SOLECTRIA
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OWNER'S MANUAL

1991 SOLECTRIA FORCE

FIRST EDITION

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I. INTRODUCTION

Congratulations on your purchase of a new electric drive Solectria **Force** vehicle. Solectria Corporation prides itself in building the most efficient, practical electric vehicles and components for use in electric drive vehicles. The car you have purchased is a converted 1991/92 Geo Metro with advanced technology Solectria electric drive components to provide efficient, low energy consumption transportation with positive environmental impact for the urban commuter. The Solectria **Force** represents environmentally-responsible transportation with the convenience of traditional cars. Solectria Corporation is confident that the high quality workmanship and components in your new **Force** will provide you with trouble-free, inexpensive transportation and the satisfaction that comes from driving an emission-free vehicle.

Please read this manual carefully in order to insure proper operation and maintenance of your vehicle. Although this car looks similar to gasoline-powered vehicles and is simpler to drive and maintain, the **Force** does require care and some preventive maintenance for its safe, long-lasting and trouble-free operation. Your reading of this manual is essential to the safe and trouble-free of operation of your vehicle.

This Owner's Manual is divided into seven sections. Section II covers the operation of the vehicle, including driving the vehicle, recharging the vehicle, using the regenerative braking, and parking. Section III provides an overview of the features of the car not altered by Solectria. (A 1991/92 Geo Metro Manual is included as an Appendix for reference.) Section IV covers the drive components installed by Solectria, including the motor, motor controller, batteries, and other electronic equipment used to monitor or regulate electric energy consumption of the car. Section V contains a detailed maintenance schedule to insure that the vehicle maintains its performance. Section VI contains warrantee information and instructions on seeking repair of the vehicle if you should need it. Section VII is a troubleshooting guide for when you have problems and for minor repairs and adjustments.

Happy Motoring!

P.S. We welcome your comments on our owner's manual. Give us a call or send us a note on how we can make this manual better serve you.

II. VEHICLE OPERATION

The Solectria Force has been built to provide you with trouble-free commuting under normal urban driving conditions. As a converted electric vehicle, the **Force** drives and handles much like a conventional gasoline-powered vehicle, once it is on the road. Certain aspects of the car, however, will seem different to the new electric vehicle owner. This section covers the day-to-day operational features of the car which may be different from what you are used to with a conventional car.

Vehicle Charging

One of the nicest benefits as a new electric vehicle owner is never again needing to pull into a gasoline station to fill up your tank with gasoline. Since the **Force** uses electricity stored in its batteries as its source of energy, the vehicle must instead be recharged via the recharging plug (located under the 'gas' cap) and extension cord (provided with your car) or the onboard solar panels (if equipped). Your **Force** vehicle is delivered with nearly fully-charged batteries, with a range of up to 60-80 miles (90-110 miles for the GT model, 50-70 miles for the five-speed manual model); so, the batteries may need some additional charging once you have reached your destination. Frequent recharging of the batteries is not detrimental; in fact, the less you drive before recharging the batteries, the better your vehicle performance will be and the longer your batteries will last. Deep discharging of the batteries can dramatically decrease your battery life.

Example: For a daily 40-mile roundtrip commute, the batteries could be recharged overnight in five hours. Estimated battery life would be just over 1 year. Alternatively, the batteries could be charged overnight for 2 1/2 hours and at work for 2 1/2 hours, with an estimated battery life of well over two years.

As the example above shows, it is better to charge the car as often as possible, and to avoid deep discharging if possible.

Below are charts demonstrating the approximate lifetime of your battery under different operating conditions. The computations are made assuming that the car is driven 300 days of the year at the stated rates:

Automatic Transmission, 4 Seats:

Depth of Discharge	Approx. Miles per day	Approx. Battery Lifetime	Approx. Miles per year	Approx. total miles for battery
80%	50	0.75 yrs.	15,000	11,250
50%	30	1.67 yrs.	9,000	15,000
40%	24	2.5 yrs.	7,200	18,000
30%	18	4 yrs.	5,400	21,600
20%	12	6 yrs.	3,600	21,600

GT, 2 Seats:

Depth of Discharge	Approx. Miles per day	Approx. Battery Lifetime	Approx. Miles per year	Approx. total miles for battery
80%	72	0.75 yrs.	21,600	16,200
50%	45	1.67 yrs.	13,500	22,500
40%	36	2.5 yrs.	10,800	27,000
30%	27	4 yrs.	8,100	32,400
20%	18	6 yrs.	5,400	32,400

Manual Transmission, 4 Seats:

Depth of Discharge	Approx. Miles per day	Approx. Battery Lifetime	Approx. Miles per year	Approx. total miles for battery
80%	44	0.75 yrs.	13,200	9,900
50%	27	1.67 yrs.	8,100	13,500
40%	21	2.5 yrs.	6,300	15,800
30%	16	4 yrs.	4,800	19,200
20%	11	6 yrs.	3,300	19,800

To charge your **Force**, simply turn your car off, remove the keys, and then plug it in, using the cord which came with your car. Plug the cord into the socket located under the 'gas' cap and then into a 110/120VAC outlet. [Note: you may use another cord but make sure that it is at least 14 Guage or bigger if you have a supercharger and at least 16 Guage or larger if you have the standard single charger. Having a cord that is larger than you need can do no harm but one that is too small may overheat and start a fire.] You should then observe that the green light on the Battery Level /Amp-Hour meter on your dashboard is flashing and the numerals are counting down. This means that power is flowing into your batteries. The Battery Charger installed in your car has a taper feature, however, it should be unplugged before it overcharges your batteries too much, otherwise a dangerous condition could result and you could ruin your batteries. The most accurate way to monitor battery charge is by monitoring your Battery Level/ Amp-Hour meter and unplugging when it is "filled up." The meter reads zero (0.00) when it is charged and will begin to go negative as it overcharges (try not to let the meter read lower than -8.00 [it is good to overcharge to -4 or -5]). The meter will auto zero (if negative) once power is being used. Some rules of thumb for charging are as follows (based on drawing current from a 120VAC outlet, using the cord provided with the car):

	Charger	Supercharger
For the automatic four seater with Lead-Acid cells-		
Car is completely drained:	8 hrs	5 hrs
Car drove 10 miles:	1.8 hrs	1 hr
Car drove 30 miles:	4.2 hrs	2.5 hrs
Maximum Overcharge	add 4 hrs	add 2 hrs

	Charger	Supercharger
For the GT Model with Lead-Acid Cells-		
Car is completely drained:	10 hrs	6 hrs
Car drove 10 miles:	1.8 hr	1 hr
Car drove 30 miles:	4.2 hrs	2.5hrs
Maximum Overcharge	add 5 hrs	add 2.5 hrs
For the manual model with Lead-Acid Cells-		
Car is completely drained:	8 hrs	5 hrs
Car drove 10 miles:	2 hrs	1 hr
Car drove 30 miles:	5 hrs	3 hrs
Maximum Overcharge	add 3.5 hrs	add 2 hrs

If you have the Nicad battery option, it will take slightly less time to recharge unless your car's batteries are fully drained.
Notice that the above are only rough figures and may vary considerably from case to case.
Please note that your car will not drive if it is plugged into the wall.
If you have the onboard Solar Panel Option, simply leave your car out in the sun and it will be charged automatically by the panels. **NOTE:** Do not apply pressure to solar panels. If you do, they may break or malfunction. Sometimes physically imperceptible damage may be fatal for a solar cell. Caution must be observed with your solar panels.

Vehicle Starting

To drive the **Force**, insert the key and turn it forward (clockwise) to the "ON" position, as you would in a conventional gasoline car. You will not hear any engine noise, but do not be alarmed, as this car is silent when it is not moving. You should wait 1 or 2 seconds, and the car will be ready to drive. Observe the Battery Level /Amp-Hour meter to see how much electrical energy (as measured in ampere-hours) you have used from your batteries. (Note: the batteries start with 55 amp-hour capacity, but this capacity decreases with usage). When the batteries are fully charged the meter should read 0.00 amp-hours. If the meter reads greater than 50 amp-hours, it is recommended that you charge up before more driving. (Note: the Amp-hour Meter counts up as you discharge the battery and counts down as you charge the battery). If you overcharge, the meter will read negative, but will automatically go back to zero once a tiny amount of power has been used. If the meter reads 55 or higher, your batteries are probably completely drained.

Driving the Force

Now that the car is ready to drive, you should select forward or reverse by using the "Forward/Neutral/ Reverse" toggle switch on your dashboard. In the Force automatic single speed, you want to avoid rolling in the opposite direction of travel, so, when

starting on a grade, it is highly recommended that you apply the parking brake and the foot brake and do not release them until you feel the car pushing against them, especially if you want to move uphill. (ie - before taking your foot off the brake pedal and releasing the hand brake (parking brake), slowly apply pressure to the accelerator pedal. With practrice you can ensure a smooth start, without allowing the car to roll backward (or forward if going in reverse)). [**NOTE OF CAUTION** : Attempting to drive forward when the car is rolling back or attempting to drive backwards while the car is rolling forward, may cause serious damage to your motor. ALWAYS ENSURE THAT YOU ARE AT A COMPLETE STOP BEFORE CHANGING DIRECTIONS OR BEGINNING MOVEMENT.] Once you are moving, your speed is regulated by the accelerator pedal. Note that when you are drawing energy from the batteries to accelerate or to maintain speed, the red light (LED) on your Battery Level /Amp-Hour meter will flash. You may slow down by easing up on the gas pedal. As you release the accelerator pedal, the motor controller will switch to regenerative braking mode to slow you down and charge the batteries. When regenerative braking begins, the car will slow significantly. Regenerative braking actually works by turning your motor into a generator. When you use it, you will notice that the green LED on your Amp-Hour meter is flashing. This signifies that you are recharging your batteries. If you need to stop very fast, apply the mechanical brakes by using the brake pedal. Prudent driving should not require frequent use of the brake pedal. Using the regular mechanical brakes will not give you any energy back but will fast deceleration for quick stops. Since regenerative braking does provide some charging of the battery, it is recommended that you adjust your driving habits so that if you need to slow down, you do so mostly with regenerative braking.

At all times when the vehicle is parked, the parking / hand brake should be used.

III. OVERVIEW OF 1991 GEO METRO OWNER'S MANUAL*

The 1991 Geo Metro Owner's Manual covers all of the basic features of the car from safety to adjustable seats and even includes driving tips. You should read through the Geo Metro Owner's Manual before you drive the **Force** and as you read this Manual. The manual is divided up into 7 Parts and an Introduction. Please read the introduction first.

Part 1: Seats and Safety Belts. This section is entirely applicable to the **Force**, and should be read carefully and understood. Solectria recommends the use of seatbelts whenever you are in the car.

Part 2: Features and Controls. The subsections on *keys, doorlocks, and theft* apply directly to your car with the following exceptions:

There are no Carbon Monoxide emissions from your car so you do not need to worry about the caution on p. 47 which refers to driving with the hatchback open.

Removing the key will not lock your transaxle in any case. However, it will lock the steering wheel.

Information on the *Break-in* period is applicable for new brakes, however, it will not do the **Force** any harm to drive it at one speed during this period. The Ignition Switch is identical and starting instructions for the car are covered in SECTION II, VEHICLE OPERATION of Solectria's **Force** Manual. See SECTION II of Solectria's **Force** Manual with regard to vehicle starting and disregard the *Starting Your Engine* part of the GEO Manual. Also please disregard the sections on *Engine Block Heater , Automatic Transaxle, Shifting into Park (Automatic Transaxle Models Only), Shifting out of Park, Engine Exhaust,* and *Running Your Engine While You're Parked.*

Manual Transaxle instructions (p. 56-58, p. 60) apply to the manual version of the **Force**.

Instructions on the *Parking Brake* (p. 58) apply in their entirety to your car as well. Solectria recommends that you always use the parking brake when the car is parked.

Although the **Force** has no exhaust system, some electrical components may get very warm or hot, and it is recommended that you not park over flammable materials (see reference on p. 61 in the GEO Manual).

Vehicle features mentioned from pp. 62-75 apply if installed in your car.

Notice that the cigarette lighter and ashtray have been removed to provide a convenient location for the heater button and Battery Level/Amp Hour meter.

Also, notice that there are some changes in the *Instrument Panel* and *Warnings and Indicators* Sections (pp. 74-82 in the GEO Manual). There is no fuel guage, engine collant guage, oil pressure guage, charging system light and check engine light. Please refer to SECTION II, VEHICLE OPERATION, of the **Force** manual for this information on your car.

Part III: Comfort Controls and Audio Systems.

Our comfort controls for the Air conditioner and Heater are the similar to those on the original GEO.
For using the heat:
Press the Red button on your dash consol and turn the fan on. You may regulate the amount of heat by using the car's control levers (as described in the GEO manual).
For the air conditioning:
Push the blue button and turn the fan on. Direct the amount of cooling by regulating with the control levers (as indicated in the GEO manual).

Remember that all of these elements run directly off your battery and using them will decrease your range as much as 15% or more depending on your heating or cooling usage. The heater and air conditioner have no effect on the vehicle's acceleration performance.

Audio system: If you have been provided with a Delco radio / cassette deck system follow the operations manual in the GEO manual. If your car is outfitted with another top of the line audio system, please follow the owner's manual from the manufacturer. Some systems are coded to deter theft - should the radio system be disconnected from the batteries, follow instructions provided for "recoding".

Part 4: Your Driving and the Road. This part contains some useful tips about driving. Remember that in reference to braking (pp. 108-112), you have not only the brakes listed in the GEO Manual, but Regenerative Braking as well. It does no harm to use your regenerative brakes frequently and they will help you to stop faster. In general, Solectria recommends that you try to use only regenerative braking when braking is required and reserve your disk and drum brakes for emergencies and fast stops. Note also that with your electric car, if you are caught in a blizzard, you do not need to run your engine to use the heater (pp. 136-7), but the heater will draw substantial energy from your batteries, so only use it when it gets uncomfortably cold (for example, when caught in a blizzard, after taking all measures described in the GEO manual).

Part 5: Problems on the Road. Everything in this section is applicable except *Jump Starting* and *Engine overheating*. Do not attempt to jump start your **Force** from another car or jump start another car with your **Force**. Not only would it be hazardous, but both vehicles could be damaged. The **Force's** main batteries are at a much higher voltage than a conventional car's electrical system, and the **Force's** 12 volt DC-DC converter cannot provide nearly enough amperage to be able to jump start a conventional car engine. *Engine Overheating* also does not apply. See SECTION VII, TROUBLESHOOTING GUIDE of the **Force** Manual to determine how to deal with similar problems in your

car. Note also, your spare wheel and jack are stored differently in your car than in the GEO. See SECTION VII for this information. On *Reporting Safety Defects*, Report to Solectria Corporation in lieu of General Motors (p. 165) and substitute Solectria Corporation for General Motors in that subsection. Call us at (617) 894-6670 or write us at Solectria Corporation, 27 Jason ST, Arlington, MA 02174.

Part 6: Service & Appearance Care. Service on electric and electronic components should be done by Solectria Engineers or Solectria approved, trained mechanics in your area (who are familiar with your car's drive system). This includes the motor, controller, gearbox, belt drive, batteries, solar panels and maximum power tracker (if installed), 12 volt DC-DC converter, Battery Level Meter/Amp-Hour counter, and heater, as well as the air-conditioner motor and motor controller (if installed). Brakes, body work, wheels, tires, air conditioner compressor, condenser, and Freon (if installed), etc. can be serviced adequately by any service station or GEO dealer. Read the *caution and notice* on p. 168 carefully, as they apply to your car as well. PP. 169-179 are not applicable to your car with the exception of p. 172. Some of the features (such as hood prop, windshield washer reservoir, brake fluid reservoir and main fuse box) remain in your car. See SECTION VII (the troubleshooting guide of the **Force** manual) for more details. If you have the manual transmission **Force** model, you will need to follow the instructions on the manual transaxle fluid on pp. 181-182. If you have the automatic model, see SECTION V (maintenance) and SECTION VII (troubleshooting guide) of the **Force** Manual. You will need to check the coolant (anti-freeze/ethylene glycol) level mentioned on pp. 183-185 and use the recommended mixture since this runs through the heating unit. The information on the *Brake Master Cylinder* (pp. 185-88) applies to your car. Your battery is far different than the original Geo's and you should refer to SECTIONS V and VII on care and troubleshooting. Headlight and Bulb replacement, pp. 189-194 is identical. The sections from p.195-219 are all useful and pertinent to your car and contain information on loading, cleaning, replacement parts and fuse boxes. For the technical information on pp. 220-226, refer to SECTION VI, WARRANTY/REPAIR.

Part 7: Index. This section (the index) is self explanatory.

*Reference: Geo 1991 Metro Owner's Manual, General Motors Corporation, Chevrolet/Geo, 1990.

IV. THE ELECTRIC DRIVE SYSTEM

The Electric Drive System is what makes the **Force** a unique and truly ideal automobile. It is important that you understand the basics of its operation and how it works.

The Automatic Model (4 seat and GT versions):

The "brains" of the system are housed in the Motor Controller which is inside the small black box (approximately 2'xl'x6") under the hood (see diagram on page 22. This controls and coordinates all functions of the electric motor, regenerative braking, battery bank and load distribution. Directly below the controller is a larger black box which contains five batteries in the regular 4-seat model. The other seven are contained in the hatchback section at the back of the car (the GT has a similar battery bank up front but has more in the rear). The battery is what stores the energy that your car uses. You can think of it as your fuel tank. Your battery banks have approximately 10 Kilowatt-hours of energy in the four seat automatic **Force** and 14 Kilowatt-hours in the **Force GT**. The silver colored circular cylinder (which can be either smooth or with fins) at the back of the engine compartment is your motor. This serves to propel your vehicle or to slow it down during regenerative braking by being used as a generator (as regulated by the motor controller). The motor is connected to the axle through a belt to a simple one speed transmission (automatic model) contained in the transmission gearbox which is the slightly oblong shaped, silver colored box at the back of the engine compartment. Overall, the system is very simple and has very few moving parts.

V. EFFICIENT DRIVING TIPS

The **Force** vehicles have been carefully designed to provide peppy performance in the city and also have the capability to cruise at highway speed. However, there are several tips that allow you to get the best range possible, achieve longer battery life and conserve energy.

1.) Acceleration: Your **Force** has been equipped with good acceleration capability which is nice for safety and enjoyment. Although using the full acceleration often does not signifigantly increase wear on any electronic or drivetrain components, it does take a toll on the batteries, and causes the vehicle to use more energy, thereby decreasing the car's range.

Flooring the accelerator occasionally is not detrimental but, like many things, may be harmful if done too often.

To maximize your range and efficiency, accelerate gently and anticipate decelerations and decelerate gently. Decelerating gently will allow you to get the most from the regenerative braking.

2.) Cruising: In order to use the least energy when travelling from one point to another, a constant speed is most efficient. Stopping and starting uses a considerable amount of energy even with the regenerative braking feature that your car is equipped with. High speed driving uses the most energy of all. The chart below shows approximately how far you can theoretically drive at different speeds if you could cruise continuously without stopping or changing speed significantly.

Speed	Force, 4 seat	Force GT	Force, 5 spd
20 mph	90 miles	132 miles	80 miles
30 mph	80 miles	120 miles	70 miles
40 mph	60 miles	90 miles	51 miles
50 mph	42 miles	63 miles	36 miles

Theoritical Maximum Miles per Charge

The following chart shows approximate Amp-Hours used per mile driven at different speeds.

Speed	Force, 4 seat	Force GT	Force, 5 spd
20 mph	0.64 A-H	0.75 A-H	0.70 A-H
30 mph	0.73 A-H	0.84 A-H	0.80 A-H
40 mph	1.00 A-H	1.10 A-H	1.10 A-H
50 mph	1.40 A-H	1.50 A-H	1.56 A-H

Approximate Amp-Hours per Mile

3.) Hill Climbing: Hill climbing is an energy-intensive task. However, the slower you drive, the less power is required. To be efficient, it is recommended that you climb hills slowly, if possible.

4.) Generally, the red light on your Battery Level/Amp-Hour meter flashes quickly when you are using a lot of power and slowly when you are using lower amounts of power. The lower the power used, the more range you will get on your present battery charge. You should try not to let the red light blink so quickly that it looks like it is on all the time. This indicates that you are using too much power and not driving efficiently! The slower you can make this red light blink, the more miles you will get per charge.

VI. MAINTENANCE SCHEDULE*

The purpose of maintenance is to ensure that your vehicle is safe to drive at all times and to maximize the life of all parts of your car. It is possible that you may use your car more or in worse conditions than are anticipated by this maintenance schedule, but it should be adequate for normal commuting and around town driving. The schedule is specifically designed for cars that

- carry passengers and cargo within the recommended limits. The limits can be found on the edge of the drivers door. (A rule of thumb for the **Force** is 4 people or 150 lbs in the place of each person.)[1]

- are driven on reasonable road surfaces within the legal driving limits.[2]

- are not routinely discharged to over 50% of battery capacity.

Based on this, there is one recommended maintenance schedule for your **Force** automobile.

A. Chassis Lubrication: Every 6,000 miles or 6 months.
B. Tire and Wheel Inspection and Rotation: Every 6000 miles.[3]
C. Brake Fluid Inspection: Every 15,000 miles or 15 months.[4]
D. Drive Belt/Drive System Inspection: Every 12,000 miles or 12 months.
E. Transmission Fluid Inspection/Change: Every 15,000 miles.
F. Battery Inspection: Every 5,000 miles or 6 months.

Explanation of Scheduled Maintenance:

A. Chassis Lubrication - Lubricate transaxle shift linkage (manual model only), parking brake cable guides, underbody contact points and linkage.[5]

B. Tire and Wheel Rotation and Inspection - For long wear and maximum tire life, rotate your tires following the instructions in the 1991 GEO Metro Owner's Manual. Check the tires for uneven wear or damage. If you see irregular or premature wear, check the wheel alignment. Check for damaged wheels as well. While tires and wheels are removed for inspection, perform brake system inspection (L.).[6]

C. Brake Fluid Inspection - Check the brake fluid level. Note: a low brake fluid level can indicate worn disc brake pads which may need servicing.[7]

D. Drive Belt/Drive System Inspection - On all Models: inspect the drive belt for tension and wear. Adjust/Replace if necessary (if there is any question,

Solectria recommends replacing the belt). Check all components for wear. (Call Solectria for replacement parts information).

E. Transmission Fluid Change/Inspection - Inspect transmission case for leaks and wear. Drain, inspect and change transmission fluid. Inspect transmission gears for wear. Test for proper operation.[8]

F. Battery Inspection - Inspect batteries for leaks, damage, good connections, cleanliness, and water level. Refill/replace as necessary.

Owner Inspections to be conducted every 1 or 2 weeks of car operation:

G. Windshield washer fluid level - check windshield washer fluid level in the windshield washer tank and add fluid if necessary.[9]

H. Check tires for inflation - check tires for proper pressure; if they appear low, inflate to levels specified on Tire-Loading Information sticker on edge of driver's door.[10]

I. Inspect/Clean Solar Panel (only for cars with this Option) - clean panels with mild, non abrasive soap and water only and a soft cotton cloth. Never wipe panels with a dry cloth unless they are already wet. Never use other solvents as these may damage the panels.

Owner Inspections to be conducted at least twice a year during car operation.

J. Steering, Suspension, and Front-Wheel-Drive Axle Boot and Seal Inspection - Inspect the front and rear suspension and steering system for damaged, loose or missing parts, signs of wear, or lack of lubrication. Check for seal leakage. Clean and then inspect the drive axle boot seals for damage, tears or leakage. Replace seals if necessary. Check final drive axle output shaft seals for leaking.[11]

K. Motor Drive Belt Inspection - Inspect Belt for cracks fraying or wear. Adjust or replace them as necessary.

L. Brake System Inspection - It is easiest to do this when the wheels are removed for rotation (B.). Inspect lines and hoses for proper hook-up, binding, leaks, cracks, chafing, etc. Inspect disc brake pads for wear and rotors for surface condition. Also inspect drum brake linings for wear and cracks. Inspect other brake parts, including drums, wheel cylinders, parking brake, etc. Check parking brake adjustment. You may need to inspect your brakes more often if your driving habits or conditions result in frequent braking. (If you are careful and use your regenerative brakes whenever braking is required, it will result in

less wear on your conventional brakes and less maintenance expense.) Check the brake fluid level. See the GEO owner's manual pp. 186-7. **Note:** A low fluid level can indicate worn disc brake pads which may need to be serviced. Also, if a brake warning light comes on or flashes at any time or, if your vehicle is equipped with antilock brakes and the warning light comes on or remains on, something may be wrong with the brake system. Have it inspected and repaired at once.[12]

M. Fluid Level Check - Check the automatic or manual transmission fluid levels and add as needed. See the **Force** Owner's manual, SECTION II and III.[13]
- Check the heater system fluid level and add as needed, and check the system for leaks.

N. Hood Latch Operation - Pull the hood release inside the car. The secondary latch should keep the hood from opening all the way. Make sure that the hood closes firmly.[14]

Owners Inspections to be conducted at least every year:

O. Key Lock - Lubricate the key lock cylinder with the lubricant specified in the List of Lubricants at the end of this section.[15]

P. Steering Column Lock - While parked, and with the parking brake set, try to turn the key to Lock and ensure that the steering wheel is locked. Turn the key to on and ensure that the steering wheel has full play.[16]

Q. Parking Brake Mechanism - **Caution - the vehicle could move during this check - make sure there is sufficient room in front of the vehicle so that, should it roll you could stop it with the foot brake without injury to people or damage to property.** - park on a fairly steep hill, with the vehicle facing down hill. Keeping your foot on the regular brake, set the parking brake. Place the toggle switch in Neutral so that the motor is not applying any braking or motive force to the vehicle. Place your manual transmission in Neutral. Slowly remove foot pressure from the regular brake pedal. Do this until the vehicle is held by the parking brake only.[17]

R. Underbody Flushing - At least once every spring, use plain water to flush any corrosive materials from the underbody. Take care to clean thoroughly any areas where mud and other debris can collect being careful not to spray water into the battery box or onto electrical connections.[18] **Caution - although the possibility is slight, there is a chance that spraying large volumes of pressurized water into your car could cause short circuits resulting in damage to the auto and/or injury to yourself, so be careful.**

List of Lubricants[19]:

Hydraulic Brake System - Delco Supreme 11 Brake Fluid (GM Part No. 1052535) or DOT 3 Brake Fluid or equivalent.

Parking Brake Cables, Guides - Chassis lubricant meeting requirements of GM-6031M (GM Part No. 1052497) or equivalent.

Automatic Transmission - SAE 75W-90 Gear Lubricant

Manual Transaxle - SAE 75W GL-5 Gear Lubricant.

Manual Transaxle Shift Linkage - Chassis lubricant meeting requirements of GM-6031M (GM Part No. 1052497) or equivalent.

Key Lock Cylinders - Lubricate with Multi Purpose Lubricant (GM Part No. 12345120) or synthetic SAE 5W-30 engine oil.

Chassis Lubrication and Wheel Bearings - Chassis lubricant meeting requirements of GM-6031M (GM Part No. 1052497) or equivalent.

Windshield Washer Solvent - GM Optikleen™ Washer Solvent (GM Part No. 1051515) or equivalent.

Body Door Hinge Pins, Folding Seat, Electrical 110 VAC plug protection door hinge (gas door), Rear Compartment Lid Hinges - Engine oil.

Weatherstrips - Silicon Grease (GM Part No. 1052497) or equivalent.

Battery - Pure Distilled Water only.

Maintenance Locations: Maintenance of your car body, standard transmission, disc and drum brakes, wheels, tires, etc. can be performed at any service station or GEO Dealer. Electronic and Electric drive system maintenance must be performed by Solectria or a Solectria approved repair facility. Presently, the Solectria's main facility is located at 119 River ST, Waltham, MA 02154, 617-894-6670, fax: 617-894-9522.

*Reference: Geo 1991 Metro Maintenance Schedule.

[1]Geo 1991 Metro Maintenance Schedule, p. 2.
[2]Ibid., p. 2.
[3]Ibid., p. 4.
[5]Ibid., p. 8.
[6]Ibid., p. 8.
[7]Ibid., p. 10.
[8]Ibid., p. 9.
[9]Ibid., p. 11.
[10]Ibid., p. 11.
[11]Ibid., p. 12.
[12]Ibid., p. 13.
[13]Ibid., p. 13.
[14]Ibid., p. 13.
[15]Ibid., p. 14.
[16]Ibid., p. 15.
[17]Ibid., p. 15.
[18]Ibid., p. 15.
[19]Ibid., pp. 16-18.

VII. WARRANTY/REPAIR*

Solectria's Customer Satisfaction Policy: Solectria has had and intends to maintain a very high customer satisfaction record. We want you to be completely satisfied with your new **Force** automobile.

It is very important that you fully understand how to operate your car and so we highly recommend reading the entire owner's manual.[1]

When maintenance is performed, you should record it and keep all the records in one place. Keeping receipts is also highly recommended.[2]

If you ever have any questions about your warranty or repair information in general, please feel free to contact the management at Solectria Corporation for assistance.

Warranty Coverage:

Under no circumstances does this warranty cover routine maintenance or damage caused by misuse, accident, alteration, lack of maintenance, or use of incorrect lubricants.[3] Additionally, coverages do not apply if the odometer has been disconnected or the mileage reading has been altered.[4] Finally, any electronic component that is opened or tampered with will void the warranty on that component and may void the entire warranty (electronic components are the following: Motor Controller(s), DC-DC Converter, Maximum Power Tracker (if installed), Battery Charger, Amp-Hour Counter, Motor(s)).

Drive System: Warranty Coverage on the Drive System is Complete for the first 12 months or 12,000 miles whichever comes first. Any malfunction or repair work needed will be covered by Solectria provided it is done by Solectria or an approved repair facility.

Please ask us for information on our extended warranty program.

Repair Locations: Repair of your car body, standard transmission, disc and drum brakes, wheels, tires, etc. can be performed at any service station or GEO Dealer. Electronic and Electric drive system repairs must be performed by Solectria or a Solectria approved repair facility. Presently, the Solectria's main facility is located at 119 River ST, Waltham, MA 02154, 617-894-6670, fax: 617-894-9522.

*Reference: Geo 1991 Passenger Car Warranty and Owner Assistance Information, Chevrolet Motor Division, General Motors Corporation, 1990.

[1]Geo 1991 Passenger Car Warranty and Owner Assistance Information, p. 3.

[2]Ibid., p. 3.

[3]Ibid., pp. 8-9.

[4]Ibid., p. 8.

VIII. TROUBLESHOOTING GUIDE

The purpose of this section is to give you, the owner, some guidance on what to do if you suspect or know that something is wrong and need to figure out what it is. You are strongly cautioned not to open up the motor controller, the DC-DC converter, the Maximum Power Tracker or any other sealed piece of electronic equipment. Doing so could damage the car and cause severe injury to yourself.

Some common problems and how to deal with them.

A. Car will not start:

1. First, check your Battery Level/Amp-Hour meter to make sure you have power (if it reads between 50-60 then you may be low on charge.)

2. Make sure that you have unplugged the car - it will not start if the car is plugged into the wall.

3. Have you tried driving it? Remember, you really don't hear anything when you turn your car on.

4. Check to see that your key is inserted in the ignition switch and is in the "on" position. If you are not sure, turn everything off, wait a few seconds, insert the key turn to "start" and release (it should now be at the "on" position), and wait 1-2 seconds.

5. Is your toggle switch on the dashboard in either the Forward or Reverse positions and not in the Neutral position? Have you released the parking brake?

6. Your car should now drive. If it still doesn't, the problem could be mechanical or electrical. If you can hear your motor running but you don't move anywhere, look under your hood. Check the belts from the motor to the transmission gearbox (both models). If they are intact and you can observe them spinning when the motor spins and you have the automatic model, then there is probably a problem in the gearbox. At this point you will need an experienced mechanic. If you have a manual transmission and your motor spins, but your car doesn't move and the belts are fine, try shifting gears. If this has no effect, check under the hood and make sure that your gear shift linkage is intact and attached. Once you have done this, try again. If that doesn't work, you will probably again need an experienced mechanic, or need to contact a Solectria Repair facility.

If the motor does not spin at all, your problem is electrical. In this case, we recommend contacting a Solectria Repair facility which will check all electrical connections from the battery box to the motor. If you are comfortable working with high voltage systems, you may want to try to find the problem yourself,

however, we do not recommend this since our warranty does not cover electrical systems that have been tampered with or altered, and it is an inherently dangerous procedure.

B. Car will not Charge:

1. If you have plugged your car into the a wall outlet and the green light on your amp-hour counter is not flashing, this indicates that you are not getting any power to your batteries. Unplug your car.

2. Check the outlet to make sure it is getting power. Check your extension cord to make sure it is in good condition.

3. Plug your car in again and you should now observe that the green light is flashing. If the green light is not flashing, watch the numbers on the counter, if they are decreasing, then you are charging and the problem is that the green light is burned out. This will not harm your car but you should get it fixed.

4. If none of this happens, the car must be brought in for service.

C. Jerking Motion when moving the car from a rolling/stopped position (your 4 seat automatic car wants to move in one direction; rolling in the opposite direction presents a mixed signal):

1. Stop the car immediately with the foot brake.

2. Ensure the car is fully stopped.
3. Make sure car is unplugged - it will not drive if it is plugged into the wall.

4. Apply the hand (parking) brake, and release the footbrake, ensuring the car remains fully stopped. If necessary, keep the foot brake depressed as well.

5. Slowly depress the gas pedal until you feel the car straining against the brakes.

6. Release the brakes and ensure the car moves only in the desired direction (as indicated by your forward/reverse toggle switch). If the car starts to roll back, stop and start the procedure over again.

7. DO NOT ATTEMPT TO DRIVE THE CAR IN THE OPPOSITE DIRECTION FROM WHICH IT IS ROLLING EVEN IF IT IS ONLY ROLLING SLOWLY. SUCH ACTIONS MAY CAUSE SEVERE DAMAGE TO YOUR CAR AND IRREPARABLE DAMAGE TO YOUR TRANSMISSION AND MOTOR.

D. Changing Tires/Wheels.

1. If you experience a flat tire, you should stop the car and replace the wheel in question with the spare.

2. The spare wheel is provided with your car and may be carried at your discretion of the battery box in the rear of the car. The jack and lug wrench may stored on the right rear portion of the hatchback section next to the battery box. (Cars with the supercharger option istalled, can carry the jack and lug wrench stored in the passenger compartment.)

3. Use the procedures outlined in the GEO Manual for replacing the wheels.

4. Be careful not to drive for too long on the spare wheel. Replace it with a standard wheel as soon as possible.

E. Batteries are not recharging or are not holding a full charge.

1. This is a sign of battery wear and could be due to damaged batteries or low levels of water. Battery Boxes should be opened, batteries inspected and filled with distilled water, if necessary. If batteries are damaged, they should be replaced. It is recommended that this be done by an experienced auto mechanic and preferably by Solectria or an approved repair facility.

2. Note: rough driving can cause damage to batteries, damage which may not be visible on the outside. Internal damage may cause the batteries to have a shorter life and reduced charging ability.

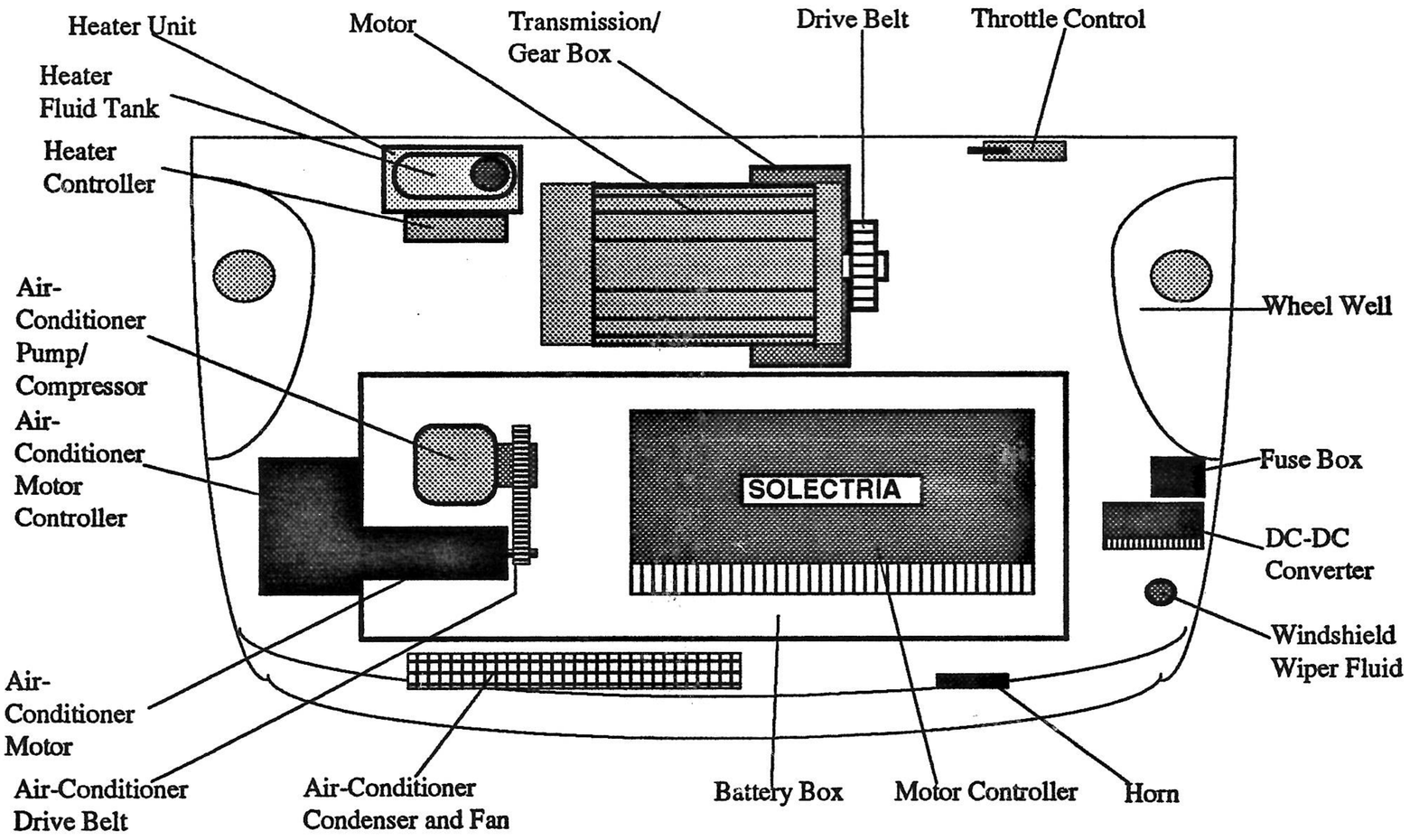

DIAGRAM OF EQUIPMENT UNDER THE HOOD

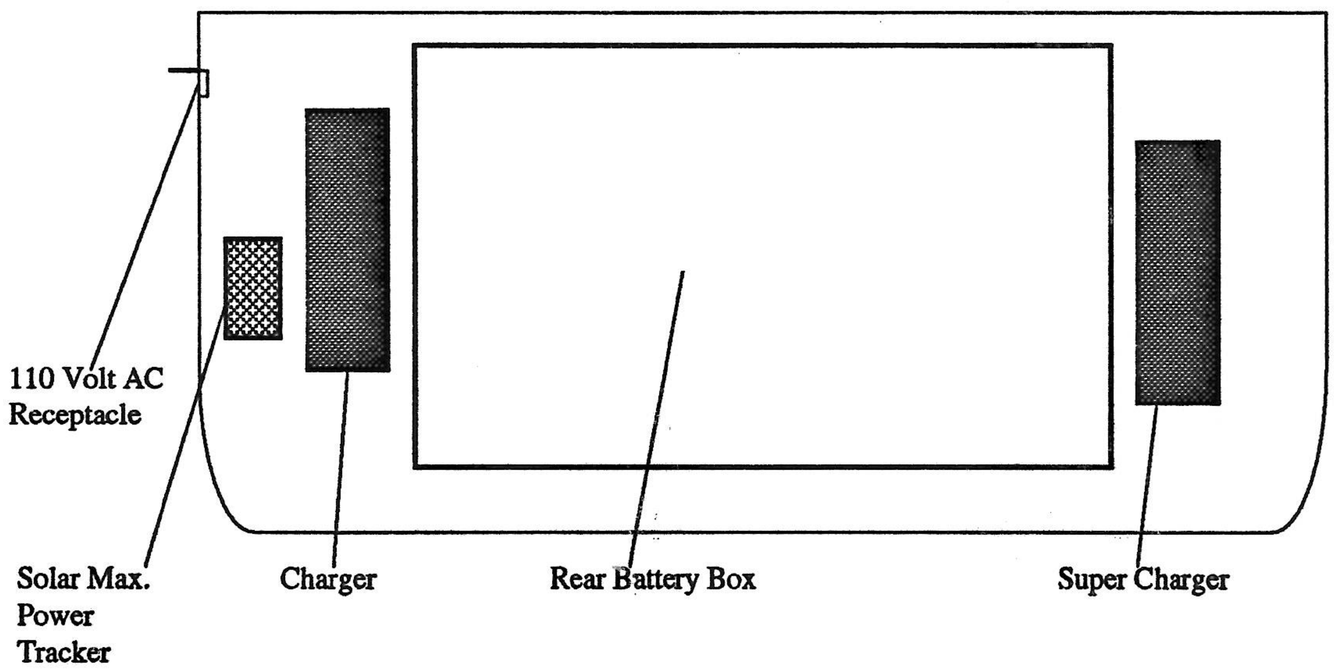

DIAGRAM OF REAR COMPARTMENT