Traffic Operations

URMS

Universal Ramp Metering Software
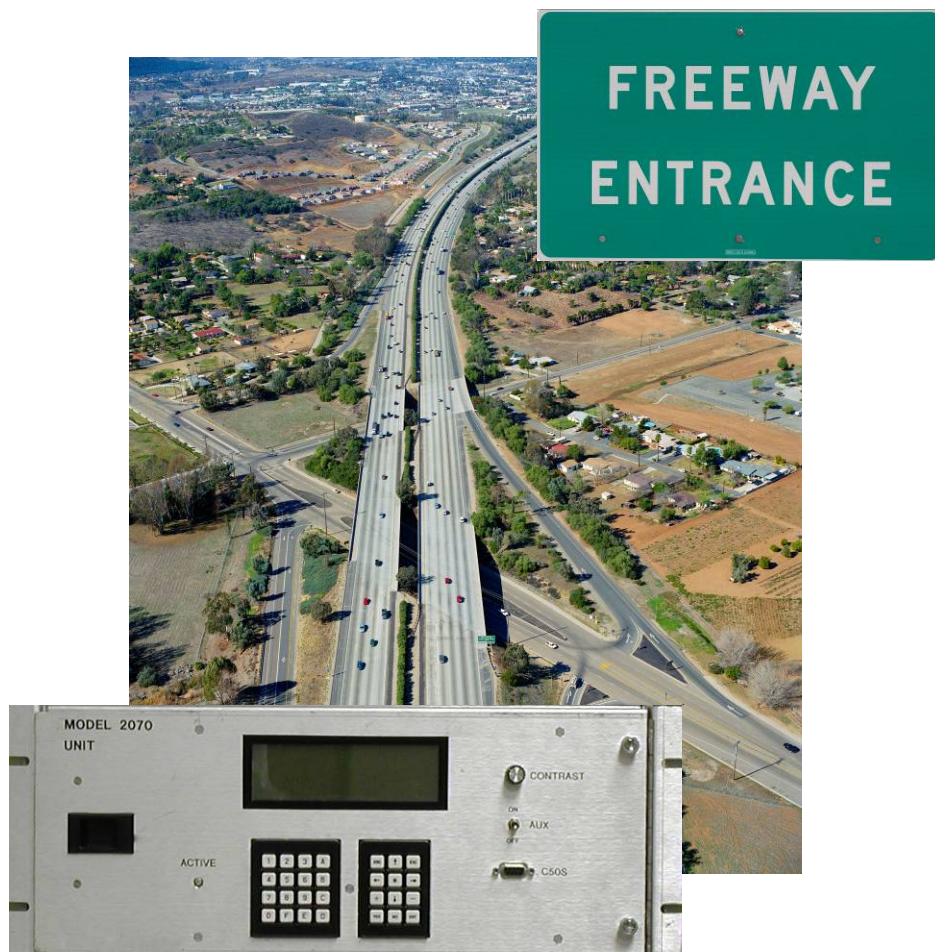
User Manual - Draft
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Caltrans

URMS
Users Manual
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Revision History

Date	Version	Description	Author
07/28/2008	1.0	First draft	Eddie Torizno David Wells
07/29/2008	1.02	Fixed some grammatical errors	David Wells
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10/01/2008	1.07	Updated manual to reflect changes made to the URMS	David Wells
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<u>Note:</u>
The latest revision of this manual is available at
the following Caltrans Intranet website:
http://trac

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Overview

The Universal Ramp Metering Software (URMS) program allows the Model 2070 Controller to function as a ramp metering controller for use throughout the State. It was designed to incorporate most of the functionally already utilized for ramp metering operations used by various Caltrans Districts into one program. The main operational features of URMS are:

Features
- 4 Metered Lanes with up to 4 queues for each lane
- 8 Mainline Lanes – Dual or Single detector per lane
- 8 Opposite Mainline Lanes – Dual or Single detector per lane
- 16 Additional Detector Locations
- 8 General Purpose Outputs – Non-Flashing, or flashing
- 1 Failsafe Input
- 10 Traffic Responsive Plans, each with 15 levels
- Command Sources: Manual, Communications, Time-of-Day and Default
- Command Actions: Fixed Rate, Traffic Responsive, Rest-in-Dark, Rest-In-Green and Emergency Green
- 16 Fixed Holidays
- 12 Floating Holidays
- Automatic Daylight Saving Time correction
- Time of Day Modes: Fixed, Traffic Responsive, Dark, Green, Emergency Green and Traffic Responsive Slave.
- Communications: 1200, 2400, 4800, 9600, 19200, 38400 baud, EIA-232, 2/4 Wire Modem and TCP/IP Polling
- Supports Telnet and FTP communications
- Supports remote access to the controller front panel using Telnet
- Supports standard SDRMS, SATMS and TOS polling and time synchronization functionality

Keyboard and Display Operations

URMS is fully menu-driven. The user can access all screens through the selection of menu choices. Menu selections are made by pressing the key corresponding to the selection desired. The selection key is always shown to the left of the choice, followed by the dash character. Once a menu selection key has been pressed, the selected screen or a sub-menu will be displayed from which further selections can be made. It may be necessary to proceed through up to three sub-menus to access certain screens. To return to a previous menu, press the [ESC] key. Repeated pressing of the [ESC] key will eventually return the display to the main menu.

On data entry screens, the position of the cursor is designated by two arrows [< >] surrounding a data entry position. The cursor position may be moved by pressing any of the four arrow keys [⇦], [⇨], [⇧] or [⇩]. In the case of multiple page data entry screens, the cursor will move to the next adjacent page if moved beyond the end of the screen. The [NEXT] key may also be used to advance directly to the next page on multiple page data entry screens.

Once the desired data entry position is selected, data may be entered. There are three different types of data entry positions on the various data entry screens. These include decimal data entry (both with and without a decimal point), flag data entry and list data entry.

Decimal data entry is accomplished by pressing the number keys [0] to [9] corresponding to the data entered. As each key is pressed, the digits entered scroll from right to left. Fields with decimal points have the decimal placed automatically, and are entered identically to those without decimal points. Once the data entry process has begun by pressing a number key, the cursor arrows will turn from arrows "< >" into square brackets "[   ]". This indicates that data entry is in progress. Continue entering the decimal digits until the desired number is shown in the field. If errors are made press the [ESC] key, the up arrow [⇧] or the down arrow [⇩] keys to completely cancel the entry. Then reselect the item and re-enter the desired data. Once the entry is complete, pressing the [ENT] key will save the data.

There is one type of flag data entry which is day-of-week. Day-of-week bit set consists of eight bits labeled SMTWTFSH. Press the key corresponding to the desired bit to toggle that flag entry: [1] is for Sunday, [2] is for Monday, [3] is for Tuesday, [4] is for Wednesday, [5] is for Thursday, [6] is for Friday, [7] is for Saturday and [8] is for Holiday. Once again, press the [ENT] key to save the day-of-week data.

The list type data entry allows the selection of one setting for each entry, which is usually presented as text, but sometimes consists of discrete numbers. Press the [+] or [–] keys to advance through the available choices. Once the list type data entry process has begun by pressing the [+] or [-] key, the cursor arrows will begin flashing. The list of choices is cyclic, and continuing to press either the [+] or [–] key will eventually return to the original selection. After a change has been made, press the [ENT] key to save the data. The [ESC] key can be pressed to cancel any change made and restore the original selection. List type data entry with the values of "YES" or "NO" may also be changed by pressing the [YES] or [NO] keys.

The Active LED on the front panel indicates the status of the controller, and blinks once per second during normal program operation. However, when the URMS is creating a backup copy of all user data entered to the Datakey, the Active LED will blink rapidly at five times per second. The copy procedure lasts about 60 seconds. Do not turn the power to the controller off when the Active LED is blinking rapidly, or the backup copy will not be completed.

Input and Output Assignments

URMS provides complete flexibility when configuring inputs. Each physical input is configured by assigning it to a device. Likewise, each physical output is configured by assigning it to a Load Switch Output. The Model 2070 Controller has 64 physical inputs numbered from 0 to 63 and 64 physical outputs also numbered from 0 to 63. The following table shows each physical input number for each input and output file slot for a Model 334 cabinet; however, the URMS is also capable of being configured for other cabinet models. For convenience, most current ramp metering output configurations can be selected under the Physical I/O Configuration Menu (menu item 8-7).

URMS Configuation Input and Output Numbers

C1 Input to I File Input Numbers

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
UPPER	C1-46	C1-50	C1-49	C1-55	C1-51	C1-57	C1-59	C1-61	C1-81	C1-79	C1-53	C1-41	C1-43	C1-45
UPPER	7	11	10	16	12	18	20	22	46	44	14	2	4	6
LOWER	C1-39	C1-47	C1-48	C1-56	C1-52	C1-58	C1-60	C1-62	C1-80	C1-82	C1-54	C1-40	C1-42	C1-44
LOWER	0	8	9	17	13	19	21	23	45	47	15	1	3	5

C1 Switchpack Output Numbers

	1	2	3						9	10	11	12	13	14
RED	C1-2	C-4	C1-7						C1-97	C1-94	C1-91	C1-88	C1-85	C1-83
RED	0	2	5						53	50	48	45	42	40
YELLOW	C1-37	C1-5	C1-8						C1-98	C1-95	C1-101	C1-89	C1-86	C1-100
YELLOW	34	3	6						54	51	37	46	43	36
GREEN	C1-3	C1-6	C1-9						C1-99	C1-96	C1-93	C1-90	C1-87	C1-84
GREEN	1	4	7						55	52	49	47	44	41

If additional inputs are needed then an additional input rack or "J" file can also be connected to the controller. When used, the URMS input numbers and 2070 C1/C11 connections are as shown on the table below.

URMS Configuation Additional Rack Input Numbers													
C1/C11 Input to Ramp Metering J File Input Numbers													
1	2	3	4	5	6	7	8	9	10	11	12	13	14
C1-73	C1-75	C1-77	C1-67	C11-10	C11-12	C11-15	C11-17	C11-19	C11-21	C11-23	C11-25	C11-27	C11-29
38	40	42	32	24	26	48	50	52	54	56	58	60	62
C1-74	C1-76	C1-78	C1-68	C11-11	C11-13	C11-16	C11-18	C11-20	C11-22	C11-24	C11-26	C11-28	C11-30
39	41	43	33	25	27	49	51	53	55	57	59	61	63

(UPPER = rows with 38–62; LOWER = rows with 39–63)

URMS Initialization Errors

When the controller boots up, the URMS checks to ensure that a valid configuration file exists on the controller..

If any configuration error is found, then the following error screen will be displayed. Press any key to go to the Main Menu. URMS will still run, but you may want to remove this unit from service until the reason for the error is determined.

```
      URMS CONFIGURATION FILE ERRORS
        WERE FOUND WHEN LOADING THE
      CONFIGURATION FILE /r0/urms.cfg
```

If the URMS configuration file cannot be found by URMS or if the configuration file is corrupt, then the following error screen will appear. URMS will not run without a valid configuration file. Load a new URMS configuration file or remove the controller from service.

```
     URMS CONFIGURATION FILE NOT FOUND
      PLEASE ENSURE THE CONFIGURATION
      FILE /r0/urms.cfg IS LOADED AND
               NOT CORRUPT
```

URMS Main Menu

The Main Menu is the home screen for URMS. If you don't know what menu screen you are on in the program, pressing [ESC] repeatedly will eventually bring you back to the Main Menu. The Main Menu is divided into 10 logical areas which allow the user to view the controller status and to modify the current configuration.

```
       URMS VERSION 2.08 - MAIN MENU

   1-Metered Lanes        6-Time of Day
   2-Mainline             7-Communications
   3-Additional Detection 8-General
   4-Traffic Resp. Plans  9-Utilities
   5-Command Source       A-Status

```

Metered Lanes   Status and configuration for up to 4 metered lanes.

Mainline   Status and configuration for up to 8 mainline and 8 Opposite mainline lanes.

Additional Detection   Status and configuration for up to 16 additional detection stations which can include off ramp, on ramp, merge detection or any other location which the user would like to collect traffic monitoring data.

Plans   Metering plans used for traffic responsive metering.

Command Source   The status and configuration for the various controller command sources that can command the controller such as time-of-day or communications.

Time-of-Day   Used for time-of-day functions such a setting the clock, time-of-day tables, and both fixed and floating holidays.

Communications   Status and configuration for serial ports 1, 2 and TCP/IP.

General   Physical I/O Setup, current I/O configuration, General Purpose Output ON and OFF flashing times and failsafe feedback.

Utilities   Power failure logging, raw input and outputs detection status, detector reset, wiring and signal test, software status, configurations backup as well as several other utility functions.

Status   Controller status indications of timing, traffic responsive rate, current plans, current metering rates and other ramp metering status information.

1. Metered Lanes

The Metered Lanes menu has 5 menu items to allow a user to get the status of and to modify the configuration of up to 4 metered lanes.

```
                  METERED LANES
      1-Statistics
      2-Detection
      3-Detector Status
      4-Car Count
      5-Configuration
      6-Queue Configuration
```
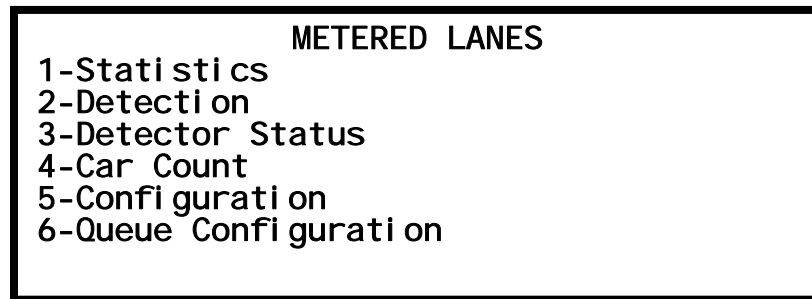
Statistics	Shows the last 30-second volume and occupancy data for each Queue, Demand, and Passage Detector.
Detection	Shows the current detection state of each Queue, Demand, and Passage Detector.
Detector Status	Shows the current operational status of each Queue, Demand, and Passage Detector.
Car Count	Shows the number of vehicles that have been detected on each Queue, Demand and Passage Detector since the controller was turned on.
Configuration	Allow the user to configure the metered lane timing and detector configuration parameters.
Queue Configuration	Allow the user to configure the queue detection and configuration parameters.

1-1 Statistics

The Statistics menu show the last 30 seconds of data for each of the configured metered lane. The data shown is updated every 30 seconds. It should also be noted that the controller will only display data for the number of lanes configured.

```
         Metered Lane 30 Second Data
  LANE      QUEUE     |  DEMAND  |    PASSAGE
          VOL   OCC%  |   VOL    |  VOL   OCC%
    1      6    15.3  |    5     |   3    12.4
    2      5    12.3  |    4     |   4    13.4
    3      7    12.4  |    4     |   3    12.4
    4      4    10.3  |    4     |   3    12.3
```

Queue Volume   The number of vehicles that have passed through the queue
                       detection zone during the last 30-second interval.

Queue Occupancy   The percentage of time that vehicles were present in the queue
                       detection zone during the last 30-second interval.

Demand Volume   The number of vehicles that have passed through the demand
                       detection zone during the last 30-second interval.

Passage Volume   The number of vehicles that have passed through the passage
                       detection zone during the last 30-second interval.

Passage Occupancy The percentage of time that vehicles were present in the
                       passage detection zone during the last 30-second interval.

1-2 Detection Status

The Detection Status menu displays whether a Queue, Demand or Passage Detector for each
metered lane is currently in the actuated or de-actuated state. A dot (.) represents a de-
actuated /OFF state while an asterisk (*) represents an actuated /ON state.

```
      METERED LANE DETECTION STATUS
  LANE                1     2     3     4
  Queue4              .     .     .     .
  Queue3              .     .     .     .
  Queue2              .     *     .     .
  Queue1              .     .     .     .
  Demand              .     .     .     .
  Passage             .     .     *     .
```

1-3 Detector Status

The Detector Status menu displays the current operational status of the metered lane Queue, Demand and Passage Detectors.

```
        METERED LANE DETECTOR STATUS
 Lane                  1     2     3     4
 Queue4                W     W     D     D
 Queue3                W     W     D     D
 Queue2                W     W     D     D
 Queue1                W     W     D     D
 Demand                W     R     R     D
 Passage               W     W     MP    D
```

Due to space limitations the following abbreviations are used in the display of the metered lanes detector status:

Working [W]   Indicates that this detector currently appears to be working normally.

Recalled [R]   Represents that the detector has been configured to be in a continuous recalled or ON state.

Disabled [D]   Represents that the detector has been configured to be in a continuous de-actuated or OFF state.

Maximum Presence [MP]   Indicates that the input on the detector for a metered lane has been continuously actuated for longer than the configured Maximum Presence Time.

No Activity [NA]   Indicates that the input on the detector for a metered lane has been continuously de-actuated or OFF state for longer than the configured Maximum No Activity Time.

Erratic Count [EC]   Indicates that the vehicle count on the detector for a metered lane exceeded the maximum number of counts allowed under the configured Erratic Count Threshold during the last 30-second interval.

1-4 Car Counts

The Car Counts menu show the number of cars that have traveled over a detector since the controller was powered on or the car counts were reset. For metered lanes only the last 5 digits of the car counts are displayed on the front panel.

```
            Metered Lane Car Counts
Lane                 1      2      3      4
Queue4            7521   7312   7443   6923
Queue3            7421   7321   7432   6985
Queue2            7444   7242   7446   6953
Queue1            7434   7431   7438   6983
Demand            7432   7422   7412   6974
Passage           7436   7345   7423   6877
```

Note:
Car Counts can be cleared using menu 9-C (clear car counts)

1-5 Configuration

The Configuration menu displays the metered lanes configuration menu.

```
        METERED LANE CONFIGURATION

   1-General          6-Demand
   2-Startup          7-Passage
   3-Metering         8-Queue Usage
   4-Shutdown         9-Metering Defaults
   5-Groups           A-Queue Override
```

General	Represents the general items related to a lane such as the Lane Group Number.
Startup	Represents those items which relate to the transition of the ramp meter from the non-metering state to the metering state.
Metering	Represents those items which relate to the timing that occurs while the controller is actively metering traffic.

Shutdown   Represents those items which relate to the transition from the active metering state to the non-metering state.

Dependency Groups   Represent configuration items that affect ramp metering groups such as fixed metering offset time or fractional offset time.

Demand   Represents the configuration items for the metered lane Demand Detector.

Passage   Represents the configuration items for the metered lane Passage Detector.

Queue Adjustment Limits   Represents the method by which Queue Override if enabled will occur.

Queue Adjustment Rates   Represents the adjustment rate and levels used for rate, rateup and level adjustments.

Queue Override   Represents those items that can prevent queue override from occurring if the mainline is extremely congested.

1-5-1 General

The General Configuration menu displays the items of each metered lane which are fairly general in nature.

```
  METERED LANE CONFIGURATION - GENERAL
 Lane                1     2     3     4
 Dep Group           A     A     C     C
 Veh-Per-Green       1     1     1     1
 Meter Enabled      YES   YES   YES   YES
 Yellow  Fail       2.0   2.0   2.0   2.0
 Max Meter Rate      0     0     0     0
 Min Meter Rate      0     0     0     0
```

Dependency Group A group to which each metered lane is associated with. Every lane within a group must start and end metering at the same time. Groups can also incorporate other dependent functionality such as fixed offset times. The dependency group can be configured to be group A, B, or C.

Vehicles-Per-Green How many vehicles per green light activation are allowed to pass. The configurable range is 1 to 3 vehicles.

Meter Enabled Enables a metered lane. YES means that the lane will meter as requested. NO means the lane will be prevented from transitioning from the Pre-Meter Non-Green Interval (DARK) to the Pre-Meter Green Interval. Note that setting this configuration item to a value of NO will not turn off a metered lane that is currently metering. It only prevents a metered lane from starting the metering sequence by preventing it from entering the Pre-Meter Green Interval.

Yellow Fail If the status of the Demand Detector shows any error condition and the Demand Fail Yellow Time is greater than zero then the Demand Yellow Time will be used rather than Yellow Time for the respective Metering Yellow or Shutdown Yellow interval. If the Demand Fail Yellow Time is set to zero, then no adjustment will be made. The Configurable Range is 0 and 0.5 to 5.0 Seconds in 0.1-second increments.

Max Meter Rate Limits the metering rate to meter at a rate equal to or less that the rate entered. A value of zero (0) will deactivate maximum metering rate limiting. The configurable range is 0 and 240 to 1800 VPH in 1 VPH increments.

Min Meter Rate Limits the metering rate to meter at a rate equal to or greater that the rate entered. A value of zero (0) will deactivate minimum metering rate limiting. The configurable range is 0 and 240 to 1800 VPH in 1 VPH increments.

1-5-2 Metering Startup

The Metering Startup Configuration menu displays those configuration items used by a metered lane during the transition from non-metering to fixed rate or traffic responsive metering.

```
  METERED LANE CONFIGURATION - STARTUP
Lane              1      2      3      4
Min Meter(M)   10     10     10     10
Start Alert    1.0    1.0    1.0    1.0
Start Warn     1.0    1.0    1.0    1.0
Start Green   10.0   10.0   10.0   10.0
Start Yellow   4.0    4.0    4.0    4.0
Start Red      2.0    2.0    2.0    2.0
```

Minimum Meter   The minimum amount of time that once the metered lanes have started metering the lanes will continue to actively meter. The configurable range is 0 to 60 minutes in 1-minute increments.

Startup Alert   The length of time to turn on the advanced warning signs prior to Startup Green Interval. The configurable range is 0 to 60.0 seconds in 0.1-second increments.

Startup Warning   The length of time to turn on the Advanced Warning Signs prior to the Startup Green Interval. If the value of Startup Warning is set to 0 and the commanded action is traffic responsive metering then the Advance Warning Sign will always be ON, even when the ramp is not actively metering traffic. If the value is greater than 0 then the Advance Warning will be turned OFF when the program is not actively metering. The configurable range is 0 to 60.0 seconds in 0.1-second increments.

Startup Green   The length of the Startup Green Interval. The configurable range is 0 to 60.0 seconds in 0.1-second increments.

Startup Yellow   The length of the Startup Yellow Interval. The configurable range is 0 to 10.0 seconds in 0.1-second increments.

Startup Red   The length of the Startup Red Interval. The configurable range is 0 to 10.0 seconds in 0.1-second increments.

1-5-3 Metering

The Metering menu displays those configuration items used by a metered lane when actively metering during fixed rate or traffic responsive metering.

```
  METERED LANE CONFIGURATION - METERING
 Lane                1      2      3      4
 Min Green          2.0    2.0    2.0    2.0
 Max Green          3.0    3.0    3.0    3.0
 Yellow             0.0    0.0    0.0    0.0
 Min Red            2.0    2.0    2.0    2.0
 Demand Gap         1.0    1.0    1.0    1.0
 Demand Red         3.8    3.8    3.8    3.8
```

Minimum Green   The minimum length of the Green Interval. The configurable range is 1.0 to 5.0 seconds in 0.1-second increments.

Maximum Green   The maximum length of the Green Interval. The configurable range is 1.0 to 15.0 seconds in 0.1-second increments.

Yellow   The length of the Yellow Interval. The configurable range is 0 seconds and 0.5 to 5.0 seconds in 0.1-second increments. A value of zero (0) indicates that the Yellow Interval shall be skipped.

Minimum Red   The minimum length of the Red Interval. The configurable range is 1.0 to 15.0 seconds in 0.1-second increments.

Demand Gap   The length of time that can elapse after the Red Interval has expired without actuation of the Demand Detector that a vehicle will still be considered to have been over the Demand Detector during the red cycle. The configurable range is 1.0 to 5.0 in 0.1-second increments.

Demand Red   The length of time by which the current Red Interval will be extended if a vehicle has not been detected on the Demand Detector during the normal Red Interval. This is to prevent the metered lane from cycling to green before the vehicle has actually stopped on over the Demand Detector. The configurable range is 0 and 1.0 to 15.0 in 0.1-second increments. A value of zero (0) indicates that no time shall be extended.

1-5-4 Metering Shutdown

The Metering Shutdown configuration menu displays those parameters that relate to the transitioning of the metered lane from the metering state to the non-metering state.

```
 METERED LANE CONFIGURATION - SHUTDOWN
Lane                 1      2      3      4
Shut Warn          3.0    3.0    3.0    3.0
Post Green        30.0   30.0   30.0   30.0
Shut Time (s)      0      0      0      0
Min Non-Meter(M) 4       4      4      4
Q VS Shutdown     NO     NO     NO     NO
```

Shutdown Warning	The length of the Shutdown Warning Interval. This is the final period during which the Advanced Warning Signs are ON (unless an Advance Warning Time of zero (0) has been selected). The configurable range is 0 to 60 seconds in 0.1-second increments.
Post Green	The length of the Post Metering Green Time that shall occur after the Advance Warning Sign has been turned OFF (unless an Advance Warning Time of zero (0) has been selected). The configurable range is 0 to 60 seconds in 0.1-second increments.
Shutdown Time	The maximum length of shutdown metering. Shutdown is metering that is done at a different or shutdown rate. This can be used to clear out metering ramps prior to final metering shutdown. The configurable range is 0 to 60 minutes in 1-minute increments. Normally this value is zero (0).
Minimum Non-Meter	The minimum length of the non-metering state. This will prevent excessive transitioning of the ramp meter between the metering and non-metering states. The configurable range is 0 to 60 minutes in 1-minute increments.
Q VS Shutdown	Selects if active metering shall be restricted from transitioning into the non-metering state if the Queue Flag is set.

1-5-5 Dependency Groups

The Dependency Groups menu configures how metered lanes associated in a metered lane group will be affected by other lanes in the same metering group.

```
  METERED LANE CONFIGURATION - GROUPS
Group                 A      B      C
Signal Serv Mode   MUTEX  FIXED  FRACT
Grn Offset Time    4.0    4.0     4.0
Fract Offset Time  3.0    3.0     3.0

Shutdown Gap Time  0.0    0.0     0.0
```

Signal Service Mode	Determines the method of inter-dependency between each metered lane in the dependency group.
	The following group modes are available:
None	There is no dependency between the lanes within this dependency group.
Fixed	The start of the Green Interval for any lane will occur no sooner than configured in the Green Offset Time.
Fractional	The start of the Green Interval for any lane will occur no sooner than the calculated value of the number of metered lanes in a group divided by the metering cycle length. At no time, however will the time be less than the Fractional Offset Time.
MUTEX	Mutually Exclusive. One and only one lane in the dependency group shall display green at any given time while the group is actively metering.
MUTX2	Mutually Exclusive. One and only one lane in the dependency group shall display green or yellow at any given time while the group is actively metering.
Green Offset Time	Used when the controller Signal Service Mode is set to Fixed Offsets; this item configures the length of time between the beginnings of successive Green Intervals for

metered lanes. The configurable range is 0.5 to 10.0 in 0.1-second increments.

Fractional Offset Time   Used when the controller Signal Service Mode is set to Fractional Offsets; this item configures the minimum length of time between the beginnings of successive Green Intervals for metered lanes. The configurable range is 0, 0.5 to 5.0 in 0.1-second increments. A value of zero (0) indicates that there is no minimum length of time.

Shutdown Gap Time   Indicates the length of time between successive actuations of demand detectors necessary to terminate the shutdown metering. The configurable range is zero (0) to 10.0 in 0.1-second increments.

1-5-6 Demand Detector

The Demand Configuration menu allows the user to configure the Demand Detector Mode, Maximum Presence Time, No Activity Time, Erratic Count, Dependent Maximum Presence Time and Dependant No Activity Count.

```
   METERED LANE CONFIGURATION - DEMAND
 Lane              1       2      3      4
 Mode            RECAL   RECAL   ENAB  ENAB
 Max Pres (M)      5       5      5      5
 No Activity (M)   0       0      0      0
 Erratic Cnt (V)  22      22     22     22
 Dep Max Pres(S)  10      10     10     10
 Dep No Act(V)     5       5      5      5
```

Mode   The current operating mode of the Demand Detector. It can be set to either Recalled or Enabled.

Enabled   Sets the Demand Detector so that it is ready to detect and will place a call when a vehicle is present in its detection zone.

Recalled   Sets the Demand Detector so that it shall constantly place a call, even without a vehicle being present in its detection zone.

Redlk   Allows the user to lock in calls on the Demand Detector anytime the metered lane is in the red state. This can be helpful if the Demand Detector is not as reliable as it should be, but can have the unintended consequence of additional cycling of the metered lane if vehicles do clear entirely off the Demand Detector before the Green Time has expired.

Maximum Presence   The amount of time that the Demand Detector for a metered lane can be continuously actuated before the metered lane detector status will report a detector status of Maximum Presence Error. The configurable range is 0 to 720 minutes in 1-minute increments. A value of zero (0) will deactivate Maximum Presence monitoring.

No Activity   The amount of time that the Demand Detector can be continuously non-actuated before the metered lane detector status will report a detector status of No Activity Error. The configurable range is 0 to 720 minutes in 1-minute increments. A value of zero (0) will deactivate No Activity monitoring.

Erratic Count   The maximum number actuations that the Demand Detector can receive within a 30-second period before setting the lane detector status to a status of Erratic Count Error. The configurable range is 0 to 255 vehicles in 1-vehicle increments. A value of zero (0) will deactivate Erratic Count monitoring.

Dependent Maximum Presence   The number of seconds that the Demand Detector can be continuously actuated while the Passage Detector has been continuously non-actuated before the metered lane detector status will report a detector status of Maximum Presence Error. The configurable range is 0 to 600 seconds in 1-second increments. A value of zero (0) will deactivate Dependant Maximum Presence monitoring.

Dependent No Activity   The number of actuations of the Passage Detector that can occur while the Demand Detector has been continuously non-actuated before the

metered lane detector status will report a detector status of No Activity Error. The configurable range is 0 to 30 vehicles in 1-vehicle increments. A value of zero (0) will deactivate Dependant No Activity monitoring.

1-5-7 Passage Detector

The Passage Configuration menu allows the user to configure the Passage Detector Mode, Maximum Presence Time, No Activity Time and the Erratic Count.

```
  METERED LANE CONFIGURATION – PASSAGE
Lane               1     2     3     4
Mode             ENABL RECAL ENABL ENABL
Max Pres (M)       0     0     0     0
No Activity (M)    5     5     5     5
Erratic Cnt(V)    22    22    22    22


```

Mode	The current operating mode of the Passage Detector. It can be set to either Recalled or Enabled.
Enabled	Sets the Passage Detector so that it is ready to detect and will place a call when a vehicle is present in its detection zone.
Recalled	Sets the Passage Detector so that it shall constantly place a call, even without a vehicle being present in its detection zone.
Maximum Presence	The amount of time that Passage Detector for a metered lane can be continuously actuated before the metered lane detector status will report a detector status of Maximum Presence Error. The configurable range is 0 to 720 minutes in 1-minute increments. Setting this parameter to zero (0) will deactivate Maximum Presence monitoring.
No Activity	The amount of time that the Passage Detector can be continuously non-actuated before the metered lane detector status will report a detector status of No Activity Error. The configurable range is 0 to 720 minutes in 1-minute increments. Setting this parameter to zero (0) will deactivate No Activity monitoring.

       Erratic Count   The maximum number actuations that the Passage Detector can receive within a 30-second period before setting the lane detector status to a status of Erratic Count Error. The configurable range is 0 to 255 vehicles in 1-vehicle increments. Setting this parameter to zero (0) will deactivate Erratic Count monitoring.

1-5-8 Queue Usage

The Queue Usage menu allows the user to configure the method by which multiple metered lane queues will interact with each other. For metered lanes that have only a single queue detector the recommended setting is priority (PRIOR).

```
        METERED LANE QUEUE Usage

Lane                1     2     3     4
Queue Usage        ADD   ADD  PRIOR  PRIOR
```

    Queue Usage   Selects the Queue Usage Mode. Additive will add the rates and level adjustments of each individual queue which has its Queue Flag SET into a combined queue rate and level adjustment. Priority will set the rate adjustment of the highest numbered queue (ie. Queue 4 has priority over Queue 3) which has its Queue Flag SET. The allowable parameter settings are Additive or Priority. Note: Queue Fixed Rate Adjustments are ignored when the Queue Usage is set to Additive.

1-5-9 Default Command Source

The Default Command Source menu item sets up the default command source which has the lowest command source level. Note that this configures the same parameters as menu item 5-5, Default Command Source. Essentially this defines what action the controller will take when the controller is powered on or if it is before the first Timebased Control entry for the day. As with any command source there are 3 settable parameters which are Action, Rate, and Plan.

```
     COMMAND SOURCE PRIORITY — DEFAULT

lane       Action          Rate          Plan
 1         Rest in Dark    900              1
 2         Rest in Dark    900              1


Manual  Action is only valid for 6 hours
```

Action   The action that you want the controller to take.

The allowable settings are:

Rest in Green   The meter heads will be set to the green state.

Rest in Dark   The meter heads will be turned OFF.

Traffic Responsive   Meter responsively based on the plan number and current mainline traffic conditions.

Fixed Rate   The controller will meter at the rate specified

Emergency Green   The meter heads will immediately be set to green. If the controller is actively metering, normal metering shutdown will not occur.

Rate   The amount of vehicles per hour per lane that will be released. The configurable range is 240 to 1800 vehicles in 1 VPH increments.

Plan   The plan number used to determine the amount of mainline traffic required before actively metering and the release rate. The configurable plan numbers are 1 to 10.

1-5-A Queue Override

The Queue Override menu allows the user to prevent increasing the Metering Rate due to Queue Override if the mainline lanes are extremely congested. In addition, the user can also select to prevent Queue Override from occurring if the unit is controlled remotely through the communications command source. This can be useful if TMC corridor control software is used such as SWARM.

```
                    QUEUE OVERRIDE

Critical Flow Limit              1800
Critical Occ Limit               30.5
Critical Speed Limit               40
Override if in Comm Mode           NO


```

Critical Flow Limit   If the Mainline Average Flow Rate exceeds this value the metered lane will be prevented from incorporating queue override adjustment to the current metering rate. A value of zero (0) will inhibit the Mainline Flow Limit from affecting Queue Adjustment.

Critical Occupancy Limit   If the Mainline Average Flow Rate exceeds this value, the metered lane will be prevented from incorporating queue override adjustment to the current metering rate. A value of zero (0) will inhibit the Mainline Occupancy Limit from affecting Queue Adjustment.

Critical Occupancy Limit   If the Mainline Average Speed is below this value, the metered lane will be prevented from incorporating Queue override Adjustment to the current metering rate. A value of zero (0) will inhibit the Mainline Speed Limit from affecting Queue Adjustment.

Override if in Comm Mode   Selecting YES will prevent Queue Adjustments from occurring whenever the command source for any metered lane is Communications. Selecting NO for this parameter will allow the controller to incorporate local Queue Adjustments even when the command source is Communications.

1-6 Queue Configuration

The Configuration menu displays the metered lanes configuration menu.

```
                QUEUE CONFIGURATION
1-Queue Standby Flags
2-Q1 Configuration  8-Q3 Configuration
3-Q1 Adjustment     9-Q3 Adjustment
4-Q1 Rates          A-Q3 Rates
5-Q2 Configuration  B-Q4 Configuration
6-Q2 Adjustment     C-Q4 Adjustment
7-Q2 Rates          D-Q4 Rates
```

Queue Standby Flags   Represents the general items related to a lane such as the Lane Group Number.

Startup   Represents those items which relate to the transition of the ramp meter from the non-metering state to the metering state.

Metering   Represents those items which relate to the timing that occurs while the controller is actively metering traffic.

Shutdown   Represents those items which relate to the transition from the active metering state to the non-metering state.

Dependency Groups   Represent configuration items that affect ramp metering groups such as fixed metering offset time or fractional offset time.

Demand   Represents the configuration items for the metered lane Demand Detector.

Passage   Represents the configuration items for the metered lane Passage Detector.

Queue Adjustment Limits   Represents the method by which Queue Override if enabled will occur.

Queue Adjustment Rates   Represents the adjustment rate and levels used for rate, rateup and level adjustments.

Queue Override   Represents those items that can prevent queue override from occurring if the mainline is extremely congested.

1-6-1 Queue Standby

The Queue Standby menu allows the user to configure a queue as a standby queue, which can stop a controller from actively metering when the associated queue flag is set.

```
                QUEUE STANDBY

Lane                 1      2      3      4
Queue 1 Standby  NO     NO     NO     NO
Queue 2 Standby  NO     NO     NO     NO
Queue 3 Standby  NO     NO     NO     NO
Queue 4 Standby  NO     NO     NO     NO
```

Queue Standby   Selects if the queue is a Standby Queue. If a standby queue is set then a meter which is actively metering will cycle into the standby metering state.

1-6-2 Queue 1 Configuration

The Queue 1 Configuration menu allows the user to configure the method by which the Queue Detection Flag will be set, and how the Queue Detector will look for queue detection errors.

```
    METERED LANE – QUEUE 1 CONFIGURATION
Lane                 1      2      3      4
Detect Mode      OCCUP  OCCUP  DISBL  DISBL
Max Pres (M)       5      5      5      5
No Activity (M)    0      0      0      0
Erratic Cnt(V)     0      0      0      0
Dep Max Press(S)   0      0      0      0
Dep No Act(V)      8      8      8      8
```

Detect Mode   The detection mode selects the current mode by which the Queue Detection Flag will be set or cleared.

Disabled   The Queue Flag will always be clear.

Count   The Queue Flag will be set if the Queue Count is higher than the Queue Count High Limit. The Queue Flag will be cleared if the Queue Count is lower than the Queue Count Low Limit.

Occupancy   The Queue Flag will be set if the Queue Occupancy is higher than the Queue Occupancy High Limit. The Queue Flag will be cleared if the Queue Occupancy is lower than the Queue Occupancy Low Limit.

Maximum Presence   The amount of time that the Passage Detector for a metered lane can be continuously actuated before the metered lane detector status will report a detector status of Maximum Presence Error. The configurable range is 0 to 720 minutes in 1-minute increments. Setting this parameter to Zero (0) will deactivate Maximum Presence Monitoring.

No Activity   The amount of time that the Passage Detector can be continuously non-actuated before the metered lane detector status will report a detector status of No Activity Error. The configurable range is 0 to 720 minutes in 1-minute increments. Setting this parameter to Zero (0) will deactivate No Activity Monitoring.

Erratic Count   The maximum number actuations that the Queue Detector can receive within a 30-second period before setting the lane detector status to a status of Erratic Count Error. The configurable range is 0 to 255 vehicles in 1-vehicle increments. Setting this parameter to Zero (0) will deactivate Erratic Count monitoring.

Dependent Maximum Presence   The number of seconds that the Queue Detector can be continuously actuated while the Passage Detector has been continuously non-actuated before the metered lane detector status will report a detector status of Maximum Presence Error. The configurable range is 0 to 600 seconds in 1 second increments. Setting this parameter to Zero (0) will deactivate Dependant Maximum Presence Monitoring.

Dependent No Activity   The number of actuations of the Passage Detector that can occur while the Queue Detector has been continuously non-actuated before the metered lane detector status will report a detector status of No Activity Error. The configurable range is 0 to 30 vehicles in 1-vehicle increments. Setting this parameter to Zero (0) will deactivate Dependant No Activity Monitoring.

1-6-3 Queue 1 Adjustment Limits

The Queue 1 Adjustment Limits menu allows the user to configure when to set the Queue Detection Flag based on either Queue Occupancy or Queue Counts. In addition, the user can also select the Replacement rate to use if the Queue Adjustment Mode has been set to Fixed.

```
       METERED LANE - QUEUE 1 ADJUST
Lane              1      2      3      4
Adjust Mode     Rate   Rate   Fixed  Fixed
Len Up Lmt       40     40     40      40
Len Lwr Lmt       5      5      5      5
Occ Up Lmt      15.0   15.0   25.0   25.0
Occ Lwr Lmt     10.0   10.0   10.0   10.0
Replace Rate    600    600    600    600
```

Adjust Mode   The adjustment mode determines how metering rate shall be adjusted if the Queue Flag is set.

Fixed   The current metering rate will be replaced by the fixed rate whenever the Queue Flag is set. Note: Fixed rate adjustments are ignored when the Queue Mode is set to Additive (menu 1-6-1).

Rate Up   The current metering rate will be increased by the configured amount every time the Queue Flag is set. When the Queue Flag is cleared, the metering rate will return immediately back to the base rate.

Rate   The current metering rate will be increased by the configured amount every time the Queue Flag is set. When the Queue Flag is cleared, the metering rate will return incrementally back to the base rate.

Level	The current metering level will be increased by the configured amount every time the Queue Flag is set. When the Queue Flag is cleared, the metering rate will return incrementally back to the base level.
Length Upper Limit	The number of vehicles stored on the metered lane that, if exceeded, will set the Queue Flag. This count is obtained by summing the differences between the vehicle counts at the Passage and Queue Detectors over successive calculation intervals. The configurable range is 0 to 255 vehicles in 1-vehicle increments.
Length Lower Limit	The lower threshold of vehicles stored. When the Queue Count is below this number the Queue Flag will be cleared. The configurable range is 0 to 255 vehicles in 1-vehicle increments.
Occupancy Upper Limit	The occupancy of a Queue Detector that, if exceeded, will set the Queue Flag. The configurable range is 0 to 99.9 percent in 0.1-percent increments.
Occupancy Lower Limit	The lower occupancy limit of the Queue Detector that, when the occupancy drops below will clear the Queue Flag. The configurable range is 0 to 99.9 percent in 0.1-percent increments.
Replacement Rate	The metering rate at which the metered lane will be metered if the Queue Flag has been set and the Queue Adjustment Mode is fixed. The configurable range is 600 to 1800 VPH in 1-VPH increments.

1-6-4 Queue 1 Adjustment Rates

The Queue 1 Adjustment Rates menu allows the user to select how quickly, and by how much to adjust the metering release rate base on both the actual release rate or by adjusting the plan level.

```
         METERED LANE – QUEUE 1 RATES
Lane                  1     2     3     4
Adjust Rate          20     0     0     0
Rate Iterat           5     0     0     0
Rate Delay           30    30    30    30
Adjust Level          3     0     0     0
Level Iterat          3     0     0     0
Level Delay          30    30    30    30
```

Adjust Rate   Indicates the rate by which the current metering rate will be increased if a queue has been detected. The configurable range is 0, 5 to 1800 VPH in 1-VPH increments. A value of zero (0) indicates that no adjustments are made to the current metering rate.

Rate Iteration   The maximum number of queue override rate adjustments which can be made during the existence of a single queue. The configurable range is 0 to 20 iterations in 1-iteration increments for Queue Detectors. A value of zero (0) indicates that the current metering rate is not increased after a queue has been detected.

Rate Delay   The length of time between successive queue override rate adjustments. The configurable range is 20 to 240 seconds in 1-second increments.

Adjust Level   The number of levels by which the current metering level will be decreased if a queue has been detected. The configurable range is 0 to 5 levels in 1-level increments. A value of zero (0) indicates that no adjustments are made to the current metering level.

Level Iteration The maximum number of queue override level adjustments which can be made during the existence of a single queue. The configurable range is 0 to 5 iterations in 1-iteration increments for Queue Detectors. A value of zero (0) indicates that the current metering level is not decreased after a queue has been detected.

Level Delay   The length of time between successive queue override level adjustments. The configurable range is 20 to 240 seconds in 1-second increments.

1-6-5 Queue 2 Configuration

The Queue 2 Configuration menu allows the user to configure the method by which the Queue Detection Flag will be set, and how the Queue Detector will look for queue detection errors.

```
    METERED LANE — QUEUE 2 CONFIGURATION
Lane              1     2     3     4
Detect Mode     OCCUP  OCCUP DISBL DISBL
Max Pres (M)      5     5     5     5
No Activity (M)   0     0     0     0
Erratic Cnt(V)    0     0     0     0
Dep Max Press(S)  0     0     0     0
Dep No Act(V)     8     8     8     8
```

Detect Mode	The detection mode selects the current mode by which the Queue Detection Flag will be set or cleared.
Disabled	The Queue Flag will always be clear.
Count	The Queue Flag will be set if the Queue Count is higher than the Queue Count High Limit. The Queue Flag will be cleared if the Queue Count is lower than the Queue Count Low Limit.
Occupancy	The Queue Flag will be set if the Queue Occupancy is higher than the Queue Occupancy High Limit. The Queue Flag will be cleared if the Queue Occupancy is lower than the Queue Occupancy Low Limit.
Maximum Presence	The amount of time that the Passage Detector for a metered lane can be continuously actuated before the metered lane detector status will report a detector status of Maximum Presence Error. The configurable range is 0 to 720 minutes in 1-minute increments. Setting this parameter to Zero (0) will deactivate Maximum Presence Monitoring.
No Activity	The amount of time that the Passage Detector can be continuously non-actuated before the metered lane detector status will report a detector status of No Activity Error. The configurable range is 0 to

720 minutes in 1-minute increments. Setting this parameter to Zero (0) will deactivate No Activity Monitoring.

Erratic Count   The maximum number actuations that the Queue Detector can receive within a 30-second period before setting the lane detector status to a status of Erratic Count Error. The configurable range is 0 to 255 vehicles in 1-vehicle increments. Setting this parameter to Zero (0) will deactivate Erratic Count monitoring.

Dependent Maximum Presence The number of seconds that the Queue Detector can be continuously actuated while the Passage Detector has been continuously non-actuated before the metered lane detector status will report a detector status of Maximum Presence Error. The configurable range is 0 to 600 seconds in 1 second increments. Setting this parameter to Zero (0) will deactivate Dependant Maximum Presence Monitoring.

Dependent No Activity   The number of actuations of the Passage Detector that can occur while the Queue Detector has been continuously non-actuated before the metered lane detector status will report a detector status of No Activity Error. The configurable range is 0 to 30 vehicles in 1-vehicle increments. Setting this parameter to Zero (0) will deactivate Dependant No Activity Monitoring.

1-6-6 Queue 2 Adjustment Limits

The Queue 2 Adjustment Limits menu allows the user to configure when to set the Queue Detection Flag based on either Queue Occupancy or Queue Counts. In addition, the user can also select the Replacement rate to use if the Queue Adjustment Mode has been set to Fixed.

```
      METERED LANE - QUEUE 2 ADJUST
Lane               1     2      3      4
Adjust Mode      Rate   Rate  Fixed  Fixed
Len Up Lmt        40     40     40     40
Len Lwr Lmt        5      5      5      5
Occ Up Lmt       15.0   15.0   25.0   25.0
Occ Lwr Lmt      10.0   10.0   10.0   10.0
Replace Rate     600    600    600    600
```

Adjust Mode

The adjustment mode determines how metering rate shall be adjusted if the Queue Flag is set.

Fixed

The current metering rate will be replaced by the fixed rate whenever the Queue Flag is set. Note: Fixed rate adjustments are ignored when the Queue Mode is set to Additive (menu 1-6-1).

Rate Up

The current metering rate will be increased by the configured amount every time the Queue Flag is set. When the Queue Flag is cleared, the metering rate will return immediately back to the base rate.

Rate

The current metering rate will be increased by the configured amount every time the Queue Flag is set. When the Queue Flag is cleared, the metering rate will return incrementally back to the base rate.

Level

The current metering level will be increased by the configured amount every time the Queue Flag is set. When the Queue Flag is cleared, the metering rate will return incrementally back to the base level.

Length Upper Limit

The number of vehicles stored on the metered lane that, if exceeded, will set the Queue Flag. This count is obtained by summing the differences between the vehicle counts at the Passage and Queue Detectors over successive calculation intervals. The configurable range is 0 to 255 vehicles in 1-vehicle increments.

Length Lower Limit

The lower threshold of vehicles stored. When the Queue Count is below this number the Queue Flag will

be cleared. The configurable range is 0 to 255 vehicles in 1-vehicle increments.

Occupancy Upper Limit   The occupancy of a Queue Detector that, if exceeded, will set the Queue Flag. The configurable range is 0 to 99.9 percent in 0.1-percent increments.

Occupancy Lower Limit   The lower occupancy limit of the Queue Detector that, when the occupancy drops below will clear the Queue Flag. The configurable range is 0 to 99.9 percent in 0.1-percent increments.

Replacement Rate   The metering rate at which the metered lane will be metered if the Queue Flag has been set and the Queue Adjustment Mode is fixed. The configurable range is 600 to 1800 VPH in 1-VPH increments.

1-6-7 Queue 2 Adjustment Rates

The Queue 2 Adjustment Rates menu allows the user to select how quickly, and by how much to adjust the metering release rate base on both the actual release rate or by adjusting the plan level.

```
       METERED LANE — QUEUE 2 RATES
Lane               1      2      3      4
Adjust Rate        20     0      0      0
Rate Iterat        5      0      0      0
Rate Delay         30     30     30     30
Adjust Level       3      0      0      0
Level Iterat       3      0      0      0
Level Delay        30     30     30     30
```

Adjust Rate   Indicates the rate by which the current metering rate will be increased if a queue has been detected. The configurable range is 0, 5 to 1800 VPH in 1-VPH increments. A value of zero (0) indicates that no adjustments are made to the current metering rate.

Rate Iteration   The maximum number of queue override rate adjustments which can be made during the existence of a single queue. The configurable range is 0 to 20 iterations in 1-iteration increments

for Queue Detectors. A value of zero (0) indicates that the current metering rate is not increased after a queue has been detected.

Rate Delay   The length of time between successive queue override rate adjustments. The configurable range is 20 to 240 seconds in 1-second increments.

Adjust Level   The number of levels by which the current metering level will be decreased if a queue has been detected. The configurable range is 0 to 5 levels in 1-level increments. A value of zero (0) indicates that no adjustments are made to the current metering level.

Level Iteration   The maximum number of queue override level adjustments which can be made during the existence of a single queue. The configurable range is 0 to 5 iterations in 1-iteration increments for Queue Detectors. A value of zero (0) indicates that the current metering level is not decreased after a queue has been detected.

Level Delay   The length of time between successive queue override level adjustments. The configurable range is 20 to 240 seconds in 1-second increments.

1-6-8 Queue 3 Configuration

The Queue 3 Configuration menu allows the user to configure the method by which the Queue Detection Flag will be set, and how the Queue Detector will look for queue detection errors.

```
   METERED LANE — QUEUE 3 CONFIGURATION
Lane              1      2      3      4
Detect Mode     OCCUP  OCCUP  DISBL  DISBL
Max Pres (M)      5      5      5      5
No Activity (M)   0      0      0      0
Erratic Cnt(V)    0      0      0      0
Dep Max Press(S)  0      0      0      0
Dep No Act(V)     8      8      8      8
```

Detect Mode   The detection mode selects the current mode by which the Queue Detection Flag will be set or cleared.

Disabled   The Queue Flag will always be clear.

Count   The Queue Flag will be set if the Queue Count is higher than the Queue Count High Limit. The Queue Flag will be cleared if the Queue Count is lower than the Queue Count Low Limit.

Occupancy The Queue Flag will be set if the Queue Occupancy is higher than the Queue Occupancy High Limit. The Queue Flag will be cleared if the Queue Occupancy is lower than the Queue Occupancy Low Limit.

Maximum Presence   The amount of time that the Passage Detector for a metered lane can be continuously actuated before the metered lane detector status will report a detector status of Maximum Presence Error. The configurable range is 0 to 720 minutes in 1-minute increments. Setting this parameter to Zero (0) will deactivate Maximum Presence Monitoring.

No Activity   The amount of time that the Passage Detector can be continuously non-actuated before the metered lane detector status will report a detector status of No Activity Error. The configurable range is 0 to 720 minutes in 1-minute increments. Setting this parameter to Zero (0) will deactivate No Activity Monitoring.

Erratic Count   The maximum number actuations that the Queue Detector can receive within a 30-second period before setting the lane detector status to a status of Erratic Count Error. The configurable range is 0 to 255 vehicles in 1-vehicle increments. Setting this parameter to Zero (0) will deactivate Erratic Count monitoring.

Dependent Maximum Presence   The number of seconds that the Queue Detector can be continuously actuated while the Passage Detector has been continuously non-actuated before the metered lane detector status will report a detector status of Maximum Presence Error. The configurable range is 0 to 600 seconds in 1 second increments. Setting this parameter to Zero (0)

	will deactivate Dependant Maximum Presence Monitoring.
Dependent No Activity	The number of actuations of the Passage Detector that can occur while the Queue Detector has been continuously non-actuated before the metered lane detector status will report a detector status of No Activity Error. The configurable range is 0 to 30 vehicles in 1-vehicle increments. Setting this parameter to Zero (0) will deactivate Dependant No Activity Monitoring.

1-6-9 Queue 3 Adjustment Limits

The Queue 3 Adjustment Limits menu allows the user to configure when to set the Queue Detection Flag based on either Queue Occupancy or Queue Counts. In addition, the user can also select the Replacement rate to use if the Queue Adjustment Mode has been set to Fixed.

```
     METERED LANE - QUEUE 3 ADJUST
Lane              1     2     3      4
Adjust Mode     Rate  Rate  Fixed  Fixed
Len Up Lmt       40    40    40     40
Len Lwr Lmt       5     5     5      5
Occ Up Lmt      15.0  15.0  25.0   25.0
Occ Lwr Lmt     10.0  10.0  10.0   10.0
Replace Rate    600   600   600    600
```

Adjust Mode	The adjustment mode determines how metering rate shall be adjusted if the Queue Flag is set.
Fixed	The current metering rate will be replaced by the fixed rate whenever the Queue Flag is set. Note: Fixed rate adjustments are ignored when the Queue Mode is set to Additive (menu 1-6-1).
Rate Up	The current metering rate will be increased by the configured amount every time the Queue Flag is set. When the Queue Flag is cleared, the metering rate will return immediately back to the base rate.
Rate	The current metering rate will be increased by the configured amount every time the Queue Flag is

set. When the Queue Flag is cleared, the metering rate will return incrementally back to the base rate.

Level	The current metering level will be increased by the configured amount every time the Queue Flag is set. When the Queue Flag is cleared, the metering rate will return incrementally back to the base level.
Length Upper Limit	The number of vehicles stored on the metered lane that, if exceeded, will set the Queue Flag. This count is obtained by summing the differences between the vehicle counts at the Passage and Queue Detectors over successive calculation intervals. The configurable range is 0 to 255 vehicles in 1-vehicle increments.
Length Lower Limit	The lower threshold of vehicles stored. When the Queue Count is below this number the Queue Flag will be cleared. The configurable range is 0 to 255 vehicles in 1-vehicle increments.
Occupancy Upper Limit	The occupancy of a Queue Detector that, if exceeded, will set the Queue Flag. The configurable range is 0 to 99.9 percent in 0.1-percent increments.
Occupancy Lower Limit	The lower occupancy limit of the Queue Detector that, when the occupancy drops below will clear the Queue Flag. The configurable range is 0 to 99.9 percent in 0.1-percent increments.
Replacement Rate	The metering rate at which the metered lane will be metered if the Queue Flag has been set and the Queue Adjustment Mode is fixed. The configurable range is 600 to 1800 VPH in 1-VPH increments.

1-6-A Queue 3 Adjustment Rates

The Queue 3 Adjustment Rates menu allows the user to select how quickly, and by how much to adjust the metering release rate base on both the actual release rate or by adjusting the plan level.

```
          METERED LANE - QUEUE 3 RATES
Lane                1      2      3      4
Adjust Rate         20     0      0      0
Rate Iterat         5      0      0      0
Rate Delay          30     30     30     30
Adjust Level        3      0      0      0
Level Iterat        3      0      0      0
Level Delay         30     30     30     30
```

Adjust Rate   Indicates the rate by which the current metering rate will be increased if a queue has been detected. The configurable range is 0, 5 to 1800 VPH in 1-VPH increments. A value of zero (0) indicates that no adjustments are made to the current metering rate.

Rate Iteration   The maximum number of queue override rate adjustments which can be made during the existence of a single queue. The configurable range is 0 to 20 iterations in 1-iteration increments for Queue Detectors. A value of zero (0) indicates that the current metering rate is not increased after a queue has been detected.

Rate Delay   The length of time between successive queue override rate adjustments. The configurable range is 20 to 240 seconds in 1-second increments.

Adjust Level   The number of levels by which the current metering level will be decreased if a queue has been detected. The configurable range is 0 to 5 levels in 1-level increments. A value of zero (0) indicates that no adjustments are made to the current metering level.

Level Iteration The maximum number of queue override level adjustments which can be made during the existence of a single queue. The configurable range is 0 to 5 iterations in 1-iteration increments for Queue Detectors. A value of zero (0) indicates that the current metering level is not decreased after a queue has been detected.

Level Delay   The length of time between successive queue override level adjustments. The configurable range is 20 to 240 seconds in 1-second increments.

1-6-B Queue 4 Configuration

The Queue 4 Configuration menu allows the user to configure the method by which the Queue Detection Flag will be set, and how the Queue Detector will look for queue detection errors.

```
    METERED LANE — QUEUE 4 CONFIGURATION
Lane               1     2     3     4
Detect Mode      OCCUP  OCCUP DISBL DISBL
Max Pres (M)       5     5     5     5
No Activity (M)    0     0     0     0
Erratic Cnt(V)     0     0     0     0
Dep Max Press(S)   0     0     0     0
Dep No Act(V)      8     8     8     8
```

Detect Mode   The detection mode selects the current mode by which the Queue Detection Flag will be set or cleared.

Disabled   The Queue Flag will always be clear.

Count   The Queue Flag will be set if the Queue Count is higher than the Queue Count High Limit. The Queue Flag will be cleared if the Queue Count is lower than the Queue Count Low Limit.

Occupancy The Queue Flag will be set if the Queue Occupancy is higher than the Queue Occupancy High Limit. The Queue Flag will be cleared if the Queue Occupancy is lower than the Queue Occupancy Low Limit.

Maximum Presence   The amount of time that the Passage Detector for a metered lane can be continuously actuated before the metered lane detector status will report a detector status of Maximum Presence Error. The configurable range is 0 to 720 minutes in 1-minute increments. Setting this parameter to Zero (0) will deactivate Maximum Presence Monitoring.

No Activity   The amount of time that the Passage Detector can be continuously non-actuated before the metered lane detector status will report a detector status of

	No Activity Error. The configurable range is 0 to 720 minutes in 1-minute increments. Setting this parameter to Zero (0) will deactivate No Activity Monitoring.
Erratic Count	The maximum number actuations that the Queue Detector can receive within a 30-second period before setting the lane detector status to a status of Erratic Count Error. The configurable range is 0 to 255 vehicles in 1-vehicle increments. Setting this parameter to Zero (0) will deactivate Erratic Count monitoring.
Dependent Maximum Presence	The number of seconds that the Queue Detector can be continuously actuated while the Passage Detector has been continuously non-actuated before the metered lane detector status will report a detector status of Maximum Presence Error. The configurable range is 0 to 600 seconds in 1 second increments. Setting this parameter to Zero (0) will deactivate Dependant Maximum Presence Monitoring.
Dependent No Activity	The number of actuations of the Passage Detector that can occur while the Queue Detector has been continuously non-actuated before the metered lane detector status will report a detector status of No Activity Error. The configurable range is 0 to 30 vehicles in 1-vehicle increments. Setting this parameter to Zero (0) will deactivate Dependant No Activity Monitoring.

1-6-C Queue 4 Adjustment Limits

The Queue 4 Adjustment Limits menu allows the user to configure when to set the Queue Detection Flag based on either Queue Occupancy or Queue Counts. In addition, the user can also select the Replacement rate to use if the Queue Adjustment Mode has been set to Fixed.

```
        METERED LANE - QUEUE 4 ADJUST
Lane                1     2     3      4
Adjust Mode        Rate  Rate  Fixed  Fixed
Len Up Lmt          40    40    40     40
Len Lwr Lmt          5     5     5      5
Occ Up Lmt         15.0  15.0  25.0   25.0
Occ Lwr Lmt        10.0  10.0  10.0   10.0
Replace Rate       600   600   600    600
```

Adjust Mode   The adjustment mode determines how metering rate shall be adjusted if the Queue Flag is set.

    Fixed   The current metering rate will be replaced by the fixed rate whenever the Queue Flag is set. Note: Fixed rate adjustments are ignored when the Queue Mode is set to Additive (menu 1-6-1).

    Rate Up   The current metering rate will be increased by the configured amount every time the Queue Flag is set. When the Queue Flag is cleared, the metering rate will return immediately back to the base rate.

    Rate   The current metering rate will be increased by the configured amount every time the Queue Flag is set. When the Queue Flag is cleared, the metering rate will return incrementally back to the base rate.

    Level   The current metering level will be increased by the configured amount every time the Queue Flag is set. When the Queue Flag is cleared, the metering rate will return incrementally back to the base level.

Length Upper Limit   The number of vehicles stored on the metered lane that, if exceeded, will set the Queue Flag. This count is obtained by summing the differences between the vehicle counts at the Passage and Queue Detectors over successive calculation intervals. The configurable range is 0 to 255 vehicles in 1-vehicle increments.

Length Lower Limit   The lower threshold of vehicles stored. When the Queue Count is below this number the Queue Flag will

be cleared. The configurable range is 0 to 255 vehicles
in 1-vehicle increments.

Occupancy Upper Limit   The occupancy of a Queue Detector that, if exceeded,
will set the Queue Flag. The configurable range is 0 to
99.9 percent in 0.1-percent increments.

Occupancy Lower Limit   The lower occupancy limit of the Queue Detector that,
when the occupancy drops below will clear the Queue
Flag. The configurable range is 0 to 99.9 percent in 0.1-
percent increments.

Replacement Rate   The metering rate at which the metered lane will be
metered if the Queue Flag has been set and the Queue
Adjustment Mode is fixed. The configurable range is
600 to 1800 VPH in 1-VPH increments.

1-6-D Queue 4 Adjustment Rates

The Queue 4 Adjustment Rates menu allows the user to select how quickly, and by how
much to adjust the metering release rate base on both the actual release rate or by adjusting
the plan level.

```
        METERED LANE — QUEUE 4 RATES
Lane                1       2       3       4
Adjust Rate         20      0       0       0
Rate Iterat         5       0       0       0
Rate Delay          30      30      30      30
Adjust Level        3       0       0       0
Level Iterat        3       0       0       0
Level Delay         30      30      30      30
```

Adjust Rate   Indicates the rate by which the current metering rate will be
increased if a queue has been detected. The configurable range is
0, 5 to 1800 VPH in 1-VPH increments. A value of zero (0)
indicates that no adjustments are made to the current metering
rate.

Rate Iteration   The maximum number of queue override rate adjustments which
can be made during the existence of a single queue. The
configurable range is 0 to 20 iterations in 1-iteration increments

for Queue Detectors. A value of zero (0) indicates that the current metering rate is not increased after a queue has been detected.

Rate Delay   The length of time between successive queue override rate adjustments. The configurable range is 20 to 240 seconds in 1-second increments.

Adjust Level   The number of levels by which the current metering level will be decreased if a queue has been detected. The configurable range is 0 to 5 levels in 1-level increments. A value of zero (0) indicates that no adjustments are made to the current metering level.

Level Iteration   The maximum number of queue override level adjustments which can be made during the existence of a single queue. The configurable range is 0 to 5 iterations in 1-iteration increments for Queue Detectors. A value of zero (0) indicates that the current metering level is not decreased after a queue has been detected.

Level Delay   The length of time between successive queue override level adjustments. The configurable range is 20 to 240 seconds in 1-second increments.

2. Mainline Lanes

The mainline detector stations are used to gather data of freeway traffic conditions. The flow rate, average speed and occupancy for each individual lane are calculated. The mainline station averages are then calculated from the individual lane data for each lane that has a current detector status of "working" and has not been configured as an HOV lane.

URMS supports 2 directional mainline detection stations named Mainline and Opposite Mainline. The Mainline and Opposite Mainline each support a maximum of 8 lanes of detection. Although the URMS can support up to 8 mainline and 8 opposite mainline lanes, only the number of lane configured will be displayed. The number of mainline and opposite mainline lanes are configured in menu item 8-7, "Configure Ramp I/O".

```
                MAINLINE LANES

    1-Mainline Lanes
    2-Opposite Mainline Lanes




```

2-1 Mainline Lanes

```
                MAINLINE LANES

    1-Statistics
    2-Detection
    3-Detector Status
    4-Car Counts
    5-Configuration


```
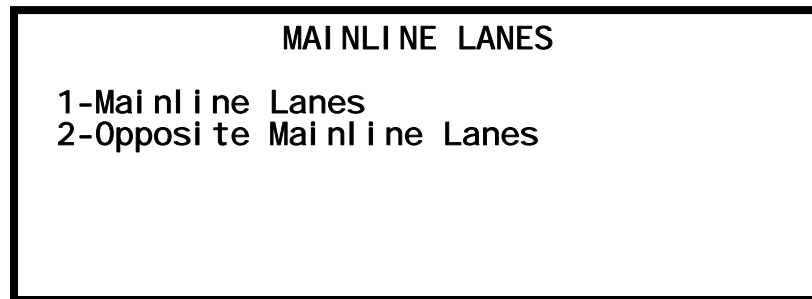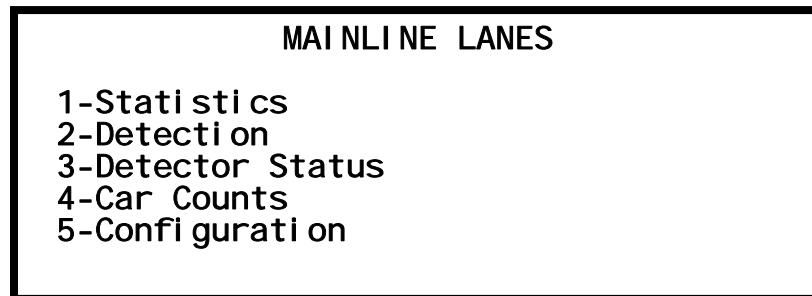
The menu areas are:

Statistics   Displays the mainline volume, occupancy and speed statistics for the last 30-second calculation interval.

Detection   Displays the current activation status of each mainline detector.

Detector Status   Displays the current working status of each mainline detector.

Car Counts   Display the number of actuations of the mainline detector since the controller was turned on or the car counts were reset to zero (0).

Configuration   Allows users to configure the mainline lane detectors.

2-1-1 Statistics

The Mainline Data Statistics menu displays the current lane volume, occupancy and speed for each mainline lane during the last 30 second calculation interval. Although only 4 mainline lanes are shown in this example, the URMS is configurable for up to 8 mainline lanes. Please note that if more than 4 Mainline lanes are configured you will need to scroll down to the higher number lanes by pressing the down arrow on the front panel.

```
          MAINLINE 30 SECOND DATA
  LANE          LEADING          TRAILING       SPEED
              VOL    OCC%    |  VOL    OCC%   |
  1DH          5     12.4       6     12.5        54
  2D           4     15.3       4     15.5        54
  3D           3     14.5       3     14.4        56
  4D           7     13.6       7     13.7        62
 Volume  6          Occupancy  14.5%     Speed  58
```

Lane Descriptor Shown directly after the lane number these letters show the current lane mode. In addition if a lane is configured as a HOV lane a second lane descriptor will also be shown. Current lane descriptors are:

> **L - Leading**
> **T - Trailing**
> **D - Dual**
> **P - Preprocessed**
> **X - Disabled**
> **H - HOV Lane**

Volume   Represents then number of vehicles that have passed over the detector during the last 30-second calculation interval.

         Occupancy   Represents the percentage of time that a vehicle has been over the detector during the last 30-second calculation interval.

         Speed   Represents the average vehicle speed during the last 30-second calculation interval.

The last line represents the cumulative statistics for all of the lanes, except for those lanes that have been designated as an active HOV lane.

2-1-2 Mainline Detection

The Mainline Detection menu displays current detector status of both the lead and the trail mainline detectors. A dot (**.**) represents a de-actuated/OFF state, an asterisk (*****) represents an actuated/ON state and a (P) indicated that the detector is configured to receive preprocessed data.

```
            MAINLINE DETECTION

LANE       1   2   3   4   5   6   7   8
LEAD       .   *   *   .   .   .   .   P
TRAIL      .   .   .   .   .   .   *   P
```

Note:
Only mainline lanes can use preprocessed data

2-1-3 Detector Status

The Mainline Detector Status menu displays the current operational status of each of the mainline detectors.

```
         MAINLINE DETECTOR STATUS
LANE       1   2   3   4   5   6   7   8
LEAD       W   W   W   MP  W   W   D   D
TRAIL      W   W   EC  MP  W   W   D   D
LANE       W   W   PF  TF  W   W   D   D
W-Working D-Disabled EC-Erratic Count
MP-Max Presence      NA-No Activity
TF-Total Failure     PF-Partial Failure
```

Due to limitations in space the following abbreviations are used in the display of the current mainline detector status:

Working [W]　　　　Indicates that this detector currently appears to be working normally.

Disabled [D]　　　　Represents that the detector has been configured to be in a continuous de-actuated or OFF state.

Maximum Presence [MP]　　　　The input on the mainline detector has been continuously actuated for longer than the configured Maximum Presence threshold.

No Activity [NA]　　　　The number of minutes between detector actuations is greater than the number of minutes according to the following criteria:

　　　　a. No detected actuations for more than 26 minutes when the average mainline volume is less than 200 vehicles per hour.

　　　　b. No detected actuations for more than the number of minutes calculated using the formula '(Average Mainline Flow Rate in vehicles per hour / -40) + 31' when the average mainline volume is between 200 and 1200 vehicles per hour.

　　　　c. No detected actuations for more than one minute when the average mainline volume is greater than 1200 vehicles per hour.

Erratic Count [EC]　　　　The number of vehicle counts read by the detector has exceeded the configured Erratic Count Threshold during the last 30-secondcalculation interval.

Partial Failure [PF]　　　　Indicates that a single detector of a dual loop detection zone has failed.

　　　　Note:　During partial failure speed calculations will revert from dual detection zone speed trap calculations to single detector speed calculations.

      Total Failure [TF]   Indicates that all detectors in the lane have failed.

2-1-4 Car Counts

The Car Counts menu shows how many vehicles have traveled over a detection loop since the controller was powered on or the car counts were reset. Only 7 digits of data will be shown.

```
               MAINLINE LANES

     Lane 1: 43414      Lane 5:   48212
     Lane 2: 43533      Lane 6:   51124
     Lane 3: 43553      Lane 7:   51453
     Lane 4: 53134      Lane 8:   53525
```

Note:
Car Counts can be cleared using menu 9-C (clear car counts)

2-1-5 Configuration

The Mainline Configuration menu allows the use to configure up to 8 mainline lanes although .only 6 lanes are shown in this example. The actual number of lanes shown is configured in the Number of Mainline Lanes parameter (menu item 8-7).

```
               MAINLINE LANES

     1-Mainline 1       5-Mainline 5
     2-Mainline 2       6-Mainline 6
     3-Mainline 3       7-Mainline 7
     4-Mainline 4       8-Mainline 8
```

2-1-5-X Configuration

The Mainline Configuration menu allows a user to configure each mainline lane detector.

```
          MAINLINE X CONFIGURATION
Lane Mode               LEAD    Thresholds
Lead Zone Length        6.0     MAX        5
Trail Zone Length       6.0     Erratic  22
Speed Trap Length      20.0
Typ Vehicle Length     15.0
HOV Lane                NO
REV Lane                NO
```

The configurable parameters are:

Lane Mode   Configures the current operating mode of the mainline lane for detection.

> **Disabled**   Configures both the leading and the trailing detector to be disabled.

> **Lead**   Configures the leading detector to be enabled and the trailing detector to disabled.

> **Trail**   Configures the trailing detector to be enabled and the leading detector to disabled.

> **Dual**   Configures both the leading and trailing detectors to both be enabled.

> **Pre-Proc**   Configures both the leading and trailing detectors to preprocessed data mode. This allows the lane to use other external sensors such as G3 and G4 RADARs to provide preprocessed lane data.

Lead Zone Length   Configure the detection zone length of the leading detector. The configurable range is 0 to 15.0 feet in 0.1 foot increments.

Trail Zone Length   Configures the detection zone length of the trailing detector. The configurable range is 0 to 15.0 feet in 0.1 foot increments.

Speed Trap Length   Used for dual loop speed calculations, configures the distance between the leading edge of the leading mainline detector to

the leading edge of the trailing mainline detector. The configurable range is 0 to 45.0 feet in 0.1 foot increments.

Type Vehicle Length　Used with leading or trailing loop configurations, configures the length of a typical vehicle, which is used for mainline lane speed estimation with a single detector. The configurable range is 0 to 45.0 feet in 0.1-foot increments. A value of zero (0) shall inhibit speed estimation.

HOV Lane　　　Configures the lane as an HOV lane. It can be configured to be either YES or NO.

REV Lane　　　Configures the lane as a reversible lane. It can be configured to be either YES or NO.

MAX Threshold　　Selects the maximum threshold time that a mainline lane detector can be continuously actuated before the Maximum Presence Error is set. The configurable range is 0 to 720 minutes in 1-minute increments. A value of zero (0) shall inhibit the maximum presence testing.

Erratic Count　　Sets the vehicle erratic count threshold which if exceeded will put the detector into an Erratic Count Error. The configurable range is 0 to 255 vehicles in 1-vehicle increments. A value of zero (0) shall inhibit the erratic count testing.

2-1-6 Mainline Direction

The Mainline Direction screen will show the direction of the traffic when the lane is designated as a reversible lane. The menu will show a (F) when the traffic is moving in the forward direction and a (R) when the traffic is moving in the reverse direction.

The logic is based on determining whether a pair of mainline detectors was activated within a certain cutoff time and if so, in what direction they were activated. 2.727 seconds was chosen as the cutoff time as this is the time it takes for a vehicle traveling at 5 MPH to go from one detector to the other detector when the two detectors are spaced 20 feet apart. If the time between detections is longer than this cutoff time, then it is unlikely that any single vehicle activated both loops of the dual loop set.

The calculate lane direction the following algorithm is used:

Leading Loop Activated   If the trailing loop was activated within the last 2.727 seconds then subtract one to the lane direction count down to a minimum of -8.

Trailing Loop Activated   If leading loop was activated within the last 2.727 seconds then add one to the lane direction count up to a maximum of 8.

Lane Direction = Forward If Lane Direction count has a value of -2 to 8.

Lane Direction = Reverse   If Lane Direction count has a value of -3 to -8.

```
            MAINLINE DIRECTION

Lane   1   2   3   4   5   6   7   8
DIR    F   F   F   F   F   F   F   F



```

2-2 Opposite Mainline Lanes

```
         OPPOSITE MAINLINE LANES

    1-Statistics
    2-Detection
    3-Detector Status
    4-Car Counts
    5-Configuration


```

The menu areas are:

Statistics   Displays the opposite mainline volume, occupancy and speed statistics for the last 30-second calculation interval.

Detection   Displays the current activation status of each opposite mainline loop detector.

Detector Status	Displays the current working status of each opposite mainline loop detector.
Car Counts	Display the number of actuations of the mainline detector since the controller was turned on or the car counts were reset to zero (0).
Configuration	Allows users to configure the opposite mainline lane detectors.

2-2-1 Statistics

The Opposite Mainline Data Statistics menu displays the current lane volume, occupancy and speed for each opposite mainline lane over the last 30-second calculation interval. Although only 4 mainline lanes are shown in this example, the URMS is configurable for up to 8 mainline lanes. Please note that if more the 4 Opposite Mainline lanes are configured you will need to scroll down to the higher number lanes by pressing the down arrow on the front panel.

```
┌─────────────────────────────────────────────────┐
│     OPPOSITE MAINLINE 30 SECOND DATA             │
│   LANE         LEADING         TRAILING    SPEED │
│             VOL    OCC%   │  VOL    OCC%   │      │
│    1LH       5     12.4   │   6     12.5   │  54  │
│    2L        4     15.3   │   4     15.5   │  54  │
│    3T        3     14.5   │   3     14.4   │  56  │
│    4T        7     13.6   │   7     13.7   │  62  │
│   Volume  6       Occupancy  14.5%    Speed 58   │
└─────────────────────────────────────────────────┘
```

Lane Descriptor	Shown directly after the lane number these letters show the current lane mode. In addition if a lane is configured as a HOV lane a second lane descriptor will also be shown. Current lane descriptors are:

> **L - Leading**
> **T - Trailing**
> **D - Dual**
> **X - Disabled**
> **H - HOV Lane**

Volume	Represents then number of vehicles that have passed over the detector during the last 30-second calculation interval.

Occupancy   Represents the percentage of time that a vehicle has been over the detector during the last 30-second calculation interval.

Speed   Represents the average vehicle speed during the last 30-second calculation interval.

2-2-2 Detection

The Opposite Mainline Detection menu displays current detector status of both the lead and the trail mainline detectors. A dot (**.**) represents a de-actuated/OFF state while an asterisk (*****) represents an actuated/ON state.

```
        OPPOSITE MAINLINE DETECTION

LANE      1   2   3   4   5   6   7   8
LEAD      .   .   .   .   .   .   .   .
TRAIL     .   .   *   *   .   .   .   .
```

2-2-3 Detector Status

The Opposite Mainline Detector Status menu displays the current operational status of each of the mainline detectors.

```
     OPPOSITE MAINLINE DETECTOR STATUS
LANE      1   2   3   4   5   6   7   8
LEAD      W   W   W   W   W   W   W   W
TRAIL     W   W   W   W   W   W   W   W
STATUS    W   W   W   W   W   W   W   W
W-Working D-Disabled EC-Erratic Count
MP-Max Presence      NA-No Activity
TF-Total Failure     PF-Partial Failure
```

Due to limitations in the size of the front panel the following abbreviations are used for opposite mainline status.

Working [W]	Indicates that this detector currently appears to be working normally.
Disabled [D]	Represents that the detector has been configured to be in a continuous de-actuated or OFF state.
Maximum Presence [MP]	The input on the opposite mainline detector has been continuously actuated for longer than the configured Maximum Presence threshold.
No Activity [NA]	The number of minutes between detector actuations is greater than the number of minutes according to the following criteria:

       a. No detected actuations for more than 26 minutes when the average opposite mainline volume is less than 200 vehicles per hour.

       d. No detected actuations for more than the number of minutes calculated using the formula '(Average Opposite Mainline Flow Rate in vehicles per hour / -40) + 31' when the average mainline volume is between 200 and 1200 vehicles per hour.

       b. No detected actuations for more than one minute when the average opposite mainline volume is greater than 1200 vehicles per hour.

Erratic Count [EC]	The number of vehicle counts read by the detector has exceeded the configured Erratic Count Threshold during the last 30-second calculation interval.
Partial Failure [PF]	Indicates that a single detector of a dual loop detection zone has failed.

      Note: During partial failure speed calculations will revert from dual detection zone speed trap calculations to single detector speed calculations.

Total Failure [TF]	Indicates that all detectors in the lane have failed.

2-1-4 Car Counts

The Car Counts menu shows how many cars have traveled over a detection loop since the controller was powered on or the car counts were reset. Only 7 digits of data will be shown.

```
┌──────────────────────────────────────────────┐
│          OPPOSITE MAINLINE LANES               │
│                                                │
│      Lane 1: 43414        Lane 5:  48212       │
│      Lane 2: 43533        Lane 6:  51124       │
│      Lane 3: 43553        Lane 7:  53423       │
│      Lane 4: 53134        Lane 8:  55212       │
│                                                │
│                                                │
└──────────────────────────────────────────────┘
```

Note:
Car Counts can be cleared using menu 9-C (clear car counts)

2-2-5 Configuration

The Opposite Mainline Configuration menu allows the user to configure each opposite mainline lane detector. The actual number of lanes shown is configured in the Number of Opposite Mainline Lanes parameter (menu item 8-7).

```
┌──────────────────────────────────────────────┐
│          OPPOSITE MAINLINE LANES               │
│                                                │
│    1-Opp Mainline 1      5-Opp Mainline 5      │
│    2-Opp Mainline 2      6-Opp Mainline 6      │
│    3-Opp Mainline 3      7-Opp Mainline 7      │
│    4-Opp Mainline 4      8-Opp Mainline 8      │
│                                                │
│                                                │
└──────────────────────────────────────────────┘
```

2-2-5-X Configuration

The Opposite Mainline Configuration menu allows a user to configure each opposite mainline lane detector

```
     OPPOSITE MAINLINE X CONFIGURATION
Lane Mode              LEAD   Thresholds
Lead Zone Length        6.0   MAX        5
Trail Zone Length       6.0   Erratic  22
Speed Trap Length      20.0
Typ Vehicle Length     18.0
HOV Lane                 NO
REV Lane                 NO
```

The configurable parameters are:

Lane Mode   Configures the current operating mode of the opposite mainline lane for detection.

    Disabled   Configures both the leading and the trailing detector to be disabled.

    Lead   Configures the leading detector to be enabled and the trailing detector to disabled.

    Trail   Configures the trailing detector to be enabled and the leading detector to disabled.

    Dual   Configures both the leading and trailing detectors to both be enabled.

Lead Zone Length   Configure the detection zone length of the leading detector. The configurable range is 0 to 15.0 feet in 0.1 foot increments.

Trail Zone Length   Configures the detection zone length of the trailing detector. The configurable range is 0 to 15.0 feet in 0.1 foot increments.

Speed Trap Length   Used for dual loop speed calculations, configures the distance between the leading edge of the leading opposite mainline detector to the leading edge of the trailing opposite mainline detector. The configurable range is 0 to 45.0 feet in 0.1 foot increments.

Type Vehicle Length   Used with leading or trailing loop configurations, configures the length of a typical vehicle in 0.1 foot increments, which is used for opposite mainline lane speed estimation with a

single detector. The configurable range is 0 to 45.0 feet in 0.1-foot increments. A value of zero (0) shall inhibit speed estimation.

HOV Lane
Configures the lane as an HOV lane. It can be selected to be either YES or NO.

REV Lane
Configures the lane as a reversible lane. It can be configured to be either YES or NO.

MAX Threshold
Selects the maximum threshold time that an opposite mainline lane detector can be continuously actuated before the Maximum Presence Error is set. The configurable range is 0 to 720 minutes in 1-minute increments. A value of zero (0) shall inhibit the maximum presence testing.

Erratic Count
Sets the vehicle erratic count threshold which if exceeded will put the detector into an Erratic Count Error. The configurable range is 0 to 255 vehicles in 1-vehicle per lane increments. A value of zero (0) shall inhibit the erratic count testing.

2-2-6 Opposite Mainline Direction

The Opposite Mainline Direction screen will show the direction of the traffic when the lane is designated as a reversible lane. The menu will show a (F) when the traffic is moving in the forward direction and a (R) when the traffic is moving in the reverse direction.

The logic is based on determining whether a pair of mainline detectors was activated within a certain cutoff time and if so, in what direction they were activated. 2.727 seconds was chosen as the cutoff time as this is the time it takes for a vehicle traveling at 5 MPH to go from one detector to the other detector when the two detectors are spaced 20 feet apart. If the time between detections is longer than this cutoff time, then it is unlikely that any single vehicle activated both loops of the dual loop set.

The calculate lane direction the following algorithm is used:

Leading Loop Activated
If the trailing loop was activated within the last 2.727 seconds then subtract one to the lane direction count down to a minimum of -8.

Trailing Loop Activated
If leading loop was activated within the last 2.727 seconds then add one to the lane direction count up to a maximum of 8.

Lane Direction = Forward   If Lane Direction count has a value of -2 to 8.

Lane Direction = Reverse   If Lane Direction count has a value of -3 to -8.

```
             OPPOSITE MAINLINE DIRECTION

    Lane   1    2    3    4    5    6    7    8
    DIR    F    F    F    F    F    F    F    F
```

3. Additional Detection

Additional Detection is used to collect detector data at off ramps or at other locations where occupancy and volume detection is needed.

```
           Additional Detection

    1-Statistics
    2-Detection
    3-Detector Status
    4-Car Counts
    5-Configuration
```
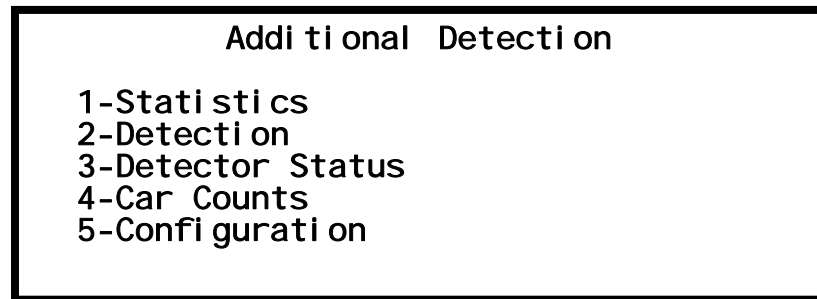
The menu areas are:

Statistics   Displays the additional detector volume and occupancy for the last 30-second calculation interval.

Detection   Displays the current activation status of each detector.

Detector Status   Displays the current working status of each detector.

Car Counts   Display the number of cars that have crossed over the detector since the controller was turned on.

Configuration   Allows users to configure additional detectors.

3-1 Additional Detection Statistics

The Additional Detection Statistics menu shows volume and occupancy percentage. Although only 6 additional detectors are shown in this example, the URMS is configurable for up to 16 additional detection locations. Please note that if there are more than 6 additional detectors configured pressing the down arrow key will allow the user to scroll down to the higher numbered locations.

```
   Additional Detection - 30 Second Data
Lane      Vol      OCC%
  1        5       12.4
  2        6       15.3
  3        3       14.5
  4        7       13.6
  5        6       13.5
  6        4       12.5
```

Volume Represents then number of vehicles that have passed over the detector during the last 30-second calculation interval.

Occupancy Represents the percentage of time that vehicles have been over the detector during the last 30-second calculation interval.

3-2 Additional Detection

The Additional Detection menu shows if a detector is currently actuated. An asterisk (*) represents an actuated state while a dot (.) represents a de-actuated state.

```
            ADDITIONAL DETECTION

     1   2   3   4   5   6   7   8
     .   .   .   .   .   .   .   .

     9  10  11  12  13  14  15  16
     .   .   .   .   .   .   .   .
```

3-3 Additional Detector Status

The Additional Detector Status menu shows the current status of the additional detector. Reference the table below for a list of detector abbreviations:

```
ADDITIONAL DETECTOR STATUS

1    2    3    4    5    6    7    8
W    W    W    D    W    W    D    D

9   10   11   12   13   14   15   16
W    W    W    D    W    W    D    D
```

Working [W]   Indicates that this detector currently appears to be working normally.

Disabled [D]   Represents the detector has been configured to be in a continuous de-actuated or OFF state.

Maximum Presence [MP] The input on the opposite mainline detector has been continuously actuated for longer than the configured Maximum Presence threshold.

No Activity [NA]   The number of minutes between detector actuations is greater than the configured No Activity Time.

Erratic Count [EC]   The number of vehicle counts on the detector has exceeded the configured Erratic Count Limit during the last 30-second calculation interval.

3-4 Additional Detector Car Counts

The Additional Detector Car Count menu shows the current amount of vehicles that have traveled over the detector since the controller was powered on or the car counts were reset:

```
ADDTITIONAL DETECTOR CAR COUNTS

DET 1     0    DET 7  322     DET 13  302
DET 2    43    DET 8    0     DET 14   60
DET 3    45    DET 9   45     DET 15   45
DET 4   234    DET 10 234     DET 16   49
DET 5    83    DET 11  83
DET 6   123    DET 12 123
```

Note:
Car Counts can be cleared using menu 9-C (clear car counts)

3-5 Additional Detector Configuration

The Additional Detector Configuration menu shows how many additional detectors can be configured.

```
        ADDITIONAL DETECTOR CONFIGURATION
1-Det 1        7-Det 7         D-Det 13
2-Det 2        8-Det 8         E-Det 14
3-Det 3        9-Det 9         F-Det 15
4-Det 4        A-Det 10        O-Det 16
5-Det 5        B-Det 11
6-Det 6        C-Det 12
```

Additional Detector Configuration (3-5-X)

The Additional Detection Configuration menu allows the user to enable or disable the detectors as well as allowing the user to select error threshold levels.

```
  ADDITIONAL DETECTOR XX CONFIGURATION

Lane Mode                    ENABLED
No Activity                    2
Max Presence                  10
Erratic Count                 22
```

Lane Mode   Select whether the lane detector is enabled or disabled.

No Activity   The amount of time that an additional detector can be continuously non-actuated before the metered lane detector status will report a detector status of No Activity Error. The configurable range is 0 to 720 in 1-minute increments. Setting this parameter to zero (0) will deactivate No Activity Monitoring.

Maximum Presence

The amount of time that an additional detector can be continuously actuated before the detector status will report a detector status of Maximum Presence Error. The configurable range is 0 to 720 minutes in 1-minute increments. Setting this parameter to zero (0) will deactivate Maximum Presence Monitoring.

Erratic Count

The vehicle count on the additional detector for a metered lane exceeded a pre-determined threshold. The configurable range is 0 to 255 vehicles in vehicle increments. Setting this parameter to zero (0) will deactivate Erratic Count Monitoring.

4. Traffic Responsive Metering Plans

4-1 Metering Plan Tables

The Metering Plan Tables menu displays the total number of plans available that may be configured. This screen is view only and cannot be configured from the front panel.

```
TRAFFIC RESPONSIVE METERING PLAN TABLES
1-Plan 1              7-Plan 7
2-Plan 2              8-Plan 8
3-Plan 3              9-Plan 9
4-Plan 4              A-Plan 10
5-Plan 5              B-Quickset Plan
6-Plan 6
```

4-1-X Metering Plan

The Metering Plan menu display allows the user to configure the metering plan's release rate and the occupancy, volume and speed thresholds. A total of 15 (1-15) levels are available and may be configured from the front panel. Levels 7 – 15 can be displayed by pressing the down arrow key on the front panel.

The metering rate for each metered lane will be determined by comparing the mainline traffic to the occupancy, volume and speed thresholds. The rates for each of these items will be compared and the most restrictive (rate with the highest level) will be used to select the metering rate.

When using a plan with traffic responsive metering, active metering will begin when mainline traffic exceeds level 2 and active metering will end when the current mainline traffic is lower than level 1.

```
   TRAFFIC RESPONSIVE METERING PLAN 2
 LEVEL     RATE      OCC%       VOL    SPEED
   1       900      10.0      1000      60
   2       850      15.0      1100      55
   3       800      20.0      1300      50
   4       750      25.0      1400      45
   5       700       0.0      1700      40
   6       650       0.0      1800      35
```

Metering Rate	The metering rate for each metered lane. The configurable range is 150 to 1800 vehicles in 1-VPH increments.
Occupancy Threshold	The percentage of time that a detection zone was occupied. Entering a value of zero (0) will cause the program to skip that entry.
Volume Threshold	The number of vehicles per lane per hour. Entering a value of zero (0) will cause the program to skip that entry.
Speed Threshold	Represents the average speed of a vehicle in miles per hour. Entering a value of zero (0) will cause the program to skip that entry.

4-1-B Quick Plan

The Quick Plan menu display allows the user to quickly create a metering plan based on the linear interpolation of the minimum and maximum metering release rates and thresholds.

```
              QUICKSET PLAN
 PLAN     1        MAX Levels 12
 Rate       MIN  240      MAX   900
 Occupancy  MIN  5.0      MAX 30.0
 Volume     MIN 1000      MAX 2000
 Speed      MIN    0      MAX    0

              ENTER DATA
```

Plan	The Plan Number that you would like to modify
Max Levels	The Number of Plan Levels that you would like to use. All plan levels greater than the selected number will have the

rate set to the maximum rate, and the Occupancy, Volume and Speed Thresholds set to zero.

Rate   The minimum and maximum Release Rates.

Occupancy   The minimum and maximum Occupancy Thresholds.

Volume   The minimum and maximum Volume Thresholds.

Speed   The minimum and maximum Speed Thresholds.

Enter Data   Has two modes, Enter Data and Set Data. The default mode Enter Data allows the user to enter the Metering Plan Number, Number of Plan Levels, Release Rate and Minimum and Maximum Thresholds. The Set Data mode, which can be selected by using the '+' (PLUS) key and pressing 'ENTER' will cause the program to immediately generate the selected plan using the entered parameters.

5. Command Source

The Command Source menu allows the user to view or configure the command source that is currently requesting command of the controller. The currently supported command sources, listed in order of precedence, are Manual, Communications, Interconnect, Time Base Control, and Default.

```
            COMMAND SOURCE

1-Manual
2-Communications
3-Interconnect
4-Timebase Control
5-Default
```
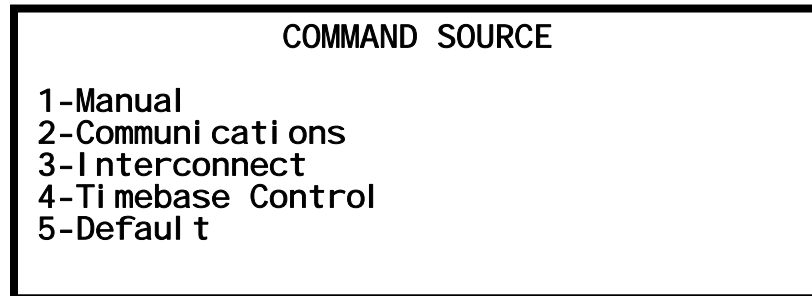
The menu areas are:

Manual	Control is from the front panel at the local controller.
Communications	Control is from the TMC or other remote communications device.
Interconnect	Not used at this time. Reserved for future use.
Timebase Control	Control request based on the Time-of-Day Entries and Timebased Control Tables (menu item 6).
Default	What the controller will do when all other command sources are skip. This is what the controller will do first when powered up or re-booted.

5-1 Manual

The Manual command source has the highest command priority. Any lane command other than skip will override any other command source. There are 3 settable parameters Action, Rate, and Plan for each metered lane.

```
  ┌─────────────────────────────────────────────┐
  │      COMMAND SOURCE PRIORITY — MANUAL         │
  │                                               │
  │ lane      Action            Rate       Plan   │
  │  1        SKIP              900           1    │
  │  2        SKIP              900           1    │
  │                                               │
  │                                               │
  │                                               │
  └─────────────────────────────────────────────┘
```

Action   The action that you want the controller to take.

The allowable settings are:

Rest in Green   The meter heads will be set to the green state.

Rest in Dark   The meter heads will be turned OFF.

Traffic Responsive   Meter responsively based on the plan number and current mainline traffic conditions.

Fixed Rate   The controller will meter at the rate specified.

Emergency Green   The meter heads will immediately be set to green. If the controller is actively metering, normal metering shutdown will not occur.

Skip   The controller will skip to the next lower (default) command source.

Rate   The amount of vehicles per hour per lane that will be released. The configurable range is 150 to 1800 vehicles in 1 VPH increments.

Plan   The plan number used to determine the amount of mainline traffic required before actively metering and the release rate. The configurable plan numbers are 1 to 10.

5-2 Communications

The Communications command source menu has the second highest priority. It can only be overridden by the Manual Command Source. The communications parameters are only settable from the TMC or other remote communications facility. The 3 viewable parameters are the current Communications Action, Rate, and Plan.

```
COMMAND SOURCE PRIORITY—COMMUNICATIONS

Lane        Action          Rate        Plan
 1          Traffic Resp    900            1
 2          Traffic Resp    900            1
```

5-3 Interconnect

The Interconnect command source has not been implemented in URMS at this time. It is only included in the menu structure for future expandability.

```
COMMAND SOURCE PRIORITY—INTERCONNECT

lane        Action          Rate        Plan
 1          Skip            900            1
 2          Skip            900            1
```

5-4 Timebase Control

The Timebase Control command source priority is the second lowest command source. Its Actions, Rate and Plan Number are set by the time of day and control tables listed under main menu item 6 (Time-of-Day). The 3 viewable parameters are the current Timebased Control Action, Rate, and Plan.

```
   COMMAND SOURCE PRIORITY—TIMEBASE CTRL

lane        Action          Rate         Plan
 1          Traffic Resp    900             1
 2          Traffic Resp    900             1
```

5-5 Default

The Default Command Source has the lowest command source level. It can be overridden by any other command source. Essentially this defines what action the controller will take when the controller is powered on or if it is before the first Timebased Control entry for the day. There are 3 settable parameters which are Action, Rate, and Plan.

```
      COMMAND SOURCE PRIORITY — DEFAULT

lane        Action          Rate         Plan
 1          Rest in Dark    900             1
 2          Rest in Dark    900             1
```

Action   The action that you want the controller to take.

The allowable settings are:

Rest in Green   The meter heads will be set to the green state.

Rest in Dark   The meter heads will be turned OFF.

Traffic Responsive Meter responsively based on the plan number and current mainline traffic conditions.

Fixed Rate   The controller will meter at the rate specified

Emergency Green   The meter heads will immediately be set to green. If the controller is actively metering, normal metering shutdown will not occur.

Rate   The amount of vehicles per hour per lane that will be released. The
            configurable range is 150 to 1800 vehicles in 1 VPH increments.

Plan   The plan number used to determine the amount of mainline traffic
            required before actively metering and the release rate. The configurable
            plan numbers are 1 to 10.

6. Time-of-Day

Time-of-Day Functions

The Time-of-Day functions indicate allow the user to set the clock, set up day-of-week entries, time based control tables and set fixed and floating holidays.

```
          TIME-OF-DAY FUNCTIONS
1-TOD Clock
2-Day of Week Entry
3-Timebased Control Tables
4-Fixed Holidays
5-Floating Holidays
```

The menu areas are:

TOD Clock	Allows the user to set the controller date, time, and allows them to enable or disable Daylight Savings Time Correction.
Day-of-Week Entry	Allow the user to select a particular Time Based Control Table at a certain time of day and day of the week.
Timebased Control Tables	When selected in the day-of-week entry, allows the user to set the action, rate and plan of the controller using the Timebased Command Source.
Fixed Holidays	Allows users to set fixed holidays.
Floating Holidays	Allows users to configure floating holidays.

6-1 Set TOD Clock

The Set TOD Clock menu allows you to modify the current time and date. It also allows the user to select whether or not the Daylight Savings Time Adjustments will be made internally in the controller.

```
┌─────────────────────────────────────────┐
│            TIME-OF-DAY CLOCK             │
│                                          │
│          TIME    02:14:41                │
│          DATE   01/22/2000               │
│          DAY    SATURDAY                 │
│                                          │
│          Daylight Saving: ON             │
│                                          │
└─────────────────────────────────────────┘
```

Note:
If the current day has been configured to be either a floating
or fixed holiday then the day of the week will show "HOLIDAY"

Time	The current controller time using a 24-hour clock or military time.
Date	The current controller date in the form of MM/DD/YYYY.
Daylight Saving	Selecting ON will have the controller internally make the adjustment. Selecting OFF will disable the controller from making Daylight Savings adjustments.

6-2 Day-of-Week Entry

The Day-of-Week Entry menu allows you to set the time ramp metering is to be activated
any given day during the week. HOV lanes can be activated by choosing YES or deactivated
by choosing NO. There are 24 Day-of-Week entries. Use the down arrow to access entries 6
though 24.

```
┌─────────────────────────────────────────┐
│           DAY OF WEEK ENTRY              │
│   #  Start      DOW        Table    HOV  │
│      Time                          Active│
│   1 <08:00>   SMTWTFSH      16       YES  │
│   2  00:00    .MTWTFS.      0        YES  │
│   3  00:00    .MTWTFS.      0        YES  │
│   4  00:00    .MTWTFS.      0        YES  │
│   5  00:00    .MTWTFS.      0        YES  │
└─────────────────────────────────────────┘
```

Start Time   Determines the time that this plan will start.

DOW   DOW selects the days of the week that this plan will operate. Using the numeric keypad the Day of the Week selections are:

> 1 – Sunday
> 2 – Monday
> 3 – Tuesday
> 4 – Wednesday
> 5 – Thursday
> 6 – Friday
> 7 – Saturday
> 8 – Any fixed or floating holiday

Table   Determines which of the 16 Time of Day tables will be used to get the controllers Timebase Control Action, Rate and Plan. Setting the table number to zero (0) will disable the Timebase Control Entry.

HOV   Selects whether or not mainline lanes configured as HOV lanes will be used in traffic responsive calculations. Selecting YES will activate HOV lanes and they will not be included in the calculations. Selecting NO will deactivate the HOV lanes and all HOV lanes will be included in the mainline traffic responsive calculations.

6-3 Timebase Control Tables

The Timebase Control Tables menu allows the user to select any one of the 16 Timebase Control Tables. Each individual table contains Action, Rate and Plan entries for Timebase Controlled metering operation. Tables are selected in the Day-of-Week Entry menu (6-2).

```
                    TOD TABLES

    1-Table 1       7-Table 7       C-Table 12
    2-Table 2       8-Table 8       D-Table 13
    3-Table 3       9-Table 9       E-Table 14
    4-Table 4       A-Table 10      F-Table 15
    5-Table 5       B-Table 11      0-Table 16
    6-Table 6
```

6-3-X Time-of-Day Table

Each of the 16 Time of Day tables tell the controller the Action (command), Rate (for fixed rate metering), and Plan (for traffic responsive metering) for each metered lane. In addition, each table allows you to enable or disable any of the 8 General Purpose outputs.

```
              TIME-OF-DAY TABLE X
    lane      Action          Rate        Plan
     1       <Traffic Resp>   900           1
     2        Traffic Resp    900           1



           Press NEXT to view GP Outputs
```

Action   The action that you want the controller to take.
                The allowable settings are:

       Rest in Green   The meter heads will be set to the green metering state.

       Rest in Dark   The meter heads will be turned OFF.

       Traffic Responsive Meter responsively based on the plan number and current mainline traffic conditions.

       Fixed Rate   The controller will meter at the rate specified.

       Emergency Green   The meter heads will immediately be set to green. If the metered lane is actively metering, normal metering shutdown will not occur.

       Skip   The controller will skip to the next lower (default) command source.

Rate   The amount of vehicles per hour per lane that will be released. The configurable range is 240 to 1800 VPH in 1-VPH increments..

Plan   The plan number used to determine the amount of mainline traffic required before actively metering and the release rate. The configurable plan numbers are 1 to 10.

Selecting 'Next' will allow the user to configure the General Purpose Outputs. Each General Purpose Output can be turned ON or OFF.

```
            TIME-OF-DAY TABLE X

GP Output #1<OFF>      GP Output #5    OFF
GP Output #2 OFF       GP Output #6    OFF
GP Output #3 OFF       GP Output #7    OFF
GP Output #4 OFF       GP Output #8    OFF


   Press NEXT to return to previous page
```

Note:
If the number of metered lanes is equal to zero (0), only the General Purpose Outputs menu will be shown when the Time-of-Day Tables are selected.

6-4 Fixed Holidays

The Fixed Holidays menu allows you to configure holidays that occur on a specific date every year. There are a maximum of 12 entries. Use the down arrow to scroll down to view entries 7 through 12.

```
            FIXED HOLIDAY
  Number      Month    Day        DOW
     1         JAN       1      .MTWTF.
     2         JAN      12      .MTWTF.
     3         MAR      31      .MTWTF.
     4         JUL       4      .MTWTF.
     5         NOV      11      .MTWTF.
     6         DEC      25      .MTWTF.
```

Month   The month in which the holiday occurs.
              The Selectable months are.

              NC – Not Configured – Disable this Entry
              JAN – January
              FEB – February
              MAR –March
              APR – April

MAY – May
JUN – June
JUL – July
AUG – August
SEP – September
OCT – October
NOV – November
DEC – December

Day   The day-of-month on which the holiday occurs.

DOW   The day-of-week on which the holiday occurs. Note that if Saturday is
               NOT selected and the holiday occurs on a Saturday, the holiday will be
               observed on the previous Friday. Likewise, if Sunday is NOT selected
               and the holiday falls on a Sunday the holiday will be observed on the
               following Monday. The selectable day-of-week options are:

               The selectable Day of Week options are:

                    1 – Sunday
                    2 – Monday
                    3 – Tuesday
                    4 – Wednesday
                    5 – Thursday
                    6 – Friday
                    7 – Saturday

6-5 Floating Holidays

The Floating Holidays menu allows the user to configure holidays that do not occur on a
specific date, but rather occur on a specific month, week and day-of-week. For example
Martin Luther King Jr. Day always occurs on the 3rd Monday in January. There are a
maximum of 12 entries. Use the down arrow to scroll down to entries 7 through 12.

```
                FLOATING HOLIDAY
   Number      Month       Week           Day
     1          JAN          3          MONDAY
     2          FEB          3          MONDAY
     3          MAY          5          MONDAY
     4          SEP          1          MONDAY
     5          OCT          2          FRIDAY
     6          NOV          3          THURSDAY
```

Month   The month in which the holiday occurs.
             The selectable months are.

                   NC – Not Configured – Disable this Entry
                   JAN – January
                   FEB – February
                   MAR –March
                   APR – April
                   MAY – May
                   JUN – June
                   JUL – July
                   AUG – August
                   SEP – September
                   OCT – October
                   NOV – November
                   DEC – December

Week   The week-of-month that this holiday occurs. If a holiday occurs in the
             last week of the month select 5.

Day   The day-of-week that this holiday occurs.
             The selectable days are:

                   1 – Sunday
                   2 – Monday
                   3 – Tuesday
                   4 – Wednesday
                   5 – Thursday
                   6 – Friday
                   7 – Saturday

7. Communications

The Communications menu allows the URMS to be configured to communicate with the
TMC and other remote locations using 2/4 wire modems, RS-232, or TCP/IP
communications architecture.

```
        COMMUNICATIONS PARAMETERS
1-SP 1 Parameters    6-TCP Port 1 TX/RX
2-SP 2 Parameters    7-TCP Port 2 TX/RX
3-TCP Parameters     8-UDP Parameters
4-SP 1 TX/RX         9-SENSYS
5-SP 2 TX/RX

If config is changed—Reboot Controller
```

The menu areas are:

SP 1 Parameters   Configure the communications parameters of serial port
                           1.

SP 2 Parameters   Configure the communications parameters of serial port
                           2.

TCP Poll Parameters   Configure the communications parameters of the
                           Ethernet port.

SP 1 TX/RX   Displays the current hexadecimal packet information
                           for serial port 1.

SP 2 TX/RX   Displays the current hexadecimal packet information
                           for serial port 2.

TCP Port 1 TX/RX   Displays the current hexadecimal packet information
                           for Ethernet on TCP port number 1.

TCP Port 2 TX/RX   Displays the current hexadecimal packet information
                           for Ethernet on TCP port number 2.

UDP Parameters   Configure the Controller ID and the IP Address and
                           Port number to broadcast UDP transmissions to.

SENSYS   Configure the Controller ID and the IP Address and
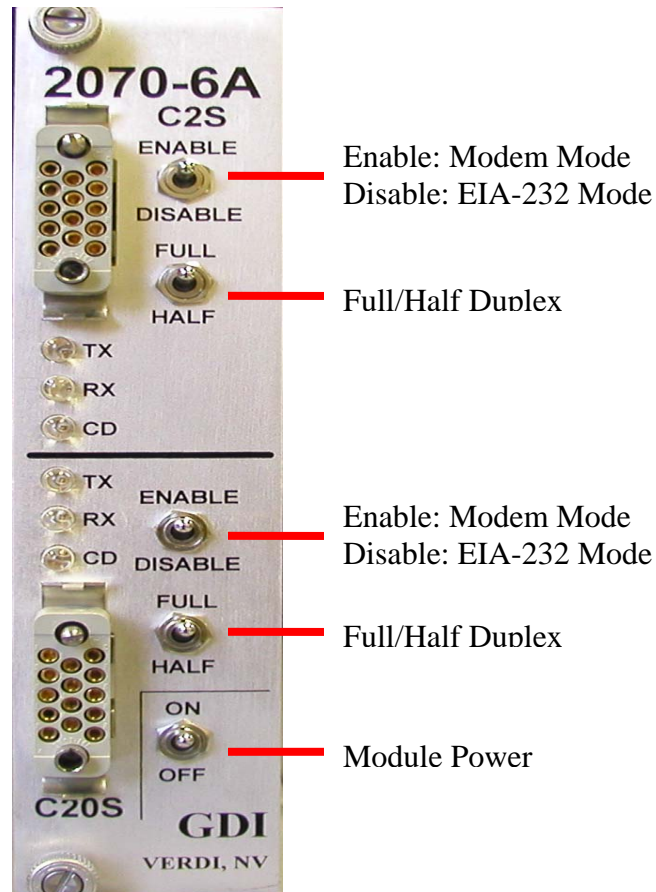   Port number to receive from Sensys access points.

2070 Serial Port Locations

Serial Port 1
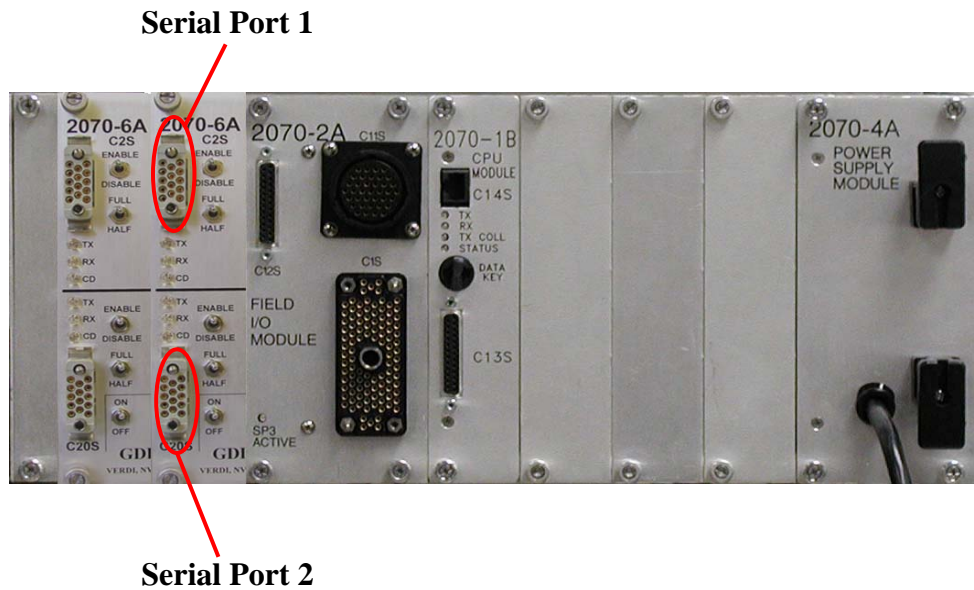
Serial Port 2

Note:

Serial Port 1 is the upper channel of the module installed in the Model 2070 Slot A2 (the second slot from the left). Serial Port 2 is the lower channel of the module installed in the Model 2070 Slot A2. Although in the picture above a 2070-6A card is used, the 2070-6B (9600 baud modem) and the 2070-7A (RS-232 Serial) can also be used in Slot A2.

2070-6A Modem Function

Enable: Modem Mode
Disable: EIA-232 Mode

Full/Half Duplex

Enable: Modem Mode
Disable: EIA-232 Mode

Full/Half Duplex
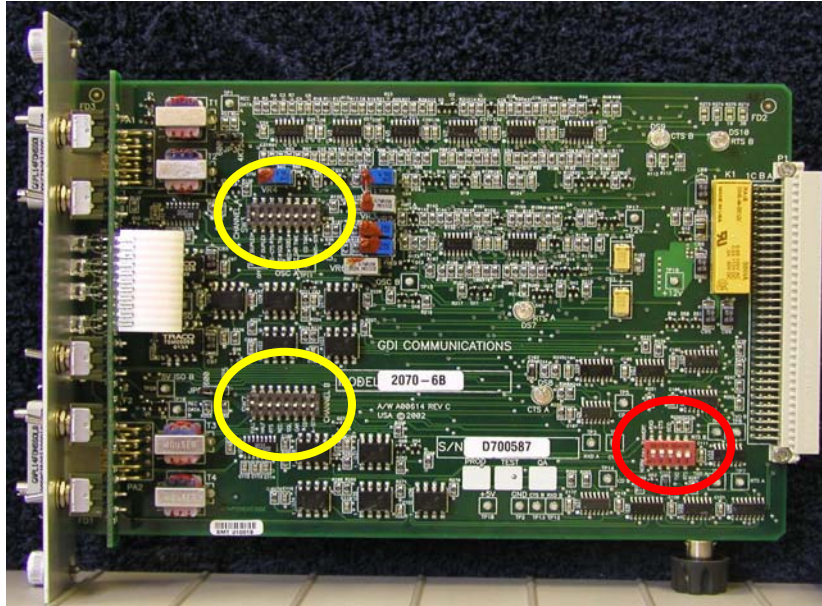
Module Power

Note:
Set the modem to the Enabled mode for Modem Operation and Disabled for EIA-232 Operations. Also ensure that the Duplex Switch is set to FULL and the Modem Power Switch is set to ON.

GDI 2070-6A Modem Dip Switches

Note:
These settings apply to GDI Model 2070-6A Modems ONLY.

The recommended settings for the DIP switches circled in Yellow (upper and lower left) are:

1-Full Duplex	OFF (Default)
2-Half Duplex	OFF (Default)
3-RTS/CTS Time	OFF (Default)
4-Soft Carrier Time	OFF (Default)
5-Half Duplex Local Echo	OFF for 4 wire operation (Default), ON for 2 wire operation
6-Rec. Squelch Time	OFF (Default)
7-Carrier Detect Time	OFF (Default)
8-Auto-Streaming Enable	ON (Default is OFF)

The recommended settings for the DIP switches (circled in Red – lower right) used for inverting the backplane RS-485 polarity signals are:

1-RXD	ON (Default)
2-CTS	ON (Default)
3-DCD	ON (Default)
4-TXD	OFF (Default)
5-RTS	OFF (Default)

7-1 SP 1 Parameters

Serial Port 1 Parameters allows the user to configure the Baud Rate, Data Bits, Parity, RTS On and OFF time, Handshaking and Address (drop number).

```
                    SERIAL PORT 1
      Address              1
      Baud Rate         1200    Handshake   NONE
      Data Bits            8    Enabled     YES
      Parity            NONE
      Stop Bits            1
      RTS On Time         10 (milliseconds)
      RTS Off Time         0 (milliseconds)
```

Address   The controller drop number.

Baud Rate   1200, 2400, 4800, 9600, 19200 or 38400.

Data Bits   5, 6, 7 or 8 Data Bits.

Parity   None, Even or Odd.

Stop Bits   1 or 2.

RTS ON Time   The amount of time the Request to Send signal will be activated BEFORE the first byte of the response packet is transmitted. This is needed by 2- and 4-wire modem systems to set carrier frequency prior to beginning transmission of a response packet. For 4-wire modem communications, the recommended time is 20 milliseconds; for 2-wire modem communications, the recommended time is 30 milliseconds.

RTS OFF   The amount of time the Request to Send signal will remain activated AFTER the last byte of the response packet has been transmitted. This may be needed if packet is being truncated. Typically, this value is set to zero.

Handshaking   None, Manual, Auto CTS, Auto RTS, Full Auto and Dynamic. The recommended setting is None.

Enabled	The current operating mode of the serial port. It can be set to either YES if the serial port in enabled or NO if the serial port in not enabled.

7-2 SP 2 Parameters

Just like Serial Port 1, Serial Port 2 Parameters allows the user to configure the Baud Rate, Data Bits, Parity, RTS On and Off time, Handshaking and the Address.

```
                    SERIAL PORT 2
   Address              2
   Baud Rate         1200    Handshake   NONE
   Data Bits            8    Enabled     YES
   Parity            NONE
   Stop Bits            1
   RTS On Time         10 (milliseconds)
   RTS Off Time         0 (milliseconds)
```

Address	The controller drop number.
Baud Rate	1200, 2400, 4800, 9600, 19200 or 38400.
Data Bits	5, 6, 7 or 8 Data Bits.
Parity	None, Even or Odd.
Stop Bits	1 or 2.
RTS ON Time	The amount of time the Request to Send signal will be activated BEFORE the first byte of the response packet is transmitted. This is needed by 2- and 4-wire modem systems to set carrier frequency prior to beginning transmission of a response packet. For 4-wire modem communications, the recommended time is 20 milliseconds; for 2-wire modem communications, the recommended time is 30 milliseconds.
RTS OFF	The amount of time the Request to Send signal will remain activated AFTER the last byte of the response packet has been transmitted. This may be needed if packet is being truncated. Typically, this value is set to zero.
Handshaking	None, Manual, Auto CTS, Auto RTS, Full Auto and Dynamic. The recommended setting is None.

Enabled   The current operating mode of the serial port. It can be set to either YES if the serial port in enabled or NO if the serial port in not enabled.

7-3 TCP Port Parameters

TCP Port Parameters allows the user to configure the TCP Port Number, Address and other TCP/IP configuration information.

```
            TCP Parameters
      Address     12
      Port #1 2101     Port #2 10011
      Connection Type STATIC
      IP Address XXX.XXX.XXX.XXX
      Netmask     XXX.XXX.XXX.XXX
      Broadcast   XXX.XXX.XXX.XXX
      Gateway     XXX.XXX.XXX.XXX
```

Address   This is the controller drop number.

Port #1   The TCP port number that the remote communications device would like to connect to. This port is general used for normal TMC Polling.

Port #2   This second TCP port number is used for remote configuration of the URMS from a TMC or other remote facility.

Connection Type   Static or Dynamic. Use Static for Fixed IP addresses. Use Dynamic for an IP address assigned through another device through DHCP.

IP Address   The Internet Protocol Address assigned to the controller.

Subnet Mask   Together with the IP address defines what network this controller belongs to.

Broadcast Address The broadcast address is an IP address with the same network-part as your network, but with only ones as host-part. Every

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host on your network listens to this IP address. It is meant for broadcasting packets.

Default Gateway   A network point that acts as an entrance to another network point.

7-4 SP 1 TX/RX

Serial port 1 packet data shows the current packet data in hexadecimal that has been received by the controller. If the type of message is known to the controller and the address is correct, the controller will display the known packet type, and depending on the packet received will transmit a response.

```
        SERIAL PORT 1 PACKET DATA
 RX:


 TX:


 Packet Type:    UNKNOWN
```

The current packet types to which URMS will respond to are:

SDRMS Zero Poll
SDRMS Normal Poll
SDRMS Opposite Side Poll
SDRMS Get
SDRMS Set
SDRMS Reset
SATMS Poll
SATMS Get
SATMS Set
SATMS Set Time
TOS Get Data
TOS Get Time
TOS Set Time
TOS Set HAR EMS

7-5 SP 2 TX/RX

Serial port 2 packet data shows the current packet data in hexadecimal that has been received by the controller. If the packet type is known to the controller and the address is correct, the controller will also display the known packet type, and depending on the packet received will transmit a response.

```
          SERIAL PORT 2 PACKET DATA
RX:  7E014309210D060A0400C57E


TX:  7E014300667E



Packet Type:    TOS SET TIME
```

7-6 TCP Port 1 TX/RX

TCP Port 1 TX/RX shows the TCP Port 1 current packet data in hexadecimal that has been received by the controller on TCP port 1. If the type of message is known to the controller and the address is correct, the controller will display the known packet type, and depending on the packet received will transmit a response.

```
          TCP PORT 1 PACKET DATA
RX:  6103000C70AA55


TX:  614707211A091328000000001080000000
     0200000000000000000000000000000044
     0E14000000FF0000003000000030000000

 Packet Type:    SDRMS NORMAL POLL
```

7-7 TCP Port 2 TX/RX

TCP Port 2 TX/RX shows the TCP Port 2 current packet data in hexadecimal that has been received by the controller on the TCP port 2. If the type of message is known to the controller and the address is correct, the controller will display the known packet type, and depending on the packet received will transmit a response.

```
           TCP PORT 2 PACKET DATA
   RX:  6103000C70AA55


   TX:  614707211A091328000000001080000000
        020000000000000000000000000000044
        0E14000000FF0000003000000030000000

    Packet Type:    SDRMS NORMAL POLL
```

7-8 UDP Port 1 Parameters

UDP Port parameters allows the user to configure the controller ID and IP Address and Port number to broadcast to is a UDP broadcast is selected under menu item 8-5 preferred comm. Protocol.

```
               UDP Parameters

   Controller ID                  21341
   Port Number                     2000
   UDP Address         192.168.010.001



```

　　　　Controller ID　　　An identifying identification number send as part of certain UDP data transmissions in order to allow the central system to identify which controller has transmitted data.

　　　　Port Number　　　This UDP port number that we would like to transmit UDP data to.

UDP Address   The remote UDP Address that you would like to transmit UDP
                     data to.

7-9 Sensys Parameters

Sensys parameters allows the user to configure the port, IP address and enables the user to
configure the system to actively receive Sensys data.

```
              SENSYS Parameters


Port Number                          2000
Sensys IP Address   192.168.010.001
Actively Poll Sensys                   NO
```

Port Number   This UDP port number that we would like to receive UDP
                     Sensys data transitions from.

Sensys IP Address   The remote UDP Address that you would like to Sensys
                     UDP Sensys data transitions from.

Actively Poll Sensys Selects whether or not we want to receive Sensys data. Yes
                     means that the URMS will accept Sensys data. No means
                     that the URMS will not accept Sensys data.

8. General

General allows the user to configure and view the physical configuration of the URMS as well as both the Failsafe Feedback Inputs and Traffic Responsive Interval.

```
          GENERAL ITEMS MENU
1-Input File Layout
2-Output File Layout
3-AUX Output File Layout
4-General Purpose Output ON/OFF Times
5-Other Items
6-Traffic Responsive Interval
7-Configure Ramp I/O
```

The menu areas are:

Input File Layout   View the physical layout of the input file slots 1 to 14.

Output File Layout   View the physical layout of the output file slots 1 to 3.

Aux Output File Layout   View the physical layout of the auxiliary output file slots 9 to 14.

General Purpose Outputs   Configure the ON and OFF times that the General Purpose output will use when the output is enabled.

Other Items   Configure failsafe input, occupancy correction and enable/disable flashing of the WARN01 advance warning sign.

Traffic Responsive Interval   Configure the number of 30-second periods to use for averaging mainline data for traffic responsive calculations. From 1 to 8 30-second Calculation Intervals may be selected.

Configure Ramp I/O   Configure the I/O configuration from one of a number of predetermine I/O layouts. Also allows the user to set the number of Metered,

Mainline, Opposite Mainline, Additional Detectors and the method by which the controller performs traffic responsive metering.

8-1 Input File Layout

The Input File screen shows the current assignments for slots 1 – 14 of the input file. If the controller is not currently metering, then the user can also modify the input assigned to an input file position. Note that modifying any input will cause the controller I/O configuration type to be changed to custom. Also note that pressing the "NEXT" key will allow the user to toggle between I file and J file inputs.

```
                I FILE INPUTS
  1     2     3     4     5     6     7
  D1    Q1    NC    NC    ML1   ML3   ML5
  P1    F1    NC    NC    ML2   ML4   ML6

  8     9     10    11    12    13    14
  NC    NC    NC    NC    D2    Q2    D3
  NC    NC    NC    NC    P2    F2    P3
```

Note:
Select next to configure the J file inputs

Because of limitation in the size of the front panel the following abbreviations are used on this screen.

NC	Input is not configured
MLn	Mainline lane n Leading detector
MTn	Mainline lane n Trailing detector
OLn	Opposite mainline lane n Leading detector
OTn	Opposite mainline lane n Trailing detector
Fn	Additional Detector number n
Pn	Metered lane n Passage detector
Qn	Metered lane n Queue detector
Dn	Metered lane n Demand detector
NC	Input is not configured for use
RCn	Rate Code Input n
252	Failsafe Feedback Input

8-2 Output File

The Output File screen shows the current assignments for slots 1 - 3 of PDA3. If the controller is not currently metering, then the user can also modify the output assigned to an output file position. Note that modifying any output will cause the controller I/O configuration type to be changed to custom.

```
┌─────────────────────────────────────────────────┐
│                 OUTPUTS FILE                     │
│                                                  │
│                  1       2      3                │
│        R         LGRN1   RED1   RED2             │
│        Y         WARN1A  YEL1   YEL2             │
│        G         LGRN2   GRN1   GRN2             │
│                                                  │
│                                                  │
└─────────────────────────────────────────────────┘
```

Because of limitation in the size of the front panel the following abbreviations are used on this screen.

NC	Outputs is Not Configured
LGRNn	Metered Lane n Lower Green output
GRNn	Metered Lane n Green output
YELn	Metered Lane n Yellow output
REDn	Metered Lane n Red output
WARN01	Meter ON Warning Sign Solid – Non-Flashing/Flashing - Global
WARN02	Meter ON Warning Sign Non-Flashing/Flashing - Global
WARN03	Meter ON Warning Sign Flashing - Global
WARN04	Meter ON Warning Sign Alternate Flashing - Global
WARNA1	Meter ON Warning Sign Non-Flashing – Dependency Group A
WARNA2	Meter ON Warning Sign Flashing – Dependency Group A
WARNA3	Meter ON Warning Sign Alternate Flashing – Dependency Group A
WARNB1	Meter ON Warning Sign Non-Flashing – Dependency Group B
WARNB2	Meter ON Warning Sign Flashing – Dependency Group B
WARNB3	Meter ON Warning Sign Alternate Flashing – Dependency Group B
WARNC1	Meter ON Warning Sign Non-Flashing – Dependency Group C
WARNC2	Meter ON Warning Sign Flashing – Dependency Group C
WARNC3	Meter ON Warning Sign Alternate Flashing – Dependency Group C

GPn   General Purpose Output number n
RCn   Rate Code n

8-3 Aux Output File Layout

The Aux Output File screen shows the current output assignments for slots 9-14 of the Model 402 Auxiliary Output File. If the controller is not currently metering, then the user can also modify the output assigned to an output file position. Note that modifying any output will cause the controller I/O configuration type to be changed to custom.

```
              AUX OUTPUTS FILE

       9      10     11     12     13     14
  R    NC    RED3    NC     NC     NC     NC
  Y    NC    YEL3    NC     NC     NC     NC
  G    NC    GRN3   LGRN3   NC     NC     NC
```

8-4 General Purpose Output ON/OFF Times

General purpose ON and OFF times allow you to control how the General Purpose outputs will be illuminated when activated. If either the ON or the OFF time is set to zero, the device when activated will illuminate solid. If both the ON and the OFF times are set to non-zero times, the device will flash using the configured ON and OFF times. The maximum duration of each of the ON and the OFF time is 5.0 seconds.

```
      GENERAL PURPOSE OUTPUT ON/OFF TIMES
            ON   OFF                   ON   OFF
GP OUT #1 0.0   0.0     GP OUT #5 0.0   0.0
GP OUT #2 0.0   0.0     GP OUT #6 0.0   0.0
GP OUT #3 0.0   0.0     GP OUT #7 0.0   0.0
GP OUT #4 0.0   0.0     GP OUT #8 0.0   0.0
```

8-5 Other Items

Other items contains allows the user to configure several items of a general/global nature in the URMS software.

```
                    OTHER ITEMS

Flash WARN01                         YES
Occupancy Correction                 RAW
Failsafe Feedback Enabled            NO    .
Reset Detectors at Met Start         NO
Preferred Comm Protocol            SDRMS
Reboot if loss of Comm               NO
```

Flash WARN01
Allow the user to have the Global Advance Warning Sign WARN01 to either be in a flashing or solid state when enabled. No will set the WARN01 output to solid, while conversely yes will set the warning sign output to flashing when enabled.

Occupancy Correction
Occupancy correction in not used at this time. It is included for future use.

Failsafe Feedback Enabled
In certain ramp meter locations, it may be unsafe to meter traffic if certain advisory signs or other devices fail. If YES is selected for the failsafe feedback input and the input fails, ramp metering will be terminated within 5 seconds, a command source of error (displayed as ERR) will be shown and all of the metering outputs will be turned OFF. Next to the failsafe input is an indication of the current status of the input with a '*' meaning the input is currently ON, and a '.' meaning the input is currently OFF. The controller will not enable any outputs until either the input is restored or the selection is changed from YES to NO. Also note that if the failsafe feedback has not been configured to an actual URMS input, URMS will not consider the lack of input actuation a failure even if feedback is enabled.

Reset Detectors at Meter Start
In certain ramp meter locations, there are a large number of callouts for detectors locking up. When set to YES, the URMS will send out a 500 millisecond pulse on the detector reset output whenever the metering location transitions from a non-metering state to a metering state.

When set to NO, no detector reset pulse will be set during metering transition.

Preferred Comm Protocol   We set the preferred communication protocol that the URMS shall use. This can be especially useful when different protocols utilize the same request for data packet. When more than one response type is possible for a received packet request, the URMS will respond with the preferred protocol.

Reboot if loss of Comm   Loss of communications is deemed to occur if the communications refresh time has expired. Setting this parameter to YES will cause to controller to re-boot up to 6 times if a loss of communications occurs. For safety reasons the controller will only re-boot if all of the following conditions are true:

1. The controller has commanded action of Dark for all metered lanes.
2. The controller is currently in the Pre-Metering Non-Green or EMS Standby Interval for all metered lanes.
3. The manual command source is set to Skip for all metered lanes.

Setting the parameter to NO will cause the controller to take no automatic action if a loss of communications occurs.

8-6 Traffic Responsive Calculation Interval

The URMS calculates Traffic Responsive Data over multiple 30-second calculations intervals (number of averaging periods) in order to provide data smoothing and reduce the likelihood of the controller cycling. You can select between 1 to 8 averaging periods to calculate the traffic responsive average volume, occupancy and speed.

```
TRAFFIC RESPONSIVE CALULATION INTERVAL

    Number of 30 second intervals to
  Smooth traffic response calculations

                   6
```

8-7 Physical I/O Configuration

Physical I/O configuration allows a controller to have its inputs and outputs configured in order to support a wide variety of ramp metering configurations used statewide.

Please note that for safety, the physical I/O configuration can not be changed while the controller is actively metering. If you do select this item the following warning screen will appear.

```
        PHYSICAL I/O CONFIGURATION

     CAN NOT CHANGE I/O CONFIGURATION
       WHILE CONTROLLER IS METERING

  To stop the controller metering go to
  Menu 5-1 and select DARK for each lane
        Press Any Key View Configuration
```

After pressing any key the Physical I/O Configuration View menu will be displayed.

```
 PHYSICAL I/O CONFIGURATION – VIEW ONLY
            SUNRISE_AND_5O
Ramp I/O Configuration          SDRMS
Number of Metered Lanes            2
Number of Mainline Lanes           4
Number of Opposite Lanes           0
Number of Ramps                    2
Traffic Responsive Mode        GREEN
```

If the C-1 connector is NOT connected then the following configuration screen will be displayed

```
            PHYSICAL I/O CONFIGURATION
Ramp I/O Configuration          SDRMS
Number of Metered Lanes            2
Number of Mainline Lanes           4
Number of Opposite Lanes           0
Number of Ramps                    2
Traffic Responsive Mode         GREEN
   Press Next to Change Controller Name
```

The first item is Ramp I/O Configuration code which allows the user to select a specific URMS configuration. A table of the current URMS configurations is shown in Appendix B.

Also selectable is the number of Metered Lanes, Mainline Lanes, Opposite Mainline Lanes, and additional Ramp Metering locations that the user needs to use for this particular location.
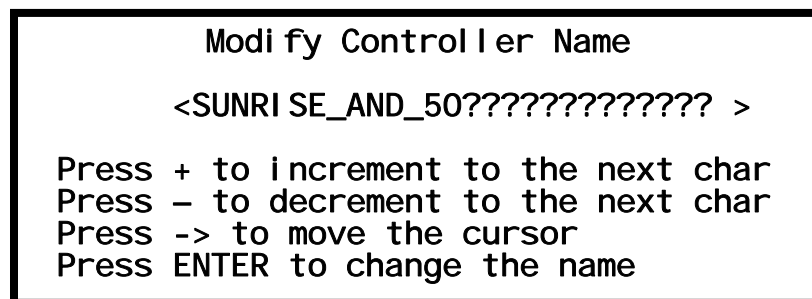
For example if the user selects a configuration of SDRMS then there is support in the physical I/O of that configuration for up to 3 Metered Lanes, however the user may select that only one lane is used.

Also on this page is the traffic responsive mode which is selectable as either Green or Dark. This is the state that the signal heads will be set to when running traffic responsive metering and the controller is not actively metering due to low mainline traffic.

Last if you want to change the controller virtual front panel name (circled in red below) you change it from the next screen:
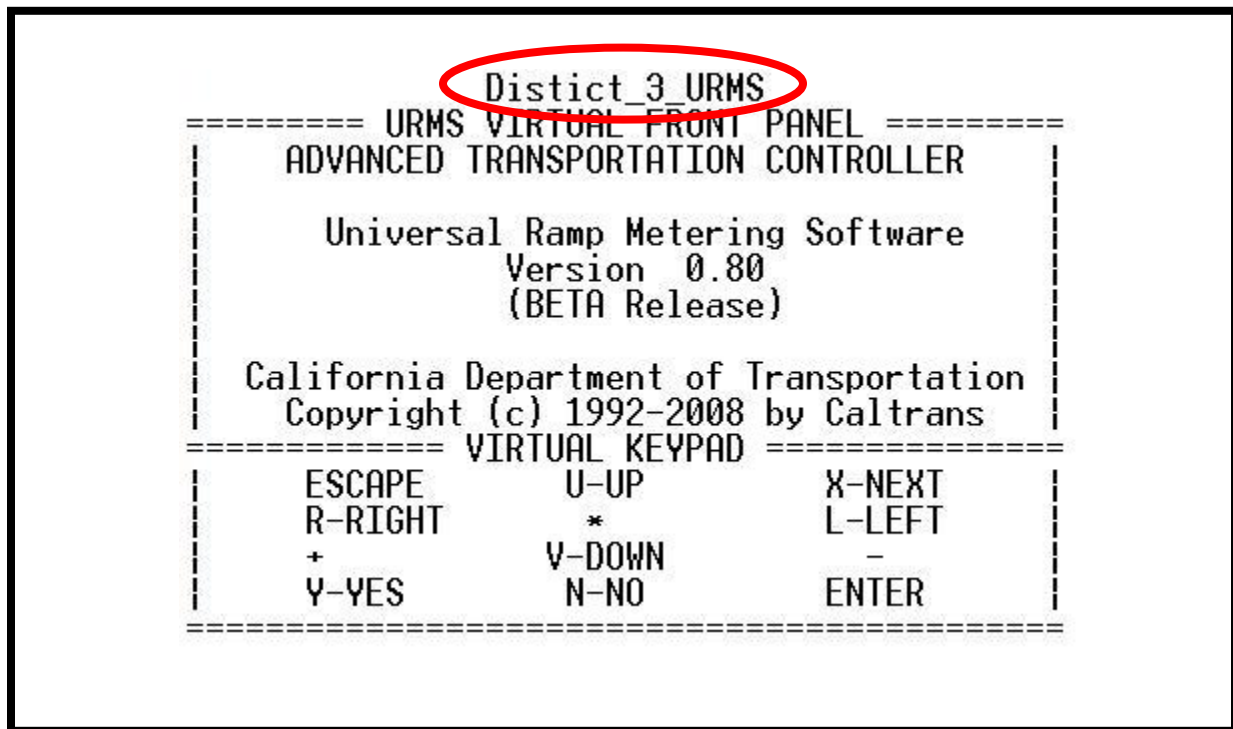
The controller virtual name lets the user be able to enter a name for the controller of up to 24 letters. It is useful to name the controller, so that when the controller is accessed remotely, it is clearly identified to the remote user. This will help to avoid remote users from changing the configuration on the incorrect controller.

```
         Modify Controller Name

      <SUNRISE_AND_50????????????? >

  Press + to increment to the next char
  Press – to decrement to the next char
  Press -> to move the cursor
  Press ENTER to change the name
```

9. Utilities

The Utilities menu contains various utility functions that verify that the URMS is operating properly. In addition there is also a utility to allow the user to back up their configuration file to a Datakey.

```
                        UTILITIES MENU

         1-ACFAIL Event Log   7-Continuity Test
         2-Input File Test    8-Lights Test
         3-Output File Test   9-File Checksums
         4-Reset Detectors    A-Program Status
         5-Keyboard Test      B-Backup Utilities
         6-Raw Output Test    C-Clear Car Counts
```

The menu areas are:

ACFAIL Event Log	Shows a log of the controller's short and long AC power interruptions.
Input File Test	Shows the current activation status of the input file.
Output File Test	Shows the current activation status of the output file.
Reset Detectors	Allows the user to send a reset pulse to the input detectors.
Keyboard Test	Allows users to check the functionality of the 2070 front panel keypad.
Raw Output Test	Allows users to check the functionality of the 334 Cabinet Load Switches.
Continuity Test	Runs a signal test which checks output continuity to a single controller output.
Lights Test	Turns on all associated output in sequence for a quick verification that all lights will illuminate.
File Checksums	Display URMS program modules and the configuration file checksums.

    Program Status   Shows if all of the URMS subprograms are running.

    Backup Utilities   Allows users to backup the URMS configuration file to a Datakey or the FLASH.

    Clear Car Counts   Allows uses to re-zero the controller car count values.

9-1 ACFAIL Event Log

The ACFAIL Log displays a system log indicating both long power failures and short power interruptions. Any power interruption longer than 500 milliseconds will cause the controller to reboot. This reboot will be logged as a power up entry in the log. If a power interruption is shorter that 500 milliseconds and does not cause the controller to reboot it will be logged as an ACFAIL event. An ACFAIL event is sometime referred to as a short out.

```
              URMS ACFAIL LOG

    POWER UP      01-JAN-1970     00:27:38
    POWER UP      01-JAN-1970     00:28:24
    POWER UP      01-JAN-1970     00:29:39
    POWER UP      01-JAN-1970     00:31:33
    ACFAIL        01-JAN-1970     00:36:07
```

9-2 Input File Test

The Input File Test menu shows the raw state of each input in the input file. A dot (.) represents the OFF state while an (*) represents the ON state for each detector. You can also select an input to generate a tone on the 2070 when the input it actuated.

```
     334 CABINET – RAW INPUT FILE DATA
I FILE
Slot   1 2 3 4 5 6 7 8 9 10 11 12 13 14
Upper  . . . . . . . . .  .  .  .  .  .
Lower  . . . . . . . . .  .  .  .  .  .
    Tone Input >SLOT 1U<
Police Control Switch  *
Police Lights Switch   *
```

9-3 Output File Test

The output file test shows the raw output state of each output to the output file(s). A dot (.) represents the OFF state while an (*) represents the ON state.

```
        334 CABINET - OUTPUT FILE TEST
 1   2   3    9   10   11   12   13   14
 .   .   .    .    .    .    .    .    .
 .   .   .    .    .    .    .    .    .
 .   .   .    .    .    .    .    .    .

Det Reset.
```

9-4 Reset Detectors

The Reset Detectors menu allows the user to be able to turn on the detector reset output. Pressing the asterisks key (*) while this screen is selected will turn on the detector reset output for 500 milliseconds.

```
          MANUAL DETECTOR RESET

         Press * to reset detectors
```

9-5 Front Panel Keyboard Test

The Keyboard Test menu allows the user to test the 2070 front panel keypads. This screen also displays the current state of the Aux Switch on the front panel.

```
               FRONT PANEL TEST
      Last key pressed shown below
                                          Aux
     Left keypad        Right keypad     Switch
     [    ]             [    ]            OFF
```

9-6 Raw Output Test

The Raw Output Test allows the user to manually turn ON or OFF any selected load switch output. Each output can be selected and set to the desired output state. After leaving this menu all outputs will return to their command source commanded state.

```
       334 CABINET - RAW OUTPUT FILE TEST

        1    2    3    9     10   11   12   13   14
     R OFF OFF<ON> OFF   OFF  OFF  OFF  OFF  OFF
     Y OFF OFF OFF  OFF   OFF  OFF  OFF  OFF  OFF
     G OFF OFF OFF  OFF   OFF  OFF  OFF  OFF  OFF
```

9-7 Output Signal Test

The Output Signal Test menu allows the user to verify that the URMS physical outputs and associated cabinet wiring has been installed correctly.

```
              Continuity Test
      This is the wiring continuity test
        Each configured output will be
              individually tested

        Press * to start and stop test
        Press + or – to change display
        Press ESC to terminate testing
```

Any function which has been assigned to an actual C-1 Connector Output will be tested one at a time in the following order. Any output not assigned will be skipped.

Lower Green 1
Green 1
Yellow 1
Red 1
Lower Green 2
Green 2
Yellow 2
Red 2
Lower Green 3
Green 3
Yellow 3
Red 3
Lower Green 4
Green 4
Yellow 4
Red 4
Advance Warning Sign – Global 01 – Non-Flashing / Flashing
Advance Warning Sign – Global 02 – Non-Flashing
Advance Warning Sign – Global 03 – Flashing
Advance Warning Sign – Global 04 – Flashing Alternate
Advance Warning Sign – Group A – Non-Flashing
Advance Warning Sign – Group A – Flashing
Advance Warning Sign – Group A – Flashing Alternate
Advance Warning Sign – Group B – Non-Flashing
Advance Warning Sign – Group B – Flashing
Advance Warning Sign – Group B – Flashing Alternate
Advance Warning Sign – Group C – Non-Flashing
Advance Warning Sign – Group C – Flashing
Advance Warning Sign – Group C – Flashing Alternate
General Purpose Output #1
General Purpose Output #2
General Purpose Output #3
General Purpose Output #4
General Purpose Output #5
General Purpose Output #6
General Purpose Output #7
General Purpose Output #8
Rate Code 1 Output
Rate Code 2 Output
Rate Code 4 Output
Rate Code 8 Output

9-8 Lights Test

The Lights Test menu is a quick signal test of all the metered lane outputs. When selected, the outputs are activated in the following order:

```
             Lights Display Test
   This is for testing signal light bulbs
     Each configured display group will
              be tested together

      Press * to start and stop test
      Press + or – to change display
      Press ESC to terminate testing
```

All Lower Green outputs will be activated
All Green Signal outputs will be activated
All Yellow Signal outputs will be activated
All Advance Warning Sign outputs will be activated
All General Purpose Outputs will be energized

9-9 File Checksums

The File Checksum menu shows the current file checksums for the URMS's configuration parameters.

```
              URMS CHECKSUMS

   GENERAL:   4763        TOD:        F3C9
   METERED:   4D27        TBC TABLE:  8493
   QUEUES:    442D        T.R.PLANS:  0f86
   MAINLINE:  F6DD        HOLIDAYS:   B45D

   Conf File: B7DF Meter: 2FD2  TOD: 47DE
```

9-A Program Status

The Program Status menu shows the current status of each program module as either RUNNING or CRASHED. This can let the user know if any module is not running for any reason.

```
          URMS BACKGROUND MODULE STATUS

  CFGMAN:     RUNNING      FFIOMAN:  RUNNING
  TIMING:     RUNNING      LEDMAN:   RUNNING
  SERMAN:     RUNNING      ACFAIL:   RUNNING
  UDP_TX:     RUNNING      SENSYS:   RUNNING
```

The modules provide the following functionality to the URMS

CFGMAN   Handles all changes to the URMS configuration file including ensuring items are within the allowable minimums and maximums.

TIMING   Handles all timing within the controller such as when to start a day plan or when to set the meter head to green.

SERMAN   Handles all RS-232 and 4 wire modem and communications on serial ports 1 and 2, as well as Ethernet TCP/IP communications. Initializes the controller IP, network mask, broadcast and gateway addresses at boot up.

FFIOMAN   Handles communication between the controller CPU and Field I/O module.

LEDMAN   Handles the front panel LED (makes the LED flash).

ACFAIL   Logs controller power interruptions.

SENSYS   Handles data sent from Sensys access points.

If any module shows as crashed then first try rebooting the controller. If that does not remove the problem then you may want to send in the controller for re-installation of the URMS or further repair.

9-B Backup Utilities

The Backup Utility menu allows the user to back up the current URMS configuration file to a Datakey inserted in the controller as well as to the controller FLASH. In addition it allows the user to recover a previously saved configuration file that was stored on the FLASH. Please note that after backing up the configuration file to the Datakey, it should be removed from the controller.

```
               BACKUP UTILITIES

  1-Backup Configuration to the Datakey
  2-Backup Configuration to the FLASH
  3-Recover Configuration from the FLASH
```

9-C Clear Car Counts

The Clear Car Counts menu allows the user to clear or reset the current car count numbers shown on the controller. Pressing the asterisks key (*) will set all car counts to a value of zero.

```
               CLEAR CAR COUNTS

         Press * to Clear Car Counts
```

A. Status

A Metered Command Source Lane Status

The Metered Command Source menu allows the user to see the current command source, action, rate, cycle count, plan and current time. This menu is useful for quickly verifying that the controller is running in the expected action at the expected time. Pressing NEXT will select the Meter Lane Phase Timing Page.

```
     METERED COMMAND SOURCE LANE STATUS
Lane               1       2
Cmd Source       TBC     TBC
Cmd Action       DARK    DARK
Rate              360     360
Cycle Count        0       0
Plan               1       1
12:13:34                          10/04/2007
```

B Meter Lane Phase Timing

The Metered Lane Phase Timing menu displays current metering interval and phase timing that is occurring in each metered lane. Pressing NEXT will select the Traffic Responsive Status menu. You can also select this page by selecting 'B' from the main menu.

```
      URMS METERED LANE PHASE TIMING
Lane Interval  Time   Min  Max Gap  Ext
 1  METER GRN  25.0   4.0  6.0
 2  METER RED  19.0   2.0  4.0 5.0 10.0
 3  DARK

Min Metering 0.0      Com Refresh   275.7
Min Non-Metering 0.0 Shutdown        0.0
```

Lane Interval	Represents the current metering interval that the metered lane is in.
Time	Represents maximum amount of time that the lane will be in the current interval.

Min Represents the minimum time that the controller will be in this interval. When the metered lane is in the Green or Shutdown Green Intervals, this represents the Minimum Green Time; when the metered lane is in the Red or Shutdown Red Intervals, this represents the Minimum Red Time.

Max Represents the maximum time that the controller will be in this interval. It is either the Maximum Green Time for the Metered Green Interval or the Maximum Red Time for the Metered Red Interval. For other intervals it is the configured interval time.

Gap Represents the Red Gap Time and is only shown during the Metering Red Interval.

Ext Represents the Red Extension Time and is only shown during the Metering Red Interval.

Min Metering Represents the remaining minimum metering time. Minimum Metering Time is the amount of time that once the controller starts metering, the URMS will continue to meter for, regardless of any commanded action or the traffic responsive rate.

Min Non-Metering Represents the remaining minimum Non-Metering Time. Minimum non-metering time is the amount of time that once the controller stops actively metering; the URMS will stay in the non-metering state for, regardless of any commanded action or the traffic responsive rate.

Com Refresh Represents the remaining communications timeout period. If the time period of the communications refresh time has expired due to a loss of communications then the communications action will automatically change to skip.

Shutdown Time Represents the remaining amount of time that the controller will be actively metering in the shutdown metering mode.

C Traffic Responsive Status

The Traffic Responsive Status menu tells the user what plan level the controller will operate in Traffic Responsive Mode based on mainline traffic data and queue detection. It should be noted that Traffic Responsive levels are calculated even if the controller is not currently in

the Traffic Responsive Mode. This is so metering plans can be tested even while no active metering is currently being performed. You can also select this page by selecting 'C' from the main menu.

```
          TRAFFIC RESPONSIVE STATUS
Lane                1      2
Plan                1      1
Base Level          3      3
Adjust Level        1      1
Final Level         4      4
Rate              360    360
Q FLAG            SET    SET
```

Plan	The current plan number that has been selected by the active command source.
Base Level	The Level based on the highest or most restrictive volume, occupancy or speed limits configured in the metering plan before any queue adjustments have been made. This is also the level that is transmitted when the controller is a master to a slave unit.
Adjust Level	The amount that the plan level is to be adjusted due to the number of cars backed up into the metering queue. Plan level is only adjusted when the Queue Adjustment Mode is set to Level.
Final Level	The Base Level plus the Adjustment Level up to a maximum level of 15.
Rate	The metering plan configured vehicles per hour based on the final level.
Queue Flag	Will show SET when any Queue Flag in a metered lane is set or CLR (clear) when all Queue Flags in a metered lane are clear.

D Current Metering Rates

The Current Metering Rates menu displays the current Metering Rate, Cycle Time, and the status of the Queue Flag. You can also select this page by selecting 'D' from the main menu.

```
          CURRENT METERING RATES
Lane                1        2        3
Met Rate(VPH)    3600      120      120
Cycle Time        1.0     30.0     30.0
Que 1 Flag        CLR      CLR      CLR
Que 2 Flag        CLR      CLR      CLR
Que 3 Flag        CLR      CLR      CLR
Que 4 Flag        CLR      CLR      CLR
```

Meter Rate   The requested release rate in vehicles per hour.

Cycle Time   The amount of time it would take to cycle in order to release vehicles at the metering rate. It should be noted that in case the cycle time is less that Minimum Red and Minimum Green Times, then those minimum times will override the cycle time.

Queue X Flag   The current status of each individual Queue Detection Flag. It will be either CLR when the Queue Flag is clear or SET when the Queue Flag is set.

E Traffic Responsive Calculation Data

The Traffic Responsive Calculations menu shows the volume, occupancy and speed averaged over several calculation intervals. This is the mainline average data that the Traffic Responsive Plan figured out its plan rate from. You can also select this page by selecting 'E' from the main menu.

```
      AVERAGE LONG MAINLINE DATA USED
    FOR TRAFFIC RESPONSIVE CALULATIONS

AVERAGE VOLUME(VPH)  2050
AVERAGE OCCUPANCY    19.9%
AVERAGE SPEED          67

LAST 240 SEC DATA UPDATED EVERY 30 SECS
```

Appendix A: Configuration Variables and their Limits

Item	Min	Max	Special Value?	Units
Global				
Number of Metered Lanes	1	4	0	Lanes
Number of Mainline Lanes	1	8	0	Lanes
Number of Opposite Lanes	1	8	0	Lanes
Number of Additional Detector Locations	1	16	0	Lanes
Traffic Responsive Mode	Green or Dark			
Number of Averaging Periods	1	8	none	Calculation Intervals
Communications Protocol	SATMS, SDRMS, REV8, OCRMS, TOS, URMS, UDP-1			
Critical Flow Limit	500	3600	0	Vehicles per Hour
Critical Occupancy Limit	5.0	99.9	0.0	0.1%
Critical Speed Limit	10	99	0	Miles per Hour
Communications Queue Override	Yes, No			
Daylight Savings	Yes, No			
HOV Active	Yes, No			
Failsafe Feedback Enabled	Yes, No			
Reboot on Loss on Communications	Yes, No			
General Purpose Output				
General Purpose Output Time On	0.1	5.0	0.0	0.1-Seconds
General Purpose Output Time Off	0.1	5.0	0.0	0.1-Seconds
Serial Communications Port				
Baud Rate	1200, 2400, 4800, 9600, 19200, 38400			
Data Bits	5, 6, 7, 8			
Parity	Odd, Even, None			
Stop Bit	1, 2			
Handshaking	None, Normal, Auto, Auto CTS, Auto RTS			
RTS On Time	1	255	0	Milliseconds
RTS Off Time	1	255	0	Milliseconds
Address (Drop Number)	1	255	0	
Port Enabled	Yes, No			
Ethernet Communications Port				
Address (Drop Number)	1	255	0	
Port Number	1	65535	0	
IP Mode	Static, Dynamic			
Address	1	255	0	IP Address Format
Network Mask	1	255	0	IP Address Format
Broadcast	1	255	0	IP Address Format
Gateway	1	255	0	IP Address Format

Item	Min	Max	Special Value?	Units
Additional Detectors				
Detector Mode	Enabled, Disabled			
Erratic Count Threshold	1	30	0	Vehicles per 30 Seconds
Max Presence Threshold	1	1500	0	Minutes
No Activity Threshold	1	1500	0	Minutes
Mainline Lane				
Lane Mode	Enabled, Disabled			
Lead Zone Length	0.1	15.0	0.0	0.1-Feet
Trail Zone Length	0.1	15.0	0.0	0.1-Feet
Speed Trap Spacing	0.1	60.0	0.0	0.1-Feet
Erratic Count Threshold	1	255	0	Vehicles per 30 Seconds
Maximum Presence Threshold	1	720	0	Minutes
Typical Vehicle Length	0.1	45.0	0.0	0.1-Feet
HOV Lane	Yes, No			
Metered Lane				
Lane Mode	Yes, No			
Red Lock	Yes, No			
Queue Mode	Additive, Priority			
Queue Standby	Yes, No			
Queue Detection Mode	Disabled, Count, Occupancy			
Queue Adjustment Mode	Rate, Rateup, Level, Fixed			
Queue Erratic Count Threshold	1	255	0	Vehicles
Queue Maximum Presence Threshold	1	720	0	Minutes
Queue No Activity Threshold	1	720	0	Minutes
Queue Dependent Max Presence Threshold	1	600	0	Seconds
Queue Dependent No Activity Threshold	1	30	0	Vehicles
Queue versus Shutdown Flag	Yes, No			
Queue Length Upper Limit	0	255	none	Vehicles
Queue Length Lower Limit	0	255	none	Vehicles
Queue Occupancy Lower Limit	0.0	99.9	none	0.1%
Queue Occupancy Lower Limit	0.0	99.9	none	0.1%
Queue Adjustment Rate	5	1800	0	Vehicles per Hour
Queue Adjustment Rate Iterations	1	20	0	Iterations
Queue Adjustment Rate Delay	20	240	none	Seconds
Queue Adjustment Level	1	5	0	

Item	Min	Max	Special Value?	Units
Queue Adjustment Level Iterations	1	5	0	Iterations
Queue Occupancy Level Delay	20	240	none	Seconds
Queue Replacement Rate	600	1800	none	Vehicles per Hour
Demand Detector Mode	Enabled, Disabled			
Demand Erratic Count Threshold	1	255	0	Vehicles per 30 Seconds
Demand Max Presence Threshold	1	720	0	Minutes
Demand No Activity Threshold	1	720	0	Minutes
Demand Dependent Maximum Presence Threshold	1	600	0	Seconds
Demand Dependent No Activity Threshold	1	30	0	Vehicles per 30 Seconds
Passage Detector Mode	Enabled, Disabled			
Passage Erratic Count Threshold	1	255	0	Minutes
Passage Maximum Presence Threshold	1	720	0	Minutes
Passage No Activity Threshold	1	720	0	Minutes
Dependency Group	A, B, C			
Minimum Metering Time	1	60	0	Minutes
Minimum Non-Metering Time	1	60	0	Minutes
Startup Alert Time	0.1	60.0	0.0	0.1-Seconds
Startup Warning Time	0.1	60.0	0.0	0.1-Seconds
Startup Green Time	0.1	60.0	0.0	0.1-Seconds
Startup Yellow Time	0.1	10.0	0.0	0.1-Seconds
Startup Red Time	0.1	10.0	0.0	0.1-Seconds
Minimum Red Time	1.0	15.0	none	0.1-Seconds
Demand Gap Time	1.0	15.0	0.0	0.1-Seconds
Demand Red Time	1.0	15.0	0.0	0.1-Seconds
Minimum Green Time	1.0	5.0	none	0.1-Seconds
Maximum Green Time	1.0	15.0	none	0.1-Seconds
Yellow Time	0.5	5.0	0.0	0.1-Seconds
Shutdown Warning Time	1	600	0	Seconds
Post-Metering Green Time	0.1	60.0	0.0	0.1-Seconds
Default Action	Dark, Rest in Green, Fixed Rate, Traffic Responsive, Emergency Green, Skip			
Default Plan Number	1	10	none	
Default Rate	150	1800	none	
Vehicles per Green	1	6	none	Vehicles
HOV Lane	Yes, No			
Bus Lane	Yes, No			

Item	Min	Max	Special Value?	Units
Plan Entry				
Metering Rate	150	1800	0	Vehicles per Hour
Occupancy Threshold	0.5	99.9	0.0	0.1%
Flow Rate Threshold	500	3600	0	Vehicles per Hour
Speed Threshold	10	99	0	Miles per Hour
Month	NC, Jan, Feb, Mar, Apr, May, Jun., Jul, Aug, Sep, Oct, Nov, Dec			
Week	1	5	none	Week Number
Day	Sun, Mon, Tue, Wed, Thu, Fri, Sat			
Dependency Group				
Signal Service Mode	MUTEX, MUTEX2, Fixed Offset, Fractional Offset, None			
Green Offset Time	0.2	10.0	0.0	0.1-Seconds
Minimum Fractional Offset Time	0.2	5.0	0.0	0.1-Seconds

Appendix B: Preconfigured URMS I/O Layouts

I/O Preconfigured Layout Table Abbreviations

The following abbreviations are used in the *URMS Preconfigured I/O Layouts* tables.

Inputs:

NC	Input is not configured
MLn	Mainline lane n Leading detector
MTn	Mainline lane n Trailing detector
OLn	Opposite mainline lane n Leading detector
OTn	Opposite mainline lane n Trailing detector
Fn	Additional Detector number n
Pn	Metered lane n Passage detector
Qn	Metered lane n Queue detector
Dn	Metered lane n Demand detector
NC	Input is not configured for use
RCn	Rate Code Input n
252	Failsafe Feedback Input

Outputs:

NC	Outputs is Not Configured
LGRNn	Metered Lane n Lower Green output
GRNn	Metered Lane n Green output
YELn	Metered Lane n Yellow output
REDn	Metered Lane n Red output
WARN01	Meter ON Warning Sign Solid – Non-Flashing/Flashing - Global
WARN02	Meter ON Warning Sign Non-Flashing/Flashing - Global
WARN03	Meter ON Warning Sign Flashing - Global
WARN04	Meter ON Warning Sign Alternate Flashing - Global
WARNA1	Meter ON Warning Sign Non-Flashing – Dependency Group A
WARNA2	Meter ON Warning Sign Flashing – Dependency Group A
WARNA3	Meter ON Warning Sign Alternate Flashing – Dependency Group A
WARNB1	Meter ON Warning Sign Non-Flashing – Dependency Group B
WARNB2	Meter ON Warning Sign Flashing – Dependency Group B
WARNB3	Meter ON Warning Sign Alternate Flashing – Dependency Group B
WARNC1	Meter ON Warning Sign Non-Flashing – Dependency Group C
WARNC2	Meter ON Warning Sign Flashing – Dependency Group C
WARNC3	Meter ON Warning Sign Alternate Flashing – Dependency Group C
GPn	General Purpose Output number n
RCn	Rate Code n

Configuration Code	Channel	Slot (I file or Output)													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
BLANK	Upper	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Lower	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Red	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Yellow	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Green	NC	NC	NC						NC	NC	NC	NC	NC	NC
SATMS	Upper	D-1	F-1	Q1-1	F-7	F-12	F-4	F-8	F-10	OL-1	OL-3	OL-5	ML-5	ML-3	ML-1
	Lower	P-1	F-2	F-3	Q1-2	F-13	F-5	F-9	F-11	OL-2	OL-4	OL-6	ML-6	ML-4	ML-2
	Red	NC	NC	RED1						NC	NC	NC	NC	NC	NC
	Yellow	WARN01	NC	YEL1						NC	NC	NC	NC	NC	NC
	Green	NC	NC	GRN1						NC	NC	NC	NC	NC	NC
SDRMS	Upper	D-1	Q1 -1	NC	NC	ML-1	ML-3	ML-5	NC	NC	NC	NC	D-2	Q2-1	D-3
	Lower	P-1	F-1	NC	NC	ML-2	ML-4	ML-6	NC	NC	NC	NC	P-2	F-2	P-3
	Red	LGRN1	RED1	RED2						NC	RED3	NC	NC	NC	NC
	Yellow	WARN01	YEL1	YEL2						NC	YEL3	NC	NC	NC	NC
	Green	LGRN2	GRN1	GRN2						NC	GRN3	LGRN3	NC	NC	NC
11RC7	Upper	D-1	Q1 -1	252	NC	ML-1	ML-3	ML-5	NC	NC	INT-8	INT-2	D-2	Q2-1	D-3
	Lower	P-1	F-1	NC	NC	ML-2	ML-4	ML-6	NC	NC	INT-4	INT-1	P-2	F-2	P-3
	Red	LGRN1	RED1	RED2						NC	RED3	NC	NC	RC4	RC1
	Yellow	WARN01	YEL1	YEL2						NC	YEL3	NC	NC	RC8	NC
	Green	LGRN2	GRN1	GRN2						NC	GRN3	LGRN3	NC	NC	RC2
SDRMS 7.97 SDRMS 7.99	Upper	ML-1	ML-2	ML-3	ML-4	ML-5	ML-6	NC	OL-1	OL-2	OL-3	OL-4	OL-5	OL-6	NC
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	MT-6	NC	OT-1	OT-2	OT-3	OT-4	OT-5	OT-6	NC
	Red	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Yellow	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Green	NC	NC	NC						NC	NC	NC	NC	NC	NC

URMS Preconfigured I/O Layouts

Configuration Code	Channel	1	2	3	4	5	6	7	8	9	10	11	12	13	14
		Slot (I file or Output)													
D3TMS1	Upper	D-1	Q1 -1	NC	NC	ML-1	ML-2	ML-3	ML-4	NC	NC	NC	D-2	Q2-1	D-3
	Lower	P-1	F-1	NC	NC	MT-1	MT-2	MT-3	MT-4	NC	NC	NC	P-2	F-2	P-3
	Red	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Yellow	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Green	NC	NC	NC						NC	NC	NC	NC	NC	NC
D6RMS1	Upper	ML-1	ML-2	ML-3	ML-4	ML-5	ML-6	ML-7	ML-8	NC	D-1	Q1-1	D-2	Q2-1	D-3
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	MT-6	MT-7	MT-8	NC	P-1	F-1	P-2	F-2	P-3
	Red	LGRN1	RED1	RED2						NC	RED3	NC	NC	NC	NC
	Yellow	WARN01	YEL1	YEL2						NC	YEL3	NC	NC	NC	NC
	Green	LGRN2	GRN1	GRN2						NC	GRN3	LGRN3	NC	NC	NC
D6RMS2	Upper	ML-1	ML-2	ML-3	ML-4	ML-5	ML-6	ML-7	ML-8	NC	D-1	Q1-1	NC	NC	D-2
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	MT-6	MT-7	MT-8	NC	P-1	F-1	NC	F-2	P-2
	Red	LGRN1	RED1	RED2						NC	RED3	NC	NC	NC	NC
	Yellow	WARN01	YEL1	YEL2						NC	YEL3	NC	NC	NC	NC
	Green	LGRN2	GRN1	GRN2						NC	GRN3	LGRN3	NC	NC	NC
D6TMS1	Upper	ML-1	ML-2	ML-3	ML-4	ML-5	ML-6	ML-7	OL-1	OL-2	OL-3	OL-4	OL-5	OL-6	OL-7
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	MT-6	MT-7	OT-1	OT-2	OT-3	OT-4	OT-5	OT-6	OT-7
	Red	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Yellow	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Green	NC	NC	NC						NC	NC	NC	NC	NC	NC
D6TMS2	Upper	ML-1	ML-2	NC	NC	NC	NC	NC	ML-3	ML-4	NC	NC	NC	NC	NC
	Lower	MT-1	MT-2	NC	NC	NC	NC	NC	MT-3	MT-4	NC	NC	NC	NC	NC
	Red	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Yellow	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Green	NC	NC	NC						NC	NC	NC	NC	NC	NC

Configuration Code	Channel	Slot 1	2	3	4	5	6	7	8	9	10	11	12	13	14
URMS Preconfigured I/O Layouts															
D6TMS3	Upper	ML-1	ML-2	ML-3	NC	NC	NC	NC	ML-4	ML-5	ML-6	NC	NC	NC	NC
	Lower	MT-1	MT-2	MT-3	NC	NC	NC	NC	MT-4	MT-5	MT-6	NC	NC	NC	NC
	Red	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Yellow	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Green	NC	NC	NC						NC	NC	NC	NC	NC	NC
D7EMS1	Upper	D-1	F-1	Q1-1	F-7	F-12	F-4	F-8	F-10	OL-1	OL-3	OL-5	ML-5	ML-3	ML-1
	Lower	P-1	F-2	F-3	Q1-2	F-13	F-5	F-9	F-11	OL-2	OL-4	OL-6	ML-6	ML-4	ML-2
	Red	WARNB1	WARN01	WARNA1						NC	NC	NC	NC	NC	NC
	Yellow	WARNB2	WARN02	WARNA2						NC	NC	NC	NC	NC	NC
	Green	WARNB3	WARN03	WARNA3						NC	NC	NC	NC	NC	NC
WARN1	Upper	D-1	F-1	Q1-1	F-7	F-12	F-4	F-8	F-10	OL-1	OL-3	OL-5	ML-5	ML-3	ML-1
	Lower	P-1	F-2	F-3	F-6	F-13	F-5	F-9	F-11	OL-2	OL-4	OL-6	ML-6	ML-4	ML-2
	Red	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Yellow	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Green	NC	NC	NC						NC	NC	NC	NC	NC	NC
TOS 53	Upper	ML-1	ML-2	ML-3	ML-4	ML-5	ML-6	ML-7	ML-8	F-1	F-3	F-5	F-7	F-9	F-11
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	MT-6	MT-7	MT-8	F-2	F-4	F-6	F-8	F-10	F-12
	Red	GP3	GP5	GP1						NC	NC	NC	NC	NC	NC
	Yellow	NC	GP7	GP2						NC	NC	NC	NC	NC	NC
	Green	GP4	GP6	NC						NC	NC	NC	NC	NC	NC
TOS 5C	Upper	ML-1	ML-2	ML-3	ML-4	ML-5	ML-6	OL-1	OL-2	OL-3	OL-4	D-1	Q1-1	D-2	Q2-1
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	MT-6	OT-1	OT-2	OT-3	OT-4	P-1	F-1	P-2	F-2
	Red	GP1	RED2	RED1						NC	NC	NC	NC	NC	NC
	Yellow	WARN01	YEL2	YEL1						NC	NC	NC	NC	NC	NC
	Green	GP2	GRN2	GRN1						NC	NC	NC	NC	NC	NC

URMS Preconfigured I/O Layouts

Configuration Code	Channel	Slot (I file or Output)													
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
TOS 63 **TOS C3**	Upper	ML-1	ML-2	ML-3	ML-4	ML-5	ML-6	OL-1	OL-2	OL-3	OL-4	OL-5	OL-6	F-1	F-3
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	MT-6	OT-1	OT-2	OT-3	OT-4	OT-5	OT-6	F-2	F-4
	Red	GP3	GP5	GP1						NC	NC	NC	NC	NC	NC
	Yellow	NC	GP7	GP2						NC	NC	NC	NC	NC	NC
	Green	GP4	GP6	NC						NC	NC	NC	NC	NC	NC
TOS 65 **TOS C5** **TOS 66** **TOS C6**	Upper	ML-1	ML-2	ML-3	ML-4	ML-5	OL-1	OL-2	OL-3	OL-4	OL-5	F-1	F-3	F-5	F-7
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	OT-1	OT-2	OT-3	OT-4	OT-5	F-2	F-4	F-6	F-8
	Red	GP3	GP5	GP1						NC	NC	NC	NC	NC	NC
	Yellow	NC	GP7	GP2						NC	NC	NC	NC	NC	NC
	Green	GP4	GP6	NC						NC	NC	NC	NC	NC	NC
TOS 69 **TOS C9**	Upper	ML-1	ML-2	ML-3	ML-4	ML-5	ML-6	ML-7	OL-1	OL-2	OL-3	OL-4	OL-5	OL-6	OL-7
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	MT-6	MT-7	OT-1	OT-2	OT-3	OT-4	OT-5	OT-6	OT-7
	Red	GP3	GP5	GP1						NC	NC	NC	NC	NC	NC
	Yellow	NC	GP7	GP2						NC	NC	NC	NC	NC	NC
	Green	GP4	GP6	NC						NC	NC	NC	NC	NC	NC
TOS 6A **TOS CA**	Upper	ML-1	ML-2	ML-3	ML-4	ML-5	ML-6	ML-7	ML-8	OL-1	OL-2	OL-3	OL-4	OL-5	OL-6
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	MT-6	MT-7	MT-8	OT-1	OT-2	OT-3	OT-4	OT-5	OT-6
	Red	GP3	GP5	GP1						NC	NC	NC	NC	NC	NC
	Yellow	NC	GP7	GP2						NC	NC	NC	NC	NC	NC
	Green	GP4	GP6	NC						NC	NC	NC	NC	NC	NC
TOS 6C **TOS CC**	Upper	ML-1	ML-2	ML-3	ML-4	ML-5	ML-6	ML-7	ML-8	OL-1	OL-2	OL-3	OL-4	F-1	F-3
	Lower	MT-1	MT-2	MT-3	MR-4	MT-5	MT-6	MT-7	MT-8	OT-1	OT-2	OT-3	OT-4	F-1	F-4
	Red	GP3	GP5	GP1						NC	NC	NC	NC	NC	NC
	Yellow	NC	GP7	GP2						NC	NC	NC	NC	NC	NC
	Green	GP4	GP6	NC						NC	NC	NC	NC	NC	NC

Configuration Code	Channel	Slot (I file or Output)													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
TOS 93 TOS A3	Upper	ML-1	ML-2	ML-3	ML-4	ML-5	OL-1	OL-2	OL-3	OL-4	OL-5	D-1	Q1-1	D-2	Q2-1
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	OT-1	OT-2	OT-3	OT-4	OT-5	P-1	F-1	P-2	F-2
	Red	LGRN1	RED2	RED1						WARN04	RED3	LGRN4	RED4	WARNB1	WARNA1
	Yellow	WARN01	YEL2	YEL1						WARN03	YEL3	GP2	YEL4	WARNB2	GP1
	Green	LGRN2	GRN2	GRN1						WARN02	GRN3	LGRN3	GRN4	NC	WARNA2
TOS 95 TOS A5	Upper	ML-1	ML-2	ML-3	ML-4	ML-5	ML-6	D-1	Q1-1	D-2	Q2-1	D-3	Q3-1	D-4	Q4-1
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	MT-6	P-1	F-1	P-2	F-2	P-3	F-3	P-4	F-4
	Red	LGRN1	RED2	RED1						WARN04	RED3	LGRN4	RED4	WARNB1	WARNA1
	Yellow	WARN01	YEL2	YEL1						WARN03	YEL3	GP2	YEL4	WARNB2	GP1
	Green	LGRN2	GRN2	GRN1						WARN02	GRN3	LGRN3	GRN4	NC	WARNA2
TOS 96 TOS A6	Upper	ML-1	ML-2	ML-3	ML-4	OL-1	OL-2	OL-3	OL-4	D-1	Q1-1	D-2	Q2-1	D-3	Q3-1
	Lower	MT-1	MT-2	MT-3	MT-4	OT-1	OT-2	OT-3	OT-4	P-1	F-1	P-2	F-2	P-3	F-3
	Red	LGRN1	RED2	RED1						WARN04	RED3	LGRN4	RED4	WARNB1	WARNA1
	Yellow	WARN01	YEL2	YEL1						WARN03	YEL3	GP2	YEL4	WARNB2	GP1
	Green	LGRN2	GRN2	GRN1						WARN02	GRN3	LGRN3	GRN4	NC	WARNA2
TOS 99 TOS A9	Upper	ML-1	ML-2	ML-3	ML-4	ML-5	OL-1	OL-2	OL-3	OL-4	OL-5	D-1	Q1-1	BUS	NC
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	OT-1	OT-2	OT-3	OT-4	OT-5	P-1	F-1	NC	F-2
	Red	LGRN1	RED2	RED1						WARN04	RED3	LGRN4	RED4	WARNB1	WARNA1
	Yellow	WARN01	YEL2	YEL1						WARN03	YEL3	GP2	YEL4	WARNB2	GP1
	Green	LGRN2	GRN2	GRN1						WARN02	GRN3	LGRN3	GRN4	NC	WARNA2
TOS 9A TOS AA	Upper	ML-1	ML-2	ML-3	ML-4	OL-1	OL-2	OL-3	OL-4	D-1	Q1-1	D-2	Q2-1	NC	NC
	Lower	MT-1	MT-2	MT-3	MT-4	OT-1	OT-2	OT-3	OT-4	P-1	F-1	P-2	F-2	NC	F-3
	Red	LGRN1	RED2	RED1						WARN04	RED3	LGRN4	RED4	WARNB1	WARNA1
	Yellow	WARN01	YEL2	YEL1						WARN03	YEL3	GP2	YEL4	WARNB2	GP1
	Green	LGRN2	GRN2	GRN1						WARN02	GRN3	LGRN3	GRN4	NC	WARNA2

URMS Preconfigured I/O Layouts

Configuration Code	Channel	Slot (I file or Output)													
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
TOS 9C TOS AC	**Upper**	ML-1	ML-2	ML-3	ML-4	ML-5	OL-1	OL-2	OL-3	OL-4	OL-5	D-1	Q1-1	D-2	Q2-1
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	OT-1	OT-2	OT-3	OT-4	OT-5	P-1	F-1	P-2	F-2
	Red	GP1	RED2	RED1						NC	NC	NC	NC	NC	NC
	Yellow	WARN01	YEL2	YEL1						NC	NC	NC	NC	NC	NC
	Green	GP2	GRN2	GRN1						NC	NC	NC	NC	NC	NC
QTEST	**Upper**	ML-1	ML-2	ML-3	ML-4	ML-5	ML-6	ML-7	ML-8	D-2	Q2-1	Q2-3	D-1	Q1-1	Q1-3
	Lower	MT-1	MT-2	MT-3	MT-4	MT-5	MT-6	MT-7	MT-8	P-2	Q2-1	Q2-4	P-1	Q1-2	Q1-4
	Red	LGRN1	RED1	RED2						NC	NC	NC	NC	NC	NC
	Yellow	WARN01	YEL1	YEL2						NC	NC	NC	NC	NC	NC
	Green	LGRN2	GRN1	GRN2						NC	NC	NC	NC	NC	NC
D6EMS1	**Upper**	ML-1	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Lower	MT-1	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Red	NC	NC	NC						NC	NC	NC	NC	NC	NC
	Yellow	WARN01	NC	NC						NC	NC	NC	NC	NC	NC
	Green	NC	NC	NC						NC	NC	NC	NC	NC	NC

URMS Preconfigured I/O Layouts

Appendix C: Legacy Ramp Metering Software Support

SDRMS Support (Districts 3, 5, 6 and 11)

The URMS support the SDRMS Normal Poll, the GET and the SET memory communication packets.

1. **SDRMS Metered Lane/Queue Parameters and their URMS Equivalents**

URMS Metered Lane Parameters	SDRMS Parameters/Suggested Default Values
Dependency Group	A
Vehicles Per Green	PSEL
Lane Enabled	YES
Yellow Fail	0
Maximum Metering Rate	0
Minimum Metering Rate	0
Min Metering	5
Startup Alert	1.0
Startup Warning	1.0
Startup Green	FIRGR
Yellow	FIRYE
Startup Red	2.0
Min Green	MINGR
Max Green	MAXGR
Yellow	CYCLY
Min Red	MINRD
Demand Gap	1.0
Demand Red	DMRED
Shut Warn	5.0
Post Green	SINDLY
Shut Time	0
Min Non-Meter	5
Q VS. Shutdown	NO
Service Mode	MUTEX
GRN Offset Time	GOCTL
Fract Offset Time	GOTME
Shut Gap Time	0.0
Demand Mode	Enabled
Max Presence	0
No Activity	0
Erratic Count	0
Dep No Activity	0
Passage Mode	Enabled

Max Presence	0
No Activity	0
Erratic Count	0
Queue Usage	Priority
Q1 Standby Flag	No
Q2 Standby Flag	No
Q3 Standby Flag	No
Q4 Standby Flag	No
Default Action	Dark
Default Plan	1
Default Rate	900
Flow Limit	0
Occupancy Limit	0.0
Speed Limit	0
Override in Com	No

URMS Queue Parameters	SDRMS Parameters/Suggested Default Values
Queue Det. Mode	Disabled
Max Presence	0
No Activity	0
Erratic Count	0
Dep Max Pres	0
Dep No Activity	0
Adjust Mode	Fixed
Len Up Limit	0
Len Lwr Limit	0
Occ Up limit	20.0
Occ Lwr limit	10.0
Replacement Rate	900
Adjust Rate	50
Rate Iterations	5
Rate Delay	30
Adjust Level	0
Level Iterations	0
Level Delay	30

2. SDRMS Polling Packet Emulation in the URMS

Bytes 3 and 4 of the central system normal polling request message are used to remotely activate the ramp meter and to clear certain system flags in the SDRMS software. In the URMS they are emulated as follows:

Byte 3 – Hold-on-Line/Rate Code
   Bits 1-4 Metering Rate Code (0 to 15)
- Rate Code   0   Dark
- Rate Code   1   Rest in Green
- Rate Codes   2-15   Metering action will be set to fixed. Release Rate is determined from the plan 1 release rate for the selected plan level.

   Bit 5 Hold-on-Line (URMS switches to the Communications Command Source)
   Bit 6 Maximum rate code flag (not used)
   Bit 7 Controller maximum rate code override flag (not used)
   Bit 8 Not used in URMS/SDRMS

Byte 4 – Reset Control
   Bit 1 Clear Power Fail Count (Not Used – Flags clear automatically)
   Bit 2 Clear Controller Alarm Flags (Not Used – Flags clear automatically)
   Bit 3 Clear Ramp Detector Error Flags (Not Used – Flags clear automatically)
   Bit 4 Clear Main Lane Detector Errors (Not Used – Flags clear automatically)
   Bit 5 Clear Main Lane Data Areas (Not Used – Flags clear automatically)
   Bit 6 Output Detector Reset Pulse (Send 500 MS pulse on the reset detector output)
   Bit 7 Not used in URMS/SDRMS
   Bit 8 Not used in URMS/SDRMS

3. Remote Activation of Ramp Meters using RMIS

Remote activation using the RMIS is similar to that of the SDRMS program. The release rate of the URMS may be remotely set by selecting a rate code between 0 and 15 in the RMIS.

RMIS Remote Activation Screen

The Rate Codes will have the following effect in the URMS:

Rate Code 0 – URMS communications action is set to Rest-in-Dark

Rate Code 1 – URMS communications action is set to Rest-in-Green

Rate Code 2 – URMS communications action is set to Fixed Rate and the release rate is set to the Metering Plan 1 level 2 release rate.

Rate Code 3 – URMS communications action is set to Fixed Rate and the release rate is set to the Metering Plan 1 level 3 release rate.

Rate Code 4 – URMS communications action is set to Fixed Rate and the release rate is set to the Metering Plan 1 level 4 release rate.

Rate Code 5 – URMS communications action is set to Fixed Rate and the release rate is set to the Metering Plan 1 level 5 release rate.

Rate Code 6 – URMS communications action is set to Fixed Rate and the release rate is set to the Metering Plan 1 level 6 release rate.

Rate Code 7 – URMS communications action is set to Fixed Rate and the release rate is set to the Metering Plan 1 level 7 release rate.

Rate Code 8 – URMS communications action is set to Fixed Rate and the release rate is set to the Metering Plan 1 level 8 release rate.

Rate Code 9 – URMS communications action is set to Fixed Rate and the release rate is set to the Metering Plan 1 level 9 release rate.

Rate Code 10 – URMS communications action is set to Fixed Rate and the release rate is set to the Metering Plan 1 level 10 release rate.

Rate Code 11 – URMS communications action is set to Fixed Rate and the release rate is set to the Metering Plan 1 level 11 release rate.

Rate Code 12 – URMS communications action is set to Fixed Rate and the release rate is set to the Metering Plan 1 level 12 release rate.

Rate Code 13 – URMS communications action is set to Fixed Rate and the release rate is set to the Metering Plan 1 level 13 release rate.

Rate Code 14 – URMS communications action is set to Fixed Rate and the release rate is set to the Metering Plan 1 level 14 release rate.

Rate Code 15 – URMS communications action is set to Fixed Rate and the release rate is set to the Metering Plan 1 level 15 release rate.

SATMS Support (Districts 7 and 12)

The URMS supports SATMS Normal Polls, Get and Set Memory and Set Time communication packets.

1. **SATMS Parameters and their URMS Equivalents**

Address	SATMS 3.0	URMS	URMS Front Panel Menu Location	Notes
080	CONT ID	Controller Address	7-1 or 7-2	READ FROM ATMS ONLY
081	FIRGR	Startup Green	1-5-2	
082	PLT YEL	Metering Yellow	1-5-3	
083	LNGYEL	Startup Yellow	1-5-2	
084		Queue Lower Occupancy Limit	1-6-3	
085	QTHRS	Queue Upper Occupancy Limit	1-6-3	
086	MXGRNA	Maximum Green	1-5-3	
087	MXGRNB	Not used in URMS		
088	CROCCA	Not used in URMS		
089	CROCCB	Not used in URMS		
08A	CRVOLA	Not used in URMS		
08B	CRVOLB	Not used in URMS		

08C	PSELA	Vehicles Per Green	1-5-1	READ FROM ATMS ONLY
08D	PSELB	Not used in URMS		
08E	RLANES	Number of Metered Lanes	8-7	READ FROM ATMS ONLY
08F	GRNHLD	Minimum Metering Time in minutes	1-5-2	
090	FMNL	Manual Rate - READ FROM ATMS ONLY	5-1	DARK - Will Report 0 Rest-in-Green will Report 1 Fixed or Traffic Responsive will report Meter Rate/60 * Number of Metered Lanes
091	FLSHR	Not used in URMS		
092	LASTGR	Post Meter Green Time	1-5-4	
093	PHYSML	Number of Mainline Lanes -	8-7	READ FROM ATMS ONLY
094	PHYSOP	Number of Opposite Mainline Lanes	8-7	READ FROM ATMS ONLY
095	Q2THRS	Queue 2 Lower Occupancy Limit	1-6-6	
096	QON	Queue 2 Upper Occupancy Limit	1-6-6	
097	Q2ON	Queue 2 Adjustment Steps	1-6-7	
098	QOFF	Queue 2 Adjustment Rate	1-6-7	Queue 2 Adjust Rate /60 * Number of Metered Lanes
099	Q2OFF	Not used in URMS		
09A		Not used in URMS		
09B	MINGRN	Minimum Green	1-5-3	
09C	CRSPEED	Queue Override (Speed)	1-5-A	
09D	Q1CYGRN	Queue Adjustment Steps	1-6-4	
09E	Q1MAXSET	Absolute Maximum Metering Rate	1-5-1	Max Set Rate/60 * Number of Metered Lanes
09F	RATESTP	Queue Adjustment Rate	1-6-4	Queue Adjust Rate/60 * Number of Metered Lanes
0F4		Metered Lane Enable	1-5-1	SET from ATMS: If Bit 1 is set to zero it will disable all metered lanes. If Bit 1 is set to one it will enable all metered lanes. Get from ATMS:

				If metered lane 1 is disabled the URMS will return a zero. Otherwise it will return a 1.

2. Time of Day Parameters

Time-of-Day and Day-of-Week parameters are set as requested by the ATMS. The URMS also has a "Holiday" day of week which is not supported by the ATMS and cannot be set from the ATMS. The Table number which refers to which Time-of-Day Table the controller will use to set it metering action, rate and plan will be set to the same number as day plan number for any requested ATMS interval. All other Time-of-Day table numbers will be set to zero. Zero indicates in the URMS that this plan number is not used. The HOV Active parameter which is used for part time HOV lanes will not be set by the ATMS, but can be set from the front panel by the operator if desired.

```
              DAY OF WEEK ENTRY
  #  Start      DOW        Table       HOV
     Time                             Active
  1 <05:00>   .MTWTF..       1         YES
  2  12:00    .MTWTF..       2         YES
  3  20:00    .MTWTF..       3         YES
  4  00:00    ........       0         YES
  5  00:00    ........       0         YES
```

Unlike SATMS, the URMS uses a separate Time-of Day table to tell the controller what action, rate and plan the controller should operate at. The action will be set to DARK whenever a rate of zero (0) veh/min is set by the ATMS. The action will be set to Rest in Green (greenball) whenever a rate of 1 veh/min is set by the ATMS. Last, the URMS shall set an action of Traffic Responsive whenever a rate of 2 veh/min or higher is set by the ATMS. The fixed release rate shall always be set to 900 and the plan number will always be set to the same number as the Time-of Day Table number.

```
          TIME-OF-DAY TABLE 1
 lane        Action         Rate          Plan
  1        <Traffic Resp>   900            1
  2         Traffic Resp    900            1



         Press NEXT to view GP Outputs
```

Metering plans are also different in URMS than in SATMS. For example the URMS does not use critical occupancy or volume. Instead traffic responsive metering uses a look of table that has 15 levels. Each level has a metering release rate and an occupancy, volume and speed threshold for each level.

When a time of data table is set by the ATMS, the URMS metering plan release rates for each level will by calculated by calculating the linearly interpolated value for each level where 900 is the maximum metering rate, and the ATMS Vehicles/Minute * 60 shall be the minimum (level 15) metering rate.   Occupancy, Volume and Speed threshold value will not be modified from the ATMS.

```
      TRAFFIC RESPONSIVE METERING PLAN 1
     LEVEL     RATE      OCC%       VOL     SPEED
       1       900       10.0      1000       0
       2       850       15.0      1100       0
       3       800       20.0      1300       0
       4       750       25.0      1400       0
       5       700       30.0      1700       0
       6       650       35.0      1800       0
```

3. Other Traffic Data Collection

The URMS does not have specifically assigned data collection points such as a Collector Distributer. Instead the URMS uses generic additional detectors detection loops. If however a SATMS input configuration is selected under menu 8-7, by default the following assigns the first 12 additional detectors to it SATMS equivalent.

SATMS	URMS
SD1 (MLHOV)	Additional Detector 1
SD2 (OSHOV)	Additional Detector 2
SD3	Additional Detector 3
SD4	Additional Detector 4
SD5	Additional Detector 5
RAMP HOV	Additional Detector 6
CD ON	Additional Detector 7
CD OFF	Additional Detector 8
CD #1	Additional Detector 9
CD #2	Additional Detector 10
On Ramp	Additional Detector 11
Off Ramp	Additional Detector 12

TOS Support (District 4)

The URMS supports the Get/Set Clock, Set HAR EMS, Get Detector Data and the Upload/Download packets for Global Parameters, Metered Lanes 1-4, Holiday/Special Event Table, Time-of-Day Table and Metering Plans 1-6.

1. TOS Get/Set Packets and URMS Known Differences

a. General
- It takes a few seconds for the URMS to process requested configuration changes when receiving TOS Protocol packets. Thus is you download using the SDLC211.exe program and then immediately upload the configuration, not all items will have had time to be configured.
- TOS has occupancy stored as XX.XX%. URMS stores occupancy as XX.X%.
- Packet data in the spreadsheet is as seen by the controller. Thus packed data received is data received by the 2070 controller. And data sent is data sent by the 2070 controller.

b. Turning ON/OFF HAR
The URMS allows the setting of General Purpose outputs (which are used by URMS for HAR outputs) by selecting their on and off times in the Timebased control tables and time of day plan. TOS does not allow HARS to be enabled or disabled based on the time of day plan. Thus for ATMS HAR Commands the URMS will take the following actions.

- **C**hanges associated Time of Day table for all 16 entries to turn the output to the commanded state.
- Also sets General Purpose Output 1 (HAR Sign) to have an ON time of 1.0 seconds/OFF time of 0.5 seconds and General Purpose Output 2 (HAR Radio) to be continuously on. Because the time of day tables are used to turn on the sign, it may take up to 1 minute between the commanded state and the URMS state. This is because time of day table is only checked at the beginning of each minute.

c. **Globals (Block 0)**
- day_of_week_1hour – Stored but not used in URMS
- start_hour_1min – Stored but not used in URMS
- day_of_week_1min – Stored but not used in URMS
- start_hour_5min-– Stored but not used in URMS
- day_of_week_5min– Stored but not used in URMS
- start_hour_1min– Stored but not used in URMS
- day_of_week_1min– Stored but not used in URMS
- start_hour_5min– Stored but not used in URMS
- day_of_week_5min– Stored but not used in URMS

d. **Metered Lanes (Block 1 to 4)**
- Maximum Rate of Increase – Stored but not used
- Maximum Rate of Decrease – Stored but not used
- Bus Enable – Stored but not used
- Minimum Red Time Minimum Limit is 1.0 Seconds (TOS tries to set 0.5 seconds)
- Minimum Green Time Minimum Limit is 1.0 seconds (TOS tries to set 0.5 seconds)
- Passage release rate is stored in the URMS in Minutes. TOS has this value in seconds. While URMS does perform a conversion, both the SDLC211.exe test times (15 and 30 seconds) are less than a minute and thus are set to zero.
- URMS does not have a single shutdown time. Setting the shutdown time will change the rate of any time based table that has an action of DARK or REST-in-GREEN to the requested shutdown time.

e. **Holidays (Block 5)**
- All holidays will set the non-TOS Day of Week selection to SMTWTFS.

f. **Time-of-Day (Block 6)**
- When setting to Traffic Responsive Code D1 to D6 or E1 to E6, URMS will set Plan Number and report back F6 (Both Occupancy and Volume Data is used). If only Occupancy or Volume Data is desired for the Plan, the Plan can be set with only occupancy or volume thresholds. Setting traffic responsive is not checked using the SDLC211.exe program.

g. **Metering Plans (Block 7 to 12)**

- URMS has 15 Plan Levels while TOS has 16 Plan Levels. Metering Plan 16 is saved by the URMS in its configuration file, but at this time is not used.
- URMS does not allow a release rate of zero. The minimum release rate in URMS is currently150 VPH.

IRIS Support (District 10)

The URMS supports the IRIS Broadcast Traffic Data UDP packet. Get and Set memory packets are the same as those used in SDRMS.

Rev8 Support (Districts 8 and 11)

The URMS supports the Rev8 polling packet. When Rev8 polling packets are used however, if the RMIS receives a software version number other than, the RMIS automatically reverts to SDRMS polling. For this reason URMS will always return a software version and revision number of 8.00 when transmitting Rev8 polling data. Rev8 Get and Set memory packets are the same as those used in SDRMS.

ORRMS5 Support (District 12)

The URMS does not currently support OCRMS5 polling; however support for OCRMS5 polling should be included in URMS 2.09. Get and Set memory packets are the same as those used in SATMS.

Appendix D: URMS Menu Tree

URMS Menu Tree

Main Menu

1. Metered Lanes
2. Mainline Lanes
3. Additional Detection
4. Traffic Resp. Plans
5. Command Source
6. Time of Day
7. Communications
8. General
9. Utilities
A. Status
B. Phase Timing
C. Traffic Resp. Status
D. Current Metering Rates
E. Traffic Resp. Data

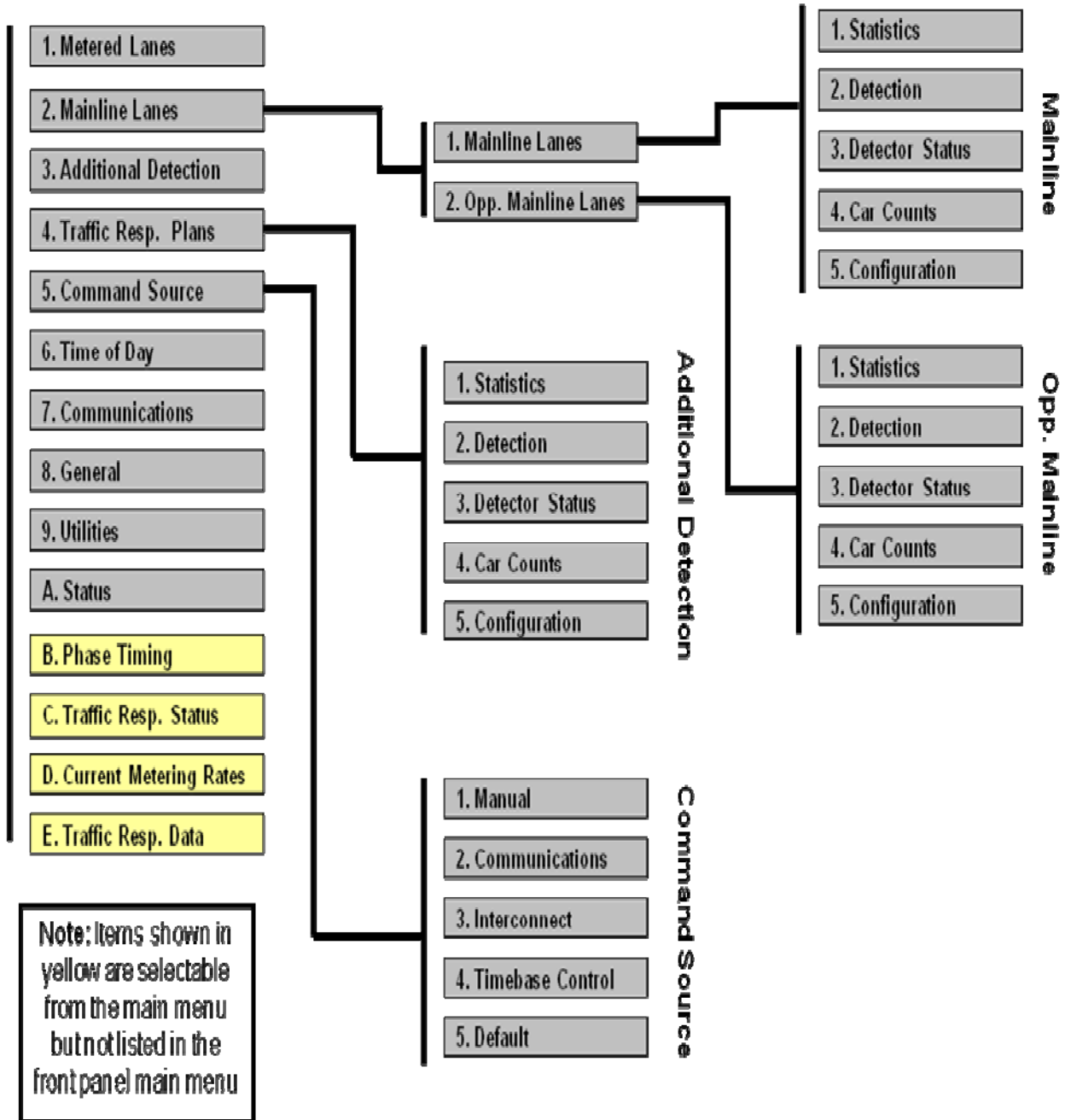Note: Items shown in yellow are selectable from the main menu but not listed in the front panel main menu

Metered Lanes

1. Statistics
2. Detection
3. Detector Status
4. Car Counts
5. Configuration
6. Queue Configuration

Metered Lane Queue Configuration

1. Queue Standby Flags
2. Q1 Configuration
3. Q1 Adjustment
4. Q1 Rates
5. Q2 Configuration
6. Q2 Adjustment
7. Q2 Rates
8. Q3 Configuration
9. Q3 Adjustment
A. Q3 Rates
8. Q4 Configuration
9. Q4 Adjustment
A. Q4 Rates

Metered Lane Configuration

1. General
2. Startup
3. Metering
4. Shutdown
5. Depend Groups
6. Demand
7. Passage
8. Queue Globals
9. Queues
A. Queue Override

Menu Tree (1 of 3)

URMS Menu Tree

1. Metered Lanes

2. Mainline Lanes

3. Additional Detection

4. Traffic Resp. Plans

5. Command Source

6. Time of Day

7. Communications

8. General

9. Utilities

A. Status

B. Phase Timing

C. Traffic Resp. Status

D. Current Metering Rates

E. Traffic Resp. Data

Note: Items shown in yellow are selectable from the main menu but not listed in the front panel main menu

1. Mainline Lanes

2. Opp. Mainline Lanes

Mainline

1. Statistics

2. Detection

3. Detector Status

4. Car Counts

5. Configuration

Additional Detection

1. Statistics

2. Detection

3. Detector Status

4. Car Counts

5. Configuration

Opp. Mainline

1. Statistics

2. Detection

3. Detector Status

4. Car Counts

5. Configuration

Command Source

1. Manual

2. Communications

3. Interconnect

4. Timebase Control

5. Default

Menu Tree (2 of 3)

URMS Menu Tree

Main Menu:
1. Metered Lanes
2. Mainline Lanes
3. Additional Detection
4. Traffic Resp. Plans
5. Command Source
6. Time of Day
7. Communications
8. General
9. Utilities
A. Status
B. Phase Timing
C. Traffic Resp. Status
D. Current Metering Rates
E. Traffic Resp. Data

Note: Items shown in yellow are selectable from the main menu but not listed in the front panel main menu

Time of Day:
1. TOD Clock
2. Day of Week Entry
3. Timebase Control Tables
4. Fixed Holiday
5. Floating Holiday

Communications:
1. Serial Port 1 Parameters
2. Serial Port 2 Parameters
3. TCP Poll Parameters
4. Serial Port 1 Packet Data
5. Serial Port 2 Packet Data
6. TCP Port #1 TX/RX
7. TCP Port #2 TX/RX
8. UDP Parameters
9. Sensys

General:
1. Input File Layout
2. Output File Layout
3. Aux File Layout
4. GP On/Off Times
5. Other Items
6. Traffic Resp. Intervals
7. Configure Ramp I/O

Utilities:
1. AC Fail Event Log
2. Input File Test
3. Output File Test
4. Reset Detectors
5. Keyboard Test
6. FPA Display Test
7. Signal Test
8. Lights Test
9. File Checksums
A. Program Status
B. Backup Utilities
C. Clear Car Counts

Menu Tree (3 of 3)

Appendix E: URMS Troubleshooting Guide

Controller has lost Ethernet Communication	Go to menu item 7-6 and verify that the controller is receiving data. If data NOT is being received: • Go to menu 9-A and verify that the Serman module is running. If not then pull controller from service. URMS Application needs to be re-installed. • Verify Status light is ON on the 1B card. No light means that the controller is not connected to the network. • Verify that the Rx light comes on at least once every 30 seconds. No Rx light may mean the controller is not being polled by the TMC or that poll requests are not being received. • Verify port number is correct (7-3) • Verify IP connection (Static for fiber, Dynamic for Wireless (7-3). • Verify that the controller IP Address, Network Mask, Broadcast Address and Gateway are correct (7-3). *Note: Make sure you reboot controller after making any IP parameter changes.* • Set Reboot on loss of comm to ON (8-5). • Reboot controller. If data IS being received but the packet type is unknown: • Verify that the controller address is correct (7-3) • May be a protocol issue. Contact David Wells to update software.
Controller has lost Serial Communications (2/4 wire modem on a 2070-6A or 2070 -6B card)	Go to menu item 7-4 or 7-5 and verify that the controller is receiving data. If data NOT is being received: • Go to menu 9-A and verify that the Serman module is running. If not then pull controller from service. URMS Application needs to be re-installed.

	• Verify that the 2070-6x modem installed in slot A2 and that the card power (bottom switch) is ON. • Verify that the modem switches are set to FULL DUPLEX. • Verify that the enable/disable switch is set to ENABLE. • Verify that you are connected to the correct serial port. Serial port 1 is the upper position. Serial port 2 is the lower position. • District 7 and 12 only. Verify if the CD light is ON on the 2070-6x card. No light means that the controller is not connected to the network. • Verify that the Rx light comes on at least once every 30 seconds. No Rx light may mean the controller is not being polled by the TMC or that poll requests are not being received. • Verify serial parameters are correct (7-1 or 7-2). *Note: Make sure you reboot controller after making any serial parameter changes.* • Verify that you are using the correct type of modem card. 2070-6A is for 1200 BAUD modems only. 2070-6B is for 9600 BAUD modems only. You cannot use a 2070-6B card for 1200 BAUD operations. • Reboot controller. If data IS being received but the packet type is unknown: • Verify that the controller address is correct (7-1 or 7-2) • May be a protocol issue. Contact David Wells to update software. If data IS being received and the controller is responding but the TMC shows packets are not being received correctly. • Raise the RTS ON time • Raise the RTS OFF time For most locations it is also recommended to: • Set Reboot on loss of comm to ON (8-5).
Controller has lost Serial Communications (RS-232	Go to menu item 7-4 or 7-5 and verify that the controller is receiving data.

Communications on a 2070-6A or 2070-6B card)	If data NOT is being received: • Go to menu 9-A and verify that the Serman module is running. If not then pull controller from service. URMS Application needs to be re-installed. • Verify that the 2070-6x modem installed in slot A2 and that the card power (bottom switch) is ON. • Verify that the modem switches are set to FULL DUPLEX. • Verify that the enable/disable switch is set to DISABLE. • Verify that you are connected to the correct serial port. Serial port 1 is the upper position. Serial port 2 is the lower position. • Verify that the Rx light comes on at least once every 30 seconds. No Rx light may mean the controller is not being polled by the TMC or that poll requests are not being received. • Verify serial parameters are correct (7-1 or 7-2). *Note: Make sure you reboot controller after making any serial parameter changes.* • Reboot controller. If data IS being received but the packet type is unknown: • Verify that the controller address is correct (7-1 or 7-2) • May be a protocol issue. Contact David Wells to update software. If data IS being received and the controller is responding but the TMC shows packets are not being received correctly. • Raise the RTS ON time • Raise the RTS OFF time For most locations it is also recommended to: • Set Reboot on loss of comm to ON (8-5).
Packets sent on the serial port are echoing back (2 wire modem)	Change dip switch #5 "Half Duplex Local Echo" on 2070-6x modem card to ON.
No data coming in from loops	Verify data in coming in on the detector cards. Verify that the C1 Cable is installed

	Verify that the I/O setup is correct (8-1). If not correct go to menu 8-7 to select the proper configuration. *Note: Field I/O may have suffered from and internal hardware reset. If this happens the controller will not be able to read any inputs or send any outputs. Reboot controller and upgrade to URMS 2.07 or later. URMS 2.07 will automatically recover from internal Field I/O hardware resets.*
Outputs do not come on	Ensure the watchdog monitor is not tripped. Ensure that the load switches are fully inserted. Check that Police Lights and Police Control. Switches are ON (9-2) Verify that the controller is sending output signals to the field (9-3). If Signals are being sent by the controller: • C1 cable loose or not installed. If Signals are NOT being sent by the controller: • Check the output file configuration (8-2 and 8-3) to verify outputs are correctly configured. If they are not configured correctly go to menu 8-7 and select the proper configuration. Perform a Raw Outputs Test (9-6) Reboot Controller *Note: Field I/O may have suffered from and internal hardware reset. If this happens the controller will not be able to read any inputs or send any outputs. Reboot controller and upgrade to URMS 2.07 or later. URMS 2.07 will automatically recover from internal Field I/O hardware resets.*
Meter did not come out at correct Timebased time.	Verify the cabinet watchdog in not tripped. Verify that the circuit breakers are ON. Verify that the loads are properly inserted. Police Light and Police Control Switches (9-2) Verify that the controller is in Timebased Control (A) Check time/date (7-1) Check Time of Day Schedule (7-2) Check Timebased table (7-3) Check holiday tables (7-4, 7-5) Verify that the meter will meter traffic manually 5-1 and select fixed rate for each metered lane).

Metered lane cycling without any vehicles present	Verify that the loop is not stuck on (1-3) Verify that the Controller has detected an loop error condition (1-4) Verify that the Demand detector on NOT on recall (1-5-6)
Cannot change the I/O configuration in menu 8-7 because the controller is metering.	Go to manual command source (5-1) and select DARK as the action for each metered lane. After meter shuts down you will be able to change the I/O configuration.
Command Source shows ERR	Failsafe input has failed.
URMS Contacts	David Wells (916) 653-1343 david_j_wells@dot.ca.gov Maria Hionides (916) 651-9048 maria.hionides@dot.ca.gov

Manual Activation/Deactivation of the Universal Ramp Metering Software using the 2070 Controller Front Panel

1. If you see a screen that looks like this select 1 using the front panel keyboard.

```
        Front Panel Manager

1-Universal Ramp Metering Software X.XX



```

2. If on the front panel you see a screen like this or have a blank screen press the enter [ENT] to go to the URMS main menu. Note that for a blank screen you may also have to adjust the contract knob to display text clearly after pressing the enter key.

```
   ADVANCED TRANSPORTATION CONTROLLER

   Universal Ramp Metering Software
            Version X.XX


California Department of Transportation
   Copyright (c) 1992-2008 by Caltrans
```

3. From the main menu select menu item 5 - command source

```
URMS VERSION X.XX - MAIN MENU

1-Metered Lanes        6-Time of Day
2-Mainline             7-Communications
3-Additional Detection 8-General
4-Traffic Resp. Plans  9-Utilities
5-Command Source       A-Status
```

4. From the command source menu select menu item 1 – manual.

```
COMMAND SOURCE

1-Manual
2-Communications
3-Interconnect
4-Timebase Control
5-Default
```

5. Enter the new metered lane action and if needed adjust rate and plan for each metered lane.

```
COMMAND SOURCE PRIORITY – MANUAL

lane      Action          Rate          Plan
 1        <SKIP>          900             1
 2         SKIP           900             1
```

Basic Data Entry

The position of the cursor is designated by two arrows [< >] surrounding a data entry position. The cursor position may be moved by pressing any of the four arrow keys [⇦], [⇨], [⇧] or [⇩].

Once the data entry process has begun by pressing a number key, the cursor arrows will turn from arrows "< >" into square brackets "[ ]". This indicates that data entry is in progress. After entering the data, press the enter key [ENT] on the right controller keypad. You will see that the curser has returned back to two arrows [< >]. To return to the main menu press the escape key [ESC] twice.

- **To shut the ramp meter down (Turn OFF the meter heads)**

  Press 1 [1] to select "*Rest in Dark*" and then press enter [ENT] for each metered lane.

- **To put the meter into a Rest in Green metering state (Each metered lane's green head will be illuminated).**

  Press 2 [2] to select "*Rest in Green*" and then press enter [ENT] for each metered lane.

- **To put the meter into a Fixed Metering (Each metered lane's green head will be illuminated.**

  Press 3 [3] to select "*Fixed Rate*" and then press enter [ENT] for each metered lane. Then enter the selected the release rate for each metered lane press enter [ENT].

- **To put the meter into a Traffic Responsive**

  Press 4 to select "*Traffic Responsive*" for each metered lane and then press enter [ENT] for each metered lane. Then select the plan number (if not plan number 1) and press enter [ENT] for each metered lane.

- **To put the meter back into the regular time of day mode**

  Press 6 to select "*Skip*" for each metered lane and then press enter [ENT] for each metered lane.