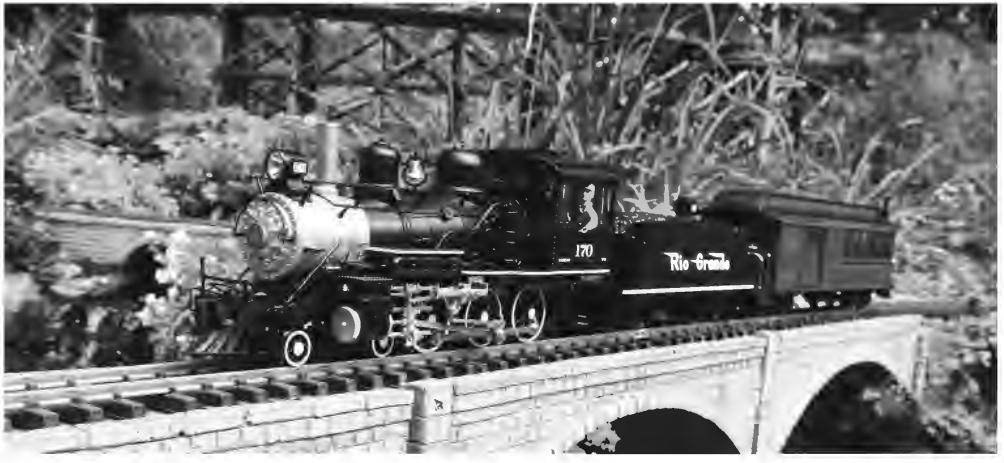
4-6-0 LOCOMOTIVE

with METAL GEARS (DCC and SOUND READY)

BACHMANN
QUALITY SINCE 1933

Bachmann 4-6-0 Features

Your Bachmann Large Scale 4-6-0 is a precision model with many features and details making it an excellent addition to your railroad's roster.



The running gear and other parts of this locomotive will require lubrication before going into service for the first time on your railroad. Failure to perform this initial lubrication may result in damage to your locomotive and also poor operating performance. We want you to enjoy years of operating pleasure and ask that you please read this manual carefully and follow all of the instructions.

FEATURES of the 4-6-0 LOCOMOTIVE:

This Large Scale model has many advanced features not offered by any other manufacturer of model trains, including:

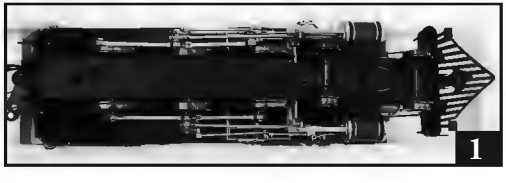
- advanced nonproprietary plug-and-play electronic printed circuit board to accommodate the control system of your choice, including conventional DC power, NMRA/NEM DCC, and/or RC operation
- powerful Pittman® precision-balanced can motor
- all-metal gearbox and gearing for superior performance at realistic speeds
- all new tender with:
    - scale rivets
    - new metal trucks with reliable axle electrical pickup
    - new body-mounted knuckle coupler (with both body height and truck height coupler options)
    - cast metal ladder
    - working rear tender light with new mount to tender
    - new realistic coal load and wood-grained coal extension boards
    - new cast metal steps
- fully operating Walschaerts valve gear with operating piston valves and linkage
- electrical pickup from pilot truck, front and rear drive wheels and both tender trucks
- optical chuff sensors, with the option of 2 or 4 steam chuffs per revolution (when user-supplied sound card is installed in plug-and-play socket)
- factory-installed speaker with wire pigtail to allow easy installation of aftermarket sound system
- switch behind the smoke box door allowing you to choose whether the smoke generator is turned off or controlled by the device in the advanced nonproprietary plug-and-play socket
- easy access to switches in the tender for motor power on/off and choice of track pickup or battery-powered operation according to NMRA or Large Scale railroading practices
- metal drivers, siderods, piston rods, valve guides, guide rods, brake pump, handrails, and piping
- whistle and pop valve
- bell swinger and machined brass bell with metal clapper
- separate sanding lines
- cab detail
- LED headlight and tender light
- load-synchronized LEDs in firebox and ashpan for realistic fire glow
- complete backhead detail including operating firebox door
- engineer and fireman figures

LUBRICATION PROCEDURES

Just like the prototype, the key to optimum performance from your new locomotive is regularly scheduled maintenance and lubrication. As it comes from the factory, your new locomotive's gearbox will already have been lubricated and will not require any additional lubrication prior to operation. However, the running gear and other parts will require lubrication before your locomotive goes into service for the first time on your railroad.

Failure to perform this initial lubrication may result in damage to your locomotive and poor operating performance. The product designers and engineers at Bachmann have designed your new locomotive so that lubrication can be performed in a few simple steps. There are, however, many moving parts and metal-to-metal connections, just like a real steam engine, so it is important to take your time and to lubricate all of them thoroughly.

PLEASE NOTE: We recommend you use Bachmann's line of *E-Z Lube*® products which includes Light Gear Oil, Heavy Gear Oil, Conductive Contact Lube, and Gear Grease. However, any plastic-compatible lubricants designed for model railroad applications can be used.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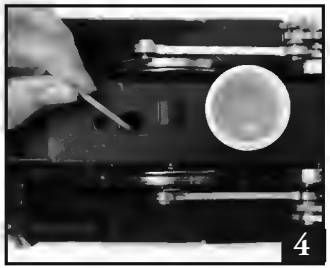
To properly service your locomotive, put it in a position that allows you to easily access the wheels, axles, and valve gear. You can place the foam top from your locomotive's packaging upside down on a sturdy, flat surface and rest the locomotive on a towel placed over the foam top (Figure 1). You can also sit in a chair and rest the engine in an upside-down position on your lap between your legs. You will be working from the rear of the locomotive and moving toward the front. Before you start, remember that over lubrication can also cause damage to your locomotive, so please use all lubricants sparingly.

To begin, take your Bachmann *E-Z Lube*® Heavy Duty Gear Oil and place one or two drops on the motor shaft and gearbox. Angle the applicator through the rear lubrication port on the bottom of the chassis to reach beyond the drive axle and into the gearbox centered in front of the rear axle (Figure 2).

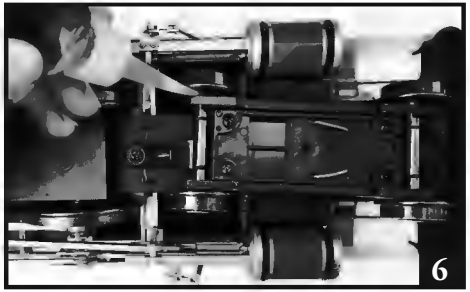
Next, put a drop or two of heavy-duty plastic-compatible gear oil onto the main axle gear which is the gear that is visible in the access port (Figure 3).

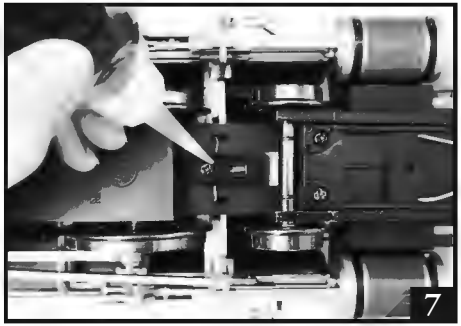


While in this same area, place a small amount of *E-Z Lube*® Heavy Duty Gear Grease through the access port into the gearbox and onto the main gear. This lubricant will not "sling off" or dissipate at high running temperatures. The best method to apply the grease is by using a thin wooden applicator, such as a toothpick or dowel (Figure 4).

Next, put a drop of Heavy Gear Oil on each side of the pillow block bearings, where each of the three drive axles rest in the locomotive frame (Figure 5).

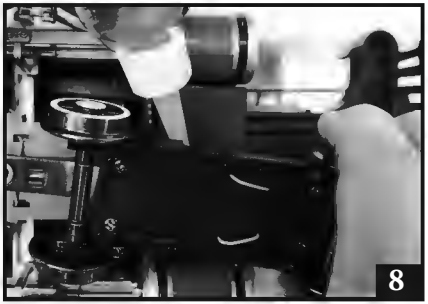
On the lead truck, add a drop or two of Heavy Gear Oil to each bearing surface where the wheel axles pass through the truck side frames (Figure 6).

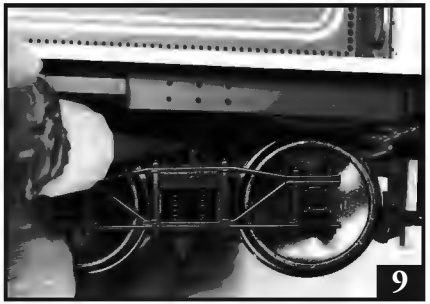




Be sure to remember the lead truck pivot point, where it attaches to the locomotive frame just in front of the lead driver (Figure 7).

Also, put a drop of Heavy Gear Oil on the pivot point on top of the lead truck. This will help it move easily in either direction (Figure 8).



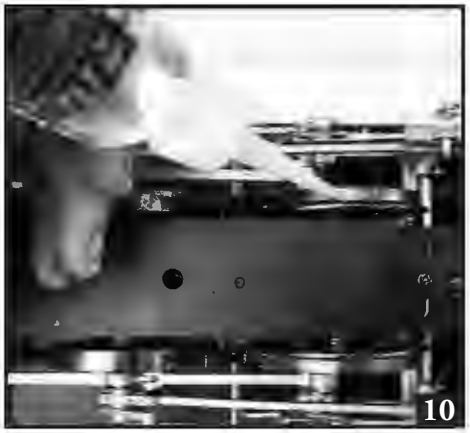


Finally, put a drop of Heavy Gear Oil on the bearing surface between the tender and the tender trucks (Figure 9).

CONDUCTIVE LUBRICANT

When operating outdoors, under high temperatures, and other environmental conditions, there is a lot of friction, wear, and lubricant evaporation. Friction is metal's worst enemy. Bachmann *E-Z Lube*® Conductive Contact Lubricant enhances electrical conductivity and will decrease the amp draw of your locomotive. Just put one drop on the electrical pickup point on each of the drive wheels (Figure 10) and on the end of each axle of the tender truck wheel sets where they enter the side frame (Figure 11). Put a small drop on each tender wheel and on each wheel tread of the locomotive's lead truck.

Please note, you should perform this electrical conductive maintenance after every 5 to 6 hours of operation, or as needed.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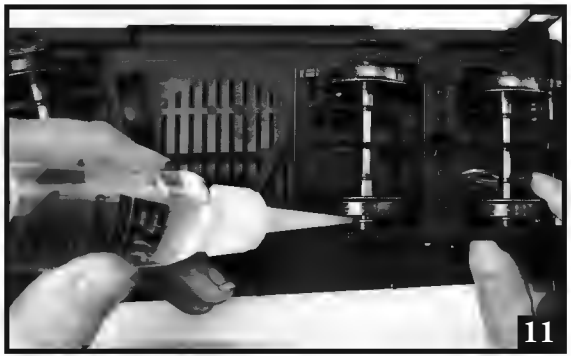
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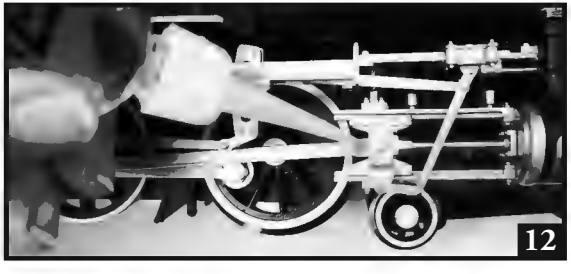
VALVE GEAR LUBRICATION

Bring the locomotive and tender to an upright position. Using Light Gear Oil, lubricate the many moving connections of the valve rod, piston rod, valve guide (Figure 12), and crank pins (Figure 13) with a small drop of oil. Remember to do both sides of the locomotive and DO NOT OVER LUBRICATE.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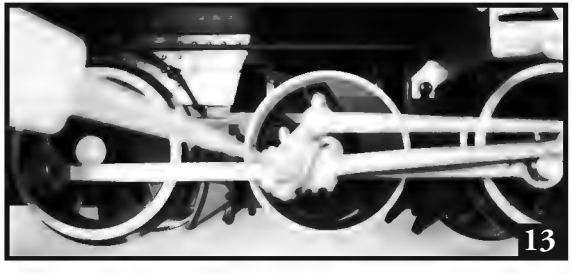
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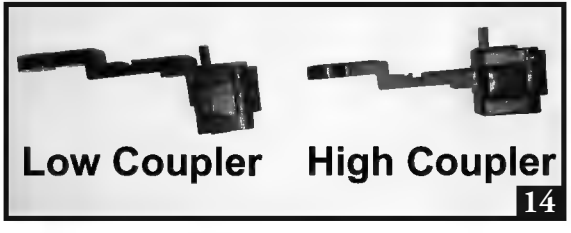
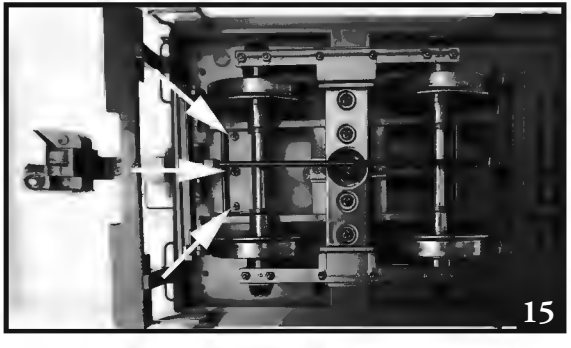
Your locomotive is now ready for track testing and many years of enjoyment. To break in your locomotive, we recommend that you run it with a light load at slow to medium speeds, checking to see that everything on the locomotive is operating properly. This is the way prototype locomotives were brought into service.

CHANGING COUPLERS

As shipped from the factory, the coupler is set to the low height used in Bachmann's *Big Haulers*® line. If desired, you can raise the coupler to the NMRA (*Spectrum*®) height by simply removing the mounting screws and installing the coupler provided in the parts bag (Figure 14). To change the coupler, unscrew the tender's rear truck and move it forward and

out of the way. Next, remove the three screws holding the coupler shaft to the tender. Replace the low-height coupler and shaft with the high-height coupler and shaft (with the trip pin pointed down toward the truck) and reinstall the three screws (Figure 15). Note: when re-installing the coupler shaft, be sure to reinstall the coupler shaft centering spring. Once the desired coupler is in place and working, reinstall the rear truck of the tender.



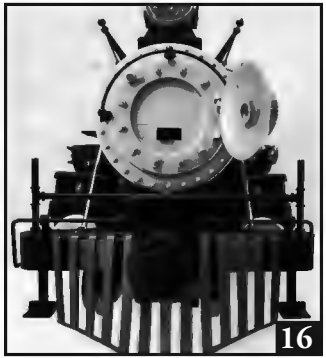


ELECTRONICS

Your 4-6-0 locomotive features totally isolated electronics, which allow for easy installation of the control system of your choice (see your hobby retailer). Switches are found in two locations: in the smoke box behind the smoke box door and in the tender underneath the coal load.

Smoke Box Switch

There is one switch behind the smoke box door (Figure 16) that controls the operation of the smoke generator. This switch has two positions: ON and OFF. In the ON position, the function above is controlled by the device installed in the plug-and-play socket. In the OFF position, the function will remain off, no matter how power is supplied to the locomotive.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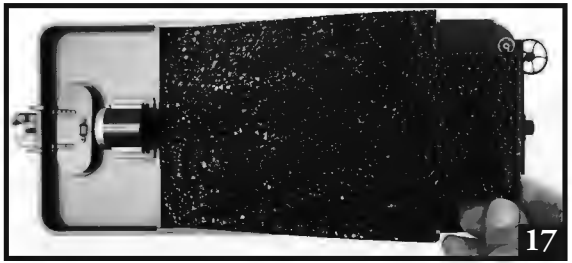
Control Switches in the Tender

To access the tender control switches, remove the coal load by lifting it from the front of the tender (Figure 17). There are four electrical control switches mounted at the front of the main PC board in the tender. The following descriptions of the locations are by looking at the tender from the rear (Figure 18).

1.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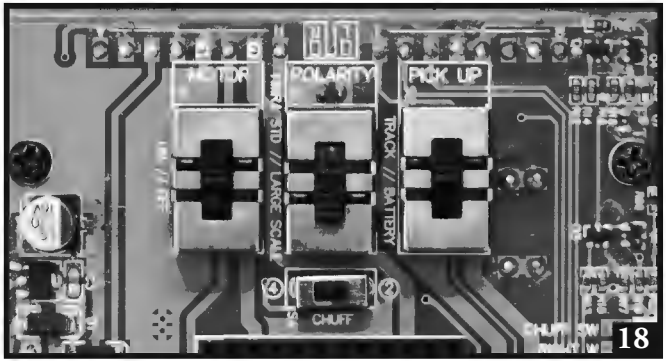

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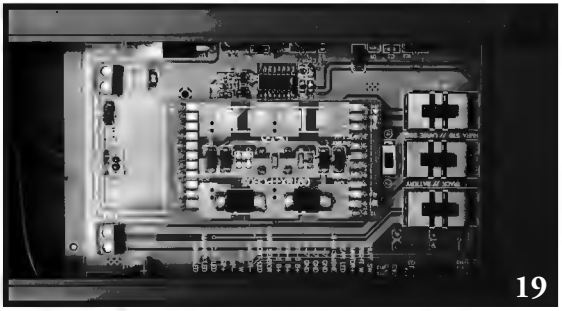
1. **Motor Switch** (left-hand side tender front): This switch controls the motor. When "OFF," the locomotive will not move but the other features of the locomotive (such as smoke or lighting) will continue to function when power is supplied to the locomotive.
2. **Track Polarity Switch** (middle tender front): In Large Scale, there are two conventions used to control the direction of the locomotive. For left-rail positive control (the most common in use), move the polarity switch to the "Large Scale" position. For right-rail positive control, move the polarity switch to the "NMRA" position. If your locomotive operates in the reverse direction to other locomotives on your layout, place the polarity switch in the opposite position.
3. **Pickup Switch** (right-hand side tender front): In the "Track" position, track power is fed from the track to the electronics inside the locomotive. In the "Battery" position, all track connections are removed and all the power is fed through the two screw terminals labeled "INPUT BATT1" on the engineer's side, behind the main circuit board.
4. **Chuff Switch** (small switch next to the polarity switch): The chuff switch is used to select either 2 or 4 chuffs per drive wheel revolution.

PLUG-AND-PLAY SOCKET

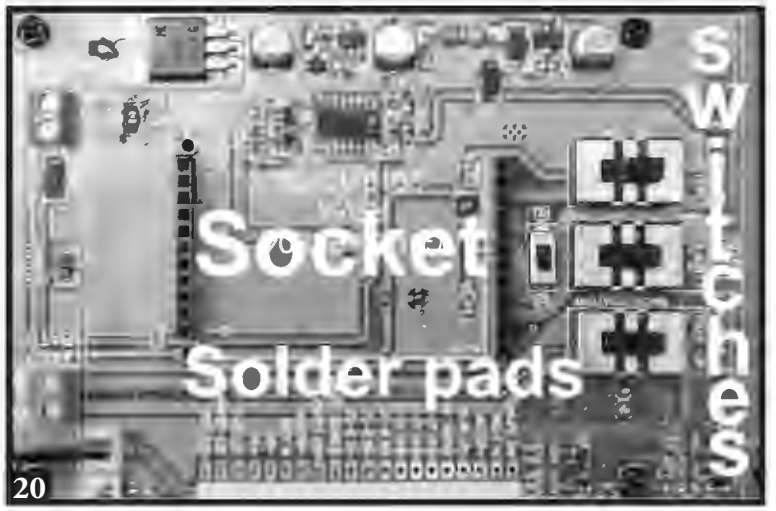
This Bachmann locomotive comes equipped with a nonproprietary plug-and-play electronics socket. This socket is designed to accommodate aftermarket plug-and-play products (contact your local hobby retailer for more information). As delivered, the locomotive has a (DC) Jumper PC Board in the socket (Figure 19).



Shown with (DC) Jumper PC Board in place.

PIN DEFINITIONS

Each pin on the plug-and-play socket has a defined purpose and is labeled on the socket under the (DC) Jumper PC Board. Each pin is also connected to a solder pad for use with systems that do not support plug-and-play functionality (Figure 20). The table on the following page provides the purpose for each pin. The J2 row of pins has a blank key on either end to help ensure that a plug-and-play device cannot be incorrectly inserted. See the following chart for pin locations.

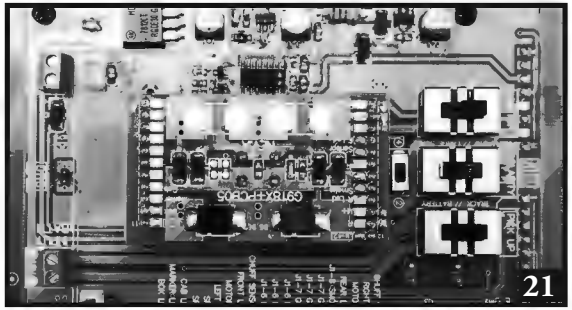


Shown with (DC) Jumper PC Board removed.

Pin number J1	Purpose	Pin number J2	Purpose
12	Rail +		Solid Key
11	Rail +	11	Not used
10	Motor +	10	Firebox Flicker
9	Rear Light on Tender (if so equipped)	9	Not used
8	Smoke Unit	8	Not used
7	Locomotive Ground	7	Not used
6	Locomotive Positive	6	Not used
5	Chuff Trigger 1	5	Train Bus –
4	Front Locomotive Headlight	4	Train Bus +
3	Motor –	3	Speaker –
2	Rail –	2	Not used
1	Rail –	1	Speaker +
			Solid Key

TRACK-POWERED DC OPERATIONS

To operate your locomotive via track power, leave the (DC) Jumper PC Board in place (Figure 21), make sure that the motor switch is "ON," the pickup switch is in the "Track" position, and the track polarity switch is set for its correct position (normally the "Large Scale" position for compatibility with other manufacturers' G scale equipment). In this mode, the locomotive headlight and rear light will be direction-dependent.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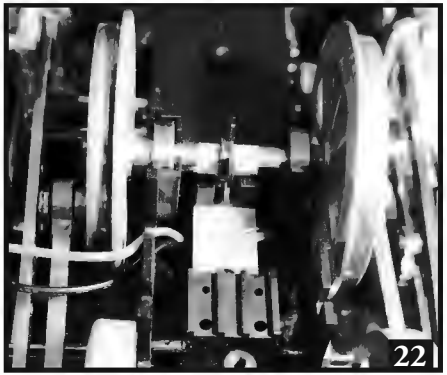
ADDING AN AFTERMARKET SOUND SYSTEM

This locomotive has a speaker mounted in the bottom of the tender with a wire pigtail to make adding an optional sound system easier. It is also designed so lighting and chuff circuits are active before the locomotive moves. If your sound system is designed for plug-and-play operation, remove the (DC) Jumper PC Board and plug in your sound system. If your sound system does not provide plug-and-play operation, continue to use the (DC) Jumper PC Board and connect the sound system wires to the solder pads labeled "Right W" and "Left W" on the main PC board in the tender (Figure 20).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LOCOMOTIVE CHUFF

This locomotive has an optical chuff sensor located on the front drive axle (Figure 22) that can be used to provide a prototypically correct chuff trigger for your sound system. A simple switch is used to select two or four chuffs per

revolution of the drivers. The switch is located in the front center of the tender under the polarity switch (small switch, Figure 18).

To use the locomotive's internal chuff for sound cards that do not plug into the socket, connect the sound board chuff connections to the main PC board solder pads, titled "Chuff Sensor" and "GND" (Figure 20). When used with DC track power, the optical sensors are electronically activated before the locomotive begins to move. If desired, your sound system's "+ -" inputs can also be used to directly power the locomotive's chuff circuits using the "INPUT BATT 2" screw terminals at the left rear of the main PC board in the tender (Figure 23). These terminals have a voltage input from 5 to 14 volts DC. Refer to your sound system for more instructions on properly connecting it to the 4-6-0. Note: this connection is not needed for either DCC or RC with Battery Operation as power for the chuff circuit is provided by the device in the plug-and-play socket.

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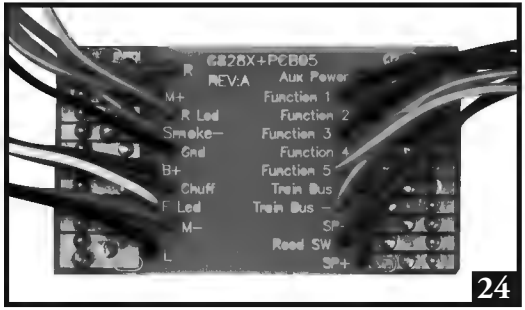
ADDING AFTERMARKET, TRACK-POWERED NMRA DCC OPERATION



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If your NMRA-compliant DCC decoder is designed for full plug-and play operation with the plug-and-play socket, remove the (DC) Jumper PC Board and replace it with your plug-and-play decoder. If your decoder is not designed for full plug-and-play operation, use the supplied Jumper PC Board with wires (Figure 24) and attach the wires to your decoder following the instructions that come with your decoder. Note: the decoder's "+" and "–" outputs must be connected to the (DC) Jumper PC Board (+ to B+ [blue wire] and - to Gnd [small black wire]) to allow the internal lighting and chuff system to function properly.

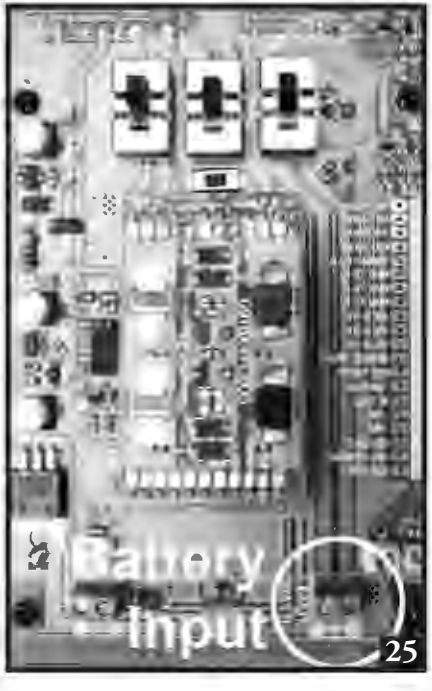
ADDING AFTERMARKET, ON-BOARD BATTERY/RC OPERATION

If your Battery/RC or DCC Direct system supports plug-and-play using the plug-and-play socket, remove the (DC) Jumper PC Board from the socket and replace it with the plug-and-play board of your choice. Install the batteries in the tender next to the main PC board or in a trailing car. Connect the batteries to the "BATT1" battery screw terminals on the tender's main circuit board (Figure 25) and switch the "Track/Battery" pickup switch to Battery (Figure 18). Note: if your Battery/RC or DCC Direct system does not provide DC power to the locomotive's ground and B+ connections, then it will be necessary to also connect the battery to the "J1-7 GND" and "J1-6 B+" connections to power the locomotive's internal functions (Figure 20). If your Battery/RC system does not support plug-and-play operation, use the supplied Jumper PC Board with wires and attach the wires to your Battery/RC or DCC Direct system following the instructions that come with your system. Note: the "+" and "–" outputs must be connected to the Jumper PC Board

to allow the internal lighting and chuff system to function properly. An alternate installation approach if your Battery/RC system does not support plug-and-play operation is to connect the motor outputs of your RC system to the "BATT1" battery screw terminals (Figure 25). Should you wish to control the locomotive's individual lighting and smoke functions, follow your specific manufacturer's instructions for connecting these functions to the 4-6-0's control system's function inputs.

HYBRID DRIVE OPERATION

Some control systems use a combination of on-board primary and backup power to provide the locomotive with the control signal being transmitted either through the track or via radio control. To install such systems, connect the onboard power ground terminal to "J1-7 GND" and the onboard power positive terminal to "J1-6 B+". The remaining connections are through the plug-and-play socket. These systems also allow for the control signal to come either from the track or a radio receiver. If using such a system, connect the radio receiver outputs to the "BATT1" terminals, and use the "Track/Battery" pickup switch to select "Track" for track signal or "Battery" for radio signal.



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GENERAL MAINTENANCE AND SERVICE

By establishing a regular lubrication and general maintenance schedule, you can have a lifetime of fun, performance, and satisfaction with your locomotive. Do not use any liquids or solvents to clean this locomotive; use a soft, lint-free cloth or cosmetics brush. Also, don't leave your locomotive unattended, outdoors overnight, or in inclement weather.

If your locomotive should need service, please note that our service department is not responsible for repairs to locomotives with aftermarket products installed in the locomotive's plug-and-play socket. Any locomotive requiring service should be returned to us as delivered, entirely in the original package AND with the factory-supplied (DC) Jumper PC Board plugged in the plug-and-play socket.

You can check out all of Bachmann's other Large Scale products at your local hobby retailer or at shop.bachmanntrains.com.

Contact our service department at:
Service Department
Bachmann Industries, Inc.
215-533-1600 (for all countries)
between 8:30 AM and 4:00 PM Eastern Time.
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