



TCP & SOLAR HIGHWAYS LTD

GEN•SUN

OPERATION AND MAINTENANCE MANUAL

TCP & Solar Highways Ltd

The Gen-Sun TL/2000/5

**Temporary traffic signal controller fitted with
5 adjustable facilities.**

**This manual covers the installation general setting up and
operations of the unit.**

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TCP & SOLAR HIGHWAYS LTD

To the operator

Micro X Temporary traffic signal controller

Thank you for selecting the Solar Highways GEN-SUN.

It is important for you the operator or selected staff to read this manual carefully.

With the knowledge of how the unit operates, you will find that your set up times are greatly reduced compared to conventional diesel driven units. We have endeavoured to keep advice and instructions as brief as possible.

Please note that this manual is up to date at time of issue, but is not subject to automatic update.

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1. INTRODUCTION

PRODUCT DESCRIPTION.

The Micro X mobile traffic light controller has been produced to the very highest standards required by today's demands.

The product conforms to Department of Transport specification TR0111 to meet the needs of users on public Highways.

The user of this product should familiarise themselves with current M.O.T requirements relevant to Vehicle detector operations.

The basic design requirement of this unit is for two-phase operation although special additions can be provided for 4 phase operations.

This system still has the benefit of vehicle detection operation at all additional heads.

In the likely event of problems within the controller it is an absolute condition that no entry into the control box is allowed.

Any attempt to break the seals could invalidate the warranty.

The components of a semi conductor nature within the controller could be harmful to the party involved if entry is made.

In the event of problems arising during operations the operator should contact for **emergency call out**:

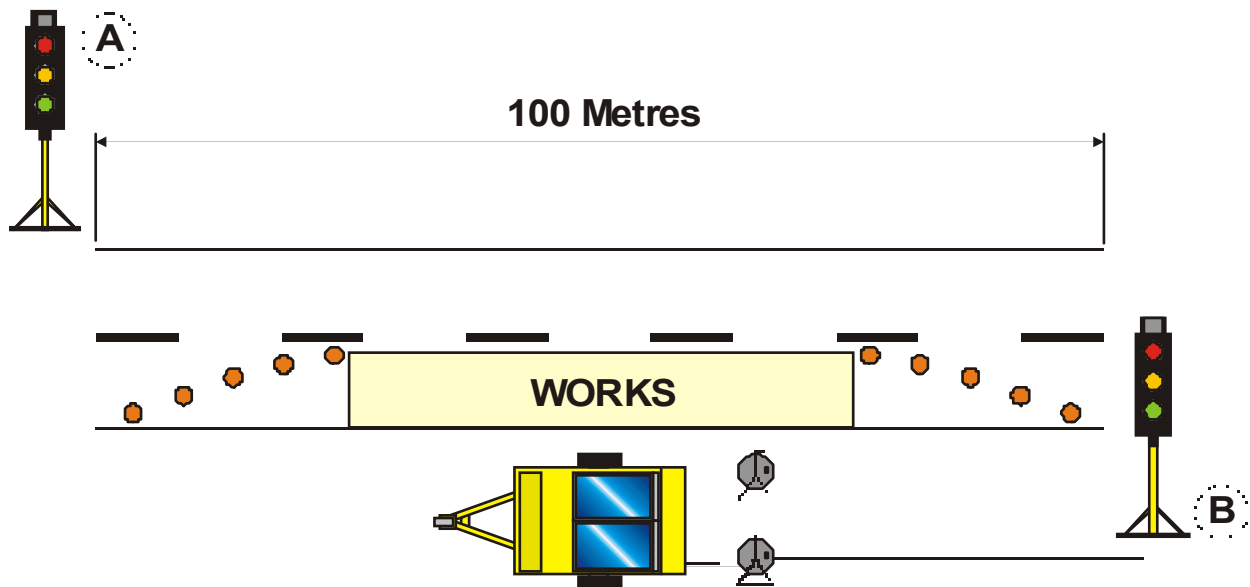
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TYPICAL SET UP

Setting up to protect a place of work on a public highway.

Always ensure that the operative understands the sequence of road signs on each approach to the lights when in operation.

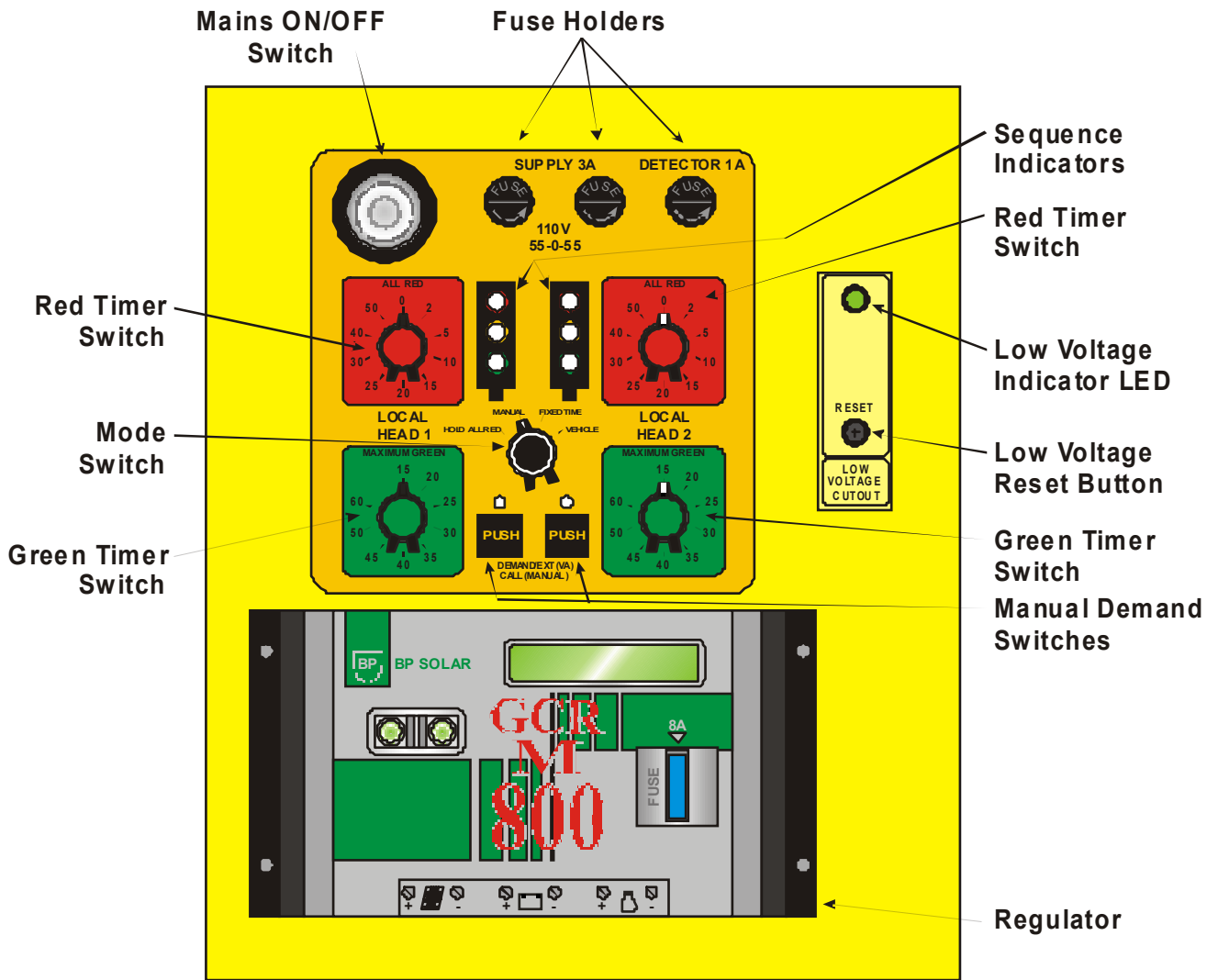
Fig 1 : Typical Layout



A check must be carried out to ensure that the Microwave Detector is operating correctly.

CONTROL PANEL

This diagram displays the layout of the Control Panel.



2. OPERATION AND SETTING UP

Place the Gen-Sun in a position where as far as is practically possible the Solar Panels will face due south (the sun at 12 o'clocknoon).

Ensure the Solar Panels are clean and free from traffic film

Ensure the Main Battery Power Isolation Switch to the controller is (ON).

Ensure that cable connections to appliances are clean.

Set up Traffic Lights on to tri-pods in the desired locations and connect cables. Avoid dragging cables through mud and debris and always ensure plugs are connected properly by pushing them fully home in to corresponding sockets.

Turn signal lights away from traffic view but directed so that they can be seen from the controller position while the equipment is switched on, tested and set. The Operator should be aware of the instructions to be followed by referring to Department of Transport, 'Pink Book' (An Introduction To The Use Of Vehicle Actuated Portable Traffic signals 'ISBN0 11 550781 7 and set the timer switches accordingly.

1. Set the Mode Switch to '**Vehicle Actuated**' mode (VA).
2. Ensure sequence of illuminated lamps is as required before coming to rest with both phases showing Red.
Note : The ON/OFF Switch is ON when it has latched in.
3. Check the vehicle detectors for correct operation.
4. SWITCH '**OFF**' on the Controller.
5. Arrange the traffic light heads to correct position for Controlling traffic.
6. **It is now important to measure the distance between the Traffic Light Signal Heads. Set the Red Timer Switches accordingly, making allowances for any gradients and any other possible impediments to traffic flow.**
7. Switch Mode Switch to '**Hold all Red**' and switch '**ON**'.

8. When the works area between the signal heads (Ref. Fig 1), is clear of traffic turn the mode switch to '**Vehicle Actuated**' mode (VA).

Note : If VA mode is selected and then the controller is Switched 'ON' then both phases are exercised in turn by cycling through green before resting on red.

9. Monitor traffic flow and adjust Green Timer settings to suit traffic flow density as required.

GUIDANCE NOTES FOR USING (VA) MODE

These notes are intended to avoid confusion when dealing with vehicle actuated control.

Note : It is a legal requirement that VA controllers are fitted and operating correctly when controlling traffic on a public highway.

Operators must be familiar with this section of the controller.

i. Description of Operation

When the unit is held in the VA mode and no traffic is present, both signal phases will rest on 'All Red'.

It should be noted that the unit is fitted with a 'Nudge' Facility that is activated on a pre-set timer, following the last detection of a vehicle.

Note :

A nudge facility is when a vehicle detection is simulated every 2 1/2 minutes approximately by the traffic control system to prevent a set becoming locked on all red. A cycle can be missed, if for instance a vehicle movement has not been detected.

Under these circumstances both signal heads will cycle in turn in case a vehicle has been missed.

As vehicles are detected at each phase, the controller will cycle each phase in turn with a standard red/amber time of 2 seconds and an amber time of 3 seconds.

Often times will be subject to Timer Switch settings as described in following notes.

ii. All Red Time

This covers the time when both Reds are on together.

This setting should be dependent on road conditions and time to clear traffic through the controlled length of road where work is taking place.

The Micro X controller allows this time to be different for the opposing directions of traffic flow as required, for example, if the signals are placed on a hill.

The time set on the Red Timer Switch for each phase is the 'All Red' time that follows the amber for that phase.

iii. All Green Time

The minimum possible Green Time for each phase is 12 seconds

The Green Time for a phase will be 12 seconds if a single call is received.

The controller will extend the green time automatically under the following circumstances: -

- (a) The green time will be extended by 15 seconds each time a call is received at a green running phase, unless a call is received from the opposing red phase.
- (b) If an opposing call is received, then the extension period described in (a) will be terminated immediately, provided a 2 second time has elapsed from the receipt of the last call on the green running phase.
- (c) If calls are received more frequently than every 2 seconds on the green running phase and an opposing call is received, then the green will continue on the running phase, from the time that the opposing call is received, for the time set on the green timer switch for that phase. After the opposing call has been serviced, the controller will return green to the interrupted phase as soon as traffic on the other phase permits.

It can be seen therefore that a continuous stream of traffic in the currently running phase will be allowed to continue following receipt of an opposing call for the period set on the Green Timer Switch.

A 'gap out' of 2 or more seconds will enable an opposing call to be serviced immediately.

Note that under light traffic conditions, when calls are frequent, the controller may return to 'All Red', to await the next call.

If a call is received for the same phase that was last at green, then the 'All Red' period will be reduced to 2 seconds.

GUIDANCE NOTES FOR USING HOLD ALL-RED, MANUAL AND FIXED TIME MODES

Use of these additional operating modes is described below: -

i. Hold all Red

This mode prevents any change occurring from 'All Red' at the signal head lights after any remaining green time has expired. The lights will display red aspects for an indefinite period.

Note: - An 'aspect' denotes Red, Amber or Green illuminating sections of signal head.

ii. Manual Mode

This mode allows site control by pressing the 'Call Buttons' to select phases manually. Note that the minimum green period of 12 seconds applies in this mode.

Such an operation may be appropriate if traffic flow is tidal to the extent that a build up occurs at one side when in VA mode due to occasional calls on the opposing phase, even when the Green Timer settings are at maximum. It should be noted that in VA mode the opposing phase will be offered green ever 2 1/2 minutes in any case due to the 'nudge' facility becoming activated and this may not be appropriate.

iii. Fixed Time Mode

Calls from vehicle detectors are ignored in this mode and the controller will free-run according to the times indicated by the Red and Green Timer Switch settings.

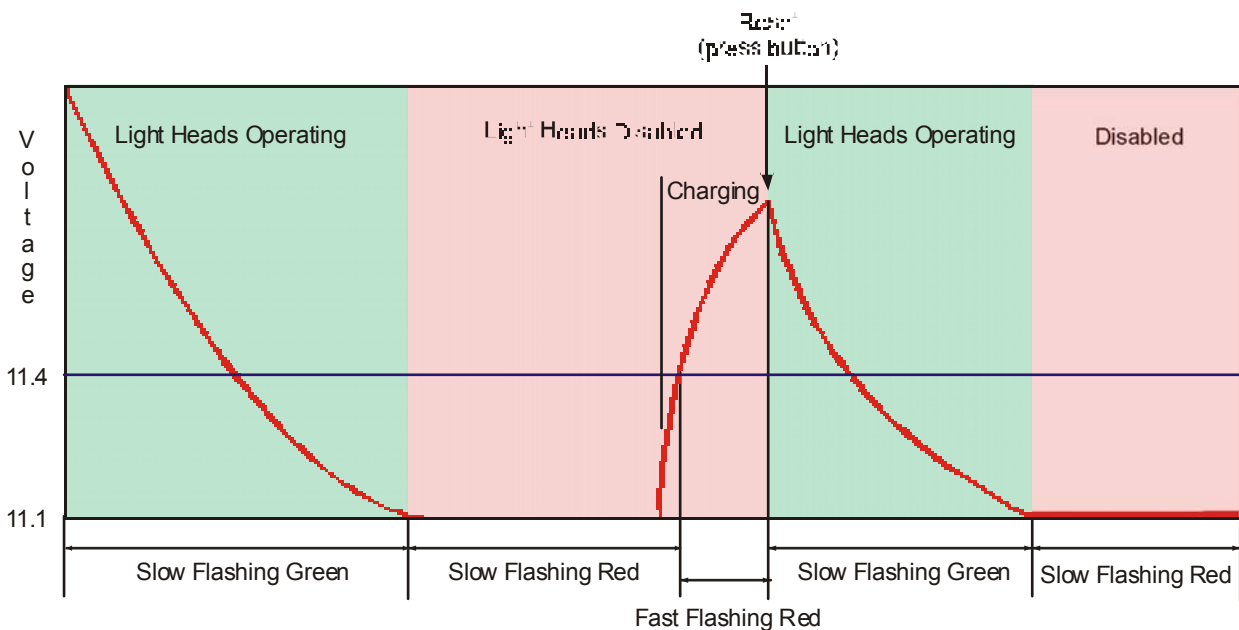
Use of this mode may be appropriate, but will occur automatically in any case, if the vehicle detectors become faulty.

3. LOW VOLTAGE DETECTOR

The concept is to turn automatically shut down the GEN-SUN unit when the battery voltage drops below the minimum set point, and to be able to push the button to turn it back on when the voltage is above the maximum set point.

The system operates as follows :

- Under normal working conditions the indicator light (adjacent to the regulator) will be displaying 'slow flashing green'.
- When or if the battery voltage discharges down to 11.1 Volts the voltage supply to the control panel will be disconnected and the indicator light will be displaying 'slow flashing red'.
- The voltage supply to the controller will continue to be disconnected until, the batteries are re-charged to 11.4 Volts (or greater). The indicator light will then display 'fast flashing red'.
- Press the reset button and the indicator light will display 'slow flash green' and the power to the controller will be re-connected.



4. WHEN TO CHARGE THE GEN-SUN

The Gensun 2 way solar assisted temporary traffic light is designed for use in all situations where there is a requirement for temporary traffic lights. Three general modes of operation have been identified, and their consequent boost charge requirements are as follows :

1. **'Jobbing'** applications, i.e. day to day work the Gensun operating within the working day (up to 7 hrs, 5 days a week). No charging requirement should be needed from end of March to beginning October. During the period of shorter days an overnight boost charge may be needed twice a month.
2. **Weekly** application, i.e. Gensun operates from Monday continuously to Friday. A charge during the weekend is recommended for the Gensun to be ready for operation the following Monday.
3. **Continuous** application, i.e. 24hr, 7day use for extended periods. The charging management of the Gensun is obviously very important in this application. The aim is to achieve a charging regime that requires the use of an external power source for no more than 7.5% of the Gensun's operating hours. (i.e no more than 12.6 hrs in a 7 day week). Ideally this should be for continuous period of charge, but for practical purposes can be split over two working days.

It is important in all modes of operation and when the Gensun is at rest, that the Gensun is positioned to make best use of all solar input. (i.e phot-voltalic panels pointing south).

****GEN-SUN CHARGING****

1. Connect 110 volt supply to yellow plug stowed in rear storage bay.
2. Press “Low Voltage Cut Out” button to reset, if required.
3. Charge for approx. **TEN HOURS** continuously (may be split over night) until charger displays “**FLOAT**”.
4. Battery Charger Display during charge cycle :
 - 0 – 80 % **Boost** (**red LED**)
 - 80% - 100% **Equalise** (**yellow LED**)
 - 100% **Float** (**bottom green LED**)

Display may show “Over voltage” during the end of the charge cycle.

NOTE ! SHORT DAILY CHARGES ARE NO SUBSTITUTE. FAILURE MAY RESULT!

Control Measures:

Monitor the battery levels from the digital read-out on the BP Regulator. Should the battery level go below 11.5 volts it is recommended that the unit be re-charged to its full capacity from a 1KVA 110v AC power supply.

The batteries should never be allowed to drain to as low as 11.1 volts. GEN-SUN will automatically shut down at 11.1 volts and will only power back up again when the batteries have been re-charged to above 11.4 volts. It is wiser to re-charge the batteries at opportune times in order to maintain battery levels at around 11.8 volts.

Further Note:

GEN-SUN is designed to run with 100m cables to each Light Head as standard. However, under controlled conditions a maximum of 150 meters to each Light Head can be used. These controlled conditions are that the battery level should not be allowed to drop to below 11.3 volts.

Should more than 150 meters of cable be used to a Light Head then the resultant voltage at the Light Head will drop to below the operational requirement.

5. FAULT DIAGNOSIS

BASIC TROUBLE SHOOTING GUIDE

Failure of the equipment should only occur due to :

- external interference
- physical damage
- a depleted battery.

COMPLETE FAILURE OF ALL TRAFFIC CONTROL HEADS

1. DISCONNECT cables at the traffic light unit
2. CHECK if **CONTROL PANEL** is switched off ?**SWITCH ON**
3. CHECK if **MAIN POWER ISOLATOR** is in “OFF” position ?.....**TURN ON**
4. CHECK if the “Low Voltage” trip flashing red ?**RESET & CHARGE UNIT.**
5. Ensure control panel is displaying correct sequence of working.
6. RE-CONNECT cables at traffic light unit.

FAILURE OF 1 OR 2 COLOURS ON ONE OR MORE HEADS

1. Poor socket connections to traffic control head(s) ? ..**CLEAN & SECURE**
2. Poor plug connections to cable reel(s) ? **CLEAN & SECURE**
3. Damage to cable(s) ?**REPLACE**

NOTE A high percentage of faults are due to cables or faulty cable terminations in plugs or sockets.

6. WARRANTY

The Micro X Traffic Light Controller is guaranteed for a period of 3 years subject to fair wear and tear, correct operation and return to our works carriage paid. We undertake to repair or replace free of charge any of our manufactures that fails, providing it has been maintained in good condition and operated with ordinary care and provided such failure is directly traceable to faulty material, or workmanship but we cannot entertain any claims for labour or other expenditure in connection therewith. Items or components subject to other manufacturer's guarantee are subject to terms of that guarantee only.

Any warranty given is void if seals on equipment are subsequently found to have been broken without prior permission by Solar Highways.

Any time of equipment repaired by Solar Highways is guaranteed from the failure for three months from the date of repair, provided that the item has been subjected to fair usage and regularly maintained.

7. MAINTENANCE

The **GEN•SUN** is basically a maintenance free unit. The following actions will assist, however, in maintaining trouble free service.

- (a) Cleaning of the controller facia and PV panels using damp cloth and mild detergent.
- (b) Batteries charged to 100% capacity whenever a unit is not in service.
- (c) Ensuring that the unit is not subject to any physical damage such as to impair its correct functionality.
- (d) Ensuring unit functions correctly prior to hire or use.
 - a. Traffic light heads are subject to physical abuse and must be physically and functionally checked after each cycle of operation.
 - b. Cable reels are subject to physical abuse and must be physically and functionally checked after each cycle of operation.

CONCLUSION

Having chosen a GEN-SUN generator traffic light set you will obtain a reliable means of providing safe traffic control for civil works plus doing your bit for the environment.

With the silence and cleanliness of operation the GEN-SUN is a must for those dealing with the countries essential services during repairs to gas, water and cables etc. Added bonuses comprise of the very low level maintenance and removing of time wasting and anti environmental practice of having to top up with diesel.

By careful study of the instructions given in this booklet you will enjoy many years of pollution free service from your GEN-SUN.

We have incorporated nationally recognised components in our unit with proven performance over 25 years to assure you of safety in operation.

Produced in England by Solar Highways Ltd.

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