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LIONEL



***Lionel Powered
PB-1 Diesel Locomotive
Owner's Manual***



featuring ***TRAINmaster***
C · O · M · M · A · N · D

Congratulations!

You own one of the most sophisticated model trains ever built—the Lionel TrainMaster Command-equipped PB-1 diesel locomotive. From the crisp detail and expert decoration on the outside to the advanced

technology and brute power under the hood, the Lionel PB-1 is ready for duty on your model railroad. Experience the superiority of today's Lionel.

- **Odyssey System™**
Electronic speed control for incredible low speed operation and automatic compensation through grades, etc.
- **Lionel Command™ reverse unit for use with the Lionel TrainMaster® Command™ model railroad control system**
- **Tire-Traction®**
- **Die-cast ElectroCouplers™**
- **Diesel smoke generator**
- **Ideal addition to PA-1 A-A set (sold separately)**

Note!

If you have purchased this locomotive as an addition to the PA-1 A-A set, you can quickly get it into operation by referring to the “Quick Start” instructions on page 19. This tells you how to add the PB-1 into the lash-up with your PA-1 A-A.

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Transformer operations

Running your Lionel PB-1 with a Lionel transformer

1

Place your PB-1 on Lionel or Lionel-compatible 0 gauge track.

- **Your PB-1 will operate on most 031 radius track configurations.** We recommend 042 radius minimum for best performance.
- Your PB-1 is almost symmetrical. To make sure you know which way it is going, note the rear of the PB-1 has the large round fan detail.

2

Power up your PB-1 with your transformer.

- **Your PB-1 is designed to operate on 7-18 volts alternating current.** Virtually all Lionel and Lionel-compatible alternating-current transformers are suitable; we recommend the TrainMaster Command model railroad control system.
- **Do not power your PB-1 with direct current (DC).** Damage to sensitive electronic components may occur.
- **When you first power up your track, the PB-1 set will wait between 3 and 8 seconds** as it “listens” for digital language from the TrainMaster Command Base (available separately). During this time, it will not respond to track voltage. When it has determined it’s on a conventional (non-Command) railroad, it will power up in neutral. (This occurs when placing the PB-1 on your railroad for the first time. Thereafter, it starts in forward after every three-second power interrupt.)

Note!

3

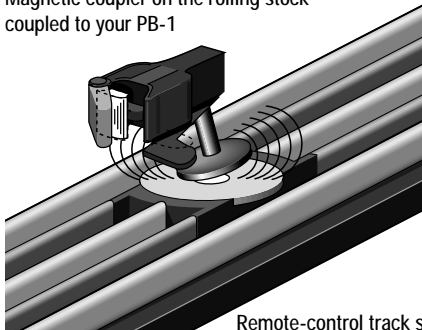
Move ‘em out!

- **Get your PB-1 moving.** Press the DIR button on your CAB-1 remote or Lionel transformer. This sequences the Liontech Command reverse unit (R2LC) to the next operating state. The R2LC alternates between three states: forward, neutral, and reverse.
- **Adjust track voltage** until your PB-1 moves at your desired speed. To increase speed, increase track voltage. To decrease speed, reduce voltage. To stop the locomotive, cut track power.
- **To select a single operating state** (example: forward only), you can deactivate the R2LC’s sequencing function. Get your PB-1 moving in the desired direction, then slide the reverse unit control switch on the PB-1’s underside to PROGRAM (PGM). See page 12 for the switch location and positioning.

Transformer operations

Using your PB-1 ElectroCouplers in the non-Command environment

To use your PB-1 ElectroCouplers in the non-Command environment, you must first couple a piece of rolling stock equipped with Lionel magnetic couplers directly to your PB-1. The magnetic coupler on the

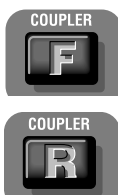


rolling stock will then react to the magnetic field generated by a Lionel remote-control track section (available separately). Place your rolling stock's coupler "trigger disc" over the central coil of a remote-control track section and press uncouple on the controller. The magnetic field pulls the disc downward, and the coupler opens.

Note! Your PB-1's ElectroCouplers will NOT open manually or by using a remote-control track section

Using your PB-1's ElectroCouplers in the TrainMaster Command environment

Both ends of your Lionel PB-1 are equipped with ElectroCouplers™ that respond to either the COUPLER F (front) or COUPLER R (rear) button on your CAB-1 remote when operated



in the TrainMaster Command environment. Simply press either button on your CAB-1 remote, and that coupler opens.

Note! Your PB-1's ElectroCouplers are NOT designed to be opened manually.

Transformer operations

Your PB-1's Odyssey System™

You can lock your PB-1 into speed control mode (ideal for low speed operation) so it will automatically compensate for grades, or to simply maintain a specific speed setting. To turn on the speed control, get your PB-1 moving at the desired speed, *in forward or reverse*. Let it run at the desired speed for at least 5 seconds. Press and hold the horn/whistle button for 2-3 seconds as you increase the throttle by at least 3 volts. Your PB-1 will accelerate briefly, then will return to your set speed once you release the horn/whistle button. As long as the throttle position is maintained at a higher setting than the initial level, your engine will maintain a constant speed. If the throttle is turned below the original level, your PB-1 will slow down due to the available voltage decrease below the "set" level. To check if the speed control setting has been "accepted", ease up the throttle. The speed will remain constant. For best results, adjust the track voltage about 3-4 volts above the "set" point. This will provide enough spare voltage to compensate for

uphill grades, etc., but will prevent excessive voltage to the smoke unit. (In conventional mode, these operate at track voltage, and excessive voltage may lead to damage.)

- * If you wish to change the speed control setting, you must deactivate the speed control, then reactivate at the new setting.

To turn speed control off, get your PB-1 into neutral for at least 5 seconds. Press the horn/whistle for 2-3 seconds while lowering the throttle voltage by at least 3 volts. Do not turn throttle to off, or speed control may not deactivate. This can be difficult if you have established a low speed control setting. Once you are in neutral, you can increase the track voltage before pressing the horn/whistle button and lowering the voltage. This will give you more "room" to lower the voltage. (The speed control deactivates when it sees a -3 volt change with horn/whistle pressed, regardless of initial voltage level.)

Note! Speed control settings are retained in memory even if power is turned off. They will remain present until deactivated.

Note! Speed control settings should be established at the same time for your PB-1 and PA-1 powered with Odyssey System if they are to be operated together.

Transformer operations

Adding fluid to your locomotive's smoke generators

Your locomotive is equipped with a smoke generator that produces safe, clean white smoke during operation.

All smoke generators require the periodic addition of Lionel smoke fluid in order to function. Pierce the tube end with a pin, then add 20-25 drops of fluid into your locomotive's stack. Smoke production will commence momentarily, faster if you run your locomotive at speed. When smoke production wanes, add more fluid (four to eight drops).

If you prefer to have a *smoke free* locomotive, there is a switch located on the bottom of the engine near the fuel tank marked SMK/NO SMK (see page 12 for location). Move the switch to NO SMK and your locomotive will stop smoking.

When the smoke unit is on, always keep a small amount of smoke fluid in the locomotive's smoke generator; the generator's element can become damaged if operated without fluid. Smoke production is greater at higher voltages and when the locomotives are pulling a heavy load or long consist.

For best results, power should be turned off when you are adding smoke fluid. If any fluid stays in the smokestack, it may be necessary to gently blow into the stack opening to force the fluid through.

NOTE: When you are in neutral (conventional mode only), the smoke unit will pulsate on and off to prevent overheating of the element.

TrainMaster Command operations

The Command control environment

Lionel TrainMaster Command is the advanced model railroad control system from Lionel. Your PB-1 is equipped with an R2LC for digital control of all features. TrainMaster Command gives you the power to operate multiple Command-equipped

locomotives on the same track, at the same time.

To operate in Command, you need a Command Base and a CAB-1 remote. Find them both at your authorized Lionel retailer.

1

Place your PB-1 on Lionel or Lionel-compatible 0 gauge track.

- **Make sure track power is OFF before placing it on the track.**
- **Make sure your Lionel Command Base is ON** and its communications wire is connected to the COMMON post on your Lionel transformer *or* the U on any of your installed PowerMasters.
- Once positioned on the track, **increase track voltage to FULL** (on PowerMaster, slide the CMD/CONV switch to CMD).

2

Address your PB-1 using CAB-1.

- **Press ENG and 1** on the numeric keypad of your CAB-1 remote. This command is sent by CAB-1 to the Command Base, which then translates your command into digital code. That code is sent around your railroad's outside rails in the form of a digital "halo." All Command-equipped Lionels listen to this digital communication, but they do not respond until they hear their individual ID number—in this case, "1."
- The digital language of TrainMaster Command—and not track power—controls the actions of Command-equipped Lionels. Track power is simply like gasoline in the tank of your car—it gives you the power to go places, but it doesn't tell you where to go or how fast to get there.
- **All Command-equipped Lionels come factory-programmed with an ID# of "1."** To change the ID# of your PB-1, see page 12.

3

Move 'em out!

- Throttle up or press any command button on CAB-1. Your PB-1 will respond to your every command. Read on.

TrainMaster Command operations

Running your PB-1 in the TrainMaster Command environment

Example address Locomotive #1

PowerMasters set to CMD or traditional power supplies ON FULL



Press ENG



Press 1 (the ID#)

Throttle up/press any command button

Your Command-equipped PB-1 comes factory-programmed with an ID# of "1." To get your PB-1 in action, set PowerMasters to CMD or set all power supplies on full. Press ENG and "1" on CAB-1. Turn the throttle or press any command button; your PB-1 is ready for Command operations.

CAB-1 commands for your PB-1



PB-1's front coupler releases.



PB-1's rear coupler releases.



Activates keypad.



Turn the **THROTTLE** to the right to accelerate, left to decelerate.



Press **HALT** to shut down *all* PowerMaster electrical output on your railroad. Stops *all* Command-equipped Lionels in operation.



Press **DIR**—the locomotive decelerates to a complete stop; turn the throttle up, and the locomotive will accelerate in the new, opposite direction. There is no neutral state.



Press and hold **BOOST** for extra power. Release **BOOST** and return to the PB-1's previous speed.



Press and hold **BRAKE** to slow down or stop. Release **BRAKE** and return to the previous speed.

TrainMaster Command operations

CAB-1 numeric keypad commands for your PB-1

When you press AUX1 on CAB-1, you turn the numeric keypad into 10 command buttons. The keypad lets you control

extra command features (until you press any top-row button like SW, ACC, RTE, TR, or ENG).

0 Stops and resets the PB-1. Resets the PB-1's direction to FORWARD.

8 Turns smoke generator off.

9 Turns smoke generator on. Press and hold for 10 seconds maximum for smoke boost. (Smoke unit switch must be on. See page 12.)

TrainMaster Command operations

Tuning your PB-1's performance

MOMENTUM

TrainMaster Command's momentum feature simulates the labored performance of a locomotive pulling a heavy load. Press L, M, or H (located under CAB-1's removable panel) for light, medium, or heavy momentum. The PB-1's R2LC remembers this setting until you change it. **For quick locomotive response, choose L.**

BRAKING AND BOOSTING

There's more to starting and stopping than just turning the CAB-1 throttle. Use the BOOST and BRAKE command buttons—they give you incremental control of speed *and* are the superior way to handle grades, gradual stops-and-starts, and more.

HIGH VOLTAGE SETTING

Press SET. Get your locomotive moving to the maximum speed you want it to run, press BOOST. Use this to keep your locomotive from excess-speed derailing. Turn off the high voltage setting by pressing SET, then BOOST, holding each for one second.

STALL

Make your PB-1 feel more responsive by setting a "stall" voltage. Get your locomotive moving, then press SET; the PB-1 will stop. Turn the throttle clockwise to get the locomotive moving, then decrease speed until the locomotive just stops. Then press SET again; the R2LC remembers the stall setting until you change it. To clear stall, press SET twice, holding it for one second each time.

Note! These settings will be lost when you assign new engine ID#s.

Your PB-1's Odyssey System in the Command Control Environment

Speed control in command mode is automatic. Simply adjust the speed to

desired level, and the Odyssey System will maintain it through grades, etc.

TrainMaster Command operations

Assigning your PB-1 a new ID#

Example *Assign new ID# to your Command-equipped PB-1*

Command Base ON

Place the PB-1 on track

PowerMasters set to CMD or traditional power supplies ON FULL

Set the powered PB-1 reverse unit control switch to PROGRAM (PGM)

Turn track power on (PowerMasters):



Press BOOST

Program the PB-1 unit with a new ID#:



Press ENG



Press a number you choose (the ID#)



Press SET

Set reverse unit control switch to RUN

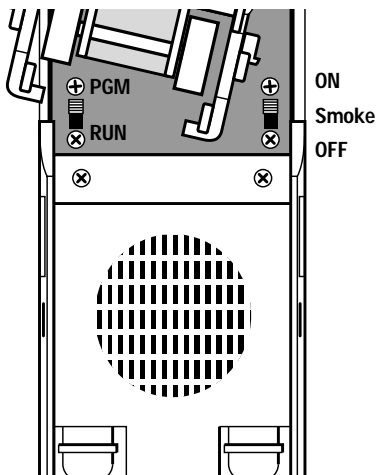
Your PB-1 remembers its ID# forever; change it any time with these steps

We recommend that you choose an easy to remember ID# for your engine. Some possibilities are part of the engine road number, your age, any two digit number that is not used by another engine. Write the number on a small piece of tape and put this on the bottom of the fuel tank to aid in remembering.

As your fleet of Command equipped Lionels grows, give your PB-1 its own ID#. Choose from any between 1 and 99.

Turn the Command Base ON and place the PB-1 on track. Power up, then slide the PB-1 reverse unit control switch to PROGRAM (PGM).

FRONT OF PB-1



Using CAB-1, press ENG, the locomotive ID#, then press the SET button located under CAB-1's removable panel. Slide control switch to RUN. Your PB-1 is now programmed to respond to the number you entered.

Advanced TrainMaster Command operations

Building lash-ups

When real railroads operate two, three, or even four locomotives together, they call it a “lash-up.” A lash-up is railroading’s answer to steep grades, long trains, and extra-heavy loads.

In the TrainMaster Command system, lash-ups are addressed as “TRAINS” -the TR button on CAB-1. When you build lash-ups with TrainMaster Command, several engines are grouped under a single TR ID#. Lash-up building should be attempted only after you’ve mastered ordinary TrainMaster Command operations.

Pick the locomotives in your lash-up and move them together (but don’t couple them) using ENG and each one’s ID#. Because CAB-1’s TR button also means “TRACK” for PowerMaster control, select a TRAIN (TR) ID# that is NOT a number identifying PowerMaster TRACKS. For example, if you’re using four PowerMasters and have named their TRACKS 1,2,3, and 4, choose a number between 5 and 9 for your TRAIN ID#.

Finally, make certain the locomotive’s direction switch is on RUN. Perform a locomotive reset (AUX1, 0) to see what the locomotive’s first-start direction is. It’s possible to have a “contrary” locomotive that’s simply following the direction of the reverse unit control switch.

Example build a Train # (you select) using engine numbers you assigned .

All “ENGINES” reverse unit control switches set to RUN

Address each engine individually with its engine ID

Move each engine into position; do not couple them

“Front” locomotive should be positioned in the forward direction (cab in front) rear locomotive should be positioned with the cab to the rear.

We recommend you use the non-powered PA-1 as the “front” locomotive and the powered PA-1 unit as the “rear” locomotive. The PB-1 should be programmed as a middle engine.

Assign the front engine to the train # (you select) using the F (front) button:



Press TR



Press ? (the train number you select)



Press ?? (the engine number you assigned it)

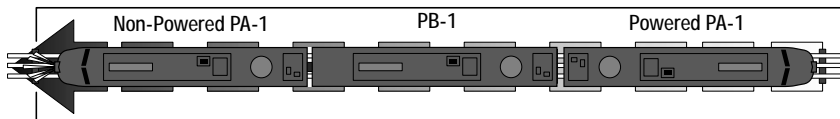


Press F



Press SET

Hear the horn blow



Note!

“Wrong” ENTRIES. If you press a wrong button while building a train, start over with that particular locomotive assignment at the TR command; the assignment isn’t sent until you press SET.

Advanced TrainMaster Command operations

Building lash-ups

Assign the PB-1 as the lash-up's middle engine:



Press TR



Press ? (the train number you selected)



Press ?? (the engine number you assigned it)



Press SET

Assign the Powered PA-1 as the lash-up's rear engine (engine #?? facing backwards) using the R (rear) button and DIR button:



Press TR



Press ? (the train number you selected)



Press ?? (the engine number you assigned it)



Press R



Press DIR



Press SET

Note!

If any engine in the lash-up faces backwards, press DIR before SET (as shown above).

Advanced TrainMaster Command operations

Building lash-ups

Note!

It's still an ENGINE. Whenever a locomotive is in a "TRAIN", you can still individually address it (using its ENG ID#) to adjust lighting, open individual couplers, and tune performance.

The front non-powered PA-1 front ElectroCoupler will respond to the TR? (number you selected) front coupler button if programmed correctly. The rear powered PA-1 front ElectroCoupler will respond to the TR? (number you selected) rear coupler button if programmed correctly. **All engines will also still respond to the coupler buttons if addressed by their engine ID #. Lights on your lash-up set will respond as follows: Lead engine's front headlight on in forward direction. Rear engine's front headlight on in reverse direction. Horn, bell, CrewTalk and TowerCom sounds will only be produced by the front engine in a "train". (This is why your non-powered PA-1 should be programmed as the front engine.)**

Note!

You may establish momentum, high voltage or stall settings for the entire "TRAIN" similarly to an individual engine (see page 11). Setting momentum, high voltage or stall settings in "TRAIN" mode overrides any previous individual "engine" settings. Conversely any "engine" settings will remain present even in "train" mode unless they are overridden. For best results and fewer required steps, these setting should be done in "TRAIN" mode if you intend to run the units as a lash-up.

Reset the direction of the lash-up



Press TR



Press ? (the train number you select)



Press AUX1



Press 0

Now all engines respond together when you address them as Train #? (the train number you select)

If an engine is out of sync after a TR reset, read "lash-up troubleshooting" on page 26 of your TrainMaster instruction manual.

Maintaining and servicing PB-1

Tire-Traction™

Your locomotive is equipped with Tire-Traction. This means that two of the drive wheels on each truck are fitted with rubber traction tires to enhance tractive effort so your locomotive can pull many cars at once.

Lionel locomotives with Tire-Traction grip the track, enabling them to pull heavy loads at higher speeds.

If your traction tires wear out, extras have been included. Simply remove the old traction-tire and stretch the new one over the wheel. Make sure it is fully seated on the wheel groove. Additional replacements (part # 6-10-6001-065) are available through Lionel service or your authorized dealer.

Maintaining and servicing PB-1

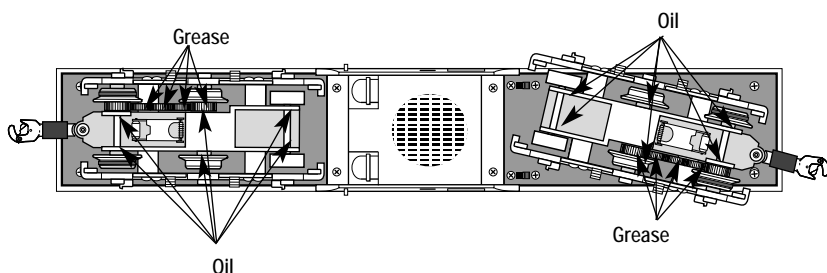
Lubricating your PB-1

Help your Lionel PB-1 lead a long and productive life on your railroad by maintaining it properly.

We recommend you purchase a Lionel 929 Lubrication and Maintenance kit (no. 6-62927), available from your Lionel dealer. Two basic rules to keep in mind: never over-lubricate (a small amount will do), and

avoid getting grease or oil on the PB-1's wheels, contact rollers, or your track.

You'll know your PB-1 requires lubrication when visual inspection reveals dryness on the parts indicated in the illustration. Remove accumulated dirt and dust before lubricating, and always lubricate any locomotive emerging from prolonged storage.



Maintaining and servicing PB-1

Reprogramming R2LC circuit boards to restore features

Due to the inevitable derailments, static, and the negative nature of electricity, it is possible that your R2LC could someday lose its setup program. The symptoms of this

condition would be unresponsiveness in command mode. This can be easily remedied by “reprogramming” your R2LC using the following steps.

STEP 1: Move switch on locomotive from run to program.

STEP 2: Turn on Command Base.

STEP 3: Place locomotive on track, then turn on power to track.

STEP 4: Press “ENG” then input locomotive’s ID#. Press “SET”

STEP 5: Press “ENG”, then the ID#, “AUX1”, then press **8** for your locomotive.

STEP 6: Turn off power to track, wait ten seconds.

STEP 7: Remove locomotive from track, move switch from program to run.

STEP 8: Place locomotive back on track, turn power on to track.

STEP 9: Press “ENG” and ID#, then operate as normal.

Quick Start Instructions to Add Your PB-1 to the PA-1 A-A Set

If you are adding the PB-1 to an existing “lash-up” operating in command control, there are two steps required.

1. Reprogram the PB-1 with a new engine number (See page 12).
2. With your PB-1 on the track, R2LC switch set to “RUN”, add it to your “train” using these steps.



Press TR



Press ? (the train number you selected)



Press ?? (the engine number you assigned it)



Press SET

Then do a “reset” to make sure all locomotives are synchronized:



Press TR



Press ? (the train number you selected)



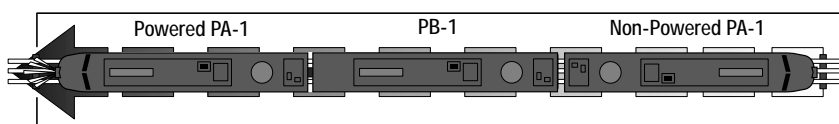
AUX 1



Press 0

When programmed as a train, you can control all three locomotives at once with a single command. For example, all smoke units can be turned off by using Train #-AUX1-8.

If you are not yet comfortable with lash-up building, here is another alternative:



Program your Powered A+B with the same engine number. (Note: Both A and B couplers will open from single command.)

Program the non-powered A with its own engine number.

At start-up, address the non-powered A first, to get the RailSounds on. Then address the powered A-B to begin movement. (Simply address the non-powered A for sounds and address the powered A-B for movement.) Use the non-powered A front coupler to separate the A-B-A set from the train.

This is only one suggestion. With your A-B-A set, there are many possible operating scenarios. If you have a unique situation that is not covered in this manual, call Lionel customer service at 1-800-4-LIONEL.

Limited Warranty/Lionel Service

This Lionel product including all mechanical and electrical components, moving parts, motors and structural components, except for light bulbs, is warranted to the original consumer-purchaser, for one year against original defects in materials or workmanship when purchased through an authorized Lionel merchant.

This warranty does NOT cover normal wear and tear, light bulbs, defects appearing in the course of commercial use, or damage resulting from abuse or misuse of the product by the purchaser. Transfer of this product by the original consumer-purchaser to another person voids this warranty. Modification of this product voids this warranty.

Any warranted product which is defective in original materials or workmanship and is delivered by the original consumer-purchaser to Lionel L.L.C. or an authorized Lionel L.L.C. service center, together with proof of original purchase, will at the option of Lionel L.L.C. be repaired or replaced, without charge for parts or labor. In the event the defective product cannot be repaired, and a replacement is not available, a refund of the original purchase price will be granted. Any products on which warranty service is sought must be sent freight or postage prepaid, as transportation and shipping charges are not covered by the warranty.

In no event shall Lionel L.L.C. be liable for incidental or consequential damages.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you.

This limited warranty gives you specific legal rights, and you may have other rights which vary from state to state.

Instructions for Obtaining Service

If service for this Lionel L.L.C. product is required, bring the item, along with your dated sales receipt and completed warranty information

to the nearest Authorized Lionel Service Center. Your nearest Lionel Service Center can be found by calling 1-800-4-lionel, or by contacting our Website @ www.Lionel.com

If you prefer to send it back to Lionel L.L.C. for factory repair, you must first call 810-949-4100 or FAX 810-949-5429 or write to Customer Service, P.O. Box 748 New Baltimore, MI 48047-0748 stating what the item is, when it was purchased and what seems to be the problem. You will be sent a return authorization letter and label to assure your merchandise will be properly handled upon receipt.

Once you have received your return authorization and label, make sure that the item is packed to prevent damage during shipping and handling. We suggest that you use the product's original packaging. This shipment must be prepaid and we recommend that it be insured.

Please make sure you have followed all of the above instructions carefully before returning any merchandise for service.

Warranty Information

Please complete the information below and keep it, along with your dated sales receipt. You must present this and your dated sales receipt when requesting warranty service.

Name _____

Address _____

Place of Purchase _____

Date of Purchase _____

Product Number _____

Product Description _____

