SMRHS – Application Note

Servo Control of Semaphores

Mechanical

The method of control used on the semaphores at the Bahia location is integration between current sinking outputs of C-MRI node 1, output card address 11 and the Tam Valley Depot Dual 3-way Mark II Servo Accessory Decoder (decoder).

The Decoder is supplied with 12 VDC and on-board generates a 5 VDC source for the connection to signal inputs (C-MRI outputs).

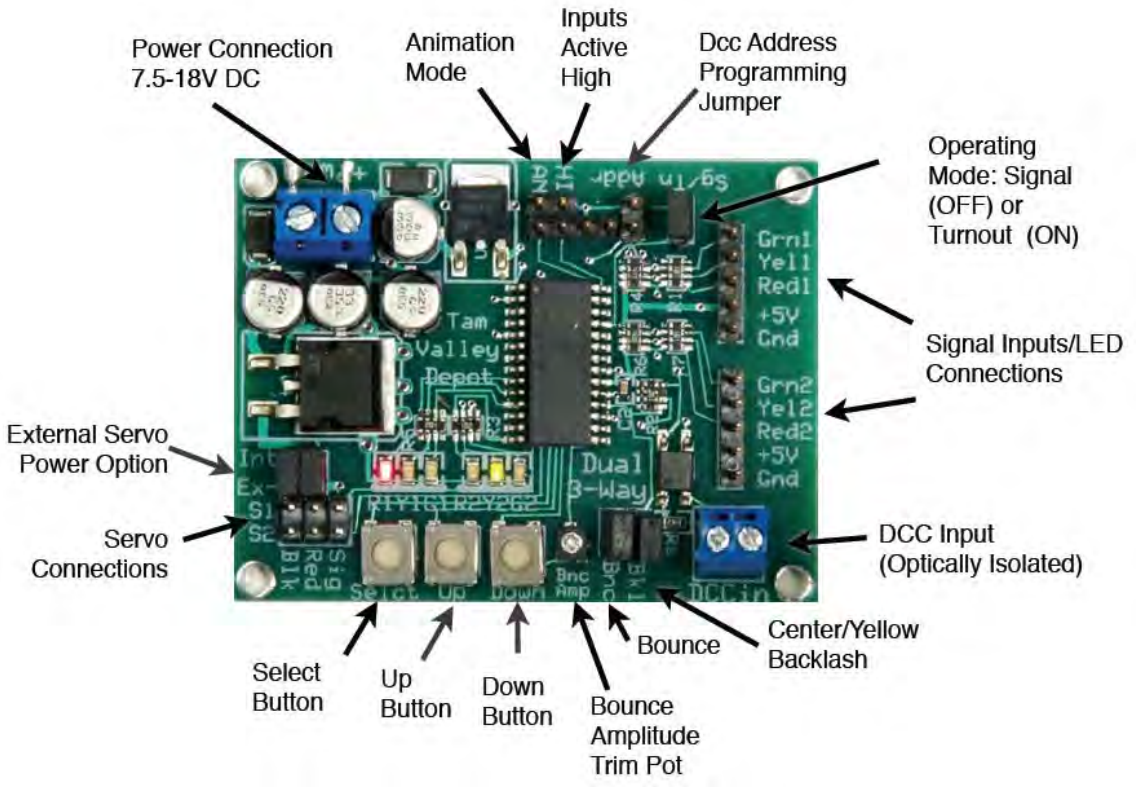


Figure 1 Tam Valley Decoder

Jumper settings: AN not; HI not; ADDR not; SG/TN not; BK1 not; BNC jumped; SIG, RED and BLK are the 3-wire connection pins for each servo motor (S1 and S2); IN and EX jumped as shown.

12 VDC comes into the upper left corner.

C-MRI output controls (2 per semaphore blade (not using center lens/position) tied to Signal Inputs GRN and RED terminals. Upper and lower blade servo motors get independent tie-downs (two green terminal blocks).

C-MRI outputs provide the switched path to ground for the 5 VDC loaded on the signal inputs, and J-MRI PanelPro provides the logic that integrates block detection.

The lighting to the LEDs in the semaphores it kept on all the time, this is on a separate small board with dropping resistors and terminal pins.

Programming (Training) Servo Positions and Speed

The system ships with the servos programmed for a small movement so that it will not move too far and break something before it is trained. To train the final positions, use the 3 buttons marked Select, Up and Down. Press and hold Select for about 1/2 second until the LEDs start flashing.

Figure 2 Decoder buttons and LED's

You can then program the servo Red position by pressing the Up/Down buttons. Press Select briefly again to move the next position and train it using Up/Down again. Each press of Select will move to the next servo position (The controller LEDs will indicate the current position) until you have cycled through all 3 and then it will let you set the servo speed. In this mode the Up and Down buttons change the servo speed. Each press alternates the servo direction so you can see the effect of the speed change. Once the speed is set pressing Select again will take you to the second servo.

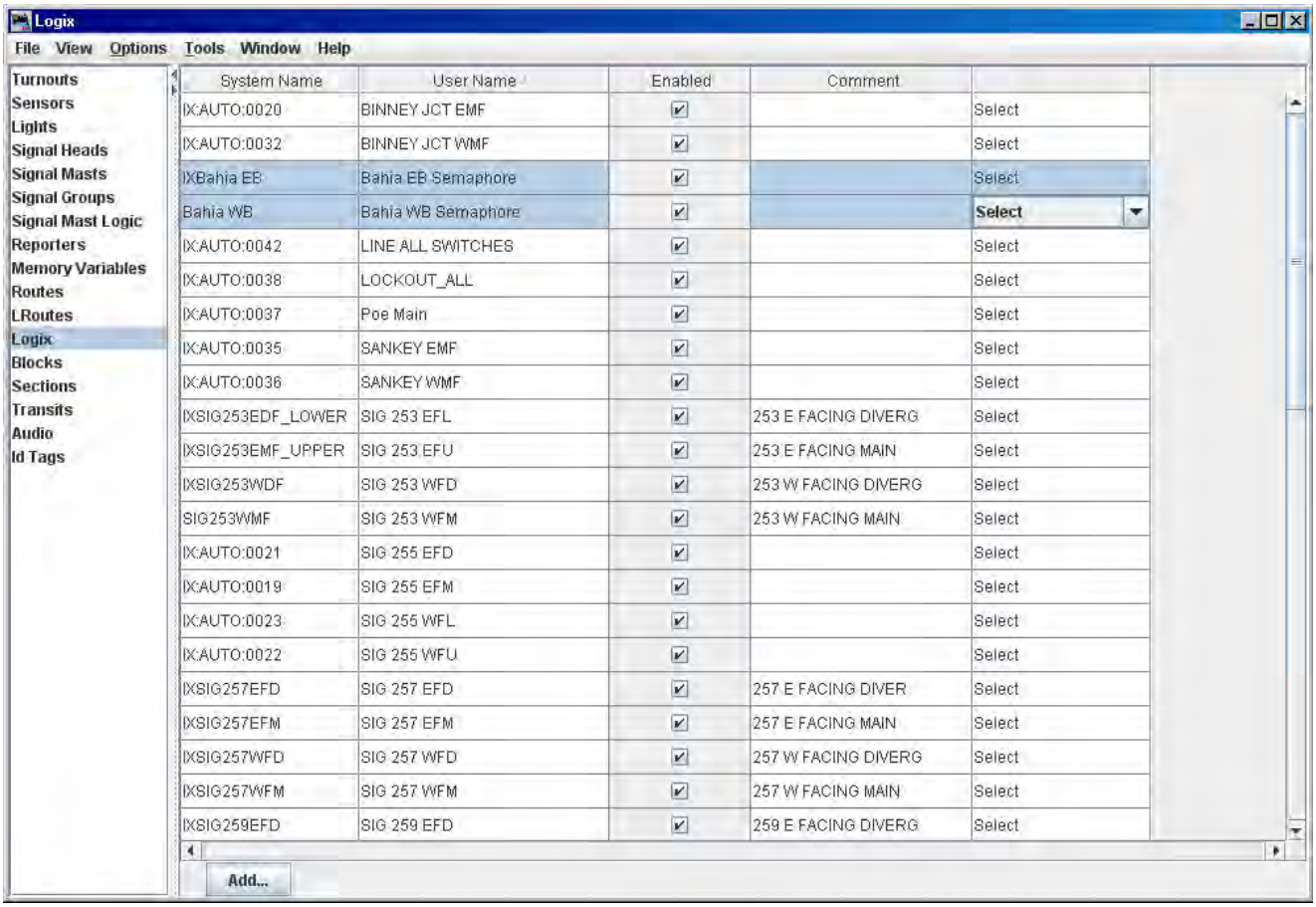
When done, press and hold Select again to exit the training mode and save the positions.

Programming JMRI PanelPro

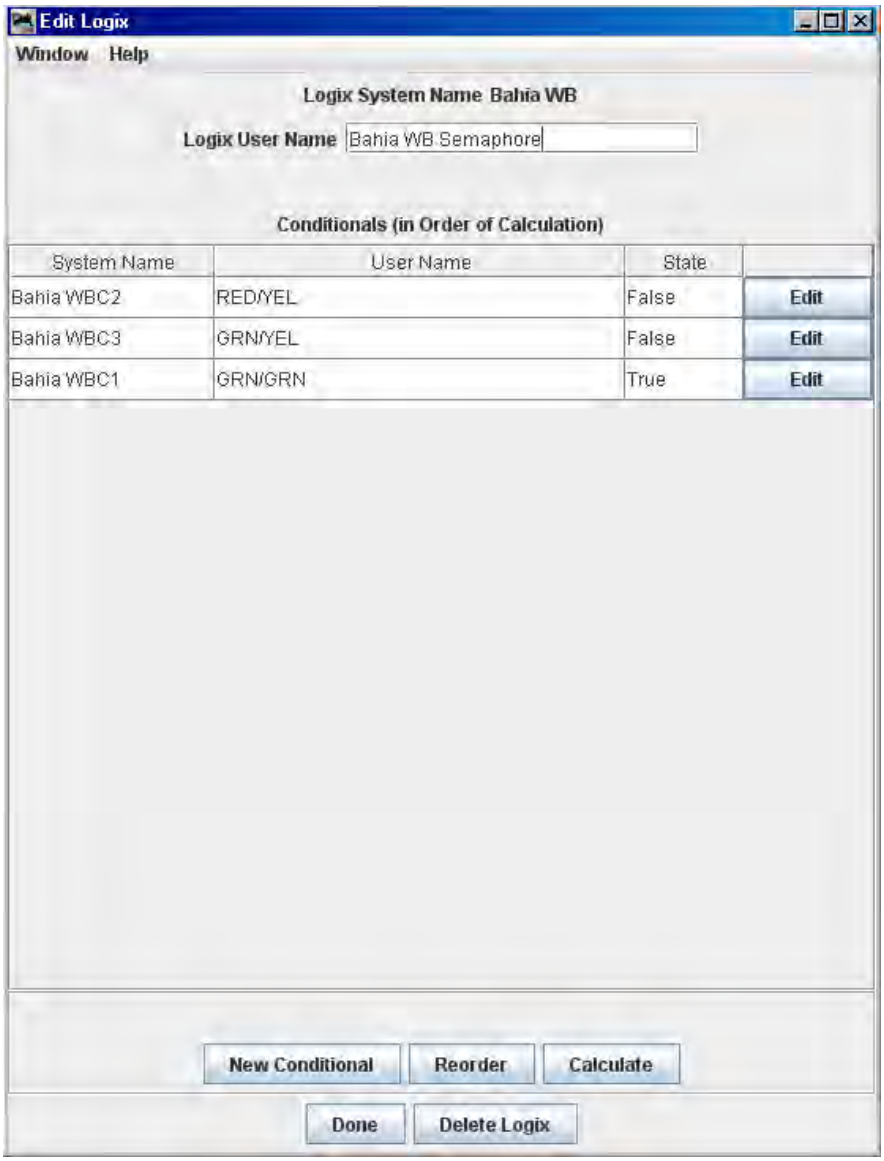
Each semaphore blade is treated as a signal head with two aspects, green and red; these aspects are then tied in the PanelPro software to the specific outputs on a C-MRI node. Each semaphore signal consists of an upper blade (home block, nearest the signal) and a lower blade (distant block, beyond the home block).

LOGIX statements are created based on block occupancy for both the home and distant blocks.

Screen shots follow.



This is the list of tables in PanelPro, Logix has been selected and the list moved to show the Bahia semaphore controls. A separate Logix is created for each semaphore mast. The right hand column provides a drop-down list and “edit” is selected for the WB semaphore.

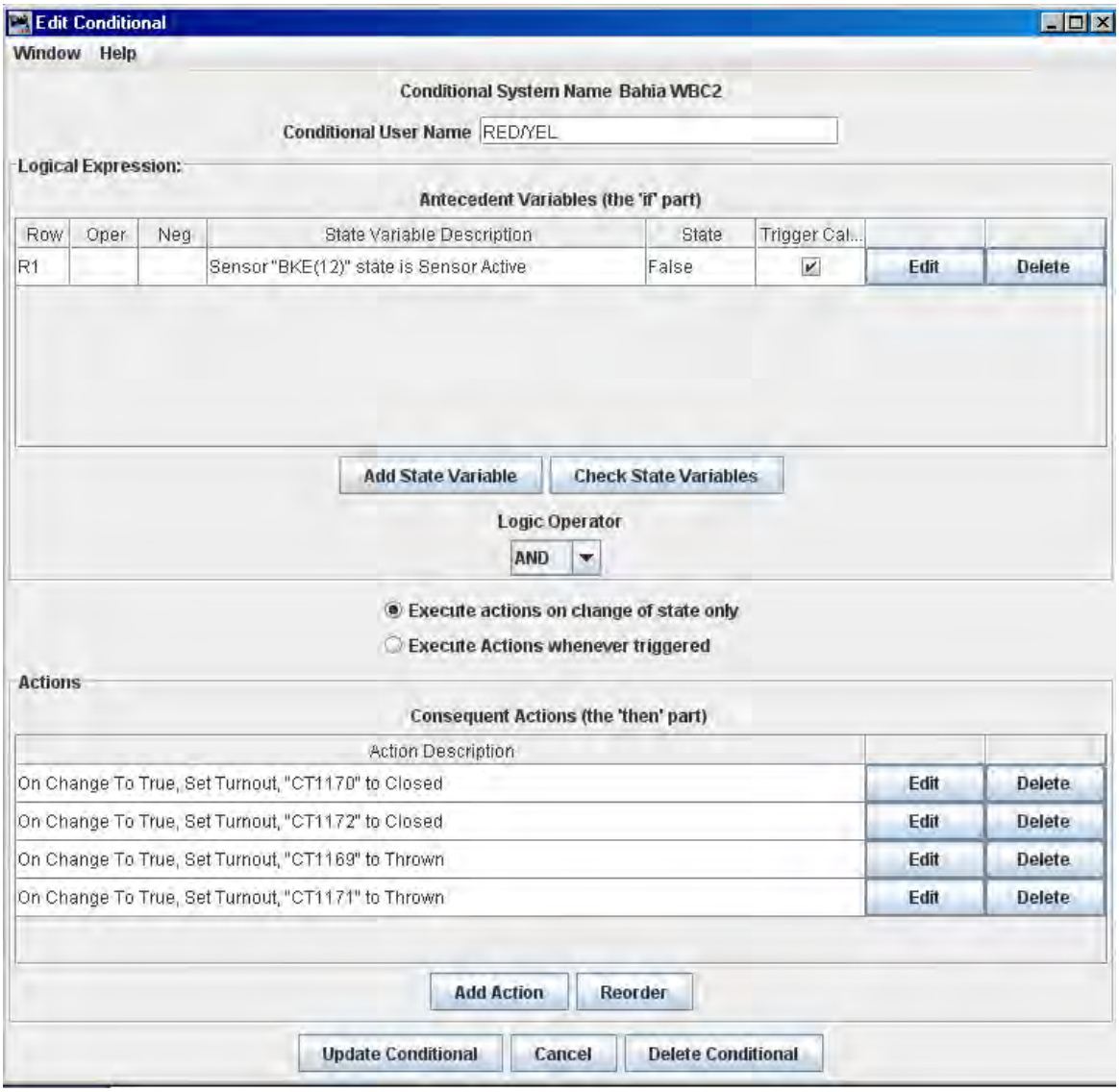


This is the resulting screen from the previous step. Each logical state gets its own expression or "Conditional"; the nomenclature used is color over color (or top blade over lower blade). Next screen is result of choosing "edit" for the RED/YEL.

States/definitions:

- RED/YEL = both home and distant blocks are occupied STOP
- GRN/YEL = home block clear, distant block occupied APPROACH (next signal would be a STOP)
- GRN/GRN = both home and distant blocks are CLEAR

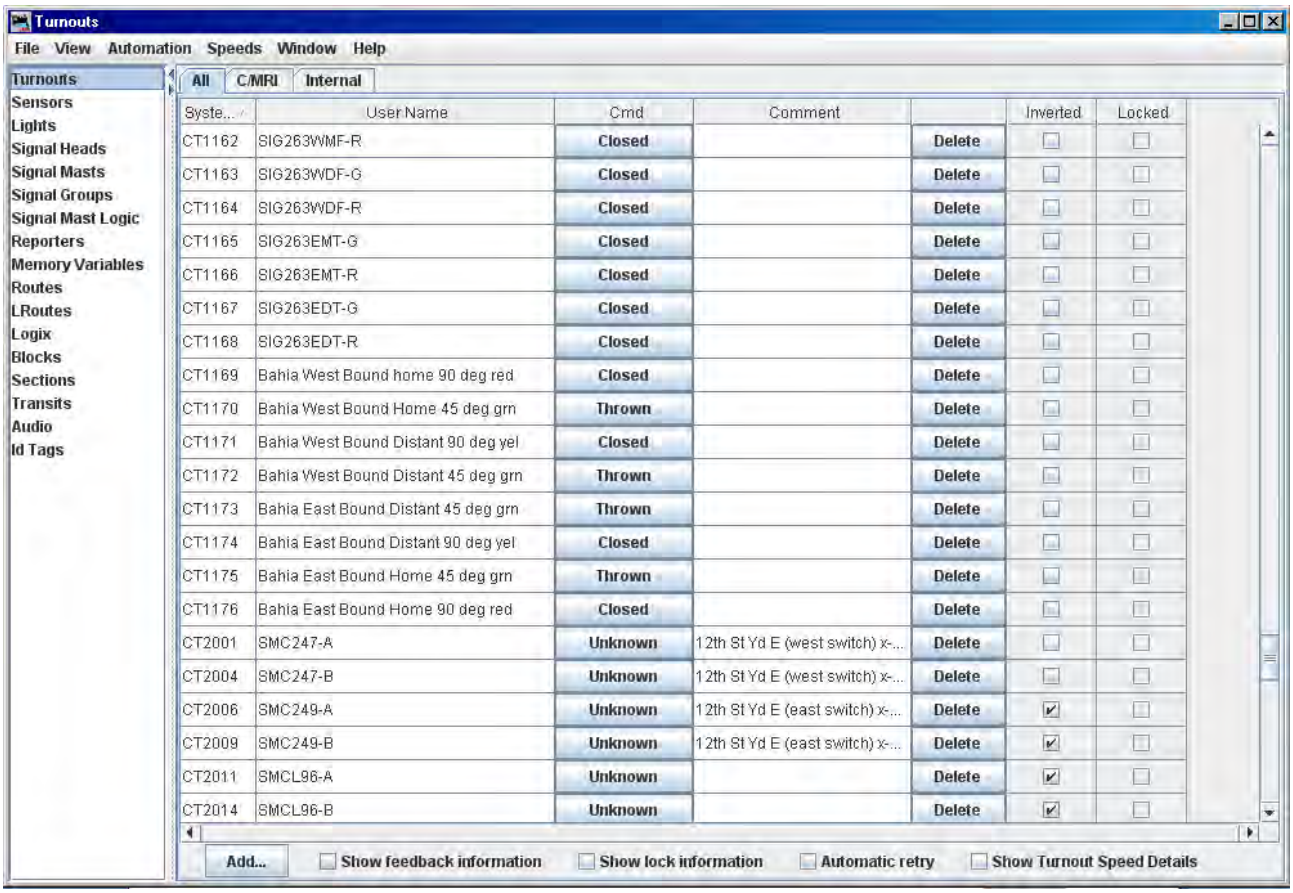
Home block is the block following the signal mast; distant block is the next block in direction of travel past the HOME block.



This is the conditional RED/YEL; note it really only looks at one state variable, the home block occupancy for BKE(12). In the other two conditionals you will find that two block occupancy sensors are referenced to set up the GRN/YEL or GRN/GRN states, using the AND operator (where both state variables must be true to toggle the operation).

Finally, the "Actions" part of the screen. We have assigned two (current sinking) outputs from the C-MRI hardware for each blade, thus a double blade mast will consume 4 outputs. These were defined in the "Turnout" table (though they are not turnouts, just generic outputs, see next screen for this table).

When the state variable changes to true, all four actions launch. You can click "Edit" to see how an Action is set up.



Refer back to page 4's screen shot – what conditional was showing "True"?

In the turnout table shown above, the 8 turnout (think generic output) assignments are shown for the 2 semaphore masts at Bahia. Look at the 4 westbound assignments – note which 2 are "Thrown" (think "ON") and look at the "User Name" description – does this match what you expect?

Remember that the Servo controller/decoder has 3 sensor inputs per servo motor connection (=1 blade) and we are only using 2 of the 3 inputs; each input will select either the 90 degree position or the 45 degree position.