INSTALLATION INSTRUCTIONS

MODEL MHC-1 AND MHC-5

menox
Hand Controls

Accelerator and Brake Hand Control to safely operate your vehicle.

Mechanical, floor mounted control with simple Installation and adjustment.

A brake latch feature and ergonomic design provide comfort and style to match your cars interior.

The multiple function options provide operation of the: Horn, wipers, turn signals, hi-beam and cruise control. All from the control grip. A relay box is available for easier wiring installation.

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1-25-05

Introduction

The Menox MHC-1 and MHC-5 vehicle hand controls are mechanical aids developed specially for handicapped drivers. They enable hand controlled acceleration and breaking. Menox is designed to be floor mounted, therefore, there are no protruding objects under the steering column. It is a safe and tested product. It can be installed into any car according to the driver's individual abilities. Covers are available for the Menox Hand Control in the colors of black, beige and light and dark grey.

Braking
In order to brake using Menox, push the stick forwards.

Acceleration
In order to accelerate using Menox, pull the stick backwards.

Cruise Control
With a light push of a finger you can program your car to run at the desired speed. You are now free from having to control your speed. You will be surprised how the driving experience becomes more relaxed, and also safer, since you can now fully concentrate on driving itself.

Brake Lock
As you stop, the same push of a finger enables the Menox Brake Latch. You are now free to use your hand for switching gears, for example. The brake latch holds the car brake pedal ON. Due to the ingenious technology, these two special features are operable with the same push button.

Horn Operation
With a light push of a finger you can operate the vehicle’s horn.

Multifunction Version
This version allows for operation of the turn signals, hi-beam and wash.

The Menox hand controls are designed to be used in vehicles with automatic transmissions only.

The strength and range of motion of the driver must be considered when installing this device. An evaluation by a qualified driver evaluator (CDRS) is highly recommended, as well as post installation training of the driver on the device.

CAUTION: Before attempting to install this hand control. Read and understand all instructions and warnings. Inspect the vehicle to insure that there is adequate space for the components. Check the package for the complete set of mounting hardware.

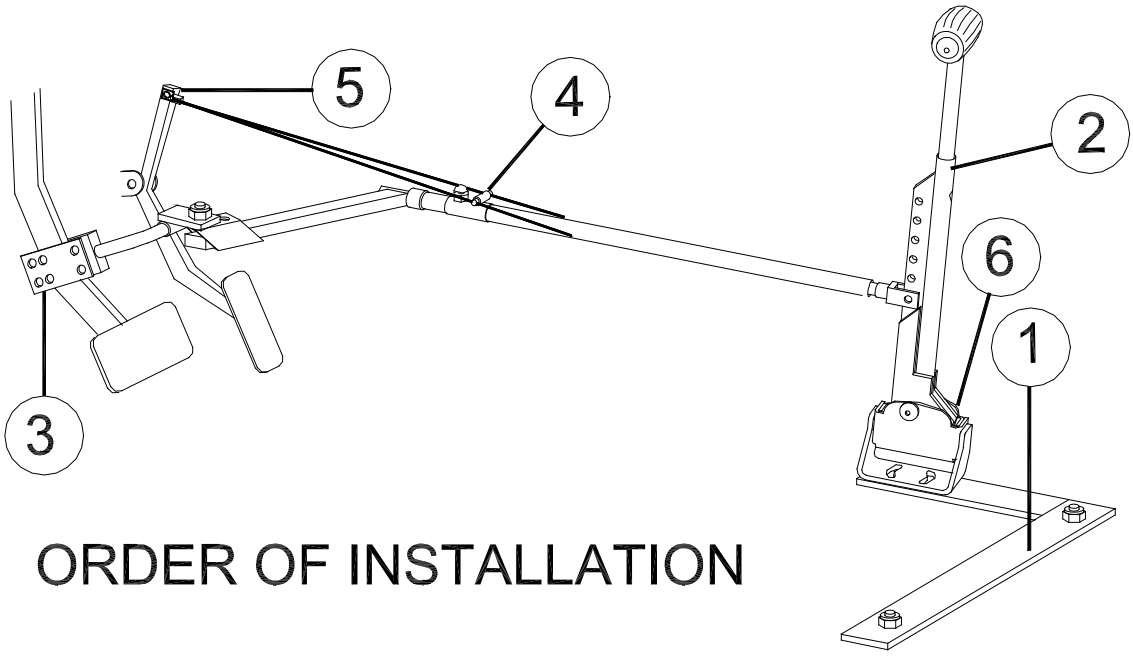
Installation Instructions

Before installation of the Menox hand control the vehicle must be inspected for proper operation of the steering, brake and throttle systems. Check stability of pedal for loose or worn components. Repair of replace as needed. It should be in overall good working condition.

The Menox Hand Control is installed and adjusted to suit each individual driver. Installation does not damage the dashboard or other fixed structures of the body. The car can also be driven using the OEM pedals.

NOTE: This hand control is to be installed for a specific driver. Position the driver in his seat and mark that position carefully. The hand control will be installed relative to that seat position.

When ready to begin installation secure the vehicle and disconnect the ground terminal of the battery. Protect against any hazard from vehicle rolling or electrical accidents.



ORDER OF INSTALLATION

Step 1. Hand Control Lever Placement

Determine the location of the hand control lever and knob. Roughly position the floor mount bracket in a location where the driver can operate the lever and it has adequate travel front and back, steering wheel clearance and driver leg clearance (see figure 1). If the Power Transmission Tube exceeds the 5º maximum, the ball joint should be used. Adjust the height of the hand grip. This can be done by lengthening the upper tube or by raising the base mount or both. This will change the range of motion and the force applied to the pedals.

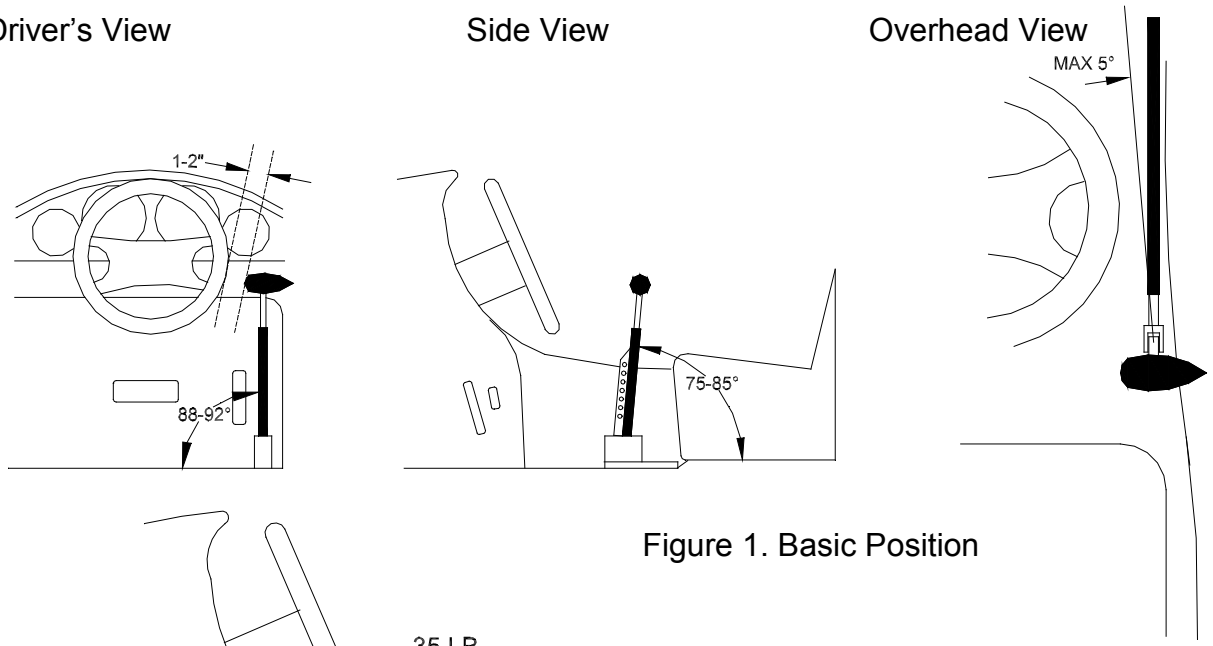


Figure 1. Basic Position

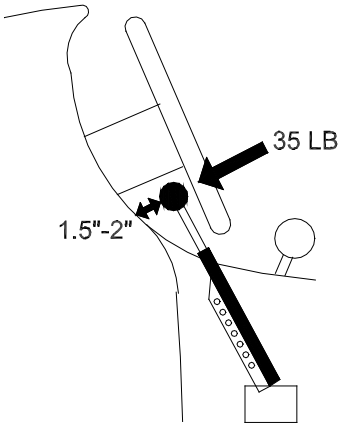


Figure 2. Braking Motion

Attention: The lever requires a <u>minimum</u> of 1.5" – 2" of clearance from any object which would inhibit brake travel (ie. dash board). Use a 35 pound test force to determine adequate clearance. This must be tested while engine is running.

ATTENTION: the carpet and floor padding may require special attention. It is important to position the mounting bracket on a solid

Step 2. Hand Control Lever Base Mounting Methods

The lever base mounting bracket is designed to swivel and pivot to permit a multitude of positions.

Method 1
Mounting through the floor, inspect the area under the vehicle for tubing, hoses and electrical materials. Cut the provided mounting plate to a size that will give maximum load distribution over the floor and provide a matching plate under the floor. This is to minimize the flex in the OEM floor.

Method 2
Mounting to seat bolts. A bracket may be fabricated to use the front bolts of the driver's seat as a securement point for the hand control lever bracket. Two bars are welded to form a "L" shaped bracket or equivalent, with the long leg under the front of the seat and the short leg extending out on the right side far enough for the lever base mounting bracket to be attached. See Figure 3 for several configurations of this mount.

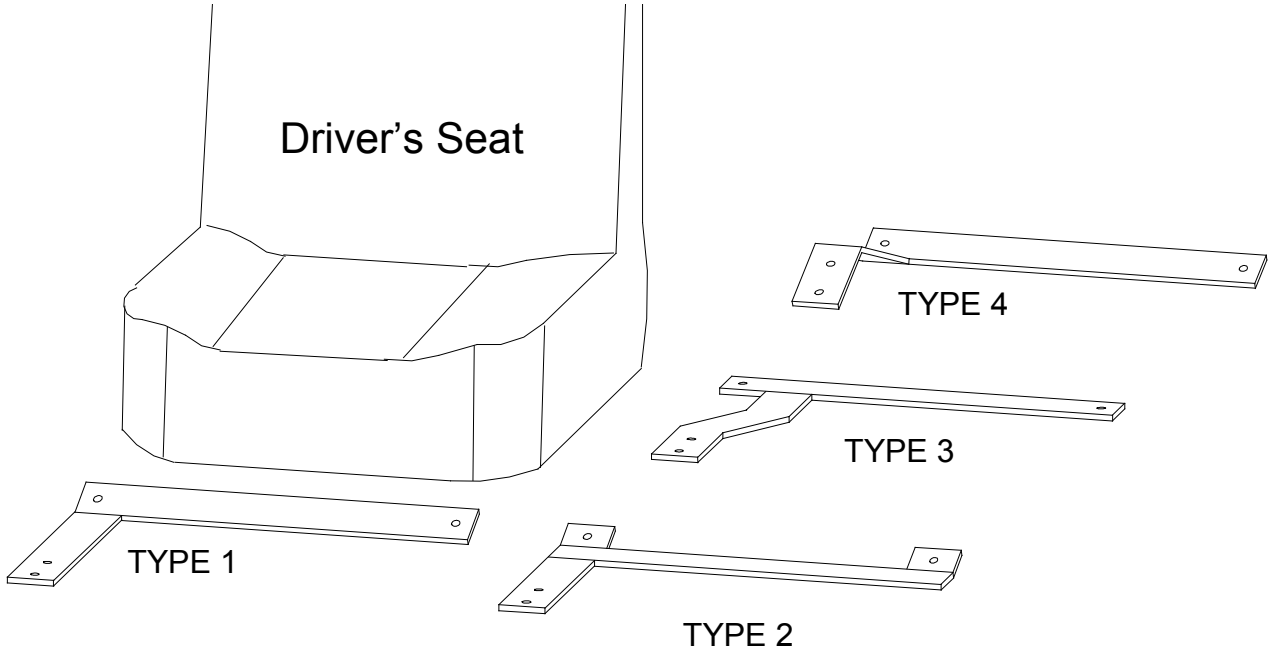


Figure 3. Examples of Seat Mounting Brackets

In some vehicles the mounting bracket will be a hybrid of several types. Consult with dSi if you have any questions.

Step 3. Brake Pedal Attachment

Determine the appropriate attachment bracket orientation for the brake pedal. See the diagram for a method suitable to the type of brake pedal(figure 4). The brake pedal attachment plate can be fixed in many locations. A lower point of attachment would provide less effort and greater travel for the control lever. Explore several to determine the best solution. In all mounting arrangements, the angle bar needs to be secured horizontally with the jam nut and the set screw in the thick block. If the optional clevis is used (see figure 5) it will also need to mounted horizontally.

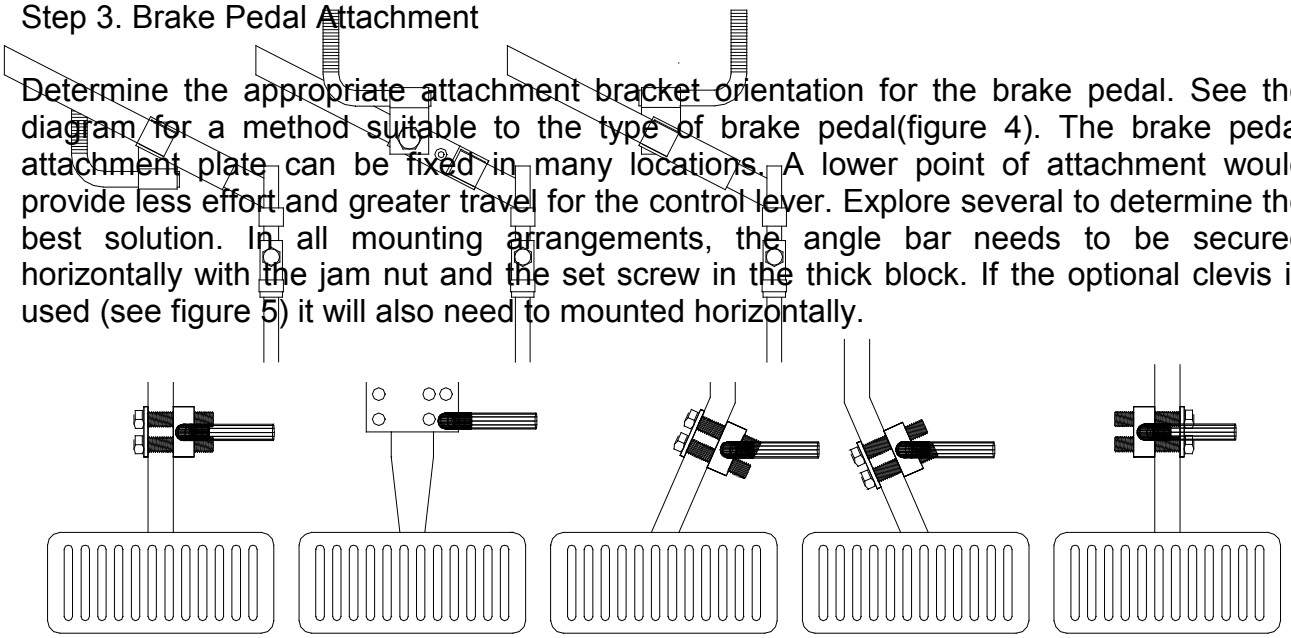


Figure 4. Brake Pedal Mounting Options

Position the slide bracket on the angle bar to provide a horizontal position for the Power Control Link. See possible arrangements in Figures 6 and 7. If the bar material of the brake angle interferes with the action of the control, cut of the excess material. Place the brake joint on the angle bar with washers on each side of the brake joint, then place the retaining clip on the end of the angle bar. With the clevis option, use a bolt with a lock nut(figure 5). Tighten the lock nut between the brake joint and brake sledge so there is smooth motion when rotating the end of the brake angle in a 2” diameter circle (see figure 8).

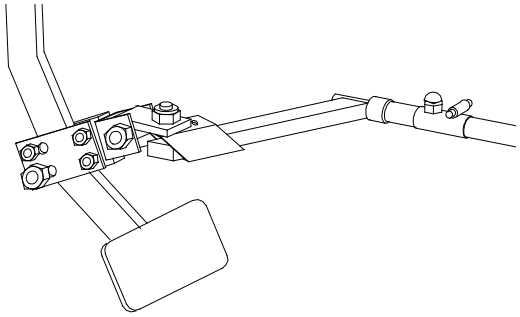


Figure 5. Clevis Mount

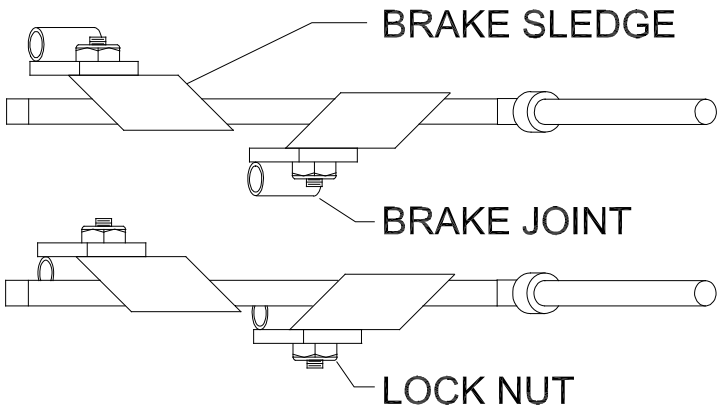


Figure 6. Slide Bracket Orientations

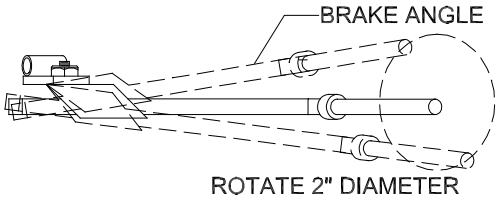


Figure 7. Slide Bracket Orientations(Plan View)

Figure 8. Rotation Test

ATTENTION: Bearing alignment is important. Position and align the mounting bracket and the power control link to eliminate binding.

Step 4. Power Control Link

Install the power control link from the brake pedal bracket to the drive lever. Attach the brake joint on the brake angle bar to the bracket on the brake pedal. See Figure 9. Slide the brake joint on the brake angle bar to align the power control link. This link should be inline between the hand control lever and the attachment point on the gas pedal. This can be fine tuned during final adjustments.

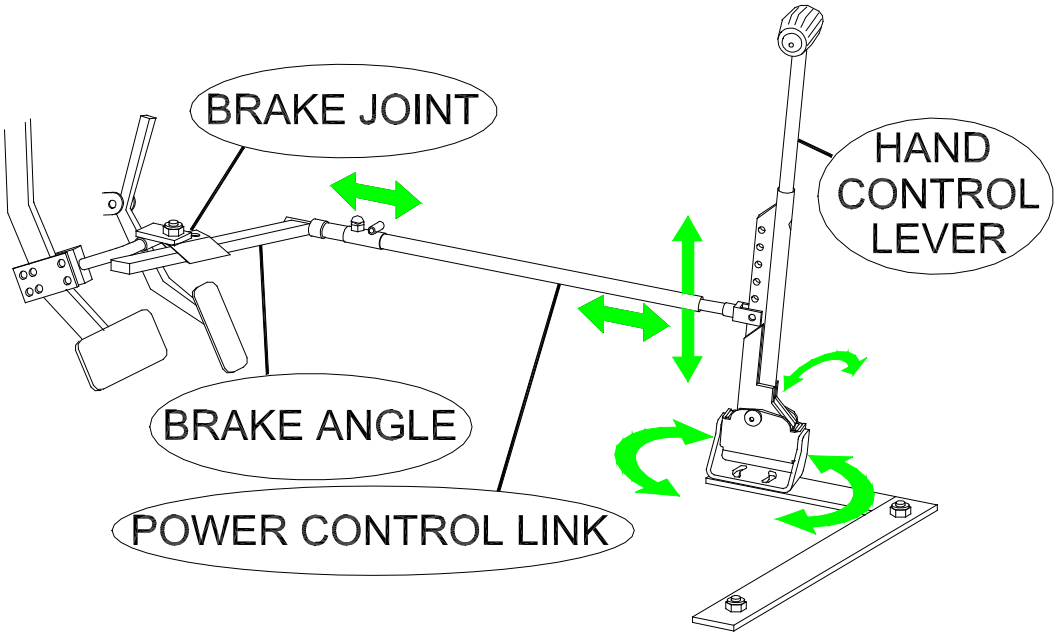


Figure 9. Control Link installation

The Power Control Link may be too long for a particular vehicle. If this is the case, the end of the tube may be cut to the correct length (minimum 11”). See Figure 10. Additional adjustments can be made with the regulator rod on the hand control lever end of the power control link. Attachment of the power control link to the hand control lever is by two

methods. A clevis and pin lock is supplied and a rod end with offset potential is available. See Figure 11.

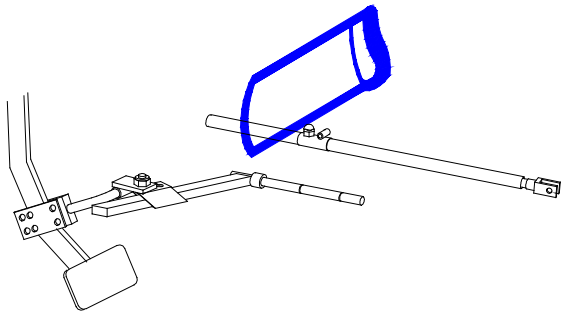


Figure 10. Shortening Power Control Link

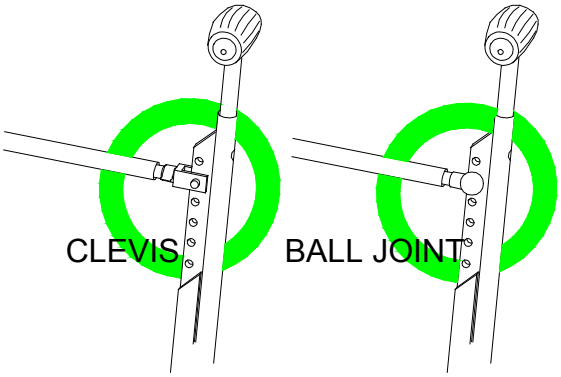


Figure 11. Power Control Link Attachment Methods.

Selection of the hole on the hand control lever is determined by the ability of the driver and their evaluation. The upper holes require more strength and less range of motion. The lower holes require less strength. The position of the brake pedal bracket will also play a factor in this equation. Moving the brake pedal bracket up or down along the pedal will fine tune the adjustment. Also see Appendix A & B for lever load maximums.

Step 5. Throttle Attachment

Attach the throttle rod to the throttle bracket on the gas pedal. Loosen the accelerator pull tube on the power control link and slip off the draw spring. Move the accelerator pull tube so that the throttle rods can be inserted into the slip bar and then tighten near the end of the power control link where the draw spring can apply some tension. The pull tube can be oriented with the slip bar on the top or the bottom of the Power Control Link.

The control is designed to pull from a point above the gas pedal pivot. Determine the type of attachment required for the gas pedal. Two options are available, the dual control rod or the wire rope. See Figure 12. The throttle tube can be adjusted to increase the spring tension to aid in the return of the throttle. For the Wire Rope, a terminal is provided for crimping the wire rope at the desired length. Note: this should be done as a final process after all adjustments, to avoid making it the wrong length.

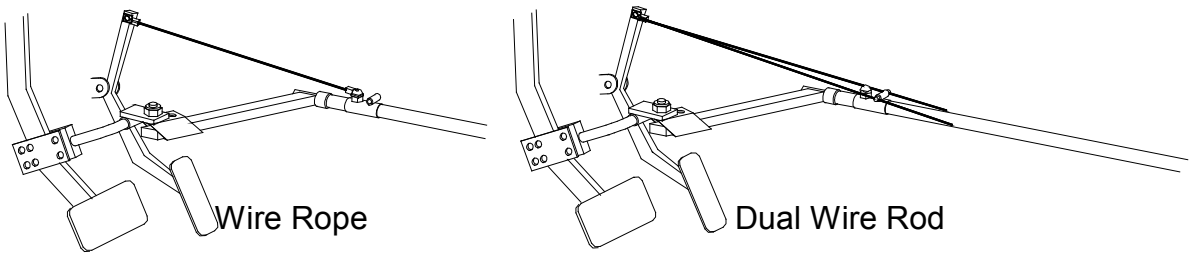


Figure 12. Throttle Attachment Methods.

The dual wire rod is provided with screw locks for adjusting the position. Both screws on each screw lock shall be made tight. If there is no point of attachment above the pivot point of the gas pedal, a plate is provided for this purpose**. Special pedal brackets may be available for specific vehicles.** The plate or bracket may be bent and mounted to the gas pedal to provide a leverage point approximately 3-4” above the pedal pivot point. See figure 13.

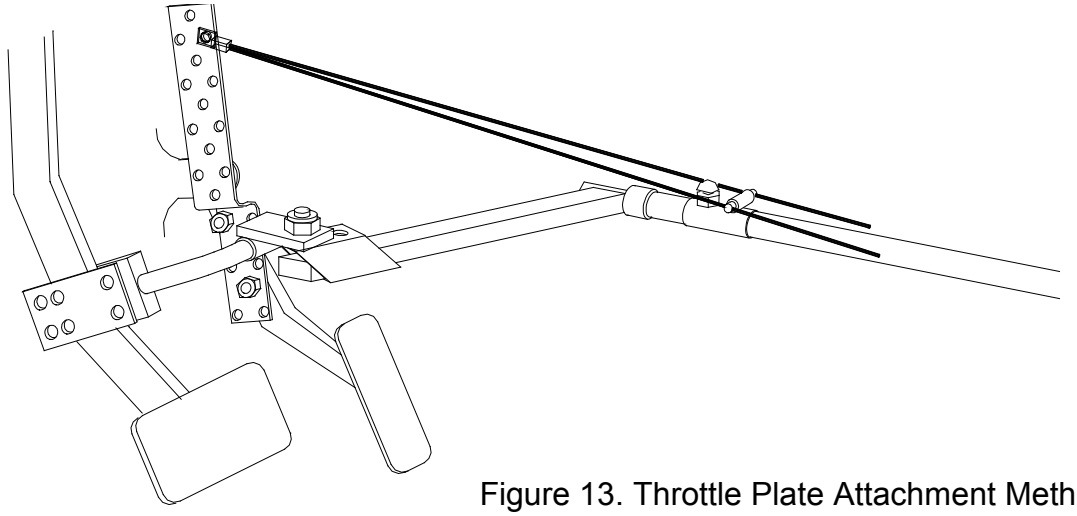


Figure 13. Throttle Plate Attachment Methods.

Left Hand Applications And Throttle Pedals With No Upper Access

When it is not possible to pull on the brake pedal from above, an optional (MHC-8) Left Hand Cable Adapter is available (see Figure 14, lower attachment). The wire cable is connected to the end of the brake angle rod and the wire rope is attached to the large pan head bolt on the accelerator pulling tube. The other end is routed to a position on the throttle pedal based on the range of motion desired. The closer to the end of the pedal, the longer the travel. This wire rope assembly is also used for left hand control applications, with the power control link to the left of the brake pedal. See upper attachment.

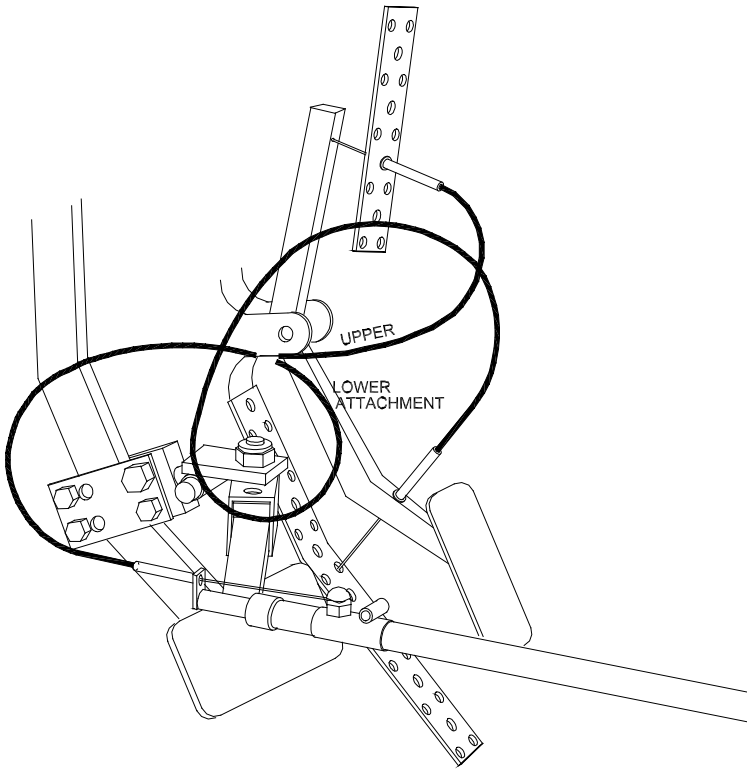


Figure 14. Optional Throttle Cable Assembly
And Left Hand Installation

Step 6. Brake Latch Wiring and Optional Function

USE CUATION WHEN WORKING WITH WIRING CIRCUITS. DSI IS NOT RESPONSIBLE FOR ANY DAMAGE INCURRED DURING INSTALLATION OF THE MENOX HAND CONTROL

Attach the Brake Latch cable wires to the brake lamp switch (White wire)(lamp side) and to ground (black wire). Secure wires along carpet and interior paneling. See Figure 15. Use the yellow and green wires to splice to the cruise control wires. See figure 16 for wiring diagram.

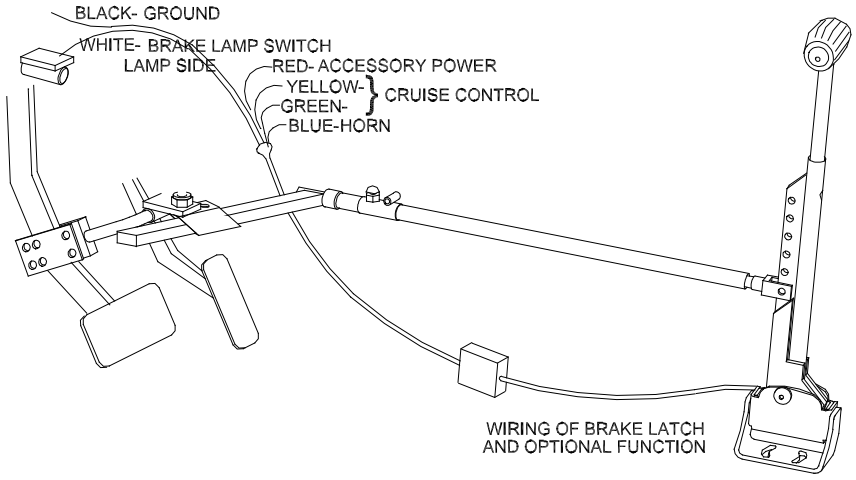


Figure 15. Wiring Connection for Grip Switch / Brake Latch.

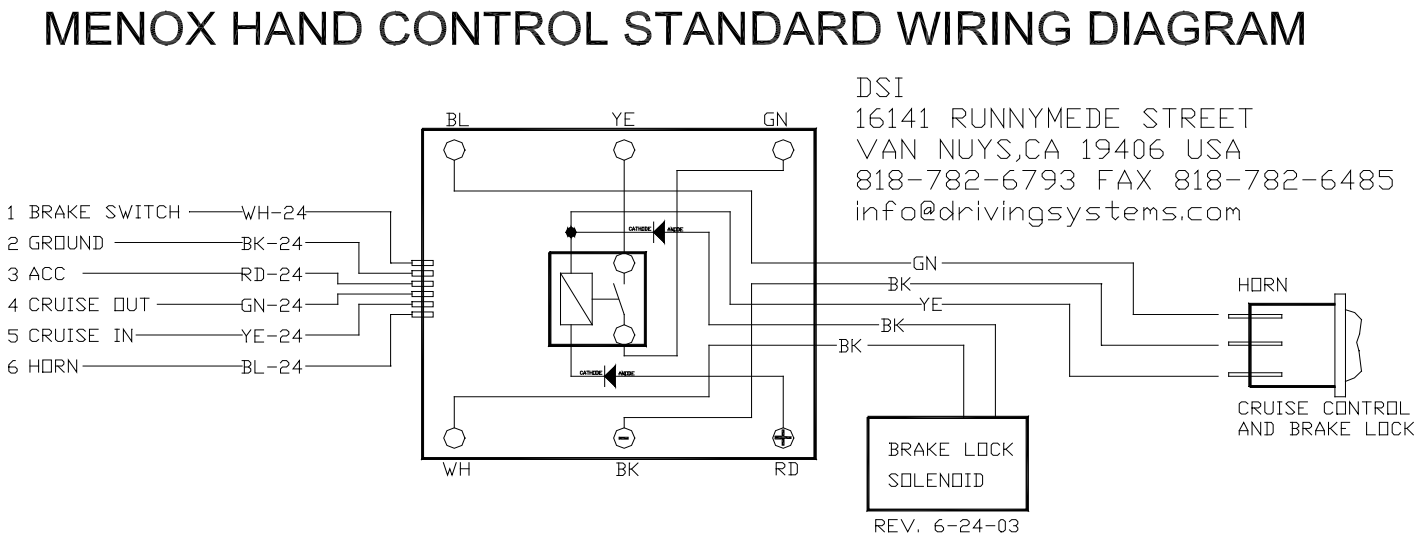


Figure 16. Wiring Diagram - Standard

Step 7. Final Adjustment and Test Drive

Final adjustment and test drive. Review all linkages and adjust to eliminate any bind (See Figure 17 and Table 1). Confirm travel of the drive lever in both the direction of brake and throttle is correct for the driver and the effort level is in the strength range desired. Perform service overload test to determine device is with load tolerance. See Appendix B & C.

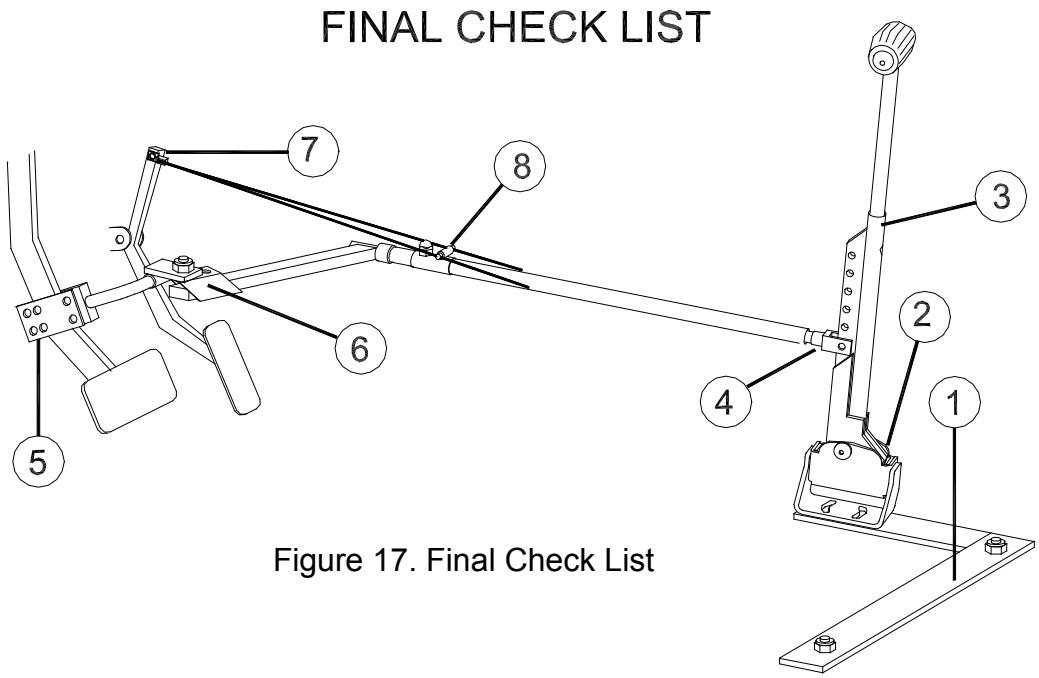


Figure 17. Final Check List

Step 8. Cover Installation

Disconnect the Power Control Link at the Clevis. The standard cover consists of a “sock” to be placed over the knob and pulled down over the pivoting base, see figure 17 Part “C”.

The optional leather-like covers are in four colors to match the car interior. They are to be install in order A through D, see figure 19.

Part A should be cut to fit the shaft below the grip and fastened at the top with a wire tie. Part B goes around the lever and is secured with three wire ties at the corners, see figure 18. Part C is pulled over the grip and down around the pivot base(like the sock) and is secured with a velcro sticker, See figure 20.

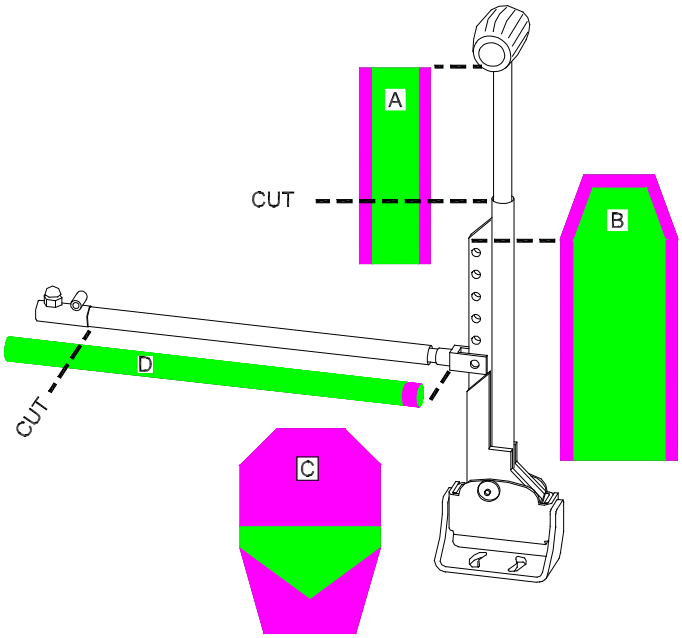


Figure 18. Hand Control Covers

Install Part D onto Power Control Link after cutting it to length. Re-attach clevis to the same hole inside the cover. If the ball joint is used, make a hole in the cover to attach the ball joint outside of the cover.

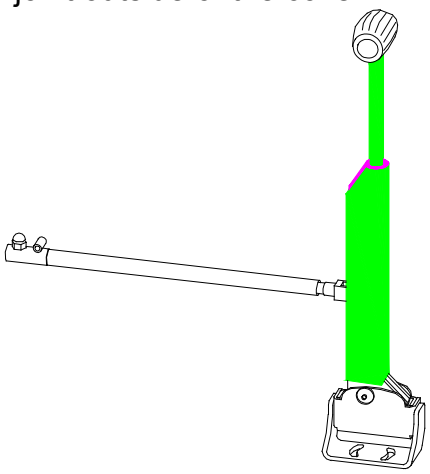


Figure 19. Covers on Lever

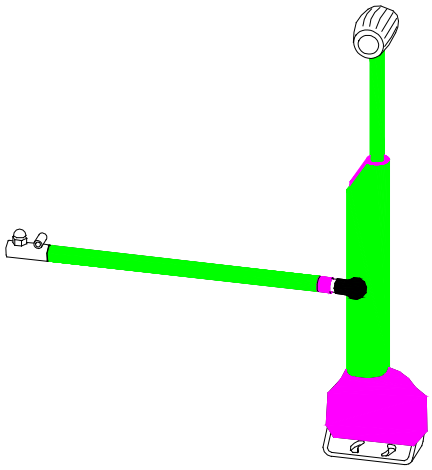


Figure 20. Covers on Pivot Base and Link

TABLE 1. Final Check List for Menox Hand Control

Menox Hand Control Model: _____

Vehicle Make & Model & Year: _____

Owner's Name: _____

REF. #	DESCRIPTION	PROCESS	DONE
1	Mounting Plate	Check Fasteners	
2	Lever bracket to mounting plate	Check Fasteners	
2	Orientation of lever to Power Control Link	Adjust and tighten	
3	Grip tube	Check Fasteners	
4	Power Control Link attachment	Check Fasteners	
4	Regulator Rod	Check Fasteners	
5	Brake Pedal Bracket	Check Fasteners	
5	Threaded Bar	Check Fastener	
6	Ball Joint and Slide Orientation	Check alignment and operation, remove any binding	
6	Ball Joint and Slide	Check Fasteners	
7	Throttle attachment	Check Fasteners	
8	Throttle Pulling Tube and Throttle rod or wire rope	Check Fasteners	
Misc.	Brake Latch Wiring. Check operation of latch when brakes are ON and running of wire harness.	Operate the latch and verify brakes are held ON. Check for proper release of latch. Secure wire harness.	
Misc.	Throttle return	Observe return of throttle to neutral, adjust Draw Spring as needed (this may require re-adjusting throttle rods or wire rope).	
Misc.	Eliminate overlay between brake and throttle	Adjust and re-tighten	
Misc.	Hand control clearance	Check for obstructions to grip travel, test 35 pound brake force.	

Inspection Preformed by:

_____

Date:

_____

Optional Multifunction Switches

The phone cables leading from the control lever can be run under the dash to the relay box. The harness from the relay box is attached to the circuits of the vehicle as described in the diagram below (see Figure 16 and 17). Note: see vehicle specific wiring diagram for exact connections.

14 Wire Harness

Color	Function	Connection	Special Instructions
BK-18	Horn	Splice to horn relay wire	
YE-18	Acc. Power	Splice to HOT IN RUN	
GN-18	Left Front Turn Signal	Splice to lamp wire	
GY-18	Left Rear TS Input	Connect to switch side	Cut wire
OR-18	Left Rear TS Output	Connect to lamp side	
WH-18	Right Front Turn Signal	Splice to lamp wire	
BN-18	Right Front TS Input	Connect to switch side	Cut wire
VT-18	Right Front TS Output	Connect to lamp side	
BL-18	Flasher Current	Splice to flasher wire	

Light Gauge Wires

RD-22	Brake Switch	Splice to wire to lamp
GY-22	Washer Output	Splice to lamp wire
GN-22	Washer Input	Splice to lamp wire
OR-22	Cruise Output	Splice to lamp wire
YE-22	Cruise Input	Splice to lamp wire

Multi-Function

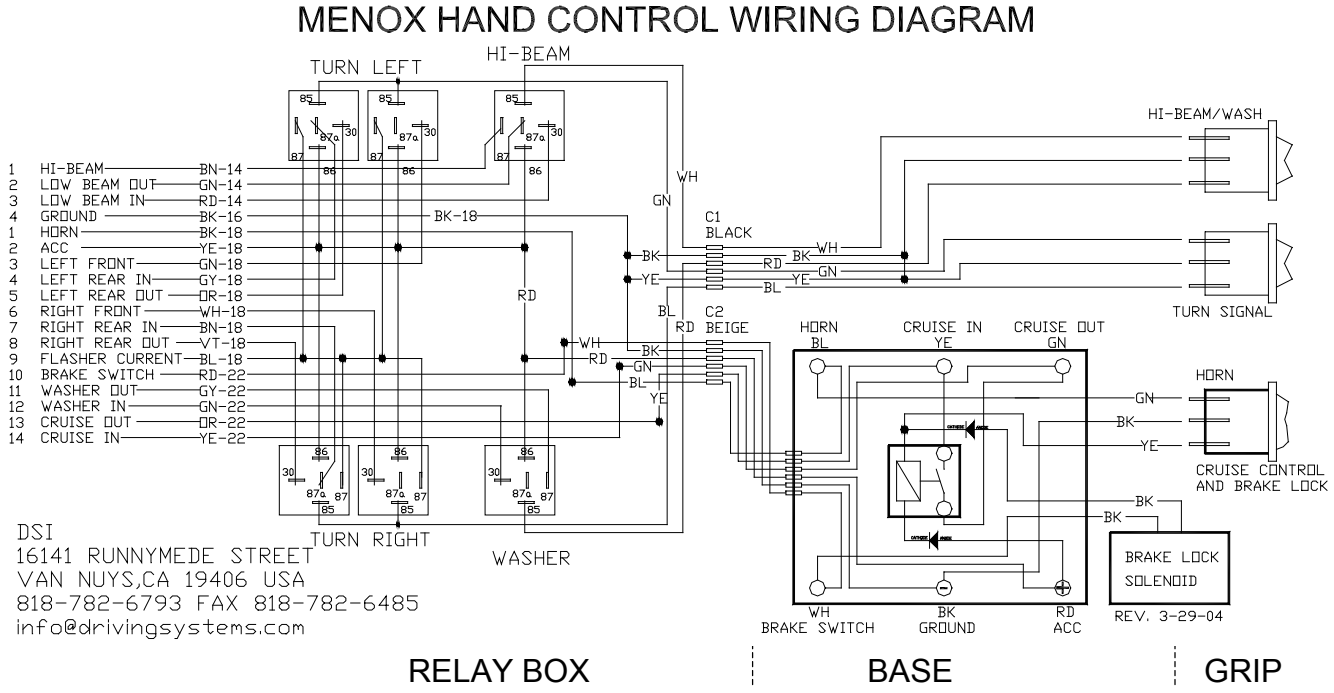


Figure 21. Relay Box

4 Wire (Heavy Gauge) Harness

Color	Function	Connection	Special Instructions
BN-16	Hi-beam	Hi-beam wire	
GN-16	Low Beam Output	Low beam wire lamp side	cut wire
RD-16	Low Beam Input	Low beam wire switch side	
BK-16	Ground	Body Ground	

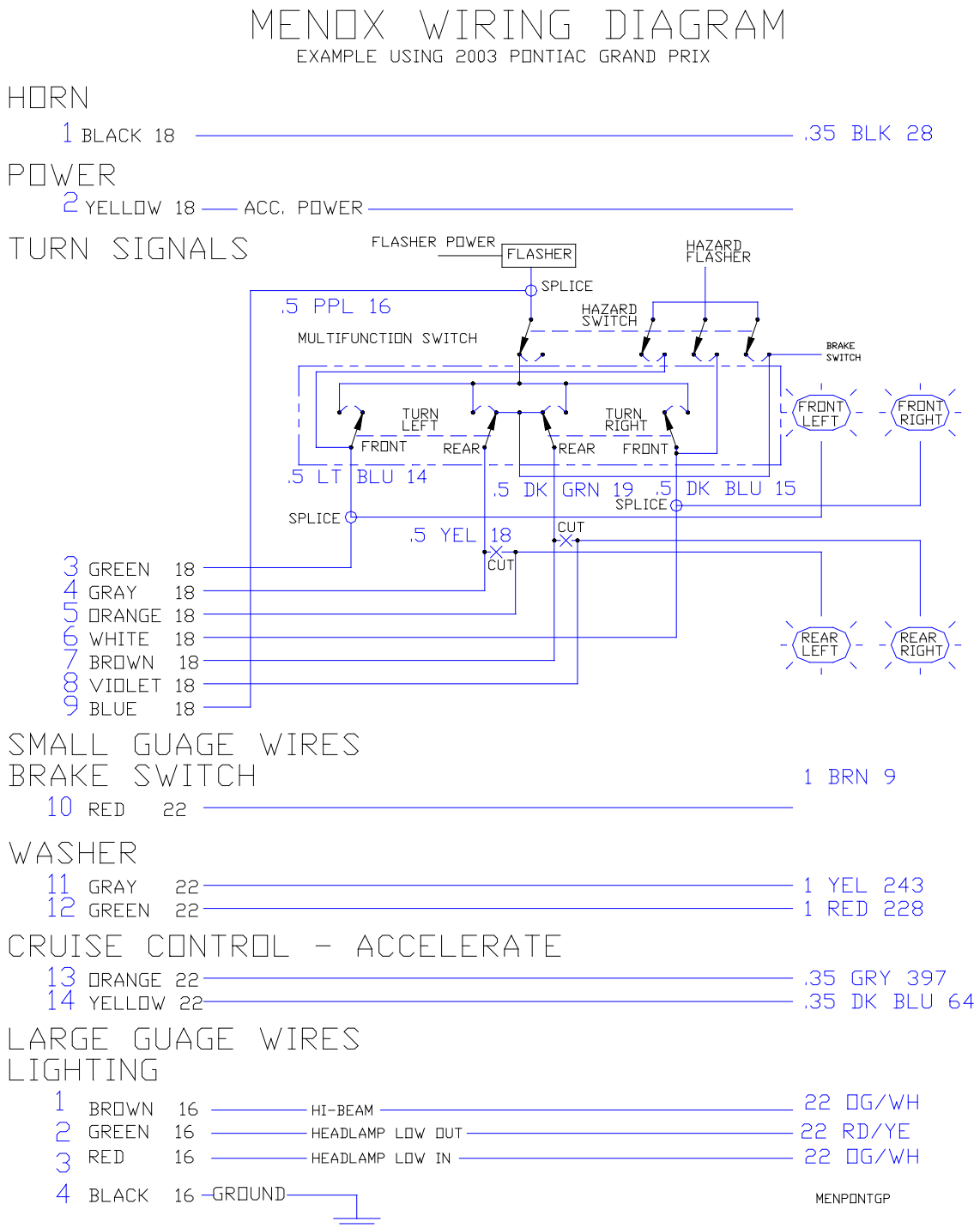


Figure 22. Example Of Vehicle Specific Wiring Diagram

Appendix A

MAXIMUM OPERATING FORCE for Menox Hand Control

Table 1. shows maximum allowed operating force in different installations. Values are in pounds of force. The left hand side of the table should be followed when the installation to the brake pedal is at the end of the slide bar (Figure 1.) and the right hand side of the table should be followed when the installation to the brake pedal is at the beginning of the slide bar (Figure 2.)

Maximum operating force depends on the two factors. The height of the grip (positions A-F) and the attachment chosen for the Power Control Link (positions 1-6). See figure 3.

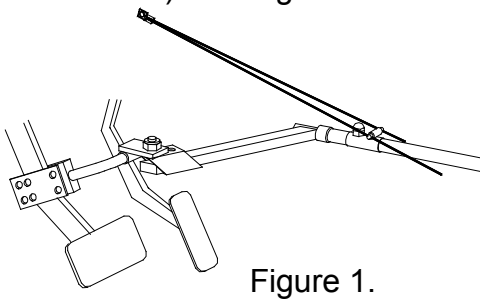


Figure 1.

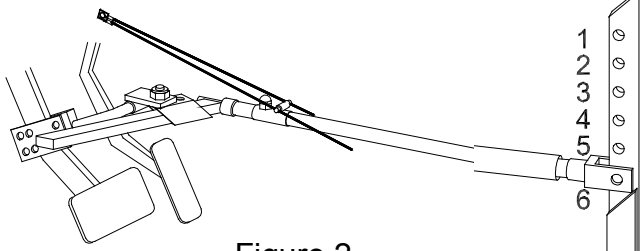


Figure 2.

Figure 3.

NOTE: Operating forces have been calculated for extreme installation (figure 1 & 2). When installed in an intermediate position,

NOTE: Force values on this chart are not directly relate to pressure on brake pedal. Position of clamping bracket is relevant to both force and grip travel range.

	Yield Strength	Rupture Limit	Yield Strength	Rupture Limit
A-1	120	180	215	305
A-2	110	165	190	270
A-3	95	145	170	235
A-4	85	130	140	200
A-5	75	110	120	165
A-6	60	95	95	130
B-1	105	160	175	270
B-2	95	145	160	245
B-3	85	130	150	220
B-4	75	115	135	190
B-5	65	100	120	165
B-6	55	80	105	140
C-1	90	140	125	190
C-2	85	125	125	190
C-3	75	110	125	190
C-4	65	100	120	170
C-5	55	85	105	145
C-6	45	70	90	125
D-1	85	125	95	145
D-2	75	115	95	145
D-3	65	100	95	145
D-4	60	90	95	145
D-5	50	75	95	130
D-6	45	65	80	110
E-1	75	110	75	115
E-2	65	100	75	115
E-3	60	90	75	115
E-4	55	80	75	115
E-5	45	70	75	115
E-6	40	60	70	100
F-1	65	100	65	100
F-2	60	95	65	100
F-3	55	85	65	100
F-4	50	75	65	100
F-5	40	65	65	100
F-6	35	55	65	100

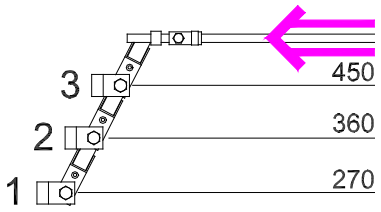
Table 1.

Appendix B

POWER PROPORTIONED TO BRAKE for Menox Hand Control

Table 1. shows power required to deliver a maximum load to the brake pedal in different installations. This maximum load is not be exceeded. This is based on 3 positions of the Brake Sledge on the Angle Bar (see Figure 1). The columns of the table relate to these positions

The height of the grip (positions A-F) and the attachment of the Power Transmission Tube to the Hand Control Lever (positions 1-6) relate to the rows on the table. Shaded boxes indicates a small force applied will exceed the safety factor.



Maximum Power in 3 Positions
Figure 1.

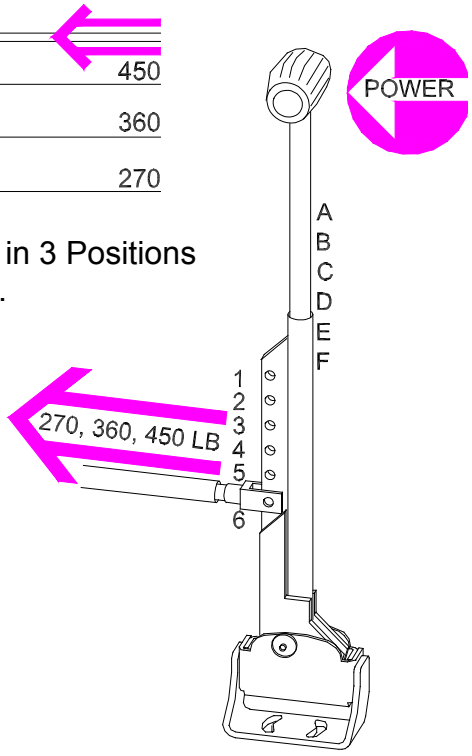


Figure 2.

NOTE: Force values on this chart are not directly relate to pressure on brake pedal. Position of clamping bracket is relevant to both force and grip travel

	270 POUNDS	360 POUNDS	450 POUNDS
A-1	190	250	315
A-2	170	225	285
A-3	150	200	255
A-4	135	175	225
A-5	115	155	190
A-6	95	130	160
B-1	170	230	285
B-2	155	205	260
B-3	135	185	230
B-4	120	160	200
B-5	105	140	175
B-6	85	115	145
C-1	155	205	205
C-2	140	190	205
C-3	125	170	205
C-4	110	150	185
C-5	95	130	160
C-6	80	105	135
D-1	145	160	160
D-2	130	160	160
D-3	115	155	160
D-4	100	135	160
D-5	90	115	145
D-6	75	100	125
E-1	130	130	130
E-2	120	130	130
E-3	110	130	130
E-4	95	125	130
E-5	80	110	130
E-6	70	90	115
F-1	110	110	110
F-2	110	110	110
F-3	100	110	110
F-4	90	110	110
F-5	75	100	110
F-6	65	85	110

Table 1.