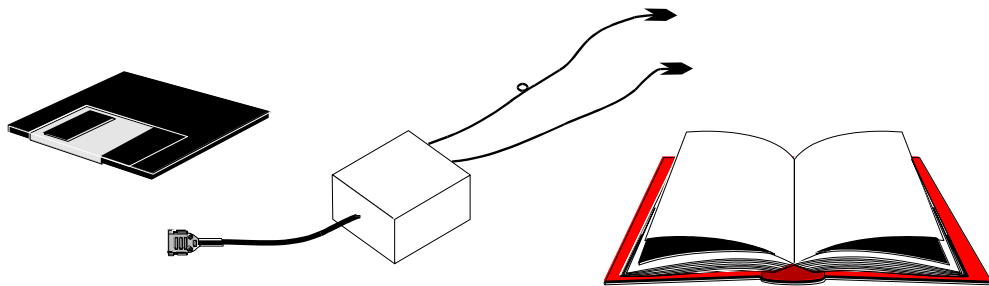


The Accutach Tachometer Calibrator/Tester

Instructions



Revision 1.0

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Mark Olson

**The Accutach Tachometer Calibrator/Tester
Instructions**

Table of Contents

Table of Contents.....	1
System Requirements.....	2
Installation Guide.....	3
Using the calibrate program.....	6
Using the sweep program.....	7
Bench power supply considerations.....	8
Serial port considerations.....	9
How to get product support.....	10

Disclaimer:

This calibrator/tester was designed to work with inductively-coupled electronic tachometers such as the Smiths type found in Sunbeam Alpines and Tigers. IT was also designed to work with direct-connected tachometers such as found with many aftermarket tachometers. This calibrator/tester was designed using optical and inductive coupling to minimize any chance of causing any damage to your PC. However, I am not responsible for any damage that might occur to your PC or your tachometer through the use or misuse of this product. Before you use this product, please check the readme.txt file on the floppy disk to see if there is any last minute information you may need.

Conventions:

Arial font is used to indicate what you should type on the keyboard.
Courier font is used to show what the computer puts on the screen.
<enter> means press the enter or return key on your keyboard.

The Accutach Tachometer Calibrator/Tester Instructions

System Requirements

The Accutach Tachometer Calibrator/Tester consists of a computer peripheral device and several computer applications programs. The computer it is used with must be an Intel compatible Personal Computer. It must have a 3.5" floppy disk drive. It must have a hardware-level compatible 9 pin serial port, either COM1: or COM2.

A computer with a 25 pin serial port can be used if a 25 pin to 9 pin adapter (not included) is used. You can purchase this adapter at a local electronic or computer retail store.

The operating system of the computer must be DOS. Unpredictable results can occur if any other operating system is used. Examples of other operating systems with unpredictable results include:

- DOS under Windows (any version)
- DOS under OS/2 (any version)
- DOS under HP's Application Manager

DOS computers without floppy disk drives (such as the HP LX100 Palmtop Computer) can be used if there is a mechanism for loading the software from a 3.5" floppy disk to the computer.

List of Parts

Your Accutach Tachometer Calibrator/Tester consists of the following parts:

- These Instructions
- The CSC (Current Switching Circuit) Unit
- A 3.5" floppy disk containing the software and documentation

The following optional items are NOT included with the Calibrator/Tester:

- Bench power supply
- 9 to 25 pin serial port adapter

These optional items can be purchased at a local electronic or computer retail store.

If the Accutach Tachometer Calibrator/Tester is to be used with a computer with a non-standard serial port (such as an HP 100LX Palmtop PC), other optional adapters such as null modem adapters or gender changers may be required. (See Troubleshooting Section.)

The Accutach Tachometer Calibrator/Tester Instructions

Installation Guide:

This section of the instructions will tell you how to install the Tachometer Calibrator/Tester software on your computer, how to connect the Tachometer Calibrator/Tester CSC unit to your computer and how to connect the CSC unit to your tachometer.

Installing the software on the computer:

Before you start, make a backup copy of your Accutach Tachometer Calibrator/Tester floppy disk. If you need help copying a DOS disk, please refer to your DOS manual.

If your PC has a 3.5" floppy disk drive, you can execute your programs directly from the floppy disk. No software installation is required. If you want to put the software onto the hard disk, simply copy all the files from the floppy disk to whatever hard disk directory you desire. You can also download the software from:
<http://accutach.com/Documents/TachCalibratorFiles.zip>

I created a directory called "TACH" on my hard disk and copied all the Accutach Tachometer Calibrator/Tester files to it.

Type `readme<enter>` to view the `readme.txt` file to get any last minute instructions or changes. Type `print readme.txt<enter>` to make a hardcopy of the `readme.txt` file.

Connecting the CSC to the computer:

The Accutach Tachometer Calibrator/Tester was designed to work on either the COM1: or COM2: serial port. Check your computer documentation to find the standard 9 pin D type male serial port connector(s). You may need to disconnect a modem, mouse or some other external peripheral device in order free up a port with which to use the Accutach Tachometer Calibrator/Tester. Merely connect the 9 pin connector on the end of the CSC cable to the available COM port, and make a note of whether you are using the COM1: port or the COM2: port.

If the COM port on your computer uses a 25 pin D type male serial port connector, you will need to buy a 25 to 9 pin adapter from a computer or electronics retail store. Be careful to ensure that the gender of the connectors is correct.

If your computer has a non-standard connector, as my HP 100LX Palmtop PC does, you will need to consult its manual or the dealer for the information you'll need to connect to the CSC unit. Connection to my HP 100LX serial cable can only be done using a 9 pin null modem adapter and a 9 pin gender changer. (See Troubleshooting Section)

Connecting the CSC to the tachometer:

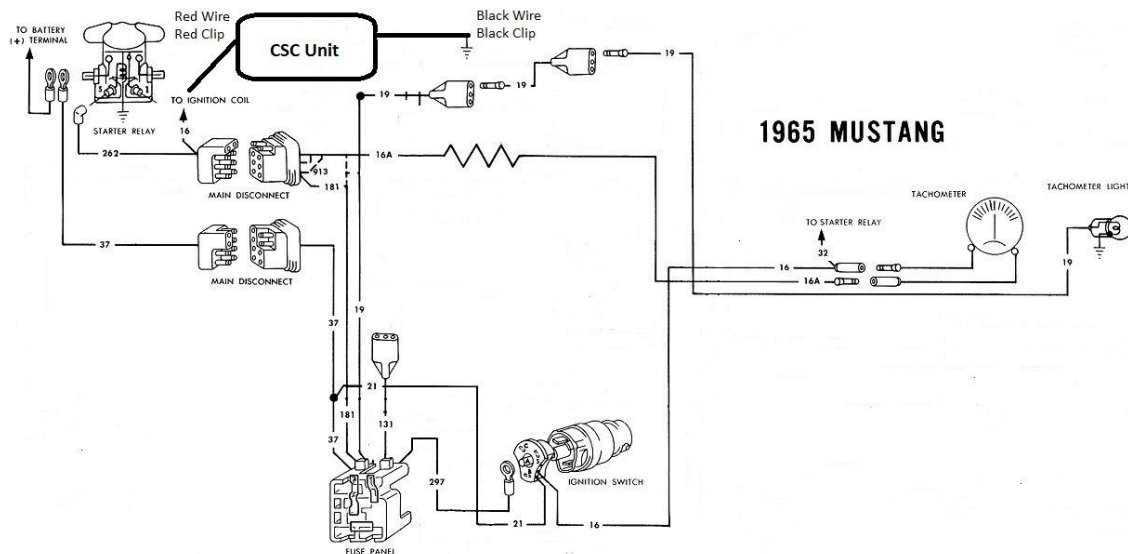
The Accutach Tachometer Calibrator/Tester Instructions

It is possible to test many tachometers in-car if you know each car's wiring. All tachs can be tested on the bench. You will need to obtain some sort of power supply in order to test or calibrate tachs on the bench. Please refer to the section entitled "Bench Power Supply Considerations" for a discussion of suitable and non-suitable bench power supplies.

There are two types of tachometers, inductively-coupled and direct-connected tachometers. If you are unsure of how to connect the CSC unit to the tachometer in question, please do not hesitate to contact us prior to using it as damage to the tachometer or calibrator can occur.

If the ignition wire runs through the tachometer between the battery and the ignition coil, such as with 64.5-67 Ford Mustangs, then the tachometer is inductively coupled. In this case, you will want to disconnect the ignition wire from the coil, and connect the red lead with the red clip from the CSC unit to the wire you removed from the coil. Connect the black lead with the black clip to a good ground. Make sure that you do not short the lead with the clip that has a different color from the wire to anything. The CSC unit will simulate the points in the car and will drive the tachometer to the RPM you select with the software.

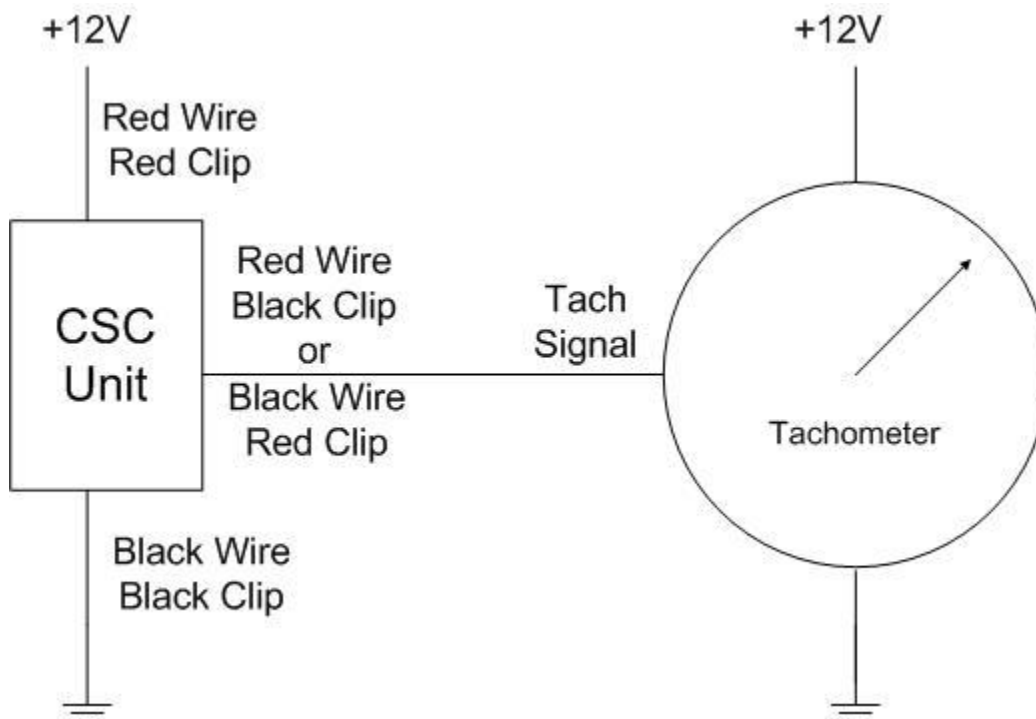
If you are testing such a tachometer on the bench, you will need to connect the positive tachometer wire to the +12V supply and connect the red clip from the CSC unit to the other tachometer wire. Some cars, such as the 64.5-67 Ford Mustangs have a resistor in series with the tachometer. In this case, that resistor should also be removed from the car and put in series with the signal between the tachometer and the CSC unit. The black lead with the black clip from the CSC unit should be connected to your power supply's ground. Again, make sure that you do not short the lead with the clip that has a different color from the wire to anything.



The Accutach Tachometer Calibrator/Tester Instructions

Direct-connect tachometers read the voltage on the points, rather than running current through the tachometer. With these systems, simply unhook the tach wire from the coil. Connect the CSC unit's lead with a different wire and clip color to the tach wire you removed from the coil. Connect the red lead with the red clip from the CSC unit to a +12 volts supply. Connect the black lead with the black clip to a good ground. The CSC unit will simulate the points in the car and will drive the tachometer to the RPM you select with the software.

If you are testing such a tachometer on the bench, you will need to connect the positive tachometer wire to the +12V supply and the tachometer ground wire to ground. Connect the red clip from the CSC unit to the +12V supply. The black lead with the black clip from the CSC unit should be connected to your power supply's ground. The lead with a different color between the wire and clip should be connected to the tachometer signal input.



Double check the power connections before turning on the power supplies.

Warning: The CSC unit dissipates 9W at 12V, so it gets quite warm if used for a long period of time with a 12V supply. In order to avoid overheating, you may not want to run the CSC unit at 12V for extended periods of time when the weather is particularly hot.

The Accutach Tachometer Calibrator/Tester Instructions

Using the calibrate program

There are 6 programs that can be used to calibrate tachometers, two for four cylinder cars, two for six cylinder cars and two for V8 cars. There are two programs for each type of car because one program is used if the CSC unit is connected to the COM1: serial port and the other program is used if the CSC unit is connected to the COM2: serial port. Be sure to select the disk and directory that contains the calibrator/tester programs. Also be sure you are not running DOS under Microsoft Windows, IBM's OS/2 or any other higher level operating system, or the timing signals will be uncertain. The programs are invoked by typing the following when at the DOS prompt:

V8TACH1<enter> to calibrate a V8 tach with the CSC unit on COM1:
V8TACH2<enter> to calibrate a V8 tach with the CSC unit on COM2:
6CTACH1<enter> to calibrate a 6 cylinder tach with the CSC unit on COM1:
6CTACH2<enter> to calibrate a 6 cylinder tach with the CSC unit on COM2:
4CTACH1<enter> to calibrate a 4 cylinder tach with the CSC unit on COM1:
4CTACH2<enter> to calibrate a 4 cylinder tach with the CSC unit on COM2:

The computer will respond with the following:

```
Inductively Coupled Tachometer Calibration Program
```

```
Copyright (C) 1993, 1994 Mark W. Olson
```

```
V8 tachometer calibration on serial COM2: port.
```

```
Enter the desired RPM between 500 and 10000,  
or anything else to quit:
```

If you enter anything other than a number between 500 and 10000, the program will drop you back out to the DOS prompt again after displaying an error message. If you enter a number between 500 and 10000, the cursor will move to the leftmost character of the line and the computer will begin to send the timing signals to the CSC unit via the serial port. Once the program is running, the computer will continue to send the timing signals until a key is pressed on the keyboard. The key that is pressed is passed to DOS, so you can get clever in ending the program. For example, if you end the program by pressing the F3 function key, DOS will put the last command executed in the command line for you. For example, if you want to check the calibration of the tach at another RPM point, just hit F3<enter> and you'll be back at the prompt for the new RPM you want to use. If I want to switch to another program, I terminate this one by pressing the space bar key.

The Accutach Tachometer Calibrator/Tester Instructions

I generally calibrate the tach at redline and then check and record the deviations at 500RPM intervals.

Using the sweep program

The sweep programs are used to sweep the tach back and forth between 500RPM and a maximum RPM that you enter. This is used to test the tach to see if there are any odd RPM points at which the tach fails. I've seen some tachs fail in small RPM bands that calibration at 500 RPM intervals wouldn't have found. It is also good to sweep the tach for a while in order to ensure that it continues to work as the electronics inside the tach warm up.

There are 6 programs that can be used to sweep tachometers, two for four cylinder cars, two for six cylinder cars and two for V8 cars. There are two programs for each type of car because one program is used if the CSC unit is connected to the COM1: serial port and the other program is used if the CSC unit is connected to the COM2: serial port. Be sure to select the disk and directory that contains the calibrator/tester programs. Also be sure you are not running DOS under Microsoft Windows, IBM's OS/2 or any other higher level operating system, or the timing signals will be uncertain. The programs are invoked by typing the following when at the DOS prompt:

V8SWEEP1<enter>to test a V8 tach with the CSC unit on COM1:
V8SWEEP2<enter>to test a V8 tach with the CSC unit on COM2:
6CSWEEP1<enter>to test a 6 cylinder tach with the CSC unit on COM1:
6CSWEEP2<enter>to test a 6 cylinder tach with the CSC unit on COM2:
4CSWEEP1<enter>to test a 4 cylinder tach with the CSC unit on COM1:
4CSWEEP2<enter>to test a 4 cylinder tach with the CSC unit on COM2:

The computer will respond with the following:

```
Inductively Coupled Tachometer Sweep Program

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V8 tachometer sweep on serial COM2: port.

Enter the desired RPM between 500 and 10000,
or anything else to quit:
```

If you enter anything other than a number between 500 and 10000, the program will drop you back out to the DOS prompt again after displaying an error message. If you enter a

The Accutach Tachometer Calibrator/Tester Instructions

number between 500 and 10000, the cursor will move to the leftmost character of the line and the computer will begin to send the timing signals to the CSC unit via the serial port. Once the program is running, the computer will continue to send the timing signals until a key is pressed on the keyboard. The program will continue its current sweep until it has swept up to its maximum and back down to 500RPM before it stops and drops you back to the DOS prompt. The key that is pressed is passed to DOS, so you can get clever in ending the program here as well. For example, if you end the program by pressing the F3 function key, DOS will put the last command executed in the command line for you. For example, if you want to sweep the tach to another maximum RPM point, just hit F3<enter> and you'll be back at the prompt for the new RPM you want to use. If I want to switch to another program, I terminate this one by pressing the space bar key.

Bench power supply considerations:

On the bench, you will need a good, well-regulated power supply to power the tach and the CSC unit. The tach requires a well-regulated 12V supply while the CSC unit requires a 5V to 12V supply.

I don't have power consumption specifications for the tachs, but they don't seem to require too much current to operate. However, it is very important that the 12V supply to the tach be a very clean, steady 12V. Ripple or noise on the power signal will confuse the tach completely. A 12 battery charger can't be used, for example, because there is far too much ripple in the power supply and it can't respond well to sudden changes in current.

The CSC unit uses almost no power when it is not being driven by the computer. However, when the calibrator/tester is driving the tach, the CSC unit draws a maximum current of 3/4 Amp if powered by a 5V supply to 1.5 Amps if powered by a 12V supply. Since the timing signal from the computer keeps the maximum current duty cycle at 50%, the power dissipation is to 2.1W if powered by a 5V supply and 9W if powered by a 12V supply. Clearly, the CSC unit will run considerably cooler when powered by a 5V supply.

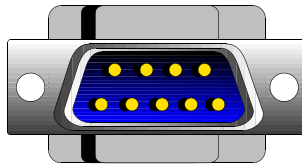
A 12V car battery is a very well-regulated power supply for bench testing tachs, but it is big, dirty, and difficult to hook a cliplead to. An ideal bench setup is a small, regulated 12V supply for powering the tach and a separate, larger well-regulated 5V supply for powering the CSC unit.

The power supply in your computer should NOT be used, as the calibrator/tester could easily overload your supply or inject noise into the system that could cause your computer to have severe problems. I have tried using a power supply out of an old original IBM PC (Not even a PC-XT.) The switching regulator didn't respond well to the demands of the calibrator/tester. More modern, higher power personal computer supplies may work better, but you'll have to check it out yourself.

The Accutach Tachometer Calibrator/Tester Instructions

Serial Port Considerations:

Personal computer serial ports are either 25 or 9 pin male D type connectors. The Accutach Tachometer Calibrator/Tester uses a 9 pin female D type connector on the end of a cable to interface to the computer. If your computer uses the standard 25 pin connector, you must buy a 25 pin female to 9 pin male serial adapter or cable. The serial port standard for both is that the computer will transmit data on pin number 3 and receive data on pin 2 of the connector. In the case of some computers, cables and adapters, pins 2 and 3 are reversed. Your equipment **MUST** supply transmitted data from the computer on pin 3 of a 9 pin male serial connector. In some cases you will need a gender changer adapter or cable, in others you will need a null modem adapter or cable and in some case you will need both. Most likely, though, your computer will be standard.



**The Accutach Tachometer Calibrator/Tester
Instructions**

How to get product support:

The Accutach Tachometer Calibrator/Tester is a very robust design and should give you years of very good service. If it breaks due to anything other than flagrant abuse, I'll repair it or replace it at my option for five years after purchase. You only need to pay the shipping and handling both ways.

Before you send it back, write or give me a call to see if we can debug things first.

I can be reached for support in the following ways:

US Mail: Mark Olson
 5467 Glennan Ct.
 San Jose, CA 95129

Internet: molson@accutach.com

Day Phone 1(408)7398-2804