

OPERATION MANUAL

4732-00 to -49



THE LEADING FORCE IN ORBITAL SHAKERS®

LAB-LINE®

ORBIT SHAKERS

Models 3518, 3519, 3520, 3521

RECEIVED
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LAB-LINE INSTRUMENTS, Inc.

DESIGNERS AND MANUFACTURERS

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We are pleased with your choice of LAB-LINE INSTRUMENTS for your equipment needs. For maximum value and ease of start-up, please proceed as follows:

1. Inspect the carton and contents for shipping damage. Notify the carrier immediately if damage is found.
2. Use the "ACCESSORY CHECK LIST" when unpacking to verify that the complete unit has been received. Do not discard packing material until everything is accounted for.
3. Read this Operation Manual thoroughly before deciding on an appropriate location for the unit. You must consider the availability of power, water and/or gas hook-ups, drains and other unit requirements, as well as user convenience.
4. Carefully follow directions in the "INSTALLATION" section of this manual.
5. Insist that each operator of the unit is familiar with the "OPERATION" section of this manual.
6. Fill out the WARRANTY REGISTRATION CARD and mail it in to Lab-Line Instruments, Inc. within seven business days after receiving the unit.
7. Keep this manual in a safe location for ready reference to the "OPERATION" and "MAINTENANCE" sections when needed.
8. If, after reading this manual, you have any difficulty with installation, operation or maintenance, please call:

LAB-LINE CUSTOMER RELATIONS DEPARTMENT
(708) 450-2600 (in Illinois)
(800) 323-0257 (elsewhere)

ALL RIGHTS RESERVED

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DANGER

DO NOT USE IN THE PRESENCE
OF FLAMMABLE OR COMBUSTIBLE
MATERIALS OR EXPLOSIVE
GASES.

FIRE OR EXPLOSION MAY
RESULT, CAUSING DEATH OR
SEVERE INJURY.

SAFE OPERATION

The instructions on this and the following page are provided to help users operate the unit safely. Failure to observe the precautions could cause severe personal injury.



= This Safety Alert Symbol is used throughout this manual to call attention to instructions for personal safety. Please read these instructions and follow them carefully.

1. Read Operation Manual before using equipment. Familiarize yourself with controls and accessories.
2. When operating this equipment, always wear protective clothing, glasses and other accessories as specified by the Safety Regulations of your laboratory or institution.
3. We recommend that you do not leave equipment unattended while it is in operation.
4. Do not operate equipment with a damaged electrical cord or allow cord to come into contact with a hot surface.
5. Do not modify construction and/or assembly of equipment. Keep guards in place.
6. Do not remove tags, labels, decals or other information from the unit.
7. Do not operate equipment in an explosive atmosphere.
8. Do not insert fingers into equipment when it is operating.
9. Make sure all vessels are securely clamped before turning on unit.
10. Do not operate the mixer at speeds which will cause the contents of vessels to be thrown out. Wherever possible, vessels should be stoppered to prevent hazardous substances being thrown out during the mixing action.

Use extra caution with hot or volatile substances, so that pressure build up in container(s) does not cause the stopper to blow off.
11. If shaking action will result in the evolution of gases or fumes, carry out the operation in a well-ventilated laboratory hood.
12. To eliminate hazard of electrical shock, make sure floor around machine is dry.

13. In the event of accidental spilling or splashing of liquids, clean up and/or neutralize the spilled liquids before continuing.
14. Do not use equipment for other than its intended purpose.
15. Use only the accessories and attachments that are shipped with the equipment or are specified for it. Substituting other attachments or accessories can produce hazards or make the unit inoperative.
16. Do not run equipment with an unbalanced load. Always load platforms for optimum stability.
17. Perform regular maintenance service as specified in this manual and keep unit in good repair. Do not operate with known defects.
18. Always disconnect equipment from power source before servicing or performing any maintenance procedures.
19. Do not operate shaker for extended periods under high humidity conditions.
20. Do not operate shaker in ambient temperatures exceeding 40°C.
21. Do not operate shaker in a CO-2 enriched atmosphere.

DESCRIPTION

The Orbit Shakers covered by this manual are designed with a 3/4" orbital motion for efficient shaking of many common laboratory vessels. The built-in timer allows continuous shaking or timed shaking for up to one hour.

MAXIMUM SAFE SPEED

While shaking speed can be varied from approximately 40 to 400 rpm, the maximum safe speed will be less than 400 rpm and depend on load, physical and chemical characteristics of liquids being mixed and results desired. At no time should a speed be employed that will result in shaker losing stability, vessels contacting each other or liquids being ejected from vessels.

INTERCHANGEABLE PLATFORMS AVAILABLE

A wide selection of interchangeable shaking platforms and vessel clips is available to accommodate most laboratory needs.

DIFFERENCES IN MODELS

The models provide essentially identical shaking characteristics and differ only in a control feature and electrical characteristics.

Models 3518 (120 VAC) and 3519 (240 VAC) display speed on a large LED readout; Models 3520 (120 VAC) and 3521 (240 VAC) display speed on an analog meter scale.

Check the nameplate of the unit you are using to be certain that it matches the power source to be used.

SPECIFICATIONS

ELECTRICAL

3518: 120 VAC, 50/60 Hz, 100 Watts
3519: 240 VAC, 50/60 Hz, 100 Watts
3520: 120 VAC, 50/60 Hz, 100 Watts
3521: 240 VAC, 50/60 Hz, 100 Watts

SHAKER MOTION

All Models: 3/4-inch circular motion.

SHAKER SPEED

All Models: 40 - 400 rpm.

TIMER

All Models: 1 - 60 minutes or continuous.

DIMENSIONS

11"W x 13-1/2"D x 7"H (28 x 34 x 18 cm)

NET WEIGHT

3518, 3520: 34 lb (15.4 kg)
3519, 3521: 38 lb (17.3 kg)

INSTALLATION

1. UNPACKING

Inspect the carton and shaker for damage. If any damage is found, call the carrier immediately and file a claim.

Unpack the unit carefully and use the "Accessory Check List" which is provided to make sure that all loose parts and accessories are found. Do not discard packing materials until all parts are accounted for.

2. LOCATION

Place the shaker on a level surface in a convenient location and near a grounded electrical outlet that matches unit requirements. At least one inch of clearance is necessary on all sides to allow unobstructed orbiting.

3. PLATFORM INSTALLATION

Select the appropriate platform for the vessels to be shaken. Tighten the four thumbscrews to secure the platform to the shaker. Make sure both sides of the platform are outside the mounting plate.

4. ELECTRICAL CONNECTION

Models 3518 and 3520 are supplied with a three-wire line cord and should be connected to an outlet designed for three-prong plugs. If an extension cord is used, it also should be the three-wire grounded type (AWG No. 16).

Models 3519 and 3521 are 240 VAC, 60 Hz units. Because of the variety of plug configurations in use worldwide for 240 VAC power, units are shipped with the plug removed. The user must install a plug to conform to local code and configuration requirements.

* Where it becomes necessary to make changes in electrical outlets, *
* wiring and other characteristics, it is recommended that these be *
* done only by a qualified or journeyman electrician. This includes *
* replacing two-prong plugs (ungrounded), for example, with a three- *
* prong plug (grounded). *
* *
* All changes need to be made to match the load requirements shown *
* on the nameplate of the unit. *

It is best to leave unit disconnected when not in use.

OPERATION

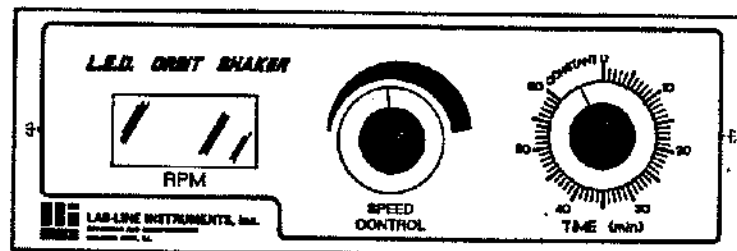


 * **DANGER:** Do not use in the presence of flammable or combustible *
 * materials or explosive gases. Fire or explosion may result, *
 * causing death or severe injury. *

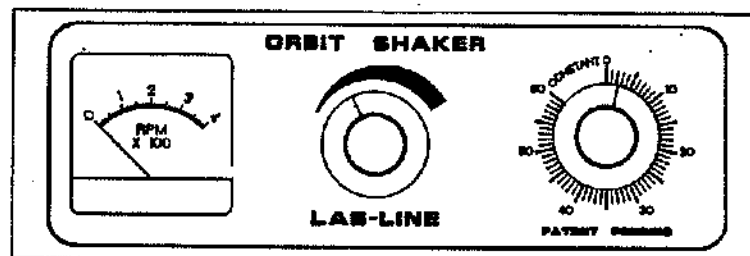
The shaker does not operate when the timer is set at "0". Before restarting, adjust the Speed Control to a slow setting to prevent loss of sample. When not in use, disconnect unit from its outlet.

Figure 1: CONTROL PANELS

Models 3518, 3519



Models 3520, 3521



1. CONTINUOUS SHAKING

Turn the timer knob counterclockwise to the "Constant" shaking position, then turn the Speed Control knob clockwise to increase the shaking speed.

2. TIMED SHAKING

The timer is marked in 1-minute increments to 60 minutes. To initiate timed shaking, it is first necessary to turn the timer knob past the 5-minute setting and then adjust the shaking speed as described below. After shaking motion is initiated, the timer knob can now be set to any timed interval from 1 minute to 60 minutes.

The timer will count down the time and stop the shaker action when the time has elapsed.

3. SPEED CONTROL SETTING

Check the tachometer. Adjust the shaking speed to the desired level. The operator should use caution in setting the speed, so that the vessels do not come out of their holders. Maximum speed is factory set at 400 rpm; however, maximum safe speed may be somewhat less depending on the particular load.

To stop the shaker, set the timer knob to "0" and the speed control to the extreme counterclockwise position.


MAINTENANCE

 * It is recommended that the following maintenance procedures *
 * and replacement of parts be performed by qualified personnel.*

 * Make no attempt to service or repair a Lab-Line product *
 * under warranty before consulting your Lab-Line dealer. *
 * After the warranty period, such consultation is still *
 * advised, especially when the repair may be technically *
 * sophisticated or difficult. *
 * *
 * If assistance is needed beyond what the distributor can *
 * provide, please call the Lab-Line Customer Relations *
 * Department at 800-323-0257 (outside Illinois) or at *
 * 708-450-2600 (inside Illinois). *
 * *
 * No merchandise, however, should be returned to Lab-Line *
 * without prior approval. *

The shaking mechanism is equipped with grease-sealed ball bearings which do not require further lubrication or adjustment.

I. PREVENTIVE MAINTENANCE (with every three months of constant use):

 *****
 * WARNING: TO AVOID RISK OF ELECTRIC SHOCK, DISCONNECT EQUIPMENT FROM *
 * POWER SOURCE BEFORE REMOVING BOTTOM COVER OR PERFORMING ANY SERVICE. *

- A. Remove the platform by loosening four thumbscrews, remove ribbed mat, remove the nine smaller screws on the platform mounting plate and then lift it from the unit (see Fig. 2, page 5-2). Inspect the drive belt for wear and proper tension. Order a replacement if necessary.
- B. Take out the two large motor mount screws and lift the motor out. Two brushes are located under plastic caps on opposite sides of the lower part of the motor. Unscrew the plastic caps and slide the brushes out. Replace brushes when they are worn down to 3/16" in length.
- C. Reattach the motor loosely to the motor mount and install the drive belt. To properly tension the belt, slide the motor away from the driven pulley until there is .08" of slack on the belt at midpoint between the pulleys when a force of 3/4 lb is applied. Next, securely tighten the mounting screws.

To correct a misaligned pulley, loosen the motor pulley setscrew, slide the pulley up or down into alignment, then securely tighten the motor pulley setscrew.

- D. Reassemble the unit carefully. Position the platform mounting plate atop the shaker body and turn all nine screws by hand until they are fingertight only. Turn the speed control fully counterclockwise ("OFF") and plug the unit into an outlet. Turn the speed control knob slowly in the clockwise direction to allow the shaker to orbit at its slowest speed.

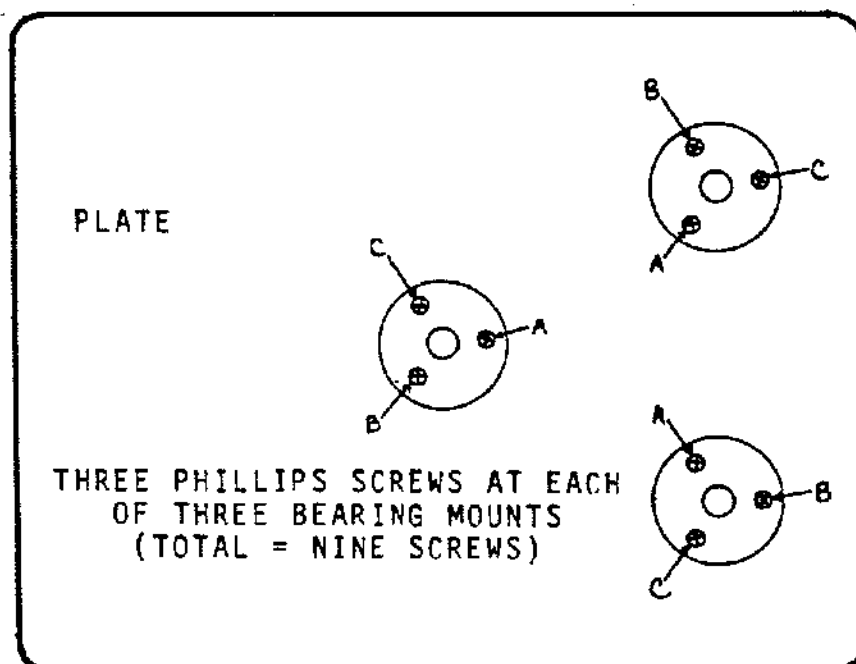
While it is slowly orbiting, slightly tighten each of the "A" screws shown in Fig. 2. Repeat this "slightly tightening" procedure with the "B" screws, then with the "C" screws.



 * CAUTION: All screws must first be slightly *
 * tightened to seat the plate properly. *

Repeat the screw-tightening procedure until all nine screws are securely tightened.

Figure 2: PLATFORM MOUNTING PLATE (Top View)



II. REPLACING PARTS



 * WARNING: TO AVOID RISK OF ELECTRIC SHOCK, DISCONNECT EQUIPMENT FROM *
 * POWER SOURCE BEFORE REMOVING BOTTOM COVER OR PERFORMING ANY SERVICE. *

- A. Motor brush and belt replacement are made the same way as is inspection, described in Section I, on page 5-1. If one brush is worn, both must be replaced.
- B. Speed control, tachometer or timer replacement requires removal of the control panel. Remove the two screws located on each side of the control panel. Pull panel towards you. It will come right out.
 1. To replace the timer or speed control, remove the control knob (two setscrews) and a retaining nut to separate it from the panel. Unplug the terminal connections from the old control unit and plug them into the new one. Reverse this sequence to put the control unit and the control panel back in place.
 2. (Models 3520 and 3521 only). To replace the tachometer, remove the four corner nuts. Be sure the terminals are connected in the same way. Refer to the wiring diagram if necessary.
 3. The tachometer circuit board is mounted to the inside rear face of the housing. Remove the screw on the back panel (right side) holding the circuit board and the ceramic spacer to the housing. Remove the circuit board and disconnect wires.

Assemble wires to new circuit board in same way as they were removed. Reinstall PC board and spacer in housing. Note that plastic disc with screwdriver slot should align with hole in housing. Tighten screw. Refer to wiring diagram if necessary.

It will be necessary to recalibrate the meter to the unit, if the tachometer PC board is replaced. Using an auxiliary strobe or other suitable tachometer, operate the Shaker at 400 rpm. Insert a small screwdriver into the screwdriver slot in the PC board through the hole in the rear of the housing. Turn the adjustment until the meter reading matches that of the auxiliary tachometer.

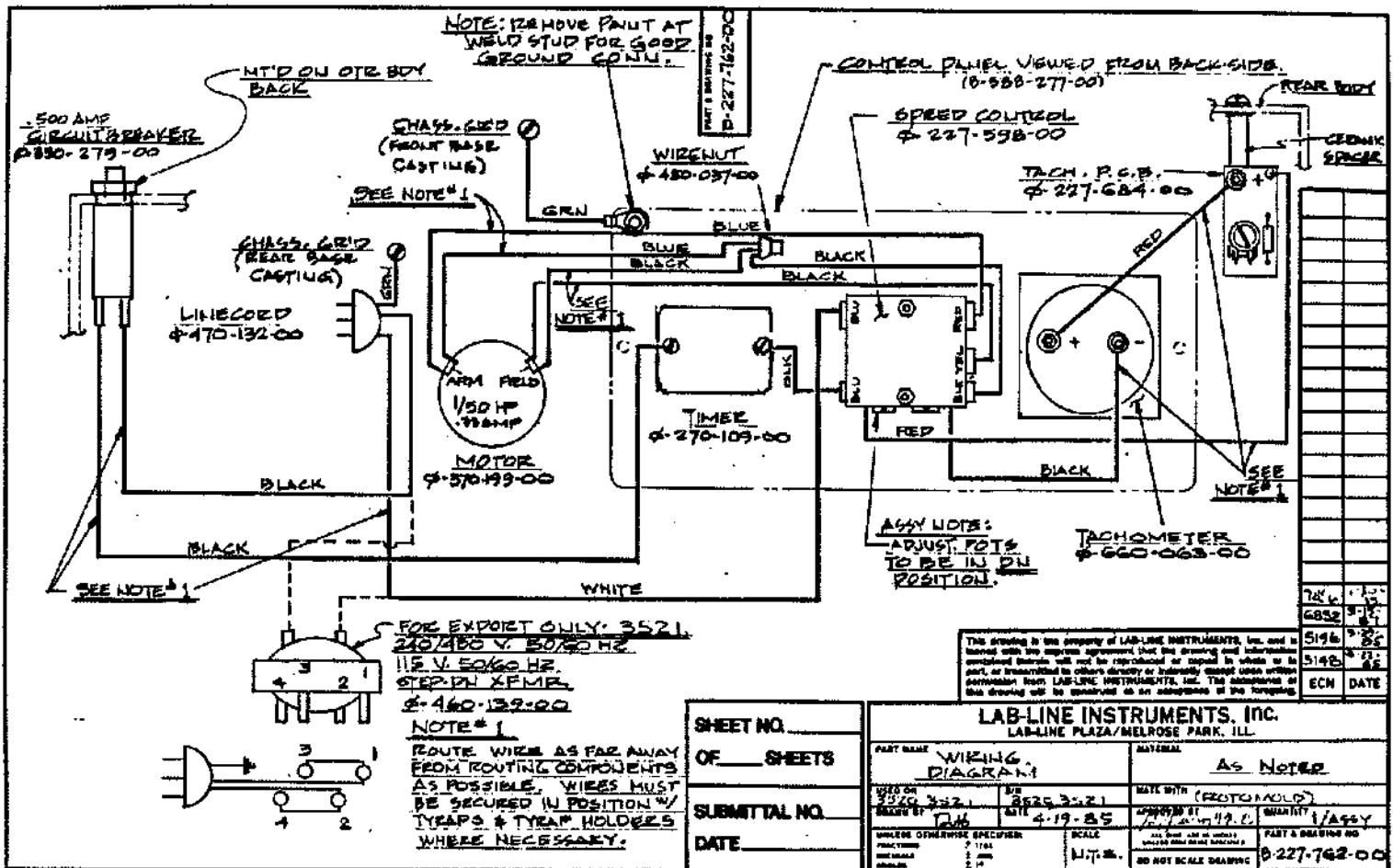
III. FACTORY REPAIR

The digital speed tachometer in 3518 and 3519 are not customer replaceable and entire shaker must be returned to factory for repair.

REPLACEMENT PARTS

DESCRIPTION	PART NUMBER
Bearing (for Upper Bearing Housing)	140-130-00
Bearing (for Shaking Mechanism, 2 each reqd per crank assembly: 6 reqd per unit)	140-236-00
Belt	150-229-00
Brushes for Motor (set of 2)	370-222-00
Circuit Breaker, 0.5 Amp	330-275-00
Cordset	470-132-00
Counterbalance Pulley	210-086-00
Feet, Rubber (4 required)	790-078-00
Knob (for timer or speed control, after 2/85)	560-223-00
Knob, Speed Control (pre-1985)	560-181-00
Knob, Timer (pre-1985)	560-140-00
Mat, Rubber	790-297-08
Motor	370-199-00
Motor Speed Control Assembly	227-598-00
Pulley	210-089-00
Shaking Mechanism, (3518, 3520)	011-482-00
Shaking Mechanism, (3519, 3521)	014-931-00
Tachometer (3520, 3521 only)	660-063-00
Tachometer Printed Circuit Board (3520, 3521 only)	227-684-00
Timer, 60-Minute	270-109-00
Transformer (3519, 3521)	460-139-00
Upper Bearing Housing Assembly (complete)	011-483-00
Wiring Diagram (3520, 3521)	227-762-00
Wiring Diagram (3518, 3519)	227-849-00

WIRING



WARRANTY

LAB-LINE INSTRUMENTS, Inc., for itself and all of its subsidiaries ("Lab-Line"), does hereby warrant for a period of 15 months from the date of receipt by the User, under normal and proper usage, all of its products (except P.A.C.E. anaerobic chambers) against defects in workmanship and material, and will repair or replace any defective part(s) without charge when same is shipped prepaid to the authorized Lab-Line distributor from which the product was originally purchased. P.A.C.E. anaerobic chambers are warranted for a period of 12 months, except the vinyl front panel and rubber sleeves/ gloves which are warranted for 30 days, from the date of receipt by the User.

Should the nature of any defect require that the product or any constituent portion thereof be returned by such authorized distributor to Lab-Line's factory at Melrose Park, Illinois, prepaid, for service, a condition precedent to any return shall be the procurement by such dealer of written authorization from Lab-Line assigning a Return Goods Number to the product or part requiring service.

Parts and accessories manufactured by others are warranted only to the extent of the regular warranty of the manufacturer or supplier of such materials and only insofar as Lab-Line is able to transfer the benefits of warranty coverage, if any, to the User. Any adequately warranted defective part or accessory manufactured or supplied by others may be exchanged through an authorized Lab-Line dealer for a replacement part, and no charge in respect thereof shall be assessed if the defective part is shipped prepaid and received at Lab-Line's factory within 30 days from the date any replacement part is obtained by the User.

This warranty supersedes and is given in lieu of all implied warranties, and is void if the User does not provide the unit with continuous ample electrical power at constant voltage, consistent with the specifications of the product.

With respect to all Explosion-Proof and Flammable Material Storage (FMS) Refrigerators and Freezers, storage by User of any materials in the product which may cause deterioration of any components of the product shall be deemed to constitute abnormal and improper usage for the purposes of this warranty.

TO OBTAIN THE BENEFITS CONFERRED BY THIS WARRANTY, USER MUST RETURN THE WARRANTY CARD TO LAB-LINE WITHIN SEVEN (7) BUSINESS DAYS AFTER RECEIPT OF THE PRODUCT.

LAB-LINE INSTRUMENTS, Inc.
(and all of its subsidiaries)



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SERVING SCIENCE, INDUSTRY, RESEARCH AND EDUCATION
SINCE 1908