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CENTRAL INTELLIGENCE AGENCY

# INFORMATION REPORT



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This is UNEVALUATED information

*THE SOURCE EVALUATIONS IN THIS REPORT ARE DEFINITIVE.*
*THE APPRAISAL OF CONTENT IS TENTATIVE.*
*(FOR KEY SEE REVERSE)*

The following are the technical requirements for radio position-finding instruments, development order K 4-51:

A. Electric requirements

1. The radio position-finding instrument for navigation purposes is intended for installation on maritime vessels to permit navigation in coastal waters and narrow passages (harbors, river mouths, and navigation channels), as well as navigation in busy shipping routes and in icebound waters. Anti-collision devices (Kollisionschutzgeraete) which do not meet the most important requirements may be utilized only as warning devices against collision with large vessels and objects encountered in open sea lanes or routes where there is a small amount of marine traffic. 25X1

2. The radio position finding instrument must guarantee an uninterrupted view of the entire horizon in an azimuth of 360° around the ship, together with the possibility of changing over to observation in one direction or observation of a narrow sector.

3. The equipment set up on vessels must guarantee a clear picture of land features (shoreline elevation 70 meters high or higher) at a distance of 20 miles and also a clear picture at a distance of 7 miles of a shoreline elevation of 7 meters or higher. The same is required for the detection of vessels of a displacement of 5,000 tons and up at distances up to 7 miles. Commercial ships with a displacement of 15 tons and up, as well as Class II buoys, must be detected at distances up to 3 miles.

4. The equipment must be designed so that all radar targets remain visible when the vessel lists up to plus or minus 10°.

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(NOTE: Washington distribution indicated by "X"; Field distribution by "#".)

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5. The radio position-finding instrument must meet the following minimum requirements as far as its resolving power is concerned:

   a. Minimum distance. An object must be detected at a minimum distance of 90 meters. . Efforts should be made to reduce that distance without reducing the other operational requirements to be met by the equipment.

   b. Multiple target discrimination. Two objects which are separated by 3° or more in azimuth and which are at least 90 meters apart must appear as two separate targets on the plan position indicator.

   c. Selectivity (Trennschaerfe) in the distance. Two objects which are at least 90 meters or more apart and of the same azimuth must appear as separate targets on the shortest range setting.

6. In the case of the largest range setting the indication of the distance to any object must not be in error more than 5% of the actual distance.

7. At least 3 scales must be provided for. The scale radius of the largest scale must correspond to a maximum distance of 1 to 2 miles (sic).

8. An automatic drive of the course scale in the remote compass indicator must be provided for. In the case of the failure of the automatic drive, manual setting of the compass course scale must be possible.

9. It must also be possible to orient the radar azimuth scale on the longitudinal axis of the vessel.

10. The error in azimuth (as indicated on the picture tube) of two adjacent reflected pulses (targets) must not exceed 1°.

11. Provisions must be made on the scale of the indicating device (picture tube) (Anzeige Geraet) for determining the azimuth of course (Kurswinkel) and direction (Anpeilung) from the ship of any object. The error in the case of direction finding for a target located at the outer edge (Aussenrand) of the picture tube must not exceed 1°.

12. The possibility of shifting the zero point on the indicator must be provided. (Die Moeglichkeit einer zuegigen Aenderung der Groesse des Nullkreisdurchmessers muss vorgesehen sein).

13. Clutter on the picture tube produced by reflections from water waves must be kept to a minimum.

14. In addition to the basic equipment and the main indicating device, it is recommended that provisions be made for remote indicators.

15. The indicating devices must be equipped with the necessary controls for viewing targets properly. The diameter of the picture tube of each indicating device must be at least 23 cm. It is desirable that, in the case of the radio position finding instrument, a projection and representation upon maps be provided for. The projection of the map should not be less than 23 cm. A projection installation (Projektionsanlage) should be provided to coordinate the represent tion on the picture tube of the indicating device and a normal navigation chart.[1] The possibility of changing the scale constantly must be provided for in the projector.

16. It is advisable to provide a device for automatically indicating the total time the equipment is in use.

17. The radio position finding instrument must be equipped with special measuring instruments for checking the performance and for tuning the equipment.

18. The elimination of radio interference (Funkentstoerung) of the instruments must be carried out in such a manner that the "norms for boundary values of operational radio interference(s)" are adhered to. These are published by the Ministry for Telecommunications of the USSR.

19. In the case of utilization of electromechanical relays, radio interference is to be eliminated by filters. The use of electromagnetic relays is to be held to a minimum.

II. Constructional requirements

1. The construction of the housings of the individual instruments, which are to be installed in closed rooms which can be heated, must be drip, splatter, and water-proof, according to VDE regulation no. 50. All instruments which are to be set up on open decks must be of hermetically sealed construction.

2. All buttons, switches, etc., must be arranged on the frontal plate of the devices and must be easily accessible and have tuning-limiting devices (Ueberdrehungsicher).

3. The radio position finding installation must be constructed in such a manner that it can withstand rolling of the vessel up to plus or minus 50°.

4. The structural parts must be vibration proof and arranged independently against change of position.

5. The installation must meet the following tests:

   a. Vibrate with a frequency of 10 cycles (600 per minute) at an amplitude of 1 mm (oscillation..2 mm) for two hours.

   b. Vibration through an impact of 7 g (g=9.81 m/sec$^2$) at a rate of 100 impacts per minute for 10 minutes. The instrument must still work properly after the conclusion of the vibration tests.

6. Utilization of easily inflammable insulation material is prohibited.

7. All parts must be moisture and heat resistant (feuchtigkeits- und waermebestaendig) so that normal operation is guaranteed in the case of:

   a. Change of temperature from minus 30°C to plus 50°C.

   b. Relative humidity of 95 plus or minus 3% at an air temperature of 20°C plus or minus 5°.

   c. The mechanically movable parts must remain in an operative condition within the temperature range indicated in "a" above.

8. It is advisable that special ceramics, plastics of high quality, and similar materials be used as insulating material in the manufacture of parts.

9. Copper, bronze, brass, silver, and similar alloys are recommended for use as conductors.

10. Preferably, corrosion-proof metals (alloys) should be used in the housings. Otherwise the housings of the radio position finding device must have corrosion-proof covers.

11. The radio position-finding instrument must be equipped with a special device to protect the operators from high voltage current when the housing is opened. After the housing is open, no contact and no wire must have high voltage either between contacts, between contacts and conductors, or from conductors to ground. When the housing is open, a provision must be made so that the high voltage condensers automatically discharge themselves.

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12. With the exception of the front panel (Frontweite), the housings of the radio position finding instrument must be of punched, cast, welded, or riveted construction. Fastening of the panels with screws or bolts is only permissible with special approval of the Soviet Sea Register.

13. The housings of the radio position finding instrument must be hinged and so secure that it is impossible for the contents to fall out when the ship rolls or lists.

14. All contact connections must withstand changes during operation.

15. All electrical connections in the instrument assembly must be screw connections or hot-soldered without use of acid. Soldered spots are to be marked in color.

16. Screw connections must be secured against loosening with check nuts or spring plates. Safeguarding with a coat of paint is permissible up to $M_3$ (sic).

17. Blank conductors must have a silver-coated surface or a similar corrosion-proof covering.

18. All component parts, as well as contacts and terminals of the individual parts (transformers, relays, springs) must be numbered according to the specifications of the skeleton diagram and assembly plan. The numbering must be legible and permanent. Utilization of paper and cardboard stickers is not permitted.

19. Terminal clamps (Ausgangsklemmen) and contacts must be marked to show their purpose (what they are connected to);on supply circuits, voltage and polarity must be indicated.

20. All handles, knobs, and measuring instruments must be labeled.

21. The positions of all switches must be clearly indicated on all identification plates.

22. The required time for gaining free access to the internal parts and tubes of the instruments must not exceed 30 seconds.

23. The individual instruments of the radio position-finding instrument must be arranged in such a manner that they do not influence magnetic compasses.

24. It is advisable that the antenna of the radio position-finding instrument be erected on a special metal pole or on a special lattice-type mast. A platform must be erected on the upper part of the pole. It must be surrounded by a protective screen, and provided with a ladder.
The antenna should be mounted near the bridge if possible. Mounting the antenna installation on the ship's mast is only permitted when the mast is located in the immediate vicinity of the bridge.

25. The antenna must be set up as high as possible and in such a manner that the field of vision of the horizon is not obstructed by superstructures, smoke-stacks, ventilators , etc. It is recommended that the antenna be erected slightly off the vessel's center, in case the field of vision in the direction of movement is obstructed by masts.

26. Tackle insulators (Takel-Isolatoren) must be inserted in all traction ropes which serve to hold the mast of the antenna installation. If this is not possible, the traction ropes must be grounded.

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27. If possible, the antenna should be erected above the transmitter, to prevent bending of the feed line. In case this is not possible, the feed line must be installed with as few bends as possible.

III. Accessories

The radio position finding station must be equipped with three copies of each of the following documents:

a. Pass (Typenfreigabe)
b. Description and instruction book
c. Skeleton diagram
d. Assembly plan
e. Photographs
f. List of spare parts
g. Transfer certificate of the manufacturer (probably a shipping list)
h. Two test reports

IV. Replacement parts

The minimum number of replacement parts which belong to the radio position-finding installation must be coordinated with the Main Administration of the Sea Register of the USSR.

V. General constructional guide lines

Data for the construction of 50 to 100 transmitters per year in mass production are to be furnished.

VI. Testing

For the factory test (Werkpruefung) of each instrument, specific regulations must be complied with. The final test must last two full hours.

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[redacted]omment. This may be similar to the U.S. video mapping devices.

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