HO
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GTEL 8500 HORSEPOWER TURBINE

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DCC & Sound by...
LokSound

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INDEX & WARRANTY

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Photo By Alvin L Schultze, courtesy of David P. Oroszi

Warranty Policy

ScaleTrains.com, Inc. (ScaleTrains.com) warrants product purchased from authorized resellers to be free from defects in material and workmanship for a period of one (1) year from the date of purchase. The warranty period can be increased to two (2) years by registering your product on line at http://www.ScaleTrains.com/pages/warranty.

If the product fails during the limited warranty period, carefully pack the model in the original packaging and include the sales receipt and explanation of the issue. Ship the model to our Customer Service address noted below. We recommend using a traceable service and adding insurance. Costs associated with shipping are not covered under warranty. If ScaleTrains.com deems the product to be defective, we will either (1) repair or (2) replace at our discretion.

Defects due to misuse, improper maintenance, and/or modification are not covered under warranty. This warranty gives you specific legal rights and you may also have other rights, which vary from state to state. These terms are covered by the State of Tennessee.

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MAINTENANCE, LUBRICATION & HOW TO REMOVE SHELL

Lubrication

The ScaleTrains UP 8,500hp “Big Blow” Super Turbine Locomotive represents hours of careful research and design work, and we are proud to present it to you. With the right care, it should provide years and years of model railroading enjoyment. Out of the box, the model should be ready for service, no lubrication should be necessary; it has been carefully lubricated at the factory for optimum performance. However, if the need to lubricate should arise, please follow these guidelines:

- Be sure to use a plastic-compatible lubricant! Most household lubricants, such as “3-in-1” type oils, may damage the slippery engineering plastic found in the driveline of the model. Wherever possible, use lubricants designed specifically for model railroad or similar hobby uses, and if in doubt, check the label for any compatibility warnings.

- Use the right type of lubricant in the right location! For metal-to-metal bearing surfaces, the use of light or medium oils is recommended. For plastic-to-plastic applications, such as gears, light greases are recommended.

- Always use lubricant sparingly! As the saying goes, a little goes a long way. When applying lubricant to bearing surfaces, a tiny drop or dab applied with a fine point, such as a toothpick, should be more than sufficient. Any excess lubricant oozing from a bearing surface should be carefully wiped away with a paper towel.

Lubrication points will be the same as would be expected in most any model locomotive. On the locomotive power trucks the bearing is behind the wheel so a small drop of light plastic compatible oil can be used behind each wheel as necessary. The interior of the both the A and B units are filled with circuit boards and wiring for the many features of your UP 8,500hp “Big Blow” Super Turbine Locomotive so great care must be taken when applying lubrication to areas that may require lubrication inside the locomotive. Refer to the below disassembly instructions and exploded diagrams to understand how to remove the body to access the inner workings of the locomotive. Lubrication points inside the model would be the motor bearings, where a small drop of oil between the motor ends and the brass flywheels, on the motor shaft, will be sufficient. The other location would be the at the worm shafts on the top of the gearboxes. These too can use a small drop of oil at both ends of the shaft. One end being where the driveshafts are attached to the metal worm shaft and the other being the opposite end where the shaft slightly protrudes out of the bearing. Grease can be applied to the gear box gear by removing the worm cover and then the worm and shaft. Once the worm and shaft are removed a small amount of grease can be applied to the top gear box gear, the one that contacts the worm gear then the worm and worm cover can be reinstalled. As the locomotive runs the grease will be distributed inside the gearbox to all the gears. Whenever possible, avoid contact of lubricants with the model’s exterior finish. Oils and greases can possibly harm the factory paint and lettering; any excess that may make contact should be gently wiped away with a paper towel or other fine cloth. Due the delicate nature of the interior components inside the locomotives if there is any concern it may be best to contact your local dealer or contact us directly to help guide you through the lubrication process.

Handling

Due to the delicate nature of the model, it is advised that care should be taken when removing the model from its packaging, and placing it onto your test track or layout. Carefully remove each component of the model (A-Unit, B-Unit, and Tender) from its compartment in the box foam. To remove each component, carefully slide off the outer sleeve from the “clamshell” plastic holder cradling each unit, and set it aside.

Next, unsnap the plastic clamshell holder; note that at one end is hinged, and designed to snap into the top half of the holder. Do this on a flat surface, to reduce the risk of the clamshell or the model slipping from your grip and falling to the floor. Once the clamshell is fully open, carefully remove the model; reverse the process to place it back into its packaging for storage. When handling the model, it is recommended that it is gripped firmly at its mid-section, avoiding the fine stirrup steps, doors, grab irons, or other small details that may be present.

Disassembly

In order to remove the body shells from the Turbine A or B-units, a total of six (6) small Phillips-head screws must be removed from each. When disassembling each unit, it is recommended it is placed upside-down into a foam cradle to protect it from damage. Begin by locating and removing the screw from each coupler box at each end of the unit. Once the screws are removed, carefully slide each coupler box from its mounting location, and set aside. Next, locate the four screws that secure the body to the chassis. On the A unit two of these screw are located being the front truck just in front of the fuel tank. The second set are at the rear on both sides of the coupler box. On the B unit the four screws are located at both ends of the chassis on both sides of the coupler boxes. Once the six screws are removed the body shell can now be removed from the mechanism. There are no wires or other connections between the body and chassis so gently lifting up on the body, paying attention to the many stirrup steps and ladders, should allow the body to be easy removed from the Chassis. At this point maintenance can be preformed or crew figures added. Reverse the process to reinstall the body shell.

Cleaning

If kept out of its protective packaging for extended periods, it is likely your UP 8,500hp GTEL may accumulate dust or other debris. While unsightly, it can also potentially damage the finish of the model if allowed to accumulate. To remove light dust, it is recommended that a fine paint brush is used to gently knock off dust particles. For heavier accumulations, canned air dusters (commonly used for cleaning electronics), or air from an airbrush, can be used.

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HISTORY

Photo By Jim Walter, Collection Of Kevin Eudaly

Beginning in the 1950s, the Union Pacific Railroad sought higher and higher horsepower ratings from its locomotives to help move increasingly heavier and longer trains. Gas-Turbine Electric Locomotive (GTEL) technology promised much higher horsepower ratings over the diesel-electric locomotive designs of the time. General Electric (GE) and American Locomotive Co. (Alco) built the first GTEL design, a double-ended, 4,500 horsepower, B+B-B+B unit, delivered as UP #50 in 1949.

This groundbreaking design would kick off the "Turbine Era" on the UP, which saw GE building successively larger and more powerful GTELs that would power UP's hottest trains over the next two decades. The basic principle of the GTEL saw a GE-designed and built gas turbine…essentially a type of jet engine…-driving a generator that produced electricity, which was fed to traction motors on the locomotive's axles. This design offered several advantages over more conventional diesel-electric locomotive designs of the era, particularly in horsepower. While competing cab and hood unit designs of the era boasted 1,500-1,750hp, the first GTELs boasted 4,500hp. Another advantage of the GTEL was it being designed to burn Bunker C heavy fuel oil, which, at the time, was much less expensive compared to conventional diesel fuel oil. GE would build successive batches of GTELs for UP, with each new design featuring improvements and design changes learned from experience from their predecessors.

All of those factors and lessons learned over the years would result in the ultimate GTEL design, the 8,500hp "Super Turbines" ordered in 1955. Indeed, design changes and technological improvements didn't see the first of these units delivered until August 1958. These "C-C" (six-axle) units, numbered UP 1-15, with a second group, UP 16-30 also added to the order books, represented the pinnacle of the GTEL design from GE. Boasting 8,500hp, these units were built in a three-unit configuration, with an "A", or Control Unit, which housed the operator's cab, electrical control equipment, radiators, dynamic brakes, and a small 8-cylinder Bessemer-Cooper prime mover for hostling and auxiliaries. The semi-permanently coupled trailing "B", or Turbine Unit, housed the heart of the machine: a GE 10-chamber centrifugal-flow gas turbine, coupled to a pair of 3,500hp electrical generators, which in turn powered all twelve powered axles under the pair of units.

While outwardly similar, there were a few external differences between the two groups; the first, UP 1-15, featured a "H-H" and "H-I" configuration on the dynamic brake housings of the A and B-units, so-called due to the appearance of the housing shape when viewed from above. The second group, UP 16-30, featured "H-I" and "I-I" dynamics as a spotting feature. However, this spotting feature would soon be rendered moot, due to several A and B-units between the two orders being swapped during maintenance.

Completing each set was a fuel tender trailing the B-unit, which held up to 24,000 gallons of Bunker C, which was heated by built-in electrical heater elements to keep the tar-like fuel in a viscous state. In an interesting melding of technology, the fuel tenders started out as steam locomotive tenders, salvaged and rebuilt from retired UP FEF-1 Northern and 4-6-6-4 Challenger steam locomotives. There were differences in how the tenders were (re)built; UP 1-20 were delivered with 24-C tenders, which featured insulation and a welded outer sheet metal jacket, giving them a smooth appearance. UP 21-30 were delivered with 23-C tenders, which had riveted construction and a body shorter in length in comparison to the 24-Cs. Eventually, tenders would be swapped between units as maintenance needs dictated, resulting in units originally equipped with 24-C tenders sporting 23-C tenders, and vice-versa.

The resulting 3-unit set (Control unit, Turbine unit, and tender) was massive, stretching almost 179 feet end-to-end, with the last unit, UP #30, delivered in June 1961. And their performance was impressive; put to work on UP's Eastern District, they were commonly seen between Council Bluffs, IA, and Ogden, UT, hauling a variety of freight trains, frequently all by themselves. The deafening noise of their turbine engine and exhaust earned the Super Turbines the nickname "Big Blow"; so loud, that UP reportedly restricted their operation in and around major cities due to noise complaints. Indeed, the city of Los Angeles was made basically off-limits to the Big Blows and other GTELs after a few deafening visits in 1962. Nonetheless, the Big Blows made a name for themselves across the vast plains of Wyoming and Utah, often being heard from miles and miles out before they were even seen.

As with any other groundbreaking locomotive technology, in-service upgrades were implemented over their lifetimes to improve performance. In 1962, UP increased their rating to a whopping 10,000hp, which was subsequently dropped back down to their original 8,500 after a few years due to concerns of over-loading their electrical systems. Many of the B-units were retrofitted with Farr-built "Dynavane" air intake systems for the turbine engine, resulting in a large, boxy structure jutting from the roof of the B-unit. Air requirements for the turbine were an issue early on, so much so that UP #30, the last unit built, came from GE with a one-of-a-kind intake system it would keep for its entire career. Horns on many were relocated from the operator's cab roof (ironically due to crew noise complaints), to a location over the A-unit radiators, which also had the side benefit of keeping the horns from being fouled by snow and ice during winter. Another visual change began appearing on many members of the fleet in 1962, which saw the original boxy diesel fuel tank under the A-unit replaced with a more angular high-capacity design, allowing for less-frequent trips to the fuel rack for the hostling engine. 1965 also saw the addition of Multiple-Unit, or MU equipment (additional pneumatic lines and electrical jumper connections), added to the rear of all but five of the B-units, allowing the Big Blows to operate in multiple with other locomotives.

Despite their outstanding performance, the Big Blows were to have relatively short careers. One of the contributing factors to this was rising fuel costs; the once-cheap Bunker C fuel oil the turbines were designed to burn, which refiners practically couldn't give away early on, saw its price per gallon rise dramatically in the 1960s, eventually negating the fuel cost advantage the turbines enjoyed over their diesel-electric contemporaries. Rising maintenance costs compared to diesel-electrics also became an issue. The turbine engines were complex pieces of machinery compared to a typical diesel prime mover, in particular the delicate turbine fan blades. These factors, along with advances in diesel-electric locomotive horsepower, and limitations on where the GTELs could operate, saw the first of the Big Blows, UP 1-4, retired in August 1968, after scarcely 10 years of service. Their numbers continued to dwindle over the last few years of the decade, with UP #7 holding the distinction of being the last Big Blow to operate, pulling its last train on December 26th, 1969. All were officially retired by February 1970, closing out the loud and exciting Turbine Era on the Union Pacific.

Photo By Jim Walter, Collection Of Kevin Eudaly

Basic DCC/DC Instructions

The Prototype

The “Big Blow” Super Turbine is not your typical locomotive. While it has a small Diesel engine in the Control, or “A” unit, its main power comes from a gas-turbine engine in the Turbine, or “B” unit. The diesel is only used to maneuver through the yard while setting up the train, and while moving the turbine set around a fuel or maintenance facility. Coined the “hostler” engine, it is used in these applications to conserve fuel, and reduce and wear and tear on the turbine. Once the train is made up and ready to depart, the massive gas-turbine engine will be started. This turbine will run at a deafening, almost constant speed during operation out on the road.

The Model

Your ScaleTrains Union Pacific 8,500hp “Big Blow” Super Turbine GTEL model is a meticulously designed and crafted model of these incredible machines. Your Turbine includes an on-board sound system, featuring speakers in the Control and Turbine units, designed to replicate the roar of the prototype. Also included are sounds for the hostler engine, horn, bell, various auxiliary systems, and sounds of flange squeal* and wheel “clunk”* through frogs and crossings, activated via sensors built into the trucks.

*Museum Quality versions only

Start Up Cycle

Like most LokSound equipped models, the sound is off when you first put the locomotive on the track. In DCC pressing F8, the start-up sequence will begin. In DC the start up sequence will start as soon as there is sufficient electrical power on the track.
The start-up sequence of the ScaleTrains “Big Blow” Super Turbine is one of the most realistic in the hobby to date! Simulating the effect of the crew climbing aboard at the start of their run, you will see the cab interior light come on, then the number boards, and finally the instrument lights in the control stand.* Once the lights are on, the hostler engine will start. After the hostler engine has fully started, the cab interior light will go out, and your Turbine is ready to move.**

**Please note, Like the prototype the Model will not move while starting.
*Museum Quality versions only

Headlights

Like most models, in DCC, F0 will illuminate the Front headlight. Unique to the turbine is the Use of F10 to turn on the rear light on the B unit. You can dim either light by pressing F7. Please note that headlights are only illuminated in the direction of travel. In DC operations the headlights are automatic in their direction control and are on all the time with sufficient track power.

Hostler Mode

When the turbine engine is not on, and all is heard is the hostler engine from the A-unit, you will be in “Hostler Mode”. As the speed was limited on the prototype while in this mode, it too is limited on the model. Once you have activated the turbine engine, you will notice you will have the full range of throttle. Hostler mode will only work in DCC. In DC operation both the hostler engine and turbine engine come on as soon as there is sufficient track power. You will have full operational speed for your turbine. Please note that with your Turbine, as with most sound equipped locomotives running in DC, it takes quite a bit of track power to operate the sound system and therefore quite a bit of power is necessary to start and run your Turbine.

Turbine Start

In DCC once you are coupled to your train and ready to depart, you can press the F3 button and the turbine will go through its start-up sequence. Once fully started, it’s very loud, so don’t forget your hearing protection! Also, be sure to keep your fingers free of the spinning turbine blade inside the B-unit exhaust outlet on Museum Quality versions! As noted above in DC operation the turbine will start to run as soon as the track power is sufficient.

Class Lights

The A-Unit is equipped with changeable tri-color class lights. The colors signified train status on the prototype:
Green: Second Section of the same train symbol/number
White: “Extra” train not shown in the timetable
Red: Reverse move (pushers)
Please visit http://trn.trains.com/railroads/abcs-of-railroading/2006/05/locomotive-classification-lights if you would like additional information on prototype class light operation.
On the model, you can press F6 to illuminate the class lights on the nose of the A-unit. A single press will activate a white light;

press again, and it will change to red, and again to go to green. A fourth press will turn the class lights off, and a fifth will start the cycle again.
In DC operation the class lights will come on automatically and in the white color only.

Night Time Mode*

On Museum Quality versions, there is a night time mode which can be achieved by pressing F5 on your DCC Throttle. Once pressed, first the rear walkway light between the A unit and the B unit will illuminate, followed by the ground light under the engineer's side of the cab.
*Only on Museum Quality Models operating in DCC.

Wheel Sensors*

For the first time ever in a North American Locomotive model, the ScaleTrains Museum Quality Turbine come factory-equipped with special sensors in the trucks that provide automated wheel squeals when the model negotiates curves. Along with the curve squeal, you will also hear the "clunk" sounds of the wheels when passing through turnout frogs. To remove the monotony, there many different sounds for both features, and they will all play at random when triggered. No need to use a function button…your Turbine will "know" when to play these!

* Not available in DC Operation

ESU PowerPack

Sound Equipped Models come equipped with ESU PowerPack Energy storage built into the A and B units. These PowerPack devices will work as a backup if the models lose power for a short period of time. Please remember these are a backup, not batteries. This is not an excuse to never clean your track again! They must be charged using track power to function and need the track power to stay charged.

F8 Sound ON/OFF

Like most ESU LokSound Equipped Locomotives, The ScaleTrains Turbine comes with the Sound OFF until F8 is pressed. Pressing F8 will turn on the Hostler Motor in the A Unit. If you wish for the sound to be on upon layout power up, please change the following CV's in BOTH the A unit and the B Unit.

CV31 = 16, CV32 = 2

CV403 = 32

DCC Function Mapping

As with all LokSound decoders, the function buttons can be changed to work in any way you desire. By default, the Turbine is set up as follows:

F0 – Front Headlight
F1 – Bell
F2 – Horn
F3 – Turbine on B Unit.
F4 – Dynamic Brake
F5 – Night time mode
F6 – Class lights
F7 – Headlight dimmer
F8 – Hostler Motor on A Unit
F9 – Coupler Clank
F10 – Rear Headlight
F11 - Sanding Valve
F12 – Short Air Let Off

For more info on changing the function mapping to your liking, please consult the Full LokSound Manuals at www.LokSound.com

Basic Programming Notes

Each unit, A unit, B unit and tender should be treated as a separate "Locomotive" during programming althouht all three units shojd use the same address, do not consist the three units. DO NOT program all three units on the programming track at the same time. Doing so may cause some instruction to be missed by one of the decoders. It is recommended that you use Paged Mode programming to adjust CV settings. If you are not familiar with Paged Mode programming, refer to your DCC system manual for more information. Programming track boosters are not necessary in order to program the decoders. If you will operate your model on a DC track or layout, these instructions do not apply.

If you will operate your Turbine on DCC, it is recommended that you download, read and understand the appropriate Loksound decoder manual covering the decoders used in your model. Both Museum Quality and Rivet Counter models now use the LokSound V5 decoder. A clear understanding is necessary to maintain your model's sound and operation to optimum levels. Information on downloading the Loksound manual can be found on page 9 of this manual. Additional CV reference page links are found at the bottom of page 8.

From the factory, each unit, including the tender, is set to default address: 03
The decoder can be set to 2 or 4 digit addresses with normal addressing on all DCC systems.
The decoders support CV 1 Addressing Short Address 1-127
Each decoder supports CV 17/18 Long Address 128-9999 - Please add 32 to value of CV29 to enter Long addresses.
Each decoder supports NMRA Consisting Using CV's 19, 21 and 22.
A decoder reset can be accomplished by setting CV8 to a value of 8 on the program track. NOTE: Please see important info on decoder resets on page 8 of this manual.
Short address CV1 -03
Manufacturer CV8 -151
Long (Extended) Address CV17/CV18 – 192/128

Instructions continued on next page...

CV8 Resetting the Decoder

Should it become necessary to reset the decoder on any of the units, place the unit on the programming track and follow these instructions:

Enter Paged Mode Programming on a DCC system
Enter CV programming and change CV8 to a value of 8 *.

NOTES:
1. When reading CV8 to perform a reset, you will note the default value reads: Manufacturer ID: 151.
2. CV1 (Short address) will be returned to default value: 03.
3. Long (Extended) Address CV17/18 – 192/128.

*DO NOT reset the decoder using POM (Programming On the Main) as you will need to cycle the power OFF and ON to complete the reset cycle. Failure to do so may result in the decoder not properly resetting.

CV163/164 Sound Options/ Alternate Horns and Bells

Your New Turbine will come to you with the Correct Leslie S5T-RF Horn and GE Bell right out of the box. But in case you would like to hear a different horn or bell sound we have provided an assortment.

Horns:

CV163=0 Dual Leslie A200
CV163=1 Nathan K3L
CV163=2 Nathan M5
CV163=3 Nathan P3
CV163=4 Nathan Old Cast P5A
CV163=5 Leslie S2M
CV163=6 Leslie RS3L
CV163=7 Leslie S3L
CV163=8 Leslie S5T
CV163=9 Nathan M3
CV163=10 Leslie RS3K
CV163=11 Nathan K5H
CV163=12 Leslie S3LR
CV163=13 Nathan M3H
CV163=14 Leslie Dual A125-A200
CV163=15 Leslie S5T-RF *Default*

Bells:

CV164=0 EMD Air Bell
CV164 =64 GE Air Bell *Default*

Other Common Sound CV's

Tubine Volume

The turbine sound is actually two sounds that is are CVs 267 and 323 it is our reccomendation that both CVs to the same volume
level based on your liking. The range of these two volumes are 0-128. From the factory they are set to maxium of 128. To access
these sound volume CVs you will need to set values on CV 31 and CV 32 first before setting the volume level on either CV 267 and 323. So here is how you would do this.

Set CV31 to a value of 16, then set CV 32 to a value of 1 and then set the value of CV 267 to your desired level. Then you will need to
go through the same process for CV 323. Remember that everytime you want to access these sound volume CVs CV31 and CV 32 must have the above values entered first and in that order.

For a full listing of all sound CVs please download the Loksound Bulletins at the following web addresses

http://projects.esu.eu/projects/print/93426.1 Museum Quality A unit

http://projects.esu.eu/projects/print/93426.2 Museum Quality B uint

For Even more information you can download the complete LokSound Manuals for the V5 decoders at this address.

http://www.esu.eu/en/downloads/instruction-manuals/digital-decoders/

Both Museum Quality and Rivet Counter now come with the ESU V5 decoder.

Configuration Register CV29 – 4 Add 32 (bit 5) for Long address.

The most complex CV within the DCC standards. This register contains important information for setting up your decoder. The range of this CV is 0-255 with the factory default set at 4.

Function	Bit	Value
Reverse direction of travel (forward becomes reverse)	0	1
Speed steps: 0 = 14 speed steps, 2 = 28/128 speed steps	1	2
Analog mode enable, 4 = Analog mode enabled	2	4
Speed curve selection. 0 = CV 2,5,6 ; 16 = CV 67 - 94	4	16
Address select. 0 = Primary address, 32 = Extended address	5	32

How to program long addresses. Typically most command stations will do this internally but if you need to enter the CVs manually the below information will guide you through the steps.

The long address is separated into two CVs. In CV 17 you will find the higher-valued byte of the address. This byte determines the section, in which the address will lie. If there, e.g., a value of 192 in CV 17, the extended address can accept values between 0 and 255. If there a value of 193 in CV 17, the extended address can accept values between 256 and 511. This can be continued up to a value of 231 in CV17, and then the extended address can take a value of 9984 and 10239. In the table on the below, all possible sections are listed. To calculate the values refer to the following:

- First determine the address desired, e.g. 4007.
- Refer to the values shown in the table below on the right hand side of each column and choose the address section desired. In the right column next to the address section chosen you will find the numerical value you have to write in C17, here in our example for 207:

CV 18 is apprized as follows:
Address desired 4007
Minus first address found in address section - 3840

Equals value of CV 18 167
- Figure 167 is now the value you have to write in CV 18, thus your decoder is responsive to address 4007.

If you wish to read out your addresses, please read out CV 17 and CV 18 one after another and flip the process:
Let´s say you read out the following:
CV 17 = 196; CV 18 = 147. For the corresponding address section look at the table below. The first possible address of this section is 1024. Now you have to add it to the value of CV18, and you will just know the address of the loco:

1024
+ 147
= 1171 Loco Address

Instructions continued on next page...

Address sections		
from	to	CV 17
0	255	192
256	511	193
512	767	194
768	1023	195
1024	1279	196
1280	1535	197
1536	1791	198
1792	2047	199
2048	2303	200
2304	2559	201
2560	2815	202
2816	3071	203
3072	3327	204
3328	3583	205

Address sections		
from	to	CV 17
3584	3839	206
3840	4095	207
4096	4351	208
4352	4607	209
4608	4863	210
4864	5119	211
5120	5375	212
5376	5631	213
5632	5887	214
5888	6143	215
6144	6399	216
6400	6655	217
6656	6911	218
6912	7167	219

Address sections		
From	to	CV 17
7168	7423	220
7424	7679	221
7680	7935	222
7936	8191	223
8192	8447	224
8448	8703	225
8704	8959	226
8960	9215	227
9216	9471	228
9472	9727	229
9728	9983	230
9984	10239	231

Digitrax CV Programming for CV's over 255

Some Older Digitrax Systems do not allow programming of CVs above 255. In order to make full Programming possible, we have implemented an assistance tool. This helps to write the number of the CVs desired temporarily into two assisting CVs (so-called address registers), since the usual CVs cannot be reached. Afterwards the value of the CV desired will be programmed into another assisting CV (so-called value register). When the value register is written, the content will be copied to the actual desired position and the assisting CV will be set back. Consequently, 3 CVs have to be programmed to write one CV. These 3 CVs are described in the following chart:

CV	Name	Description	Value range
96	Address offset	Saves the CV number that should be actually programmed in hundreds.	0 – 9
97	Address	Saves the CV number that should be actually programmed in units and tens.	0-99
99	Value	Saves the value of the CV that should be actually programmed.	0-255

Example: You wish to program CV 317 with value 120.
Proceed as follows:
Program the value of the CV number in hundreds in CV 96.

- In this example: CV 96 = 3.

Program the value of the CV number in units and tens in CV 97.

- In our example: CV 97 = 17.

Program the desired value in CV 99.

- In our example: CV 99 = 120.

As soon as you have programmed CV 99, the value of CV 99 will be transferred into CV 317. When the programming finished, CVs 96, 97 and 99 will be set back automatically.
This procedure is ONLY needed when programming CV's above 255 on some older Digitrax DCC Systems.

Note: Please make sure that Index CV 32 is set to 1 and Index CV 31 is set to value 16 before you change any of the sound volume CVs. Please refer to the decoder's user manual.

If after you have reviewed the information contained in this manual and ESU manuals and you have any further questions in regard to DC or DCC operations please contact Scaletrains.com for additional support.

Thank you again for your purchase and support of Scaletrains.com

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12 RIVET COUNTER FEATURES

Many separately applied details on the front end of the GTEL A-Unit, including separately-applied nose cover plate.

As-delivered details on UP #1, including cab-mounted horn, and no grab iron ladder on right side of nose.

Rear of GTEL A-Unit #1 showing the fine details of its electrical connections.

Profile of UP GTEL B-Unit #1B with its as-built air intake box on the roof and early "H-I" dynamic brake housings.

The front of GTEL B-Unit #1B. It has early "H-I" dynamic brake configuration, and electrical connectors.

The rear of GTEL B-Unit #1B, shows off its as-built rooftop air intake system, operating back-up light, and exhaust housing.

Smooth-sided construction of the 24C tender and its "Commonwealth" 6-wheel trucks.

Detail on the front of the 24C tender, including its "Peacock" handbrake stand, finely-molded ladders and railings, and electrical connectors.

Finely detailed 24C insulated tender, featuring fine plumbing and electrical connection details on the front end.

Rooftop details on the GTEL A-Unit cab roof include cab heater box, lift lugs, windshield grab irons, and more.

Sharply detailed access door and grab iron details on the sides of the GTEL B-Unit.

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MUSEUM QUALITY FEATURES 13

Late-era details on UP #26, including relocated horn, and grab iron ladder on right side of nose.

Operating cab door with separate handles, revealing detailed cab interior inside.

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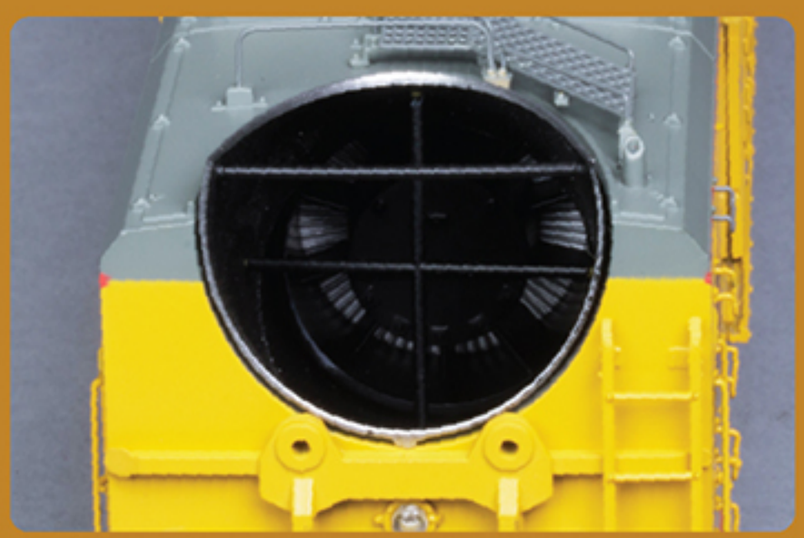
Rear of GTEL A-Unit 26B showing the flexible rubber electrical bus cables and MU cables for installation between the A and B-unit

GTEL B-unit #26B showing its retrofitted "Dynavane" air intake system, "I-I" dynamic brake housings, and intricate grab iron and step details.

MU connection, lift lugs, and "I-I" details on the front end of the GTEL B-Unit #26B.

Rear of GTEL B-Unit #26B, showing the rear of the rooftop "Dynavane" air intake system, operating back-up light, and exhaust housing.

Open B-Unit doors revealing a replica of a GE 10-chamber centrifugal-flow gas turbine and accompanying generators.



Operating back-up light, and operating turbine blade synced to operation of the model.

Highly-detailed 23C tender with intricate rivet detail, and finely-rendered "Buckeye" 6-wheel trucks.

Stunning detail on the front of the 23C tender, including electrical connections, handbrake, and fine ladders and steps.

Detailed rear end of the 23C tender, showing its operating back-up light, and separately applied plumbing details.

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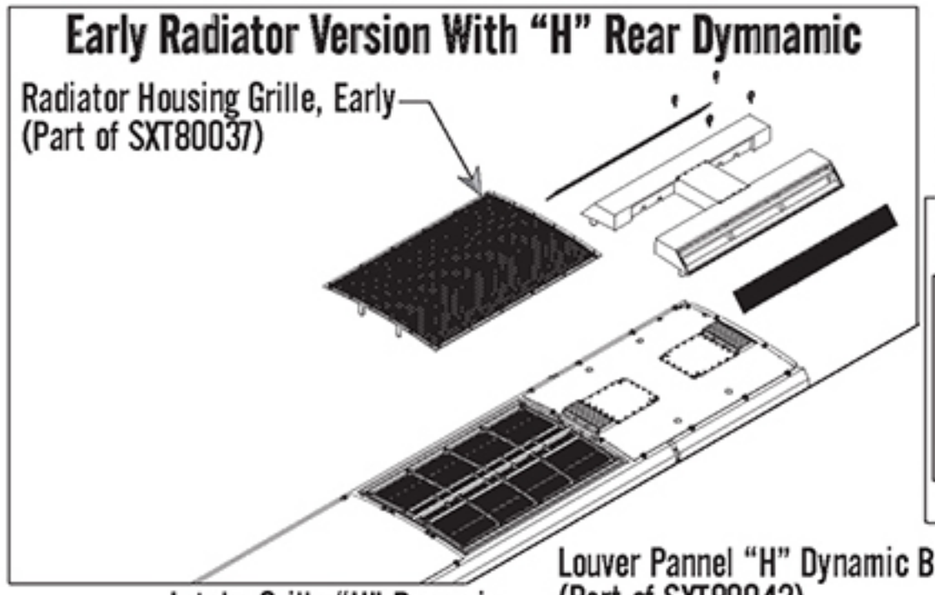
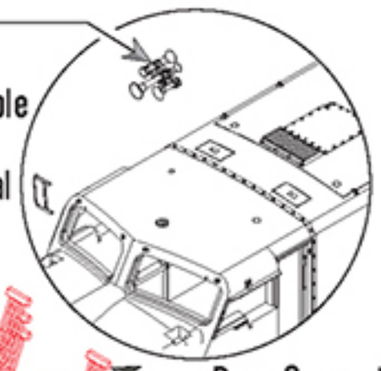
A UNIT

Early Radiator Version With "H" Rear Dymnamic



Early Version With Front Horn Placement



Electrical Buss Housing, Triple (Part of SXT80046)
Electrical Buss Housing, Dual (Part of SXT80046)
Electrical Buss (Part of SXT80046)
Buss Connector (Part of SXT80070)
End Gangway Drop Step (Part of SXT80046)
End Door Frame W/ Lift Lugs (Part of SXT80046)
MU Control Cable (Part of SXT80070)
Coolant Hose Retainer Grab (Part of SXT80020)
Hose, Trainline (Part of SXT80054)
Round MU Receptacle (Part of SXT80046)
Cable (Part of SXT80070)
Coolant Hose Pipe (Part of SXT80046)
Electrical Connector Box (Part of SXT80046)
D/B Field Loop Receptacle (Part of SXT80046)
Fuel Start Line Fitting (Part of SXT80054)
Coolant Hose Support (Part of SXT80046)
MU Hose, 5 Cluster (Part of SXT80054)
Rear Porthole Window (Part of SXT80022)
Grab Iron, Drop, Rear (Part of SXT80020)
Rear Door, Left (Part of SXT80026 for RC) (Part of SXT80027 for MQ)
Rear Door Handrail Short, Left (Part of SXT80020)
Rear Door Handrail Long, Left (Part of SXT80020)
Control Unit Side Radiator Intake Grille (Part of SXT80046)
Rear Side Ladder (Part of SXT80039)
Coolant Hose (Part of SXT80070)
Walkway Light (Part of SXT80022)
Roof Grab 2 (Part of SXT80020)
Engine Compartment Air Scoop Mounting Panel (Part of SXT80037)
Rear Door Handrail Short, Right (Part of SXT80020)
Rear Door Handrail Long, Right (Part of SXT80020)
Rear Door, Right (Part of SXT80026 For RC) (Part of SXT80027 For MQ)
Air Scoop Grille (Part of SXT80037)
Engine Compartment Air Scoop (Part of SXT80037)
Exhaust Stack Grille (Part of SXT80037)
Exhaust Stack (Part of SXT80037)
Radiator Shutter Housing (Part of SXT80037)
Radiator Housing Grille, Late (Part of SXT80037)
Lift Ring (Part of SXT80037)
Dynamic Brake Housing "I" (Part of SXT80042)
Intake Grille "I" Dynamic (Part of SXT80042)
Horn W/ Bracket SXT80062
Roof Grab Iron, Short (Part of SXT80020)
Louver Pannel "H" Dynamic Brake (Part of SXT80042)
Intake Grille "H" Dynamic (Part of SXT80042)
Dynamic Brake Housing "H" (Part of SXT80042)
Lift Lug, Cab Roof (Part of SXT80021)
Radio Antenna (Part of SXT80021)
Cab Roof Heater Box (Part of SXT80021)
Cab Roof Heater Box Grille (Part of SXT80037)
Nose Sandfiller, Right (Part of SXT80021)
Nose Sandfiller, Left (Part of SXT80021)
Right Front Side Window (Part of SXT80022)
Roping Eye (Part of SXT80046)
Operating Cab Door Hinge Shaft (Part of SXT80027)
Operating Cab Door Spring (Part of SXT80027)
Door Window (Part of SXT80022)
Cab Side Door Handrail-Right (Part of SXT80020)
Grabiron, Drop, Right Nose Corner, Late (Upper) (Part of SXT80020)
Grabiron, Drop, Right Nose Corner, Late (Lower) (Part of SXT80020)
Nose Ladder Grabiron, Right (Part of SXT80020)
Cab Eyebrow Grabiron, Left (Part of SXT80020)
Grabiron, Drop (Part of SXT80020)
Cab Eyebrow Grabiron, Right (Part of SXT80020)
Windshield Wiper SXT80066
Class Light Lens (Part of SXT80022)
Number Board Glass (Part of SXT80022)
Nose Door Grabiron (Part of SXT80020)
Headlight Lens (Part of SXT80022)
Nose Headlight Glass (Part of SXT80022)
Nose Lift Lug Cover Plate, Right (Part of SXT80021)
Nose Lift Lug Cover Plate, Left (Part of SXT80021)
Front Windshield, Right (Part of SXT80022)
Front Windshield, Left (Part of SXT80022)
Pilot Corner Step, Right (Part of SXT80038)
Pilot Corner Step, Left (Part of SXT80038)
Pilot Corner Grabiron, Straight (Part of SXT80020)
Nose Ladder Grabiron, Left (Part of SXT80020)
Cab Light PCB SXT80080
Uncoupling Lever, Left Front (Part of SXT80041)
Hose, Trainline Front (Part of SXT80054)
Uncoupling Lever, Center Front (Part of SXT80041)
Uncoupling Lever, Right Front (Part of SXT80041)
Air Filter (Part of SXT80048)
Frame Rail, Right (Part of SXT80023)
Cab Seat (Part of SXT80025)
Screw, 2.0MM X 5.0MM SXT80084
Cab Interior Rear Wall (Part of SXT80025)
Motherboard PCB SXT80074
DCC Decoder
A Unit Body See Parts List for Different Versions
Cab Side Mirror SXT80065
Operating Cab Door Hinge (Part of SXT80027)
Non-functioning Cab Doors (For RC) (Part of SXT80026)
Door Handle (Part of SXT80027)
Operating Cab Doors (For MQ) (Part of SXT80027)
Door Ladder Control Unit (Part of SXT80020)
Cab Side Door Handrail-Left (Part of SXT80020)
Left Front Side Window (Part of SXT80022)
Speaker Housing (Part of SXT80033)
28MM Speaker SXT80067
Radiator Fan Shroud (Part of SXT80033)
Radiator Fan Shroud Grille (Part of SXT80033)
Motor Assembly SXT80032
Rear Walkway Light PCB SXT80078

Parts that are indicated in Blue are used only on the Rivet Counter models.
Parts that are indicated in Red are used only on the Museum Quality models.

Lift Lug, Underframe
(Part of SXT80046)

Cab Interior Front Bulkhead
(Part of SXT80025)

Control Console Gauges
(Part of SXT80022)

Control Console PCB
SXT80077

Cab Interior Floor
(Part of SXT80025)

Front Headlight LED Shield
(Part of SXT80055)

Front Headlight PCB
SXT80075

Class Light LED Shield
Part of (SXT80055)

Class Light PCB
SXT80079

Swerve PCB
SXT80081

Ground Light PCB
SXT80079

Chassis
SXT80016

Universal Sleeve
(Part of SXT80035)

Joint
(Part of SXT80035)

Universal Joint , Flywheel
(Part of SXT80035)

Coupler Box Lid
(Part of SXT80031)

Coupler Centering Spring
SXT80206

Coupler Type E Die Cast
SXT80201 2 Pair
SXT80202 6 Pair

Coupler Box
(Part of SXT80031)

Screw, 2.0mm X 6.0mm
SXT80085

Worm Cover
(Part of SXT80030)

Screw, 2.0mm X 5.0mm
SXT80083

Screw, Flat Head 1.8mm X 5.5mm
SXT80082

Frame Rail, Left
(Part of SXT80023)

Fuel Tank Extended
Left Pipe #3
(Part of SXT80047)

Frog Thump Sensor Plate, Left
(Part of SXT80071)

Truck Magnet
SXT80069

20 Tooth TruckGear
(Part of SXT80018)

Handbrake Chain Guide
SXT80072

Bell
(Part of SXT80046)

Power Wheelset
SXT80073

Frog Thump Sensor Plate, Right
(Part of SXT80071)

Bearing Cover, Timken (Rotating)
(Part of SXT80028)

Brake Cylinder, Short Pivot Arm, Right
(Part of SXT80028)

Truck Snubber, Left
(Part of SXT80028)

GE Speed Recorder, Early
SXT80221

Truck Snubber, Right
(Part of SXT80028)

Bearing Cover, SKF
(Part of SXT80028)

Sanding Line, Right
(Part of SXT80028)

Sanding Line, Left
(Part of SXT80028)

Fuel Tank Extended
Right Pipe #1
(Part of SXT80047)

Brake Cylinder, Short Pivot Arm, Left
(Part of SXT80028)

Truck Sideframe, Right
(Part of SXT80028)

Fuel Tank Extended
Right Pipe #4
(Part of SXT80047)

Universal Joint, Worm
(Part of SXT80035)

Front Air Tank Right
Pipe
(Part of SXT80048)

Universal Shaft, Turbine Unit
(Part of SXT80035)

Worm and Shaft
SXT80050

Worm Gear Washer
SXT80036

Worm Bushing
SXT80049

Fuel Tank Extended Right
Pipe #2
(Part of SXT80047)

Gearbox Half, Left
(Part of SXT80030)

13 Tooth TruckGear
(Part of SXT80018)

Gearbox Half, Right
(Part of SXT80030)

14 Tooth Axle Gear
(Part of SXT80018)

Axle Bushing
SXT80052

Wheel Half Axle
SXT80043

Gearbox Bottom Cover
(Part of SXT80030)

Truck Pick Up Plate
SXT80051

Frog Thump Sensor
(Part of SXT80071)

Battery Box Doors, Right
(Part of SXT80053)

Fuel Tank Extended
Right Pipe #6
(Part of SXT80047)

Air Tank Right Rear Pipe
(Part of SXT80048)

Rear Air Tank Center Pipe
(Part of SXT80048)

Air Tank Left Rear Pipe
(Part of SXT80048)

Primary Air Reservoir
(Part of SXT80048)

Fuel Tank Pipe And Valve
(Part of SXT80047)

Battery Box Doors, Left
(Part of SXT80053)

Battery Box
(Part of SXT80053)

Fuel Filler
(Part of SXT80047)

Front Air Tank
Center Pipe
(Part of SXT80048)

Air Tank Left Front Pipe
(Part of SXT80048)

Fuel Tank Extended Right Pipe #3
(Part of SXT80047)

Fuel Tank Extended Right Pipe #4
(Part of SXT80047)

Fuel Gauge
(Part of SXT80047)

Fuel Tank Extended
(Part of SXT80047)

Fuel Tank Extended Left Pipe #2
(Part of SXT80047)

Fuel Tank Extended Left Pipe #1
(Part of SXT80047)

Brake Cylinder, Long Pivot Arm, Right
(Part of SXT80028)

Brake Cylinder, Long Pivot Arm, Left
(Part of SXT80028)

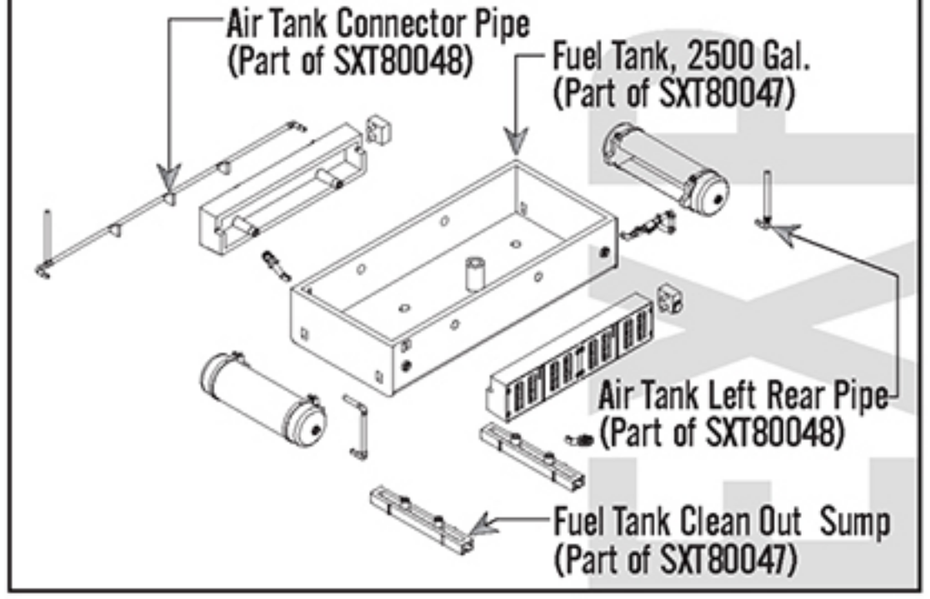
Brake Cylinder Pipe
(Part of SXT80028)

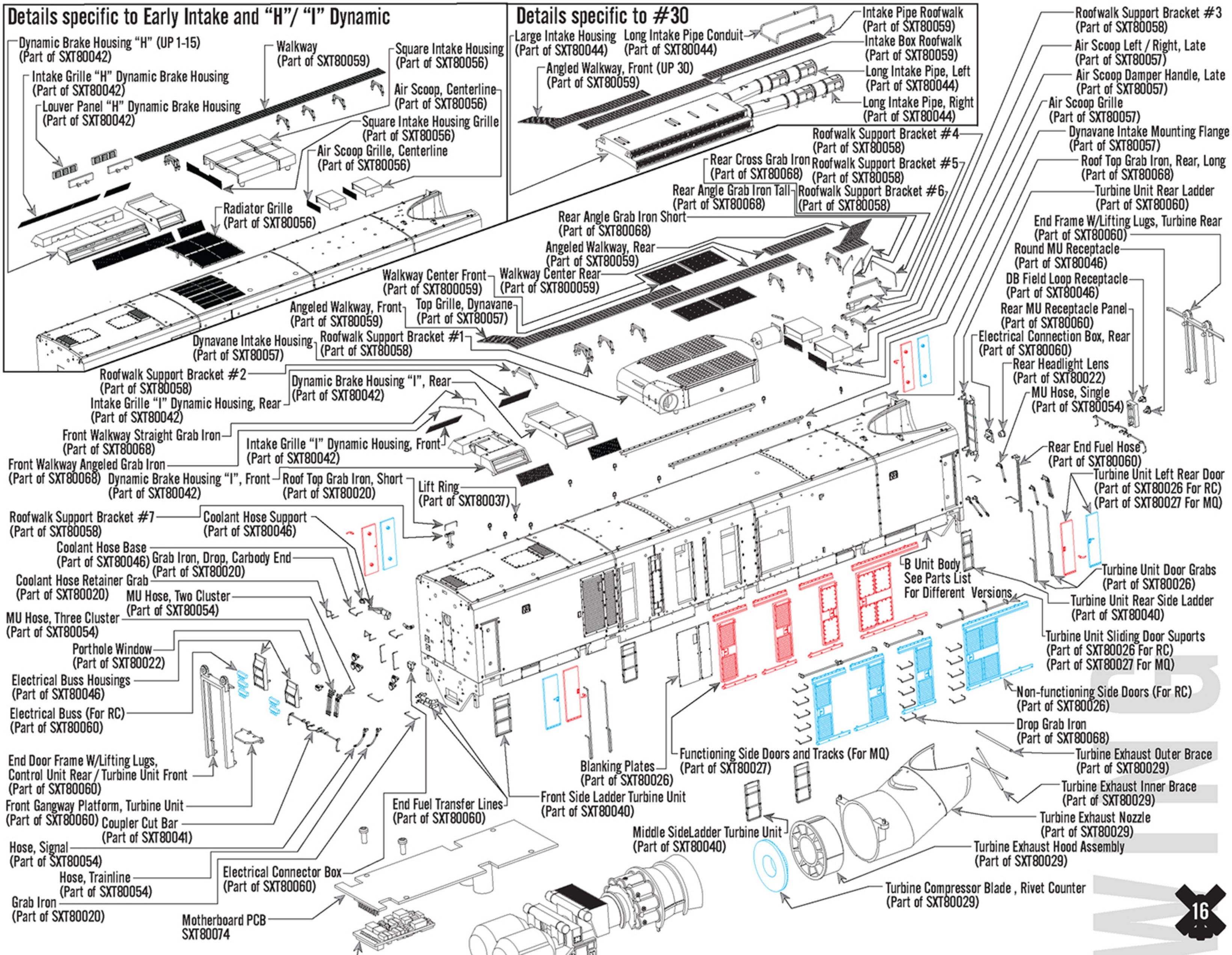
Truck Sideframe, Left
(Part of SXT80028)

Wheel Antislip Detector, Left Cable
SXT80063

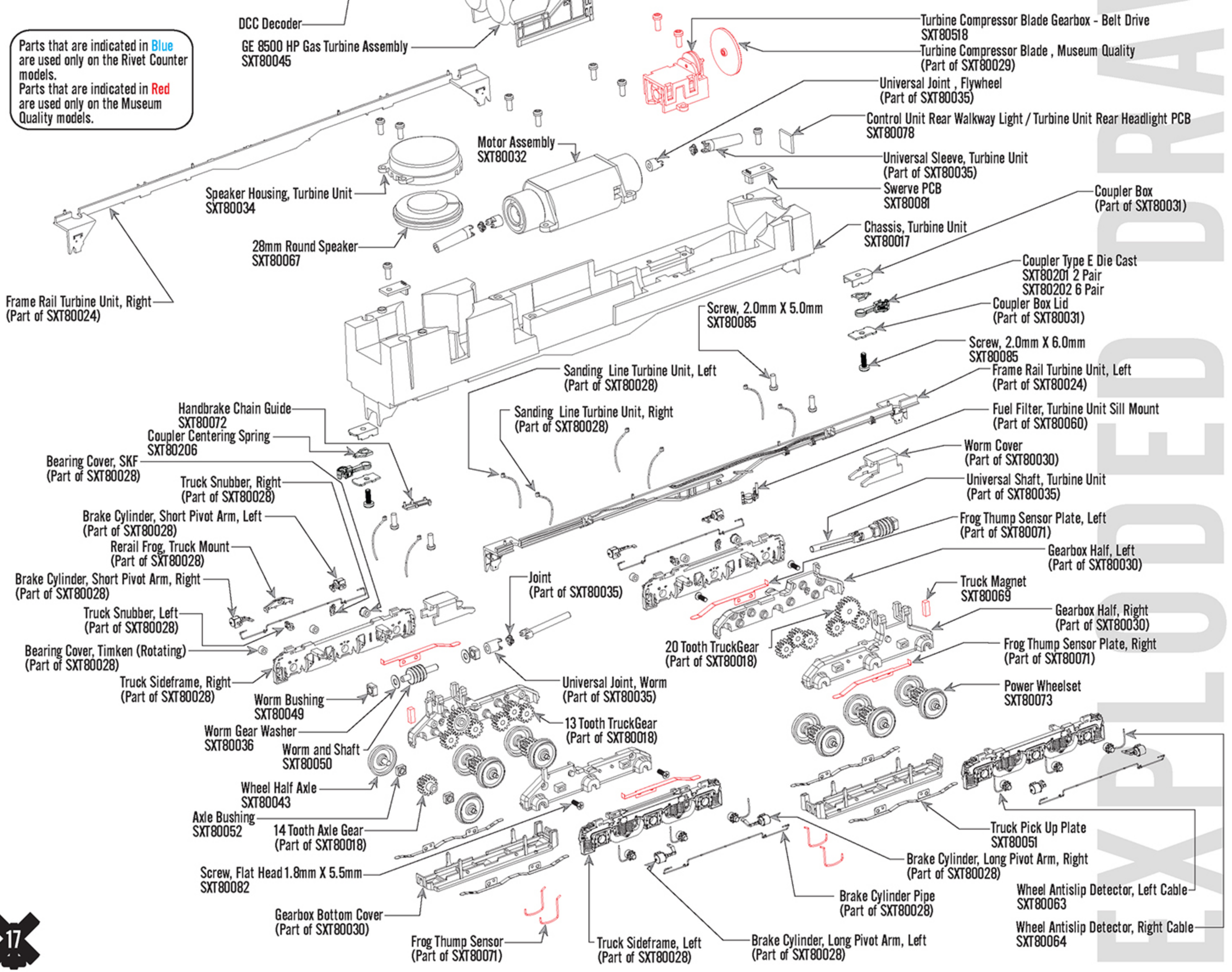
Wheel Antislip Detector, Right Cable
SXT80064

As Built 2500 Gallon Fuel and Air Tank Arramgment




Details specific to Early Intake and "H"/ "I" Dynamic
Dynamic Brake Housing "H" (UP 1-15) (Part of SXT80042)
Intake Grille "H" Dynamic Brake Housing (Part of SXT80042)
Louver Panel "H" Dynamic Brake Housing (Part of SXT80042)
Walkway (Part of SXT80059)
Square Intake Housing (Part of SXT80056)
Air Scoop, Centerline (Part of SXT80056)
Square Intake Housing Grille (Part of SXT80056)
Air Scoop Grille, Centerline (Part of SXT80056)
Radiator Grille (Part of SXT80056)
Details specific to #30
Large Intake Housing (Part of SXT80044)
Long Intake Pipe Conduit (Part of SXT80044)
Angled Walkway, Front (UP 30) (Part of SXT80059)
Intake Pipe Roofwalk (Part of SXT80059)
Intake Box Roofwalk (Part of SXT80059)
Long Intake Pipe, Left (Part of SXT80044)
Long Intake Pipe, Right (Part of SXT80044)
Roofwalk Support Bracket #4 (Part of SXT80058)
Rear Cross Grab Iron (Part of SXT80068)
Roofwalk Support Bracket #5 (Part of SXT80058)
Rear Angle Grab Iron Tall (Part of SXT80068)
Roofwalk Support Bracket #6 (Part of SXT80058)
Rear Angle Grab Iron Short (Part of SXT80068)
Angeled Walkway, Rear (Part of SXT80059)
Walkway Center Front (Part of SXT800059)
Walkway Center Rear (Part of SXT800059)
Angeled Walkway, Front (Part of SXT80059)
Top Grille, Dynavane (Part of SXT80057)
Dynavane Intake Housing (Part of SXT80057)
Roofwalk Support Bracket #1 (Part of SXT80058)
Roofwalk Support Bracket #2 (Part of SXT80058)
Dynamic Brake Housing "I", Rear (Part of SXT80042)
Intake Grille "I" Dynamic Housing, Rear (Part of SXT80042)
Front Walkway Straight Grab Iron (Part of SXT80068)
Front Walkway Angeled Grab Iron (Part of SXT80068)
Intake Grille "I" Dynamic Housing, Front (Part of SXT80042)
Dynamic Brake Housing "I", Front (Part of SXT80042)
Roof Top Grab Iron, Short (Part of SXT80020)
Lift Ring (Part of SXT80037)
Roofwalk Support Bracket #7 (Part of SXT80058)
Coolant Hose Support (Part of SXT80046)
Coolant Hose Base (Part of SXT80046)
Grab Iron, Drop, Carbody End (Part of SXT80020)
Coolant Hose Retainer Grab (Part of SXT80020)
MU Hose, Two Cluster (Part of SXT80054)
MU Hose, Three Cluster (Part of SXT80054)
Porthole Window (Part of SXT80022)
Electrical Buss Housings (Part of SXT80046)
Electrical Buss (For RC) (Part of SXT80060)
End Door Frame W/Lifting Lugs, Control Unit Rear / Turbine Unit Front (Part of SXT80060)
Front Gangway Platform, Turbine Unit (Part of SXT80060)
Coupler Cut Bar (Part of SXT80041)
Hose, Signal (Part of SXT80054)
Hose, Trainline (Part of SXT80054)
Grab Iron (Part of SXT80020)
Electrical Connector Box (Part of SXT80060)
Motherboard PCB SXT80074
End Fuel Transfer Lines (Part of SXT80060)
Front Side Ladder Turbine Unit (Part of SXT80040)
Blanking Plates (Part of SXT80026)
Functioning Side Doors and Tracks (For MQ) (Part of SXT80027)
Middle SideLadder Turbine Unit (Part of SXT80040)
B Unit Body See Parts List For Different Versions
Roofwalk Support Bracket #3 (Part of SXT80058)
Air Scoop Left / Right, Late (Part of SXT80057)
Air Scoop Damper Handle, Late (Part of SXT80057)
Air Scoop Grille (Part of SXT80057)
Dynavane Intake Mounting Flange (Part of SXT80057)
Roof Top Grab Iron, Rear, Long (Part of SXT80068)
Turbine Unit Rear Ladder (Part of SXT80060)
End Frame W/Lifting Lugs, Turbine Rear (Part of SXT80060)
Round MU Receptacle (Part of SXT80046)
DB Field Loop Receptacle (Part of SXT80046)
Rear MU Receptacle Panel (Part of SXT80060)
Electrical Connection Box, Rear (Part of SXT80060)
Rear Headlight Lens (Part of SXT80022)
MU Hose, Single (Part of SXT80054)
Rear End Fuel Hose (Part of SXT80060)
Turbine Unit Left Rear Door (Part of SXT80026 For RC) (Part of SXT80027 For MQ)
Turbine Unit Door Grabs (Part of SXT80026)
Turbine Unit Rear Side Ladder (Part of SXT80040)
Turbine Unit Sliding Door Suports (Part of SXT80026 For RC) (Part of SXT80027 For MQ)
Non-functioning Side Doors (For RC) (Part of SXT80026)
Drop Grab Iron (Part of SXT80068)
Turbine Exhaust Outer Brace (Part of SXT80029)
Turbine Exhaust Inner Brace (Part of SXT80029)
Turbine Exhaust Nozzle (Part of SXT80029)
Turbine Exhaust Hood Assembly (Part of SXT80029)
Turbine Compressor Blade , Rivet Counter (Part of SXT80029)

Parts that are indicated in Blue are used only on the Rivet Counter models.
Parts that are indicated in Red are used only on the Museum Quality models.



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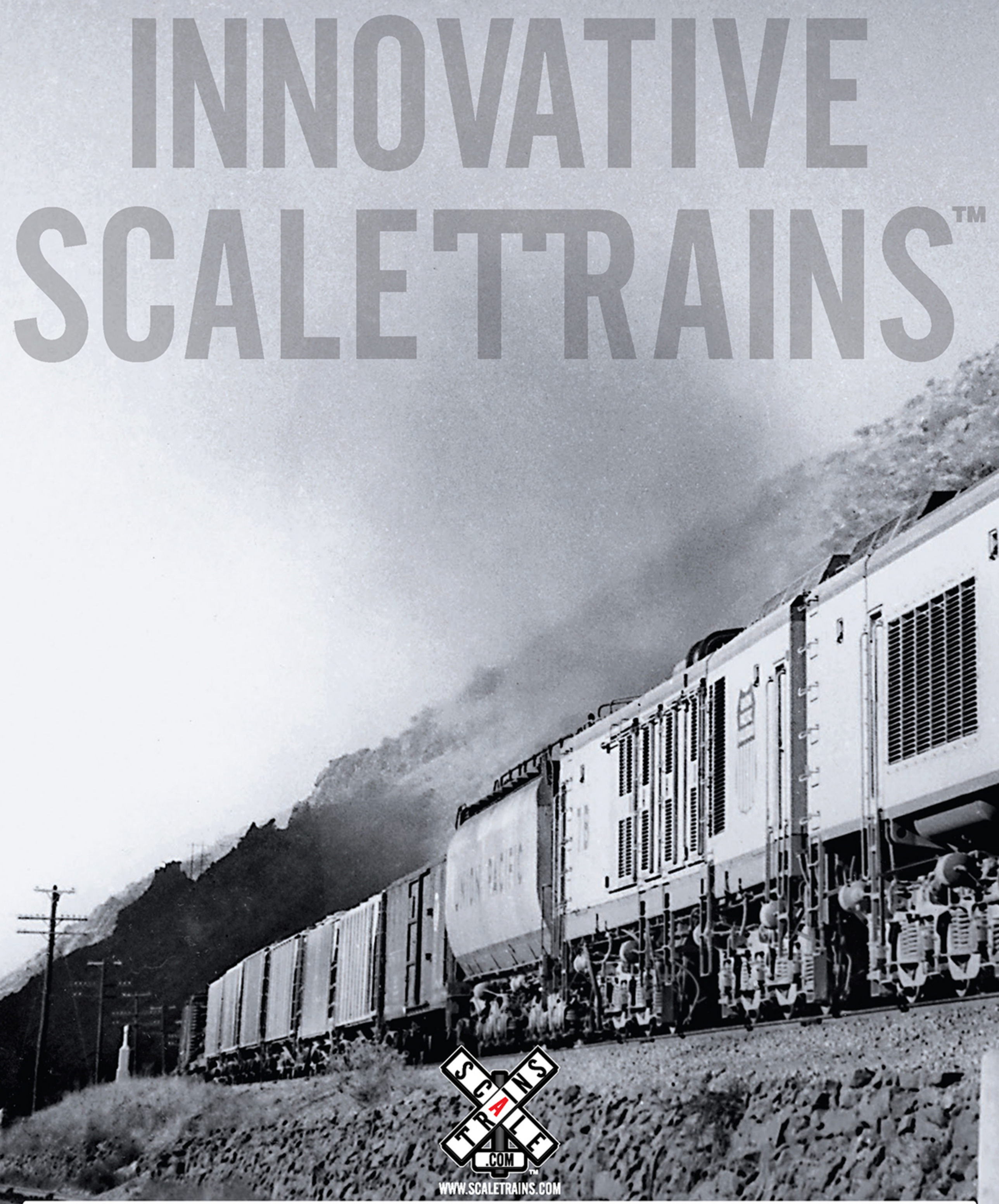

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