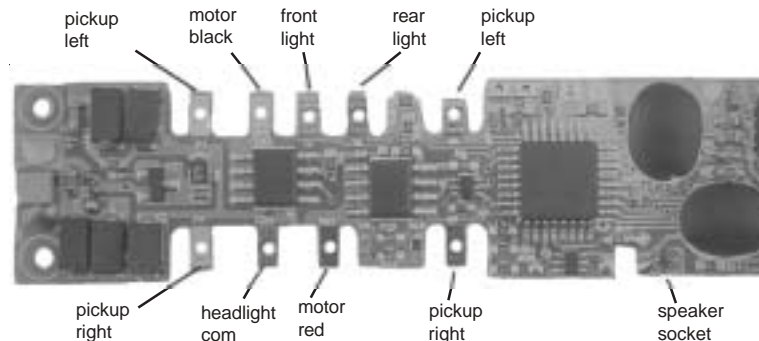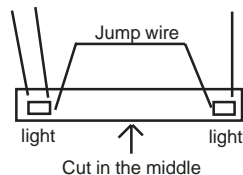# XL SYSTEMS INC
Item #0001916
HO DC/DCC Diesel Sound Decoder Drop in for Atlas Genset Locomotives

• Triple core processor generating three independent diesel genset prime mover sounds
• 22 different types of horns and 8 types of bells
• Programmable individual sound volumes (16 levels)
• Programmable either 2-digit or 4-digit addresses
• Programmable start voltage and top voltage
• Programmable acceleration and decelaration rates
• Programmable 14, 28, 128 speed steps
• Back EMF load control
• Supports read back address and CV value
• Selectable factory default speed curve
• Advanced speed table control CV67-CV94
• Kick start voltage control CV65
• 17 light effects: ditch lights, mars light, gyra light, strobe light, prime strobe...
• 28 accessory functions (F1-F28)
• Compatible with NMRA DCC standards
• Complies with Part 15 of FCC Rules
• 16x35 mm speaker included
• Dimensions: 73.0mm x 17.6mm x 8.4mm

INSTALLATION: This decoder board completely replaces the PC Board in the Atlas GenSet Loco. Slowly remove the body shell from the chassis of the loco. Don't break wires when you remove the body shell. We recomend using a dab of hot glue to secure the headlight wires close to the headlight location inside the long hood of the body shell, to avoid them breaking off. Use a 1" to 2" thin wire to connect ("T" connection) the two black wires from the headlights.Tape the joint to avoid short circuit. This thin wire will be connected to the tab marked "headlight com". Remove the original board with two Atlas ditch light boards. Remove the weight from the rear part of the chassis. Remove two capacitorshidden under the weight. They will not be used. The speaker supplied with your decoder fits snugly in place where you removed the two capacitors. We recomend using a small bead of glue to fully secure the speaker to it's location. Before installing the ditch light boards please use clear tape to completely wrap both front and rear ditch light board holders/slots to prevent the LEDs from touching the chassis, and shorting out. The ditch light boards are already soldered to the decoder for your conveniance. Be very careful with these wires as they are very fragile. The 4 ditch lights are tiny SMD led's. Do not put force on them during install or when removing the ditch light boards. You may need to remove some of the tape from the board to ease the fit. However, you must make sure the rear board be covered with tape, or insulated from the frame. Due to Atlas changing the chassis after first run of production they have two versions of chassis. You may have problem of fiting the light board . You can compare the light board to the original one. If our light boards are shorter than yours, you have to cut the light board in the middle. Don't not cut the jump wire which links the two light together. Using clear tape wrap the pcb. Using the supplied wiring diagram, attach the four pickup, two motor and three headlight wires to the decoder board and secure using the plastic clips or by soldering the wires to the tabs on the decoder. The black motor wire may need to be extended. Use all the wire channels in the chassis to route the wires going to the decoder and use scotch tape in these locations to keep the wires from moving.

Jump wire

light   light

Cut in the middle

pickup left — motor black — front light — rear light — pickup left

pickup right — headlight com — motor red — pickup right — speaker socket

OPERATION
The decoder has a default address #3. Select address #3 on your DCC system. Release service brake (F5). You will hear the brake release sound when you turn off F5. Move up the throttle and the loco should start to moveThe decoder has start up and shut down features. If the loco was previously shut down you have to start up the engine. Press any function key to start up the engine before operating the loco. To shut down the engine you must bring the loco to idle and then press F8 three times. This decoder is default to manual notch setting (CV122=3). F9 will notch up and F8 will notch down. If you want automatic notching enabled set CV 122 = 0. It has three independent diesel genset prime mover sounds. The second engine will turn on at notch 4 and turn off below notch 4. The third will turn on at notch 6 and and turn off below notch 6. This decoder also mimics the real GenSet, and if left idling for a long period of time will shut down and restart automatically at specific intervals to conserve fuel. Shutting off the sound in CV49 will not disable the horn. The decoder has two types of diesel prime movers. You can use F12 or CV 123 to select the desired prime mover sound. You can use F19 to select 34 different horn sounds and use F18 to select 8 different bell sounds. With MRC Prodigy Advance2 DCC which has 28 functions, you can easily setup and access all the decoder's functions. If not, you may not be able to access all the features of the decoder. And you have to use the CV program to setup the decoder.

SERVICE BRAKING
To apply service brake set throttle to zero and press F5. The loco will slow down fast and you will hear the brake squeal. You can pump the brake by turning F5 on and off to stop the loco at desired location. The brake rate is proportional to deceleration rate that you program in CV4. If you forget to turn off F5 and move the throttle up. The loco will move. However, when you release the throttle the service brake will apply again. The service brake can only operate when throttle is at 0. If you don't hear the brake sound program CV115 with a value of 2.

BACK EMF LOAD CONTROL (PID CONTROLLER)
This decoder is equipped with adjustable back EMF load control feature. It is a closed loop speed control. With back EMF load control the locomotive will maintain its speed regardless of pulling up hill or driving down hill. You may program the back EMF load control intensity, CV124, to a lower value to get less back EMF load control. This will enable the locomotive to slow down during uphill travel like real locomotive. The PID controller contains three components: proportional gain (CV113); the integral gain (CV114); and derivative gain (fixed). Designing (tuning) a PID controller is a kind of "rocket science". So optimized these gains at the factory but still give the customer final adjustments. We recommend that you do not change these settings. Too much gain may cause the motor to oscilate (becomeunstable). Too little gain may cause slow response. Additional knowledge of PID feedback control is required before attempting to adjust CV113 and CV114. If CV113 and CV114 are programmed incorrectly, the locomotive will not run smothly. If this happens just program CV124 to 0.

HAED LIGHT EFFECT CV117
The decoder has 17 different lights effects. CV 117 controls both front and rear headlight effect.

#	Effect	#	Effect
0	Normal on/off	8	Marslight
1	Dyno effect (fading)	9	Single strobe light
2	Cim, bright, off cycle	10	Single strobe light
3	Rule 17	11	Double strobe light
4	Both healights on	12	Rotating beacon
5	Ditch light type A	13	Fred rear end flashing
6	Ditch light type B	14	Firebox flicker A
7	Gyra light	15	Firebox flicker B

TROUBLE SHOOTING

This decoder should perform well with all DCC systems. The maximum DCC output should be less than 15 V. If the locomotive does not respond to commands, it may have lost its address. Please re-program the address and program CV19 to 0 (disable consist). If loco lost sound use F12 or Program CV49 to turn on the sound. If it responds to slowly, you should clear its momentum by reprogramming CV3 and CV4 to zero. If step 1's speed is too high, you should program start voltage, CV2 to zero. If its top speed is too slow, program top voltage CV5 to 63. You should also clean the track to improve electrical pickup. Read your DCC system manual to learn how to program and operate the decoder. For more information about CVs and their functions, please refer to the NMRA DCC Standard & Recommended Practices, RP-9.2.2. This is available directly from the NMRA or their website at **www.nmra.org**.

RETURN PROCEDURE

This decoder carries a 6 month warranty against factory defects. This warranty does not include abuse, misuse, neglect, improper installation, If it should become necessary to return the decoder for warranty repair / replacement, Please also include a check or a money order for $9.00 to cover return shipping and handling. If the decoder is no longer considered under warranty, then please include a check or a money order for $25.00 to cover the cost of repair or replacement and return shipping and handling. Before sending in the decoder please email us at linzping@gmail.com for service support. We may solve your problem through email.

Send the decoder to: XL Systems Inc 14 Dora Ln Holmdel NJ 07733

About US

XL Systems Inc has designed and manufactured model rail road products for MRC for more than 20 years. All MRC DCC products are made by XL Systems Inc. All our DCC products are compatible MRC DCC products. We will introduce more new products to meet customer's beget. We also provide installation and special programming and modification for customer. If you have special needs please contact to us at: linzping@gmail.com or maxiulandcc@gmail.com.

FUNCTION CHARTER

Function	Idle / Moving
F1	Bell on/off
F2	Horn
F3	Accessory lights on off, Air release
F4	Coupling 1
F5	Brake release / brake squeal
F6	Dynamic brake on/off
F7	Air hose firing/uncoupling lever
F8	Click 3 times will shut down when in idle/Manual notch down
F9	Engine cooling fan / Manual notch up
F10	Rail wheel clack (only moving)
F11	Traction air compressor
F12	Toggle between max master volume and sound off
F13	Master volume reduce (CV49) by 1 / air release
F14	Master volume increase (CV49) by 1 / air release
F15	Air compressor
F16	flange squeal
F17	Air release
F18	Change bell type (CV52 , 8 types plus off)
F19	Horn type select (CV50, total 22 different horns plus off)
F20	Associated loco sound
F21	Change bell volume and turn on the bell
F22	Change horn volume
F23	Change diesel rumble volume
F24	Safety valve pop
F25	Air release
F26	Flange noise
F27	Sand drop
F28	Air release change air compressor speed mode CV121

SPEED TABLE CV67-CV94 FOR 28 SPEED STEPS

When CV29's bit 4 is set to "1" it will use the speed table formed by CV67-CV94 to control speed (motor voltage). It allows you to setup each speed for all 28 speed steps. First, program CV29 to 18 for short addresses (1-127) or program CV29 to 50 for long addresses (128-9999) to enable speed table control. Then select throttle to 28 speed steps and run your loco at speed step 1. Use program CV on the main to change CV67's value (1-255) to adjust step 1's speed. The kick voltage, CV65 is only applied when the speed step changes from 0 to 1. You should switch between 0 to 1 many times to check step 1's speed. When done with CV67, select speed step 2 and program CV68. CV68's value must be greater then CV67's. When done with CV67-CV94, use read back CV to make sure their values are in increasing order.

Note: When using MRC Prodigy DCC to program addresses it will automatically disable the speed table (set CV29's bit 4 to "0"). Programming CV125 to 1 will also disable the speed table and re-program CV67-CV94 to a default linear speed setting.

PROGRAMMING CV CHART

CV	Description	Range	Defualt
CV1	Short address	1-127	3
CV2	Start voltage	0-63	10
CV3	Acceleration, 1=1 sec, max is 63 sec to reach top speed	0-63	0
CV4	Deceleration, 1=1 sec, max is 63 sec to stop at top speed	0-63	0
CV5	Top voltage, 63=full speed, 0=half of the top speed	0-63	63
CV6	Adaptive back EMF control enable, 1=enable, 0=disable	0-1	1
CV29	Basic configuration		6
CV17	Long address upper byte		
CV18	Long address low er byte		
CV19	Advanced consist address	0-127	0
CV21	When CV21=0, all accessory functions w ill follow its own address. When CV21=1, all functions w ill follow the consist address		
CV49	Sound on/off- horn alw ays on	0-1	1
CV50	Horn type	0-22	13
CV51	Horn volume	0-15	12
CV52	Bell type	0-8	3
CV53	Bell volume	0-15	12
CV54	Bell ring rate	0-50	3
CV55	Prime mover volume (0=diesel off)	0-13	12
CV56	Brake squeal volume	0-15	7
CV58	Air release volume	0-15	12
CV59	Air pump volume	0-15	12
CV60	Safety pop valve volume	0-15	12
CV61	Engine cooling fan volume	0-15	12
CV62	Coupling volume	0-15	12
CV63	Auto ditch lights flash w ith horn enable	0-1	1(enable)
CV64	Rail w heel clack volume	0-15	12
CV65	kick start voltage	0-63	63
CV67-94	28 speed steps table while CV29.4=1	1-255	linear
CV113	Back EMF Load control proportional gain Kp	0-31	20
CV114	Back EMF Load control integral gain Ki	0-31	10
CV115	Auto brake squeal enable/disable	0-1	1(enable)
CV116	Brightness of dim light	0-255	255
CV120	Light brightness	0-255	255
CV121	Ditch lights flash (=1) or stay on (=0)	0-1	0
CV122	Diesel notch mode, 0=auto-notch 3=manual notch		
CV123	prime mover type	0-2	0
CV124	Back EMF Load control intensity (0=off)	0-255	160
CV125	Program it to1 will restore some the CV to factory default		