

Scanmaster 2.1

for '86 and '87 Buick Turbo V6 and '89 Turbo Trans Am

Scanmaster Instructions

Power Up

On initial key-on, the right-most decimal point will flash quickly to indicate that data is being received. The Scanmaster version number will be displayed at this time. If no data is received the Scanmaster will turn itself back off.

Waiting Mode

Once synchronized with the datastream the display will change to “--- ---“ while waiting for the engine to be started.

Run Mode

When the engine is started the Scanmaster will enter RUN mode and will display O2 millivolt readings from the engine's exhaust oxygen sensor on the left display and retard degrees (detonation level) on the right display. If high-speed ECM data is detected (this is an option in the ECM chip) the display will update twice per second, triple the standard rate.

Expanded Modes

Pressing the MODE button (on the left of the display digits) selects expanded display modes. Which data is available is dependent on which display options are present in the ECM chip. Refer to the Expanded modes reference for details.

Record Mode

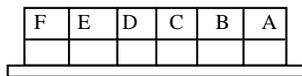
While in RUN mode, if the TPS (Throttle Position Sensor) voltage exceeds 3.00 the Scanmaster will enter Record Mode. In Record Mode the highest Retard reading and lowest O2 Millivolt readings will be stored along with the vehicle speed (MPH) that they occurred. The third decimal point (to the right of the Millivolt digits) will be lit during recording. The stored readings can be recalled anytime before the engine is turned off. (See Recall Mode) Pressing the REcall button while in Record mode will erase any readings stored, this is used to delete any captured false knock readings while racing. Note: Record Mode begins one second after the TPS voltage exceeds 3 volts, during this delay, the third decimal point will blink.

Recall Mode

While in RUN mode, pressing the RECALL button (on the right of the RETARD display) changes the Scanmaster to RECALL mode. In this mode any previously recorded O2 Millivolt and Retard readings will be displayed. The third decimal point will blink quickly. Pressing the mode button while holding the recall button displays the MPH values associated with the stored O2 and retard values. Turning the engine off will erase all stored data.

Installing the Scanmaster

1. Disconnect the battery negative cable under the hood.
2. Mount the Scanmaster inside the car on or under the dashboard radio “pod” or wherever is convenient.
3. Extend and connect the black wire to a “good” ground.
4. Extend and connect the red wire to a fused power source, the “IGN” terminal in the fuse box is a good choice.
5. Connect the White wire to the serial data signal at the ALDL connector under the dashboard. This signal is pin E, top row, second from the left. Either use a .125” blade spade connector, or crimp/splice to the orange wire going to pin E.
6. Reconnect the battery and test the Scanmaster.



ALDL Plug

Tuning with the Scanmaster

NOTE: the following are tuning hints derived from experience, however, racing and tuning for maximum power puts a huge strain on cars and engines and could cause damage. The manufacturers of the Scanmaster will not be responsible for damage to any car that might be caused by use or misuse of this information.

The primary tuning information used for tuning will be O2 millivolts and Knock Retard. O2 Mv gives us some information about the Air/Fuel ratio that is burning in the engine. Higher numbers represent richer mixtures (more fuel) and are generally safer. *Assuming sufficient octane*, most turbo Buicks run best with an O2 Mv reading of 750 – 770. As long as Retard stays low, less than 3 on pump gas, less than 1 on race gas, leaner mixtures (lower O2 Mv) usually results in more power although going lower than 720 Mv is not recommended. Pump gas usually requires 790 Mv or higher to prevent excessive retard. If tuning at the race track, tune for best MPH, since the ET will vary with traction. Vericom or Gtech tools can also be used.

Track tuning and adjustment:

1. Set the TPS (using the sensor mounting screws on the throttle body of the engine) for .42 to .44 at idle; 4.6 to 4.8 at WOT (wide open throttle)
2. Make a baseline pass, keep a notebook to track fuel pressure, boost pressure, and Scanmaster readings in high gear.
3. As long as the O2 Mv reading is above your target (~750mv) and knock retard is low, turn the boost level up a pound or 2 per pass until it is at the desired level. Watch the O2 and knock. A couple degrees of knock at a shift is acceptable as long as it goes away. If knock is excessive or increasing, abort the pass. “Its better to fix things before they break”
4. Once the boost has been turned up to the desired level, the Fuel delivery can be reduced until the car no longer gains performance or knock retard begins to increase. If you reduce fuel pressure and the car slows down or knock retard increases, return to the previous settings and recheck.
5. Keep notes on all your passes. Temperature and barometric pressure affect how the car performs. Accurate records will make future tuning a breeze.
6. Always make two passes to confirm each adjustment. The ECM needs to adjust to the new settings.
7. If major changes are made to the car’s configuration, start over. Turn the boost down and the fuel pressure up and begin tuning your new ‘combination’
8. Enjoy

Scanmaster version notes:

Loop status will be indicated by the decimal point in the retard display.
blinking indicated open loop operation.

Retard and O2 milivolt scaling. Different scantool will display this data differently. The scaling chosen for the Scanmaster will match that displayed by Direct Scan, OTC2000, TurboLink, and early OTC4000. OTC4000E, Diacom, Snap-on, and others will read higher in O2. Knock retard scaling varies widely also among scantools.

Scanmaster 2.0 supports optional datastream Y

Scanmaster 2.1 Supports optional datastreams Y and W.

Malfunction code reference.

Scanmaster datastreams from the ECM contain these Malfunction Codes.

Code number	Description	Typical cause
12	Missing reference pulses	Engine not running
13	O2 sensor slow to respond	Sensor unplugged or lead fouled
14	Coolant temperature sensor high	Bad sensor or grounded wire
15	Coolant temp sensor low	Bad sensor or unplugged
21	TPS sensor high	Bad/misadjusted sensor, bad wire
22	TPS sensor low	Bad/misadjusted sensor, bad wire
23	Air temp sensor low	Bad/unplugged sensor, broken wire
24	Vehicle speed sensor	Bad speedometer, broken cable
25	Air temp sensor high	Bad sensor, grounded wire
31	Wastegate solenoid	Blown fuse, bad solenoid, broken wire
32	EGR	Bad or unplugged EGR solenoid or module
33	MAF sensor signal too high	Bad Mass AirFlow sensor
34	MAF sensor signal too low	Bad or unplugged MAF sensor
41	Cam sensor	Bad or unplugged Cam sensor.
42	EST circuit failure	Bad ignition module or wiring. Bad ground
43	ESC circuit failure	Bad ESC module or wiring
44	Oxygen sensor lean	Bad O2 sensor, wires, vacuum leak, exhaust leak, wrong chip, fuel pressure too low
45	Oxygen sensor rich	Bad O2 sensor, wires, wrong chip, fuel pressure too high
51	Prom error	Bad chip or socket
52	Cal-Pak error	Bad/missing Cal-Pak, bad socket
55	ADU error	Bad ECM

Scanmaster Expanded display modes

Pressing the left “Mode” button selects the expanded mode. Pressing the right button returns the display to normal(run) mode. During expanded mode operation the left display will identify the mode being viewed while the right display will show the data.

Left Display	Mode description	Range values	note
AF	AirFlow (MAF reading)	0-255	
L8	LV8, engine load	0-255	
bAt	Battery Voltage	0-25.5	
Int	Integrator	100-150	short term ECM learning
bL	Block Learn	100-150	long term ECM learning
MPH	Vehicle speed	0-255	
CLt	Coolant temp	-40 – 300	
AtS	Air Temp	-40 – 300	
r	RPM	0-6350	
tPS	Throttle position sensor	0-5.00 volts	set to .42 at idle and 4.6-4.8 at WOT (engine off)
IAC	Idle Air Control	0-150	
cc	Cross Counts	0-255	running count of o2 sensor transitions
PL	Injector Pulsewidth	0-50 ms	
SP	Spark advance	0-60 degrees btdc	
MAL	Malfunction codes		see table