The Intellitec Multi-Point Switching system has been created for use on vehicles to communicate switching and indication signals. It uses Intellitec's popular, proprietary multiplexing protocol. Intellitec's multiplexing protocol is a time division multiplexing that divides time into a number of repeated segments, which are used by various signals to "talk to each other". The time segments repeat on a periodic basis to ensure more constant and accurate data. Each of these time segments is used to transmit unique data over a single wire, known as the multiplex "bus".

In Intellitec's Multi-Point Switching System, time is divided into 16 address groups (labeled A through P) of 10 signals each, for a total of 160 segments or channels. Each of these channels can be used for a unique signal. In this system, they repeat about 25 times per second. The channels are created by a Multiplex Control Master which puts a signal on the multiplex "bus", which is simply the wire that carries the signal to all the modules of the system.
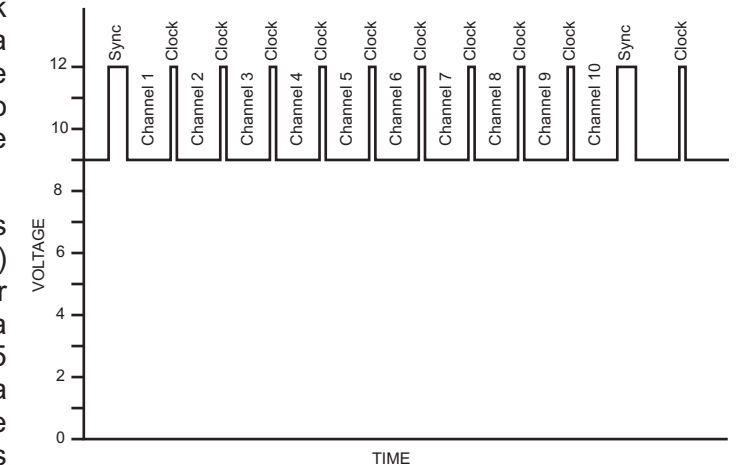

Figure 1

Figure 1 diagram is an example of the clock and sync signals created by the Multiplex Control Master. You can see that a module group of ten signals starts with a sync pulse, which is wider than the clock pulses. This sync pulse "alerts" all the modules in the system that the next group of ten signals is about to begin. If this is the first group, it is referred to as the "A" group; the first channel of that group is referred to as "A1". The next signals, or channels are called "A2, A3, A4, etc.". When the "A" group is finished, the "B" group is next.

Once this framework is set up, communications can begin. Input or switch modules put signals on the bus, then output modules respond to them. To put a signal on the bus, a switch panel or an input module "pulls" the bus low for the time of that channel. As long as the button on a switch panel is pressed, it will continue to put out a signal on the bus.

DESIGN & INSTALLATION MANUAL

Figure 2 shows what the signal would look like with inputs on channels 1, 3, and 7. These signals are called level "A" signals. They tell the latching output modules to change state from *OFF* to *ON*, or *ON* to *OFF*. The output modules respond to these signals.

Once the output modules turn *ON*, they send out a level "B" signal, on the same channel, to drive the indicators on the switch panels. *(see Figure 3)*

There are a number of different output modules available with both non-latching and latching outputs. When a *latching* output module "sees" a momentary signal at its address, it will turn *ON*. The next time it "sees" a momentary signal at its address, it will turn *OFF*. This would be a typical function to turn a light *ON*, or *OFF*. This signal can be generated by any number of input or switch modules. In this way, a light can easily be switched from many locations without any complicated wiring, or switching. Once a latching modules output is *ON*, it sends out a level "B" signal on the same channel to signal the indicators on the switch panels to turn *ON*. *Figure 3* shows level "B" signals on channels 3 and 7 with a level "A" on channel 1.

To send a signal over the system, a *non-latching* output module can be used. When a non-latching module is used, the output corresponding to that channel will turn *ON* as long as there is a signal from an input, or switch module. This function is useful for controlling motor-driven devices, or signal lights that operate as a function of a switched input. With the motor-driven device, the motor will run as long as a switch button is pressed, or in the instance of the indicator light, the light will be *ON* as long as the input signal is *ON*.
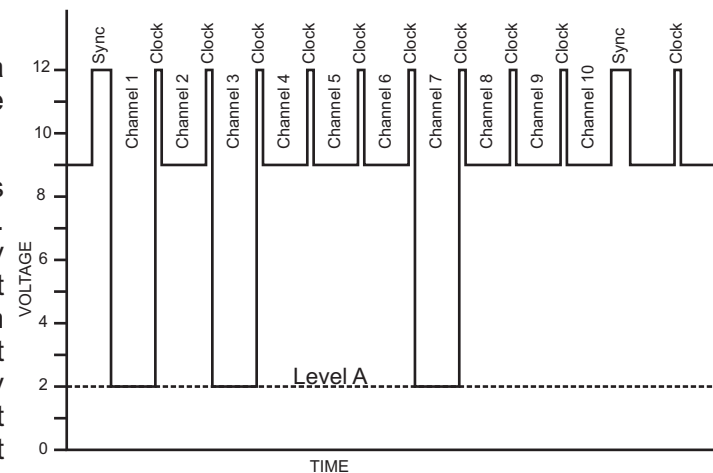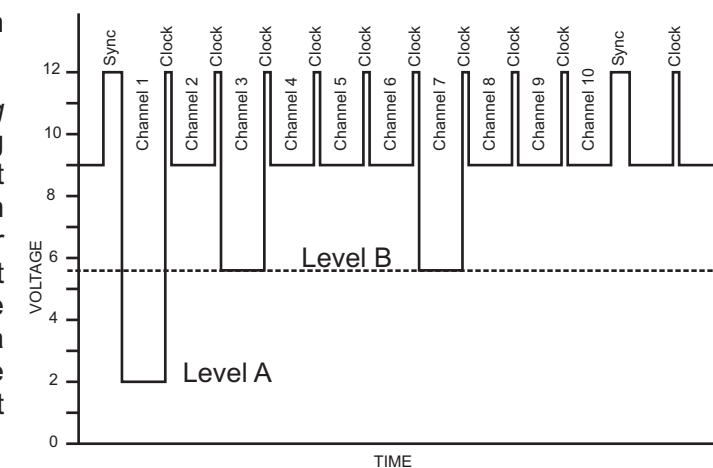

Figure 2

Figure 3
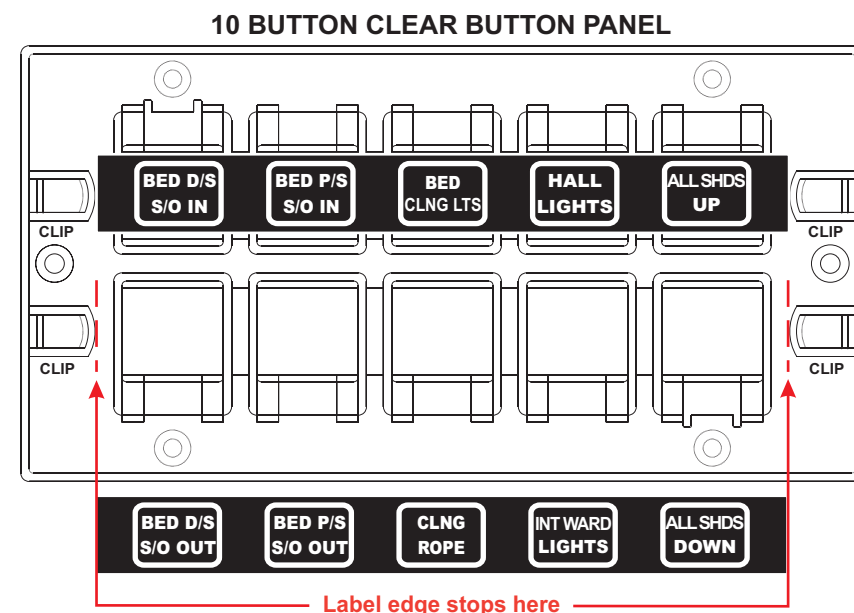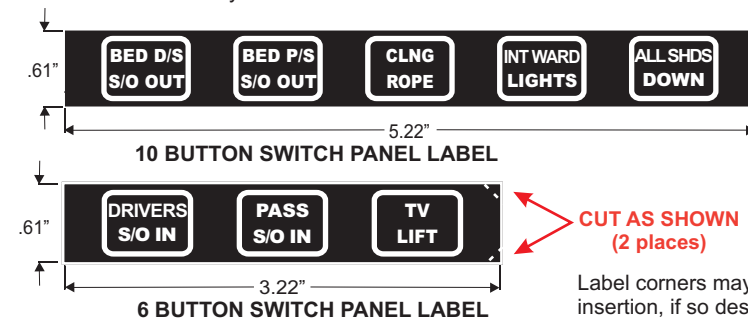
SWITCH PANEL DISPLAY - LABEL ORIENTATION

After printing labels, SLIDE label UNDER each raised button spanning from one edge of the clear button panel to the other, from left or right, whichever is easier for you. Label corners may be clipped for ease of insertion, if so desired *(See 6 button diagram)*. Label edge should butt up against edge of clip from one side of the clear button panel to the other.

NOTE:

Clips are not designed to hold the label in place, but intended as a "stop" for the label edge. *Clips on edge are for holding Switch Panel Cover on AFTER labels have been installed.* **WARNING:** *If label is placed under clip, the label will not lay flat when switch panel cover is installed.*

10 BUTTON CLEAR BUTTON PANEL

NOTE: *Recommended* Label Material: Mylar Poly 0.015" thick
If label will not slide in, check your label dimensions.
Width may need to be trimmed.

10 BUTTON SWITCH PANEL LABEL

6 BUTTON SWITCH PANEL LABEL

Label corners may be clipped for ease of insertion, if so desired, *although not required.*

CUT AS SHOWN (2 places)

**Orientation of the label is the same for 6 button switch panels.

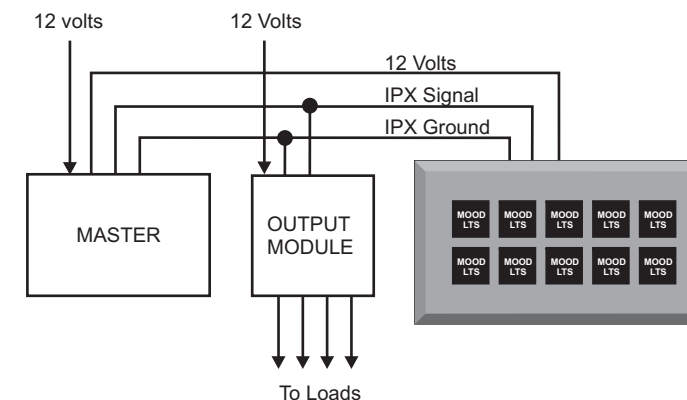
THE SIMPLEST SYSTEM

The simplest system would include:

- Multiplex Control Master (Intellitec P/N 00-00837-000)
- A ten channel latching output module (I.e., Intellitec P/N 00-00844-120)
- A ten button switch panel

These would be wired together as shown in the following diagram:

The output module's address would be set to a given Address, such as "C". The switch panel buttons would be set to be channels C1 through C10. This would provide a ten channel system, with each being a dimmer. This example is not a very good use of the system; however, demonstrates the principles.

The next step in adding to the system, would be to incorporate an additional switch panel with all the buttons addressed as the first one. This would offer "three-way" switching and dimming. As the requirements of the system demands additional switch panels, output modules can be added.

SETTING UP A SYSTEM

The first step in setting up a practical system is to determine what loads will be controlled by the system. This might include: light fixtures, motor loads such as water pumps, fans, slide-out rooms, or appliances such as water heaters. The next step is to choose the output modules best suited to drive these loads. *Intellitec's website has a catalog of output modules that can be used.* Most of these modules are usable in both the Multi-Point Switching System, as well as the Programmable Multiplexed Control (PMC) systems.

Typically, a latching output module, such as the Intellitec P/N 00-00844-120, would be used for controlling up to ten loads. This module can be set to be a ten channel dimmer, or six channel dimmer with four non-dimming channels, or a four-channel dimmer with six non-latching channels. Another slightly less expensive alternative would be the ten-channel latching relay module, Intellitec P/N 00-00838-000. This module will provide up to ten latched outputs.

Other momentary functions, such as bi-directional motor control, can also be a part of the system by using the Quad "H" Bridge module (Intellitec P/N 00-00916-120). This module can drive up to four, bi-directional motors individually, or all as a group. This module's outputs can also be used to drive up to 8 individual outputs, or any combination in between. (For a ten out put non-latching application, use the Intellitec P/N 00-00838-410.)

Once these modules have been selected, you will have to set their address. This is done by setting the address dip switch on the module. *Each output module must have a different address, or it will react to the same signals as any others with that address.* The settings of the addresses are shown on each module.

If you are using the system with the Intellitec Energy Manager, remember that modules A through C are already used by the energy management system. Therefore, you should start with module D. The modules can be in alphabetic order, or you can skip around as you like.

The system is limited to a total of 25 modules by the loading of the clock and sync generator. Each output module represents a load and each switch panel represents a load. Be sure not over load the system as it will begin to act sporadically.

THE MASTER MODULE

The system must start with the Master module. This can be the Multiplex Control Master (Intellitec P/N 00-00837-000) or if the vehicle already is using one of Intellitec's Energy Management Systems, it can be used for this function. Just remember that the Energy Management system uses modules A through C to communicate; therefore, these module addresses must be avoided by the rest of the system.

SWITCH PANELS

The next step is to determine the number and placement of the switch panels. There are three switch panels to choose from and four cover plates. There is a ten button, a six button, and a six button with four external inputs. The ten, and the six with the external inputs, are the same size, but use a different cover plate.

The Six button panel with the external inputs can be used for a variety of functions. It can be used to allow a nearby remote switch to be an input to the system without the need to use and entire additional switch panel at that location. It can also be used as an input point for an indicator function that wants to be displayed at a remote switch panel location.

The part numbers for these panels are as follows:

Ten Button   00-00841-010
Six Button with ext inputs   00-00841-006
Six Button   00-00854-060

There are two cover plates available for the ten button panel, one with ten openings and one with six openings. There are two cover plates available for the six button panel, one with six openings and one with four openings.

The part numbers for these cover plates are as follows:

Description	PREFIX	BLACK	WHITE	PUTTY
10 BTN	64-00272	- 000	- 100	- 200
10/6 BTN	64-00274	- 000	- 100	- 200
6 BTN	64-00277	- 000	- 100	- 200
6/4 BTN	64-00276	- 000	- 100	- 200

SIX BUTTON WITH EXTERNAL INPUTS

The Six Button panel with external inputs can be used to in a couple of different ways to allow inputs into the system from external switches. As an example, if you want a single switch into the system at a location that does not want a full six button panel, the four inputs on this panel can be used to input that switch.

There is a six pin plug on the back of the panel that allows access to the four inputs, the common ground lead and a source of power for backlighting of the remote switch. The maximum load on this on. source should not exceed 200 milliamps. This backlighting power will be turned on whenever the backlighting or the panel is turned on.

The connections to the module are made through a 6-pin, MOLEX Mini-fit, JR. Connector. The mating plug number is Molex 39-01-2060. The connections are as follows:

Pin No	Function
1	Remote Backlighting
2	Remote Switch 3
3	Remote Switch 4
4	Remote Switch 7
5	Remote Switch 8
6	Common Ground

PROGRAMMING THE SWITCH PANELS

Each of the buttons on the switch panels is programmable, to put out a signal on any of the 160 channels of the system. This programming is done using a Windows™ based GUI program that can be down-loaded from the *www.intellitec.com*.

The figure below shows the screen for the ten button switch panel program:
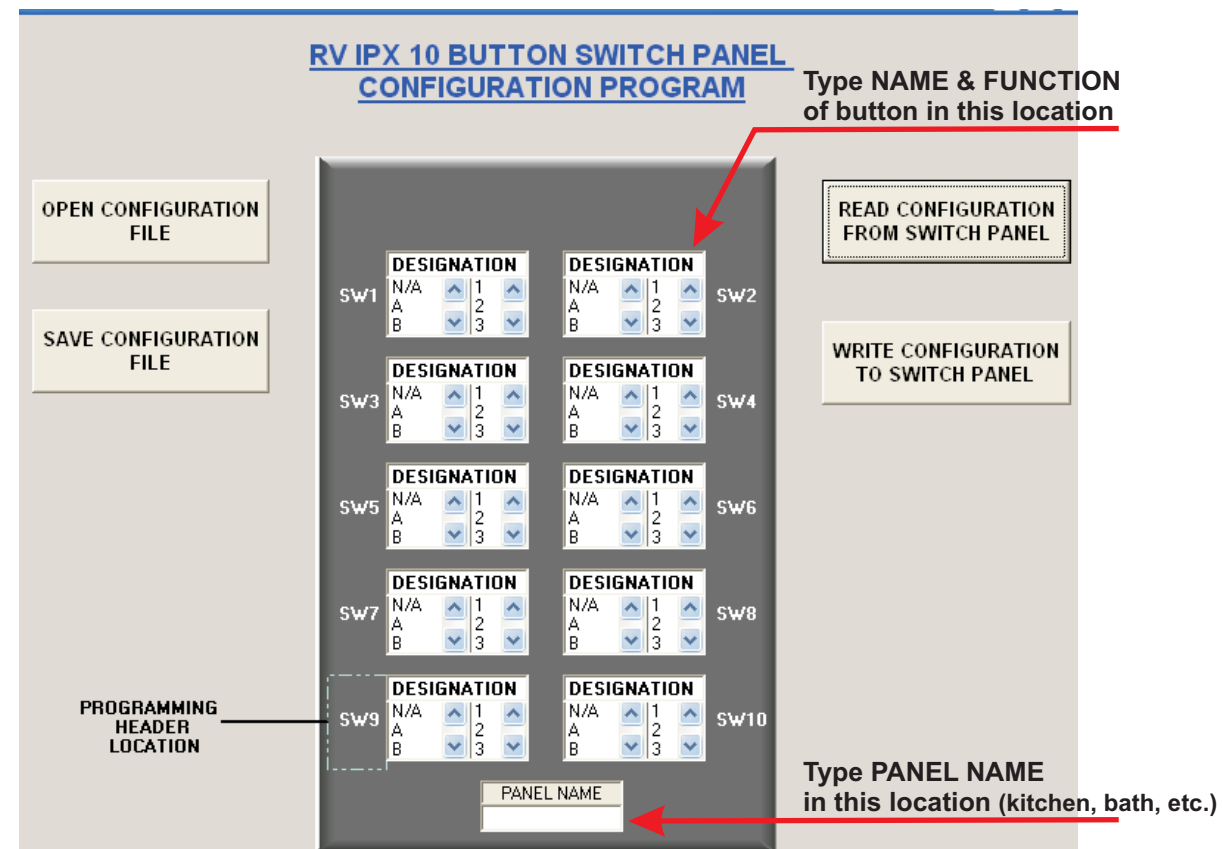
In addition to the program, you will need a Universal Programming adapter (Intellitec P/N 10-00936-120), to make connection to the switch panel. The plug from this kit plugs into the front plug on the lower left of the switch panel. Then you are ready to program the switch panel.

Once you've decided what you want each switch to do, you can program the panel. This is easily done by simply using your computer mouse to drag and select the channel designation for each switch on the panel. (**NOTE** the PROGRAMMING HEADER LOCATION to be sure you get the panel in the proper orientation.) Once this is done, you should type the Panel name in the box provided to identify this file. Then, click on "WRITE CONFIGURATION TO SWITCH PANEL". The "write to" the panel will only take a couple of seconds. If you want another panel programmed with the same button assignments, unplug the first panel and plug in the next. Click on "WRITE CONFIGURATION FILE TO SWITCH PANEL". This can be repeated as often as necessary.

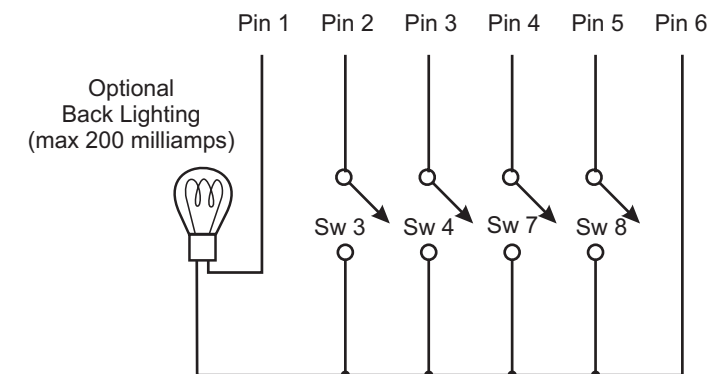To program the functions of the switches, is programmed in the same way as a standard switch panel, with there assignments being done as Switches 3, 4, 7, & 8.

TYPICAL REMOTE SWITCH WIRING

CONNECTING THE MODULES

Once the modules have been selected, the next step is connecting them together. This is a relatively easy procedure. Each module in the system must be connected to the multiplex bus in either a star or daisy-chain configuration. The order of connection is not important. Some designers prefer to put all of the output modules in a single location to make future trouble shooting easier, while others find by distributing the modules, considerable wiring can be saved.

In either case, the thing that is important is to be sure all the modules get connected properly. For wire runs in excess of 50 feet, we suggest using at least a #16 gauge wire for the ground and for runs in excess of 100 feet, we suggest using at least a #14 gauge wire for ground. The other two wires can be as small as #18 gauge.

TYPICAL INSTALLATION

Circuit Breaker

Multiplex Control Master

Intellitec P/N 00-00837-000

COM FAULT
COM OK
+12V
PWR GND
BACKLIGHT 5A FUSE
BACKLIGHT PWR
COM +
COM -
BACKLIGHT PWR
COM +
COM

Pin 1

FROM BATTERY

Additional Communications Connection

10 Channel PMC Relay Module
P/N 00-00838-410
Non Latching
70A Max per module
J3-5 power ground

J3 Ch 10 Ch 9 Ch 8 Ch 7 Ch 6 J2 Ch 4 Ch 3 Ch 2 Ch 1

POWER INPUT STUD

12V Multiplex Fet Output Module
P/N 00-00844-120
Intellitec

LOAD 10 10A MAX LOAD 9 10A LOAD 8 10A MAX LOAD 7 10A LOAD 6 10A MAX LOAD 5 10A LOAD 4 10A MAX LOAD 3 10A LOAD 2 10A MAX LOAD 1 10A MAX

TO LOAD 10

TO LOAD 1

TO LOAD 10

TO LOAD 1

CEILING ROPE | GALLEY CLNG LTS | DRIVERS S/O IN | PASS S/O IN | SPARE
LIV CLNG LIGHTS | HALL LIGHTS | DRIVERS S/O OUT | PASS S/O OUT | MASTER OFF

Pin 1

CEILING ROPE | GALLEY CLNG LTS | DRIVERS S/O IN | PASS S/O IN | SPARE
LIV CLNG LIGHTS | HALL LIGHTS | DRIVERS S/O OUT | PASS S/O OUT | MASTER OFF

Pin 1

CEILING ROPE | GALLEY CLNG LTS | DRIVERS S/O IN | PASS S/O IN | SPARE
LIV CLNG LIGHTS | HALL LIGHTS | DRIVERS S/O OUT | PASS S/O OUT | MASTER OFF

Pin 1