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SHIP-SHORE RADIO DIVISION
RADIO COUNTERMEASURES SECTION

5 March 1946

MODIFICATION OF KOHLER EMERGENCY
GENERATOR FOR OPERATION ON 60 CYCLE CURRENT

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- Report R-2778 -



FR-2778

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Approved by

E. A. Speakman - Head, Radio Countermeasures Section

Mr. L. A. Gebhard
Superintendent, Ship-
Shore Radio Division

Commodore H.A. Schade, USN
Director, Naval Research
Laboratory

Preliminary Pages a-c
Numbered Pages 4
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BuShips Problem No. S975R

a.

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ABSTRACT

At least twenty-five Kohler emergency generator plants model 1E 21H, 1.5KVA, 110V.A.C. have been returned from service in the Canal Zone to be used at other activities. The plants were designed to supply 60 cycle emergency power in the event of failure of the 25 cycle line supply which is normal line frequency in the service area. Since all controls on these equipments are designed to operate from the 25 cycle supply, it was requested that the least number of changes to assure continuous operation on 60 cycle current be determined, that one unit be modified accordingly and that instructions be provided for enabling the remaining units to be modified. A list of parts and the procedure for making the changes is included in this report.

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INTRODUCTION

1. This problem was authorized by BuShips letter of reference (a) establishing Problem S975R. It was requested that the changes necessary to convert the control circuits of a Kohler emergency generator plant from 25 cycle operation to operation by 60 cycle current be determined, and the modification carried out on one unit. After all the components necessary to make the conversion were installed, the plant was tested and its performance noted.

DESCRIPTION

2. The equipment consists of a four cylinder, four horsepower gasoline engine directly coupled to a 1.5 KVA, 110V, 60 cycles alternator together with control circuits, starting batteries and combination starting motor and alternator exciter. The combination starting motor and alternator exciter windings are wound on the alternator rotor. The entire plant is housed in a sheet steel enclosure. A complete description of the plant is given in the instruction book of reference (b).

3. The control circuits govern the operation of the plant automatically. Normally the 60 cycle line is supplying the load (discussion deals with operation of control circuits after conversion to 60 cycle operation), the gasoline engine is not operating and the starting battery is being charged by means of the included trickle charger. On failure of the 60 cycle line, the gasoline engine starts automatically supplying 60 cycle current to the load until the 60 cycle line power is returned when the plant turns off after a suitable delay which is determined by the timer setting. The starting battery is being charged when the plant is in operation also.

4. In performing the conversion, the Kohler Company was consulted in order to determine the components required for the control circuits. The Eagle Signal Corporation was also consulted, to determine the components necessary to convert the timer to 60 cycle operation. The replacement components are:

Kohler Co. Parts

- (a) One coil for transfer relay, 115V, 60 Cycle operation. Part No. 5932
- (b) One transformer for trickle charger, 115V, 60 Cycle operation. Part No. 5883
- (c) One battery rate resistor, 8 ohms. Part No. 5906
- (d) One emergency battery rate switch. Part No. 152555

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(e) One Hi-Lo name plate. Part No. 151509

(f) One Lock ring. Part No. 151511

Eagle Signal Corp. Parts

(g) One coil for Timoflex reset timer, 115V, 60 cycle operation. Part No. HD 10-12.

(h) One synchronous motor for Timoflex reset timer 115V, 60 cycle operation. Part No. HQ 525-415.

5. Modification procedure is as follows.

(a) Remove the 25 cycle trickle charger transformer, labeled TR in the circuit diagram on page 16 of reference 2, located in the main control circuit assembly, and replace it with a 60 cycle unit.

(b) Replace the 25 cycle coil, labeled TC in the circuit diagram on Page 16 of reference (2), in the transfer relay found in the control circuit assembly, with a 60 cycle unit.

(c) Replace the high rate battery charging resistor, labeled HR in the circuit diagram on Page 16 of reference (b) found in the control circuit assembly, with the 8 ohm unit.

(d) Install the emergency battery rate switch, labeled BC in the circuit diagram on Page 16 of reference 2, located in the control circuit assembly, between the points shown on the above mentioned circuit diagram. The switch should be mounted to the metal housing of the control circuits near the emergency test switch, ET, and the line voltmeter. The hi-lo name plate and lock ring should be used in the mounting of this switch.

(e) Replace the 25 cycle coil, labeled MC in the circuit diagram on page 16 of reference (b) in the Timoflex reset timer which is found in the small metal box external to the control circuit assembly, with a 60 cycle unit.

(f) Replace the 25 cycle synchronous motor, labeled M in the circuit diagram on page 16 of reference (b) in the Timoflex reset timer which is located in the small metal box external to the control circuit assembly, with a 60 cycle motor.

6. With all the modifications made, the unit was tested and found to be operating normally. The plant started up on failure of the commercial power line and shut off after the preset time delay when the commercial power line resumed operation. It was found from measurement that the starting battery

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was being charged at .5 amperes when the charging rate switch was in "Hi" position, and at .2 amperes when this switch was in "lo" position. When the emergency generating plant was in operation the "hi" charging rate was 2.0 amperes and 1.6 amperes when on "lo" charging rate.

REFERENCES

1. BuShips ltr. 349215 of 25 November 1944 to Dir., NRL (SRPPB). Request for assignment of problem S975R.
2. Kohler Co. Instruction book "Instructions for Operation and Care and Price List of Parts for $1\frac{1}{2}$ KVA Model 1E21H, 110V.A-C".

Original data recorded in NRL Log Book No. 5885

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BuShips (938) (5)
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MAR 27 1946

To: Chief of Bureau of Ships
Attn: Code 938

Subj: Modification of Kohler Emergency
Generator for Operation on 60 Cycle Current.
Report on by R. Zirm. Problem S975R, For-
warding of.

Encl: (H.W.)
(A) Five (5) copies of subject report R-2778 of
5 March 1946.

1. Enclosure (A) is forwarded herewith.

G. I. Webb
Lt. Comdr. USNR
By direction of Director
Naval Research Laboratory

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