VM-3810G

Installation, Operation and Maintenance Instructions

VIBRATORY FEEDERS

MODELS - HS-10, UHS-10, HS-20 & UHS-20

ERIEZ MAGNETICS HEADQUARTERS: 2200 ASBURY ROAD, ERIE, PA 16506–1440 U.S.A.
WORLD AUTHORITY IN ADVANCED TECHNOLOGY FOR MAGNETIC, VIBRATORY and INSPECTION APPLICATIONS

Introduction

This manual details the proper steps for installing, operating and maintaining the Eriez Vibratory Feeder models identified on the cover.

Careful attention to these requirements will assure the most efficient and dependable performance of this equipment.

If there are any questions or comments about the manual, please call Eriez at 814/835-6000 for Vibratory Feeder assistance.

⚠ CAUTION: Safety labels must be affixed to this product. Should the safety label(s) be damaged, dislodged or removed, contact Eriez for replacement.

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ERIEZ VIBRATORY FEEDER - MODELS HS-10, UHS-10, HS-20 AND UHS-20

User Technical Safety Information

The following instructions are provided for the personal safety of operators and also for the protection of the described product and connected equipment. Also refer to the IOM for the CE approved feeder control for additional safety information.

- Eriez Manufacturing Co. has applied due diligence to ensure that our drives, feeders, and feeder systems are CE compliant. When part of the feeder system is purchased from Eriez, the customer must select components that make the feeder system (drive(s) + tray + control) CE compliant.
- The drivers, feeders and controls are NOT approved for operation in hazardous locations.
- Equipment is to be assembled and installed according to the IOM and local electrical/safety codes by qualified personnel.
- Isolate the mains before installing, dismantling, or repairing the equipment, as well as for fuse changes or post installation modifications.
- Do not operate the equipment if the feeder power cable or control power cable is damaged.
- All electrical connections must be covered.
- All earth (ground) connections must be checked for correct function after installation.
- Equipment is to be operated by technically qualified personnel.
- Personnel are to maintain a safe distance from the equipment during operation. Do NOT stand, sit, or lay on the vibratory feeders during operation.
- Safety devices/relays must be installed by the end user to ensure that the feeder does not start prematurely if power to the control is interrupted and restored.
- The end user of the feeder must determine if hearing protection is required for their feeder application.
- The end user bears responsibility to specify an enclosed tray for dusty product where a potential health hazard is present.
- Eriez drivers produce a weak magnetic field during operation. The end user bears the responsibility to assess if this magnetic field will affect employees with medical devices, and provide adequate warning regarding this potential risk.
- The surface of the driver electrical assembly may exceed 149°F depending upon tuning requirements. Do not contact this surface until sufficient time (30 minutes)is provided after shutdown for this surface to cool.
- Certain products (plastics, for example) can create a static charge as it is introduced, conveyed, and removed from vibratory feeder trays. The end user must assess if this static charge presents a health or a safety hazard. Eriez can supply trays with Earth grounding devices upon request.

Installation

MOUNTING
This Hi-Vi model should be mounted on a flat surface in one of the following ways:

POSITIONED AND FASTENED
Fastened to desired surface with bolts of proper size through the base grommets (See FIGURE 1). Use flat washers under the bolt heads. Do not fasten the bolts too tightly or the vibration isolating effect of the grommets will be lost.

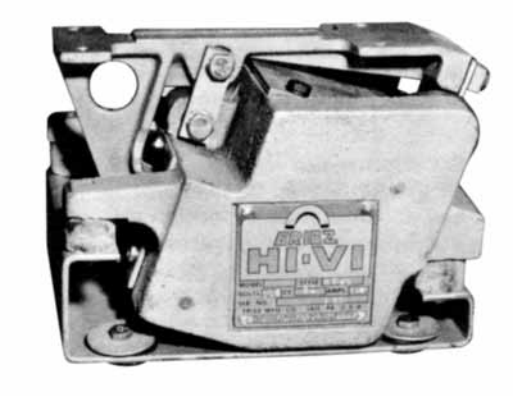


FIGURE 1

POSITIONED BUT NOT FASTENED
Fixed headless stud pins of proper size and spacing (See FIGURE 2). Set the base (with base grommets in place) over the pins.

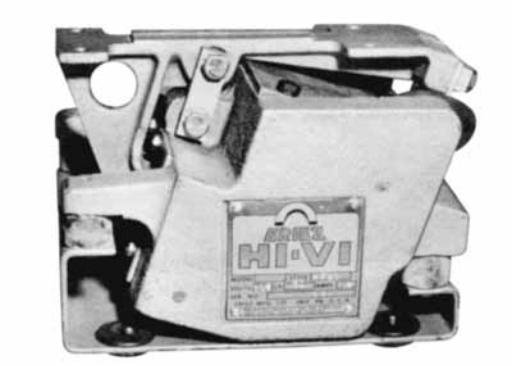


FIGURE 2

NOT POSITIONED OR FASTENED
Simply place on a flat surface in the desired position. If unit has tendency to "walk" during operation, secure unit to avoid damage and maintain safety.

ELECTRICAL CONNECTIONS

1. Check the supply voltage and frequency and make certain that they are the same as those shown on the nameplate of the Feeder and Control.

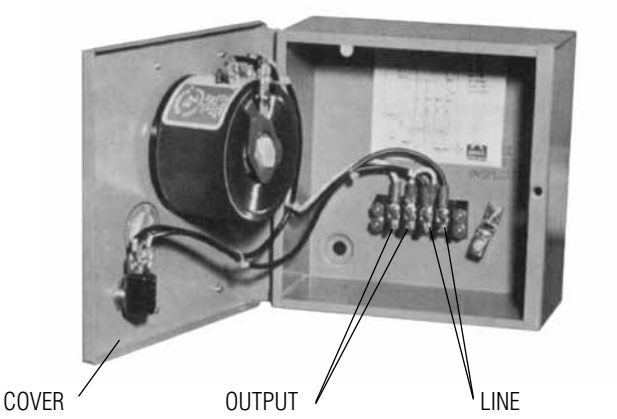


FIGURE 3

2. Connect the black and the white wires in the Feeder power cord to the terminals in the control box marked "Output".
3. Connect the green wire (ground) to the lug provided in the box.
4. Connect the power line to the terminals in the control box marked "Line".
5. Connect the lug in the control box to a good earth ground (a cold water line is excellent). If a well-grounded metallic conduit system is used, the latter connection may be dispensed with.
6. On multiple drive feeders (two or more drives on one tray) all drives should be wired electrically in phase. The black wires from each power cord should be connected together and the white wires connected together. The black wires should be connected to the positive side of the single phase input voltage and the white wires should be connected to the negative side.

NOTE: The Eriez Vibratory Feeder cannot be operated from a DC source.

YOU ARE NOW READY TO START YOUR VIBRATORY FEEDER.

Operation

CAUTION: Do not operate the unit with associated equipment touching any part of the unit.

To start the feeder after all connections have been made, throw the control box switch and adjust the output voltage to maximum by rotating the control knob to the full clockwise position. Usually (at ordinary room temperatures) the unit will take about two minutes to warm up and reach full steady-state displacement.

After full steady-state displacement has been attained, use the controller to adjust the unit to the desired feed rate.

No routine maintenance or lubrication is required, except that any accumulation of foreign matter should be periodically removed from between the tray-tiebar assembly and the body, and from between the base and the body, to prevent restriction of movement of the vibratory elements.

IMPORTANT NOTE:
SPECIAL TRAYS AND ATTACHMENTS
Eriez engineering service should always be consulted before undertaking the design or construction of special trays. Neither standard or special trays as furnished by Eriez Magnetics should be modified or attachments made without first consulting us. Changes made without Eriez' prior approval will void the warranty (See Standard Tray Specifications.)

ADJUSTMENT (TUNING)
The tuning means is provided solely for the purpose of mechanically tuning the unit, with its tray, to the desired vibratory displacement at full voltage. When a unit is furnished complete with tray, it is properly tuned to the tray at the factory. Such tuning is naturally somewhat different for trays of different size or weight.

Tuning is accomplished by changing the stiffness of the tuning spring stack at the back of the feeder (See FIGURE 4). Variations in stiffness are obtained by changing the number of springs in the stack and/ or by changing the number of fiberglass plies in one or more individual springs.

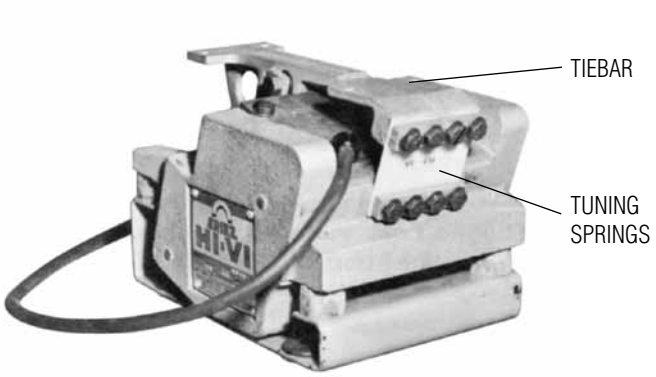


FIGURE 4

In normal operation at full voltage after warm-up, the total displacement for standard size trays, measured at the back of the tray, is .085" to .090" (2.2 to 2.3 mm). For trays substantially larger than standard this normal displacement range should be reduced by .005" (0.1 mm), while for trays substantially smaller the range may be increased by .005" (0.1 mm).

CAUTION: NEVER OPERATE THE UNIT IN A STRIKING CONDITION

HOW TO MEASURE DISPLACEMENT
With the unit operating observe where the fine gray lines on the displacement sticker meet (See FIGURE 5). This point will be higher or lower as the displacement changes. Opposite the point where they meet, read amount of displacement. If a rule is used, the displacement can readily be measured as a "blurred bar" at the back of the tiebar.

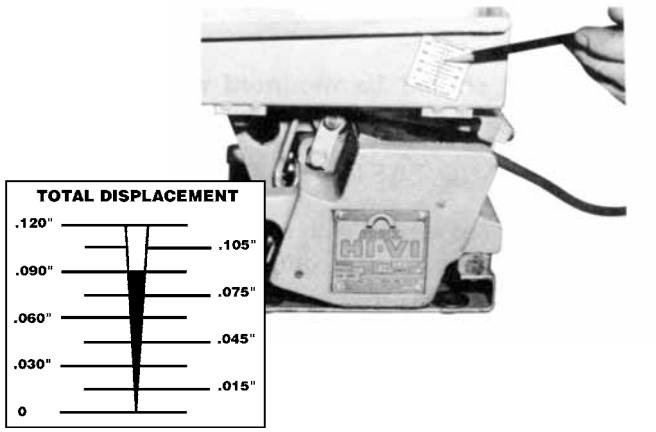


FIGURE 5

Operation (cont.)

ADJUSTING GUIDE

The following general rules, which apply only to a warmed-up HS-10 or HS-20 feeder operating ideally on the normal side of its tuning curve, should be borne in mind when making tuning adjustments to increase or decrease the displacement:

1. To **decrease** the tray displacement, **decrease** the stiffness of the tuning spring.
2. To **increase** the tray displacement, **increase** the stiffness of the tuning spring.

If decreasing or increasing the tuning spring stiffness has an opposite effect, it means that the spring stiffness is great enough (or the tray mass small enough) that the unit is operating on the opposite side of the tuning curve, which is not the ideal operating condition even though it can be tolerated. If possible, the spring stiffness should be reduced (or the tray mass increased) until the behavior is in accordance with rules 1 and 2. The unit can then be properly tuned to the desired displacement.

As a guide to the stiffness of individual tuning springs, each spring is marked with a code number—Example 527. The first number (5) is the number of fiberglass plies in the spring. The following number (27) indicates the relative stiffness of the spring; the higher this number, the stiffer the spring.

The total stiffness of the tuning spring stack is the sum of the relative stiffness numbers. By various combinations of different ply springs having different relative stiffness, practically any desired total stiffness can be obtained.

ADJUSTMENT FOR NON-STANDARD TRAYS

If it is necessary to tune the unit to an off-size or nonstandard tray, follow this procedure:

1. Attach the tray, making sure that all lockwashers are in place and the fasteners tight.
2. Energize the unit at the nameplate voltage and frequency and allow it to warm up at full voltage.
3. (a) If a hammering or striking noise appears during warm-up or if such a noise occurs when the unit is turned off and on quickly, the displacement is well in excess of normal. Whether striking or not, if the displacement exceeds the normal range for that particular size tray [see Adjustment (Tuning)], it must be reduced by substituting a tuning spring leaf or leaves of lesser stiffness, or by subtracting one or more leaves, until approximately normal full voltage displacement is attained. Then use the controller for fine or variable control of displacement and feed rate.

   (b) If the displacement at full voltage after warm-up is below the nominal range for that particular size tray, and greater displacement is desired, increase the tuning spring stiffness by substituting leaves of greater stiffness or by adding more leaves.

ADJUSTING OR TUNING FOR DIFFERENT CONDITIONS OF TRAY LOADING

Units with Eriez-built trays are factory tuned for normal displacement (approximately .085" [2.2 mm]) with light loading (light head load, light materials, limited depth of flow of heavier materials), and ordinarily this tuning will not need to be changed; however, in cases where somewhat greater than normal loading is unavoidable, it may be necessary to increase the tuning spring stiffness slightly to maintain normal deflection under load. In no case, however, should the unit be permitted to deflect more than .090" (2.3 mm) without load.

CAUTION: A small amount of striking during tuning is permissible, but must not be allowed during regular operation since damage to the feeder can result.

Repairs

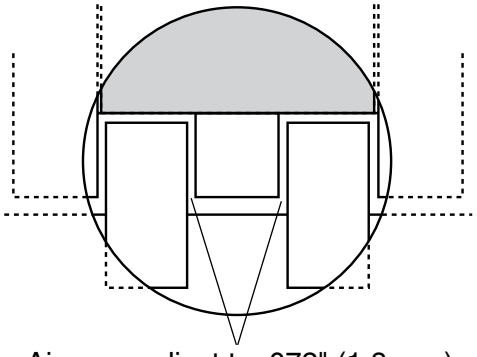
COIL REPLACEMENT
Refer to the Parts List Drawing and Figures 6, 7, 8 and 9.

The coil in a Vibratory Feeder may eventually fail due to over-voltage operation or normal aging.

The following procedure should be followed in removing and replacing the electrical assembly, which includes the coil:

1. Remove both nameplates and insert the two gap spacers (furnished with the unit) between the E-frame center leg and the two armature pole pieces (See FIGURES 6 & 7).

FIGURE 6



Air gaps adjust to .072" (1.8 mm)

FIGURE 7

2. Remove, in order, the bolts securing (a) the upper end of the tuning spring stack to the tiebar, (b) the lower ends of the spring lever arms to the body housing, and (c) the lower end of the tiebar to the armature. Lift the tray-tiebar-lever assembly away from the body housing (See FIGURE 8).
3. Remove the bolts securing the electrical assembly to the body housing and lift the assembly out of the body housing (see Figure 9). At this point the armature could also be removed, if necessary, by simply lifting it out of the body cavity.
4. If the coil is defective, the entire E-Frame assembly including the coil must be replaced (order from Eriez parts list).

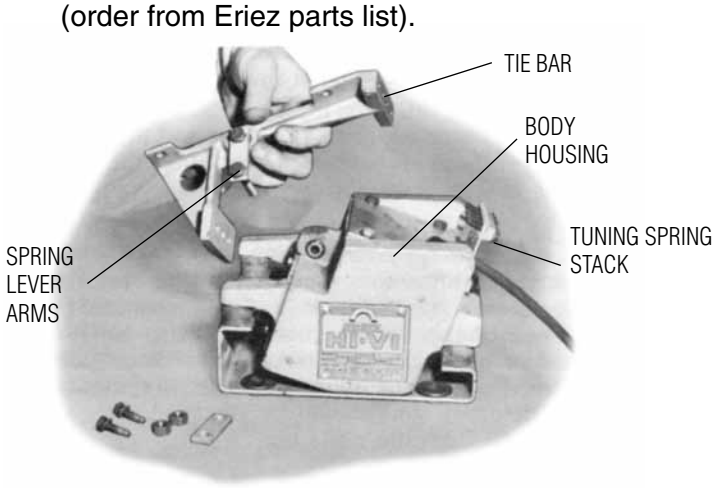


FIGURE 8

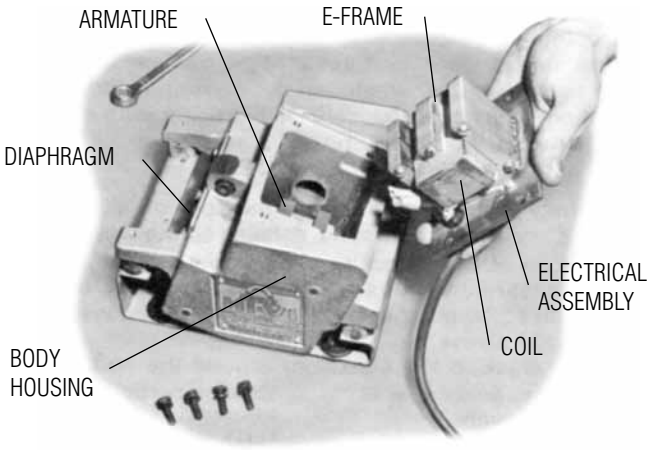


FIGURE 9

Repairs (cont.)

5. In reassembling the unit, first center the armature at the bottom of the body cavity; then insert the E-frame into the body cavity, making sure that the center leg enters the space between the armature pole pieces. Insert the bolts securing the electrical assembly and fasten only finger tight.
6. Center the boss at the front of the armature assembly in the window of the diaphragm, making sure that the edge of the diaphragm does not ride up on the boss.
7. Place the tray-tiebar-lever assembly into its original position and replace, in order, the bolts securing (a) the lower end of the tiebar to the armature, (b) the lower ends of the spring lever arms to the body housing, and (c) the upper end of the tuning spring stack to the tiebar. Make sure that all tuning spring spacers are in place and that all bolts are tight.
8. Loosen the electrical assembly bolts slightly and roughly center the E-frame center leg between the pole pieces. Insert the two spacers between the E-frame center leg and the pole pieces and adjust the electrical assembly forward or backward until both spacers move freely in the gaps. Tighten the electrical assembly plate and replace the nameplates.

SPRING REPLACEMENT

Refer to the Parts List Drawing and Figures 10, 11 and 12.

Although the non-metallic springs used in the HS-10 & HS-20 Feeders have outstanding life characteristics, failure may eventually occur, especially if the displacement is greater than normal. The symptoms of such failure will be:

1. Erratic behavior of the unit, or
2. Greatly reduced displacement.
3. Striking sound.
4. Higher amperage reading at 100% voltage.

If spring failure is suspected, the tuning spring stack should be removed after first inserting the two gap spacers between the center leg of the E-frame and the two pole pieces (See FIGURE 10). The purpose of this is to hold the tiebar or tray-tiebar assembly in position with the tuning spring removed.

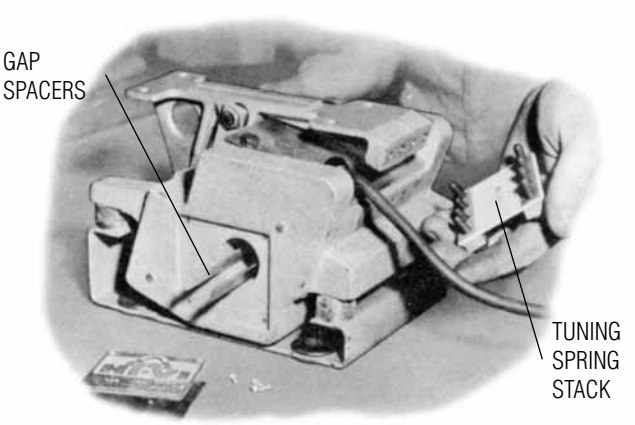


FIGURE 10

Carefully examine each tuning spring for signs of delamination or breakage, especially in the area next to the spring shims. A failed spring can be recognized by the appearance of the spring surface. If this surface is discolored or has a patchy whitish appearance, perhaps accompanied by surface bulging or other irregularity, the spring is defective and should be replaced with a new spring ordered from the parts list.

If the feeder still exhibits signs of spring malfunction after the tuning spring has been checked and replaced, check the two cylindrical elastomer springs after first inserting the two gap spacers, then removing the spring lever arms, and finally removing the elastomer springs in the following manner:

1. Lay the unit on its side, making sure that the gap spacers stay in place, and use a small hammer and flat ended round bar or dowel to tap the elastomer spring out of the body housing. Next, support the tiebar with a small block between the tiebar and work surface, and tap the spring out of the tiebar (See FIGURE 11).

Repairs (cont.)

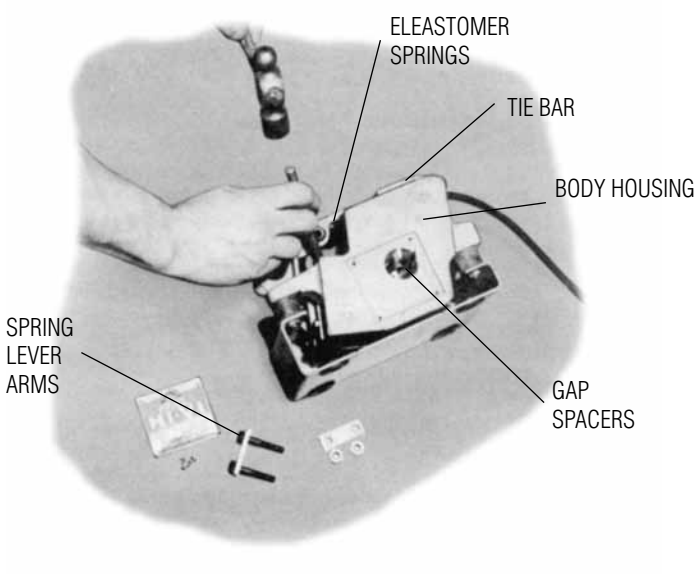


FIGURE 11

2. Carefully examine both springs for signs of failure and replace if such signs are found. A failed spring will exhibit one or more of the following characteristics:

   (a) Looseness of the spring combined with signs of rubbing or abrasion at the outer surface of the cylinder. Looseness of the metal sleeve.

   (b) Small crack in the elastomer around the end of the metal sleeve, possibly with small abraded particles of the elastomer present.

   (c) Tackiness of the elastomer around the metal sleeve and at the outer surface of the cylinder, possibly with some outward bulging of the elastomer.

3. In replacing the elastomer springs, lay the unit on its side so that the chamfered ends of the spring holes are up. After making sure that the holes and their chamfered ends are clean and free from obstructions, lubricate the springs with a little water (never lubricate with a petroleum product) and press them partly into place with the thumbs.

FIGURE 12

   Then tap the springs back into place, again using the small supporting block between tiebar and work surface. Make sure that the springs go in straight and that the steel inner sleeves protrude equally at both ends of both spring holes (See FIGURE 12).

4. Replace the lever arms, tightening the two fastening bolts securely, and remove the two gap spacers. If a new elastomer spring has been installed, it may be necessary to retune the feeder. See Tuning Guide.

CAUTION: Make sure that all of the fasteners in the assembly are tight at all times. Periodic checks for tightness should be made to insure against possible malfunction or damage due to loose parts.

ARMATURE REPLACEMENT

Refer to the Parts List Drawing and Figures 6, 7, 8 and 9.

Prolonged striking may damage the armature to an extent that it will have to be replaced. If this should become necessary, order a new armature from the parts list and follow the same instructions as for coil replacement.

Repairs (cont.)

THE HI-VI MAGNETIC DRIVE CIRCUIT

Old-style electromagnetic vibratory equipment has an inefficient attract-release type operation, where a mass mounted on springs is attracted by a DC electromagnet and returned to its original position solely by the springs. The Eriez HI-VI method incorporates a lifetime permanent magnet and is operated directly from an alternating current line. No rectifier is required.

In the HI-VI method, the spring-mounted mass is alternately both attracted and repelled by an AC electromagnet assisted by the springs.

The pole pieces of the permanent magnet are intermeshed in the air gaps of the electromagnet. The polarity of the electromagnet alternates at the line frequency. The polarity of the electromagnet is shown as it would exist on one side of the sine wave.

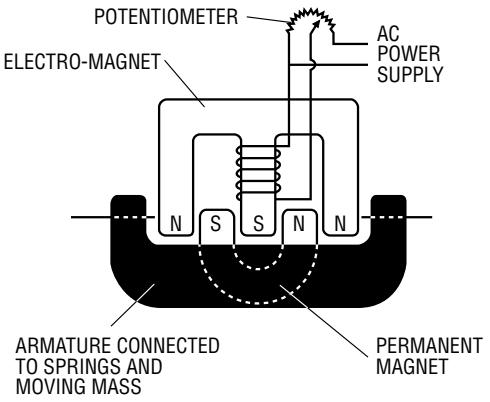


FIGURE 13

Note that both poles of the permanent magnet are being attracted toward the unlike electromagnet poles. They are also being repelled in the same direction by the like electromagnet poles. This results in four forces accumulating to drive the armature in the same direction. It also results in closing the magnetic circuit through the electromagnet providing a magnetizing effect on the permanent magnet on each side of the sine wave. The de-magnetizing force is very minor, for the magnet poles and the magnetic lines of flux would much rather be attracted than repelled. This always places the permanent magnet in a net magnetizing circuit regardless of where the AC current is on the sine wave.

As the polarity of the electromagnet changes, all of the forces are reversed and the permanent magnet armature is driven in the opposite direction.

CAUTION: Operation from portable engine driven power plants.

Varying and unstable line frequency has an adverse effect on vibratory feeders because they are tuned mechanical devices, designed around either 50 or 60 cycle operating frequency. Shifts in the operating point due to changes in frequency (+ or -1 cycle) can cause higher than normal spring stress, striking and high line currents which can cause drive and tray failure. When operating from portable engine-driven power plants, be certain that the engine is up to speed and all other loads are started and at running speed before starting the electromagnet feeder.

The feeder should always be stopped first when the engine-driven power plant is shut down.

Troubleshooting

TABLE 1. SERVICE CHART

NATURE OF PROBLEM		Misapplication	Tampering or Changing of Base or Tray	Loose Spring Clamp or Tray Mounting Bolts	Coil Failure	Control Failure	Incorrect Voltage	Spring Failure	Foreign Material Between Tray & Reaction Mass	Incorrect Tuning	Poor or Broken Weld on Tray	Incorrect Factory Adjustment	Sympathetic Vibration in Other Equipment	In Contact with Other Equipment	Line Voltage or Hz Variation	Blown Fuse or Circuit Breaker	Other Electrical Connections	Shockmount Deterioration	Corrosive or Abrasive Material	Product Variation or Product Sticking to Tray
Initial Installation	Reduced or Low Output	1	2			5	6	7	8	9				13	14		16			19
	Noisy but Output Okay		2	3					8	9	10	11	12	13						
	Noisy Certain Periods Only													13	14					
Develop After Satisfactory Initial Operation	Completely Inoperative		2		4	5		7						13		15	16			
	Operating but Reduced Output		2	3		5	6	7	8	9	10		12	13	14		16	17		19
	Output Okay Too Much Noise		2					7	8	9	10		12	13	14					
	Gradual Fading					5		7	8	9	10			13						19
	Excessive Tray Wear																		18	
	Turbulent Flow										10							17		
	Inconsistent Output		2	3		5	6	7		9	10		12	13	14		16	17		19

REFER TO TABLE 1. SERVICE CHART

1. **Misapplication**
   Feeder too small. Product difficult or impossible to handle. Impossible temperatures or atmospheres. Impossible dimensional requirements. Feeding requirements too precise or excessive. Consult Eriez.

2. **Tampering or Changing of Base or Tray**
   Improper disassembly, extensions, covers, weights, screens or other modifications or attachments may have affected performance. Reassemble in accordance with printed instructions or consult Eriez.

3. **Loose Spring Clamp or Tray Mounting Bolts**
   Tighten all bolts.

4. **Coil Failure**
   Replace coil or coil and “E” frame assembly. Order from Eriez parts lists. Follow maintenance instructions carefully.

5. **Control Failure (if applicable)**
   Check control for proper wiring and function. Inspect for defective components.

6. **Incorrect voltage**
   Check nameplate specifications and line voltage.

7. **Spring Failure**
   See maintenance instructions. Disassemble for examination. Tuning spring failure will also show up as white areas. Order new parts from factory and replace per instructions.

Troubleshooting (cont.)

8. **Foreign Material**
   Examine and remove foreign material.

9. **Incorrect Tuning**
   See maintenance instructions. To decrease displacement, output, and eliminate striking, use fewer or thinner tuning springs. To increase displacement use more or thicker tuning springs.

10. **Poor or Broken Weld on Tray**
    Check and correct.

11. **Incorrect Factory Adjustment**
    See maintenance instructions (Gap adjustments.)

12. **Sympathetic Vibration in Other Equipment**
    Check and correct.

13. **Contact with Other Equipment**
    Check and correct.

14. **Line Voltage or Hz Variation**
    Check and install voltage regulator if necessary. Check and install Hz regulator.

15. **Blown Fuse or Circuit Breaker**
    Check for short circuits and correct.

16. **Other Electrical Connections**
    Check all connections and correct.

17. **Shockmount Deterioration**
    Check and correct.

18. **Corrosive or Abrasive Material**
    May require special tray. Consult Eriez.

19. **Product Variation or Product Sticking to Tray**
    If product density, moisture content or other characteristics vary, customer should take own corrective measures, such as cleaning tray surface periodically.

Declaration of Conformity

Eriez Manufacturing declares that the Electromagnetic Vibratory drives conform to the following:

EN 60204-1 in accordance with the Low Voltage Directive (73/23/EEC).

Eriez Manufacturing declares that the Electromagnetic Feeders (vibratory drives with trays) conform to the following:

EN 60204-1 in accordance with the Low Voltage Directive (73/23/EEC).

EN ISO 12100-1, BS EN ISO 12100-2, and EN 1050 in accordance with the Machinery Directive (98/37/EC).

Eriez Manufacturing declares that the Electromagnetic Feeder System (vibratory drives with trays and controls) conform to the following:

EN 60204-1 in accordance with the Low Voltage Directive (73/23/EEC).

EN ISO 12100-1, BS EN ISO 12100-2, and EN 1050 in accordance with the Machinery Directive (98/37/EC).

EN 61000-6-4 and EN 61000-6-2 in accordance with the Electromagnetic Compatibility Directive (89/336/EEC).

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World Authority in Advanced Technology for Magnetic, Vibratory and Inspection Applications
Headquarters: 2200 Asbury Road, Erie, PA 16506-1440 U.S.A.
Telephone: 814/835-6000 • 800/345-4946 • Fax: 814/838-4960 • International Fax: 814/833-3348
® Web Site: http://www.eriez.com e-mail: eriez@eriez.com
Manufacturing Facilities: AUSTRALIA • BRAZIL • CANADA • CHINA • INDIA • JAPAN • MEXICO • SOUTH AFRICA • UNITED KINGDOM • UNITED STATES

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