INSTRUCTION MANUAL

FOR

Onan®

ELECTRIC GENERATING PLANTS

LK

SERIES

ONAN ENGINE/GENERATOR DIVISION Studebaker CORPORATION

2515 UNIVERSITY AVE. S.E. MINNEAPOLIS, MINN. 55414
IN CANADA: ONAN GENERATORS CANADA LTD., P.O. BOX 652, GUELPH, ONTARIO

930-1

Price $1.00

Printed in U.S.A.
8 AC 65

We mean it.....

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I Warrant, Page 28

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Remarks: by Don manual models advanced to "C" spec per ECN 123 [illegible] Gen Data to B, hi tension mag, Nos anti-flicker, oilbath air cleaner, new W.D.,

changed pages 3, 5, 10, 16, 17, 23, 24, 27, 28, 34, 35, 36, 37, 39, 40, 46, 47, 49, 78, 80, 81, 82, 83, date

Remote + Vacu Flo advance later - therefore qty 750 3AC65

(was 12AB63)

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Bruning says we build about 50 per month of LK

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FORM 27C104

102 in stock (over 1) 8/16/65 7:30 AM

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☒ Gathering

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Total Time

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Remarks: by EaM signed off by D J Breining many minor files added Spec C remote - issue 3AC65 had Spec C manual only. previous copy 2500 watt, noted fiber optics C notation - the added remote Spec C, W.D. is 610 C 266 610 C 267 610 C 270

O.K.'d. by HK took 15 for 161 bundle ONAN bundle spacer

Complete to HK 11-16-65 used 728 past 6 months

FORM 27C104

GENERAL INFORMATION

This instruction book contains information for the proper installation, operation, and maintenance of your equipment. We suggest that this book be kept handy so that it can be referred to when necessary.

This equipment is the result of proven engineering design, highest quality materials, and expert workmanship. Thorough inspection and testing assures you that this equipment will perform as expected.

If you wish to contact your dealer or the factory regarding this equipment, be sure to supply the complete MODEL and SPEC. NO., and the full serial number of the equipment as shown on the nameplate. This information is necessary to identify the equipment among the many basic and special optional types manufactured.

MANUFACTURER'S WARRANTY

The Manufacturer warrants, to the original user, that each product of its manufacture is free from defects in material and factory workmanship if properly installed, serviced and operated under normal conditions according to the Manufacturer's instructions.

Manufacturer's obligation under this warranty is limited to correcting without charge at its factory any part or parts thereof which shall be returned to its factory or one of its Authorized Service Stations, transportation charges prepaid, within one year after being put into service by the original user, and which upon examination shall disclose to the Manufacturer's satisfaction to have been originally defective. Correction of such defects by repair to, or supplying of replacements for defective parts, shall constitute fulfillment of all obligations to original user.

This warranty shall not apply to any of the Manufacturer's products which must be replaced because of normal wear, which have been subject to misuse, negligence or accident or which shall have been repaired or altered outside of the Manufacturer's factory unless authorized by the Manufacturer.

Manufacturer shall not be liable for loss, damage or expense directly or indirectly from the use of its product or from any other cause.

The above warranty supersedes and is in lieu of all other warranties, expressed or implied, and of all other liabilities or obligations on part of Manufacturer. No person, agent or dealer is authorized to give any warranties on behalf of the Manufacturer nor to assume for the Manufacturer any other liability in connection with any of its products unless made in writing and signed by an officer of the Manufacturer.

DATED August 1, 1963

IMPORTANT

RETURN WARRANTY CARD ATTACHED TO UNIT

LIST OF ILLUSTRATIONS

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PLANT RUNNING HOURS COMPARED TO AUTOMOBILE RUNNING MILES

The engine of your generating plant makes as many revolutions in one hour, as the average automobile engine does when the car travels a distance of 41 miles.

100 running hours time on a generating plant engine is equivalent in total RPM's to approximately 4100 running miles on an automobile.

However, do not conclude that the wear on the generating plant engine and the wear on the automobile engine would be the same. The generating plant engine is built much more ruggedly, (having larger main bearings, bigger oil capacity and has a heavier crankshaft proportionately per horsepower) than most automobile engines. Given the proper care and periodic servicing the generating plant engine will continue to give many more hours of efficient service than an automobile engine will after having been run the equivalent number of running miles.

Compare the running time of your generating plant engine with the number of miles traveled by an automobile. The oil in an auto is checked every one or two hundred miles (3 to 5 hrs. running time) and changed every 1000 to 1500 miles (28 to 42 hrs.) whereas in a generating plant or stationary power engine, the oil should be checked every 6 to 8 running hours (250 to 350 miles) and changed every 50 to 100 operating hours (2000 to 4000 miles) depending on operating conditions.

About every 5,000 to 10,000 miles (120 to 250 hours), services have to be performed on an auto, such as checking ignition points, replacing spark plugs, condensers, etc. Similarly on your generating plant engine, these same services have to be performed periodically except the change period is reckoned in hours. 10,000 miles on an auto is equivalent to about 250 running hours on your plant engine.

To arrive at an approximate figure of comparative generating plant running hours as against automobile engine running miles, multiply the total number of running hours by 41 to find the equivalent of running miles on an automobile.

Your generating plant engine can "take it" and will give many hours of efficient performance provided it is serviced regularly.

Below is a chart showing the comparison between a generating plant engine running hours and an automobile running miles.

GENERATING PLANT RUNNING HOURS		AUTOMOBILE RUNNING MILES
DAILY AVERAGE	1 Hr.	41 Miles
	4 Hrs.	164 "
	6 "	246 "
	8 "	328 "
WEEKLY AVERAGE	7 "	287 "
	28 "	1,148 "
	42 "	1,722 "
	56 "	2,296 "

GENERATING PLANT RUNNING HOURS		AUTOMOBILE RUNNING MILES
MONTHLY AVERAGE	30 Hrs.	1,230 Miles
	120 "	4,920 "
	180 "	7,380 "
	240 "	9,840 "
YEARLY AVERAGE	365 "	14,965 "
	1,460 "	59,860 "
	2,190 "	89,790 "
	2,920 "	119,720 "

NOTE: Electric generating plants do not operate economically when used to power electric refrigerators and will add from 4 to 8 operating hours per day in addition to the regular lighting load.

ORIENTATION

INTRODUCTION. - This instruction manual is supplied to assist in the proper installation, operation, and servicing of the LK series electric generating plants. Unless otherwise stated, these instructions apply to all standard plants of the LK series.

NOTE

The plant model and specification, serial numbers, and electrical characteristics appear on the nameplate. The manufacturer produces many types of generating plants, and the MODEL & SPEC. NO. on the nameplate should always be mentioned in any reference to the plant if contacting a dealer or the factory.

Some details of these instructions may not apply to special models having modifications specified by the purchaser. Due to the wide variety of uses for which these plants are suitable, these instructions must be of a general nature. The use of auxiliary or special equipment, special installation requirements, or unusual operating conditions may require the operator of this generating plant to modify these instructions. However, by using the instructions and recommendations given in this manual as a general guide, it will be possible to make a good installation, and to properly operate and maintain the plant.

The engine end is designated as the "Front End" of the plant and the carburetor side is designated as the "Right Side" of the plant.

GENERAL DESCRIPTION

Each LK generating plant is a complete electric power plant, consisting of an internal combustion engine, and a self excited electric generator, directly connected to the engine. Controls and accessories suitable for a normal installation and according to the particular model are supplied.

Each generating plant is given an actual running test at the factory and is carefully checked under various electrical load conditions before shipment, to assure that it is free of any defect and that it meets all performance requirements. Inspect the plant carefully for any damage which may have occurred in shipment. Any part so damaged must be repaired or replaced before putting the plant into operation.

ALTERNATING CURRENT PLANTS. - The alternating current (ac) plant generates current similar to that supplied by most commercial power lines. This type plant must be operated whenever electric power is desired.

Most electrical appliances can be used on either 50-or 60-cycle frequency but it is advisable to check appliances before purchasing to assure that they are adaptable to the current frequency and voltage. 50-cycle plants operate at approximately 1500 rpm. 60-cycle plants operate at approximately 1800 rpm. Due to the speed difference, the output rating is lower for the 50-cycle plant.

The manual types of plants are designed for applications where portability is important. A pull rope serves for hand cranking, and the plant can not be connected to batteries for electric cranking. A mounted fuel tank is provided. Electrical load wires must be attached to the generator output leads within the junction box on the plant. Load receptacles can be conveniently added.

The remote control type of plant is designed for applications where the installation will be more or less permanent. When properly connected to a 12-volt battery (or two 6-volt batteries in series), the plant may be cranked electrically at the plant, from one or more remote control switch locations, or through automatic controls. In the event of failure of the starting battery current, the plant may be started manually. The remote control type plant has a built-in charging circuit for keeping the starting battery in a well charged condition. A separate 5-gallon (U.S. Measure) fuel tank is used. Terminals inside the control box provide for connecting the electrical load wires.

ALL PLANTS. - The net weight of the plant is approximately 230-to 240-pounds.

Standard models use gasoline fuel. Certain special models are equipped for burning gas fuel.

ENGINE DETAILS

A vertical single cylinder, four stroke cycle, air cooled, L-head, internal combustion engine is used. The cylinder bore is 3-1/4 inches, the stroke 3-inches, piston displacement 25-cubic inches, compression ratio 5.5 to 1, and the rated horsepower at 1800-rpm is 5 h.p. The cast iron cylinder and crankcase is a single casting.

The engine speed is controlled by a flyball type governor built into the camshaft gear. The governor is adjusted at the factory. Ignition current is supplied by a high tension, flywheel type magneto on manual-type

plants and by the starting battery on remote type plants. The engine is cooled by air forced around the cylinder walls and head. Plants which are "pressure cooled" have blower fins on the flywheel which draw air in through the opening at the front of the blower housing. Remote-type special models may be Vacu-Flo (suction) cooled, and have blower fins which expel heated air out through the duct at the top of the blower housing, as desirable for small enclosure installations.

The engine has an aluminum alloy three ring piston, aluminum alloy connecting rod, and full floating type piston pin. The counterbalanced crankshaft turns in two unusually large sleeve type main bearings.

The cylinder head and oil base are removable for servicing the engine.

Positive splash type lubrication is standard. Oil capacity is 2 quarts U. S. Measure.

The exhaust valve is stellite faced, seats on a stellite replaceable seat, and uses a positive rotator providing long trouble-free performance. Tappets are adjustable and self-locking.

GENERATOR DETAILS

All generators of this series generating plants are revolving armature, four pole, self excited type. The machined steel ring frame mounts the pole shoes and field coils. The armature is directly connected to the engine crankshaft through a taper fit and held in place by a stud which passes through the hollow center of the shaft.

AC GENERATORS. - The alternating current generator field is shunt wound. Remote control models have an additional series winding which permits use of the generator as a motor for cranking the plant. The armature contains both ac and dc windings. The direct current is used for energizing the field. The remote control plant uses also direct current to charge the starting battery.

CONTROLS

AC MANUAL TYPE PLANTS. - These plants are started by manually cranking with a pull rope. The carburetor is manually choked. Electrical load is connected to the plant by connecting to the receptacles in the junction box mounted on the plant. The plant is stopped by pushing a stop button on the ignition breaker box. This type plant can not be connected to batteries for electric starting.

AC REMOTE CONTROL PLANT. - The remote control type plant is designed for electrical starting, either at the plant or by means of remote control stop-start switches. Automatic or line failure transfer equipment may be connected to the plant.

The carburetor is automatically choked for starting. The control box is mounted over the generator and contains a reverse current relay, a start solenoid, a stop-start toggle switch, a two-step voltage regulator, a stop relay, output terminals, manual or electric start switch, a charge rate ammeter, and necessary resistors. Terminals for battery connections are provided. Output leads connect to terminals in the control box, for connecting to the load wires.

STANDARD ACCESSORIES
(Subject to Change)

MANUAL PLANT. -Manual plants are supplied with a Readi-Pull starter (begin Spec.C), muffler, and instruction manual. The Readi-Pull starter does not apply to Vacu-Flo cooled plants.

AC REMOTE CONTROL PLANT. -The ac remote control plant is supplied with a muffler, separate 5-gallon fuel tank with connecting fuel line, a flexible exhaust tube, and battery cables.

OPTIONAL ACCESSORIES

CARRYING FRAME KIT. - The plant can be mounted in a lightweight tubular-steel carrying frame which provides easier handling when moving the plant between successive locations. The frame is intended for use with the manual starting plant having a mounted fuel tank and no starting battery.

TWO-WHEEL DOLLY. - A 2-wheel dolly, onto which the plant may be permanently mounted, provides easy one-man transportation of the plant. The dolly does not carry the starting battery nor the separate fuel tank used with various plants.

FOUR WHEEL DOLLY. - A 4-wheel dolly is available for installation on housed models. The dolly is available in kit form.

FUEL PUMP. - A fuel pump and related lines and fittings can be installed on models not originally so equipped.

GAS CARBURETOR. - Some models are equipped with a special carburetor and high compression cylinder head for gaseous fuel operation. A gas conversion kit is available for field installation.

AUTOMATIC CONTROLS (AC Remote Start Plants Only). - A separate control is available for either 50 or 60 cycle ac units that will automatically start and stop the plant as the load requires.

LOAD TRANSFER CONTROLS (AC Remote Start Plants Only). - Load transfer controls are available for use with either 50 or 60-cycle units in standby service. When regular high line power fails, the load transfer control automatically starts the standby plant and takes over the load. The plant stops automatically when regular service is restored.

UNDERGROUND FUEL TANKS AND LINES. - 55 gallon and 110 gallon fuel tanks and 1/4 inch and 5/16 inch copper fuel lines in either 25 or 50 foot length are available for installing the fuel tank underground.

REMOTE START-STOP SWITCHES. - Additional remote start-stop switches are available from your dealer.

3-CONDUCTOR CABLE. - This cable is designed for remote start-stop station installation and is available from your dealer.

RECEPTACLE PLATES FOR AC MANUAL PLANTS (Standard begin Spec. C). - Two duplex, 3-prong grounding type receptacles, which are mounted on a plate, and are connected electrically, can be mounted on the plant junction box. These receptacles permit easy "plug-in" of the load to the generator plant, as desired for non-permanent type installations, and also provide a load equipment ground. Matching 3-prong plugs for the load lines are required. These receptacles plates differ between generator voltage ratings. The receptacle for 120-volt circuits takes a plug with two parallel blades and one grounding prong (an ordinary 2-prong plug will fit). The receptacle for 240-volt circuits takes a plug with tandem blades (two blades in line) and one grounding prong.

RECEPTACLE PLUGS OR CAPS. - These 3-prong grounding type plugs, to fit the receptacles mentioned above, are available from your dealer.

HOUSING. - The protective housing is designed for the Vacu-Flo equipped plants. The housing provides space for a fuel tank and the starting batteries.

COLD WEATHER SHUTTER. - Fits Vacu-Flo plants. Limits air flow.

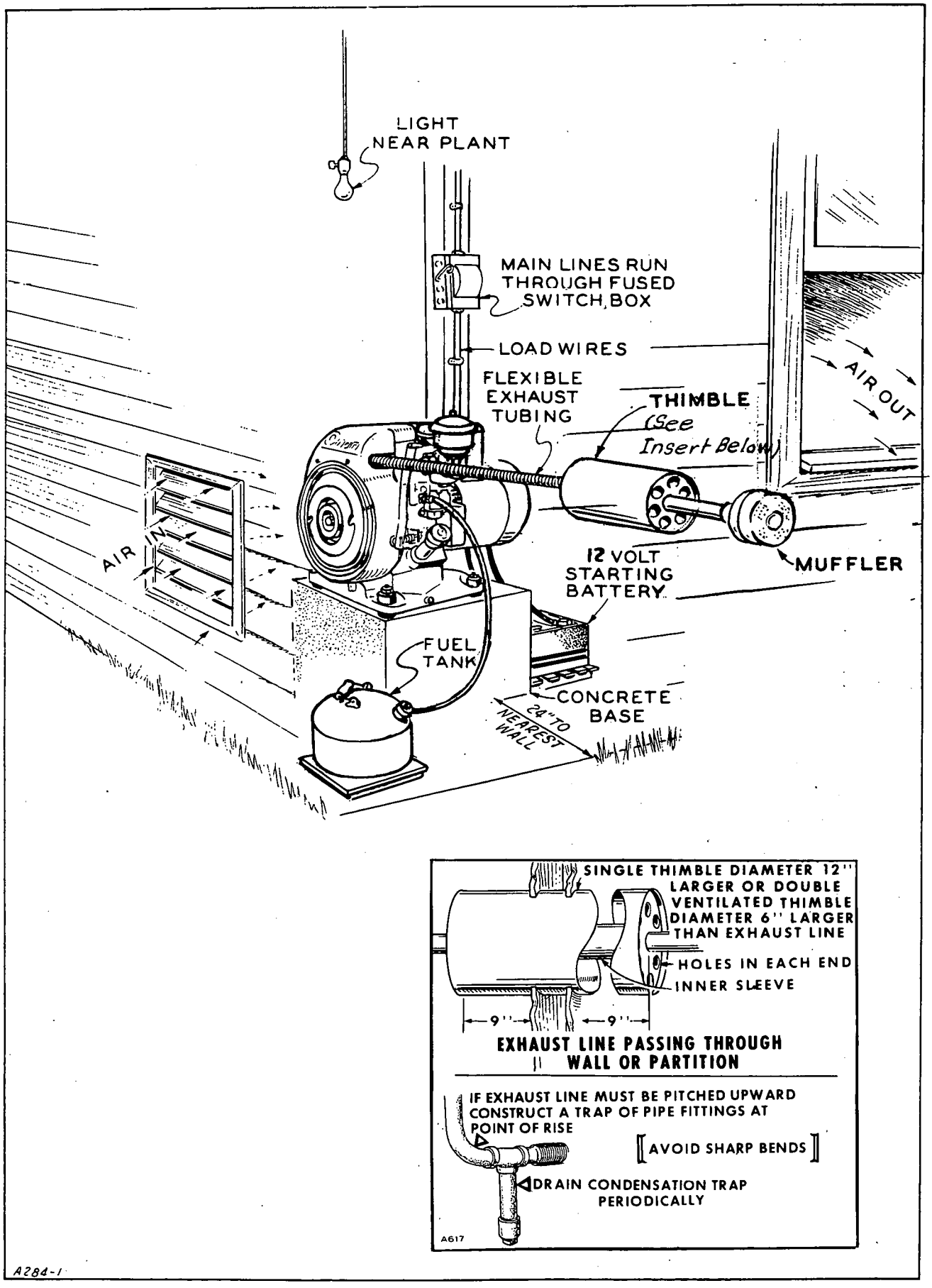


FIG. 1 - TYPICAL INSTALLATION

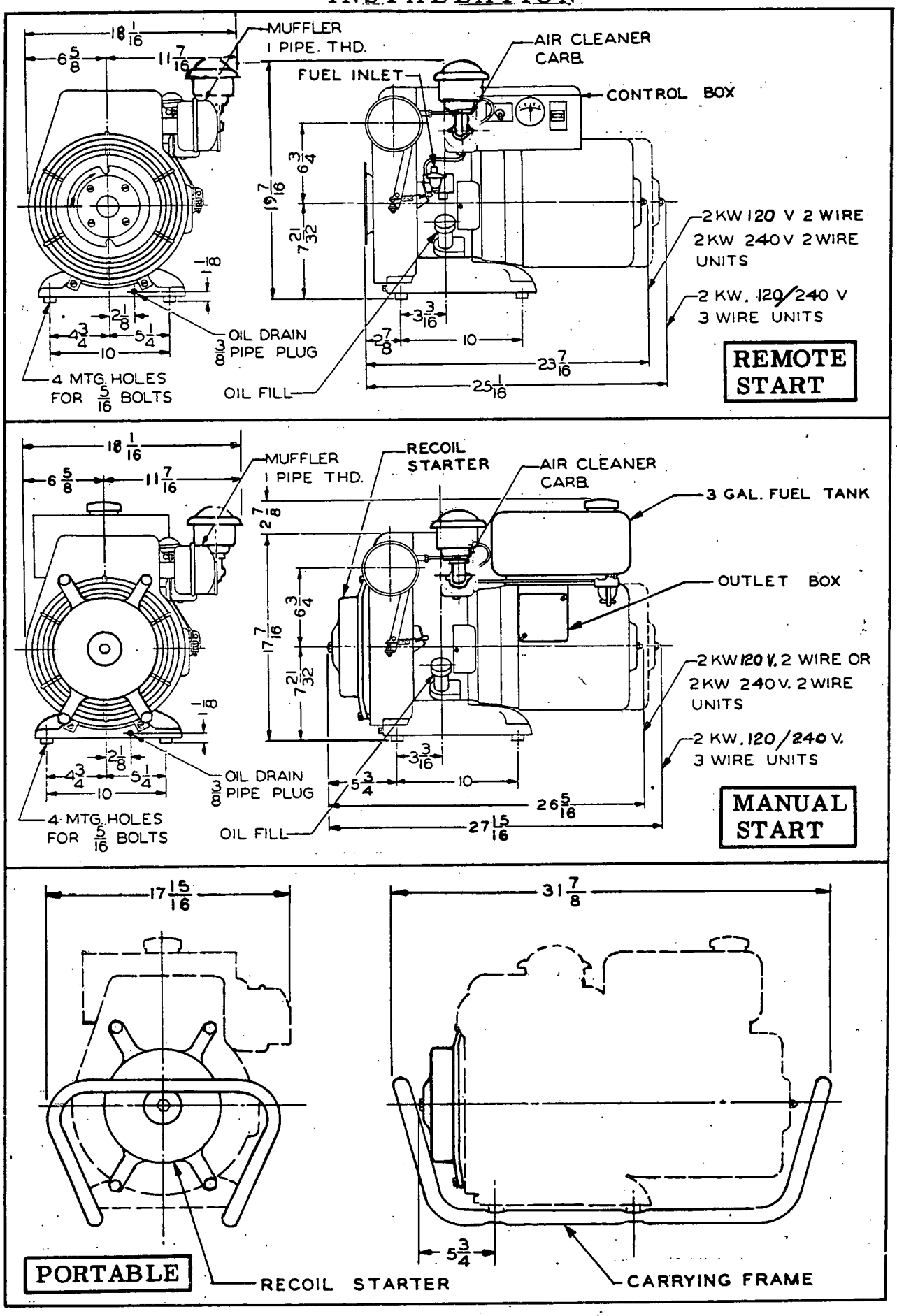


FIG. 2 - DIMENSIONAL OUTLINE

CAUTION

EXHAUST GASES FROM INTERNAL COMBUSTION ENGINES ARE DEADLY POISONOUS. EXCESSIVE INHALATION WILL CAUSE SERIOUS ILLNESS OR DEATH. NEVER OPERATE THE PLANT INSIDE A BUILDING OR OTHER CONFINED SPACE WITHOUT PIPING ALL EXHAUST GASES OUTSIDE THE ENCLOSURE.

The preferable ambient air temperature for best engine performance is well above freezing, and the preferable ambient air temperature for most efficient generator operation is well under 100°F. and should not exceed 110°F. if conditions permit controlling the temperature.

MANUAL TYPE PLANT. - The manual type of plant is particularly adaptable to a wide variety of portable applications. The plant may be mounted on a carrying frame, dolly, trailer, or suitable platform if desired. Install the muffler directly to the engine exhaust outlet. Be sure to provide for adequate circulation of air for proper cooling. Serious damage from overheating can result if cooling air is obstructed. The plant may be operated out of doors, but reasonable care should be taken to protect the plant as much as practicable from exposure to the elements. Be sure the plant sets level when in operation. Use rubber mounting cushions to minimize vibration.

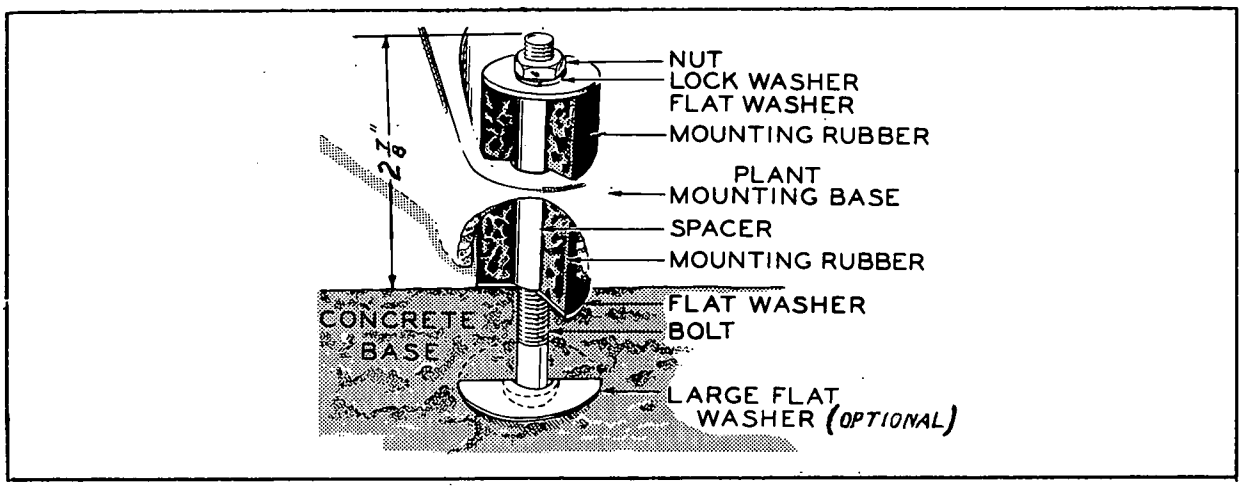


FIG. 3 - MOUNTING CUSHIONS

MOUNTING, PERMANENT INSTALLATION. - Refer to the illustration, Typical Installation. Select a site for the plant which will be clean, dry, well ventilated, and which preferably can be heated in extremely cold weather. A damp or dusty location will necessitate more frequent servicing. Install batteries as close as practicable to the plant. Mount the plant on a substantial level, concrete or timber base, preferably at least 12 inches high. Locate the base so as to provide at least 24 inches space on all sides for convenience in servicing. Use the rubber mounting cushions to mini-

mize vibration. See the mounting details as illustrated.

Provide separate air inlet and outlet openings large enough to provide for proper circulation of cooling air. The openings may be adjustable if desired, so as to partially control the temperature of the enclosure. In ordinary temperatures the inlet and outlet air openings should be at least 3 square feet in area. The outlet should be nearer the ceiling.

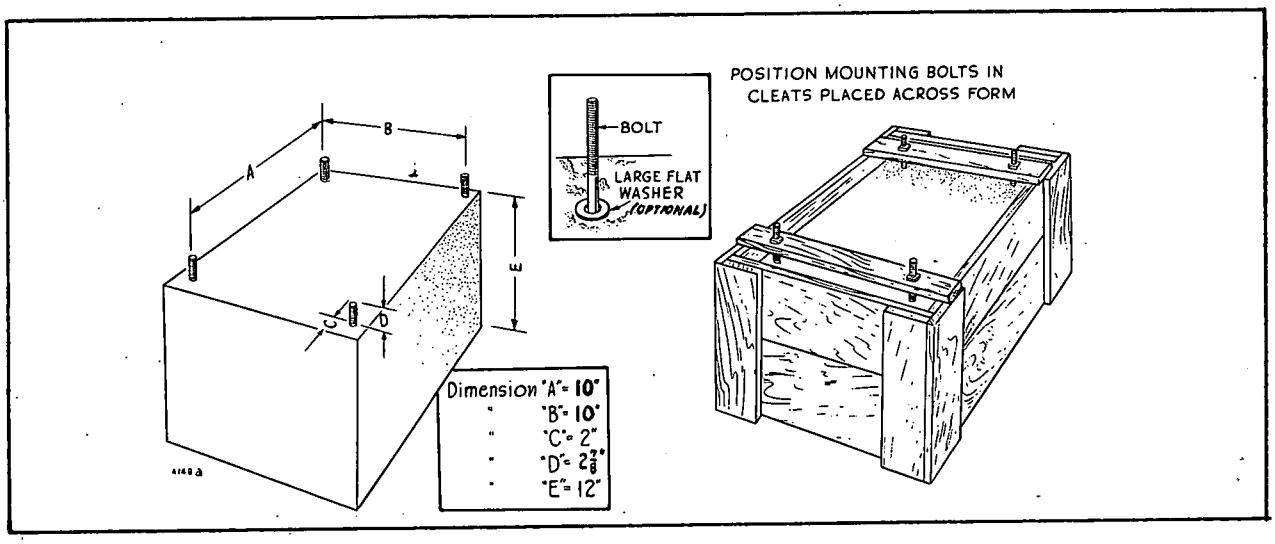


FIG. 4 - MOUNTING BASE

EXHAUST. - Pipe the exhaust gases outside the enclosure, using 1 inch pipe or larger. Increase the exhaust line size, by one pipe size, after each additional 10 foot length. Avoid sharp bends if possible by using bent pipe or sweeping elbow where necessary. Connect the flexible exhaust tube to the plant exhaust outlet, a sufficient length of pipe to conduct the gases outside the enclosure, and the muffler to the pipe outside the enclosure. Protect combustible walls, partitions, etc. through which exhaust pipes pass with a metal thimble having the dimensions shown in the illustration below. Insulate pipes where the danger of personal contact exists. If the exhaust line must be inclined upward from the plant, install a condensate trap at the point where the upward pitch begins. Periodically drain the trap.

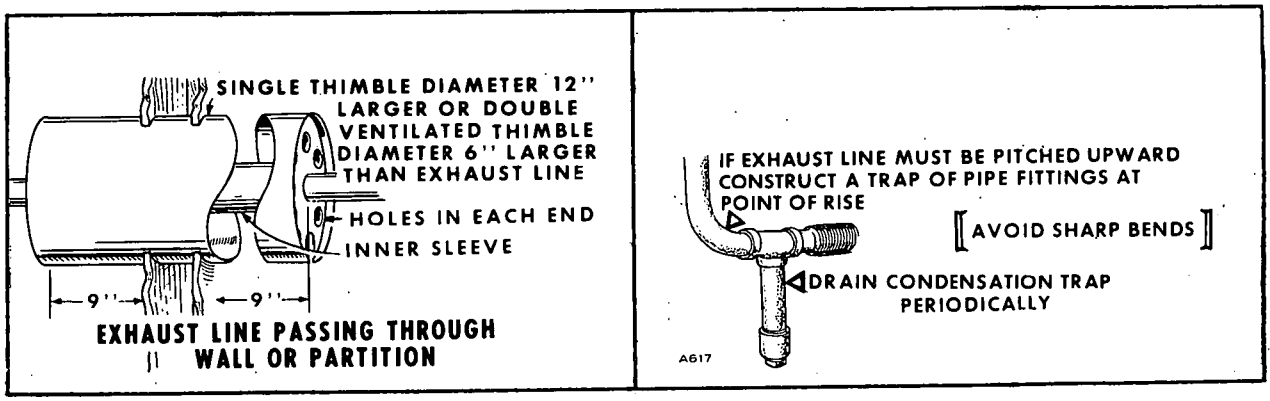


FIG. 5 - EXHAUST INSTALLATION

If exhaust noise from the standard muffler will be objectionable, an underground muffler may be constructed. Do not use an underground muffler if there is any danger of its filling with water at any time. Use a heavy metal drum, welding suitable pipe fittings in place. Do not use a drum which contained any inflammable liquid without first making sure that all explosive vapors have been driven out. Remove the bottom of the drum or drill holes in the bottom to allow condensation from exhaust gases to drain away. The muffler exhaust pipe should extend at least 24 inches above ground, with a gooseneck fitting on the end to prevent entry of rain or snow.

SEPARATE FUEL TANK. - The separate fuel tank has a capacity of 5 gallons (U.S. Measure).

If the plant has no fuel pump, install the tank on a substantial support so that the bottom of the tank will be one inch above the carburetor fuel inlet.

On gravity feed installations, fuel leakage when idle, or flooding condition during operation, will result if the fuel tank is elevated too high. If the plant is in a vehicle and subject to transportation jars, it is advisable to close the shut-off valve when not in operation.

Be sure to open the air vent at the top of the tank. The shut-off valve should be turned all the way outward until it backseats.

If the plant has a fuel pump, install the fuel tank so that the bottom of the tank will b e less than 4 feet below the fuel pump. The top of the tank must not be above the fuel pump. As with an underground fuel tank, if the fuel lift is more than 4 feet, install an auxiliary electric fuel pump.

Note that only one end of the flexible fuel line has a fitting, and this end of the line should be assembled to the fuel filter at the plant inlet. Thread about 15 inches of line through the rain cap (lubricate the line with soap). Assemble the rain cap to the fuel tank. Press the metal tank cap over the top of the rain cap to keep water from entering the vent hole.

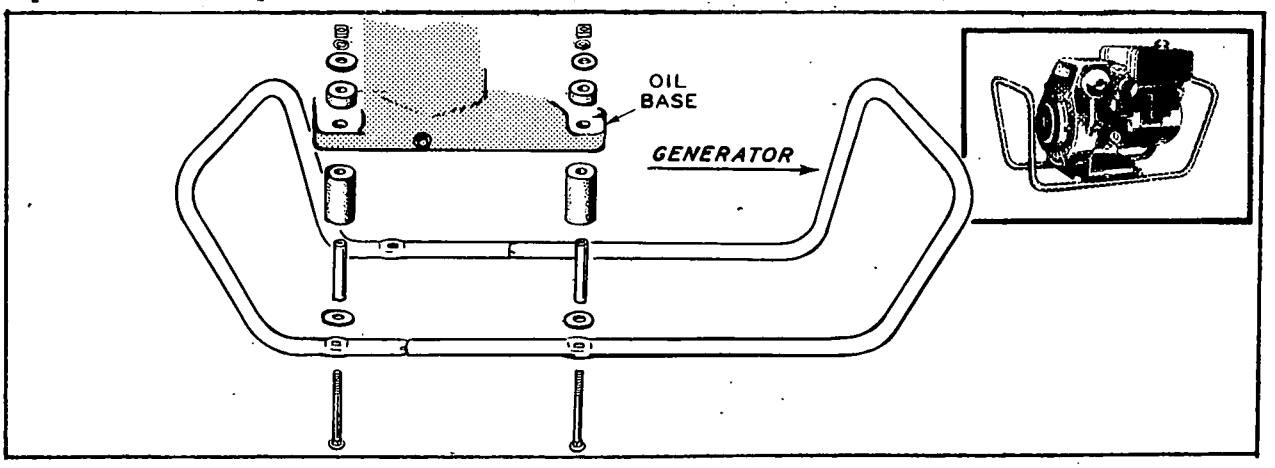


FIG. 6 - CARRYING FRAME

CARRYING FRAME (OPTIONAL ACCESSORY). - The illustration shows the position of hardware used to mount the plant. Use the existing mounting cushions, bushings, and washers supplied with the plant. The frame fits lengthwise under the plant so that handles are on opposite ends.

DOLLY ASSEMBLY (OPTIONAL ACCESSORY). - The illustration shows the position of hardware used to assemble the dolly and mount the plant. The dolly tires and feet cushions serve to absorb vibration so that mounting cushions at the oil base are not required.

Mount the plant on the dolly with the generator end toward the handles. Grease wheel bearings.

(1) On each end of the axle install a washer, a wheel, a washer, and a cotter pin. Spread the pins well.
(2) Select the pair of holes in the axle channel which fit the plant to be mounted. Attach each handle by installing its stud into the axle channel holes; leave the front holes open to mount the plant base.
(3) With the plant in position on the dolly, install 2 bolts with washers through the oil base holes, next through the dolly handles, then through the axle channel.

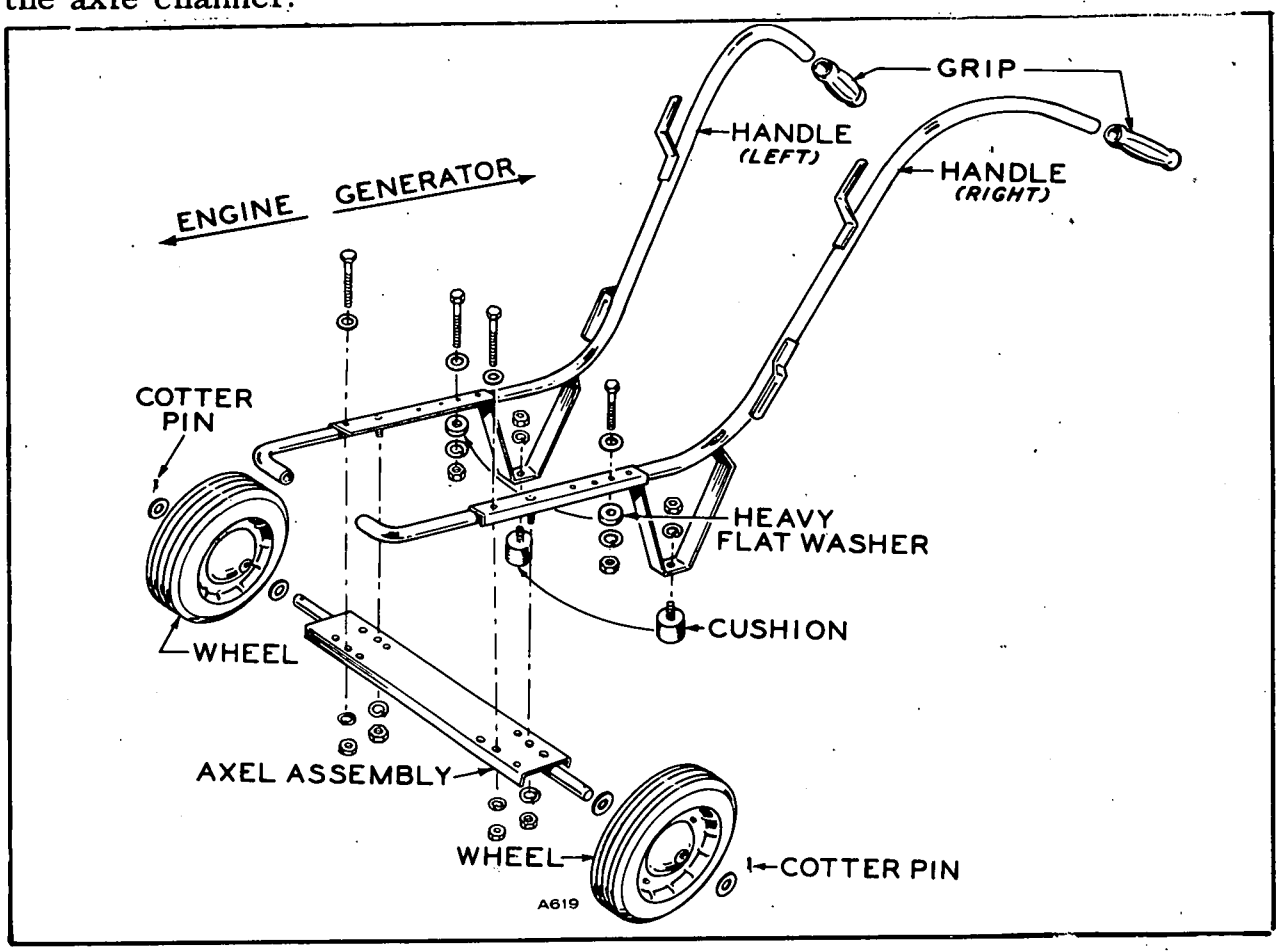


FIG. 7 - DOLLY

(4) Install 2 bolts with washers through the remaining oil base holes, next through the dolly handles. Use a thick flatwasher under the handle end mounting holes. Use a lockwasher under each nut and tighten all nuts on the bolts and studs.
(5) Secure a foot cushion to each handle with a lockwasher and nut. Install the handle grips (if shipped loose)using soap suds to aid installation.

OIL DRAIN EXTENSION. - An oil drain extension pipe and coupling will provide cleanliness and convenience in draining oil from the oil base. Before filling the oil base with oil as directed in the following section, remove the drain plug from the oil base and install a 3/8" pipe nipple and coupling in its place. Install the drain plug in the coupling. When draining the oil, remove only the plug.

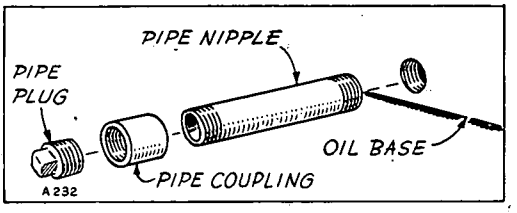


FIG. 8 - OIL DRAIN EXTENSION

BATTERY, AC REMOTE CONTROL PLANT. - A 12 volt battery is required. If two 6 volt batteries are used, the batteries must be connected in series by connecting a short cable between the positive post of one battery and the negative post of the other battery.

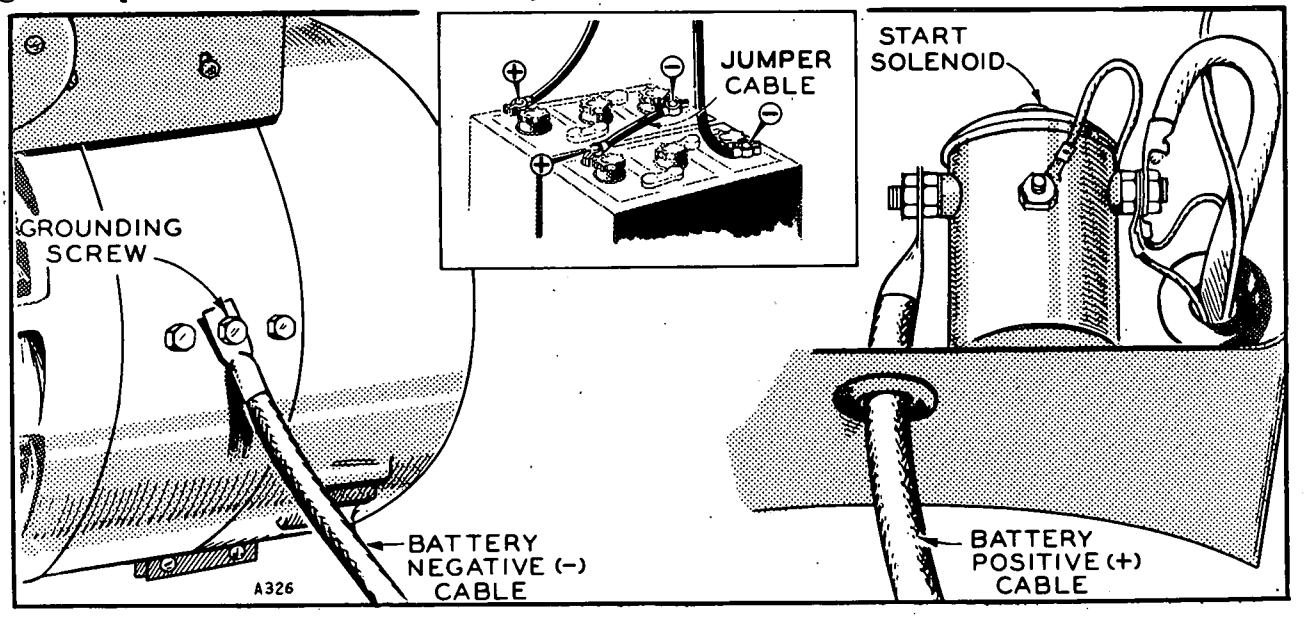


FIG. 9 - BATTERY CONNECTION - AC REMOTE PLANT

Connect one of the long battery cables between the positive (+) battery post and the BATTERY terminal on the start solenoid in the control box. Connect the other battery cable between the negative (–) battery post and the grounding terminal (screw, stud, or solderless) on the generator.

Be sure battery connections are tight. Coat the battery clamps and posts lightly with grease or vaseline to minimize corrosion. Batteries shipped "dry" must be prepared for use as directed on the tag attached to each battery. Batteries shipped ready for use were fully charged when shipped. Such batteries slowly lose their charge when standing idle and it may be necessary to give them a "freshening" charge before putting them in use. Use a hydrometer to determine the charge condition.

WIRING. - If necessary to install wiring, follow specifications of local and national electrical codes. If in doubt, consult a licensed electrician. Use sufficiently large, insulated wire between the plant and the load. Install a circuit breaker or a fused main switch in the load line near the plant. REFER TO THE APPLICABLE PLANT WIRING DIAGRAM.

Where connections are made by joining two wires, always be sure to tape the connections thoroughly. Apply two layers of half-lapped electrician's tape and two layers of half-lapped friction tape, extending both well beyond the ends of the connection.

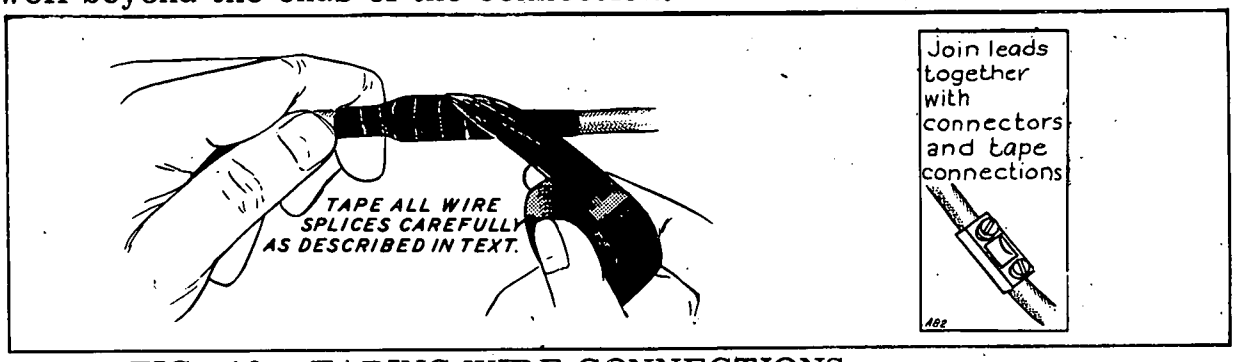


FIG. 10 - TAPING WIRE CONNECTIONS

The wire size will depend largely on the distance and permissible voltage drop between the plant and the load, and the amount and kind of load. Consult a competent electrician. Check national and local codes before installing.

GROUNDING, ALL PLANTS. - If grounding is called for in local codes, or if radio interference necessitates it, provide a separate ground. Radio interference may result if the plant is grounded to a water pipe or to a ground used by a radio. Drive a 1/2" diameter pipe or rod into the ground as near to the plant as possible. Make certain that the ground rod will always penetrate moist earth. Fasten an approved ground clamp to the rod. Run a wire (number 8 or larger) (not smaller than 2 sizes smaller than the largest wire used in the system) from the clamp to the plant ground terminal. If no separate grounding terminal is provided on the plant, connect to the BATTERY NEGATIVE or to the grounded load line wire.

The installation must be mechanically secure, and must have low resistance electrically. Comply with national and local electrical codes.

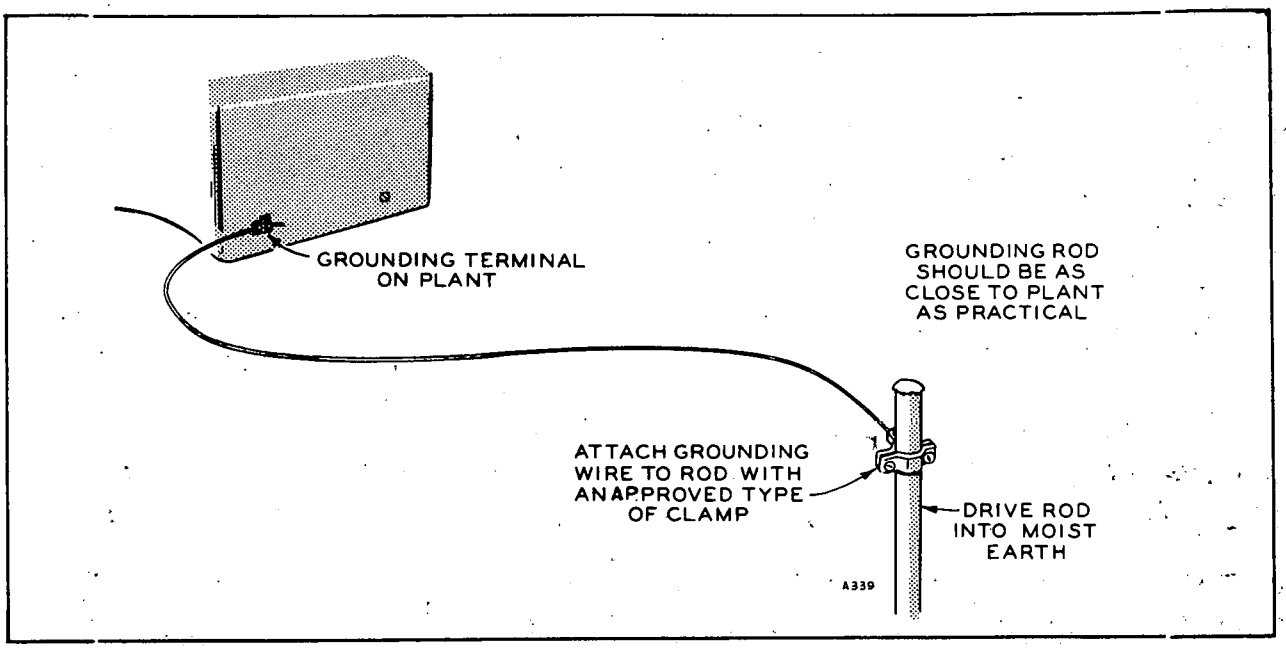


FIG. 11 - PLANT GROUNDING

WIRING TABLE - 115-V.

Unity Power Factor. 2% Voltage Drop (2.3 Volts)

WIRE SIZE NO.		14	12	10	8	6	4	2
WATTS	AMPS	* Distances expressed in feet per wire size.						
100	.87	510	810	1280	2040	3250	5300	8200
200	1.74	255	405	640	1020	1625	2650	4100
300	2.61	170	270	430	680	1080	1770	2730
400	3.48	125	200	320	510	810	1325	2050
500	4.35	100	160	255	410	650	1060	1640
750	6.52	65	100	170	275	430	710	1090
1000	8.69	50	80	125	205	325	530	820
1500	13.04	35	55	85	140	215	350	550
2000	17.38	25	40	65	100	160	265	410
2500	21.73	20	35	50	80	130	210	350

* Above figures represent a point to point distance for a 2-wire run. If a 4% voltage drop is permissible, double the distance listed. If only 1% voltage drop is allowable, divide the distances listed by 2.

Single Phase 115-Volt A.C. - Use 115-Volt table above.

Single Phase 115/230-Volt A.C. 3-Wire - Use 115-Volt table above for each 115-Volt Circuit.

Single Phase 230-Volt A.C. - Double the distances listed in the 115-Volt table above. Use Amps Column.

REMOTE CONTROL SWITCH, AC PLANTS. - One or more remote control switches may be connected to provide remote control of starting and stopping remote plants.

The wire length from the plant to the switch determines the wire size necessary. For distances up to 250 feet use #18 wire. Use #16 wire up to 400 feet, or use #14 wire up to 630 feet.

The four place terminal block, located in the control box, is marked "REMOTE CONTROL", B+, 1, 2, and 3 appears in the illustration. Terminal number 1 is used as a common ground, terminal number 2 connects to the stopping circuit of the plant and terminal number 3 connects to the starting circuit of the plant. The terminal marked B+, is to be used only with an automatic control installation.

Use single-pole double-throw momentary-contact center-off type switches as Remote Start-Stop Stations as illustrated. Connect all number "2" or "OFF" switch terminals to the number "2" terminal on the plant terminal block. Likewise, connect together all number "3" or "ON" terminals and also, all number "1" or "SINGLE" (not marked) terminals. If the switch is to be mounted vertically, start position should be upward to conform with operation at the plant when a toggle switch is used.

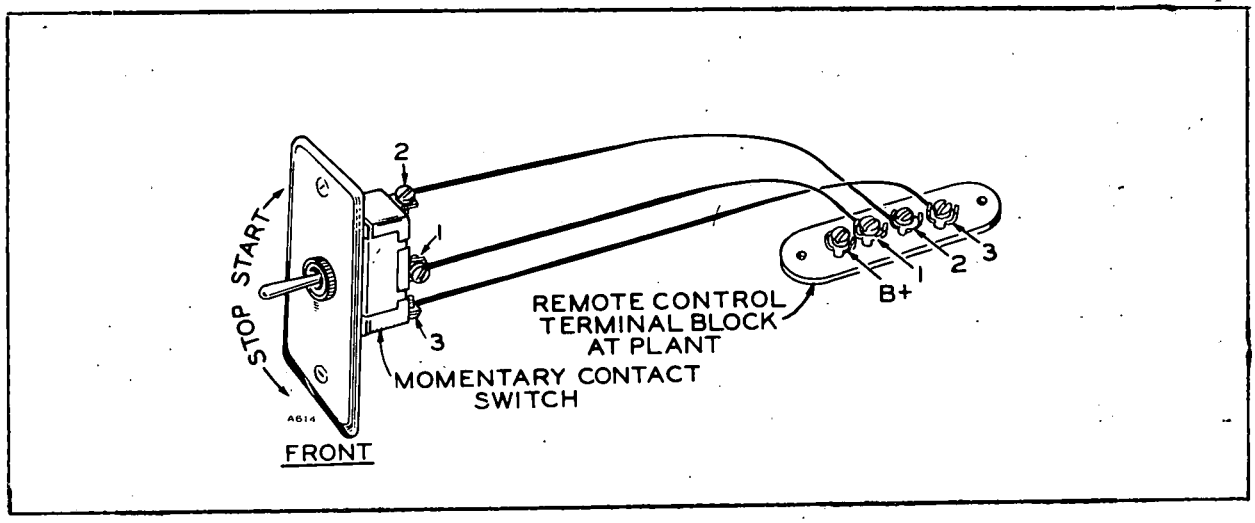
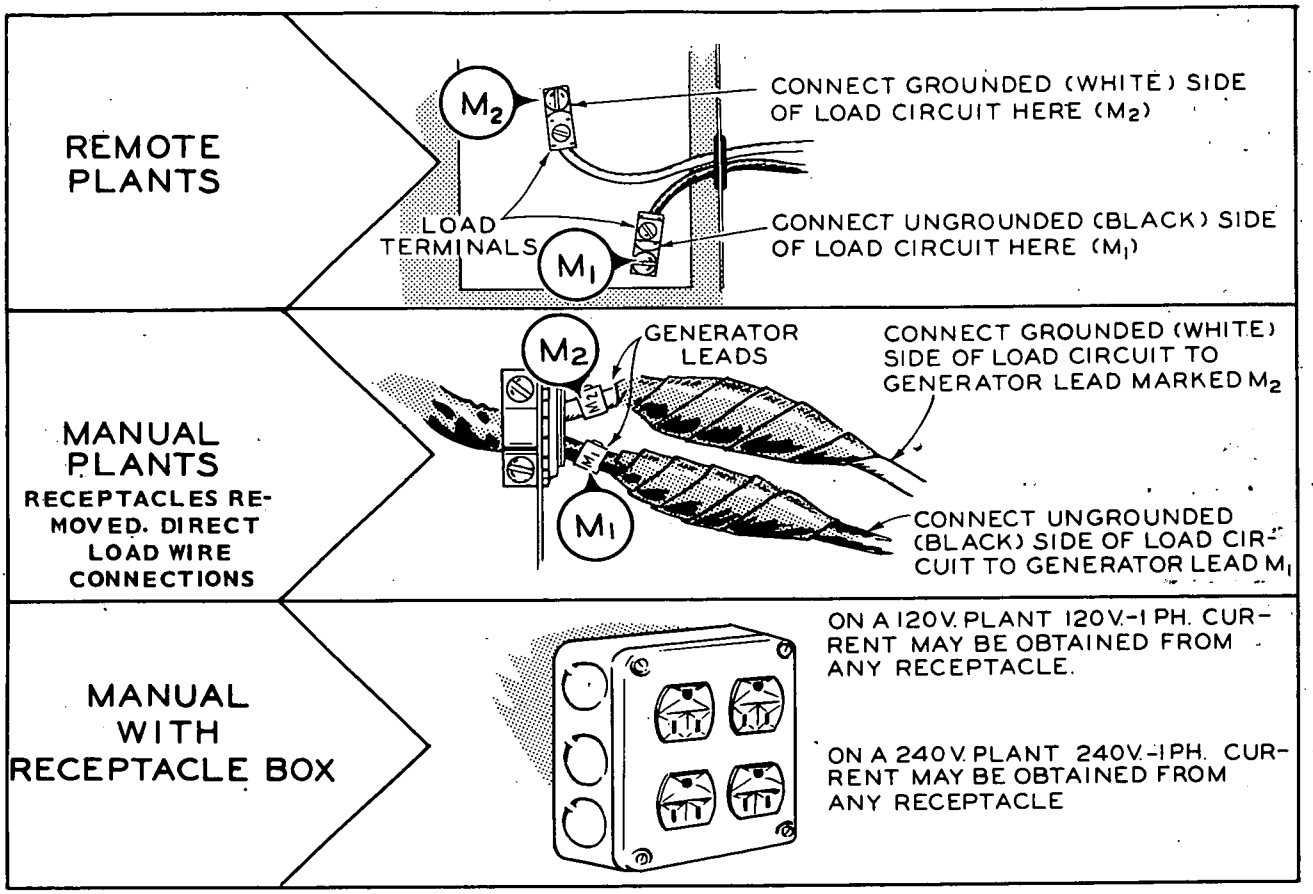


FIG. 12 - REMOTE START-STOP STATIONS

CONNECTING THE LOAD WIRES, AC REMOTE PLANTS. - The a.c. load terminals are located inside the control box and are marked. The same markings appear on the wiring diagram. These terminals are of the solderless type and connections are made by simply inserting the end of the load wire into the connector and tightening the screw. Thoroughly strip 3/8 of an inch of insulation from the end of each wire before inserting it into a terminal. Load wires enter the control box through a grommeted hole. Be sure connections are clean and tight.

Leave the load line switch open until the plant has been started and checked. No damage to the generator or controls will result from running the plant with no load connected.

SINGLE PHASE, TWO WIRE CONNECTIONS



SINGLE PHASE, THREE WIRE CONNECTIONS

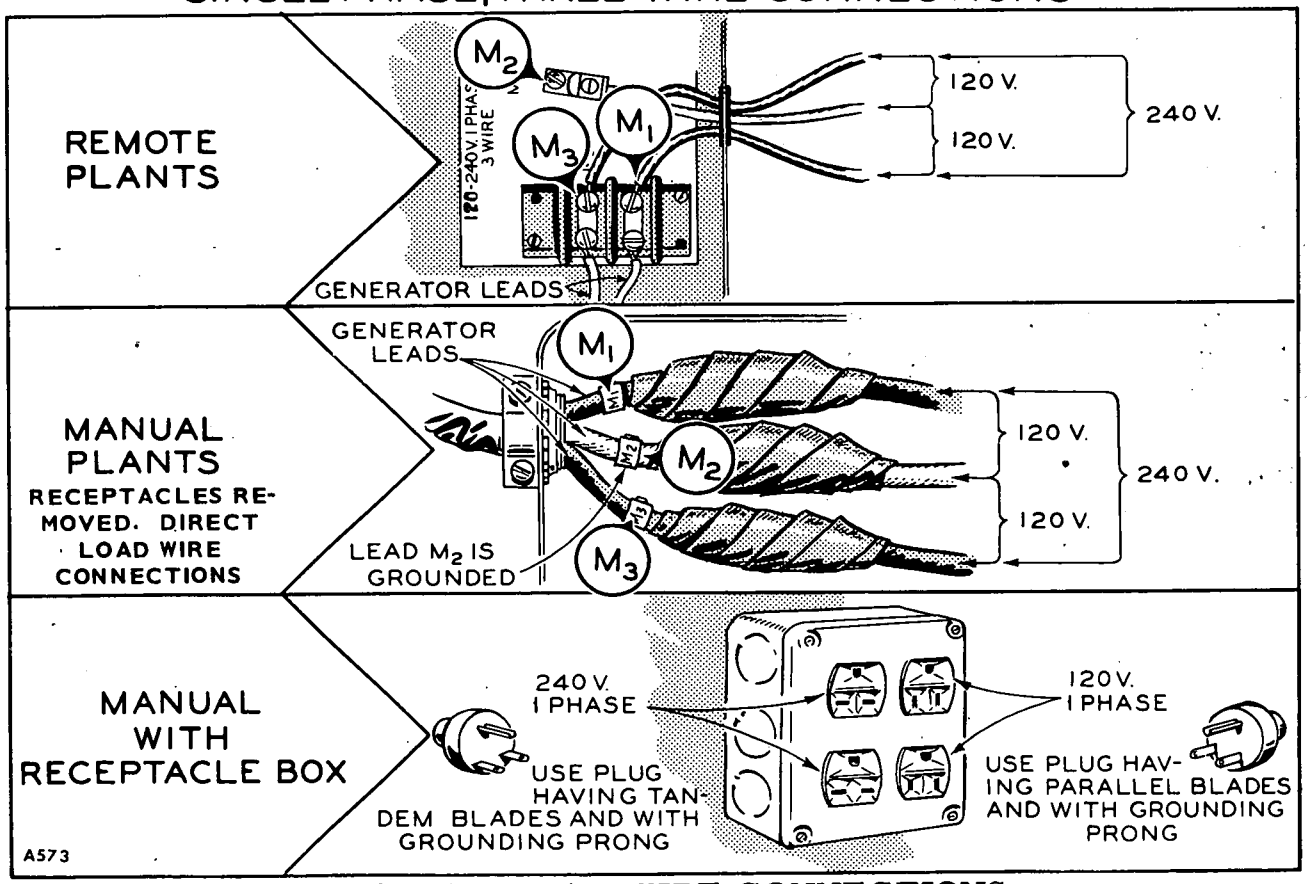


FIG. 13 - AC LOAD WIRE CONNECTIONS

1-Phase, 2-Wire

On single phase, two wire plants, connect the load wires to the plant by connecting the ground (white) load wire to the control box terminal marked "M2". Connect the "hot" ungrounded (black) load wire to the control box terminal marked "M1".

1-Phase, 3-Wire

On single phase, three wire plants, connect the load wires to the plant by connecting the ground (white) load wire to the control box terminal marked "M2". Connect one of the "hot" ungrounded (black) load wires to the control box terminal marked "M1", and connect the remaining "hot" ungrounded (black) load wire to the control box terminal marked "M3".

Two 120-volt circuits are available. One circuit across "M1" and "M2" and another circuit across "M2" and "M3". The load on each 120-volt circuit should not be more than 1/2 the capacity of the plant.

One 240-volt circuit is available. This circuit is across "M1" and "M3". "M2" is not used with a 240-volt circuit. If only 240-volt current is used, the full rated capacity of the plant may be used.

Both 120-volt current and 240-volt current may be used at the same time. However, the total of either 120-volt load plus 1/2 the 240-volt load should not exceed 1/2 the capacity of the plant. For example: a total of 1000-watts is available on each 120-volt circuit of a 2000-watt single phase 3-wire plant. If 500-watts of current is used on each 120-volt circuit, only 1000-watts of 240-volt current is used, only 500-watts of 120-volt current is available on each 120-volt circuit.

CONNECTING THE LOAD WIRES, AC MANUAL PLANTS. - Manual plants have output leads which extend to a receptacle box (junction box prior to Spec. C). Connections to the output leads may vary between different installations. If the receptacles are disconnected and not used and the load wires are connected to the generator output leads install a circuit breaker or a fused switch in the main load line to provide for automatic disconnecting of the load.

If the application is essentially stationary, the user may desire to connect the load leads within the junction box on the plant, using bolts or connectors and taping each lead. If the main load lines are to be run in rigid conduit, install a short length of flexible conduit between the outlet box and the rigid conduit. Flexible conduit may be used entirely if so desired. If conduit is not used, install a load conductor securing device, to hold the load wires where they enter the outlet box.

1-Phase, 2-Wire

On single phase, two wire plants, connect the load wires to the plant by connecting the ground (white) load wire to the generator lead marked "M2". Connect the black (hot) load wire to the generator output lead marked "M1".

1-Phase, 3-Wire

On single phase, three wire plants, connect the load wires to the plant by connecting the ground (white) load wire to the generator lead marked "M2". Connect one of the "hot" ungrounded (black) load wires to the generator lead marked "M1", and connect the remaining "hot" ungrounded (black) load wire to the generator lead marked "M3".

If the application requires plant operation at various locations, the user may desire to add receptacles of adequate rating to the output leads and use plugs on the load leads such as those offered as optional accessories by the factory, and available through the dealer. These two duplex 3-prong grounding type receptacles are mounted on a plate which fits the existing junction box on the plant. The receptacles are wired and the assembly contains short leads for bolting to the generator output leads. On the assembly for the 120/240-volt plant, the jumper bar between the two ungrounded 120-volt receptacle terminals is broken out, as necessary to prevent a dead short which would cause failure of plant output. Likewise, a future replacement of the 120-volt receptacle only, on the 120/240-volt plant must have the jumper bar removed between the "hot" terminals. When installing the receptacles and plate assembly, refer to the illustrations herein and bolt receptacle lead or leads marked "M1" to generator output lead marked "M1", then tape the connection. Likewise, connect "M2" to "M2" and so on according to the model in question.

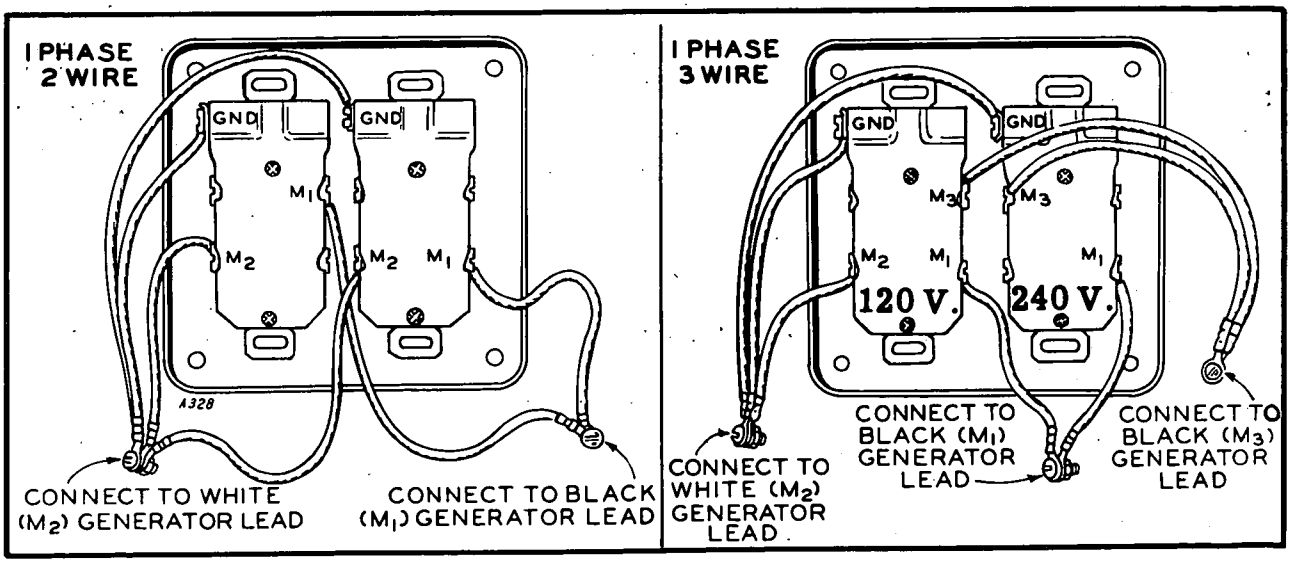


FIG. 14 - RECEPTACLE PLATE CONNECTIONS-MANUAL START PLANTS

FUEL RESERVOIR (DAY) TANK. - In standby service, the generating plant may stand unused for many days. In this period of shut-down, sufficient gasoline may evaporate from the carburetor to lower its fuel level considerably. Prolonged cranking may then be necessary in order to pump enough gasoline into the carburetor for the engine to start. On installations where automatic, unattended starting after extended shut-down is necessary, an auxiliary, gravity feed fuel tank should be installed. Fuel from this tank flows by gravity to the carburetor, thus replacing any fuel lost through evaporation and promotes quick starting after an idle period.

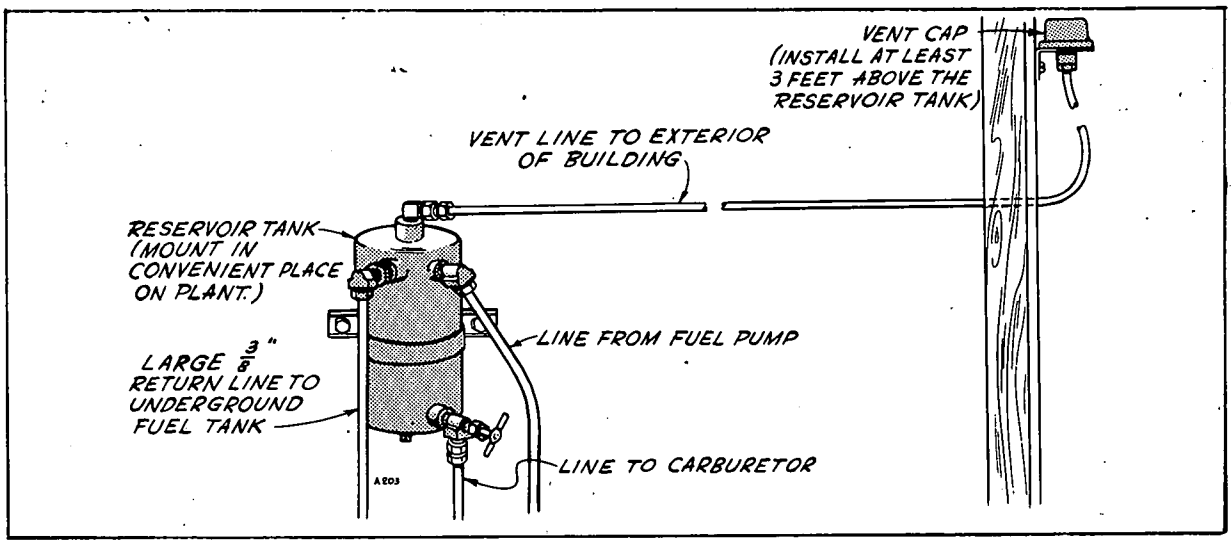


FIG. 15 - FUEL RESERVOIR "DAY" TANK

INSTALLING SECONDARY GAS REGULATOR. - The secondary regulator is designed to operate on an incoming line pressure of from two to eight ounces, a primary regulator must be installed and adjusted to reduce the line pressure before it enters the secondary regulator.

A fuel filter should be installed in the line, before the secondary regulator to prevent pipe scale and other impurities from entering the regulator. An electric solenoid shut off valve is required in some localities.

NOTE !

For model 2LK-1RV1330/ "Mobile Communications" or "Utility Type" plant, refer also to Special Purpose Section.

GAS FUEL. - Plants equipped to burn gas fuel (natural gas or LPG) are supplied with an atmospheric type gas pressure regulator. The regulator is designed to operate on a fuel line pressure of eight (8) ounces. If the fuel line pressure exceeds eight ounces, a primary type regulator must be installed ahead of the regulator supplied, to reduce the line pressure. Consult the fuel supplier.

The installation must conform to local gas regulations. Some localities require the installation of a fuel filter, and an electric solenoid shut-off valve.

Mount the regulator in an upright position on the gas supply pipe. Use a flexible line between the regulator outlet and the carburetor inlet. Use care to see that no pipe cuttings, scale, etc. are trapped in the pipe so as to enter the regulator. Test thoroughly (soap bubble) for leaks after finishing the installation.

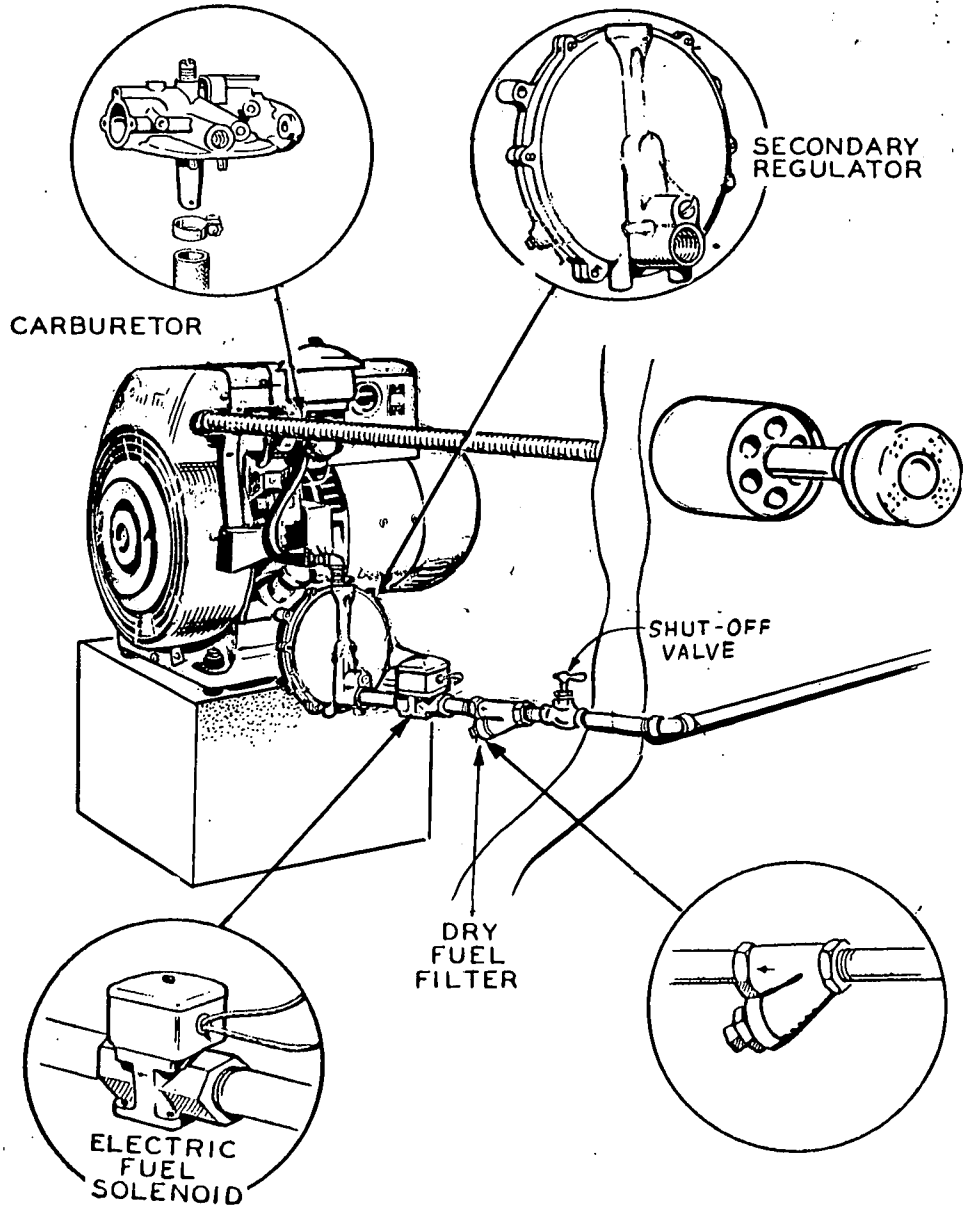


FIG. 17 - GAS FUEL INSTALLATION

GAS FUEL

- ASSEMBLING THE REGULATOR -

1. Assemble the 3/4"(B) and 1/8"(C) pipe plugs to the regulator.
2. Assemble the reducer bushing (L) when supplied, to the regulator.
3. Assemble the pipe nipple (K), elbow (D), and half nipple (E).
4. Some installations require a fuel filter. Install the filter in the incoming fuel line ahead of the regulator as shown.
5. Install the regulator to the 3/4" incoming fuel supply line. Turn the regulator to an upright position and support the supply line so as to serve as a mounting for the regulator.

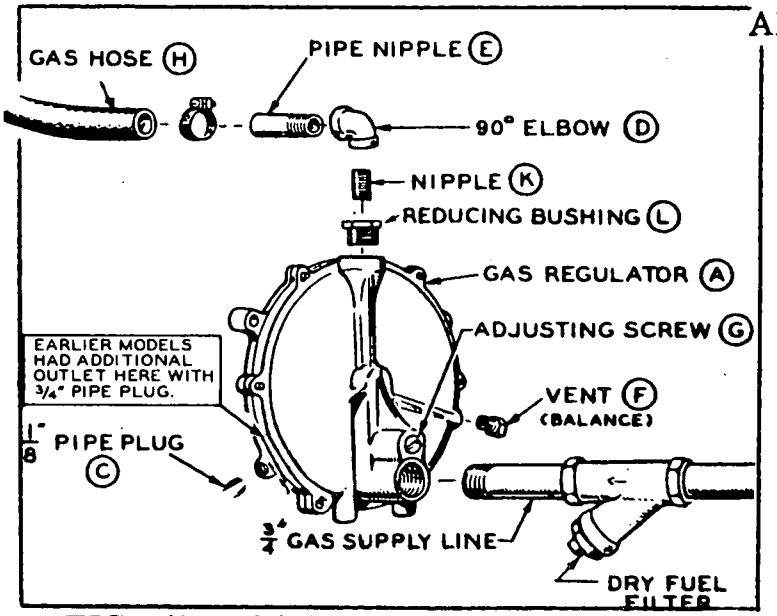


FIG. 17 - GAS FUEL INSTALLATION

ADJUSTING THE REGULATOR

This regulator was factory adjusted to lock-off at a pressure of 4 ounces (7"water column). The regulator will operate satisfactorily at incoming pressures of from 2 to 4 ounces. If your gas supply pressure is within these limits, no regulator adjustment is required. If your gas supply pressure is under 2 ounces, the regulator will not operate. If your gas supply pressure is between 4 and 8 ounces, install an appliance regulator set for 2 ounces ahead of the regulator, or adjust the regulator as follows:

WARNING! A soap bubble placed over the regulator outlet will not accurately test for regulator closing. The soap bubble's resistance when multiplied by the greater area of the regulator diaphragm, is enough to shut off this very sensitive demand type regulator.

1. Connect a manometer, which reads up to 14 inches water column, to regulator's plugged test hole near inlet. Turn gas on.
2. Turn regulator closing adjusting screw (G) inward just far enough so that the manometer reading remains constant when you repeatedly cover and uncover the regulator outlet with your hand. Failure to close indicates too high incoming pressure or dirty regulator valve and seat.
3. Close the gas supply line valve. Remove manometer. Bleed air from gas supply line. Install test-hole plug in regulator. Open gas supply line valve. See that vent fitting (F) is installed.
4. With a clamp on each end, secure the hose (H) between the regulator nipple and the carburetor inlet.
5. Operate the engine to assure quick starting results.

Refer to the ADJUSTMENTS section for carburetor adjusting information.

VACU-FLO COOLING (Optional Equipment). - Cooling air is drawn past the engine and out through the front of the blower housing on plants which are Vacu-Flo cooled (also referred to as suction cooled). This type of cooling is desirable where the plant must be installed in a small enclosure. Provide **AT LEAST** 103 square inches of free (net) air inlet area. Install duct work to exhaust heated air outside of the enclosure, using flexible material next to the engine air ducting scroll. Vacu-Flo type cooling is available only for remote type plants, all of which have battery ignition. The optional cold-weather-air-shutter (damper) is thermostatically controlled to limit air flow and includes a safety shut-down switch.

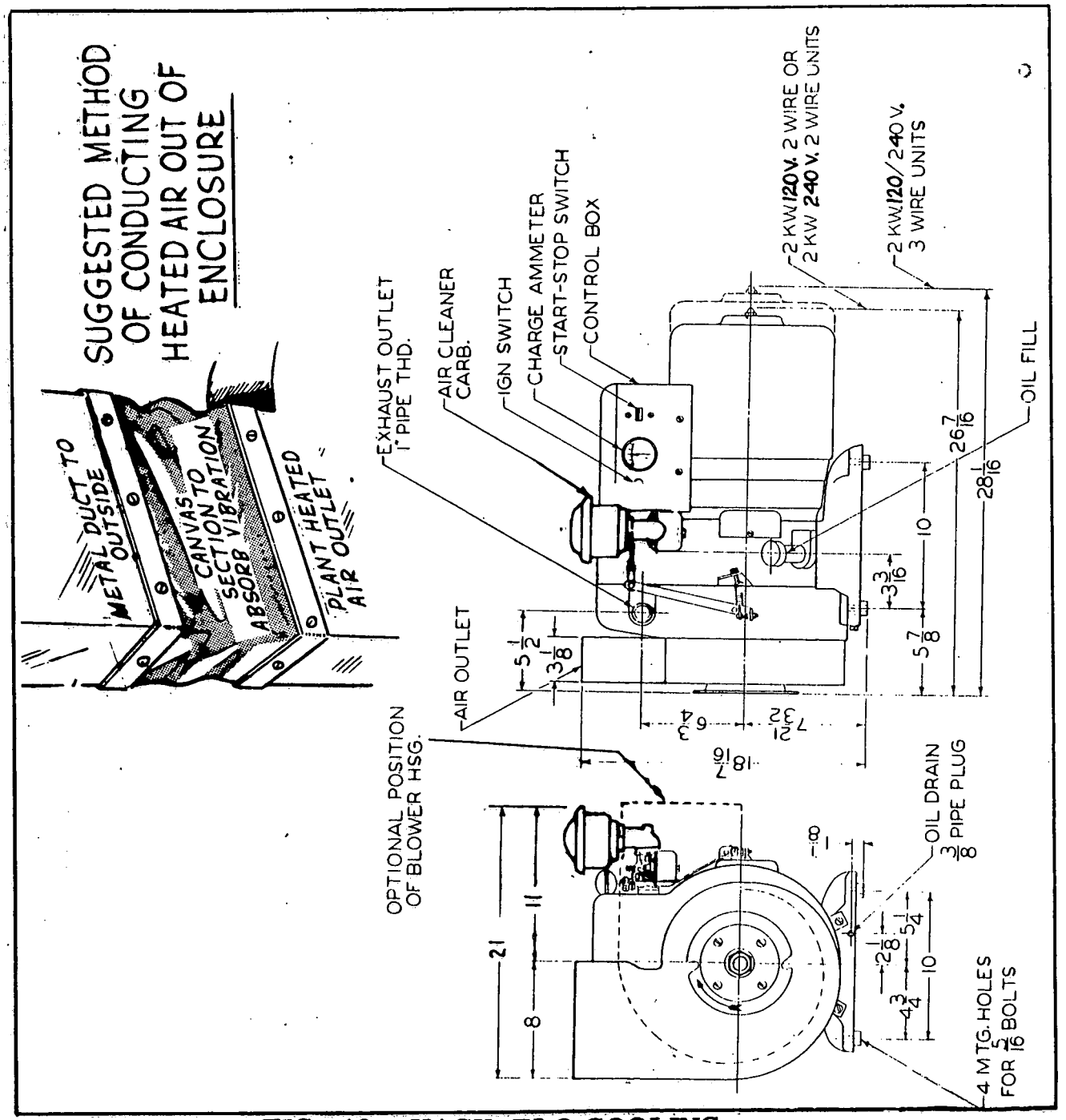


FIG. 18 - VACU-FLO COOLING

CAUTION

DO NOT ATTEMPT TO START OR OPERATE THE PLANT UNTIL IT HAS BEEN PROPERLY PREPARED FOR OPERATION WITH OIL AND FUEL AS DIRECTED IN THIS SECTION.

CRANKCASE LUBRICATION. - The oil capacity of the plant is 2 quarts (U.S. Measure). Use detergent oil classified by the American Petroleum Institute as Service "DG" or, as marketed by most manufacturers, "MS/DG". The use of Service "DS" is not recommended.

Multiviscosity oils such as 5W-20 or 10W-30 are not recommended, as the oil consumption increases greatly (in some cases consumption may be more than doubled). At low temperatures where cold starting may be difficult and high oil consumption is not a factor, the use of multiviscosity oil may be justified. Do not use a non-detergent oil.

TEMPERATURE	SAE NUMBER
Above 90°F. (32°C.)	50
30°F. to 90°F. (-1°C. to 32°C.)	30
0°F. to 30°F. (-18°C. to -1°C.)	10W
Below 0°F. (-18°C.)	5W

When using a detergent type oil, always use oil of the same brand when adding oil between oil changes. When mixed together, detergent oils of different manufacturers sometimes form chemical compounds that are harmful to internal engine parts.

Place a drop or two of non-gumming oil at the point where the governor linkage engages the carburetor throttle arm. Units with plastic type ball joint require cleaning of ball joint only.

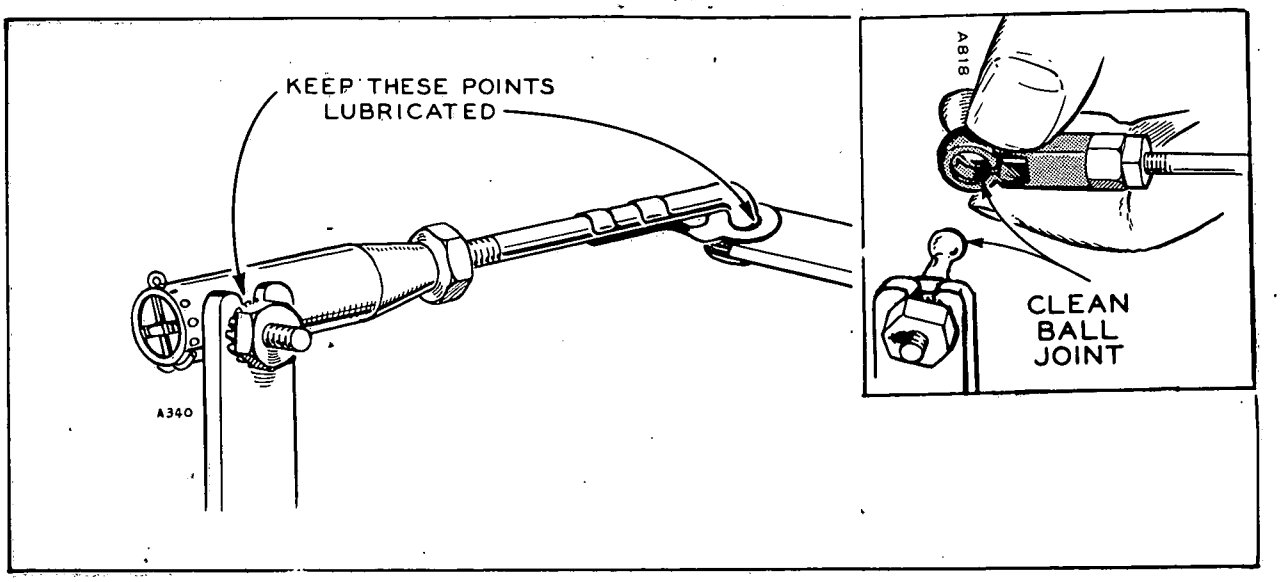


FIG. 19 - GOVERNOR LINKAGE LUBRICATION

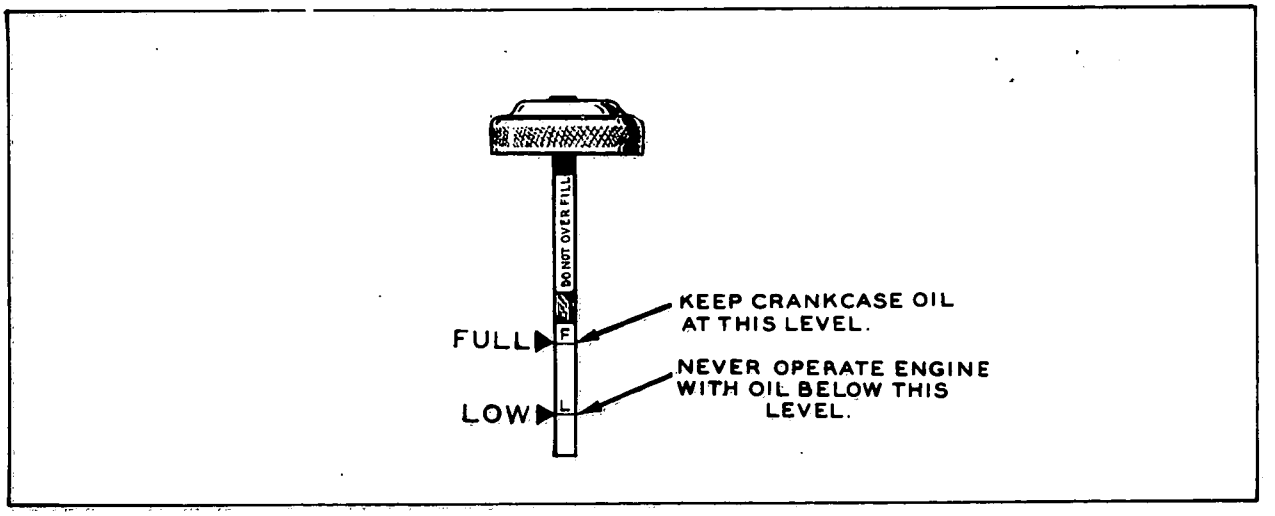


FIG. 20 - CRANKCASE OIL LEVEL

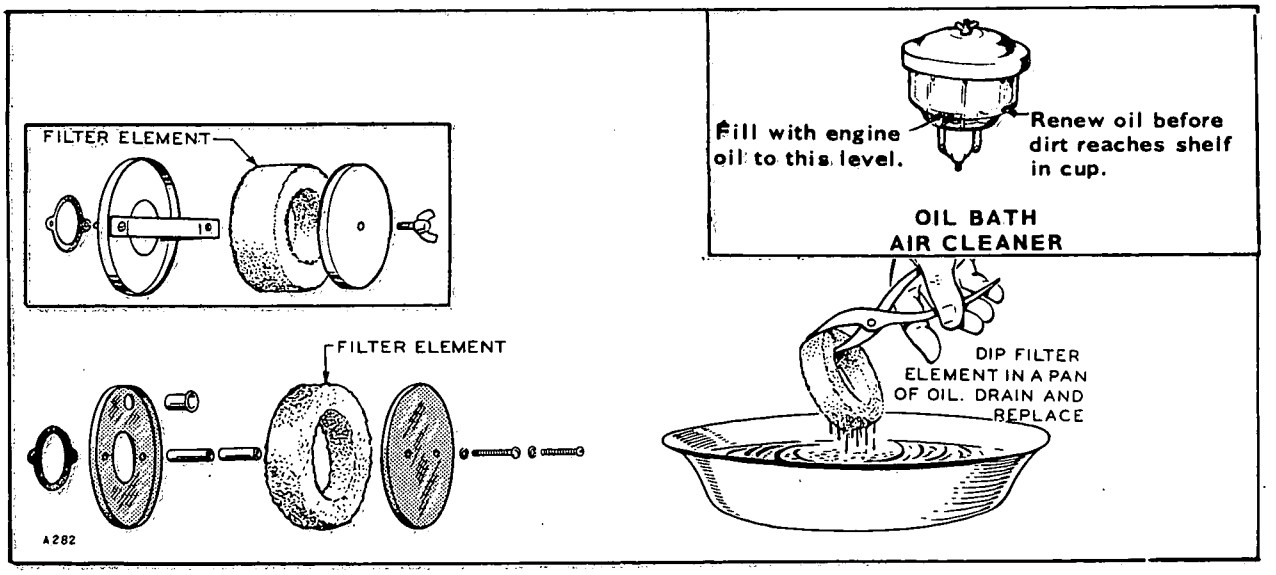


FIG. 21 - AIR CLEANER SERVICE

Lubricate the governor arm ball joint with a dry type lubricant such as powdered graphite to assure best performance and longest life of the ball joint. If graphite is not available, use light non-gummy oil.

Remove the air cleaner mesh element (Fig. 21) and dip in oil of the same SAE number as used in the crankcase. Allow the excess oil to drain off, reassemble the air cleaner.

FUEL. - The manual type plant has a 3-gallon rectangular tank mounted over the generator. The stationary type plant has a 5-gallon separate tank. Measures are U.S. Standards. Fill the tank nearly full with clean, fresh, automotive type "regular" grade of gasoline. Do not use a highly leaded premium type gasoline, as its use will necessitate more frequent carbon removal and spark plug and valve service. Do not fill the tank entirely full of cold gasoline. Expansion of the fuel as the plant warms up may cause the gasoline to overflow and result in a fire hazard. Observe the usual precautions when handling gasoline. NEVER FILL THE TANK WHEN THE PLANT IS RUNNING, BECAUSE OF FIRE HAZARD.

Open the fuel shut-off valve all the way until it back seats. Inspect the fuel system for leaks.

If the preceding instructions have been followed, the plant should be ready for operation. Before starting the plant, however, carefully study the sections OPERATION and ABNORMAL OPERATING CONDITIONS immediately following.

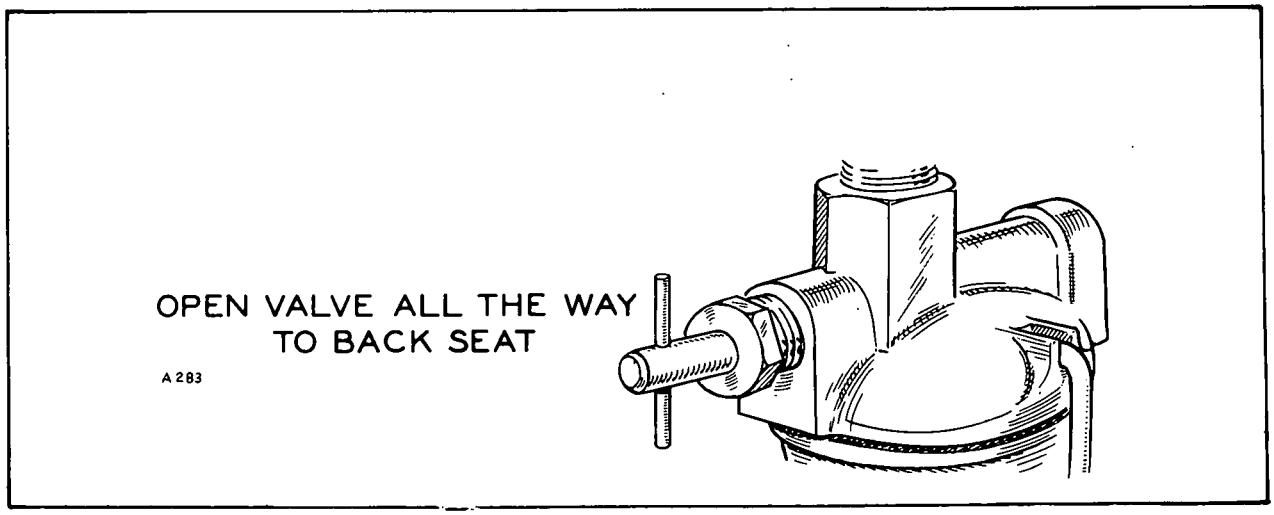


FIG. 22 - FUEL SHUT-OFF VALVE

BEFORE INITIAL START. - Clean the spark plug in gasoline before the initial start to dispose of preservative oil placed in the cylinder before factory shipment. Dry it thoroughly.

BEFORE ATTEMPTING TO START THE PLANT, MAKE SURE THE PLANT HAS BEEN PROPERLY INSTALLED AND PREPARED FOR OPERATION AS DIRECTED IN THE PREVIOUS SECTIONS.

ALTERNATING CURRENT PLANTS

STARTING THE REMOTE CONTROL PLANT ELECTRICALLY. - Before starting a new plant the first time, or one which has run out of fuel, it will be necessary to pump gasoline into the carburetor. Work the fuel pump primer lever or allow the plant to crank electrically by holding the START-STOP switch at the START position. It usually takes approximately 30 revolutions of the crankshaft to properly fill the carburetor with gasoline. If fuel does not reach the carburetor, inspect carefully for an air leak between the fuel pump inlet and the fuel tank. Be sure all valves are open and the pump primer lever is returned to inward position. The air vent on the separate tank must be partially open.

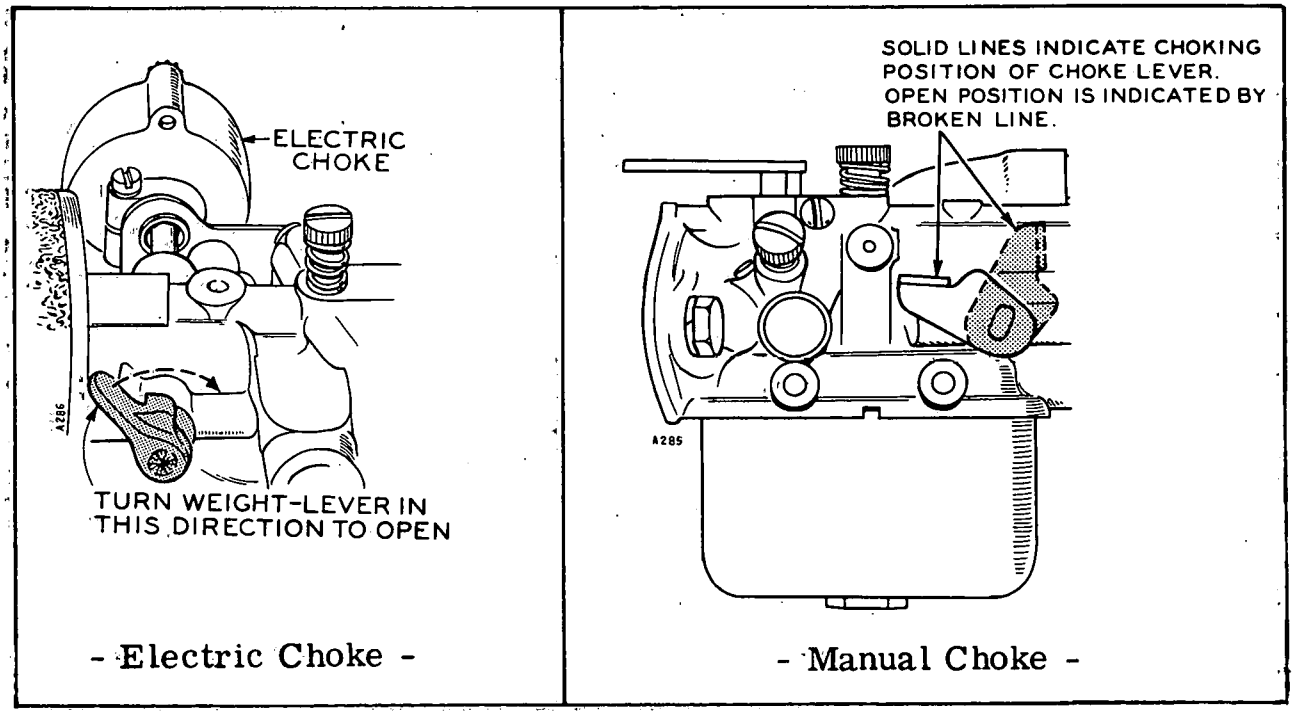


FIG. 23 - CARBURETOR CHOKING

To start the plant, push the START-STOP toggle switch to the START position. The plant should start after a few revolutions. The carburetor is automatically choked. If the plant does not start after a few crankings of approximately 5 seconds each, carefully check the fuel and ignition systems. Release the start switch as soon as the plant starts, making sure that the switch returns to the center position. If one or more remote control switches have been installed, check the installation by trying the START and STOP positions of each remote control switch. Gaseous fueled models do not use choke.

STARTING THE REMOTE CONTROL PLANT MANUALLY. - To start the plant manually, first be sure the carburetor is properly filled with gasoline as described above under STARTING THE REMOTE CONTROL PLANT ELECTRICALLY. Do not have a heavy electrical load connected to the generator. On plants not equipped with a recoil starter accessory kit, engage the knot of the starting rope in a notch of the flywheel rope sheave and wind the rope in a clockwise direction to within a few inches of the handle. Crank the engine with a strong, fast pull the full length of the rope. Do not jerk the rope. Repeat the cranking as necessary. If the plant does not start readily, check the fuel and ignition systems, correcting any trouble found. No choke used on gas fueled models.

STARTING MANUAL PLANTS. - The mounted tank supplies a continuous supply of fuel to the carburetor by gravity feed. Adjust the manual carburetor choke (as illustrated) as necessary for the temperature conditions. If the plant has been standing idle in cold weather, the carburetor choke may have to be completely closed for the first cranking. In hot weather, or if the plant is still warm from recent operation, little or no choking should be required. Avoid overchoking. Before cranking, adjust the choke. On plants not equipped with a recoil starter accessory kit, wind the starting rope on the flywheel rope sheave in a clockwise direction to within a few inches of the rope handle. Crank the engine once with a strong, fast pull the full length of the rope. If the plant fails to start at the first cranking, change the choke setting and repeat the cranking. As the plant starts, adjust the choke position to the point where the plant runs smoothly. As the plant warms up, gradually open the choke to the running position, as illustrated. No choke used on gas fueled models.

IMPORTANT!!

This unit has been run and tested for about 3 to 4-hours at the factory. Additional break-in time is required and will vary depending upon load conditions, oil used, etc. Load during break-in should be between 1/2 load and rated load, preferably near rated load for best results. Above procedure will result in faster break-in and lower oil consumption.

APPLYING THE LOAD. - Best results are obtained if the plant is allowed to thoroughly warm up before applying a heavy load. Load wires should be connected before operating, according to the model in question, as instructed under INSTALLATION.

Apply the load to the remote control type plant by throwing the main line switch to the ON position. If no main line switch was installed, throw the switch for the individual load to the ON position. When possible apply portions of the load in steps.

Procedure for applying the load to the manual type plant will depend upon the installation and application. If no plug-in receptacles were added at the plant, load application as given for remote control type plants will apply.

On the manual type plant, to which plug-in receptacles where added, apply the load by inserting the load plug directly into the receptacle at the side of the generator. The 240-volt output 3-prong grounding type receptacle requires a tandem load plug having two blades in line and one load equipment grounding prong. The 120-volt output 3-prong grounding type receptacle is designed for a load plug having two blades parallel and one load equipment grounding prong. An ordinary two blade plug can be used in the 120-volt output 3-prong receptacle if grounding of the load equipment is not desired.

CAUTION

Continuous overloading of the generator will cause the generator temperature to rise to a dangerous point and may lead to serious damage to the windings. Keep the load within the rating of the plant as shown on the nameplate.

BATTERY CHARGE RATE. - The starting battery is recharged by generator exciter current. The charging rate is automatically switched by the 2 step voltage regulator to either LOW rate or HIGH rate depending upon the charge condition of the battery. LOW rate can not be adjusted. HIGH rate is set at the factory during the test run and can be further adjusted by moving the slide clip on the adjustable resistor. Operating conditions, such as exceptionally frequent starts may require increasing the HIGH charge rate. Check the charge condition of the battery frequently with a hydrometer.

STOPPING THE PLANT. - To stop the manual type engine, press the STOP button on the cover of the ignition breaker box until the engine has come to a complete stop. The high tension magneto provides a firing spark even when the engine is running at very few rpm. Release of the STOP switch too soon will allow the plant to again pick up speed and continue to run.

To stop the remote control type plant, hold the remote STOP switch or hold the control box switch at the STOP position.

In an emergency, if the STOP button fails to work, the plant may be stopped by closing the fuel shut-off valve.

N O T E !

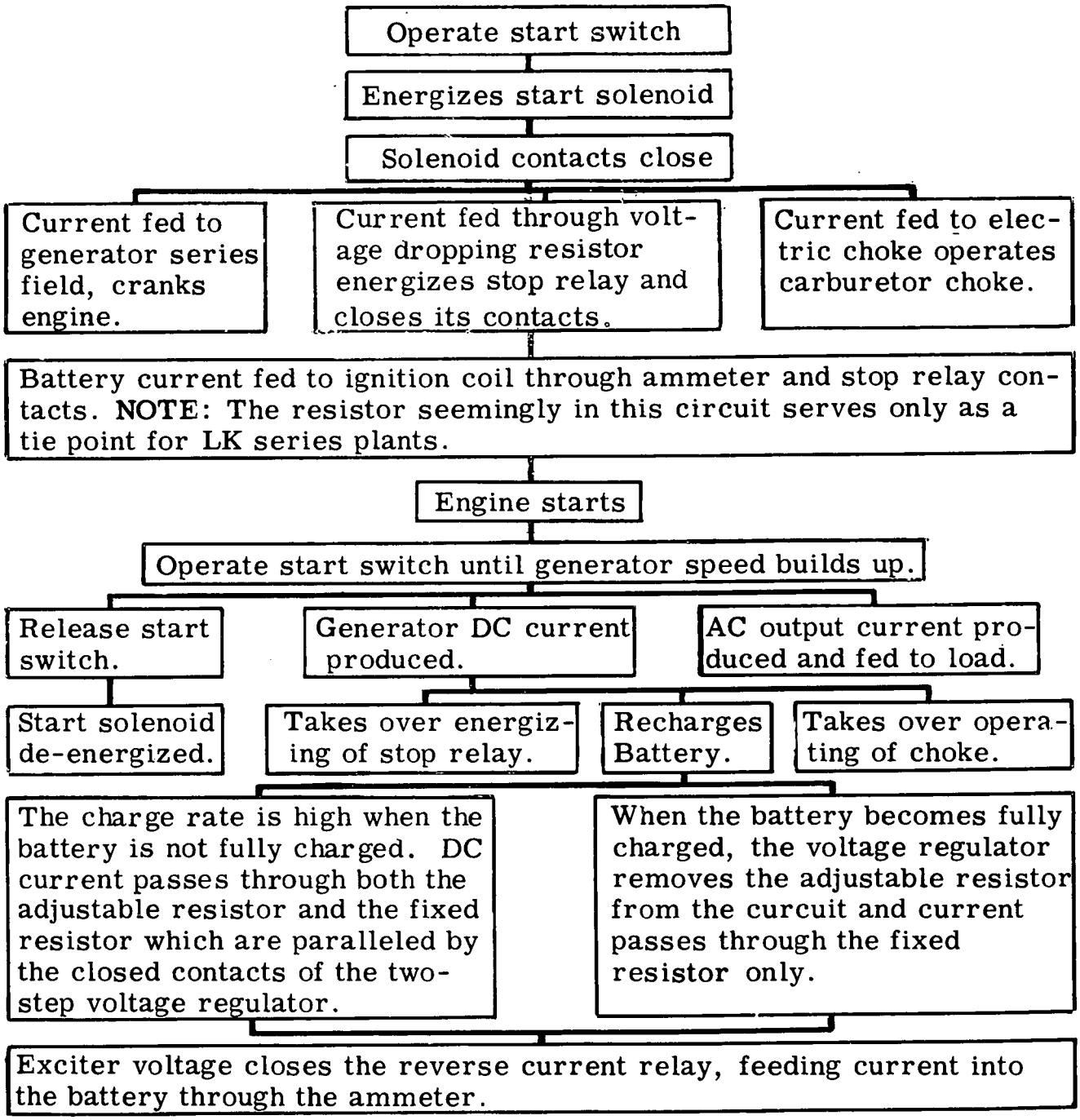
For model 2LK-1RV1330/ "Mobile Communications" or "Utility Type" plant, refer also to Special Purpose Section.

CAUTION

Do not disconnect battery while plant is running as serious damage to the control system will result.

FUNCTION OF THE CONTROLS. - Reference to the plant wiring diagram, and a thorough understanding of how the controls work, will aid in diagnosing trouble if failure occurs.

This chart explains function of controls during remote plant starting:



LOW TEMPERATURES

LUBRICATION. - Directions for the proper grade of oil to use in cold weather are given in the PREPARATION section. When changing oil in cold weather, be sure to drain the oil only when the oil is warm from running.

If an unexpected drop in the temperature causes oil in the crankcase to become too thick to run freely from the oil drain, do not attempt to start the plant. If the plant is started when the oil is congealed, serious damage may result from improper lubrication. Remove the plant to a warm location, or apply heat externally until the oil is sufficiently warm.

FUEL. - Fresh winter grade, automotive type gasoline is an aid to starting in cold weather. Premium highly-leaded gasoline should not be used. Keep gasoline supplies free of moisture condensation. Leave room in the fuel tank to compensate for expansion. Open the carburetor main jet approximately 1 additional turn for below 0°F. operation.

IGNITION. - Cold weather starting is aided by a properly serviced ignition system. See that the ignition breaker points are clean and properly adjusted. Clean and adjust the spark plug.

BATTERY. - If the plant uses starting batteries, keep the batteries in a well charged condition. A discharged battery may freeze at 20°F. A fully charged battery will not freeze at -90°F.

COOLING. - The flow of air to the engine may be partially obstructed to keep the engine at operating temperature, if desired. However, use extreme care to avoid overheating.

HIGH TEMPERATURES

LUBRICATION. - In temperatures above 90° (32°C.) for continuous operation use SAE number 50 oil. Keep the oil level close to the full level, and change the oil at least every 100 operating hours.

COOLING. - The engine and generator of this plant depend upon a constant supply of fresh air for proper cooling. See that nothing obstructs the circulation of air to and around the plant. Keep cooling fins clean and unobstructed. Make sure that the blower housing and cylinder air housings are properly in place and are undamaged. Keep the ignition timing properly adjusted.

BATTERY PREPARATION FOR REMOTE START AC PLANT. - For a usual plant installation, follow the instructions for Batteries under INSTAL-

LATION. However, if the installation will be made in a location where temperatures are consistently high, battery life will be extended by reducing the battery acid specific gravity.

Standard automotive type storage batteries will self discharge very quickly when installed where ambient temperature is always above 90°F., such as in a boiler room. To lengthen battery life, adjust the electrolyte from a normal 1.275 reading at full charge, to a 1.225 reading.

The cranking power of the battery is reduced somewhat when its electrolyte is diluted to reduce acid activity and thus lengthen battery life. However, if the temperature is consistently above 90°F. (32.2°C.) adjust the electrolyte as follows:

1. Fully charge the battery. DO NOT BRING AN OPEN FLAME OR BURNING CIGARETTE NEAR THE BATTERIES ON CHARGE BECAUSE THE GAS RELEASED DURING CHARGING IS VERY FLAMMABLE.

2. While battery is on charge, use a hydrometer or filler bulb to siphon off all of the electrolyte above the plates in each cell. Do not attempt to pour off!! Dispose of the removed electrolyte. AVOID SKIN OR CLOTHING CONTACT WITH ELECTROLYTE.

3. Fill each cell with pure distilled water.

4. Recharge the batteries for one hour at a 4 to 6 ampere rate.

5. Use a reliable battery hydrometer, to test each cell. If the specific gravity is above 1.225, repeat steps number 2, 3, and 4 until the highest specific gravity reading of the fully charged battery is not over 1.225. Most batteries require repeating steps 2, 3, and 4 two times.

DUST AND DIRT

CLEANLINESS. - Keep the engine as clean as practicable. Service the air cleaner as frequently as conditions require. Keep oil and gasoline supplies in air tight containers. Do not allow cooling fins of cylinders or cylinder heads to become dirty or obstructed. Keep the generator commutator, brushes, and brush guides clean.

LUBRICATION. - Change the crankcase oil every 50 operating hours, instead of every 100 operating hours, during severely dusty operating conditions.

HIGH ALTITUDE OPERATION. - If the unit is to be operated at an altitude of 2,500 feet or more above sea level, the carburetor main jet adjustment should be "leaned" slightly to obtain maximum possible power. The carburetor was factory adjusted for best performance at the factory altitude: approximately 860 feet above sea level.

Because the air becomes less dense as the altitude increases, less fuel is required to maintain the proper air-to-fuel ratio. Consequently any engine will develop less total power at higher altitudes. The usual decrease in maximum power available at high altitudes is approximately four percent for each 1, 000-feet above sea level.

ONAN GASOLINE ENGINE SERVICE CHART

The following recommended Servicing Chart may be used as a guide to estimating servicing requirements of Onan Electric Generating Plants and Engines. It is based on the average of records kept by the factory.

The chart is based on the Units operating under favorable conditions, such as: satisfactory installation, use of recommended fuel and oils, etc.

SERVICE & PARTS REQUIRED	HOURS OF OPERATION																
	100	200	300	400	500	600	700	800	900	1000	1500	2000	2500	3000	3500	4000	4500	5000
Oil Change	x	x	x	x	x	x	x	x	x	x								COMPLETE RECONDITIONING
Clean and Adjust Spark Plugs	x	x	x	x	x	x	x	x	x	x								
Service Air Cleaner	x	x	x	x	x	x	x	x	x	x								
Check Ignition Points		x		x		x		x		x								
Clean Carbon					x					x	x	x	x	x	x	x	x	
Clean Carburetor										x		x		x		x		
Check Tappets					x					x	x	x	x	x	x	x	x	
Grind Valves										x		x		x		x		
Remove and Clean Oil Base										x		x		x		x		
Clean Crankcase Breather	x	x	x	x	x	x	x	x	x	x								
Inspect Commutator		x		x		x		x		x								
Inspect Brushes		x		x		x		x		x								
Lubricate Generator Bearings										x		x		x		x	x	
Clean Generator										x		x		x		x		
Replace Spark Plugs	AS REQUIRED																	
Replace Valves	AS REQUIRED																	
Replace Points	AS REQUIRED																	
Replace Generator Brushes	AS REQUIRED																	
Replace Piston Rings	AS REQUIRED																	

If it is necessary to remove parts for inspection and gaskets are disturbed they should be replaced with new ones. Keep spare cylinder head, cylinder base, oil base and other gaskets on hand.

When brushes are replaced be sure the commutator and slip rings are in A-1 condition. Seat brushes per instructions in service manual.

Periodic Inspection: For Loose or Poor Connections, Fittings, etc.

Recommended Fuel: Use a regular grade of automotive type gasoline. If a high lead content fuel is used, it will be necessary to remove the lead deposits more frequently.

Follow a definite schedule of inspection and servicing to assure the best performance and long life of the plant. Service periods outlined below are for average service and normal operating conditions. Under unusual service or abnormal operating conditions, service the plant more frequently. Keep a record of the hours the plant is operated each day to assure servicing at the proper time.

DAILY SERVICE

If the plant is operated more than 8 hours daily, perform the following services each 8 hours of operation.

FUEL. - Check the fuel supply often enough to avoid running out of fuel. NEVER FILL THE FUEL TANK WHILE THE PLANT IS RUNNING. Use clean, fresh, regular automotive type gasoline of at least 68 octane rating. Use of a highly leaded premium grade of gasoline is not recommended.

CRANKCASE OIL LEVEL. - Remove the oil fill cap and check the crankcase oil level. Add oil as necessary to keep the oil level at the full mark on the gage. Recommended grades of oil are given under PREPARATION. Avoid overfilling which will allow the connecting rod to cause oil foaming and interfere with efficient lubrication.

The oil fill cap gasket must always be in good condition and the cap must always be securely tightened in place. Air leakage into the crankcase at this point will cause oil leakage around the seals and excessive oil consumption.

CLEANING. - A clean plant will give more satisfactory service. Wipe off dirt and any spilled oil.

WEEKLY SERVICE

If the plant is operated more than 50 hours weekly, perform the following services each 50 hours of operation.

CRANKCASE. - If using diluted oil, or highly leaded gasoline, change the crankcase oil each 50 hours of operation. Under normal conditions and when using oil which is not diluted, change the crankcase oil each 100 hours of operation. Do not drain the oil when the plant has been standing idle. Run the plant until the oil is thoroughly warmed up, then stop the plant and drain the oil.

AIR CLEANER, DRY TYPE. - Remove and disassemble the air cleaner. Remove the element and wash thoroughly in a solvent. Dry thoroughly and dip in oil of the same SAE number as used in the crankcase. Allow to drain until dripping stops, then reassemble. OIL BATH TYPE - Remove and clean filter element, clean oil cup, refill with engine oil.

GOVERNOR LINKAGE. - Put a drop or two of lubricating oil at the point where the link engages the carburetor throttle arm. Plastic type ball joint requires cleaning only.

Lubricate the governor arm ball joint with a dry type lubricant such as powdered graphite to assure best performance and longest life of the ball joint. If graphite is not available, use a light non-gummy oil.

SPARK PLUG. - Clean the spark plug and reset the gap as given in the Table of Clearances. Test the plug under compression on a plug testing machine, if one is available. Replace a defective plug.

BATTERY. - If the plant uses a starting battery, keep the connections tight and clean. Keep the electrolyte at the proper level above the separators by adding clean water. Distilled water is recommended for use in batteries. If distilled water is not obtainable, use clean soft water such as filtered rain water. Do not use water which contains alkali or minerals. Use a hydrometer to check the charge condition before adding water. In freezing weather, add water only before running the plant, to assure mixing the water with the electrolyte.

MONTHLY SERVICE

If the plant is operated more than 200 hours monthly, perform the following services each 200 hours of operation.

FUEL SYSTEM. - On plants with a separate fuel tank, drain the fuel tank and remove the shut-off valve and filter assembly. Carefully clean the filter screen. Tighten connections well when reassembling. Empty carburetor bowl and fuel filter bowl of any sediment which may have accumulated.

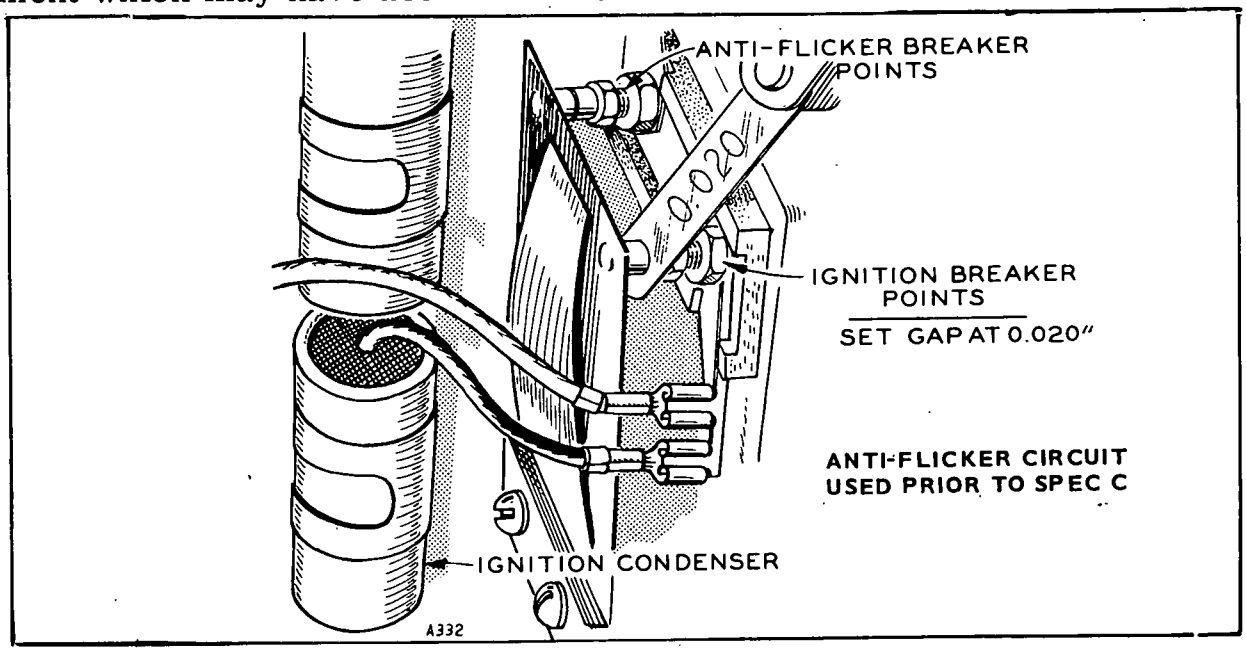


FIG. 24 - SERVICING THE BREAKER POINTS

IGNITION AND ANTI-FLICKER BREAKER POINTS. - Remove the cover and inspect the breaker points. Contact points which are not badly burned or pitted may be dressed smooth, using a fine abrasive stone or hone. If the points are pitted or burned deeply, replace them with a new point set. Excessive burning of the contact points is usually an indication of a defective condenser, which should be replaced with a new one. Adjust the gap between the points as given in the Table of Clearances. If retiming the ignition is needed, refer to Maintenance and Repair herein. CLEAN BREAKER POINTS ACCURATELY ADJUSTED AID STARTING.

Note: Spec C units anti-flicker points are not connected into any circuit and may be used as ignition breaker points by changing the ignition lead wires to the flicker point terminals and relocating the ignition condenser closer to the flicker points.

EXHAUST SYSTEM. - Inspect all exhaust line connections carefully. Make any necessary repairs or replacements.

CARBON REMOVAL. - Regular removal of carbon deposits from the combustion chamber helps to keep engine efficiency high. The frequency with which it is advisable to remove carbon will vary considerably with the type of fuel used, the type of oil used, and operating conditions. Use of highly leaded gasoline necessitates frequent removal of carbon and lead deposits from the cylinder head, top of piston and valves, and top surface of the cylinder block.

BREATHER VALVE. - The nylon ball, contained in the breather valve, helps maintain a partial vacuum which is created in the crankcase while running. Remove the hose which carries expelled air from the breather valve at the valve compartment cover, to the air cleaner. Loosen the valve with pliers. Occasionally the valve will lift out and remain inside the hose. Wash the valve in kerosene or other suitable solvent. Then dry and replace. The valve must work freely and must prevent expelled air from re-entering the crankcase. The hose must not be restricted. Install parts removed. See the illustration, Valve Service, under Maintenance and Repair section.

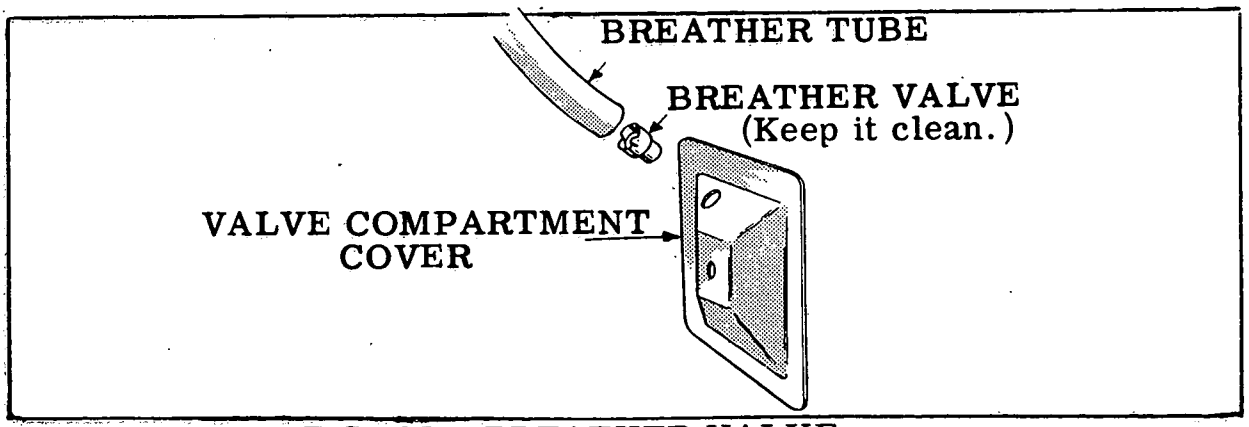


FIG. 25 - BREATHER VALVE

GENERATOR. - Check the condition of the commutator, ac collector rings, and brushes. Clean the commutator (and ac collector rings) with a dry, lint free cloth. If heavily coater or slightly rough, sand smooth with #00 sandpaper. Do not use emery or carborundum cloth or paper.

Install new commutator brushes and other rectangular brushes when the old ones are worn to 5/8" or less in length.

See that all connections are tight. Remove carbon dust from the generator.

CONTROL BOX. - Keep the control box free of dust and dirt. See that all connections are clean and tight. Replace with a new one any part which does not function properly. Always disconnect the battery ground before servicing controls to avoid accidental shorts.

GENERAL INSPECTION. - Thoroughly inspect the entire plant for loose connections, loose screws or nuts, oil leaks, etc. Make any necessary repairs.

See that equipment which serves for radio noise suppression is in place and with clean tight connections. Suppression equipment includes spark plug shield, shielded ignition leads and by-pass capacitors in generator and control.

GENERATOR BALL BEARING. - A double sealed, prelubricated ball bearing is used on the generator. No periodic service is required.

Generating plant satisfactory performance is dependent upon correct adjustments. Adjustments can not fully compensate for troubles such as low engine power due to engine condition. See also Special Purpose Section.

GOVERNOR. - The governor controls the speed of the engine.

On ac generating plants, engine speed determines the output voltage and current frequency of the generator. By increasing the engine speed, generator voltage and frequency is increased, and by decreasing the engine speed, generator voltage and frequency is decreased. An accurate voltmeter is required in adjusting the governor of ac plants. A small speed drop not noticeable without instruments will result in an objectionable voltage drop.

The governor arm is fastened to a shaft which extends from the gear cover and is connected by a ball joint and link to the carburetor throttle arm. If the carburetor has been removed, or the governor disassembled, it may be necessary to readjust the governor.

A binding in the bearings of the shaft which extends from the gear cover, in the ball joint, or in the carburetor throttle assembly will cause slow governor action or poor regulation. Looseness or excessive wear in the governor mechanism will cause erratic governor action or alternate increase and decrease in speed (hunting). A lean carburetor adjustment may also cause hunting. Springs of all kinds have a tendency to lose their calibrated tension through fatigue after long usage. If all governor and carburetor adjustments are properly made, and the governor action is still erratic, replacing the spring with a new one and resetting the adjustments will usually correct the trouble.

When the plant is stopped, tension of the governor spring should hold the carburetor throttle arm at the wide open position, pushed toward the generator end of the plant. At wide open position, the lever on the throttle shaft should just touch the carburetor body or clear it by no more than 1/32 inch. This setting can be obtained by increasing or decreasing the length of the connecting linkage as necessary, by turning the ball joint on the threads of the link. Be sure to retighten the ball joint to the governor arm. This operation synchronizes governor action with the carburetor throttle action.

ADJUSTING THE GOVERNOR - AC PLANT. - Refer to the illustration, Governor Adjustment.

Connect the voltmeter across the output of the generator. With no electrical load connected, start the plant and adjust the speed adjusting nut to give a voltmeter reading of approximately 126 volts maximum for a 120-volt plant. Apply a full rated electrical load and again observe the voltage reading, which should be approximately 108 volts minimum. For 240-volt plants, these voltages will be approximately doubled. The correct sensitivity adjustment gives the sharpest regulation without

causing a hunting condition. If the voltage spread between no load and full load conditions is too great, turn the sensitivity screw out slightly. If the voltage spread is satisfactory but there is a tendency toward "hunting" at times, the sensitivity is too close and the sensitivity screw must be turned inward slightly. Any change in the sensitivity adjustment usually requires a compensating speed nut adjustment.

If a tachometer is used for adjusting the governor, engine speed for a 60-cycle plant should be approximately 1800-rpm, or for a 50-cycle plant should be approximately 1500-rpm, with a drop of not more than 100-rpm from no load operation to full load operation.

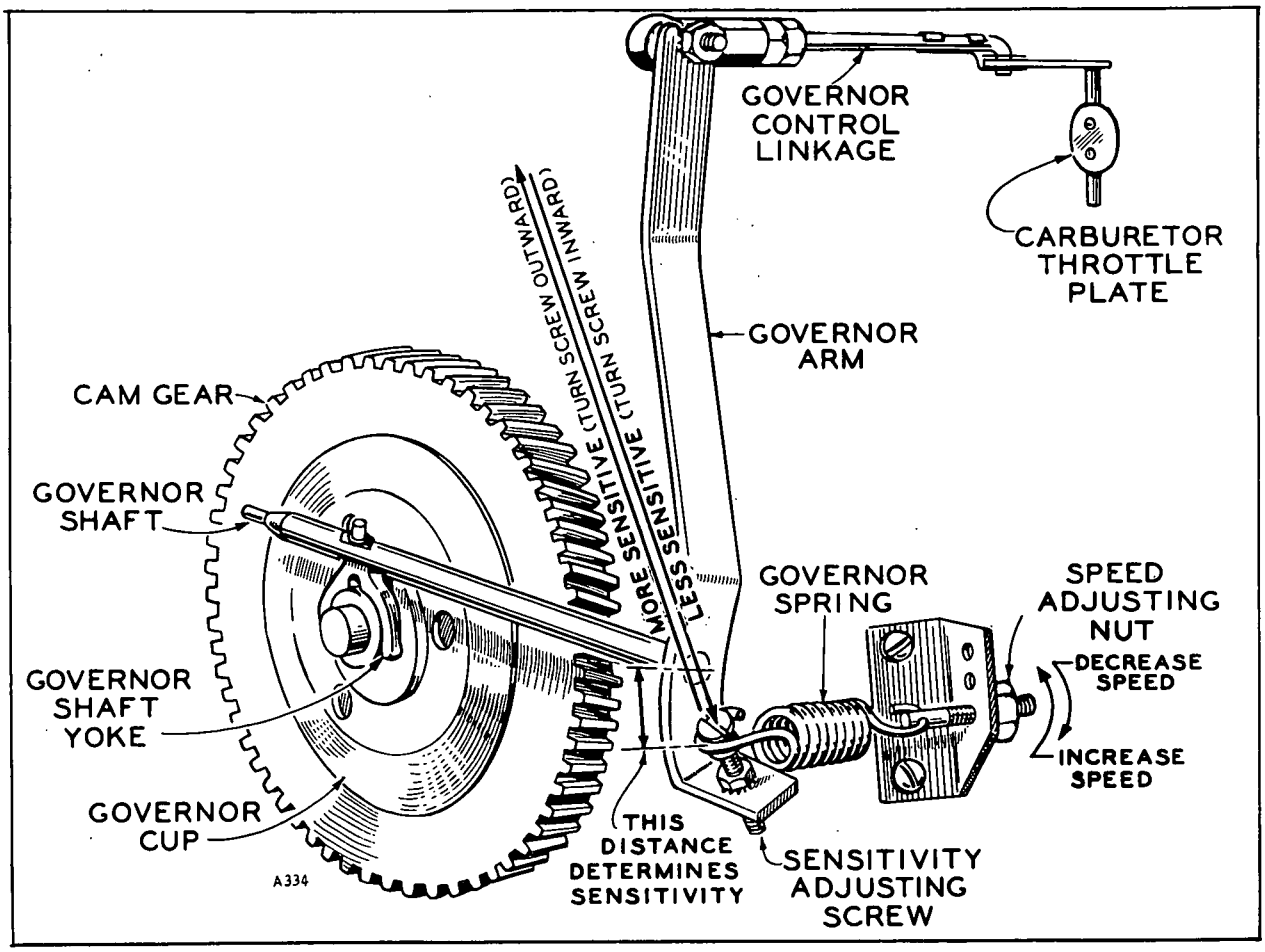


FIG. 26 - GOVERNOR ADJUSTMENT

ANTI-FLICKER MECHANISM (Prior to Spec C Only). - The anti-flicker mechanism, also called flicker resistance mechanism, is provided to help eliminate flicker of lights in the load. Breaker points and a field resistor are used to compensate for a surge in the voltage during the power stroke of the engine. The breaker points are located on the right side of the crankcase, protected by a sheet metal cover. The breaker point set for the plant includes both the anti-flicker points and the ignition points. Both moveable contacts are

contained on one spring and are operated by one plunger off the engine camshaft. The resistor is mounted on the brush rig or support. See that the breaker points are not burned or pitted. Burned or pitted points are usually an indication of a defective condenser. The points gap at full separation should be .020". The plunger must work freely. If points and condenser are in good condition and flicker of a small capacity light bulb, while operating at average plant load, is objectionable, check to see if a new resistor is required. Beginning Spec C, anti-flicker points remain but circuit and components not used.

If an adjustable resistor is used, loosen the sliding clip on the resistor and, while watching a small light connected with an average plant load, slide the clip along the resistor to the point where the least flicker is noticeable. Tighten the clip at this position.

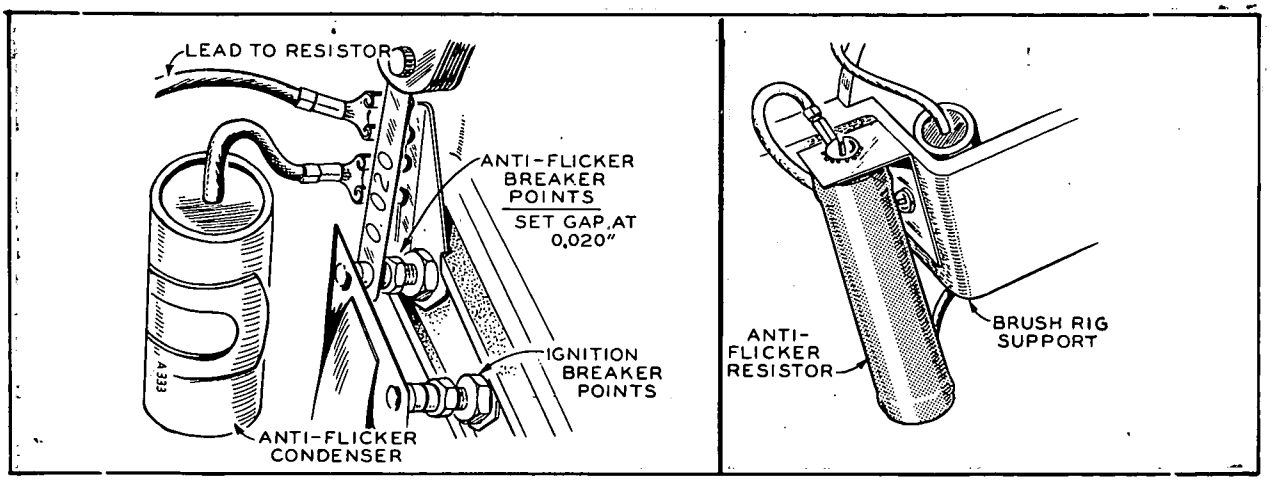


FIG. 27 - ANTI-FLICKER (Prior to Spec C Only)

CARBURETOR. - Refer to MAINTENANCE AND REPAIR-CARBURETOR if it becomes necessary to remove the carburetor for repairs. A small piece of foreign matter lodging in a jet may cause hard starting and poor operation. Dirty gasoline may cause the jets to wear larger, resulting in excessive gasoline consumption. Before tampering with jet settings, mark the existing adjustment or count the number of turns the needle was backed out from its seat.

The carburetor is a side (horizontal) draft type and has two adjusting needles. The "idle" needle is located nearer the cylinder head. The "main" needle is located on the top nearer the air cleaner. Turning the needle inward gives a leaner fuel mixture for either jet.

The correct setting for the main jet needle gives the best stability at full rated load operation. The correct setting for the idle needle gives the best stability at no load operation.

Full load and no load operating conditions are necessary when making carburetor adjustments.

To adjust the carburetor, turn the adjusting needles in gently (finger tight) to their seats. Do not force them in, as they may be damaged by seating too tightly. Back the main needle out about 2-1/2 full turns. Back the idle needle out about 3/4 of a turn. Start the plant and allow it to thoroughly warm up under a full load condition.

Slowly turn the main adjusting needle inward (clockwise) for leaner mixture, until the plant begins to lose speed, or the voltage drops. Turn the needle outward (counterclockwise) to the point where the plant will carry the full load. Check the operation at various loads. If there is a tendency to hunt (alternately increase and decrease speed) at any load, turn the adjusting needle out for richer fuel mixture, until the hunt is corrected, but do not turn the adjusting needle out more than 1/2 turn beyond the point where maximum generator output is obtained. Adjust the idle needle with the plant warm, and with no ac electrical load connected, slowly turn the idle adjusting needle inward (clockwise) until the plant loses speed from lack of fuel. Then turn the needle slowly outward until the plant runs smoothly. Refer also to Abnormal Operation Conditions.

A substantial change in a carburetor adjustment requires a compensating adjustment of the governor speed.

The throttle idle stop screw should be adjusted to clear the throttle shaft stop by 1/32" when the plant is operating at desired speed and no load condition. This setting helps prevent hunting during changes in load.

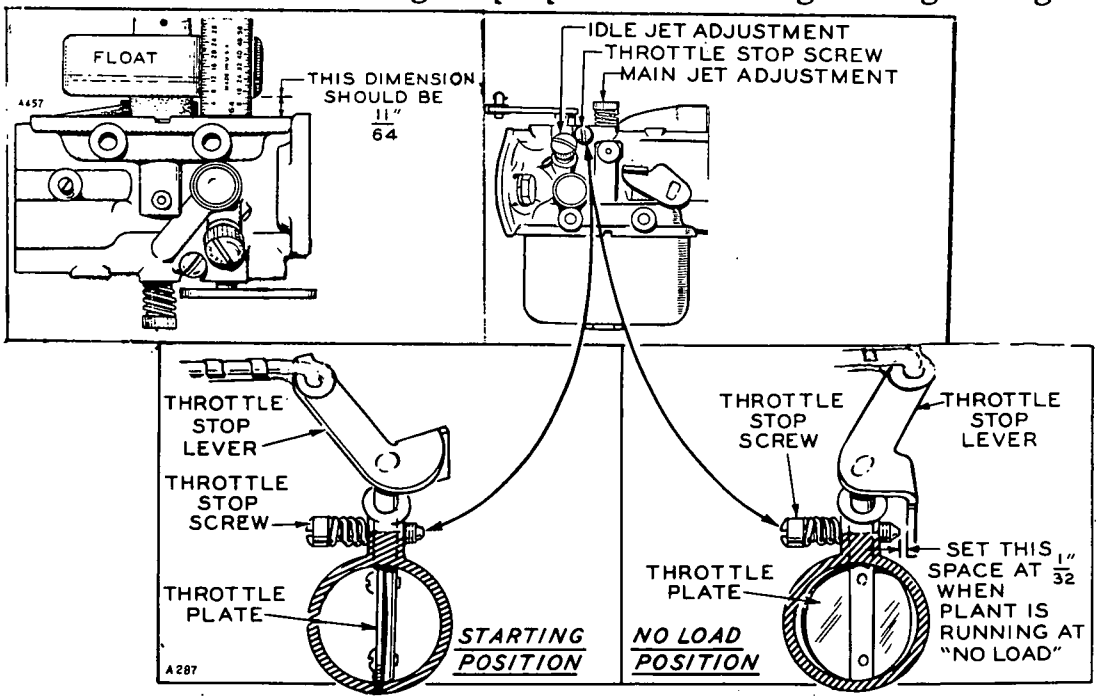


FIG. 28 - CARBURETOR ADJUSTMENTS

CARBURETOR FOR GAS FUEL ONLY. - To adjust the gas fuel carburetor, set the main adjusting screw approximately 1-1/2 turns open, and set the idle adjusting screw

approximately 1-1/4 turns open, to permit starting the engine. Further adjust the screws as necessary for best operation while allowing the engine to thoroughly warm up under an average load condition. Make the final adjustment of the main adjusting screw while operating with a full load connected. Turn the screw in until the plant voltage (or speed) begins to drop, then turn the screw slowly outward until the voltage (or speed) returns to normal, and operation is steady. If it is necessary to turn the screw out more than 1/2 turn after normal voltage is attained, in order to prevent surging, it may be necessary to adjust the governor for slightly less sensitivity. Make the final adjustment of the "idle" screw for best operation after the load is disconnected.

ELECTRIC CHOKE. - The ac remote control type plant is equipped with a thermal action electric choke. A thermostatic coil (bi-metal) engages the choke shaft and is set at the factory to give the correct choking action for average temperature conditions. When the plant starts, current from the generator is supplied to a small heating element in the choke cover. This heating element causes the thermal coil to wind tighter and turn the choke shaft, gradually opening the choke as the plant warms up. When the plant is stopped the thermal coil cools off, causing the choke shaft to return to the correct position for the next start.

At a temperature of 70°F., the choke should be approximately 1/8" from the fully closed position. The thermal coil (bi-metal) is installed in the choke body in a clockwise direction as viewed starting from the inside turn. The thermal coil tends to coil tighter when heated rather than unwind.

Extreme temperature may require a slight re-adjustment of the choke setting. To adjust the choke, loosen the two screws which retain the choke cover to the choke body. For less choking action, turn the cover assembly slightly in a counterclockwise direction, looking at the thermal unit end. For more choking action, turn the cover assembly slightly in a clockwise direction.

If the choke does not operate properly, check to see that the heating element heats properly. There must be no binding of the choke shaft or thermal coil. Be sure to retighten the lock screw after any adjustment.

A manual operating lever and weight, fastened on the opposite end of the choke shaft, may be used to operate the choke in the event the elec-

tric element burns out or the choke does not operate for any reason. Turn the lever to horizontal position to open the choke. The choke would remain at closed position if electric choke failure occured.

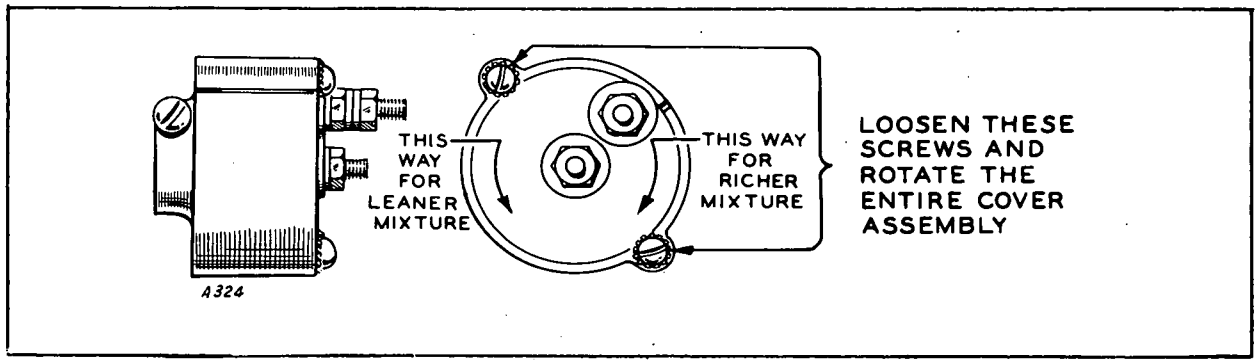


FIG. 29 - ELECTRIC CHOKE ADJUSTMENT

Note that the direction marking "CHOKE→" as appears cast on the body of some carburetors is correct for manually choked plants, but is wrong for electric choked plants due to the choke valve arrangement. Choking position of the weight lever is vertical, on the shaft of electrically choked plants. Choking position of the lever is horizontal on manually choked plants.

GENERAL. - Refer to the Service Diagnosis section for assistance in locating and correcting troubles which may occur. If a major repair or overhaul becomes necessary, the engine should be carefully checked and necessary repairs made by a competent mechanic. Major generator repairs should be made by a competent electrician. Maintain factory limits and clearances as given in the Table of Clearances, replacing worn parts when necessary. Avoid accidental shorts by disconnecting the battery when servicing control parts.

TABLE OF CLEARANCES

All clearances given at room temperature of 70° F.

	MINIMUM	MAXIMUM
Intake Valve Tappet Clearance at 70°F.	0.015"	0.017"
Exhaust Valve Tappet Clearance at 70°F.	0.015"	0.017"
Intake Valve Stem Clearance in Guide	0.001"	0.0025"
Exhaust Valve Stem Clearance in Guide	0.0025"	0.004"
Valve Seat Width	1/32"	3/64"
Valve FACE Angle	44°	
Valve SEAT Angle	45°	
Valve Interference Angle	1°	
Crankshaft Main Bearing Clearance	0.002"	0.003"
Crankshaft End Play	0.006"	0.012"
Camshaft Bearing Clearance	0.0015"	0.003"
Camshaft End Play	0.003"	
Connecting Rod Bearing Clearance (Alum. Rod)	0.002"	0.003"
Connecting Rod End Play	0.013"	0.038"
Timing Gear Backlash	0.002"	0.003"
Oil Pump Gear Backlash	0.002"	0.005"
Piston Clearance in Cylinder, Conformatic Type (at bottom of skirt)		
Interference	0.0005"	
Clearance		0.0015"
Piston Pin Clearance in Piston at 70°F.	Thumb Push Fit	
Piston Pin Clearance in Rod at 70° F.	0.0002"	0.0007"
Piston ring gap in cylinder	0.010"	0.023"
Breaker Point Gap at Full Separation	0.020"	
Spark Plug Gap - For Gaseous Fuel	0.018"	
Spark Plug Gap - For Gasoline Fuel	0.025"	
Crankshaft Main Bearing Journal-Std. Size	1.9995"	2.000"
Crankshaft Rod Bearing Journal-Std. Size	1.6255"	1.6260"
Cylinder Bore - Standard Size	3.248"	3.249"

ASSEMBLY TORQUES

Assembly torques as given here require the use of a torque wrench. These assembly torques will assure proper tightness without danger of stripping the threads. If a torque wrench is not available, you will have to estimate the degree of tightness necessary for the stud, nut or screw being installed and tighten accordingly. Be careful not to strip the threads. Check all studs, nuts and screws often. Tighten as needed to prevent them from working loose.

	LB. FT. TORQUE
Cylinder Head Capscrews	29 to 31
Rear Bearing Plate Nuts	20 to 25
Connecting Rod Bolts	24 to 26
Flywheel Capscrew	40 to 45
Starter Armature thru Stud and Nut	45 to 50
Other 5/16 Inch Cylinder Block Studs and Nuts	10 to 12

ENGINE

CARBURETOR. - Carburetor maintenance should consist of regular cleaning. Some types of gasoline have a tendency toward formation of gum deposits inside the carburetor. This gum formation can usually be removed by soaking in alcohol or acetone. A fine soft wire may be used to clean jets.

See that the float is not damaged. If necessary to reset the float level, use a small screw driver to bend the lip of the float. With the carburetor casting inverted and the float resting lightly against the needle in its seat, there should be 11/64 inch clearance between the outer edge of the casting and the free end of the float (side opposite needle seat).

Carburetor adjustments appear in the ADJUSTMENT section herein. Be sure the throttle assembly works freely. When reinstalling adjusting needles, do not force them into their seats.

MAGNETO STATOR INSTALLATION. - The magneto stator assembly is mounted on the gear cover and the flywheel must be removed to expose it. The stator has 2 pairs of mounting holes. The innermost holes give 19° spark advance as required for engines with speed range of 1500 to 2400 rpm. The outermost holes give 25° spark advance as required for engines with speed range of 2500 rpm and above. Connect the smaller coil lead (ground) to the stator mounting screw. Connect the larger coil lead to the ignition coil (either terminal). Be sure the larger lead is held in place to prevent rubbing on the flywheel.

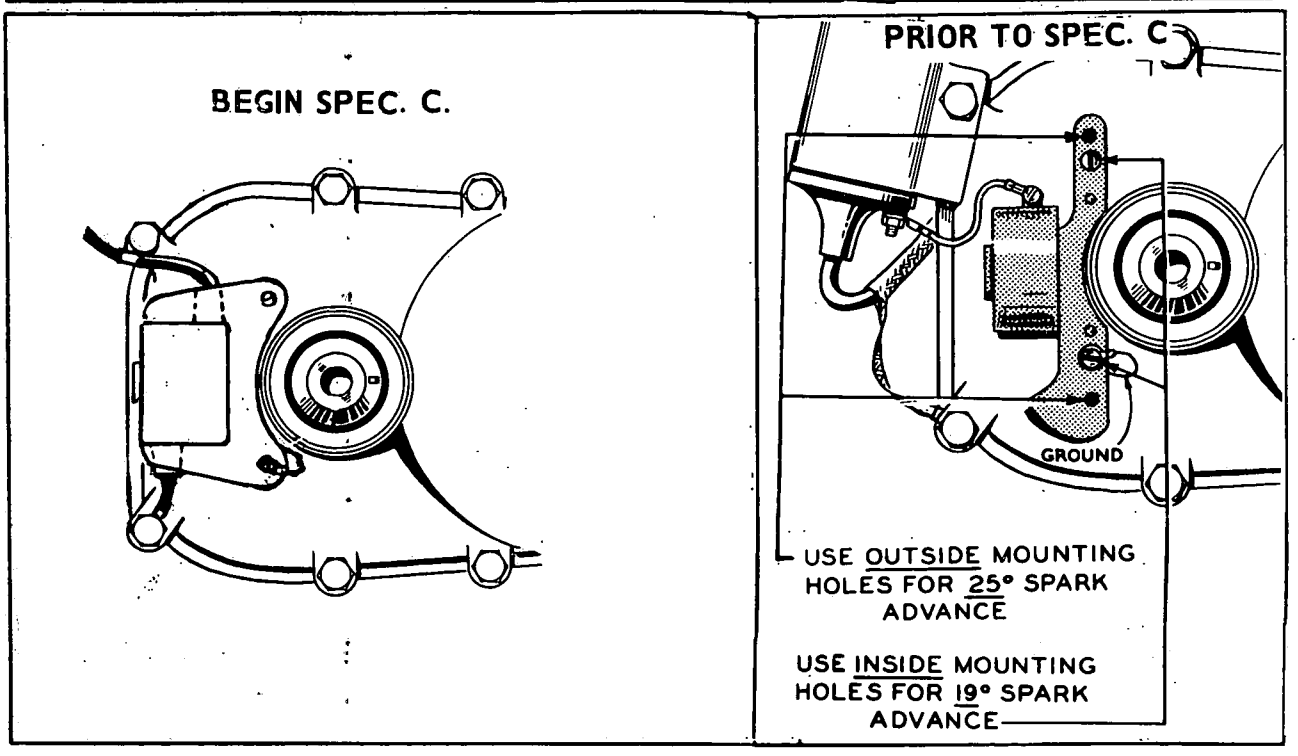


FIG. 30 - MAGNETO STATOR INSTALLATION

IGNITION COIL INSTALLATION. - Coil connections differ between magneto ignition plants and battery ignition plants. Refer to the illustration which applies. The ignition coil is grounded on magneto ignition plants but not grounded with battery ignition. The spark occurs at the build-up of magneto current and at the collapse of battery current (magneto ignition coil used prior to Spec C).

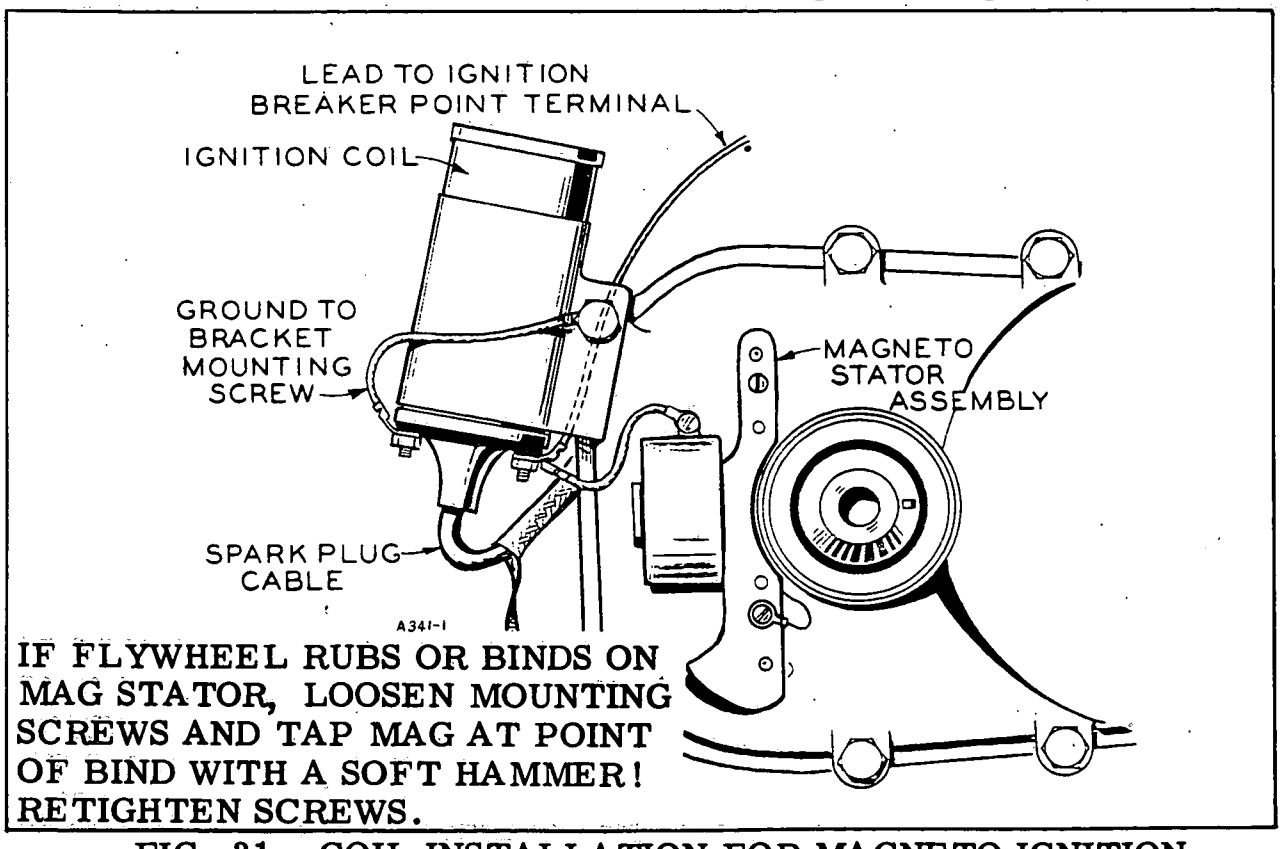


FIG. 31 - COIL INSTALLATION FOR MAGNETO IGNITION

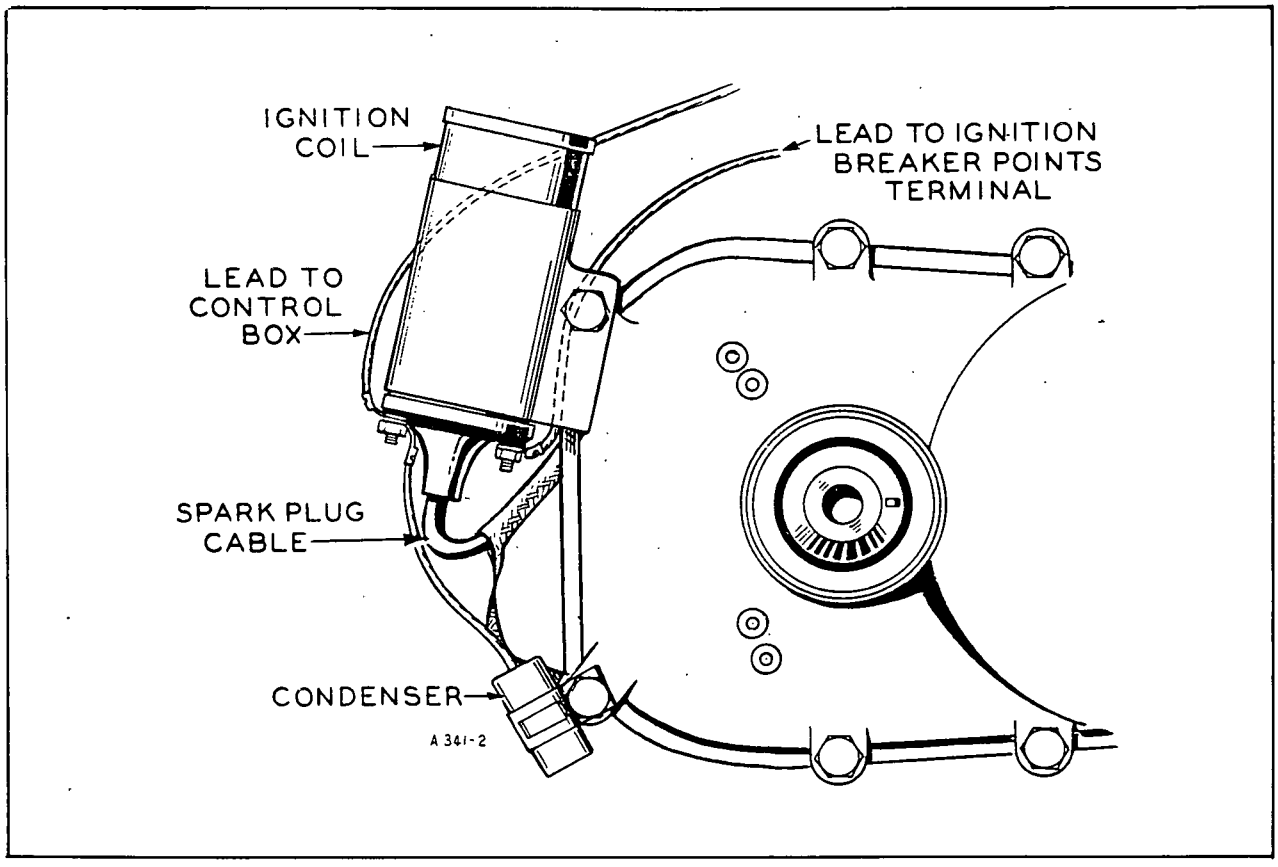


FIG. 32 - COIL INSTALLATION FOR BATTERY IGNITION

TIMING THE IGNITION. - Ignition timing procedure is the same for manual-start type plants with magneto ignition as for remote-start type plants with 12-volt battery ignition.

The spark advance is 19° before top center for all models with engine speeds ranging from 1500 to 2400 rpm. Models with engine speeds of 2500 rpm and up use the 25° spark advance.

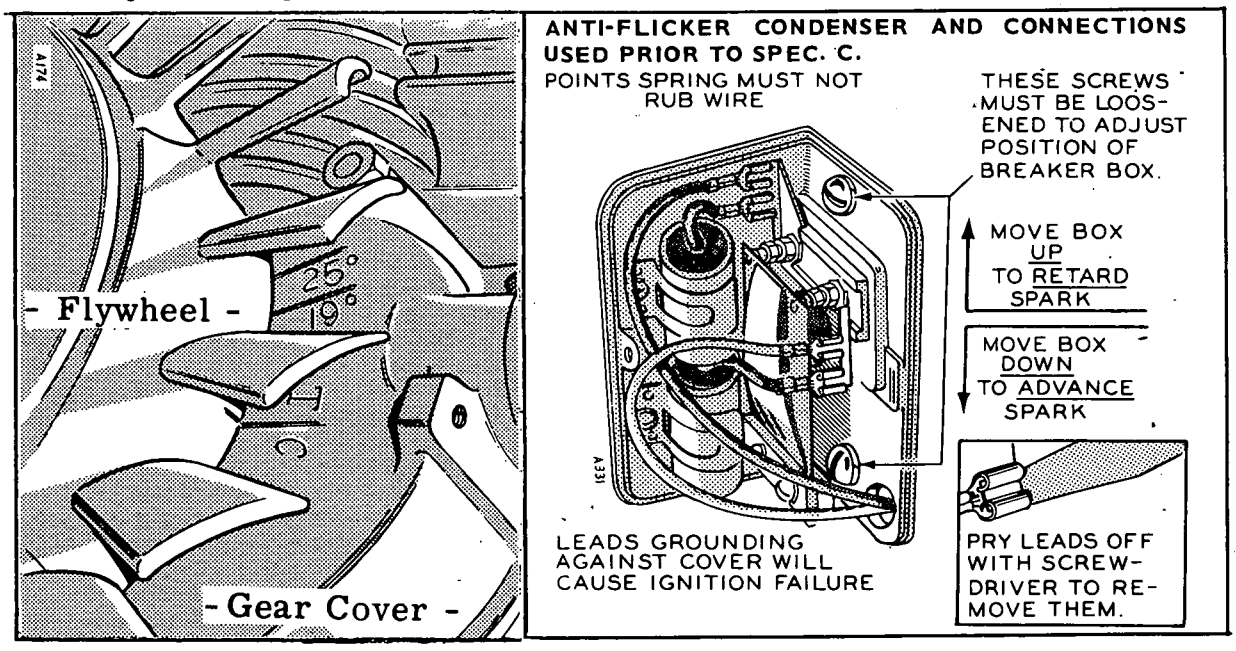


FIG. 33 - IGNITION TIMING

Timing procedure follows:

1. Remove the cover from the breaker box.

2. Crank the engine over slowly by hand in the direction of crankshaft rotation until the witness mark on the flywheel and the "TC" mark on the gear cover are exactly in line ON THE COMPRESSION STROKE. See the illustration Ignition Timing.

3. Adjust the ignition breaker point gap width to .020 inch at full separation.

4. Turn the flywheel to the left, against crankshaft rotation , until the mark is about two inches past the 25° mark on the gear cover.

5. Turn the flywheel slowly to the right and note whether the ignition points just separate when the mark on the flywheel aligns with the 19° mark on the gear cover. The engine must be on the compression stroke. If the marks align as the points break, timing is correct. If they do not, loosen the breaker box mounting screws and shift the whole breaker box assembly slightly upward to retard the timing (points breaking too soon), or shift it slightly downward to advance the timing (points not breaking soon enough). Tighten the breaker box mounting screws securely after making an adjustment.

To accurately check the time at which the spark occurs, an automotive type timing light may be used when the engine is running.

To accurately check the time at which the spark occurs, without running the engine, connect a continuity test lamp set across the ignition breaker points. Touch one test prod to the breaker box terminal (to which the lead to the coil is connected), and touch the other test prod to a good ground on the engine. Turn the crankshaft against rotation (backwards) until the points close. Then slowly turn the crankshaft with rotation. The lamp should go out just as the points break.

6. Install the breaker box cover.

FLYWHEEL. - To remove the flywheel turn the flywheel mounting screw outward about 2 turns. Use a screw driver behind the flywheel to take up the crankshaft end play. Then strike a sharp endwise blow on the head of the cap screw with a heavy soft faced hammer to loosen. A suitable puller can easily be fashioned from a piece of bar steel and the flywheel removed with the aid of the puller if so desired.

Do not drop the flywheel. A broken fin will destroy the balance. Use a steel key for mounting the flywheel.

A magneto flywheel which has lost its magnetism can be remagetized. The spark should jump a 3/16 inch gap with ease as tested by holding

the spark plug wire away from a clean metal part of the engine while cranking. Never remove magnets from wheel.

VALVE SERVICE. - Properly seated valves are essential to good engine performance. The aluminum cylinder head is removable for valve servicing. Do not use a pry to loosen the cylinder head, rap sharply on the edge with a soft faced hammer, taking care not to break any cooling fins. A conventional type valve spring lifter may be used when removing the valve spring locks, which are of the split type. Clean all carbon deposits from the cylinder head, piston top, valves, guides, etc. If a valve face is burned or warped, or the stem worn, install a new valve.

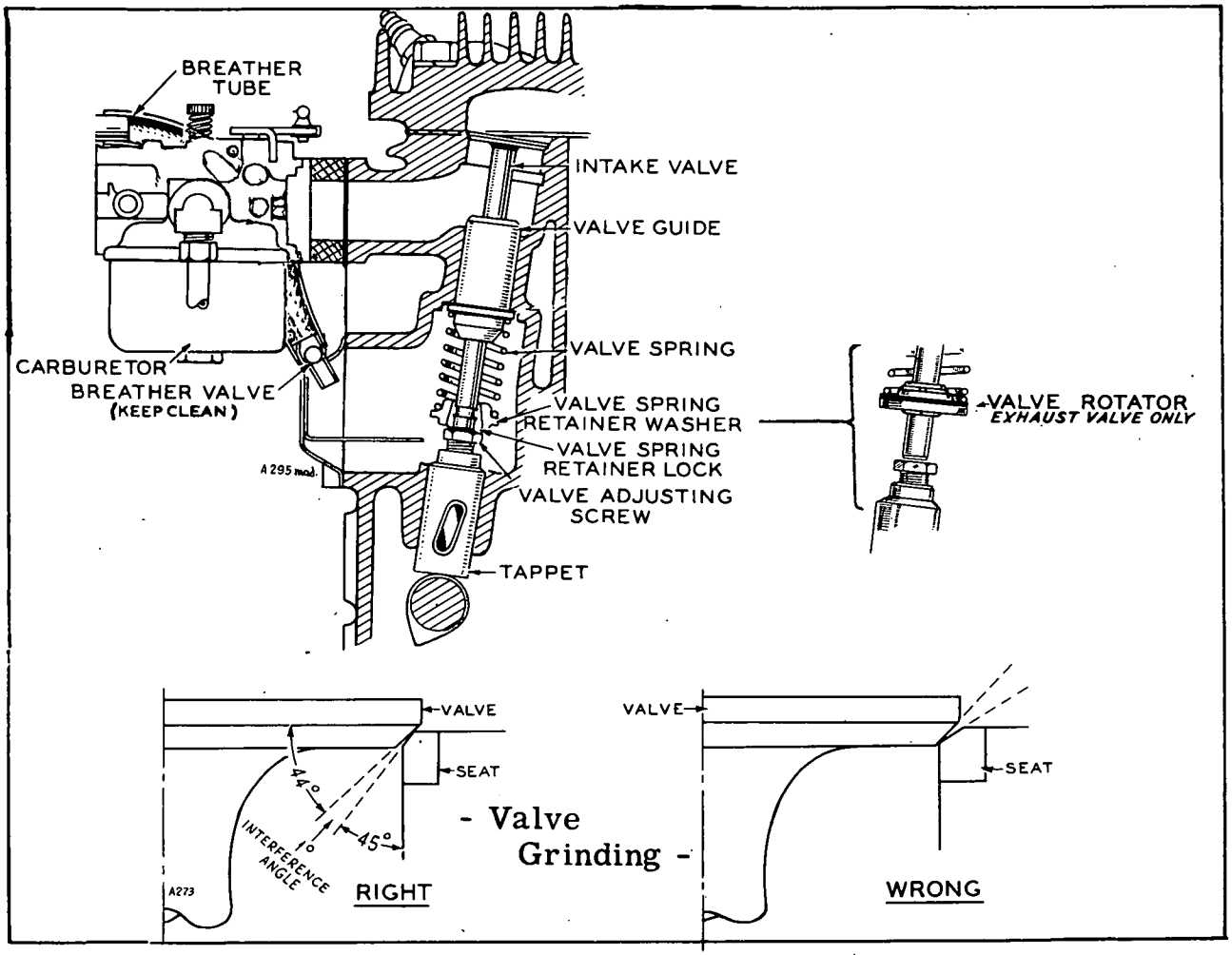


FIG. 34 - VALVE SERVICE

Worn valve stem guides may be replaced from inside the valve chamber. Valve locks are the split, tapered type, the smaller diameter of which must face toward the valve head. Tappets are also replaceable from the valve chamber, after first removing the valve assemblies.

The valve FACE angle is 44°. The valve SEAT angle is 45°. This 1°

interference angle results in a sharp seating surface between the valve and the top of the valve seat. The interference angle method of grinding valves minimizes face deposits and lengthens valve life.

The valves should not be hand lapped, if at all avoidable, since the sharp contact may be destroyed. This is especially important where stellite faced valves and seats are used. Valve faces should be finished in a machine to 44°. Valve seats should be ground with a 45° stone, and the width of the seat band should be 1/32 to 3/64 of an inch wide. Grind only enough to assure proper seating.

Remove all grinding compound from engine parts and place each valve in its proper location. Check each valve for a tight seat, using an air pressure type testing tool. If such a tool is not available, make pencil marks at intervals across the valve face and observe if the marks rub off uniformly when the valve is rotated part of a turn against the seat.

Lightly oil the valve stems and reassemble all parts removed. Adjust the valve clearance.

TAPPET ADJUSTMENT. - The tappet clearance may be easily checked after first removing the valve compartment cover and the blower housing. Crank the engine over by hand until the intake valve (the one nearest the carburetor) opens and closes. Continue turning the flywheel slowly until the mark on the flywheel is in alignment with the TC mark on the gear cover. The correct tappet clearance for both the intake and exhaust valves appear in the Table of Clearance. Tappets are fitted with self locking adjusting screws. Use a 7/16" wrench for the screw, and a 9/16" wrench for the tappet when making any adjustment.

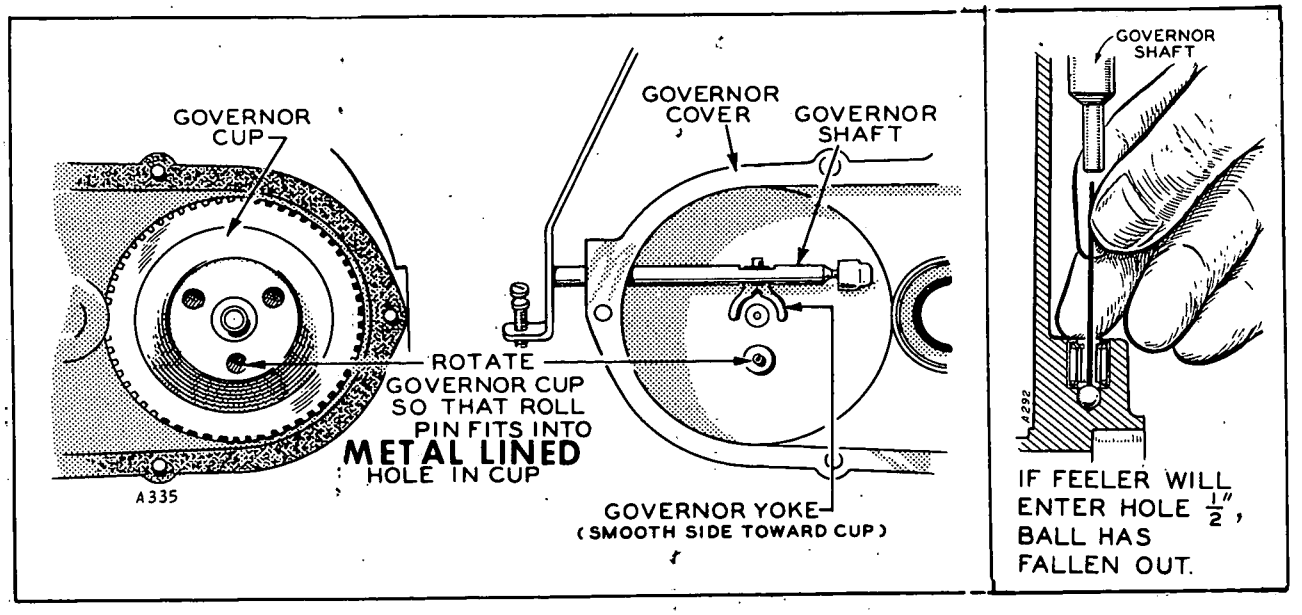


FIG. 35 - INSTALLING THE GEAR COVER

GEAR COVER. - After removing the mounting screws, tap the gear cover gently with a soft faced hammer to loosen it.

When installing the gear cover, make sure that the pin in the gear cover engages the metal lined (smoothest) hole in the governor cup. Turn the governor cup so that the metal lined hole is in downward position. Adjust the roll (stop) pin to protrude to a point 3/4 inch from the cover's mounting surface. Turn the governor arm and shaft clockwise as far as possible and hold in this position until the gear cover is installed flush against the crankcase. Have the yoke's smooth side toward the cup. Be careful not to damage the gear cover oil seal.

GOVERNOR CUP. - With the gear cover removed, the governor cup can be taken off after removing the snap ring from the camshaft center pin. Catch the flyballs while sliding the cup off.

Replace with a new part, any fly ball which is grooved or has a flat spot, the ball spacer if its arms are worn or otherwise damaged, and the governor cup if the race surface is grooved or rough. The governor cup must be a free spinning fit on the camshaft center pin, but without any looseness or wobble.

When installing the governor cup, tilt the engine so the gear is up, put the flyballs in place (equally spaced), and install the cup and snap ring on the camshaft center pin.

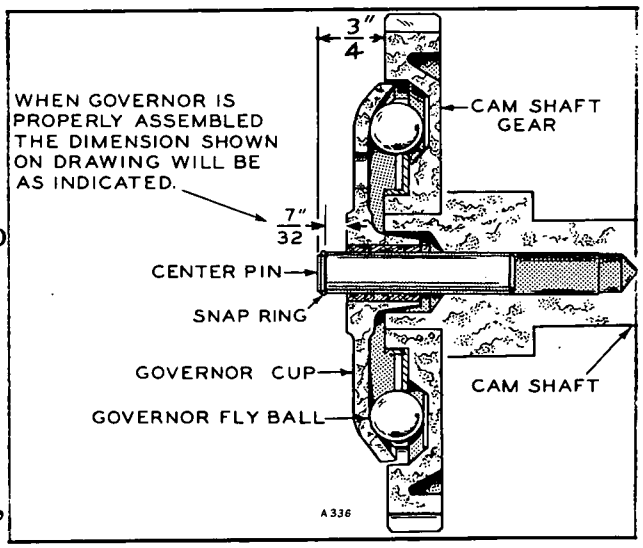


FIG. 36 - GOVERNOR CUP

The camshaft center pin extends out 3/4" from the end of the camshaft. This distance provides an in and out travel distance of 7/32" for the governor cup, as illustrated. Hold the cup against the flyballs when measuring. If the distance is less (the engine may race especially at no load), remove the center pin and press a new pin in only the required amount. Otherwise, grind off the hub of the cup as required. The camshaft center pin can not be pulled outward nor removed without damage. If the center pin extends out too far, the cup will not hole the fly balls properly.

TIMING GEARS. - If replacement of either the crankshaft gear or the camshaft gear becomes necessary, install both gears new, never one only. To remove the crankshaft gear, insert two long #10-32 steel screws into the tapped gear holes and tighten the screws alternately. As the screws are tightened, the screw ends will seat a-

gainst the crankshaft shoulder and force the gear off the end of the crankshaft.

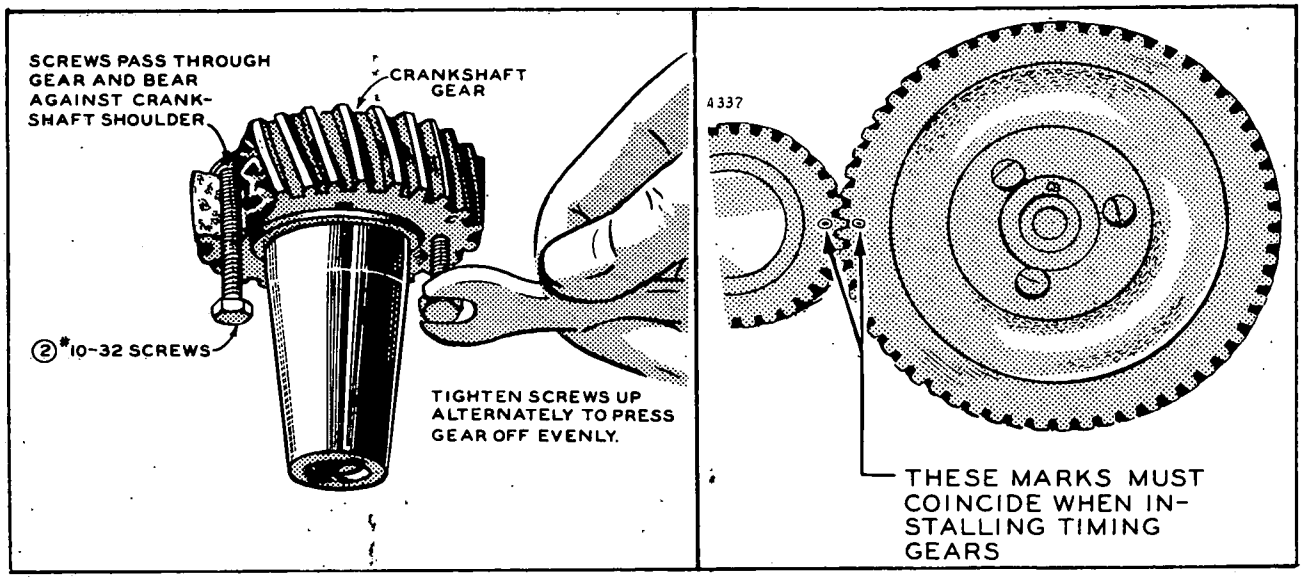


FIG. 37 - TIMING GEARS

The camshaft gear is pressed on and keyed to the camshaft. The camshaft and gear must be removed as an assembly, after first removing the crankshaft gear lock ring and washer. Before removing the camshaft and gear assembly, remove the cylinder head and valve assemblies. Remove the operating plunger for the breaker points. Remove the fuel pump (where used) and tappets. After removing the governor cup assembly from the gear, the camshaft may be pressed out of the gear by use of a hollow tool or pipe which will fit over the camshaft center pin. Do not press on the center pin or damage it in any way. The governor ball spacer is a press fit to the camshaft gear.

If either the crankshaft gear or camshaft gear becomes damaged or worn, replace both gears with new ones, never one only. When pressing a camshaft gear onto the camshaft, be sure the gear is started straight and that the key is properly in place. Install the governor cup assembly before installing the camshaft and gear in the engine.

Note that each timing gear is stamped with "O" mark near the edge. The gear teeth must mesh so that these marks exactly coincide when the gears are installed in the engine. Be sure, when installing the camshaft gear and shaft assembly, that the thrust washer is properly in place behind the camshaft gear. Replace the retaining washer and lock ring to the crankshaft.

CYLINDER HEAD. - Models using gaseous fuel have a high compression cylinder head. This head has a 3/32" radius boss visible on the thick edge near the spark plug to identify it from standard compression.

CYLINDER. - The cylinder wears very little in normal service. If through improper lubrication or accident, the cylinder wall should become scored or worn badly, the cylinder may be rebored and honed to accomodate a new piston and rings of one of the available oversizes. Pistons are obtainable in .010", .020", .030", and .040" oversizes. Piston rings are available in .010", .020", .030", and .040" oversizes. Use standard size rings on a .005" oversize piston. If the cylinder is not being reconditioned, but new piston rings are being installed, remove any ridge which may have become formed at the top of piston ring travel in the cylinder bore. Engines might be fitted at the factory with a .005" oversize piston and are so indicated by a letter "E" following the engine serial number stamped on the side of the crankcase near the oil fill, and on the plant nameplate.

PISTON AND RINGS. - The piston and connecting rod assembly are removed through the top of the cylinder. The piston is fitted with two compression rings and one oil control ring. The piston ring grooves should be cleaned of any carbon deposits, and the oil return holes in the lower groove must be open. Before installing new rings on the piston, check the ring gap by placing each ring squarely in the cylinder at a position corresponding to the bottom of its travel. The gap between the ends of the ring should be as given in the Table of Clearances. Rings which are slightly oversize may be filed as necessary to obtain the correct gap, but do not use rings which require too much filing. Standard size rings may be used on a .005" oversize piston. .010", .020" and .030" oversize rings are to be used on .010", .020", and .030" oversize pistons, respectively. Rings of the tapered type are usually marked "TOP" on one side, or identified in some other manner, and the ring must be installed with this mark toward the closed end of the piston. Space each ring gap one third of the way around the piston from the preceding one, with no gap directly in line with the piston pin. The bottom piston ring groove should be fitted with an oil control ring and the two upper grooves fitted with compression rings. If a chrome faced ring is used, it will be in the top groove.

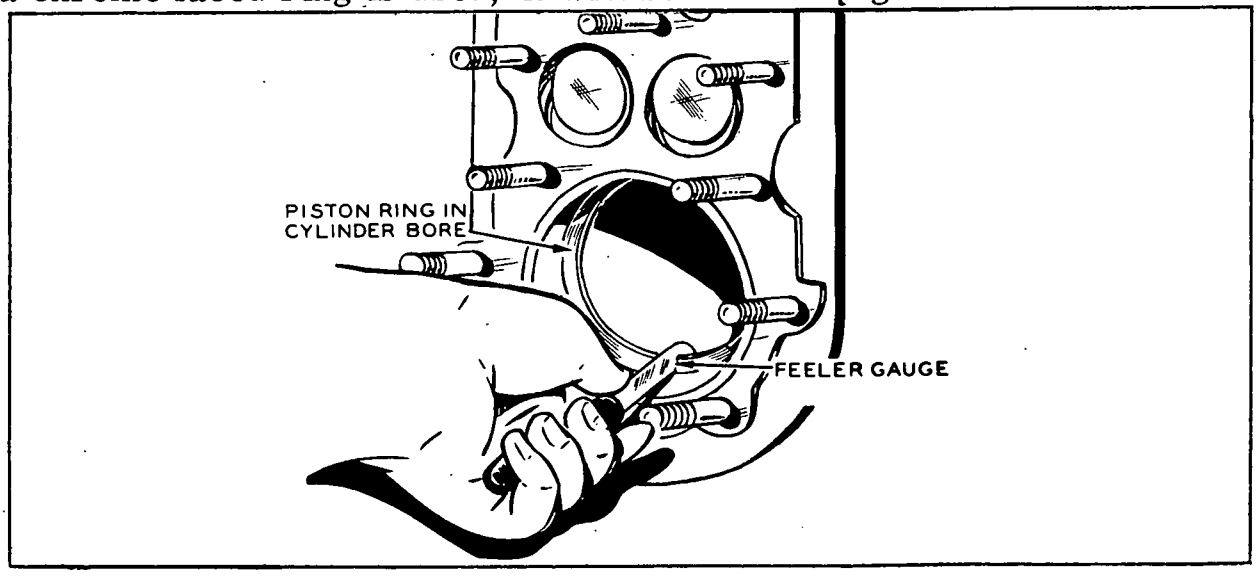


FIG. 38 - FITTING PISTON RINGS TO THE CYLINDER

The piston is fitted with a full floating type piston pin. The pin is kept in place by two lock rings in the piston, one at each side. Be sure these lock rings are properly in place before installing the piston and connecting rod in the engine. Correct piston to cylinder clearance appears in the Table of Clearance.

CONNECTING ROD. - Mark the connecting rod before removing it to assure reassembling with the same side facing the camshaft. Note that the oil dipper splashes oil away from the camshaft. The connecting rod cap is installed on the side away from the camshaft.

The connecting rod bearing clearance to the crankshaft journal may be reduced as necessary by carefully dressing the cap on a sheet of abrasive cloth (#320 grit or finer) placed flat on a surface plate or piece of plate glass.

The connecting rod and piston assembly must be properly aligned before reassembly to the engine. The aligning should be done on an accurate aligning gauge by a competent operator. Misalignment may cause rapid wear of piston, pin, cylinder and connecting rod.

Be sure the connecting rod oil dipper is properly installed, as it is vital to proper lubrication.

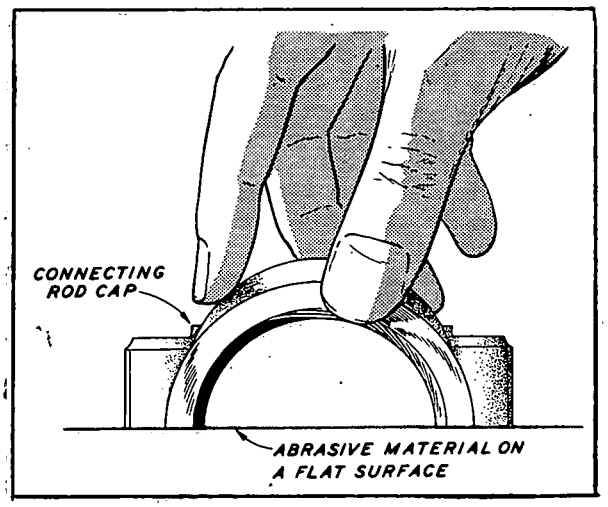


FIG. 39 - REDUCING CONNECTING ROD CLEARANCE

BEARINGS. - Removal of the camshaft or crankshaft bearings requires complete disassembly of the engine. Use a press or a suitable drive plug to remove the bearings. Drive or press the crankshaft bearings and the camshaft bearings from the outside toward the inside of the cylinder block. Avoid damaging the block during bearing removal.

The crankshaft main bearings must be installed from the inside of the cylinder block with the oil hole in each bearing aligned with the oil hole in the bearing boss and the notch in the bearing flange aligned with the stop pin. The oil passage must be at least 1/2 open and near the top on splash lubricated engines. New crankshaft main bearings are precision type which DO NOT require line reaming or line boring after installation. Crankshaft bearings are available in standard size or in 0.002 inch or 0.020 inch undersize. Using a press or drive plug to install the bearing in a cold cylinder block might result in damage to this type of bearing. Warm the bearing plate and cylinder block to expand the bearing bore size. Use hot water, a 200°F. oven, or in an emergency a low flame from a torch. Only a little heat is required. The cold precision

bearing should then require only light taps to position it. The flange of the bearing must be against the inner end of the bearing boss. Use oil on the outer surface of the bearing to reduce friction and coat the inner surface before installing the crankshaft.

New camshaft bearings are precision type which DO NOT require line reaming or line boring after installation. Coat the bearing with lubricating oil to reduce friction. Place the bearing on the crankcase over the bearing bore with the elongated hole in proper position and narrow section facing out (except bores without oil holes install with bearing groove at the top). Be sure to start the bearing straight. Press the front bearing in flush with the outside end of the bearing bore. Press the rear bearing in flush with the bottom of counterbore which receives the expansion plug.

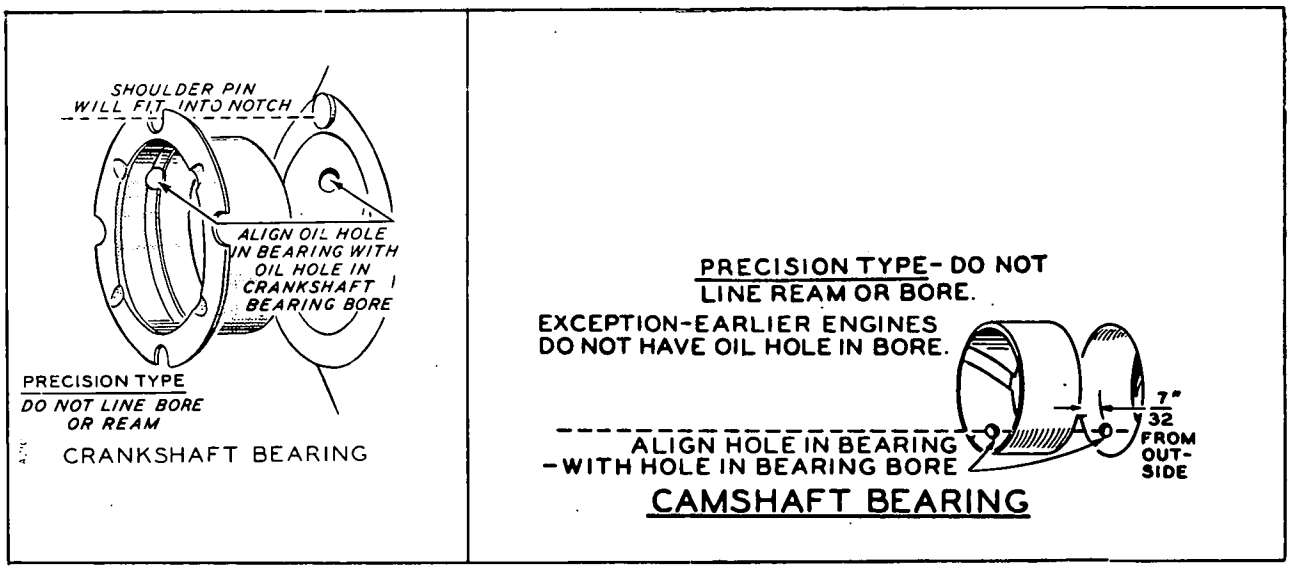


FIG. 40 - BEARING INSTALLATION

OIL SEALS. - The gear cover must be removed to replace its oil seal. Drive the old seal out from the inside of the gear cover.

The bearing plate must be removed to replace its oil seal. Drive the oil seal out from the inside.

When installing the gear cover oil seal, tap the seal inward until it is 31/32 of an inch from the mounting face of the cover. When installing the new style thin open-face seal, tap the seal inward until it is 1-7/64 of an inch from the mounting face of the cover.

When installing the bearing plate oil seal, tap the seal into the bearing plate bore to bottom against the shoulder in the plate bore. After the seal is in place, it is advisable to apply a thin coating of shellac or Permatex around the outer surface of the seal at the point where it

comes in contact with the bearing plate boss. Use a seal expander, or place a piece of shim stock around the end of the crankshaft, when replacing the bearing plate to avoid damaging the seal. Remove the shim stock as soon as the plate is in place.

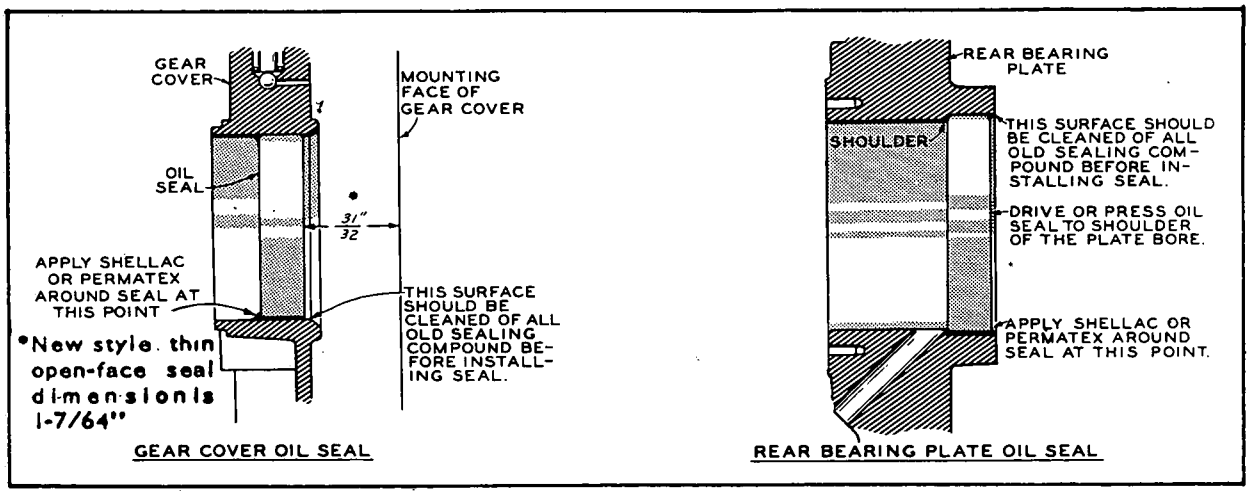


FIG. 41 - OIL SEAL INSTALLATION

VALVE COMPARTMENT OIL DRAIN. - A drain hole from the valve compartment enters the crankcase. This hole must be unobstructed to provide for proper drainage of oil from the valve compartment.

CRANKSHAFT. - Inspect the bearing journals. If they are scored and can not be smoothed out by dressing down, the bearing journals should be refinished to use 0.002", 0.010", 0.020", or 0.030" undersize bearings or a new crankshaft should be installed.

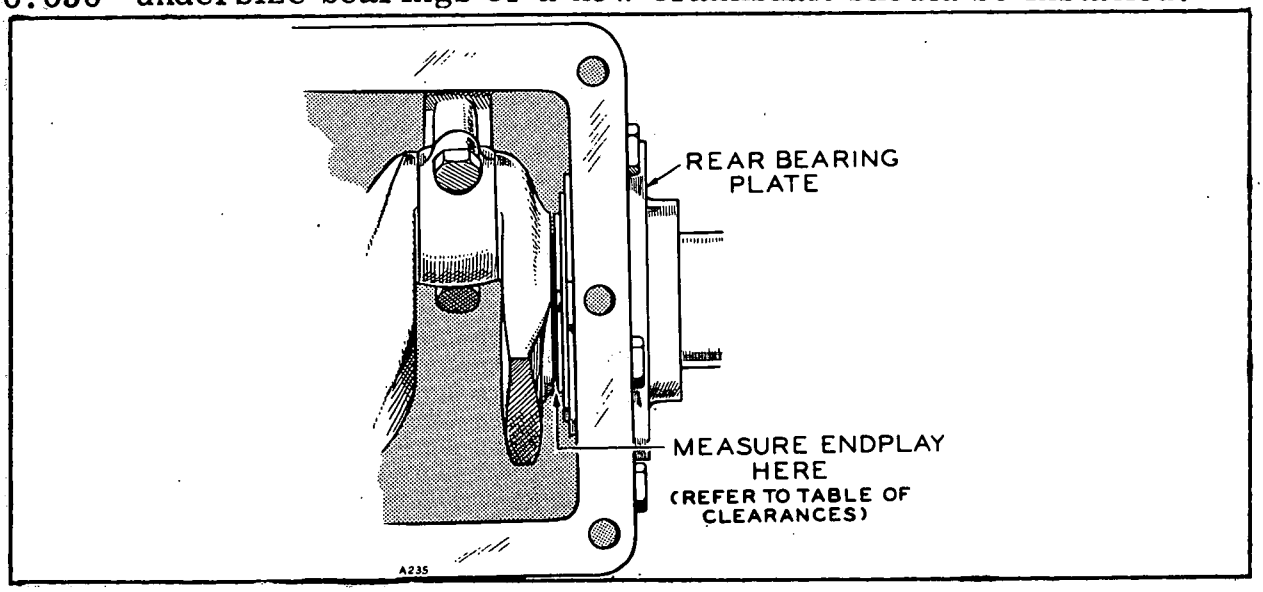


FIG. 42 - CRANKSHAFT END-PLAY

If a worn main bearing journal can not be fitted with an available precision type undersize bearing, then refinish it to the next undersize. If a worn connecting rod bearing journal can not be fitted by dressing down the rod cap, then refinish it to take the undersize rod available.

When installing the crankshaft, use gaskets as needed behind the bearing plate to assure end play of 0.006 to 0.012 inch.

RUNNING TIME METER

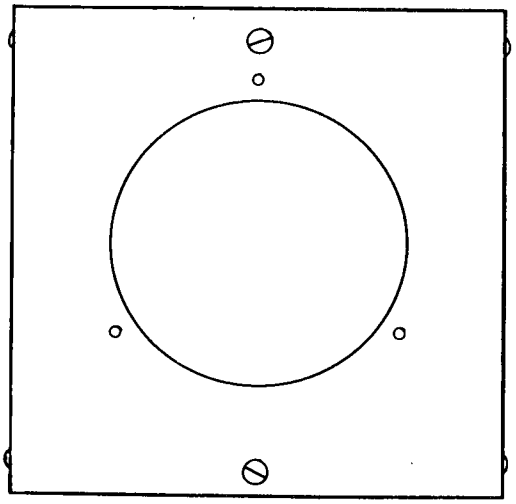
Do not Guess- Know how many hours your plant runs, so that you can change oil and service the plant at proper intervals.

This meter will be an investment rather than an expense. Simple to connect. This meter runs only when the plant is operating.

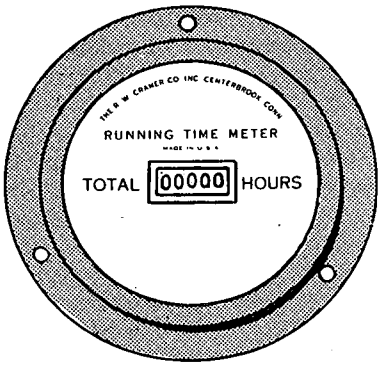
PART NO.	USED WITH PLANT
302B212	60 Cycle, 120-Volt, AC
302-102	50 Cycle, 120-Volt, AC
304-99	Resistor - adding to either meter above makes it suitable for 240-volt use.

Meters listed above are 3-1/2 inch diameter, and are for flush mounting on panel; fit into 2-29/32 inch hole. For wall mounting, order separately.

301-500 Instrument Box



INSTRUMENT BOX



RUNNING TIME METER

GENERATOR

The generator normally needs little care other than a periodic check of the brushes, commutator and collector rings. If a major repair job on the generator should become necessary, have the equipment checked by a competent electrician who is thoroughly familiar with the operation of electric generating equipment. Continuity tests may be performed without disassembly of the generator.

GENERATOR DISASSEMBLY. - The procedure is mostly self-evident. Remove the band and endcover. Remove constant-pressure-type springs and lift all brushes.

Remove generator through stud nuts. Hold both the end bell with its brush rig and the frame assembly, since they are separate parts, and remove them as one assembly from the adapter. Screw driver slots in the adapter provide for prying the frame loose. Be careful not to let the frame assembly rest or drag on the armature.

Turn the armature nut out to the end of the armature through stud. While pulling outward with one hand under the armature, strike a sharp endwise blow on the nut to loosen the armature. Remove the armature and blower as an assembly. The blower is a keyed and pressed fit on the armature shaft, and is a keyed and tapered fit to the engine crankshaft.

If the armature does not come loose, place a heavy brass rod on the armature shaft near the ball bearing and strike a sharp downward blow on the rod with a hammer. Rotate the armature 1/2 turn before repeating. Do not strike the commutator, collector rings, or bearing.

BRUSHES AND SPRINGS. - Inspect brushes periodically. Brushes worn to 5/8 inch should be replaced. Replace springs if damaged or if proper tension is questionable. Rapid brush wear may be caused from high mica between commutator bars, rough commutator or collector rings, or from a deviation from "neutral" position in the adjustment of the brush rig. NEVER bend the constant-pressure-type spring over the edge of its support.

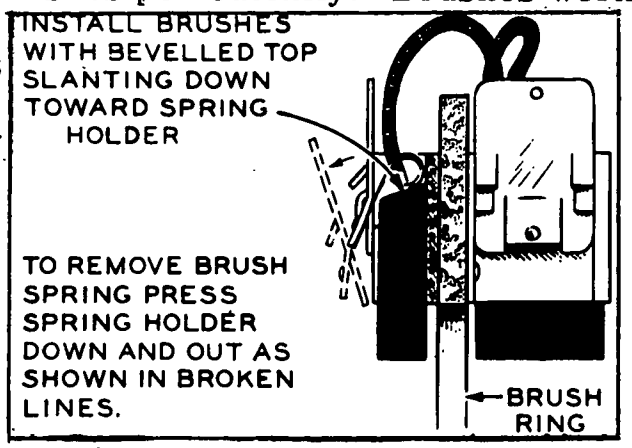


FIG. 43 - BRUSHES AND SPRINGS

BRUSH RIG POSITION. - Check the witness mark on the brush rig and if necessary align it with the boss in the end bell. If the brush rig is adjusted so that there is arcing of the brushes, brush wear will be rapid, voltage and current will not hold steady, and

the generator may overheat.

Whenever a new brush rig or armature is installed, the brush rig must be adjusted to the point where the brushes do not arc regardless of where the witness mark falls. This is commonly known as the "neutral" brush position.

COLLECTOR RINGS (AC Units). - If the collector rings become grooved or out of round, or the brush surface becomes pitted or rough so that good brush seating cannot be maintained, remove the armature and refinish the collector rings in a lathe. If the commutator appears to be rough or scored refinish it at the same time. Remove or adequately shield the ball bearing during refinishing.

COMMUTATOR. - The commutator bars wear down with usage so that the mica between them must be undercut. This should be done as soon as the mica on any part of the commutator touches the brushes. A suitable undercutting tool can be made from a hack saw blade. Avoid injury to the surface of the copper bars. Leave no burrs along the edges of the bars. The mica must also be undercut whenever the commutator is refinished.

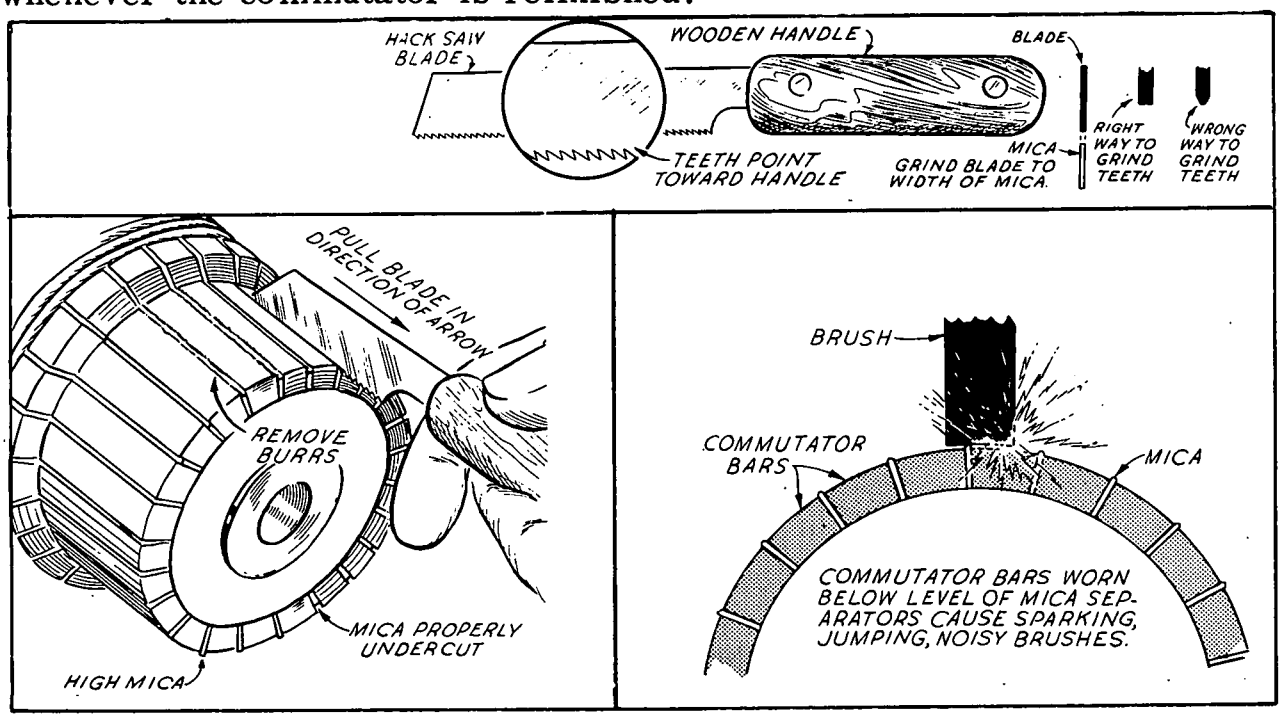


FIG. 44 - COMMUTATOR REPAIR

TESTING WINDINGS. - A test lamp set and an armature growler are required for the various tests. Before making any tests, lift all brushes into their holders and disconnect the load circuit wires from the plant. If the armature tests defective, the practical repair is to replace it. If a field coil tests defective, replace the entire coil assembly unless the trouble is in one of the external leads. Then it can be repaired as the nature of the trouble requires.

ARMATURE GROUND TEST. - To test the armature for a grounded condition, lift or remove the brushes so that none contact the commutator or collector rings. Use a continuity type test lamp set. Place one test prod on the commutator, and the other test prod on a bare, clean part of the armature shaft. The test prods must make good electrical contact. The test lamp should not glow. If the test lamp does glow, the dc winding or the commutator is grounded. To test the ac winding, place one test prod on one of the collector rings and the other test prod on the armature shaft. If the test lamp glows, the ac winding or a collector ring is grounded. Replace a grounded armature with a new one.

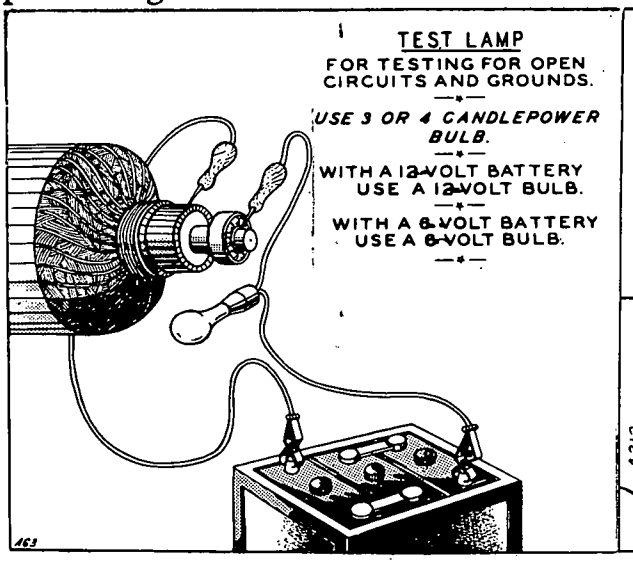


FIG. 45 - CONTINUITY TEST LAMP

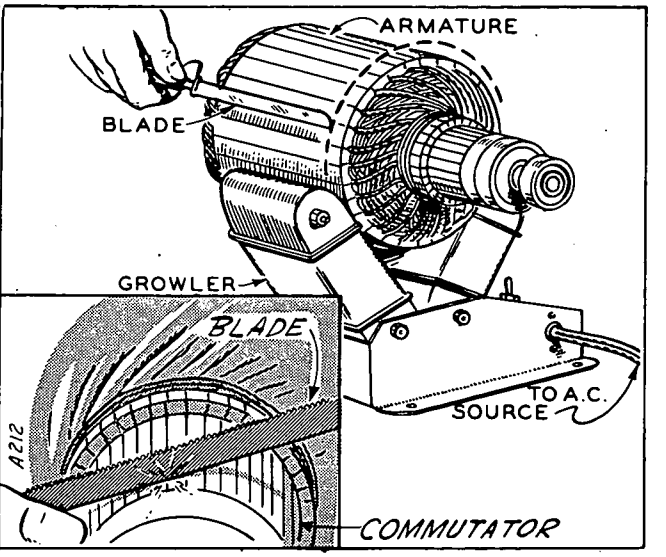


FIG. 46 - ARMATURE GROWLER

ARMATURE OPEN CIRCUIT TEST. - The armature ac winding may be tested for an open circuit without removal of the armature. Testing the dc winding requires removal and the use of an armature growler.

To test the ac winding, be sure all brushes are lifted or removed. Use a test lamp set. Place one test prod on each of the collector rings. If the test lamp does not glow, the ac winding is open circuited.

To test the dc winding, place the armature in a growler. With the growler current on, pass a smooth steel strip across the commutator segments. Repeat all around the commutator. At some point around the commutator, a spark should occur as the strip contacts two adjacent segments. Rotate the armature slightly and repeat the test. Continue until a spark is obtained between all adjacent segments. If no spark is obtained at some point, an open circuit is indicated. NOTE - A short circuit in the winding might prevent sparking. This condition may be indicated by the short circuit test described in the next paragraph. Replace an open circuited armature with a new one.

ARMATURE SHORT CIRCUIT TEST. - To test for a short circuit, place the armature in a growler. With the growler current on, hold a steel strip about 1/2 inch above the armature laminations. Pass the strip back and forth over the laminations. Cover as much of the lamination area as possible. If the strip is magnetically attracted to the armature at any point, a short circuit is indicated. After testing in one position, rotate the armature slightly in the growler and repeat the test. Continue until a complete revolution of the armature in the growler has been made. Replace a short circuited armature with a new one.

TESTING FIELD WINDINGS. - Use a test lamp set for all tests except a short circuit. The field coils of all ac plants are saturated shunt wound, the Remote Start plants having a series field winding in addition for cranking and battery charging purposes. When testing a field coil assembly, disconnect all of its external leads from their terminals. Tag and mark each lead to assure proper connections when reassembling.

TESTING FIELD WINDINGS FOR GROUNDS. - To test a coil assembly for a ground, disconnect its external leads and touch one test prod to the terminal of one of its leads and the other test prod to the generator frame. If the lamp lights, the coil assembly being tested is grounded. The ground may be in a coil, coil connection, or coil lead. Repair or replace as needed.

TESTING FIELD WINDINGS FOR OPEN CIRCUIT. - To test a coil assembly for an open circuit, disconnect its external leads and touch one test prod to the terminal of one coil lead windings and the other test prod to each of the other leads of that coil winding in turn. If the lamp does not light, the circuit being tested is open. If the fault lies in connection between coils or in a coil lead, the trouble can be repaired. If it is inside the coil proper, replace the entire coil assembly.

GENERATOR ASSEMBLY. - When assembling the generator, see that there are not any nicks or dirt on the armature tapered surface. These conditions may lead to an armature that is not properly aligned. Tighten the armature stud nut securely.

BALL BEARING. - If replacement of the armature ball bearing becomes necessary, pull the bearing from the shaft with a suitable bearing puller. Be careful not to damage the armature shaft because it must remain true to serve as a turning center when refinishing the commutator or collector rings. Drive the bearing up to the shoulder on the shaft. Use a double-sealed pre-lubricated ball bearing.

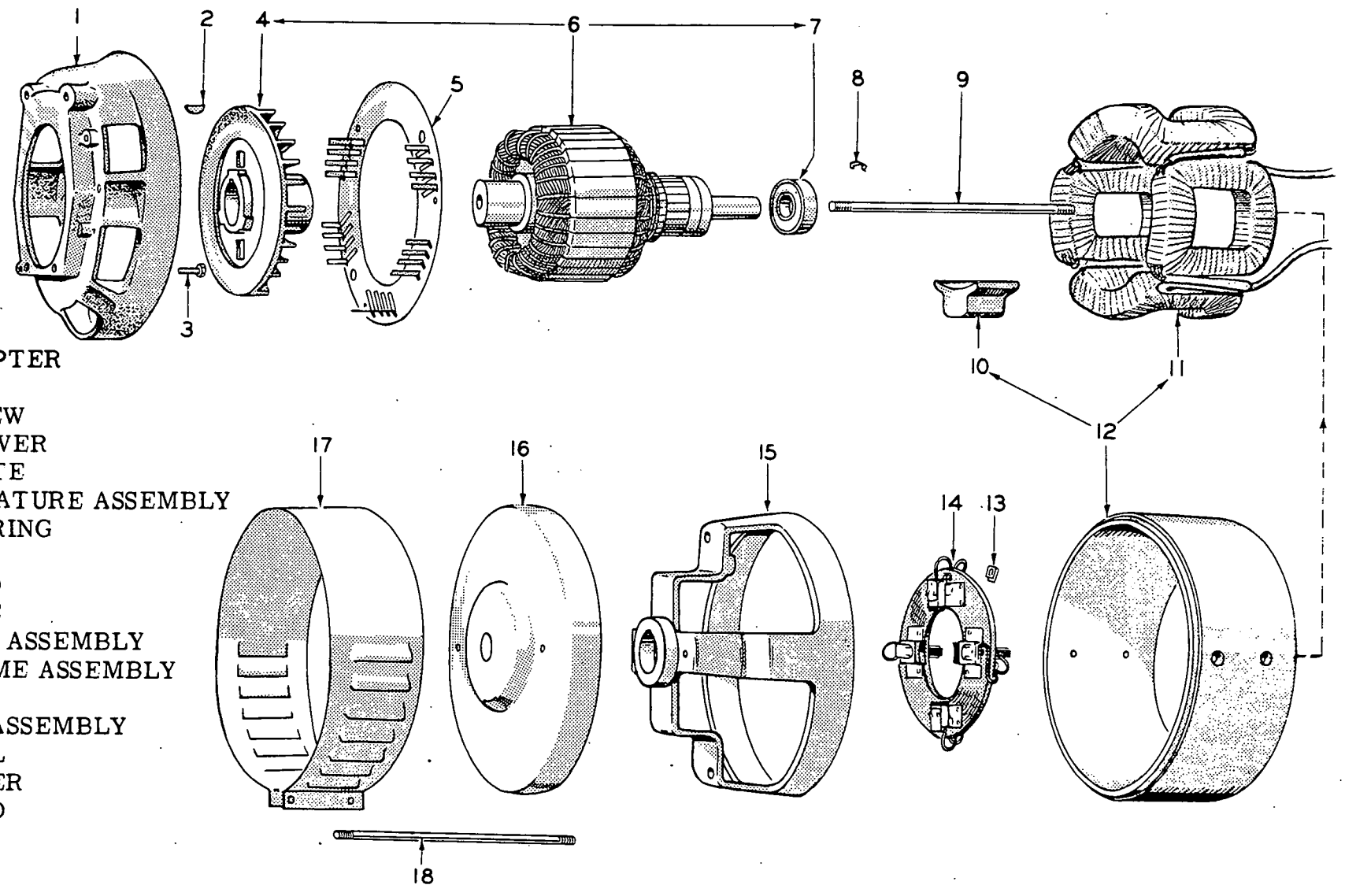
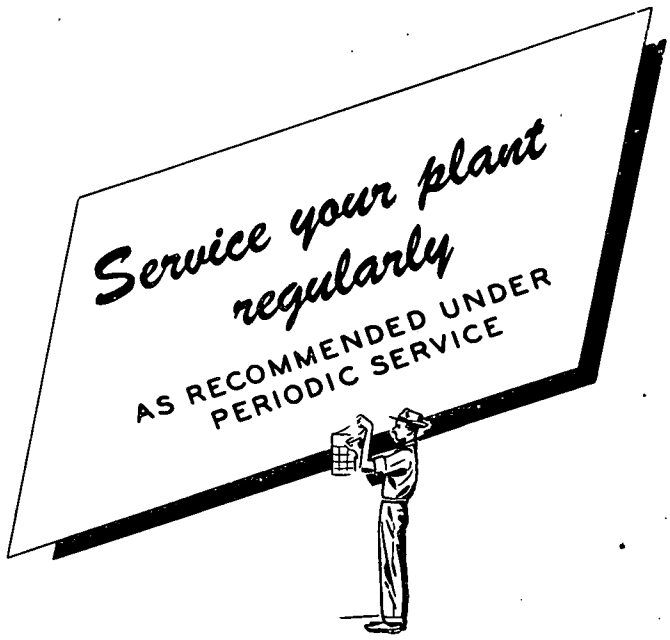


FIG. 47 - GENERATOR ASSEMBLY

CONTROLS

If any of the control equipment fails to function properly, replace the defective part with a new part of the same kind rather than try to repair the old part. No attempt should be made to repair such parts as meters, fuses, switches, relays, or receptacles. Check all electrical connections and contacts whenever servicing control equipment.

Always disconnect the battery whenever servicing controls to avoid accidentally starting the plant. When disassembling controls, tag each lead that has to be removed and mark the connection point of the lead on the tag to assure correct connections when reassembling.



READI-PULL STARTER

SERVICING THE READI-PULL STARTER. - Refer to the illustration showing the Readi-Pull manual starter disassembled.

CAUTION: The recoil spring may unwind and cause injury if let fly wildly when starter is disassembled or reassembled.

The sheave hub bearing (16) has a recess which was packed full of grease at the factory. Normally no additional lubrication is required. However, if the starter is disassembled for some other reason, add grease to the bearing and to the spring pawls (11) where they contact the ratchet arm (13).

To install a new rope or internal parts remove the starter from its mounting ring by removing the 4 clamping screws (19).

To install a new rope, rotate the sheave (10) with crankshaft rotation direction to fully tighten the spring (8), back up only as necessary to align the hole in the sheave with the slot in the cover (5), clamp the rope to the sheave, then when released the rope will wind on the sheave.

To install a new recoil spring remove the sheave from the cover. Wind the spring, with its rivet heads outward, forming a coil small enough to be inserted in the recess of the starter cover. It may be necessary to tie the spring with a piece of wire to prevent its unwinding during installation unless other help is available. Place the spring in the cover recess in crankshaft rotation direction. Remove the tying wire if used. While holding the spring to prevent its unwinding install the inside end of the spring on the roll pin (7) in the cover. With the pull rope removed, install the sheave assembly in the cover so that the tab on the sheave enters the outside end loop of the recoil spring. Be sure the thrust washer (9) is in place. Then install the pull rope.

Spring breakage is much less common than spring fatigue due to long usage. In either case the spring should be replaced. Cleaning and lubricating the pawls, and ratchet arms in the rope sheave will improve a sluggish acting recoil. To temporarily extend the life of a fatigued spring, try rewinding it "inside out" (rivets heads inward).

To install a ratchet arm (13) in the sheave, the pawl (11) must first be removed. The ratchet arm will fit in only the correct position. The spring pawl must be installed with its flat edge against the ratchet arm.

The anti-back lash cogwheel (6) is an easy press fit on the starter cover.

1-ROPE AND GRIP
2-ROPE ONLY
3-GRIP ONLY
4-PLUG
5-STARTER COVER
6-COG WHEEL
6A-SPRING WASHER
7-ROLL PIN
8-RECOIL SPRING
9-THRUST WASHER
10-ROPE SHEAVE
11-PAWL
12-PAWL SPRING
12A-SPIROL PIN
13-RATCHET ARM
14-PIVOT ROLL PIN
15-ROPE CLAMP
16-BEARING
17-SCREW
18-FLEXLOCK NUT
19-WASHER
20-MOUNTING RING
21-SPEED GRIP NUT

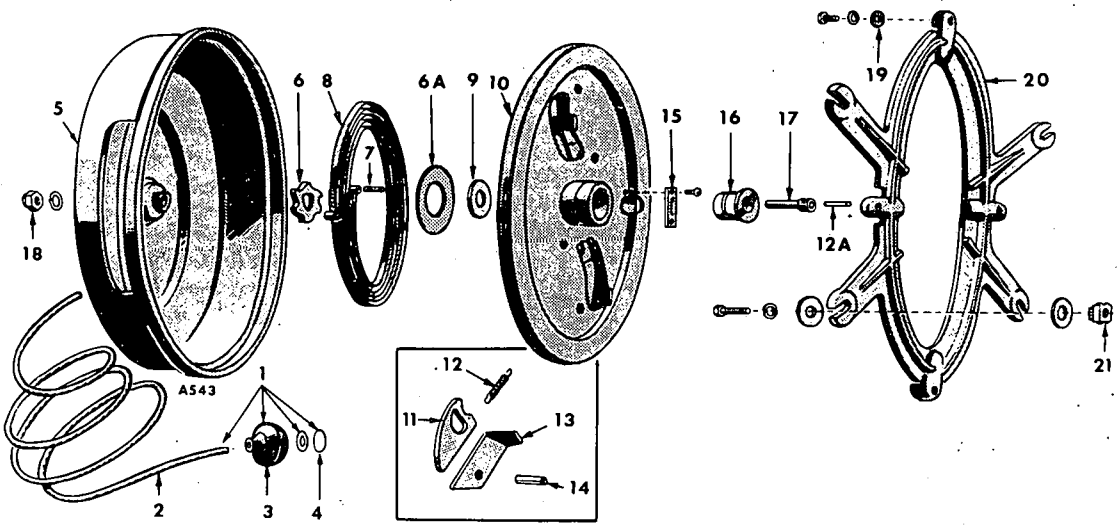


FIG. 48 - READI-PULL STARTER

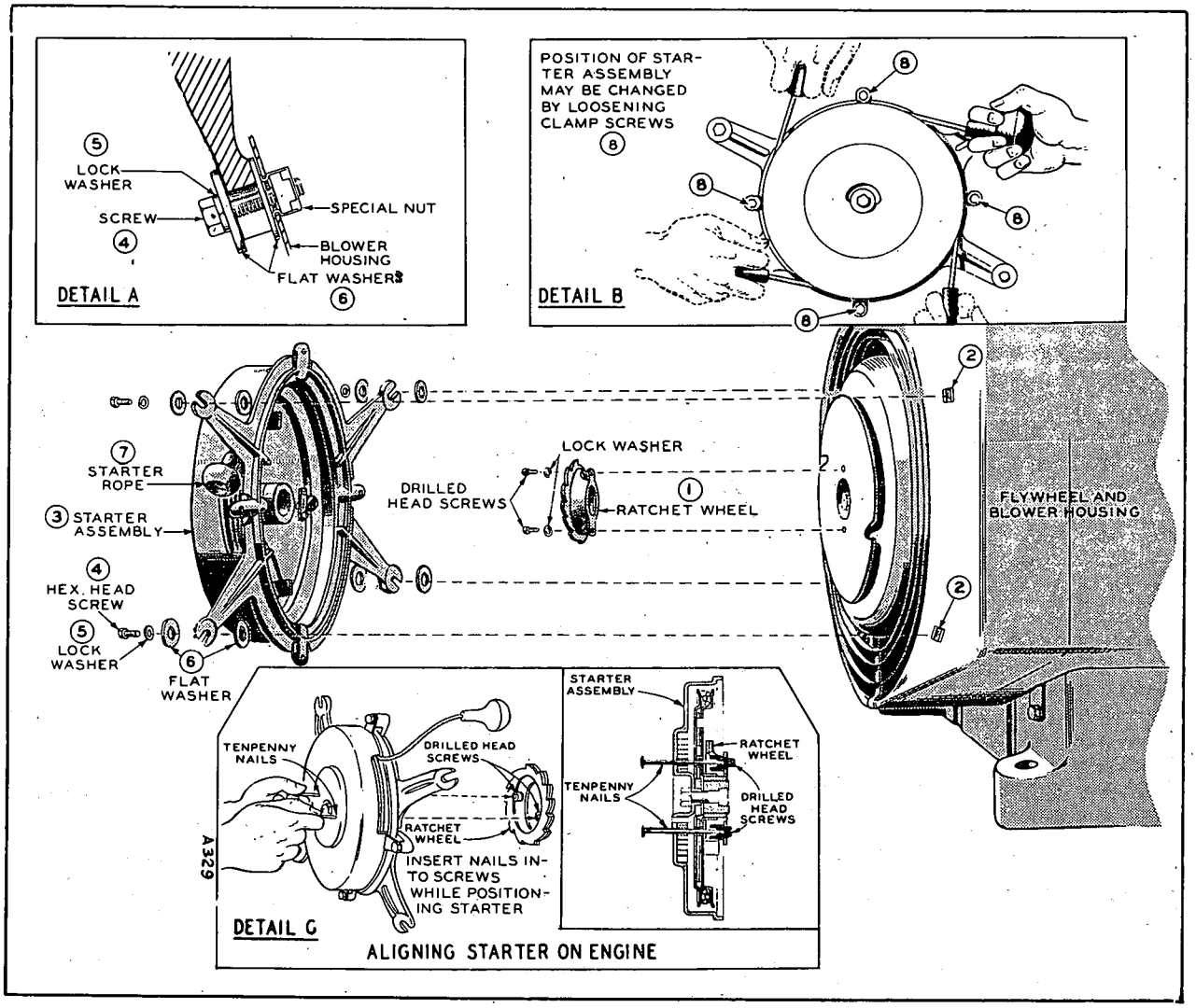


FIG. 49 - INSTALLING STARTER, SPEC "A" UNITS ONLY

INSTALLING THE STARTER, SPEC "A" UNITS ONLY. - Refer to figure 49.

The blower housing on the engine must be as rigid as possible. Examine the blower housing carefully. If the mounting holes are worn or if the blower housing is otherwise damaged, replace it with a new one. Proceed as follows to install the complete starter kit.

1. Refer to the installation drawing. Do not change the flywheel mounting screw. New screws (if furnished) are needed on other model engines only.

2. Install the new ratchet-wheel (1) to the blower wheel, using the two special head screws and lock washers provided. A 3/8 inch 12 point socket or closed end wrench fits these screws. Tighten securely.

3. Four special nuts are supplied for mounting the starter to the blower housing. If the blower housing is not already fitted with similar mounting nuts, remove the blower housing and install the nuts in the square holes (2) in the blower housing. See detail A. Reinstall the blower housing, tightening securely in place.

4. Note that there are two small holes drilled through the starter cover. See detail C. Pull slowly out on the starter rope while sighting through one of these holes. When the starter is turned a partial turn, the open-center roll pins in the starter rope sheave will align with these two holes. While holding in the aligned position, insert a ten penny common nail through each of the holes. Push the nails in up to their heads.

5. Install the starter assembly (3) to the blower housing, making sure that the nail ends enter the pilot holes in the ratchet wheel mounting screws. It will probably be necessary to turn the flywheel a partial revolution to allow proper alignment. While holding in position, mount the starter, using a hex head screw (4), lockwasher (5), and two flat washers (6) at each mounting arm as shown in the detail drawing A. Tighten the mounting screws securely. Remove the nails.

6. The direction of pull on the starter rope is adjustable to fit the requirements of the individual installation. See detail B. To change the direction of pull, loosen the four clamp screws (8) and turn the starter in its mounting ring to the desired position. Tighten the four clamp screws securely. Try the starter several times, making sure that the pull rope will not rub against one of the clamp screws.

7. Ocassionally check the operation of the starter, making sure the starter is properly centered (step 5 above). See that the blower housing mounting screws are tight. If the blower housing tends to shift, its mounting holes may have become worn oversize. If the blower housing tends to weave or distort during starter operation, installation of a new housing is recommended.

INSTALLING STARTER, UNITS BEGINNING SPEC "B". - See that the engine blower housing is in good condition. If the mounting holes are worn or if the blower housing is otherwise damaged, replace it with a new one. See Fig. 50.

1. Engage drive hole of rope sheave (11) with flywheel boss. Install flat-washer (15) between rachet wheel (1) and rope sheave (11). Secure with flywheel mounting screw (9) and lockwasher (10).

2. Four special nuts are supplied for mounting the starter to the blower housing. If the blower housing is not already fitted with similar nuts, remove the blower housing and install the nuts as shown in detail A. Reinstall the blower housing, tightening securely in place.

3. Install centering pin (12) in starter center screw (14) allowing 3/8" to protrude. For reinstallations readjust pin depth.

4. Center the starter assembly over the ratchet wheel with the centering pin engaging the center hole of the flywheel mounting screw. While holding in position, mount the starter, using a hex head screw, lock washer, and two flat washers at each mounting arm as shown in detail A. Tighten the mounting screws securely.

5. The direction of pull on the starter rope is adjustable to fit the requirements of the individual installation. See detail B. To change the direction of pull, loosen the four clamp screws (8) and turn the starter in its mounting ring to the desired position. Tighten the four clamp screws securely. Try the starter several times, making sure that the pull rope will not rub against one of the clamping screws.

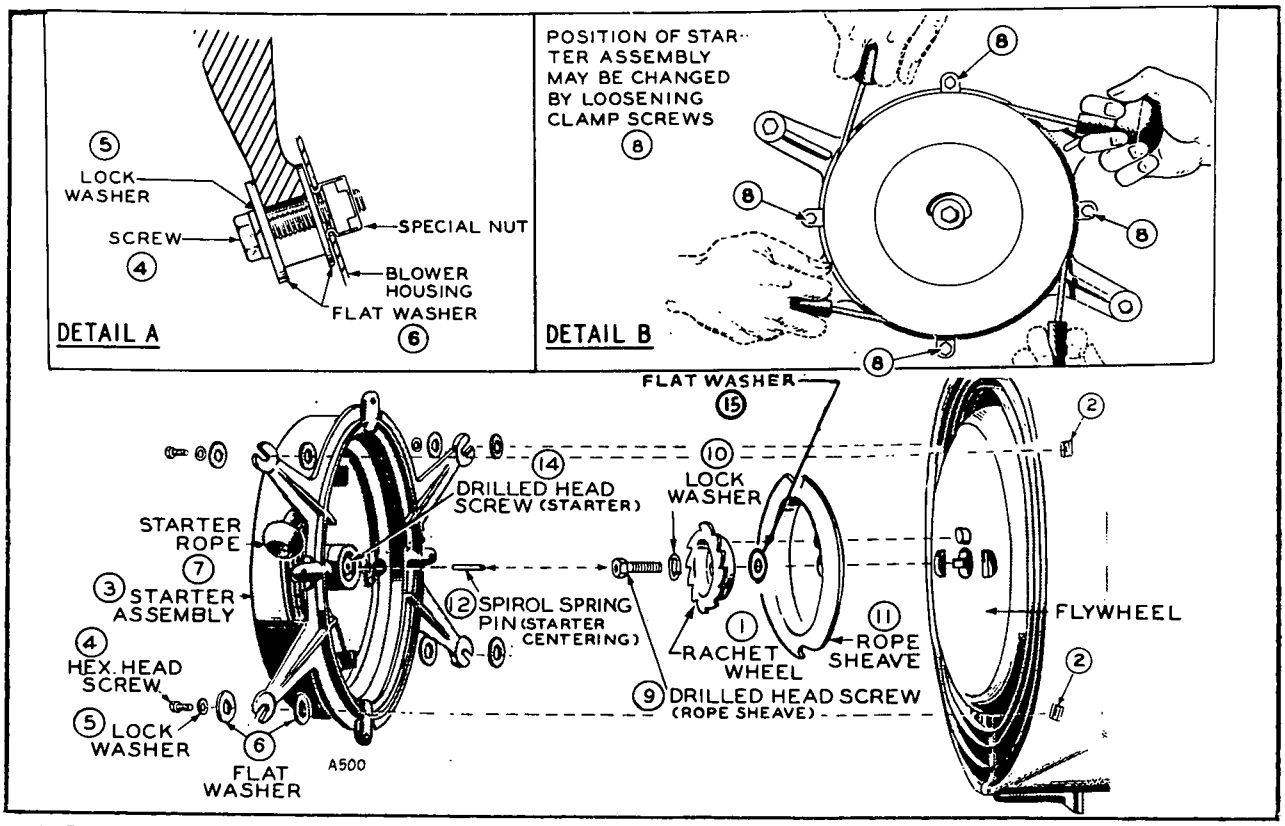


FIG. 50 - INSTALLING STARTER, UNITS BEGINNING WITH SPEC "B"

This section applies specifically to the "Mobile Communications" or "Utility Type" models of the LK series generating plants. These supplementary instructions are to be used, where they apply, instead of the instructions for the standard generating plants.

The utility type of plant is designed to supply 12-volt dc output for radio, etc., while the truck is stopped at a service job. At the same time, ac power is available for flood lights, power tools, etc. Thus the generating plant eliminates the necessity of running the truck engine to prevent battery run down at a service job.

When the plant is used to recharge a battery that is low (no load on the battery) it will start charging at 30-amps or thereabouts, but very quickly drop to a very low rate, so that it will take a very long time to charge the battery. If the governor is adjusted to boost the speed, to increase this low rate, the plant will no longer perform properly for it original purpose. (Bear in mind that while an ordinary plant is adjusted in our test room to provide best ac voltage regulation, the Spec 1330 is adjusted for proper dc voltage for its purpose). A conventional battery charging generator will taper off slowly, and charge the battery---much faster.

The utility type plant has a relay, which opens the charging circuit in the generator set when the truck engine is running, to prevent the battery from being charged from both sources at the same time. This is necessary to prevent damage to the reverse current relays in both the truck and generator set charging systems as a result of interaction between them.

Vacu-Flo cooling and remote control of starting and stopping make the plant suitable for installation in a small compartment.

- RATED OUTPUT -

(Alternating current and direct current are produced at the same time.)

Combined ac and dc rated output (Spec. C)	2500-Watts
(Prior to Spec. C)	2000-Watts
Maximum dc amperes (automatically limited)	30-Amps
Available ac output	
Spec. C (2500-Watts less watts of dc charging current)	
Minimum (while full load dc connected-truck stopped)	2110-Watts
Maximum (while truck running or battery charged and no dc load connected)	2500-Watts
Prior to Spec. C (2000-Watts less watts of dc charging current)	
Minimum (while full load dc connected-truck stopped	1610-Watts
Maximum (while truck running or battery charged and no dc load connected)	2000-Watts
Open circuit dc voltage (12-Volt battery charging)	15-Volts
Nominal ac voltage (power for tools, etc.)	120-Volts

Requirements will differ between installations. Except for wiring, most of the installation instructions are standard.

Consider the following factors when selecting the location for the plant: (1) Near enough to truck's batteries or large enough cable to limit the loss in cranking voltage. (2) Accessible for periodic servicing of fuel, lubricating oil, air cleaner, etc. (3) Adequate air inlet and outlet for combustion and cooling. (4) Protected from road splash, etc. (5) Shock mounting.

FUEL. - The separate fuel tank must be securely mounted in an accessible location. If the tank is to be carried for refilling, a quick release clamp should be provided. Locate the tank so that the fuel lift is not more than 4 feet. To prevent flooding, especially during transit, the bottom of the tank should never be more than 1 inch above the carburetor.

If the truck's fuel supply is used for the plant, provide an independent supply line rather than connecting to the truck's supply line.

WIRING. - The installation involves wiring for cranking, charge-disconnect, ac output, and remote control of starting and stopping. Refer to the Wiring Diagram for this model.

Install two sufficiently large battery cables between the truck's battery and the battery terminals on the generator plant control. These cables serve for cranking the plant and for charging the battery. In order to crank the plant there must be at least 9 volts on the terminal at the plant while cranking. Suggested battery cable sizes under adverse conditions are: Up to 3 feet length use #2 size cable; 3 to 6 feet use #1/0; 6 to 9 feet use #3/0; 9 to 12 feet use #4/0. Battery condition, oil viscosity and ambient temperature also affect the ability to crank.

Either polarity (negative ground or positive ground) of the battery can be used with the plant. However, with reverse polarity, the ammeter will read reversely and the operator should either reverse the wire connections to the ammeter or mark the panel to clarify which direction of the needle is "charge".

The ac output leads, M1 (hot) and M2 (grounded) extend out from the generator. Receptacles can be located where convenient elsewhere on the truck and permanently connected to the generator output leads.

Connect a wire from the armature (ARM) terminal on the truck's voltage regulator to the terminal marked B in the plant control. The connection will be to the coil energizing terminal of the plant relay which interrupts generator lead A1. Use no. 18 or larger wire. This correction is not used, when truck battery is charged with alternator. See the wiring diagram.

One or more momentary contact switches may be connected to provide remote control of starting and stopping. Make connections to the terminal block in the plant control. Terminal number 1 is used as a common ground, terminal number 2 connects to the stopping circuit of the plant and terminal number 3 connects to the starting circuit of the plant. Connect the switch so that when held at OFF, number 2 is grounded and when held at ON, number 3 is grounded.

OPERATION. - The purpose of this plant and its output rating is explained in the introductory paragraphs of this section.

CAUTIONS ! !

A voltage too high will overcharge and possibly damage the battery. Adjust the governor only to correct the dc voltage output of the generator at operating temperature. If a carburetor adjustment is made, then a recheck of the governor adjustment must be made.

Do not become alarmed if the ammeter reads 45 amperes when first starting the plant. After a few minutes the current will come down to normal as the generator warms up and the battery voltage comes up.

Consistently high charge rate (after warm up) could be due to a poor battery in the truck or to running the plant too fast.

CHARGE RATE. - Rated dc output is 30 amperes. A circuit breaker opens the charging circuit to protect the generator if dc output is too much. Equal time is consumed by the breaker to cut-in and cut-out and it may go through this cycle several times, each succeeding cycle becoming more rapid, until it acts and sounds like a buzzer, during an overload on the dc output. Generally, the battery will warm up and the charge rate will drop so that the breaker will not reach the buzzing stage.

As the battery reaches a charged condition, its terminal voltage approaches that of the generating plant, resulting in a desirable tapering off charge rate. After the battery becomes fully charged, the charge rate equals the dc load (radio, lights, etc.) connected.

The plants charge ammeter reads zero while the truck's engine is running.

AC OVERLOADING. - It is not expected that men on the job will determine available load each time before plugging in tools etc. Overloading is apt to occur especially during night work when both lights and tools are used. If the plant speed drops, ac lights will dim, and part of the load must be disconnected. If more ac power is required, simply run the truck's motor to take over the dc load for that interval, and make the full rating available in ac output.

A short circuit across the ac terminals will collapse the field to protect the generator.

GOVERNOR ADJUSTMENT. - To check or correct the engine speed, a dc voltmeter is required, the plant must be warm and all load disconnected. Proceed as follows:

1. Run plant with full ac load connected for at least 1/2 hour to reach operating temperature.
2. With the load alternately removed and connected, adjust the governor sensitivity screw, if necessary, to attain a minimum drop in speed from no load to full load operation with no hunting condition.
3. Remove the ac load and stop the plant, then disconnect the generator lead A1 at the relay in the plant control.
4. Connect the dc voltmeter across lead A1 and ground.
5. Run the plant and adjust the speed to deliver 15 volts dc.
6. Remove the voltmeter, reconnect the A1 lead to the relay and replace other parts removed.

POSSIBLE CAUSE	REMEDY
ENGINE CRANKS TOO STIFFLY	
Too heavy oil in crankcase.	Drain. Refill with lighter oil.
Engine seized.	Disassemble and repair.
ENGINE CRANKS TOO SLOWLY WHEN CRANKED ELECTRICALLY	
Discharged or defective battery.	Recharge or replace.
Loose connections.	Tighten loose connections.
Corroded battery terminals.	Clean corroded terminals. Replace cable if necessary.
Brushes worn excessively or making poor contact.	Replace brushes or clean commutator.
Short circuit in generator or load circuit.	Repair or replace parts necessary. Disconnect load.
Dirty or corroded points in start solenoid switch.	Replace switch.
ENGINE WILL NOT START WHEN CRANKED	
Faulty ignition.	Clean, adjust, or replace breaker points, spark plug , condenser, etc., or retime ignition.
Lack of fuel or faulty carburetion.	Refill the tank. Check the fuel system. Clean, adjust or replace parts necessary.
Clogged fuel filter.	Clean.
Cylinders flooded.	Ground spark plug cable. Crank engine with spark plug removed.
Poor fuel.	Drain. Refill with good fuel.
Poor compression.	Tighten cylinder head and spark plug . If still not corrected, grind the valves. Replace the piston rings if necessary.
Wrong ignition timing.	Reset breaker points or retime ignition.

POSSIBLE CAUSE	REMEDY
ENGINE RUNS BUT VOLTAGE DOES NOT BUILD UP	
Poor brush contact.	See that brushes seat well on commutator and collector rings, are free in holders, are not worn too short, and have good spring tension.
Open circuit, short circuit, or ground in generator.	Refer to the GENERATOR section of Maintenance and Repair.
Residual magnetism lost.	Magnetize the field.
VOLTAGE UNSTEADY BUT ENGINE NOT MISFIRING	
Speed too low.	Adjust governor to correct speed.
Poor commutation or brush contact.	Refinish commutator or undercut mica if necessary. See that brushes seat well on commutator and collector rings, are free in holders, are not worn too short, and have good spring tension.
Loose connections.	Tighten connections.
Fluctuating load.	Correct any abnormal load condition causing trouble.
GENERATOR OVERHEATING	
Short in load circuit.	Correct short circuit.
Generator overloaded.	Reduce the load.
Improper brush rig position.	Adjust.
ENGINE OVERHEATING	
Improper lubrication.	Change to proper oil.
Poor ventilation.	Provide ample ventilation at all times.
Dirty or oily cooling surfaces.	Keep the engine clean.
Retarded ignition timing.	Retime ignition.
Generator overloaded.	Reduce load.

POSSIBLE CAUSE	REMEDY
VOLTAGE DROPS UNDER HEAVY LOAD	
Engine lacks power.	See remedies under "Engine Misfires at Heavy Load".
Poor Compression.	Tighten Cylinder head and spark plug. If still not corrected grind the valves. Replace piston rings if necessary.
Faulty carburetion.	Check the fuel system. Clean, adjust or repair as needed.
Dirty carburetor air cleaner.	Clean.
Choke partially closed.	Choke plate must be wide open at operating temperature.
Carbon in cylinders or in carburetor venturi.	Remove carbon.
Restricted exhaust line.	Clean or increase the size.
ENGINE MISFIRES AT LIGHT LOAD	
Carburetor idle jet clogged or improperly adjusted.	Clean.
Spark plug gap too narrow.	Adjust to correct gap.
Intake air leak.	Tighten. Replace gasket if necessary.
Faulty ignition.	Clean, adjust, or replace breaker points, spark plug, condenser, etc., or retime ignition.
ENGINE MISFIRES AT HEAVY LOAD	
Defective spark plug.	Replace.
Faulty ignition.	Clean, adjust, or replace breaker points, spark plug, condenser, etc. or retime ignition.
Clogged carburetor.	Clean carburetor.
Clogged fuel screen.	Clean.

POSSIBLE CAUSE	REMEDY
ENGINE MISFIRES AT HEAVY LOAD(CONT.)	
Defective spark plug cable.	Replace.
ENGINE MISFIRES AT ALL LOADS	
Fouled spark plug.	Clean and adjust.
Defective or wrong spark plug.	Replace.
Leaking valves.	Grind valves.
Broken valve spring.	Replace.
Defective or improperly adjusted breaker points.	Adjust or replace breaker points.
ENGINE BACKFIRES AT CARBURETOR	
Lean fuel mixture.	Clean carburetor. Adjust jets.
Clogged fuel filter.	Clean.
Poor fuel.	Refill with good, fresh fuel.
Spark advanced too far.	Reset breaker points or retime ignition.
Intake valve leaking.	Reseat or replace.
EXCESSIVE OIL CONSUMPTION, LIGHT BLUE EXHAUST	
Poor compression. Usually due to worn pistons, rings, or cylinders.	Refinish cylinders. Install oversize pistons and rings.
Oil leaks from oil base or connections. This does not cause smoky exhaust.	Replace gaskets. Tighten screws and connections. Check breather valve.
Oil too light or diluted.	Drain. Refill with proper oil.
Too large bearing clearance.	Replace bearings necessary.
Engine misfires.	Refer to "Engine Misfires At All Speeds"

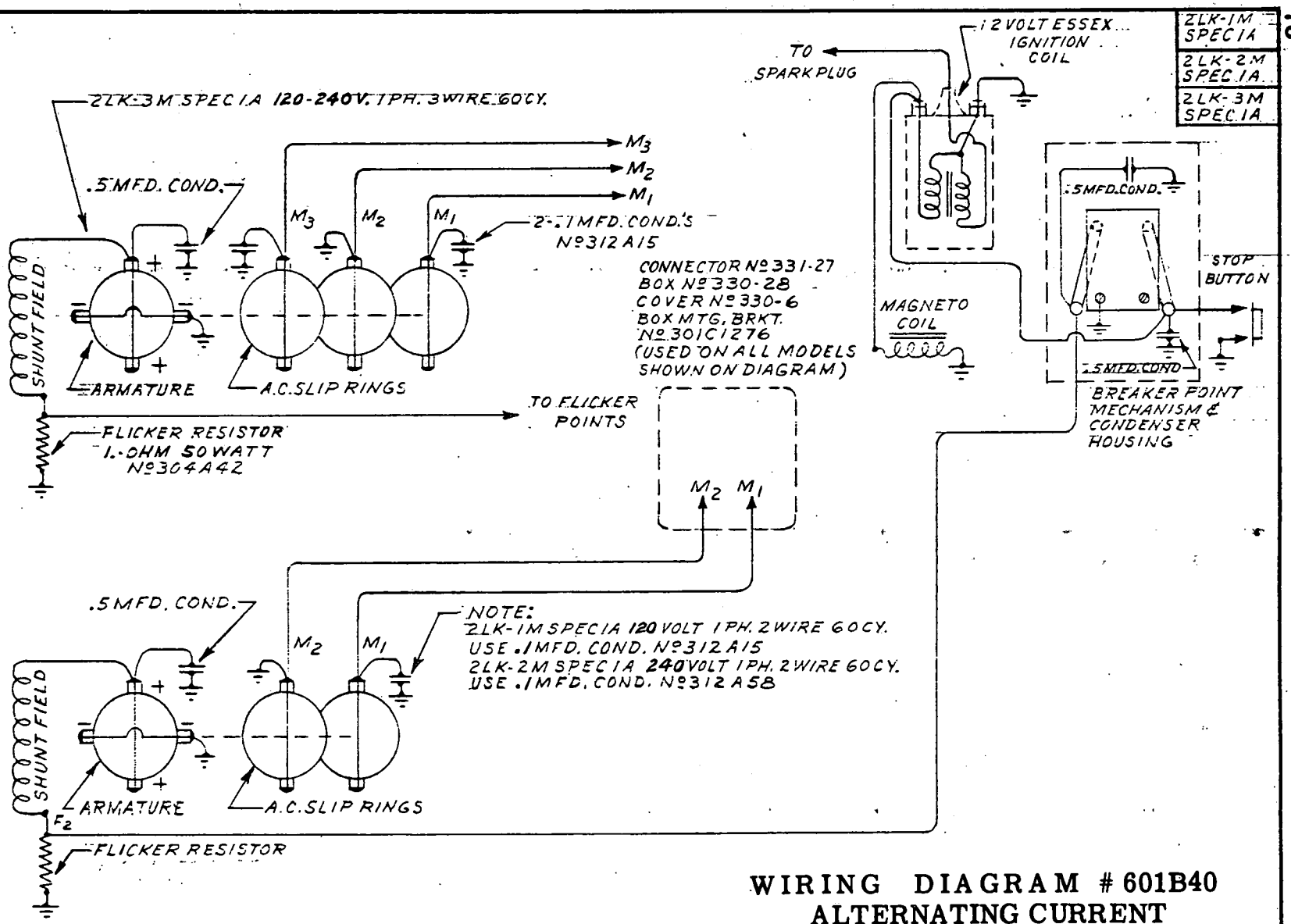
POSSIBLE CAUSE	REMEDY
EXCESSIVE OIL CONSUMPTION, LIGHT BLUE EXHAUST (CONT.)	
Faulty ignition.	Clean, adjust, or replace breaker points, spark plug, condenser, etc., or retime the ignition.
Too much oil.	Drain excess oil.
BLACK, SMOKY EXHAUST, EXCESSIVE FUEL CONSUMPTION FOULING OF SPARK PLUG WITH BLACK SOOT, POSSIBLE LACK OF POWER UNDER HEAVY LOAD.	
Fuel mixture too rich.	See that choke opens properly. Adjust jets properly. Adjust the float level.
Choke not fully open.	See that choke opens properly.
Dirty air cleaner.	Clean.
Excessive crankcase pressure, causing excessive fuel pump pressure.	Clean breather valve.
LIGHT POUNDING KNOCK	
Loose connecting rod.	Adjust clearance or replace.
Low oil supply.	Add oil. Change if necessary.
Oil badly diluted.	Drain. Refill with proper oil.
ENGINE STOPS UNEXPECTEDLY	
Empty fuel tank.	Refill.
Defective ignition system.	Check the ignition system. Repair or replace as needed. See that the STOP button lead is not grounded.
DULL METALLIC THUD. IF NOT BAD, MAY DISAPPEAR AFTER FEW MINUTES OPERATION. IF BAD, INCREASES WITH LOAD.	
Loose crankshaft bearing.	Replace unless one of the next two remedies permanently corrects the trouble.

POSSIBLE CAUSE	REMEDY
SHARP METALLIC THUD, ESPECIALLY WHEN COLD ENGINE FIRST STARTED.	
Low oil supply.	Add oil.
Oil badly diluted.	Change oil.
PINGING SOUND WHEN ENGINE IS SUDDENLY OR HEAVILY LOADED	
Carbon in cylinder.	Remove the carbon.
Spark advanced too far.	Reset breaker points or retime ignition.
Wrong spark plug.	Install correct spark plug.
Spark plug burned or carboned.	Clean. Install new plug if necessary.
Valves hot.	Adjust tappet clearance.
Fuel stale or low octane.	Use good, fresh fuel.
Lean fuel mixture.	Clean fuel system. Adjust carburetor jets properly.
Engine hot.	Check air circulation.
TAPPING SOUND	
Valve clearance too great.	Adjust to proper clearance.
Broken valve spring.	Install new spring.
HOLLOW CLICKING SOUND WITH COOL ENGINE UNDER LOAD	
Loose piston.	If noise is only slight and disappears when engine warms up, no immediate attention needed. Otherwise replace parts necessary.
VOLTAGE LOW AT FAR END OF LINE BUT NORMAL NEAR PLANT	
Too small line wire used for load and distance.	Install larger or extra wires or reduce load.

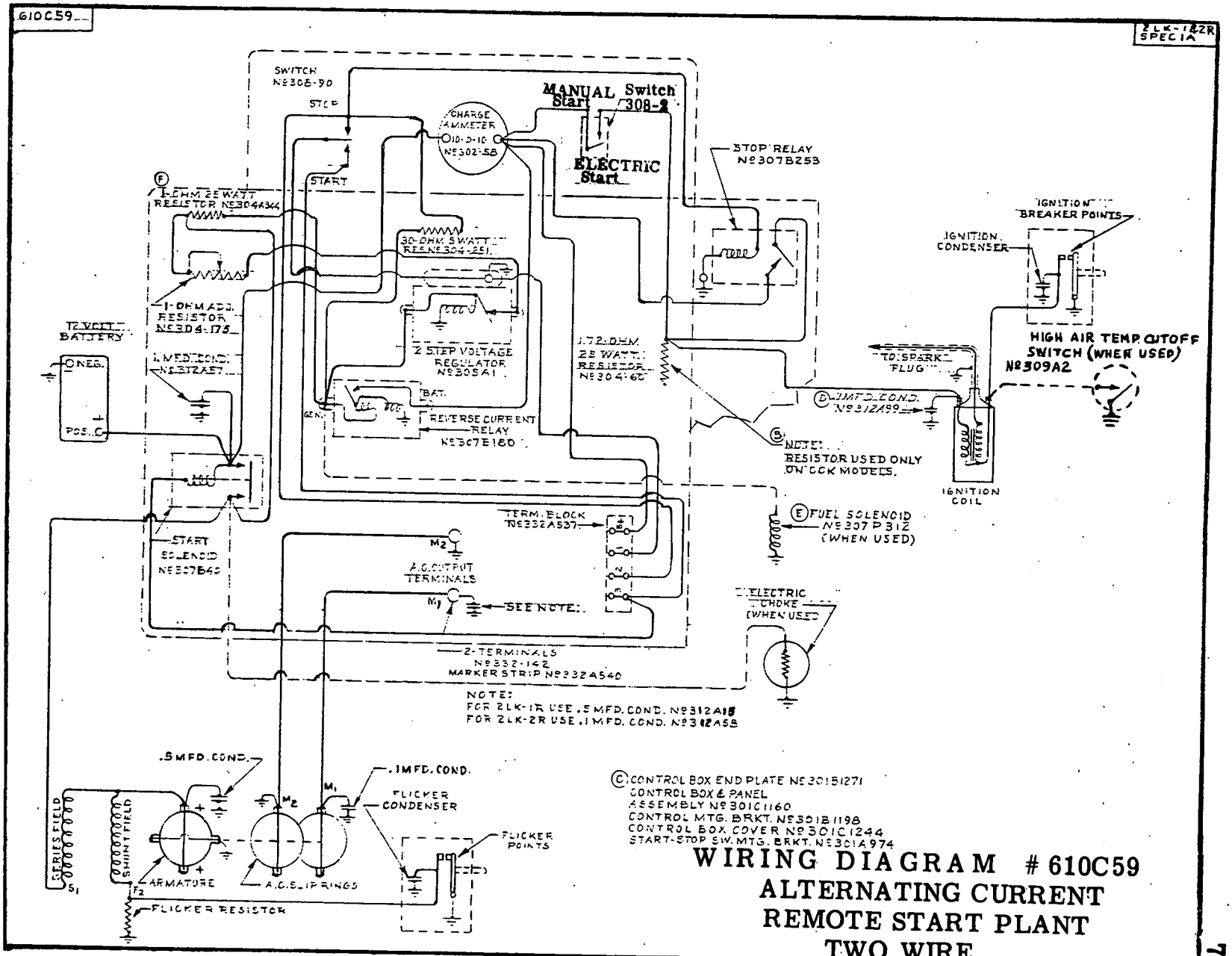
POSSIBLE CAUSE	REMEDY
MOTORS RUN TOO SLOWLY AND OVERHEAT AT FAR END OF LINE BUT OK NEAR THE PLANT	
Too small line wire used for load and distance.	Install larger or extra wires or reduce load.
NOISY BRUSHES	
High mica between bars of commutator.	Undercut mica.
EXCESSIVE ARCING OF BRUSHES	
Rough commutator or rings.	Turn down.
Dirty commutator or rings.	Clean.
Brushes not seating properly.	Sand to a good seat or reduce load until worn in.
Open circuit in armature.	Install a new armature.
Brush rig out of position.	Line up properly.

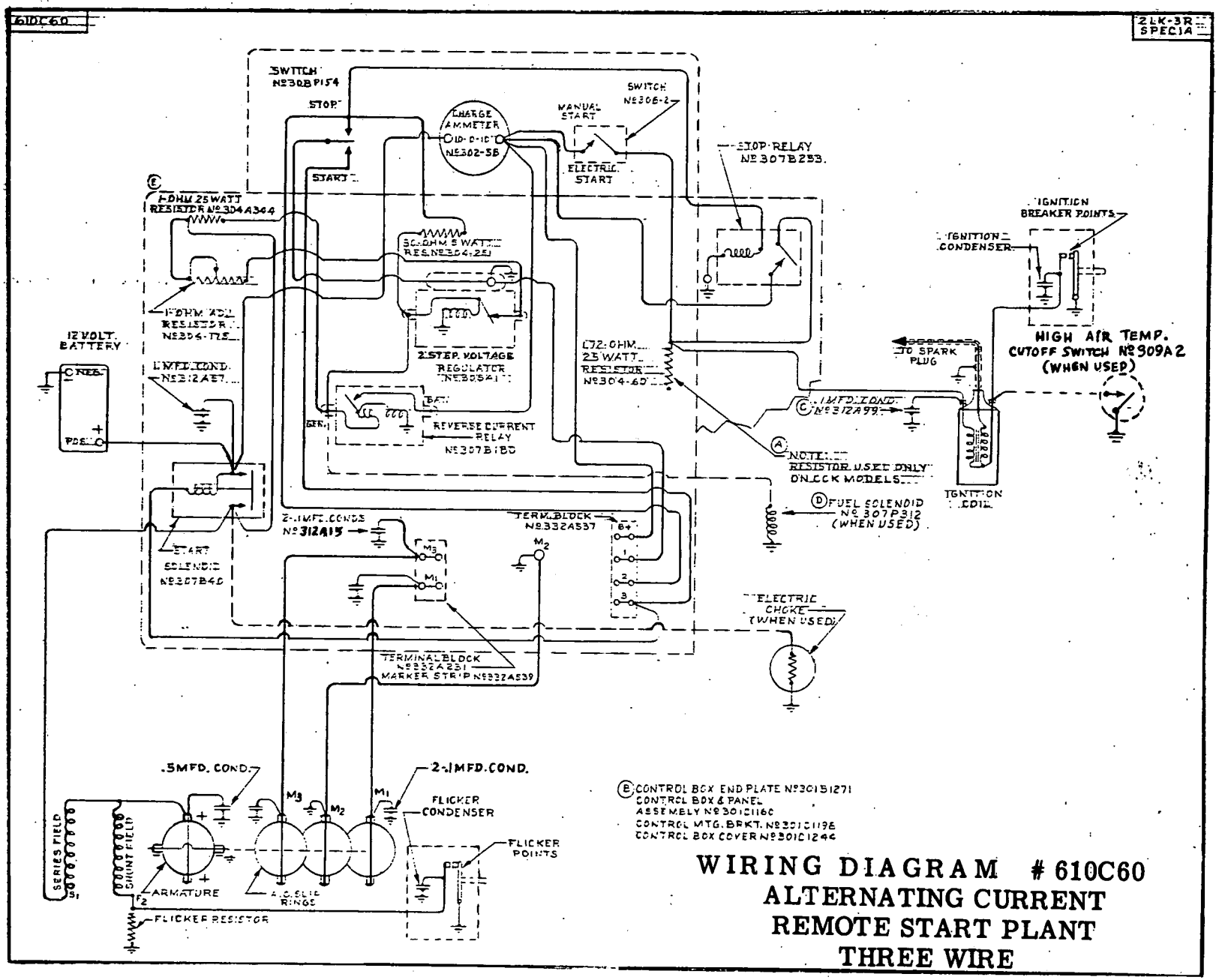
601B40

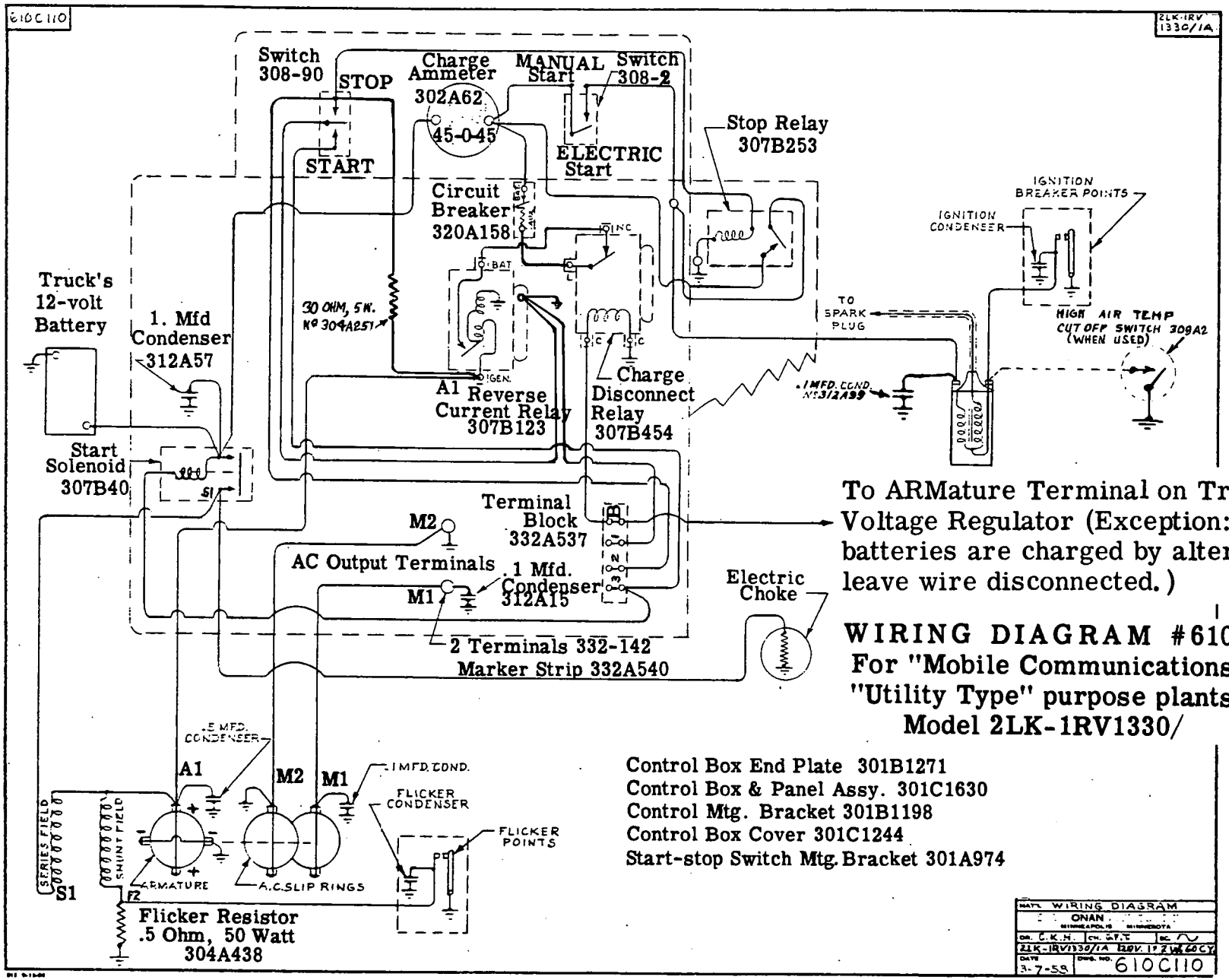
2LK-1M SPEC 1A
2LK-2M SPEC 1A
2LK-3M SPEC 1A



WIRING DIAGRAM # 601B40
ALTERNATING CURRENT
MANUAL START PLANT
PRIOR TO SPEC C.


610C59
2LK-1&2R SPECIA
SWITCH Nº308-90
STOP
START
MANUAL Switch Start 308-2
ELECTRIC Start
CHARGE AMMETER 10-0-10 Nº302-58
STOP RELAY Nº307B253
1-OHM 25 WATT RESISTOR Nº304A34
30-OHM 5 WATT RESISTOR Nº304-251
1-OHM ADJ. RESISTOR Nº304-175
12 VOLT BATTERY
NEG.
POS.
2 STEP VOLTAGE REGULATOR Nº305A1
1.72-OHM 25 WATT RESISTOR Nº304-60
BAT.
GEN.
REVERSE CURRENT RELAY Nº307E160
IGNITION BREAKER POINTS
IGNITION CONDENSER
HIGH AIR TEMP. CUTOFF SWITCH (WHEN USED) Nº309A2
TO SPARK PLUG
IGNITION COIL
NOTE: RESISTOR USED ONLY ON ROCK MODELS.
TERM. BLOCK Nº332A537
START SOLENOID Nº307B40
A.C. OUTPUT TERMINALS
SEE NOTE
FUEL SOLENOID Nº307P312 (WHEN USED)
ELECTRIC CHOKE (WHEN USED)
2-TERMINALS Nº332-142 MARKER STRIP Nº332A540
NOTE: FOR 2LK-1R USE .5 MFD. COND. Nº312A15 FOR 2LK-2R USE .1 MFD. COND. Nº312A58
.5 MFD. COND.
.1 MFD. COND.
FLICKER CONDENSER
FLICKER POINTS
SERIES FIELD
SHUNT FIELD
ARMATURE
A.C. SLIP RINGS
FLICKER RESISTOR
CONTROL BOX END PLATE Nº301B1271
CONTROL BOX & PANEL ASSEMBLY Nº301C1160
CONTROL MTG. BRKT. Nº301B1198
CONTROL BOX COVER Nº301C1244
START-STOP SW. MTG. BRKT. Nº301A974
WIRING DIAGRAM # 610C59
ALTERNATING CURRENT
REMOTE START PLANT
TWO WIRE


610C60
2LK-3R
SPECIA
SWITCH
Nº30BP154
STOP
START
CHARGE
AMMETER
10-0-10
Nº302-5B
MANUAL
START
SWITCH
Nº306-2
ELECTRIC
START
STOP RELAY
Nº307B253
1-OHM 25 WATT
RESISTOR Nº304A344
50-OHM 5 WATT
RES. Nº304-25J
1-OHM ADJ.
RESISTOR
Nº304-175
2 STEP VOLTAGE
REGULATOR
Nº305A1
172-OHM
25 WATT
RESISTOR
Nº304-60
12 VOLT
BATTERY
NEG.
POS.
1-MFD. COND.
Nº312A87
REVERSE CURRENT
RELAY
Nº307B180
GEN.
BAT.
IGNITION
BREAKER POINTS
IGNITION
CONDENSER
TO SPARK
PLUG
HIGH AIR TEMP.
CUTOFF SWITCH Nº309A2
(WHEN USED)
1-MFD. COND.
Nº312A99
IGNITION
COIL
NOTE:
RESISTOR USED ONLY
ON LOCK MODELS
FUEL SOLENOID
Nº307P312
(WHEN USED)
2-1MFD. CONDS
Nº312A15
TERM. BLOCK
Nº3324537
START
SOLENOID
Nº307B40
M3
M2
M1
ELECTRIC
CHOKE
(WHEN USED)
TERMINAL BLOCK
Nº332A251
MARKER STRIP Nº3324539
.5MFD. COND.
2-1MFD. COND.
FLICKER
CONDENSER
FLICKER
POINTS
SERIES FIELD
S1
SHUNT FIELD
F2
ARMATURE
A.C. SLIP
RINGS
FLICKER RESISTOR
E CONTROL BOX END PLATE Nº30151271
CONTROL BOX & PANEL
ASSEMBLY Nº30121160
CONTROL MTG. BRKT. Nº30121196
CONTROL BOX COVER Nº30101244
WIRING DIAGRAM # 610C60
ALTERNATING CURRENT
REMOTE START PLANT
THREE WIRE



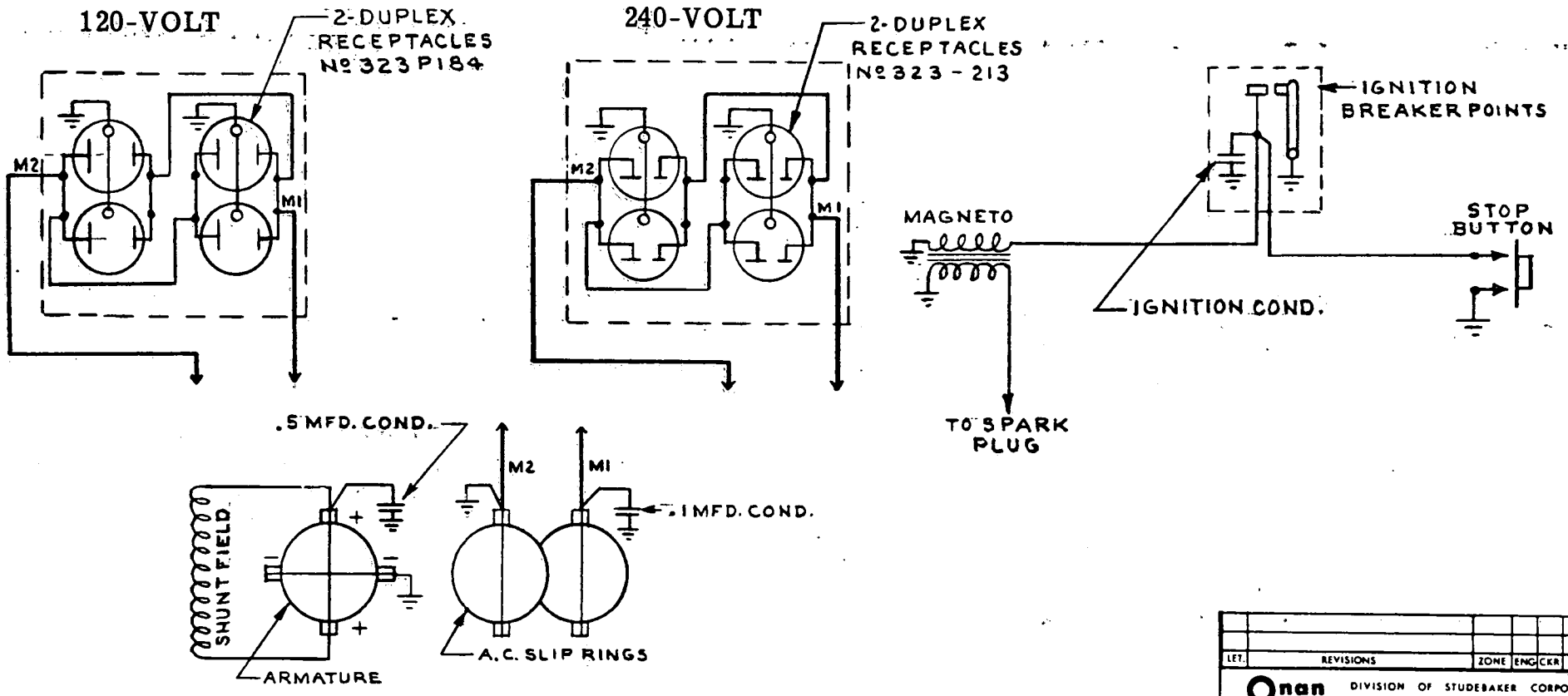
To ARMature Terminal on Truck Voltage Regulator (Exception: if batteries are charged by alternator, leave wire disconnected.)

WIRING DIAGRAM #610C110
For "Mobile Communications" or "Utility Type" purpose plants, Model 2LK-1RV1330/

Control Box End Plate 301B1271
Control Box & Panel Assy. 301C1630
Control Mtg. Bracket 301B1198
Control Box Cover 301C1244
Start-stop Switch Mtg. Bracket 301A974

601 B126 | 601 B127

BOX Nº 330-28
COVER Nº 330-42
MTG. BRKT. Nº 301C1276
CONNECTOR Nº 331-27



LET.	REVISIONS	ZONE	ENG	CKR	DATE

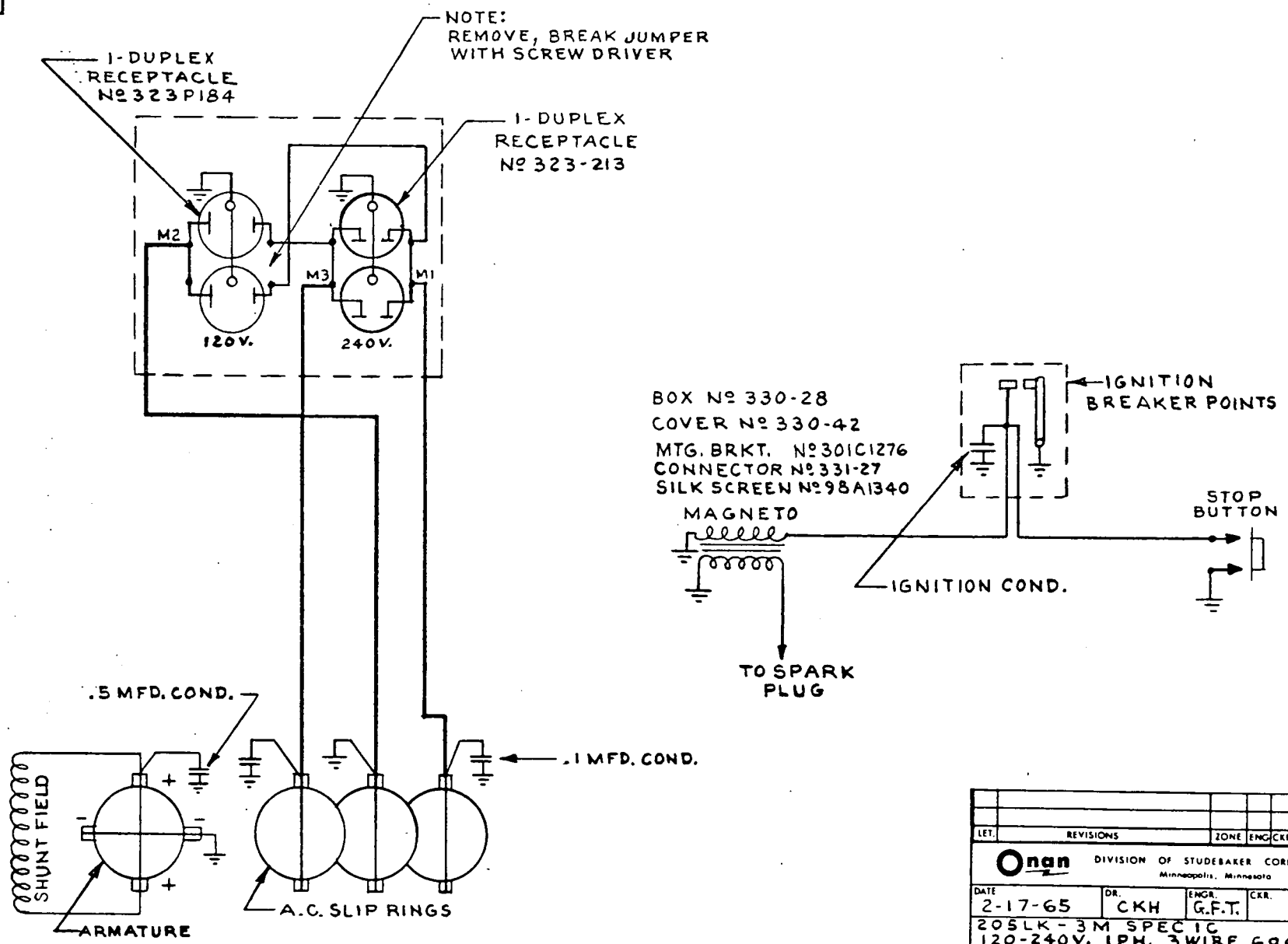
Onan DIVISION OF STUDEBAKER CORPORATION Minneapolis, Minnesota

DATE	DR.	ENGR.	CKR.	SC.
2-16-65	CKH	G.F.T.		

205 LK- M SPEC IC
2 WIRE 60 CY.

DWG. NO.

601B128



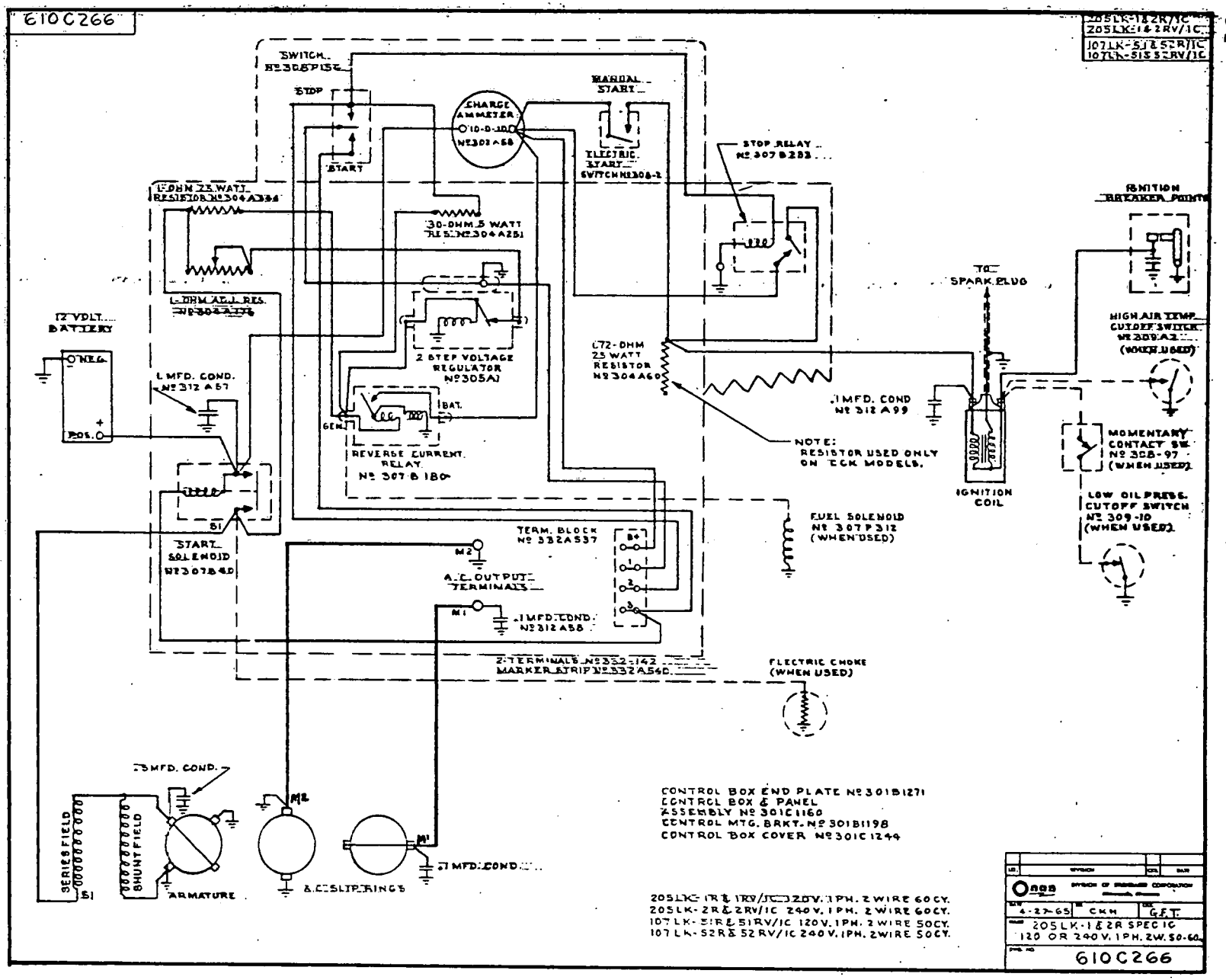
LET.	REVISIONS	ZONE	ENG.	CKR.	DATE

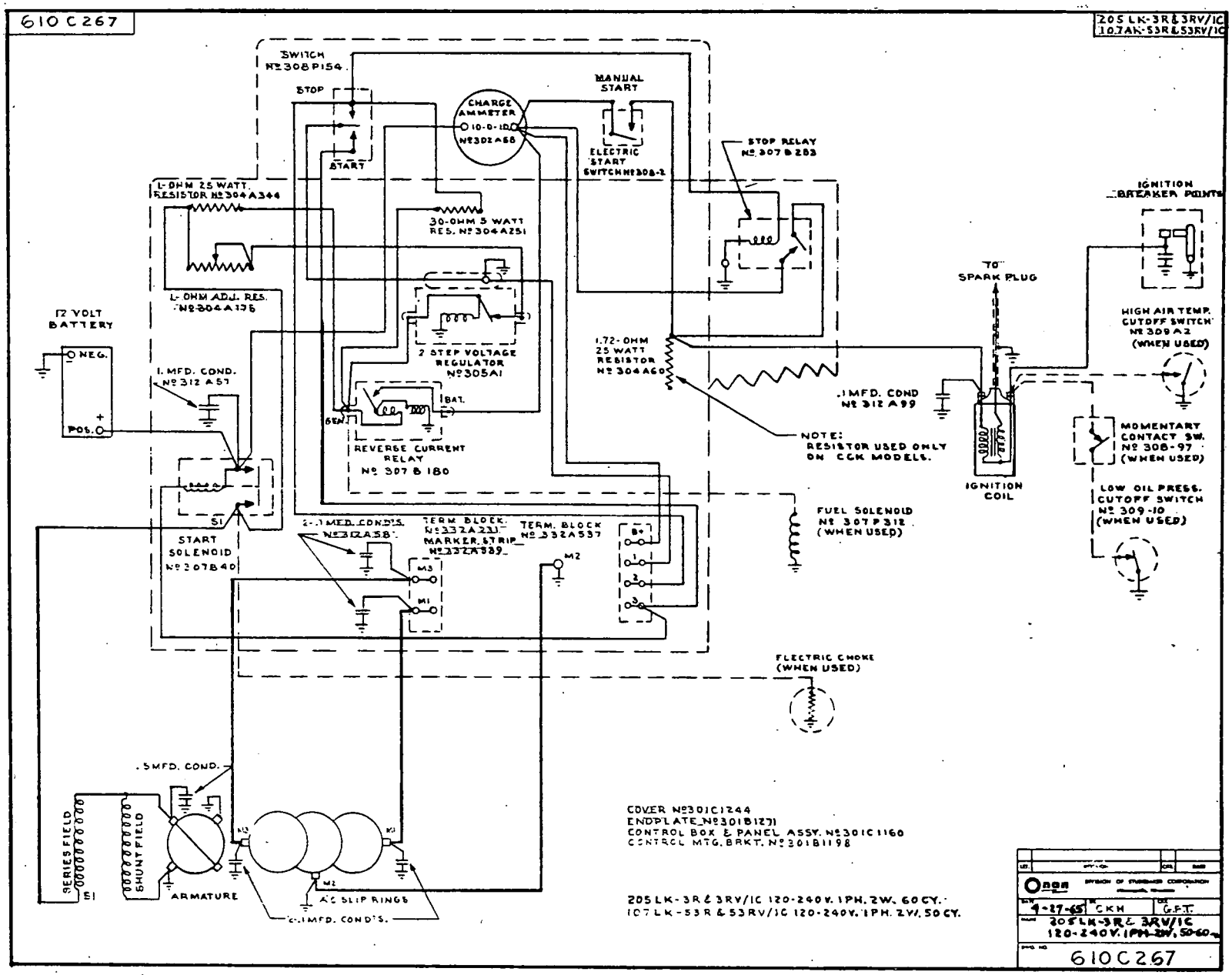
Onan DIVISION OF STUDEBAKER CORPORATION
Minneapolis, Minnesota

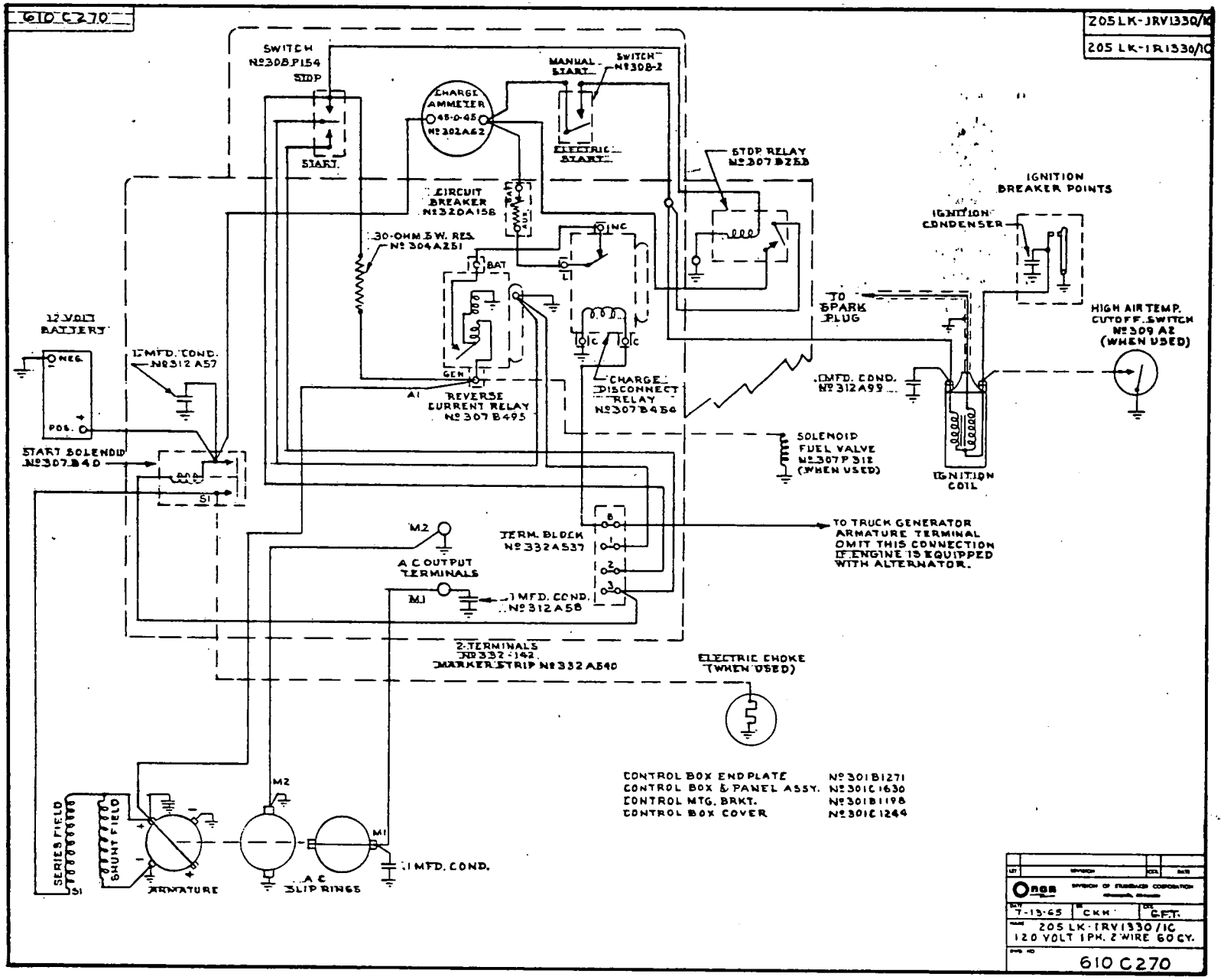
DATE	DR.	ENGR.	CKR.	SC.
2-17-65	CKH	G.F.T.		—

205LK-3M SPEC IC
120-240V. 1PH. 3WIRE GOCY.

DWG. NO. 601B128


610C266
205LK-1&2R/1C
205LK-1&2RV/1C
107LK-51&52R/1C
107LK-51&52RV/1C
SWITCH
STOP
START
CHARGE AMMETER
MANUAL START
ELECTRIC START SWITCH
STOP RELAY
IGNITION BREAKER POINTS
TO SPARK PLUG
HIGH AIR TEMP. CUTOFF SWITCH (WHEN USED)
12 VOLT BATTERY
NEG.
POS.
1 MFD. COND.
2 STEP VOLTAGE REGULATOR
BAT.
GEN.
REVERSE CURRENT RELAY
.1 MFD. COND
NOTE: RESISTOR USED ONLY ON ECK MODELS.
IGNITION COIL
MOMENTARY CONTACT SW. (WHEN USED)
LOW OIL PRESS. CUTOFF SWITCH (WHEN USED)
START SOLENOID
TERM. BLOCK
FUEL SOLENOID (WHEN USED)
A.C. OUTPUT TERMINALS
2 TERMINALS
MARKER STRIP
ELECTRIC CHOKE (WHEN USED)
25 MFD. COND.
SERIES FIELD
SHUNT FIELD
ARMATURE
A.C. SLIP RINGS
CONTROL BOX END PLATE
CONTROL BOX & PANEL ASSEMBLY
CONTROL MTG. BRKT.
CONTROL BOX COVER
205LK-1R & 1RV/1C 120V. 1PH. 2 WIRE 60 CY.
205LK-2R & 2RV/1C 240V. 1PH. 2 WIRE 60 CY.
107LK-51R & 51RV/1C 120V. 1PH. 2 WIRE 50 CY.
107LK-52R & 52RV/1C 240V. 1PH. 2 WIRE 50 CY.
4-27-65
CKM
G.F.T.
205LK-1 & 2R SPEC IC
120 OR 240V. 1PH. 2W. 50-60
610C266


610 C 267
205 LK-3R & 3RV/1C
107 AK-53R & 53RV/1C
SWITCH
Nº 308 P 154
STOP
START
MANUAL
START
CHARGE
AMMETER
10-0-10
Nº 302 A 68
ELECTRIC
START
SWITCH Nº 308-2
STOP RELAY
Nº 307 B 283
1-OHM 25 WATT
RESISTOR Nº 304 A 344
30-OHM 5 WATT
RES. Nº 304 A 251
1-OHM ADJ. RES.
Nº 304 A 196
2 STEP VOLTAGE
REGULATOR
Nº 305 A1
12 VOLT
BATTERY
NEG.
POS.
1 MFD. COND.
Nº 312 A 57
BAT.
GEN.
REVERSE CURRENT
RELAY
Nº 307 B 180
1.72-OHM
25 WATT
RESISTOR
Nº 304 A 60
.1 MFD. COND
Nº 312 A 99
NOTE:
RESISTOR USED ONLY
ON CCK MODELS.
TO
SPARK PLUG
IGNITION
COIL
IGNITION
BREAKER POINTS
HIGH AIR TEMP.
CUTOFF SWITCH
Nº 309 A2
(WHEN USED)
MOMENTARY
CONTACT SW.
Nº 308-97
(WHEN USED)
LOW OIL PRESS.
CUTOFF SWITCH
Nº 309-10
(WHEN USED)
S1
START
SOLENOID
Nº 307 B 40
2-.1 MFD. CONDS.
Nº 312 A 58
TERM. BLOCK
Nº 332 A 237
MARKER STRIP
Nº 332 A 239
TERM. BLOCK
Nº 332 A 537
M1
M2
M3
B+
1
2
3
FUEL SOLENOID
Nº 307 P 312
(WHEN USED)
ELECTRIC CHOKE
(WHEN USED)
.5 MFD. COND.
SERIES FIELD
SHUNT FIELD
S1
ARMATURE
M1
M2
M3
A.C. SLIP RINGS
2-.1 MFD. COND'S.
COVER Nº 301 C 1244
ENDPLATE Nº 301 B 1271
CONTROL BOX & PANEL ASSY. Nº 301 C 1160
CONTROL MTG. BRKT. Nº 301 B 1198
205 LK-3R & 3RV/1C 120-240 V. 1PH. 2W. 60 CY.
107 LK-53R & 53RV/1C 120-240 V. 1PH. 2W. 50 CY.
Onan
DIVISION OF STUDEBAKER CORPORATION
4-27-65
C.K.H.
G.P.T.
205 LK-3R & 3RV/1C
120-240 V. 1PH. 2W. 50-60
610 C 267


610 C270
205 LK-JRV1330/1C
205 LK-IRV1330/1C
SWITCH
№308P154
STOP
START
MANUAL START
SWITCH
№308-2
ELECTRIC START
CHARGE AMMETER
45-0-45
№302A62
STOP RELAY
№307B258
IGNITION BREAKER POINTS
IGNITION CONDENSER
CIRCUIT BREAKER
№320A158
30-OHM 5 W. RES.
№304A251
NC
BAT
L
L1
12 VOLT BATTERY
NEG.
POS.
1 MFD. COND.
№312A57
GEN
T
A1
REVERSE CURRENT RELAY
№307B495
CHARGE DISCONNECT RELAY
№307B456
C
TO SPARK PLUG
HIGH AIR TEMP. CUTOFF SWITCH
№309A2
(WHEN USED)
1 MFD. COND.
№312A99
START SOLENOID
№307B40
S1
SOLENOID FUEL VALVE
№307P31E
(WHEN USED)
IGNITION COIL
M2
TERM. BLOCK
№332A537
TO TRUCK GENERATOR ARMATURE TERMINAL
OMIT THIS CONNECTION IF ENGINE IS EQUIPPED WITH ALTERNATOR.
A C OUTPUT TERMINALS
M1
1 MFD. COND.
№312A58
2-TERMINALS
№332-142
MARKER STRIP №332A540
ELECTRIC CHOKE
(WHEN USED)
CONTROL BOX END PLATE №301B1271
CONTROL BOX & PANEL ASSY. №301C1630
CONTROL MTG. BRKT. №301B1198
CONTROL BOX COVER №301C1244
SERIES FIELD
SHUNT FIELD
S1
ARMATURE
A C SLIP RINGS
1 MFD. COND.
7-13-65
CKM
C.F.T.
205 LK-IRV1330/1C
120 VOLT 1PH. 2 WIRE 60 CY.
610 C270

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★ **Two-Bearing Generators**

★ **Air Cooled Engines**

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