

PROGRAMMING MANUAL

Tommy Car Wash Tunnel Controller

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DESCRIPTION

The Tommy Controller offers total automation for the automatic car wash tunnel.

The Tommy car wash controller is de-signed to control the entire physical operation of the carwash tunnel. The controller will operate a conveyORIZED equipment package, utilizing traditional over/under roller type conveyors, surface conveyors, or belt type conveyors, using a steady pulse created in relation to conveyor speed. As the vehicle moves along within the car wash tunnel, it will turn on and off solenoid valves, chemical application pumps, lights, electric motor starters, and other car wash equipment through internal relays. Electric motors can be controlled and monitored with variable speed drives (VSD), directly communicating via Ethernet networks. In addition to controlling output applications, signals and systems critical to proper operation are continually monitored. All these signals can be viewed on site or on line anywhere through an internet connection. A special feature of the controller is its ability to notify the operator of any control problems within the car wash through visual banners, text messages, or email.

OPERATION

The operation of Tommy is to simply accept the wash configuration from the car wash customer and automatically wash their vehicle in a precise and accurate manner. This is accomplished by accepting a pulse (clock) signal in direct proportion to the movement and speed of the car wash conveyor, matching it with the gate (enter) signal received at the beginning of the wash equipment, measuring the vehicle, and turning on and off the functions as programmed in direct relationship to the vehicle size and it's speed as it travels through the car wash tunnel.

FEATURES

- Modular, "plug and play" construction saves thousands of dollars in installation time and wiring costs. Remote modules, motor control centers, variable speed drives, premises lighting panels, and additional touchscreens can all be connected together via Ethernet networks.
- Full output control for each function - entire vehicle, as well as front, rear, middle, and tire application. Configurable starting sequencers, "look-back" set points, and flash rates. Function outputs can react within the wash stop or anti-collision loops, or outside either loop for special safety reasons.
- With 36 different wash packages, each with 29 variables, any combination of wash services can be programmed for wash customers purchasing services.
- Manual or automatic vehicle loading, with outputs available for a full range of signaling devices to guide the car wash customer into and away from the car wash system.
- Equipment safety sensor inputs accept signals from tank level switches and other devices to protect motors and pumps.
- Direct network connection to variable speed drives for full operation and monitoring on line locally and remotely via the web gate.
- Complete conveyor control, including a warning horn function, with inter-lockable function control, and a Main Control Relay output function for safety.

- Control sequences available for dual conveyor systems, with Loading and Production belt. On line speed adjustments with Loading Belt speed offsets.
- Remote modules provide an easy to install, easy to configure solution for expansion.

Installation and Wiring

Safety and Warnings

Follow all applicable safety procedures and instructions.

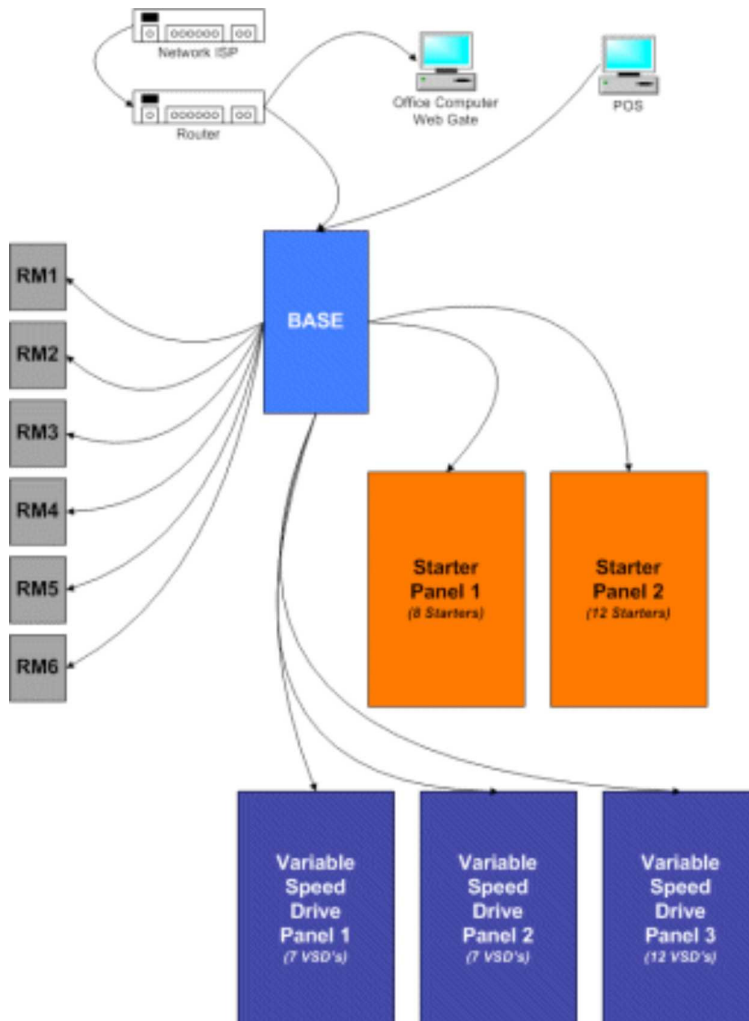
Mounting, commissioning, maintenance, modification and changing is to be performed by qualified personnel only.

Disconnect all power sources before proceeding with any work on this equipment. Hazardous voltages are present on specific parts and can cause electrical shock and burns. Hot and ionized arc gas can escape, especially during a short circuit.

Non-observance with this warning can result in death, severe personal injury, or substantial property damage.

Overview of Modular Components

The Tommy car wash tunnel controller system is designed as a modular system for ease of installation and setup, and reduction of initial wiring costs. All components are "plug and play" with simple on-screen and remote setup.

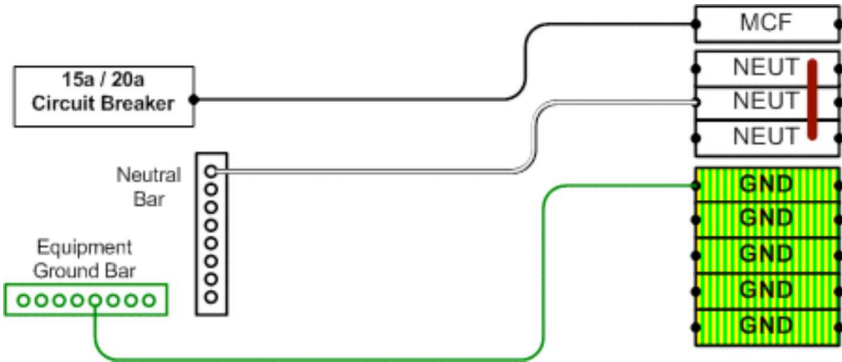


WIRING

This manual offers a summary only of the necessary wiring terminations for proper operation of the Tommy controller. For more complete information and wiring schematics, consult the TPA Wiring Manual.

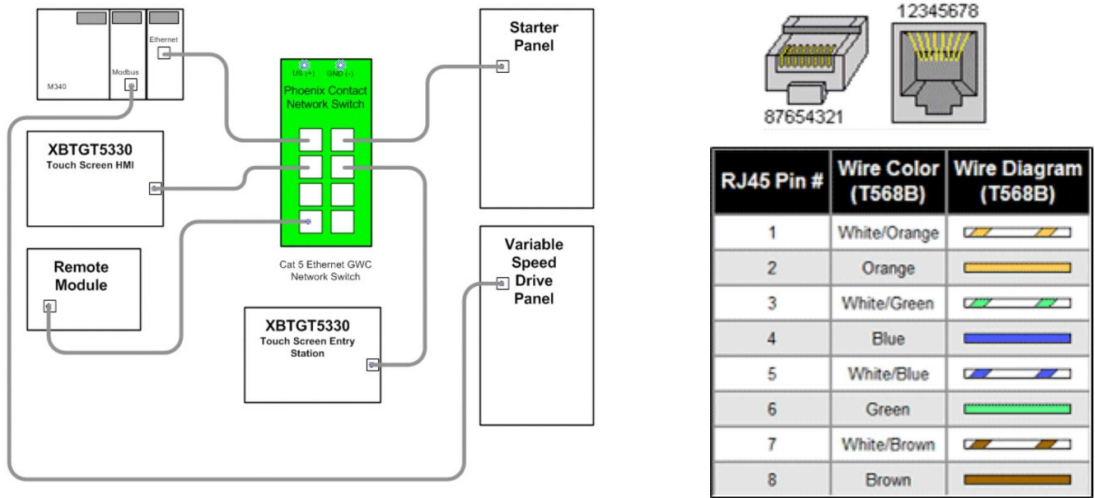
Control Power

Provide a dedicated 120vac circuit to MCF and NEUT. This circuit powers the PLC and 24v DC power supply.



Network

The heart of the Tommy controller is network connectivity and the benefits it provides. Ethernet TC/IP has become the standard for industrial networking.



Follow the RJ45 pin wiring diagram (ATT standard) for all Ethernet cables within the Tommy controller system.

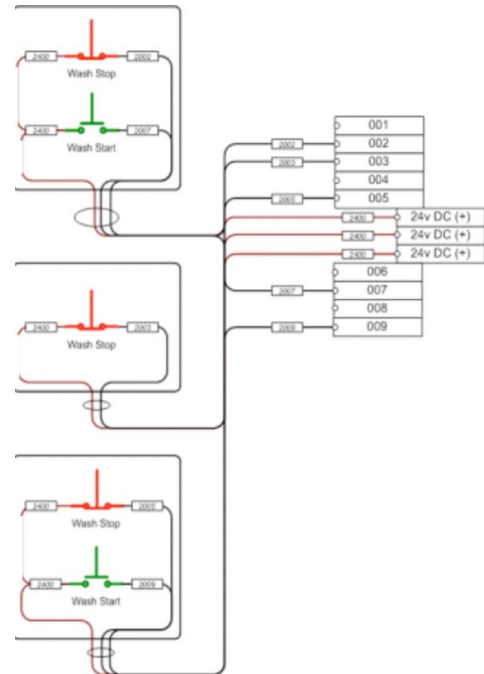
INPUT DEFINITIONS

Within the Tommy System, input signals are accepted to determine if, when, and how a function could occur. All input terminals accept a 24v DC PNP signal utilizing a power supply installed within the system. Input signals can be monitored remotely or through the HMI touch screen. See the programming portion of this manual for more information on each input and its effect on functions and outputs.

Wash Stop / Wash Start Input Terminals

Input terminals 000 through 005 are reserved as Wash Stop input terminals. Use of a maintained, normally closed (NC) pushbutton is recommended. An input signal must be seen at all terminals for function outputs to occur. **Be sure to add a jumper wire between any unused stop terminals and 24v DC (+).**

A momentary input signal applied to terminals assigned as Wash Start will begin the conveyor start sequence.

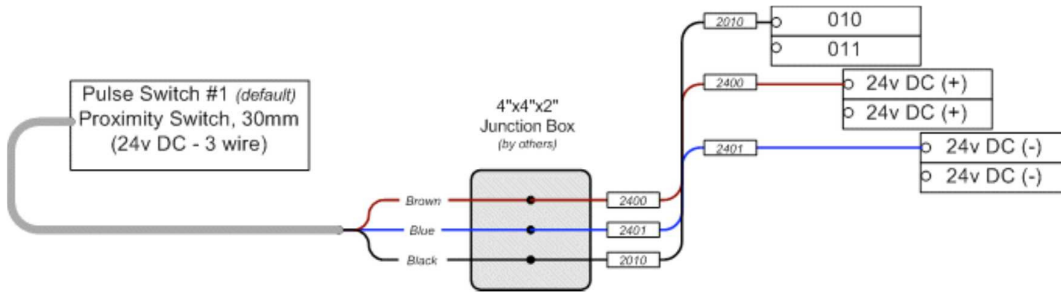


Loading Conveyor Stop

Used where a loading / production conveyor system is installed, input terminal 005 becomes a Loading Conveyor Stop button. A normally closed, maintained contact type pushbutton or switch is used to provide a constant signal to this input. The loading conveyor function will be active as long as the signal is maintained. Both the loading and production conveyors operate with the normal start / stop circuit.

Conveyor Pulse

The pulse sensor provides a pulsed clock signal relative to conveyor speed. The Tommy controller can accept two redundant conveyor pulse input signals to terminals 010 and or 011. Three wire 30mm proximity sensors are recommended, such as the Turck T4670700.

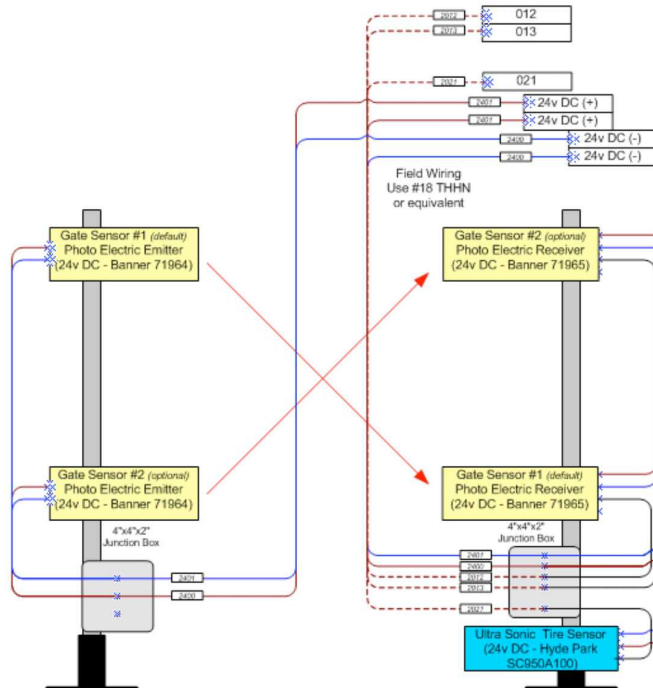


Entrance Gate

The Entrance Gate input is a signal from a detection device, often a photo electric beam, that is ON for the entire vehicle as it passes by on the conveyor, providing a length profile. Two inputs can be accepted and selected to operate as a backup or as a redundant input signal. Wire Gate 1 sensor to terminal 012, Gate 2 to terminal 013. Banner World Beam sensors are recommended.

Tire Sensor

This input provides placement of the front and rear tire of a vehicle passing through the Entrance Gate. The signal can be made from a variety of devices, such as a pressure sensitive pads, photo electric beam, or sonic sensor. Wire the tire sensor to terminal 021.

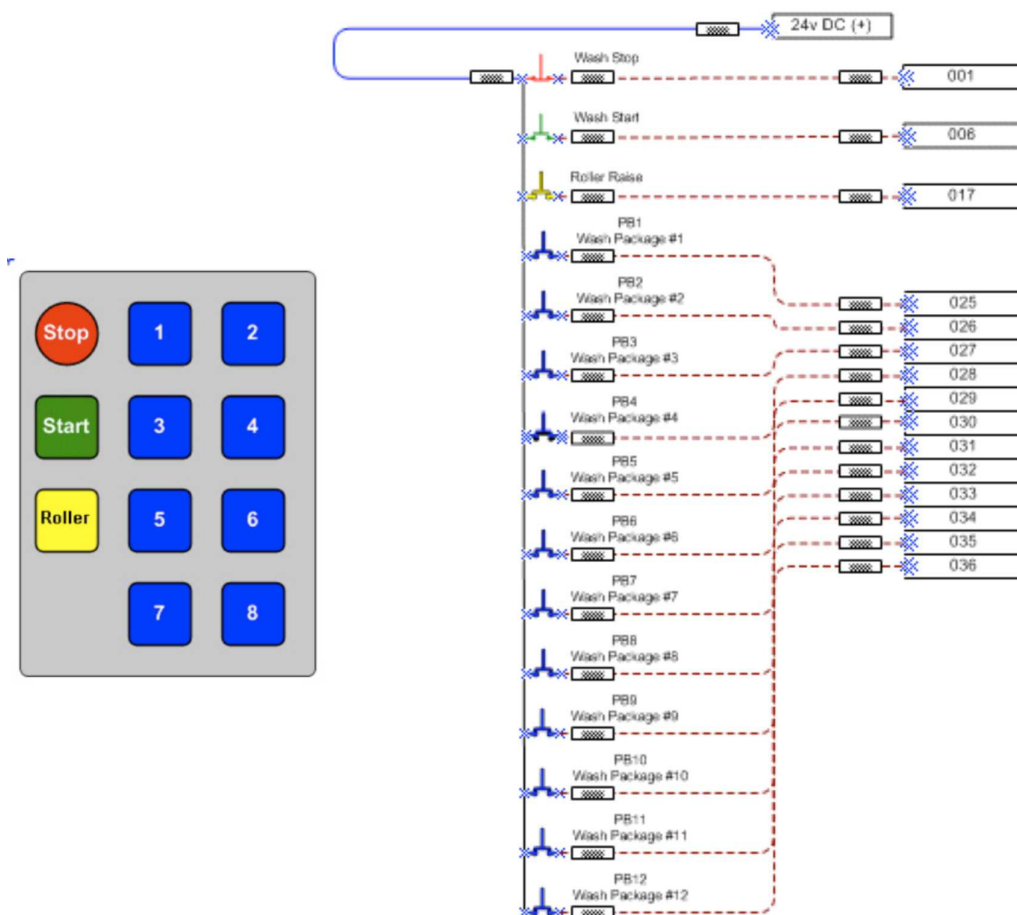


Manual Operator Station

The manual operator station provides the most basic way for the car wash attendant to interface with the Tommy controller. Pushbuttons are installed for wash stop, wash start, roller raise, and eight package pushbuttons.

Manual Package Pushbutton

Inputs will affect the first car in the Wash Line only, either adding a vehicle to an empty line, or modifying the first car loaded into the Wash Line. Often the manual station is used in conjunction with auto cashiers and multiple sales lanes to allow an attendant to add safety items such as a retract to a vehicle ready to be washed. Wash packages built from wash code combinations, or individual wash codes as ala carte transactions can be attached to POS inputs.



Roller Raise

This input will start the sequence that will raise a roller on an over/under or surface type conveyor. Connect the Roller Raise pushbutton to terminal 017. The Roller Position Sensor and Vehicle Position Sensor may affect the roller raise output sequence.

POS Pushbuttons

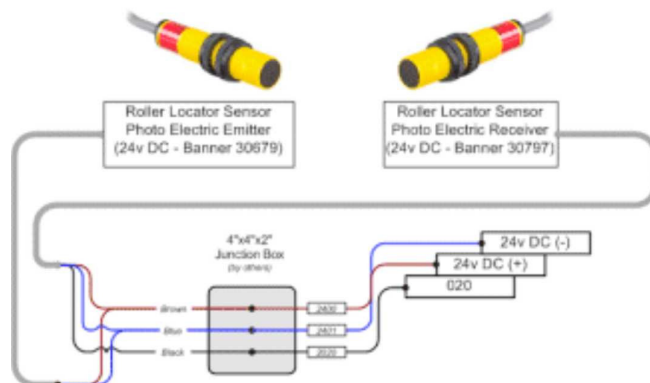
These input signals, wired to terminals 049 through 060, along with a subsequent "Load" input, will place the purchased transaction into the Wash Line. Wash packages built from wash code combinations, or individual wash codes as ala carte transactions can be attached to POS inputs.

Load

The "Load" pushbutton is wired to terminal 016, and loads selected wash packages or ala carte combinations into the wash line. The wash line can hold up to 10 vehicles, the number of which is indicated on the Status page as "Ready To Wash". Loaded wash packages can also be viewed, modified, and re-arranged within the Wash Line. The Load pushbutton is only active and necessary with wash transactions selected with signals to the POS pushbutton inputs.

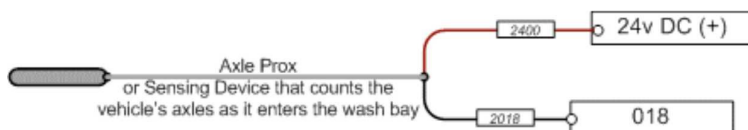
Roller Position Sensor

In certain roller style conveyors, it may be desired to only raise a roller when that roller is in place, or a certain position on the conveyor. This input will delay a roller raise output signal until such an input is given. To use this feature, wire the sensors to terminal 020 and answer **Yes** to the question "Roller Sensor to be Used" in the Roller Raise setup page.



Axle Prox Sensor

Accepts an input to terminal 018 that counts the wheels, or axles, as the vehicle drives onto the car wash conveyor. This sensor should be placed just past the roller raise trap door on an over/under or surface conveyor, or at the point that the vehicle is sufficiently loaded onto a belt conveyor. The input is used in an auto loading sequence. Answering **Yes** to the Auto Roller question in the roller raise setup page will make active this input to accept signal. Often a pressure type pad cut into the concrete on the passenger side is used.



Vehicle Position Sensor

When auto loading is selected and properly setup, a Vehicle Position Sensor may be desired to verify that a vehicle is actually in place on the conveyor, ready to be washed. This can be accomplished with in-ground loops, photo electric sensors, sonic sensors, or other sensing means. Connect the sensor to terminal 019.

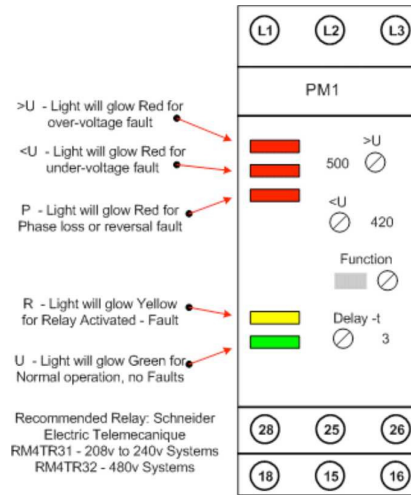
Alarm Signals and Inputs

Chain Tension Sensor

Accepts a signal from a device that will activate when the car wash conveyor chain or belt has stretched or loosened to the point that maintenance is required. An alarm can be triggered. Wire the sensor input to terminal 014.

Phase Monitor

This input accepts the signal from an optional three phase monitoring device. If such a device is installed, a signal will halt all automatic car wash operation and the controller will activate an alarm. The phase monitor signal input is wired to terminal 015.



Oil Level Sensor

Accepts a signal from a sensing device that will monitor a low oil level in one or more hydraulic oil tanks. When active, a low oil alarm will interrupt the wash stop loop, stopping the conveyor output and prohibiting a restart until the alarm is cleared. The sensor is often setup to provide a signal when the fluid level is high and is wired to terminal 023.

Air Pressure Sensor

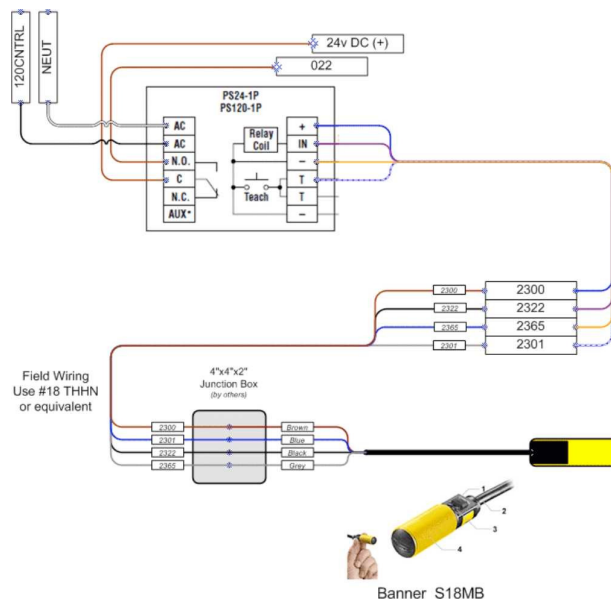
Accepts a signal from a sensing device that will monitor the air pressure in a manifold system. When active, a low air alarm will interrupt the wash stop loop, stopping the conveyor output and prohibiting a restart until the alarm is cleared. The sensor is normally set up to close on pressure rise, and wired to terminal 024.

Equipment Safety Sensors

There are ten equipment safety sensor inputs available, terminals 037 to 047. Each one can accept a signal from a device that will affect the operation of the function to which it is assigned. Often these sensors are used to monitor water levels in pumping stations.

Exit Anti Collision Sensor Input

Accepts a signal from a sensor located at the tunnel exit to locate a vehicle that has not pulled away from the tunnel conveyor. When the optional sensor is installed and wired to input terminal 022, and when Anti Collision data is entered, the conveyor will pause when a vehicle in the wash tunnel approaches an exiting vehicle that has not pulled away and rests over the sensor. The conveyor will automatically restart when the stopped vehicle pulls away. While the Banner MGAGE S18MB and Flat Pak sensors are suggested, other devices such as in ground loops may be used.



FUNCTION DEFINITIONS

Operations within the Tommy controller are described as functions. There are 14 special function definitions, up to 64 car wash base functions, 48 car wash functions available from 6 remote modules, 20 motor starter functions, and up to 26 variable speed drive functions available. Pricing for the controller is determined by the number of output relays and terminals desired, but all function definitions are included. Each desired special function needs to be assigned to an output relay and terminal. Each car wash function is assigned by default to an output terminal unless over assigned to a special function. Each output terminal is individually fused and controlled by a single pole double throw relay with a maximum rating of 6 amps @ 24v to 120v.

Special Functions

Production Conveyor

This function can be used to operate a hydraulic pump or electric drive gear motor. It can also be assigned to a variable speed drive. It is affected by the wash start sequence, oil level sensor and air pressure sensor. When the wash start sequence is begun, the warning horn and delay timers are activated at times programmed. This conveyor function should be used when a single conveyor system is used. See the conveyor setup page for programming instructions and output terminal assignment.

Loading Conveyor

When a loading / production conveyor system is installed, this function operates the loading conveyor. It is controlled by the wash start sequence, in addition to reacting to the Loading Conveyor input. When assigned to a variable speed drive, the loading conveyor speed can be set to match exactly the production conveyor, or offset faster or slower by hertz.

Warning Horn

This function becomes active for the desired number of seconds after the wash start sequence is activated. A default time of two-seconds is set into the GWC. Consult local and applicable safety codes for information regarding the time required for the horn to sound and delay before the conveyor starts. See the conveyor setup page for programming instructions and output terminal assignment.

Roller Raise

This function is used to activate a device that raises a roller to push the vehicle along the conveyor. The function can be programmed for front wheel pull or rear wheel push, choosing length of conveyor travel or the roller position sensor to determine function duration. Activation can be automatic or manual. See the Roller Raise setup page for programming instructions and output terminal assignment.

Wash Package Lights

There are eight wash package light functions available to illuminate signs at the wash tunnel entrance announcing to the customer the package purchased. Wash package lights are also used to report package counts. See the Wash Package setup page for programming instructions and output terminal assignments.

PULL FWD Light

The Pull Forward Special Function can operate a directional light placed at the front of the car wash tunnel. The function comes on when a wash package is placed into the wash line, and the car wash conveyor is running.

STOP/NEUTRAL Light

This light function works along with the "Pull FWD" light to instruct the customer to put their cars in neutral and relax, or whatever the sign may instruct them to do. The function becomes active when a wash package has been loaded, the conveyor is running, and the roller raise has been activated, either automatically or manually. See the setup for this function to adjust it for front or rear wheel push.

Lighting, or Daily / Clock Based Functions

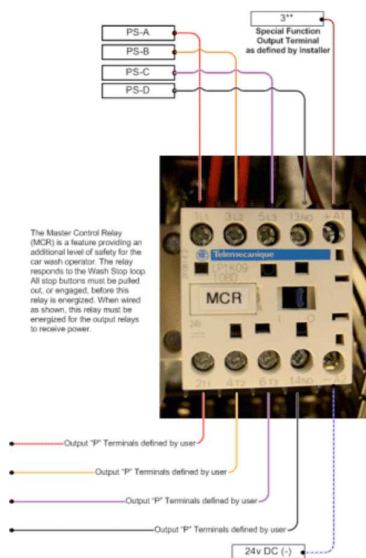
Lighting functions can be setup to automatically operate lot or tunnel lighting, or any other function that can be operated by a 24hr / 7 day clock.

Pressure Washer Pump 1 & 2

Two functions are available to operate separate pump motor starters. They are controlled with assigned input switches and or timers. See the programming instructions for these functions for more information.

Main Control Relay (MCR)

This function becomes active only when the wash stop loop is closed. It is highly recommended for safety reasons that this function be assigned to an output controlling a power relay that interrupts all voltage applied to output terminals when a wash stop pushbutton is depressed. This optional relay may be installed in some Tommy Controller systems. Recommended 4 pole power relay part # TEL LP1K0910BD is available.



Car Wash Tunnel Functions

Tunnel Functions

Tunnel Functions react as programmed as the vehicle travels down the car wash conveyor. These functions operate based on pulse, gate, tire and profile sensor inputs. By default, tunnel functions are assigned to output terminals that are aligned with the function number. Functions can be used to operate solenoids, application pumps, motor starters, service and directional signs, and many other car wash devices.



Variable Speed Drive Functions

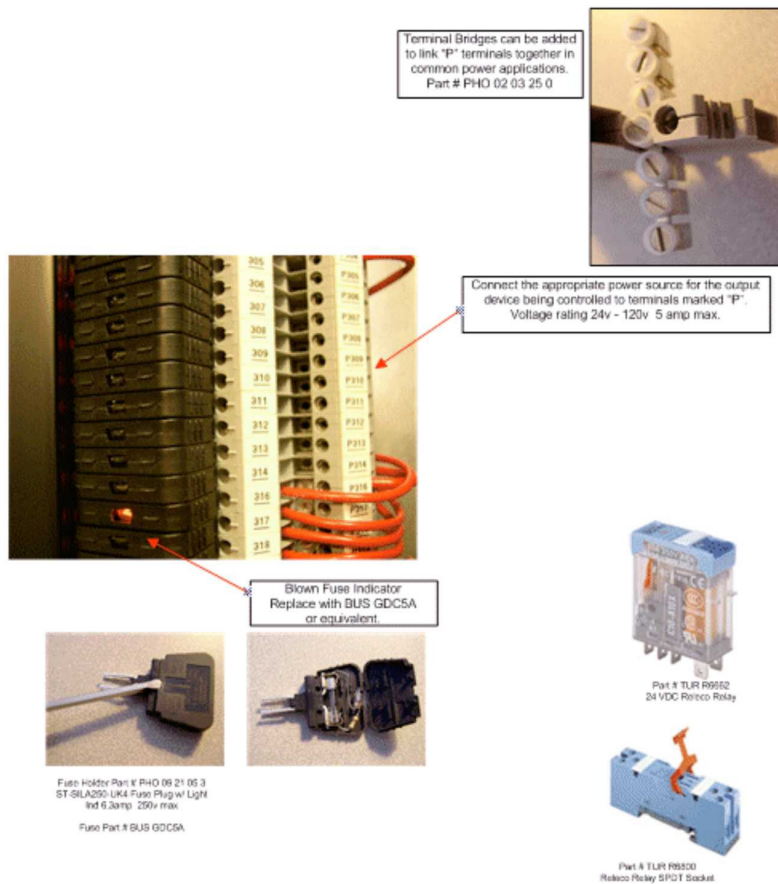
VSD functions operate in the same way as other car wash function, but variable speed drives operate motor outputs only. VSD's can vary the speed of the motor, and perform special operations like slowing dryer motors over pickup trucks, or efficiently maintaining proper pump pressure. The most important benefit of a VSD is the elimination of motor inrush current, maximizing efficiency.



Output Relays and Terminals

Each output is provided with a power terminal (P3XX) and an output terminal (3XX). The power terminals can be grouped together with common voltage power sources with available bridging. Each output is protected with a 5 amp fuse. Each fuse holder has a built in blown fuse indicator that will glow when the fuse is blown and needs replaced.

Output relays are rated at 6amps, 24 - 240 vac, single pole double throw, with an indicator light and manual operation tab. Terminal bridging, spare fuses and relays are all available from Custom Control Specialists.



Log In / Log Out

Most screens and pages are accessible, but the ability to change setup data, parameters, force outputs on and affect package combinations on vehicles being washed is restricted according to log in level. Unique user names and log in levels can be assigned. All user names and access levels are assigned from this screen page, accessed by entering the master name "ADMIN" and password "CCS".

Levels are assigned 0 through 8 and provide access at that level and below.

Level 0 - view most screens, but no changes to setup or data can be made.

Level 1 - Force output switches off or on.

Level 2 - Move vehicles in and out of the Wash Line,

Level 3 - Modify wash transactions.

Level 4 - Add wash transactions.

Level 5 - Make changes to setup data.

Level 6 - Future

Level 7 - Future

Level 8 - All access

Tunnel Status

The Tunnel Status page will display current wash information. *Ready to Wash* indicates the number of vehicles loaded into the Wash Line, ready to be washed. *Cars This Hour*, *Last Hour*, and *Todays Total* give a snapshot of current wash activity. *Average Washed Rate* is a projected wash rate based on conveyor speed and number of vehicles washed during the current hour.

The Pulse pilot light will glow to indicate that the conveyor pulse clock is working properly. A Green glow will indicate that the an input signal is being accepted from a sensor wired to terminals defined in the pulse setup menu. White indicates pulse interpolation. A Blue glow indicates that the Standby pulse signal is being used. Gate and Tire pilot lights will glow when these sensors signals are being accepted by the controller. The Wash Stop pilot light will glow red when any of the installed normally closed Wash Stop pushbuttons are opened.

Anti-Collision pilot indicates that the entire wash tunnel is in an Anti-Collision "pause" state. The conveyor output will pause or stop, depending on setup, and some function outputs may stop, depending on their setup configuration.

Conveyor Setup - Line Starter

This page will properly configure conveyor starting operation. In recommended operation, the wash sequence will begin only after all wash stop input terminals are accepting a signal, all alarms are satisfied, and one of the wash start input terminals senses a momentary signal, as in briefly pushing a button.

Auto Shutdown:

Enter the length, in pulses, that the conveyor will operate to wash one vehicle. Add several pulses to insure the vehicle has left the wash tunnel before the conveyor automatically stops. This "counter" is reset every time the gate sensor is triggered. Auto Shutdown is disabled if a car is entered into the wash line.

Anti Collision:

Enter the point, in pulses measured from the gate sensor, that a vehicle should stop if a car in front of it has not left the car wash tunnel. When a car reaches this point and another car has not left the wash tunnel and is over the sensing device, the conveyor will pause. Restart will occur when the first car exits the wash tunnel and is no longer over the sensing device. A zero in this data field disables the anti-collision feature.

Automatic Start:

The wash conveyor can be set to start automatically when a wash package is loaded, when the Axle Prox sensor is triggered, or disabled for manual start / stop operation.

Assign to Output:

Conveyor and Warning Horn functions can be assigned to any installed output terminal. Data entered into the "secs" field will provide the proper time the warning horn will sound and the delay before the conveyor starts.

Conveyor Setup - Variable Speed Drive

These pages will appear when Advanced Setup Menu – Conveyor VSD is answered "Yes". With this configuration, the conveyor is setup to be controlled through a variable speed drive. A loading conveyor VSD can also be installed. Conveyor speed is set by adjusting the set point, in Hertz. While a loading belt is normally set to operate at the same speed as the production conveyor, an offset speed higher or lower can be adjusted. In recommended operation, the wash sequence will begin only after all wash stop input terminals are accepting a signal, all alarms are satisfied, and one of the wash start input terminals senses a momentary signal, as in briefly pushing a button.

Auto Shutdown:

Enter the length, in pulses, that the conveyor will operate to wash one vehicle. Add several pulses to insure the vehicle has left the wash tunnel before the conveyor automatically stops. This "counter" is reset every time the gate sensor is triggered. Auto Shutdown is disabled if a car is entered into the wash line.

Anti-Collision:

Enter the point, in pulses measured from the gate sensor, that a vehicle should stop if a car in front of it has not left the car wash tunnel. When a car reaches this point and another car has not left the wash tunnel and is over the sensing device, the conveyor will pause. Restart will occur when the first car exits the wash tunnel and is no longer over the sensing device. A zero in this data field disables the anti-collision feature.

Automatic Start:

The wash conveyor can be set to start automatically when a wash package is loaded, when the Axle Prox sensor is triggered, or disabled for manual start / stop operation.

Assign to Output:

Conveyor and Warning Horn functions can be assigned to any installed output terminal. Data entered into the "secs" field will provide the proper time the warning horn will sound and the delay before the conveyor starts.

Pulse Sensor

The Pulse Sensor is the heartbeat of the Tommy system. It provides feedback from the conveyor that can verify that the conveyor is running, and the speed that the conveyor is operating.

Pulse Sensor Choice:

The controller can accept one or two sensor input signals. Choose "1" or "2" to accept either signal. On the Tunnel status page, the pulse light will blink green when working with the wired pulse sensor. If either pulse sensor fails or a pulse fault alarm occurs, choose "3" to go to stand by pulse to continue operating at a recorded pulse rate. The pulse light on the Tunnel Status page will flash blue when operating on standby pulse. The recorded rate is displayed in the "**Stand By Pulse Rate**" data field, and can be easily recorded by pressing the "**Set Pulse**" button when the conveyor is operating normally and correctly with a wired pulse sensor input signal. Whenever the conveyor speed is changed, this button should be pushed to record the new rate. If the rate is inaccurate when operating under stand by pulse, the rate can be adjusted by touching the data field and manually adjusting the rate. The pulse rate is actually the time measured between pulses, so if timing is too fast the rate should be increased, and if the timing is too slow the rate should be decreased.

Pulse Interpolation, Sensor 1 or 2:

Pulse interpolation is a unique way to increase pulse count definition and provide a more accurate function output application. When Interpolation is chosen, the controller calculates the actual pulse and pulse length and produces an internal pulse with an accuracy of 4 inches. The real pulse rate and count can be compared to the interpolated rate and count in the Diagnostics page. The pulse light on the Tunnel Status page will flash yellow when operating on interpolated pulse.

Actual Pulse Length:

To accurately determine the correct pulse length, measure out 20 feet on the conveyor track. Count the number of pulse sensor input signals that occur when a marked roller travels between the measured twenty feet. Divide this number by 240, and enter this number in the data field. This number represents the average distance the conveyor travels between each pulse input.

Pulse Fault Timer Set point:

This number, entered in seconds, is the time that the controller needs to see a pulse input signal while the conveyor is to be running. If a pulse input does not occur, the pulse alarm will signal a pulse failure. Usually a number between 3 and 5 seconds will work properly.

Diagnostics:

Within the pulse diagnostics page, the conveyor can be started and stopped, and pulses can be counted for setup and maintenance. Pressing the Audible Test button will make the warning horn sound whenever the wired pulse sensor input signal is received.

Entrance Gate Sensor

The Entrance Gate Sensor locates and measures the vehicle as passes through the sensor on the car wash conveyor. Photo electric thru beam type sensors are recommended, but other types of sensors may be used. The tunnel sequence is initiated based on packages entered and assigned to the vehicle, and the settings of the various functions and outputs. Choose the type of signal desired. Dual sensors can be installed if desired. Enter a "1" or "2" to choose between the two. Enter a "3" to accept both inputs. This method provides some redundancy as either signal will be accepted. If the sensor fails to operate properly, enter "4" to operate in Standby Gate. This will allow the wash to continue operation by sending a vehicle of the average length into the wash tunnel after a roller raise input signal. Enter the distance from the front of an average vehicle to the Gate Sensor. Also enter an average length of vehicle in feet for Standby Gate and Status calculations. Gate Sensor ON and OFF delay reduces "bounce", or the chance of multiple signals. A recommended setting of 1second can also reduce nuisance trips due to people walking through a photo eye beam. Pressing the Audible Test button will cause the warning horn to sound when the gate sensor input signal is triggered.

Tire Sensor

By default, the tire sensor signal is extended by one second to provide a "de-bounce" buffer to the signal. This data field can be changed if necessary.

Roller Raise

For a standard over / under or surface car wash conveyor, the "Roller" pushes against the rear wheel of the car or pulls against the front wheel to propel the car through the car wash tunnel. Normally, there is a device that puts the roller into position to move the car. That device is operated by the Roller Raise function output. Enter, in pulses, the length of time the roller raise function is to be active, bringing up the proper number of roller assemblies. Answer **Yes** to **"Auto Roller Call?"** if a Axle Prox sensor is to be used to automatically raise the roller, such as in an Auto Load setup. **Auto Roller Call** can be delayed if desired. A roller position sensor, wired to Input Terminal 020, will delay the roller forks until a roller is in the correct position. Answer **Yes** if this feature is desired. Choose the output terminal (function#) to be wired to the roller raise solenoid or device. If an Auto Load setup is used, along with Auto Roller, front wheel pull or rear wheel push is determined by entering the number of signals accepted by the Axle Prox input (terminal 018). "1" is for front wheel pull, "2" is for rear wheel push. If a front wheel pull conveyor is installed, extra rollers will be brought up behind the rear wheel when an Axle Prox sensor is installed.

The Roller Raise output can be manually operated from this menu with the AUTO-OFF-MAN pushbutton. The Tunnel Status screen will display a red **F** when roller raise output is in the MAN position.

Additional rollers can be added behind a vehicle or wheel by pressing a Roller Raise input button wired to terminal.

The "Pull FWD" light output is affected by the roller raise sequence. The switch from "Stop / Neutral" to "Pull FWD" can be delayed to allow the vehicle to proceed farther into the car wash tunnel by entering pulse data into the delay data field.

Equipment Safety Sensors

The Base and each remote module has several safety sensors built in. Select the desired module. A Remote Module or Starter Panel must be installed and in proper "health" or the choice will be blacked out.

Safety Sensors can be configured to protect an output device, or to trigger an alarm in a fault condition. The red / green pilot light indicates whether the switch is in alarm or not. Assign a function number to the switch. The assigned function will operate only when the switch is not in alarm condition. Choose to activate the alarm on a low or high condition. When one switch, such as a low level float, is to affect several functions, use a jumper wire to connect the switch to multiple input terminals, and assign several function numbers to the same switch input. Conversely, if a function is affected by multiple safety sensors, wire them in series to one input.

A unique name can be entered to describe the sensor. A safety switch can also be used as a progress switch input.

Special Outputs

Special outputs are more clearly defined in the Special Functions section of this manual, pages 18 and 19. The Special Output page provides a way to assign an output terminal and test the output with the Auto - Off - Man switches. An ON indicator light reflects status, and a unique description can be typed into the field.

Wash Packages

Wash packages are a very important part of the Tommy system in order to properly wash a customers' car and apply the appropriate purchased services. Wash package setup within the Tommy controller is a very versatile system that will allow the car wash operator to match the car wash marketing system to the actual application equipment. Begin by defining as many of the 31 available Wash Codes as necessary to separate the functions into sequential (every vehicle), programmable (selected), or de-programmable (unselected) groups. Functions will "point" to a wash code as programmed to operate on the vehicle being washed or not. Wash codes are grouped into Wash Packages or used individually as ala carte items that can be added to packages. Wash code "0" is set aside as the sequential wash code for all functions that occur for every wash. Wash Codes are also used to control Package Lights outputs and counters. Each car wash Function will operate from only one of the wash codes (numbers 0 through 30). However, each pushbutton can be configured to program as many of the wash codes as desired.

Up to 36 Wash Packages can be built in one of two ways, Replace and Program/ Deprogram.

Note: Pushbutton 1 is the default wash package that is loaded for any car that enters the wash without having been assigned a wash package. If a default wash is not desired, do not configure Pushbutton #1. Input Terminals 025 through 040, and 049 through 058 are designed to accept a 24v DC PNP (+) signal from a manual pushbutton or a POS system with closed contact outputs emulating a pushbutton closure.

Input signals to terminals 025 through 040 affect the first and only the first car in the wash line.

Input signals to terminals 049 through 058, along with a momentary signal to the LOAD Input (Terminal 016) will build a wash line of vehicles ready to be washed.

The wash line can hold up to 10 vehicles.

A pushbutton can be set to one of three different modes:

DISABLE - Pushbutton is ignored.

REPLACE - This pushbutton will replace all codes entered from any pushbutton pressed before it, including empty codes. For example, Operator presses PB1, then PB2. If PB2 is setup for replace mode, only codes added by pressing PB2 are loaded. Any codes that were added by pressing PB1 are discarded.

Note: Setting a PB in this mode w/ no codes selected turns the PB into a CLEAR button.

PROGRAM / DE-PROGRAM - When pressed, codes setup for pushbutton are added or subtracted to those entered from any button pressed before it. When this mode is selected, a green + sign or a red — sign will appear next to selected wash codes. Green marked codes will be added to the wash given, red marked codes will be deleted.

Be sure to press the **"Apply"** button to lock in the selection

Function Menu, Outputs

SETUP - Navigation button will advance to the Function Setup screen for the selected output.

TERMINAL - Output terminal number assigned to the function.

DESCRIPTION - Enter a unique name or description. Maximum 25 characters.

INDICATOR LIGHT - This light will turn green to indicate the output is turned on.

Note: The operator must be logged in with a security level of 1 or greater to make changes to the following AUTO/OFF/MANUAL switches.

AUTOMATIC - Normal operating position. If selected, the program has automatic control over the output. The output will turn on and off when a vehicle reaches the set points entered in the Function Setup page.

OFF - This switch will disable the output

MANUAL - This switch will force the output on. The button will flash to indicate that the output is in forced on.

Function Setup

A function in the Tommy controller will operate an output based on the data entered into this screen

Note: A security level of 2 or above is necessary to make changes to values on this page.

Choose the Wash Code (0-29) that this function will point to to determine operation. Each function will point to only one wash code. Select the function start timing configuration. Select the function stop timing configuration. Choose if the output should flash, as for a tunnel extra service sign. Also, choose if the function is to be part of the wash down group.

If the function is to react to the Wash Stop loop, answer Yes. Otherwise, if the output should remain on if the conveyor stops, such as a retract function, answer NO. The button will turn red and blink, indicating a possible safety issue.

Start Type

From this menu choose how the function will turn **ON**.

Start when the front of the car is at XXX pulses.

Start when the rear of the car is at XXX pulses.

Start at the rising edge (ON) of an input signal (select the input terminal)

Start at the falling edge (OFF) of an input signal (select the input terminal)

Start when the tire is at XXX pulse

Stop Type

From this menu choose how the function will turn **OFF**.

Stop when the front of the car is at XXX pulses.

Stop when the rear of the car is at XXX pulses.

Stop at the rising edge (ON) of an input signal (select the input terminal)

Stop at the falling edge (OFF) of an input signal (select the input terminal)

Stop after XX seconds, as in a tire application.

Energy Saving

Energy saving parameters allow the function to be set up for maximum efficiency.

Sequential Start

Stage a tunnel restart after a complete stop to minimize electrical current inrush in large motors.

Choose one of the four levels. Refer to the Sequential Start setup page for additional information.

Look Back

A setting that will force the controller to "look back" down the car wash tunnel and keep a selected function on if another vehicle is approaching within the pulse setting entered into the data field.

Variable Speed Drives Output Control

Output Control for Variable Speed Drives is the same as for other functions, with additional features. In *Automatic*, the VSD function will operate according to the setup parameters. In *Manual* operation, the drive will run at the hertz setting entered.

A unique description can be entered for each drive output.

The *Hertz Monitor* will reflect the speed reference being sent to the motor. Touching the yellow Hertz monitor button will lead to the *Monitor* page.

Function setup will lead to the setup page.

Variable Speed Drives Function Setup

Choose the appropriate wash code for proper operation. Enter the desired data, in pulses, when the function should **Start** and **Stop**.

The output LED will glow to give a visual indication of the speed reference being sent to the VSD, based on the **VSD Speed Setpoints** entered. Blue indicates low speed, Green for high, and Yellow for the manual speed setpoint.

The **Lookback to Pulse** setting will place the VSD in either a **Fast** or **Slow** speed setting, based on the choice, when an approaching vehicle is within the pulse data entered. This is a useful feature to allow a dryer motor to go to slow speed in between cars to minimize impeller windup time and maximize efficiency.

Slow Front: The function can be set to allow the VSD to go to the slow speed setting for the desired pulses over the front of the vehicle. This is beneficial for a brief slowing of the dryer motor for special accessories such as bug shields, etc. Assign a unique wash code and configure a pushbutton to add this feature to wash packages.

Slow Rear: The function can be set to allow the VSD to go to a slow speed setting after the entered pulses for the remainder of the vehicle. This can be a useful feature to slow a dryer motor over the rear portion of a vehicle, such as a pickup truck bed. Assign a unique wash code and configure a pushbutton to add this feature to wash packages.

Slow Entire Car: The function can be set to allow the VSD to go to a slow speed setting for the entire vehicle. This can be a useful feature to slow a dryer motor over a high vehicle or ski racks, etc. Assign a unique wash code and configure a pushbutton to add this feature to wash packages.

Variable Speed Drives, Monitor

A major benefit of using variable speed drives to operate motors in the automatic car wash is the ability to provide more protection for the motor, and provide more information to the car wash operator as to how that motor is working. Line voltage, motor current, output frequency (motor speed), and any recent faults all can aid in a quick overview of motor operation and efficiency.

Drive parameters reflect proper settings in the VSD. If necessary, these parameters are changed at the VSD itself.

Package Lights

Wash Package Lights are 8 outputs that can be used to activate informational lights or signs that can inform the customer of services purchased. The outputs can be operated with the Auto/Off/Manual selector switches. Program the output to activate by entering a Wash Code. See Pushbutton Setup instructions. Wash Package Lights will turn on based on the Wash Codes programmed to the first vehicle in the wash line. Wash Package Lights can also be used as counters to tabulate package wash counts. Code refers to the wash code set by the wash package pushbutton or Point of Sale system that will turn on the package light.

For example, wash package 1 is the only wash package that has code 13 enabled. If Package Light 2 is set to look at code 13, Package Light 2 will turn on when wash package 1 is purchased and in the first position in the wash line.

A unique description can be added for each package light.

Alarm Configuration

For All Alarms:

Select "Alarm on High" or "Alarm on Low" depending on your hardware requirements. For example:

If the Air Pressure sensor is setup for fail safe operation (maintains a power input to the GWC when air pressure is ok) then you would select "Alarm on Low". In order for the alarm to show up on the alarm banner, alarm log, or email, or function in the controller (exception: stop button), the alarm must be enabled by checking the Enable / Disable box.

The alarm indicator light turns green (if alarm enabled) if NOT in an alarm condition. If the indicator turns red then an alarm is active.

Chain Tension Sensor optional (Input Terminal #14) - This alarm is used to notify you if the conveyor chain needs tightened. Note: This will NOT shutdown the conveyor.

Phase Monitor optional (Input Terminal # 15) - An installed phase loss monitor will alert the GWC of electrical phase loss and over / under voltage conditions and stop all operation to protect motors and sensitive electrical equipment.

Oil Level Sensor (Input Terminal #23) - This alarm is used to monitor hydraulic oil level for your conveyor motor etc. If an alarm occurs, the car wash conveyor will stop.

Air Pressure Sensor (Input Terminal #24) - This alarm will monitor air pressure in the car wash system. If an alarm occurs, the conveyor will be stopped.

Pulse Fault (Input Terminal(s) #10 and/or #11) - This alarm looks at the pulse input configured on the pulse setup screen. If the conveyor is being told to run and the controller does not receive a pulse signal input for the time configured on the pulse setup screen, then a pulse fault alarm will be generated. Note: This alarm is for information purposes only and does not affect the operation of the car wash.

Stop Pushbutton (Input terminals #1 thru #5) - This alarm is for information, troubleshooting, and/or logging purposes only. Disabling this alarm does not affect the operation of the stop buttons.

Prep Gun Pump Low Level (Input Terminal #48) - This alarm protects the Prep Gun pumps from running with an empty water tank.

Sequential Start

Sequential Start - To help protect against electrical surges and reduce electrical inrush current when the conveyor re-starts after being stopped with cars in the tunnel being washed. Enter the time in milliseconds for each sequential start timer in the range of 0-2,000. I.E. 2,000 equals 2 seconds. As soon as the conveyor restarts, timer 1 starts timing. After timer 1 is completed, timer 2 starts timing and so on.

From the Function Setup Screen:

Enter a number between 0 and 4. Zero means that the function will start as soon as the conveyor starts. One through four selects a built in timer that is configurable under the sequential start setup menu.

Wetdown

Choose which functions are to be activated by the Wet Down feature by answering Yes or NO in the Function Setup Screens. Set the Wet Down timer for the number of seconds desired.

Choose whether or not you want the conveyor to run during the wet down sequence.

The red count down timer registers the time remaining.

Start the Wet Down feature by pressing the Activate button for several seconds, until the red count down timer starts timing down.

Starting the Wet Down feature remotely is accomplished by pressing Pushbuttons #7 and #8 simultaneously for several seconds until the warning horn sounds and the marked equipment starts. This is an additional feature of PB7 and PB8, and these pushbuttons can still be programmed for normal inputs. The Wash Down feature is cancelled three different ways - the timer completes it's cycle, a Wash Stop button is pressed, or a Start button is pushed. If a Wash Stop button is pushed, the Wet Down feature must be re-activated from the beginning.

Alarms

Active Alarms

One of the primary features of the Tommy is to provide the operator with proactive approach to possible sensor and equipment problems or failures.

The Alarm page will provide a running list of those alarms. Alarms can be acknowledged, which will change the line to yellow. Alarms will disappear from the active alarm page when the problem is solved.

Alarm History

Alarm History will provide a list of previous alarms, those that were acknowledged, and when the issue was resolved. RTN is "return to normal".

Active alarms will scroll across any touch screen page to alert the operator of the problem and provide a

Monitor

The **Monitor** pages allow an operator to view the status all input signals. It is a way to confirm proper electrical connections, sensor operation, pushbutton and POS input, and safety sensor

signals are properly being accepted by the GWC. All input terminals are listed. A unique description can be added. All terminals will show a **Red** indicator when voltage at the terminal is zero. When 24v DC (+) is applied to the terminal, the terminal will glow Green.

Ready to Wash

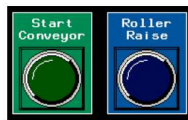
Entry Touch Screen Wash Line

As wash transactions are entered, a wash line, or queue, is built. Up to ten vehicles

The **Entry Touch Screen** provides the operator with flexibility in entering wash transactions, building a wash line, and maneuvering vehicles within the wash line.

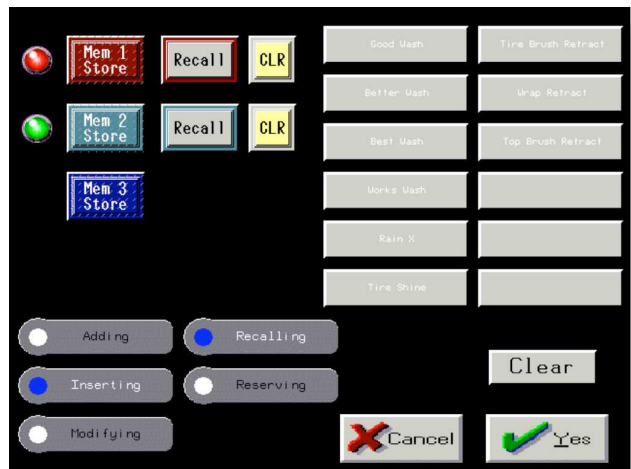
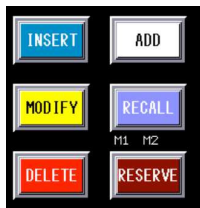
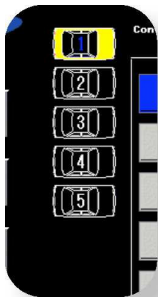
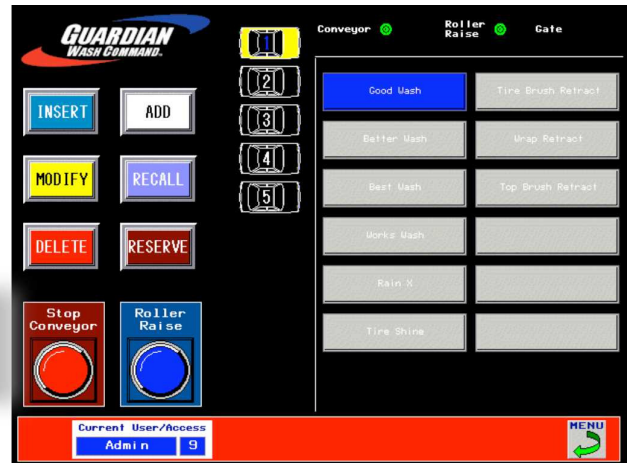
can be entered into the

Start - Stop Conveyor. Start or Stop the conveyor through the touch screen. Roller raise is also available. Pilot light indicators along the top of the page reflect current status.



wash line. Touch any car icon, and the highlighted icon will turn yellow and display the transaction contents in the wash package table. Press the **ADD** button to add a wash transaction to the end of the wash line. Choose the wash package desired and any additional services, then confirm by pressing YES. Highlight any icon, press the **INSERT** button, and a transaction will be added *after* the highlighted icon.

Pressing **DELETE** will remove a highlighted transaction from the wash line. An exclusive feature of the GWC Ready To Wash page is the ability to place a vehicle into reserve and then replace it back into the wash line. All this can be done graphically without affecting the transaction by an wash attendant using a color coded system. Up to three vehicles can be placed into reserve. To do so, highlight the car icon that represents the actual vehicle in the wash line. Press the **RESERVE** button. The page shown below will appear. Choose to place the vehicle into Red, Green, or Blue reserve. Then press YES to confirm. An indicator will appear above the **RESERVE** button to show how many cars are in reserve. To recall the car back into the wash line, choose to either insert the reserved car into the wash line by highlighting the car icon in front of where the reserved car is to be inserted, or leave all icons un-highlighted and the recalled transaction will be entered at the end of the wash line. Then press the **RECALL** button, and choose the car to be recalled by pressing the Recall button. Confirm by pressing YES.



Reports

Status Report Page

The first report page, or car wash status page, can be used to give a complete overview of the current wash progress, or can be used as an "end of day" report. The report can be printed on site with an optional receipt printer, or emailed to appropriate recipients. The fields on the left side of the page are fixed. The fields on the right side of the page reflect the counts attributed to the Package Lights as programmed and set up to account for either wash packages sold or individual items. See the "Package Light" setup in this manual for more information on proper configuration.

The second page is a "Custom Report" page that will report back counts for any individual function. At any time, a function number can be entered and counts will be reported back. These counts are stored in the PLC and are always available. This page can also be printed with the optional receipt printer, or emailed as an end of day report.