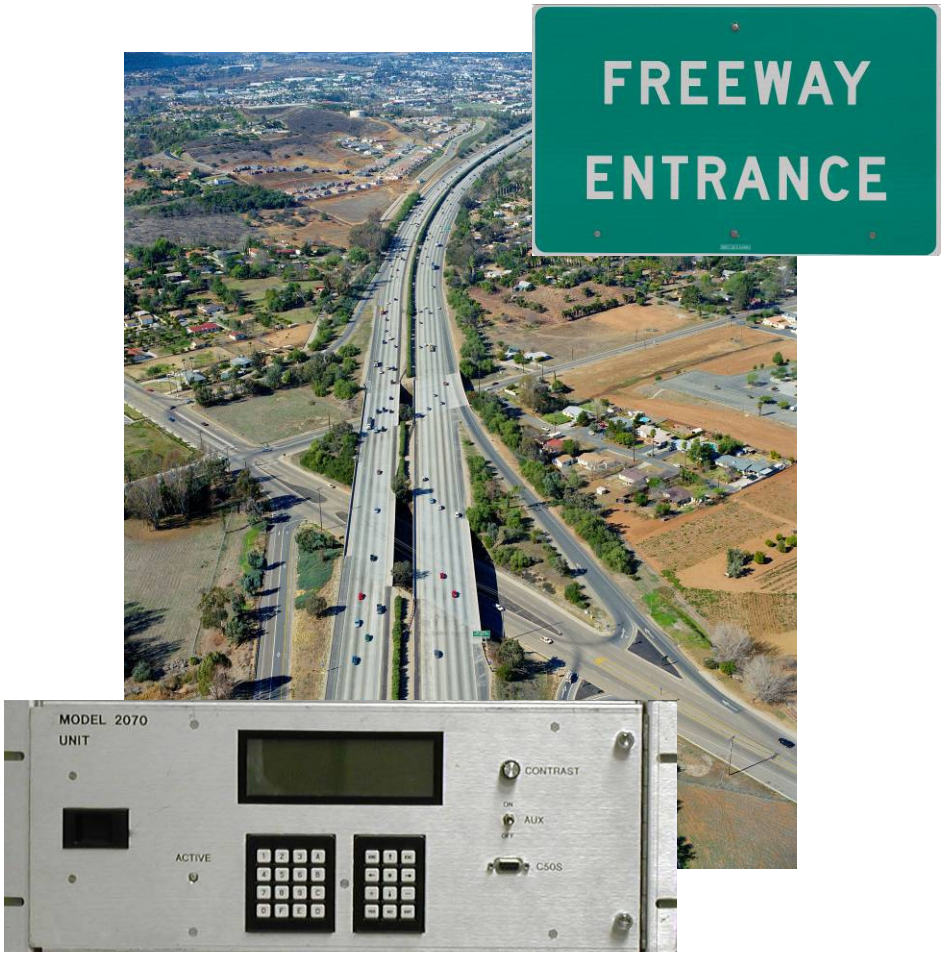
Traffic Operations

Universal Ramp Metering Software



Training Guide

February 24, 2009

Caltrans

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URMS Quick Information Sheet

Configuring the controller

1. Configure Ramp I/O (8-7)
2. Set Metered Lane Configuration (1-5)
3. Set Mainline Lane Configuration (2-1-5)
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5. Set Additional Detector Configuration (3-5)
6. Set Plans (4)
7. Set Date (6-1)
8. Set Time of Day Table (6-2)
9. Set the Day Plan Tables (6-3)
10. Set Communications (7-1, 7-2 or 7-3)

Configuring a Serial Port

1. Ensure modem card is configured correctly
2. Ensure C2 cable is connected to the correct serial port
3. Configure the Serial Port in the URMS
4. Reboot the Controller
5. Verify that the controller is communicating with the TMC

Configuring a TCP/IP Port

1. Ensure the Ethernet cable is plugged in.
2. Configure the TCP/IP Port in the URMS
3. Reboot the Controller
4. Verify that the controller is communicating with the TMC

Verifying Communications

1. Check Metered Lane Phase Timing (B)
2. Check communications status page (7-4, 7-5 or 7-6)

Verify that the Controller is running properly

1. Verify Metered Lane Status (A)
2. Verify Metered Lane Phase Timing (B)
3. Verify Traffic Responsive Status (C)
4. Verify Current Metering Rates (D)
5. Verify Traffic Responsive Data (E)
6. Verify Metered Lane Detection (1-1)
7. Verify Mainline Lane Detection (2-1-1)
8. Verify Opposite Mainline Lane Detection (2-2-1)
9. Verify Additional Detector Detection (3-1)

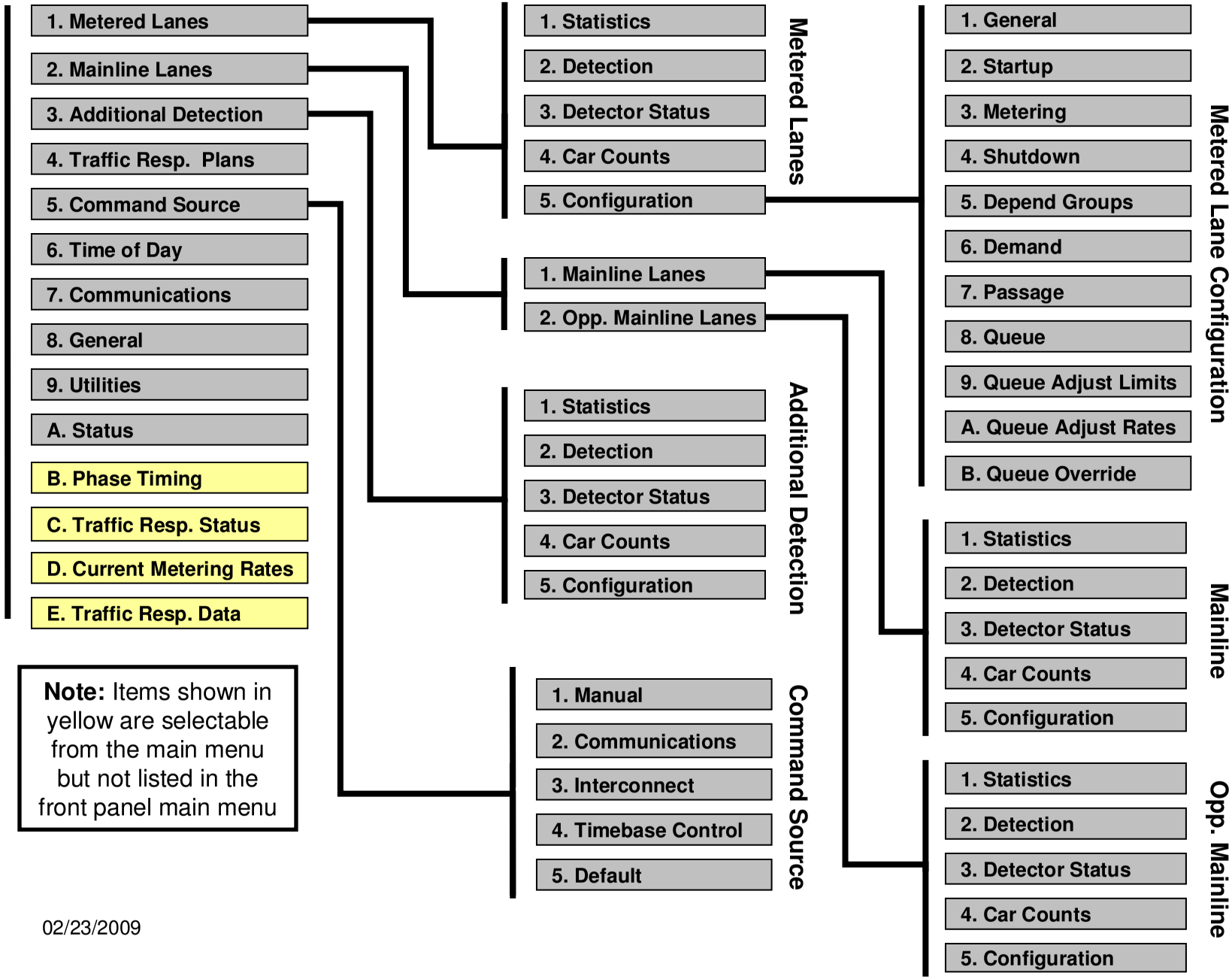
Modem Troubleshooting

1. Is the 2070 Controller Receiving Serial Communications?
2. Is the URMS program receiving communications?
3. Does the URMS know what the packet type is?
4. Is the URMS transmitting the response?
5. Is the 2070 controller transmitting the response?
6. Is the ATMS/RMIS receiving the response?
7. Does the controller lock up the local drop line?
8. Transmitted characters are echoing back on a 2 wire modem

URMS Software Issues

1. Verify that the controller has power
2. Can we access the URMS Main Menu
3. Verify that all URMS modules are running (9-A)
4. Reboot
5. Verify that all URMS modules are running
6. Remove controller from service
7. Call David Wells at (916) 653-1342

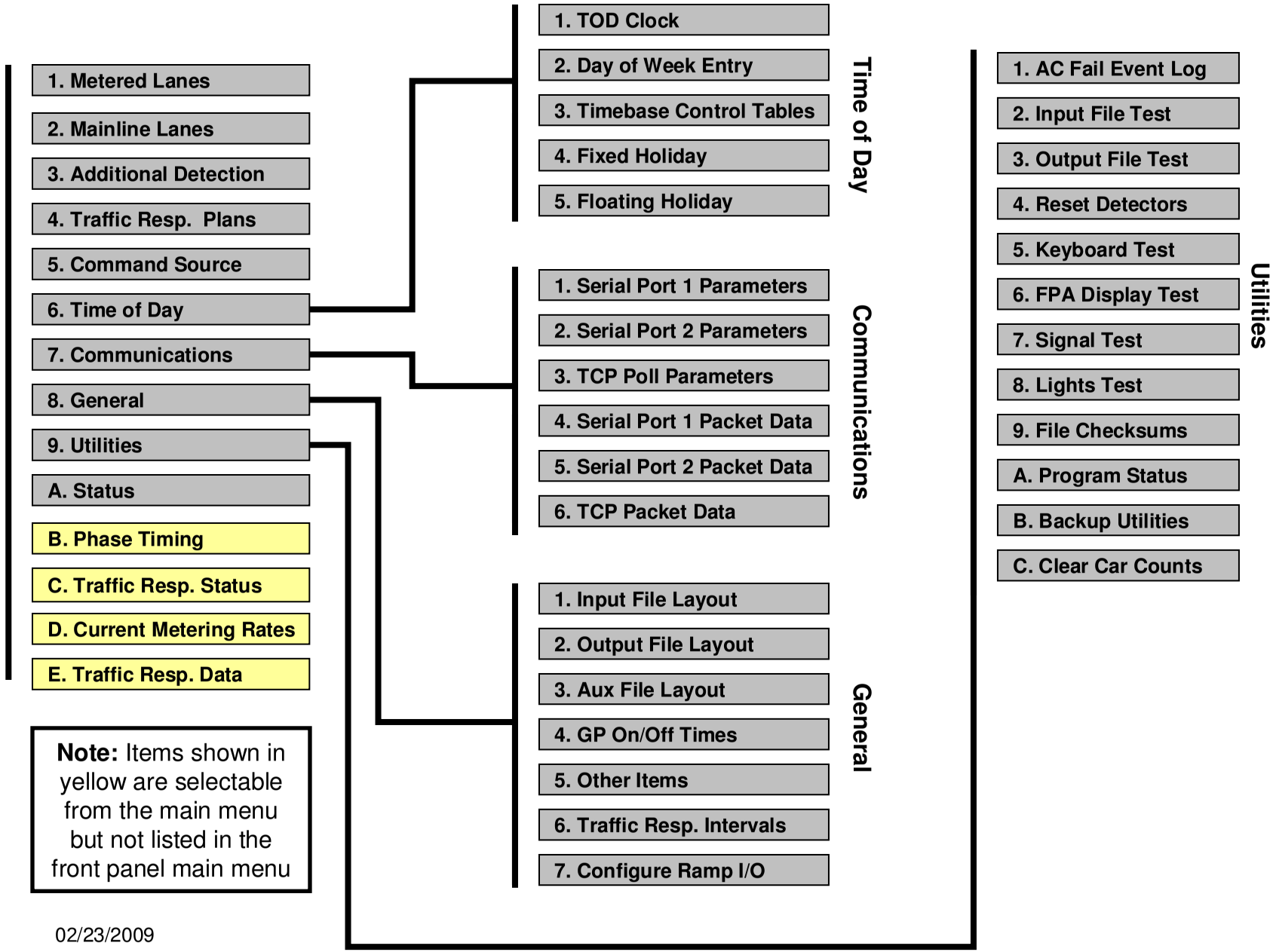
URMS Menu Tree



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

02/23/2009

URMS Menu Tree



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

02/23/2009

Basic Ramp Meter Operation

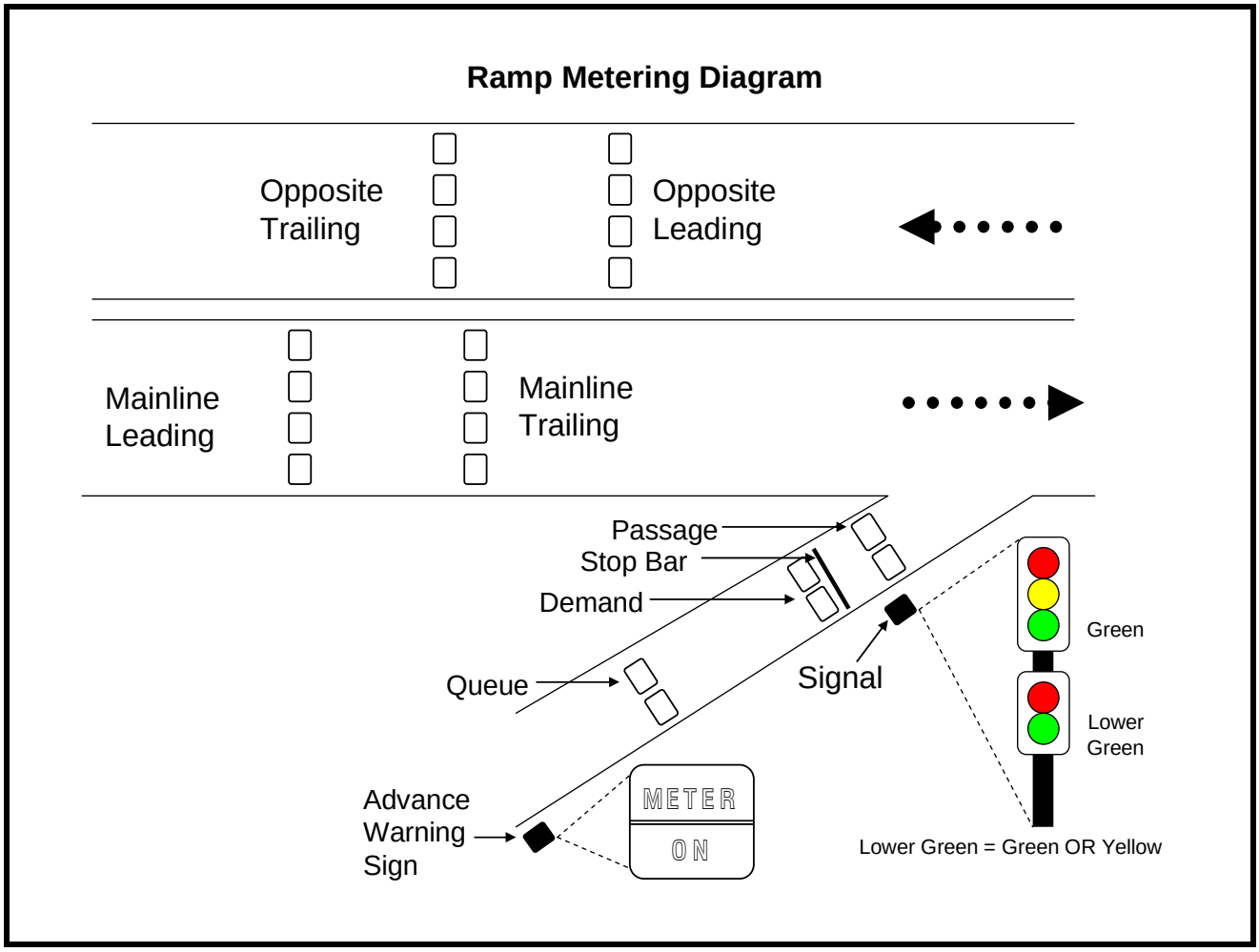


Figure 1 - Typical Ramp Meter

Major Functional Areas of a Ramp Meter Location

a. ***Mainline Lane***: A lane of freeway traffic for which detectors have been installed to monitor vehicle speed, flow and occupancy. Additionally this data may be used to regulate the flow rate of metered lane traffic.

b. ***Opposite Mainline Lane***: A lane of freeway traffic for which detectors have been installed to monitor vehicle speed, flow and occupancy generally in the opposite direction of the Mainline Lane. This data is only used for monitoring purposes and will not be used to regulate the flow of metered traffic.

c. ***Metered Lane***: The freeway onramp lane that a vehicle travels on before entering a freeway, which is also constrained by some type of metering device. A metered lane also has Queue, Demand and Passage detectors to provide vehicle detection at critical points along the lane.

d. ***Metered Lane Signals***: A Red, Yellow, Green indication for each metered lane used to control vehicle flow onto the freeways. In addition, some metered lanes may also have a Lower Green indication – as part of a 2-section signal head – that is controlled separately.

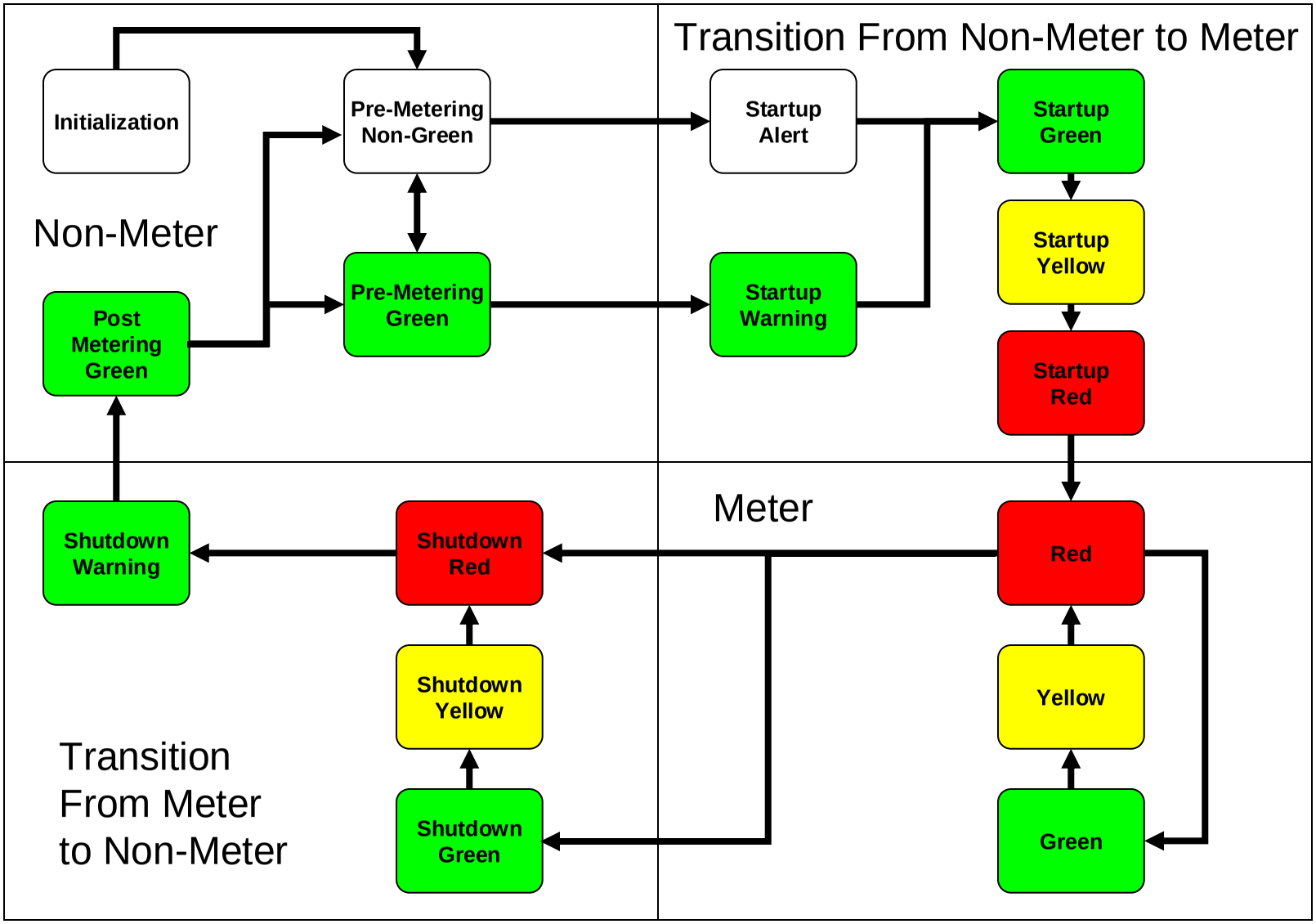
e. ***Additional Detectors***: Used for monitoring the volume and occupancy of any additional locations not related to Metered Lanes, Mainlines or Opposite Mainlines. This data is only used for monitoring purposes and will not be used to regulate the flow of metered traffic. Although an additional detector can be used for a variety of purposes, they are commonly used for monitoring freeway off-ramps.

f. ***Advance Warning Signs***: Used to alert an approaching vehicle prior to entering the metered lane that ramp metering is currently active.

Typical Operation of an Metered Freeway Onramp

Typically during the metered state, a vehicle will enter a metered lane from an arterial. The first thing that the vehicle may encounter is an Advance Warning Sign alerting the driver that ramp metering is turned on. The vehicle will then proceed across the Queue detector onto the Demand Detector and wait at the stop bar. In front of the vehicle should be a signal indication of Red, and also visible should be a sign notifying the driver of the number of vehicles which should proceed on a Green indication. Once the signal turns green; the vehicle will proceed past the passage detector and onto the freeway mainline.

METERING INTERVALS



Be Familiar with the Hardware Components of a 2070 Controller

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Be Familiar with the Hardware Components of a 2070 Controller

March 2009

Model 2070 Hardware

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Key Components of the Model 2070L

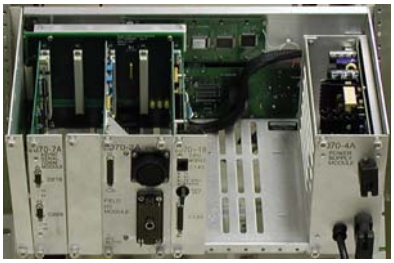
- Unit Chassis
- Model 2070-1B CPU
- Model 2070-2A Field I/O unit
- Model 2070-3B Front Panel Assembly
- Model 2070-4B Power Supply
- Model 2070-6A MODEM

3

Model 2070L

4

Model 2070L – Top View



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Model 2070 Serial Ports

- Seven Serial Ports (SP's)
- SP1 Through SP6 are routed to Model 2070 Mother Board
- SP8 provides an auxiliary Serial Output Channel

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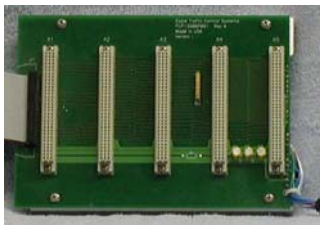
Model 2070 Motherboard



7

Model 2070L Mother Board

- Back plane utilizes RS-485 bus
- No CPU on Mother Board
- Card slots A1 through A5 utilize a 96-pin connector, Not all cards will work in all slots (Though they may fit, the cards are slot specific)
- Molex connector provides: +5V Stand By, +5V, +12 Serial, -12V Serial, +12V Iso, Power Up/System Reset, Power Down, Linesync, Equipt. GND) to Power Supply

8

Model 2070-1B CPU

9

Model 2070-1B CPU

- Used in the Model 2070L
- Provides an Ethernet Port
- Contains a Datakey Receptacle
- C13S connector which is also SP8
- Installs in Mother Board slot A5
- Hosts OS-9 operating system

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Model 2070-2A Field I/O

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Model 2070-2A Field I/O

- C1S connector is the same as C1 connector on the Model 170 (44 inputs / 56 outputs)
- C11S provides 28 additional I/O Terminals
- Installs in card slots A3 and A4
- C12 connector (RS-485) for future use
- Contains a jumper switch that turns On/Off Serial Port 3 (SP3)
- LED indicates whether SP3 is active (Bottom right of panel)

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Front Panel Assembly (FPA)

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Common Features of Model 2070-3B Front Panels

- 8 lines x 40 character LCD display
- Front Panel Reset Switch on the rear of the FPA
- LED is controlled by the application program
- 2 key pads
- AUX switch
- Contrast adjustment knob
- Back Light on the LCD

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Model 2070-4B Power Supply

15

Model 2070-4B Power Supply

- Provides 4 channels of power
- 41.5 Watts maximum rated output
- Capable of holding up 30 watts for 0.5 seconds
- 2 connectors 1 for motherboard (12 pin), 1 for VME (10 pin), Model 2070L only uses 1 connector for the Mother Board - Remaining connector is unused

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GDI Model 2070-6A 1200 Baud MODEM

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Model 2070-6A MODEM

- 1200 Baud
- Compatible with Model 400 MODEM
- Two independent channels
- If enabled - MODEM
- If disabled - functions as an RS-232 port to connect to an external MODEM

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Model 2070-6A MODEM (cont.)

- Installs in Card slots A1 or A2 (Slot A2 Preferred)
- If Front Panel connector C50S (SP4) is being used, then the SP4 (on the faceplate of the Model 2070-6A) will not work
- Contains On-Board Fuses

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GDI MODEM Switches

Channel 1 MODEM Enabled Switch
Enabled – MODEM
Disabled – EIA 232

Channel 1 Full / Half Duplex

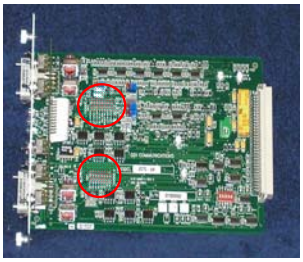
Channel 2 MODEM Enabled Switch
Enabled – MODEM
Disabled – EIA 232

Channel 2 Full / Half Duplex

Card Power

20

GDI Model 2070-6A 1200 Baud MODEM



Dip Switches

1 Full Duplex (not used) off
2 Half Duplex (not used) off
3 RTS/CTS Time
4 Soft Carrier Time
5 Half Duplex Local Echo
6 Rec. Squelch Time
7 Carrier Detect Time
8 Anti-Streaming Enable

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GDI Model 2070-6A 1200 Baud MODEM

Dip Switches

5 Half Duplex Local Echo
- Set to OFF (default) if using 4 wire modem
- Set to ON if using 2 wire modem

8 Anti-Streaming Enable
- Set to ON (default is OFF)
  - This will prevent the modem from transmitting any single message for more than 5 seconds

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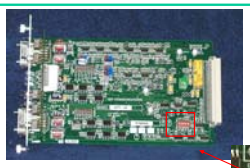
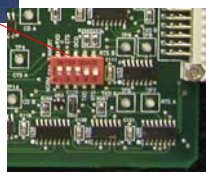
GDI MODEM Signal Inversion DIP Switches



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



Dip Switch Positions Also Listed in Manual Included With MODEMs

23

Model 2070 Modules in Mother Board Slots

- Slot A1 - Empty
- Slot A2 - MODEM (Model 2070-6A, 6B or 7A)
- Slot A3 & A4 - Field I/O (Model 2070-2A)
- Slot A5 - CPU (Model 2070-1B)

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Installation

- Same procedure as a 170 Controller
- Front Panel lifting
- Air flow above and below
- LCD display very fragile and expensive

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Be Familiar with why the URMS was created

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Be Familiar with why the URMS was created

March 2009

The Problem

The State uses a variety of ramp metering programs that are incompatible with each other.

2

State is using a variety of Ramp Metering Programs

- SATMS – Semi Automated Ramp Metering System (7 and 12)
- SDRMS – San Diego Ramp Metering System (3, 6, 8, 11)
- TOS – Traffic Operating System (4)
- OCRMS – Orange County Ramp Metering System (12)

3

The Solution

Create a ramp metering program that can be used throughout the state an be backward compatible with the existing legacy systems.

4

Ramp Metering Software Capabilities

	Metered Lanes	Mainlines	Opposite Mainlines	Additional Detection Locations
SDRMS	3	6	None	2
SATMS	1	6	6	11
TOS	4	8	8	16
URMS	4	8	8	16

5

Design Goals for the URMS

- Follow existing State and National Standards
- Backward compatible to support a existing infrastructure
- Forward looking – Support for NTCIP standards
- Must be as good or better than existing software
- Must be robust and reliable
- Must be user friendly

6

URMS Backward Compatibility

- Designed to be backward compatible with the existing 334 cabinet infrastructure
  - Direct Replacement for the 170 controller
  - Same C1 connector for inputs/outputs
  - SDRMS Packets
  - SATMS Packets
  - TOS Packets

7

Some Benefits of the URMS

- Increased data collection capabilities including dual lane data for all mainline lanes
- Increased ramp metering configuration flexibility
- Statewide standardization will reduce cost and simplify future system integration

8

Loading the URMS Software onto a 2070 Controller using a Datakey

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Loading the URMS Software onto a 2070 Controller using a Datakey

March 2009

Loading the URMS onto the controller

- Controller will come from the warehouse with the Traffic Control Signal Program (TSCP) already loaded.
- URMS must be loaded by the Districts.

2

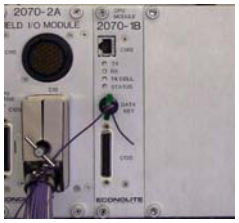
Loading URMS

- Easiest way is with a Datakey
  1. Get the Datakey with the URMS application loaded on it

3

Loading URMS

2. Insert the Datakey into the 2070 controller and turn the Datakey 90 degrees clockwise



4

Loading URMS

3. Turn on the controller power. The program will now load software onto the controller automatically.
4. The 2070 front panel will show the loading process.

5

Loading URMS

5. When the loading has completed (3 to 5 minutes), the front panel will display that the files are done being loaded.

*** DATAKEY LOADER ***
FILE LOADED
KEYLDR PROGRAM TERMINATED

6

Loading URMS

6. Remove the Datakey
7. Reboot the controller
8. Verify no configuration issues occurred
9. Check that all URMS modules are running (9-A)

7

Loading URMS

Time for you
to give it a try

8

Know how to Configure the URMS

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Know how to Configure the URMS

March 2009

Navigating Through the URMS

- Select the URMS (Item 1) from the Front Panel Manager to bring up the URMS Splash Screen.
- Pressing any key will then bring up the URMS Main Menu
- Pressing the escape “esc” key repeatedly will return you to the Main Menu

2

Initial URMS Splash Screen

```
Front Panel Manager

1-Universal Ramp Metering Software 1.00
```

3

Main Menu

```
URMS VERSION 1.00 - 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

Configuring the Controller

1. Configure Ramp I/O (8-7)
2. Set Metered Lane Configuration (1-5)
3. Set Mainline Lane Configuration (2-1-5)
4. Set Opposite Mainline Configuration (2-2-5)
5. Set Additional Detector Configuration (3-5)
6. Set Plans (4)
7. Set Date (6-1)
8. Set Time of Day Table (6-2)
9. Set the Day Plan Tables (6-3)
10. Set Communications (7-1, 7-2 or 7-3)

5

1. Configure Ramp I/O (8-7)

```
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
```

6

1. Configure Ramp I/O (8-7)

```
          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
```

7

2. Set Metered Lane Configuration (1-5-1)

```
  METERED LANE CONFIGURATION - GENERAL
Lane             1      2      3
Dep Group        A      A      C
Veh-Per-Green    1      1      1

Red Lock        NO     NO     NO
```

8

Configuring Metered Lanes

- Groups
  - Metered lanes that are associated with each other
  - All lanes in the same group must start and stop metering together
  - Each group can be setup to perform None, Fixed, Fractional, or MUTEX metering offset.

9

2. Set Metered Lane Configuration (1-5-2)

```
  METERED LANE CONFIGURATION - STARTUP
Lane           1      2      3
Min Meter(M)  20     20     30
Start Alert   10.0   10.0   10.0
Start Warn    10.0   10.0   10.0
Start Green   10.0   10.0   10.0
Start Yellow  10.0   10.0   10.0
Start Red     10.0   10.0   10.0
```

10

2. Set Metered Lane Configuration (1-5-3)

```
  METERED LANE CONFIGURATION - METERING
Lane            1      2      3
Min Green      4.0    3.0    1.0
Max Green      6.0    6.0    1.0
Yellow         2.0    2.0    1.0
Min Red        2.0    2.0    1.0
Demand Gap     5.0    5.0    1.0
Demand Red    10.0   10.0    1.0
```

11

2. Set Metered Lane Configuration (1-5-4)

```
  METERED LANE CONFIGURATION - SHUTDOWN
Lane                1      2      3
Shut Warn         3.0    3.0    3.0
Post Green       40.0   40.0   34.0
Shut Time (s)     100    200    200
Min Non-Meter(M)  300    400    100
Q VS Shutdown      NO     NO     NO
```

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2. Set Metered Lane Configuration (1-5-5)

METERED LANE CONFIGURATION - GROUPS			
Group	A	B	C
Signal Serv Mode	<MUTEX>	FIXED	FRACT
Grn Offset Time	20.0	10.0	20.0
Fract Offset Time	10.0	30.0	10.0
Shutdown Gap Time	5.0	5.0	5.0

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Metered Lane Offsets

- **None** – Timing is independent for each lane
- **Fractional** – the start of the green interval for any lane will occur no sooner than either the Fractional Offset Time or the cycle time / number of lanes
- **Fixed** - the start of the green interval for any lane will occur no sooner than Fixed Offset time after start of a previous green interval start of a previous green interval
- **MUTEX** - one and only lane in the dependency group shall display green or yellow at any given time during the Metering state.

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2. Set Metered Lane Configuration (1-5-6)

METERED LANE CONFIGURATION - DEMAND			
Lane	1	2	3
Mode	RECAL	RECAL	ENAB
Max Pres (M)	100	200	100
No Activity (M)	200	100	200
Erratic Count	100	200	200
Dep Max Pres	10	10	10
Dep No Act	4	4	4

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2. Set Metered Lane Configuration (1-5-7)

METERED LANE CONFIGURATION - PASSAGE			
Lane	1	2	3
Mode	ENABL	RECAL	ENABL
Max Pres (M)	100	200	300
No Activity (M)	300	100	100
Erratic Count	100	300	400

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2. Set Metered Lane Configuration (1-5-8)

METERED LANE CONFIGURATION - QUEUE			
Lane	1	2	3
Detect Mode	OCCUP	DISBL	DISBL
Max Pres (M)	13	21	12
No Activity (M)	100	200	100
Erratic Count	200	100	200
Dep Max Press	21	43	12
Dep No Act	4	3	3

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Metered Queue Detection Mode

- **Disable** – The Queue Flag will always be clear.
- **Occupancy** – The Queue Flag will be set when the Queue is greater than the High Queue Limit.
- **Count** - The Queue Flag will be set when the Queue Count is greater than the Queue Count Limit.

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2. Set Metered Lane Configuration (1-5-9)

METERED LANE CONFIGURATION-QUEUE ADJUST			
Lane	1	2	3
Adjust Mode	Rate	Rate	Fixed
Len Up Lmt	100	200	300
Len Lwr Lmt	200	100	100
Occ Up Lmt	10.0	10.0	30.0
Occ Lwr Lmt	10.0	20.0	20.0
Replace Rate	600	600	600

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Metered Queue Adjustment Modes

- **Rate** - the queue will be overridden by increasing the current metering rate.
- **Rateup** - the queue will be overridden by increasing the current metering rate only when the Queue Occupancy Flag is Set.
- **Level** - the queue will be overriden by decreasing the current metering level.
- **Fixed** - the queue will be overriden by replacing the current metering rate with the override rate.

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Metered Queue Replacement Rate

- **Replacement Rate** – The new rate that will be applied when the Queue Flag is set and the Queue Mode is Fixed.

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2. Set Metered Lane Configuration (1-5-A)

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

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Queue Rates

- **Adjustment** – The number that will be temporally added or subtracted to the base metering rate.
- **Iterations** – The maximum number of times that the adjustment will be applied.
- **Delay** – How often we look at the Queue Flag to see if an adjustment needs to be made.

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2. Set Metered Lane Configuration (1-5-B)

QUEUE OVERRIDE	
Critical Flow Limit	1800
Critical Occ Limit	2.3
Critical Speed Limit	40
Override if in Comm Mode	NO

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Queue Override

- Prevents queue adjustment if mainline traffic congestion exceeds certain thresholds.

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3. Set Mainline Lane Configuration (2-1-5)

```
        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
```

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4. Set Opposite Mainline Lane Configuration (2-1-5)

```
    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
```

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5. Set Additional Detector Configuration (3-5)

```
  ADDITIONAL DETECTOR XX CONFIGURATION

Lane Mode               ENABLED
No Activity               2
Max Presence            200
Erratic Threshold       100
```

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6. Set Plans (4-X)

```
                METERING PLAN 2
LEVEL     RATE      OCC%      VOL     SPEED
  1      <1800>     50.0      1000      60
  2       1700      60.0      1100      55
  3       1600      70.0      1300      50
  4       1500       0.0      1400      45
  5       1400       0.0      1700      40
  6       1300       0.0      1800      35
```

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Metering Plans

- Works as a lookup table
- Compares Volume, Occupancy and Speed Thresholds – One with the highest level is set
- Travel Responsive Metering starts when the mainline traffic is a level 2 or higher
- Travel Responsive Metering starts when the mainline traffic is less than level 1
- Entering 0 in a Volume, Occupancy or Speed Entry will cause the program to bypass that entry

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7. Set Date (6-1)

```
TIME-OF-DAY CLOCK

TIME   <02:14:41>
DATE   01/22/2000
DAY    SATURDAY
Daylight Saving: ON
```

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8. Set Day of Week Entries (6-2)

```
                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
```

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TOD Entry

- Sets hour to start TOD Table
- Sets the days of the week to start TOD table
  - A holiday is considered its own special day of the week
- Sets the TOD table
  - Selecting Zero (0) will disable the entry
- Selects whether to include HOV lanes in the Mainline Averages
  - YES: HOV are active, do **not** include HOV lanes in the Mainline Averages
  - NO: HOV are not active, include HOV lanes in the Mainline Averages

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9. Set the Day Plan Tables (6-3)

```
          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
```

34

TOD Tables

- Sets Actions, Rate and Plan
  - Action: What you want the controller to do (ie. Fixed Rate)
  - Rate: The rate that get set if the controller is not in Traffic Responsive Metering
  - Plan: The plan the controller will user to get its metering rate based on mainline traffic.

35

Actions

- Rest in Dark
- Rest in Green
- Fixed
- Traffic Responsive
- Emergency Green
- Skip

36

9. Set the Day Plan Tables (6-3)

```
          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
```

37

TOD Tables

- Time of Day Tables also lets you turn ON and OFF up to 8 General Purpose Outputs

38

10. Set Communications (Serial)

```
              SERIAL PORT 1
Baud Rate     <1200>     Address      1
Data Bits        8       Enabled    YES
Parity        NONE
Stop Bits        1
RTS On Time     10 (milliseconds)
RTS Off Time    14 (milliseconds)
Handshaking        NONE
```

39

10. Set Communications (TCP/IP)

```
            IP Parameters
   Address     <16>
   Port Number 2101
   Connection Type STATIC
   IP Address XXX.XXX.XXX.XXX
   Netmask    XXX.XXX.XXX.XXX
   Broadcast  XXX.XXX.XXX.XXX
   Gateway    XXX.XXX.XXX.XXX
```

40

Exercise

Configure the Controller

41

Configure the URMS for EIA-232, 2/4 wire modem communication

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Configure the URMS for EIA-232, 2/4 wire modem communication

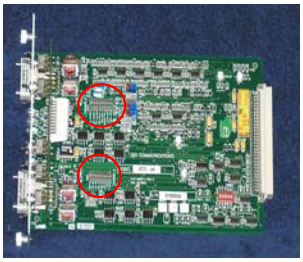
March 2009

- Configuring a Serial Port (GDI Modem)

Configuring a Serial Port

1. Ensure modem card is configured correctly
2. Ensure C2 cable is connected to the correct serial port
3. Configure the Serial Port in the URMS
4. Reboot the Controller
5. Verify that the controller is communicating with the TMC

1. Ensure modem card is configured correctly



Dip Switches

1 Full Duplex (not used) off
2 Half Duplex (not used) off
3 RTS/CTS Time
4 Soft Carrier Time
5 Half Duplex Local Echo
6 Rec. Squelch Time
7 Carrier Detect Time
8 Anti-Streaming Enable

GDI Model 2070-6A 1200 Baud MODEM

5 Half Duplex Local Echo (default is OFF)
- 2 Wire Modem – Set to OFF
- 4 Wire Modem – Set to ON

8 Anti-Streaming Enable (default is OFF)
- Set to ON - This will prevent the modem from transmitting any single message for more than 5 seconds

GDI MODEM Switches

Channel 1 MODEM Enabled Switch
Enabled – MODEM
Disabled – EIA 232

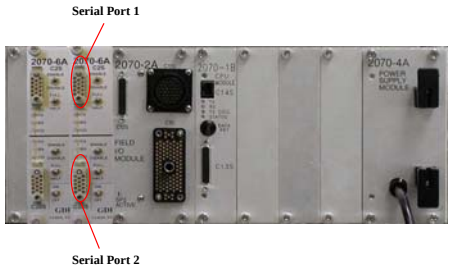
Channel 1 Full / Half Duplex

Channel 2 MODEM Enabled Switch
Enabled – MODEM
Disabled – EIA 232

Channel 2 Full / Half Duplex

Card Power

2. Ensure C2 cable is connected to the correct serial port



7

3. Configure the Serial Port in the URMS

```
      COMMUNICATIONS PARAMETERS
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 Packet Data
If config is changed-Reboot Controller
```

8

3. Configure the Serial Port in the URMS (7-1 or 7-2)

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

9

3. Configure the Serial Port in the URMS

- Set the Baud to 1200
- Set the Data Bits to 8
- Set the Parity (EVEN, ODD, NONE)
- Set the Stop Bit to 1

10

3. Configure the Serial Port in the URMS

- RTS ON Time
  - Set to 20 ms for a 4 wire modem
  - Set to 30 ms for a 2 wire modem
    - RTS ON Time is the time that the controller will turn on the Request to Send signal before actually transmitting any data.
- RTS OFF Time
  - Set to 0
    - RTS OFF Time is the time that the controller will turn hold on the Request to Send after the data byte has been transmitted.

11

3. Configure the Serial Port in the URMS

- Set the Handshaking to NONE
- Set the Drop Address in Decimal
- Set Port Enabled to YES

12

4. Reboot the Controller

- Cycle to power switch on the 2070 controller

13

5. Verify that the controller is communicating with the TMC (7-4 or 7-5)

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

TX: 614707211A0913280000000001080000000
    020000000000000000000000000000000044
    0E14000000FF0000003000000030000000

 Packet Type:   SDRMS NORMAL POLL
```

14

5. Verify that the controller is communicating with the TMC

- Controller will show any data that it receives
  - Note: The URMS will show every packet received on the multi-drop system, but will respond only to those packets that match the controller drop number (address)
  - Note: Packets addressed to other controllers will have an “UNKNOWN” packet type

15

Configure the URMS for TCP/IP communication

Office of ITS
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Configure the URMS for TCP/IP communication

March 2009

Configuring a TCP/IP Port

1. Ensure the Ethernet cable is plugged in.
2. Configure the Serial Port in the URMS
3. Reboot the Controller
4. Verify that the controller is communicating with the TMC

2

2. Configure the Serial Port in the URMS (7-2)

```
          IP Parameters
Address            <16>
Port Number       2101
Connection Type STATIC
IP Address XXX.XXX.XXX.XXX
Netmask    XXX.XXX.XXX.XXX
Broadcast  XXX.XXX.XXX.XXX
Gateway    XXX.XXX.XXX.XXX
```

3

2. Configure the Serial Port in the URMS

- Drop Address – Address of the controller
- IP Port Number – Port number that the polling process will use
- Connection Type - Static or Dynamic (DHCP)

4

2. Configure the Serial Port in the URMS

- IP Address – IP Address of the controller
- Netmask – Typically 255.0.0.0
- Broadcast
- Gateway

5

NOTE:

Ethernet if configured from the URMS configuration file at boot-up. The number on the screen may not be the same configuration that the controller is set to. This is especially true if the configuration mode is set to dynamic

6

3. Reboot the Controller

- Cycle to power switch on the 2070 controller

7

4. Verify that the controller is communicating with the TMC (7-6)

```
            TCP PACKET DATA
RX: 6103000C70AA55

TX:614707211A0913280000000001080000000
   020000000000000000000000000000000044
   0E14000000FF0000003000000030000000
 Packet Type:   SDRMS NORMAL POLL
```

8

4. Verify that the controller is communicating with the TMC

- Controller will show any data that it receives
  - Note: The URMS will show every packet received on the multi-drop system, but will respond only to those packets that match the controller drop number (address)
  - Note: Packets addressed to other controllers will have an “UNKNOWN” packet type

9

Know how to verify that the URMS software is working correctly in the field

Office of ITS
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Know how to verify that the URMS software is working correctly in the field

March 2009

Verify that the Controller is running properly

1. Verify Metered Lane Status (A)
2. Verify Metered Lane Phase Timing (B)
3. Verify Traffic Responsive Status (C)
4. Verify Current Metering Rates (D)
5. Verify Traffic Responsive Data (E)
6. Verify Metered Lane Detection (1-1)
7. Verify Mainline Lane Detection (2-1-1)
8. Verify Opposite Mainline Lane Detection (2-2-1)
9. Verify Additional Detector Detection (3-1)

2

Lane Status (A)

```
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
```

3

Lane Status

- Shows the current controller time and date
- Shows the current commanded source
- Shows the current commanded rate
- Shows the current commanded plan
- Shows the cycle count

4

Metered Lane Phase Timing (B)

```
     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
```

5

Metered Lanes Phase Timing

- Shows the current lanes interval
- Shows the remaining interval time
- Show the interval limitation
- Shows minimum metering and non metering times, communications refresh time and metered lane 1 shutdown time

6

TRAFFIC RESPONSIVE STATUS (C)

```
      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
```

7

TRAFFIC RESPONSIVE STATUS

- Continuously calculates the metering rate for traffic responsive metering, even when then controller is not metering traffic.

8

TRAFFIC RESPONSIVE STATUS

- Final level =
  Base Level + Queue Level Adjustment
- Final Level will always be between 1 and 15
- Queue flag will show as SET when ever queue adjustment is in effect

9

CURRENT METERING RATES (D)

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

10

CURRENT METERING RATES

- Shows the current metering rates for each metered lane

11

AVERAGE LONG MAINLINE DATA (E)

```
    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
```

12

AVERAGE LONG MAINLINE DATA

- Shows the actual Volume, Occupancy and Speed being used to calculate Traffic Responsive Metering
- Data can be calculated in 1 to 8 30 second increments

13

Metered Lane 30 Second Data (1-1)

```
        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
```

14

Metered Lane 30 Second Data

- Shows the Volume and Occupancy for the Passage and Queue Detectors over the last 30 seconds
- Shows the Volume of the Demand Detector over the last 30 seconds

15

METERED LANE DETECTION STATUS (1-2)

```
        METERED LANE DETECTION STATUS

LANE              1     2     3     4
Queue             .     *     .     .
Demand            .     *     .     .
Passage           .     .     *     .
```

16

METERED LANE DETECTION STATUS

- A '.' shows that the detector is NOT actuated
- A '*' shows that the detector is actuated

17

METERED LANE DETECTOR STATUS (1-3)

```
        METERED LANE DETECTOR STATUS
Lane              1     2     3     4
Queue             W     W     D     D
Demand            W     R     R     D
Passage           W     W     MP    D
W-Working          MP-MAX Presence
R-Recalled         NA-No Activity
D-Disabled         EC-Erratic Count
```

18

Status Abbreviations

- D: Disabled
- MP: Maximum Presence
- NA: No Activity
- EC: Erratic Count
- R: Recalled
- W: Working

19

METERED LANE DETECTOR STATUS

- Detector failures will clear automatically once the failure condition has been cleared

20

Metered Lane Car Counts (1-4)

Metered Lane Car Counts

Lane	1	2	3	4
Queue	7434	7433	7432	6988
Demand	7432	7422	7412	6974
Passage	7436	7345	7423	6877

21

Metered Lane Car Counts

- Shows the number of vehicles that have passed over a detector since the controller was turned on

22

MAINLINE 30 SECOND DATA (2-1-1)

MAINLINE 30 SECOND DATA

LANE	LEADING		TRAILING		SPEED
	VOL	OCC%	VOL	OCC%	
1	5	12.4	6	12.5	54
2	4	15.3	4	15.5	54
3	3	14.5	3	14.4	56
4	7	13.6	7	13.7	62
Volume 6		OCCUPANCY 14.5%			Speed 58

23

Mainline 30 Second Data

- Slightly different from metered lanes because of the ability to use dual detection systems for better speed accuracy

24

Mainline Detector Status (2-1-2)

```
          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
```

25

Mainline Detector Status

- In addition to individual detector status also has a lane status
- Partial Failure [PF] – One detector on a lane with dual detection has failed
- Total Failure [TF] – The only detector on a lane with single detection has failed or both loops in a lane with dual detection has failed

26

Know how to verify a controller in communicating in the field

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Development and Support

Know how to verify a controller in communicating in the field

March 2009

Verifying Communications

1. Check Metered Lane Phase Timing (B)
2. Check communications status page (7-4, 7-5 or 7-6)

Metered Lane Phase Timing (B)

```
     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
```


Metered Lane Phase Timing

- If communications time is not zero, controller is communicating

Serial Port Status (7-4 or 7-5)

```
              SERIAL PORT X
RX: 7E014309210D060A0400C57E


TX: 7E014300667E


Packet Type:   TOS SET TIME
```


Serial Port Status

- 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

Serial Port Status

- The URMS will respond to any known packet type if the drop number is correct
- If the drop number is not correct or the packet type is unknown the URMS will show a packet type of unknown

Know how to troubleshoot URMS software issues in the field

Office of ITS
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Know how to troubleshoot URMS software issues in the field

March 2009

URMS Software Issues

1. Verify that the controller has power
2. Can we access the URMS Main Menu
3. Verify that all URMS modules are running (9-A)
4. Reboot
5. Verify that all URMS modules are running
6. Remove controller from service
7. Call David Wells at (916) 653-1342

2

1. Is the controller powered

- Is power on?
- Is the Molex Power Cable Plugged in (PS2)?
- Are the Power Supply LED's on?

3

URMS Software Issues

```
Front Panel Manager
1-Universal Ramp Metering Software 0.95
```

4

2. Can we access the main menu?

- Did you select 1on the URMS Splash Screen to select the URMS?
- Is the contrast knob adjusted properly on the Front Panel?

5

3. Are all Modules Running?

```
URMS BACKGROUND MODULE STATUS

CFGMAN:    RUNNING     FFIOMAN: RUNNING
TIMING:    CRASHED     FPAMAN:  RUNNING
SERMAN:    RUNNING     LEDMAN:  RUNNING
TCP_POLL:  RUNNING     ACFAIL:  RUNNING
```

6

4. Reboot

- It's just like Windows – Rebooting will fix 90% of problems

7

5. Are all Modules Running Now?

```
URMS BACKGROUND MODULE STATUS

CFGMAN:    RUNNING     FFIOMAN: RUNNING
TIMING:    RUNNING     FPAMAN:  RUNNING
SERMAN:    RUNNING     LEDMAN:  RUNNING
TCP_POLL:  RUNNING     ACFAIL:  RUNNING
```

8

6. Remove the Controller from Service

- If the controller is still not working safely, remove the controller from service

9

7. Call Me

Contact me (David Wells)

Phone: (916) 653-1342
E-mail: david_j_wells@dot.ca.gov

10

Troubleshooting Modem Issues

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Troubleshooting Modem Issues

March 2009

Modem Troubleshooting

- 4 major areas of communications failure
  1. TMC to the 2070 Controller (Hardware issue)
  2. Controller to the URMS program (URMS issue)
  3. URMS program to the Controller (URMS issue)
  4. 2070 Controller to the TMC
- Other issues
  - Controller locks up the local drop line
  - Echo of characters when using 2 wire systems

2

Modem Troubleshooting

1. Is the 2070 Controller Receiving Serial Communications?
2. Is the URMS program receiving communications?
3. Does the URMS know what the packet type is?
4. Is the URMS transmitting the response?
5. Is the 2070 controller transmitting the response?
6. Is the ATMS/RMIS receiving the response?
7. Does the controller lock up the local drop line?
8. Transmitted characters are echoing back on a 2 wire modem

3

Modem Troubleshooting

1. Is the Controller Receiving Serial Communications?

   This will verify that the 2070 controller is actually receiving data from the TMC

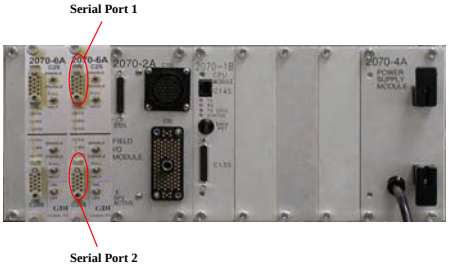
4

Is the Controller Receiving Serial Communications?

- Are we connected to the correct serial port?
- Is the modem Card Power switch “ON”?
- Are the modem switches correctly set (Modem/EIA-232 and Full/Half Duplex)
- Do we see communications coming into the controller?
  - CD light illuminated
  - RX light illuminated

5

Serial Port Locations



6

GDI MODEM Switches

Channel 1 MODEM Enabled Switch
Enabled – MODEM
Disabled – EIA 232

Channel 1 Full / Half Duplex

Channel 2 MODEM Enabled Switch
Enabled – MODEM
Disabled – EIA 232

Channel 2 Full / Half Duplex

Card Power

7

GDI MODEM Status Indications

Transmit Indication – Serial Port 1

Receive Indication – Serial Port 1

Carrier Detect Indication – Serial Port 1

Transmit Indication – Serial Port 2

Receive Indication – Serial Port 2

Carrier Detect Indication – Serial Port 2

8

Is the Controller Receiving Serial Communications?

- RX light should illuminated whenever a communications packet is received – even if the URMS is not running.
- In some Districts the CD light should always be illuminated when connected to the network

9

Modem Troubleshooting

2. Is the URMS program receiving communications?

   This will verify that the URMS program is actually reading the incoming packets from the 2070 modem

10

Is the URMS program receiving communications?

- Incoming and outgoing communications packets can be viewed in URMS menu item 7-4 (serial port 1) or 7-5 (serial port 2)
  - Note: The URMS will show every packet received on the multi-drop system, but will respond only to those packets that match the controller drop number (address)
  - Note: Packets addressed to other controllers will have an "UNKNOWN" packet type

11

Example URMS Packet Data Screen Shot (7-4 or 7-5)

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

TX: 614707211A0913280000000001080000000
    020000000000000000000000000000000044
    0E14000000FF0000003000000030000000

 Packet Type:   SDRMS NORMAL POLL
```

12

Is the URMS program receiving communications?

- Are we receiving packets?
- Is the modem in slot A2?
- Is the modem cable in the correct position (upper for serial port 1, lower for serial port 2)?

13

Serial Port Locations

Slot A1
DO NOT put a modem here
Slot not supported in URMS

Slot A2
Put the modem here

14

Is the URMS program receiving communications?

- If the modem is receiving data (RX light) but the URMS is not “seeing” the data the problem is either the modem hardware or software configuration is incorrect, the modem has internally locked up, or the modem has failed.
  - Check the URMS modem configuration
  - If safety allows – reboot controller after making modem configuration changes

15

Is Controller Communications Configured Correctly? (7-1 or 7-2)

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

16

Is Controller Communications Configured Correctly?

- Is the RTS ‘ON’ time set for 20 milliseconds for a 4 wire modem
- Is the RTS ‘ON’ time set to 30 milliseconds for a 2 wire modem
- You also try increasing these values to even greater numbers

17

Is Controller Communications Configured Correctly?

- Is the Baud rate correct (1200)?
- Is the parity correct (EVEN, ODD, NONE)?
- Is the stop bit correct (1)?
- Is the drop (address) set correctly?
- Is the port enabled?
- Is handshaking set to ‘None’?

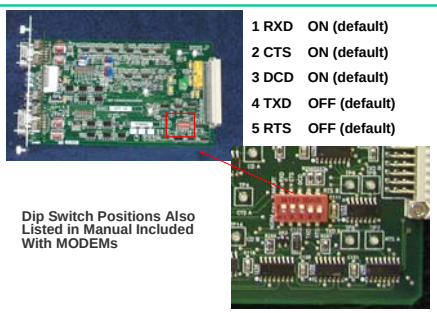
18

Is the URMS program receiving communications?

- Verify the internal modem TX/RX/DCD dip switches on the modem card

19

GDI MODEM Signal Inversion DIP Switches



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

Dip Switch Positions Also Listed in Manual Included With MODEMs

20

Modem Troubleshooting

3. Does the URMS know what the packet type is?

   This will verify that the URMS program actually understands the packet requests and that the controller drop address is correct

21

Does the URMS know what the packet type is? (7-4 or 7-5)

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

TX:

 Packet Type:    UNKNOWN
```

22

Does the URMS know what the packet type is?

- Number one reason that the URMS does not know what the packet type is that the drop number is incorrect.

23

Typical SATMS and SDRMS Poll Messages

- Typical SATMS POLL
  - 20/20/0D/0A/13/05/FF/FF/FF/00/15/
    - Drop Number is 19 (HEX 0x13)
- Typical SDRMS POLL
  - 63/03/00/00/66/AA/55/
    - Drop Number is 3 (Hex 0x3)

24

Modem Troubleshooting

4. Is the URMS transmitting the response?

   This will verify that the controller has correctly read the poll request and has sent the response packet to the modem for transmission

25

Is the URMS transmitting the response? (7-4 or 7-5)

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

TX: 614707211A0913280000000001080000000
    020000000000000000000000000000000044
    0E14000000FF000000300000003000000000

 Packet Type:   SDRMS NORMAL POLL
```

26

Modem Troubleshooting

5. Is the controller transmitting the response?

   This verifies that the 2070 controller modem actually transmitted the packet send by the URMS program

27

Is the controller transmitting the response?

- Verify that the TX light is illuminating on the modem card when a packet of data is transmitted

28

GDI MODEM Status Indications

Transmit Indication – Serial Port 1
Receive Indication – Serial Port 1
Carrier Detect Indication – Serial Port 1
Transmit Indication – Serial Port 2
Receive Indication – Serial Port 2
Carrier Detect Indication – Serial Port 2

29

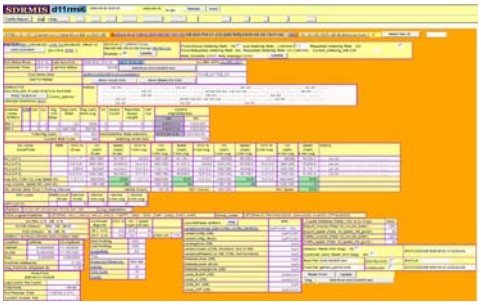
Modem Troubleshooting

6. Is the ATMS/RMIS receiving the response?

   This verifies that the requested poll data was actually received by the TMC

30

Is the ATMS/RMIS receiving the response?



31

Is the ATMS/RMIS receiving the response?

- May want to use a protocol analyzer to verify actual packet data received at the TMC

32

Modem Troubleshooting

7. Does the controller lock up the local drop line?

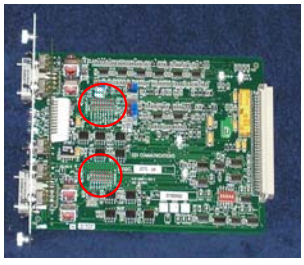
33

Does the controller lock up the local drop line?

- Is the modem dip switch 8 set to Anti-Streaming?

34

GDI Model 2070-6A 1200 Baud MODEM



Dip Switches

1 Full Duplex (not used) off
2 Half Duplex (not used) off
3 RTS/CTS Time
4 Soft Carrier Time
5 Half Duplex Local Echo
6 Rec. Squelch Time
7 Carrier Detect Time
8 Anti-Streaming Enable

35

GDI Model 2070-6A 1200 Baud MODEM

8 Anti-Streaming Enable

Set to ON (default is OFF)

This will prevent the modem from transmitting any single message for more than 5 seconds

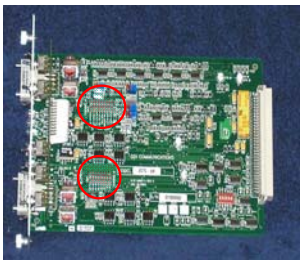
36

Do transmitted characters echo back on a 2 wire modem?

- Is the modem dip switch 5 Half Duplex Local Echo set to ON?

37

GDI Model 2070-6A 1200 Baud MODEM



Dip Switches

1 Full Duplex (not used) off
2 Half Duplex (not used) off
3 RTS/CTS Time
4 Soft Carrier Time
5 Half Duplex Local Echo
6 Rec. Squelch Time
7 Carrier Detect Time
8 Anti-Streaming Enable

38

GDI Model 2070-6A 1200 Baud MODEM

Dip Switches

5 Half Duplex Local Echo

Set to OFF (default) if using 4 wire modem
Set to ON if using 2 wire modem

39

Be Familiar with URMS Utilities Functions

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Be Familiar with URMS Utilities Functions

March 2009

Utilities Menu (9)

```
UTILITIES MENU
1-ACFAIL Event Log  7-Signal 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-FPA Display Test  C-Clear Car Counts
```

2

ACFAIL event log (9-1)

```
            URMS ACFAIL LOG
POWER UP    01-JAN-2008   00:27:38
POWER UP    06-JAN-2008   00:28:24
POWER UP    07-JAN-2008   00:29:39
POWER UP    08-JAN-2008   00:31:33
ACFAIL      10-JAN-2008   00:36:07
```

3

ACFAIL Event Log

- ACFAIL is any power failure that was to short in duration to cause a controller reboot
- POWER UP happens every time the controller boots up

4

Raw Input File Data (9-2)

```
     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  . . . . . . . . . .  .  .  .  .
Police Control Switch  *
Police Lights Switch   *
```

5

Raw Input File Data

- Shows the raw I File detection status currently being received by the controller

6

Raw Output File Data (9-3)

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

7

Raw Output File Data

- Shows the outputs to the Switch Packs currently being sent from the controller

8

Manual Detector Reset (9-4)

```
MANUAL DETECTOR RESET
Press * to reset detectors
```

9

Manual Detector Reset

- Allows user to send a 500 millisecond pulse to the detector reset output

10

Front Panel Test (9-5)

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

11

Front Panel Test

- Allows users to test the operation on the front panel keypad

12

Front Panel Display Test (9-6)

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

13

Front Panel Test

- Allows users to test the operation on the front panel display

14

Signal Display Test (9-7)

```
Signal Display 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
```

15

Signal Display Test

```
SIGNAL DISPLAY TEST

METERED LANE 1 RED
```

16

Signal Display Test

- Tests each configured output individually
- Used for testing wiring continuity

17

Lights Display Test (9-8)

```
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
```

18

Lights Display Test

```
LIGHTS DISPLAY TEST

ALL GREEN OUTPUTS ON
```

19

Signal Display Test

- Tests each set of signal lights together
  - For example all green indications, then all yellow indications
- Used for quickly verifying all signal lamps are working

20

File Checksums (9-9)

```
              FILE CHECKSUMS
CFGMAN:   604763        FFIOMAN: F6F3C9
MENU:     194D27        FPAMAN:  F88493
TIMING:   B7442D        LEDMAN:  7E0f86
SERMAN:   6BF6DD        ACFAIL:  B45DE0
TCP_POLL:C3EED8

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

21

Files Checksums

- Verifies the correct file checksums for the version of URMS you are using
- Calculates a file checksum for the entire configuration file
- Calculates a checksum composed of all the metering parameters
- Calculates a checksum composed of all the time-of-day table parameters

22

URMS Module Status (9-A)

```
      URMS BACKGROUND MODULE STATUS

CFGMAN:    RUNNING     FFIOMAN: RUNNING
TIMING:    RUNNING     FPAMAN:  RUNNING
SERMAN:    RUNNING     LEDMAN:  RUNNING
TCP_POLL:  RUNNING     ACFAIL:  RUNNING
```

23

Files Checksums

- Verifies the all the URMS subprograms are currently running

24

Backup Utilities (9-B)

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

25

Backup Utilities

- Allows users to backup the configuration file to a Datakey
- Allows uses to backup the configuration file to the 2070 FLASH memory
- Allows users to recover an existing configuration file from the 2070 FLASH memory

26

Clear Car Counts (9-C)

```
CLEAR CAR COUNTS

Press * to clear car counts
```

27

Clear Car Counts

- Will reset all car count values to 0

28

Be familiar with some of the issues with using URMS with the existing RMIS/ATMS

Office of ITS
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Be familiar with some of the issues with using URMS with the existing RMIS/ATMS

March 2009

URMS Issues

1. URMS does not use specific memory locations like the 170 does. Memory is allocated dynamically by the 2070 operating system.
2. URMS Support of setting and getting metering parameters using RMIS/ATMS systems is very limited
3. URMS does not calculated data in quite the same way so polled data may not have exactly the same meaning in URMS
4. URMS only supports 1 Queue Detector per Metered Lane

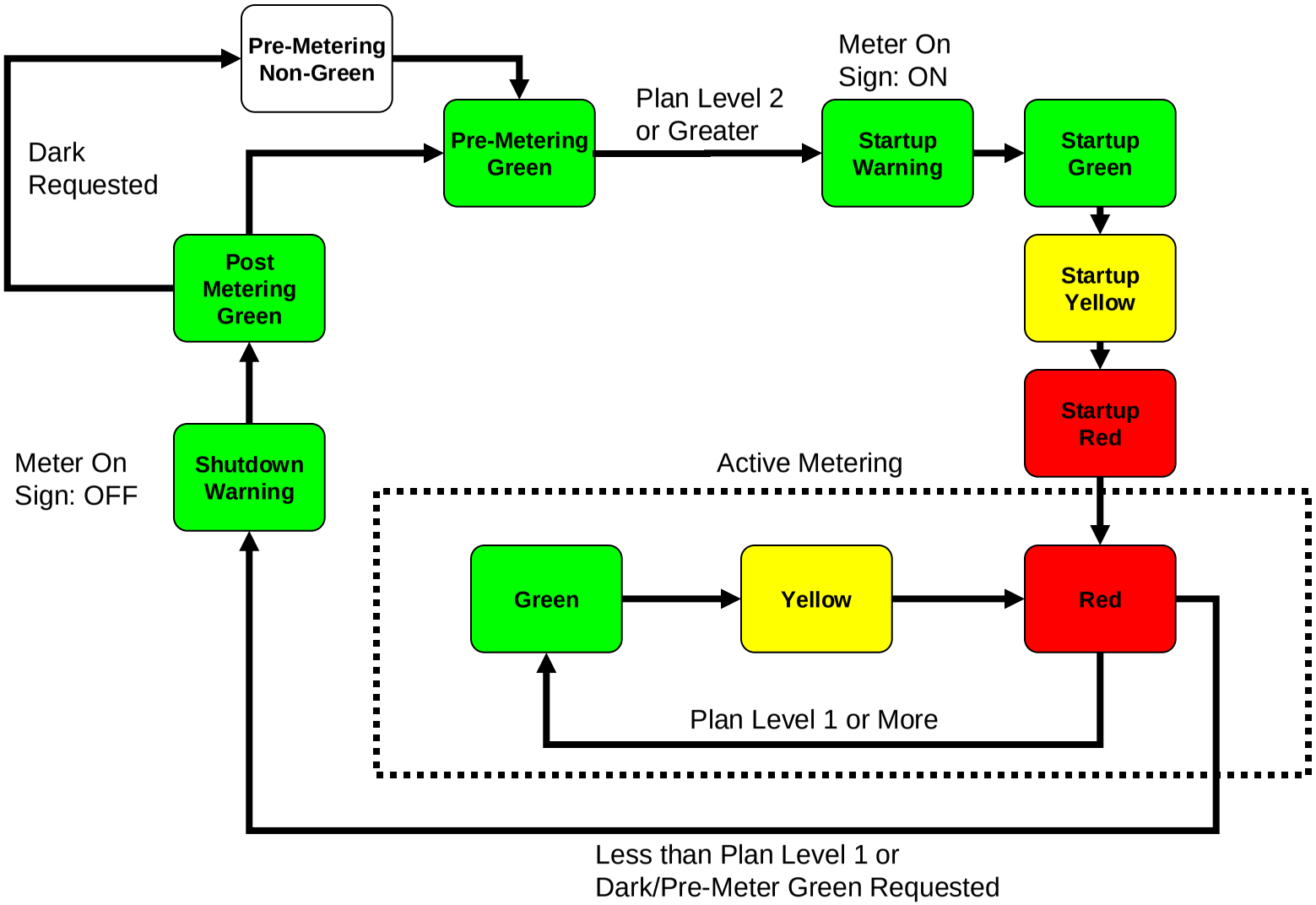
2

URMS Issues

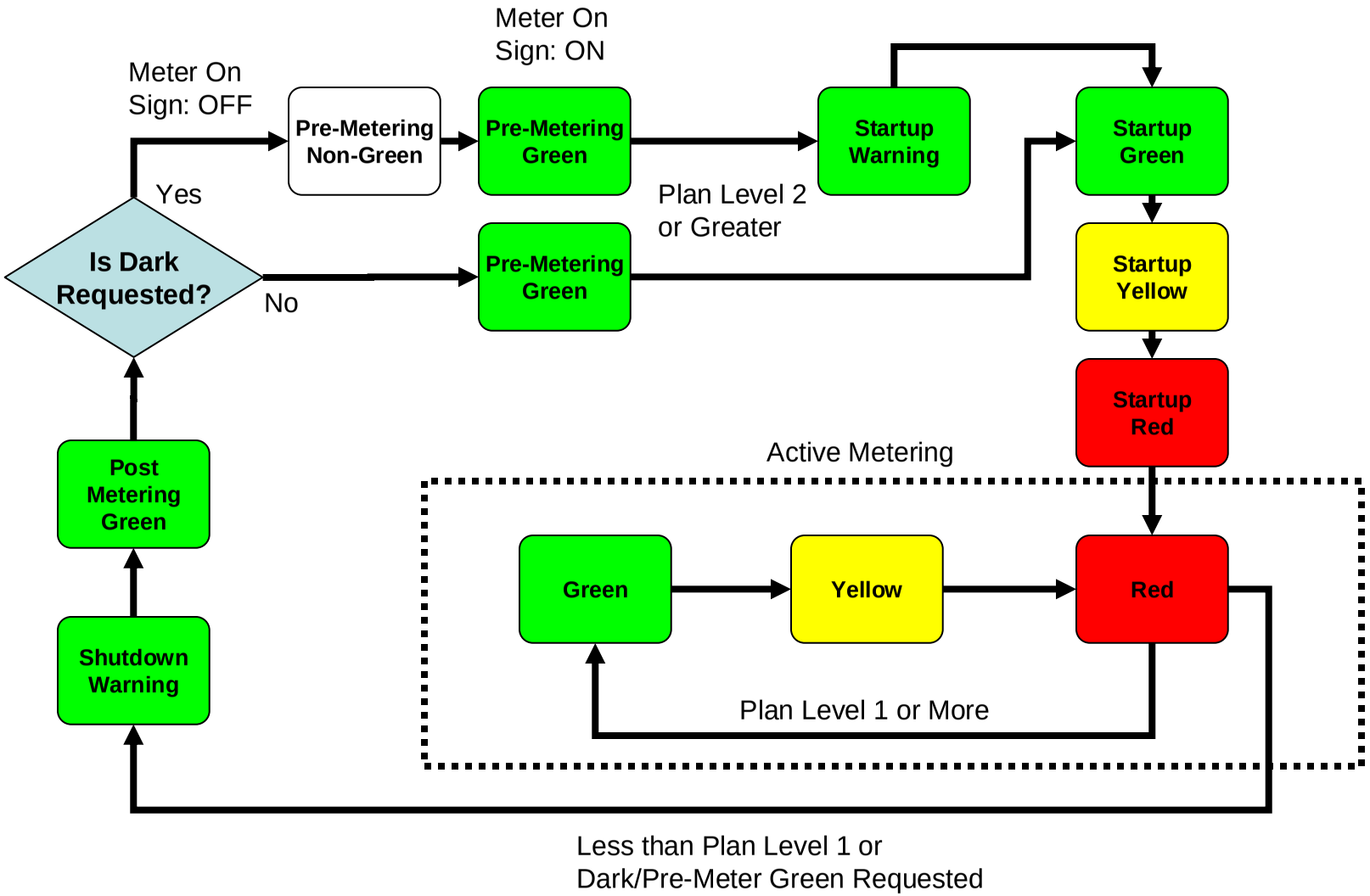
5. Yellow time is not set automatically when more than one vehicle per green is selected.

3

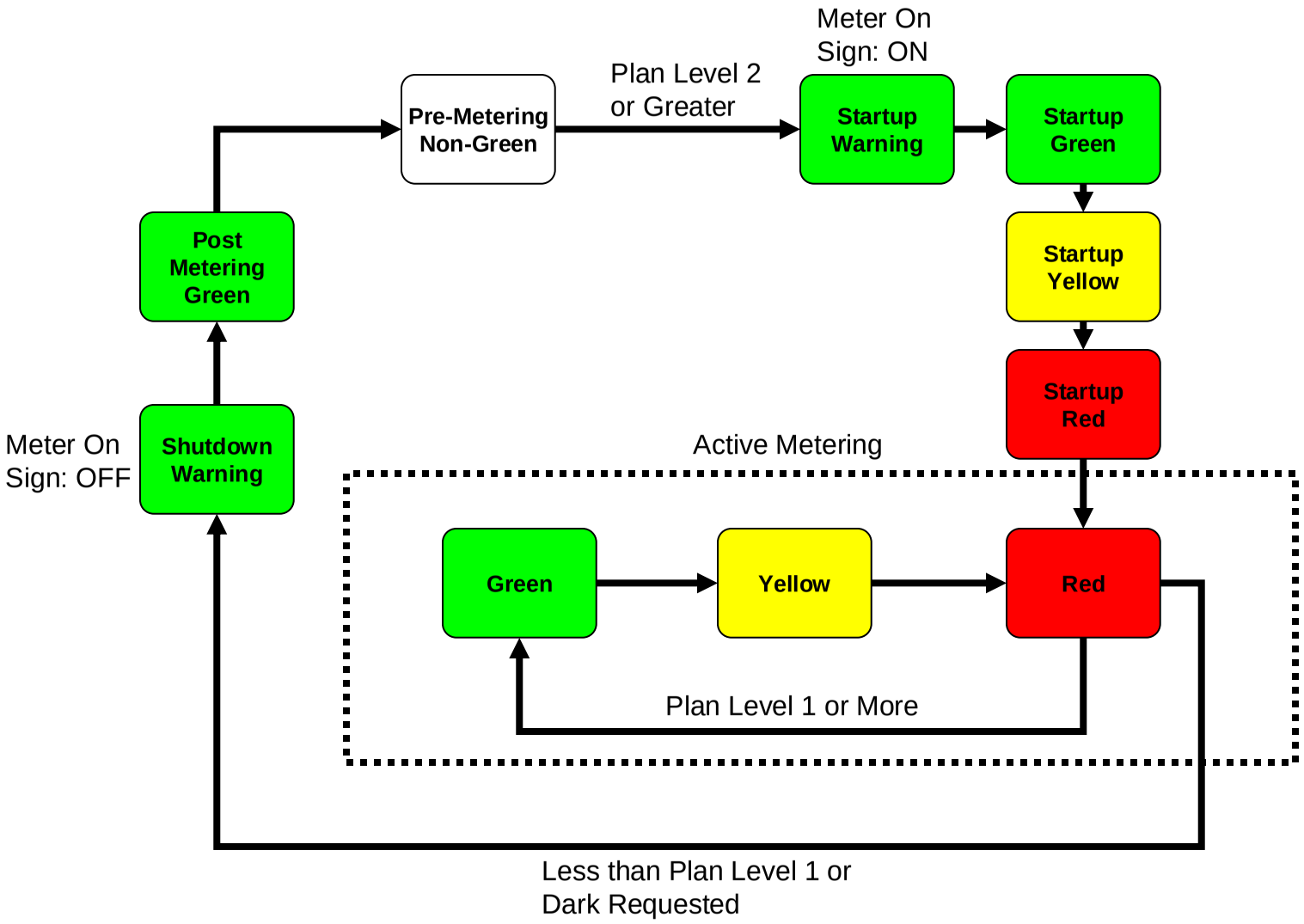
Traffic Responsive – Green
Startup Warning Time Greater than Zero



Traffic Responsive – Green
Startup Warning Time Equal to Zero



Traffic Responsive – Dark



URMS
How Day Plans are Set Up

Day plans are set up in 2 or 3 parts and use both the Day Plan menu and the Time Based Control Table. If the Time Based Control Table has a selected mode of Traffic Responsive, then a Plan is also used to find the correct metering rate based on mainline traffic.

Day Plan (6-2)

Day Plan determines what time based control table is selected at the time of day and days the of week selected. Additionally, you can make HOV lanes active (YES) or inactive (NO). If yes is selected, then any mainline lane that has been configured as a HOV lane is NOT counted in Mainline Averages for Traffic Responsive Metering.

Time Based Control Table (6-3-x)

Time Based Control Table sets the controllers **RATE** (for fixed rate metering), **PLAN** (for traffic responsive metering) and **ACTION** (Traffic Responsive, Rest-in-Green, Rest-in-Dark, Fixed Rate, or Skip)

Plan (4-x)

Plan determines the metering rate whenever the signal is configured to run in traffic responsive mode. Active metering starts when the mainline traffic threshold in the metering plan exceeds level 2. Active metering stops when the threshold is below metering plan level 1. Speed, Occupancy and Flow levels are compared, and the metering rate is set to the highest (most restrictive) level. If plan speed, occupancy or flow levels are set to zero then that level is skipped.

URMS Configuration Worksheet Page 1/4

Route: Example Direction: NB P.M. Location: Example
E No Location No. Line No. Engineer: D. Wells

General Items (8-7)	
IO Configuratation	
Number of Metered Lanes	
Number of Mainlines	
Number of Opposite Mainlines	
Number of Ramps	
Traffic Responsive Mode	
Other Selected Items	
Traffic Resp Ave. Periods (8-6)	
Daylight Savings (6-1)	
Drop Number (7-x)	
Failsafe Inputs (8-5)	
Fail-safe Feedback	

Floating Holidays (6-4)

	Month	Week	Day	Holiday Name
	Jan	3	Monday	Martin Luther King Day
	Feb	3	Monday	Presidents Day
	May	5	Monday	Memorial Day
	Sep	1	Monday	Labor Day
	Oct	2	Monday	Columbus Day
	Nov	4	Thursday	Thanksgiving
	Nov	4	Friday	Day after Thanksgiving

Fixed Holidays (6-5)

	Month	Day	Holiday Name
	Jan	1	New Years Day
	Feb	12	Lincolns Birthday
	Mar	31	Ceasar Chevez Day
	July	4	Independence Day
	Nov	11	Veterans Day
	Dec	25	Christmas

URMS Configuration Worksheet Page 2/4

Route:Example Direction: NB P.M. Location: Example
E No Location No. Line No. Engineer: D. Wells

Metered Lanes (1-5)

		1	2	3	4
General	Dep Group				
	VPG				
	Red Lock				
Startup	Min Metering				
	Startup Alert				
	Startup Warning				
	Startup Green				
	Yellow				
	Startup Red				
Metering	Min Green				
	Max Green				
	Yellow				
	Min Red				
	Demand Gap				
	Demand Red				
Shutdown	Shut Warn				
	Port Green				
	Shut Time				
	Min Non-Meter				
	Q VS. Shutdown				

		A	B	C
Groups	Service Mode			
	GRN Offset Time			
	Fract Offset Time			

		1	2	3	4
Demand	Demand Mode				
	Max Pressence				
	No Activity				
	Erratic Count				
	Dep Max Press				
	Dep No Activity				
Passage	Passage Mode				
	Max Pressence				
	No Activity				
	Erratic Count				
Queue	Queue Mode				
	Max Pressence				
	No Activity				
	Erratic Count				
	Dep Max Press				
	Dep No Activity				
Queue Adjust	Adjust Mode				
	Len Up Limit				
	Len Lwr Limit				
	Occ Up limit				
	Occ Lwr limit				
	Replacement Rate				
Queue Rates	Adjust Rate				
	Rate Interations				
	Rate Delay				
	Adjust Level				
	Level Inerations				
	Level Delay				
Overrride	Flow Limit				
	Occ Limit				
	Speed Limit				
	Override in Com				

URMS Configuration Worksheet Page 3/4

Route:Example Direction: NB P.M. Location: Example
E No Location No. Line No. Engineer: D. Wells

Mainline Lanes (2-1-5)								
	Mainline 1	Mainline 2	Mainline 3	Mainline 4	Mainline 5	Mainline 6	Mainline 7	Mainline 8
Lane Mode								
Lead Zone Length								
Trail Zone Length								
Speed Trap Spacing								
Erratic Count Threshold								
Max Presence Threshold								
Typical Vehicle Length								
HOV Lane								

Opposite Lanes (2-2-5)								
Opposite Lanes	Opposite 1	Opposite 2	Opposite 3	Opposite 4	Opposite 5	Opposite 6	Opposite 7	Opposite 8
Lane Mode								
Lead Zone Length								
Trail Zone Length								
Speed Trap Spacing								
Erratic Count Threshold								
Max Presence Threshold								
Typical Vehicle Length								
HOV Lane								

Additional Detection Locations (3-5)								
	Det 1	Det 2	Det 3	Det 4	Det 5	Det 6	Det 7	Det 8
Det Mode								
Erratic Count Threshold								
Max Presence Threshold								
No Activity Threshold								
	Det 9	Det 10	Det 11	Det 12	Det 13	Det 14	Det 15	Det 16
Det Mode								
Erratic Count Threshold								
Max Presence Threshold								
No Activity Threshold								

URMS Configuration Worksheet Page 4/4

Route:Example Direction: NB P.M. Location: Example
E No Location No. Line No. Engineer: D. Wells

INTV	Time of Day (HRS)	Default Rate (VPH)	Plan	Days of the Week S	M	T	W	T	F	S	H	Devices 1	2
01													
02													
03													
04													
05													
06													
07													
08													

Level	Traffic Responsive Plan 1 (4-1) Metering Rate (VPH)	Occupancy Threshold	Flow Rate Threshold (VPH)	Speed Threshold	Traffic Responsive Plan 2 (4-2) Metering Rate (VPH)	Occupancy Threshold	Flow Rate Threshold (VPH)	Speed Threshold
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

URMS Configuration Worksheet Page 1/4

Route: D6 Example Direction: NB P.M. Location: Example
E No Location No. Line No. Engineer: D. Wells

General Items (8-7)	
IO Configuratation	D6RMS1
Number of Metered Lanes	2
Number of Mainlines	4
Number of Opposite Mainlines	0
Number of Ramps	2
Traffic Responsive Mode	GREEN
Other Selected Items	
Traffic Resp Ave. Periods (8-6)	6
Daylight Savings (6-1)	YES
Drop Number (7-x)	1
Failsafe Inputs (8-5)	
Fail-safe Feedback	NO

Floating Holidays (6-4)

	Month	Week	Day	Holiday Name
X	Jan	3	Monday	Martin Luther King Day
X	Feb	3	Monday	Presidents Day
X	May	5	Monday	Memorial Day
X	Sep	1	Monday	Labor Day
X	Oct	2	Monday	Columbus Day
X	Nov	4	Thursday	Thanksgiving
X	Nov	4	Friday	Day after Thanksgiving

Fixed Holidays (6-5)

	Month	Day	Holiday Name
X	Jan	1	New Years Day
	Feb	12	Lincolns Birthday
	Mar	31	Ceasar Chevez Day
X	July	4	Independence Day
X	Nov	11	Veterans Day
X	Dec	25	Christmas

URMS Configuration Worksheet Page 2/4

Route:D6 Example Direction: NB P.M. Location: Example
E No Location No. Line No. Engineer: D. Wells

Metered Lanes (1-5)

		1	2	3	4
General	Dep Group	A	A	A	A
	VPG	1	1	1	1
	Red Lock	No	No	No	No
Startup	Min Metering	4	4	4	4
	Startup Alert	1.0	1.0	1.0	1.0
	Startup Warning	1.0	1.0	1.0	1.0
	Startup Green	25.0	25.0	25.0	25.0
	Yellow	4.3	4.3	4.3	4.3
	Startup Red	2.0	2.0	2.0	2.0
Metering	Min Green	1.5	1.5	1.5	1.5
	Max Green	2.5	2.5	2.5	2.5
	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	4.0	4.0	4.0	4.0
Shutdown	Shut Warn	3.0	3.0	3.0	3.0
	Port Green	40.0	40.0	40.0	40.0
	Shut Time	0	0	0	0
	Min Non-Meter	2	2	2	2
	Q VS. Shutdown	No	No	No	No

		A	B	C
Groups	Service Mode	Fixed Offset	Fixed Offset	None
	GRN Offset Time	4.0	4.0	4.0
	Fract Offset Time	0.0	0.0	2.0

		1	2	3	4
Demand	Demand Mode	Enabled	Enabled	Enabled	Enabled
	Max Pressence	0	0	0	0
	No Activity	0	0	0	0
	Erratic Count	0	0	0	0
	Dep Max Press	0	0	0	0
	Dep No Activity	0	0	0	0
Passage	Passage Mode	Enabled	Enabled	Enabled	Enabled
	Max Pressence	0	0	0	0
	No Activity	0	0	0	0
	Erratic Count	0	0	0	0
Queue	Queue Mode	Disabled	Disabled	Disabled	Disabled
	Max Pressence	0	0	0	0
	No Activity	0	0	0	0
	Erratic Count	0	0	0	0
	Dep Max Press	0	0	0	0
	Dep No Activity	0	0	0	0
Queue Adjust	Adjust Mode	Fixed	Fixed	Fixed	Fixed
	Len Up Limit	7	7	7	7
	Len Lwr Limit	2	2	2	2
	Occ Up limit	90	90	15	15
	Occ Lwr limit	80	80	8.5	8.5
	Replacement Rate	1200	1200	1200	1200
Queue Rates	Adjust Rate	0	0	50	50
	Rate Interations	0	0	8	8
	Rate Delay	30	30	30	30
	Adjust Level	0	0	2	2
	Level Inerations	0	0	3	3
	Level Delay	30	30	30	30
Overrride	Flow Limit	0	0	0	0
	Occ Limit	0	0	0	0
	Speed Limit	0	0	0	0
	Override in Com	No	No	No	No

URMS Configuration Worksheet Page 3/4

Route:D6 Example Direction: NB P.M. Location: Example
E No Location No. Line No. Engineer: D. Wells

Mainline Lanes (2-1-5)

	Mainline 1	Mainline 2	Mainline 3	Mainline 4	Mainline 5	Mainline 6	Mainline 7	Mainline 8
Lane Mode	Lead	Lead	Lead	Lead	Lead	Lead	Disabled	Disabled
Lead Zone Length	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Trail Zone Length	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Speed Trap Spacing	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Erratic Count Threshold	22	22	22	22	22	22	22	22
Max Presence Threshold	5	5	5	5	5	5	5	5
Typical Vehicle Length	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
HOV Lane	No	No	No	No	No	No	No	No

Opposite Lanes (2-2-5)

Opposite Lanes	Opposite 1	Opposite 2	Opposite 3	Opposite 4	Opposite 5	Opposite 6	Opposite 7	Opposite 8
Lane Mode	Lead	Lead	Lead	Lead	Lead	Lead	Disabled	Disabled
Lead Zone Length	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Trail Zone Length	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Speed Trap Spacing	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Erratic Count Threshold	22	22	22	22	22	22	22	22
Max Presence Threshold	5	5	5	5	5	5	5	5
Typical Vehicle Length	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
HOV Lane	No	No	No	No	No	No	No	No

Additional Detection Locations (3-5)

	Det 1	Det 2	Det 3	Det 4	Det 5	Det 6	Det 7	Det 8
Det Mode	Enabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Erratic Count Threshold	0	0	0	0	0	0	0	0
Max Presence Threshold	0	0	0	0	0	0	0	0
No Activity Threshold	0	0	0	0	0	0	0	0
	Det 9	**Det 10**	**Det 11**	**Det 12**	**Det 13**	**Det 14**	**Det 15**	**Det 16**
Det Mode	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Erratic Count Threshold	0	0	0	0	0	0	0	0
Max Presence Threshold	0	0	0	0	0		0	0
No Activity Threshold	0	0	0	0	0	0	0	0

URMS Configuration Worksheet Page 4/4

Route:D6 Example Direction: NB P.M. Location: Example
E No Location No. Line No. Engineer: D. Wells

INTV	Time of Day (HRS)	Default Rate (VPH)	Plan	Days of the Week								Devices	
				S	M	T	W	T	F	S	H	1	2
01	530	600	PLAN 1		X	X	X	X	X			OFF	OFF
02	930	600	Dark		X	X	X	X	X			OFF	OFF
03												OFF	OFF
04												OFF	OFF
05												OFF	OFF
06												OFF	OFF
07												OFF	OFF
08												OFF	OFF

Level	Traffic Responsive Plan 1 (4-1)				Traffic Responsive Plan 2 (4-2)			
	Metering Rate (VPH)	Occupancy Threshold	Flow Rate Threshold (VPH)	Speed Threshold	Metering Rate (VPH)	Occupancy Threshold	Flow Rate Threshold (VPH)	Speed Threshold
1	570	12.2	1538	0	240	0.0	0	0
2	570	15.9	1700	0	240	0.0	0	0
3	551	16.1	1721	0	240	0.0	0	0
4	533	16.3	1742	0	240	0.0	0	0
5	514	16.5	1763	0	240	0.0	0	0
6	496	16.7	1784	0	240	0.0	0	0
7	477	16.9	1805	0	240	0.0	0	0
8	458	17.1	1826	0	240	0.0	0	0
9	440	17.3	1847	0	240	0.0	0	0
10	421	17.5	1868	0	240	0.0	0	0
11	403	17.7	1889	0	240	0.0	0	0
12	384	17.9	1910	0	240	0.0	0	0
13	384	18.1	1931	0	240	0.0	0	0
14	384	18.3	1952	0	240	0.0	0	0
15	384	18.5	1973	0	240	0.0	0	0

2070 Drop Number Convsersion Table
Use only when you need to do both Normal and Opposite Side Polling

Lower - SDRMS Normal Poll	Upper - Opposite Side Poll															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
1	1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
2	2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
3	3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
4	4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
5	5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
6	6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
7	7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
8	8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
9	9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
10	10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
11	11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
12	12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
13	13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
14	14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
15	15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255