

## The distinctive features of RASCAN-4 radar:

- Ability of executing one-sided sounding of a wall, instead of double-sided sounding as X-ray apparatus does
- Ability to find out not only metal objects, but also non-metallic ones
- Safety of radar's using for operator.

### RASCAN-4 radar can be used in the following areas:

- Counterintelligence activities for detecting bugging devices
- Inquiry activities of law-enforcement agencies
- Inspection of building structures for determining the position of reinforcement, voids and other heterogeneities
- Surveying of especially critical constructions (airport runways, bridges, etc.) for determining their latent flaws
- Detection of cracks in underground parts of buildings and structures for prevention of the water infiltration.

### Technical info:

The weight of equipment set	- 1.9 kg
Maximal sounding depth	- 0.2 m
Resolution in plane of sounding	- 2 cm
Radiating power	- 10 mW
Number of operating frequencies	- 5
Number of signal's polarizations	- 2
Productivity	- 4...6 sq m per hour

The input of the information in IBM PC is carried out through special interface connected to the USB port of computer. Thus computer's modernization is not required.

*The Laboratory's staff members had been rewarded with Russian Federation government's prize in the field of science and technology for creation of the RASCAN radar technology.*

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*We know how  
to see invisible*



**High Resolution  
Radar for Sounding of Building  
Structures and Works**

**RASCAN-4**

We are offering the RASCAN-4 device for sounding of building designs with high resolution in UHF range. The device is radar with the transmitting and receiving parts of the antenna located on one side of an evaluated surface. General view of the RASCAN-4 radar is shown in Fig. 1.

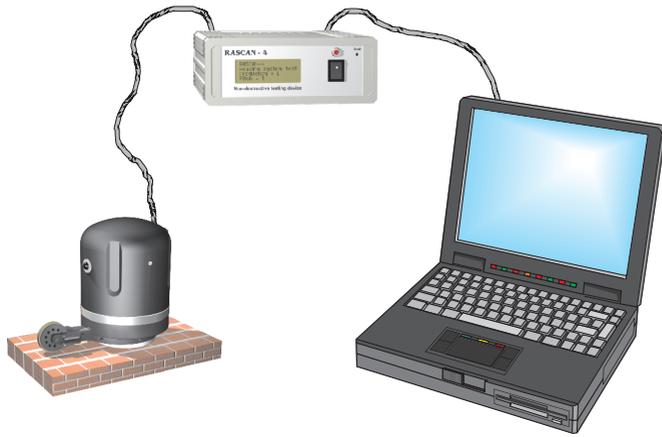


Fig. 1

The reflection of electromagnetic radiation occurs from objects, permittivity of which differs from permittivity of environment. There are metallic and non-metallic objects in microwave images received by the radar. In these images, we can see inclusions, emptiness and parts of constructions with different moisture.

For demonstration of the surveying efficiency of RASCAN-4 radar, a model of wall was made. The wall mockup was presented by a packet consisting of fifteen 1 m by 1.2 m plasterboards. The packet was 22.5 cm thick in the aggregate, and there were different objects placed between the layers. Two metal wires and seven 25-mm coins presented the objects under consideration. One of the coins was placed under the left-hand wire and the other one was under the right-hand wire. Besides, a 3 cm by 3 cm square opening was made in the second plasterboards and the opening's depth was identical to the board thickness, i.e. 1.5 cm. The arrangement of the objects within the wall mockup is presented in Fig. 2. The size of the shadowed surface on the diagram is equal to 0.6 m by 0.6 m.

The figure placed at each of the objects states the ordinal number of a layer, counted from above, under which this

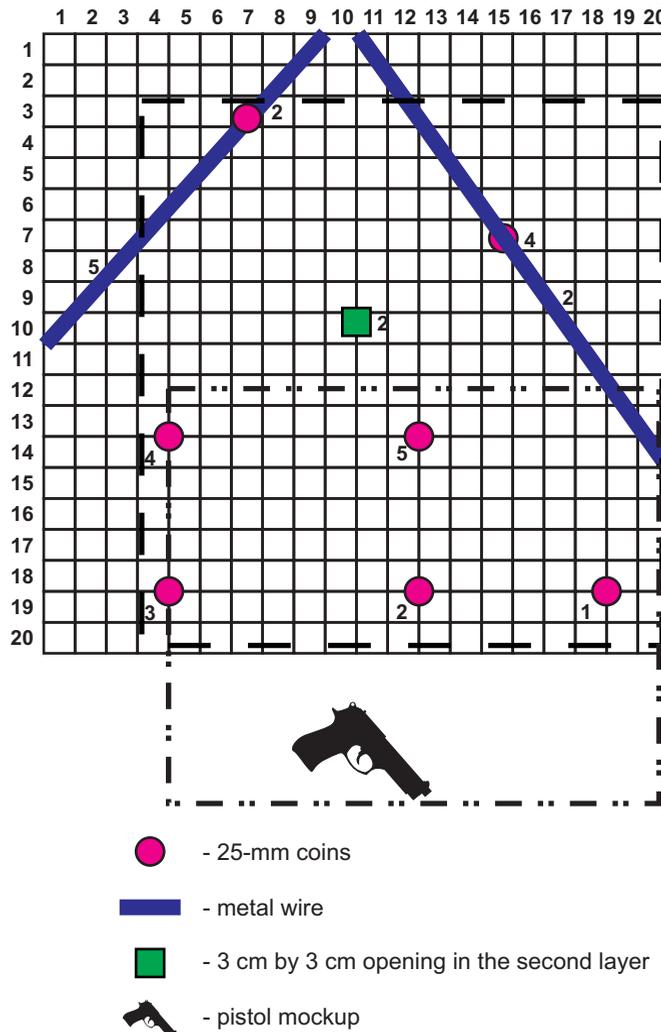


Fig. 2

object is located, i.e. the object No. 2 lays between the 2nd and 3rd layers of dry plaster. A recess was made in the 3rd and 4th layers where a pistol mockup was placed; its barrel length is equal to 13.5 cm and its handle length equals 9.7 cm. A grid was plotted on the diagram for convenience. The grid spacing equals 3 cm. The experimental results of the sounding of the wall mockup are shown in Fig. 3 and 4.

Fig. 3 shows microwave images of the mockup part enclosed by a dotted line in Fig. 2. This figure presents two microwave images, which have been obtained at the parallel (left image) and cross (right image) polarizations of

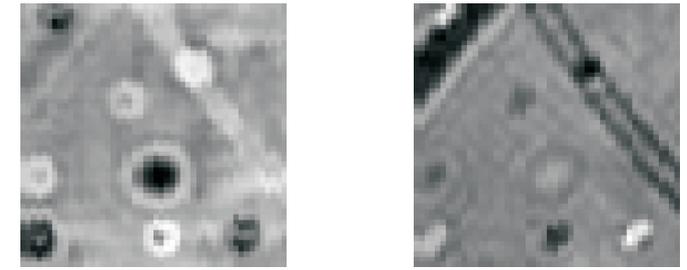


Fig. 3

the received and transmitted radar signals. Wires, seven coins and the opening in plasterboard are observed in the image. Note that both coins placed before and behind the wire are seen very well. The possibility of the observation of an object located behind another object in its shadow is related to the differences in the phases of signals reflected from objects located at different depths. By changing the

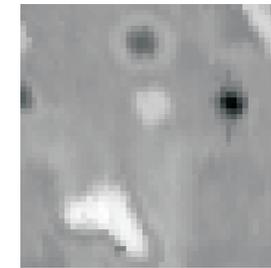


Fig. 4

frequency of a sounding signal, we can reduce the contrast of a nearby object and enhance the contrast of an object positioned at a greater depth behind the former one. Fig. 4 shows the microwave image of the part of the mockup enclosed by a dash-dot line in Fig. 2. The pistol outline is seen in this image.

Microwave images of tiny TV camera and microphones under two layers of chipboard are shown in Fig. 5. The microwave image of the wire fixed under wallpaper is presented in Fig. 6. The wire's diameter is equal to 0.01 mm, and its length is 50 cm.



Fig. 5



Fig. 6