

# INSTRUCTION BOOK

*for*

# SOUTHERN CROSS ALTERNATING SET

**Fig. 2735/2736 20 KVA 240/415 Volt**



## THE SOUTHERN CROSS ORGANISATION

### QUEENSLAND:

TOOWOOMBA FOUNDRY  
PTY., LTD.,

Box 109, P.O., Toowoomba, Q.  
Box 393, P.O., Rockhampton, C.Q.  
Box 304, P.O., Townsville, N.Q.  
Box 115, P.O., Charleville.

### VICTORIA:

SOUTHERN CROSS WINDMILLS  
& ENGINES PTY., LTD.,  
24 Moray Street, South Mel-  
bourne, S.C.5.

### NEW SOUTH WALES:

SOUTHERN CROSS ENGINE  
AND WINDMILL CO. PTY.,  
LIMITED,

22 Young Street, Sydney, N.S.W.  
32-34 Fitzroy Street, Tamworth,  
N.S.W.  
70 Frome Street, Moree, N.S.W.

### SOUTH AUSTRALIA:

SOUTHERN CROSS  
MACHINERY PTY., LTD.,  
37 Rann St., Birkenhead, S.A.

### WEST AUSTRALIA:

SOUTHERN CROSS WINDMILL  
AND ENGINE COMPANY,  
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292-4 Railway Terrace, Maylands,  
W.A.

### SOUTH AFRICA:

SOUTHERN CROSS WINDMILL  
& ENGINE CO. (PTY.), LTD.,  
50 Henry Street, Bloemfontein,  
South Africa.

# SOUTHERN CROSS

## 20 KVA 240/415 Volt

# ALTERNATING SETS

FIG. No. 2735 TANK COOLED.

FIG. No. 2736 RADIATOR COOLED.

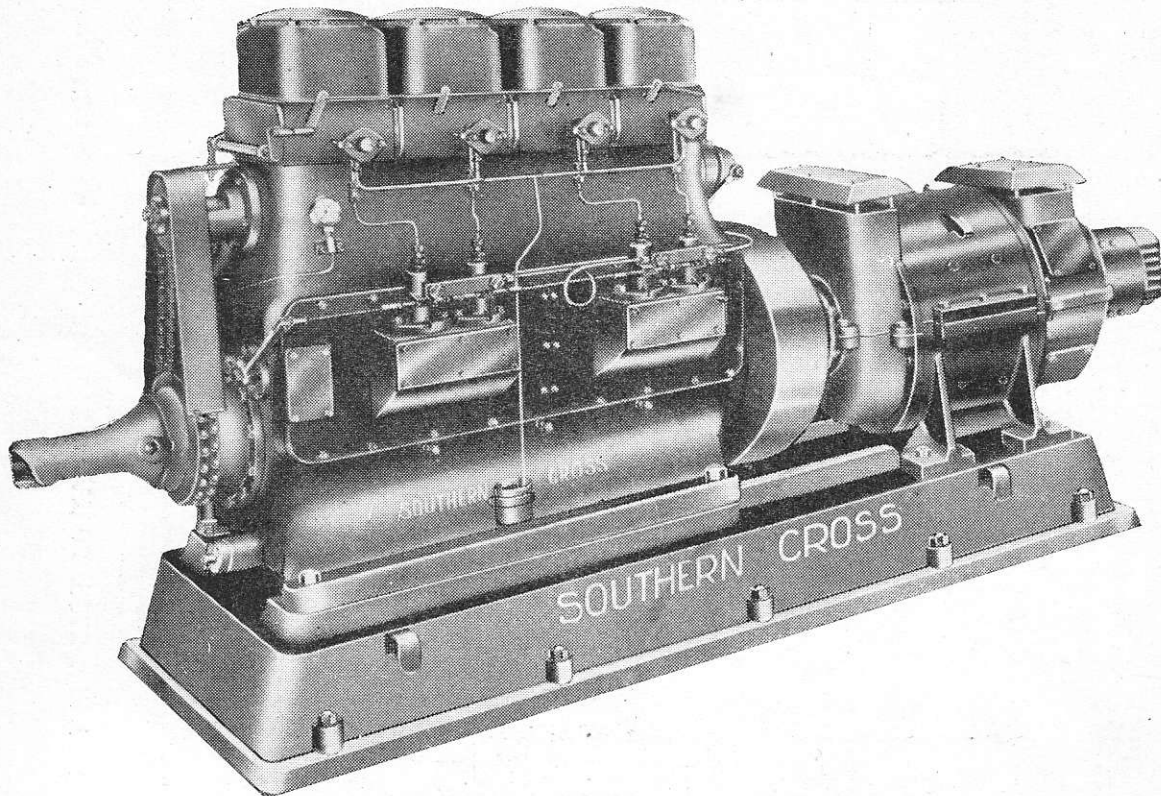


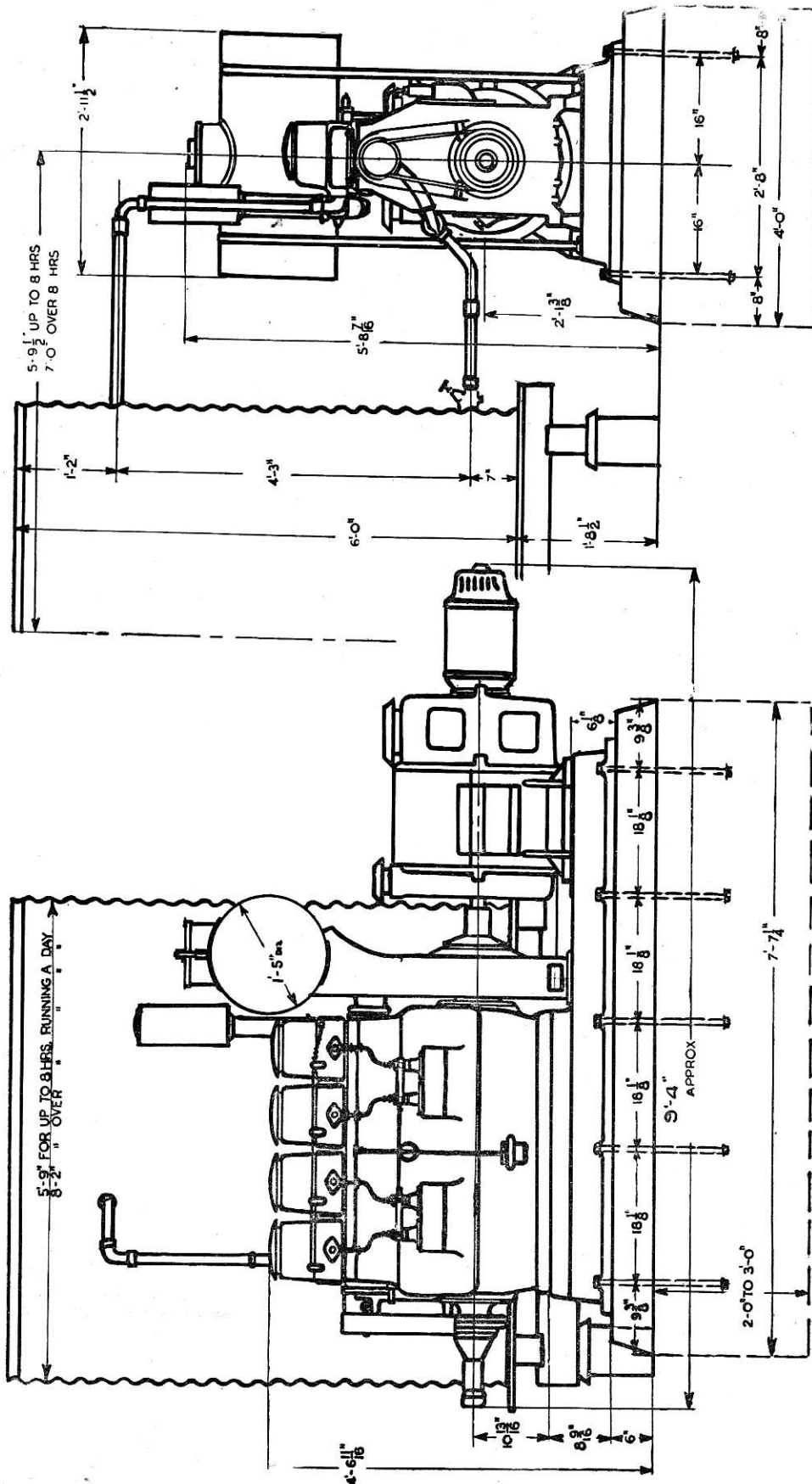
Fig. No. 2735 20KVA 240/415 Volt Alternating Set.

### FOUNDATION.

In order to obtain the best results from this unit it must be set up on an absolutely firm foundation. The most satisfactory foundation is a good block of concrete. The size of the base and shape of the mould is shown on page 2.

### TO MAKE CONCRETE BASE.

1. From the timber of the case construct a wooden mould similar to that illustrated on Page 2 of the engine instruction book to suit the alternating set base, illustrated on page 2 of this instruction book.
2. Nail two cross boards on the ends of the mould so that it can be supported over the hole in the ground.
3. Take the special foundation hole cross boards with the square wooden blocks nailed on to them. Open out the cardboard cartons and tack the cartons to the square block. These cartons make square holes in the concrete to permit grouting the foundation bolts.
4. Nail the cross boards to the top of the mould in the positions indicated, and see that the cartons are in line.



General Arrangement of Fig. 2735 20 KVA. 240/415 Volt Alternating Set.

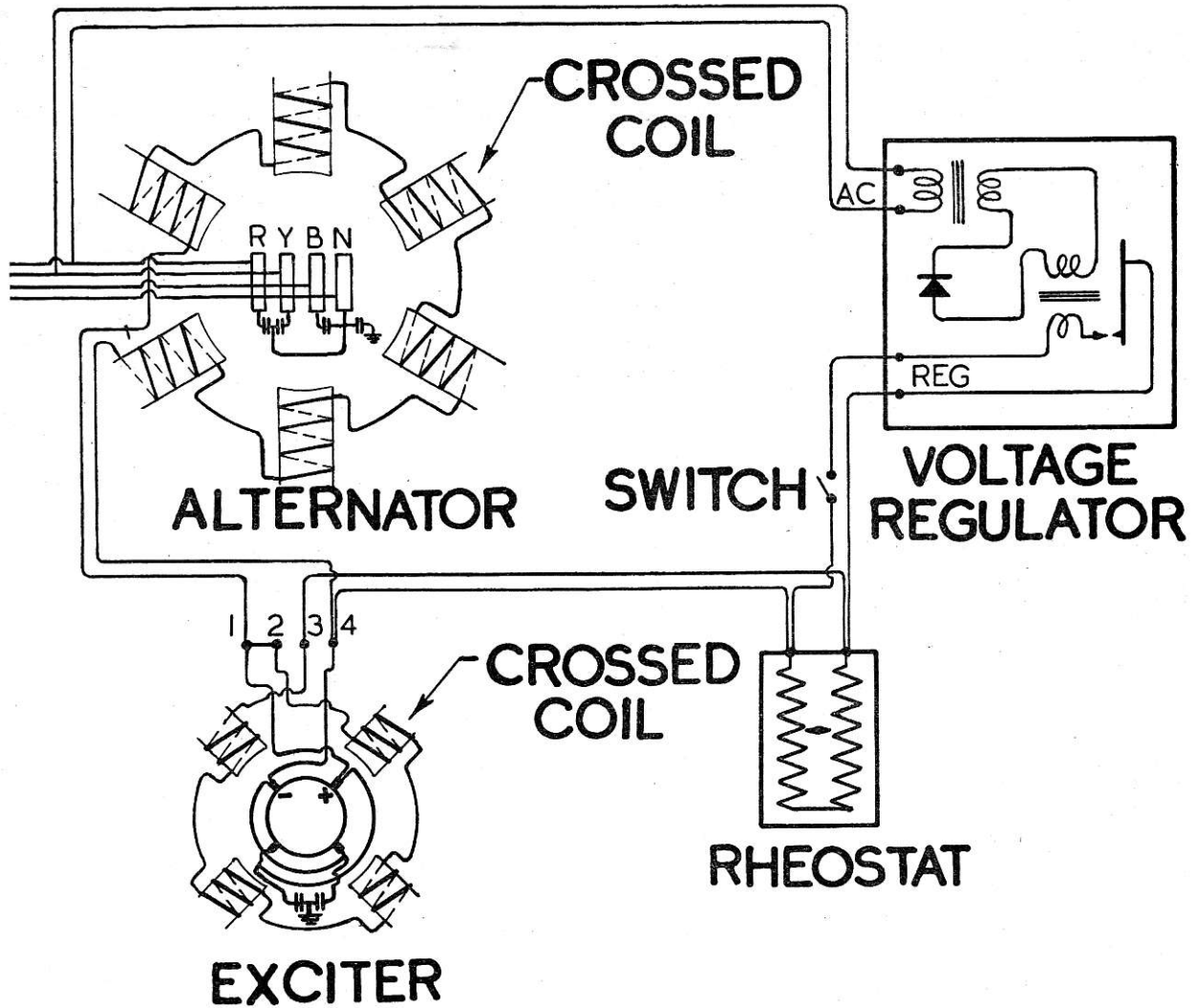
5. Now having decided where the unit is to be installed, sink a hole in the ground 2ft. to 3ft. deep and the same size as the mould.  
The depth of the hole depends on the type of soil, but always make the block larger for preference.
6. Place the mould over the hole and level it in both directions.
7. Mix a batch of concrete using 3 parts sand, 4 parts sharp stone or rubble, and 2 parts cement. See that the stone and sand are sharp and clean and do not contain any clay or dirt. If they do, wash carefully before mixing. A block 3ft. deep will require approximately  $1\frac{1}{2}$  yards of sand,  $1\frac{3}{4}$  yards of sharp stone, and 24 bags of cement.
8. Fill the hole to ground level and also the mould up to the top, and at the same time place some old bolts or iron pipe in to act as reinforcement.
9. Allow concrete to set for a day, and, while it is setting, prepare the base for the cooling tank.
10. Next day remove the cross boards which hold the cartons in position and dig the cartons out.
11. Place the foundation bolts with nuts removed in the holes in the block.
12. Lift the Alternating Set on to the block by means of two slings under the lugs on the base. To prevent the paint from being marked, put a bag between the engine and the slings.
13. As the engine is lowered on to the block, guide the foundation bolts into the holes in the base and, when the unit is resting on the block, screw the nuts on a full nut.
14. The engine and alternator have been correctly lined up before the unit left the factory. However, the base must be set up true or this alignment is destroyed. Therefore remove the pins and rubber bushes from the flexible coupling. Screw the indicator rod support into the tapped hole in the Flexible Coupling Boss, attach the Indicator Rod to the Support and the Indicator to the Rod.
15. True up the base using wooden wedges under it. The base must be lined up so that the misalignment as shown on the indicator does not exceed .005in. on the diameter of the flywheel, and .010in. on the face of the flywheel. This alignment is most important, and unless care is taken to get it correct the life of the coupling rubbers will be greatly reduced.
16. After the unit has been correctly aligned, proceed to grout in the bolts with a mixture of two parts clean sand and one of cement. When the holes are filled work the grouting under the base of the unit so it will set on a firm level foundation. This must be very carefully done to prevent the unit getting out of alignment.
17. Next day remove the wedges, tighten the foundation bolts, and check alignment, and, with the same mixture, clean up the surface of the block.
18. On the following day, assemble the pegs and rubbers and tighten them very tightly. The engine may now be started, but not before, as it is essential that the block be allowed to set for at least four days before the engine is run.

#### SPEED.

When supplied the engine is set to run at 1200 R.P.M. This must be altered to 1000 R.P.M., by adjusting the governor. For instructions on altering the speed, refer to the Engine instruction book, Page No. 19, Governor.

#### ELECTRICAL CONNECTIONS. (BRABYON REGULATOR ONLY)

Terminal connections are shown in the field circuit Wiring Diagram. A Southern Cross Mark AM-H Universal Rheostat is connected across terminals 3 and 4 of the exciter. The remainder of the connections depends on the requirements of the set.



## VIEW FROM EXCITER END

Field Circuit Wiring Diagram.

### AUTOMATIC VOLTAGE REGULATOR

#### INSTALLATION.

The automatic voltage regulator should be mounted in as vibrationless a position as possible. It should be mounted with the control knob at the top or bottom, that is, in a vertical plane.

The connections should be made as shown in the diagram, and the machine started on no load. Reduce the voltage by means of the hand regulator to 90% of the line voltage, e.g. 415 Volt line reduced to 370 Volts, 240 Volt line reduced to 215 Volts. Switch to Automatic operation. Set voltage by means of the adjustment knob on the automatic voltage regulator without altering the position of the hand regulator. If the voltage is then unstable, i.e. the pointer of the voltmeter swings over a considerable range, it will be necessary to change over the leads on the terminals marked REG, and then re-adjust.

**MAINTENANCE. (BRABYON REGULATOR ONLY.)**

Should the action of the regulator become unstable after a period of satisfactory operation, the contact points have probably become dirty and should be cleaned with some fine sand paper inserted between them.

Check the clearance of the vibrating steel armature from the pole face of the magnet. It should be .125 inches.

Set the contact gap at .007 inch clearance.

Make sure all nuts are tightly locked as any looseness will give poor regulation.

**CARE OF ALTERNATOR.**

In order to ensure trouble-free operation of the Alternator it is necessary to observe a certain maintenance routine.

**CLEANING.**

Keep all parts of the Alternator clean. It is most important that the commutator be kept free from dust and dirt. The Sliprings, Brushes, Brush Holders and Spindles, Windings and Terminals should be periodically wiped down with a clean dry rag.

**BEARINGS.**

When the Alternator leaves the works the bearings are packed with grease and do not require further attention before the plant is put into operation.

However, it is advisable to remove the end caps from the bearings at least once a year to examine them. The balls and races should be clean and show no signs of rusting. There need only be a smear of grease on the bearing. If necessary, grease should be added to the bearing. Only fill the bearing cage, don't fill the cap 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.

**Recommended Greases Are:—**

SKF. No. 28 Grease.

Shell RB Grease.

Shell No. 2 Fibre.

Gargoyle No. 3 Grease.

**COMMUTATOR AND SLIPRINGS.**

Keep them clean and bright. Do not allow copper or carbon dust to collect on the insulation between the bars, nor about the junction of the armature windings with the bars.

**BRUSHES.**

Keep the brushes free in their holders and all even in pressure. When worn down to less than 5/8in. long they should be replaced with new brushes of the size and grade stamped on the name plate.

**TO FIT NEW BRUSHES.**

The brush rocker on the Exciter is set in the neutral position, and this position is marked with white paint.

It may be loosened by slackening off the clamp screw and loosening off the commutator End Bearing Cap.

This permits the Brush Rocker to swivel around to expose each Brush Holder.

Remove the old brushes and try the new brushes of the size and grade stamped on the name plate in the Brush Holder.

They should slide freely without sticking. If they are tight ease them down carefully by rubbing the tight side lightly on a flat sheet of fine sandpaper until they will just slide in the holder.

With the new brushes in position, bed them on the commutator or sliprings with a piece of sand paper between the brush and the commutator.

Draw the paper backwards and forwards until the brushes assume the correct curvature, and be careful to keep the cloth around the commutator so that a flat is not formed on the brush. When the process is nearly completed, fine glass paper should be used to obtain a very smooth finish.

After bedding, carefully clean away every trace of dust from the commutator or sliprings, brushes and holders. Make sure no specks of abrasive material are embedded in the Face of the Brush.

Reassemble and shift Brush Rocker to correct position and retighten screws.

The Alternator may be started up again, but it is advisable to run it on light load for a few hours before putting on full load to enable the brushes of the exciter to settle down properly.

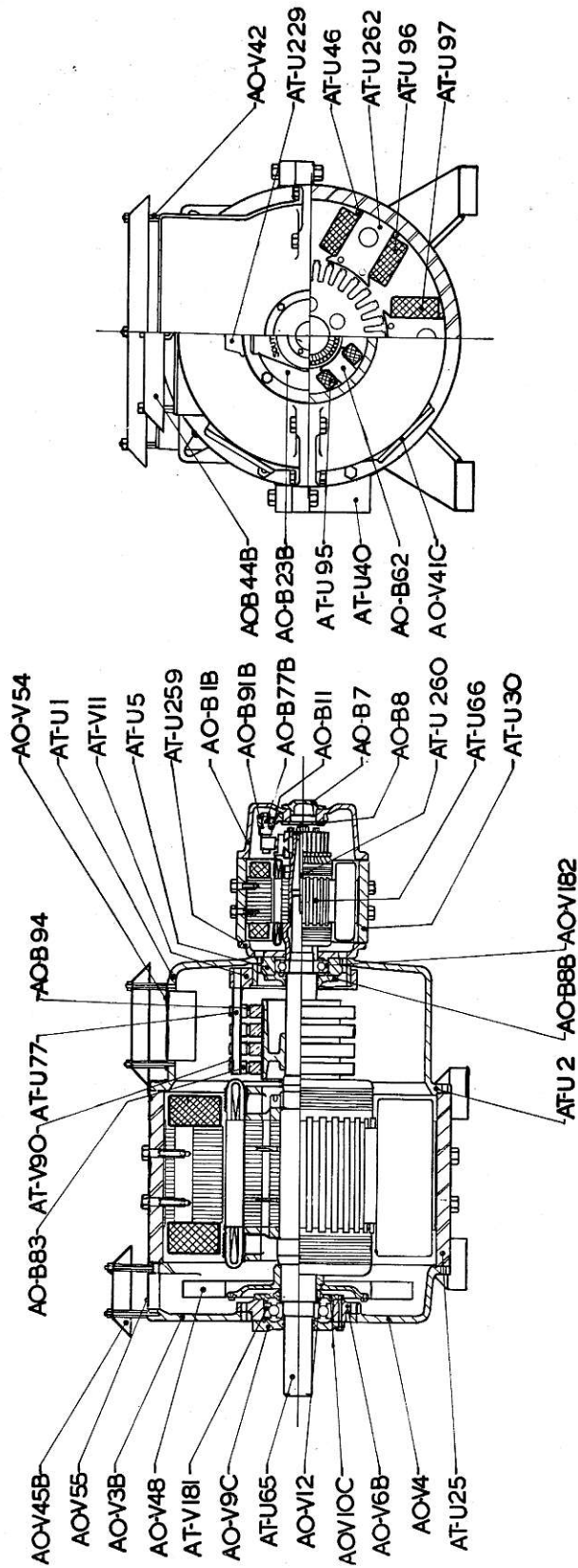
### **SPARKING AT BRUSHES.**

The commutator must be examined occasionally while the plant is running. It should be practically sparkless at all times. If sparking does occur steps should be taken immediately to cure it or serious trouble may arise in a short time.

The sparking may be due to several causes:—

- (1) Brush rocker not in neutral position (check markings).
- (2) Overloading of Alternator.
- (3) Jumping of brushes due to vibration or incorrect pressure on the Brush Tension Arm.

When the Alternator is supplied the tension of the brush of the exciter is correct with the spring in the lowest notch of the Tension Arm, and as the Brush wears it is necessary to place it in a notch further back.



Mark AT-U 20 KVA 240/415 Volt Alternator—Sectional View.



## Southern Cross Generating Sets—PARTS LIST.

### 20 KVA. ALTERNATOR.

No. Off	Sym. No.	Name of Part.	No. Off	Sym. No.	Name of Part.
1	AT-U 1	Alternator Slipring End End Shield—Top Half.	1	AT-U 66	Exciter Armature.
1	AO-B 1B	Exciter Commutator End End Shield.	2	77	Alternator Brush Holder Rod.
1	AT-U 2	Alternator Slipring End End Shield—Bottom Half.	4	AO-B 77B	Exciter Brush Holder Spindle.
1	AO-V 3B	Alternator Drive End End Shield—Top Half.	12	83	Brush Holder.
1	4	Alternator Drive End End Shield—Bottom Half.	2	AT-V 90	Alternator Brush Rod Insulation.
1	AT-U 5	Alternator Slipring End Bearing Housing	8	AO-B 91B	Exciter Brush Holder Spindle Insulating Washer.
1	AO-V 6B	Alternator Drive End Bearing Housing.	12	94	Brush.
1	AO-B 7	Exciter Commutator End Bearing Cap—Outside.	4	AT-U 95	Exciter Shunt Coil.
1	8	Exciter Commutator End Bearing Cap—Inside.	3	96	Alternator Field Coil—Straight.
1	AO-V 8B	Alternator Slipring End Bearing Cap—Inside.	3	97	Alternator Field Coil—Crossed.
1	9C	Alternator Drive End Bearing Cap—Outside.	1	120	Alternator Suppressor Condensor Clamp.
1	10C	Alternator Drive End Bearing Cap—Inside.	1	AO-B128	Exciter Terminal Insulating Strip.
1	AT-V 11	Alternator Brush Rocker.	1	129	Exciter Terminal Strip.
1	AO-B 11	Exciter Brush Rocker.	5	130	Exciter Terminal Bridge.
1	AO-V 12	Fan Boss.	10	131	Exciter Terminal Clamp.
3	K-N 22	Suppressor Condensor.	1	AO-F132	Exciter Terminal Connecting Link.
2	AO-B 23B	Exciter Commutator End End Shield Cover.	4	AO-B133	Exciter Brush Holder Spindle Nut.
1	AT-U 25	Alternator Assembled Body.	4	134	Exciter Brush Holder Clamp Screw.
1	30	Exciter Body.	1	137	Exciter Pole Shim.
1	40	Junction Box.	1	AT-V181	Alternator Drive End Bearing.
4	AO-V 41C	Alternator End Shield Inspection Plate.	1	AO-V182	Alternator Slipring End Bearing.
12	42	Drip Cowl Stud and Distance Piece.	5	AT-U186	Alternator Field Coil Connection.
1	44B	Alternator Slipring End Drip Cowl.	1	187	Alternator "Neutral" Brush to Terminal Connection.
1	45B	Alternator Drive End Drip Cowl.	1	188	Alternator "Blue" Brush to Terminal Connection.
1	AT-U 46	Alternator Field Coil Support.	1	189	Alternator "Yellow" Brush to Terminal Connection.
1	AO-V 48	Alternator Fan.	1	190	Alternator "Red" Brush to Terminal Connection.
1	54	Alternator Slipring End Screen.	1	202	Alternator Name Plate.
1	55	Alternator Drive End Screen.	1	203	Exciter Name Plate.
6	AT-U 62	Alternator Main Pole.	1	AT-V229	Exciter Terminal Cover.
4	AO-B 62	Exciter Main Pole.	4	233	Alternator Bridge for Brush Holder.
1	AT-U 65	Alternator Armature.	1	AT-U259	Exciter Drive End Flange.
			1	260	Exciter Armature Locking Bolt.
			1	261	Exciter Armature Sleeve Washer.
			1	265	Exciter Armature Sleeve Driving Pin.
			2	Y-F336B	Dowel for Alternator Body.
			12	AO-T511	Alternator Main Pole Setscrew.

### MARK BO-T BASE AND FITTINGS.

No. Off	Sym. No.	Name of Part.	No. Off	Sym. No.	Name of Part.
4	AW-D160	Engine and Generator Dowel.	1	BO-T 1	Base for Engine and Generator.

**NOTE.**—For Parts of Engines, refer to separate Engine Instruction Book.