GAMMA 160S

Field Manual

GENERAL INSTRUCTIONS

GAMMA 160S

This manual has been written in order to aid the starting up, adjusting, and fault finding procedures needed when working on a Gamma 160S control system.

Before plugging in the P.C.B.'s, the complete installation must be thoroughly checked out for any possible fault condition that can damage the P.C.B.'s and cause an unsafe working condition.

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Adjusting Procedure - Gamma 160S

DO NOT REMOVE OR REPLACE ANY P.C.B.'S WITH THE POWER SWITCHED ON

The Gamma 160S System, General Overview

The outlay of the Gamma 160S system is shown in Sketch #2.

The actual drive unit is a single speed A.C. motor, the motor output is controlled to give Acceleration, contract speed, deceleration, relevelling, and inspection speed conditions.

The motor selected for the Gamma 160S uses 380V A/C; therefore, a transformer is required to interface between incoming line voltage and elevator control.

Because it is only a single speed motor, the above functions are controlled by the Gamma 160S logic circuits and without the P.C.B.'s plugged in, these functions are not available.

Not only does the logic circuits control the normal speed functions, but it also controls the direction of rotation of the motor.

The contract speed of the elevator is controlled by the logic circuits which keep the contract speed constant, irrespective of the load inside the car.

Inspection and Commissioning Operations

IMPORTANT

To use the elevator on inspection control requires that all the P.C.B.'s be fitted and plugged in to the Gamma 160S logic rack. Before this operation is attempted, all inputs to the Gamma 160S rack must be checked for good insulation and continuity.

The inspection speed is achieved by the action of the Gamma 160S logic control circuits and the thyristors controlling the amount of power developed by the motor.

A tester must carry out these following tests:

Perform the following operations in the prescribed order:

1. Checking the insulation and continuity of the electrical circuits (optional).
2. Main fuses.
3. Fitting of the tachogenerator.
4. Clarification of the electrical connections.
5. Clarification of the "supply voltage".
6. Fitting of the printed circuit panels to the Gamma 160S rack.
7. Presetting of the brake.
8. Checking the inspection operation from the machine room.
9. Checking and use of inspection operation on top of the car.

Whenever working on any equipment, especially when working in the shaft, that the Safety Codes are complied with.

1. Checking the Insulation and Continuity of the Electrical Circuits:

   1.1 Motor

   For the purpose of this test, the use of a Megger is required, to check the insulation and continuity of the system. For purpose of the insulation test, the output of the Megger must be 500 volts D.C.

2. Main Supply/Transformer Output:

Check the output voltage of the transformer to 380V A/C and GE-MOV. Varistors are wired between phases on the secondary (P/N V480PA80A). Check if XO has a direct connection to HL1 on the controller.

3. Fitting of the Tachogenerator:

Sketch #3 shows the mounting of a tachogenerator. It is important that before the tachogenerator is fitted, all the "butting" surfaces are dressed to ensure that the tachogenerator is perfectly aligned with the high speed shaft.

If the output voltage ripple exceeds 300 mv due to bad alignment, this ripple will be detected by the electronic system and result in a bad ride in the car; therefore, the output voltage ripple should be reduced to a minimum by aligning the tachogenerator with the aid of the test tool provided (Normal ripple should not exceed 150 m volts).

The tachogenerator comes supplied with a shielded cable. This cable must be run directly back to the controller without a break. The screen core should be isolated at the tachogenerator and earthed at the controller as described in the next section.

4. Required Electrical Connection:

On the Gamma 160S logic rack, there are two columns of terminal blocks. These are the input and output connections from the Gamma 160S rack.

It is important that these connections be checked out before any power is applied to the rack.

Left Hand Terminals

I.C. connector, this is the connector from the Gamma 160S logic to the thyristor firing panels "I.T.B." The lead that is supplied should not be crossed, its polarity is marked by a red line along its length on one side. If the plug is a plug with the red line toward terminals 7 and 8 on the rack, then it must be toward terminals 7 and 8 on the I.T.B. panels.

OV OV TG1, TG2	One 0 volt terminal must connect direct to HL1 stud on the controller (not a HL1 that loops around the controller)

The second 0 volts terminal is required for the screen cable of the tachogenerator.

Normally, it is only connected at the controller end; however, to minimize A/C ripple voltage, try connecting at both ends, then each end individually and choose the connection which gives the lowest A/C ripple voltage from the tachogenerator.

TG1 TG2	Are the connections from the tachogenerator. The polarity will have to be checked to allow the machine to run in correct mode. If they are initially connected wrong, the elevator will come to a stop after one (1) second.
TR1 TR2 TR3 TR4	These connections are 24 volt A.C. supplied from the transformer which are then rectified for the logic circuits.
TG test:	These terminals are provided to allow the tachogenerator to be aligned. The filter is built into the board.
L1 L2 L3	These connections are the 380 volts connections which are used for synchronization signals of the phases; also the supply to a phase reversal circuit.

It is important that those terminals are phased out with the connection to the thyristor panel.

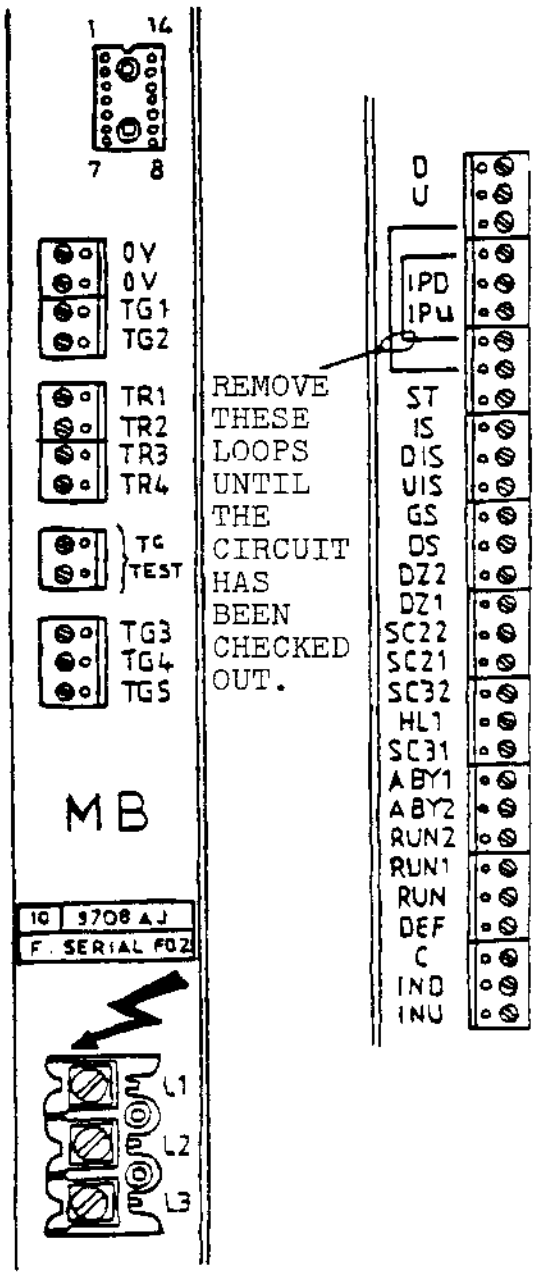
i.e., L1 is the same phase as 4B
L2 is the same phase as 2B
L3 is the same phase as 5B

IND Input, inspection button input signal - determines
INU direction of drive on inspection control.

The following external connections must be made:

- Motor connections
- Brake Coil
- Blower Motor
- Safety Chain Devices
- Car Inspection (Top of Car Inspection Unit)

NECESSARY ELECTRICAL CONNECTIONS



5.2 Switch on the power supply and check:

- The main 3 phase supply
- The two 24 volts A.C. supplies, TR1-2 and TR3-4
- The 110 volts A.C. for the main controller switches and 120 volt DC for relay (if any).

5.3 Synchronism of L1, L2, L3 with the 3 phase main input supply

The purpose of this operation is to ensure that the phases connected to L1, L2, and L3 respectively are connected to 4B, 2B, and 5B.

Energize switch SW by hand.

With SW energized, the main supply is now connected to terminals 4B, 2B, and 5B.

Measure with a meter on the 1000 volt AC range the potential between 4B and L1
2B and L2 (See Sketch 5)
5B and L3

If there is any potential present, the phasing of the controller is incorrect (See tabulation)

No voltage between	380V AC between	380V AC between
4B - L1	4B - L2	3B - L2
2B - L2	2B - L1	2B - L3
5B - L3	5B - L3	5B - L1

Switch off and correct phasing until there is no potential present between the respective terminals. Once correct, do not inchange the connection for any reason.

6. Fitting of the Printed Circuit Panels:

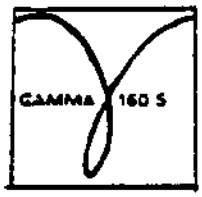
Caution: Never remove or replace the printed circuit boards with the power supply switched on.

6.1 Clarification of the voltages supplied by the Supply Board:

An extender board (20-800-095) is needed for this operation.

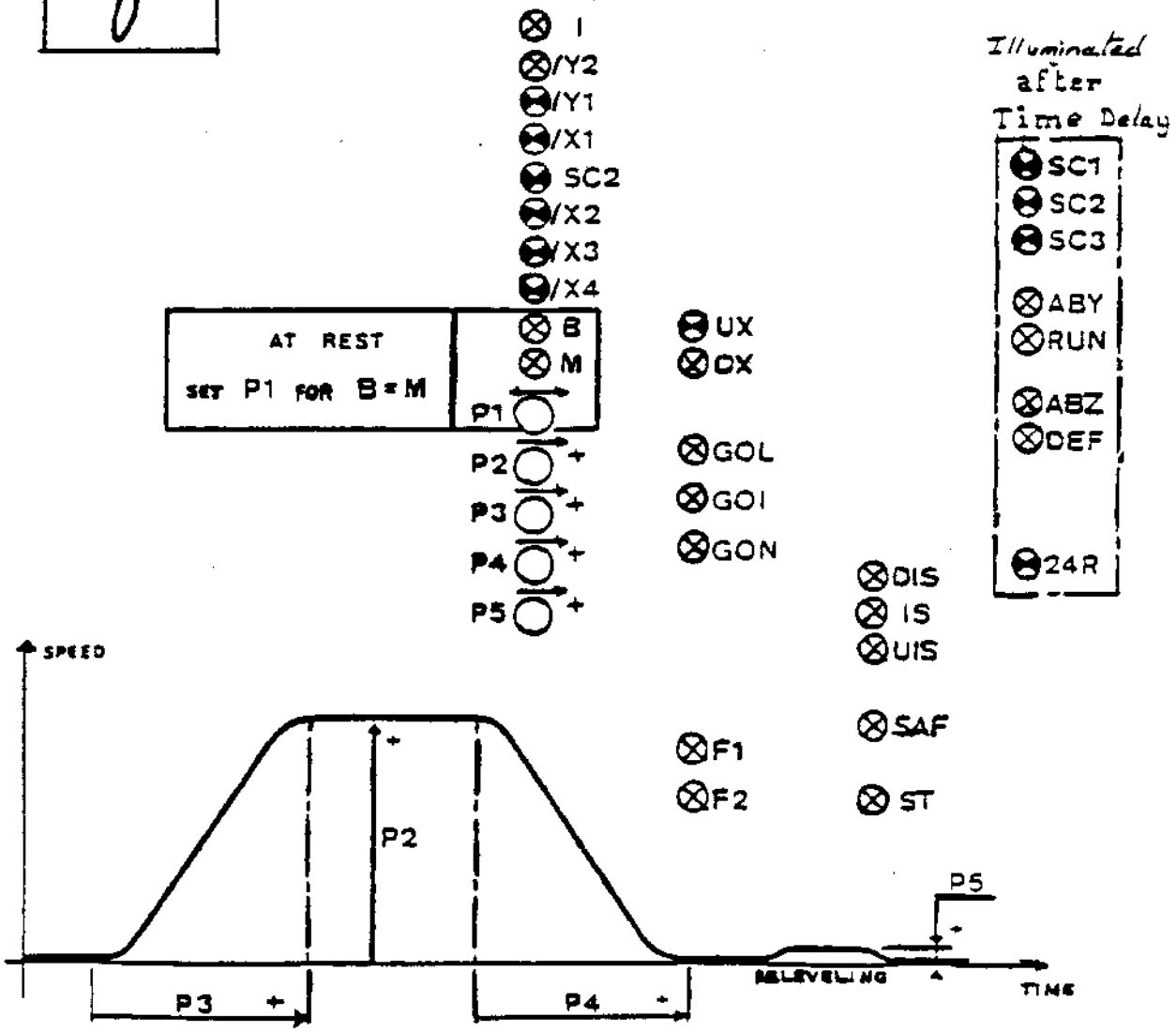
- Switch off the power supply and insert the Supply Board only.
- Switch on the power supply and check the positive (+) 12 volts terminal Tac 1 & 2.

Sketch 6

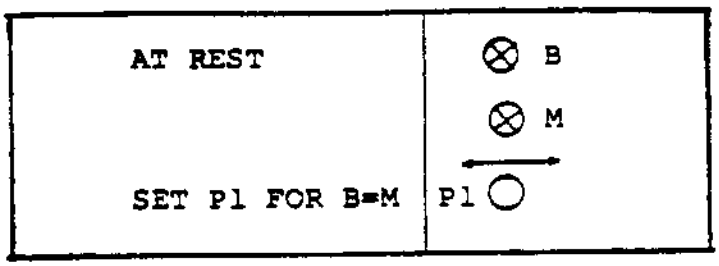


FRONTPANEL SIGNALS

Status after switching on



both have the same illumination intensity with the car at rest.



Note: It might be possible that after this prime adjustment, the condition of LED's "M" and "B" will change.

Do not worry about this. Because the electronic circuits used for this are so sensitive, it is quite impossible to keep this condition constant.

8.4 Checking the Inspection Speed Safety Circuits:

8.4.1 Overspeed Safety Control

- Position the empty car at the lowest floor level.

- Simulate an up direction inspection operation from the controllers.

- As soon as the speed stabilizes (approximately .20 of nominal speed), press button BT2. This will cause the firing angle to reduce to zero.

  The machine will go out of control and accelerate until the speed of .325 of nominal speed, where the SC2 relay de-energizes and switches off the SAF signal.

Note: The above operation is not memorized. If the inspection operation is not terminated, the elevator will start to oscillate. It is not advisable to maintain the above operation for prolonged periods of time, because the thyristors are switched off and on, under transient currents. These transient currents can cause the main fuses, circuit breaker or Protistor (thyristor fuses) to rupture.

8.4.2 Underspeed Safety Control

- Position the empty car at the highest floor level

SAFETY PRECAUTION (Cont'd)

- Press the "down" button while the elevator is moving down. Operate the "stop" switch. The elevator should stop.

- Repeat the above operation for the up direction.

When on top of car inspection operation, check that the elevator stops on releasing any of the inspection buttons; also when operating the shaft limits.

Note: If work does not call for frequent elevator movement, it is advisable to switch off the power supply to the installation.

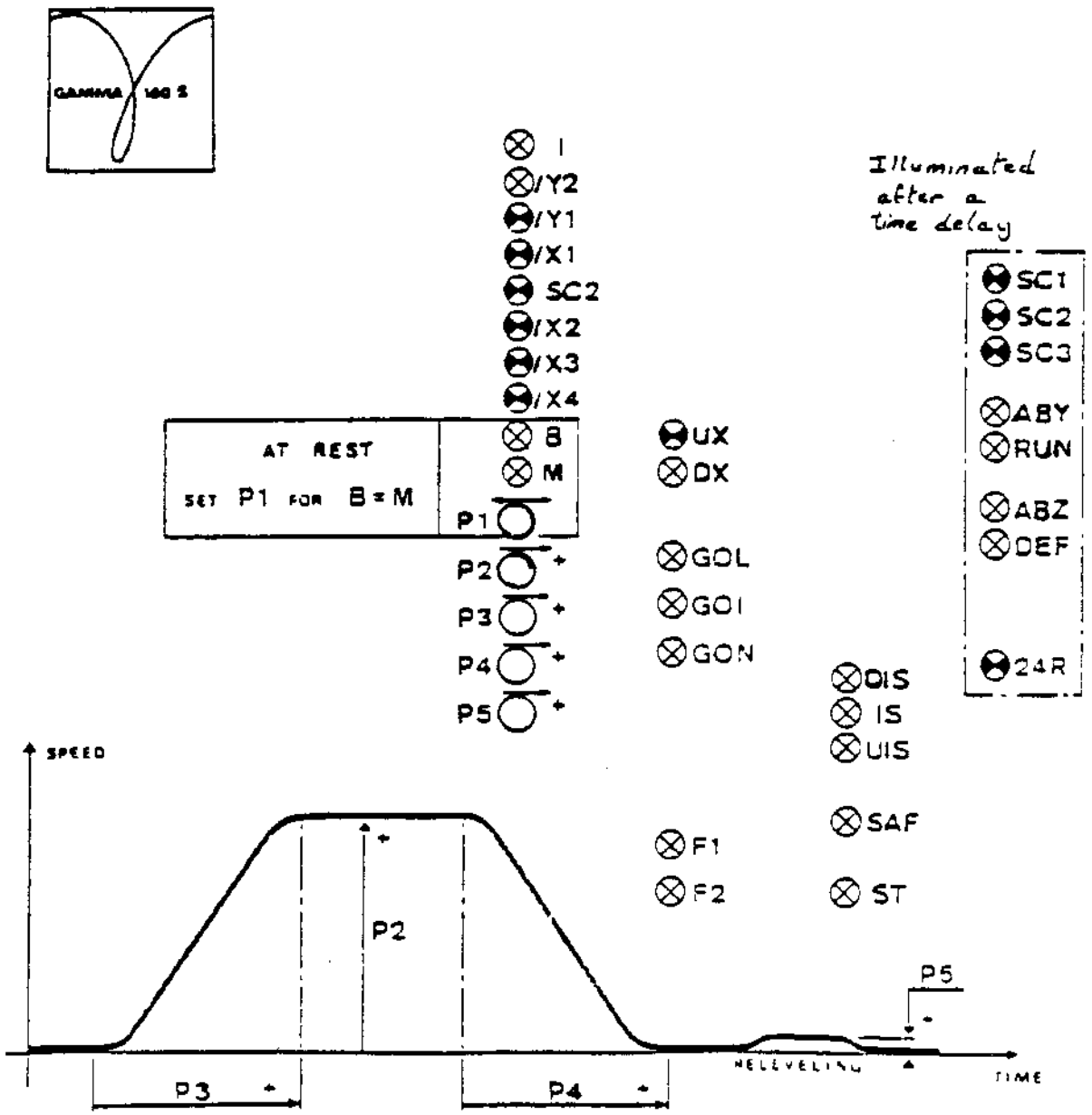
1. Various Checks to be Performed Before Adjusting (Cont'd):

1.15 Ensure: That the doors are not allowed to open during the initial adjusting stage.

2. Position of Adjusting Potentiometers:

All the adjustments are made on the Speed Control Board (SCB).

The adjusting potentiometers are arranged as shown by the sketch below:



3.4 Position the other potentiometers as indicated below: P3 fully toward the negative (-) (20 turns to the negative)

P2 Set to the mid-point position (20
P4 turns to the left followed by 10
P5 turns to the right).

3.5 Starting up, fast speed run:

Before the fast speed run is initiated, ensure that the U and D loops on the Gamma 160S rack are disconnected if the MRV tool is not used.

- Switch the TCI switch to the normal position.

- The items below can be done by using the MRV Tool and not disconnecting any wires; however, in the event an MRV Tool is not available, this procedure may be helpful.

- Apply a positive 120 volts to the "ST" terminal of the Gamma 160S rack.

- Apply a positive 120 volts to the U loop terminal of the Gamma 160S rack. The elevator should now start up and run at high speed. It should slow down at the next floor after receiving the IPU information.

- Check during the high speed run all the LED's showing the different car speeds, threshold points, and running conditions.

  The following LED's will illuminate: UX, RUN, SAF, DEF, ABY, ABZ, GON, and M.

  The following LED's will be extinguished in the order shown: /Y1, /X1, /X2, /X3, and SC3.

- Ensure that at the first operation of IPU, the elevator starts to slow down (if not, remove the feed to U) and then the following LED's will illuminate: I, /X3, SC3, /X2, /X1, /Y2, and B or M. RUN, GON should be extinguished after B or M. At this precise moment, remove the positive 120 volts to the U loop terminal of the Gamma 160S rack.

  LED /Y1 should now illuminate and I, /Y2, ABY, ABZ, SAF, and DEF should now be extinguished.

3.6 Adjust roughly the levelling accuracy by adjusting P4 potentiometer in such a manner that the elevator stops in the door zone.

6. Alignment of the Tachogenerator:

- Connect a digital voltmeter to the "TG" test terminals of the Gamma 160S rack (Voltmeter to be used on 1.5 AC scale).

- Balance load to be placed inside the car.

- Run the car between the terminal floors

- When the car reaches a speed of .94 of nominal speed (LED /X3 will extinguish), press the button BT1. This will cause the thyristor to fire a full angle.

  Under this condition, the motor will run at its synchronized speed and the Servo system will not influence the tachogenerator output voltage ripple.

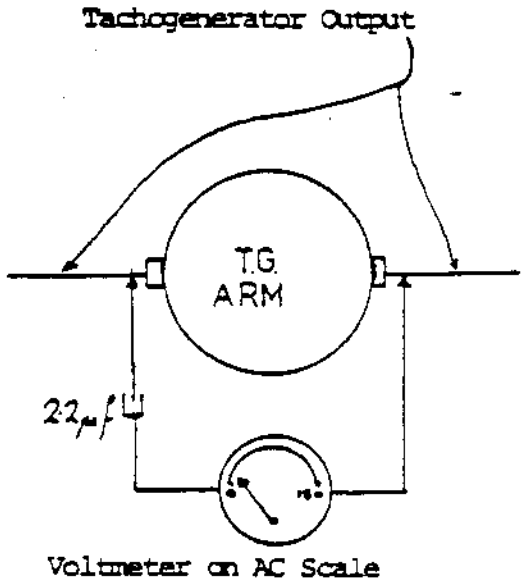
- Adjust the alignment of the tachogenerator in such a manner that the AC voltage reading is the lowest possible reading obtainable when the car runs at high speed.

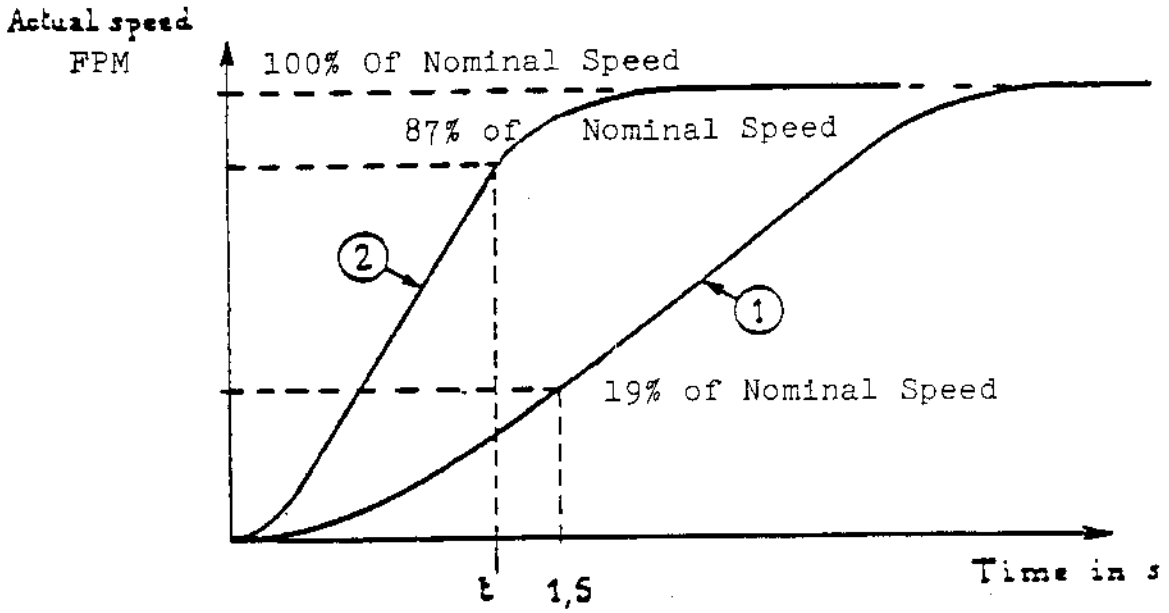
  On no account must the voltage reading exceed 0.15 volts (150m volts).

- To make the tachogenerator alignment easy, the voltmeter can be used directly at the tachogenerator in conjunction with a 2.2 micro-farad 250 volt capacitor as shown.

  By using the voltmeter in series with the 2.2 micro-farad capacitor across the tachogenerator output actually at the machine instead of at the controller, the meter reading can be observed while the tachogenerator is being aligned.

  Future couplings hopefully will eliminate all alignment.





Curve No. 1

The speed is equal to .19 of nominal speed, 1.5 seconds after U or D signals switch to a logic "1".

With the above operation, logic signal F2 will switch, causing a shut down.

To reset F2, press button RB on the logic board (LB).

Curve No. 2

The maximum acceleration is defined as follows:

The speed must be lower than .87 of nominal speed when the car cam leaves the 3LS and 4LS limits after a departure from the terminal floors. Above this speed, relays SW and BW will de-energize.

Note: It is possible that the speed may never reach this speed even with P3 turned fully toward the negative (-), because it depends upon the motor torque and the inertia of the elevator.

The acceleration must be adjusted between these two limits. A suggested adjustment would be to measure the tachogenerator voltage at high speed

8. Fault Finding Aids (Cont'd):

Indication	Description
SC2	Illuminated while the elevator is at rest. Will extinguish when: 1. The elevator speed exceeds .32 of nominal speed. 2. The car runs the wrong way, i.e., the speed falls below a reference speed of .03 of nominal speed.
/X2	Illuminated all the time the elevator speed is below .50 of nominal speed. Will extinguish once the speed exceeds .50 of nominal speed.
/X3	Illuminated all the time the elevator speed is below .875 of nominal speed. Will extinguish once the speed exceeds .875 of nominal speed.
/X4	Illuminated all the time the elevator speed is below 1.25 of nominal speed. Will only extinguish when the elevator speed exceeds 1.25 of nominal speed, i.e., overspeed condition.
B	Might be illuminated at rest, but will be illuminated during a braking mode, i.e., empty car up (regenerative condition, braking), slowing down regenerative condition.
M	Might be illuminated at rest, but will be illuminated during a motor mode, i.e., full load up (generating condition, motoring)
UX	Illuminated when set for up direction.
DX	Illuminated when set for down direction (either UX or DX will be illuminated because of a memory circuit memorizing the last direction of travel).
GON	Will be illuminated when a normal dictation of travel is established. Will extinguish after /Y2 illuminates.
GOL	Will be illuminated during a relevel dictation of travel; otherwise it will be extinguished.
GOI	Will only be illuminated during an Inspection dictation of travel.

8. Fault Finding Aids (Cont'd):

Indication

SC1 — Illuminated at rest. Extinguished when:

1. Out of door zone.
2. Speed is greater than .875 of nominal speed.
3. Speed is greater than .50 of nominal speed or 1.25 of nominal speed.
4. No integration signal or relevel operation occurring.

In Item 2 or 3, the speed might be less than the stated speed, but the signal states are incorrect.

SC3 — Illuminated when the speed is below .875 of nominal speed. Extinguished when the speed is above .875 of nominal speed, or if the signal state is incorrect, i.e., speed is below .875 of nominal speed but speed indication states the speed is 1.25 of nominal speed.

ABY — Illuminated when the brake relay "BY" is energized.

RUN — Illuminated when a signal to run is received (Signals a brake - brake operation).

ABZ — Illuminated when the brake signal is received. Extinguished after an electrical stop. Main supply removed 700 m sec. after an electrical stop.

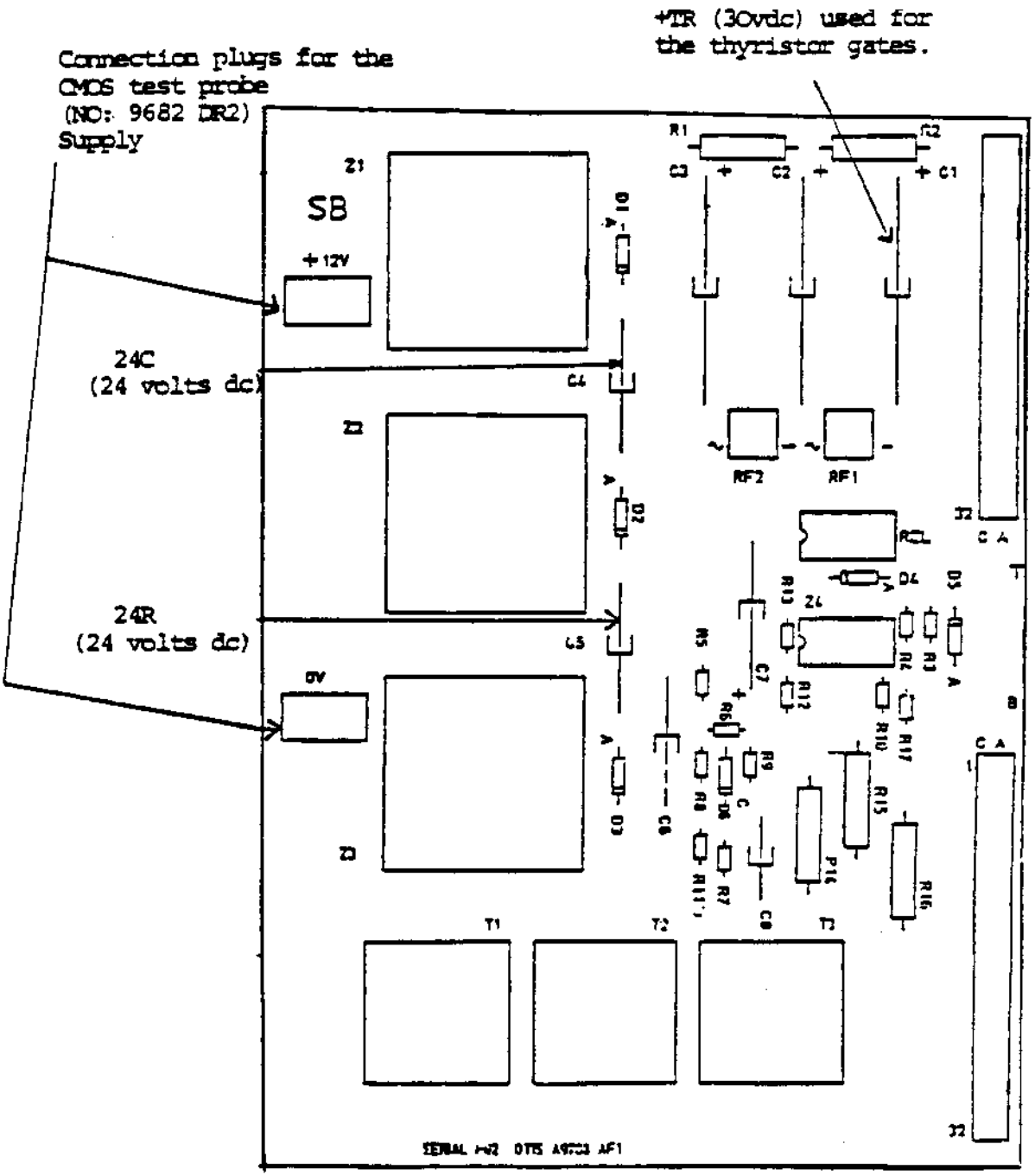
DEF — Illuminated only when a SAF signal is received and no defect signals are detected, i.e., F1 or F2.

24R — Should be illuminated all the time. Will illuminate approximately five (5) seconds after the power is switched on and the phase rotation is correct. If the phase rotation is reversed or if the "supply board" is faulty, then it will be extinguished.

9. Board Position Layout:

The position of the six (6) PCB's are as shown on the sketch found on the following page.

Since it is not possible to gain access to the back of the "mother board" rack to check certain signals, an extension board is required (Extension Board #20800-095).

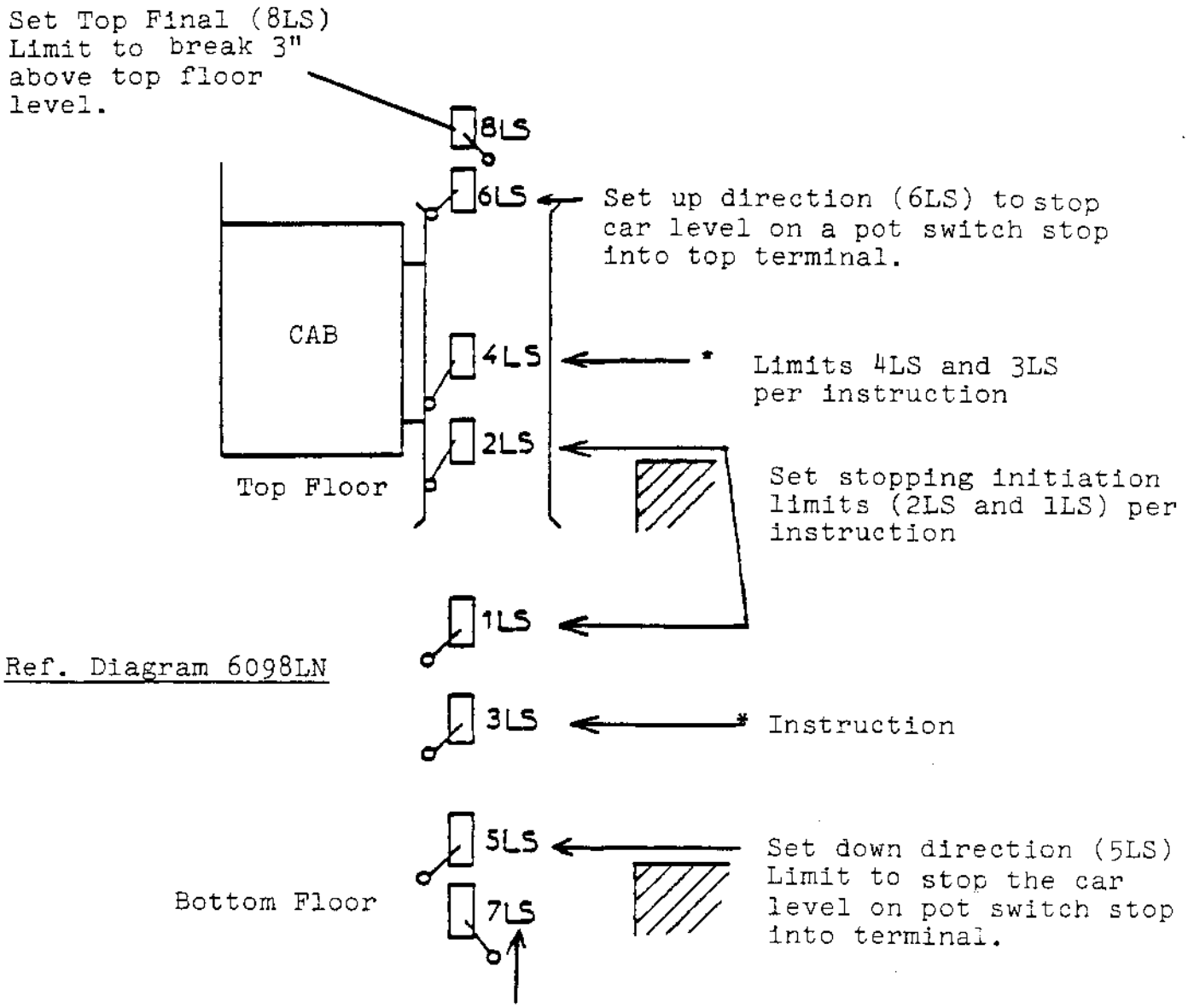


11. Shaft Limits and Inductor Vanes - Prime Settings:

The prime setting of the terminal shaft limits are as shown. Their final positioning depends upon the setting of the system and the nominal speed (the up test limit is now shown, but should be set according to local codes).

Limit Settings and Their Functions:

8LS Limit should be set so the limit breaks before the counterweight strikes its buffer and the car strikes any overhead projections.


Set Top Final (8LS) Limit to break 3" above top floor level.
8LS
6LS
Set up direction (6LS) to stop car level on a pot switch stop into top terminal.
CAB
4LS
*
Limits 4LS and 3LS per instruction
2LS
Top Floor
Set stopping initiation limits (2LS and 1LS) per instruction
1LS
Ref. Diagram 6098LN
3LS
*
Instruction
5LS
Set down direction (5LS) Limit to stop the car level on pot switch stop into terminal.
Bottom Floor
7LS
Set bottom final (7LS) Limit to break 3" below bottom floor level.