Secas 2020 Acetech User Guide

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1. Non Panel Switched Function Explanation

1.1 Statements of functionality not controlled by switch panels (1-9)

1.) **Scene Light Rear** activates if the sidelights are on and the rear door is open and the handbrake is on. It can also be turned on & o ffvia the Scene Light Rear switch on the Driver Panel 

which has enabling conditions of handbrake on (see page 7).

2.) **Panic Warning Device** activates for a 12 second period when the panic switch/strip is pressed. An indicating buzzer will also sound for a period of 2 seconds in the vehicle cab .

3.) **SAT NAV** is enabled when ignition is on and disabled when ignition is off.

4.) **DVR** is enabled when ignition is on and disabled when ignition is off.

5.) **Comms Relay** is enabled when ignition is on and disabled when ignition is off.

6.) **Saloon Lights Full** activate automatically if either the rear or side door is open or not fully closed. They will deactivate automatically after a period of 5 minutes during which time there is no motion detected in the saloon.

7.) **Scavenger Fan** If the Ignition input is ON then the Scavenger Fan will be ON.

8.) **Video** is enabled when ignition is on and disabled when ignition is off.

9.) **Siren Silencer** is enabled when 999 switch is On and Handbrake is ON.

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1. Non Panel Switched Function Explanation

1.2 Statements of functionality not controlled by switch panels (10-23)

10.)Side Door Step Light activates when the side door is open or not fully closed and sidelights are on.

11.)Rear Door Step Light activates when the rear door is open or not fully closed and sidelights are on.

12.)Reverse Monitor activates automatically when the vehicle is in reverse.

13.)Cooler is enabled when ignition is on and disabled when ignition is off.

14.)Cab Lights is enabled when ignition is on and disabled when ignition is off.

15.)Speed Limiter OP is on when the 999 switch is ON.

16.)LSU is always on as long as the Acetech system is on and not in low power mode.

17.)Intercom is always on as long as the Acetech system is on and not in low power mode.

18.)Stretcher & ELK are always on as long as the Acetech system is on and not in low power mode.

19.)PIR is always on as long as the Acetech system is on and not in low power mode.

20.)Reverse Alarm activates automatically when the vehicle is in reverse.

21.)JI05, Bullhorn, Cab Torch+Lights is always on as long as the Acetech system is on and not in low power mode.

22.)Cab Buzzer Op12+ will sound when Handbrake is off, and either door open OR side step is Deployed.

23.)B2B Op35+ will Turn ON when IP11+(Engine is Running) is ON.

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1.3 Low Power Mode

The Acetech boards obtain their power from the auxiliary battery so will continue to function even after the engine is switched off. In order to ensure that the auxiliary battery does not drain when the driver leaves the vehicle, the system, after a delay of 1 hour enters low power mode.The delay starts when the ignition is turned off.
Pressing buttons on the switch panels will not restart the delay.
In LPM the ECU switches o ffthe diagnostic leds, de-energises all outputs driven by the ECU & sends a CAN message to all switch panels to enter LPM. Activating ignition or pressing a button on any of the five switch panels will awaken the system.

This particular system will enter low power mode under the following conditions -

1. **If the ignition and Mains ON input remains off for a period of 1 hour and there is no motion detected in the saloon then the system will automatically enter LPM.**
2. **With ignition off the system will automatically enter LPM when the aux battery reaches a critical level (< 10.5 volts).**

With ignition on the system will remain operational unless the aux battery reaches a severely critical level (< 6 volts). At this point the system performs a complete shutdown to prevent EEPROM damage.

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1.4 Battery Charging / Emergency Start Strategy

The purpose of the battery charging strategy is:

a) To keep all auxiliary batteries charged whilst protecting the main chassis battery from being drained.
b) To assist the main chassis battery if required when cranking the engine in order to start the engine when the main battery is low.

The system constantly monitors the 4 battery voltage inputs on the Acetech ECU and automatically decides when to fire its Charger output to parallel up all the batteries so that any charging current available will be shared between all batteries, be it from the engine alternator, shoreline charger, solar panels, or any other source of current.

The Charger output is normally connected to 1 or more HCRs (high current relays) which are external to the ECU and, when closed, perform the function of connecting the batteries together allowing current to flow between them. The ECU itself has an on-board solid state relay which is normally-closed such that, if the ECU's power supply is dead, a voltage source on the ECU's Ignition input (input #3) will be automatically fed through to the Charger output to provide ability to charge the auxiliary batteries and thus power up the Acetech system.
No user action is required to configure or activate the strategy but a manual override feature is also included. The strategy continues to operate even when the system is in Low Power Mode.

Normal Operation
On power-up of the Acetech system (with ignition off), the system enters an initialisation state (INIT) where the Charger output remains on until either:

a) The EngineRunning signal is True or the (common) battery voltage exceeds 13.1V (indicating the engine is running or another external means of charging the battery is active, e.g. shoreline charger), upon which the system enters the Normal Intelligent Charge state (NORM_INTELL) leaving the batteries parallelled, or
b) the (common) battery voltage drops below 11.5V for 10s (or it subsequently somehow rises back above 11.7V), in which case the system enters the Normal No Charge state (NORM_OFF) uncoupling the batteries to prevent the main chassis battery becoming discharged due to dead auxiliary batteries or large auxiliary loads.

NORM_INTELL and NORM_OFF are the standard operating modes when the system is up and running normally.

In NORM_OFF, the HCRs are open and the batteries are uncoupled. The system remains in this state until the EngineRunning signal becomes True or ANY battery voltage rises above 13.1V. This will normally be the main vehicle battery (engine has started) or the auxiliary battery (e.g. shoreline charge connected) but in principle it can be due to ANY battery voltage rising above 13.1V. In any case, once this condition is detected, the system enters the NORM_INTELL state.

In NORM_INTELL, at least 1 battery voltage is above 13.1V, so intelligent charge is activated - the HCRs are closed and the batteries are parallelled up and charging. The system remains in this state until the EngineRunning signal is no longer True and the (common) battery voltage has fallen below 12.9V (indicating engine stopped or other charger disconnected). The batteries then remain parallelled up for a further 4 minutes, after which time the system returns to the NORM_OFF state with batteries uncoupled. If, during the 4 minutes, the engine was restarted or another charger was reconnected such that the (common) battery voltage went above 13.1V again, then the system stays in the NORM_INTELL state keeping the batteries parallelled up. If, during the 4 minutes, the main battery falls below 12.5V, the batteries are uncoupled immediately and the system is held in this state for 1 minute before returning to NORM_OFF. This is to prevent the HCRs from rapidly toggling o ffand on if Vmain is below 12.5V and one of the other batteries is greater than 13.1V (in this scenario, the system would transition rapidly from NORM_OFF to NORM_INTELL to NORM_WAIT and back to NORM_OFF and continue to repeat this cycle possibly damaging the HCRs). If at any time during normal operation the voltage of any battery exceeds 14.8V, the batteries are uncoupled to prevent potential damage. They will remain uncoupled until the voltages of ALL batteries fall below 14.6V.

Engine Cranking & Emergency Start Assist

At any time, if the ignition turns on then the above strategy is temporarily overridden with an Engine Cranking strategy, as follows:
When the ignition turns on, the system enters the Standard Cranking state (CRANK_STD). The HCRs are initially left in the same state as they were. However now, if the main battery voltage falls to more than 0.5V below ANY of the other battery voltages, then the Emergency Start Assist state (CRANK_EMERG) is entered - the HCRs are closed and the batteries parallelled up to aid cranking of the engine.
The Emergency Start Assist state (CRANK_EMERG) is also entered directly if at any time the Emergency Start key is pressed on an Acetech switch panel.
The Engine Cranking strategy remains in force until either the EngineRunning signal becomes True or the main vehicle battery reads more than 13.1V (indicating engine started), or 2 minutes have elapsed. The system then returns to the normal charging strategy.

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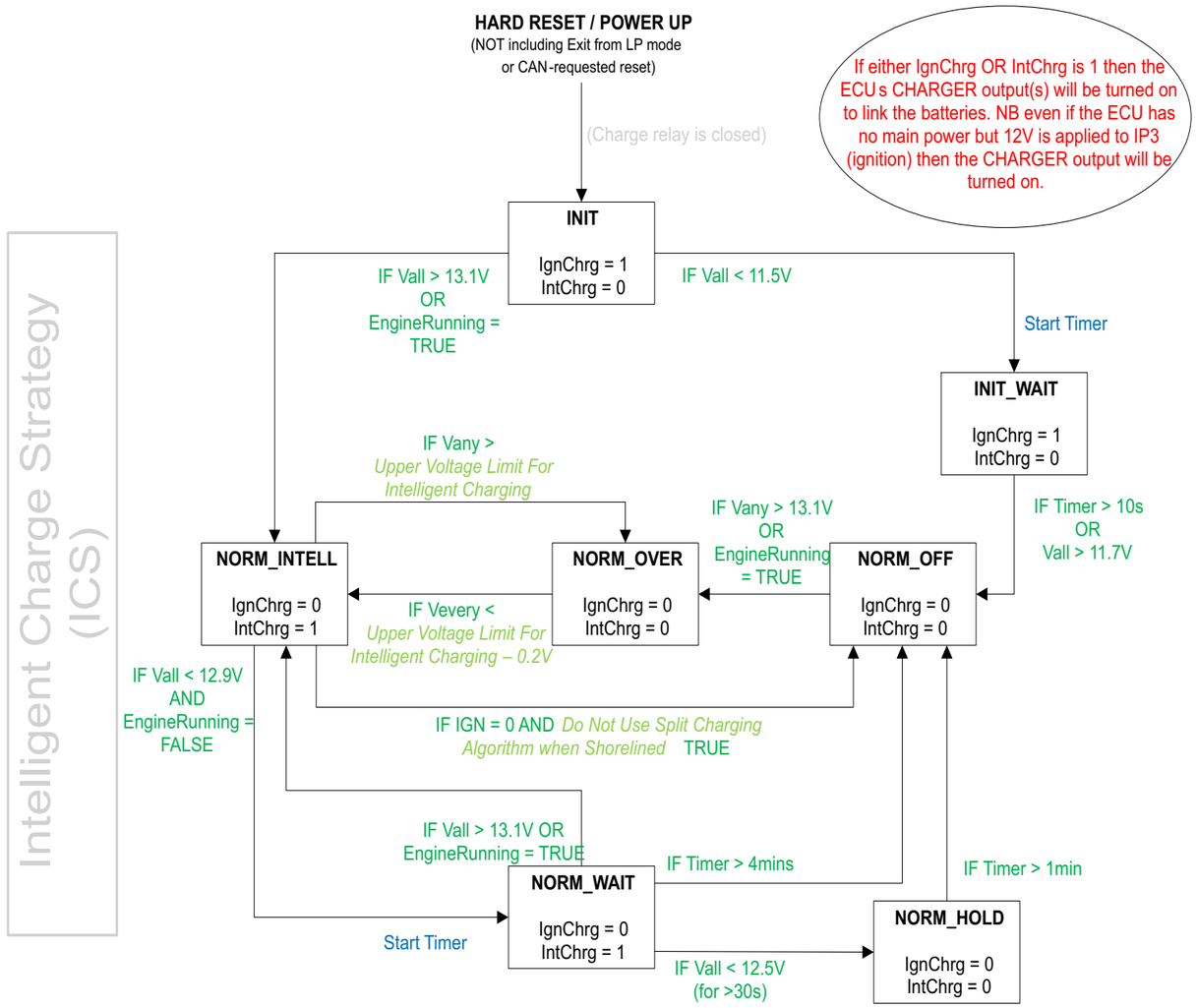
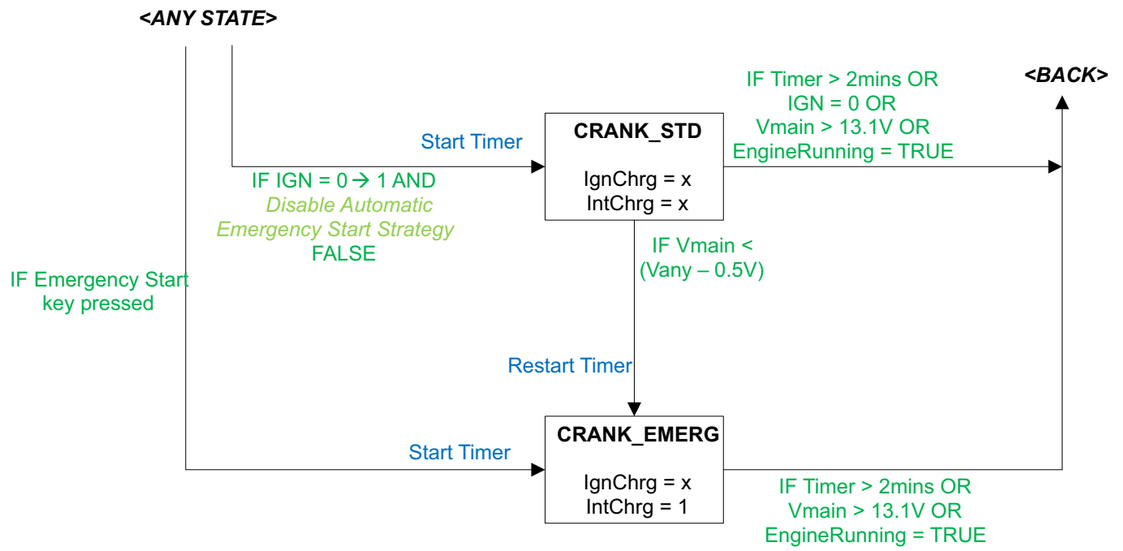
1. Non Panel Switched Function Explanation

1.4.1 Battery Charging / Emergency Start Strategy Flow Chart





Config Parameters are denoted by *light green italics*

Individual battery banks may be excluded from the charging strategy by selecting appropriate *Exclude Battery Bank From Charging Algorithm* checkbox

IgnChrg Ignition Charge
IntChrg Intelligent Charge

turn output off
turn output on
x leave output unchanged

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2. Driver Panel (1)

Indicator which Indicates when It is Safe for Driver to Reverse. A Warning buzzer sounds if it is not Safe to Reverse.

Switch which illuminates when the reverse alarm sounds and can be then used to cancel this audible warning. Enabling conditions, Reversing input ON.

Indicator which flashes and sounds a warning buzzer if any of the Battery voltages drops below 11.5 volts.

Switch which turns on and off the left scene light when the handbrake is on. This switch will turn on and off the left alley light when the handbrake is off. (The left alley light will automatically turn off after 60 seconds).

Switch which turns on and off the rear scene light. Switch enabling conditions - handbrake on.

Switch panel switches key -

»Timed Press Switch - achieves different functionality depending on how long it is held down for.

»Emergency Mode Switch - only one can be on at a time. Pressing a second emergency mode switch whilst another is on will drive the first off.

»Cyclic Switch - has more than one press to activate various functions / levels of functionality.

»Switch - has one press for on and one press for o ffwhen active.

»Indicator - not usually pressable. Is used mainly for indication of the state of an input to the crew.

Switch which turns on and off the right scene light when the handbrake is on. This switch will turn on and off the right alley light when the handbrake is off. (The right alley light will automatically turn o ffafter 60 seconds).

Emergency mode switch which turns on and off the side blues, the light-bar blues, the rear reds, the saloon light full switch and the runlock switch, Rear POD blues. Switch enabling conditions - handbrake on.

Emergency mode Switch which turns on and off the white piercers, the light-bar piercers,the side blues, the grill/wing blues, the light-bar blues, the light-bar high intensity, Rear POD blues, Speed Limiter OP and arms the siren. Switch enabling conditions - ignition on.

Indicator which flashes if any of the Doors are Open. A Warning buzzer sounds if any Door is open and the handbrake is off.

Indicator which flashes when the Side Step/Ramp Input is ON. A Warning buzzer sounds if Side Step/Ramp Input is ON and the handbrake is off.

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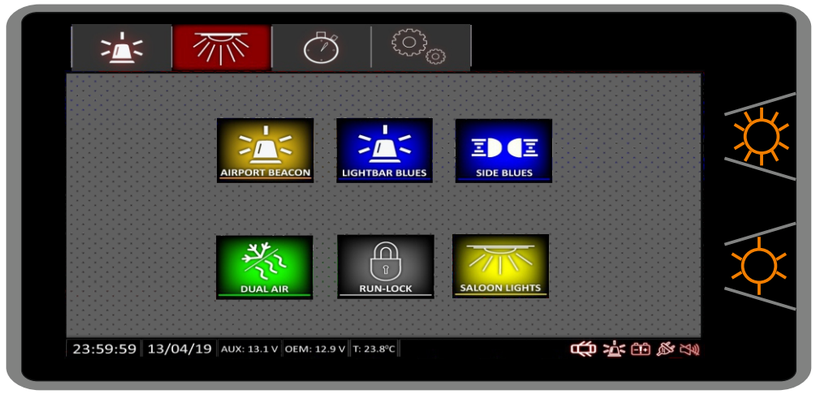
2.1 Driver Panel (2)



Switch which turns on and off the air conditioning/heater (the rear and side doors must be closed for the air conditioning to activate). After loss of ignition the heater will automatically remain on for 60 minutes unless manually switched off.

Switch which turns on and off the airport beacon.
Switch enabling conditions - Ignition on.

Switch which turns on and off engine runlock.
Switch enabling conditions - ignition on & handbrake on.

Switch panel switches key -
»Timed Press Switch - achieves different functionality depending on how long it is held down for.
»Emergency Mode Switch - only one can be on at a time. Pressing a second emergency mode switch whilst another is on will drive the first off.
»Cyclic Switch - has more than one press to activate various functions / levels of functionality.
»Switch - has one press for on and one press for o ffwhen active.
»Indicator - not usually pressable. Is used mainly for indication of the state of an input to the crew.

Switch which turns on and off the side body blues and TIR.

Switch which turns on and off the light-bar blues.

Switch which turns on and off the saloon lights in their full state.

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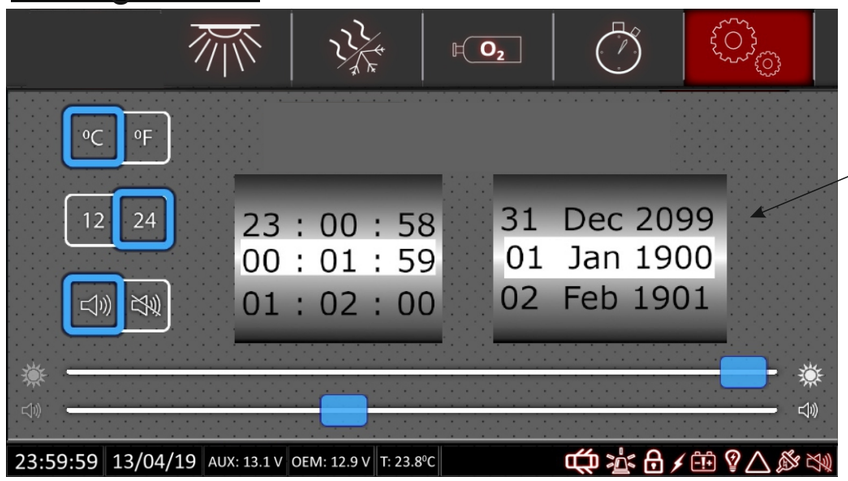
2.1 Driver Panel Settings/Timer Menu

Settings Menu



Temp

12/24hr

Mute/Unmute

Time/Date Settings

Audio Volume

Brightness

Time/Date/Batt/Temp Panel

Timer Menu

MenuTab

Start Timer

Pause Timer

Stop Timer

Repeat/single

Countdown

Indicator Panel

Temp Button: Can change between Celsius and Fahrenheit.

12/24hr Button: Can change between 12 hour and 24 hour mode.

Mute/Unmute Button: Can mute/Unmute the sound on the SP3.

Time/Date Settings: The time and Date for the Sp3 can be set Manually via this option.
Sp3 will automatically Get it's time and date updated from an AVI module if it is in the system and has GPS signal.

Audio Volume Slider: Slide up and down the Blue volume icon to increase/decrease the Sp3 volume..

Brightness Slider: Slide up and down the Blue volume icon to increase/decrease the Sp3 volume..

Starter Button: When Pressed will start the timer.

Pause Button: When Pressed will Pause the timer.

Stop Button: When Pressed will Stop and reset the timer.

Repeat/Single Button: When Pressed will put the Timer in a Repeat or single Loop setting.

Countdown Button: When Pressed will put the Timer in countdown mode.

Indicator Panel: This Panel when Programmed can show Warning indicators.
For example it can show Battery Low, Door's open, Shoreline Connected.

Switch panel switches key -

»Timed Press Switch - achieves different functionality depending on how long it is held down for.
»Emergency Mode Switch - only one can be on at a time. Pressing a second emergency mode switch whilst another is on will drive the first off.
»Cyclic Switch - has more than one press to activate various functions / levels of functionality.
»Switch - has one press for on and one press for o ffwhen active.
»Indicator - not usually pressable. Is used mainly for indication of the state of an input to the crew.

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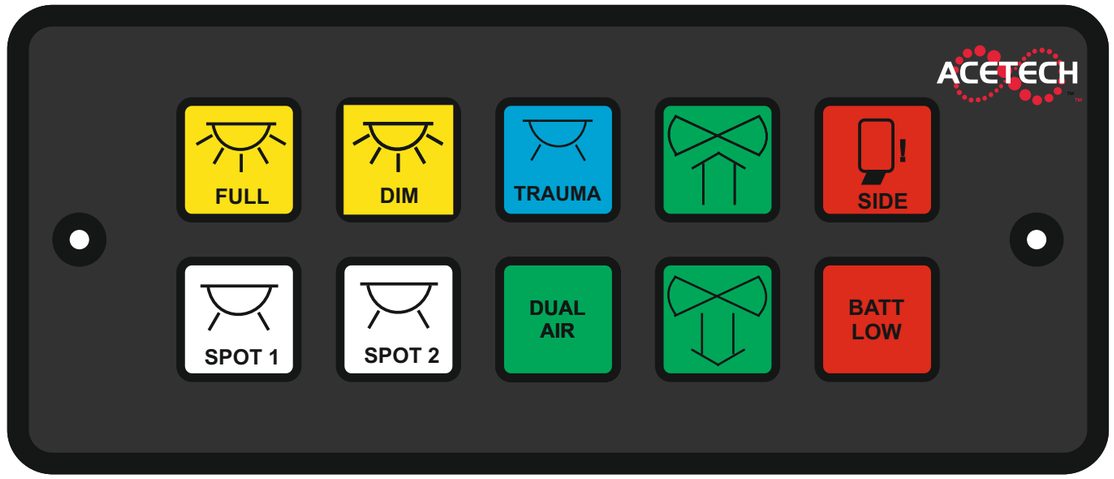
3. Attendant Panel



Note: There are 2 identical attendant panels in the saloon.

Switch which turns on and off the saloon lights in their full state. This switch will deactivate the trauma switch if it is active.

Switch which turns on and off the saloon lights in their dim state. This switch will deactivate the trauma switch if it is active. Switch enabling conditions - saloon light full switch on.

Switch which turns on and off the trauma lights. This switch when activated will turn o ffthe saloon light full and/or dim switches if they are on.

Switch which turns on and off the vent intake. Switch enabling conditions - Ignition on.

Indicator which flashes when the Side Step/Ramp Input is ON. A Warning buzzer sounds if Side Step/Ramp Input is ON and the handbrake is off.

Switch key -

»Timed Press Switch - achieves varying functionality depending on how long it is held down.
»Emergency Mode Switch - only one can be on at a time, pressing a second emergency mode switch whilst another is active will drive the first off.
»Cyclic Switch - has more than one press to activate varying functions.
»Switch - has one press for on and one press for off when active.
»Indicator - Used mainly for indication of an input state to the crew (not normally pressable).

Switch which turns on and off the spot lights 1.

Switch which turns on and off the spot lights 2.

Switch which turns on and off the air conditioning/heater (the rear and side doors must be closed for the air conditioning to activate). After loss of ignition the heater will automatically remain on for 30 minutes unless manually switched off.

Switch which turns on and off the vent extract. Switch enabling conditions - Ignition on.

Indicator which flashes and sounds a warning buzzer if any battery voltage drops below 11.5 volts.

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4. I/O Map

Input List

IP 1+ Reverse Safe		IP 33+
IP 2+ Side Lights		IP 34+
IP 3+ Ignition		IP 35–
IP 4+ STOP		IP 36–
IP 5+		IP 37–
IP 6+		IP 37+
IP 7+		IP 38–
IP 8+ PIR		IP 38+
IP 9+ Reversing		IP 39–
IP 10+ Ramp Out		IP 39+
IP 11+ Engine Running		IP 40–
IP 12+ Mains ON		IP 40+
IP 13+ Side step		
IP 14– Handbrake		
IP 15– Sliding Door		
IP 16– Rear Door		
IP 17–		
IP 18–		
IP 19– N/S cab Door		
IP 20–		
IP 21– O/S Cab Door		
IP 22–		
IP 22+		
IP 23–		
IP 23+		
IP 24–		
IP 24+ Panic Warning Device		
IP 25–		
IP 25+		

Output List

OP 1+ (Saloon Light Full)		OP 37 + O/S puddle light
OP 1+ (Saloon Light Full)		OP 37–
OP 2+ (Saloon Light Dim)		OP 38 + Runlock
OP 2+ (Saloon Light Dim)		OP 38 –
OP 3+ (Spot 1)		OP 39 + Reverse Alarm
OP 3+ (Spot 1)		OP 39 –
OP 4+ (Scavenger Fan)		OP 40 + Reverse Monitor
OP 4+ (Scavenger Fan)		OP 40 –
OP 5+ (Trauma Light)		OP 41A + Sat Nav (Sat Nav, DVR, Video)
OP 5+ (Trauma Light)		OP 41B + DVR (Sat Nav, DVR, Video)
OP 6+ (Air Con Ignition)		OP 41C + Video Switch (Sat Nav, DVR, Video)
OP 6+ (Air Con Ignition)		OP 42A + Cooler Box (Cooler, Cab Lights, Comms Relay)
OP 7+ (Spot 2)		OP 42B + Cab Lights (Cooler, Cab Lights, Comms Relay)
OP 7+ (Spot 2)		OP 42C + Comms Relay (Cooler, Cab Lights, Comms Relay)
OP 8+ (Heater)		OP 43A + LSU (LSU, Intcom, ELK, Stretcher)
OP 8+ (Heater)		OP 43B + Intercom (LSU, Intcom, ELK, Stretcher)
OP 9+ White Piercers		OP 43C + ELK, Stretcher (LSU, Intcom, ELK, Stretcher)
OP 10+ TIR		OP 44A + PIR (PIR, HCR FB2, Reverse Safe Feed)
OP 11+ Wing / Grill Blues		OP 44B + HCR FB2 (PIR, HCR FB2, Reverse Safe Feed)
OP 12+ Cab Buzzer		OP 44C + Reverse Safe Feed (PIR, HCR FB2, Reverse Safe Feed)
OP 13+ High Level Body Blues 1		OP 45A + (JI05, Bullhorn, Cab Torch + Lights)
OP 14+ High Level Body Blues 2		OP 45B + (JI05, Bullhorn, Cab Torch + Lights)
OP 15+ Rear Reds		OP 45C + (JI05, Bullhorn, Cab Torch + Lights)
OP 16+ Rear POD Blues		OP 45D + (JI05, Bullhorn, Cab Torch + Lights)
OP 17+ Scene Lights Rear		
OP 18+ Scene Lights N/S		
OP 19+ Scene Lights O/S		
OP 20+ Alley Light N/S		
OP 21+ Alley Light O/S		
OP 22+ Airport Beacon		
OP 23+ Vent Intake		
OP 24+ Vent Extract		
OP 25+ Side Door Step Light		
OP 26+ Rear Door Step Light		
OP 27+ Panic Warning Device		
OP 28+ Door open LED		
OP 29+ Lightbar High Intesity		
OP 30+ Lightbar Corners		
OP 31 + Siren Silencer		
OP 32 + Siren Vbat+		
OP 33 + Speed Limiter		
OP 34 + Lightbar Piercers		
OP 35 + B2B Activation		
OP 36 + N/S puddle light		

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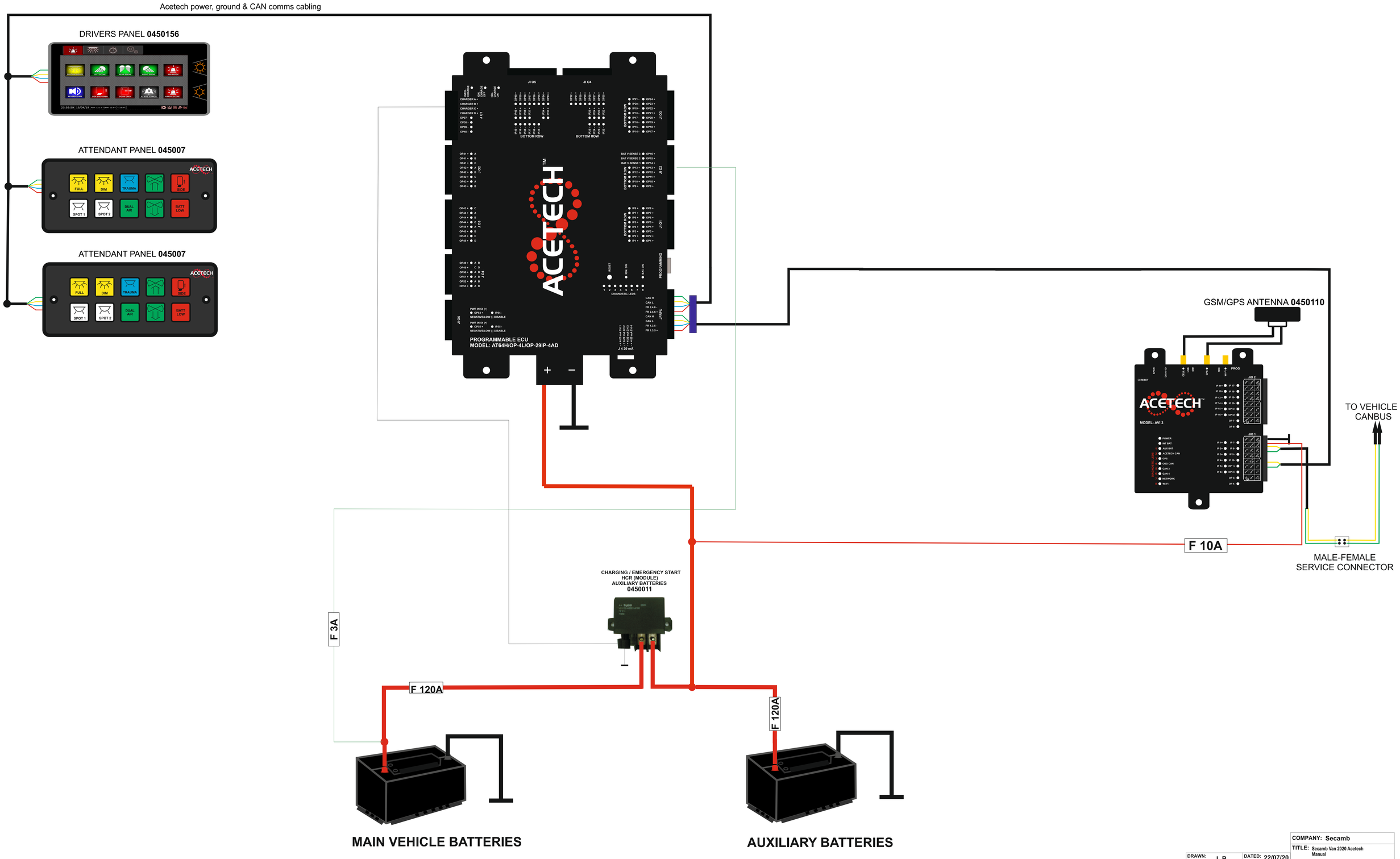
5. System Overview*



*Drawing is a representation of Acetech hardware only and not to be used as a wiring schematic.

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