



# **Model 36 Chronograph**

## **User's Manual**

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## Model 36 Chronograph

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**Revision History:**

## CHAPTER 1

# Quick Start

The Oehler Model 36 must be used with a Windows PC. Operation of the Model 36 is centered about the display and keyboard, not switches and knobs. We've made operation as intuitive as we know how, but you still must read the instructions. If nothing else, please read this quick start section. We've given you a new rope; you can swing like Tarzan or just swing.

### Quick Start

1. Install the software on your Windows PC using the disk provided. If the installation does not start automatically, run setupM36.exe.
2. *Run the Model 36 program before you connect the USB cable.* This will install the proper USB driver. Connect Model 36 to PC using the USB cable. Connect the screens.
3. Run the Model 36 program again. There may be a slight delay as the PC and Model 36 shake hands for the first time.
4. From the **Model 36 – Main Display** window, select the Setup button. From the menu, select **New/Edit Test Template**.
5. From the displayed green bars, select the desired mode of operation and go to the **Next** screen.
6. On the setup screen, the distance from Screen 1 to Screen 3 is critical and must be entered correctly. All other information is for your test records and is optional.
7. You can either use the displayed name for the test or you can assign a new test name. Hit the **Finish** button.
8. After you are returned to the **Main Display** window, hit the **Test** button.
9. If **Machine Gun Chronograph** mode was selected, you will be asked to enter the maximum expected rate of fire and the minimum expected velocity.
10. A pop-up window will show the PC initializing the Model 36. At completion, hit the **Begin Test** push-button.
11. The **Testing Display** will show a green **Ready** indicator at the upper left along with a diagram of your setup and column headings for your results.
12. Fire your shot through the screens. Results will be displayed and accented.
13. Results can be omitted by hitting the **Omit/Restore** pushbutton or the **O** (oh, not zero) key. Omission will be indicated by dashes across the data. The function will toggle.
14. You can hit the **Summary** button at any time to pop up a statistical summary window.
15. At the end of your group you can either go directly to a **New Group** or go back to the **Main Display**.
16. If all else fails, hit the **Help** button to display the instruction book. You can start with the Quick Tour on page 2.

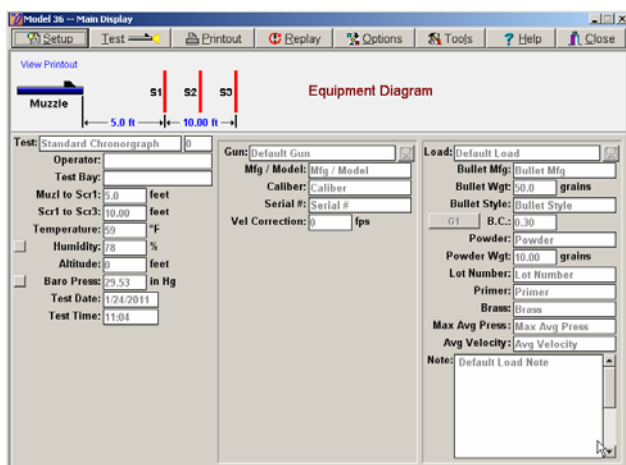
## CHAPTER 2

# Quick Tour

The best way to learn this system is to install the program in your computer and play along as you read these instructions. Replay some of the tests we've already fired, print them out, and then pretend you're setting up and firing tests of your own. You won't break anything.

Exit from all other applications and install the Model 36 software provided. Operation has been tested with 2000, XP, Vista, and 7 (both 32 and 64 bit). Operation with Windows 98 and NT has not been tested. **Run the Model 36 software before you connect the USB cable.**

The Model 36 program will start with a title window over the main display. Just hit the OK button to remove the title window.



**Main Display**

The main display shows the test set-up and conditions, the description of the gun and description of the tested load. From the main display you can select the **Replay** action with the pushbutton.

Rec #	Test Name	Group #	Shots	Measured	Date	Gun Name	Load Name
2	Standard Chronograph	1	20	mv, time	1/24/2011	Default Gun	Default Load
4	Burst Chronograph	1	37	Burst rate	1/15/2011	Default Gun	Default Load
6	Burst Chronograph	2	87	Burst rate	1/22/2011	Default Gun	Default Load
7	Rebound Chronograph	2	10	C.O.R.	1/18/2011	Default Gun	Default Load
8	Rebound Chronograph	3	20	C.O.R.	1/18/2011	Default Gun	Default Load
9	Rebound Chronograph	8	20	C.O.R.	1/18/2011	Default Gun	Default Load
10	Standard Chronograph	7	20	mv, prf, time	1/24/2011	Default Gun	Default Load
11	Rebound Chronograph	10	20	C.O.R.	1/24/2011	Default Gun	Default Load
12	Standard Chronograph	8	10	mv, prf, time	1/24/2011	Default Gun	Default Load

**Replay Test List**

Here is a list of the previously fired tests. Highlight the test you want to see and initiate the replay of that test with either a double-click on the selected test or a click on the **Replay** button after a test is selected.

Rnd	Vel13	Prf	Time13
1	2500	0	4000
2	2500	0	4000
3	2500	0	4000
4	2500	0	4000
5	2500	0	4000
6	2500	---	4000
7	2499	---	4001

Summary for test: Standard Chronograph			
---Muzzle---			
Avg	Vel13	Prf	Time13
2500	0	4000	
SD	0	0	0
High	2500	0	4001
Low	2499	0	4000
ES	1	0	1

**Replay Test Window**

This is the test screen that you would have seen at the completion of the firing. You can see the schematic of the test setup and the numeric value of each test parameter of each shot. Use the scroll bar to see up to twenty rounds of the test.

Summary for test: Standard Chronogr...			
---Muzzle---			
	Vel13	Prf	Time13
Avg	2500	0	4000
SD	0	0	0
High	2500	0	4001
Low	2499	0	4000
ES	1	0	1

### Summary

Here is the statistical summary of all parameters just as if you had requested the summary at the end of the test. If the size and resolution of your display permits, you can move the summary window to uncover the primary test window. Leaving the summary window open during an actual test provides an up-to-date running summary after each shot is fired.

The Omit/Restore pushbutton will alternately omit the data from a round from the summary, or it will restore the data from a round to the summary. Omitted rounds will have a line drawn through the numeric data.

The Main Display pushbutton returns you to the Main Display window. In this window you can observe the complete set-up conditions for the test you just replayed. The left-hand column contains the administrative information on the test. The middle column includes all the essential information on the gun. The right-hand column contains the information about the ammunition.

Go back to the Main Display and replay a few more different tests. Play with all the buttons just to become familiar with the actions.

To print a previously fired test, follow a similar procedure. You just hit the Printout button instead of the replay button while you are in the Main Display window. Select the test to be

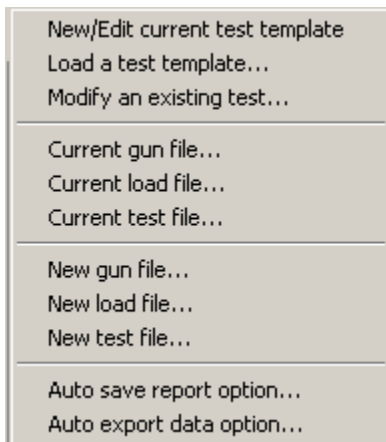
printed with a double-click, push the Printout button. The Preview button is selected by default, and an OK will show the preview on your screen. If you really want the report printed on paper, select the Printer pushbutton instead of the Preview button.

Now that you've replayed some of our tests, and printed copies of our reports, it's time to do your own test. Start from the Main Display window using the Setup pushbutton. The setup pushbutton will pull down a list of confusing terms. (If you've used the Oehler 43, 83, or 84 you will be right at home.)

In the Model 36 program, we refer to the description of a test as a template. A test template is the complete description of a test *excluding* the actual firing data. The template describes what parameters are to be tested, what test equipment is used and how it is arranged (screen spacing), environment (temperature, wind, barometric pressure, ...), gun description, and load description.

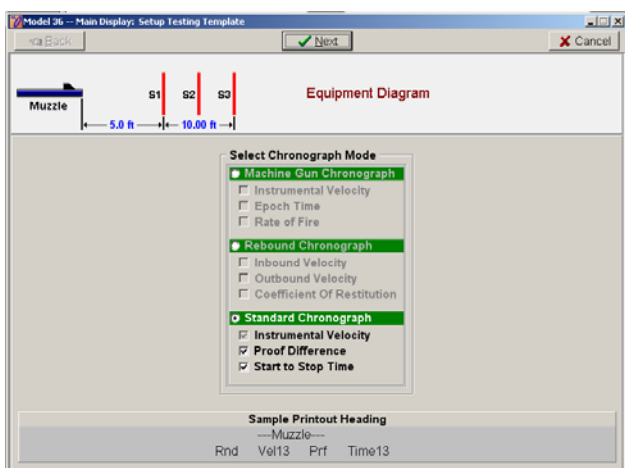
*You must have a test template prior to each test. You can continue using an existing test template, you can modify an existing template, or you can edit an existing template and rename it to make a new template.*

When you are testing, each test will probably be very much like the previous one. You might change powder charge between tests, or the temperature may change, or you might grab a different gun, but chances are you won't change the whole setup. The program works just like that.



### Setup Pull-down List

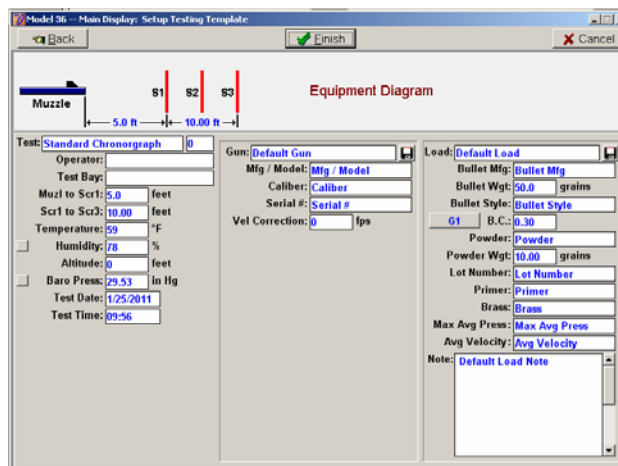
From the Setup pull-down list, choose the New/Edit current test template option. This will bring up the Setup Testing Template window.



### Setup Testing Template

In this window you first select the mode in which you want to use the Model 36. Press the button on the appropriate green bar. In the **Standard Chronograph** mode, you can select the columns you wish to display. In the other modes, display output is fixed.

Proceed to the next screen with the Next button.



### Main Display – Parameter Entry

**Note that this is the only place in the program that you can enter or modify the test conditions, gun information, or load information.**

We check and change the parameters from top-to-bottom, left-to-right. The tab key naturally moves you this way.

**The test name is very important.** The name, with the group number, is used as the file name when the test data is stored in Excel or .pdf format. The appropriate generic extension is appended to the test name. The test name is limited to thirty characters to prevent bloated file names. It is the responsibility of the user to define a naming convention. You may end up with hundreds or thousands of test reports stored in a single folder. When you look for a report or data for a particular test, it will be more convenient if the computer sorts the file names into similar groups. We suggest that the ammo headstamp name (without spaces or punctuation) form the initial part of the test name. Following the headstamp, we suggest that you indicate the nature of the test. For instance V could indicate standard velocity tests and B could indicate machine gun burst tests. Following the nature of the test, we'd suggest

the bullet weight in grains. Each user and installation will have its own preference of the hierarchy in test names. It's your decision. The computer doesn't care what names you use, but it will use its standard rules to sort them. Think about it before you start.

Enter the test conditions in the left column. Don't worry about correct date and time; they will update when a test is fired.

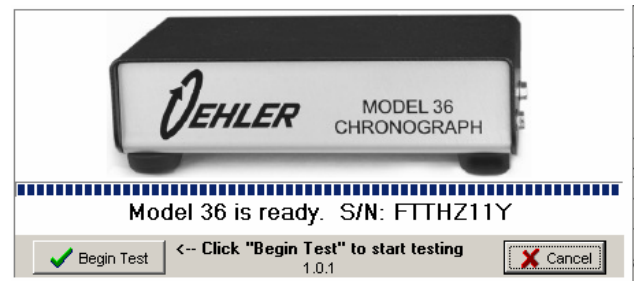
Advance to the Gun column. Again, plan ahead when choosing a gun name. We always start with the headstamp (no punctuation or spaces) and then add descriptors as needed. Getting all your 308W guns in one group helps you locate any specific gun. Mfg/Model, Caliber, and Serial # are memo fields to the Model 36, but you might use them in Excel to analyze the Excel data to determine such information as total rounds fired through a barrel. The Vel Correction is assumed to be the result of barrel assessments and are included in the numeric velocity results reported by the Model 36. After you have completed the gun column, click on the little diskette button and Save your gun in the gun file. Next time you want to test with that gun, use the same button and Load the gun information.

As with the guns, we assign load names starting with the headstamp. We usually enter bullet weight as the second item of the load name, and we don't bother with entering decimal points, hyphens, mms, or grains. You might want to use product numbers or similar. After a load is entered, use the diskette button and Save it. It's easier to use the diskette button and Load a similar load and change one parameter than to enter a new load from scratch. All entries for the load are considered memo.

Much of the information entered for gun and load is not critical for testing, but it is critical for test documentation. You may not appreciate it now, but you will bless it months and years from now when you review your recorded data.

*After completing the entry of data into the boxes of the parameter entry screen, finish the process with the Finish pushbutton. This will typically bring up a warning that the test name already exists. You have the choice of either overwriting an existing test template (appropriate only if you are authorized to change the master template) or proceeding with the test using the edited template. Note that this will not change the template or raw data from a previously fired test, and it will not change the master template.. As each test is fired and recorded, template in effect at the time of the test is recorded along with the raw data.*

After the template is successfully accepted, you will be returned to the Main Display window. Push the Test pushbutton to start the test. This will establish and check the USB connection to the Model 36.

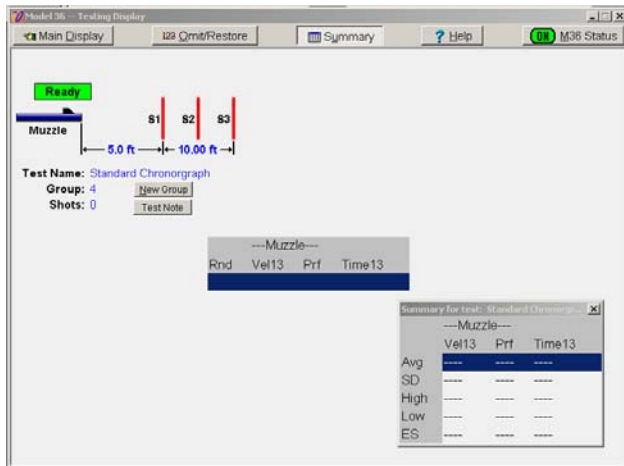


**Monitor Screen**

The monitor screen will be displayed. You will see a dotted completion bar under the picture of the Model 36 front panel as initial checks are performed. After the completion bar is finished, push the Begin Test button. You must allow the completion bar to finish.



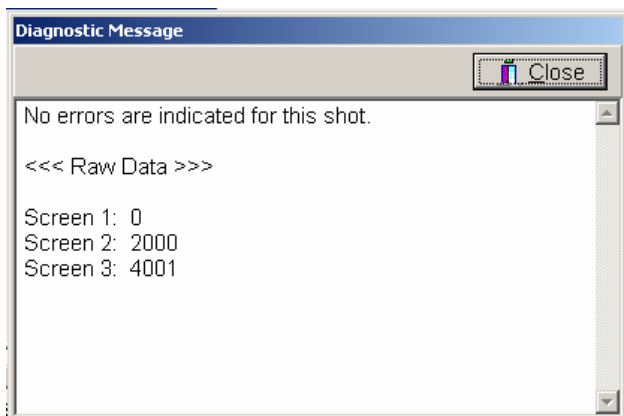
Leaving the diagnostic window shows the testing display.



**Testing Display**

The testing display is your window for actual shooting. You see the graphic picture of your test setup. Pay attention to the green ready light in the upper left of the screen. If the light shows steady green and Ready, the system is ready for you to shoot; if it's red or flashing, there are false triggers.

Fire the first shot and you should see the parameter value appear in each column. To get a diagnostic window, select and double-click on the round in question.



**Diagnostic Message**

The diagnostic message shows the times at which various critical events occurred. It is especially useful for isolating problems with

screens. All the times shown are in microseconds, and are referenced to the first recognized event. The times at which each of the screens triggered is shown in microseconds. Any expected event that did not occur is represented by - - - -.

If any line of shot data is overwritten by lines or dashes, it is considered to be omitted from the summary. When the Model 36 detects known abnormal data, it will automatically omit that shot. We use a special logic on the Omit function. If the last shot is shown as omitted on the display, the next shot will erase and overwrite it. This allows you to cleanly forget those shots obviously caused by warming rounds or by a false trigger or other such goof. Any previous shot can be omitted (removed from the summary), but it will not be erased. You can't remove all evidence of a shot just because you later decide that you don't like it. The data may be trying to tell you something even if you don't recognize it now.



**The M36 Status button located at the upper right corner is especially valuable. Any time you fail to get a response from a shot (due to a sensor malfunction, bad cable, etc.), push the M36 Status button. This will cause the system to send all available recorded data to the PC. You can then double-click on the displayed line and read the raw diagnostic information. The system will automatically reestablish the connection between PC and M36 and will continue the test in progress.**

## CHAPTER 3

# Main Display

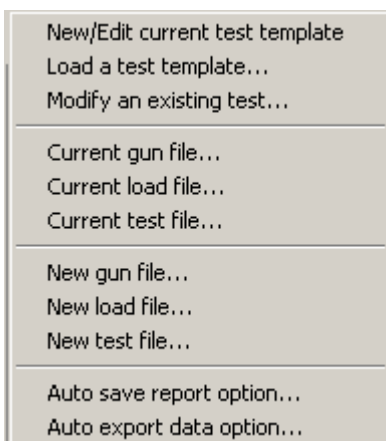
This chapter provides more details on setting up a test. For those who don't really believe in Windows, here are some old-fashioned printed instructions. If you are a Windows purist, we apologize for some of the constraints left in the program. For standardization, we have chosen to restrict some of the options sometimes available in Windows.

If you haven't taken the quick tour described in Chapter 2, we urge you again to take it now. It will help if you have your M36 program running as you read these explanations.

The Main Display widow is the center of the Model 36 software. Everything starts and ends at this window. You leave this window by pushing one of the buttons at the top, and the only controlled exit from the program is back through this window.

### Setup Options

The Setup button will bring up a list of options.



**Setup Options**

**You must go through the setup options prior to any test *except* when you are firing another group with the same gun and ammo under exactly the same conditions. It's the only place you can enter test information!**

The New/Edit current test template option lets you define what you want to measure, how your equipment is set up, the environmental conditions, gun information, and load information.

The Load a test template option allows you to load any previously defined template. You can add new groups to an earlier test, or you can load an earlier similar test to form the basis for editing. It is anticipated that users will keep common tests in a networked file to assure consistency between gunners and firing bays.

The Modify an existing test is a dangerous option. It allows you to correct a previously fired test for information or conditions entered in error. For example, you can correct the distance between screens on a velocity test. Upon any subsequent replay or printing, the test results will reflect the changes you make. You can edit test conditions, fill in extra blanks about the load, or make similar corrections; you can also demolish the validity of a test if you put in the wrong numbers. To note possible alteration of your original recorded data, any replay or print subsequent to a modification will include an "edited" flag in place of the date.

The Current gun file, Current load file, and Current test file options allow you to specify the files currently in use by the program. The program will typically search a folder for files with the .m36 suffix and allows you to select the desired

files for use. As a matter of habit, we use .m36 as the suffix for all of these files, and reflect the type of file in the prefix name. For instance, we would use Gundata.m36, GunRifles.m36, GunGage.m36, TestBarrels.m36 or similar names for gun files.

**The TestData.m36 files are particularly important. These files contain the “mother lode” information for each test, and should be backed up and treated as valuable. You can use the Model 36 software installed on any Windows computer with a test data file to replay or print the results of any test contained in the file. You can even print the test report and export both the pdf and Excel files. We suggest starting new test data files (for instance TestData2011.m36, TestData2012.m36, TestDataCharlie.m36 so that your files do not become excessively long.**

Here you will also enter the locations for Auto save report option ... and Auto export data option ... These folders will receive the *pdf* and *Excel* reports automatically generated at the end of each firing test.

The New gun file, New load file, and New test file options allow you to create the new files for any of the three functions. If you do a lot of tests, you will probably want to start segregating different types of guns, loads and test data into different test data files. For example, you may want to reserve certain names for networked files of standard test barrels [guns], standard cataloged ammo [loads], and output data from standard tests. Users may generate local files for nonstandard tests and conditions.

## Test Button

The Test pushbutton starts an actual firing test. It will establish handshaking between the PC and the Model 36. If handshaking cannot be established, the most common cause is the USB cable not properly connected. The diagnostic screen will indicate proper connection. If all else fails, then unplug, hesitate, and then replug the USB connection. By the time you get to the actual test screen, there isn't much to do except shoot when the light is green.

## Printout Button

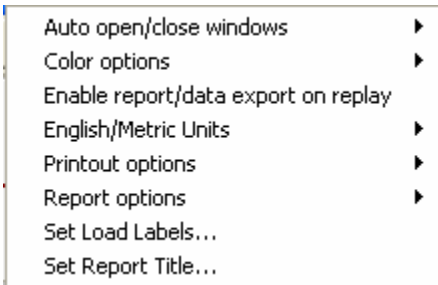
The Printout button of the main display is used to print or to view the results of fired tests. Select the test you want to print or view from the list. Hint: *The right mouse button will easily take you back to the last test you selected. You often want to go there. After one or more tests are selected for printing, hitting the PrintOut button will bring up the Report Setup screen. It will default to showing a preview of the printed report on the screen. If you want a real printed copy of the report, hit the printer icon at the top of the preview screen. If you don't hit the printer icon now, you'll have to go through the select process again and select the Printer pushbutton instead of the default Preview button.*

## Replay Button

The Replay button of the main display is similar in function to the printout button. It allows you to select from a test list and shows the screen of the actual test results with summary and ballistics available. The setup, gun, and load information for the selected test will be displayed on the Main Display when you return from the replay. You can get a consolidated report of both test results and the setup conditions with a printout.

## Options Button (Includes English/Metric)

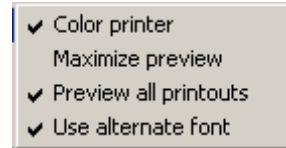
Under the Options button of the main display, you can change several appearance items.



### Options

Auto open/close windows provides for automatic opening and positioning of the Summary windows during a test. The Color options affect the display of the testing screen used during actual shooting. Printout options affect the content and appearance of the printed reports. Enable report/data export on replay allows the export of both report and data during replay. This function is especially useful if the test template has been changed to include measurement channels not included in the original report. English/Metric Units allows operation in either English or metric units. When the selection is changed, it takes effect only after you exit and restart the program. The same data file is used for both modes. You can test and print report and English units, change units, and then replay and print the same test in metric units, or vice versa. Report options allow choice between the standard report, a raw data report useful in diagnosing malfunctions, and a multi-report summary to summarize data from more than one test. The multi-report summary is most useful if a test of more than twenty rounds if required. For such a test, fire the test in twenty-round groups and then print using the multi-report summary. The statistics from all included reports will be combined and the summary sheet will reference all included reports. The Set Load Labels allows the entry of optional labels for two data fields in the load

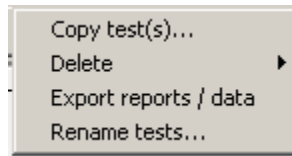
information. The Set Report Title option allows you to put your own report title (for instance, company name can automatically appear as the major heading of each printed report).



### Printout Options

Under the printout options you can make several significant selections. Checking the Maximize preview spreads the report preview over the entire screen. Checking Preview all printouts makes you look at a screen before it wastes a sheet of paper on a printout; it also slows you down when you know what you want to print or want to print multiple reports. Checking Use alternate font may help older printers.

## Tools Button (Includes Export to Database)



### Tools Options

Under the Tools pushbutton of the main display, there are several useful options. The Copy test(s) allows you to reorganize your tests and put test results into different test data files. The Delete function allows you to delete or scrap tests, guns, loads, or test templates. The Export reports / data option allows you to export test data in both *pdf* and *Excel* format to the folders specified in Setup. The Rename tests ... option allows you to rename your tests. **This can be dangerous!** If you rename tests, you assume responsibility that the changed names of the tests are reflected in all data files and reports.

## Close Button

The Close button lets you exit the program gracefully.

The Equipment Diagram of the main display gives you a picture of the test equipment used for the displayed template. It is automatically updated to show the distances and equipment specified in the setup.

## Entering Test Setup

For adequate documentation of each test, you should fill in all the little boxes of the main display. The distance between start and stop screens is essential. The other boxes may simply be desired for record. Just fill them all in; we guarantee that you won't have too much data years from now.

Test:

*Name the test with a unique name. Tests can be alpha-numerically sorted on all lists, so choose the first few characters carefully. This will determine the test order and grouping on all displayed lists. The box to the right of the test name is the group number of all those tests performed with this same template.*

Operator:

*The name of the gunner or operator is an optional bit of data.*

Test Bay:

*The number or name of the test bay is optional.*

Muzl to Scr1: feet

*Enter the distance in feet from the muzzle of your gun to the start screen.*

Scr1 to Scr3: feet

*Enter the distance between the start and stop muzzle screens. The standard SAAMI distance is 20 feet.*

Temperature: F

*Enter the current temperature in degrees Fahrenheit.*

Humidity: %

*Enter the relative-humidity percentage.*

Altitude: feet

*Enter the altitude at the firing range in feet above sea level. An accuracy of 100 feet is normally sufficient for ballistic coefficient calculations.*

Baro Press: in Hg

*Enter the current reported barometric pressure in inches of mercury. If you do not know the current pressure, use the standard value of 29.92.*

*Reported pressures are corrected to sea level. The program corrects the reported pressure to the actual pressure at your altitude. If you know the raw pressure at your location, hit the button to the left of the box and the program will then accept the raw pressure.*

Date: Time:

*The program automatically picks up the time and date from the computer when a test is fired. If the displayed time and date are not correct on your test report, you must reset your computer's clock.*

## Entering Gun Data

Most gun data is entered only one time for any gun, but it can be edited. Learn to use the little load and store icon located immediately to the right of the gun name box. It will save much time.

For the purposes of this program, we consider a test barrel as a gun. The entries saved in the networked gun file should be entered by the personnel responsible for reference ammo corrections.

The various entries in the gun file are.

### Gun Name:

*Enter the name of your gun. We find it most convenient to use the headstamp caliber numbers as the initial characters. That way it's easier to find guns in a list.*

### Mfg/Model:, Caliber:, Serial #:

*These entries are optional.*

### Vel Correction:

*Enter the barrel correction as determined by assessment. Otherwise zero.*

## Entering Load Data

All load data is for your memo use only. Load data may be reused many times. Again, it will be to your advantage to learn how to save and store loads in the load file. We would expect normal production loads to be stored in a networked load file.

### Load Name:

*As with guns, we prefer to start load name with the numerals of the headstamp designation, followed by any required alpha character, a space and the bullet weight in grains. This grouping makes it easier to find loads in the list. You may want to use catalog numbers or other product identification.*

### Bullet Mfg:

*This is optional.*

### Bullet Wgt: Gr

*This is optional.*

### Bullet Style:

*This is optional.*

### BC:

*This is optional.*

### Powder:

*This is optional.*

### Powder Wgt: Grains

*This is optional.*

### Lot Number:

*This is optional, but almost as important for your records as powder type and weight.*

### Primer:

*This is optional.*

### Brass:

*This is optional.*

**Max Avg Press:**

*This is optional and is simply for convenient reference.*

**Avg Velocity:**

*This is optional and is simply for convenient reference.*

Note that the last two above headings can be altered to record any other parameter of regular interest. See Set Load Labels under the Options list of the Main Display.

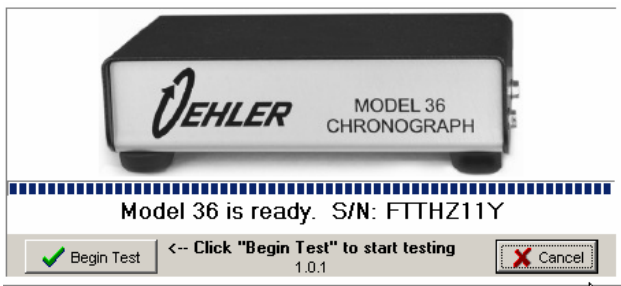
**Note:**

*You can add a short note about this load.*

## CHAPTER 4

# Testing Display

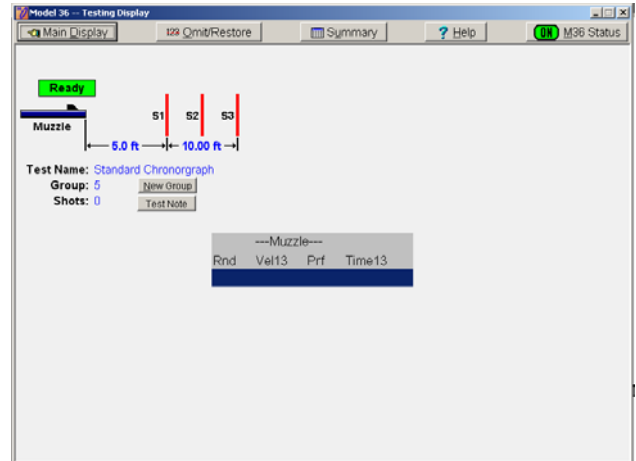
After the template is successfully saved, you will be returned to the Main Display window. Push the Test pushbutton to start the test. This will establish and check the USB connection to the Model 36.



**Monitor Screen**

The monitor screen will be displayed. You will see a dotted completion bar under the picture of the Model 36 front panel as initial checks are performed. The ready message includes the serial number of the USB input module and the version number of the firmware is located immediately under “Begin Test”. After the completion bar finishes, push the Begin Test button. You must allow the completion bar to finish to assure proper communication between the computer and the Model 36.

Leaving the monitor window shows the testing display.



**Testing Display**

The testing display is your window for actual shooting. You see the graphic picture of your test setup. Pay attention to the green ready light in the upper left of the screen. If the light shows steady green and **Ready**, the system is ready for you to shoot; if it's red or flashing, there are false triggers.

Fire the first shot and you should see the parameter value appear in each column. Soon after the shot, the ready light should return to green in anticipation of the next shot.

You can see the schematic of the test setup and the numeric value of each test parameter of each shot. Use the scroll bar to see up to twenty rounds of the test.

Across the top of the Testing Display are five buttons.

The Main Display button returns you to the Main Display window.

The Omit/Restore pushbutton will alternately omit the data from a round from the summary,



or it will restore the data from a round to the summary. Omitted rounds will have a line drawn through the numeric data.

If any line of shot data is overwritten by lines or dashes, it is considered to be omitted from the summary. When the Model 36 detects known abnormal data, it will automatically omit that shot from the summary. We use a special logic on the omit function. If the last shot is shown as omitted on the display, the next shot will erase and overwrite it. This allows you to cleanly forget those shots obviously caused by warming rounds, by a known false trigger or other such goof. Any previous shot, or shots, can be omitted (removed from the summary), but they will not be erased. You can't remove all evidence of a shot just because you later decide that you don't like it. The data may be trying to tell you something even if you don't recognize it now.

The Summary button pops up a window including a summary of all valid rounds fired.

Summary for test: Standard Chronogr...			
---Muzzle---			
	Vel13	Prf	Time13
Avg	2500	0	4000
SD	0	0	1
High	2500	0	4001
Low	2499	-1	4000
ES	1	1	1

**Summary**

If the size and resolution of your display permits, you can move the summary window to uncover the primary test window. It is convenient to leave it just below the testing display so that it shows an extra set of column headings at the foot of the numerical shot data. Leaving the summary window open during an actual test provides an up-to-date running summary after each shot is fired.

The Status button could just as well be labeled the *Question* button. If you fire a shot and get no response from the Model 36, pushing the status button will force the Model 36 to display all the information it knows regarding the last shot. After a response has been forced by the status button, highlight the last shot data and double-click. This will bring up the diagnostic window.

The diagnostic message shows the times at which screen triggers occurred. All the times shown are in microseconds, and are referenced to the first recognized event. Any expected event that did not occur is represented by - - - -.

The Status button allows you to re-enter the test in progress through the monitor screen window. It is most often used if communication between the Model 36 and the computer is interrupted.

The Help button is available for those hints you need to keep going.

The Test Note button can be opened at any time before, during, or after the test. The only restriction is that you must make your notes before you ask for a new group. This is the ideal spot for any alibis or other notes. These notes will be printed on the test report and will be available during any replay. Notes can be added or modified during replay.

If you make any changes in distances or other data during a replay, it is good practice to record such changes and reasons in the notes.

The New group Button. After you fire at least one shot, you can start a new group. The data from all shots is cleared from the screen and the group number increments as soon as you hit [N]. Use [N] to start a new group only if you have no comments to add to your existing group and you have no changes to make regarding

conditions, gun, or load. If you hit [N] and then exit to the setup screen, the setup screen will have the group number of the new group.

Any time you end a test with the new group button or otherwise, the system will automatically write the test report in *pdf* and *Excel* to the appropriate folders designated in setup. The test name and group number will be used as the file name. If the “raw” report option has been selected, then “raw” will be included in the file name.

### Measurement Channels

The column headings shown on the testing screen are those you previewed on the Setup screen. They may include:

- Rnd**  
*The round number of the shot within the test group.*
- Vel13**  
*The velocity measured from screen #1 to screen #3. It is commonly called the instrumental velocity.*
- Prf**  
*The velocity proof number. It is computed by subtracting VEL13 from VEL12. Ideally this number is both small and consistent. If the number is large ( say more than 5 fps) but consistent, it normally indicates an error in screen spacing. A consistently negative number, for example, indicates that screen#2 is too close to screen#3.*

If the system did not recognize proper input signals for any measurement channel, that measurement will be shown as dashes, --- . Highlight the shot and double-click to get the computer's guess of what went wrong on that

shot. If a shot record contains dashes instead of data, the shot will be automatically omitted. It can be restored and included with the group data by hitting the Omit/Restore button before the next shot is fired.

### Statistical Summary

The line items in the summary are:

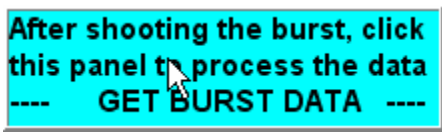
- Avg**  
*Average is the average or mean value of the valid shots. The average velocity is corrected for reference.*
- SD**  
*The standard deviation of the valid shots.*
- High**  
*The highest value among the valid shots.*
- Low**  
*The lowest value among the valid shots.*
- ES**  
*The extreme spread or the range between the highest and lowest values for the group.*

## Burst Rate and Muzzle Velocity

If burst rate and muzzle velocity are the selected measurements, you must answer two extra questions.

You are asked the maximum expected rate in rounds per minute and the minimum expected velocity in feet per second. Spacing between Screen#1 and Screen#3 must be at least two feet. You must be realistic in answering these two questions. Your answers will be used to compute the minimum time after the first bullet clears the stop screen until the second bullet reaches the start screen. We need at least three milliseconds.

At the testing screen you are instructed to fire the burst.



After the burst is fired, signal the computer by clicking the window. Your data will then be displayed in a window that can be scrolled.

Rnd	Epoch Time	Vel13	Rate of Fire
1	0.000000	2499	xxx
2	0.206968	2500	290
3	0.389652	2500	328
4	0.708230	2500	188
5	0.919104	2500	285
6	1.096152	2499	339
7	1.272508	2500	340
8	1.449402	2499	339
9	1.621241	2499	349
10	1.822809	2500	298
11	1.993176	2500	352
12	2.168853	2500	342

**Testing Display, Burst Fire**

The column headings are:

**Rnd**

*The number of the round fired. If you fire more than 400 rounds the system will show only the first 400 rounds.*

**Epoch Time**

*The elapsed time of each round from the beginning of the burst. If this time exceeds 999 seconds it recycles.*

**Vel13**

*The velocity of each round measured between screen#1 and screen#3.*

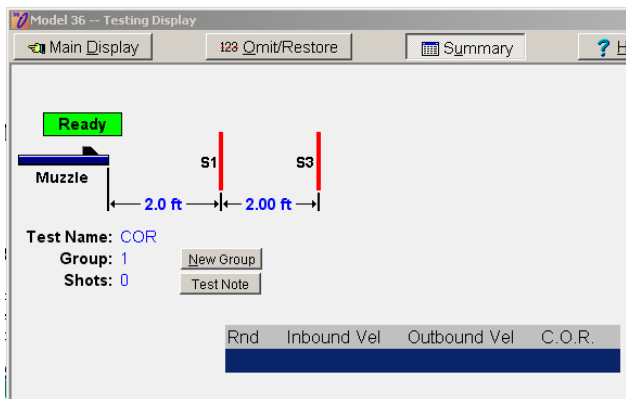
**Rate**

*This rate in rounds-per-minute is calculated based on the time between each round. You can compute the average rates for portions of the burst by using the differences in times and the number of shots between the times.*

In the burst rate mode you can still access the summary. In the statistical summary, the average rate of fire is computed as the average of all the individual rates of fire. You can compute ROF for the entire burst or segments by using the difference in epoch time for the desired beginning and ending rounds.

## Rebound Chronograph

The Rebound Chronograph mode is included specifically for testing of sporting balls. We do not expect bullets to rebound. The “coefficient of restitution” or COR is a common measure of performance, and is defined as the ratio of rebound velocity to inbound velocity. The typical test set-up will include two photoelectric screens (Typically Oehler Model 57 screens modified for low velocity use) mounted between the ball cannon and the rebound surface or plane.



After a ball is fired, the system will respond with the Rnd (shot number), Inbound Vel or the velocity of the ball inbound toward the rebound surface, Outbound Vel or the velocity of the ball outward from the rebound surface, and the C.O.R or coefficient of restitution measured for that shot.

The Summary window can be used to indicate the statistical summary of the velocities and the COR.

## CHAPTER 5

### Miscellaneous Topics

#### *Proof Channel<sup>tm</sup>*

There is nothing more frustrating in testing than having a velocity reading near what was expected, but still questioned. Was it the ammo, or was it the instrumentation. Screens work well under most conditions, but under certain conditions there will be errors. If you haven't yet found these conditions, you will. Errors are seldom, and we expect that users will forgive the system *if* the Model 36 indicates those shots that may contain errors. If the numbers in the *Proof Channel* columns, labeled PRF, are unusually large or erratic you know to look for problems in the velocity measurement.

A large number in the *Proof Channel* can be caused by inaccurate screen spacing (more than 0.2 inch error in mounting distance, screens not parallel, shooting a small bullet too high in the screen window, shooting too near the sides of the window instead of centered, **muzzle blast ahead of a subsonic bullet**, inadequate light due to dust and dirt accumulation, abnormally bright muzzle flash or tracers.

The *Proof Channel* is actually a second chronograph. On a standard chronograph with two screens, the first screen (Start) detects the bullet as it enters the screens. The second screen (Stop) detects the bullet as it leaves the screens. The chronograph measures the elapsed time between the signals from the Start and Stop screens, and reads out the velocity in feet-per-second.

The *Proof Channel* adds a middle screen (MID) and a second timing channel. The bullet's velocity is measured twice by each set of three screens, once by the first two screens (the proof velocity) and once by the first and third screens (primary velocity).

If screens are accurately spaced, the proof velocities should be very near the primary velocities and the PRF numbers will be small. If you do a sloppy job spacing the screens, expect larger (but often consistent) differences on each shot. If you have occasional large differences, they are probably due to false triggering from muzzle flash or blast from subsonic loads.

For example, if you move the middle screen just a quarter inch from the exact midpoint, you can see an increased difference between the primary and proof velocities as indicated by a larger PRF number. The *Proof Channel* shows the importance of accurate and adequate screen spacing. The reading of the PRF channel is comparable in size to typical errors in your velocity measurements.

## Subsonic Velocities

With velocities below the speed of sound, the muzzle blast wave reaches the screen before the bullet. This muzzle blast wave is like a lens traveling through the air at the speed of sound. The resulting light diffraction can trigger the screens. (The speed of sound is approximately 1060 plus the air temperature in degrees Fahrenheit, or 1130 fps at room temperature.)

Premature triggering of only the start screen will cause the primary velocities to be abnormally low and the PRF number to be negative. Premature triggering of both start and middle screens will cause the primary velocity to read abnormally low and the PRF number to be large and positive. Premature triggering of all three screens (a rare case) will cause the primary velocity to read near the speed of sound and the PRF to be small.

Subsonic blast problems can occasionally be cured by moving the screens farther from the muzzle. The only sure solution is to install a blast baffle midway between muzzle and first screen. This baffle should be a piece of plywood with a small hole or vertical slot to shoot through. We use a piece of plywood, 2x4 feet, standing on end and leaning on a single hinged leg. Cut a vertical inch-wide shooting slot from gun level to the top of the shield. Place the baffle about halfway between the muzzle and the first skyscreen. **Do not use a metal plate!**

## Model 76 Firing Simulator

The first step in trouble-shooting is to double-click on the high-lighted line of the suspect shot. This will display the times of the critical events of the shot and can be used to diagnose most problems.

The second step is the use of the M76 simulator. This unit provides signals of know timing and amplitude to emulate the responses of transducers, screens, and microphones for a complete firing test. It conveniently draws a line between the Model 36 and the sensors. If the Model 36 provides the expected response to the M76, look for problems with your input sensors or cables. If the Model 36 does not properly respond to the M76, call Oehler.

## Personal Reference Ammo

You can quickly check the operation of the chronograph portion of the system with an airgun. Velocities will range from approximately 225 fps for a kid's BB gun, to approximately 600 fps for adult match air rifles, up to over 1000 fps for some adult sporter air rifles. BBs and pellets are small, short, and slow. They provide a severe test of screen sensitivity, so you must shoot through the lower half of the screen window. If your system works with an airgun, but fails with larger guns, you can suspect problems related to muzzle blast or flash.

## APPENDIX A

### Correcting Data

Sooner or later you will have a test record in which you have entered the wrong distances, temperature, load information, or other data. You will want to salvage and correct the data for the actual conditions. It can be done but you should leave clear tracks of the edit in the notes section. The corrections entered will apply only to the one group.

A second application of this procedure is to examine different parameters recorded during the test. You can change the channels displayed during replay and printed on the report. The Model 36 will measure and record the data from all screens. By modifying the test setup to change only the channels to be displayed, you can observe data previously hidden.

Begin the correction process from the **Setup** pushbutton of the Main Display. From the menu, select **Modify an existing test**. Load the desired test and make any desired modification.

After you return to the Main Display, we urge you to **Replay** the test you just modified, and make notes describing the nature of the correction.

The corrected group has now been saved. **Replay** it for a quick look at the corrected data, or use **Printout** for a corrected copy of the test. The procedure makes accurate corrections for small errors in distances and conditions.

## APPENDIX B

### Calibration

There is no "Blessed" procedure for the calibration of the projectile velocity measurement systems. Iron-clad calibration of chronographs requires the use of projectiles of known velocity; such projectiles are simply not available. The calibration and use procedures outlined utilize the desired concepts of traceability whenever they are available and appropriate.

The accuracy of any digital chronograph system is primarily influenced by four considerations.

**Time Base Frequency** The actual frequency of the time base oscillator must be within expected tolerances of the nominal frequency.

**Digital Counting and Computation** The time required for the projectile to pass between start and stop sensors is determined by counting the cycles of the time base signal. Assumed distance is divided by the observed time to determine velocity. Such counting and computations are commonplace and are normally subject to gross failures but not small errors.

**Spacing Between Projectile Sensors** Because velocity is computed from the formula  $VELOCITY = DISTANCE / TIME$ , the distance is just as important as the time. It is often assumed that the distance is simply the mechanical distance between the screens. In reality, the true distance is the distance that the projectile travels between the electronic start and stop signals. This distance is practically impossible to measure exactly.

**Projectile Detection** The passage of a projectile must be detected at each sensor to mark the start and stop of the measured time interval. The time accuracy of this detection is

most critical to the velocity measurement, but the detection process occurs in the "use" environment and cannot practically be simulated in the calibration laboratory. Any errors or delays in the detection process directly influence the actual distance the projectile travels between start and stop signals. This is the most important, and the most ignored, aspect of chronograph accuracy and reliability.

#### Model 36 Specific

The time base frequency can be calibrated with conventional calibration laboratory procedures. Remove the cover, apply power to the unit, and measure the frequency of the signal of the crystal oscillator of the 40-pin 5213 module. The frequency of the oscillator should be 3.666666 MHz resulting in a clock frequency of 66.000000 MHz for the processor. This frequency is most easily measured at the terminals of the crystal using a 10/1 probe for minimal loading. If the frequency is within 0.015% of nominal (between 3.666116 and 3.667216 MHz), the chronograph is considered to be calibrated.

The digital counting and computation is assumed to be correct. No calibration is required or suggested. If verification is required, we suggest use of the Oehler Model 76 firing simulator as a source of trigger pulses at known time intervals..

The spacing between projectile sensors must be accurately determined during the operation and use of the system. Appropriate calibration and use of measurement devices is assumed.



## **Model 57 Photoelectric Screens**

We cannot provide a calibration certificate for the M57 screens simply because we don't know how to provide a "blessed" calibration. We can, and do, test function to assure ourselves and our customers that the screens will work for their intended purpose. Asking for calibration of the screens is almost like asking for a calibration of a pocket knife; safety, function, accuracy, etc. are so dependent on the user and conditions of use that the calibration certificate doesn't mean much.

Triggering a photoelectric screen with a light source driven by a specific electrical signal can yield a screen output at a measurable time delay. This test measures only the response of the electronic detector portion of the screen; it does not measure the performance of the light source or the optical path of the screen.

It is theoretically possible to calibrate screens using either micro-flash or high-speed x-ray triggered by the screen output to locate the projectile at the time the screen triggered. This procedure would be prohibitively expensive to implement, and would still demonstrate performance only in the laboratory environment with a projectile of a specific size, shape, and velocity.

In the practical world, measuring the velocity of common air rifle "BB" at 250 fps or faster is a realistic (actually very difficult) test of screen function and system operation. It's not a blessed calibration, but we've used it for forty years.

## **Redundant Measurements**

The difficulty of calibration leaves one suggested alternative. If the velocity measurement is critical, make a redundant measurement of the velocity at each shot. Either use a second system completely independent of the first, or compromise and use a third screen such as employed by the Model 36. The differences in the velocity readings from the two systems provide an intuitive measure of the accuracy of the measurements. Such an arrangement will usually detect the common errors caused by muzzle flash, muzzle blast, interfering light, or even the simple errors in screen

## APPENDIX C

### Firmware Protocols

The Model 36 supports the measurement of muzzle velocities in three modes, Standard Chronograph, Machine Gun Chronograph, and Rebound Chronograph.

#### Event Timing and Capture

The following time events are captured from one of four synchronized 32 bit hardware timers with a resolution of 1uS. Raw times are referenced to activation of the green “Ready” light.

- Velocities
  - Start S1                      Latched Rise Edge      Timer 2
  - Mid S2                        Latched Rise Edge      Timer 3
  - Stop S3                       Latched Rise Edge      Timer 4

#### Muzzle Velocity

The muzzle velocity routine returns three time stamps corresponding to Fire, Start, Mid, and Stop.

#### Burst rate of Fire

The Burst rate of Fire routine returns two time stamps, Start and Stop, for each of the first 400 rounds fired.

#### Rebound Chronograph

The Rebound Chronograph routine returns four time for each shot. It first indicates the times at screens S1 and S3 as the ball is inbound toward the rebound surface, and it then indicates the times at screens S3 and S1 as the ball rebounds from the surface.

## Communication Interface

### Hardware Interface

The hardware interface to the PC is an industry standard USB. The USB module is a Future Technology UM232R. The appropriate driver can be downloaded from their website, <http://www.ftdichip.com>

The RS232 control signals from the UM232R have been modified from usual convention. The DTR line is used to provide a “hard reset” to the Model 36 hardware. To absolutely reset the Model 36, set DTR line low for 5 milliseconds and then restore it to high.

### Application Programming Interface

The control characters used in the Model 36 are ASCII upper-case alpha. Communications are master-slave protocol with the Model 36 measurement unit as slave to the PC. The command and response character set is defined in Table 1 below.

Character	Software Command	Firmware
B	Burst Rate of Fire	Measure Burst Rate of Fire and Velocities
D	Dump Data Set	Send Full Data Set from last operation
E	Echo	Echo Last Command “E” - Verify USB Communications
N	Send Next Data Block	Hand shaking within the Data Dump Routine
R		Respond - Ready for Command
H	Velocity	Measure Muzzle Velocity Only
V	Rebound	Measure Inbound and Rebound Velocities
X	Abort current Task	Abort Task and Return to Ready
Z	Data Transfer Complete/Terminated	Hand shaking within the Data Dump Routine

**Table 1 Command control Character set**

After reset, the Model 36 enters the **Ready** state. It sends an **R**, and then continually polls the input for a command. The Model 36 always returns to the **Ready** state after completing a command.

Upon receipt of a character the firmware determines if it is a valid command.

Invalid commands are echoed back. The firmware then loops back into the **Ready** state.

Valid commands are echoed back. The program executes the appropriate measurement routine.

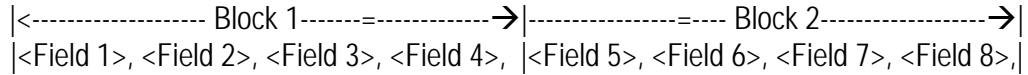
The **Measure Burst Rate of Fire** requires an additional input. Upon entering, the Model 36 polls for an 8 bit binary integer value. The routine accepts values from 3 to 255. All other values (0, 1, and 2) are rejected. All values are echoed. This value in milliseconds is used as a delay or hold-off time between rounds of a burst.

Upon completion any command, the Model 36 returns to the **Ready** state.

During the execution of any command, the Model 36 frequently checks for an **Abort** command. Upon receipt of the **Abort** command, the Model 36 builds an appropriate **Data Dump Set** for return to the PC, signals the PC with an **R**, and enters the **Ready** state in anticipation of a command to dump data.

### Communication Protocol for Data Dump

The data file is organized in Blocks and Fields. Each block contains four Fields. See file format definition below.



**Figure 2**

All Fields are comma separated. All data is formatted ASCII alpha or a formatted 32bit positive integer value, (0 through 999999999).

The Model 36 transfers a Block of data, then waits for a command **N** to transfer the next Block or a **Z** to abort Data Dump. The software can request multiple Blocks to be transferred by issuing multiple block transfer commands.

After transfer of the final block, the Model 36 will poll for an acknowledgment **Z** indicating that the file transfer is complete.

## Data File Format

### Block 1:

Field 1 = Last Command / Measurement completed

Field 2 = PS A Time Stamp at (Sample 81) or (Threshold Crossed)

Field 3 = 0

Field 4 = Field Count = 816

### Block 2:

Field 5 = Fire Time Stamp

Field 6 = Start Time Stamp

Field 7 = Mid Time Stamp

Field 8 = Stop Time Stamp

### Block 3:

Field 9 = Microphone 1 Time Stamp

Field 10 = Microphone 2 Time Stamp

Field 11 = Microphone 3 Time Stamp

Field 12 = Microphone 4 Time Stamp

### Block 4 => 103:

Field 13 = Burst Start Shot 1 Time Stamp

Field 14 = Burst Start Shot 2 Time Stamp

Field 15 = Burst Start Shot 3 Time Stamp

Field 16 = Burst Start Shot 4 Time Stamp

.

-----

.

### Block 104 => 203:

Field 413 = Burst Stop Shot 1 Time Stamp

Field 414 = Burst Stop Shot 2 Time Stamp

Field 415 = Burst Stop Shot 3 Time Stamp

Field 416 = Burst Stop Shot 4 Time Stamp

.

-----.

.

### Block 204

Field 813 = Reserved Status Code 1 =Q

Field 814 = Firmware Revision =100

Field 815 = Check Sum Field 2 => Field 812

Field 816 = "Z"

## APPENDIX D

### Model 36 Organization

The purpose of the Model 36 is to measure velocities of tested ammunition and preserve the results of these measurements in a form that is easily interpreted by the operator and is recorded for archives and future interpretations.

The Model 36 uses test names for each test. The test name consists of a root test name plus a successive group number of various tests fired using this name. You must be able to locate the results of previous tests, either by shuffling through many printed test reports or by searching in a computer. Fortunately, the gun and ammo industry has the names and a way to make the first sort of test results, test guns, and test ammunition. The headstamp name is unique, concise, and universally recognized. We urge that test names, gun name, and ammunition names use a headstamp name as the initial characters. To conserve space on lists and displays, we suggest that only numerals and letters be used without spaces or symbols. For instance, 308Win, 7RemMag, 7RemExp, 300WSSM, and 223Rem are recognizable and unique identifiers. If all test names begin with these characters, any search is narrowed considerably.

After a space, the nature of the test can be described. For instance, we'd suggest the following abbreviations.

- V Muzzle Velocity
- B Burst Fire Velocity and Rate

If you see a test name of 3006Spr V xxxxxxxx, you know it is a routine velocity test of a 30-06 Springfield. The Model 36 allows root test names of up to 30 characters. Following the headstamp and nature of the test, the user may add to the test name at his discretion.

It is recognized that the gunner wants to enter minimal information into the computer before firing the test. However, you want to see complete information on any test reports and data. If the gunner doesn't provide all the desired archival information, it must come from somewhere and be properly associated with the test.

The Model 36 uses what we call "templates" to define the test name and conditions and to describe just what is to be measured. In the environment of multiple test tunnels shared by many operators, standardization of the tests is a high priority. Operator data-entry with the associated errors must be minimized, yet the operator must retain the capability to properly record any departures from the provided script. The traditional means of minimizing data entry errors is allowing choice from a predetermined list. For instance, each test tunnel would include its own set of templates. Given a sample of 30-06 ammo for the standard velocity test, the operator would look for and load the template labeled "3006Spr V xxxxxxxx". The template would already include entries for tunnel designation, appropriate screen locations, environment,, etc. The operator would probably insert his name. The template would default to a particular gun, but this could be readily changed by selecting and loading a new gun, filed under "3006 . . ." that new gun file would include the appropriate reference corrections. The template would include a default load file. That file too can be readily changed by selecting from a list of "3006 . . ." standard load files. After making the appropriate selections, the operator will have the freedom to make changes to the template; any changes made will be reflected in the printed test report and exported data.

If changes are made to the template, the operator will be given an option to save (overwrite) the existing template. If the operator elects to overwrite, he will be prompted “Are you authorized to make this change?” Only if the operator claims authorization will the original template be altered. The operator may use the edited template during his test session without saving it, but the template will revert to its original form for later tests.

We envision a structure of test templates, gun files, and load files in which the operators have the freedom to make required changes, but are restricted from making inadvertent changes. Just as Windows has administrators, users and guests, we envision a similar protocol for use of the Model 36. We feel ham-strung by the Vista requirements for administrator permission for relatively minor changes, but we do appreciate the warning that we are making potentially damaging changes. The Model 36 will give the warning, but it won't tie you hands.

We envision that the “master” test templates would be established by supervisors or proven capable operators. These templates will be stored locally in the tunnel where they are used (and can provide information unique to that tunnel or setup). Test data and any special templates will be written to folders local to the tunnel. Reports and exported test data stored in folders at each tunnel will be periodically “mined” and reviewed by an administrator and then placed in appropriate archives.

We suggest that the gun files be created and maintained by the person responsible for determining the reference corrections for the barrel. These gun files can be stored at one common network location and need not be stored at individual tunnels. If a barrel is available for use, the most current data is automatically available.

Load data files are not critical. Again, we suggest that files for common catalog and production items be established and maintained in one common network folder. The Model 36 makes practically no use of the information included in the load data; it is required as a “memo” to assure a complete record of your test.

## APPENDIX E

# Multiple Model 36 Units on One Computer

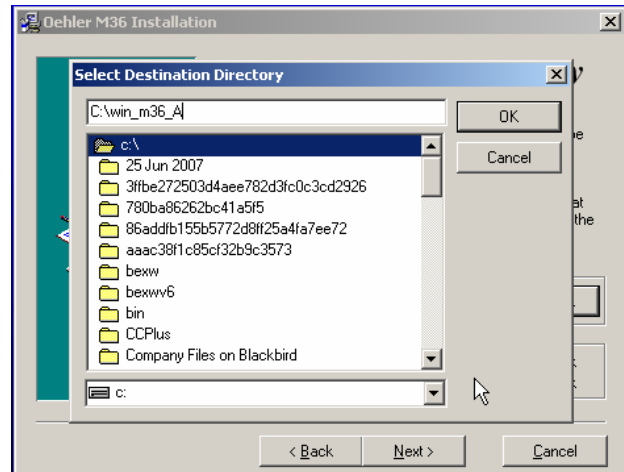
The Model 36 software is designed to allow more than one Model 36 to be operated simultaneously from a single Windows PC. Each instance of the Model 36 software requires Windows system memory, resources and processing when it's running, so for best results a high-end desktop PC should be used.

The Model 36 software window is 800 by 600 pixels wide and high, respectively. If you can tolerate some overlap, then a 1920 x 1080 resolution monitor does a credible job of hosting up to four instances of the Model 36 software. An alternative is to use multiple monitors. Each instance of the Model 36 software retains its screen position from session to session, so those instances that are positioned on a second monitor will reopen on that same monitor.

Note that you can eliminate significant confusion if you "uninstall" any existing copies of the software and directories.

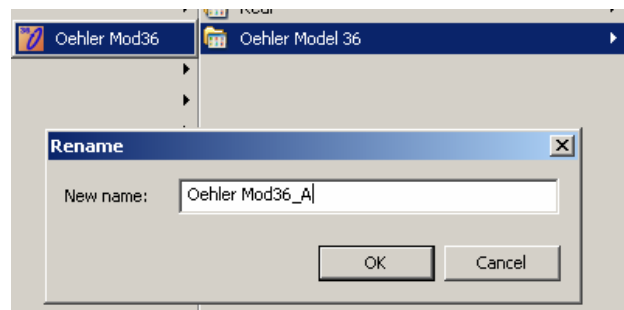
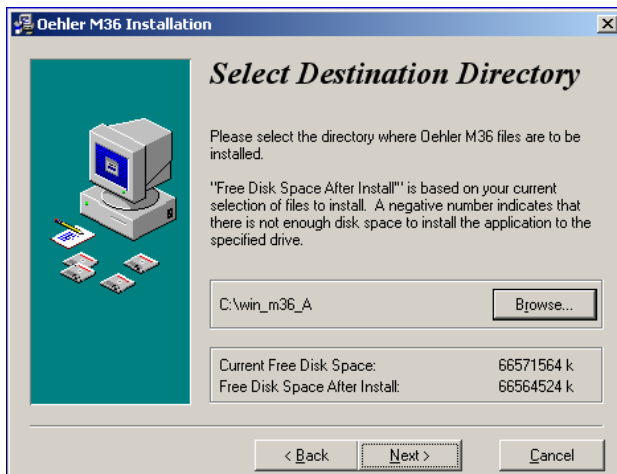
### Installing Model 36 Software

Each instance of the Model 36 software must be installed to its own folder. By default, the software is installed to the "C:\win\_m36" folder, but you can change this by clicking the browse button on the *Select Destination Directory* dialog. In the example following, the folder name was changed to "C:\win\_m36\_A".



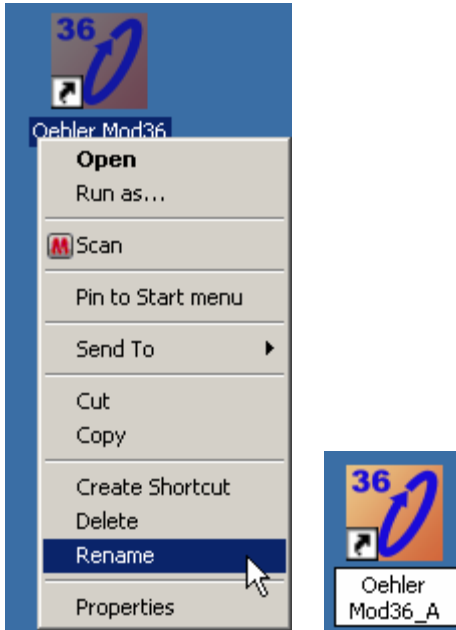
Continue and finish installation to C:\win\_m36\_A.

Once installed, open the Windows Start menu and find the "Oehler Model 36" group. Open that group and right click on "Oehler M36" to open a menu that allows you to select "Rename" as shown below. In the example below the name was changed to "Oehler M36\_A".

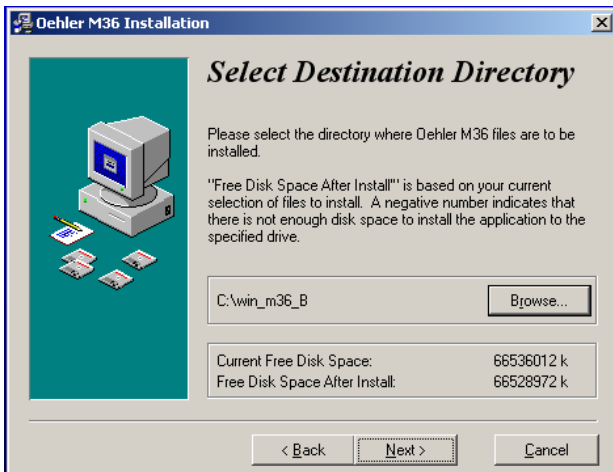




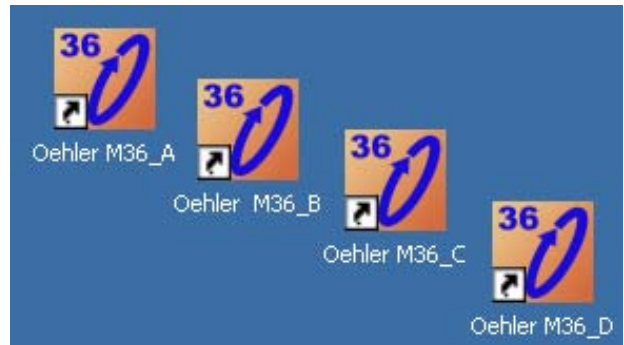
If you selected to add a desktop icon during the install you need to also rename it. Right click on the icon to open a menu that allows you to select “Rename” as shown below. In the example below the name was changed to “Oehler M36\_A”



Now you are ready to run the setup again to install the second copy of the Model 36 software. Only this time change the destination directory to “C:\win\_m36\_B” as shown below.



Rename both desktop icons and the Start menu to “Oehler m36\_B” the same way shown above. This is now the second instance of the Model 36 software. It is important that you rename both the Start menu and the icon during each installation. Doing the next installation before renaming adds confusion. Continue the process of installing and renaming until you have all instances installed. Four instances are shown on the desktop in the example below.



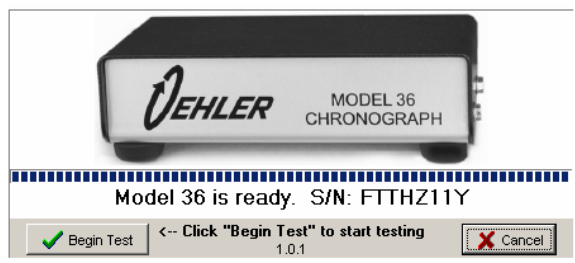
Four instances are shown in the Start menu in the example below.



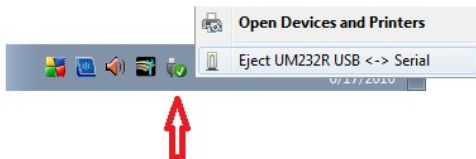
## Installing USB Driver

Launch one of the instances of the Model 36 software. If the needed driver has not already been installed you will be prompted to install it. Follow the on-screen instructions. Launch each instances of the Model 36 software again to make sure each one opens. Position each the windows for each instance to its desired location and then close it.

Plug in just one of the Model 36 boxes. You'll see the standard "found new hardware" Windows message. Wait until you get the message that the new hardware is ready to use and then launch one of the Model 36 software instances and click "Test" near the top of the main display to make sure you can connect to the Model 36 box. You should get the "Model 36 is ready" message shown below. Then click Cancel.



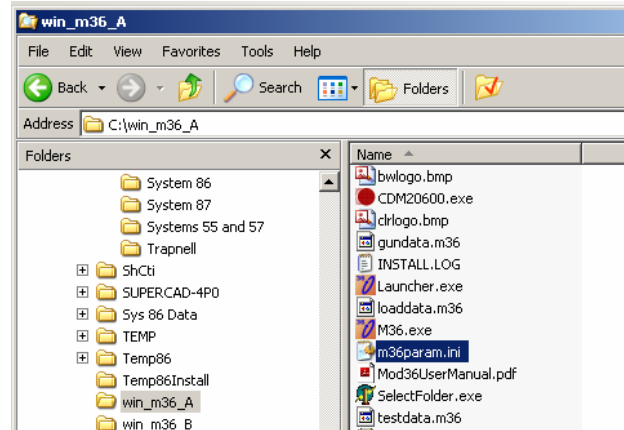
Eject the current Model 36 box by clicking on the USB icon in the Taskbar Tray and selecting "Eject UM232R USB <-> Serial".



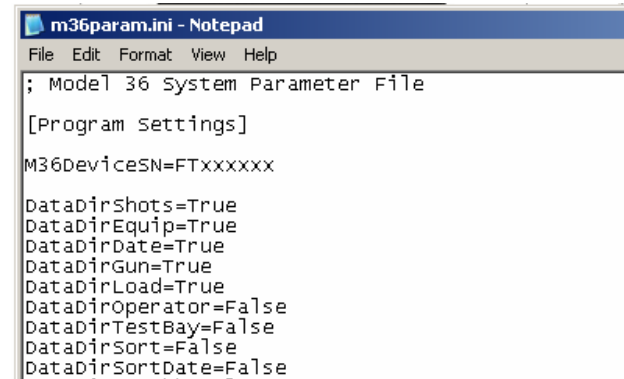
Plug in the next Model 36 box and allow Windows to install it as before. Once ready to use, connect to it using the "Test" button in the Model 36 software to verify the connection is working. Repeat the process until all of Model 36 boxes have been installed and the connection tested.

## Connecting Software Instances to Specific Model 36 Boxes

The Model 36 Software allows each instance to connect to a preferred Model 36 Box by placing the specific box's USB serial number in the instance's **m36param.ini** file. Use Windows Explorer or My Computer to browse to the instance's folder as shown below.

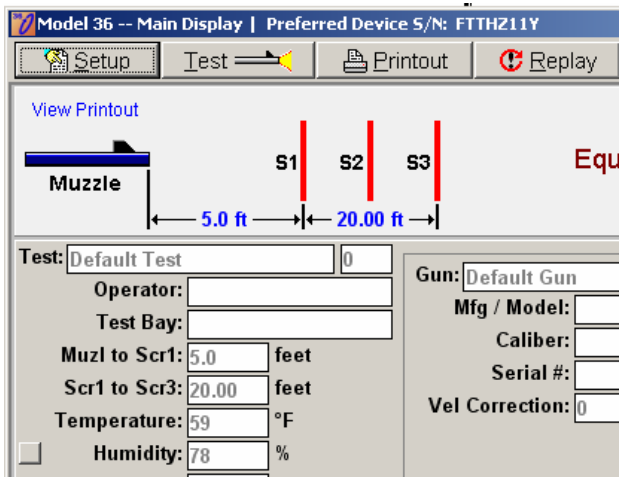


Double click on "M36param.ini" to open it in Notepad as shown below.



Add the line "M36DeviceSN=FTxxxxxx" anywhere in the "[Program Settings]" section where "FTxxxxxx" is the Model 36 unit's USB serial number. This number should be indicated on the Model 36 "Begin Test" box. Once the line is added click **File** and **Save** to save the change.

Launch that instance of the Model 36 software and you should see the “Preferred Device S/N” at the top of the window as shown next.



Repeat setting up the M36param.ini file for each instance of the Model 36 software. Plug in all of the Model 36 boxes and open all instances of the Model 36 software. Then click the “Test” button on each instance to connect to its preferred device.

If an instance cannot connect to its preferred device you’ll get the following message.

Could not find the preferred Model 36 S/N of FTEJ7T35. Click OK to use any other Model 36 that is connected.

In that case, make sure the S/N shown is correct and that that specific Model 36 box is connected. One problem area is entering the wrong S/N. It’s easy to mistake the letter O for the number 0, or the letter l for the number 1.

Once all instances are installed, set up, and the connections tested you’re ready to complete the hardware installation and run multiple Model 36 units from the same screen.