INSTRUCTION BOOK NO. 1; INSTALLATION, CARE, AND OPERATION OF 25 KW. GASOLINE-ELECTRIC GENERATING SETS G. E. CO., TYPE GM-12. ENGINEER DEPARTMENT, UNITED STATES ARMY FEBRUARY, 1916

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649466337

Instruction Book No. 1; Installation, Care, and Operation of 25 Kw. Gasoline-Electric Generating Sets G. E. Co., Type GM-12. Engineer Department, United States Army February, 1916 by Various

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

www.triestepublishing.com

VARIOUS

INSTRUCTION BOOK NO. 1; INSTALLATION, CARE, AND OPERATION OF 25 KW. GASOLINE-ELECTRIC GENERATING SETS G. E. CO., TYPE GM-12. ENGINEER DEPARTMENT, UNITED STATES ARMY FEBRUARY, 1916

Trieste

INSTRUCTION BOOK No. 1

INSTALLATION, CARE, AND OPERATION OF

25 Kw. GASOLINE-ELECTRIC GENERATING SETS

G. E. Co., TYPE GM-12

ENGINEER DEPARTMENT, UNITED STATES ARMY
FEBRUARY, 1916

Prepared by the Engineer Depot, Washington Barracks, D. C.

WASHINGTON
GOVERNMENT PRINTING OFFICE
1916

WAR DEPARTMENT,
Document No. 497
Office of the Chief of Engineers.

PREFACE.

1. This book covers the installation, operation, and general care of the 25-kw. gasoline-electric generating sets manufactured by the General Electric Co., and issued by the Engineer Department for fortification purposes. It supersedes instruction books Nos. 8367, 8402, 8557 (and supplements thereto) and Revised Memorandum previously issued by the Engineer Department.

2. For convenience of discussion, the subject matter of the book is divided into four parts:

I.—Description.
II.—Care and operation.
III.—Installation.
IV.—Part lists.

Changes in or additions to the text which may be rendered necessary from time to time will be issued in such form as to be readily pasted in portions of book to which they pertain.

3. The book is not intended to be a general treatise on the subject of gas-engine operation, and matters which are common to the operation of all gasoline engines are not included; it is assumed that the operator has a general knowledge of the operation of internal-combustion engines, such as can be obtained from experience or standard texts. **However, no attempt should be made to install or operate a set until this book has been thoroughly studied.**

INSTALLATION, CARE, AND OPERATION OF 25-KW. GASOLINE-ELECTRIC GENERATING SETS.

PART I.—DESCRIPTION.

TYPE AND FORM.

4. The 25-kw. gasoline-driven generating sets of the General Electric Co., which have been issued by the Engineer Department since 1908, are designated by the makers by type and form numbers. The type number designation has always been "Type G. M. 12." The form number has been changed from time to time coincident with changes in the details of the set. The distinguishing features of the form numbers are:

Form A1. First Government sets with manganese bronze base, gear pump and Eisemann A–8 magneto.

Form A2. Sets with cast iron base. Radical changes made in the oiling system. Both Eisemann A–8 and G. E. magnetos Type AY–105 have been furnished with the Form A2 engines.

Form A14. These engines were equipped with Eisemann magnetos and Kinney water pumps.

Form A20. Same as Form A14, except noise-reducing features were added.

Form A23. Same as Form A20, except that Splitdorf AX magneto was substituted for the Eisemann magneto.

CAPACITY.

5. The set consists of a vertical, four-cylinder, four-cycle, single-acting engine, direct-connected to a direct-current generator. The set is capable of being operated at rated load indefinitely and at 25 per cent overload for two hours, furnishing in each case 2 kw. additional for operating the radiator fan motor. With each set there are furnished a gasoline tank, a switchboard, a radiator with motor-driven fan, a muffler, a box of tools, and a box of spare parts.

FRAME.

6. This is a single piece casting, bored for the crank bearings. This construction maintains the generator and engine in proper alignment. The frame is provided with large handholes protected by cover plates. The latter are easily removed and provide means for adjustment and replacement of interior parts. The bottom portion of the frame is utilized as an oil reservoir for the lubricating system.

CYLINDERS.

7. Cylinders are made with water jackets cast in one piece. Suitable openings, provided with covers, are located on the water jackets for removal of sediment.

CRANK SHAFT.

8. The crank shaft is made in one piece. It is supported by two end bearings, one at the flywheel end and one at the generator end, and by three intermediate bearings. The end bearings are attached to the frame by studs. Through bolts in the frame perform the dual function of holding up the interior bearings and holding down the cylinders. Oil ducts are provided in the crank shaft. The oil ducts deliver oil, under pressure, from the crank-shaft bearings to the crank pins.

GEARS.

9. Located in an oil-tight gear case, at the flywheel end of the engine, is a chain of gears operated by a pinion keyed to the crank shaft. Immediately above the pinion and meshing therewith is the idler gear. To the left of the idler gear, in the order named, are the intake cam shaft gear and the pump gear. To the right of the idler gear, in the order named, are the exhaust cam shaft gear and the magneto gear. In the engines equipped with the "silencing features" the idler gears, pump gears, and magneto gears are of the cloth type. In all other engines the gears are made of steel.

PISTONS, CONNECTING RODS, ETC.

10. The pistons are machined, ground, and provided with four snap rings. Motion is transmitted from pistons to the crank shaft by means of wrist pins and connecting rods. An oil duct or tube, located on the connecting rod, delivers oil from the crank pin to the wrist pin.

CAM SHAFTS.

11. There are two sets of cams, one for operating the intake valves, the other for operating the exhaust valves. Cam shafts are made in one piece and are operated by their respective gears. The inlet cam shaft is provided with a bevel gear at the generator end for operation of the governor and oil pump. A lever is provided at the generator end of the exhaust cam shaft by means of which the exhaust cam may be shifted to relieve compression and thus facilitate starting. Throwing the lever inward, toward the engine, relieves compression; throwing the lever outward restores normal conditions. Shifting the exhaust cam shaft to relieve compression brings (in addition to main cams) an auxiliary set of cams into operation. These auxiliary cams open the exhaust valves during the later part of suction

stroke and hold them open during the greater part of following compression stroke.

BEARINGS.

12. Each bearing is adjustable and may be removed without disturbing the adjustment of other bearings or removing the shaft. The wrist pin bearing is one solid bushing. The main bearings are provided with removable linings.

VALVES.

13. Valves are provided with a removable stem guide and are free to rotate in their seats while in operation. In addition to the main valve spring, found on all engines, Form A–20 and subsequent engines are equipped with tappet rod springs. Cams on the cam shafts, coming in contact with the cam rollers, raise the rollers and cam roller forks which hold them. The stem of the fork passes through a guide attached to engine frame. Motion is transmitted from fork stem to valve stem through the medium of valve adjusting clamp—thus raising the valve from its seat. Valves are closed by the action of the main valve spring.

EXHAUST HEADER.

14. The exhaust header is a one-piece water jacketed casting, flange-connected to cylinders. Blind and threaded flanges (interchangeable in position) are provided at either end of the exhaust header.

MUFFLER.

15. The sound of the exhaust is deadened by a suitable muffler, which does not impair the efficiency of the operation of the engine. The arrow on the muffler indicates the proper direction for the passage of the exhaust gases.

FUEL SUPPLY SYSTEM.

16a. Pump.—A double plunger gasoline pump, attached to the engine frame, pumps gasoline (58° to 68° Baumé) from the supply tank to the carburetor. One plunger is provided with a lever for hand operation, the other is mechanically driven by an eccentric rod. The eccentric rod is operated by an eccentric on the water pump shaft, the latter being driven by the water pump gear. The hand-operated pump is used for starting or when the mechanically driven pump momentarily fails to function. The mechanically driven plunger supplies fuel when the engine is running. Suitable check valves keep the pump primed. The mechanically driven pump is of sufficient capacity for maximum load on the engine. For other than maximum load the excess gasoline returns to its source through the overflow pipe from the carburetor, the carburetor being of the constant level type.