GMC Western States

Tech Center Number 40 – June 1, 2003

From our Technical Vice President Gene Fisher

GMCWS is collecting permanent information for our GMC Classics. Last month we described how to down load and print almost any operation and maintenance manual for equipment that was used on the GMC Motorhome. At the Fall Rally at Temecula, we video and audio recorded technical sessions, which we hope to make available to GMC owners in the near future.

This permanent information is a way to supply information to all GMC owners, not just GMC owners on the Internet but also owners who do not have access to computers or are not able to attend rallies. There are several thousand GMC owners who have no contact with the new innovations that are becoming available every day. Often the technologies presented at rallies are lost to those who do not attend. Every day new innovations are shared on the Internet, and are lost to those who do not access the Net. GMCWS is providing this information on the web site (http://www.gmcws.org/) and this newsletter.

In this newsletter, we have included a step-by-step procedure to do preventative maintenance on the Onan Generator by Duane Simmons. You can do this maintenance yourself. We also have listed new products that have just become available from our excellent GMC vendors. Last month Chuck Botts talked about how rag wall tires and proper tire pressure may eliminate steering problems with the GMC, and he is continuing to collect and present data on this topic (http://www.gmcws.org/Tech/TireSafety/index.html)

I know you will find this information useful and I encourage you to contact me with any suggestions you have for the GMCWS organization.

Please send your comments and ideas for the Tech Center to:

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GMC Western States Rally, Temecula, CA, April 28 through May 3, 2003
Notes on Technical Seminars by Donna Prishmont

FanTastic Vent Fan, Bob Golie, Factory Representative 4-28-03, 12:00 p.m.
The FanTastic Vent Fan moves 900 cu ft of air per minute. Should have a window open for good circulation. The units are built of Lexan material. Units are guaranteed for a lifetime. The guarantee goes with the coach not the individual.

To clean, vacuum the screen regularly. Take the screen off and use a base product without petroleum (303 -- found at Camping World) to clean the blades. You can use 303 on any rubber gasket, doors, etc. Camping World installs them ($45 installation charge). George Baxter, GMC Cascader, has installed many Fantastic Fans. For tips on installation, contact George at glbaxt@aol.com.

The original openings need to be squared off a small amount. If you drive with the fan open, then open just a short distance. The 5000 automatically shuts off via a thermostat. The 4000 model is a manual operation as well as open and close.

Number to call for service from the factory - 800-521-0298 ask Bob Baretta or Larry Milks

Ragusa Screen Door Demo by Angelo Ragusa 4-28-03, 1:30 p.m.
Angelo installed his screen door in approximately 10 minutes with many interested onlookers. The cost is $390 plus shipping. This screen door has much of the same appearance as the Birch screen door with modifications. It arrives in two sections and comes with a complete set of instructions. The big plus is you don't have to remove the outside door to install this screen door. Check out Ragusa on the web at www.ragusarv.com, email: ragusashop@earthlink.net, or 949-261-5898.

New Owners Meeting , Frank Condos Moderator 4-28-03, 8:00 p.m.
The meeting was well attended, as there were 15 new coach owners at the rally. All of the traditional topics were covered and the feedback from the meeting was that the meeting was excellent but became too technical too fast. Future meetings may be scripted and more formal.

Toronado/ELDorado Parts Demo with Steve Ferguson 4-29-03, 9:30 a.m.
This demonstration was how to remove and replace ball joints and adapting a Tornado control arm for the GMC. Stay away from "early" Tornado control arms was just one of his helpful hints. Most of the front end components from a Tornado can be used if the can has disk brakes. Steve used his knowledge and experience to give hints, how-tos and the dos and don'ts. Pictures and discussion of his techniques can be found on the GMCphoto site (http://www.gmcmhphotos.com/gallery/showalbum.php?aid=77&&uuid=botiemad). Many of those attending this seminar had many questions and comments for Steve.

Tire Safety with Chuck Botts 4-29-03, 11:00 a.m.
Steve Malysiak of Michelin America gave background, basics, tire information, and how to read the DOT nomenclature on the tire. The date code is the most important (the last four digits). Chuck weighed all the GMCs per axle and individual tire on arrival at Pechanga. All of this information was put into a database and you can get a copy of this from Chuck on the Internet

(http://www.gmcws.org/Tech/TireSafety/index.html). This information and data is still being collected at the GMC Eastern States rally. The results will be updated on the web site and the final results posted.

Get an accurate tire pressure gauge. The digital gauge is very accurate. Information was given on sidewall cracking and sidewall dressings. Steve does not recommend the use of additives in sidewall dressings. Use dressings that do not contain petroleum, silicone or alcohol products. Steve feels it is not a good idea to true a tire.

Front Wheel Bearing Service with Chuck Aulgur 4-29-03, 1:30 p.m.
Being a retired rocket engineer, Chuck did a demonstration seminar that was very clear and concise for the proper procedures and tools to remove and replace the front wheel bearing and knuckle. Chuck put a lot of effort into building a demonstration tool that he used to demonstrate removing the knuckle and replacing the bearings. We videotaped the presentation. Chuck also provided us with a very informative handout covering which bearings to use as well as background on the different bearing pullers compliments of Cinnabar Engineering, Inc. During the seminar he demonstrated many different wheel pullers. Darren Paget from TZE Plus also demonstrated his design, a new bearing puller utilizing one wrench. Check out Darren's website at www.tzeplus.com or with a link through our website at www.gmcws.org.

Chuck began his seminar with a strong emphasis on safety: Do the bearings on a level place and chock your wheels. Jack up with floor jack in center of front cross member after you have broken the center nut loose (middle of hub) as well as your lug nuts. Jack up just enough to get the wheels off the ground then put two jack stands under the cross member. Then put bottle jack under the A arm where you are going to work. The tranny should be out of gear. And that was just the beginning.

We hope to make the videotape of this seminar available in the future.

Vendor Night at the Clubhouse April 29, 2003, 8:00 p.m.
Each vendor was given their 15 minutes of fame in an exclusive time slot without competing sessions. The owners and vendors enjoyed talking about new products.

Al Chernoff - Is taking orders for rubber wells where the driver puts his feet.

Bert & Fay Curtis - Denim shirts, carpets, hats, fiberglass parts, steering column boot sets, body insulation pads.

Blue Ox - Reggie & Patsy Collins -- towing products, supplemental braking, tire monitor, $500 for the 6 wheel tire monitor for the GMC, Smart Tire.

Denny Allen - Macerator kits. Macerator pump made by Jabsco. Includes everything you need to install and use. The complete kit is $250, the kit installed is $350. Light bulbs and fuses for the GMC. Fuel line from fuel pump to carburetor. Blinker clicker.

Jim Bounds - Repair and maintenance. Full renovations and restoration. The vendor that came the furthest - from Orlando,FL.

Darren Paget - TZE Plus - Custom aluminum and stainless steel. Battery trays, aluminum cabinets, bearing

tool, insulation products for engine and generator compartments. Front-end parts. Correct track. Onan parts.

John & Jackie Adams - RV Alliance America RV specialty insurance company. Insures GMCs for agreed value as well as autos and umbrella policies. Medical emergency evacuation plans, also.

Jim Kanomata - Final drives. 4 year, 48,000 warranty. Mandrel bent exhaust system, Thorley headers and Alcoa Wheels

Gary Berry - Onan muffler system including downpipe from the exhaust manifold for the 6KW for $149.

Ken Booth - High tech vehicle wax, a replacement air compressor, T-Shirts and under dash panel gauges for the 1973-76 GMC.

Gene Ranson - Correct Track - spacers for the front wheel to help with rutted roads and stability for $395.

Wood Art - Don Claar - "World of Wood," www.artistyinwood.com, wood art pictures of your GMC from a photo.

Ragusa Products by Duane Simmons - Onan control boards. Holding tanks. Remote priming switch for the Onan. High voltage bridge rectifiers for the Onan. Semi smart AC to DC converters.

Dana Air Pump Rebuild Demonstration by John Clement. 4-29-03 and 4-30-03, 3:30 to 5:00 p.m.
John did an outstanding job running his clinic for Dana pumps. John has all of the parts and instructions to evaluate and rebuild your Dana pump. Contact him at 909-737-0969

Tranny Seminar by Manny Travao 4-30-03 9:30 a.m.
Manny gave a short history of our transmission and insight into why the rebuilds are not lasting as long as the original. Make sure you get an Allison-like converter ($210) and that it is braced, that it has a double bearing, and that its for a motorhome with 3 lugs. The difference between a regular torque converter and a switch pitch is that the blades move in the switch pitch stator. You need Sonex plates and Thornington bearings on each side of the stator so it isn't riding on plastic anymore. Rebuilding: the kit is not enough, bushings are very important. Replace them. Change the filter every 10,000-15,000 miles. Danny Dunn and Caspro transmissions seems to last the longest.

Wireless Toys Seminar by Al Chernoff 4-30-03, 11:00 a.m.
Technology has evolved quickly. MP3 players, 20 Gig drive carries 20+ CDs on it.

Wireless : Verizon phone acting as modem and a telephone. Configuration Kyocera PDA and telephone, Serial Port. Plugs into USB. Use Verizon because it charges a flat rate per minute charges. After 8 p.m. there is free time to connect. No roaming, no long distance. Gives you an ISP so you don't have to connect to your own ISP from home. Tri mode phone, analog and digital and CDMA. The 3G phone is great but not everywhere right now. Can also send a text email message right on your phone.

GPS-Global positioning not only shows you the place you want to go, but also gives you directions. (Map

Source) comes with the GPS. Price range $400 with software is minimum. Initial software comes on CD then is updated on the Internet. Beginners just buy the software and use the tutorials. It takes time playing with it and learning it. Can get a cable ($30) (high speed USB adapter)(www.keyspan.com) that plugs into your serial port with a USB port on the other end for older models. Need software with that. Need a driver for Windows 95 and 98. Fire wire?? Can take this hand held GPS on a hike and you can tell it to backtrack if you are lost. Battery life on his GPS is about 30 hours.

DeLorme Street Atlas 2003 USA - can use this on your computer. GPS sensor DeLorme antenna costs about $100 to pick up the information and send it to your computer. You are limited to using it in your coach with this method

80211B or 80211G totally wireless. Allows you to take your computer ($20-80), delink plugs into your PC card and you are totally wireless.

Cameras - Don't need much in mega pixels if you are just taking pictures. 2-3-4-5 mega pixels is fine. Buy PC card reader that reads your pictures from your camera into your computer. It's removable media (inexpensive).

Onan Preventive Maintenance Demo by Duane Simmons 04-30-03, 1:30 – 3:30 p.m.
Duane jumped right into a GMCer's Onan and had a large crowd to watch his hands on demonstration of the preventive maintenance that needs to be done on our 25+ year old generators. Duane passed out a booklet outlining everything that he was doing for reference when we do this on our own. However, there is nothing like actually seeing it done before tackling it on your own. His demo included a visual inspection, air filter, control board, cylinder head covers, oil filter adapter, electric fuel pump, fuel hose, carburetor adjustment, output AC voltage setting, ignition system, voltage regulator, battery cable, Onan carburetor priming switch, and control board trouble shooting.

See Duane's handout in this newsletter. Use the step-by-step procedure to do your own Onan maintenance.

Amateur Radio Operators Meeting by Terry Taylor n6mon@pacbell.net 4-30-03, 8:00 p.m.
Terry was prepared for an extensive Ham radio meeting. He had test equipment and example radios to demonstrate. But the turnout was small. Most of the Hams were not operating from their coaches. We will have to see how this develops in the future.

The Future of GMC Restorations by Jim Bounds 05-02-03, 9:30 a.m.
Jim gave a little of his background and how he became interested in the GMC and his involvement with renovations. Defines the many uses for the motorhome. Party vehicles, transport vehicles, high-end eye catchers, as well as a home on wheels. Demonstrated with a visual presentation, many renovations featuring Darren Paget's aluminum cabinets, specialized countertops, dishwashers, and wood floors among many other innovations. The new basecoat, clear coat paints are terrific. A really great paint job will run about $10,000.

Digital Photography by Chuck Bennett 5-2-03, 11:00 a.m.
Chuck gave the history of digital cameras from a newspaper cameraman's point of view from the NC 2000 to the small Minolta of today. Discussion of pixels: 1 mega pixel produces a good 4x6 picture, 2 mega pixels = 5x7, 3 mega pixels = 8x10, 4 mega pixels =11x14. A six-mega pixel camera is equal to the quality

of the best 35 mm camera. You can purchase a 3 or 4 mega pixel camera for $350 to $1,000.

Use a flash memory card. A 512-megabyte card on 3 a meg pixel camera can put 350 - 400 pictures on the card which can be used over and over. Costs $90 today on Ebay. Type one and type 2 have different thickness. Most cameras take either size card. Sandex and Lexar make good cards with 5-year warranties.

Archiving of pictures: Burn a CD with everything that goes through your digital camera so you have a permanent copy of your pictures. Printing aspects: if the print is important to you, send it out for an archival print. Do all your manipulations through a software program like Photoshop, then take your flashcard to Costco, etc., and have them print only the pictures that you want. Durability and quality depends on the paper and the ink you use.

Batteries: the cameras go through batteries fast. You can use either rechargeable or AA batteries. Larger batteries probably get about 150 pics per charge. Get two batteries for your digital.

Storage and manipulation: One CD will store a little more than one card - 350 - 400 pictures. Adobe Photo shop is the primary software to manipulate pictures. Full version costs $500. You don't need the very expensive software. Check out twocows.com, seenet.com, freeware and shareware. PhotoShop Essentials is an inexpensive option at around $50. Adobe PhotoShop Album is great for organizing, inserting caption information, etc. I Photo from Apple is an excellent program for Apples.

Slides and good values on cameras: scanning takes about 1 ½ minute for each slide or take it to a lab that costs about $1.50 each. With a 3-4 mega pixel camera - make sure you can shoot a picture with it before you buy it. Watch for time delay. Canon Powershop S30, Best Canon Power G3, G2s also good at reduced prices $500. Go to dpreview.com for reviews on all cameras.

Macerator Installation Demo by Denny Allen 5-2-03, 1:30 p.m.
Denny did a demonstration installation on a GMCer's coach using his macerator kit with most of his audience lying on the ground around the GMC. After cutting a section out of the main drain just aft of the original dump valve he installs his fittings and new valve in place of the section removed. The macerator is installed on the frame; electrical and dump hose are connected and it's up and running. The new valve with pull is installed aft of the macerator which would allow you to dump the old fashioned way if need be. The kit retails for $250. The kit includes everything needed for a complete job. With installation it is $350. Denny can be contacted at gmcnot@shaw.ca.

Electronic Fuel Injection 5-2-03, 8:00 p.m.
Manny Travao showed a Howell kit and described how easy it was to bolt on the GMC coaches. This kit sells for abut $1200. Owners said they carry a spare computer, injector, and O2 sensor for spare parts. The computers are available from wrecking yards ($50) and the chip sets for the computer are available from Howell as spare parts.

GMC ONAN GENERATOR (POWER DRAWER) PREVENTATIVE MAINTENANCE DEMO
By Duane Simmons April, 2003

VISUAL INSPECTION: Observe the general condition of the Onan for any obvious failure of the muffler system, fuel system, frayed battery/power cables or any other item that could cause a major problem, such as a fire. Correct these!

AIR FILTER: Remove, inspect, clean, or replace. An after market (6 KW only) replacement filter made by K and N (p/n R1030) is available from local auto parts store. Cut off the rubber top, remove the metal bottom from OEM filter, place metal bottom onto bottom of K and N filter and drill ¼" hole thru rubber bottom. Insert OEM bolt and secure air filter. Service/clean and oil as required!

CONTROL BOARD: Remove the metal cover (5/16" open end wrench) and spray the board and wire terminals with "2-26" electrical cleaner and lube (Home Depot's electrical dept.) and let it soak. Spray all electrical terminals!

CYLINDER HEAD COVERS: Remove (3 each 3/8" bolts) the sheet metals covers from each head(2). Brush or air blow the dust, etc. from each head area. Check/re-torque the head bolts (9/16" socket and torque wrench) to the following torque values (See GMC Maintenance Manual, Section 24-C for Cylinder Head Torque Sequence):

4 KW Onan	14 -16 ft-lbs in sequence
6 KW Onan	17 - 19 ft-lbs in sequence

NEVER, NEVER HOSE DOWN THE ONAN WITH WATER. NEVER, NEVER!

OIL FILTER ADAPTER: Observe the oil filter to the adapter and the oil filter adapter to the engine block for signs of oil leaks. Tighten the adapter attachment bolts (2) with an open end wrench. Observe the oil pressure switch for signs of oil leaks. Replace if a leak is noted. Replace the sheet metal head covers and install a seal around the oil filter. The seal is required for proper air circulation and cooling.

ELECTRIC FUEL PUMP: Remove the bottom cover from the fuel pump (1/4 turn with 5/8" box end wrench). Remove the filter element. Clean, replace, and install cover.

FUEL HOSE: Observe the inlet fuel hose for signs of leaks. Replace with ¼" fuel line if leaks are observed or if it is a plastic product (OEM hose). Observe the fuel hose between the fuel pump and the carburetor for signs of leaks. Replace hose if leaks are noted. Remove hose at the fuel pump first. One can file off the OEM swage fittings and install a 3/16" hose over the barbs (w/small worm clamps). Use Teflon tape as sealant at carburetor end only.

CARBURETOR ADJUSTMENT: Start the Onan and allow some warm up time for the engine. Disconnect the Onan AC power from the coach for a no load condition. Adjust the main fuel jet in the bottom of the float bowl for a smooth running engine condition. Screw the jet in and out for an optimum set point.

Note: Remove the jet and replace the o-ring seal if fuel leaks occur.

OUTPUT AC VOLTAGE SETTING: Attach one probe of an AC volt meter (Digital Multi- Meter) to a good chassis ground and the other probe to the input wire (left side) of the Onan circuit breaker (top

rear of Onan). Adjust the nut on the end of the governor arm spring to set the output AC voltage to the following level (An increase in RPM will increase the output voltage):

NO LOAD SETTING 125 to 126 V AC maximum

Apply the Onan power to the coach, turn on one roof air conditioner and verify that the voltage drops no more than 4 to 5 V AC of the no-load setting.

CONTROL BOARD TROUBLE SHOOTING: See sections that follow on Onan control board operation.

IGNITION SYSTEM: Observe ignition points to verify that they are not pitted. Adjust points as necessary as follows:

4 KW Onan	0.025”
6 KW Onan	0.016”

See GMC Maintenance Manual, Section 4-C, for Timing and Point Setting Procedure.

VOLTAGE REGULATOR: Disable/remove the VR since it is not needed or desired. It will shut down the control board as it becomes faulty by loading down the flywheel alternator’s signal (30 Volts AC).

Remove the single wire at the VR and tape it up without the wire touching anything. Remove the two-wire-to-one adapter at VR and tape it up without the wire/adapter touching anything. Stow the wires for a permanent fix.

STARTER BRACKET: Push and pull on the starter motor to determine if the bracket has failed. There should be no motion of the starter motor.

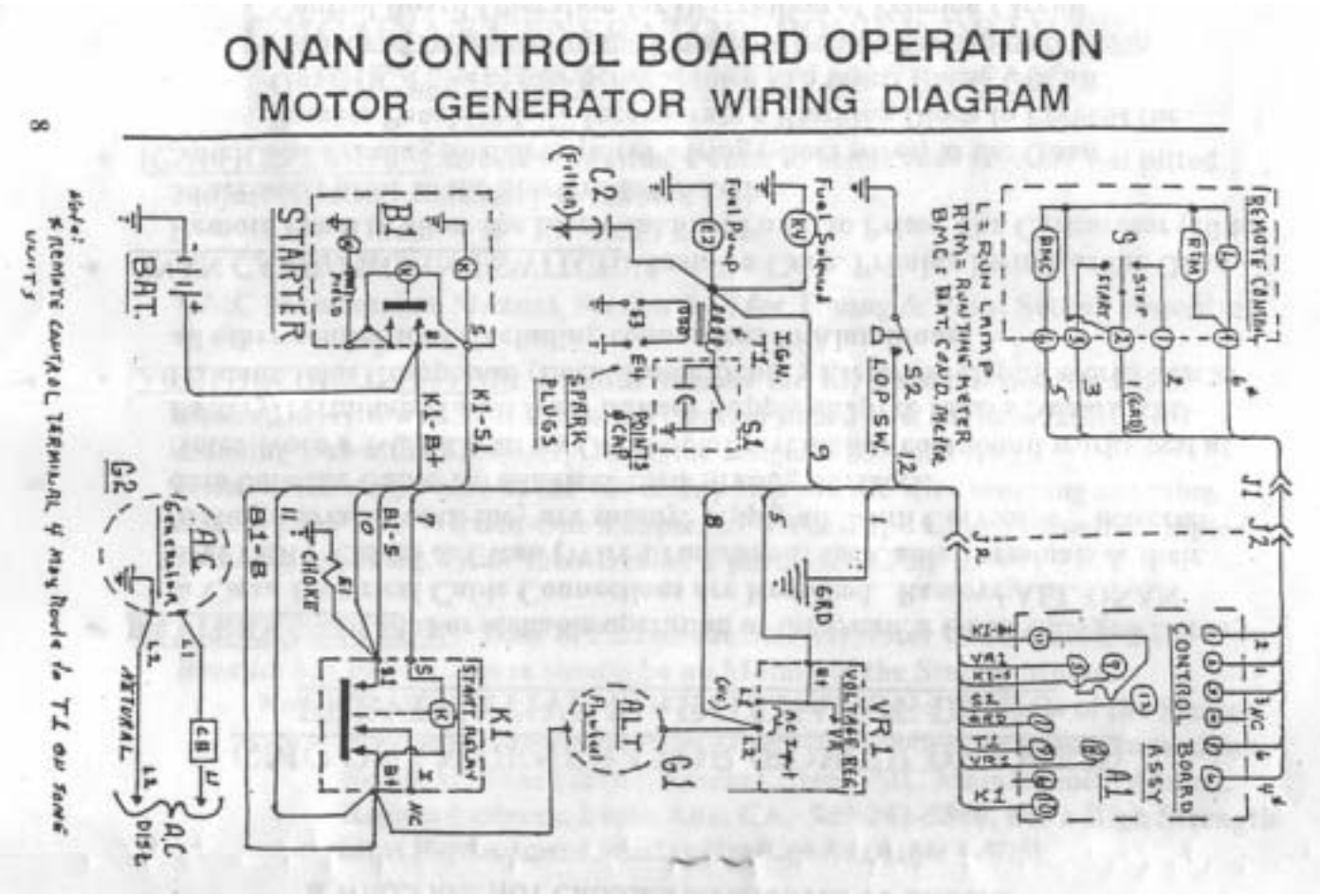
Note: The starter can be removed via two bolts on the ears of the starter. However, the Onan’s front cover and flywheel must be removed for removal of the starter bracket (see GMC Maintenance Manual). Ragusa Patterns, Santa Ana, CA, 949-261-5898, has a high strength steel replacement starter bracket available (~$35).

BATTERY CABLE: For reliable operation of the Onan, a fully charged battery and clean electrical cable connections are required. Remove ALL Onan battery cables and clean (wire brush/sand) the cable terminals and their mating surfaces until they are shiny. Apply an anti corrosion material onto both the cable terminals and their mating surfaces.

Note: Noco’s NCP-2 Battery Corrosion Preventative compound works best on battery terminals (local auto battery supply shop) and Ideal’s Noalox Anti-Oxidant Joint Compound (local Home Depot’s electrical dept.) works best at all other connections, including connections to aluminum.

ONAN CARBURETOR PRIMING SWITCH: Install a carburetor priming switch at the Onan remote panel to allow the electrical fuel pump to prime the carburetor (10 to 30 seconds) prior to the starter motor action.

Note: The priming switch requires wiring (short wires) at the Onan remote panel ONLY. Incorporate a blocking diode to prevent the Onan DC power from being applied to a failed house circuit (source of DC power to the priming circuit). See separate Onan Control Board Operation section below for description of priming circuit.



ONAN CONTROL BOARD OPERATION

TROUBLE SHOOTING AID #1: TRIES TO RUN WITH START SWITCH ON:

- ✓ Battery charge verified, battery cables clean/functional, control board fuse (5A) ok, and oil level verified.
- ✓ Attach jumper board terminal 9 to 5: should hear fuel pump running.
  - o Press start switch and <u>Onan runs</u>.
    - ▪ Remove jumper and Onan <u>continues to run</u>.
      - • **Suspect** low battery voltage between terminals 11 to 1 (with starter on). Must be greater than 10.5 v. DC (typically 11.5+ v. DC).
      - • **Suspect** K-1 starter relay wiring faulty. Must have greater than 10.5 v. DC terminal 10 to 1 (with starter on). Temporarily jumper terminals 5 to 10 and try starting. (Remove jumper.)
    - ▪ Remove jumper and Onan <u>will not continue to run</u>.
      - • **Suspect** low AC voltage (terminals 8 to 11). Must be 26 to 30 v. AC running. Disable/disconnect Onan voltage regulator wiring. Remove single wire and tape up without touching ground or other wires. Remove double wire with adapter (Keep these connected together) and tape up without touching ground or other wires.

- **Suspect** remote control panel – wiring faulty. Remove wires from upper terminals 1, 2, and 3 and try running again.
- **Suspect** faulty low oil pressure (LOP) switch – wiring failure. Remove wire from board terminal 12 and try running again.
- **Suspect** control board faulty: test/repair board as required.

- Press start switch and Onan will not run.
  - **Suspect** fuel or ignition problem: Repair as required.

ONAN CONTROL BOARD OPERATION

TROUBLE SHOOTING AID #2: WILL NOT TRY TO RUN (STARTER OK)

- ✓ Battery charge verified, battery cables clean/functional, control board fuse (5A) ok, and oil level verified.
- ✓ Attach jumper board terminal 9 to 5: Should hear fuel pump run.
  - Press start switch and Onan runs. See Trouble Shooting Aid #1 Chart above: Onan continues to run.
  - Press start switch and Onan will not run. (Jumper attached.)
    - **Suspect** fuel problem – probe pump wire for voltage. Remove carburetor fuel hose at fuel pump. Fuel must flow out of pump with jumper attached. If not, fuel pump is faulty, hose is faulty or no fuel in tank.
    - **Suspect** ignition problem. Remove ignition point cover and hit starter so points are closed. Open and close points – should have spark. If not, **suspect** wiring, coil, or points faulty.
    - **Suspect** faulty low oil pressure (LOP) switch/wiring failure. Remove wire from board terminal 12 and try running again. If now functional, **suspect** LOP switch/wiring faulty.
    - **Suspect** remote control panel/wiring faulty. Remove wires from upper terminals 1, 2. and 3 and try running again. If now functional, **suspect** remote control panel/wiring faulty. Probe wires from upper terminals 1, 2, and 3 to verify control panel operation and wires are not crossed or shorted to ground.

ONAN CONTROL BOARD OPERATION

TROUBLE SHOOTING AID #3: RC PANEL IS NON FUNCTIONAL

- ✓ Battery charge verified, battery cables clean/functional, control board fuse (5A) ok, and oil level verified.
- ✓ If any of the remote control panel functions are not responsive:
  - **Suspect** the 4 wire connector faulty (located in Onan compartment near rear on compartment floor). Eliminate the 4 wire connector by hard wire bypass.
- ✓ Press remote control start switch and stop switch: Onan should respond. If non functional, remove wires from upper board terminals 1, 2, and 3.
  - Jumper upper terminal 1 to 3: Onan should start.
    - If functional, **suspect** remote control panel/wiring faulty.
    - If non functional, **suspect** control board faulty.

- Jumper upper terminals 1 to 2 (Onan running): Onan should stop.
  - If functional, **suspect** remote control panel/wiring faulty.
  - If non functional, **suspect** control board faulty.

ONAN CONTROL BOARD OPERATION

TROUBLE SHOOTING AID #4: NO AC POWER OUTPUT

- ✓ **Suspect** failed bridge rectifier (BR). Replace /adapt with higher voltage rated BR (NTE 5328 or equivalent). Not pin compatible and requires base modification to allow individual wire attachment. See GMC Maintenance Manual for BR test method.
- ✓ Onan circuit breaker failure: Replace/adapt button type with more reliable unit (GE/Westinghouse Quik Lug Type @ 40 or 50 amp.) Probe each control board wire terminal with respect to chassis ground to determine if AC is present.
- ✓ Loss of residual magnetism: Disassembly or electrical fault may cause loss/reversal of residual magnetism. Polarize magnet by a flash/momentary current flow into field winding. Remove BR and apply flash/momentary battery: positive (+) voltage to the field positive(+) wire and chassis, negative(-) voltage to field negative (-) wire (momentarily only).
- ✓ Brush failure: see GMC Maintenance Manual for details.

Note: The control board is for engine operation only and has nothing to do with AC power generation.

ONAN CONTROL BOARD OPERATION

TROUBLE SHOOTING AID #5: WILL NOT RESPOND TO STOP SWITCH

- ✓ Battery charge verified, battery cables clean/functional, control board fuse (5A) ok, and oil level verified.
- ✓ Press control board's stop switch: non functional/will not stop.
  - Remove wires from board's upper terminals 1, 2, and 3. Attach jumper between upper terminals 1 and 2.
    - If non functional, **suspect** faulty control board.
    - If functional, **suspect** faulty control board.
  - To force stop function, remove wire from board terminal 11, 9, or 1.

ONAN CONTROL BOARD OPERATION

TROUBLE SHOOTING AID #6: NO STARTER ACTION

- ✓ Battery charge verified, battery cables clean/functional, control board fuse (5A) ok, and oil level verified.
- ✓ Press control board start switch and no starter action. Jumper K-1 starter relay S terminal (small) to chassis ground.
  - Starter action. Control board or wiring faulty.

- No starter action. Apply +12 v. DC to K-1 starter relay S1 terminal (large, left side)
  - Starter action. K-1 relay faulty.
  - No starter action. Apply +12 v. DC to starter solenoid S terminal (slip-on terminal).
    - Starter action. Wiring between K-1 starter solenoid faulty.
    - No starter action. Starter faulty.

Note: If starter ever stays engaged after Onan starts, pull slip-on terminal wire from starter solenoid to stop starter.

- If starter will not stop, **suspect** starter solenoid (clean and lube). Remove battery cable to stop.
- If starter stops, **suspect** K-1 relay and associated drive circuit.

ONAN CONTROL: QUICK TROUBLE SHOOTING AID

AUG 15, 2002

1) Remove board cover and spray/soak wire terminals with 2-26 Measured Value

2) Measure DC voltage between terminals 5 and 1 (should be ~ 12.8 v DC) _____

3) Measure DC voltage between terminals 8 and 1 (should be ~ 12.8 v DC) _____

4) With starter engaged,
measure DC voltage term. 10 and 1 (should be 10.5 v DC min.) _____

5) Jumper terminals 9 to 5, hear fuel pump and start Onan YES_____NO_____
If no start: ignition, fuel supply, or wiring problem

6) With Onan running,
measure AC between term. 8 and 11 (should be 26 to 31 v AC) _____

7) Stop Onan and pull wire from term. 12.....Try to start YES_____NO____

8) Stop Onan and pull wire from UPPER Term. 1 , 2 and 3.....Try to start YES_____NO____

If no start: suspect control board