase Locked Oscillator
Unit HP-13M	-	Microwave Power Amplifier and Manipulator
Unit HP-14M	-	Mixer and Video Amplifier
Unit HP-22M	-	Code Amplifier
Unit HP-71M	-	Drive Mechanism
Unit HP-81M	-	Storage Battery

The signs engraved on cases and used in text are as follows:

	Sign	Function
Unit HP-01M	ON/OFF F	Switch ON/OFF Fuse
Unit HP-71M	LOCK/MAN/AUTO AZIMUTH	Selector LOCK/MAN/AUTO Scale AZIMUTH

1.2 RADAR CONSTITUENT UNITS

Fig. 1 shows the general view of the radar.

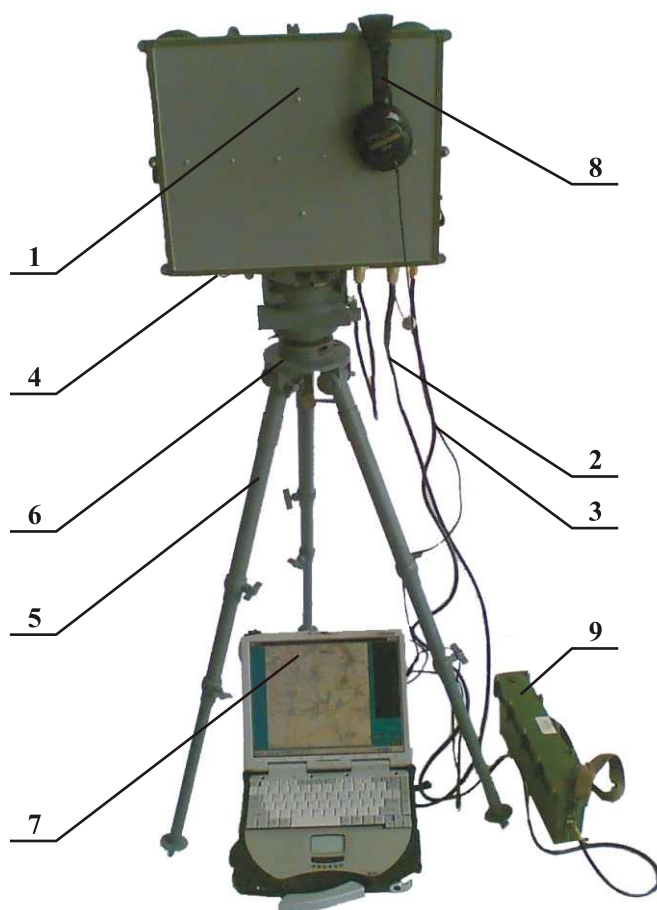


Fig. 1. Ground Radar HP-100M

1 - Unit HP-01M	4 - ON/OFF Switch	7 - Unit HP-02M
2 - Cable No 1M	5 - Unit HP-03 (Tripod)	8 - Headphone
3 - Cable No 3M	6 - Unit HP-71M	9 - Unit HP-81M

1.3 SPECIFICATIONS AND FEATURES

Range	0 - 8000m	
Mode	Range Scale [m]	Range Resolution [m]
SURVEILLANCE	8000	200
	4000	100
	2000	50
	1000	25
IDENTIFICATION	4000	100; 50; 25
TRACKING		50; 25
MAXIMUM DETECTION RANGE for ground targets under direct radar visibility: - a single person walking in full height at radial speed greater than 2km/h - moving group of people - a light vehicle driving at radial speed from 2 to 80km/h - a heavy vehicle driving at radial speed from 2 to 80km/h Maximum detection range may be somewhat reduced under wind speed greater than 10m/s, precipitation of more than 4mm/h and/or presence of fog.		$\geq 2500\text{m}$ $\geq 3000\text{m}$ $\geq 5000\text{m}$ $\geq 6000\text{m}$
DETECTION RANGE ACCURACY		25m
RESOLUTION - Range Resolution - Azimuth Resolution		better than 50m better than 5°
MINIMUM RANGE TO DETERMINE CO-ORDINATES		< 25m
AZIMUTH SCANNING SECTOR		within 0° - 360°
BLANK SECTOR		within 0° - 360°
ALARM		audio, visual
INDICATOR - Sound - Visual		Headphone TFT Active Matrix Color LCD

<i>OPERATION WITH AND STORAGE OF ELECTRONIC MAPS</i>	HP-100M permits operation with an electronic map of a site of (10x10)km
<i>CONTROLS</i>	Electrical & Mechanic Switches, Keyboard
<i>ANTENNA</i> Type Scan Rate Beamwidth in: - horizontal plane - vertical plane Side Lobes Polarization vertical	Microstrip patch antenna 5°/s $(5 \pm 1)^\circ$ $(12 \pm 2)^\circ$ better than 15dB
<i>TRANSMITTER</i> Antenna Power Frequency	greater than 200mW (9720 ± 20) MHz
<i>RECEIVER</i> Video-Amplifier Frequency Band Doppler Filter Frequency Bands	150Hz to 10MHz at -3dB level within $(50 \div 1400)$ Hz
<i>POWER SUPPLY</i> Input Voltage Input Power	within $(10 \div 30)$ VDC [220VAC-option] less than 25W
<i>AMBIENT CONDITIONS</i> Temperature -Radar unit - Operator unit Humidity, vibrations, shocks, dust, drop and others	MIL-STD-810F from minis 30°C to +55°C minus 20°C to +55°C MIL-STD-810F

<i>WEIGHT</i>	less than 21kg
<i>CONTINUOUS OPERATION WITH ONE BATTERY ONLY</i>	8h at least
<i>BATTERY STATUS INDICATION</i>	Yes
<i>ANTENNA SEPARATION (cable)</i>	100m; >2000m with additional amplifiers
<i>POSSIBILITY TO BE INTEGRATED WITH OTHER SYSTEMS</i>	Yes (There is a version without a standard PC, if control is performed by another system)
<i>DATA/CONTROL INTERFACE</i>	ETHERNET
<i>MTTR</i>	1h
<i>DIMENSIONS (approx.)</i> Radar unit Drive unit Operator unit Tripod	(410 x 340 x 95)mm (150 x 140 x 170)mm (302 x 63.5 x 275)mm effective hight is 1.1m above ground level
<u>OPTIONS</u> GPS Wireless Remote Operation Networked and Integrated with other systems	