Everything You Wanted to Know About Rear Suspension

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1. Jacking

A. Floor Jack*
   1. Use bogie arm plate (vendor supplied)

B. GMC Jack & Chain*
   1. Follow instructions in Owner's Manual

C. Jack Pads*
   1. Use bottle jack 2 ton or greater
   2. Place leaf spring (partial) under control arms

*Always block frame after raising, NEVER rely on jacks holding weight

2. Air Bag(s)

A. Rotate every two (2) years – prevents "hot dogging"
   1. Loosen nuts when bag(s) full of air
   2. Raise bogie taking weight off bag(s)
   3. Disconnect air line
   4. Rotate bag(s) 180° degrees
   5. Tighten nuts, do not over torque front and rear nuts after turning or replacing air bag(s)
   6. Reconnect air line
   7. Inflate bag(s)
   8. Lower bogie

B. Check For:
   1. Aging
      a. cracks & tears*
      b. exposed thread and broken thread strands
      *Missing black rubber coating exposing threads does not indicate bag failure.
   2. Leaks
      a. at O ring (front of air bag)
         – use liquid soap solution in spray bottle, spray and look for bubbles
      b. air line fittings – plastic more prone to failure, use brass if replacing
      c. stones or small debris between cone and bag
         – after marketing deflectors (check with vendors)

C. If Bag Breaks
   1. Use threaded rod, 3/4" x 18" and four (4) nuts
   2. Wooden block 13 1/2" long (insert between bogie air bag brackets)
   3. Regussa™
      a. cut bag and insert casting

D. Maximum Bag Pressure 120 lbs. PSI, Minimum Pressure for Travel 60 lbs. PSI
   1. Compressor will normally come on at 90 lbs. PSI when in travel mode
      a. Design I & II (single tank)
         maximum pressure – 120 lbs. PSI
         minimum pressure – 90 lbs. PSI

E. Install Shut Off Valves (air bag - vendor supplied)
   1. For parking (helps prevent leak down)
   2. Air line falilure
      a. have a way of maintaining air in bag(s) for safe travel
   3. Side air line can be added for easy inflation

F. Cones
   1. Make sure cones are alumnimum, not plastic
      a. plastic cones can shatter
   2. Keep cone clean and free from dirt and small stones

G. New Style Air Bags
   1. Floating two (2) bag system (one side) – four (4) bags total
   2. Fixed four (4) bag

3. Level System

A. Check Height
   1. Front: 13 1/8" plus or minus 1/4"
      a. measure rom elongated hole on front frame (measurement is with **bias** ply, 16 1/2" tires)*
   2. Back 11 11/16 plus or minus 1/4"
      a. measure elongated hole of rear frame (measurement is with **bias** ply, 16 1/2" tires)*
      *measurement different with radial ply ties, with 16" wheels

B. To Adjust Height
   1. Rear
      a. loosen control, move up or down, tighten, re-check height
         – if adjustments cannot be made, check arm linkage between control leveler and bogie arm

C. Proper Use of Controls
   1. Manual – 1973 to 1976 (Design I)
      TRAVEL: when coach is in motion
      HOLD: to maintain position when parked
      RAISE: to raise right or left side
      LOWER: to lower right or left side
   2. Electro Level I & II – 1976 to 1978*
      TRAVEL: auto for auto leveling, then **hold** when coach is in motion*
      RAISE: to raise right or left side
      LOWER: to lower right or left side
      *instructions changed to read same as Design I
   3. Either system can raise or lower the rear of the vehicle (right or left side) approximately 4" (single air bag system only)

4. Wheel Bearings – Total Eight (four inner – 4 outer – 4 seals)

A. Check Yearly
1. Re-pack at 24,000 miles
   a. check for wear or heat
   b. check inside of rear wheels for thrown grease

IMPORTANT! ***Caution is to be advised when changing real seal due to design change in the part number (89745). Improper seal will cause bearing failure in as little as 1,000 miles***

B. Torque to Specifications
1. 25 foot pounds, back off 1/2 turn, then finger tight
   a. should **always** be a little play in wheel, top to bottom

CAUTION! ***If no play is present, over tighting can cause bearings to heat and cause bearing failure.***

b. **WARNING!** ***purchase a heat sensing gun, check hub heat at rest stops, all hubs should be reading equal heat – if a hub is found hot (to hot to keep a finger on – DO NOT proceed until problem has been found.***

NEVER OVER TORQUE

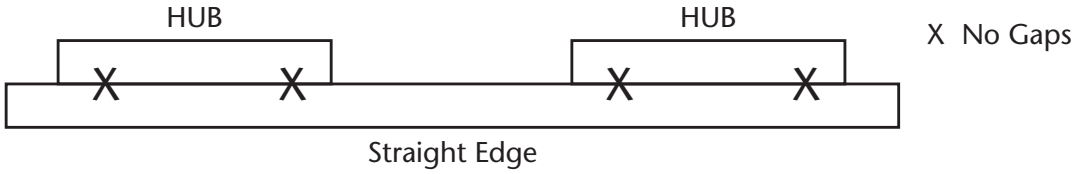
5. Bogie Pins – four (4)

A. Grease approximately every 2,000 miles
1. Raise bogie until wheels are off the ground
2. Drop air in bag(s)
3. Use shovel under wheel, moving up and down while greasing (seond person a big help)
4. Make sure grease exits from front and rear of pin
5. With wheels elevated – check to make sure there is **no** play on control arm (pushing and pulling front edge of tire should have no play)

B. Removing Old Grease from Pins
1. Remove zerk fitting
2. Insert straw 5/16" diameter approximately 9" long (Arby's work great)
   a. push in until approximately 1/2" sticks out, twist, pinch end, remove straw
3. Re-greasing
   a. use quality hi temp grease, (such as Mobil 1™ synthetic or equal)
   b. 1973 to 1974, 1 1/4" pins, one (1) inner grease slot
      – follow procedure A.
   c. 1975 to 1978, 1 1/2" pins, two (2) inner grease slots
      – follow procedure A or
      – use lube tube (vendor supplied), remove zerk, insert tube (after grease has been removed) apply grease, grease should come out of rear only, remove lube tube, re-install original zerk, apply grease, grease should appear in front of pin.

6. 4 Wheel & 6 Wheel Alignment Check

A. Make sure bogie arm is straight and pin is not worn
   1. Jack side, remove wheels, put straight edge – 1 1/2" x 1 1/2" x 48" aluminum 90° angle on wheel hubs
      a. hubs should not have gaps wheel to wheel



If so, control arm can be bent back into position using an arm pusher* drawings available.

B. With straight edge on hub, face laser level on aluminum angle, shoot forward to front wheel, measure with tape (laser dot to face front hub, record, measure opposite side using smae method, record, recorded measurements should be within plus or minus 1/4" of each other

*According to Cinnabar Engineering, the only way to truely get a 6 wheel alignment is to use slip plates on all 6 wheels, other methods can be used, always seek propfessional help

C. If the frame is not bent, there is no camber or caster adjustment. Toe in and toe out are done by shimming the rear bogie (providing the control arm is not bent, and pins are not worn)

7. Brakes

A. Check Yearly
   1. Show wear
   2. Drum wear
      a. dust edge breaking off
      b. weights missing
   3. Cylinders leaking
   4. Brake lines and hoses
      a. worn or bulged
   5. Adjustments
      a. for slight drag
      b. re-tensioning parking brake
   6. Bleeding
      a. gravity
      b. pressure
         – lock out equalizing valve
      c. vacumn pumping
         – lock out equalizing valve

8. Shock Absorbers

A. Check for leaking
B. Check for bent or broken ears and rods, or loss of retaining nuts

9. EVERY Trip

A. Check for foreign material in air bag cones
B. Ride height
C. Feel hubs, if you cannot keep you fingers on hub due to heat – **DO NOT PROCEED!** Wheel Bearing Failure.

Designer	General Motors	Leigh Harrison	Jim Kanomata	Zeb Frady	Alex Sirum	Dan Hensley	Jim Bounds	Silver Motor Coach
System name	OEM	Four Bag	Quadra Bag	Southland		Hensley	Big Ole Bag (BOB)	Silvertone
Year introduced	1973	1995				2011	not yet!	1991, 2011 GMC
Bags per side	1	2	2	1	2	1	1	1
Bag manufacturer	Firestone	Firestone	Firestone	Firestone		Firestone		
Bag part number	8301	W01-358-3400	W01-358-7325					
Bag vendor, USA, retail	none	Leigh Harrison, generally orderable	Applied GMC, COOP, Alex Sirum, Grandview, MGM, generally orderable	Southland Motorhome Center				Applied GMC
Bag price w/o shipping, each (date)	n/a	$100 (May 2011)	$100 (May 2011)	$300 (May 2011)				$400 (May 2011)
Max height under bogie								
Pressure at max height								
Min height under bogie								
Bag pressure at normal ride height and weight, psig	80-90	100-110	80-90	90		90-100		125
Leveling range, inches: +up, -down	full: +4, -4	reduced: +3, -4	full: +4, -4	reduced: +3, -4		greatly reduced		
System vendor	none	Leigh Harrison	Applied GMC	Southland Motorhome Center	Alex Sirum GMC Motorhomes	Dan Hensley		Applied GMC
System vendors, other			GMC COOP, Alex Sirum, Grandview, MGM					
System price, both sides (date)	n/a	$1075 (May 2011)	$1600 (May 2011)	$950 (May 2011)		$600 (May 2011)		$800 (May 2011)
System weight		57 lbs						
Shipping price, ~2000mi USA	n/a	$50						
Time to install, both sides	n/a	4-6hrs	4-6hrs	1hr		1hr		
Ease of installation	n/a	straightforward but some difficult to access and/or high torque work	straightforward but some difficult to access and/or high torque work	easy		easy		easy
Systems sold (date)	12,921 (1979)		200+ (Jun 2011)	12 (Jun 2011)		5 (May 2011)		
Design features		• should survive loss of single bag per side (2x load on remaining bag and tire!)	• should survive loss of single bag per side (2x load on remaining bag and tire!)			• can travel with bags deflated, ~2" clearance between tires and wheel wells		
Reviews, fans		• improved handling (esp for towing) • good protection of hoses and bags from road debris	• improved handling (esp for towing)	• rides like OEM				
Reviews, skeptics		• firmer ride than OEM • isolated report of damage to center support under extreme road dynamics	• firmer ride than OEM	• rides like OEM		• question about side-load stresses		

Designer	General Motors	Leigh Harrison	Jim Kanomata	Zeb Frady	Alex Sirum	Dan Hensley	Jim Bounds	Silver Motor Coach
Notes	• bags no longer manufactured • some NOS bags are still available but cost prohibitive (e.g. Cinnabar, $700/ea?)		• adapted from Harrison design with many updates (details will be added soon).	• cone design patented • Southland is only US distributor for bag, but it is said to be common in international trucking use	site says "new style" air bag system in stock, no link or info			• bag/cone system original on Silver MC vehicles in 1991 • repurposed for TZEs in 2011 • future availability and current bag age uncertain
More information		Leigh Harrison product page	Applied GMC product page	Southland Motorhome Center product page				
			installation instructions (PDF)	GMC ES presentation (PDF)		installation video		
		air bag data sheet 3400 (PDF)	ait bag data sheet 7325 (PDF)					
		bellows data sheet 224 (PDF)	bellows data sheet 26 (PDF)					

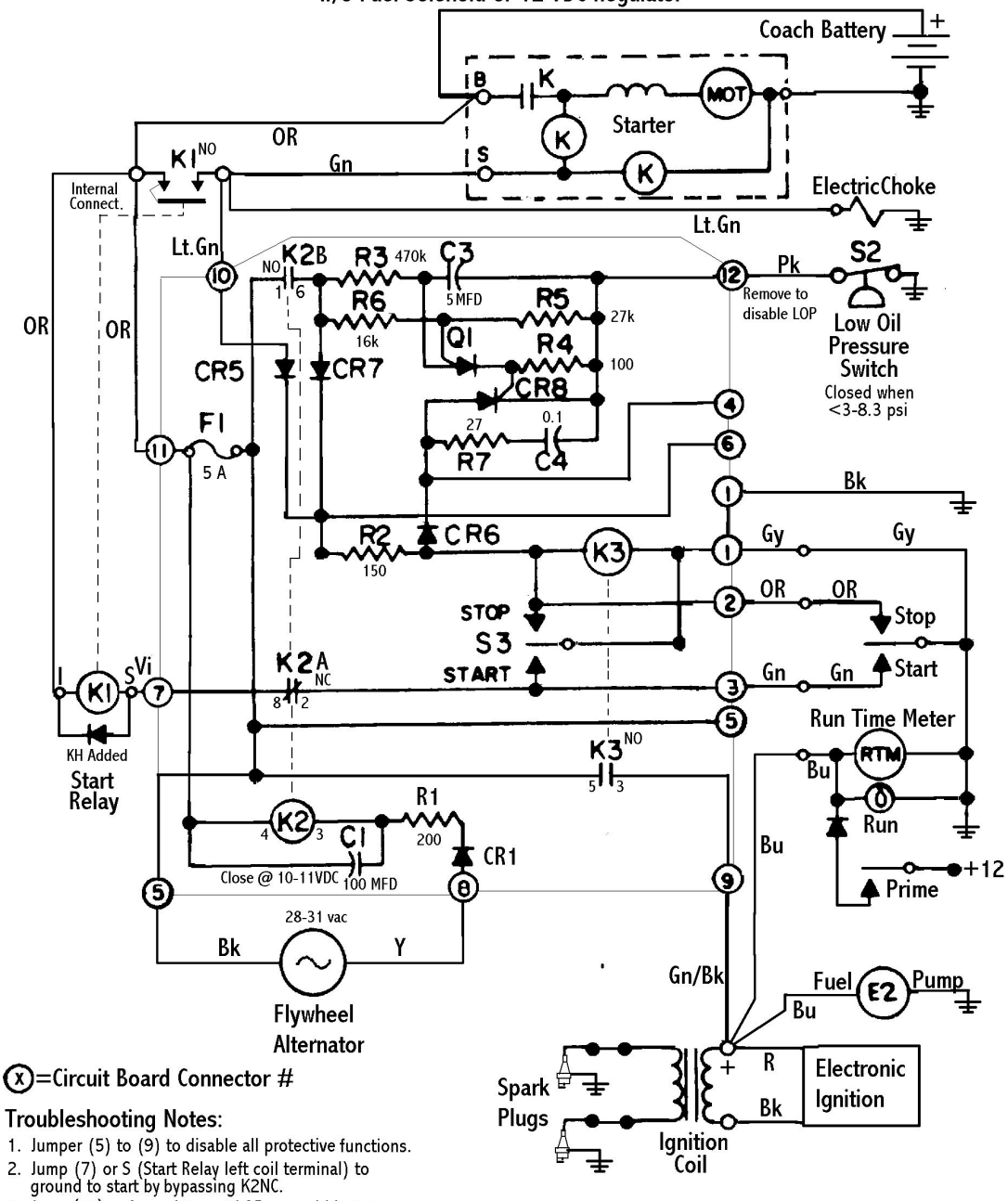
Brakes Available Today

Brake Type	Status	Features
78 Cadillac OEM	Available in Junkyards	Discs Only -- Middle and/or Rear -- Large Calipers w/ or w/o Parking
TSM (The Street Machine)	Delivering from TSM	Discs Only -- Middle and/or Rear -- Large Calipers w/ or w/o Parking
Leigh Harrison	Delivering from Iden Corp	Discs Only -- Front, Middle and/or Rear -- Large Calipers -- Extra Large Rotors
Applied GMC	Delivering from Applied GMC	Discs Only -- Middle and/or Rear -- Large Calipers

Reaction Arm System	Status	Features
Norm Jestico Reaction Arm	Prototyped by Deceased Norm	Discs Middle and Rear -- Large Calipers w/ or w/o Parking Sway Bars Reaction Arms Give Some Track Control
Chuck Aulger Reaction Arm	Delivering from Applied GMC	Discs Middle and Rear -- Large Calipers w/ or w/o Parking Sway Bars Reaction Arms Give Some Track Control
Chuck Aulger Reaction Arm	Delivering from Applied GMC	Discs Middle and Rear -- Large Calipers w/ or w/o Parking Reaction Arms -- No Track Guides
Manny Brakes	Delivering from Manny's Trannys	Discs Middle and Rear -- Small Calipers w/ or w/o Parking Optional Track Guides
Tom Pryor Reaction Arm	Delivering from Applied GMC	Drums and/or Discs -- Middle and Rear Optional Straight Track Guides

4kW Onan Generator Wiring

w/Electronic Ignition
w/o Fuel Solenoid or 12 VDC Regulator



(X)=Circuit Board Connector #

Troubleshooting Notes:

1. Jumper (5) to (9) to disable all protective functions.
2. Jump (7) or S (Start Relay left coil terminal) to ground to start by bypassing K2NC.
3. Jump (12) to Ground to test LOP stop within 3-4 sec.
4. Disconnect (12) to disable LOP
   CAUTION -- NO PROTECTION FROM OIL LOSS

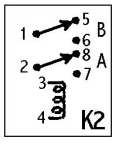
R1=200 Ohm
R2=150 Ohm
R3=470k Ohm
R4=100 Ohm
R5=27k Ohm
R6=16k Ohm
R7=27 Ohm

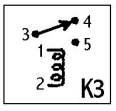
C1=100 MFD 25VDC
C3=5MFD 25VDC
C4=0.1MFD 100V
Q1=UJT(2N6027)
CR1-7=0.5A100V (1N4004)
CR8=GCR 0.8a30v (2N5064)

K2=ECG #RLY5142 400 ohm 2A DPDT
(Starter Disconnect / Hold Relay)

K3=ECG #RLY6522R 1400 ohm
(Run / Engine Stop Relay)

S2=NAPA OP6282 Close @ <3-8.3psi 1/8-27 NPT
(Engine Low Oil Pressure Switch)





Modified from the Onan Original
By Ken Henderson 1 Sep 2001