

Proj # 1

C.G. Unit 45  
Chincoteague, Va.  
9 March, 1944

To: THE COMMANDANT (ECM-1, C.G. 815)

Subj: Test Station Project No. 1 - High Frequency (10.585 mc) Loran Transmitter and associated radiating system; preliminary report and recommendations. (Proposed installations at C.G. Units 10 and 30)

1. Enclosures (A), (B), (C) and (D) show basic construction recommendations with regard to the  $3/4$  wave co-phase antenna and its associated ground system. It is understood that C.G. Unit 30 has a suitable pole (about 90 feet high, which is much greater height than required) but no ground system. It is believed that C.G. Unit 10 has a standard installation for use with a high frequency grounded antenna and that this installation is similar to the original installation at Unit 45.
2. The original ground system at Unit 45 when used with a  $1/4$  wave antenna at 10.6 mc showed a radiation-plus-loss resistance of 66 ohms against a theoretical maximum of 36 ohms, or a loss of 45 per-cent in power. By supplementing the original ground as shown in enclosure (C) (but including only 3 or 4 ground rods, as more rods were not available) the loss resistance was reduced from the original 30 ohms to 10 ohms. The remaining loss resistance probably occurs, for the greater part, in absorption by adjacent objects. Losses decreased with frequency.

With the 10 ohms loss resistance the  $1/4$  wave antenna with its radiation resistance of 36 ohms would show a power loss of 22 per-cent. The  $3/4$  wave co-phase antenna having a radiation resistance of 135 ohms would show a loss of only 7 per-cent, and has the additional advantage of height over nearby objects, concentration of radiation at low angles and a relatively flat impedance characteristic over a suitable range of side-band frequencies.

3. This report is submitted at this time so that, if desired, construction of ground systems and preparations for the erection of the antenna may proceed at Units 10 and 30. Details concerning co-phase antenna adjustment and simultaneous operation of L.F. and H.F. transmitters, involving additional time delay equipment will be contained in a separate report. The co-phase phase inverter units and supplementary time delay units for the two installations are now at Unit 45. F.B. Duncan Lt.(jg), USCGR



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Encls:

- (A)- Three copies- CO-PHASE ANTENNA FOR 10.585 mc (CONFIDENTIAL)
- (B)- Two copies - GROUND SYSTEM FOR 10.585 mc ANTENNA (CONFIDENTIAL)
- (C)- Two copies - SUPPLEMENTARY GROUND SYSTEM FOR 10.585 mc ANTENNA (CONFIDENTIAL)
- (D)- Three copies- ANTENNA COUPLING HOUSE FOR 10.585 mc ANTENNA (CONFIDENTIAL)



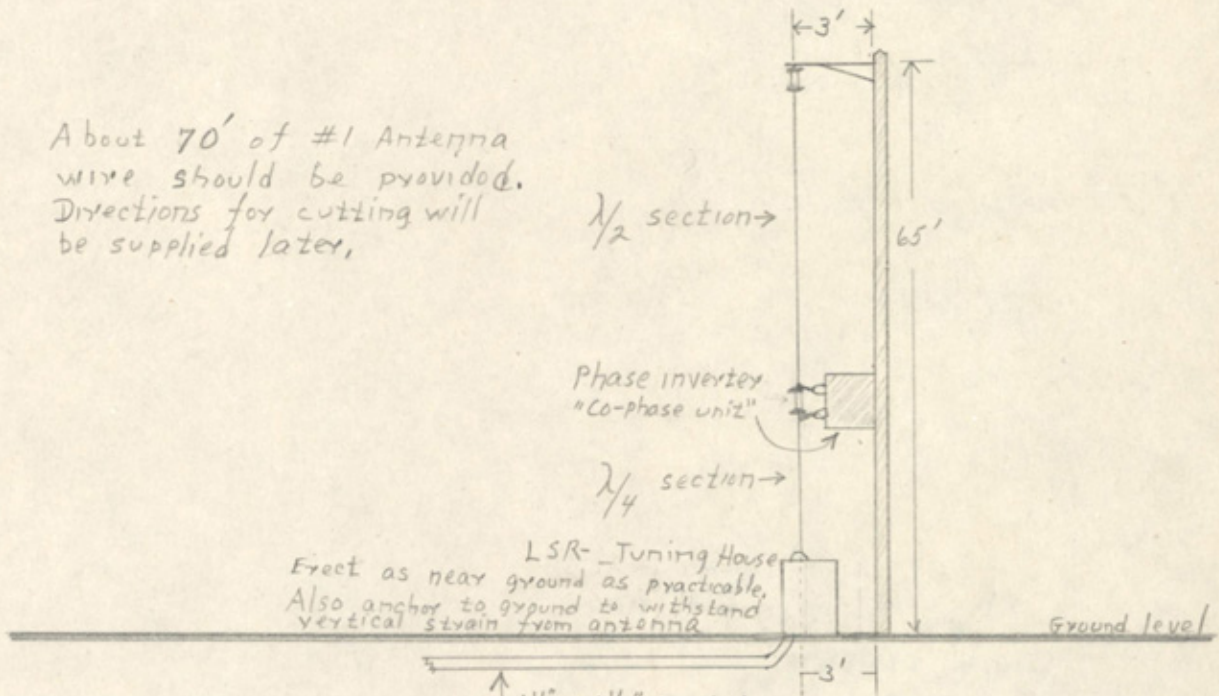
encl (A)



UNITED STATES COAST GUARD  
CO-PHASE ANTENNA FOR 10.585 mc

For both C.F. units  
10 and 30

About 70' of #1 Antenna wire should be provided. Directions for cutting will be supplied later.



Erect as near ground as practicable. Also anchor to ground to withstand vertical strain from antenna

1 1/4 x 1 1/2" Conduit.

To contain two lengths (one for transmitting, one for monitoring) of CASSF-50-1 solid dielectric cable.

Cable to be cut to an odd number of  $\frac{1}{8} \lambda$ . For CASSF-50-1 cable  $\frac{1}{8} \lambda \cong 7$  feet, at 10.585 m.c.

Coil up that part of the cut length not needed mechanically for connection to apparatus.

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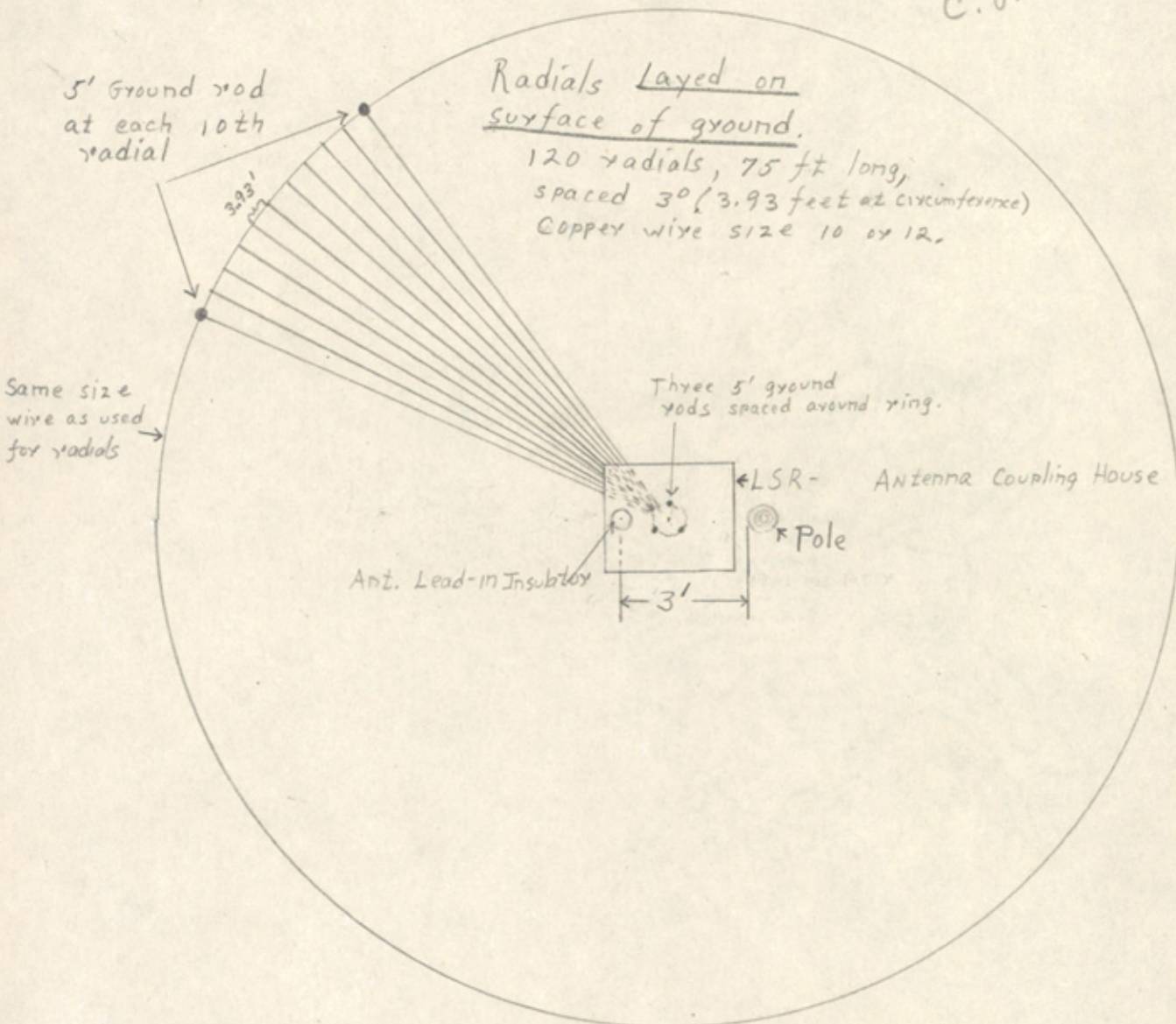




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GROUND SYSTEM FOR 10.585 mc ANTENNA

For installation at  
C.G. Unit 30



C.G. Unit 45  
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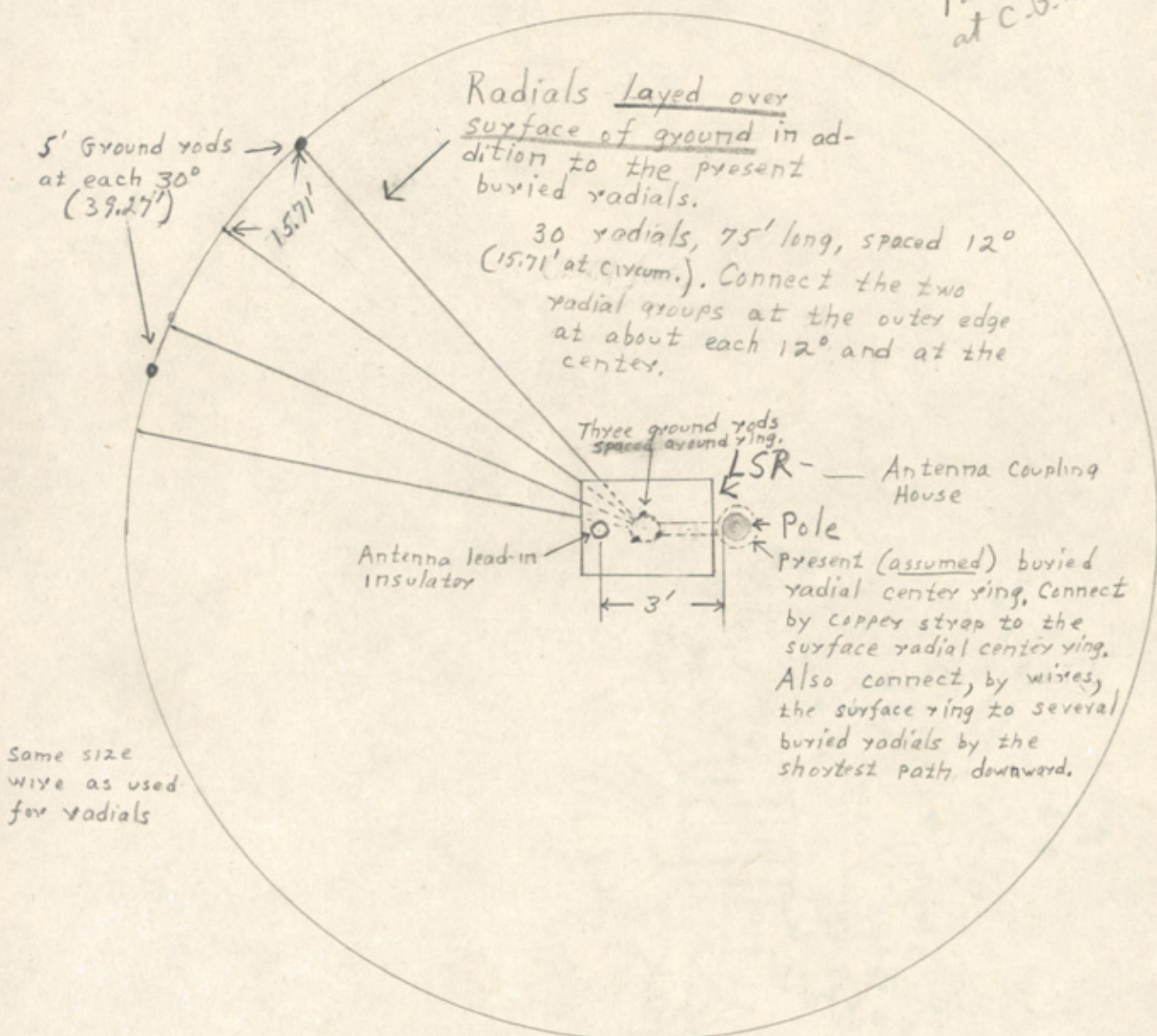




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SUPPLEMENTARY GROUND SYSTEM FOR USE WITH  
10.585 mc ANTENNA

*For metallation  
at C.G. unit #10*



C.G. Unit 45  
Project No. 1  
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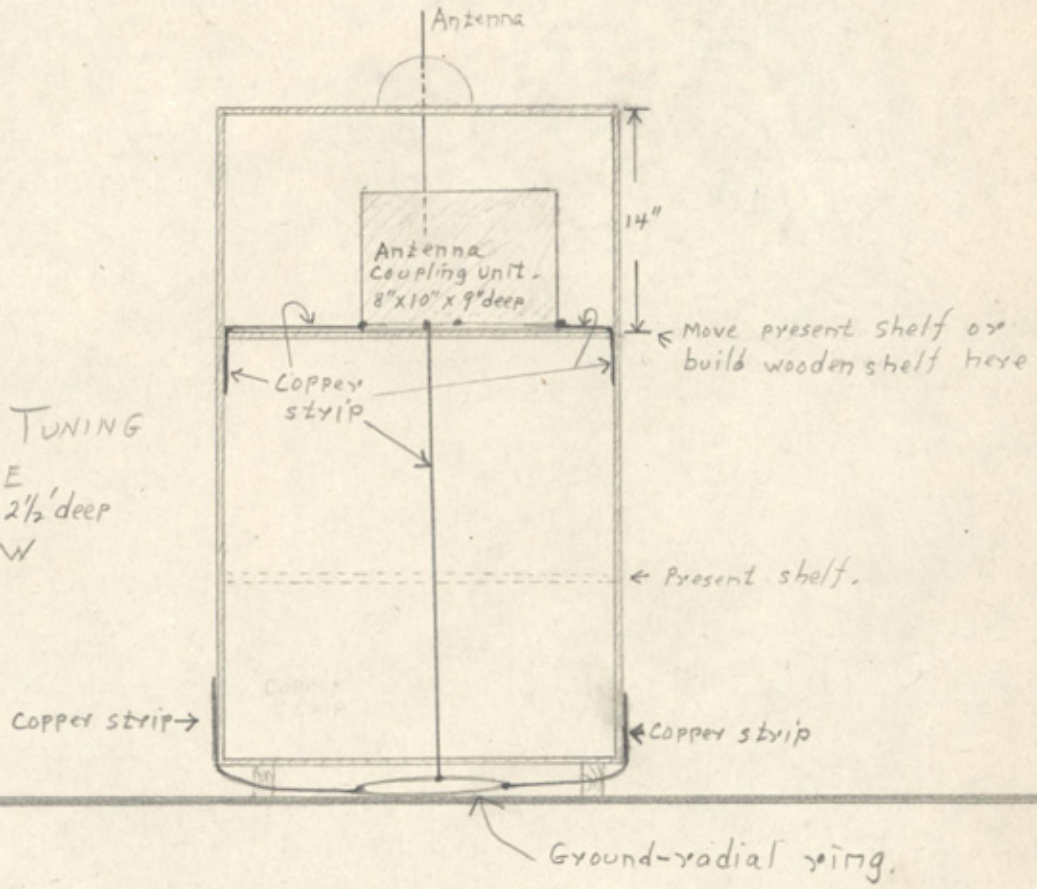
ANTENNA COUPLING HOUSE FOR  
10.585 mc ANTENNA

Encl D  
For both C.G. units  
10 & 30



UNITED STATES COAST GUARD

LSR-  
ANTENNA TUNING  
HOUSE  
22' x 3 1/3' x 2 1/2' deep  
Front view



C.G. Unit 45  
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## Description:

1. Set up and test HF Loran transmitter, Harvey Model 108-T, Ser #2A, converted to 10,585 kc, into dummy load
2. Erect and conduct experiments with  $\lambda/4$ ,  $\lambda/2$  and  $3/4\lambda$  co-phase antennas for 10,585 kc.
3. Construct antenna coupling housing and in every respect prepare the HF transmitting system unit for permanent installation elsewhere
4. When sufficient power supply becomes available run simultaneous tests:
  - a. L.F. and H.F. Transmitters on B-1 tuner.
  - b. " " " " " " on C " "
  - c. L.F. transmitter on B-1 tuner \* H.F. transmitter on C tuner and vice versa

Tests should be made using antennas.  
HOWEVER - before operating L.F. transmitter on antenna, <sup>specific</sup> authorization must first be obtained from Headquarters.

Project history on following pages.



PROJECT 1 : R

SUBJECT: HIGH FREQUENCY TRANSMITTER TEST OPERATION.

Ref: The following is an excerpt from inclosure 1 of H/L 21 April, 1944 ECM-1 CG-815.

Procedure: Operate the Harvey Model 108-T transmitter at 10.585 MC into dummy load both single and double pulsing with B-1 and C timers.

Erect and operate a 3/4 wave co-phase antenna a 10.585 MC feeding a coaxial line.

Operate with supplementary delay unit furnished by Radiation Laboratory M.I.T.

Results: A general report of operating observations is desired; the particular specific points to be covered are the ability of one timer to pulse both low and high frequency transmitters, the development of antenna tuning and line matching procedure, practicability of supplementary delay unit and development of HF monitoring technique.