

ANCIAC 80 **INSTRUCTIONS**



A.C. GENERATOR STATIC AUTOMATIC VOLTAGE REGULATOR

SPECIFICATION

GENERAL

The A.V.R. control system is shown in Fig. 1 and consists of two basic control loops (a) and A.C. voltage control loop, (b) an inner current control loop.

(a) Voltage Loop

This control loop operates to maintain constant a.c. generator voltage over the load range N.L. to F.L. at 0.8 p.f.

(b) Current Loop

Operates by controlling the limit to which the exciter current can rise and also provides the degree of forcing required for good transient response. The current limit is also maintained when the prime mover is run at lower speeds.

A "low-speed" protection circuit is incorporated within the AVR to prevent the excitation rising to a sustained high level during slow speed running, thus protecting the generator field windings from overheating.

The A.V.R. has also been designed to cover a large range of exciter a.c. generator combinations with system stability in mind and should not require any change of components or adjustments to ensure stability.

"Start Up" is ensured by the use of the start relay "SR" Fig. 1. This causes the thyristor to switch on fully and in synchronism with one half cycle of the generator voltage. When the generator voltage has risen to 60% "SR" is energised and normal control of the thyristor is ensured.

TECHNICAL DATA

INPUT TO A.V.R. AND NORMAL A.C. GENERATOR VOLTAGE

3 phase, 4 wire supply. A.V.R. output power taken from line A and neutral. 3 phase, 3 wire systems require additional external transformer.

A.V.R. Transformer Tap	Nominal Volts Range
260 V	220-260
460 V	400-460
620 V	540-620

VOLTAGE TRIM ADJUSTER

± 10% of any nominal voltage within the ranges quoted above.

FREQUENCY

40-70 Hz continuous

AMBIENT TEMPERATURE

0-70 Deg. C.

TYPICAL VOLTAGE TEMPERATURE COEFFICIENT

Minus 0.02% of nominal volts/Deg. C. increase.

VOLTAGE - FREQUENCY COEFFICIENT

Negligible

VOLTAGE REGULATION

± 1% under the following conditions:-

- N.L. to F.L. 0.8 p.f.
- Balanced Load
- Compounding inoperative
- No excessive waveform distortion.

A.V.R. GENERATOR RESPONSE TIME-(BRUSHLESS EXCITER TYPE)

0.5 sec. to 1.5 sec. when switching N.L. to F.L. 0.8 p.f. dependent upon size of generator and degree of field forcing available.

STABILITY

The Anciac 80 as the name suggests (A New Concept In Automatic Control), is something special, it employs a unique Electric Construction circuit which provides an inherent automatic anti-hunt feature. Although primarily designed for use with Electric Construction a.c. generators, achieving stability without adjustments, a similar performance should be obtained with a.c. generators not of our manufacture providing the a.c. generator time constant is greater than twice that of the exciter.

RESIDUAL VOLTAGE

A starting device is included which will enable the generator to excite from less than 10 volt residual.

RECOMMENDED MAXIMUM OPERATING FIELD VOLTAGE

120 volts d.c.

MAXIMUM CONTINUOUS OUTPUT CURRENT

6 amps at 45 Deg. C. derating linearly to 4 amps at 70 Deg. C.

OUTPUT CURRENT LIMIT

Pre-set to requirements at either 3, 4, 5, or 6 amps. selected by a soldered link connection on printed circuit card.

PARALLEL RUNNING ADJUSTMENT

0-4% volts droop N.L. to F.L. 0.8 p.f. This adjustment is used in conjunction with an external current transformer designed to provide an output of 1.25 volts R.M.S. at F.L.C. when provided with a suitable Burden resistor, thus enabling generator sets to be run in parallel and reactive loads to be shared without excessive circulating currents.

APPROXIMATE WEIGHTS AND DIMENSIONS

Regulator	
Weight	3.17 kg.
Dimensions	222mm wide x 182mm deep x 112mm high

Transformer (Only required for 3-wire Systems).

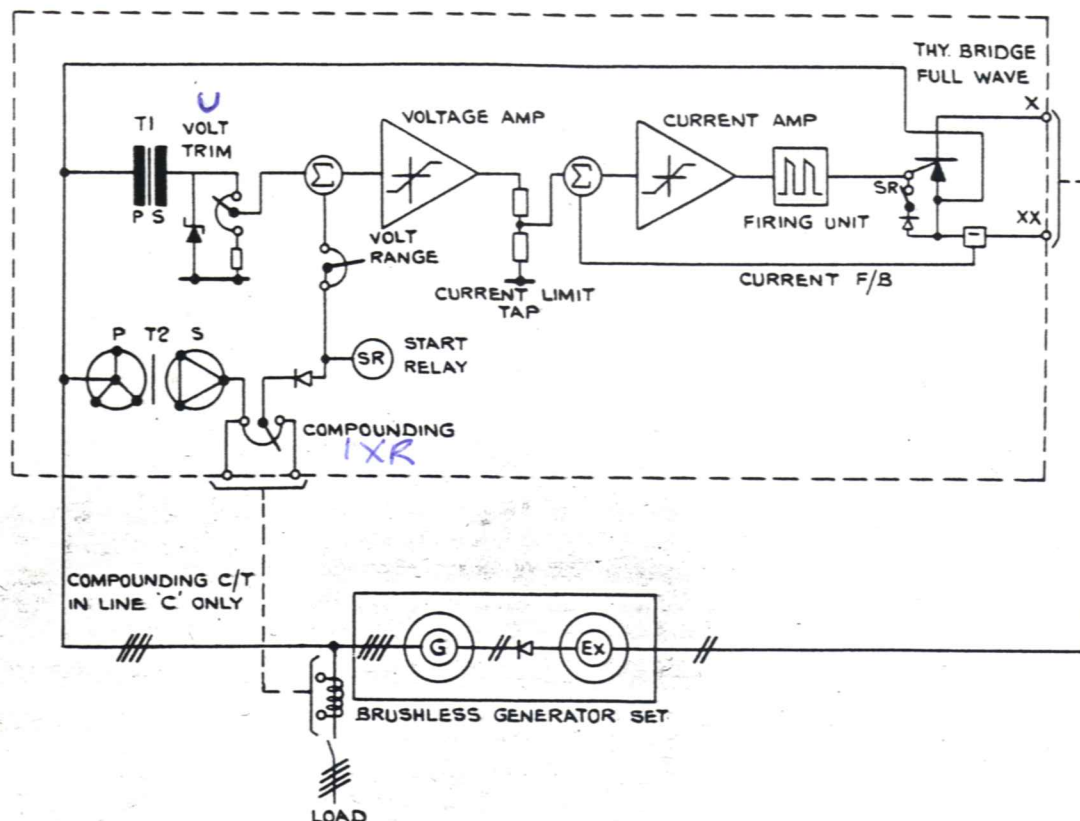
Weight	34 kg.
Dimensions	226mm wide x 191mm deep x 242mm high.

PANEL MOUNTING

The regulator is suitable for panel mounting being a chassis type of unit, without protective covers.

AVR. CONTROL SYSTEM – ANCIAC 80

Fig. 1



SETTING UP INSTRUCTIONS FOR ANCIAC '80'

INSTRUMENTS REQUIRED

Voltmeter (moving iron) to measure a.c. generator voltage.

Field Ammeter 0-10A d.c.

Tachometer to measure prime mover speed.

PROCEDURE

1. Check external connections to Fig. 2.
2. Check AVR internal transformer taps for correct operating voltage. (See Fig.3).
3. Set range potentiometer to mid position, 5 turns from anti-clockwise end (located on printed card).
4. Set voltage trim "U" to mid position.
5. Set reactive compounding adjustment 'IXR' to zero.
6. Set LSP potentiometer fully clockwise initially.
7. Check current limit tap setting on printed card. This should be set at a tap which is larger than the maximum field current required, i.e. maximum current required at FL 0.8 p.f. is 4.2A, then from a tap selection of 3A, 4A, 5A, 6A select tap 5A.
8. Run up prime mover to correct speed.
9. Adjust voltage range potentiometer to correct nominal voltage. A $\pm 10\%$ of nominal voltage should now be obtainable on the voltage trim potentiometer.
10. Check voltage regulation NL to FL at 0.8 p.f. This should be better than $\pm 1\%$.
11. Check maximum field current when running set down. This should be approximately the value of the tap setting.
12. Set LSP potentiometer as follows:-
 - a) Connect a voltmeter 0-15V (20,000 ohm/V) across test points (1) and (2) on the LSP card.
 - b) Reduce the generator speed until the excitation current exceeds the full load (at 0.8 p.f.) figure by approx. 10%.

- c) Adjust the LSP potentiometer until the voltage across the test points just starts to increase i.e. point (1) going negative with respect to point (2).
- d) Reduce the speed further until the maximum forcing value is obtained, i.e. current limit setting.
- e) The current should remain at this value for approx. 15 seconds before automatically reducing to full-load excitation.
- f) Run the generator at its correct speed and apply full load to ensure that the LSP circuitry does not operate on full-load. If the voltage starts to fall after a time, turn the LSP potentiometer clockwise slightly to correct.

PARALLEL RUNNING CHECKS

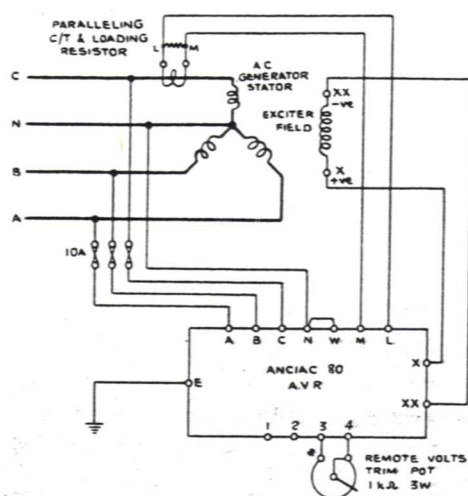
1. Check that paralleling current transformer is in correct line to the load, i.e. line 'C'.
2. Check that a loading resistor is connected across C/T secondary.
3. Set NL voltage to correct value by volts trim potentiometer.
4. Run each machine separately and match kW/speed characteristic of each prime mover to ensure correct kW load sharing. Adjust governor as necessary.
5. Run each machine separately on reactive load 0.8 p.f. and increase reactive compounding adjustment 'IXR' to produce an extra 1% droop on the normal NL-FL regulation. Should the voltage rise when this control is increased reverse connections L and M to the AVR. The Load Voltage characteristic of each generator should be matched by means of the compounding adjustment 'IXR' before paralleling. A slight re-adjustment may be required when the sets are in parallel to reduce circulating current to a minimum.

DIAGRAM OF CONNECTIONS – ANCIAC 80

360/440v 3 phase

(see Figure 3 for other voltage connections)

Fig. 2



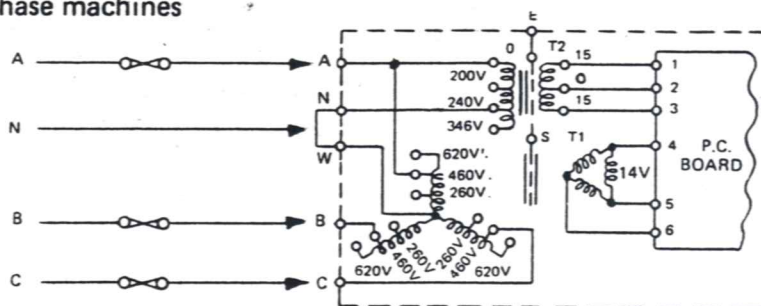
* Fully Clockwise End.

NOTES

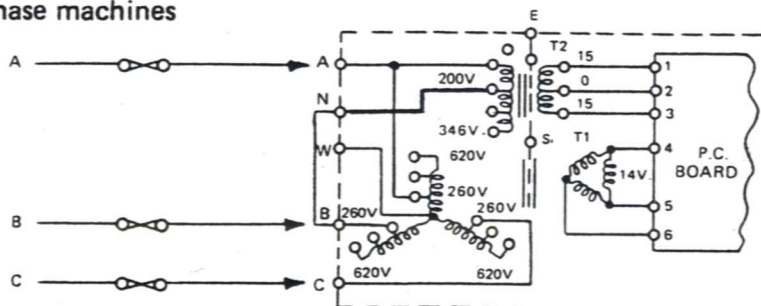
1. When paralleling current transformer is NOT fitted, terminals L & M on AVR, should be linked.
2. When remote "Volts Trim" potentiometer is NOT fitted, terminals 1-3 and 2-4 on AVR should be linked.
3. Insulated screen lead should be used for connections to paralleling C/T and "Volts Trim" potentiometer earthing the screen at the AVR end only. These cables should be run away from power cables to prevent possible "Pick-Up".

Fig. 3

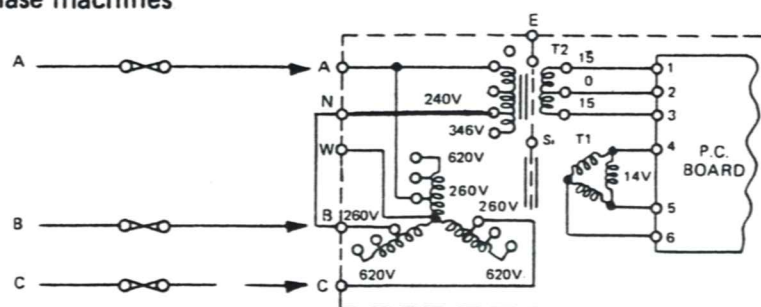
a. For 380/440v. 3-phase machines



b. For 190/220v. 3-phase machines



c. For 220/250v. 3-phase machines



Note Neutral Connection from Generator not used for 190/250 volt operation.
All Fuses:— 10A Rating

SERVICE PROBLEMS

SYMPTOM	CAUSE	RECTIFICATION
(A) A.C. generator voltage fails to build up.	1) Lack of residual voltage.	Flash exciter field, using a 12 volt battery at terminals X (positive)—XX (negative) WITH AVR DISCONNECTED. POLARITY IS IMPORTANT
	2) Fuse Open Circuit	Replace fuse (rating 10A).
	3) Fault in AVR.	Return to Works for repair.
	4) Faulty diode in main rectifier.	Check and replace if necessary. A low forward resistance and high reverse resistance should be measured.
	5) Fault in machine winding.	Check Faulty stator or rotor winding. Faults 4 & 5 can be confirmed by a check on the excitation figures at NL. In event of a fault these figures will be considerably higher than normal.
	6) Generator on load.	Remove load.
	7) External wiring.	Check to relevant drawings.
(B) A.C. Generator voltage builds up to over-voltage condition.	1) Incorrect setting of voltage trim or voltage range control.	Re-set to instructions above.
	2) Fault in AVR.	Return to Works for repair.
(C) Poor voltage regulation.	1) A.C. generator excessively loaded or p.f. outside range.	Check load.
	2) Severe waveform distortion due to type of load.	Check load.
	3) Unbalanced load.	Check phase balance.
	4) Too much droop introduced by IXR setting.	Turn IXR potentiometer anti-clockwise.
	5) Faulty AVR.	Return to Works for repair.
(D) Voltage unstable	1) Prime Mover unstable.	Check and correct.
	2) Faulty AVR.	Return to Works for repair.
	3) LSP potentiometer set too far anti-clockwise.	Reset to instructions.



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