

**MARKS CUSTOM KITS**



## INTRODUCTION

Before we get into any technical assembly, circuit description or system explanation, I would like to thank you for purchasing this new digital instrumentation package for your car.

You have chosen a product that has gone under tremendous research and design, to give you, the client and fan of the tv show, the best possible product. The vast amount of research that went into this was to give the most discerning fan the closest replica of one of the most highly recognizable cars in tv history. While it would be impossible to offer every conceivable option that the show purported to have due to show-to-show inconsistencies, production flaws and continuity errors, you have received the best combination of looks, style and functionality. This well designed product will give you years of satisfactory operation.

The installation of this new product will not be difficult if you are both familiar with the dash assembly of your car and you read this manual first to get a better grasp of what's to come. This manual takes you from turning the first screw for dash disassembly, to the final tweaking of your new layout. With 12 years of fabricating the 1 TV dash product-line, and from "ground-up" design of this new product, much attention has been given to both the product design and installation to make it as simple as possible.

You won't need to be an electrical engineer or designer to install this product, just have patience, get a thorough understanding of what your about to do, ask questions, read and re-read this manual, and all should go well. If at any time you have any questions regarding this product and/or its installation, do not hesitate to contact Mark's Custom Kits for any clarification and/or assistance you may need during normal business hours of 7:30am to 4:00p, Monday thru Friday at 321-697-5445. The most important concept to have going in on this project is to TAKE YOUR TIME ! Rushing the installation will only run the risk of installing something wrong and damage any number of electronic circuits. Warranty repair will not cover any damage from mis-installation or wrongful application. So please be careful and take your time installing this high-tech product.

If after reading this manual you feel that its installation is beyond your capabilities, please do not attempt to try and fake it. Extensive damage can occur. Seek assistance. Mark's Custom Kits offers installation for those who don't have the know-how or capacity to do the correct installation. Contact the company should you want to have us install this system for you.

## SYSTEM DESCRIPTION

Before we begin, it must be made clear that you **MUST** have the full analog gauges already installed in your dash. Without these gauges and their sending units, you will not be able to get the proper signals to make your new digital gauges work properly. If you do not have the analog gauges, you will have to obtain, and install, the various sending units such as water temp and oil pressure from an auto parts store and have them installed in your engine block. If you already have the analog gauges, then proceed to next paragraph.

For those of you who have the 1982 to 1992 Trans Ams, your stock gauge set up is basically the same, with only minor differences. The old analog gauges will be removed and the new display boards and main driver board will be attached to the clips and/or contacts on your gauge housing. The method of attachment will be determined by the year of your car. The older cars simply had the gauges pushed into the metal clips that make contact with the Mylar circuit trace on the back of the gauge housing, whereas the newer cars had a slightly different method of attaching the gauges.

The whole idea behind the digital gauges is that they are more accurate and precise than your analog ones. The error factor in the old style gauges is such that when your arrow is halfway on the oil gauge, just how many pounds of pressure is that? Same goes for all of the other gauges. They are not as precise as digital systems can be. And the 1 TV dash layout has numeric readouts for your level gauges to give you a far more accurate idea of your various levels. And while your gas tank is 16 gallons when full, there are only 10 LED's in the fuel circuit, so that all 10 will be on when you have a full tank, 5 on when half tank, etc.

Your speed and tach readouts are the same. By using the values set by the manufacturer, your speed reading will be the more accurate than the old needle gauge. And depending upon which year you have, you may need to have your digital gauges calibrated slightly different. That is done during assembly and should have no effect on your installation. In addition to function circuits, your new 1 TV dash also has randomly sequencing circuits to give visual appeal to the whole layout and make it look like the car is doing diagnostics randomly. If you've ordered the color 5 inch CRT, then you have 1 video outputs for any source of video you can think of; a color camera, a vcr, etc. You also have the voice display which when tied into the front speaker of the car, will react with whatever audio is coming through the system.



## SYSTEM LAYOUT

Your new 1 TV dash system is relatively easy to install, since everything is based already calibrated and all that is needed is for 12 volts and ground to be applied, and the various signals from the gauge housing. A description of the entire system will start from the left hand side of the dash and work towards the right. Please note: During the installation and following descriptions, you may be directed to adjust small blue colored potentiometers. ONLY adjust the ones you are directed to. Any pot that is sealed with red locking material is NOT to be adjusted. It will throw off the calibration and render your gauges non-calibrated.

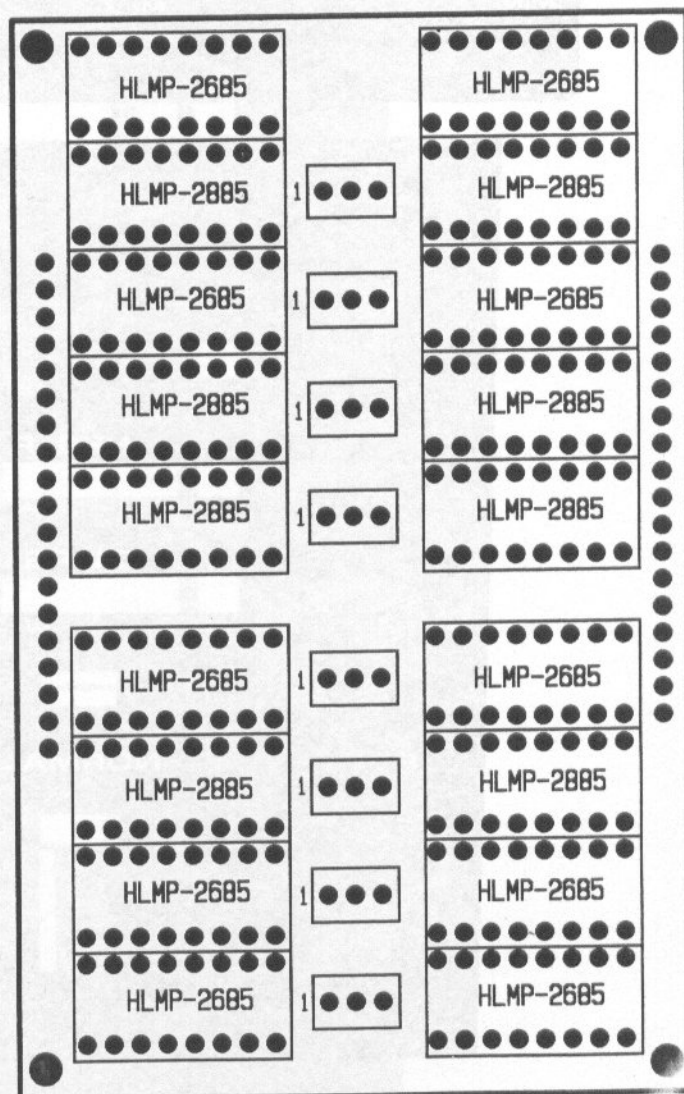
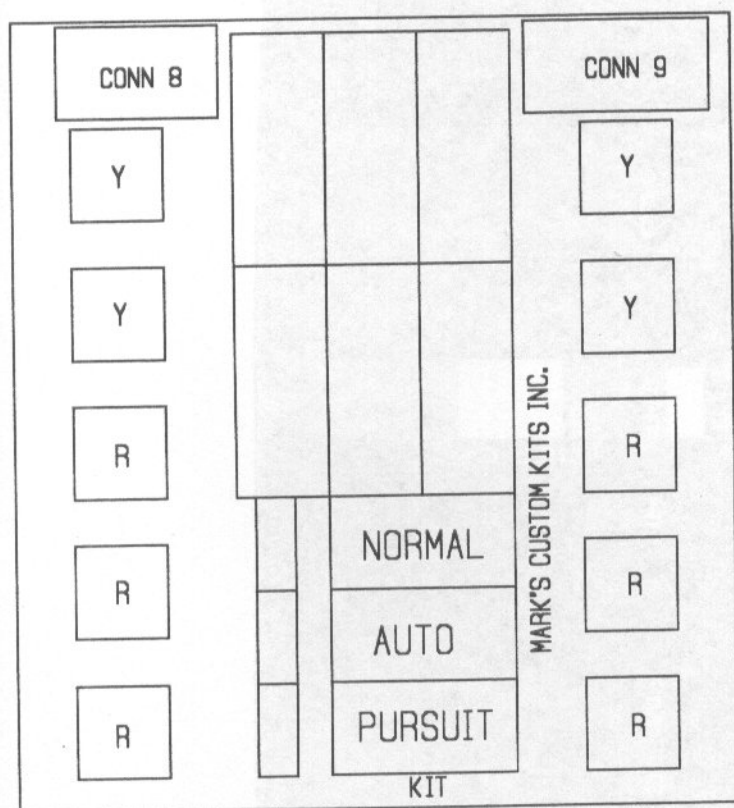
- Digital Compass: ( if ordered ) This display board is plugged into the compass sending unit which is mounted under the dash away from any speakers or other magnetic field. The digital compass is very sensitive and is properly calibrated towards magnetic North. A black mark on the small white sending unit must be aimed towards North in order for the dash to be set properly.
- Odometer Display Board: This board is where your main odometer digits are displayed. It is connected to the main driver board via a ribbon cable to get the information from the odometer circuit.
- Speed Display Board: This board is where your speed is displayed in both numeric and bargraph form. The numeric odometer digits are also located on the speed display board. The speed signal is connected to the speed display board's white wire. 2 ribbon cables to the main driver board connect the odometer circuit to the odometer digit readouts. For both main and trip odometer operation, and care must be observed when hooking up the ribbon cables to ensure proper odometer. See hookup diagram in upcoming sections.
- Voice Display Board: 2 ribbon cables to the Main Driver Board to receive the audio signals connect this display board. You must hook up the front left speaker to the Main Driver Board to get the Voice Display to work. Once power is applied to the circuit, the 4-step sequencer on both the top dash trough and down along side of the bargraphs will light up in sequence. The Voice Display circuit is a "switched" circuit, meaning you must supply power to the circuit as it is not tied in to the main driver board power and will not automatically come on when the dash is turned on. This allows isolated operation of the circuit to be controlled separate from the dash.



- Tach Display Board: This display board shows you your engine RPM in both numeric and bargraph forms. The brown wire coming off the back of the display board is what is connected to your Tach connector in the gauge housing. Your Tach Display board also has a couple of randomly sequencing circuits that are fed signals from the tach board. The speed of scan is adjustable by the user. The small blue adjusting potentiometer on the back of the circuitboard can be adjusted to slow down or speed up the rate of sequencing.
- Telltale Display Board: The telltale board is where your various levels bargraphs are located. You have a bargraph for the voltage level, oil pressure, water temperature and fuel level. These are calibrated for your car and should not need to be adjusted. Also located on the telltale board is the alphanumeric display readout, which has a fixed word, and also has the "Normal", "Power", "Pursuit" and "Cruise" readouts. Under normal driving conditions, both the "Power" and "Normal" LED's will be lit. If the "Pursuit" circuit is used, when 12 volts is applied to the circuit, it will make the LED jump from "Normal" to "Pursuit" as long as the voltage signal is applied. Once removed, the LED will return to "Normal" status. The "Cruise" LED only lights when a 12-volt signal is applied to the "Cruise" pad. Even if you don't have cruise control, you can still use this by putting a momentary switch with 12 volts on one side to the "Cruise" pad, and as long as the button is pushed, the "Auto Cruise" will stay lit.
- COLOR CRT: If you've ordered this, it can be used to display any NTSC video signal from a color camera, VCR, GPS system. It does NOT have any audio capabilities.
- Numeric Display Board: ( if ordered ) your dash comes with the bargraph readouts for your level gauges. But if you want more accuracy, the numeric option will allow you to see exact readings for your various levels such as 12.3 volts, 14 gallons of fuel, 50 pounds of oil pressure or 185 degrees for your water. The numerics are extremely accurate and are calibrated for your cars factory sending units.
- Main Driver Board: This board, which is mounted to the gauge housing, is where the odometer circuit, the voice display and the circuitry for the numeric option, if ordered. The Main Driver is connected to 12 volt and ground clips in the gauge housing. The display boards visible from the front of the dash are connected to this board by ribbon cables.

Care must be taken when plugging in the ribbon cables to prevent any pins from being bent and broken. If that happens, the cable is useless and the circuit function will not operate. Please refer to the board layout diagrams for proper ribbon cable connection direction. If installed into the sockets wrong, then you will damage and/or destroy some components. If you ordered the numeric option, then you will have to plug the various wires into the proper connectors in the gauge housing to give the numeric circuits their signals. See the connector layout diagram for proper location of each circuit's wires.

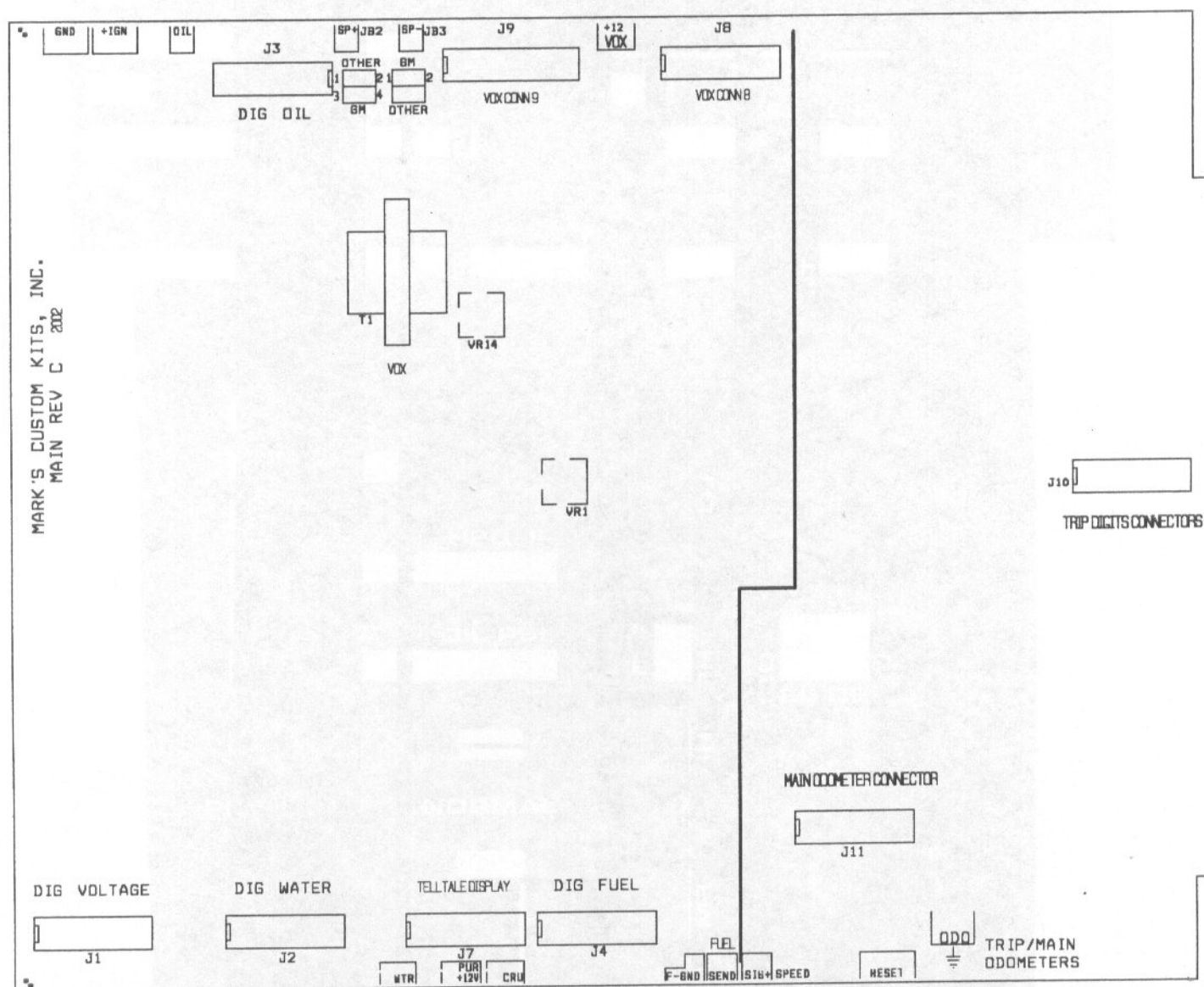
- Switchpods: (If ordered) These are located in the pod ends and all that is need is for 12 volts to be supplied to them, as well as ground. There is no on/off switch, as once power and ground is applied, they will light up and start sequencing.
- Overhead Console: (if ordered customized) This console, which is mounted to the headliner only needs 12 volts and ground for the name board to light up. The colored switches located on the bottom are also tied in to light up when the first red switch is activated. Since there are 18 switches, you have an ample number of switches to use for your own devices.



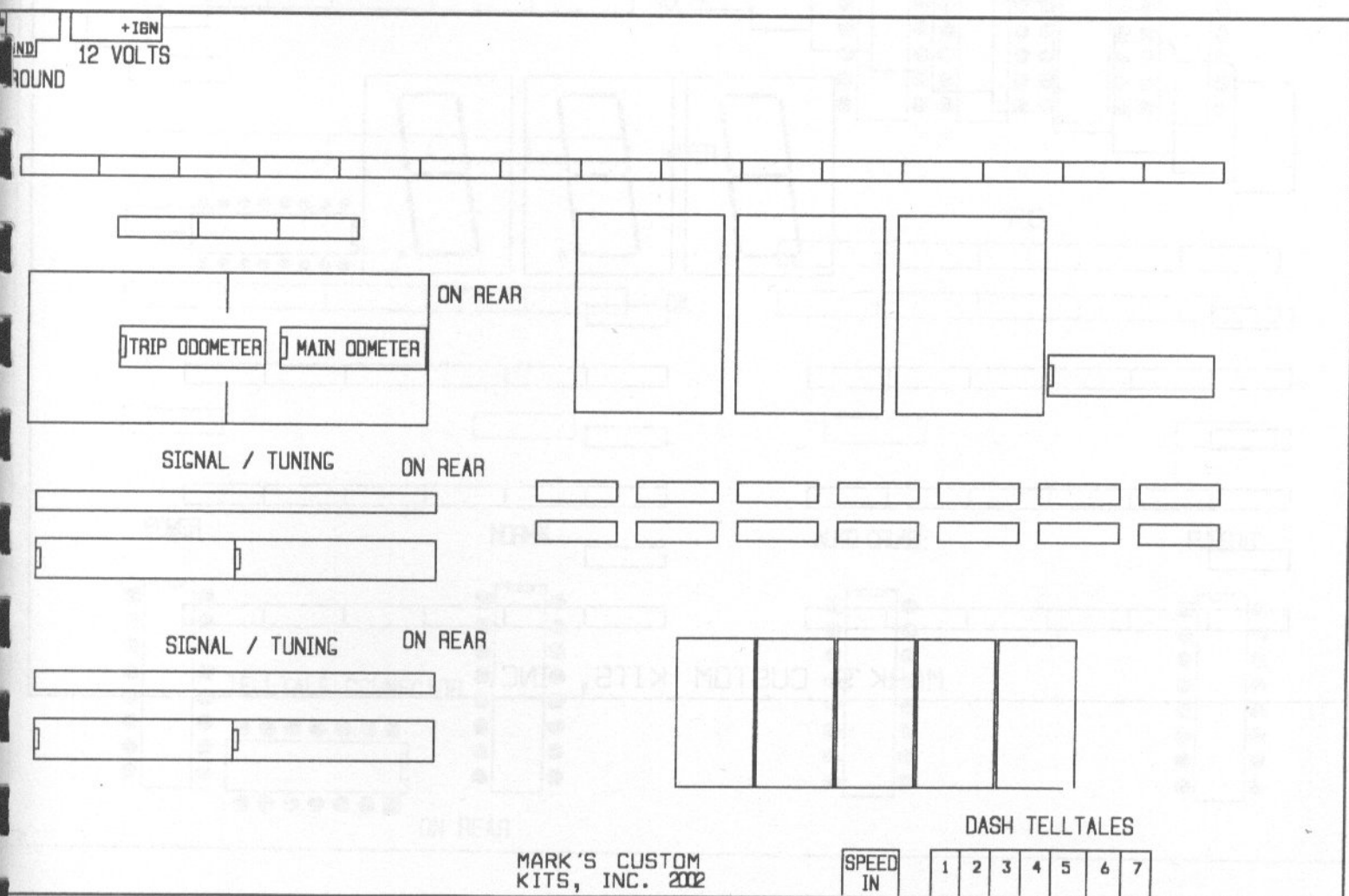


## BOARD LAYOUT

- MAIN DRIVER BOARD:** The Main Driver Board is where the Voice Display, Odometer, and Numeric Readout electronics are located. Ribbon cables connect between the Main Driver Board and the Odometer Display Board, Speed Display Board and the Voice Display. Correct alignment of the ribbon cables is a must, as inserting the cables wrong could damage many components and render your electronics useless. Below is the layout of the Main Driver Board with the ribbon cable connectors and "User-Adjustable" potentiometers. It is also here where you can tie in the "pursuit" and/or "auto-cruise" signals for the Voice Display. Applying a 12 volt signal to either input pad will either make the "Normal" display on the Voice Display Board jump to "Pursuit", or the "Auto Cruise" LED to come on.

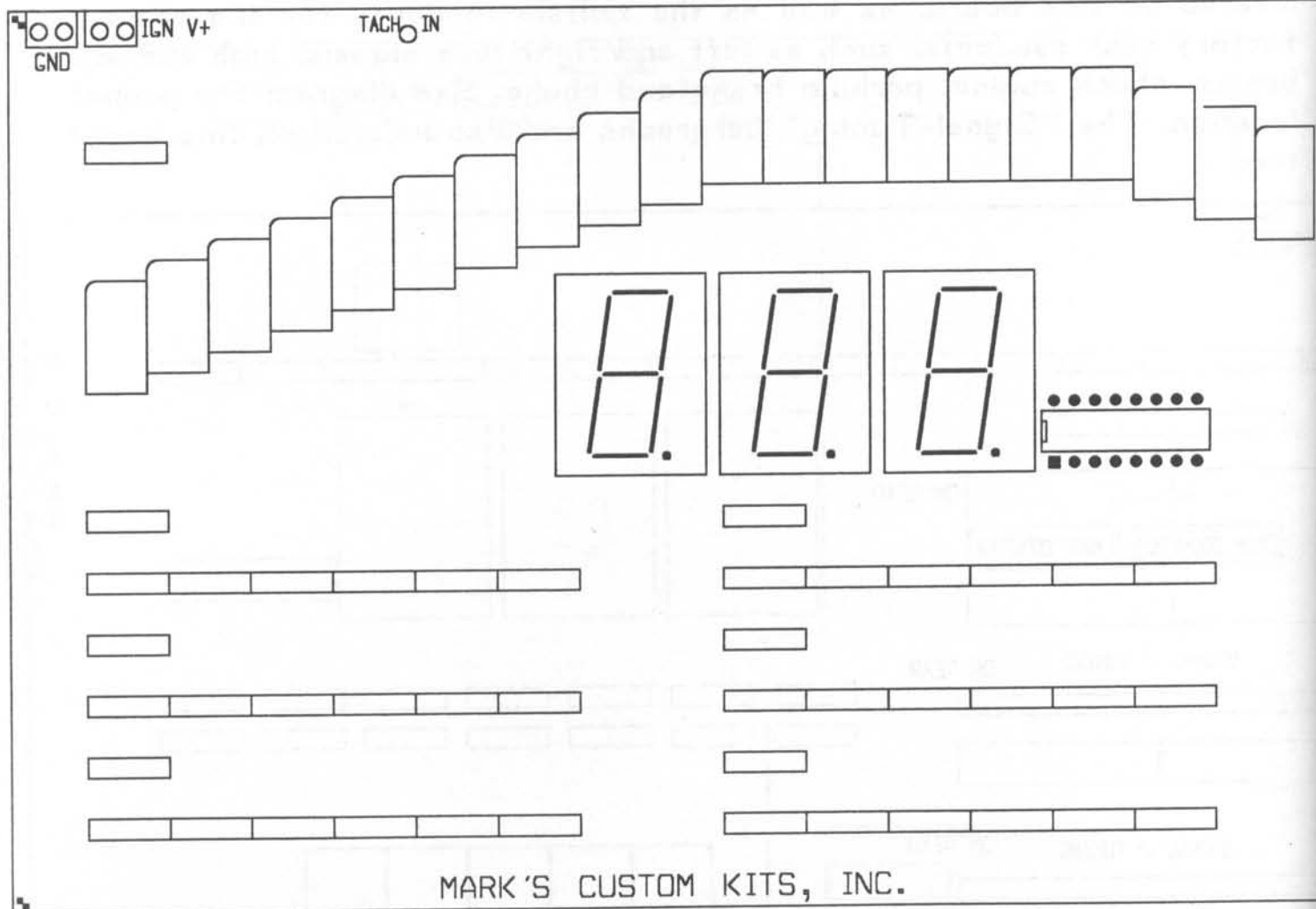


- **SPEED DISPLAY BOARD:** This board is where the speed signal from the sending unit installed inline with your cable from the transmission is fed. The speed readout in both numeric and bargraph form take the signal from the cable and convert it into digital pulses. The speed signal is connected to the *white* wire on the Main Driver board. Please see the section on installing the sending unit for directions on how to install the inline speed sensor. You must have this in order for the speedometer to function. Later year cars, from 1987 to 1992 use the electronic speed signal from the gauge housing and do not need a sending unit installed inline. The random sequencing circuits are also located on the speed display board and have a sequencing rate adjustment pot to either speed up or slow down the rate of sequencing. The main odometer and trip odometer digits are located on this board, as well as the telltale readouts for the various factory dash readouts, such as left and right turn signals, high and low beams, check engine, parking brake and choke. See diagram for proper location. The "Signal-Tuning" bargraphs are also located on this board too.





- TACH DISPLAY BOARD:** This display board is where your engine RPMs are displayed in both numeric and bargraph form. The *brown* wire is for the tach signal and is coming off the board. The tach has already been calibrated for your car and the size of the engine, either a V-6 or a V-8 engine. The random sequencing circuits are also located on the speed display board and have a sequencing rate adjustment pot to either speed up or slow down the rate of sequencing

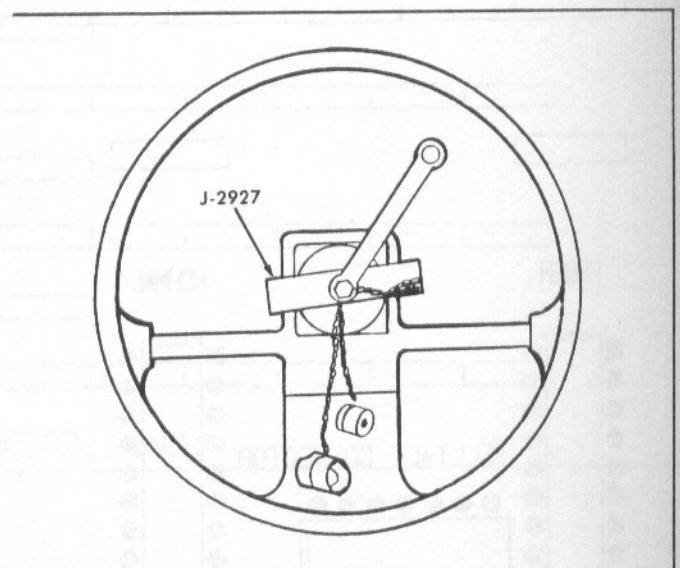
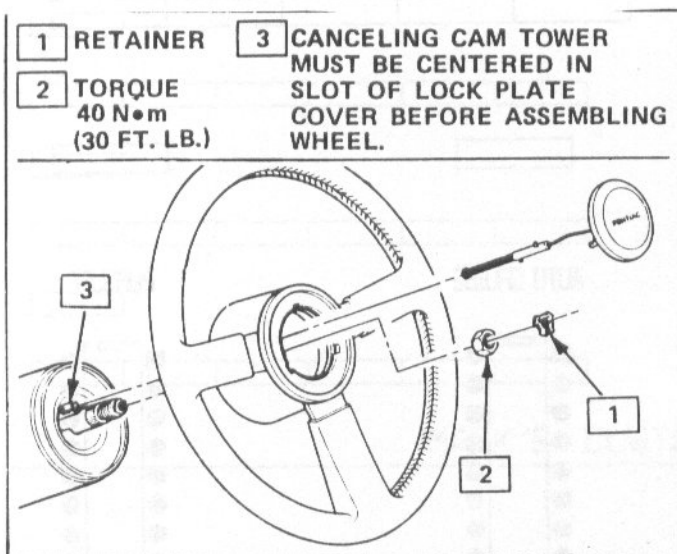


## DASH DIS-ASSEMBLY

This will probably be the first time tearing apart your factory dash, and there is nothing more daunting than wondering if you can do it and if you go too far will you be able to re-assemble everything. Well, once you take this plunge, there is nothing that you won't be able to "un-do", and in the meantime you will learn about how your car is assembled. You will be able to reverse the process and put your car back to stock appearance should you ever want to. It's just a matter of getting that first burst of intestinal fortitude to turn that first screw.

**NOTE:** At this time, it will be necessary for you to disconnect your battery at the negative terminal to prevent any shorting out of components during installation.

Since you will probably be putting your dash in at this time, the first thing to remove will be the steeringwheel that will require a "Steering Wheel Removal" tool. You will not be able to pull it off so don't even try. This tool can be rented from any auto parts store, or bought for about \$ 30. See diagrams below for approximate procedure. If you are going to be installing a new Gullwing Steeringwheel, then you will need a special steeringwheel adapter kit from the auto parts store. The kit you need will be from Grant, and their number is a "3196". You'll need this before you take off the old factory wheel, since the new gullwing will not be mountable without the adapter.



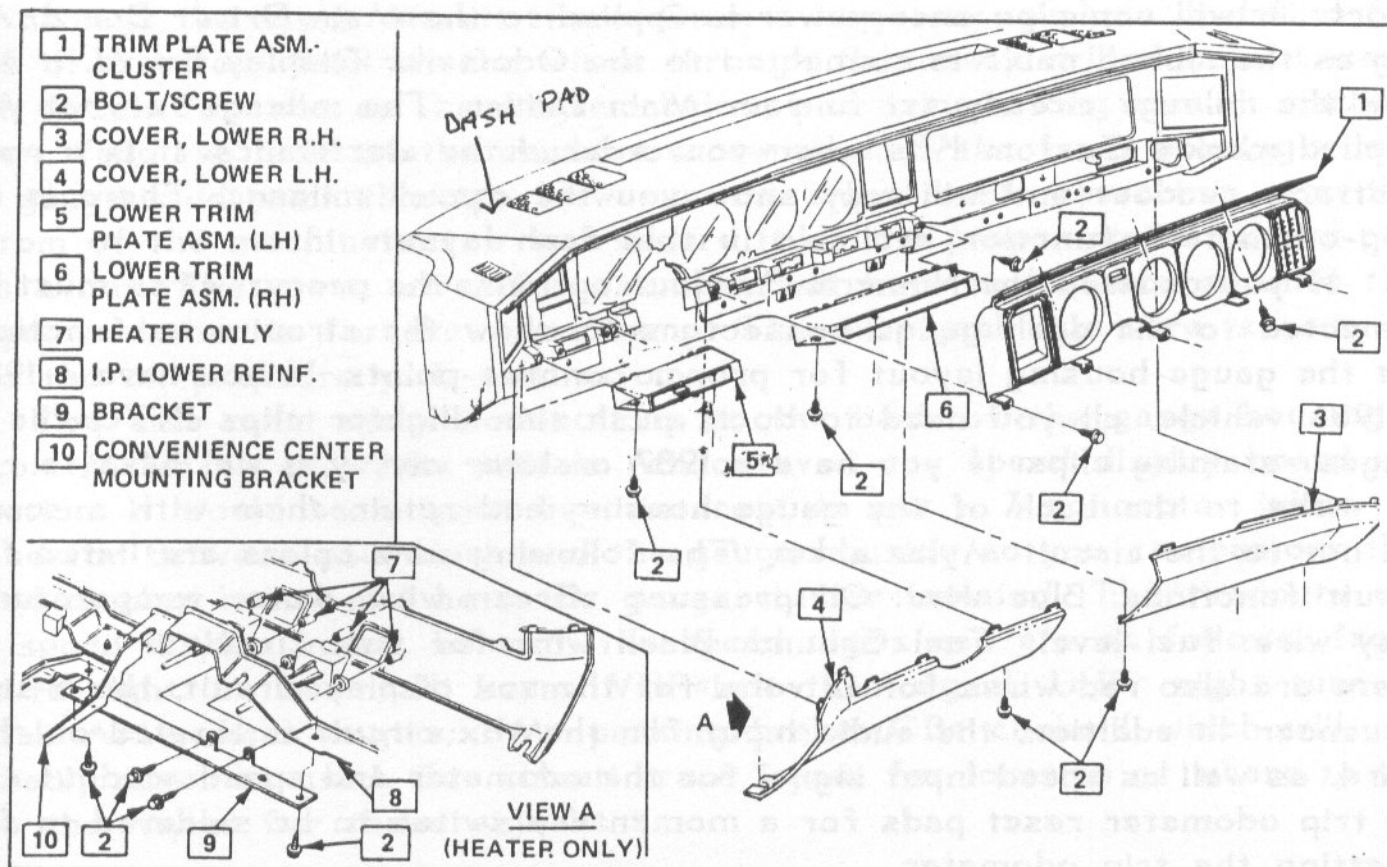
Removing Steering Wheel



Additional needed tools will be a screwdriver to pop the horn button off, and a 13/16<sup>th</sup> socket to remove the main retaining bolt, along with a "C-clip" removal tool for the retaining clip on the top of the column mount. You may want to lower your steering column if you have tilt, this will make it a little easier.

Next off will be the factory dash pad, which is held on by 4 screws in the defroster vent and 6 screws under the front lip of the pad. Be careful when removing the screws in the defroster vent, if you drop them down into the defroster, it will destroy the unit and you will have to disassemble to defroster to replace it. You will need a 9/32 socket to remove the screws under the front lip of the dash. Once off, the dash pad will now just lift up and off. You will also need to remove the trim plates that go around the gauges since you won't be using them. It's always a good idea to keep all screws and plastic pieces, should you ever decide to convert the car back to stock. See diagram below for the trim plate removal. Due to federal regulations, you must retain the factory stock speedometer installed in the car.

Fig. 8C-2 Instrument Panel Carrier



## MAIN DRIVER BOARD INSTALLATION

Your main driver board consists of the following functions; the digital odometer, the voice display system, and the circuitry for the numeric readout option. The Main Driver board screws down to the blue gauge housing, and the red and black wires are for connecting the Main driver to 12 volts and ground. It is also where you supply an audio source for the voice display.

The Voice Display circuit is a "switched" circuit, meaning that it is not tied into the Main Driver Board power, and you must supply it with a switched 12 volts. This allows the circuit to be independently operated from the dash. The audio from your front left speaker will give the signal needed to make the unit work. Carefully strip away a little bit of wire from both conductors and splice in the attached wire already soldered to the board. You'll notice that there are 2 wires; one is marked "Speaker +", and the other is marked "Speaker -". The wires going to the speaker are also polarity marked; the one conductor with the white stripe on it is the Speaker +, and the plain black lead is the Speaker -. Use electrical tape to seal the connections once you've made your splices. Now, when you apply 12 volts to the Voice Display circuit, and have the radio turned on, any audio source coming through the speakers will make the circuit function.

The odometer function is automatic and does not require any operator efforts. It will come on once power is applied to the Main Driver Board. As long as the ribbon cable is connected to the Odometer Display Board, it will show the mileage already set to your Main Driver. The mileage is what you supplied mark's Custom Kits when you ordered the electronics. It is a non-resettable readout and will only show you the overall mileage. There is no "trip-odometer" function available in this dash layout.

If you ordered the Numeric Readout options, the proper wires must be connected to the dash gauge connectors to allow the circuits to function. See the gauge-housing layout for proper connect-points. If you have a 1982 to 1986 vehicle, all you need to do is push the alligator clips INTO the gauges retaining clips. If you have a 1987 or later car, you will have to run the wires to the back of the gauge housing and retain them with a screw and nut to the circuit Mylar sheet. The following wire colors are listed for circuit functions: Blue wire: Oil pressure Green wire; water temperature Gray wire: fuel level Fuel Ground: Black wire for fuel circuit

There are also red wires for 12 volts for the vox display circuit, the 5-step sequencer. In addition, the audio input for the vox circuit is located on this board, as well as speed input signal for the odometer and speed readout and the trip odometer reset pads for a momentary switch to be soldered to for resetting the trip odometer.



## Fiberglass Dash Installation

The actual installation of the new fiberglass dash is rather simple. Once the factory dash pad is removed, you will be placing the fiberglass dash on TOP of the old cluster housing. The outer edge of the new dash is designed to slide up against the windshield and the defroster vent openings will line up with the factory defroster vents. There will be 3 or 4 holes already drilled into the fiberglass dash that should line up with the mounting holes on the factory firewall tabs. Using the same long screws that you took out of the padded factory dashpad, use those screws in the new fiberglass dash to secure your dash to the firewall mounting tabs.

NOTE: **CAUTION!** You MUST be very careful when screwing the screws into the defroster vent as to NOT drop the screws down into the defroster. Should you drop any of the screws, it will damage the defroster the next time you use it as the screws will jam the defroster fan blades. If you drop the screws down into the defroster, it will require the extraction of the screws by either dismantling the entire cluster assembly, or the removal of the windshield to get down into the defroster.

Once your new dash is mounted on top of the cluster housing, no further attachment will be necessary, as the dash is well balanced and the only other optional item that you may want for cosmetic element would be the armrest console which ever-so-slightly gives front support to the dash and keeps the lower tv section from any slight up and down movement during hard driving.

It is advised that before you tighten down the dash, you crawl under the dash and make any connections you need such as vox display ribbon connections, speed signal wire connection, odometer cable connection, etc. Once the dash is tightened down, room under the dash is very tight and not easy to move around with.

**NOTE:** For proper operation, good clean grounds are an absolute necessity. These digital gauges are very sensitive and any rust or oxidation on grounding points will give inaccurate readings and sporadic operation. If you must run new ground wires from under the dash, then do so. Do NOT rely on the ground clips in the gauge housing. They are notorious for not being a perfect grounding location for digital gauges.

## GAUGE HOUSING CONNECTIONS

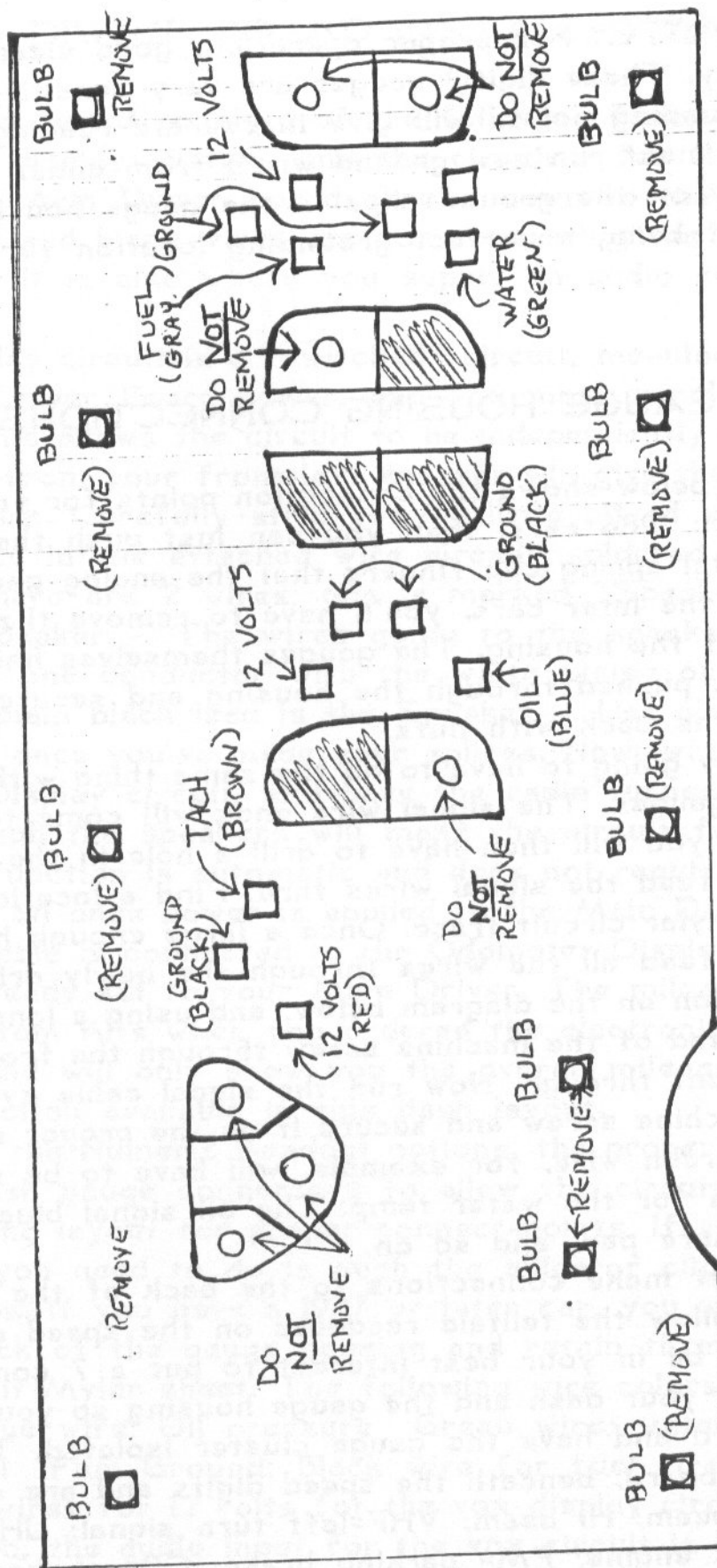
The diagram below shows the connection points for your gauges. If you have the 1982 thru 1986 cars, then you can just push the small alligator clips into the metal spring clip fingers that the analog gauges were pushed into. If you have the later cars, you'll have to remove the whole cluster to get at the back of the housing. The gauges themselves had the metal studs attached to them, pushed through the housing and secured to the Mylar circuit trace on the back with nuts.

You are basically going to have to do the same thing with the signal wires from the digital gauges. The signal wire ends will come to you with "eye-crimps" on them, you will then have to drill a hole in the back wall of the gauge housing to feed the signal wires thru. Find a location where you will not damage the Mylar circuit trace. Once a large enough hole is drilled for all 5 or 6 wires, feed all the wires through the newly drilled hole. Locate each circuit function on the diagram below, and using a long enough machine screw, feed the head of the machine screw through the front opening where the gauge stud went through. Now run the signal cable eye-crimp over the bottom of the machine screw and secure it on the proper signal copper pad with a nut. The green wire, for example, will have to be secured onto the copper pad that is for the water temp. The oil signal blue wire is secured onto the oil pressure pad, and so on.

You also must make connections to the back of the gauge housing circuit Mylar to allow the telltale readouts on the speed display board to function. It would be in your best interest to put a 7 connector inline connector between your dash and the gauge housing so you can remove the speed display board and have the gauge cluster isolated. The readouts on the speed display board, beneath the speed digits and are as follows, from left to right: Lo beam; Hi beam; VHF=left turn signal; UHF= right turn signal; AM= check engine; FM= parking brake; CB= choke ( which will probably never be used. See circuit trace layout for location of where to tie onto the Mylar for those signals.



# FIREBIRD TRANS-AM CLUSTER '82-87



- GREEN WIRE GOES TO WATER
- BLUE WIRE GOES TO OIL
- BLACK (IF USED) GOES TO GROUND

- RED WIRES GO TO 12 VOLTS
- BLACK WIRES GO TO GROUND
- BROWN WIRE GOES TO TACH
- GRAY WIRE GOES TO FUEL

CLUSTER REAR VIEW



- TP1 Oil Pressure Gage Sender  
TP2 Temperature Gage Sender  
TP3 Fuel Gage Sender  
TP4 Tachometer Sender  
TP5 Speed

- |    |                          |
|----|--------------------------|
| 1  | Tachometer Sender        |
| 2  | Ground                   |
| 3  | Illumination             |
| 4  | Choke Warning Indicator  |
| 5  | Temperature Gage Sender  |
| 6  | Not Used                 |
| 7  | Open                     |
| 8  | Oil Pressure Gage Sender |
| 9  | Ignition                 |
| 10 | Not Used                 |
| 11 | Not Used                 |
| 12 | Ground                   |
| 13 | Fasten Belts             |
| 14 | Speedometer              |

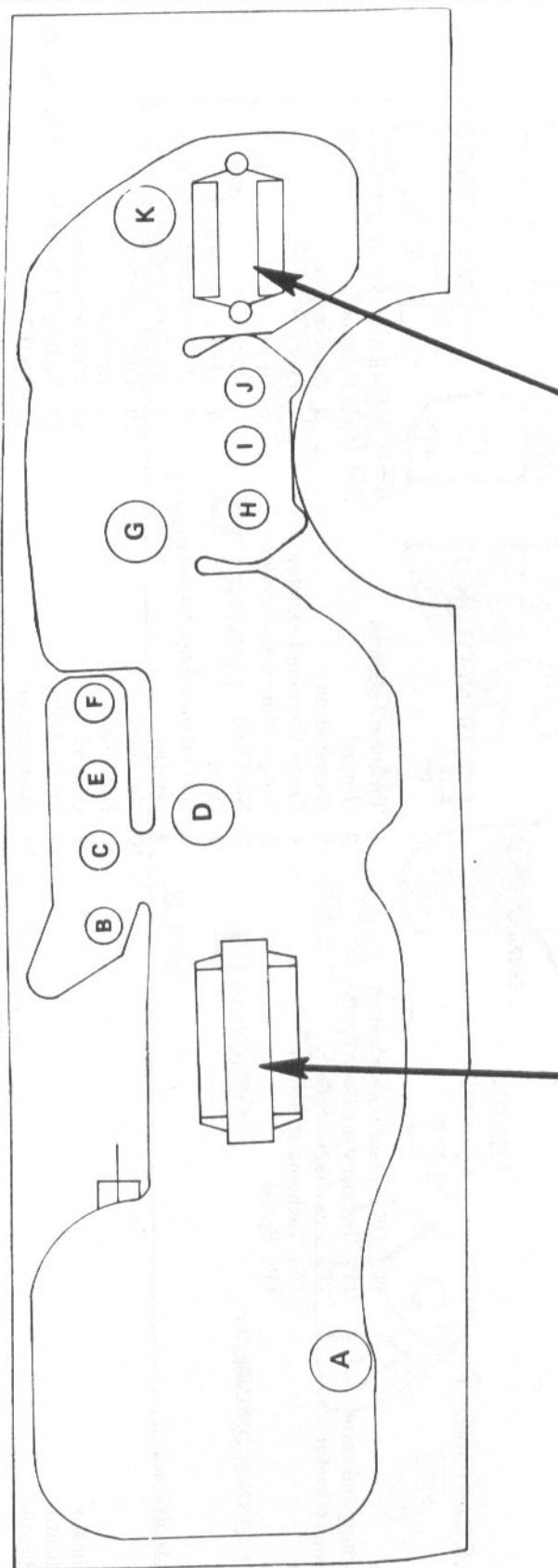
- |    |                               |
|----|-------------------------------|
| 1  | BRAKE Warning Indicator       |
| 2  | Ground                        |
| 3  | Illumination                  |
| 4  | Open                          |
| 5  | Open                          |
| 6  | Open                          |
| 7  | LH Turn Indicator             |
| 8  | Hi Beam Indicator             |
| 9  | RH Turn Indicator             |
| 10 | Fuel Gage Sender              |
| 11 | Not Used                      |
| 12 | 470 $\Omega$ to Generator     |
| 13 | SERVICE ENGINE SOON Indicator |
| 14 | SHIFT Indicator               |

## 1986 TO 1988 GAUGE HOUSING W/ STOCK GAUGES



# INSTRUMENT PANEL: DIGITAL CLUSTER

## CLUSTER REAR VIEW



CONNECTOR C1

CONNECTOR C2

## BULB LOCATIONS

- G LCD Illumination
- H RH Turn Indicator
- I Hi Beam Indicator
- J LH Turn Indicator
- K LCD Illumination

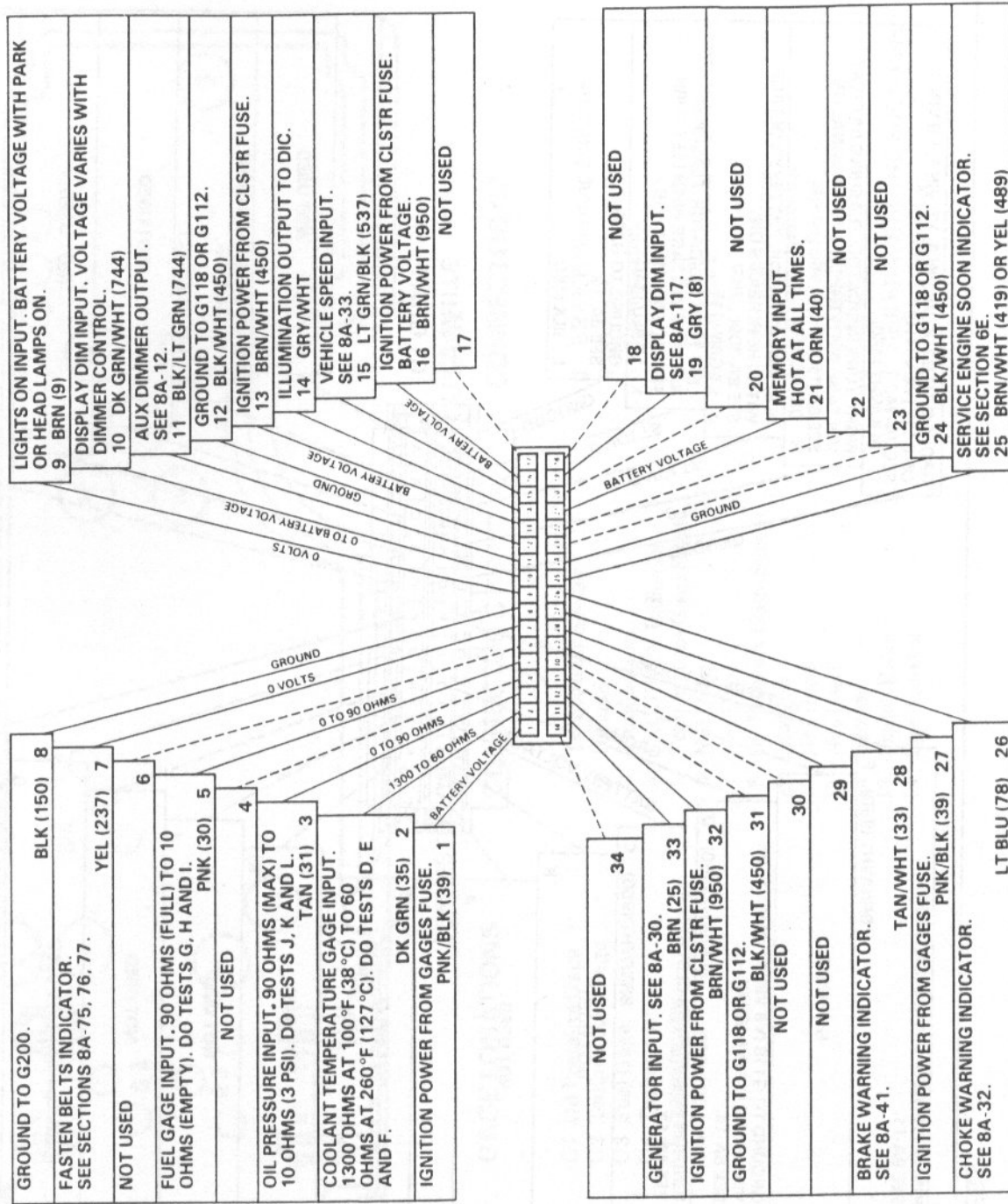
- A LCD Illumination
- B CHOKE Warning Indicator
- C FASTEN BELTS Indicator
- D LCD Illumination
- E BRAKE Warning Indicator
- F SERVICE ENGINE SOON Indicator

1987 TO 1989 DIGITAL GAUGE CLUSTER

# INSTRUMENT PANEL: DIGITAL CLUSTER

## B: CONNECTOR C2 PINOUT TEST

- IGNITION SWITCH IN RUN EXCEPT FOR RESISTANCE MEASUREMENTS
- MAKE ALL RESISTANCE MEASUREMENTS WITH THE NEGATIVE BATTERY CABLE REMOVED
- MEASURE TO GROUND UNLESS ANOTHER TERMINAL IS GIVEN
- CLUSTER CONNECTOR C2 AS SEEN FROM THE DRIVER'S SEAT WITH THE INSTRUMENT CLUSTER REMOVED
- IF THE CORRECT VOLTAGE OR RESISTANCE IS FOUND AT THE TERMINALS, AND THE CLUSTER FUNCTION THAT USES THOSE TERMINALS DOES NOT OPERATE, CHECK WIRES AND BULBS. IF OK, REPLACE THE INSTRUMENT CLUSTER
- IF THE CORRECT VOLTAGE OR RESISTANCE IS NOT FOUND AT A TERMINAL, DO THE TEST GIVEN OR GO TO THE PAGE REFERRED



(Continued on next page)

## DIGITAL CLUSTER CONNECTORS

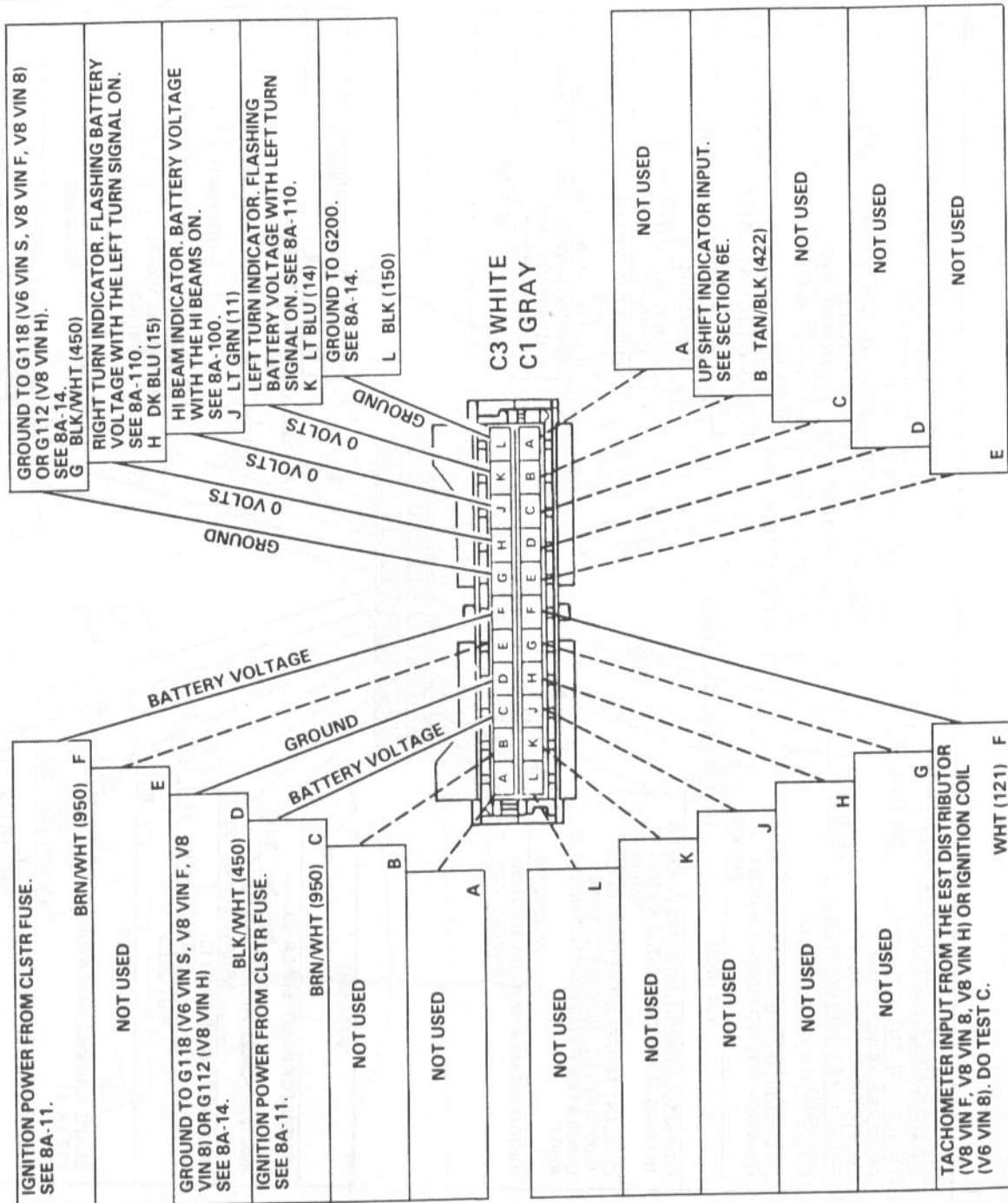


# INSTRUMENT PANEL: DIGITAL CLUSTER

(Continued from previous page)

## A: CONNECTOR C1/C3 PINOUT TEST

- IGNITION SWITCH IN RUN EXCEPT FOR RESISTANCE MEASUREMENTS
- MAKE ALL RESISTANCE MEASUREMENTS WITH THE NEGATIVE BATTERY CABLE REMOVED
- MEASURE TO GROUND UNLESS ANOTHER TERMINAL IS GIVEN
- CLUSTER CONNECTOR C1/C3 AS SEEN FROM THE DRIVER'S SEAT WITH THE INSTRUMENT CLUSTER REMOVED
- IF THE CORRECT VOLTAGE OR RESISTANCE IS FOUND AT THE TERMINALS, AND THE CLUSTER FUNCTION THAT USES THOSE TERMINALS DOES NOT OPERATE, CHECK WIRES, BULBS, AND PRINTED CIRCUIT. IF OK, REPLACE THE INSTRUMENT CLUSTER
- IF THE CORRECT VOLTAGE OR RESISTANCE IS NOT FOUND AT A TERMINAL, DO THE TEST GIVEN OR GO TO THE PAGE REFERRED

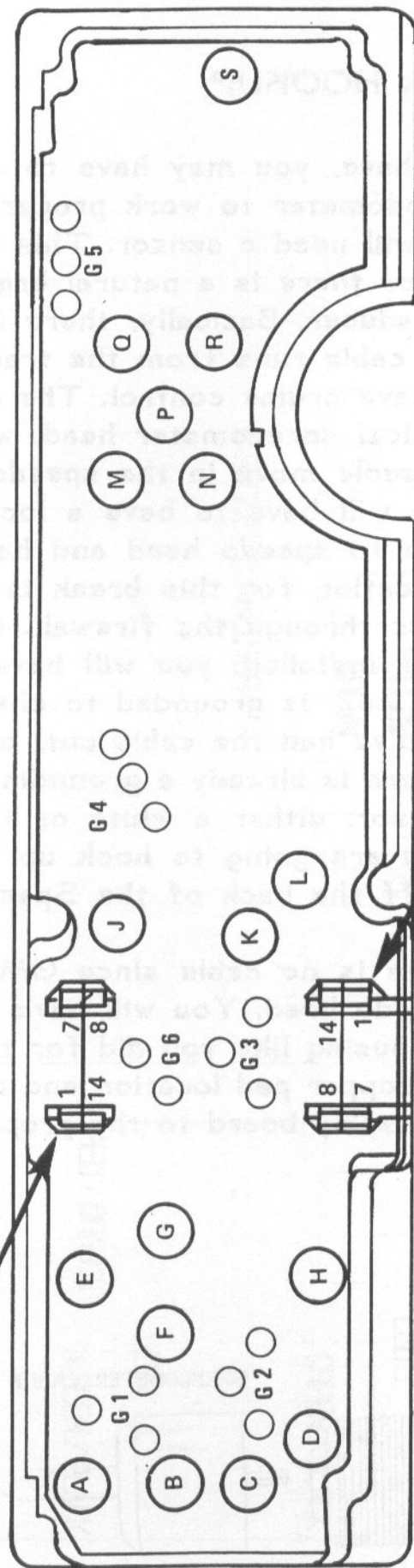


## DIGITAL CLUSTER CONNECTORS

# INSTRUMENT PANEL: GAGES CLUSTER

## CLUSTER REAR VIEW

CONNECTOR C2



CONNECTOR C1

CONNECTOR C2

### BULB LOCATIONS

- A Illumination
- B BRAKE Warning Indicator
- C SECURITY Indicator
- D Illumination
- E Illumination
- F SERVICE ENGINE SOON Indicator
- G SHIFT Indicator
- H Illumination
- J Illumination
- K Fasten Belts Indicator
- L Illumination
- M RH Turn Indicator
- N Illumination
- P HI Beam Indicator
- Q LH Turn Indicator
- R Illumination
- S Illumination

### GAGE LOCATIONS

- G1 Oil Pressure Gage
- G2 Temperature Gage
- G3 Fuel Gage
- G4 Tachometer
- G5 Speedometer
- G6 Voltmeter

### CONNECTOR C1

- 1 Tachometer Sender
- 2 Ground
- 3 Illumination
- 4 SECURITY Indicator
- 5 Temperature Gage Sender
- 6 Not Used
- 7 Not Used
- 8 Oil Pressure Gage Sender
- 9 Ignition
- 10 Not Used
- 11 Not Used
- 12 Ground
- 13 Fasten Belts
- 14 Speedometer

### CONNECTOR C2

- 1 BRAKE Warning Indicator
- 2 Ground
- 3 Illumination
- 4 Not Used
- 5 Not Used
- 6 Not Used
- 7 LH Turn Indicator
- 8 HI Beam Indicator
- 9 RH Turn Indicator
- 10 Fuel Gage Sender
- 11 Not Used
- 12 Not Used
- 13 SERVICE ENGINE SOON Indicator
- 14 SHIFT Indicator

1989 TO 1992 GAUGE HOUSING



## SPEED SENSOR HOOKUP

Depending upon which year car you have, you may have to install a speed sensor for your speedometer and odometer to work properly. If you have a 1982 to 1986 Trans Am, then you will need a sensor. This is usually done at the cruise control transducer since there is a natural break in the cable from the transmission for the transducer. Basically, there is a cable that turns with the transmission and this cable runs from the transmission to the cruise control transducer, if you have cruise control. The output of the transducer is then fed to the mechanical speedometer head, which also utilizes the spinning cable to make the needle move in the speedo head. If you do not have cruise control, then you will have to have a local speed shop cut the cable from the transmission to speedo head and have the speed sensor installed inline. The best location for this break is in the engine compartment before the cable goes through the firewall. Once the cable is cut professionally and the sensor installed, you will have 2 wires coming off the sensor. One wire, a black one, is grounded to chassis to a bolt or screw either on the firewall if you've had the cable cut, or actually on the cruise control transducer where there is already a grounding nut and screw. Feed the other wire from the sensor, either a white or tan wire, through the firewall and that is what you are going to hook up to the speedometer circuits white wire coming off the back of the Speed Display Board.

If you have a 1987 or later car, there is no cable since GM went to electronic pulses for a new electronic speedo head. You will have to access the signal pad on the back of the gauge housing like you did for the earlier signals. See diagram for the speed signal copper pad location and attach the white speed signal wire from the Speed Display board to the proper pad on the gauge housing.

P/N# 8901 SPEEDOMETER SENDER  
FOR GM TYPE TRANSMISSIONS

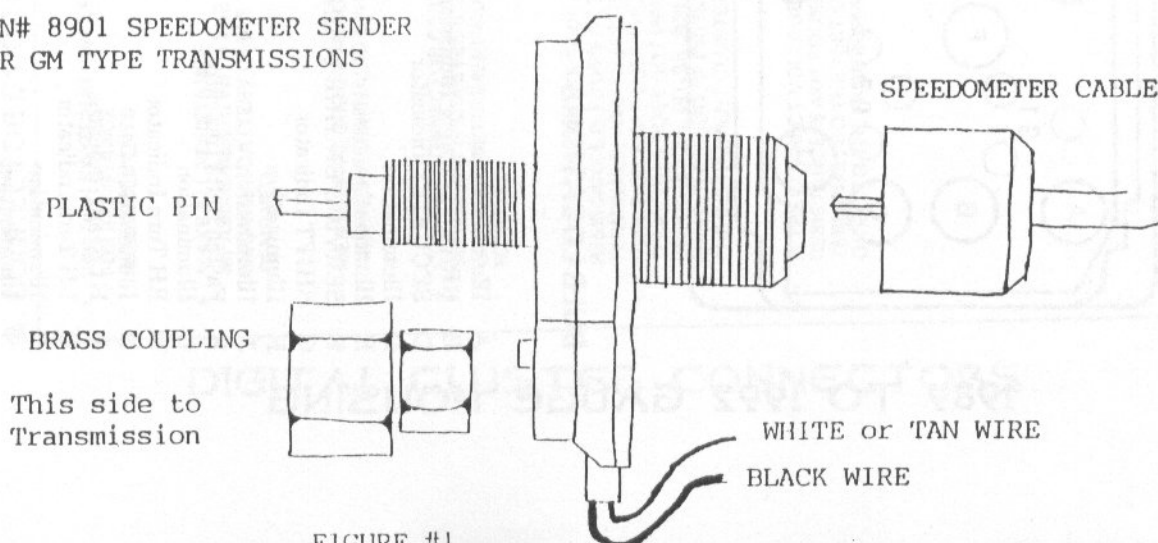
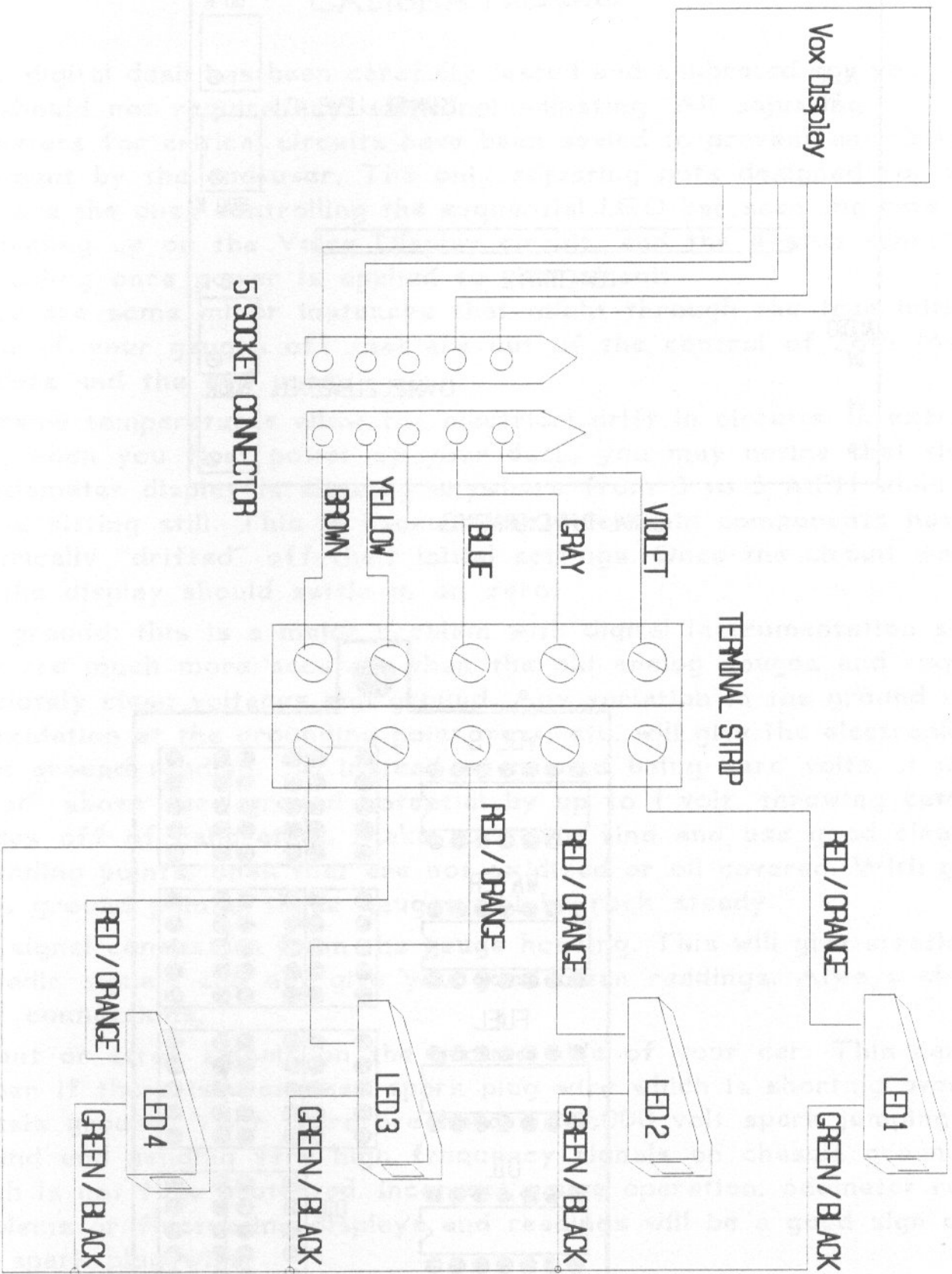
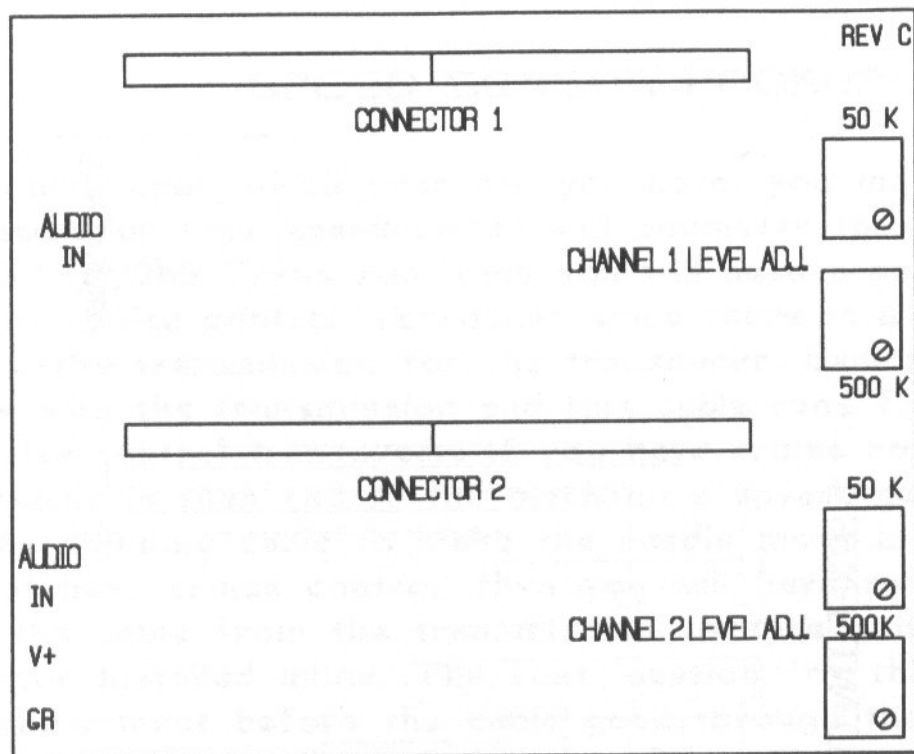
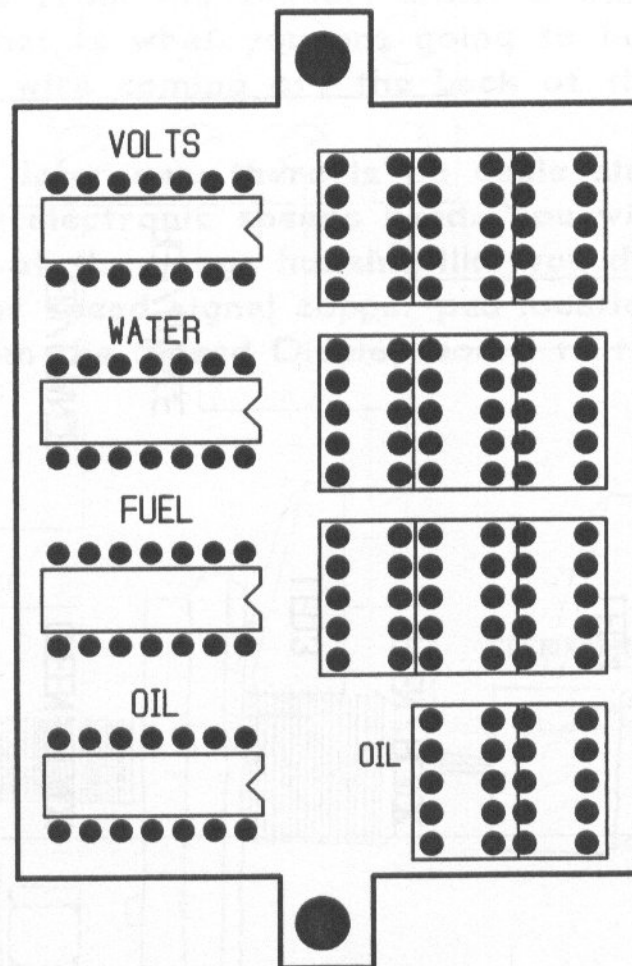


FIGURE #1





SIGNAL-TUNING DRIVER BD.



NUMERIC READOUT DISPLAY



## CALIBRATION

Your digital dash has been carefully tested and calibrated for your year car and should not require any additional adjusting. All adjusting potentiometers for critical circuits have been sealed to prevent any drift or misadjustment by the end-user. The only adjusting pots designed for user interface are the ones controlling the sequential LED bar scanning rate, the rate of scaling up on the Voice Display circuit, and the 4-step sequencer rate of scaling once power is applied to that circuit.

There are some minor instances that might throw the true initial calibration of your gauges off that are out of the control of both Marks Custom Kits and the end user.

- Extreme temperatures allow for electrical drift in circuits. In extreme cold, when you first power up your dash, you may notice that the speedometer display is showing anywhere from 3 to 5 MPH while the car is sitting still. This is because the electronic components have electrically "drifted" off their initial settings. Once the circuit warms up, the display should settle in on zero.
- Bad ground: this is a major problem with digital instrumentation since they are much more accurate than the old analog gauges and require absolutely clean voltages and ground. Any variation in the ground such as oxidation at the grounding point, rust, etc. will give the electronics a false ground reading. So instead of ground being zero volts, it may "float" above zero ground potential by up to 1 volt, throwing certain gauges off of calibration. Make sure you find and use good clean grounding points, ones that are not oxidized or oil covered. With good clean ground points, these gauges will be rock steady.
- Bad signal connection from the gauge housing. This will give erratic or sporadic signals and not give you good clean readings. Always check your connections.
- Errant or stray signals on the ground side of your car. This can happen if there is a cracked spark plug wire which is shorting over to chassis ground. You therefore have a 40,000 volt spark jumping to ground and sending very high frequency signals on chassis ground which is not fuse protected. Incorrect gauge operation, odometer reset problems or fluctuating displays and readings will be a good sign of a bad spark plug wire.
- Unshielded wires from a high power stereo system. Same symptoms as above.

**NOTE:** Due to the high RF (radio frequency) generation from your dash electronics, you may on occasion notice some "zero-one" bounce with your speedometer display reading. While every effort to minimize this occurrence has been designed into the circuit design, some bounce may still be apparent on some older cars due to the electrical system being less than ideal for the accuracy and intricacies of the digital circuits.

## TROUBLESHOOTING

Your digital gauges should be both troublefree and free from any problems right out of the box. They have been designed to be "bullet-proof" and under normal usage, should give you years of pleasure. On occasion, a component may become damaged or short out. A bad transistor may die, a resistor open, etc. If you ever have a problem with your products, your first action should be to check all connections to make sure they are tight. Many problems can be quickly fixed by making sure your sending unit connections are good and that none of the circuitboard connectors have come off or out. Also, make sure that there are no bent pins on any of the ribbon connectors if you've removed and replaced the cables into the DIP sockets. A bent or broken pin on a connector renders that cable un-useable and it must be replaced. Take your time during installation to ensure that everything has been installed as outlined in this book. If after checking all of your connections you find that there is still a problem, please contact Mark's Custom Kits during normal business hours of 8am and 4:30pm, M-F. and we will try and talk you through the problem.

## WARRANTY

The electronics are designed to be as accurate as the cars electrical system will allow, and are made using top name components from major companies such as Hewlett Packard, National Semiconductor and Harris Corp. Mark's Custom Kits offers a limited lifetime warranty on the electronics that will cover the ORIGINAL purchaser in the unlikely event that something fails or ceases to function. This warranty will NOT cover electronic failure under the following conditions:

- **Tampering:** Attempting to modify the products original design and operation. This includes, but not limited to; un-authorized repair attempts; back engineering of circuit function; un-authorized part replacement.



- Incorrect Installation: If you have installed the electronics incorrectly and have damaged any part of the system; you have hooked up the cables backwards and have damaged any components; you have hooked up both 12 volts and ground in the wrong configuration.
- Unsatisfactory automotive electrical environment: If you have made extreme alterations to your cars electrical systems, or have added any high power stereo system into your car; or have done modifications to the original factory wiring or have replaced the factory sending units with non-compatible substitutes.

Should any repairs be necessary, you will be instructed by Mark's Custom Kits on how to proceed. Any repairs needed that are shown to be caused by the above reasons, will be repaired at the current shop rates and will further negate any further warranty of that system.

## CONCLUSION

Your new digital instrumentation package has been designed with both authenticity and functionality in mind and will give you many years of troublefree operation. Mark's Custom Kits has built a worldwide reputation for quality products and stands behind each and every item sold. We hope that you enjoy the use of your new system and thank you for making the decision to purchase our products.



## **Additional Troubleshooting**

Your new digital electronics are a precision designed system, to monitor and readout various signals within your cars dash cluster. Because the older cars were not very well designed with regards to electrical interference, new digital signals are prone to the “noisy” electrical environment that is so common on 20-year-old cars. In dealing with cars that are 20 years or older, natural oxidation on ground screws, as well as loose or corroded connections throughout the car, make electronic problems common unless the car has had a “frame-off” restoration. And most people don’t go thru that expense.

Also introducing electronic noise into the cars already noisy environment, are today’s newer and more powerful sound and stereo systems that are usually so big and powerful, they are mounted into the trunk with additional power supplies and cooling. These high power systems all contribute additional static and noise on the cars ground, or chassis ground, side. And digital instruments are not normally filtered on the ground side of their design. So you now have static, electronic pulses, high RF ( radio frequencies ) and other electronic trash invading the digital clusters circuitry. Here are some more common issues that you may or may not see and their potential remedies;

- Fuel level unsteady. This is caused by the black fuel ground wire NOT being tied to a good clean ground screw. Your fuel gauge is very sensitive and if the ground wire is not connected to a zero voltage level, chassis ground, then it will read above normal levels, or fluctuate unnecessarily. Always make a new drill hole close to the main driver board and make sure you have a good CLEAN grounding point for your fuel gauge.
- Oil or water temp gauge unsteady or not working: This usually is caused by either one of three possible conditions; the original OEM sending unit is not as accurate enough and was just giving out a signal that the old mechanical gauge could read, but barely. Or the clips in the cluster housing are oxidized and need burnishing with steel wool on the film-Mylar side of the cluster, which is the backside. Or the wiring between the sending unit and the cluster is cracked and/or broken.
- NOTE: The original mechanical gauges are notoriously inaccurate, as they are nowhere near as precision made as the new gauges. They were not as prone to ambient electrical noise as today’s clusters. Example; how many times did you fill up your fuel tank and drive for days and it never moved, then one day you noticed it bottom out and start reading the real level?
- Tach reading not tracking properly: Possible causes are that your electronics were calibrated for the wrong version engine, say you have a V-6 and the gauges were calibrated for a V-8. Or vice versa. OR, the wiring from your distributor cap has corrosion or oxidation on any number of contact points.
- Speed digit fluctuating off of zero when sitting still: This is a common problem within older cars again because of massive issues with ground loops and/or electronic noise coming down the ground/chassis from other sources. The electronics are designed to filter out as much noise as possible, but if you have a car that has been out in the weather and has a lot of 20 year old corrosion or oxidation, then your going to have some slight zero bounce due to an unsteady ground level.
- Odometer resetting to zero: There is only ONE cause for this problem, and it all relates back to a ground loop issue. That is, any number of high current items, such as headlights, brake lights, power antenna, headlight motors, etc, have corrosion or oxidation on the grounding straps and there is some slight current leakage going onto the ground side of the car. These power spikes go down the chassis ground and because the odometer circuit ground is not fused, it will see this spike a reset the readouts to zero. The only solution is to isolate which high-current item makes your odometer digits reset and troubleshoot that circuits ground clips and clean, burnish and re-apply the ground screw to a new-clean, ground hole.