

INSTRUCTION BOOK FOR SOUTHERN CROSS LIGHTING PLANTS

Fig. 2296 150-500 w. 32 Volt.

Fig. 2420 700 w. 32 or 50 Volt.

Fig. 2298 1500 w. 32 or 50 Volt.



THE SOUTHERN CROSS ORGANISATION

QUEENSLAND—

Toowoomba Foundry Pty., Ltd. Toowoomba, Townsville, Rockhampton,
and Charleville.

NEW SOUTH WALES—

Southern Cross Engine and Windmill Co. Pty., Ltd., 22 Young Street, Syd-
ney, and at Tamworth and Moree.

VICTORIA—

Southern Cross Windmills and Engines Pty., Ltd., 24 Moray Street, South
Melbourne, S.C.S.

WEST AUSTRALIA—

Southern Cross Windmill and Engine Company, Limited, Maylands, W.A.

SOUTH AUSTRALIA—

Elder, Smith & Co., Limited, Adelaide.

SOUTH AFRICA—

Southern Cross Windmill and Engine Company, Limited, 50 Henry Street,
Bismfontein, S.A.

Fig. 2296. 150-500 W. 32 Volt Battery Plant**UNPACKING.**

Remove the top of the case, take out the instruction book, then remove sides and ends and unscrew four nuts holding the generator to the bottom of the case and remove the generator.

With the check list in the same envelope as the instruction book, check off the items in the box.

FOUNDATION.

The best results will be obtained from the generator if it is set up on a firm foundation. A block of concrete is best, but, failing that, a substantial log set well into the ground.

If the generator is set up on a concrete foundation, then the bolts supplied with the slide rails should be set in the concrete when the foundation is put down.

Should the generator be installed on an existing concrete floor, then punch holes in the floor to take the bolts in the slide bars, then set slide rails and bolts in position and fill the holes with a mixture of two parts sand and one of cement.

LINING UP THE GENERATOR.

It is very important that the generator is lined up correctly with the engine which is driving it.

A piece of string is stretched across the back face of the generator pulley and the outer face of the flywheel so that it is touching on the edges.

The generator is then swivelled round until the outer and inner edges of the pulley and flywheel are just touching the string.

The two pulleys are then lined up correctly.

TO MAKE A CONCRETE BASE.

If a new concrete base is to be set down, using the timber of the case, construct a wooden mould to the required size.

Decide upon the position of the generator. When the plant leaves the factory it is set to run in an anti-clockwise direction at the pulley end. Then sink a hole in the ground 1 foot deep to the inside dimensions of the mould.

Then line up the generator. Nail two pieces of timber across the top of the mould to support the slide rails with foundation bolts in position.

Mix up a batch of concrete, using a mixture of three parts sand, four parts stone or rubble, and two parts cement.

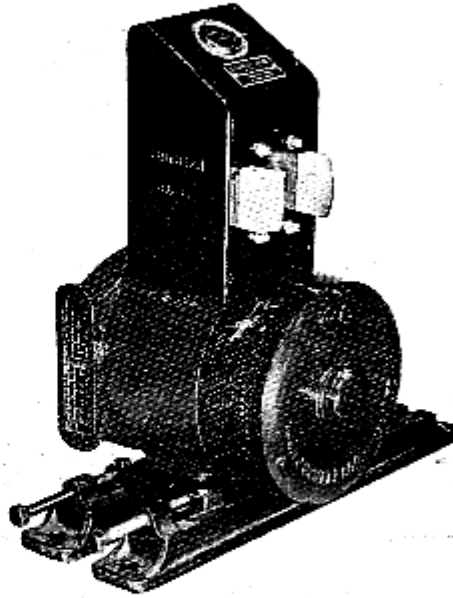
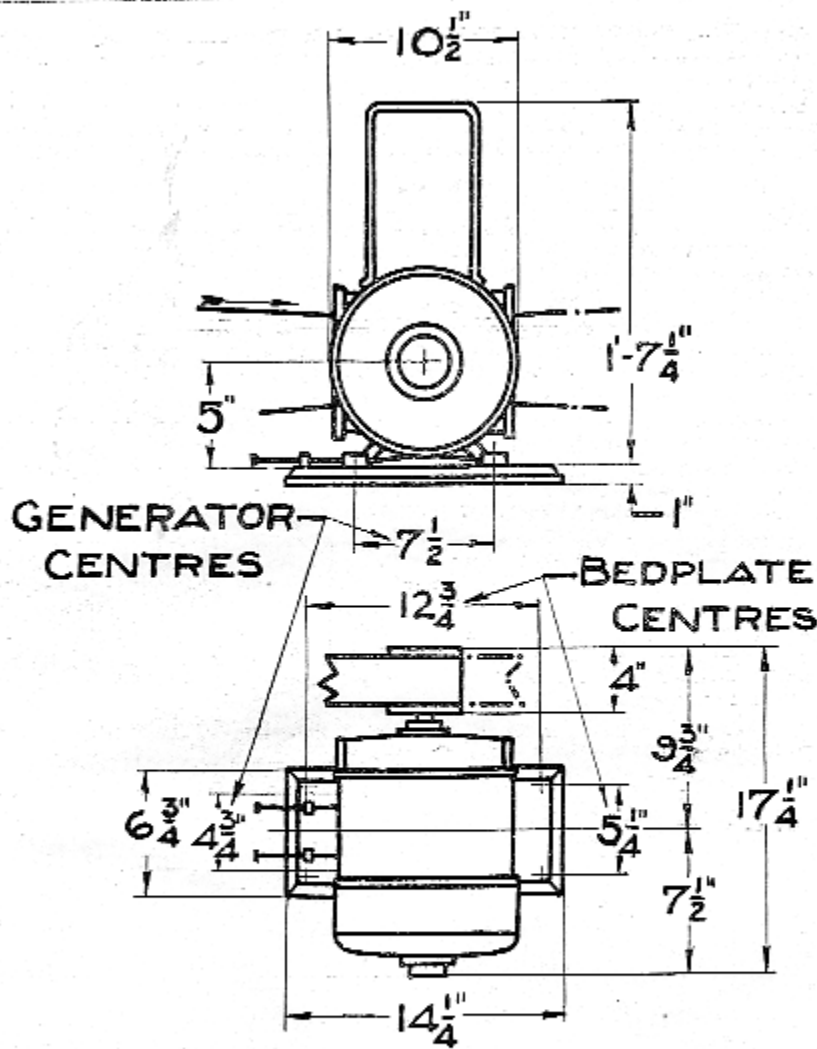


Fig. 2296.



DIMENSION CHART-FIG 2296
 150-500W.32 & 50V ϕ LIGHTING
 PLANT.

Fig. 2475.

Fill the mould with concrete. The concrete should be allowed to set for a day and then the mould and generator removed and the block well dampened and finished off with a mixture of two parts sand and one part cement.

Allow the block to set for another day and then set generator rails in position and again check the alignment of the two pulleys, swivelling the generator on the slide bars, if necessary. Then cut belt to length and fit fasteners and tighten down generator.

GENERATOR.

If the generator is to give the best efficiency it must be driven at the correct speed.

When the plant was ordered the engine speed and size pulley were specified, and we have supplied the correct pulley with the generator.

WIRING.

When electricity flows through a wire the wire offers some resistance to the current. This means that some of the pressure or voltage is used up in overcoming the resistance of the wire. This is referred to as voltage drop.

To eliminate as much voltage drop as possible, care should be taken to see that the proper size wire is used for the installation.

The wiring from the generator to the batteries and the wiring of the house must be carried out by a qualified electrician and done to conform with the S.A.A. rules, otherwise the insurance company may refuse to accept the installation.

As this plant is designed to operate from the milking machine engine, and as the milking shed is usually a considerable distance from the house, the generator has been designed to cope with voltage drop between generator and battery, the battery being located at the house.

It requires 1 h.p. to charge a 32 volt battery at the rate of 9 amps. through a line 100 yards long. See also table following. Therefore, if this plant is to be run at the same time as the milking machine, it is necessary to be sure that the engine has sufficient power to do the milking and run this plant as well.

The table set out below gives the h.p. and various outputs with different lengths of overhead line from the milking shed to the house:—

| H.P. | Amp. Charge. | Watts Per Hour. | Distance from Shed to House. |
|------|--------------|-----------------|------------------------------|
| .9 | 9 | 280 | 50 Yards |
| .7 | 7 | 210 | 50 " |
| .5 | 5 | 150 | 50 " |
| 1 | 8 | 250 | 100 " |
| .75 | 6 | 180 | 100 " |
| 1 | 7 | 210 | 200 " |
| .75 | 5 | 150 | 200 " |
| 1 | 7 | 210 | 300 " |
| .75 | 5 | 150 | 300 " |

The watts per hour is the effective charge in the battery which will be received after allowing for line losses.

For example:—

210 watts per hour with milking machine running 5 hours per day is 1050 watt hours, so that seven 40 watt lamps could be lit for about $3\frac{1}{2}$ hours every night.

The correct size wire to be used on this plant to minimise the voltage drop is 7/20 wire from the generator to the batteries, and 7/20 for the various circuits, and 8/20 switch leads.

Make sure that no more than 5 lights are connected up to the one circuit.

SETTING UP BATTERIES.

Assemble battery stand and set in position previously decided upon. Unpack the batteries and place them in position on the stand, about 1½ in. apart.

Connect cells together, making sure that they are connected correctly; that is, positive terminal to negative terminal. Use the flexible connection on the end cells of the two rows.

Tack the battery instruction chart on the wall behind the batteries, also drive two nails into the wall to support the bulb of the hydrometer and allow it to hang free without any risk of breaking.

STARTING FOR THE FIRST TIME.

When all the wiring is completed, start the engine with the belt connected to the generator.

Observe the charging rate and adjust if necessary. The charging rate for the batteries is marked on the battery maintenance chart.

If it is necessary to alter the charging rate, then move one of the clips on the rheostat.

Moving the clips apart reduces the charging rate, and bringing them closer together increases the charging rate.

Now, if the engine is used for driving some other machinery besides the generator, then put the load on to the engine and see if it has sufficient power to drive both the generator and the other machinery as well, at the charging rate decided upon.

If not, then reduce the charging rate by altering the rheostat clips until the engine is running not fully loaded.

It is essential for the operation of any engine that it should not operate in a fully loaded or overloaded condition.

GENERAL RUNNING INSTRUCTIONS.**GENERATOR.**

The generator does not require any attention other than an occasional cleaning of the commutator with **sand paper**, not emery paper.

The generator must not be run with the batteries disconnected as it WILL BURN OUT the winding in the cutout.

SWITCHBOARD.

If at any time one of the wires should be disconnected by mistake it can be replaced in its correct position by referring to the number on the wire and attaching the wire to the terminal of the same number.

Refer to the layout diagram, Fig. 2474, page 5, and note that each terminal and connection is numbered and both ends of the wire are numbered to correspond so that no difficulty will be experienced in following the circuit.

CUTOUT, refer to page 18.

FUSES.

If the generator is running and does not show a charge, inspect the cutout first and see that the contacts are closed and are making proper contact.

If so, stop engine and inspect the two fuses on the switchboard and see if they are blown, and, before renewing them, endeavour to find a short circuit which may have caused them to blow.

It will probably be found that the two wires for the overhead lines are touching.

After this has been rectified, renew fuses and test again.

If it still won't charge, and there are any fuses at the house, between the batteries and the generator, check these and see that they are correct.

If these are correct, and all connections at the generator end and the battery end are correct, and generator still fails to charge, then do not interfere with the generator, but arrange for a qualified electrician to inspect the plant.

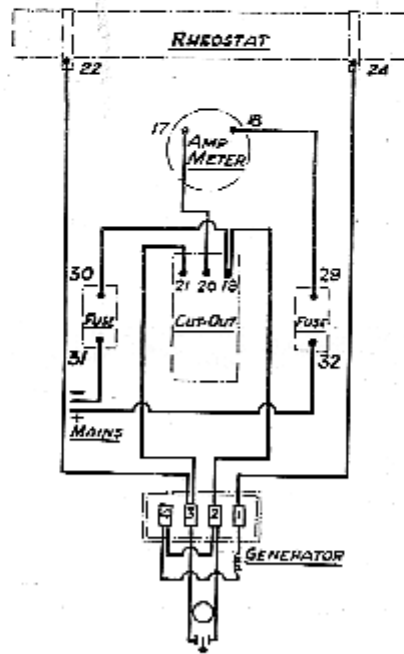
BATTERIES.

As the Fig. 2296 plant, in the majority of cases, is used in conjunction with a milking machine engine, instructions will be different from those set out on page 16, for Figs. 2420 and 2298 plants.

With the Fig. 2296 plant the batteries are charged while the engine is driving the milking machine.

In this case it is advisable to observe the condition of the batteries daily, and if it is found that they are not being discharged in a proper manner, as set out on page 16, then disconnect the belt from the generator and allow the battery to discharge to about $\frac{1}{2}$ charged and then connect up the generator.

Once every month the batteries must be given an overcharge, and to do this it will be necessary to allow the engine to run for a while after the milking has been completed, and to get the maximum results and efficiency this must be carried out.



LAYOUT DIAGRAM FOR FIG. 2296
150-500W. LIGHTING PLANT

Fig. 2474.

**Fig. 2420. 700 W. 32 or 50 Volt Semi-Automatic
Lighting Plant**

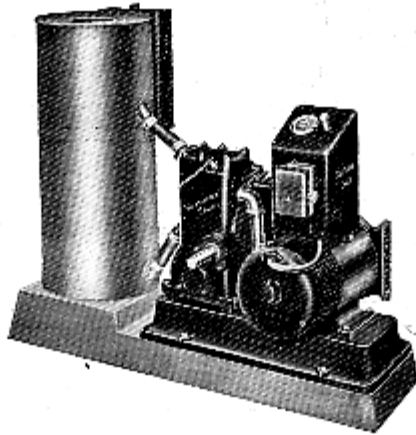


Fig. 2420.

UNPACKING.

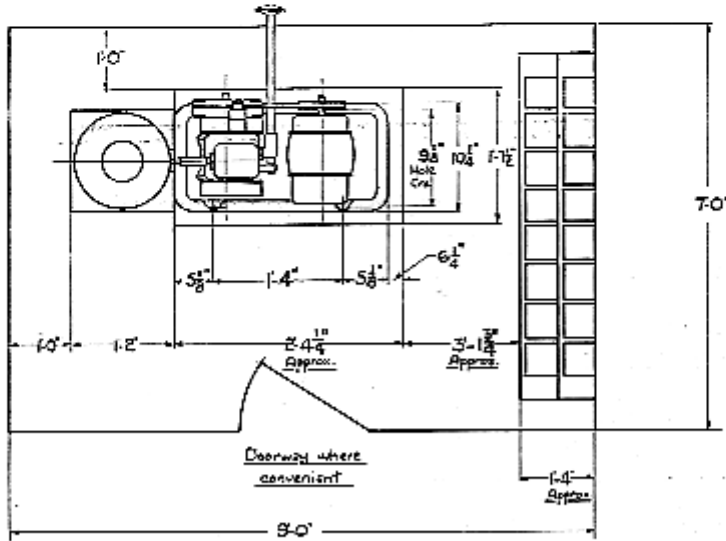
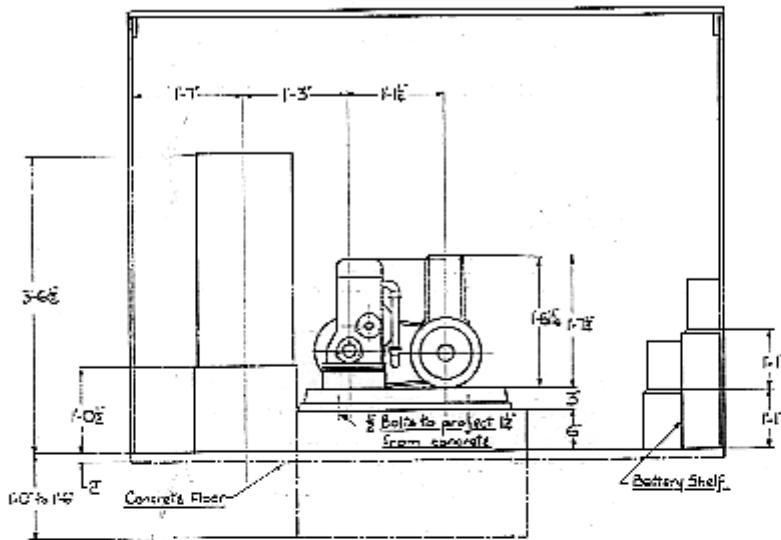
After removing the top of the generator case, this book will be found tacked inside the case. Then, with the check list with the instruction book, check off the items in the box and, finally, remove the generator.

The engine is packed separately in another box and is checked to the list in the back of the engine instruction book.

FOUNDATION.

The plant will give the best results if it is set up on a firm foundation—a block of concrete is the best.

The plant can also be bolted to an existing concrete floor, and in this case four holes are punched into the floor with a cold chisel to correspond with the foundation holes in the base.



GENERAL ARRANGEMENT OF FIG 2470
 700 WATT 22.5V 50VOLT LIGHTING
 PLANT WITH MARK AKB ENGINE

Fig. 2477.

The foundation bolts supplied are set in position in the holes and the base fitted over them. Put nuts on bolts and, after levelling the base, fill the holes with a mixture of 50-50 sand and cement.

Allow the mixture to set for 24 hours and then fit the engine and generator as set out under "Assembling Plant."

TO MAKE A CONCRETE BASE.

If a new base is to be made construct a rectangular wooden form, the inside dimensions to be 2ft. 8½in. long, 1ft. 7½in. wide, and 6in. high, from the timber in the case.

Refer to Fig. 2477, showing foundation plan of plant and decide upon the most convenient position of the unit, making allowance for the batteries to be erected as near as possible to the generator.

Then sink a hole 12in. deep in the ground to the same dimensions as the inside of the mould.

Set two pieces of 2 x 1 into the top of the mould to support the engine base.

Put foundation bolts in position in base and set base over mould.

Now mix a batch of concrete, using four parts stone, three parts sand, and two parts cement, and pour enough of the mixture into the mould to support the foundation bolts temporarily, then remove base and fill the mould level with the top. Replace base, moving bolts to suit if they have been shifted.

Smooth off the block and allow the concrete to set for 24 hours.

If the engine is tank cooled, either a wooden stand or a concrete block is made to take the tank. (See Fig. 2477 for dimensions.)

After base has been standing for approximately 24 hours, remove the supporting strips from under the cast iron base and allow base to sit on concrete. Again check base for level, packing it up with shims, if required.

Remove wooden mould, and surface block with a 50-50 mixture of sand and cement. Allow base to stand for at least another day.

ASSEMBLING PLANT.

Refer to Engine Instruction Book.

First remove the angle feet from the engine sump and reverse them so that the flange of the angle projects under the engine sump.

Lift engine into position on base and tighten down with the four setscrews supplied.

Remove the carburettor from the engine and screw in bend for exhaust outlet and then replace carburettor. Make sure packing is not damaged when removing carburettor.

Now set cooling tank in position and connect up the engine. Also connect up the fuel system. This is set out in the engine instruction book.

Set generator with switchboard attached in position on base. With a piece of string or a straight edge, test the two pulleys for alignment and, if necessary, shift the generator pulley until they line up. Further adjustment can also be obtained by swivelling the generator with the bolts partly loosened.

When in line, tighten up the generator. Then tighten belt if necessary by removing a link. See page 19.

SETTING UP THE BATTERIES.

Assemble battery stand and set in position previously decided upon. Unpack the batteries and place them in position on the stand, about 1½ in. apart.

Connect cells together, making sure that they are connected correctly; that is, positive terminal to negative terminal. Use the flexible connection on the end cells of the two rows.

Tack the battery instruction chart on the wall behind the batteries. Also drive two nails into the wall to support the bulb of the hydrometer and allow it to hang free without any risk of breaking.

ELECTRICAL CONNECTIONS.

Using 7/16 insulated cable, connect the battery positive terminal on the back of the switchboard to the positive terminal of the battery and the negative terminal to the negative terminal of the battery.

Also, using 7/16 wire, connect wire from the positive and negative line terminals out to the point where the overhead line goes across to the house.

If the house wiring is complete, the plant is now ready to start.

TO START PLANT.

Refer to Engine Instruction Book.

1. Fill the petrol tank with fuel and the sump with lubricating oil. Refer to pages four and five of the engine instruction book.
2. Turn on Fuel Cock 123 in Filter and allow fuel to run into carburettor.
3. Fill the cooling tank with water, not over 1½ in. from the top. Don't allow water level to get lower than the top water connection of the cooling tank.
4. Remove spark plug from cylinder head and pour in a teaspoonful of lubricating oil and then replace the plug.
5. Open needle valve, No. 96, to No. 1 position.
6. Turn flywheel, No. 4, in the opposite direction to the arrow on the flywheel until compression is felt.
7. Press starter switch on switchboard and momentarily choke the engine when starting, but do not overchoke the engine or it will be hard to start.

As the engine warms up, gradually close the needle valve, No. 96, to the running position, the final setting being made about ten minutes after the engine has started.

A little care spent in adjusting the needle valve will result in a great saving in fuel. The exhaust should be smokeless.

When plant is running and batteries are not fully charged the ammeter should read approximately 16.5 amps. It will be necessary to reduce the engine speed to provide the correct charging rate. The engine, as supplied, is set to run at 1800 r.p.m., and this speed is reduced to about 950 to 1000 r.p.m. for the Lighting Plant.

To increase or decrease the charging rate, either increase or decrease the engine speed until the required charging rate is obtained.

To stop engine, screw needle valve down on seat. Do not use undue pressure as it will damage the seat.

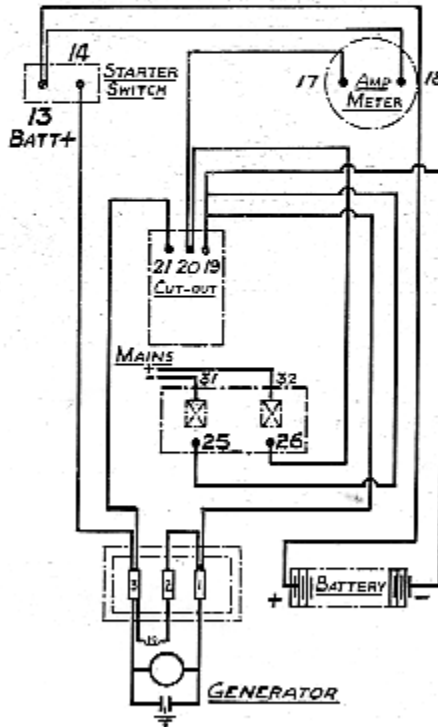
General Running Instructions

Engine.—Refer to engine instruction book.

Generator.—Refer to pages 18 and 19, under heading of "Lubrication of Generator."

Cutout.—Refer to page 18, "Cutout."

Batteries.—For care and maintenance of batteries, refer to page 16.



LAYOUT DIAGRAM FOR FIG. 2420
700w. 32 or 50v. LIGHTING PLANT.

Fig 2476.

Fig. 2298. 1500 W. 32 or 50 Volt Semi-Automatic Lighting Plant

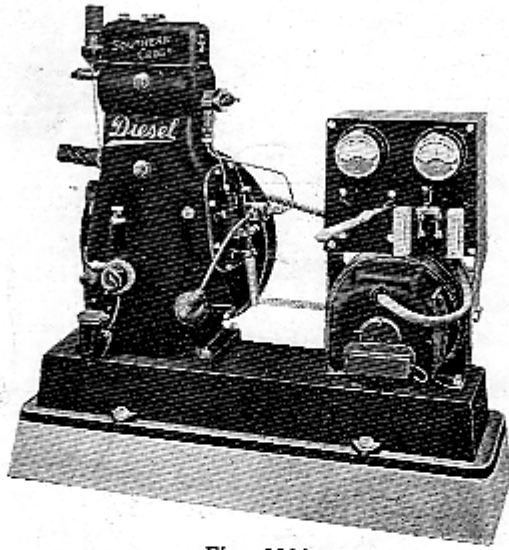


Fig. 2298.

UNPACKING.

After removing the top of the generator case this book will have been found in the top.

Then, with the check list in the same envelope, check off the items in the box and finally remove the generator.

The engine is packed separately in another box, and is checked to the list in the back of the engine instruction book.

The base is in the long box, and the contents of this box are checked to the list inside.

THE FOUNDATION.

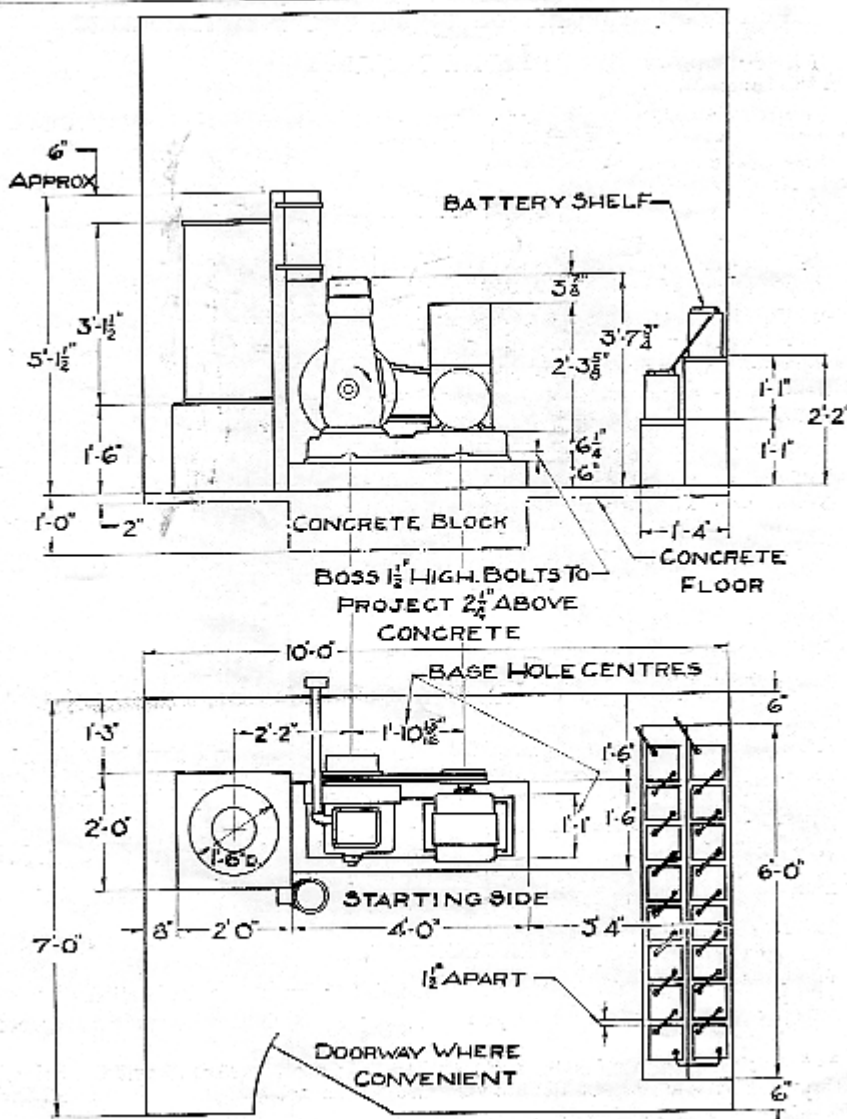
This plant will give the best results if it is set up on a firm foundation.

A block of concrete is the best, or the base may be bolted to an existing concrete floor.

In the latter case, four holes are punched with a cold chisel to suit the holes in the base, and then the bolts supplied with the base are put in position in the holes and the base fitted over them.

Then put the nuts on the bolts and, after levelling the base, fill the holes with a 50-50 mixture of sand and cement.

After the block has set, proceed to fit the engine and generator as set out below.



GENERAL ARRANGEMENT OF FIG. 2296-1500W 32V & 50V ⚡
 LIGHTING PLANT
 Fig. 2478.

TO MAKE A NEW BASE.

If a new base is to be made, make a rectangular wooden form, 4ft. x 1ft. 6in. x 6in. high from the boards in the case.

Refer to Fig. 2478 and decide on the position of the plant, making allowance for the batteries to fit in a convenient position near the generator.

After deciding on the position, sink a hole 12in. deep in the ground the same size as the inside of the mould.

Fit the four foundation bolts in position on the base with the large washer at the bottom against the head.

Screw the nut on a full thread. Now place the base on top of the mould and support it with two pieces of thin pine or flat bar.

Mix a batch of concrete, using 3 parts sand, 4 parts stone, and 2 parts cement.

Pour enough of this mixture into the mould to support the bolts temporarily, then remove the base and fill the mould level with the top.

Replace the mould, moving the bolts to suit if they have been shifted.

Smooth off the top of the base and allow concrete to set for about 4 to 8 hours.

Remove supporting strips and allow base to sit on concrete. Check it for level.

Remove the wooden form and surface with a 50-50 cement mixture.

Allow the base to dry for at least a day. With a Diesel Engine the base must be allowed to dry for two days before the engine is started.

Either a wooden stand or a concrete block is then made to take the cooling tank.

ASSEMBLING PLANT.

Refer to engine instruction book.

Lift engine and place in position on studs. Tighten nuts.

Now assemble engine and install cooling tank as set out in the engine instruction book. Use the extra exhaust pipe supplied to carry the exhaust through the side wall.

Fit pulley to engine flywheel.

Put four special bolts in generator base and lift the generator and set it on the base. The heads of the four bolts go through the large holes in the base. See that the flats under the heads are turned correctly to suit the slots. Slide the generator along into the slots.

Put the two V belts on engine pulley and generator pulley.

With a piece of string or a straight edge check the two pulleys for alignment, and, if necessary, shift the generator pulley sideways on the shaft by loosening the setscrew.

When in line pull the generator back until the bolts are tight.

Check the alignment again, and, if necessary, adjust by swivelling the generator with the bolts only partly tightened.

When the belts are tight and the pulleys in line, tighten the generator bolts and setscrew in pulley.

BATTERIES.

Assemble battery stand and set in position previously decided upon.

Unpack batteries and place in position about 1½ in. apart.

Connect cells together. Make sure that they are correctly connected, positive terminal to negative terminal. Use the flexible connection between the end cells of the two rows.

Tack the instruction chart on the wall behind the batteries.

Drive two nails into the wall, which will hold the bulb of the hydrometer and allow it to hang free without any risk of breaking.

ELECTRICAL CONNECTION.

Using 7/16 insulated cable, connect + B terminal on the back of the switchboard to the positive terminal of the battery. Also the — B terminal to the negative terminal of the battery. Using 7/16 insulated wire run two wires from the + line and — line terminals to the point where the overhead line goes across to the house.

The house wiring must be installed to conform with the S.A.A. rules, and by a qualified electrician.

If our electrician is installing the plant he is a qualified man, but if a local man is installing the plant see that he is registered, otherwise the Insurance Coy. may refuse to accept the installation.

7/20 wiring is to be used in the house and 3/20 switch leads. No more than 5 lights are to be connected to one circuit. A separate circuit is to be made of 7/20 wire for each power point on 32 volt plants.

TO START PLANT.**Mark YB Diesel Engine.**

See that the fuel tank is full and lubricating oil is in the crankcase. Refer to pages 4, 5, and 6 of the engine instruction book.

1. See that the fuel cock is on.
2. Lift automatic overload stop on pump so that control rod moves to full open position.
3. Push valve lift plunger (D Fig. 2252) in and at the same time rotate the engine and the plunger will slide in and release the compression.
4. Pour sufficient lubricating oil into the oil starter plug (K Fig. 2252, Engine Instruction Book) to nearly fill it, then put into head and tighten. **(DO NOT POUR OIL IN WHILE ENGINE IS RUNNING.)**
5. Pull starting lever on switchboard up to starting position and the generator will rotate the engine.
6. As soon as the engine has run a couple of revolutions release the valve lift plunger by rotating the twist grip (J Fig. 2252, Engine Instruction Book) and the engine will start.
7. Hold starting lever up until engine gains speed and then release it and the generator will charge the battery.

Mark PAA Kerosene Engine.

Refer to pages 2, 3, and 4 of Engine Instruction Book.

1. Lift drain plug in carburettor and allow any kerosene in carburettor to drain out. Then press plug firmly into seat.
2. Fill the carburettor with petrol.
3. Open needle valve to No. 1 position.
4. Move air regulator, No. 310, Fig. 2112B, so that the holes are closed.
5. Pull starting lever on switchboard up to starting position and generator will rotate the engine.
6. As soon as the engine starts open the air regulator, No. 310, Fig. 2112B.

Then as the engine starts up gradually close the needle valve to running position, No. 2. The final setting is made about 5 to 10 minutes after the engine has started.

A little care spent in adjusting the needle valve will result in economy of fuel. The exhaust should be smokeless.

When starting in very cold weather, it may be necessary to turn off the fuel cock and fill the carburettor a second time before the engine will run on kerosene.

ENGINE SPEED.

With the engine running charging the batteries the ammeter should show a charge of about 17 to 20-amps if the battery is not fully charged, but with a fully-charged battery the charge will be about 12 to 15 amps.

As the Diesel Engine, when supplied, is set to run at 1200 r.p.m., and the Kerosene Engine at 900 r.p.m., the charging rates at first will be too high, as the correct engine speeds on full loads are 950 r.p.m. for Diesel Engines and 625 r.p.m. for Kerosene Engines.

To alter the charging rate of the plant, alter the governor spring adjustment to reduce the engine speed till the rate is about right.

Then make sure that the main switch is open and turn the change-over switch to "direct."

Now note the voltage, and if about 32-36 volts switch on a few lights and observe again. If above 32-36 reduce the engine speed until the voltage is correct. Now check charging rate again by switching to "charge."

When running the plant direct without the batteries the ammeter will indicate on the discharge side.

When the plant is started and run on direct the voltage may not rise to 32-36 volts, but stop at about 24 volts. It will rise as soon as a few lights are switched on.

If a rev. counter is available, check the speed on full load. It should be 950 r.p.m. for the Diesel Engine and 625 r.p.m. for the Kerosene Engine. Adjustment to the charging rate is made by moving the middle clip on the rheostat to the left to increase the charge, and to the right to decrease it.

For direct lighting the voltage should remain between 30 and 37 volts, and any variation to the voltage can be made by moving the right hand clip.

If the house wiring is complete the plant is now ready for service.

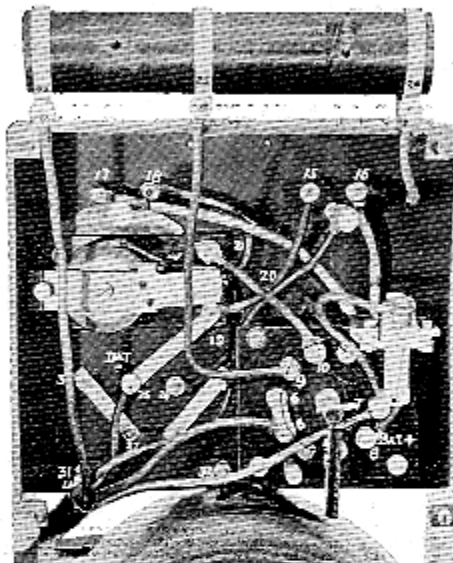
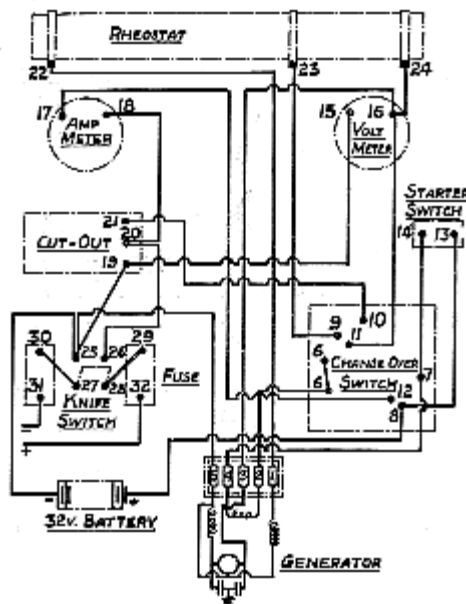


Fig. 2480.
Switchboard, Fig. 2298 Plant.



LAYOUT DIAGRAM FOR FIG. 2296
1500W 32 OR 50V LIGHTING PLANT

Fig. 2479.

GENERAL INSTRUCTIONS.

Engine.—Refer to engine instruction book.

Generator.—The generator must not be run in the battery charge position with the batteries disconnected, as this will burn out the cutout.

If at any time one of the wires is disconnected by mistake it can be replaced by referring to the number on the wire and attaching the wire to the terminal of the same number.

Refer to Figs. 2479 and 2480 and note that each terminal has a number, and stamped on each end of each wire is a number to correspond with the terminal to which it is bolted.

BELTS.—Occasionally it will be necessary to slide the generator back to tighten the belts.

CUTOFF.—Refer to page 18.

RUNNING INSTRUCTIONS.

Use the plant direct without batteries whenever possible, for ironing and whenever a lot of lights are used, and so save the batteries.

The battery should only be used as a standby, and if this procedure is adopted very much longer life will be obtained from them.

The Diesel Engine is very economical to run and should be used as much as possible.

Batteries.—When the batteries are being charged, and are nearly fully charged, the voltmeter will read 40 to 45 volts. Refer to chart supplied with batteries and page 17.

Generator.—Refer to page 18, under "Lubrication of Generator."

General Instructions For All Plants

BATTERIES.

If a battery is to give its maximum life and complete satisfaction, then it must be regularly charged and discharged to about $\frac{1}{2}$ charge and not kept in a fully charged condition all the time.

When a set of batteries is installed, they should be charged immediately at the specified rate until the gravity reading on the hydrometer ceases to rise after three consecutive hourly readings and the cells are gassing freely.

The capacity of the batteries should be such that the load can be carried from 5 to 7 days without recharging. If the load is greater than $\frac{1}{2}$ the normal discharge rate at any time during the week, the batteries should be assisted by operating the engine over this period.

Once every 60 days the batteries should be given an equalising charge. Continue charging for approximately 2 hours after the battery has reached a fully charged condition.

For the Fig. 2296 plant the above instructions should be adhered to as closely as possible, although it may be difficult in this case where the engine driving the milking machine is operating the generator.

The average running for one of these engines is 3 to 4 hours per day and, unless there is a fairly large drain on the batteries, it will be found that the batteries are being continually overcharged, and this will greatly reduce the life of the batteries.

Check the batteries every day with the hydrometer, and so that they will be properly discharged, it may be necessary to disconnect the belt from the generator and, when they become partially discharged again, connect up the generator.

DO.

1. Do check the battery every second day with the hydrometer. (Every day for the Fig. 2296 plant).
2. Do charge and discharge to $\frac{1}{2}$ or $\frac{1}{4}$ charge regularly, as specified.
3. Do wipe down battery after checking.
4. Do overcharge battery every 60 days.
5. Do keep batteries charged when not in use.

DON'T.

1. Don't maintain a practically fully charged battery at all times. This reduces the life of the battery by approximately 30 to 38 per cent.
2. Don't maintain a practically fully charged battery at all times and considerably overcharge on each recharge. This will shorten the life of the battery by approximately 70 to 80 per cent.
3. Don't allow battery to stand in a discharged condition and idle for monthly or two monthly periods and then charge and use. This will shorten their life by 30 to 40 per cent.
4. Don't exceed maker's recommendation for rate of charge.
5. Don't bring a naked light near the batteries.

CHARGING A RADIO BATTERY FROM A STANDARD SOUTHERN CROSS PLANT.

A radio battery has a low discharge and charging rate. The charging rate should rarely exceed 6 amps.

This rate is therefore much below the charging rate of the plant and could not be connected up with the other batteries which are charged at approximately 15 to 20 amps. This rate would ruin a radio battery.

The following method can be adapted to the Southern Cross Plant for the ordinary radio battery. We can supply a suitable charging board on request.

Connect a lamp in series with radio battery and then connect to the source of supply. An ordinary tumbler switch is wired in the circuit to shut off the supply when there is no battery in the circuit.

The lamp acts as a resistance in the line and allows the current to pass into the battery and thus charge it. A 60 watt lamp at 32 volts will allow a charging rate of 2 amps.

The above circuit is as follows:—

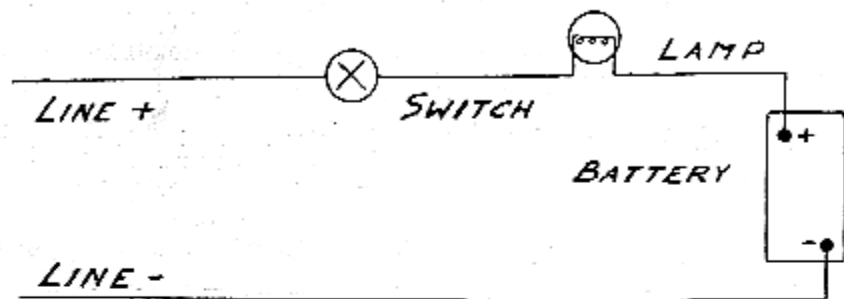


Fig. 2481.

CHARGING CAR BATTERIES.

Exactly the same procedure as for charging a radio battery can be adopted for a car battery. The car battery can stand a higher charging rate, and so the size of the lamp is increased, or extra lamps can be placed in parallel with the present one and so increase the charging rate. A standard Southern Cross battery charging board can be purchased for this purpose.

CUTOUT.

The cutout is adjusted correctly before leaving the factory and should not require any further adjustment when installing the plant.

However, after the plant has been in use for some time the cutout points may become burnt and require cleaning.

To clean the points proceed as follows:—

1. Remove one of the battery wires.
2. With a magneto file carefully file the contacts so that they are quite clean. Do not file away more than necessary, and see that the contacts, when closed, press firmly and evenly over the whole face.
3. Replace the battery wire.
4. Start the engine and observe the action of the cutout and see that the contacts open and close properly, and tighten spring on moving contact if contacts do not open promptly when engine is stopping. The ammeter should not show more than 5 amps discharge before the contacts open.

LUBRICATION OF GENERATORS.

When the machine leaves the works, the bearings are well packed with grease, and, providing it is not working in a hot atmosphere, the bearings do not require attention for two or three years.

After the expiration of that time it is advisable to take off the outside caps and re-pack the bearings with grease.

The faults arising from over-lubrication are far greater than those occurring from under-lubrication. Under no condition must oil or grease containing graphite be used.

COMMUTATOR AND BRUSHES.

It is important that the commutator be kept free from dust and dirt. Check the commutator while the engine is running. It should be practically sparkless at all times.

Periodically clean the commutator with SAND PAPER, not emery paper.

If sparking does occur at the brushes, stops should be taken immediately to cure it or serious trouble will arise in a short time. First see that the brushes are free in the holders. If taken out they must be replaced in exactly the same position.

Should new brushes be fitted at any time, see that they are free to slide in the holders.

When brushes are worn down to less than $\frac{1}{16}$ in. replace them immediately.

BRAMMER BELTS.

Brammer Belling should always be installed one link short in every 12 inches of length. Each belt in a set should have exactly the same number of links. No further attention is necessary unless slippage is occurring.

To remove a length of belting from the coil, first ascertain length required and note where links have to be released. Hold the belting in both hands with thumbs on top of the studs in front of and behind the link which is to be loosened, the studs to be in a vertical position with the heads marked "R" at the top.

Still holding the belt firmly, bring the thumbs towards each other, in which case the link between the thumbs will move forward and the stud will slip into the large hole in the centre of the link. A light wriggling motion will help if the stud is stubborn. Immediately the stud slides into the large hole the link can be lifted off.

Repeat the process with the next link and the belt will come apart. Five minutes practice will enable anybody to completely master the manipulation of this Belling.

To link up, pass the stud at the end of the link through the centre large hole of the link at the other end of the belt. Ease the stud back into the small hole at the narrow end of the link. Pass the next stud through the large hole in the same link but pull into the small hole at the round end of the link. Repeat with the link that is left and the belt is complete.

See that the belt is **TIGHT IN THE FIRST INSTANCE** so as to remove the dormant elasticity and then the only adjustment necessary should be by reason of wear after a considerable period.

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