

## HOMELITE GASOLINE ENGINE GENERATOR SETS

### EMERGENCY CHARGING EQUIPMENT

#### FOR

#### P.B.X. SWITCHBOARD BATTERIES

### 1. GENERAL

1.01 This section describes the use of portable Homelite Gasoline Engine Generator Sets for charging P.B.X. batteries on an emergency basis and explains the methods to be employed in their operation and maintenance. This section replaces Section A301.299, issue A and Section F23.963, issue A and is reissued to include changes in procedure and the frequency of test.

Caution: Gasoline fumes are very likely to be explosive. Exhaust gases are dangerous to life when inhaled. Avoid ignition of explosive gases and breathing of exhaust gases.

1.02 This type of set is not approved by the fire underwriters for use inside of buildings.

1.03 Appendix 1 of this section is for listing locations where the portable equipment is stored and the P.B.X. batteries which will require charging, together with the engine generator set to be used at the P.B.X. in case of power failure. The attachment to the appendix is a prepared sample of instructions for each installation in regard to locating the portable sets and the running of the charging leads. The individual instructions are to be prepared and maintained by the local maintenance force.

### 2. DESCRIPTION

(A) Purpose of Emergency Charging Equipment

2.01 Portable gasoline engine-generator sets, charging leads and miscellaneous equipment are provided as emergency units to be used in case of complete failure of the Electric Company supply of sufficient duration to imperil the switchboard storage battery reserve.

2.02 In case of a continued power failure (two hours or more) the emergency charging equipment is to be transported to the buildings where switchboards are located which are to receive emergency power service treatment. The gasoline engine-generator set is to be placed in the street, alley or lot adjacent to the building and the charging leads run to the switchboard battery or power panel.

2.03 One engine-generator set may be used to charge several battery installations in different locations, depending upon the size of the batteries and their loads. These emergency sets will remain at each building location for sufficient time to restore the battery to a charged condition after which they may be transported to other locations for similar use or returned to the building where stored.

2.04 The premises of all buildings where it is planned to supply emergency charging service shall be surveyed and individual instructions prepared for each location as covered in attachments to Appendix 1.

2.05 Definite plans shall be established for use of the equipment so that in case of an emergency it

can be used to the best advantage. The plan shall be based on maintaining service at all times at those private branch exchanges which are in the following groups:

1. Hospitals
2. Military Establishments
3. Governmental Offices, Federal, State, County and City
4. Newspapers
5. Transportation Companies, Air Lines and Railroads
6. Power and Light Companies
7. Communication Companies, Broadcasting and Telegraph
8. Industrial Concerns Associated with National Defense

2.06 Consideration should also be given to the order in which the important P.B.X.'s are classified, hospitals first, military establishments second, governmental offices third, etc. The men selected to carry out the work in connection with the plan should know well the location of all P.B.X.'s and means of identification shall be provided which will enable them to gain admittance to all P.B.X. locations so that there will be no delay in making replacement of batteries or placing the emergency generators in operation.

(B) Description of Engine-Generator Set and Associated Equipment

2.07 The portable engine-generator sets are manufactured by the Homelite Corporation, Port Chester, New York. Some of the details of these machines are as follows:

D.C. Generator Rating	Weight	Fuel Tank Capacity
3000-W 22/55-V	130	2 Gals.
1800-W 22/55-V	100	1-1/2 Gals.
1250-W 22/55-V	82	1-1/4 Gals.

  

D.C. Generator Rating	Full Load Fuel Consumption	Engine Speed
3000-W 22/55-V	1 Gal. per Hr.	3400
1800-W 22/55-V	1/2 Gal. Per hr.	3200
1250-W 22/55-V	1/2 Gal. per Hr.	3200

Fuel Feed - Pressure from base type storage tank. Gravity from tank located above carburetor.

Lubrication - Oil mixed with gasoline is forced to all moving parts by compression in the crank case. Macmillan Ring Free Motor Oil is recommended for use in all type sets.

2.08 Each engine-generator set has associated with it a kit and accessories which are numbered as set #1, set #2, etc. All positive cables are painted red at both ends to designate polarity.

2.09 The following miscellaneous equipment is provided with each engine-generator set:

Quantity	Item
1	5-gallon safety can painted red for gasoline
1	2-gallon safety can painted green for motor oil
1	Screen funnel
1	Measure
1	Spark plug (Champion J-10)
1	Hand lantern (with batteries)
1	Retard coil
1	Book of instructions
1	Set of tools
1	Starting rope
1	Gallon of motor oil
2	Cables 100-ft.
1	Cable 15-ft.
1	Carrying case for aux. apparatus and tools
	Clean engine wiping rags
1	Sketch EEW-4810 (Method of connecting generating unit to battery)
1	Checking list
1	In operation log

2.10 Four (4) extra 100-foot cables for use at locations where the 100-foot cables accompany the sets are not long enough are provided and held in Seattle for emergency use.

2.11 Piece parts for the engine-generator sets may be obtained from the Homelite Corporation, 200 Davis Street, San Francisco, California.

3. PROCEDURE UPON FAILURE OF  
ELECTRIC COMPANY POWER SUPPLY

(A) Repair Service Bureau

3.01 Upon receipt of report indicating there is a failure of the Electric Company power supply serving switchboards designated to receive emergency power supply treatment, the Bureau receiving the report shall immediately notify the Supervisor of the condition and be guided by his advice.

3.02 If it appears that the probable duration of the power failure will be for more than two hours or switchboard load conditions are such as to imperil the reserve capacity of storage batteries, the Supervisor shall refer to the capacity list of the various P.B.X. batteries and, if necessary, arrange with the Repair Foreman of the affected locality for transportation of the engine-generator set to the switchboard location and for assigning employees to operate the equipment.

3.03 In the event of a general power failure affecting several districts, the routing and transportation of all engine-generator sets shall be made under the direction of the District Plant Manager.

(B) Transportation and Fuel Supply

3.04 The engine-generator sets are stored at Company owned or operated garages and buildings. The Repair Foreman of the locality where the power failure has occurred shall arrange for the transportation of the assigned engine-generator set, gasoline and oil cans, together with the miscellaneous equipment required from the garage or building to the P.B.X. When the battery has been restored to a charged condition or if there is no further need for the charging equipment, the equipment shall be returned to its storage location.

3.05 It shall be the duty of the employee who picks up the engine-generator set to see that the 5 gallon can is filled with the correct mixture of fuel. As the 3000 and 1800 Watt engines do not use the same amount of oil in the gasoline as the 1250 Watt engine, it will be necessary to carefully check to be sure that the fuel for the particular engine is of the proper mixture. The 3000 and 1800 Watt sets use 1/2 pint of S.A.E. 40 Motor Oil mixed with each gallon of gasoline. The 1250 Watt sets use 3/4 pint of S.A.E. 40 Motor Oil mixed with each gallon of gasoline. Macmillan Ring Free Motor Oil is recommended for use in all type sets, however, if this is not available, use the equivalent in any first grade motor oil.

3.06 In cases where it is evident that an extended run will be necessary, the 5 gallon gasoline can shall be refilled with the proper mixture of fuel immediately following the emptying of the 5 gallon can and while the engine tank is full of fuel.

(C) Setting Up Engine-Generator Equipment

3.07 Locate the engine set close to the building so as to avoid stringing wires across the sidewalk. Direct the exhaust pipe so as to cause a minimum of annoyance to pedestrians and neighboring shopkeepers. Arrange the equipment compactly except that the gasoline can should be kept at least five feet away from the engine. Place a manhole guard or rope railing around the equipment if there is an appreciable amount of traffic close to the charging equipment.

(D) Running the Charging Leads

3.08 The charging leads should be run in accordance with the detailed instructions as covered in the

sheets which have been prepared for each P.B.X.

3.09 When starting to connect the engine-generator set to the battery, first connect the charging leads to the generator and work toward battery. In this way, the leads will be dead until the final connection is made to the battery. When charge is completed, stop the engine and disconnect charging leads from battery studs, thereby making all leads dead.

3.10 Charging leads may be temporarily run on the floor but should be properly supported at the earliest opportunity. Use heavy cord for tying the cable. Use friction tape for protecting the cable against damage when it is hung over sharp cornices or where it passes through doors and may be damaged.

3.11 During hours of darkness, a lantern should be used at the engine-generator set.

#### (E) Starting the Engine

3.12 Fill the fuel tank and open the fuel line shut-off cock or valve under the fuel tank.

3.13 Turn the generator field rheostat to cut out all of the resistance. (All of the way in the direction of increased charge.)

3.14 For the 3000 Watt machine, choke by pulling the plunger pump black knob all the way up and releasing it two or three times. For the 1250 and 1800 Watt machines place the throttle in the starting position.

#### (a) On Battery

3.15 The engine may be started from the P.B.X. battery by pressing the starting button on the switch box. As soon as the engine starts, release the button.

#### (b) Manually

3.16 Wind the starting cord counter clockwise on the pulley. For the 3000 Watt machine, place one foot on the footrest between the spring mountings; for the 1800 and 1250 Watt machines, press one hand on the fuel tank and pull hard on the rope, giving a quick spin to the engine. Repeat, if necessary, until the engine starts.

Note: In all cases, the cord handle should be held in the hand with the fingers partly open so that in case of a kickback the handle will be pulled from the hand. Such kickbacks may occur if the engine is not spun quickly enough or if the engine is hot.

#### (F) Charging the Battery

3.17 Adjust the field rheostat of the generator to give the desired charging rate. The ampere output shall not exceed the rated full load amperes of the generator. (see the name-plate.)

3.18 The battery may be charged in most instances at the maximum rated ampere output of the machine. A 20% rise in temperature of the battery from the start to the completion of the job or a maximum of 110 degrees Fahrenheit shall not be exceeded. For 100-ampere hour single string batteries, the charging rate should not exceed 40 amperes. If the temperature rises rapidly before sufficient ampere hours are restored, reduce the charging rate and continue the charge.

3.19 The charge shall be stopped when one of the following conditions are made:

- a) All indicators are up in the pilot cell.
- b) The specific gravity of the pilot cell shows the battery to 90% charged.

- c) The battery temperature rises above 110° F.
- d) It becomes necessary to proceed to another location in order to prevent service failure at that plant.

(G) Stopping the Engine

- 3.20 Adjust the rheostat to cut in resistance until the load is reduced as much as possible.
- 3.21 Stop the engine by depressing the red stop button and holding it depressed until the engine stops.
- 3.22 Close the fuel line shut-off cock.
- 3.23 Disconnect the battery leads immediately to prevent the possibility of placing a short on the battery, if the engine is not to be placed in service at once.

4. PERIODIC ROUTINE TEST AND INSPECTION OF SET AND EQUIPMENT

4.01 Once each month each engine generator set shall be taken outside of the storage location and into the open air and the engine run for one hour with the generator connected to whatever battery load is available (not to exceed rated capacity of the set) in order that its behavior under load will be checked. During the test, observations should be made to check performance and to determine any signs of trouble. Operation of the generator at no load may cause overheating of the armature and should be avoided. Any troubles which are likely to develop will probably

6. GENERAL ENGINE TROUBLES

6.01 In general, the failure of the engine or generator to function properly will be due to one or more of the troubles listed below.

a) Engine Troubles

If the engine is hard to start, stops, does not come up to speed, or overheats, check for:

be noticed during such a test run and may be corrected before the set is needed at a time of actual power failure.

5. RESPONSIBILITY FOR OPERATION, MAINTENANCE AND REPAIR OF EMERGENCY CHARGING EQUIPMENT

5.01 The local maintenance force at the location where the engine-generator sets are stored shall be responsible for all of the equipment.

5.02 The P.B.X. Repair Force shall operate the engines in an emergency and care for all details such as shipment of the engines, connection and disconnection to the batteries, supply of fuel, order in which P.B.X. batteries are to be charged and take all necessary safety precautions.

5.03 The local maintenance force at the location where the engine-generator sets are stored shall conduct the periodic tests described in Paragraph 4.01 of this practice and make minor repairs such as cleaning or replacing spark plugs, cleaning fuel strainer, replacing carbon brushes and tightening loose parts or connections.

5.04 Engine-generator sets requiring repairs of a major nature shall be referred to the supervisor in charge for disposition.

5.05 Operating instructions and general service information for Homelite Direct Current Generators shall be associated with each engine-generator set.

	<u>Trouble</u>	<u>Cause</u>	<u>Action</u>
6.02	Defective Spark Plug	Wrong type Cracked Porcelain Improper point Gap  Points shorted by ) carbon ) Points shorted by ) oil or fuel )	Use Champion J-10 Commercial Replace Spark Plug See instructions for particular engine for proper air gap adjustment  Take out and clean
6.03	Fails to deliver rated output	Rheostat incor- rectly adjusted Engine not up to speed Dirty commutator Worn brushes Brushes out of adjustment	Adjust rheostat  Correct engine trouble Clean Replace  Adjust
6.04	Insufficient fuel supply	No fuel in tank Strainer in tank clogged Fuel line clogged Water or dirt in fuel	Fill tank  Clean Remove obstruction Empty tank and refill with proper fuel
6.05	Defective ignition	Improper breaker gap  Breaker points pitted Broken spark plug cable Loose connections Coil defective ) Magnet weak ) Condenser ) defective )	See instructions for particular engine for proper air gap adjustment File smooth and adjust  Repair or replace  Tighten  Replace
6.06	Loss of power	Cylinder ports clogged  Piston and cylin- ) der head carbon- ) ized ) Carbon on piston ) wall )	Remove exhaust manifold and scrape carbon from exhaust ports.  Remove cylinder and clean thoroughly
6.07	Defective Carburetor	Improper Adjustment Strainer clogged Nozzle clogged  Float stuck  Float needle worn	Adjust needle valve Clean Remove needle valve assembly and clean nozzle Remove float bowl cover and clean bowl Replace

b) Generator Troubles

	<u>Trouble</u>	<u>Cause</u>	<u>Action</u>
6.08	Arcing at Brushes	Dirty commutator Worn-out brushes Brushes bind in holders Brushes out of adjustment	Clean Replace Free  Loosen terminal post and line up marks on terminal plate and brush head
6.09	Fails to Generate	Brushes bind in holders Rheostat fully cut in Worn-out brushes Dirty commutator Broken connections Loose connections	Free Cut out some resistance  Replace Clean Repair Tighten
6.10	Fails to Deliver Rated Output	Rheostat incorrect- ly adjusted Engine not up to speed Dirty commutator Worn Brushes Brushes out of ad- justment	Adjust rheostat Correct engine trouble  Clean Replace Adjust