Traffic Control Unit
MICROCONTROLLER BASED VERSION

Model EMTC09

USER'S HAND BOOK
&
TECHNICAL MANUAL

A product of

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CONTENT

CONFIGURATION OF TRAFFIC CONTROLLER

PARAMETER	AVAILABLE OPTIONS	
Controller Operating supply	12-24 volts DC	
Solid State output switches (working supply of connected Signal Lights)	12-24 volts DC	
Number of out puts	24 Maximum in 8 channels of 3 each	
Number of Phases	8 phases configurable	
PROGRAMMING METHOD	LCD Display and front Panel Keyboard	
	RS232 port for Hand held and PC/Laptop operation	
CONTROLLER OPERATING MODES	NIGHT BLINKING	
	FIXED TIME SCHEDULE	
	MANUAL CONTROL	
	MULTICYCLE PROGRAMS	
PROGRAMMABLE SCHEDULES	FIXED SINGLE CYCLE DAY PLAN	
	FLEXIBLE MULTICYCLE DAY PROGRAMS	
	WEEK PROGRAMS	
	HOLIDAY PLAN	
Green Light Conflict Monitor	Switches on Flashing amber in case of conflict detection and other lights are cut.	
VISUAL PROGRAMMING AND MONITORING AIDS	LCD display shows the current stage and time	
	16 pair of LEDs on front panel shows status of each output channel.	

Chapter - 1	**Explanation of Abbreviation**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

1. T.S.	Time Slot
2. RTC	Real Time Clock
3. Sch	Scheme
4. Prg	Programme
5. Stg	Stage
6. Holiday	Holidays
7. Weekly	Week Days
8. Cycle	Cycle Time
9. Drtn	Duration of Time
10. O/P	Output
11. Phs	Phase
12. TB	Terminal Block
13. CN	Connector
14. CM	Conflict Monitor
15. TC	Terminal Connector
16. MCB	**miniature circuit breaker**
17. TRB	Channel TRIAC Board
18. N	Neutral
19. P	Phase
20. P-R.	Phase for Red lights
21. P-A.	Phase for Amber lights
22. P-G.	Phase for Green lights
23. MCU	Master Control Unit
24. SMPS	Switch Mode Power Supply

Chapter - 2	**INTRODUCTION**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

This handbook describes the instructions, use and method of operation, maintenance and salient features of automatic traffic control unit. The information given in this book assists the user in maintenance, repair of the system & programming.

MASTER CONTROL UNIT. The micro controller based traffic control unit is sophisticated electronic control Instrument. The system is flexible and easily programmed & edited at site with the help of keyboard. The basic functions of the system are as follows: -

The Controller is capable of being operated in one or more of the following modes: -

1. Automatic Mode (Isolated Intersection controller with Multiple day Plan)
2. Blinking Mode
3. Manual Mode
4. Synchronized Mode (Corridor controller)

24 nos. of outputs (in 8 groups of 3 each)

Multi-program facilities: flexible multi-cycle day programs, week programs and holiday Programs.

Week days can also be programmed for all seven days plan per day for any particular day of the week.

Routine Day plan can be programmed for 24 Hrs in different plan per day i.e. combination
Programme and Schemes including Vehicle actuated mode as and when req.

Total number of Programmes: 16
Total number of Schemes (sequence): 8
Provision for connecting to 16 Input channel
DAY Plan – 24 maximum.

This makes this system a True Multi-mode, Multi- programme and Multi-cycle Control System.

The actual configuration of the Controller can be customized as listed in the first sheet of this document.

Chapter - 2	**INTRODUCTION**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

HAND HELD TERMINAL/KEYPAD

Key Board: This key board consists of sixteen push button switches in form of four rows and four columns. The function of each key is explained below.

i)	(0-9) Key	these keys are used to change the numbers in programming.
ii)	'*' Key	this key is used to checks previous Data.
iii)	'Feed Key	this key is used to editing the program.
iv)	'#' Key	this key is used to perform Next operation.
v)	'Menu' Key	this key is used to display menu.
vi)	'Print' Key	this key is used to clear the LCD.
vii)	'Enter' Key	this key is used for editing

DISPLAYS & INDICATORS

i) **LCD Display** (liquid Crystal Display of 16 Character x 2 Line).

This LCD displays Date, Day & programme Sequence.

ii) **Indicators**

a) **Power** This Indicator in ON Condition indicates availability of power to the controller.

b) **Phase LED** Sixteen Nos. green and Yellow LEDs are used to indicate STAGE SEQUENCE STATUS of Control unit.

Chapter -3	**BRIEF TECHNICAL DESCRIPTION**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

This Chapter describes brief Technical Description of the control Unit when used in different modes of operation. Fuller Details of the System, when operating in Vehicular Actuated mode are given in the later part of this section.

Envoys Traffic Signal Control Unit EMTC 09 is designed keeping in view all Safety / technical Features ensuring Smooth Flow of Traffic – This model is Modular in design, Consisting many add on features for up-gradation, which allows it to work as Intersection controller & centrally controlled with CCTV Surveillance, RED Light Violation etc, using extra peripherals / interface cards. This model has Ethernet, & USB support port & especially port for Digital Count Down Timers which can also work in Vehicle Actuated or demand dependent mode, other basic features like Multiple Day Plan, Day of the week programming, Specific date plan (Holiday) are also available.

Traffic Controllers have been designed to confirm to Indian Standard specification IS: 7537 – 1974 and British Standard Specification No. BS EN 12368 (previously BS: 505 – 71) wherever applicable and standard international practices.

TECHNICAL SPECIFICATIONS: -

- Micro Controller based circuitry – 8 -bit ATMEL Microcontroller
- Non-volatile EEPROM memory for storage of signal control parameters
- Battery backed Real Time Clock Dallas RTC 12C887.
- 16x2 LCD display interface
- 16 Keys - Keyboard interface (Hand Held terminal (HHT) for on-site programming)
- Supports Auto/Manual, Step, Flash mode, Lamp Test, Reset switches
- Up to 16 sets of Stage Indicators to show respective phases & will glow in parallel with respective phase Green traffic Light
- 24 programmable outputs in Terms of 8 Phases - 3 outputs for each phase

Chapter -3	**BRIEF TECHNICAL DESCRIPTION**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

SELF DIAGNOSTIC FEATURES

1) Time Based Errors (RTC)

2) Memory corruption / checksum error

3) Power supply faults.

4) Special interface lock provided to switch over to predefined automatic mode in case connection to Central Control Room is lost due to any reason (optional)

The controller will have Multiple day plans, Week days programming, Holiday Programming can And can select multiple day plans , peak hours timing , off peak hours , any scheme as and when required in the day Plan , with the help of suitable interface, it will be possible to bring the controller on demand dependent mode & controlled centrally – during this period, controller will work as slave unit and will switch outputs timing for Phases as per the commands of duration from Control Unit (Master unit).

Special Interface Lock will be provided to switch over to predefined automatic mode in case connection to Central control room is Lost due to any reason .

It will be possible to build-up a 24 hours day plan from the combination of Cycle plans such that a particular cycle plan is in operation during any desired period of the day. It will be possible to provide maximum 24 cycle plans in a day.

With the help of Hand held Terminal or through pc windows based software, system can be programmed or edited at site by operator / police man even without knowledge or training of electronics or software programming.

Controller can be programmed for weekdays of the month and holidays (any special day of the year) and multiple day plans for routine.

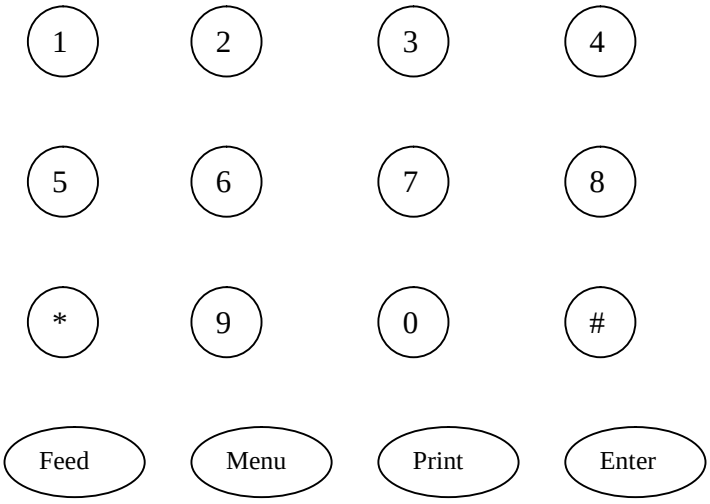
Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

4. A) Program through Keyboard

This chapter gives detail description of operating sequence and programming techniques of controller at field

A) **Programming with Key Board (Hand Held Terminal)**

Key Pad



Function of Keys

0-9 - To change or Program (0-9) Number

* - Previous

- Next

Feed - Editing

Menu - Function

Print - Clear

Enter - To save

Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

Programming Techniques

I) Setting of Clock Timing and Days: -

S.No.	Operation	Display on LCD
1.	To Change clock Timing Press 'Menu' key.	Clock - 1 Scheme - 2 Program - 3 Modes - 4 Day Plan - 5 Week - 6 Holiday - 7 Save - 8
2.	Press '1' key for next operation.	22 -05 TUE 154428 YEAR 2010
3.	Press 'Feed' Key to change clock timing. Now change time	22 -05 TUE 154428 YEAR 2010
4.	Press '1' to '7' key to change Days.	
5.	Press 0 to 9 Key to change timing	
6.	To save changes press 'Enter' key.	

Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

II) Scheme: This function is to edit or program the scheme of output for particular program and stage i.e. during switching On/OFF, blink particular output, out of total 48 outputs of that stage.

S.No.	Function	Display on LCD
1.	Press 'Menu' Key to change make scheme. ⟶	Clock - 1 Scheme - 2 Program - 3 Mode - 4 Day Plan - 5 Week - 6 Holiday - 7 Save - 8
2.	Press '2' Key to perform next operation	Scheme Stages 01 00
3.	To change scheme Press 'Feed' Key then press.	
4.	Press '0' for new scheme or '1' for changing existing scheme	Editing Scheme New (0) Edit (1)
5.	Similarly press # key and feed scheme, stage, phase and output as you required till maximum scheme 08.	Editing Scheme No. of Stages 08 Sch Stg Phs O/P 01 01 01 AB
6.	Press 'Print' Key after editing to save program. Like these 8 different schemes can be programmed each-scheme has 32-stages.	

Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

III) Program Sequence Duration:-

This section is to edit or to select the time duration of each cycle of the sequence and scheme.

S. No.	Operation	Display on LCD
1.	Press 'Menu' Key to change program sequence duration.	Clock - 1 Scheme - 2 Program - 3 Modes - 4 Day Plan - 5 Week - 6 Holiday - 7 Save - 8
2.	Press '3' Key for next operation.	Prg Sch Stg Cycl 01 01 04 0058
3.	To change program Press 'Feed' Key and change it as required.	
4.	Press '0' for new program, '1' for edit existing program or '2' for VA program. (This means schemes nos. selected for this particular program.)	Edit Program New - 0 Edit – 1 VA -2 Edit Program 3 Scheme number 2
5.	Press 'Print' Key to save changes. Similarly program for st-02,03,04…..	Prg Sch Stg Drtn 01 01 04 0020

Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

IV) To Select Operation Mode:-

S.No.	Operation	Display on LCD
1.	Press 'Menu' Key to select operation mode. ⟶	Clock - 1 Scheme - 2 Program – 3 Modes - 4 Day Plan - 5 Week - 6 Holiday - 7 Save - 8
2.	Press '4' key for next operation.	Current Mode – FREE Free -1 Synchronic - 2
3.	Press '1' Key for Free mode Press '2' key for Synchronous mode.	
4.	Press 'Print' Key	

Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

V) Day Plan: - Three options are available to select day plan.

1. For routine.
2. For Holiday.
3. For weekly.

In routine day plan, twenty four Hour day plan can be selected for the desired options.

S.No.	Operation	Display on LCD
1.	Press 'Menu' Key to select day plan. →	Clock - 1 Scheme - 2 Program - 3 Modes - 4 Day Plan - 5 Week - 6 Holiday - 7 Save - 8
2.	Press '6' Key for next operation and press '#' to change weekly day – Sun, Mon, Tue..,…….	Weekly Day Y/N Sun 0
3.	Press 'Feed' for Yes /No ('1' for Yes or '0' for No.)	

Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

VI) Week: -

S.No.	Operation	Display on LCD
1.	Press 'Menu' Key to select day plan. ⟶	Clock - 1 Scheme - 2 Program - 3 Mode s- 4 Day Plan - 5 Week - 6 Holiday - 7 Save - 8
2.	Press '5' Key for next operation.	Day plan 1 Routine 2 Holiday 3 Weekly
3.	Press '1' Key for routine day plan	
4.	Press '2' Key for Holiday	
5.	Press '3 ' Key for Weekly	

VII) **Holidays**:-

S.No.	Operation	Display on LCD
1.	Press 'Menu' Key to select day plan. ⟶	Clock - 1 Scheme - 2 Program - 3 Modes - 4 Day Plan - 5 Week - 6 Holiday - 7 Save - 8
2.	Press '7' Key for next operation	Holiday DD-MM YN NO. 01 00-00 0
3.	Feed Number of holidays and dates.	
4.	Press '#' for change holiday.	
5.	Press 'Print' for go to previous menu	

VIII) Permanent Save:-

S.No.	Operation	Display on LCD
1.	Press 'Menu' Key to select day plan. ⟶	Clock - 1 Scheme - 2 Program - 3 Modes - 4 Day Plan - 5 Week - 6 Holiday - 7 Save - 8
2.	Press '8' Key for next operation	Permanent Save ? Proceed – Y/N. 1/0
3.	Press '1' to save permanently.	

4. B .1) Program through PC/ Laptop

SOFTWARE

WINDOWS BASED SOFTWARE FOR PROGRAMMING ENVOYS MAKE TRAFFIC SIGNAL CONTROLLER.

Connection to Pc can be done through:-

1. **RS 232 Serial comm. Cable connect PC serial port and Traffic control unit.**

1) FILE

Traffic controller Program contains three menus. First of those is file menu. Which contains followings options: -

1) New

This option is used to create new program as required.

2) Open

This option is used to open existing program (already created)

3) Save

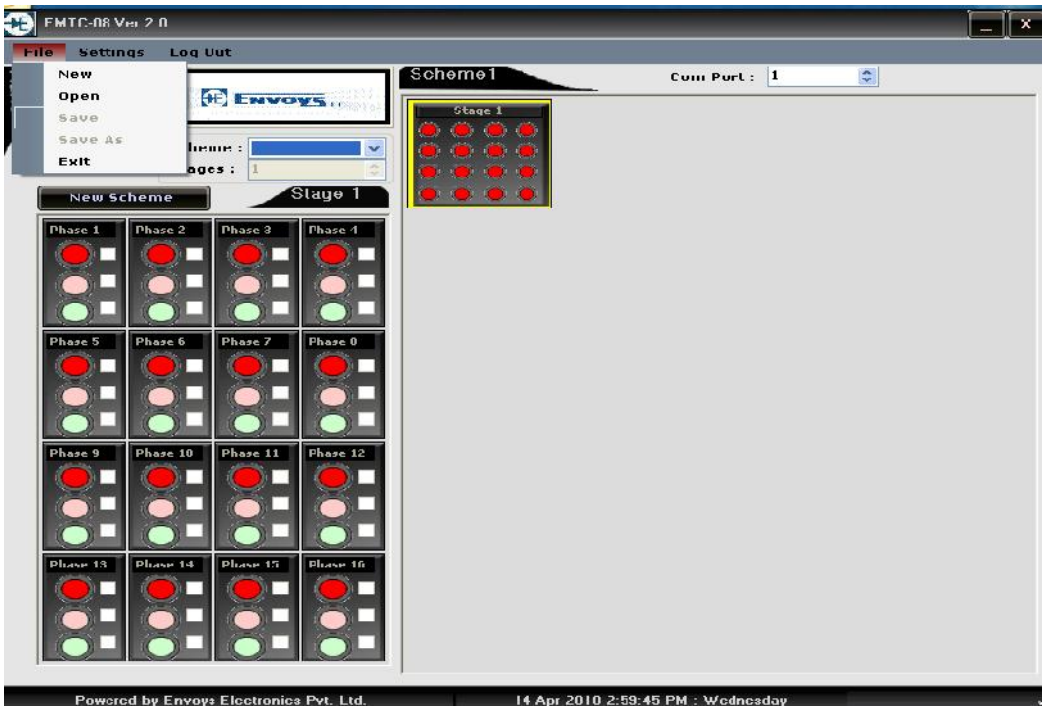
We use save option to save current created program so that we can use the same in future if required.

4) Save As

This option helps us to create a duplicate file of any saved program file with a different name.

5) Exit

This option is used to exit from Traffic Controller Program.



Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

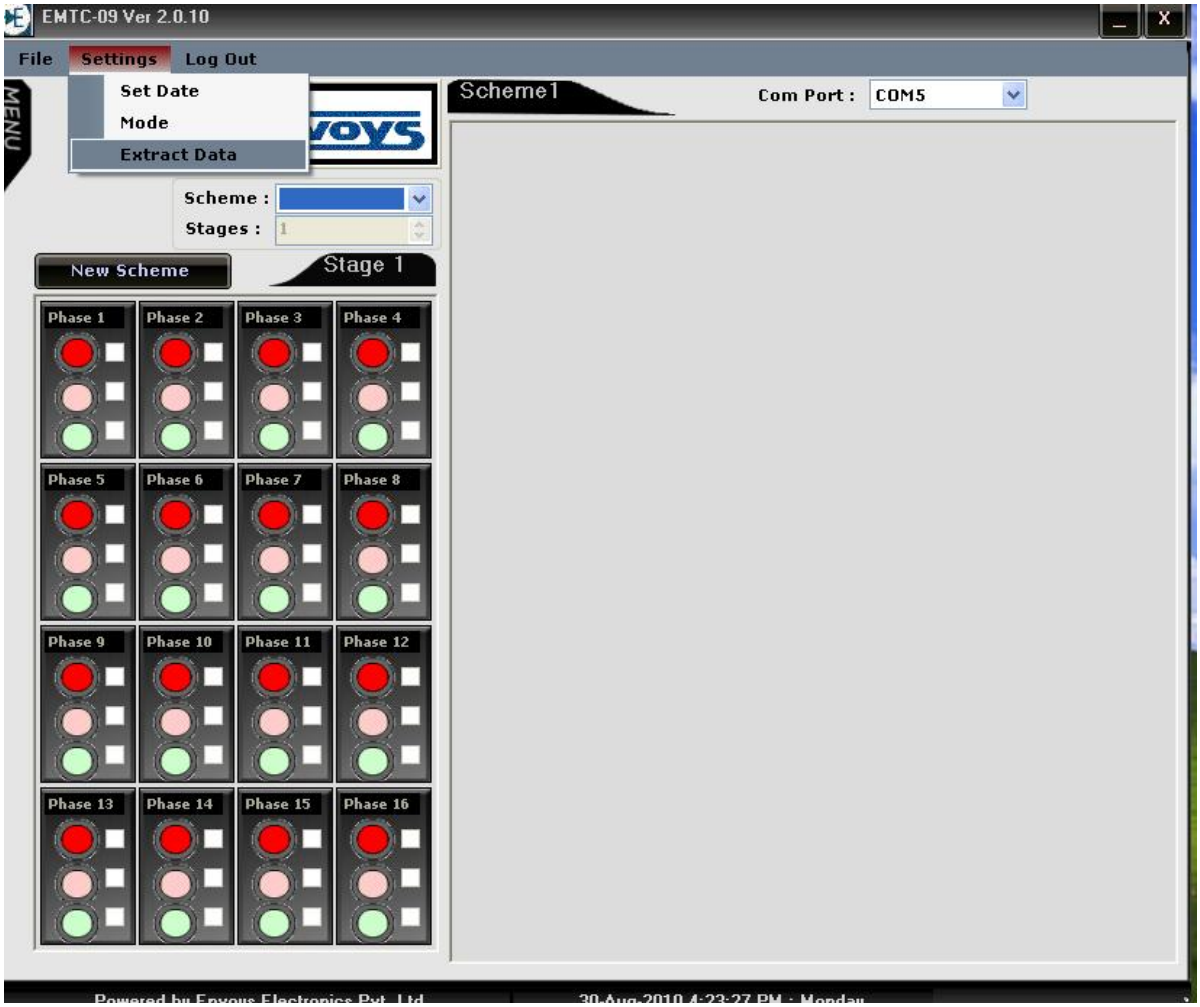
2) Setting

1) User Management

This option is used to manage user and passwords.

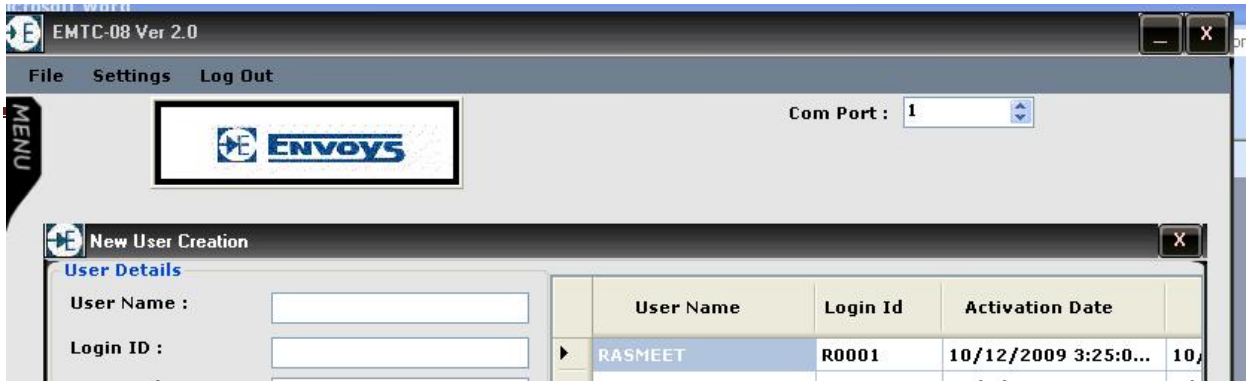
2) Set Date

This option is used to set date



Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

3.) Extract Data: this is used to extract program file from controller to computer



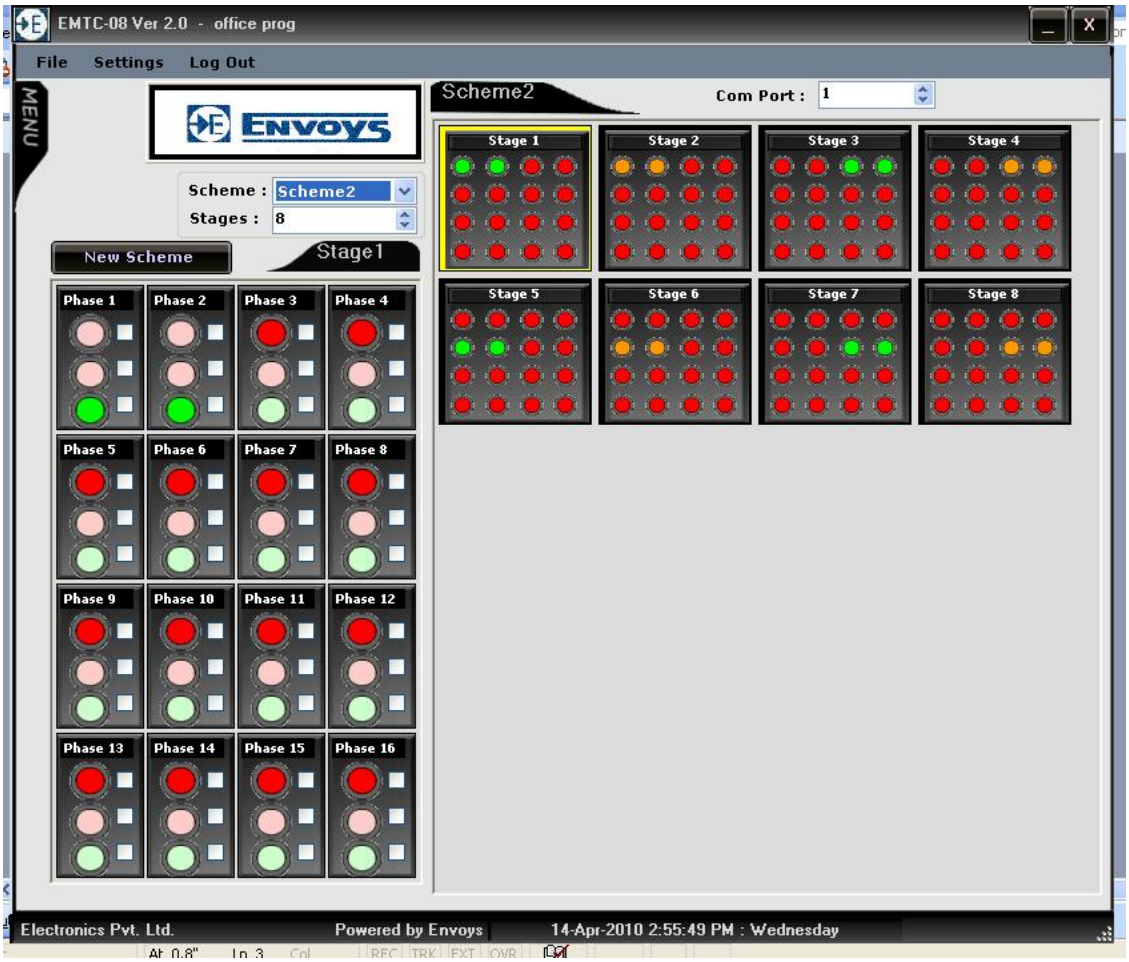
Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

PROGRAMME WIZARD

5. B.1) Normal programming

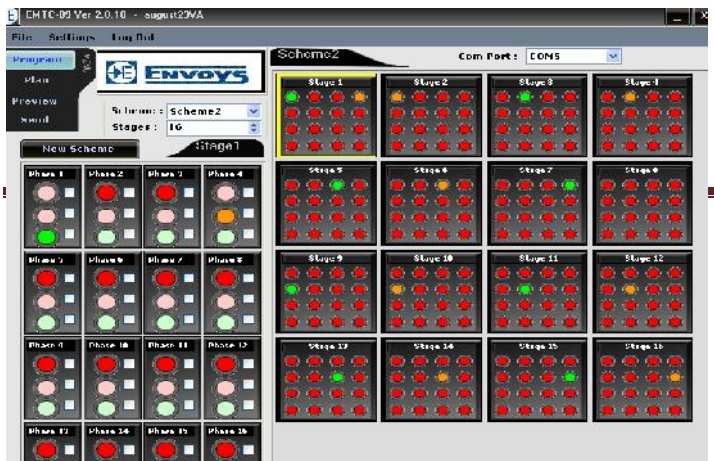
STEP- 1 Click on File Menu and select 'New' option and give package name then OK.

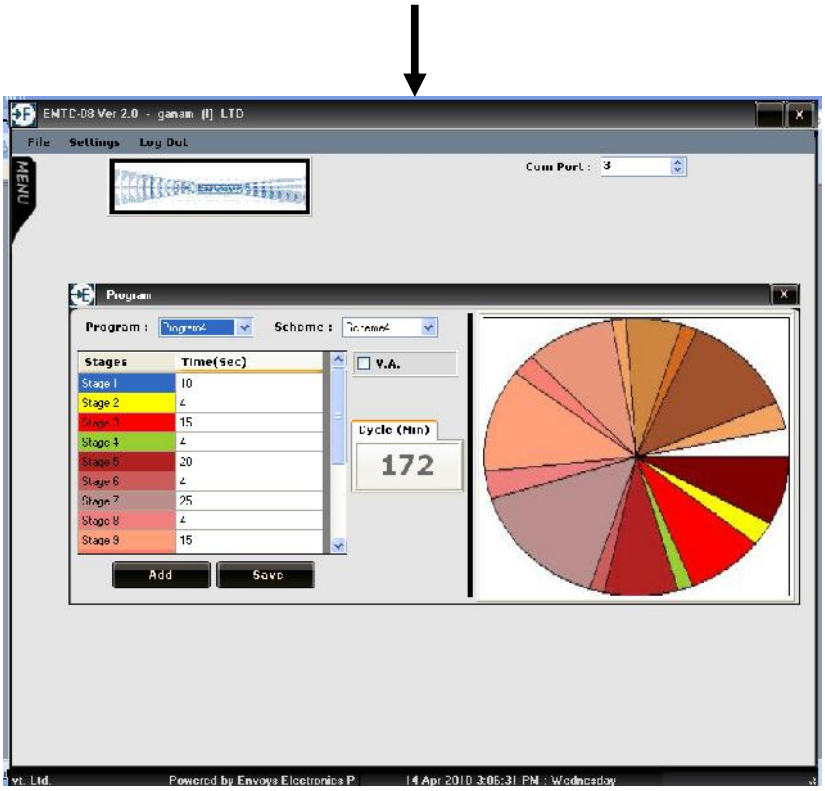
STEP- 2 Create Scheme and define no. of stages required (select option from drop down menu.



Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

STEP -3. Click on pop up 'menu' then click on program option



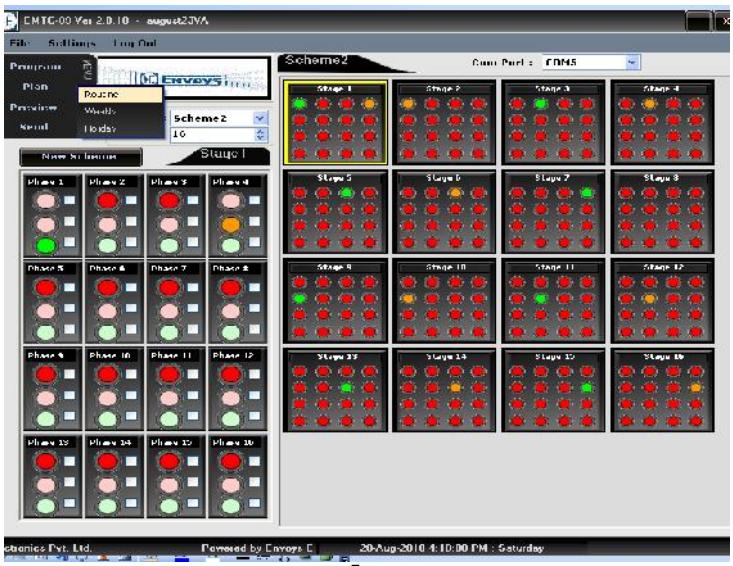


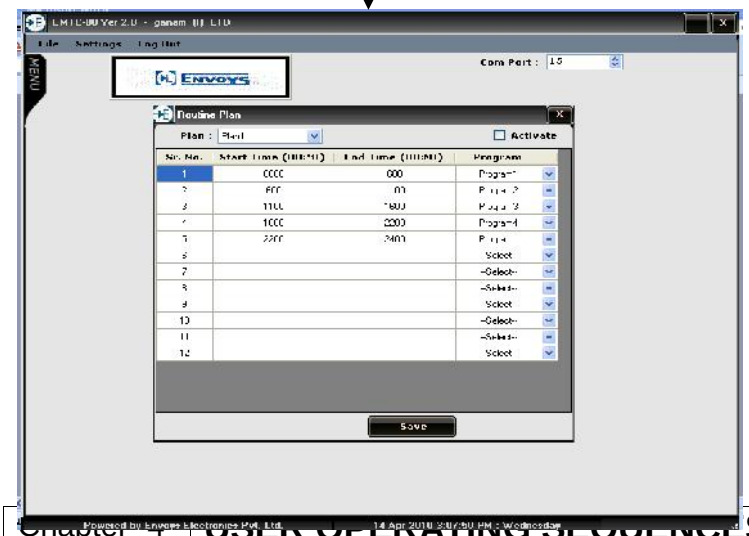
Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

STEP -4. Select program and scheme accordingly and set timing in seconds for each stages.

STEP -5. Click save button after feeding seconds for each stage thereafter click on Add button to add new program.

STEP - 6. Select sub options of Plan option of Menu. – Routine, weekly, Holiday and define parameter.

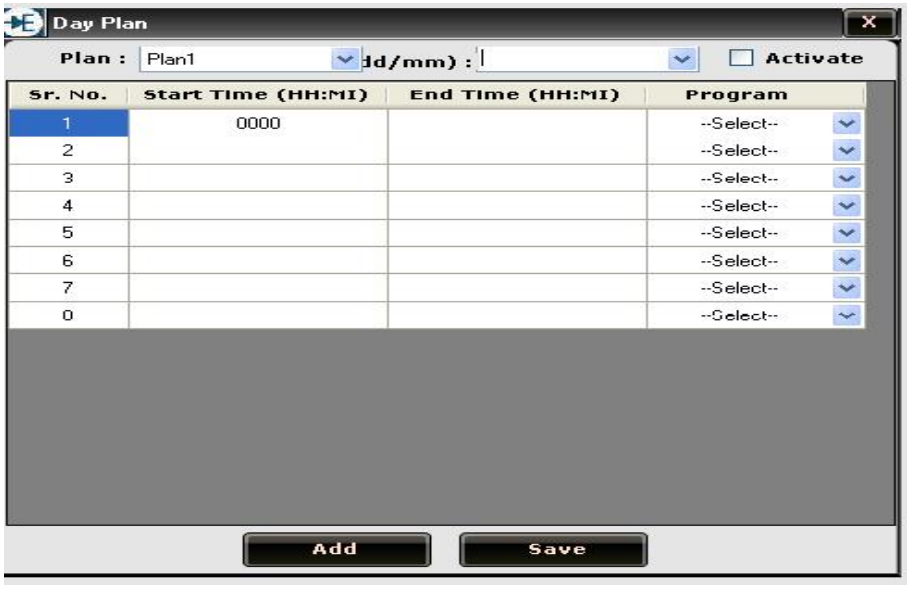




Notes: - Routine plan: - Users can set start time, end time and subsequently sequences of program. After that, ticks up the check box of Activate option and then save.

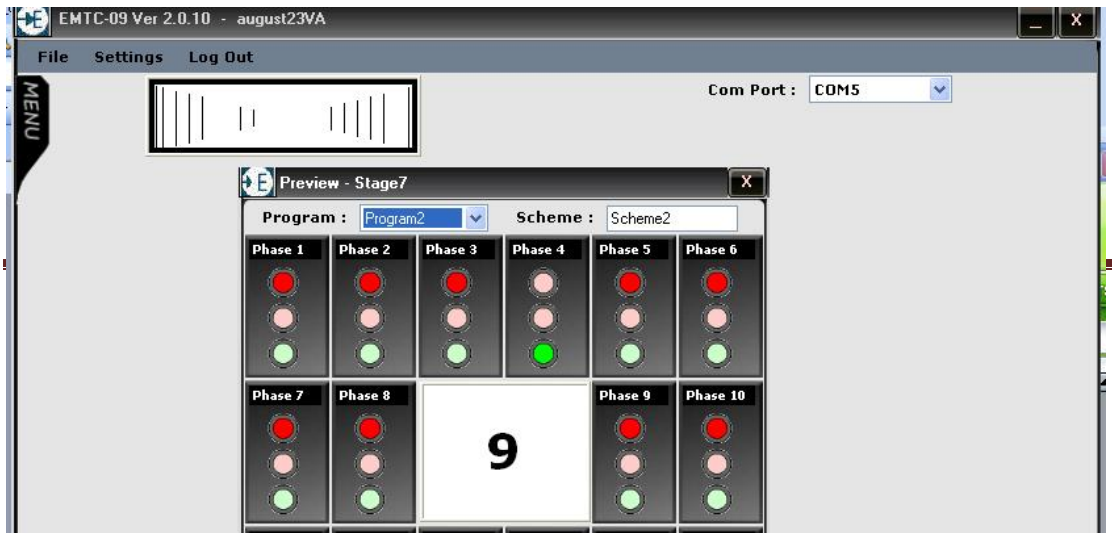
Weekly: - Users can set program for particular days for Sunday and/ or Monday, Tuesday …… After that, ticks up the check box of activate option and then save.

Holiday: - Users can set program for number of holidays or special day. After that ticks up the check box of activate option and then save.



Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

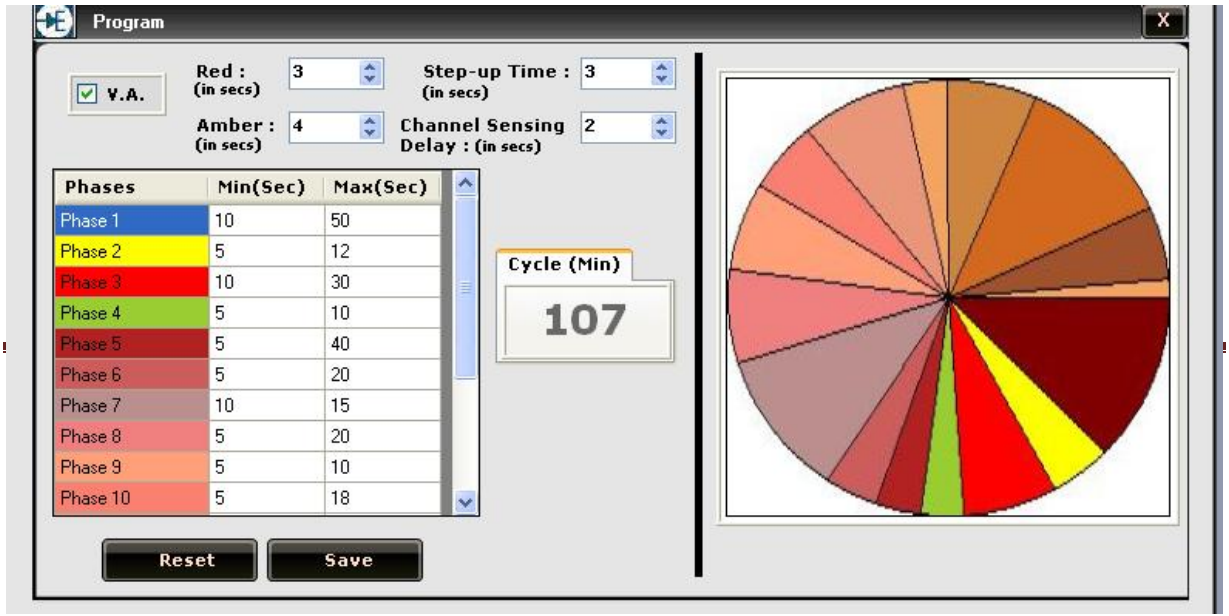
STEP 7. Select preview option of Menu.



STEP -8. Click on file menu and then save the program file.

STEP -9. Click on send option of Menu to save the program.

4. b. 2) VA programming



User has to click the check box of V.A option to start V.A. programming.

Red (in Secs) : Allot time in seconds for ALL Red Period which will be applicable for all the Phases active in VA mode. In case ALL RED is not to be activated enter "0" seconds.

Amber (in secs.): Allot time in seconds for amber signal common for all phases. It will follow after green signal of respective Phase.

Step-up time (in secs): This is basically to increase the duration of Green Signal time on detection of vehicle. If 3 secs are entered then system will add up 3 more seconds in green phase time while detection of vehicle.

Channel sensing delay: This is delay of sensing time between two vehicles. (In + seconds). After one vehicle or PED is sensed – The input sensing will be inactive for allotted duration of Time. The next input will be sensed after the duration entered in this option.

After allotting time in above sections, user has to enter minimum and maximum seconds for phases required. User can also leave blank or allot 0 second if a particular phase is not to be activated.

RESTS ALL STEPS WILL BE REMAIN SAME AS NORMAL PROGRAMING.

Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

CONTROLLER FUNCTIONS / OPERATIONS :

- *FIXED TIME MODE:* As an independent fixed time controller, it is fully flexible and can be edited or programmed at site with help of hand held terminal or Laptop / PC. It works as Independent isolated Multi Day plan controller, can be programmed for any day plan / duration or timings of Peek / Off peek – Night

flashing – Can Be programmed for Multiple Day Plans, Week days , Date of the Year (Holidays)

- *MANUAL MODE:* - At any time of requirement controller can be switched to manual mode. It will be possible to bring the controller under manual control by operation of auto manual switch in police box. The operation of the switch would result in transfer of control over the duration of each stage from the electronic timing unit of the controller through a push button manual control switch. The sequence of stages preset on the electronic unit will remain undisturbed .Each time push button is pressed, the current stage will changeover to the next stage in the controller. The duration of the stage in manual control is determined by the interval between successive operations of the push button. A separate over-riding switch is also provided in the police box such that the operation of the switch puts the controller to flashing Amber mode.

- FLASH MODE (Blinking Mode): A separate over-riding switch is also provided in the police box such that the operation of the switch puts the controller to flashing Amber mode. The controller is equipped with a reliable electronic flashing unit that would flash Amber signals in the following conditions:

  1. When the day plan provides for it.
  2. When fault monitor alarm has detected a fault in the signaling system.
  3. When switched to this mode by manual control.

  The flashing unit will confirm with A solid state blinker will be provided for flashing Amber signal lights. The flashing rate will be within the range of 30 flashes per minute when this applied voltage varies in the range between +15% and –20% of its nominal values ±4% of its nominal frequency over an ambient temperature range of 0 to 55c.

- **SYNCHRONIZED MODE:** (master & Slave – Lead Time) as part synchronized green wave system with neighboring intersection. (cable linking or GPRS or RTC) System can work as green wave synchronized corridor vehicle moving in one direction at a pre defined speed will get Green signal throughout the corridor.

Chapter -4	**USER OPERATING SEQUENCES**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

INDICATIONS & CONTROL :

The traffic control unit will incorporate the following Controls (Only interfaces are to be supported by PCB): -

- ON / OFF Switch
- Control circuit fuse
- Control Circuit Supply Indicator
- Lamp Test Switch
- Phase Stage Indicators
- LCD Display 2 Line 16 Digit with back light
- Hand Held Terminal / Serial comm. / USB / Ethernet (as per options)
- Auto/Manual Switch
- Police man control box
- Flash Mode Switch.

Chapter - 5	**SYSTEM MAINTENANCE AND SERVICING SCHEDULE**	USER MANUAL EMTC09 Issue No. 001 **Date: 25.12.2013**

This chapter gives idea about system maintenance and servicing of the system. This chapter also gives an idea about precaution and safety measures during servicing.

5.1) **Maintenance Traffic Signal Post**: -

Maintenance of Traffic Signal Post following points must be taken in account.

1.) Check the electrical connection of Traffic signal Post every month.

2.) Clean the Junction box of Traffic Signal every month.

6.2) **Maintenance of Traffic Lamp Head**: -

1.) Clean Reflector and glass after fifteen days.

2.) Check Connectors and Holder connection after two month.

3.) Check clip spring after two month.

4.) Keep front door Locked.

5.) Replace Rubber gasket after Twenty four month.

5.2 Servicing Schedule: - This section of the chapter lists the nature of faults (Fault Diagnosis) and their method /procedure of rectification).

S.No.	Nature of Faults	Probable Causes	Rectification

1.	Signal completely Off.	i) Mains supply may cut off.	i) Check mains supply in the pedestal box.
		ii) Timing and Programming of Traffic Control Unit is not operating.	ii) Check timing and programming in control unit.
2.	Signal is working but some of the lights are off.	i) Respective fuse in MOSFET board may off.	i) Replace the fuse.
		ii) That Particular kit may fuse.	ii) Check LED kit if defective replaces that.
		iii) SMPS circuit of that particular kit may faulty.	iii) Check SMPS circuit if found defective replace that.
3.	Some of the light are permanently 'ON'	i) The particular MOSFET may be sort.	i) Check the MOSFET and replace
4.	Signal Scheme is working during Night and blinking (Amber flashing during day.)	i) Time setting may upset in Control unit.	i) Check RTC Timing if found disturb correct it by keyboard.
		ii) R-T-C may faulty	ii) Check RTC if found faulty replace it.
5.	Signal is working but timing of control unit is not correct.	i.) Check RTC if faulty	i.) Replace that.