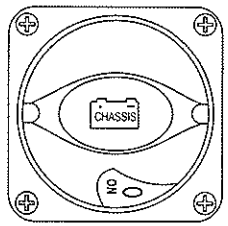
## CHASSIS ELECTRICAL - INTRODUCTION

This section contains guidelines, procedures and information that will assist in understanding the chassis electrical system and the operation of various components. Refer to the OEM manuals included in the Owner's Information File box for their respective, in-depth, individual component operating instructions.

## BATTERY DISCONNECT
### *Chassis*



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The chassis battery disconnect is located in the curbside battery compartment. The switch controls the DC power to the front electrical bay. Most chassis and engine functions are interrupted when the battery disconnect is turned off. Some electronic components of the engine and transmission require a constant power source and will continue to draw power when the disconnect is engaged.

Turn the main battery disconnect switch off when the motorhome is going to be stored or when performing electrical maintenance. If possible, leave the motorhome plugged into an AC source with the battery disconnect switch on to help prevent the possibility of dead batteries.

If an AC source is not available, and the motorhome is going to be stored more than 48 hours, it is recommended to turn the battery disconnect switch off.

**WARNING**
**When welding is involved for motorhome repair or modification, only qualified, experienced technicians should weld on the chassis. Improper welding procedures and materials may weaken the assembly or result in damage that is not obvious and may not cause an immediate problem or failure. Unauthorized modifications or repairs to the chassis could result in a forfeiture of warranty coverage.**

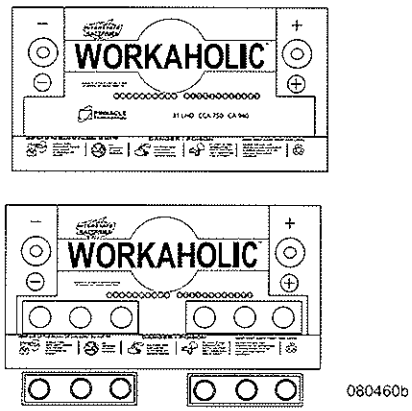
**DANGER**
**Due to the sensitive nature of the electronics on the chassis, the following precautions are required to protect electrical components in the motorhome chassis:**

1. **Disconnect the (+) positive and (-) negative battery connection.**
2. **Cover electronic control components and wiring to protect from hot sparks.**
3. **Disconnect the terminal plugs from the engine Electronic Control Unit, located on the curbside of the engine block.**
4. **Disconnect all the plugs from the transmission Electronic Control Unit located in the roadside front distribution panel.**
5. **DO NOT connect welding cables to electronic control components.**
6. **Attach the welding ground cable no more than two feet from the part to be welded.**

## BATTERY - CHASSIS

The chassis battery is designed to produce high amperage necessary to start the engine. Maintain the chassis battery through regular electrolyte level inspections and hydrometer readings. High electrolyte consumption, or inconsistent hydrometer cell readings, may indicate a charging system problem. Perform a charging system and current draw check if the battery is exhibiting abnormal hydrometer readings.

**NOTE**
**Replacement batteries should have the same cold cranking amp (CCA) rating.**



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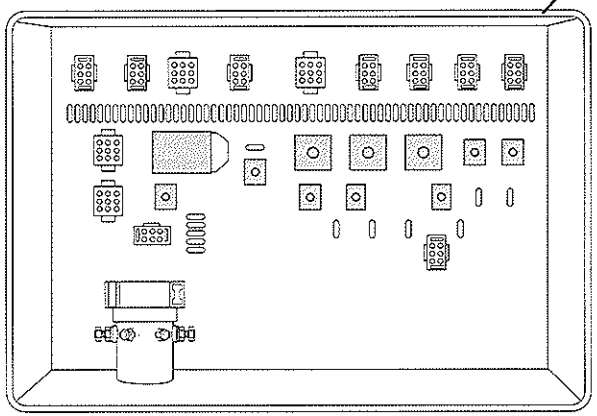
*Battery with cover removed. Cut plastic to remove cover.*

## FUSE & CIRCUITS
### *Front Distribution Panel*

The front electrical panel is located in the outside roadside front compartment and contains the fuses, self resetting manual reset supply circuit breakers, solenoid and relays.

The automotive fuses are located in the front electrical panel. The fuses are the standard plug-in type (ATM). When a fuse "BLOWS," the wire in middle of the plastic case will be broken. A bad or blown fuse must be replaced with a fuse of the same rating and type.

Using a fuse of a different rating will defeat the circuit protection provided by the fuse, which could result in damage to the motorhome electrical system. If a fuse has been replaced and it "BLOWS" repeatedly, that may be an indication that a fault exists or an electronic component has failed. It is recommended that the motorhome be taken to a qualified RV technician before any future use to diagnose and repair the problem. Circuits are identified on the fuse label located on the inside of the electrical door. Remove 3 wing nuts, turn cover over to view.



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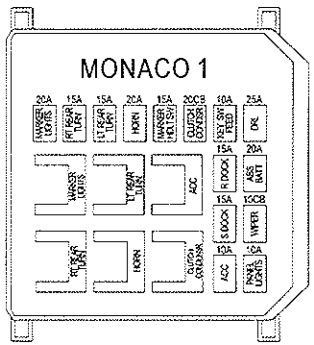
*Typical Distribution Panel*

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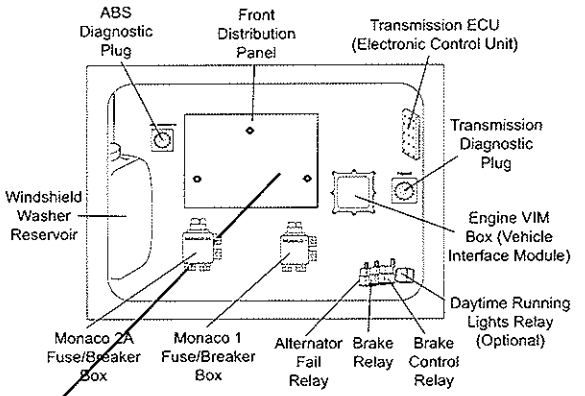
*Located in Front Roadside Compartment*




*Front Electrical Compartment*

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| FUSE NO. | DESCRIPTION | MAX FUSE SIZE |
|---|---|---|
| C401(F) | CHASSIS | |
| 4-1 | STEP MOTOR | 25 |
| 5-2 | STEP SWITCH | 7.5 |
| 6-3 | SPARE | 15 |
| 3-4 | SPARE | 3 |
| 2-5 | LEVELING AIR/HYD. | 15 |
| 1-6 | AIR LEV COMPRESSOR | 15 |
| C402(D) | | |
| 4-7 | NAVIGATION | 15 |
| 5-8 | STEP COVER | CB-15 |
| 6-9 | SUNVISOR | 5 |
| 3-10 | CB RADIO PREP | 5 |
| 2-11 | KEYLESS | 15 |
| 1-12 | ALADDIN MAIN PWR | 15 |
| C403(D) | IGN#1 | |
| 4-13 | DASH A/C | 20 |
| 5-14 | JACK/ANT WARNING | 5 |
| 6-15 | TV/LEVEL LOCKOUT | 7.5 |
| 3-16 | MIRROR HEAT | 15 |
| 2-17 | MIRROR MOTORS | 2 |
| 1-18 | SIDE DOCKING LIGHTS | 15 |
| C415(F) | RELAY FUSE | |
| 1-59 | PATIO AWNING | CB-15 |
| 2-60 | ENTRY DOOR AWNING | CB-15 |
| 3-61 | SIDE DOCK LT REALAY | 15 |
| 6-62 | N/A | 15 |
| 5-63 | N/A | 15 |
| 4-64 | N/A | 15 |
| 65 | MARKER LIGHTS | 10 |

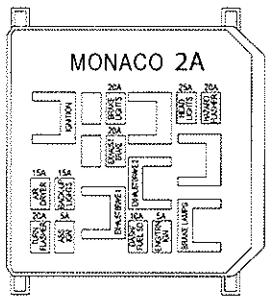
| FUSE NO. | DESCRIPTION | MAX FUSE SIZE |
|---|---|---|
| C404(F) | IGN#2 | |
| 4-19 | STEP/ISO SENSE | 7.5 |
| 5-20 | LEVELING JACKS | 15 |
| 6-21 | SPARE | 3 |
| 3-22 | SLIDE-OUT RELAY | 15 |
| 2-23 | SPARE | 15 |
| 1-24 | SPARE | 15 |
| C405(D) | ACC#1 | |
| 2-25 | REAR VISION | 5 |
| 1-26 | ALADDIN ING FEED | 5 |
| 4-27 | ADJUSTABLE PEDALS | 10 |
| 7-28 | OVER HEAD DEFROST | 15 |
| 8-29 | ACCESSORY | 15 |
| 9-30 | AIR DUMP | 15 |
| 6-31 | AIR LEVELING | 15 |
| 3-32 | FOG LAMPS | 15 |
| C214(F) | NON SWITCHED HOUSE 12V | |
| 4-66 | RADIO MEMORY | 10 |
| 5-67 | REFER | 5 |
| 6-68 | AIR LEVELING | 15 |
| 3-69 | LP/CO DETECTOR | 10 |
| 2-70 | SYST. HEAT/SNAP DISC | 5 |
| 1-71 | HOUSE READ OUT | 3 |
| | CIRCUIT BREAKERS | |
| | INTERIOR FUSE PANEL 80 | |

| FUSE NO. | DESCRIPTION | MAX FUSE SIZE |
|---|---|---|
| C406(F) | SWITCHED HOUSE 12V | |
| 4-33 | DRV POWER SEAT | CB-15 |
| 5-34 | PASS POWER SEAT | CB-15 |
| 6-35 | STORAGE LIGHTS | 15 |
| 3-36 | SERVICE LIGHT | 7.5 |
| 2-37 | POWER CORD REEL | CB-15 |
| 1-38 | POWER HOSE REEL | CB-15 |
| C407(F) | | |
| 2-39 | SPARE PASS OVERHEAD | 20 |
| 1-40 | BAY 12V/CPTR RECEP. | 15 |
| 4-41 | SPARE | 5 |
| 7-42 | SPARE | 15 |
| 8-43 | SPARE | 3 |
| 9-44 | SPARE | 15 |
| 6-45 | STEP WELL LIGHTS | 15 |
| 3-46 | SPARE | 15 |
| C408(F) | | |
| 4-47 | SPARE | 10 |
| 5-48 | SPARE | 15 |
| 6-49 | DRVRS S/O PWR #1 | 15 |
| 3-50 | PASS S/O PWR | 15 |
| 2-51 | DRVRS S/O PWR #2 | 15 |
| 1-52 | PASS S/O PWR BED/LAV | 15 |
| C409(D) | | |
| 4-53 | MAP LIGHT | 7.5 |
| 5-54 | 12V COMUTER RECEPT. | 15 |
| 6-55 | BATT. BOOST/TV BOOST | 5 |
| 3-56 | SPARE | 15 |
| 2-57 | HOME THEATER AMP | 15 |
| 1-58 | SERV. LT/AUX 12V PWR | 15 |

03213970 rev. B

100216

*Front Distribution Fuse Panel*

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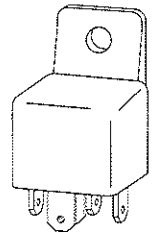
*Located in Front Roadside Compartment*

## *Relays*



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The motorhome uses various relays to operate electrical equipment, such as lights and motors. If a relay needs to be replaced, carefully record the location of each wire and all markings or labels.

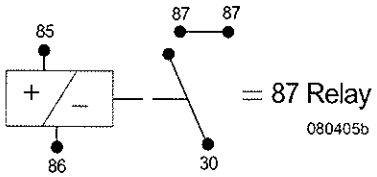
Relays can look the same in appearance, but differ in function. Note that on the side of the relay is a schematic drawing identifying if the relay is 87 or 87a relay. These current ratings differ, and if mixed, will create problems. Ensure the replacement relay is of the current rating to assure proper operation.

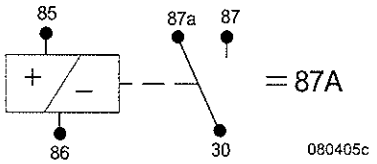
Another indicator to the type of relay is the post or legs. Turn the relay over and look at the post.

**Note the differences between the numbered posts:**

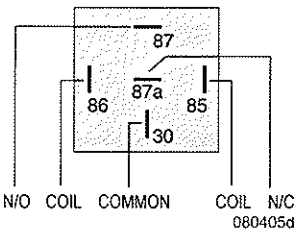
1. The 30 post is the incoming fuse and/or breaker power. Some relay applications supply power to the 30 post. Some use it for ground. The 30 post can be used many different ways.
2. The 85 post is one side of the coil, tripped different ways.
3. The 86 post is the opposite side of the coil, tripped different ways.
4. The 87 posts are not common to the 30 post until the relay is tripped. When the relay trips, both 87 posts are common to the 30 post.

5. Using an 87a relay, the 30 post and the 87a post are common. When the coil is tripped, the 87a post becomes inactive and the 30 post becomes common to the 87 post located on the outside of the relay.



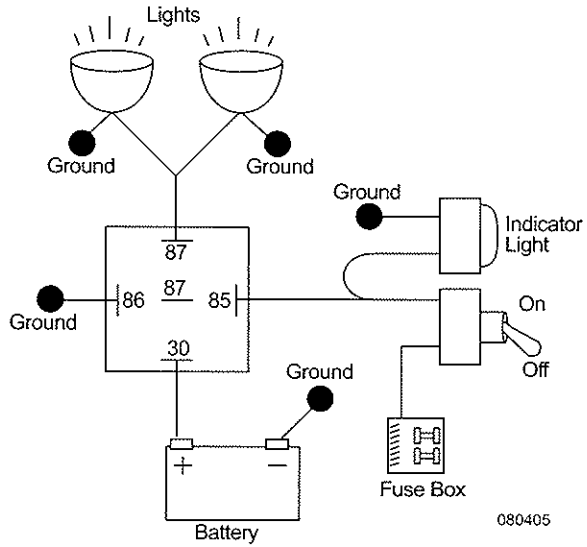

A Single Pole Single Throw relay (SPST) is an electro-magnetic switch consisting of a coil (terminals 85 & 86), one common terminal (30), one normally closed terminal (87a), and one normally open terminal (87).




*Single Pole Single Throw Relay.*

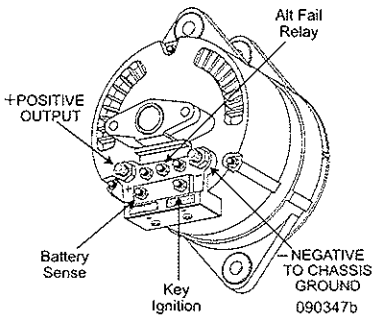
When the coil of the relay is at rest (not energized) the common terminal (30) and the normally closed terminal (87a) have continuity. When the coil is energized, the common terminal (30) and the normally open terminal (87) have continuity.

**NOTE**
**When there is power applied to the coil, the coil sets up a magnetic field in the windings. When the power is removed, the field collapses. A momentary high voltage discharge will occur. This is how an ignition coil works.**




## ALTERNATOR

The alternator is designed for output through the engine operating range. When traveling, keep an eye on the voltmeter in the dash area. Normal readings should be between 13 to 14.5 Volts DC. Voltage indications higher or lower indicate a potential problem with the charging system. If the alternator output drops below an acceptable level, a charge indication warning lamp will illuminate.




The alternator replaces amp hours the chassis battery used to start the engine. The amount of charge the alternator sends to the chassis battery is dependent on the amount of time the engine is operated. Repeatedly starting the engine for short periods may not be enough operating time to adequately replace the amp hours the chassis battery uses to start the engine.

The function of the alternator is an electrical system voltage maintainer, not a battery charger. When the engine is operating, the alternator maintains electrical system voltage relative to a load, such as headlights and windshield wipers. When a heavy load is placed on the alternator, such as trying to charge dead house batteries, the operating temperature of the alternator will increase. Excess operating temperature of the alternator for extended periods of operation can lead to premature failure of the alternator.

**NOTE**
**The alternator is not designed to charge the house batteries from a complete discharge to a full state of charge. The alternator will maintain the battery charge during travel, supplying the DC current necessary to operate running lights or other DC loads.**

If the house batteries are in a low state of charge, it is recommended to charge the house batteries with the converter/inverter or an auxiliary battery charger before driving the motorhome.

**CAUTION**
**Long-term use of the inverter to operate the microwave while in transit will damage the alternator. Use the generator to operate the microwave while in transit.**

### *Alternator Testing Procedure*

**Alternator Testing:**

- Check all wiring for burnt or loose electrical connections. Repair as needed.
- Check all grounds and electrical connections to confirm they are clean and tight.

A. Alternator ground to chassis frame.
B. Motor block ground to chassis frame.
C. Chassis battery ground to chassis frame.
D. Alternator positive output to isolator relay terminal.

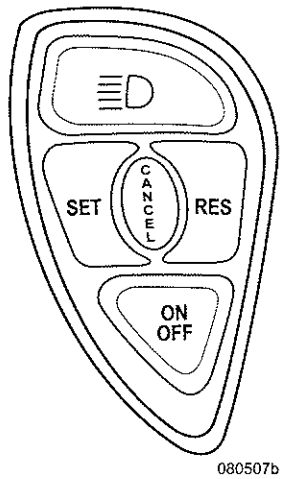
- **Inspect** the alternator for damage.
- Check belt, pulley and fan for wear. Replace as needed.
- **DO NOT** disconnect the battery, or battery wire from the alternator with the engine running as this can damage the alternator or regulator.
- The pulley for the alternator should be torqued to 80 ft. lbs.
- Chassis battery voltage with the engine **OFF** should range from 12.2 to 12.7 Volt DC.
- Chassis battery voltage with the engine at idle should range 13.5 to 14.2 Volts DC.
- The output of the alternator range is 13.6 to 15.4 Volts DC. Connect a volt meter to the (B+) terminal of the alternator and chassis ground. Idle the engine up to 1200 RPM.
- Connect a clamp-on amp-meter, if available, to the positive battery cable to verify the battery state/rate of charge.

**CAUTION**
**The alternator is not a battery charger. The alternator is designed to maintain proper electrical system voltage. A battery with a low state of charge, or a dead battery, may overheat and damage the alternator.**

## STEERING COLUMN
### *Smart Wheel Operation*

**HORN:**
When pressed the horn bar on the steering wheel activates the roof mounted air horn.

**HEADLAMP FLASH:**
When headlights are **ON**, press and hold the switch to turn them off. When the headlamps are **OFF**, press and hold the switch to turn them on.



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**Cruise Function:**

- **CANCEL** - Signals cruise system to disengage without losing the current speed memory setting.
- **ON/OFF** - Cycles cruise system **ON** and **OFF**.
- **RES (RESUME)** - Actuates cruise resume function of engine controller.
- **SET** - Actuates cruise set function of the engine controller.

**WARNING**
**DO NOT use cruise control in heavy traffic or on roads that are winding, slippery or unpaved. DO NOT shift the transmission into "N" (Neutral) with the cruise control on. High engine RPM run up will occur until the cruise control is turned off.**

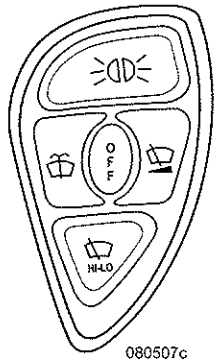
**To use the Cummins High Idle Feature:**

- With the cruise control **OFF** (see dash light), press and release the **RES** button. Each time the switch is pressed and released, the idle will rise 25 RPMs, from 500-800 RPM. To lower the idle, press and release the **SET** button. Engine idle speed will decrease in 25 RPM increments.
- With the Cruise Control **ON**, press and release the **RES** button once. Engine speed will increase to 1000 RPM. Push and hold the **RES** button, engine speed will increase to 1500 RPM. Use **CANCEL** or turn the cruise control **OFF** to return the engine to an idle.
- With the Cruise Control **ON**, press the **SET** button once. Engine will increase to 1200 RPM. Press and hold the **SET** button, engine speed will decrease to 800 RPM. Use **CANCEL** or turn the cruise control **OFF** to return the engine to idle.

**NOTE**
**The transmission will not shift into gear if the engine RPM is at or above 900. The display will flash "6" indicating the engine RPM is excessive. Select "N" and lower the engine RPM. The brake also deactivates high idle.**

### *Wiper Function*

The windshield wipers are driven by a single motor. Any wiper function generates a Headlamp On signal from the Master Controller. To disengage automatic headlight illumination, turn off the ignition, or activate and then deactivate the dashboard headlamp switch.



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**Marker Flashlamp:**
Pressing Marker Flash lamp causes the taillights and all marker lights to momentarily flash.

OFF

**OFF:**
Cancels all wiper operations. Wiper function is also cancelled when the ignition is turned off.

HI-LO

**HI-LO:**
When the button is pressed, wipers activate on low speed. If the button is pressed again, the high wiper speed setting is activated. Subsequently pressing the **HI-LO** button will alternate wiper operation between low and high speed mode.

**Wiper Wash:**
Activates the wash pump relay while the button is pressed. If no wiper function has been selected, the low wiper will activate for a period of approximately three wiper cycles, after the switch is released. If any wiper functions have been selected, the wipers will continue to run in the selected mode after the wash button is released.

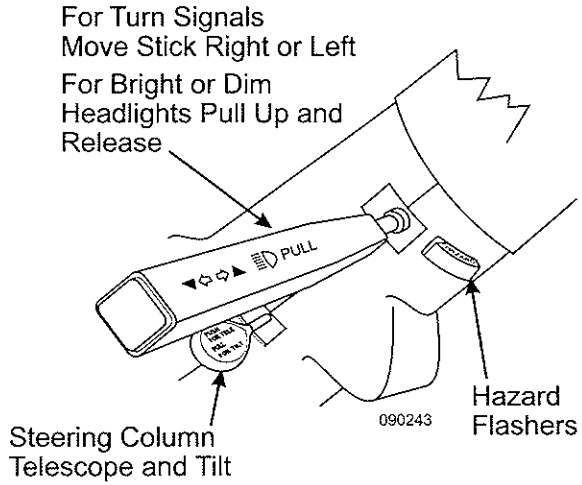
**Wiper Variable:**
Operation of the Wiper Variable button causes the low speed wiper function to activate for one wipe. If the button is pressed again within approximately 30 seconds, the low speed wiper function activates and repeats at an interval determined by the time between the last two operations of the button. Additional button operations will shorten the cycle. Activating other wiper modes cancels the variable mode.

***Example:*** In light rain or misting conditions press the button once to initially clear the windshield. If the windshield requires a second clearing, press the button again, setting the timed interval between subsequent wipes required by the current conditions. To extend the wipe interval, press the intermittent button twice more, or switch the wipers off and use the same method to set the desired interval.

### *Tilt & Telescope*

**Tilt and Telescope Steering Wheel Control Lever: Located on the Steering Column.**

- To tilt the steering wheel pull the lever up. Tilt the steering wheel where desired. Releasing the lever will lock the steering wheel in the new position.
- To telescope the steering wheel push and hold the lever down. Push down or pull up on the steering wheel until the wheel is in place. Release the lever and the steering wheel will lock in the new position.



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**Turn Indicator and Headlight High/Low Dimmer Control Lever: Located on the Steering Column.**

- Pushing the lever forward will activate the right turn indicator circuits when the ignition is on.
- Pulling the lever down will activate the left turn indicator circuits when the ignition is on.

- Pulling the lever up will select high/low beam circuits when the headlights are **ON**.

NOTE
**An audible sound is heard when turn signals are activated. Applying the foot brake cancels the turn signal sound, releasing the foot brake activates the audible turn signal sound.**

**Hazard Flasher Button: Located on the Steering Column.**

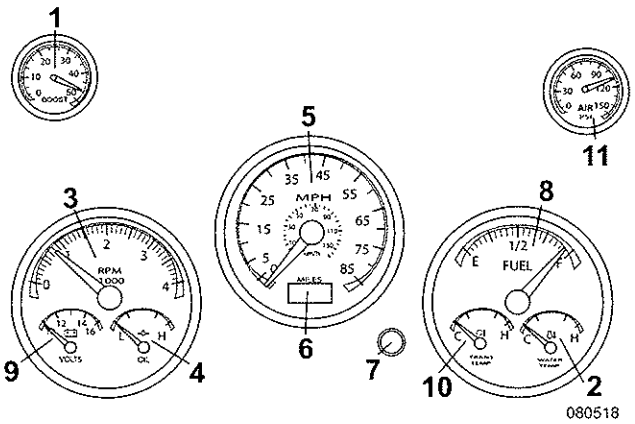
- Pull out on flasher button to turn four way flasher on.
- Push button inward to shut off flasher.

## DASH
### *Instrument Panel*

1. **TURBO BOOST:** Boost pressure produced by engine turbocharger.

2. **WATER TEMP:** Monitor this gauge frequently when CLIMBING HILLS, TOWING or in HIGH AMBIENT TEMPERATURES. Refer to the Aladdin™ system if the needle indicates an out of range condition. IMMEDIATE ACTION should be taken to avoid engine damage. Refer to the OEM instructions for specific temperature recommendations.

3. **TACHOMETER:** Displays engine speed in revolutions per minute (RPM).




4. **OIL PRESSURE:** Indicates oil pressure not the amount of oil in the engine. Please refer to manufacturer's instructions for specific pressure recommendations.

WARNING
**If oil pressure drops and the WARNING lamp illuminates, stop the engine and check oil level.**

5. **SPEEDOMETER:** Indicates the speed of the motorhome. The gauge indicates MPH and KPH.

6. **ODOMETER/TRIP METER:** Records the mileage driven as well as total mileage on a trip.

7. **MILEAGE/TRIP RESET BUTTON:** Used to toggle between the odometer and trip meter. Holding the button down for two seconds resets the trip meter.

8. **FUEL:** Fuel gauge registers approximate fuel tank level when ignition switch is in the run position.

NOTE
**Fuel mileage varies with driving style and road conditions. Always average more than one tankful to obtain a more accurate figure. The diesel Generator uses fuel from main tank and will affect fuel mileage figures. Diesel generators will not operate below ¼ tank to ensure there is enough fuel to run main engine.**

9. **VOLTMETER:** Shows the charge condition in the chassis battery. The normal voltage with the ignition switch **ON** and the engine **OFF** varies between 12.0 and 13 Volts. Battery charging voltage is about 14.0 Volts when the engine is operating under a normal load. Battery readings of less than 10.5, or more than 15 Volts, usually indicate a battery or electrical system problem.

10. **TRANS TEMP:** Shows approximate normal operating temperature of the transmission fluid. Do not let the transmission cooler oil temperature exceed OEM specifications. If excess temperature is indicated, stop the motorhome and shift to neutral. Accelerate the engine at 1200 to 1500 RPM and allow temperature to return to normal. Refer to the Aladdin™ system when the needle indicates an out of range condition.

11. **AIR PRESSURE GAUGE:** Uses two needles to indicate air system pressures. One needle indicates air pressure of the front air tank. The other needle indicates air pressure of the rear air tank. The normal air system operating pressures are 105 to 120 psi. These air pressures are preset at the factory. If a problem occurs with either air system not maintaining normal operating pressure, it is an indication of a malfunction in the air system. Use caution and stop the motorhome in a safe area. Contact a qualified technician immediately.

**NOTE**
**Layouts may vary with difference in models or options.**

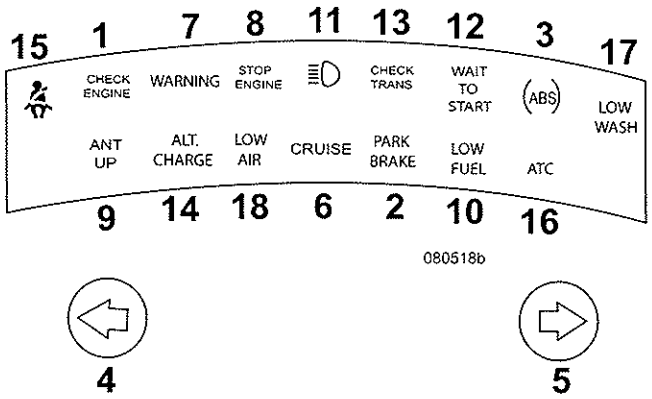
### *Indicator Lights*

1. **CHECK ENGINE:** Problem with the engine.

2. **PARK BRAKE:** Parking/emergency brake is applied.

3. **ABS:** Possible fault in the ABS Brake system. Also indicates fault codes for service technicians.

4. **LEFT TURN:** Audible Turn Indicators: Left Turn indicator circuits active. Audible indicator cancels when the brake is applied.




5. **RIGHT TURN:** Audible Turn Indicators: Right Turn indicator circuits active. Audible indicator cancels when the brake is applied.

6. **CRUISE:** Indicates when cruise control is activated.

7. **WARNING:** Out of range conditions exist within the engine protection circuits. Stop coach; check all fluid levels. Do not check the coolant level until it has had sufficient time to cool. The warning light may also signify that there is water in the fuel. Water is heavier than fuel and will collect in the primary filter bowl. Drain primary filter bowl using the valve on the bottom of the filter bowl.

8. **STOP ENGINE:** Alerts driver of severe out of range condition within the engine protection circuits. Pull over and stop as soon as possible. Shut-off engine to avoid engine damage.

9. **ANT UP:** TV antenna is raised. Lower antenna before moving coach.

10. **LOW FUEL:** Fuel level is becoming low.

11. **HEADLIGHT BEAM:** High beams when illuminated.

12. **WAIT TO START:** Monitors the air intake heater at engine start up. Wait for lamp to cycle off before cranking engine.

13. **CHECK TRANS:** Alerts driver of problems related to the Allison Transmission. The light should momentarily illuminate when the ignition is switched ON and extinguish to indicate the circuits are working properly. If the lamp fails to illuminate, or remains on, the transmission needs to be checked immediately. Contact the nearest Allison dealer.

14. **ALT CHARGE:** Failure within the alternator charging system.

15. **SEAT BELT WARNING:** A warning light that indicates seat belts are not fastened.

16. **ATC (Automatic Traction Control):** The ATC indicator light will illuminate steady when the ignition key is turned ON. The light remains illuminated until the first brake application. The indicator flashes slowly when the ATC switch is pressed. The indicator light will flash quickly when an ATC event occurs.

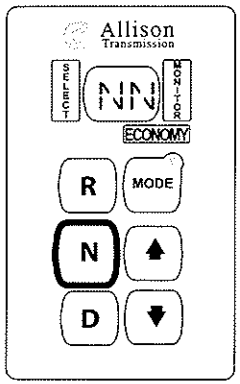
17. **LOW WASH:** Windshield washer fluid is becoming low.

18. **LOW AIR:** Air tank pressures are out of range. Check air pressure.

## CONSOLE

NOTE
**Switch and component placement on panels may vary.**

### *Shift Selector*



080355g

The keypads on the shift control are **R** (Reverse), **N** (Neutral), **D** (Drive), Arrow up, Arrow down, Mode button. A digital display window shows gear selection, various transmission modes, oil level and transmission fault codes. Generation 4 keypads have a split screen displaying two number sets while in drive. The left number displays the highest forward range available. The right number is the range that the transmission is currently in. **NN** (Neutral) will appear in the display window when the ignition is turned On. This indicates the transmission is in neutral and it is safe to start. If the **NN** does not display when the ignition is turned on, there is no power to the shift selector and the transmission will not allow the engine to start. No display is an indicator of electrical problems with the engine batteries, ECU or the shift selector.

**Keypad Functions:**

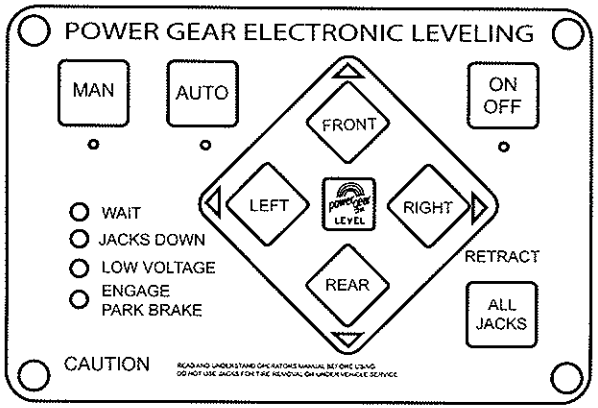
- Select the Reverse gear by pressing **R**. RR will display.
- Select Neutral by pressing **N**. The area around the **N** button has a raised ridge so the driver can orient his hand to the push buttons by touch without looking at the display.
- Select Drive range by pressing **D**. The highest forward gear (6th gear) appears in the display and the transmission will shift to first gear indicated as 6 1.
- The **Up** and **Down** arrow buttons are used to select a higher (if not in "6") or lower (if not in "1") forward range. These buttons are not functional in Neutral or Reverse. When in Drive, one press changes the gear range selected by one. If the button is held continuously, the selected range will continue to change up or down until the button is released or until the highest/lowest possible range of gears is selected.
- The Mode button enables a secondary shift point to be selected. This is commonly referred to as Economy mode. Economy mode affects the upshift schedule 3-4, 4-5, 5-6 and downshift schedule 6-5, 5-4, 4-3. During highway driving, with the cruise control set between 55 and 65 m.p.h., setting the transmission to economy mode will eliminate about 99% of transmission downshifts from sixth to fifth when incurring a slight incline or overpass.

**DO NOT** use economy mode while traveling in mountain terrain. The lower RPM shift schedule will reduce the flow of antifreeze, lubricating oil and air flow through the radiator, resulting in increased transmission and engine temperature.

CAUTION
**DO NOT use the economy mode in heavy stop and go traffic or mountainous terrain. Frequent shifting will occur and increase transmission fluid temperature. Exit economy mode until road conditions improve.**

NOTE
**When the Auxiliary Braking device is used, the display will change to a default reading of 6-2. This setting is pre-selected at the factory and can only be altered by an authorized Allison Service center. The transmission is not actually in second gear. This is only a reference point indicating the transmission will automatically downshift to second gear when auxiliary braking device is engaged.**

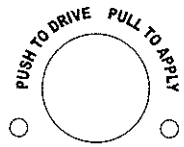
**Power Gear Control - Hydraulic Systems:** The three-point hydraulic leveling system is operated from the control module to manually or automatically level the motorhome. The control features a multiple warning system with flashing lights and an alarm to alert of a jack down.




*Power Gear Hydraulic Level* 020039f

## *Parking Brake*

The parking brake system is activated by pulling the push-pull control knob located on the driver's left console panel. When the knob is pushed, the brake is released. Prior to driving, allow time for the air compressor to build up sufficient air to shut off the air warning lamp.

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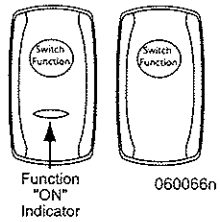
**WARNING**

**It is possible for the parking brake to be accidentally released if the air system is charged. It is advised to fabricate a device to be placed under the parking brake handle to prevent children or pets from releasing the brake when parked. A wooden clothespin clasped to the shaft is suitable.**

## *Switches*

There are two types of switches used, one is lighted and the other type is non-lighted. Each switch has the function it controls printed on the switch. Press the top of the switch to start the function and press the bottom to stop the function. Following is a list of switches used and their functions.

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**Driver's Console**

**ATC:** The ATC system improves traction on slippery or unstable surfaces by preventing excessive wheel slip. (See Section 10 for detailed information.)

**EXH BRAKE:** The exhaust brake is an auxiliary braking device for slowing down the motorhome. The exhaust brake is an effective device for speed control in town and on local routes. The exhaust brake is not a substitute for service brakes. Do not neglect service brake maintenance.

**BATT BOOST:** The Battery Boost switch is used if the motorhome chassis battery is too low to start the engine. Use Battery Boost to momentarily "jump" the house batteries for extra battery charge.

**PEDAL IN/OUT:** Use the Pedal In/Out switch to adjust the brake and throttle pedal to be either closer or farther away. The switch moves the pedals inward or outward approximately three inches. If it is necessary to move the pedals inward, push the same switch in the opposite direction. When the pedal comes to the end of the traveling distance there will be a different sound in the noise of the motor. Stop by releasing the switch. Do not continue moving the pedals. Damage to the motor and/or fuse may result if operation of the switch continues after reaching the fullest extend or retract position.

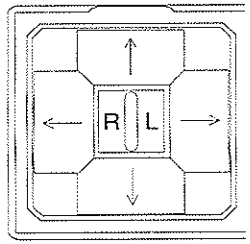
**AIR DUMP:** Manually dumps all air out of air bags. May aid in leveling the motorhome. Releasing the air from air bags gives more range of travel for leveling. Ignition must be in accessory or run position.

**NOTE**

**Never drive the motorhome with the air bags deflated. This may damage the motorhome.**

**MIRROR HEAT:** Turns on the heaters in outside rear view mirrors. The mirror heaters should be used when defogging or deicing is needed. Mirror heat should not be left in the **ON** position unless continuous fogging conditions occur.

**MIRROR ADJUST:** To adjust the rear view mirror the small selector in the middle of the switch must be placed in the desired side. The middle position is to prevent accidental bumping of the switch and changing of the mirror position. The outside mirrors have been placed so that they can be easily adjusted with the Allen wrench. After taking delivery of the new motorhome it will be necessary to adjust both the driver and the passenger mirrors.



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## Driver's Dash

**ALADDIN™ CONTROLLER:** The controller allows the operator to control cursor movements and select different menus and screens.

**HEADLIGHT:** Pull one click to operate the parking lights. Pull two clicks to operate the headlights. Rotating the headlight switch counterclockwise illuminates and dims-up the dash lights. Rotating the switch clockwise dims the dash lights.


080332

**Driver Map Light:**
Rotating the headlight switch counterclockwise turns on the halogen map light above the driver. Rotate clockwise to turn off. The map light is not dimmable.

**Dash Switches:**
Dash switches can be illuminated, and dimmed if desired, by turning the headlight switch counterclockwise. Rotating clockwise dims and turns off the switch light.

**NOTE**
**If the headlights are left ON and the ignition turned OFF a warning bell sounds alerting the driver that headlights are still ON. ENG DIAG: Checks engine functions.**

**DRIVER SHADE:** Operates the power sun visor located on driver's side.

**PASS SHADE:** Operates the power sun visor located on the passenger side.

**AUX LIGHTS:** Operates the fog lights with the ignition key on and the headlights in the low beam position. The fog lights will go off when the headlights are switched to high beam.

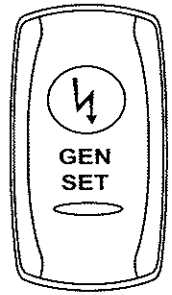
**SIDE DOCK:** Operates the side docking lights to increase visibility when parking.

**ENG DIAG:** Checks engine functions.

**O'HD DEF (Optional):** The Overhead Defrost switch operates a two speed fan which assists in windshield defrosting, cooling and recirculation. Middle position is off, up position is high fan and down is low fan.

**GEN SET:** The generator automatically initiates a preheat cycle when the switch is pressed to START. The preheat cycle is indicated by the light on the switch flashing rapidly. Depending on ambient temperature when preheat cycle may last up to fifteen seconds.

**To Start the Generator:** Press and hold the switch to START. The light flashes rapidly indicating the preheat cycle. At the end of the preheat cycle the engine will crank and start. Release the switch after the generator has started and is operating smoothly.



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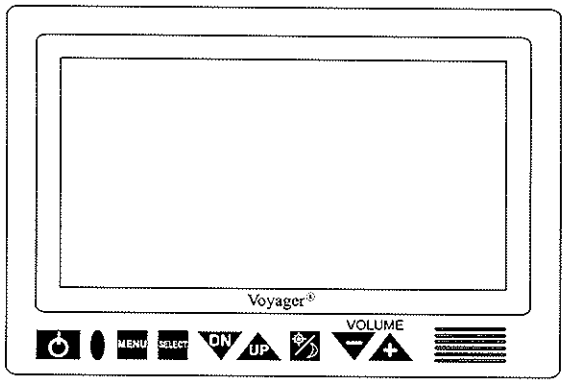
**To Stop the Generator:** Momentarily press the switch to STOP. It is not necessary to hold the switch until the generator has stopped.

**STEP COVER:** Extends and retracts the step cover.

**WARNING**
**Stepwell cover is under air pressure. When operating the stepwell cover be sure there are not pets, shoes or other obstructions in the stepwell area. Do not operate the stepwell cover while standing in the stepwell area.**

**RADIO:** Turns on the radio. The dash radio ON/OFF switch must be on in order for this switch to operate.

**BACKUP MONITOR:** Used with the back up camera and will display the rear view of the motorhome.




*Back Up Monitor* 031276b

## Passenger Console

**STEP COVER:** Extends and retracts the step cover.

**MAP LIGHT:** Turns ON and OFF map light.

**PASS SHADE:** Operates the power sun visor located on passenger side.

**STEP LIGHT:** Operates step light.

## Entry Door

**BATT CUT-OUT:** Turns house battery power on to 12 Volt domestic fuse panels.

**ENTRY STEP:** Provides power to operate the entry step through magnetic switches.

**PORCH LIGHT:** Turns ON and OFF the outside porch light.

**CEILING LIGHT:** Illuminates the front ceiling light from the entry area.

**STOR LIGHTS:** Turns the bay lights ON and OFF.

**DOOR AWNING:** Extends and retracts door awning.

**PATIO AWNING ON-OFF:** Turns power on and off to the patio awning.

**PATIO AWNING EXT-RET:** Extends and retracts patio awning.

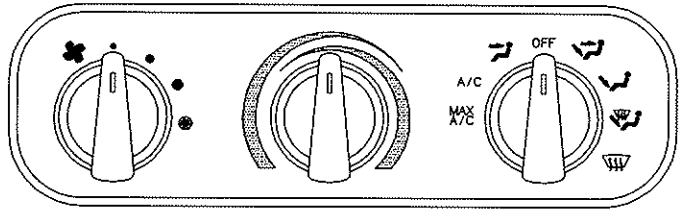
## AIR CONDITIONER & HEATER CONTROLS

The system is designed to only provide heating, cooling and defrost for the pilot and co-pilot area. The system is not capable of heating or cooling the entire motorhome.

**Blower Control Switch:**
This switch controls the four speeds of the blower motor. This is one of the most effective ways of controlling temperature. The blower will not activate until the Mode Control Switch is set to any position other than Off.

**Temperature Control Switch:**
Setting the switch to the red zone controls an electric water valve regulating the amount of engine coolant passing through the heating coils in the system. Rotating to the blue zone sets the cut-in/cut-out temperature of the air conditioning compressor on the engine.

**Mode Control Switch:**
This switch directs air flow by opening or closing damper doors. Use the Mode Control Switch to direct airflow where it is needed to maximize comfort in the cockpit area.




*Blower Speed Control* *Temperature Control* *Mode Control Switch*

080221

**MAX A/C** - Recirculated air is drawn from the passenger area and discharged through the dash louvers.


**A/C** - Fresh Air is drawn from outside into the system and discharged through the dash louvers.


**VENT** - Fresh air is drawn in and discharged throughout the dash louvers.

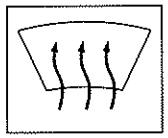
**OFF** - The blower motor does not operate. The fresh air inlet door will close, minimizing outside air infiltration into the motorhome.


**BI-LEVEL** - Fresh air is drawn in and discharged through the dash and the floor louvers.

**FLOOR** - Fresh air is drawn in and discharged through the floor louvers.

**MIX** - Fresh air is drawn in and discharged through the floor and defrost louvers. The A/C system operates to dehumidify the discharged air.

**DEFROST** - Fresh air is drawn in and discharged through the defrost louvers. The A/C compressor operates to dehumidify the discharged air.



**Heat and Defrost Operation:**

The air conditioning compressor operates in all modes except VENT, FLOOR and OFF to dehumidify the air. Rotate the temperature control switch to set discharge air temperature.

- Set the Mode Control Switch to the desired position.
- Set the Temperature Control Switch to the red zone.

**A/C Operation:** The air conditioning compressor operates in all modes, except vent, floor and off, to dehumidify the air. Rotate the temperature control switch to set discharge air temperature.

- Setting the Mode Control Switch to A/C allows outside air into the system.
- Setting the Mode Control Switch to MAX A/C recirculates inside air. When maximum cold air is desired, select this position.
- Set the Temperature Control Switch to the blue zone.

NOTE
**The temperature control switch must be set to the blue zone for cool air.**

NOTE
**Activate the A/C system monthly to keep internal components of the compressor lubricated.**

**Winter Use:**

- De-ice the windshield using the **DEFROST** mode.
- The system will heat up faster with a slower blower speed until normal engine operating temperature is obtained.

**Summer Use:**

- Close all windows and vents preventing hot and humid outside air from entering the motorhome.
- **MAX A/C** and **HI** blower provides quick cool down.
- Using a lower blower speed produces cooler air.

**Heater:**

The heater warms the air in the dash area. Engine coolant is passed from the radiator to an electric water valve. The water valve, when open, will allow the coolant to flow through the heater core. The heater core is tubing and fins. Air is drawn into the system by a blower motor through the outside recirculation door opening. Air is blown through the A/C evaporator core and then through the heater core. Coolant flows through the heater core when the temperature control is in the WARM position. Coolant flow bypasses the heater core when the temperature is in the COOL position. In either position air flow is felt at the discharge vents.

**Operating Tips and Hints:**

- Air intake and discharge temperatures are greatly effected by ambient temperature and relative humidity.
- A large amount of cooling capacity is used to dehumidify air as well as cool it. After three to five minutes of A/C compressor operation, the discharged air temperature should be about 30° F cooler than the fresh or recirculated air entering the A/C system.
- The air system on the motorhome must have adequate pressure to operate the vacuum generator or damper doors will not function.
- At the beginning of the day, activate the compressor with the engine at idle. This will avoid sudden high speed activation resulting in damage from lack of internal compressor lubrication.
- The dash A/C and heater system should be used monthly to keep the compressor lubricated.

**Electric Water Valve:**
The water valve controls the water flow to the heater core. A control module compares the output voltage from the thermostat to the feedback for the stepper motor of the water valve. The control module then drives the motor to within one-half volt of the control thermostat voltage.

**Functional Test:**
- Start and operate the engine until the water reaches normal operating temperature.
- Set the HVAC temperature control to the full hot position.
- The discharge air outlets should have hot air.
- Rotate the temperature control to full cold position.
- Allow 10 minutes for the temperature to stabilize.
- The discharge air outlets should have cold air.

## *System Components*

**Compressor** - The compressor is belt driven from the engine through the compressor and electronic clutch pulley. The compressor will pump freon from a low-pressure gas into a high-pressure, high-temperature gas. This is the start of the refrigeration process.

**Condenser** - The condenser is made of coils and fins which provide rapid transfer of heat from the refrigerant as external air passes over the coils. The high-pressure gas is changed to a high-pressure liquid.

**Condenser Fan** - A steady flow of cooling air is maintained across the condenser during system operations.

**Receiver-Drier** - Freon leaves the condenser, enters the receiver-drier and is stored until needed. The drier filters out moisture in the system. It only takes one drop of moisture to cause a malfunction in the cooling unit.

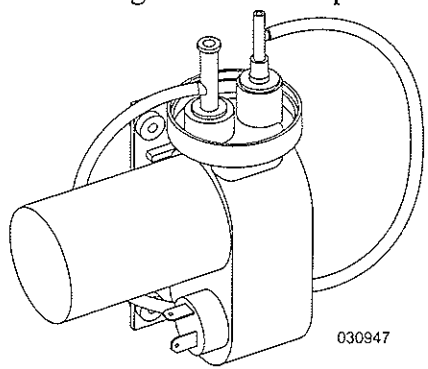
**Expansion Valve** - The expansion valve suppresses the refrigerant into the evaporator according to the cooling requirements. The pressure is reduced in the restrictive effort of the expansion valve. A part of the valve is the capillary tube assembly. The capillary tube is the sensing bulb at the outlet of the evaporator.

**Evaporator** - A tube core and fins are used in the evaporator similar to the condenser. Air is blown through the fins to allow the evaporator to cool and reduce pressure.

**Blower and Motor** - The evaporator has a fan called the blower. The blower will draw air from the cab area and force the air over the evaporator coils and fins. This forced air will ensure continuous vaporizing of the R134a.

**Relays and Switches** - Both electronic and vacuum switches are used in the control and operations of the system.

**Vacuum Generator** - The vacuum generator is important to the operation of the dash heating and A/C systems. This provides the vacuum to open and close the vacuum switches. The vacuum generator creates 15 inches of vacuum that is passed to a reservoir ball. Most dash heater and A/C systems will only require 10 inches of vacuum to operate the switches. The output from the reservoir is sent to the vent control knob. The control knob will then direct the vacuum operation to the appropriate vacuum switch to open or close vents and switches. When the ignition is on and the A/C is operating, the vacuum generator will operate.




*Vacuum Generator: Located at front firewall.*

### *Troubleshooting*

The dash A/C and Heat system uses a combination of compressed air (developed by the chassis system), vacuum air (developed by the vacuum generator) and electric relays and vacuum switches. Therefore, any repair can be classified in one of five categories:

- Electrical Vacuum
- Air Conditioner
- Heater
- Defroster

**No Cooling:**

1. Check that the blower is operating, A/C switch is in **A/C** or **MAX A/C** position, temperature control is turned to **MAX** cooling (blue area).
2. System fuses are not blown.
3. Condenser fan is operating.
4. Check power supply to unit and grounding of system.
5. Check wiring.
6. Coolant valve is leaking.
7. Drive belt is loose or broken.
8. Compressor Clutch is inoperative, will not engage.
9. Expansion Valve is faulty or frozen.
10. Thermostat control is faulty.
11. Mode control switch is faulty.
12. Compressor is faulty.
13. Loss of refrigerant.

**NOTE:**
**An ultraviolet or UV Blue Light cube is used for leak detection when dye is introduced to the A/C System.**

**Reduced Cooling:**

1. Coolant valve not operating correctly.
2. Air passages are obstructed.
3. Loose or worn drive belt.
4. Check blower and select switch.
5. Thermostat control valve is faulty.
6. Expansion valve is faulty.
7. Compressor is faulty.
8. Low refrigerant charge.

**No Heating:**

1. A/C switch is turned off.
2. Blower switch is turned off.
3. Verify the proper engine coolant level.
4. Verify that the engine is reaching operating temperature.
5. Verify engine coolant is reaching water valve attached to unit.
6. Verify operation of water valve to permit engine coolant to pass through valve to heater core.
7. Check unit fuses.
8. Check power supply to water valve and grounding.
9. Check wiring.
10. Engine thermostat faulty.

**Blower Does Not Operate or Runs Slow:**

1. Check fuses.
2. Check for loose or corroded connection.
3. Check wiring.
4. Check to ensure ignition switch is on.
5. Check blower and select switch.
6. Motor shaft has seized.
7. Blower wheel is out of alignment.

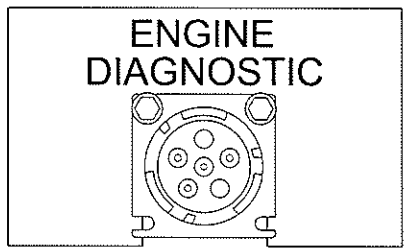
**Damper Doors DO NOT Operate:**

1. Does the motorhome air tank have pressure?
2. Is the vacuum generator being powered and producing a vacuum?
3. Check the vacuum line entering the unit for vacuum.
4. Check that the vacuum solenoid mounted on unit is receiving power from the mode switch. If operating properly, the vacuum solenoid will feel hot if current is engaging the solenoid.
5. Check the mode switch.
6. Check wiring.
7. Check for a pinch in the vacuum line leading to the vacuum motor that operates the damper door in question.

## DIAGNOSTIC PLUG LOCATION

An ABS diagnostic plug is located in the roadside front distribution box. There is also an engine diagnostic plug (J1587) located under the dash on the left side of the steering column. Another engine diagnostic plug (J1939) is found on the top of the engine next to the transmission check/fill. A Cummins diagnostic plug (J1939) is a 3-pin connector found on the engine curbside.

A transmission diagnostic plug is located in the roadside front distribution box.

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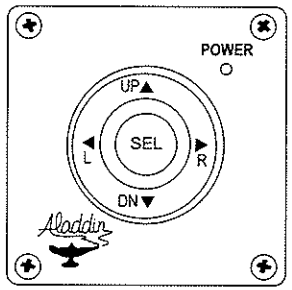
**Engine Diagnostics:**

The engine diagnostics will notify the operator of deviations from the programmed limits of the engine through the "Check Engine" lamp in the dashboard. Should a system component with the engine develop a deviation, the "Check Engine" lamp will illuminate and a diagnostic code will be logged and stored in the system memory. These codes are accessed by a service technician using special equipment.

## ALADDIN™ ENGINE DISPLAY

The optional Aladdin System will display engine and transmission statistics at a quick glance.



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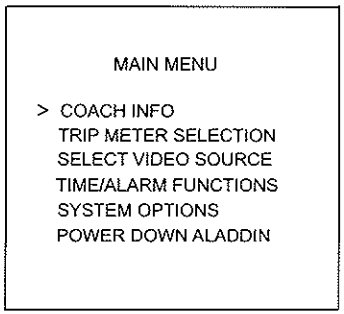
**NOTE**
**The backup camera and engine/transmission screens cannot simultaneously display.**

To display engine and transmission information, use the controller to enter Coach Info from the Main Menu.



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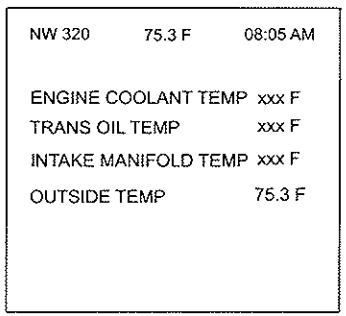

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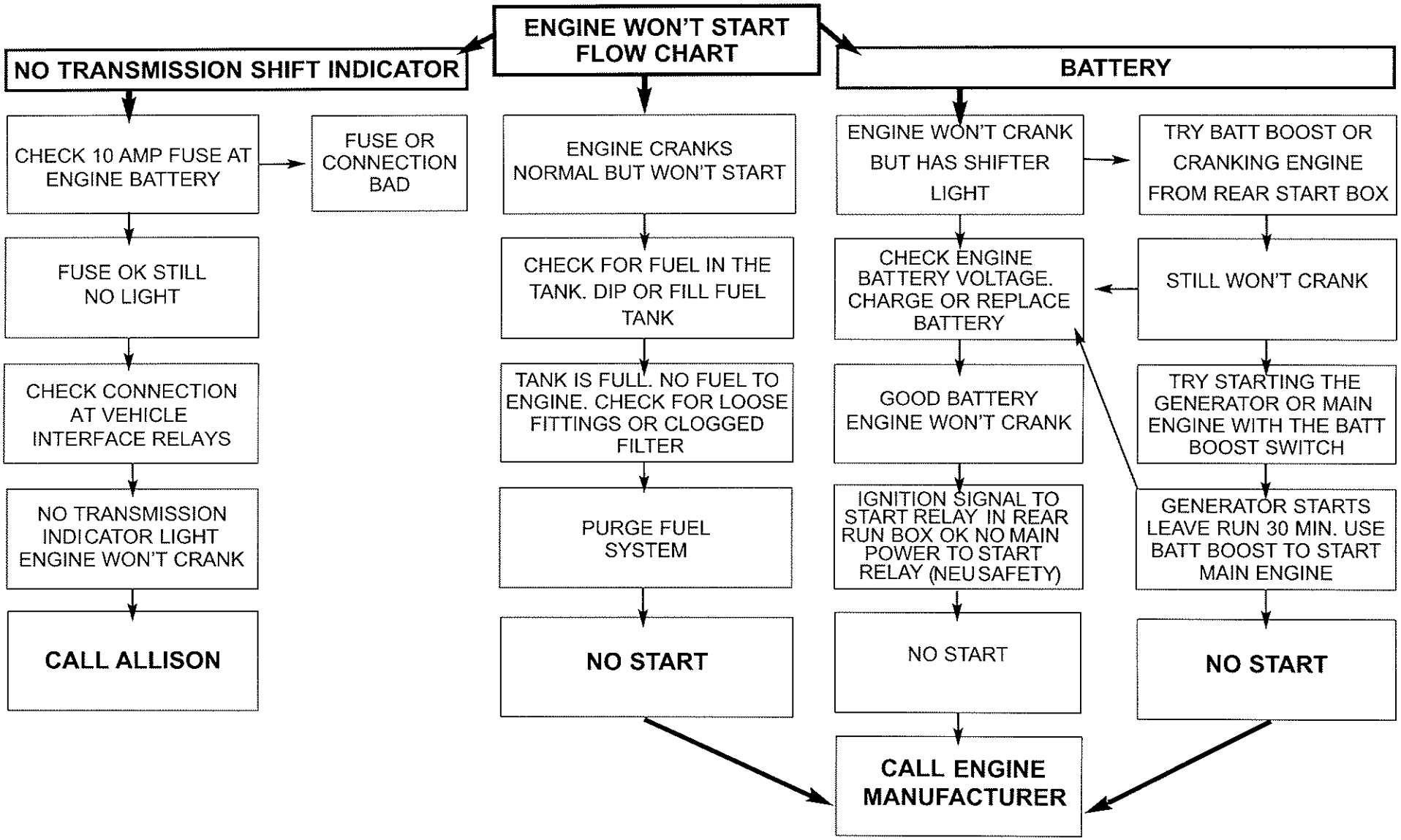
## ENGINE "NO START" FLOW CHART



# NOTES