USING THE KBC-2 WITH BODY CONTROLLER MODULES
(airbags, immobilizers, digital clusters, ECUs)

Body controller modules are small, self-contained computers which perform a dedicated function in the automobile. To accomplish its function the module computer (called a microcontroller) must have the ability to store information (data) regarding some aspect of the vehicles condition or history of past events. In the case of an airbag module, the microcontroller constantly monitors the vehicle speed, brake pedal position and the crash sensor(s). If an accident occurs, the microcontroller is informed via the crash sensor, deploys the airbag(s) and saves vehicle crash data (speed, brake pedal position, etc.). This information is saved in the module itself in one of two places; a serial eeprom memory chip or eeprom memory within the microcontroller itself. This same storage function applies to most body controller modules. They all store dynamic data (data which can change) inside a serial eeprom memory chip or the microcontroller. EEPROM stands for Electrically Erasable Programmable Read Only Memory. This type of memory retains the data even if power is removed from the module. When you work with these modules you use the EPROM+ system to connect directly to the memory chip or microcontroller. Once the equipment is connected you will then read the data directly from the parts memory array using EPROM+ software commands. Once the data has been read you may perform a variety of operations depending on what you wish to do. You may examine and change the data. You may save the data to a disk file. You may also program changed data or new data back into the part. The EPROM+ system provides a complete set of functions.

WHAT'S INCLUDED IN THE KBC-2 KIT

HARDWARE

The KBC-2 kit includes the following items: 1- EPROM+ programming system, 2 - ASERSM1A surface mount serial eeprom adapter, 3 - ACOM2 Motorola microcontroller communication adapter, 4 - Surface mount clip with cable and plug (#ASOIC8), 5 - Surface mount probe set with cable, plug and ACOM2 connector (#SMP8), 6 - Two probes with extension wires.

DOCUMENTATION

1 - SERIAL EEPROM TUTORIAL - 93C56 (AUTOMOTIVE VERSION) This tutorial (directed at automotive applications) describes how to use the system by providing a series of hands-on exercises using an actual 93C56 serial eeprom. Perform the exercises in this tutorial before you begin working with any modules.

2 - WORKING WITH AND UNDERSTANDING HOW NUMERIC and NON-NUMERIC DATA IS STORED IN AN EEPROM OR OTHER MEMORY PART This document provides an explanation of the numeric formats and how they relate to actual numbers. The docment references actual memory images from automotive modules and explains how numeric and ASCII data is stored. It is not a substitute for the 93C56 tutorial.

3 - USING THE ASERSM1A SERIAL EEPROM IN-CIRCUIT INTERFACE ADAPTER This document describes how to use the ASERSM1A adapter, including how the plug is attached and the purpose of the voltage selection slide switchs.

IMPORTANT: Read this document and become famaliar with the purpose of the slide switchs as it will allow you to work successfully with most parts in-circuit and confirm a **"GOOD READ"** of eeprom data. Also note the position of the black cable plug when installed on the adapter: The BROWN wire is always on the right, below the arrow.

4 - USING THE ACOM2 ASYCHRONOUS COMMUNICATION ADAPTER WITH MOTOROLA MICROCONTROLLERS This document completely describes the ACOM2 adapter and its use with the three families of Motorola microcontrollers. The ACOM2 adapter operates in a completely different manner than the ASERSM1A as it provides a communication interface to the body controller module microcontroller. Completely review the document before attempting work with this adapter.

5 - MASK NUMBER TO INDUSTRY STANDARD PART NUMBER CROSS REFERENCE

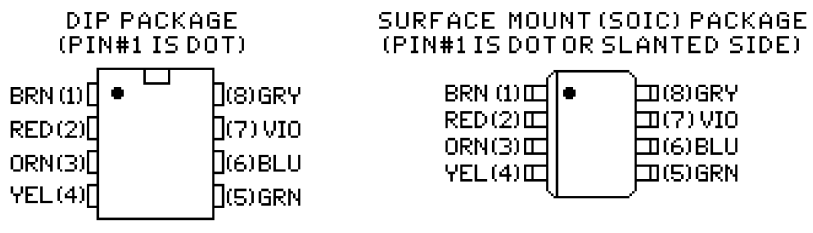
This document provides a cross reference list between a Motorola microcontroller mask number, which is usually embedded in one of the numbers printed on the actual part, and the real industry standard part number.

6 - EPROM+ PROGRAMMING SYSTEM USER MANUAL This is the operation and user manual provided with the standard EPROM+ system. Read this manual for installation and use information.

WORKING WITH 8 PIN SERIAL EEPROMS

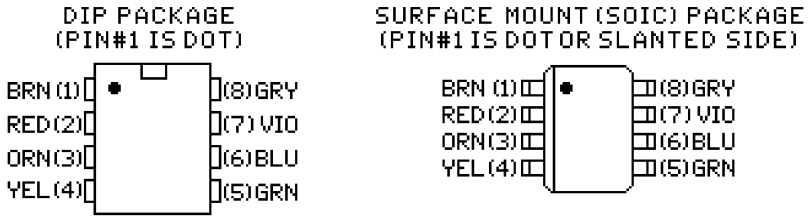
The most common memory part found on body controller modules are 8 pin serial eeproms (see below). You can identify a serial eeprom by the part number printed on the package. There are many different part numbers; here are a few examples: 93C56, 93LC66, L56R, 25040, 95160, 24C01. You must identify the part number before you can begin your work. The first request made by the EPROM+ software before access to the system commands is granted is to ENTER DEVICE TYPE. At this point you must provide the part number. Identifying the part number is not difficult however it will take practice as in some cases only a fragment of the actual number is printed on the part.

EXAMPLE: A 93C46 part may be C46 when printed on the actual 8 pin package.



ATTACHING THE CLIP OR PROBES

Install the adapter (ASERSM1A) according to the adapter addendum. Attach the clip or probe set cable to the adapter and then connect the clip or probes to the serial eeprom part.



VERY IMPORTANT NOTE: The part leads must be clean. Body controller modules are usually coated in a humidity resistant sealant. This must be removed from the part leads to insure a positive electrical contact. If the part leads are not clean you will not be able to read the data. There are a variety of chemical cleaners which will remove the sealant, however we have found that solder flux remover (flux cleaner) and a short, stiff bristle brush works very well.

When you attach the clip or probes be sure that you have identified PIN 1 of the part. PIN 1 is identified by a small dimple in the part package or a slanted side. The RED DOT on the clip is PIN 1. When attaching the probe set PIN 1 is the BROWN(1) probe followed by RED(2), ORANGE(3), YELLOW(4), GREEN(5), BLUE(6), VIOLET(7) and GREY(8). Note that the colors wrap around the package where the GREY probe will be opposite the BROWN. Once the clip or probes are attached you are ready to proceed to the system commands.

WORKING WITH MOTOROLA MICROCONTROLLERS

Motorola microcontrollers are also found in body controller modules although less frequently than serial eeproms. Microcontrollers are different from the 8 pin serial eeproms in that these parts are entire computers on a chip. Even though they are more complex, information is still stored in the internal memory of the part. Everything previously described, including cleaning applies to these parts also. A microcontroller is usually in a large square 52 pin package (13 pins on each side) although there are some packages which are larger (68 or 84 pins). You may only attach to these parts using the probe set.

CONNECTING THE ACOM2 TO A MOTOROLA MICROCONTROLLER

The ACOM2 adapter connects to a Motorola microcontroller using the probe set. The probe set is connected to the ACOM2 using a small terminator board (#PBCP1). The black plug attaches to the PBCP1board. The right angle connector on the PBCP1 is then inserted into the 8 pin in-line connector on the ACOM2. When the terminator board is inserted into the ACOM2 connector properly the plug is on the left (toward the 6 position switch). For additional connection and use information, refer to the ACOM2 addendum. Probe connections are show on the last page of the ACOM2 addendum.

PROBE EXTENSIONS

Some Motorola microcontrollers, such as the 68HC08AS32, require more than eight connections to the microcontroller package pins in order to establish communication with the part. Two probe extensions (probe and wire) are provided with the kit for this purpose. Each probe extension allows an additional wire and probe to be attached to one of the 8 standard probes. Each single probe body has two connection pins. The second probe, using the extenion wire, is then attached to the appropriate pin on the part.

MOTOROLA MASK NUMBERS

In most cases the Motorola microcontroller <u>will not</u> have the industry standard part number printed on the package. It will instead have what is called a **mask number**. The mask number actually references the photo masks used when the part was fabricated. A mask number is a sequential 4 character group always consisting of a letter followed by two numbers then another letter. **EXAMPLE**: An airbag module has 4 lines of numbers printed on the microcontroller. The third line is 1J27F. This line contains the mask number; it is the last four characters. Use the mask number cross reference to determine the actual industry standard part number. In this case the **J27F** number crosses to a **MC68HC08AS32**. The corresponding EPROM+ device is the **HC08AS32**. Mask numbers in most cases are the only way to determine the actual part number. **NOTE:** A mask number may appear in any character string printed on the microcontroller package.