Programming
Locomotives & DCS Components
Using DCS & DCS Software

Locomotives equipped with Proto-Sound 2.0 and 3.0 and the components of the M.T.H. DCS Digital Command System can be reprogrammed with new sounds or software features available via download from the M.T.H. and Proto-Sound 2.0 websites. The following instructions detail how such downloads function and what tools are required to complete the process.

If desired, most M.T.H. Authorized Service Centers can perform the reprogramming for consumers. A service charge may be applicable. See your local service center for more details.

Below is a table outlining the items needed for specific functions that can be performed with the M.T.H. Consumer Loader. You will need the following items (All functions require a PC or laptop running at least Windows XP):

Function	Required Items
Load Engine Sound File	TIU, Engine, Transformer, USB Cable (Rev L TIU only) or USB-Serial adapter or DB-9 serial cable
Load Code Chain Files	TIU, PS3.0-equipped HO Diesel, PS3.0-equipped O Gauge Engine, USB Cable (Rev L TIU only) or USB-Serial adapter or DB-9 serial cable
Load Boiler Firmware	TIU, PS3.0-equipped HO Diesel, PS3.0-equipped O Gauge Engine, USB Cable (Rev L TIU only) or USB-Serial adapter or DB-9 serial cable
Load TIU Firmware	TIU, Transformer, USB Cable (Rev L TIU only) or USB-Serial adapter or DB-9 serial cable, 1/8" STEREO mini-to-mini audio cable. If using a Rev L TIU and a USB Cable you don't need the transformer
Remote Firmware	TIU, Remote, USB Cable (Rev L TIU only) or USB-Serial adapter or DB-9 serial cable, 4-wire phone handset cord (goes between the TIU and the Remote)
DCS Commander Firmware	DCS Commander, USB to serial adapter or DB-9 serial cable, AC or DC Transformer

GETTING STARTED

To download new sound files onto any Proto-Sound 2.0 or later equipped locomotive, or to load a new software revision into your DCS system or DCS Commander, you will need the following items:

1. DCS Consumer Loader Software (Version 2.30 - available from www.protosound2.com)

2. A Transformer or power supply to power the DCS Track Interface Unit (TIU).

3. A personal computer with an available com or USB port.

4. A standard 4-pair telephone handset cord (ie: Radio Shack part # 279-306).

5. A standard Db9 male-to-female serial PC cable or a USB Cable .

6. A 1/8" Stereo Mini-to-Mini Cable (M.T.H. Part # 50-1009).
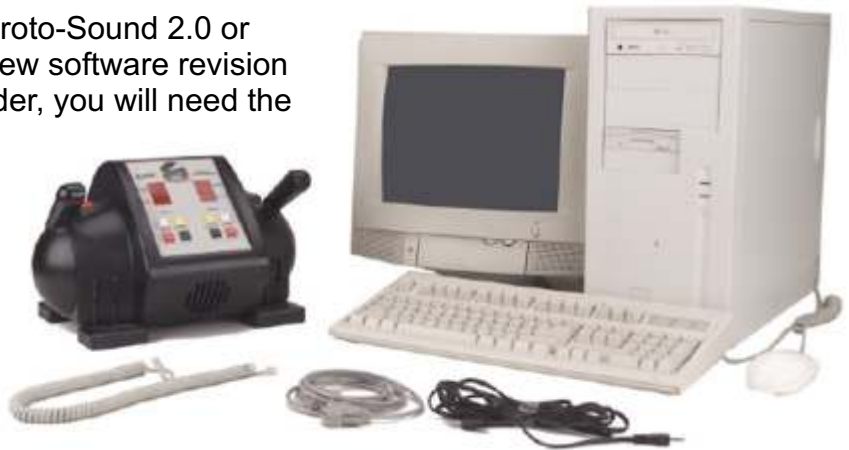
DOWNLOADING THE SOFTWARE

1. First, download the DCS Consumer Loader Software from www.protosound2.com

To download the Consumer Loader:

A. Download "V2.30.exe" by choosing "Download NOW!".
B. Complete the required fields and follow the onscreen prompts.
C. When prompted click on the file name and choose the location in your computer to save the file. The file should be saved where it can be easily found, like the Desktop.

2. Next, download the latest version of DCS Software.

To download Version 4.20 or later:

A. Download "Version 4.20" by choosing "Download NOW!".
B. Follow the steps in 1B above.

MTH DCS Consumer Loader version 2.3

What's new:
- Loads Code Chain Files (DSP Firmware, FPGA, CV Data). This is the zip file that allows existing MTH HO PS3 engines to be updated to run expanded DCC
- Two versions – one for 32-bit 'PC's, one for 64 bit PC's. .NET Framework 2.0 or higher is required for 32-bit PC's and .NET 3.5 or higher is required for 64-bit PC's.
- Removed the Get Sound File From Engine icon. Previsouly this function of the Loader allowed users to retrieve a copy of the sound file from their engines. This proved to be very time consuming for customers. All of the latest sound files can be obtained from our website at www.mthtrains.com
- The Loader now remembers the last folder you explored to. This is especially handy if you keep all your MTH files in the same folder (for example, the MY MTH Files folder that gets created when you install the Loader program
- Improves the sound file and code chain file loading by automatically adjusting the data rate for files that contain more than 50% zeros. The progress sub-bar will turn yellow to indicate a temporary data rate adjustment. Previously the Loader would try at the highest data rate, determine that an error occurred in the data transfer, then try the whole sector over again. In essence, the Loader is now much, much faster

Installation Instructions:

The MTH Consumer Loader program can operate under a 32-bit or 64-bit Windows environment. There are three download links; one for each type of operating system. One for a 32 bit Windows, one for 64 bit Windows without .NET, and one for 64 bit Windows with .NET. Select the correct one for your operating system. If you are unsure whether you have a 32-bit or 64-bit PC go here - http://support.microsoft.com/kb/827218. Also, if you are unsure of which version .NET you have installed you can go here to learn how to check - http://support.microsoft.com/kb/318785. For those users that run Windows XP you will want to look at HKEY_LOCAL_MACHINE->SOFTWARE->MICROSOFT->NET FRAMEWORK SETUP in your registry. The link doesn't show exactly where it's located on an XP PC but it will likely be in the same spot for Vista and Windows 7 as well.
If you have a 64-bit PC and have .NET 3.5 or higher then you do not need to update your .NET Framework. The Loader will run on your PC.
If you have a 32-bit PC and have .NET 2.0 or higher then you do not need to update your .NET Framework. The Loader will run on your PC.
The 32-bit version comes pre-bundled with .NET 2.0 as part of the self-extracting executable download so for you 32-bit users you likely don't need to check anything. However, for you 64-bit users, please do check as this could mean the difference between a 1MB download and a 200MB download.
Once you have determined which version your Operating System is running under (32-bit or 64-bit) then you can select the correct download link from www.protosound2.com.

32-bit

1. Download and Save the self-extracting executable to a location on your PC where you can easily find it

2. Run the exe and note that the default folder that your unzip program will want to send those files to will be a TEMP folder. If you do not want the files to go to your TEMP folder then select "Browse…" and select an appropriate place to unzip the files. A folder on your Desktop or in you're My MTH Files folder perhaps

3.	Once you have the files unzipped you will see 5 files (remember, the 32-bit version also has .NET 2.0 bundled along with it). If you already have confirmed you have .NET 2.0 or higher then just double-click on the setup.exe file and follow the on-screen installation instructions

64-bit

1.	For 64-bit users the installation will be very similar to the 32-bit. Once you have verified your version of .NET installed on your PC you will then want to select either the 64-bit download with or without .NET

2.	Download and Save the self-extracting executable to a location on your PC where you can easily find it

3.	Run the exe and note that the default folder that your unzip program will want to send those files to will be a TEMP folder. If you do not want the files to go to your TEMP folder then select "Browse…" and select an appropriate place to unzip the files. A folder on your Desktop or in your My MTH Files folder perhaps

4.	If you've downloaded the 64 Bit without .NET you will see just two files. If you've downloaded the 64 Bit with .NET you will see two files and a folder, the folder contains the .NET 3.5 install files. If you have already confirmed you have .NET 3.5 or higher then just double-click on the setup.exe file and follow the on-screen installation instructions. If you do not have .NET 3.5 or higher already installed then the Loader program, during its installation, will direct you to go to Microsoft to get at least version 3.5. Once you have 3.5 or higher installed then re-run the Loader installation

A note about .NET Framework
The reason for all the .NET stuff is that it's required to run some Windows applications. The Loader program is one of them. .NET requires being build upon previous versions. That is to say, you can't just install .NET3.5 without already having installed .NET 2.0 and then .NET 3.0. The good news is that most Windows 7 PC's come pre-loaded with .NET 4.0 and many Vista PC's came pre-loaded with .NET 3.0.

Because .NET requires that the older versions be present on your PC the download can be rather large (about 200MB). So, for you Windows Vista users that haven't updated your PC in quite a while you likely still have .NET 3.0 installed. This is fine as long as long as your PC is 32-bit. However, if it's 64-bit then you will need to download the 64 Bit Loader with .NET.

For further questions please contact MTH Service.
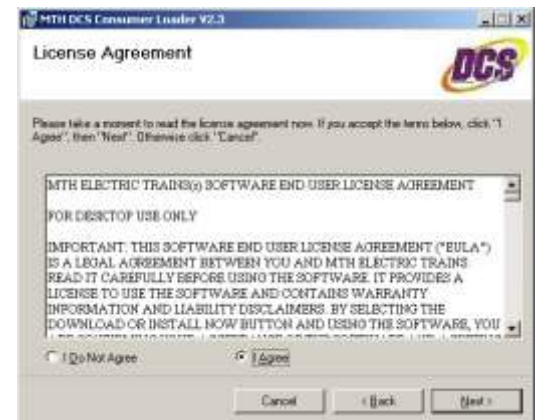
USING THE DCS CONSUMER LOADER TO REPROGRAM DCS, LOCOMOTIVES & THE DCS COMMANDER

Setting up your Com port

1. Double-click the MTH Loader icon

2. Connect your TIU to your PC via a DB-9 serial cable or USB to serial adapter

3. Apply power to your TIU

4. Click on **Options**

5. Select **Serial Port**

6. Select **Auto Search for TIU**
   a. The Loader program will now go out and look for a TIU on the available Com ports on your PC. Once it finds the TIU it will lock on to the serial port and use it until you tell it to change to another Com port. The Loader program will remember the Com port even after you shut the program down
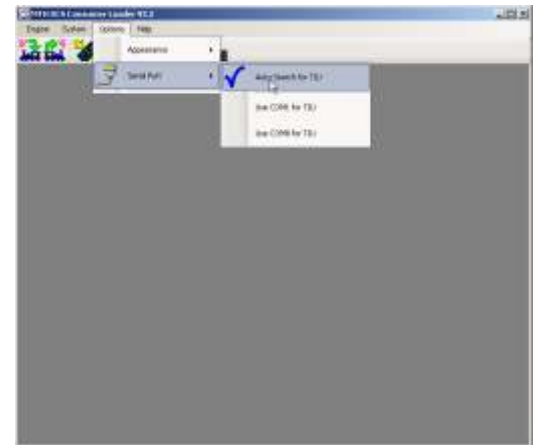
7. You have now successfully set up the Com port for your Loader.

Loading TIU Code

1. Click on the TIU icon or select **System** ->**Send Code to the TIU.**
> *HINT If you're not sure of an icon's function, just roll your cursor over one of them and a dialog box will appear telling you what the icon does.*

2. Follow the on-screen instructions in the Loader program.

3. Should you experience a failure the Loader program will allow you to Retry or Cancel. Pressing Retry will force the Loader to attempt to reconnect and reload.

4. If, after several retries, you cannot successfully load TIU code then try the following:

> a. Reset power to the TIU and close and re-start the Loader program.
> b. Repeat steps 1 and 2 above.
> c. Contact MTH Service for further assistance.

Loading Remote Code

1. Click on the Remote icon or select **System** -> **Send Code to the Remote.**

2. Follow the on-screen instructions in the Loader program.

3. Should you experience a failure the Loader program will allow you to Retry or Cancel. Pressing Retry will force the Loader to attempt to reconnect and reload.

4. If, after several retries, you cannot successfully load Remote code then try the following:

> a. Reset power to the TIU and close and re-start the Loader program.
> b. Release the power button on the Remote.
> c. Unplug and re-plug the DCS Remote tether at both the Remote and TIU.
> d. Repeat steps 1 and 2.
> e. Try a different Remote tether cable.
> ***Remember This MUST be a 4-wire cable!***
> f. Contact MTH Service for further assistance.
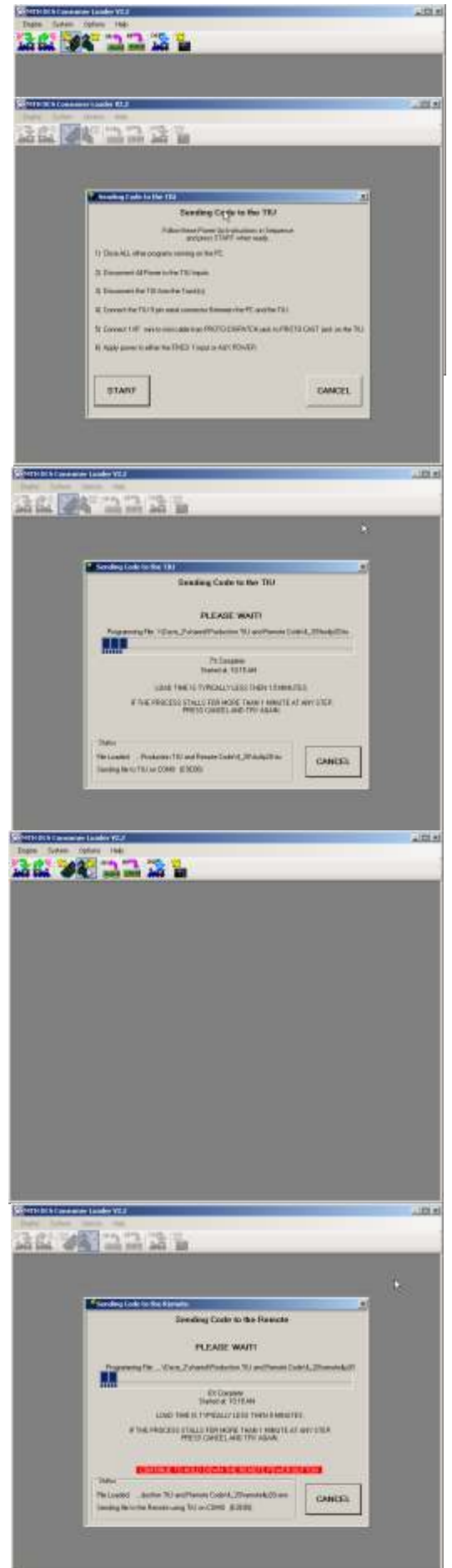
Sending Sound Files to an Engine

Note If you are attempting to load a PS3.0-equipped HO Diesel or PS3.0-equipped Steam or Diesel engine you must have version 4.20 or higher DCS code loaded into your TIU.

> 1. Click on the Send Sound File to Engine icon or select **Engine** -> **Send Sound File to the Engine**
>
> 2. Follow the on-screen instructions in the Loader program
>
> 3. If, during the Sound File transfer, the Loader sees an error it will attempt to retry the sector of memory it was previously loading. Should it fail again the Loader will prompt you to hit Retry or Cancel. Hitting Retry will force the Loader to re-attempt loading from that failed sector of memory
>
> 4. If you get continuous errors during the Sound File loading, remove power to the TIU/Engine, Hit Cancel on the Loader and then restore power to the engine and restart the Loader program
>
> > **HINT** *If you keep getting errors after performing Step 4, it is recommended to have the engine clip leaded to the TIU output, if possible. Otherwise, connect a short section of track directly to the output of the TIU. You want to minimize the chance for DCS signal interference from other items that may be on your layout (track powered switches/accessories, track powered rolling stock, etc.).*
> >
> > *For those users with Rev L TIU's you may actually find that an extra 10 feet of wire between the output of the TIU and the track will help with communications.*
> >
> > *Contact MTH Service if problems persist.*
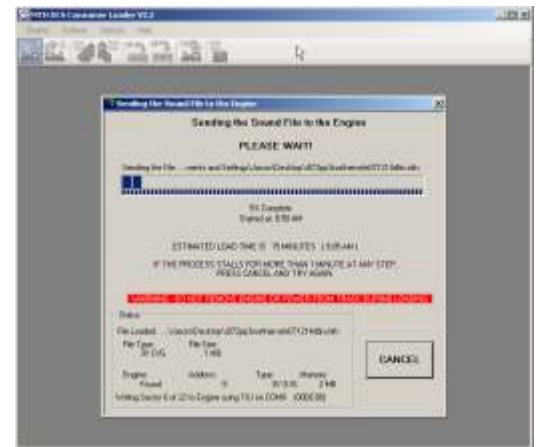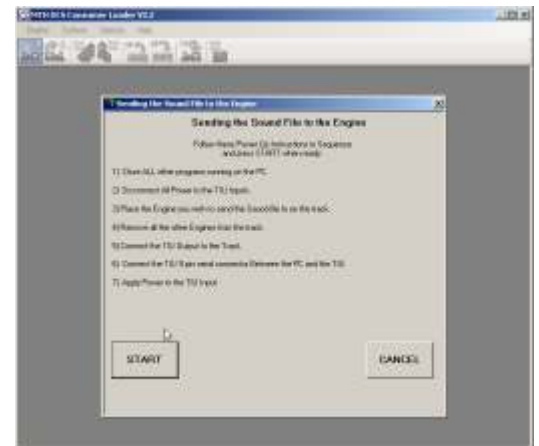
Loading Code Chain Files

MTH's Loader version 2.3 now allows you to load code files into a Proto-Sound 3.0 engine right over the rails using a TIU running version 4.20 or later. There is one exception to this and that is the HO steam engines that contain the earlier version of Proto-Sound 3.0. These steam engines have different hardware that doesn't support over-the-rail loading of the code files.

What Are Code Chain Files?

These are a series of files that are put into a zip format. Inside this zip file are multiple files and one text file that tell the Loader what filenames to load. The Code Chain Files are bundled along with the sound file (.mth) on the website.

Most PS3.0 engines on the website will have both the .mth and the .zip files associated with them. That is, when you search for a particular item number and click on the link for the sound file you are getting the sound file and the code file all in one zip file. If a particular engine doesn't have a code file or that engine doesn't accept code files then you will only see the .mth sound file. For example, the HO K-4 is not capable of accepting new code files; it can only accept a sound file. Therefore, you will only see an .mth sound file for that engine on the MTH website.

Below is an example of what would be downloaded for a CN HO SD70M-2:
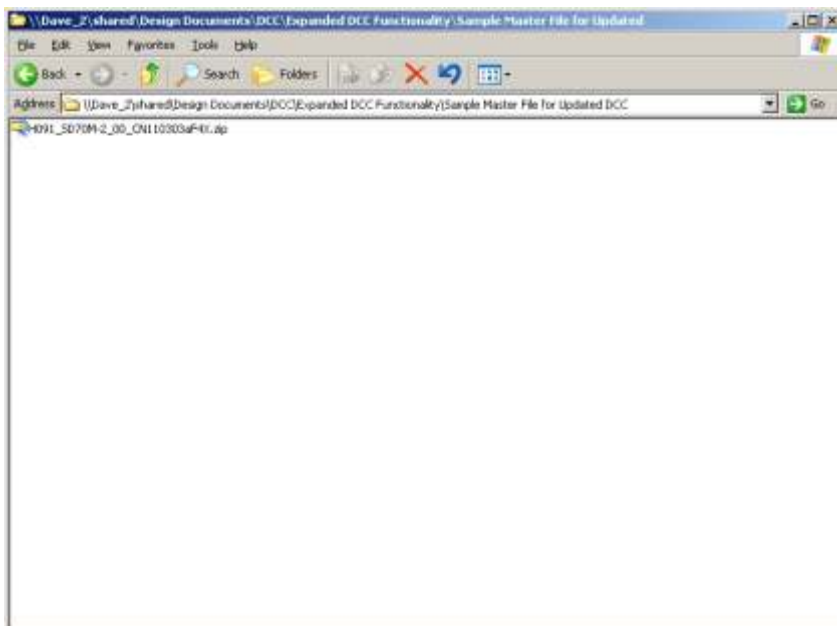
What Is Needed To Load Code Chain Files?
In order to load Code Chain Files you need the following items:
- TIU running version 4.20 or later
- PC with Loader 2.3
- Serial cable or a USB to serial adapter or a USB cable (USB cable can be used with Rev L TIU only)
- Proto-Sound 3.0-equipped engine (all HO Diesels and the new PS3.0 O Diesel and O Steam as well as the new PS3.0 HO Steam engines in both 2 rail and 3 rail)
- An unzip utility like Winzip

Which Engines Can I Load the Code Chain Files Into?
You can load the Code Chain Files into most PS3.0-equipped engines, be it O Gauge or HO. There is one exception and that is the earlier HO Steam engines. As noted earlier, if there is no Code Chain File that came along with your sound file then that engine doesn't accept the Code Chain Files. An example of this is the HO K-4. If you attempt to load the Code Chain Files into an engine that won't accept them you will receive the following error message from the Loader:

How Do You Save Code Chain Files To Be Loaded?
Once you download the main zip file from the MTH website you then need to unzip the file using Winzip or any unzipping utility. Once you do that you will see the following:
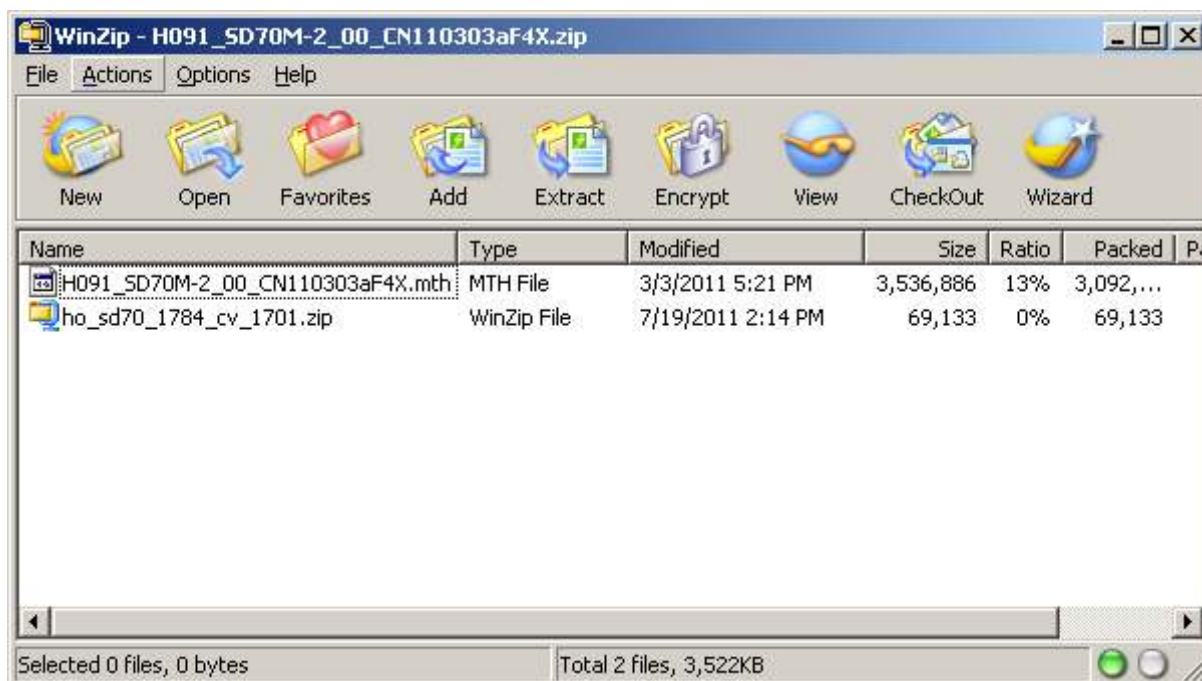
The first file you see in the list is the .mth file. That's your sound file. The second file you see in the list is another zip file. This is your Code Chain File. You DO NOT need to unzip that file. Simply extract the sound file (.mth) and the Code Chain File (.zip) to a folder of your choosing as shown below (it's recommended that you use the My MTH Files folder that is created when you install the MTH Consumer Loader program):

You now have your sound file (.mth) and your Code Chain File (.zip) all in one location. If you wanted to take it a step further you could create a folder for each engine type you have files for, that's completely up to you.

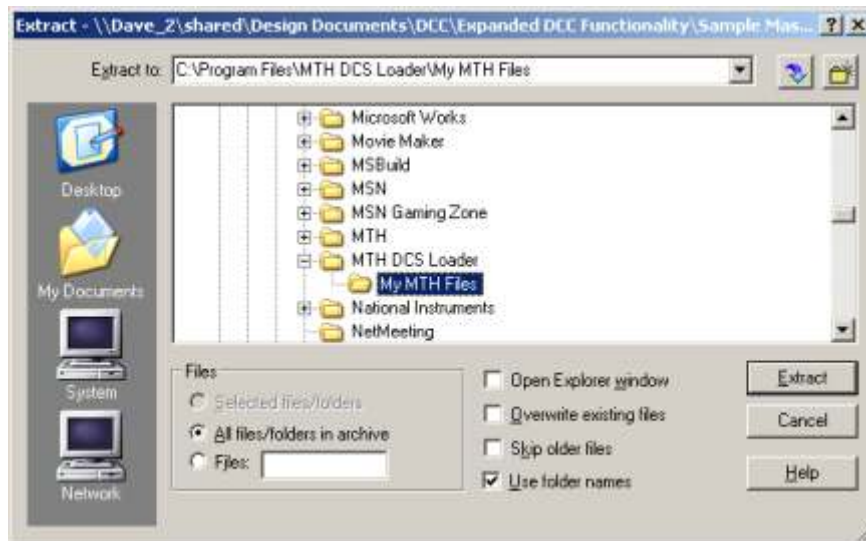## What Are In The Code Chain Files?

The Code Chain Files contain three or four files that have an .srec extension. This extension is used by the electronics inside the PS3.0 engine. The last file is a .txt file and that contains the filenames of the Code Chain Files to be loaded. The Loader looks at this .txt file to determine what must be loaded. However, when you load the files into the engine you only need to find the .zip file that contains the aforementioned files since the Loader takes care of all the work. You just point to the .zip file and the Loader does the rest. Below is an example from an HO SD70 Code Chain File .zip. Again, you DO NOT need to unzip the Code Chain File, just point the Loader to the .zip file and the Loader will do the rest:
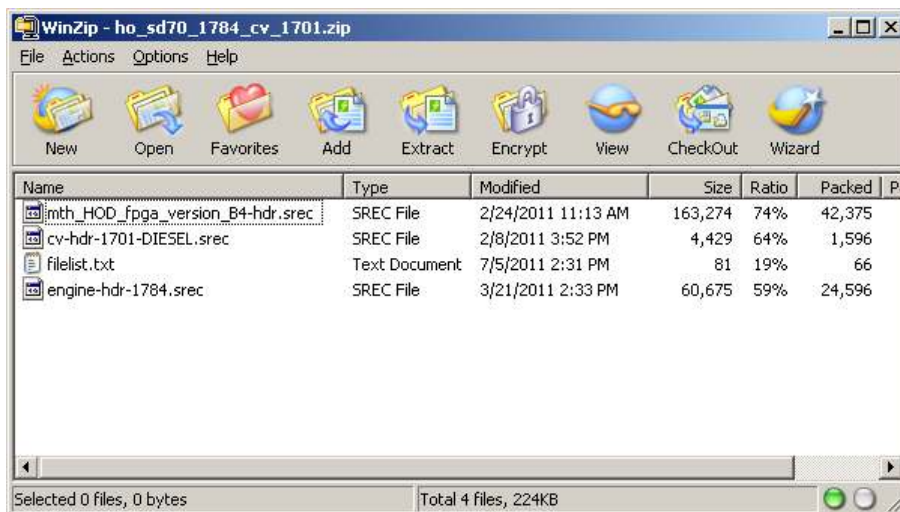
MTH's Loader version 2.3 now allows you to load code files into a Proto-Sound 3.0 engine right over the rails using a TIU running version 4.20 or later. There is one exception to this and that is the HO steam engines that contain the earlier version of Proto-Sound 3.0. These steam engines have different hardware that doesn't support over-the-rail loading of the code files.

Loading Instructions for Code Chain Files

Below are a series of screen shots showing you step by step how to load a code chain file into an MTH PS3.0-equipped engine (except current PS3.0 HO Steam Engines)

MTH DCS Consumer Loader V2.3

Engine System Options Help

Sending the FPGA Code to the Engine

Sending the FPGA Code to the Engine

PLEASE WAIT!

Sending the file: ...shared\Design Documents\DCC\temp\mth_HDD_fpga_version_B4-hdt.s

15% Complete
Started at 4:01 PM

LOAD TIME IS TYPICALLY LESS THEN 1.5 MINUTES.

IF THE PROCESS STALLS FOR MORE THAN 1 MINUTE AT ANY STEP,
PRESS CANCEL AND TRY AGAIN.

WARNING: DO NOT REMOVE ENGINE OR POWER FROM TRACK DURING LOADING

Status
File Loaded: ...teem\DCC\temp\mth_HDD_fpga_version_B4-hdt.srec
File Size: EIS DSP Address: EIS DSP Max Length:
10F9C   3C0000   020000

Engine: Address: Type: Memory:
Found   5   PS3   4 MB
Writing Sector 994 of 991 to Engine using TIU on COM9   (3C4A00)

CANCEL

MTH DCS Consumer Loader V2.3

Engine System Options Help

Sending the DSP Code to the Engine

Sending the DSP Code to the Engine

PLEASE WAIT!

Sending the File: \\Dave_2\shared\Design Documents\DCC\temp\engine-hdt-1784.srec

Download Complete, Wait for Power Cycle Reset
Started at 4:02 PM

LOAD TIME IS TYPICALLY LESS THEN 1.5 MINUTES.

IF THE PROCESS STALLS FOR MORE THAN 1 MINUTE AT ANY STEP,
PRESS CANCEL AND TRY AGAIN.

WARNING: DO NOT REMOVE ENGINE OR POWER FROM TRACK DURING LOADING

Status
File Loaded: \Design Documents\DCC\temp\engine-hdt-1784.srec
File Size: EIS DSP Address: EIS DSP Max Length:
64F6   380000   010000

Engine: Address: Type: Memory:
Found   5   PS3   4 MB
Holding for Power Cycle On (17)

CANCEL

MTH DCS Consumer Loader V2.3

Engine System Options Help

Sending the DSP Code to the Engine

Sending the DSP Code to the Engine

PLEASE WAIT!

Sending the file: \\Dave_2\shared\Design Documents\DCC\temp\engine-hdt-1784.srec

11% Complete
Started at 4:02 PM

LOAD TIME IS TYPICALLY LESS THEN 1.5 MINUTES.

IF THE PROCESS STALLS FOR MORE THAN 1 MINUTE AT ANY STEP,
PRESS CANCEL AND TRY AGAIN.

WARNING: DO NOT REMOVE ENGINE OR POWER FROM TRACK DURING LOADING

Status
File Loaded: ...\Design Documents\DCC\temp\engine-hdt-1784.srec
File Size: EIS DSP Address: EIS DSP Max Length:
64F6   380000   010000

Engine: Address: Type: Memory:
Found   5   PS3   4 MB
Writing Sector 945 of 959 to Engine using TIU on COM9   (381800)

CANCEL

MTH DCS Consumer Loader V2.3

Engine System Options Help

Sending the DSP Code to the Engine

Sending the DSP Code to the Engine

PLEASE WAIT!

Sending the File: \\Dave_2\shared\Design Documents\DCC\temp\engine-hdt-1784.srec

Download Complete, Wait for Power Cycle Reset
Started at 4:02 PM

LOAD TIME IS TYPICALLY LESS THEN 1.5 MINUTES.

IF THE PROCESS STALLS FOR MORE THAN 1 MINUTE AT ANY STEP,
PRESS CANCEL AND TRY AGAIN.

WARNING: DO NOT REMOVE ENGINE OR POWER FROM TRACK DURING LOADING

Status
File Loaded: ...\Design Documents\DCC\temp\engine-hdt-1784.srec
File Size: EIS DSP Address: EIS DSP Max Length:
64F6   380000   010000

Engine: Address: Type: Memory:
Found   5   PS3   4 MB
Holding for Power Cycle Off (25)

CANCEL

Loading Boiler Firmware

1. Download the Boiler firmware from MTH's website.

2. Click on the Load DSP Code icon or select **Engine->Load DSP Code.** The process is the same to load Boiler firmware as it is to load DSP firmware.

3. Follow the on-screen instructions in the Loader program. *NOTE Boiler Firmware can ONLY be installed into MTH PS3.0-equipped O-Gauge Engines.*

4. Select the Boiler firmware file you want to install into the engine. Boiler firmware has an ".srec" file extension.

5. The Loader will perform the loading and then power cycle your engine. Once you engine has power cycled and waited the appropriate time set by the Loader your engine will come alive. You now have updated Boiler firmware in your steam engine.
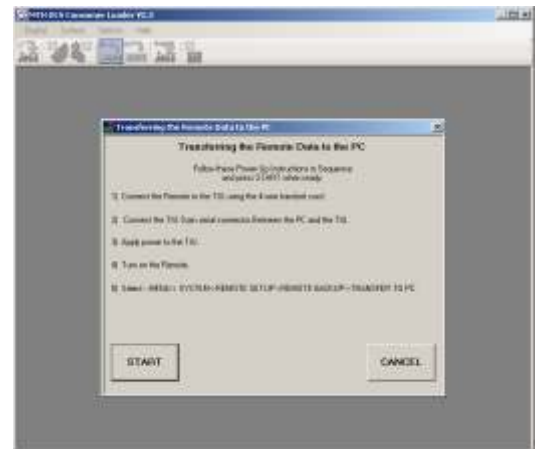
Transferring Remote Data to PC (Cloning)

1. Click on the Transfer Remote Data to PC icon or select **System** -> **Transfer Remote Data to PC**

2. Follow the on-screen instructions in the Loader program

3. When prompted by the Loader, you will need to give your remote file a name and a location to save it on your PC. The files are saved as ".txt".

4. The Remote LCD and the Loader will indicate that the process has been complete

Transferring Remote Data From PC (Cloning)

1. Click on the Transfer Remote Data From PC icon or select **System** -> **Transfer Remote Data From PC.**

2. Follow the on-screen instructions in the Loader program.

3. When prompted by the Loader, you will need to retrieve your remote file on your PC. The Remote Clone files end with ".txt".

4. When the remote has been loaded with the clone file it will shut off.

Loading DCS Commander Firmware

1. Download the DCS Commander firmware from MTH's website.

2. Connect your DB-9 Serial Cable or USB to Serial adapter to the PC and the DB-9 serial port on the back of the DCS Commander.

3. Connect your AC or DC supply to the Input voltage jack (either the barrel jack for a brick or the terminal jack for a conventional supply).

     A. NOTE The LCD on your DCS Commander should be blank at this time.

4. Click on the Load DCS Commander Code Icon or select **System** -> **Send Code to the DCS Commander.**

5. Click on the DCS Commander icon in the toolbar.

6. Click on the Configure tab and select the Com port you have your DCS Commander connected to.

7. Click Save. The Loader will remember this the next time you need to update you DCS Commander or if you are doing multiple upgrades.

8. Click on the Program tab on the Loader.

9. Click on Browse and find the code file you downloaded from MTH's website (it's a .txt file).

10. Click OK.
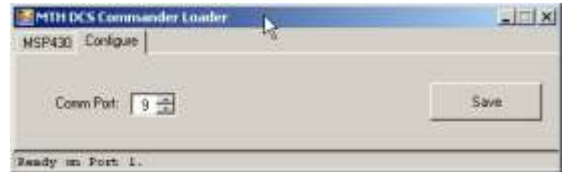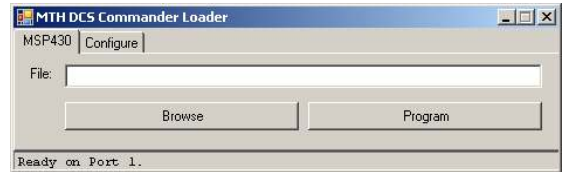
Loading DCS Commander Firmware (cont'd)

11. Now click Program on the Loader and the Loader program will begin sending the code file to your DCS Commander.

12. Once completed the DCS Commander will reset itself and display the code revision currently installed.

13. Remove the serial cable and turn off and remove your power supply connection.

Options

1. Click on **Options->Appearance.**

2. You can select to have Large or Small icons. By default the icons are set to Large.

3. Click on **Options->Serial Port.**

4. Here you can set the Loader to Auto-Search for a TIU or force it to a particular Com port.

> *Note The Com ports listed under **Serial Port** are what the Loader views in your Device Manager in Windows. That is, only those Com ports that exist on your PC are the ones displayed.*

Help

1. Click on **Help->Service** for MTH Service phone and e-mail support.

2. Click on **Help->About** for the revision number of the Loader.