BLUE-LINE ®

SERVO STABILIZER

GSS X46L/10KVA/1Ph
Range 110V to 280 V
Capacity 10 KVA/46Amps
RC-15V/sec Oil Cooled

TRAINING ON REPAIRS OF SERVO STABILIZERS AT GANJAM
31 JANUARY-01 FEBRUARY 1994

31st January

1000-1030	Registration
1030-1045	Objective
1045-1130	Introduction to servo stabilizers
1130-1145	Tea
1145-1200	Technical specifications
1200-1300	Basic principles of operation
1300-1400	Lunch
1400-1515	Circuit description
1515-1530	Tea
1530-1630	Circuit description continued
1630-1730	Field problem and fault finding

01 February

0900-1600	Practicals on testing, repairs, calibration, adjustments etc.
1600- 1700	Technical discussions and closing .

INTRODUCTION

The problem of fluctuations in voltage affects the performance of all types of electrical appliances. The voltage requirement of different electrical appliances vary to a great extent. Most of the equipment are greatly affected by low supply voltages. The stabilizers should be capable of working on extremely low loads at high efficiency. It should be produce any distortion.

Types of Stabilizer

The voltage stabilizers available in the country can be divided into following categories.

1.Manual Regulator

2.Automatic Step type (Relay)

3.Servo Stabilizer(Motor)

4.Ferro-resonant stabilizers(CVT)

Step Vs Servo Stabilizers

Both the Stabilizers are similar in their operation.However,the reliability, accuracy of servo stabilizers is much higher. These two types can be compared as below.

Sl.No.	Characteristic	Servo Type	Step Type	Remarks
1	Sensing	Solid State	Solid State	
2	Accuracy	1%	5%	
3	Correction	a.Electromechanical b.Motor c.Continuous (Step Less)	a.Electromechanical b.Relay c.Step	
4	Power Magnetics (X-former)	a. Auto & Buck /Boost b.Two nos.	a. Auto & Buck /Boost b.One	
5	System	Closed loop (Servo Mechanism)	Open loop	

TECHNICAL SPECIFICATIONS

Blue Line Servo Stabilizer(Single Phase)

Type	Servo Controlled
Model	GSS X 46L
Input Range	110V - 280 V AC
Output	220V - 1%
Capacity	10 KVA
Correction rate	15 volts/sec
Max.Current(load)	46 Amps
Cooling	Oil cooled(150 lit)
Protection	- Output delay - High/Low cut out - Thermal overload - Short ckt - HRC fuse -
Indicators	Input/output voltmeter Neon bulbs

The Servo Stabilizer has the following controls on the panel.

1.Auto/manual switch	-	The stabilizer operates automatically in AUTO position while, in Manual position it can be used as a simple Motorized auto-transformer.
2.Output Adj	-	To adjust the output voltage in AUTO Position.
3.Sensitivity Adj	-	To adjust the regulation of the stabilizer in AUTO position.
4.Incr.Switch	-	To increase the output voltage in MANUAL position.
5.Decr.Switch	-	To decrease the output voltage in MANUAL position.
6.Voltmeter(2 nos.)	-	0 – 300V.Moving Iron meter(class2.5) to read input and output voltage .
7.Load-on-Switch (upto 60 Amps)	-	To switch ON/OFF the output from stabilizer. It has an automatic fuseless tripping device for protection against short circuits .
8.Maind Indicator	-	To indicate the incoming mains to the Stabilizer.
9.Mains Limit Indicators - higher		To indicate that mains supply to the stabilizer is or lower than the specified range. Separate indicators are provided for high or low voltage .
10.Variac overload	-	(If provided)To protect against damage because of short circuits.

In addition the Stabilizer has the following:

1.Input	-	Terminal strip of 30A/60A rating/two terminals with colour coding(Red & Black).3 core,1.5 meter long mains lead to feed incoming supply .
2.Output	-	Universal socket suitable for both 5A/15A-3 pin top/terminal Strip of 30A/60A rating/two terminals(red & black)for connecting the load. Red indicates phase and black neutral.

3.Earth - Two terminals for earthing the stabilizer chassis so as to avoid any accidental leakage from the chassis.

PRINCIPLE

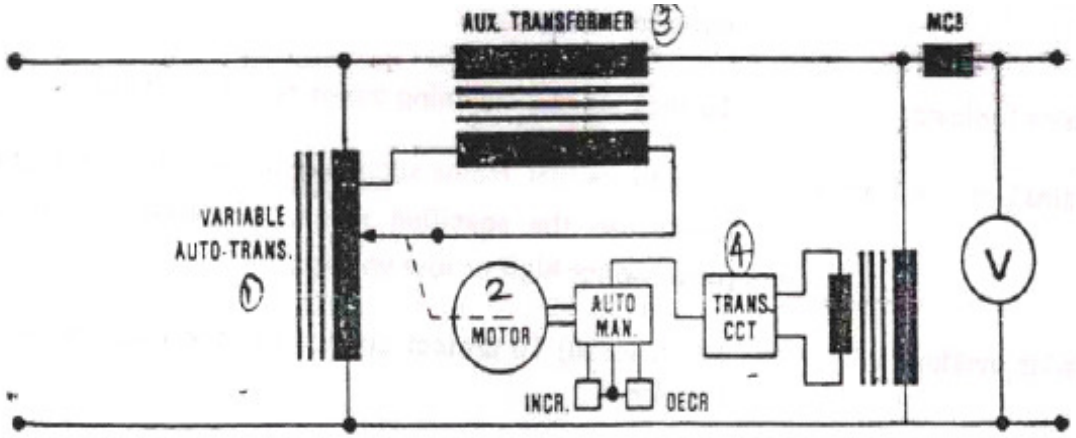
The Servo Stabiliser has four basic components:

1)Stepless Variable Toroidally-wound Auto-Transformer.

2)Reversible, instantaneous start/stop Step-Synchronous Motor.

3)Double wound step up Transformer.

4)Solid State Sensing Circuit.



The secondary of the step up transformer is connected to the mains. The primary is fed through the stepless variable toroidally-wound auto transformer. The tapping of this auto transformer is adjusted automatically by the step-synchronous motor coupled to its shaft. The movement of motor is controlled through the solid state control circuit which continuously compares the output voltage with a built-in-reference supply. In case of the error being positive the motor moves in one direction and if it is negative the motor moves in the other direction. With the movement of motor the voltage applied to the primary of the step up transformer changes, thus changing the voltage on its secondary also. If the voltage on the secondary is in phase to the Mains voltage it gets added and if it is out of phase it gets substracted.thus,both step up and step down voltages are obtained through the same transformer tapping. The circuit is arranged in such a way that if the output is more than the ‘set’ voltage the motor tends to reduce the voltage applied to the primary of the step up transformer and vice versa.

CAUTION

HRC fuse protection at the mains and load side of the stabilizer must be provided at the time of installation.

The stabilizer should not be used for output voltages above 450/250 Volts(until unless specially designed to operate at these voltages)in either AUTO or MANUAL position as this may cause permanent damage to components in the Stabilizer.

Care should be taken to feed not more than 470/270 Volts to the stabilizer because the toroidally wound auto-transformer has maximum rating of 470/270 volts only. Beyond this range it starts drawing more current 7 may get permanently damaged.

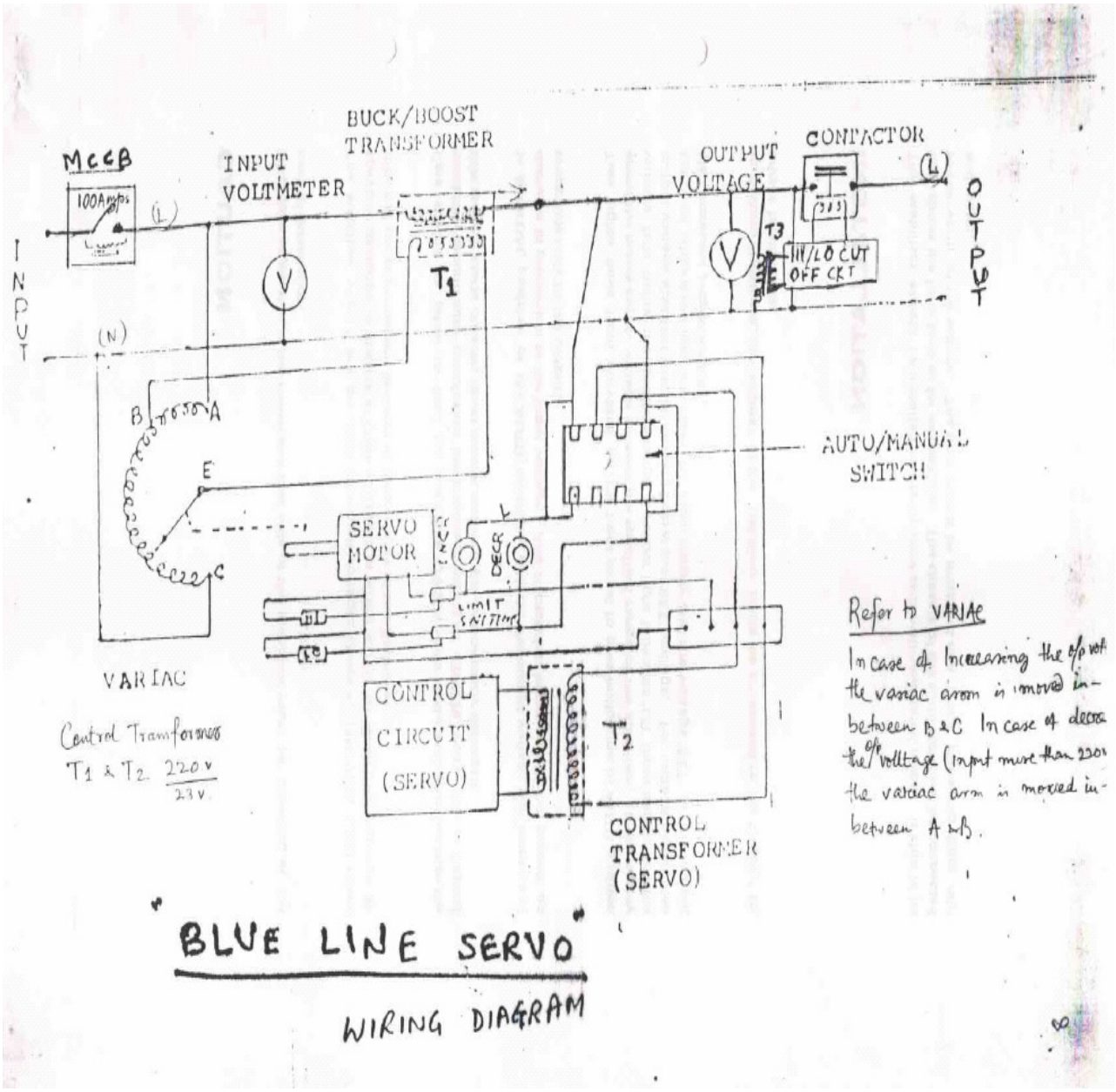
In MANUAL position of the AUTO/MANUAL switch, the current voltage will increase or decrease in proportion to the input voltage. Any fluctuation in mains will be passed on proportionately to the output.

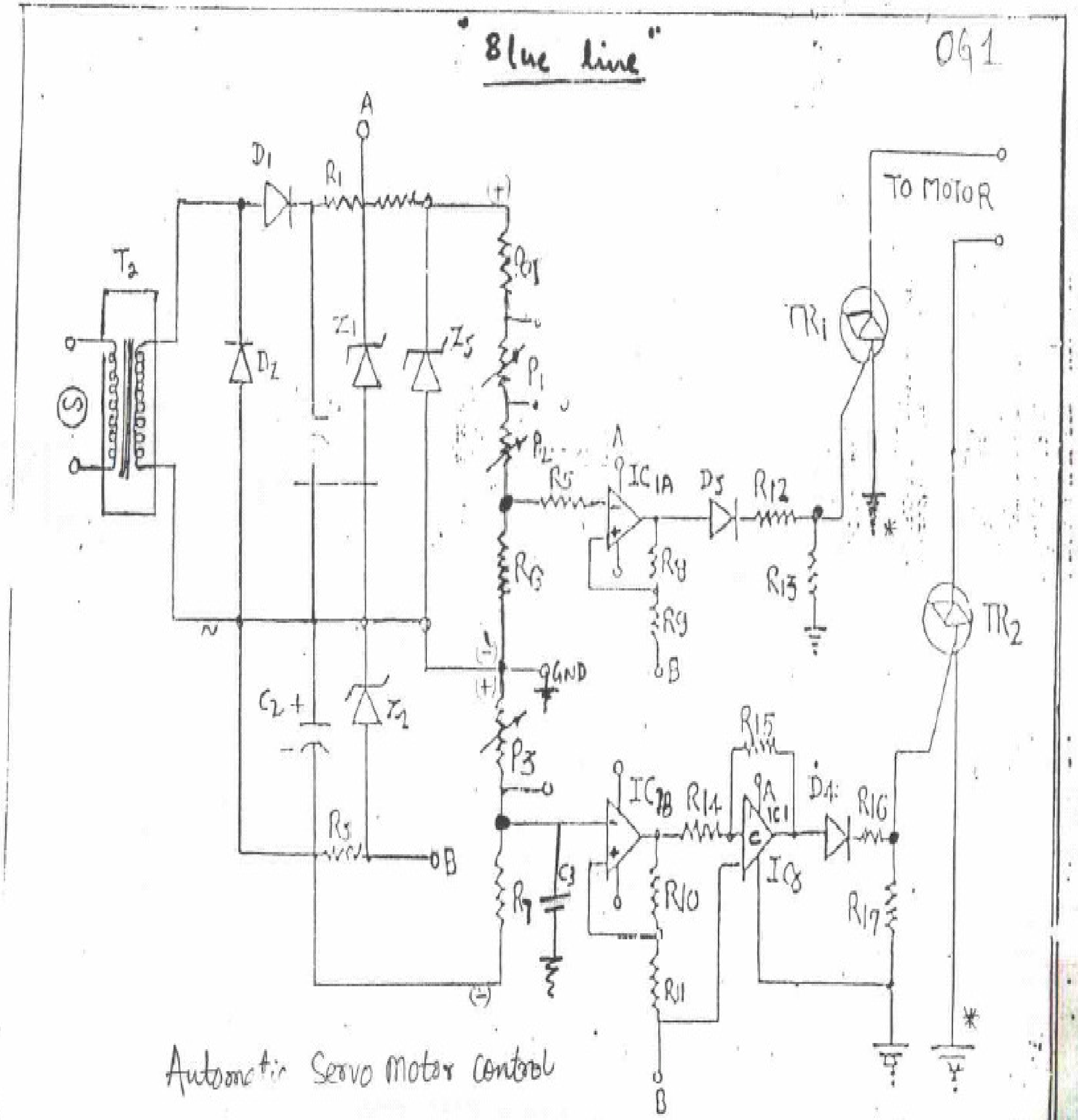
Two lights have been provided on the front panel to give indication in AUTO position when the mains supply voltage exceeds the specified range of the stabilizer. If the supply voltage falls below the specified range ,a yellow light indicates ‘LO’ input supply and the output voltage also falls proportionately below the ‘SET’ voltage. For voltage higher than specified range a red light indicates ‘HI’ input supply and the voltage ‘SET’ at the output also increases proportionately.

In 3 phase stabilizers, the ‘neutral’ of the stabilizer must be connected to the ‘Supply’ for proper functioning.

INSTALLATION

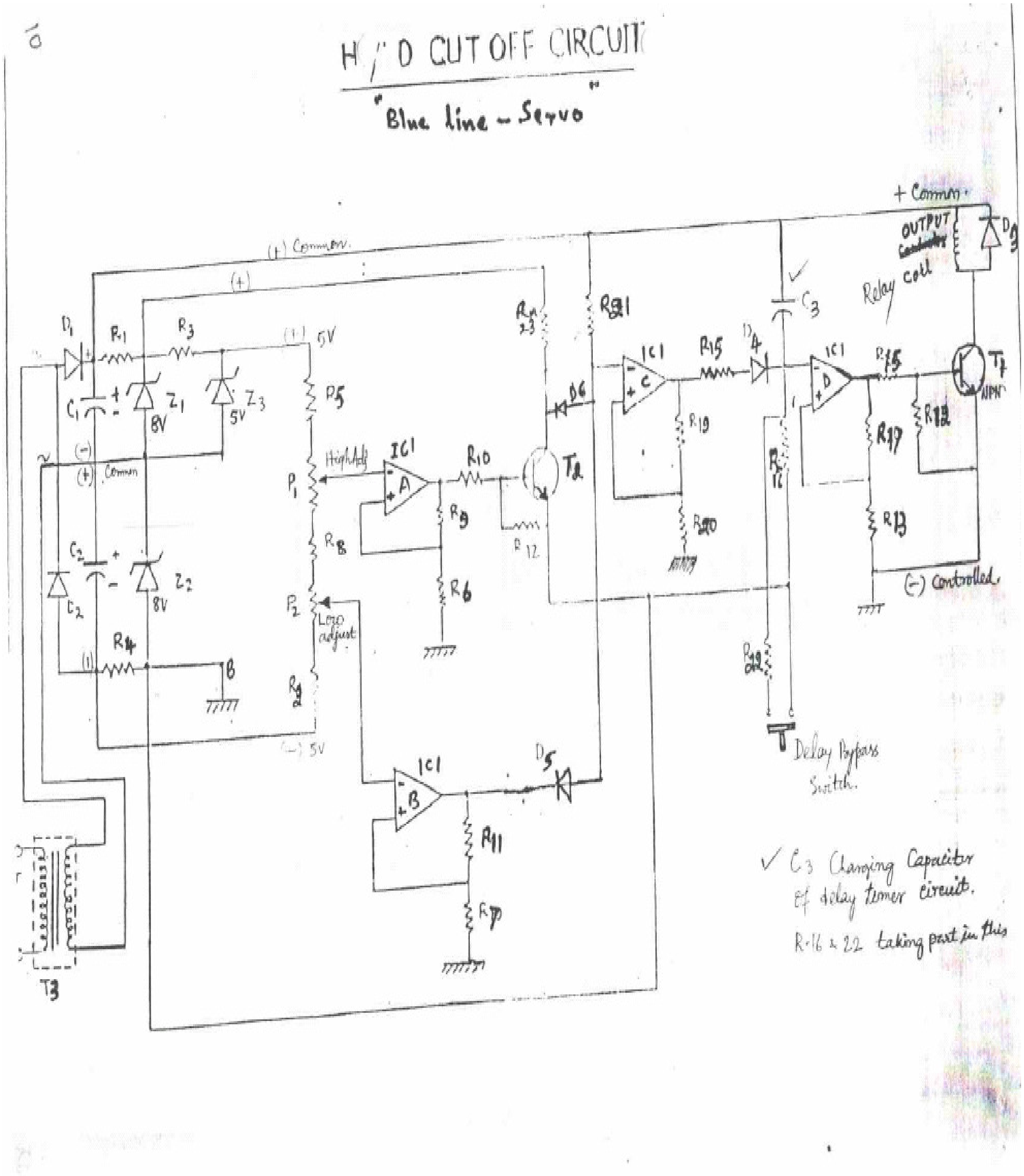
The stabilizer should be installed in a fairly cool & well-ventilated place. It should be kept above the floor level as far as possible. The chassis of the stabilizer must be connected to the ‘earth’ of the supply. The unit should be installed at a place protected from rain & water.


MCCB
100Amps
INPUT VOLTMETER
BUCK/BOOST TRANSFORMER
T1
OUTPUT VOLTAGE
CONTACTOR
T3
HI/LO CUT OFF CKT
INPUT
OUTPUT
(N)
(L)
A
B
C
E
SERVO MOTOR
LIMIT SWITCHES
AUTO/MANUAL SWITCH
VARIAC
CONTROL CIRCUIT (SERVO)
T2
CONTROL TRANSFORMER (SERVO)
Control Tranformers
T1 & T2 220 v / 23 v
Refer to VARIAC
In case of Increasing the o/p volt the variac arm is moved in-between B & C In case of decrea the o/p voltage (input more than 230v the variac arm is moved in-between A & B.
BLUE LINE SERVO
WIRING DIAGRAM



SERVO CONTROL CKT PCB

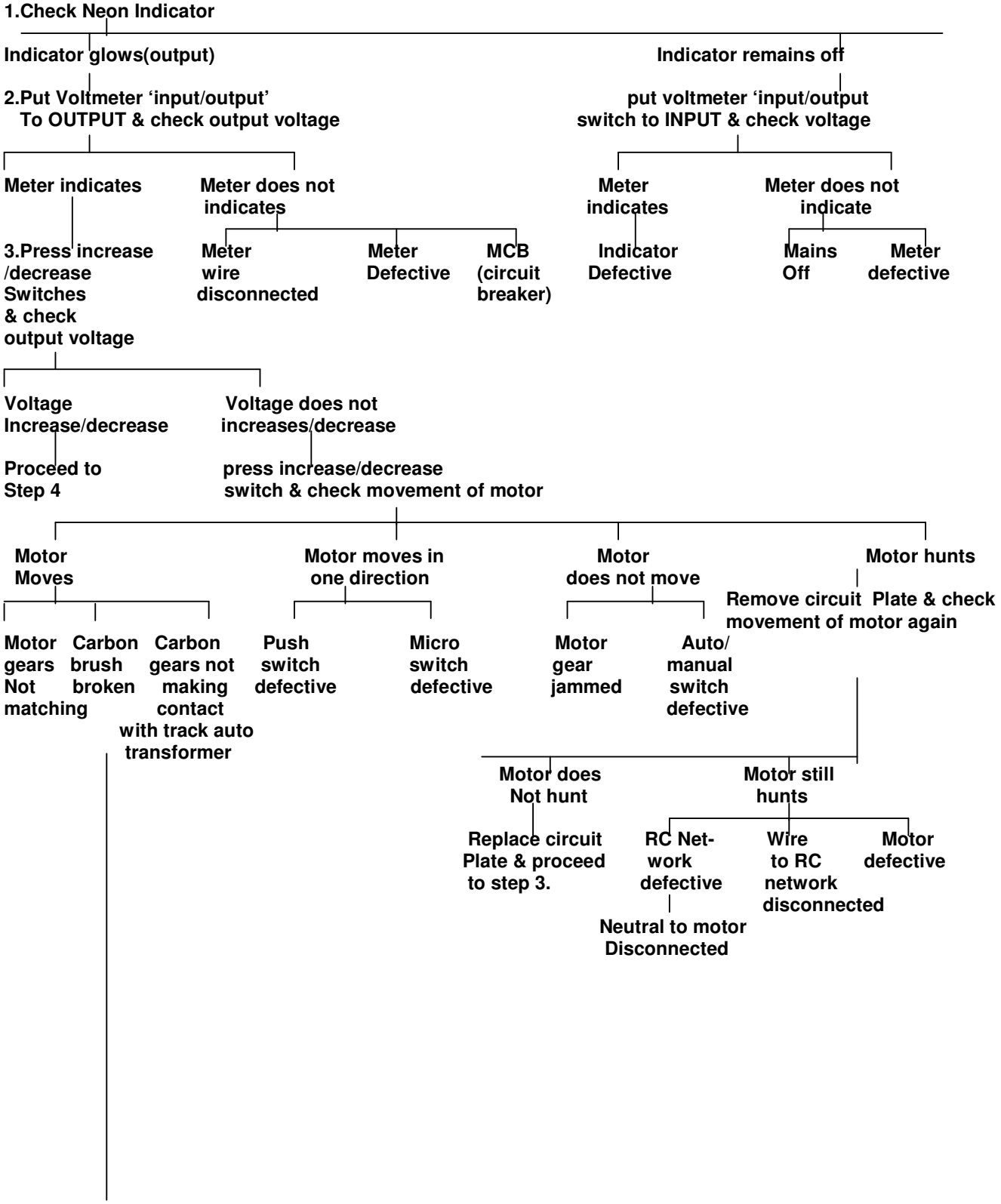
* Source of (N) Supply to servo motor through Triac. source of (L) Supply is given

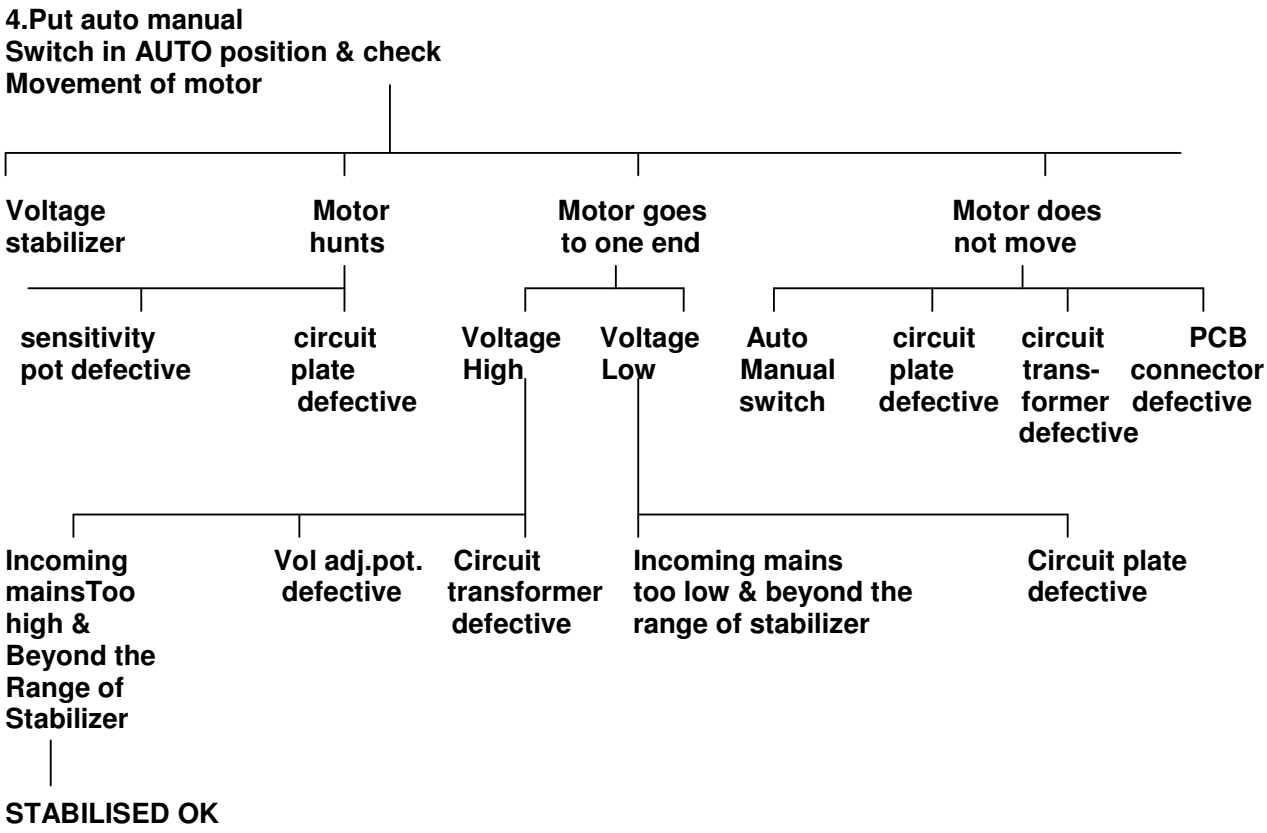

H/D CUT OFF CIRCUIT
"Blue line – Servo"
+ Comm.
OUTPUT
Relay coil
(+) Common
(+) 5V
(–) 5V
High Adj
Low adjust
(–) controlled.
Delay Bypass Switch.
✓ C3 Charging Capacitor of delay timer circuit.
R-16 & 22 taking part in this
T3

FAULT FINDING CHART(TYPE:GSS)

Connect mains to terminals marked INPUT on the stabilizer. Keep auto/manual switch in MANUAL position, miniature circuit breaker(MCB)in ON position & switch mains supply ON**.**

-Disconnect Load-




4.Put auto manual
Switch in AUTO position & check
Movement of motor
Voltage stabilizer
Motor hunts
Motor goes to one end
Motor does not move
sensitivity pot defective
circuit plate defective
Voltage High
Voltage Low
Auto Manual switch
circuit plate defective
circuit trans-former defective
PCB connector defective
Incoming mainsToo high & Beyond the Range of Stabilizer
Vol adj.pot. defective
Circuit transformer defective
Incoming mains too low & beyond the range of stabilizer
Circuit plate defective
STABILISED OK

Gargya Research Instruments blue line

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Ph.(8)67259

Packing Slip Dt:21.6.93

To,
The Cold Chain Officer, No: 1.
Directorate of Public health & Order No.GS/MO-14/93-94
Preventive Medicine,259,Anna Dalai Ref: INDEX 3055
Dispatch to Madras -dt- 30.4.93

SPARES FOR VOLTAGE STABILISER,SINGLE PHASE,CAPACITY 10 KVA.

ITEM	PART NO.	QTY
1.Voltmeter	114-30-960	1No.
2.Input Output switch	116-001-20	2Nos
3.Control cct.(OG-1)	630-000-00	6Nos.
4.Control cct.Hi/low Trip(a)new type9G3A	639-000-01	6Nos
5.Control col trans	134-08-100	6Nos.
6.R.C Network	611-010-17	Nos
7.Control ckt trans Hi/Low	134-16-100	4 Nos.
8.Toggle switch	116-011-20	6 Nos
9.Push Button Red/Yellow	116-011-22/42	6 Nos.
10.Limit Indicator Red/Yellow	113-10-021/041	6 Nos.
11.Neon Light Red/Yellow/Green	113-20-020/040/050	12 Nos.
12.Micro Switch assembly	611-00-011	3 Nos.
13.Potentiometer(output adj)	138-020-10	4 Nos.
14. Potentiometer (Sensitivity)	138-005-10	4 Nos.
15.Servo Motor(10 kg)	151-100-01	1 No.
16.Carbon Brush 100A	189-100	9 Nos
17.Gear for servo motor100A	158-00-383	2 sets

18.Variac Coil 100A	186-060-01	1 No.
19.Relays 24V,5A	115-05-242	2 Nos.
20.Time Delays with(micro Switch Type)	116-23-222	2 Nos.