

Operations Manual for 1978 GMC Royale Motor Coach TZE368V100874

by Jerry Work, September 2011

Since it was manufactured late in the model run, then outfitted by Coachman Industries and sold as a 1978 Royale, this coach has had only two owners. Both of us have maintained the coach to a high standard and over the years made upgrades and changes to what the factory originally supplied. I am writing this Operations Manual to help future owners of this GMC know what modifications were made and how to use the various systems now installed on this coach.

History of ownership. Tom Warner, a rancher from the San Diego area was the original purchaser. His family owned a ranch east of San Diego in the area today called Warner Springs, CA. He purchased the coach to take his daughter to horse shows and for recreational use. He picked the coach up new in Las Vegas in the summer of 1978. One of the first things he did was to take the coach to Mark McNeal at the Dyno Shop in Santee, CA., where they removed the original 403 CID engine and replaced it with a turbo charged 455 CID. The engine cover was raised to make room for the turbo charger.

Mark McNeal reportedly told him the turbo charged engine would not last very long as they could not get the heat out from under the front of a GMC. He apparently wanted that engine to pull a heavy horse trailer so asked them to do it anyway. He also had them add two external transmission oil coolers and an external engine oil cooler.

At some point (time unknown) he had all the soft parts of the interior removed and replaced with natural leather so the headliner, wall panels, seating and roman shades over the windows are all natural leather. The refrigerator doors are Ostrich leather.

He kept the coach for about 20 years. Some of that time his brother used it as well. In the late 1990s with 42,000 original miles on the odometer the turbo charged engine finally failed and he took it back to the Dyno Shop to have it replaced. The story is they advised against another turbo charged engine and built instead a naturally aspirated engine they could dyno tune to at least as much output as they had been able to achieve 20 years earlier with turbo charging.

According to Mark McNeal, when the engine was done Warner was not sure he wanted to keep the coach saying his wife liked the airplane better than the coach, his kids were grown and gone, and the coach was no longer new. It sat at the Dyno Shop for three years while he decided what to do with it. During that time Mark said he drove the coach 800 miles to keep everything lubricated. At some point Tom transferred the title to Mark as he was the registered owner when we purchased the coach.

In 2001, after four years of living full time in a 37 foot 1998 Beaver Patriot motor home, my wife and I purchased a 1907 former Masonic Temple building in the near ghost town of Kerby, Oregon. Our plan was to restore the building and remodel it into my studio and gallery on the first floor where I design and hand craft fine furniture with our living quarters on the second floor. With that plan in mind, we decided to sell our large Beaver Patriot which was too big for our recreational needs and buy a smaller coach which would be sized appropriately for that use.

We looked at a number of small new coaches but could not find one with the build quality we sought. Someone suggested we look at restoring a 1970s GMC which set us off on a search to find a suitable restoration candidate. At one point we drove our car to the Phoenix area to look at several coaches there but none proved to be right for us. On our way home we learned that Tom had just decided to sell his coach and detoured to Santee to see it. It was quite dirty and oxidized from sitting for three years in the sun, but it was apparent to us that the “bones” were good, so we purchased the coach. We were able to drive it home to Kerby without incident.

The speedometer cable broke some time later (around 55,000 miles or so) and I replaced the speedometer with an electronic one. So, the mileage shown is about 11,000 less than the actual miles on the new engine. Add about 55,000 to the odometer reading to get actual miles on the chassis.

Engine. The engine is a 455 built and dyno tuned by the Dyno Shop. The carburetor is not a stock GMC motorhome carb and I do not know what changes they might have made to jetting, air compensators, needles, power valve, etc. I also don't know what changes they might have made to the HEI ignition system. What I do know is that this has been a very strong, reliable engine the whole time we have owned the coach and I have never touched carburation or ignition except to remove the thermo vacuum switch (AKA “tree”) and vac operated throttle opener common on California vehicles, and to change the module, cap, coil, plugs and plug wires when necessary.

I did change the exhaust system to a dual muffler with 3” exhaust pipe in about 2005. The Dyno Shop had already added the Thorley headers but they used 2 1/2” pipe from the mufflers back. I also replaced the original radiator with a new aluminum unit made for this purpose in 2009 or 2010. It has two internal oil-to-water coolers, one hooked to the transmission oil lines and one to the engine oil lines. I removed the two external transmission coolers as they were plumbed with rubber hoses and clamps that looked suspect after all these years. I kept the external engine oil cooler which was plumbed with far more robust braided hoses and proper screw-on fittings.

I dropped the tanks and replaced all the rubber hoses in 2010, just before we took a 20,000 mile trip in celebration of our 50th wedding anniversary year. At that time I also added an electric fuel pump and large external fuel filter just after the tank selector valve to push fuel up to the mechanical fuel pump in hot weather under heavy load when the engine would suffer from vapor lock. As fuels were formulated with more and more ethanol these GMC coaches began to suffer from vapor lock. The two 25 gallon gas

tanks are flat and low to the ground which appears to allow them to pick up too much radiated heat from the road surface on a hot day causing the fuel to vaporize. Since the mechanical fuel pump cannot pull vapor, the engine would tend to stall from too little fuel reaching the carburetor. This condition was most noticeable on hot days under load, but could occur at other times once in a while as well.

I installed heat shields between the exhaust pipe and the gas tanks and added the electric fuel boost pump and a large external fuel filter outside the frame rails on the drivers side where the air temp appears to be cooler than under the coach itself. The electric fuel pump is controlled by a toggle switch with a red handle located near the drivers left knee on the side wall. Up is on, down is off and the pump is only powered when the key is in the accy or run position. Change the fuel filter about once per year.

I only turn on the electric fuel pump when I feel vapor lock and that pump pushing liquid fuel to the mechanical fuel pump seems to solve the problem almost instantly. If you leave the electric fuel pump on all the time there is a small chance that the diaphragm could rupture in the mechanical fuel pump which would push raw gas into the lubricating oil.

The brake booster has an automatic vacuum pump installed inline with the vacuum line from the intake manifold. Should the engine quit you would otherwise have only one or at most two pumps of the brake peddle to stop the coach. It is very difficult to stop the coach if it is rolling backward and you have no vacuum assist for the brakes. The automatic vacuum pump will turn on any time the key is on and it senses low vacuum in the vacuum booster. There is a five second delay before this automatic vacuum pump turns on so if you ever loose engine power, keep your foot on the brake until you hear this vacuum pump operate. You can then modulate he brakes normally until you get to a safe place to restart the engine.

The engine has had a steady diet of synthetic motor oil the whole time I have owned it. I use Mobile 15-50 or Casrol 20-50, both formulated with extra ZDDP to properly lubricate flat tappet engines like this 455 CID Olds. I change oil and the filter at 6,000 mile or six month increments.

Transmission and final drive. In 2009 I replaced the transmission with one rebuilt by Manny Trovao, the acknowledged guru of these transmissions. The work was done at Manny's home shop in San Jose. I also had him change the gears and cross over chain to result in a 3.50 final drive gear ratio replacing the stock 3.07 which was not appropriate for where we live. The 3.50 allows the coach to run at highway speeds at an RPM range very near the peak torque produced by this engine and to climb hills far more easily and without shifting down to second gear very often.

This transmission had lived on a steady diet of synthetic automatic transmission oil as well. I change the transmission filter and oil completely about once every two years. This is done on a machine designed to pump new oil in to replace all the old oil in the transmission and torque converter both. At Manny's suggestion, I unplugged the

solenoid operated transmission kick down switch as I did not like putting that load on the transmission. It does still kick down via the vacuum operated kick down switch.

Front suspension. In the summer of 2011 I replaced the front end with components from a GMC 3500HD four wheel drive pickup and diesel Suburban 4 x 4. The upper A arm is the same as stock GMC motor coach with a different upper ball joint. The lower A arm is fabricated from a stock GMC motor coach lower A arm, is greatly reinforced and uses the lower ball joint from the newer GMC 3500 truck front end. The hubs, knuckles and brakes are from the newer GMC 3500 truck as are the axles and CV joints.

My primary reason for making the change was to take front end maintenance out of my future by replacing the original pressed-in two bearing set with the much larger sealed bearing on the 3500 truck front end. The bonus came in the form of much larger front brakes and stouter hubs and knuckles. They have really transformed the way this coach stops. Before, I needed to add a lot of additional stopping time whenever using the brakes. Now it stops much more like a conventional car or truck although it is important to remember that the rears are drum brakes that will fade under hard and prolonged use.

This front end conversion kit was also put together by Manny Trovao based on design work done by Bill Hubler. The wrong outer CV joint boots were in place on the axles when I got the kit. I had to replace them with different boots as the supplied boots would hit the bolt heads holding on the lower ball joint which would eventually tear the boot. The new boot is made by Doreman and while still a close fit, seems to work just fine.

All of the major parts used are called out on stickers attached to the firewall under the drivers hood door.

Alignment. I initially took the coach to the Les Schaub store in Medford, OR, to have the alignment done. I told them I had the ride height set to the factory spec and to set the alignment to zero camber, zero toe and as much even caster as possible up to 5 degrees. When they finished, they said they were able to get zero camber and zero toe, but only about 3.5 degrees of caster. They also said they lowered the front ride height "just a bit" to get it to settle in properly.

We left there and drove to a GMC rally near Salem. When we got home I found they had lowered the front ride height by over two full inches! That was 8 full turns on the torsion bar adjustment screws, far more than "a bit". With the front end that low all the alignment settings were way off. That set me off on a hunt for why a seemingly competent alignment shop could be so far off and what I could do about it. The end result was that I developed a do-it-yourself alignment kit and a set of instructions that would allow any GMC owner to measure their alignment and reset it if they had the skill and knowledge to do that job safely. The link to a paper describing all this and how to

build the kit is available on line from my web site, <http://jerrywork.com> on the GMC page and a hard copy is also in this coach at the time of this writing.

Rear air ride height control. When we purchased this coach one of the two stock air compressors was bad. To get home we put Schrader valves in the ends of the air bags. We disconnected the auto ride height mechanical sensing units and just filled the air bags to 90 PSI. That worked well for many years but required I position my body close to the air bag when filling it and my hands and arms had to be inside the body to reach the end of the Schrader valves. I always worried about what damage would be done if an air bag suddenly failed while I was so close. In 2010 I finally added braided air lines that ran from the end of the Schrader valves to a fill point just above the line where the T skirts mate to the rear wheel openings. While still too close to the bags for comfort, at least I could fill or release air from the bags without having any part of me under the body of the coach.

In the summer of 2011 I added a wireless air control manifold and a small Senco 120vac compressor designed to power nail guns to the compartment under the drivers side rear lounge seat where the original compressors were mounted. The 120vac compressor and tank are powered off of one of the two 1000W inverters. I removed the air pressure switch and pressure regulator from the Senco unit and plumbed the output from the compressor directly into the tank. A T at the outlet from the tank contains a pressure relief safety valve set at 140 PSI and a pressure check valve to prevent air from leaking through the wireless manifold and out through the check valves in the head of the compressor. One line runs from that check valve to the inlet on the wireless air pressure manifold. From there an air line runs to each air bag.

This small Senco compressor only draws 4 amps at 120vac. Given the loss from the inverter the compressor draws about 30 amps DC when running. This means that the compressor uses about 1 amp hour of coach battery capacity per minute of operation. It seldom runs more than a minute at a time so battery draw is insignificant and this Senco unit is available in most any big box store if it ever fails. The 12vdc compressors of a similar output take about 19 amps at 12vdc, are considerably more expensive and must be ordered from a specialty supplier if they ever fail.

I left the external air fill braided hoses in place and put a shut off valve on the line from the manifold to the bags. In case of a failure of the wireless system or the compressor, you can still fill and release air via the fitting on the side of the coach. In normal use those valves are set to the open position. Once the coach is leveled where it will remain for a few days, close the valves and the air bags will not leak down. Be sure to open them again before you try to set the ride height with the airless system.

The wireless manifold is powered on by a toggle switch just under the hallway front corner of the drivers side rear lounge seat. Once powered on, it receives a signal from a battery operated hand held control unit telling the manifold what pressure to maintain in each air bag. If the manifold needs to add air to a bag to reach the set pressure and there is not already enough air in the tank to do so, it closes a relay which provides

120vac inverter power to the air compressor. Once the set pressure is reached the manifold opens the relay shutting off power to the compressor. As a result, it is bag pressure and the set pressure received by the wireless air manifold that control ride height. The original mechanical ride height devices are not used.

With the front end set to the factory recommended ride height and the coach loaded as we normally use it, the proper rear ride height is achieved with 93 PSI in the passenger side bag and 91 PSI in the drivers side bag.

The handheld control unit has nine buttons. The two with the large up and down arrows should not be used! Pressing the large down arrow will dump all the air out of both bags down to 5 PSI. Pressing the large up arrow will add 10 PSI to each air bag. The one dot button is set to the 93/91 PSI required to achieve proper driving ride height. The double dot button is set to 75 PSI which will dramatically lower the rear to make it easier to dump the black tank.

The handheld control unit will normally be in sleep mode to preserve the battery. Press any button but the middle dot in the five button cluster to wake it up. Press the left or right buttons to select the air bag you want to control. Press the small up or down arrows in that cluster to increase or decrease the desired air pressure. Press the middle dot to send that command to the wireless manifold.

In normal use, power on the manifold via the toggle switch. Turn on both inverters which are located in the passenger side rear outside compartment where the house batteries, inverters and converter are located. Open both shut off valves located near the air bags. Press the one dot button on the wireless handheld control unit. That will set and maintain the proper driving ride height. If you leave everything turned on you will likely hear the compressor come on every two to four hours. Once you park for any extended period of time, turn the shut off valves to off and turn the toggle switch off to power down the wireless manifold. The handheld control unit will power down into sleep mode after a few minutes of inactivity. Leave the inverters turned on to provide 120vac power to the coach if you wish.

Electric power systems. The coach has four sources of electric power:

- 1) the 12vdc starting battery is located under the drivers side front hood. It provides power to the chassis for starting, lights, etc.
- 2) the 12vdc house battery bank is located in the passenger side outside rear compartment. There are four 6vdc deep cycle batteries wired series/parallel to provide one battery bank of 460 amp hours of capacity. There are two 1000 watt inverters to provide 120vac power via three appliance extension cords (12 gauge three wire) to inverter receptacles located just behind the drivers seat, on the wall just inside the coach entry door and on the wall under the passenger side rear lounge seat. All inverter power receptacles are white while all shore power/generator power

receptacles are dark brown. Neither the roof A/C, microwave, food processor or refrigerator receive inverter power. All work only with shore or generator power.

- 3) The shore power inlet wire has a 120vac, 30 amp plug accessed from the black door at the rear outside on the drivers side of the coach. There is about 12 feet of wire which you just pull out or stuff back into that port. It can be plugged into any 120vac outlet with appropriate adapters for the amp capacity of the shore power source. **Do not plug this into a 220vac source!** I normally carry adapters to go from 30 amp to 15 amp and from 30 amp to 50 amp plugs. They are located in the plastic storage boxes in the two rear outside compartments. In the refrigerator compartment accessed via a door on the outside of the coach behind the refrigerator is a 30 foot 30 amp extension cord.
- 4) The 6000 watt AC Onan generator is located in the drivers side rear outside compartment. It is controlled via a panel just above the stove. On that panel is a red priming button. If the generator has not been run for over a day, push and hold that red button for ten seconds before starting the generator. That will turn on the electric fuel pump located on the generator and prime the carburetor so you will not need to crank the starter as long to fire up the generator. Once primed, press and hold the start button (black rocker switch) on the control panel until the generator starts. Do not crank the starter for more than 15-20 seconds at a time. The starting sequence is automatic so once it does start, you can release the start rocker switch. The generator will continue to run until you press the the stop rocker switch. Hold that switch down until the generator stops completely, then release it. There is an automatic transfer switch located under the passenger rear lounge seat that will connect the coach 120vac appliances and outlets to shore power if present or to generator power if the generator is running and no shore power is available.

The 12vdc system is fully described in a paper available on the GMC page of the <http://jerrywork.com> web site and a hard copy is in the coach. The four house batteries have a combined capacity of 460 amp hours. The round battery monitor located on the bulkhead wall just inside the coach entry door is set to show a need for recharging when 230 amp hours are used. This 50% point for recharging will allow the batteries to last far longer than if they are more fully depleted before recharging. Occasional discharging well below 230 amp hours used will not significantly effect battery life, but consistently discharging them beyond 50% will.

The 120vac circuits are all protected by circuit breakers located in the boxes beneath the center portion of the rear lounge seating area. The 12vdc coach circuits are all protected by fuses located in a fuse block in that same area. A heavy 12vdc positive line runs from the coach battery bank to the fuse block. The 12vdc chassis circuits are protected by fuses located in the glove compartment on the passenger side of the dash.

The house and chassis battery banks can be joined together via a toggle switch on the dash. Both battery banks have a wire coming from each battery to each side of a solenoid mounted on the firewall under the passenger side hood. Pressing the toggle

switch will connect these two battery banks together. Releasing the toggle switch will disconnect the two battery banks from one another.

Both sets of batteries will recharge from any charging source via a combiner located on the firewall under the passenger side hood. The combiner is a voltage controlled relay. When a charging current is sensed, the relay will close providing charging current to both battery banks. When no charging current is present the relay will open whenever there is a voltage differential between the two battery banks so you can draw down the house battery bank without effecting the starting battery and vice versa. There are actually two combiners installed but only one is used. The other is there as a running spare. Do not cut the red wires coming in and out of the combiners as the resistance in that length of wire is critical to the proper functioning of the combiner.

From the factory a diode isolator was used instead of the combiner. The diode isolators all suffer from a voltage drop issue which prevents the batteries from ever fully recharging. The combiner solves that issue and is much more reliable.

Charging takes place via the alternator when the engine is running. When the engine is not running then the converter/charger located in the house battery compartment will take 120vac power from either the shore power line or the generator and supply dc voltage to power the house 12vdc circuits and to recharge both the house and the chassis battery banks automatically. This converter/charger includes a three step battery charger so you can leave the coach plugged into shore power for extended periods of time without effecting battery life. The converter/charger is fan cooled so at times you will hear it's fan run while parked.

The house battery monitor displays a number of things including the current state of charge, the number of amp hours going into or coming out of the battery bank at any given point in time, the total number of amp hours that have been used since the last recharge, how long at the present rate of discharge until a recharge is indicated, etc. These values are displayed in sequence each time the right or left arrow button is pressed.

Audio/video systems. The coach has a dash mounted AM/FM radio and cd player that outputs to speakers located above the driver and passenger seats and in the back corners of the rear lounge. That unit also has a line-in which we use to source from an external tape player, iPod or iPad. It can be controlled either via the switches and knobs on the front of the head unit or via a remote control stored in the glove compartment. The cd player is behind the head unit which will power open when the cd is selected.

There is a 120vac Nakamichi Soundspace 1 AM/FM cd player mounted above the rear window. It is powered from an extension cord that comes out from under the front inside edge of the drivers side rear lounge seat. That extension cord can be plugged into either the shore power/generator power brown outlet or the white inverter power outlet nearby. The unit is controlled by an IR remote located in the front small drawer

below the wide drawer in the cabinet just aft of the entry door. Press source to turn the unit on, press and hold source to turn the unit off. Press the P.Scan button to start the cd player. There is an open button on the right side of the top of the main unit which will open the cd loading door. Manually close it when the desired cd is in place.

There is an automatic satellite finder now set for Directv mounted on a post at the rear of the coach. That unit will function either while mounted to the coach, or, with the use of the signal and power extension cords stored in a plastic box in the generator compartment, can be moved up to 50 feet away to find a clear spot to see the satellite. **Note: This unit only picks up the non-HD satellite signals so set the Directv remote to only show the non-HD channels.** Thumb screws on the mount allow the unit to be raised or lowered to make it easy to get on and off. The power and signal wires on the side of the satellite finder attach to through bulkhead fittings on the rear of the coach. From there the power wire goes to a rocker switch mounted on the outside wall of the bathroom in the rear lounge area. Whenever powered on the unit will seek for and lock onto the Directv satellites if it can find them. Turn the unit off when you travel.

12vdc power comes from the coach fuse box. The RG6 signal wire goes from the inside of the through bulkhead fitting up to a bundle at the rear corner of the lounge area behind the bathroom wall. It is marked as "from satellite". A second RG6 coax cable and bulkhead fitting allows connection to an external cable TV source.

There is a black RG6 coax cable with red tape on each end that goes from the rear to the front of the coach. It exits at the front of the overhead kitchen cabinets. This is used to transfer video signals forward and aft.

The over the air TV antenna is raised, lowered and turned via the ceiling mounted unit at the forward edge of the passenger side front overhead cabinets. That signal wire goes to a 12vdc amplifier mounted on the front of the lower kitchen cabinets just behind the drivers seat. It is turned on and off via a press button on that amplifier. From there a RG6 cable goes up to the kitchen counter behind the drivers seat.

There is a DVD player in the forward overhead kitchen cabinet with an HDMI output that goes to the kitchen counter just behind the drivers seat. There is another DVD/VCR player in the drivers side overhead cabinet in the rear lounge area. A RG6 cable comes from the VCR side down into the wire bundle and an HDMI cable from the DVD side that also goes into the same wire bundle.

The LCD TV rides beside the passenger seat and can sit either on the kitchen counter behind the drivers seat or hang from the hook under the drivers side rear lounge overhead cabinets. From either of these locations the RG6 forward/aft transfer cable allows video signals from either the over the air antenna, an external cable source or the satellite finder can be sent to either position.

The satellite decoder normally rides beside the drivers seat but can also be installed over the rear mounted DVD/VCR. It is powered by a 120vac line that can be plugged

into any shore power or inverter power outlet. Signal output is HDMI which plugs directly into the HDMI ports on the back of the LCD TV. Power to the TV is a black/white 120vac brick with a 12vdc output. This power cord, the HDMI cable from the satellite decoder and the RG6 cable from the over-the-air antenna are normally found in the map pocket on the back of the drivers seat.

Water system. Water is stored in a 40 gallon tank under the passenger side rear lounge seat. A variable speed water pump pulls water from that tank and distributes it on demand to the kitchen and bathroom sinks, toilet and shower. The pump is controlled by an orange toggle switch on the panel above the stove. There is no city water hookup. I removed that for fear that having that line pressurized while we were away from the coach could result in a bad flood if a line inside the coach burst. Water is added to that tank via a water inlet behind a door at the rear passenger side of the coach. Put a water line in the opening and run water until it comes out the overflow. Normally a gallon or two will spit back when you stop filling the tank. This is due to the plastic walls of the tank ballooning under pressure and then returning to normal once the pressure stops.

A six gallon hot water tank is mounted under the microwave in the kitchen. Water is heated both by a heat exchanger while the coach is being driven and by a propane fire when not. It is automatically controlled via a switch near the floor just inside the rear kitchen cabinet door. Press that switch down to activate the hot water tank. A thermostat will establish and maintain water at the correct temperature. The water is somewhat hotter under propane power than under the heat exchanger.

When you press the switch down, the red light will come on until the flame ignites and then will go off. If it stays on, the flame did not ignite and you should turn the switch up (off) and then back down again until ignition takes place properly. If the coach has been sitting for a while it may take a few tries before propane reaches the igniter.

Propane. The coach has a (20 gallon I think) propane tank under the dinette seat near the entry door. Access is via an outside louvered door. Turn the lock and lift out. The propane shut off valve and a BBQ grill outlet are mounted just after the pressure regulator. The refrigerator, furnace and hot water heater all work off propane. The propane gauge on the panel above the stove is not accurate. When that shows near empty, the tank will take about 10 gallons.

The refrigerator works whenever the on/off button on the front of the refrigerator is depressed. It will automatically detect and select electric power operation if the coach is plugged into shore power or if the generator is running. If no electricity is detected the refrigerator will automatically switch over to propane operation. It is very reliable and was installed new in about 2008. The stove is manually operated. Push and turn a burner knob and manually light the burner.

Furnace. The propane furnace is located under the kitchen sink. Cloth ducts direct the heated air to outlets at the forward edge of the kitchen cabinets over the first step up into the driving compartment, on the floor at both the front and rear of the kitchen cabinets, and on the side wall near the floor on the drivers side of the rear lounge area. What looks like a heat duct in the bathroom is not connected. To turn on the furnace, slide the “system” switch on the white thermostat over the stove to “heat”. Use the gray up/down arrows to select the desired temperature. If the set temperature is above the current temperature in the coach the furnace will come on. It heats up quickly and puts out a lot of heat, more than enough to blow you out on even cold days. Just like at home, once the coach temperature reaches the set temperature on the thermostat the furnace will turn off. It will cycle to keep the coach at or around the set temperature.

Fantastic fan in bedroom. On the ceiling in the bedroom is a very nice Fantastic vent fan. It is remotely controlled by the unit on the bedroom wall just below the fan. The auto/manual/off button cycles the fan through those three modes. In auto mode the lid will rise and the fan speed is controlled by the thermostat setting on the unit which you change with the up and down arrows. In manual mode the settings are percentage of full power to run the fan faster or slower. In off mode the fan will stop and the lid will come down after a few second delay. There is an automatic rain sensor which, if turned on, will turn off the fan and close the lid if water is detected. When the water dries out the lid will reopen and the fan will turn on once again.

The fan makes a grinding noise as the lid opens and closes which can be annoying if it goes up and down in the middle of the night. I suggest turning the fan to manual and turning off the rain sensor if no rain is expected or simply turn the fan off and put the lid down if rain is expected.

Making the bed. The whole rear lounge area turns into a larger than king sized bed for sleeping. We move the rear and corner cushions to the front at night. Pull up the three plywood plates that cover the back of the rear lounge seating area. They sit on the ledge along side each seating area side wall. The two window cushions fit in the space over these plates to make the bed. We use a fitted sheet that snaps in place over the cushions and a down comforter for warmth. The down comforter, pillows and sheet fit into the overhead compartment on the passenger side of the rear lounge. We have both a summer and winter weight comforter and take along which ever one fits the expected night time temperatures. It takes only a minute or two to make or unmake the bed. It is very comfortable, at least as comfortable as our bed at home for us.

Kitchen cabinet drawers. All of the large drawers in the kitchen and the large drawer in the cabinet just aft of the entry door employ full extension ball bearing slides. To keep them closed while going down the road there are 1/4” chrome pins which insert through the cabinet frame and into the side of the drawers. Open the kitchen cabinet doors to access the pins in the two large drawers forward and the utensil drawer aft. The large drawer in the cabinet just aft of the entry door we use to hold clothing. The pin inserts from the side by the door and into that drawer side.

LED lighting. Most of the interior lights are have been changed over to LEDs which consume far less 12vdc power while providing the same or brighter light output at pleasing colors than did the original incandescent light bulbs that were fitted from the factory. Each of the LED lights is powered by a voltage controlled source that will keep the voltage to the lights even over the wide range of dc voltage found in a motor coach.

Rope lights over the windows. There are 120vac rope lights over the main side windows in the kitchen and dinette areas and in the rear lounge. They are controlled by plugging them into shore/generator power outlets or inverter powered outlets.

Emptying the black and gray water tanks. The toilet and kitchen sink both drain into the black water tank. The shower and bathroom sink drain into a separate gray water tank. The black water tank is emptied via a macerator. There is a pull-to-open valve located on the side of the frame just behind the rear bogie wheels on the drivers side. That opens a slide valve between the black tank and the macerator inlet. The macerator outlet hose is coiled and stored beside and forward of the generator. There is more extension hose over the plastic storage boxes beside and to the aft of the generator. These hoses screw together via heavy brass hose fittings. The macerator is capable of pumping the ground-up black water tank contents out thirty feet and up three feet.

Since both the black and gray water tanks are flat tanks low to the ground, it is often necessary to drop air from the rear air bags to create a downward slop to move the last of the black water tank contents to the macerator inlet. Use the double dot button on the air system remote control to drop both air bags to 75 PSI. When you are through emptying the black tank, use the single dot button to restore the coach to normal ride height before driving.

The gray water tank is emptied by rotating a curved pipe downward. That pipe has a standard hose fitting on it so you can use the macerator hose extension pieces or any common water hose to direct the gray water wherever you want it. The gray water drain pipe is located just to the passenger side of the trailer hitch receiver under the back bumper. There are no valves on the gray water tank. When rotated up, the outlet to the gray water tank pipe is above he level of the gray water. When rotated down it is below the level and the gray water will flow out.

The toilet was changed out in about 2006 from the original plastic unit with a slide valve to a modern china unit with a ball valve. Pull up on the lever to add water to the bowl. Press down to flush.

We have always used a holding tank chemical with the weird sounding name of “Five star happy camper”. While the name sounds a bit stupid, this stuff really works. Add about a table spoon of the powder to water in the toilet bowl and flush whenever you start to smell the black tank. Do not flush the black tank with water as you want this

material to continue to cling to the sides of the tank when it is empty. This material is a bacteria and/or an enzyme that will consume the organic material and break down the paper products in the black tank. It eliminates smells very effectively and works far better than anything else we ever tried.

Other modifications.

The roof mounted 120vac air conditioner was installed new in 2010. It is a high efficiency unit that is quite energy efficient and relatively quiet in operation, much quieter than the two A/Cs that came on the coach originally. When plugged into shore power or when the generator is running, turn the knob to the desired air flow setting (heat, cool or fan) and turn the temp knob to the desired room temperature. The on/off rocker switch controls a small motor which oscillates the vents on either end of the unit. The knob in the center of the round vent area brings heated or cooled air directly down, what the manufacturer calls an "air shower".

The dash air was converted to Duracool in 2003. Only three 6 oz cans of Duracool are required to fully charge the system. Duracool results in much lower head pressures on the compressor so you do not feel the compressor coming on or off, gives much longer compressor life and results in much colder air than R134. It is a very good change.

I removed the roof mounted storage pod along with the ladder and roof mounted railings. I no longer wanted to be crawling around on the roof of the coach for safety reasons. I did install marine grade stainless steel D rings on the rear where the ladder attachments points were and at four places on the top so I would be able to lash something to the roof if I ever needed to.

The kitchen and bath faucets are bar fixtures that work well in the confined space of the motor coach. The bath sink was replaced with a deeper stainless unit as well. Rotate the handle to change temperature, pull the handle outward to increase flow.

When new the dinette converted into an uncomfortable small bed. To make additional room in the narrow area between the dinette and the refrigerator I moved the mounting points for the dinette seats closer together so it no longer makes into a bed.

The dinette table mounts to the wall and is self deploying-self storing via a sliding dovetail mount I built. To put the table down, fold the two flaps onto the top, push in the flap supports, fold the leg and allow the end of the table to rotate downward. The wall end of the table will lift up to the point that the other end of the table will come to rest snugly on the floor. There is no need to fasten it in place. To fold the leg, push the spring loaded metal tab to release the leg and then fold it up against the bottom of the table. This arrangement is far easier, faster and more secure than the original design which required lifting the heavy table from an awkward stance and fastening it to the wall.

I built a spare tire mounted bike/BBQ rack that squeezes down over the deflated spare. When the spare is filled with air it locks the bike/BBQ rack in place. We use folding bikes that fit on the horizontal tubes by sliding their seat tube over the bike/BBQ rack horizontal tubes. Built in cable locks provide security. Chairs (in bags to keep them clean) fit into the space between the bikes and the back of the coach. A folding table rides horizontally beneath the passenger side bike. The BBQ attaches to the two Decker hooks under the license plate. Everything needed to set up "camp" is easily accessed from the ground, yet stores under the rear window for a clear view rearward.

The headlights are HID bi-xenon units mounted in Bosch reflectors. They produce a great deal more light. It is a much brighter light yet well controlled so it does not bother oncoming drivers. I seldom ever use the high beams as the low beams make night driving far more comfortable than with the previous H4 halogen bulbs. I also installed halogen daylight running lights under the front bumper. These are key activated and controlled by a switch located just above the drivers side head light under the DS hood. They will come on automatically any time the key is in accy or run position. If you do not wish these lights to come on, press the on-off button over the headlight.

You can read about other modifications in a paper called "You gotta live in there baby!" which is on the GMC page of my web site, <http://jerrywork.com>. All of the component user manuals and the original GMC manuals on CDs are located above the cabinet just to the aft of the entry door.

Enjoy!

Jerry