Mini Automotive Controller Installation & Operation Manual

Software Version 3

Draft of 6 June 2004

INTRODUCTION

The Mini Automotive Controller (MAC) is a small, multipurpose module designed to improve many different things about your car. Unlike traditional automotive controllers, the MAC does not try to do several things in a specific area of the car. Instead, it does exactly one thing to improve just one thing in some area of the car. With simple reprogramming, however, it can do something else, somewhere else. To improve several things at once, in several areas at once, you can install several MAC units and "code" each to perform a different task. Every MAC unit is electrically identical but each can do something different.

To add a MAC unit, you need to:

• decide what the unit should do,
• wire an application-specific harness into the car, and
• program the MAC to run your application.

The next few sections explain how to install and use a controller. Later sections give the details you will need to know for your application.

INSTALLATION

Look through the later sections and find your application. Wire in its harness as shown. Code the controller as explained in the next section then mount it using screws or cable ties, preferably so that you can still code it or at least watch its status LED.

CODING

Before you can use a MAC, you must program or *code* it to run your application.

1. Consult the section for your application and write down the number of "coding" blips it requires.
2. Plug in and power up the controller, by turning on the ignition if necessary if the section mentions that. Once it has power, the controller will start flashing its LED and you may begin coding.
3. Insert the blunt end of a ball point or felt tip pen in the hole next to the LED. A BIC™ or STABILO™ pen is fine. Gently press the switch inside until it clicks. The LED will start blipping. Hold the switch and count the blips until you reach the number your application requires, then release it.
4. Confirm the LED blips back the same number of times. After a brief pause, the blipping will repeat in case you miss a blip the first time around.

5. Gently press and hold the coding switch again for the same number of blips to confirm your application's code, then release the switch.

The LED should now either start to output longer, 0.25–0.75 s flashes or blip, just once, every few seconds. If it continues to output trains of 50 ms blips, the number of coding blips didn't match. Repeat steps 3–5 until the LED starts to blip once or flash for longer. The controller is now ready for use.

If you ever wish to reuse the controller for another application, uncode it before you move or rewire it by holding the coding switch for three blips. The controller will repeatedly blip three times to confirm it is uncoded.

OPERATION

Later sections explain how to operate the controller in your chosen application. Please note that it monitors how often and how rapidly it changes its outputs. Should you cycle its outputs too often too quickly – more than perhaps a dozen times over 10 s or twice that over a couple minutes – the controller will suppose an input is noisy and temporarily shut down. It will automatically restart if you do nothing for about three minutes. In some cases, it will also restart if you cycle the ignition.

FLASH CODES

To help troubleshoot problems, the controller continuously flashes its status and the status of its inputs and outputs. If its inputs and outputs are idle, or it has not yet been fully-coded, the controller outputs short, 50 ms blips every few seconds. It outputs:

1 blip if the controller is coded and all its inputs and outputs are idle,

3 blips if the controller is not yet coded,

4+ blips if the controller is partly coded for the application with that many blips. (Follow the procedure in the earlier CODING section to finish coding and run the application.)

Otherwise, the controller flashes a string of Morse code like, 0.25–0.75 s dots and dashes to show its active inputs and outputs. It flashes:

- • if input 1 is on (grounded),
- • • if input 2 is on (grounded),
- • • • if input 3 is on (at +12v),
- • • • • if input 4 is on (at +12v),
- — if one or more outputs is on.

For example, the controller would flash • • — if input 2 and an output are on. If this all seems a little abtract, the sections that follow will explain which switch or module produces what flash. To see how the flash codes work, play a little with the controller's inputs and watch how its LED responds.
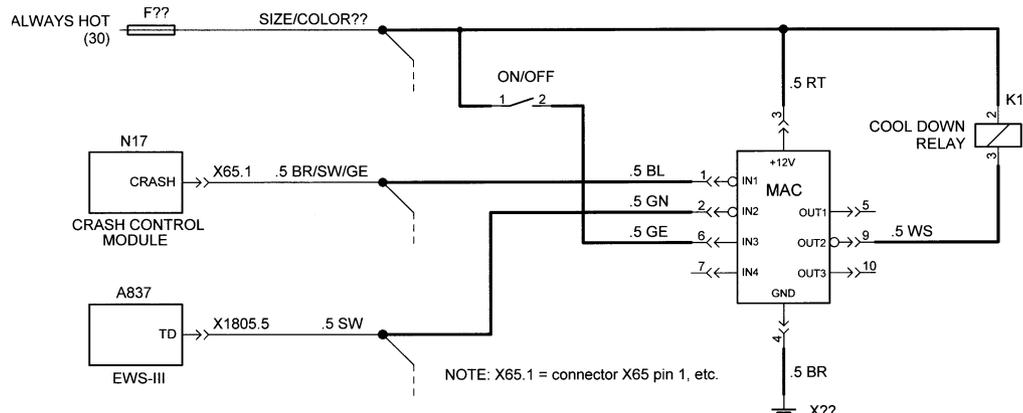
At any time, you can ask the controller to flash out the application you have chosen by briefly pressing the coding switch.

4 COOL DOWN TIMER

The Z3M coupe engine compartment gets quite hot after the engine is shut off. Monitor how long the engine has been run and, afterward, run the auxiliary cooling fan for long enough to cool things down. Start and stop cooling if an on/off switch is pressed.

WIRING

CODING

Hold the coding switch for 4 blips.

OPERATION

All times and speeds are approximate.

The controller automatically runs the auxiliary fan as needed for up to 30 minutes to cool the engine compartment after the engine is shut off.

After the engine has run 10–15 s, you may tap the on/off switch to toggle the auxiliary fan on and off. The fan will run with the engine and for up to 30 minutes afterwards.

A crash cancels any and all cooling.

For the curious, the controller runs the auxiliary fan for 10 minutes if the engine has been run for at least 5 minutes. It gradually runs the fan longer as the engine runs longer, up to a maximum of 30 minutes after the engine has been run for 15 minutes.

The controller assumes the engine cools down four times more slowly when the fan is off. If the engine ran for 15 minutes and then the fan was switched off, the controller supposes the engine is completely cold again after a couple hours.
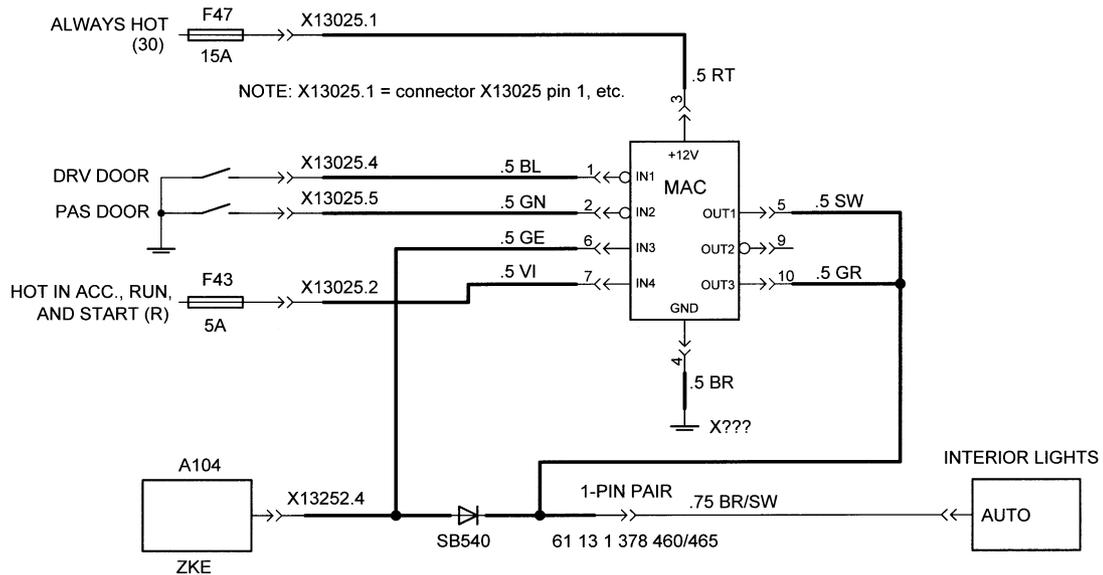
FLASH CODES

- Central module (ZKE) crash signal is active (connecting to ground).

- • Engine speed (tachometer) signal is active (changing at ca. 300 rpm or more)

- • • On/off switch is on (at +12v).

— Controller is running the auxiliary fan.

5 DOME LIGHT EXTENDER

The E36 3-series dome light stays on for just 16 s after the ignition is switched off at night. This may leave too little time to find and collect personal effects. Keep it on for two minutes.

WIRING

CODING

Hold the coding switch for 5 blips.

OPERATION

The dome light largely behaves as before only it now stays on for roughly two minutes after the ignition is switched off at night. The dome light may brighten or dim more quickly.
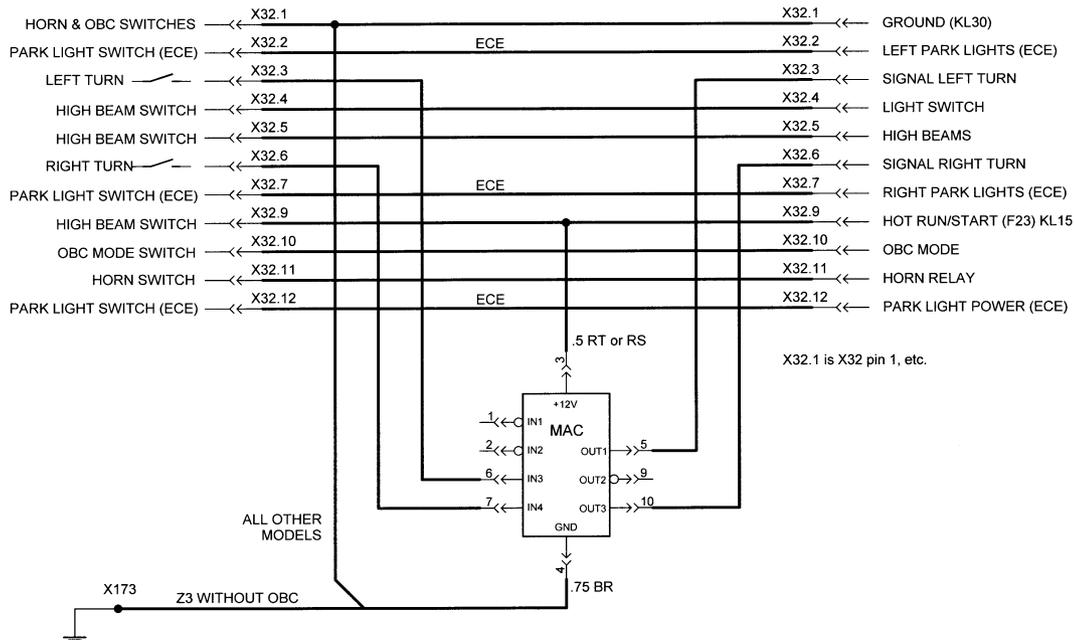
FLASH CODES

- • Driver door switch is on (connecting to ground)

- • • Passenger door switch is on (connecting to ground).

- • • • Central module (ZKE) dome light output is on (at +12v).

- • • • • Ignition (R) is on, at accessory, run, or start (position 1, 2, or 3).

- — Controller is driving the dome light.

6/7/8/9 LANE CHANGE FLASHER

Briefly tap the turn stalk of some newer European cars and they will blink the turn signals three times to signal a lane change. Add this to an E34 or E36 and allow either three or five blinks.

WIRING

CODING

For 3 blinks: switch the ignition to RUN (position 2) and hold the coding switch for 6 blips.

For 5 blinks: switch the ignition to RUN (position 2) and hold the coding switch for 7 blips.

For a car with very fast turn signals (faster than 105 flashes/minute): switch the ignition to RUN (position 2) and hold the coding switch for 8 or 9 blips to blink 3 or 5 times, respectively.

OPERATION

Press the stalk for less than a flash cycle (roughly 0.7 s) to blink 3 or 5 times.

Lock the stalk, or hold it until the second flash starts, to flash normally.

NOTE: Very hectic signaling, first one way then the other, not only confuses other drivers, it may not register with the controller. *Calmly* press and release the stalk if you are already signaling in one direction and wish to signal a lane change in the other.
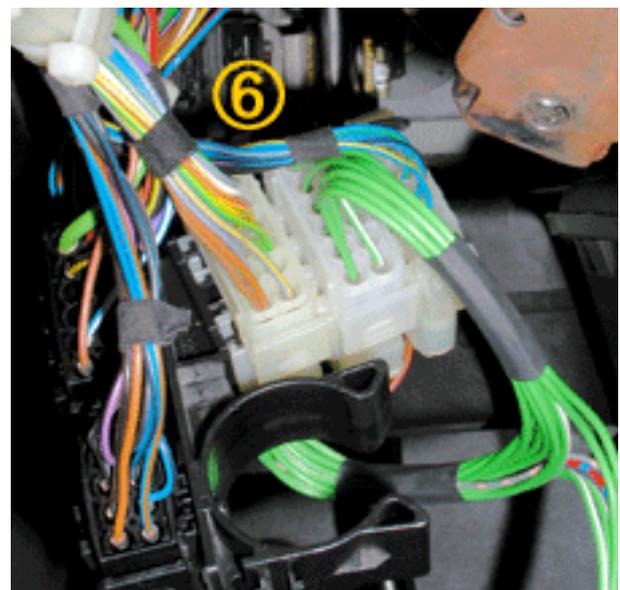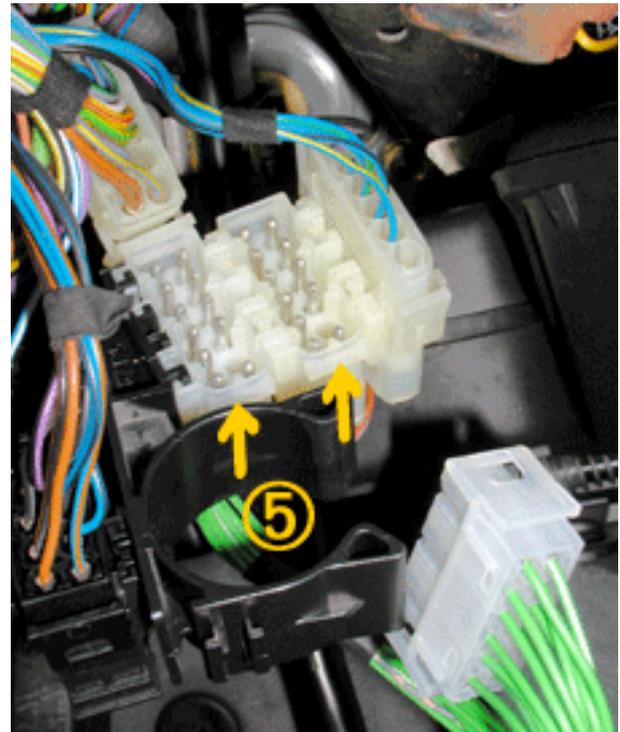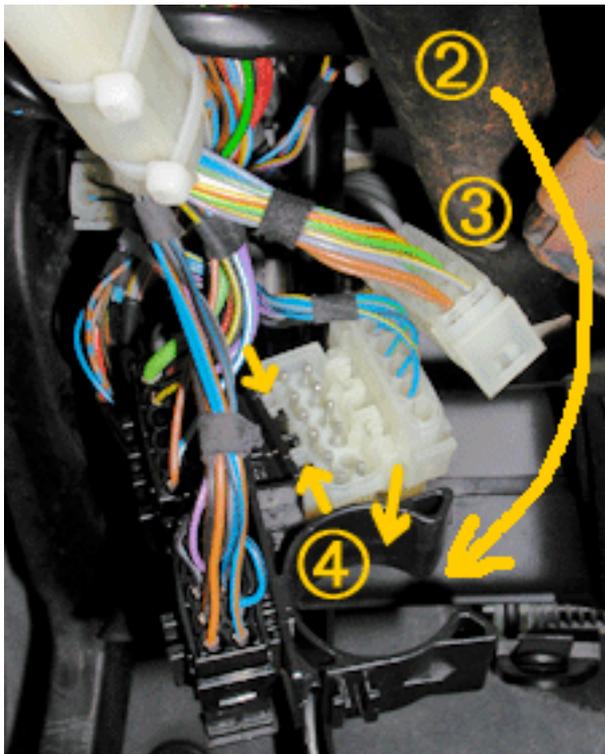
FLASH CODES

• • Optional disable switch is on (connecting to ground).

• • • Left turn switch is on (at +12v).

• • • • Right turn switch is on (at +12v).

— Controller is driving the turn signal/hazard lights module.

INSTALLATION

1. Remove the driver's kick panel and the U.S. knee protection panel.
2. Follow the stalk switch wiring as it emerges from the white raceway underneath the steering column and unclip the stalk switch connector cluster from the column.
3. Squeeze the sides of the large, white turn stalk connector and unplug it.
4. Slide off the connector it plugged into from the black steering column clip: hold the black clip in one hand, squeeze the white retaining hooks at the two arrows and push the white connectors down and off.
5. Clip the male, lane change flasher connector to the black clip by sliding it on from underneath. Then clip the old connectors onto it.
6. Plug the turn stalk into the new, lane change flasher connector and the flasher's female plug into the old, 12-pin connector.
7. Plug in the lane change flasher controller, turn on the ignition to run (position 2), and code the controller if it has not been already. Con-firm the horn and the turn stalk work, including the high beams and the OBC mode switch.
8. Mount the controller with cable ties in a convenient spot, for example, alongside the white raceway. Make sure it and the harness will clear the knee protection panel.
9. Reinstall the stalk connector cluster, knee protection panel, and driver's kick panel.

10/11/12/13/18/19 SPORT MODE

The S54 Z3Ms and E46 M3s have a sport mode. Add it to a Z3M and improve it on an M3. Each time the sport mode switch is pressed, take the engine controller (DME) in and out of sport mode and light or extinguish the instrument cluster SPORT lamp.
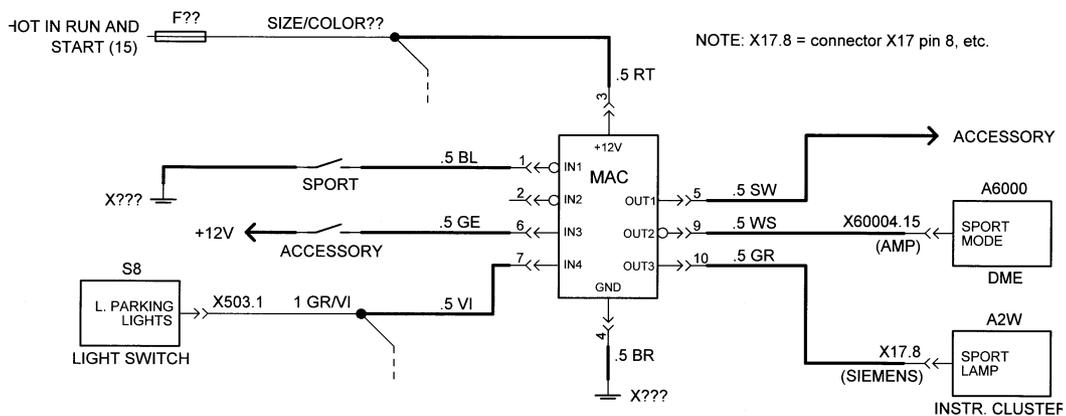
Support a second accessory switch that toggles an accessory on and off. Each time the switch is pressed, *either* pulse the accessory output *or* toggle it on and off. (See CODING).

Lockout or re-enable sport mode each time the sport mode switch is held for 5 s. Similarly, lockout or re-enable the accessory each time the accessory switch is held for 5 s.

When the ignition is switched on, *either* do nothing *or* pulse or turn on the outputs to restore sport mode and the accessory to how they were before. (See CODING.)

WIRING

CODING

Switch the ignition to RUN (position 2) and hold the coding switch for 10–19 blips:

Hold the coding switch for	To have the accessory output	And when the ignition goes on
10 blips	pulse	do nothing
11 blips	toggle	"
12 blips	pulse	wait 1 s and then restore sport mode and the accessory to how they were
13 blips	toggle	"
18 blips	pulse	wait 1 s and 4.5 s, respectively, and then restore sport mode and the accessory to how they were
19 blips	toggle	"

OPERATION

You may toggle sport mode and the accessory shortly after you switch the ignition to RUN (position 2).

Tap the sport mode and accessory switches to toggle sport mode and the accessory on and off.

Press and hold the sport mode switch for 5 seconds to lockout or re-enable sport mode. The SPORT lamp will go on, go off, or briefly flash and go out.

Press and hold the accessory switch for 5 seconds to lockout or re-enable the accessory. The accessory will toggle on, or toggle on then off.

PLEASE NOTE: if a switch does not seem to work, try pressing it for 5 seconds.

FLASH CODES

- • Sport mode switch is on (connecting to ground).

- • • Ignition appears to be off: this is an abnormal code and may signal a wiring or internal controller problem.

- • • • Accessory switch is on (at +12v).

- • • • • Parking lights are on (at +12v).

- ▬ Controller is driving the SPORT lamp or the accessory, or pulsing the DME or the accessory.
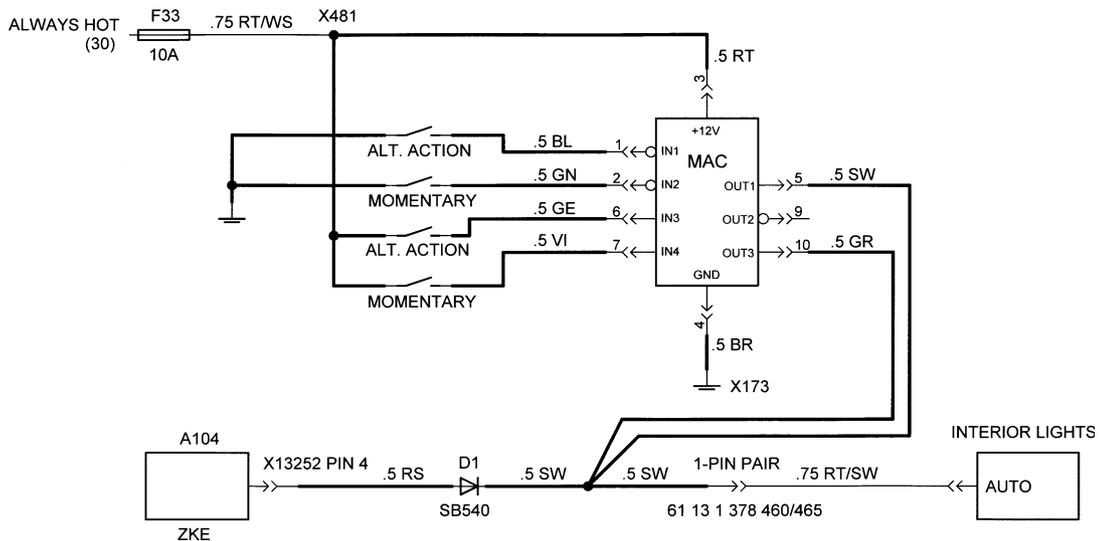
14/15 INTERIOR LIGHT TIMER

It is quite convenient to have a second rocker switch in the middle console to control the interior lights. Too convenient, actually. Although luggage belongs in the trunk, it sometimes strays up front, where it may hit the switch, turn on the lights, and kill the battery. Replace the rocker with an even more convenient momentary or alternate action switch. Turn on the interior lights for 15 minutes each time the switch is pressed.

WIRING

Do not wire switches to both Inputs 1 and 2. If both close, the controller will suppose the power has failed and kill the interior lights.

CODING

To have the lights turn quickly on and off: hold the coding switch for 14 blips.

To have the lights turn softly on and off: hold the coding switch for 15 blips.

OPERATION

Press a switch to turn on the interior lights for roughly 15 minutes. Press it again to turn them off. They will go off if the overhead dome light switch is not switched on.

FLASH CODES

- •   Switch to Input 1 is on (connecting to ground).

- • •   Switch to Input 2 is on (connecting to ground).

- • • •   Switch to Input 3 is on (at +12v).

- • • • •   Switch to Input 4 is on (at +12v).

- —   Controller is driving the interior lights.