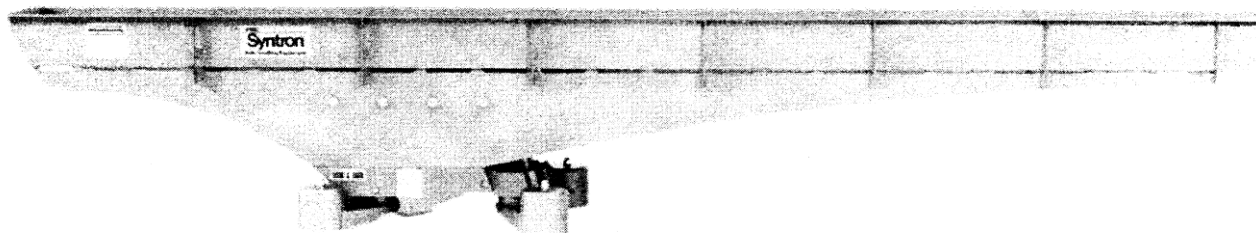


Service Manual

Syntron® Electromagnetic Feeder

Models: BF-4-ALF and

BF-4-ASLF (stainless steel hardware)



■ Installation ■ Operation ■ Maintenance

TABLE OF CONTENTS

Safety Warnings	3
Introduction	3
Inspection and Long Term Storage	4
Theory of Operation	4
Installation	5
Installing the Control	6
Operation	7
Maintenance	7
Spring Replacement	8
Magnet Replacement	8
Air Gap Adjustment	9
Measuring the Stroke	11
Troubleshooting	12
Operating Specifications	12
Parts Diagram	13
Parts List	14
Torque Specifications	15

SAFETY INSTRUCTIONS

The purpose of safety symbols is to attract your attention to possible danger. Safety symbols, and their explanations, deserve careful attention and understanding. The Safety warnings do not by themselves eliminate any danger. The instructions or warnings they give are not substitutes for proper safety procedures.

SYMBOL

MEANING



Safety Alert Symbol: Indicates DANGER, WARNING, OR CAUTION.

Attention is required in order to avoid serious personal injury. This symbol may also be used in conjunction with other symbols or pictographs.

NOTE

Notes advise you of information or instructions vital to the operation or maintenance of the Equipment.

IMPORTANT SAFETY INFORMATION

READ ALL INSTRUCTIONS BEFORE OPERATING

- Upon receipt, unpack and inspect the unit for damages that may have occurred during shipment. If damage is found, contact the shipping carrier and Syntron Material Handling immediately.
- Read instructions carefully. Be familiar with the controls and proper use of the unit.
- Do not operate the unit when Tired, ill, or under the influence of alcohol, drugs or medication.

Product safety labels must remain highly visible on the equipment. Establish a regular schedule to check visibility. If you need to replace safety labels, contact Syntron Material Handling for an additional supply free of charge.

The instructions and data in this manual are vital to the proper installation and operation of this equipment. In order to avoid delays due to faulty installation and operation of this equipment. In order to avoid faulty installation and operation, please see that these instructions are read by the persons who will install, operate and maintain this equipment.

NOTE: Supporting information, such as drawings, may be attached to the manual. The information contained therein takes precedence over corresponding information printed in this manual.

INTRODUCTION

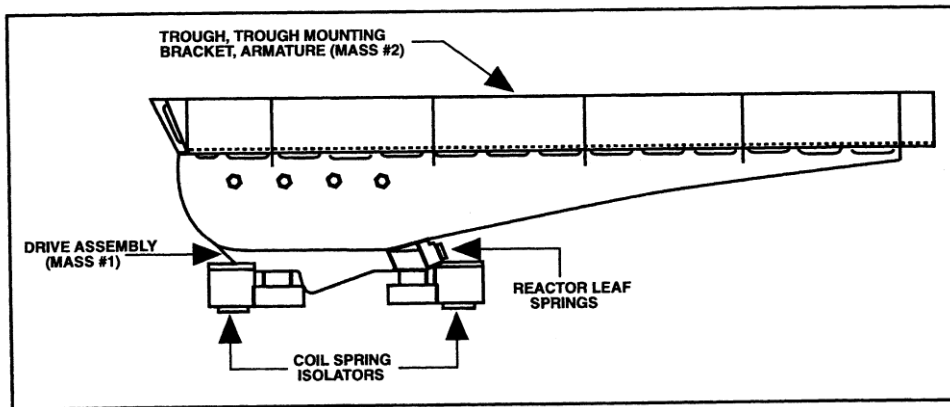


FIGURE 1: BF-4-A(LF)/A(SLF) FEEDER COMPONENTS

The Syntrol® BF-4-ALF/ASLF (low frequency) Electromagnetic Feeder is a dynamically balanced, two-mass isolated vibrating system, consisting of a trough and trough mounting bracket, coupled to the drive assembly by leaf springs. The BF-4 feeder can accommodate a large range of trough sizes with

a maximum trough length of 120 inches (3048 mm), and a maximum feed rate of 50 feet (15.24 m) per minute.

Because of its unique design, the BF-4 is ideal for feeding various types of products such as snacks and vegetables, to packaging and processing equipment such as multi-head weigh scales and filling machines. The BF-4 has along trough overhang that reduces product degradation by allowing the feeder discharge to be positioned as close to the scale or transfer point as possible, minimizing product drop.

INSPECTION AND STORAGE



WARNING: Do not drop the control or feeder; the force of the impact may damage the coponents.

Upon receipt, carefully unpack and inspect the feeder for any damage that may have occurred during shipment. If damage is found, contact the shipping carrier and Syntrol Material Handling immediately.

If the feeder is to be stored for an extended period of time, store it indoors, in its original shipping carton, in a clean, dry area protected from extreme heat. Plug all holes to prevent dirt, rodents and insects from entering. SMH advises placing a corrosion preventive inside the control box. Apply oil or rust preventive to the hardware, and completely cover the unit with a waterproof covering.



WARNING: Do not oil the spring assemblies. Oiling the spring assemblies will destroy the clamping effect of the spring pads against one another. No lubrication is required for electromagnetic feeders.

THEORY OF OPERATION

The BF-4-ALF/SLF is an electromagnetic feeder that uses current to energize the electromagnet (coil) and power the feeder. Rectified Alternating Current (AC) is applied to the magnet assembly of the drive, pulling the armature and entire trough assembly down and back toward the drive during this portion of the stroke. When the power is cycled off, the springs return the trough assembly and drive back to the “at rest” position. The trough assembly moves up and forward through this portion of the stroke. Refer to Figure 3 for the trough description of how material conveys on the feeder.

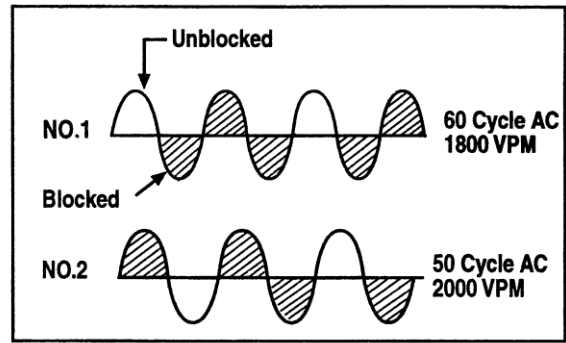


FIGURE 2: AC SINE WAVE

A timing algorithm in the micro processor supplies power to the drive at the proper voltage and frequency. The UMC Control and drive unit can be supplied for either 50Hz or 60Hz line frequency operation.



CAUTION: Do not operate the BF-4-ALF/ASLF Feeder and control on a supply frequency other than designated frequency.



CAUTION: During normal operation, the feeder performs with a smooth, even stroke. If a loud striking noise occurs, immediately turn off the unit and refer to the Air Gap Adjustment instructions in this manual.

Using the pulsating action described above, the trough assembly moves particles being conveyed forward, the pulls back and allows them to land downstream. Repeating this action at 1800 cycles per minute (60Hz), or 2000 cycles per minute (50Hz) causes the material to convey smoothly along the entire length of the trough to the discharge.

Figure 3 illustrates material flow along the trough surface. Each cycle moves the material forward and upward, and further along toward the discharge. The rate feed is controlled by the intensity of the magnetic pull, which is varied by the control.

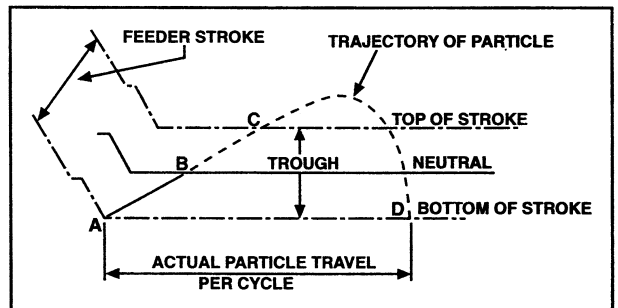


FIGURE 3: MATERIAL FLOW

During a powered half-cycle, the trough surface travels between its lowest point (A) to its highest limit (C). The trough travels at its greatest velocity between (A) and (B); although still traveling up and forward, the trough decelerates between (B) and (C). On the upward stroke, the particle of material is in contact with the trough from (A) to (B). At point (B), the velocity of the particle becomes greater than the trough, and the particle leaves the trough on a free-flight trajectory from (B) to (D). The particle lands back on the trough surface at a position further forward (D). This completes one cycle.

INSTALLATION



WARNING: Do not lift the feeder by the trough. This could cause the air gap to become misadjusted and damage the trough or drive unit.

When installing the feeder, consideration must be given to the area of support that will safely carry the full weight of the feeder under loaded conditions. The feeder must be located on the supporting structure by 1/2-inch (12.5 mm) dia X 3/4-inch (16 mm) locating pins (pins not provided by Syntron Material Handling). The bottom spring cup for the coil spring provides for a 1/2-inch (12.5 mm) dia. x 3/4-inch (16 mm) locating pin.

Refer to Figure 4 for the outline dimensions of the BF-4-ALF/ASFL Feeder drive. For trough dimensions, refer to the layout drawings provided with the equipment.

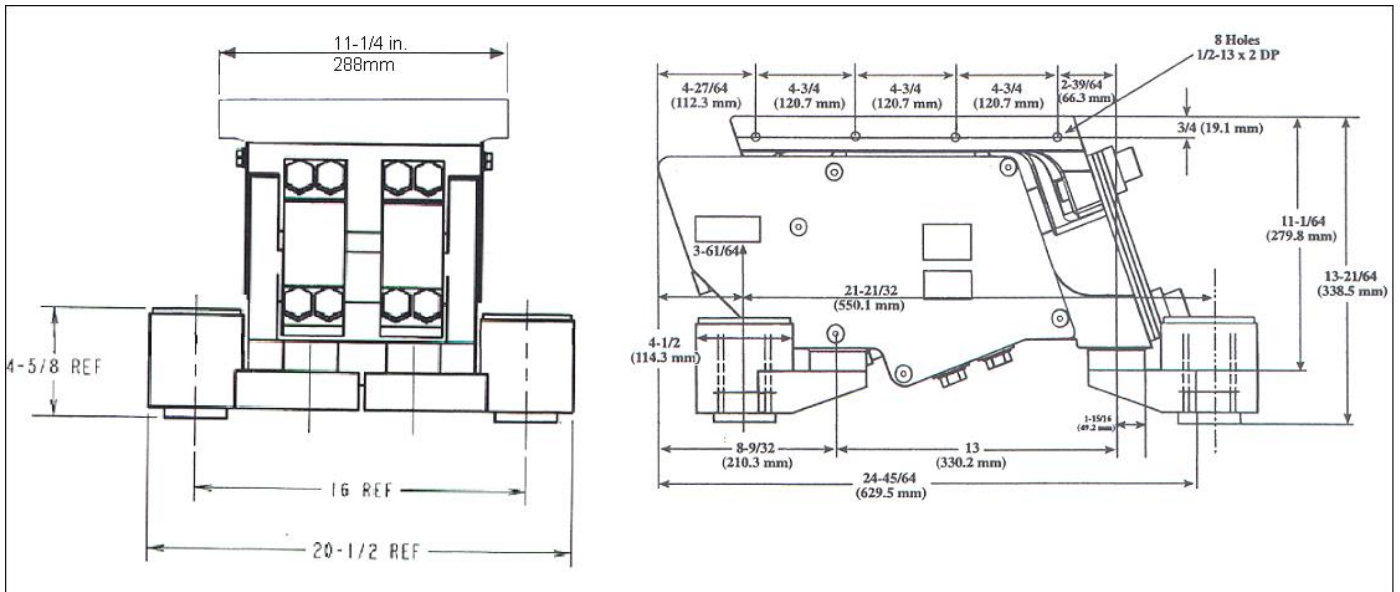


Figure 4



CAUTION: The feeder must not come in contact with any rigid object or adjacent surface that could hamper its vibrating action. Any connections (such as dust seals) between the trough and adjacent objects must be flexible, preferably cloth or rubber. A one-inch (25 mm) clearance must be maintained.

INSTALLING THE CONTROL

The separate control assembly should be installed on a wall as close to the feeder as possible, in a clean dry, vibration-free location. There must be adequate ventilation to ensure prolonged service life of the control components. The acceptable operating temperature range for this control is 30°F to 150°F (-1°C to 65°C) If the temperature of the control exceeds the suggested operating temperature, range, contact Syntron Material Handling.

INSTALLING THE CONTROL (cont'd)



WARNING: The electrical power supply connection to the SMH-supplied control must be made through a customer supplied safety disconnect switch mounted next to the control. Incorporation of an emergency stop may also be required, per local electrical codes.



WARNING: The unit must be properly grounded and verified at installation.

The conductors between the feeder and the control must be sufficient to carry the current and voltage indicated on the equipment nameplate. When the feeder and control are properly installed and all wiring is complete, the feeder is ready for operation.

OPERATION



WARNING: Before operating the feeder, be sure the control cover is closed and secured.

NOTE: The BF-4-ALF/ASLF Feeder and UMC-30 Control are preset at the factory and do not require adjustment. If a replacement Control or Printed Circuit Board is purchased, they will need to be matched to the feeder as specified in the control instruction manual provided with the Control.



WARNING: During normal operation, the feeder performs with a smooth, even stroke. If a loud striking noise occurs, immediately turn off the unit and verify that the feeder drive and or trough are not contacting any adjacent object or structure.

Striking occurs when the faces of the armature and core make contact. Striking can result in serious damage to the unit. To correct a striking condition, refer to the Air Gap instructions on page 10.

With the feeder operating satisfactorily, load the trough with the material to be conveyed and adjust the control knob to the desired output. The material will flow along the trough surface in a smooth, controlled rate of feed toward the discharge end of the trough. Refer to the UMC-30 Service Manual for additional setup procedures.

NOTE: The UMC-30 Control must be adjusted with a “Soft Start Setting” of 1.2 seconds.

MAINTENANCE



WARNING: Disconnect the power supply at the customer supplied safety disconnect switch before performing any maintenance work.

MAINTENANCE (cont'd)

Some materials may adhere to the trough surfaces. If permitted to build up, these deposits increase the weight of the feeder pan causing the feeder to operate at a reduced stroke. Material buildup on the

trough should be removed daily. Look for buildup at the rear of the feeder trough, particularly around and under the hopper opening. A clean, dry, compressed air supply is recommended for routine cleaning.



WARNING: Do not oil the spring assemblies. Oiling the spring assemblies will destroy the clamping effect of the spring pads against one another. No lubrication is required for electromagnetic feeders.

Any sign of excessive heat or burned components is an indication of trouble. Under normal operating conditions, feeder coils run warm, but never too hot to touch. At the first sign of overheating, immediately investigate and correct the cause.

SPRING REPLACEMENT



WARNING: Disconnect the power supply at the safety disconnect switch before performing any maintenance work.

If a spring needs replaced, SMH recommends replacing all the springs rather than only the defective one(s).

Work on one spring stack at a time. Start with a rear spring stack and note the location and arrangement of each spring, spacer, and clamp. Remove the bolts that secure the leaf springs to the base and the bolts that hold the springs to the trough mounting bracket.

Install the new spring assembly in the reverse order to which the old assembly was removed. Replace the cap screws and torque as specified on page 11. **DO NOT OVERTORQUE.**

MAGNET REPLACEMENT

Before and during magnet replacement, refer to Figure 5 on page 11.



WARNING: Operating feeder with the side plates removed will cause it to overstroke.



DANGER: Disconnect and remove feeder power cable from the power supply.

If it is necessary to replace the magnet assembly, remove the right side plate and side gasket to expose the magnet. Next, remove the two magnet locking screws on the bottom of the drive and the two magnet adjusting screws on the rear of the drive. Then remove the ground wire and strain relief from the base casting Refer to figure 5.

It should now be possible to remove the magnet assembly with power cable and replace it. Once the magnet is in position, attach the ground wire with ground wire screw; insert the magnet assembly locking screws and the magnet adjusting screws (sealing urethane compression spring and teflon washer on the 2-

MAGNET REPLACEMENT (cont'd)

1/4 –nch long upper magnet adjusting screw only).). Make sure that the threads on the adjusting screws have been cleaned and Loctite #242 has been applied to the threads.

NOTE: Once the magnet assembly has been replaced the air gap will need readjusted. Feeler gauges are used to measure thickness or distance between the magnet and armature. This thickness or distance is referred to as the "air gap".


When the drive is not energized (power is off), the static air gap can be measured with a feeler gauge. Set the air gap at 0.185 inches (4.7mm) and snug down the magnet locking screws and the magnet adjusting screws (it is important that the air gap is parrallel side to side and top to bottom). Replace the side gasket and securely reattach the side plate. Refer to the Air Gap Instructions below to make the final adjustments.

AIR GAP ADJUSTMENT

The air gap is the space between the faces of the armature and the magnet assembly. Proper air gap adjustment is critical to good feeder performance.


The air gap is properly set at the factory (when a feeder with trough is supplied). Re-adjustment should rarely be required. However, if high voltage is applied to the feeder, or if the air gap has been moved out of adjustment, an adjustment of the air gap will be necessary.

Adjusting the air gap is a very delicate procedure, and may require operation time to obtain the proper setting. The air gap is correct when the armature and magnet faces are as close as possible without striking when maximum current is applied to the feeder.

 **WARNING:** If the unit makes a loud striking noise while operating, immediately shut off power to the unit.

If the air gap is adjusted so that the armature and magnet are too close, they will make contact during feeder operation. This is called striking. A striking condition will cause severe mechanical damage (broken springs, cracked trough or base, cracked armature or magnet assembly).

If the air gap is adjusted so that the armature and magnet are too far apart, the current draw will be excessive. A high-current condition will result in coil burn-out, failure of control components, or reduced material feed.

 **WARNING:** Never open the air gap more than necessary. An excessive air gap draws more current which will result in poor feeder performance and possibly damage the unit.

To adjust the air gap, the feeder must be empty of all material with the trough and all side plates installed. Refer to the following instructions to adjust the air gap, and to identify the adjustment screws used to adjust the air gap. Remove these adjustment screws, clean the threads, and reinstall them with Loctite #242 applied to the threads.

AIR GAP ADJUSTMENT (cont'd)

To open the air gap:

1. Loosen the lower socket head adjustment screw. This is the screw (without the rubber washer) located on the back of the base casting between the rear spring sets.
2. Tighten the upper socket head adjustment screw. This screw is located directly above the lower socket head adjustment screw.
3. Once the appropriate gap is attained, tighten the magnet assembly locking screws.
4. When the magnet assembly locking screws are tight, secure both adjustment screws.
5. Finally, turn the unit on to confirm that it does not strike or rattle. If the unit strikes, readjust the air gap. If the rattles:
 - A.) Check to make sure that all the magnet screws are secure.
 - B.) Check to make sure that the longitudinal pan ribs are not contacting the base casting.

To close (tighten) the air gap:

1. Loosen the upper socket head adjustment screw.
2. Tighten the lower socket head adjustment screw. This screw is located on the back of the base casting between the rear spring sets.
3. Once the appropriate air gap is attained, tighten the magnet assembly locking screws.
4. When the magnet assembly locking screws are tight, secure the upper and lower adjustment screws.
5. Finally, turn the unit on to confirm that it does not strike or rattle. If the unit strikes, readjust the air gap. If the unit rattles:
 - A.) Check to make sure that all the magnet screws are secure.
 - B.) Check to make sure that the longitudinal pan ribs are not contacting the base casting.

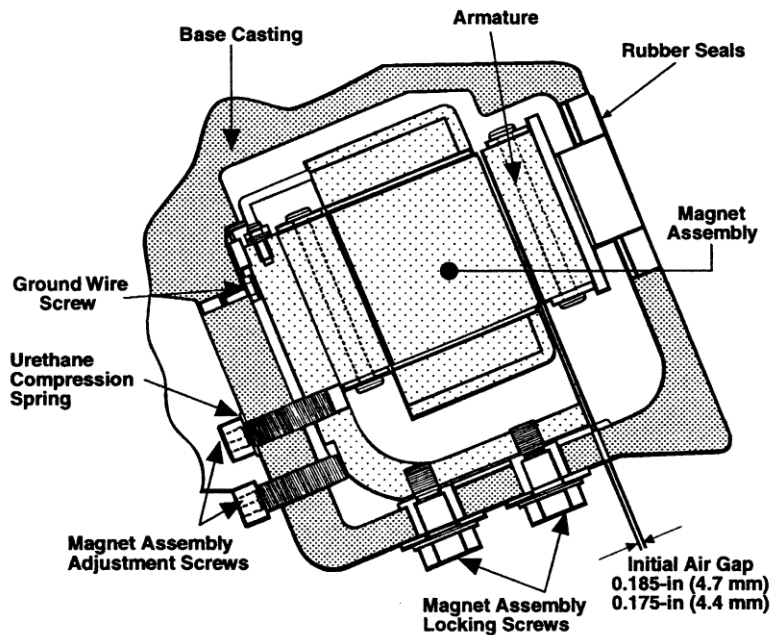


FIGURE 5: AIR GAP ADJUSTMENT SCREWS

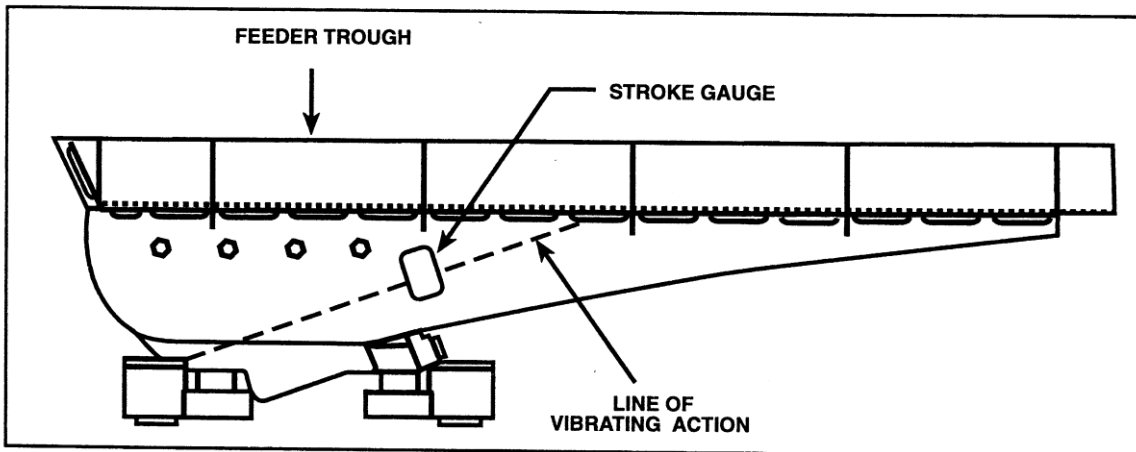


FIGURE 6: LOCATION OF THE STROKE GAUGE

MEASURING THE STROKE

Feeder stroke can be easily measured with a stroke gauge. BF-4-ALF / ASLF Feeders leave the factory with a correctly positioned metal stroke gauge attached to the side of the trough rib. Refer to Figure 6.

While the feeder is operating, the inner lines of the gauge appear as an X, and the stroke should be read at the intersection of the X. Refer to Figure 7.

The position and quality of the individual stroke gauge may cause a variance of up to .010 inches (0.25 mm), which is acceptable.

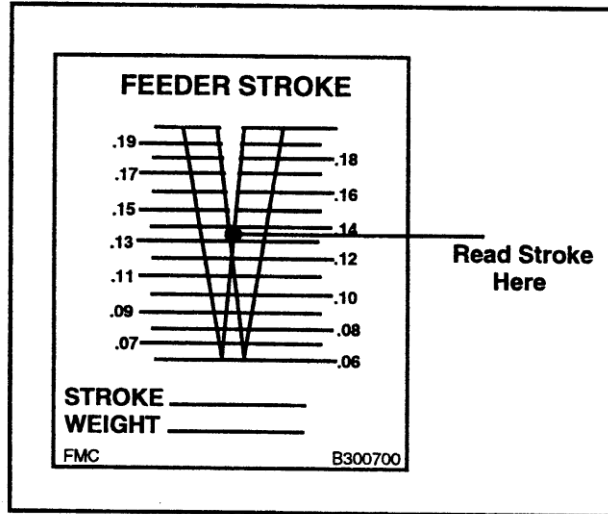


FIGURE 7: READING THE STROKE GAUGE

TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTION
	Line voltage is below voltage indicated on nameplate	Increase line voltage as designated on the nameplate.
	Unit in contact with rigid object.	Isolate the unit.
	Spring action may be hampered.	Remove and clean spring assemblies
	Defective leaf springs	*Replace.

	Material buildup on trough pan	Clean trough pan
◆ Feeder operates too fast.	Excessive line voltage (a striking will condition occur).	Reduce line voltage as designated on the nameplate
Unit hums, will not vibrate.	Defective SCR in the control	*Replace
Unit fails to operate.	No power to the control.	Check for broken or grounded lines.
	Defective switch or fuse.	*Replace.
	Defective SCR in the control.	*Replace.
	Feeder coil may be shorted or open.	*Replace coil
	Short circuit in wiring.	Repair.
	Open winding on rheostat.	*Replace.

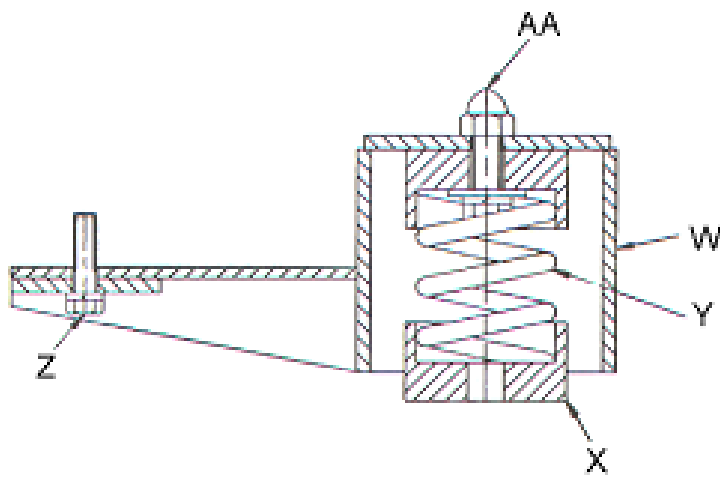
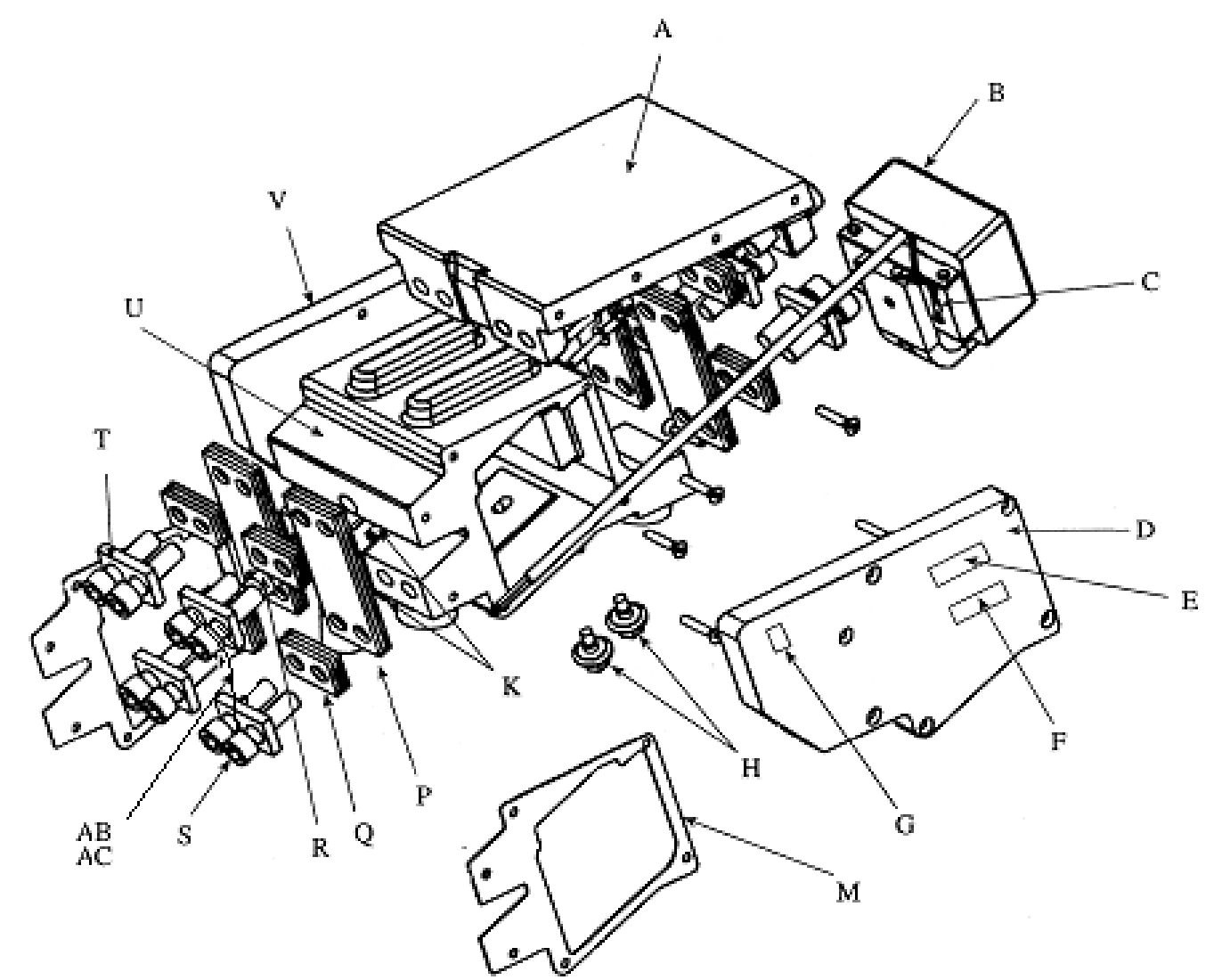
*Replace only with parts recommended or supplied by SMH.

◆ NOTE: Some items are equipped with removeable options such as screen panels or covers, these items must be in place during operation or damage to the feeder will occur.

OPERATING SPECIFICATIONS

Feeder Model	Max. Trough Weight	Minimum Natural Frequency	Coils	Operating Voltage	Maximum Current (Nameplate)	Expected Current (Ref. only)	Minimum Dynamic Air Gap	Trough Stroke Range (Maximum Trough Weights)
BF-4-ALF	110#	1775	235T12	230/60	9.0			.160 (.140 MIN.)
		1775	515T15	460/60	4.5			.160 (.140 MIN.)
		1975	275T12	220/230/50	9.0			.140 (.120 MIN.)
		1975	515T15	380/50	4.5			.140 (.120 MIN.)

PARTS DIAGRAM – BF-4-ALF / ASLF



PARTS LIST

ITEM	DESCRIPTION	QTY	PART NO.
A	Trough Mounting Bracket	1	D-300278
	Hex Hd Cap Screw 3/8"-16 UNRC-2A x 3 Lg Gr 5]	2	H0343124
	∇ Hex Hd. Cap Screw 3/8"-16 UNRC-2A x 3 Lg (SS)]	ONLY	H0311403
	Flat Washer 3/8 Zn. Pl. }	2	H0117001
	∇ Flat Washer 3/8 (SS) }	ONLY	H0177002
	Loctite #242 Threadlocker Adhesive/Sealant	As Req'd	0185X012
B	Magnet and Cable Assembly, 230V/60 Hz	1	D-300276-J
	Magnet and Cable Assembly, 460V/60 Hz	1	D-300276-K
	Magnet and Cable Assembly, 220 - 230V/50 Hz	1	D-300276-L
	Magnet and Cable Assembly, 380V/50 Hz	1	D-300276-K
C	Ground Wire Assembly	1	C-300039-A
	Hex Hd. Mach. Screw (1/4-20 x 1/2) Br.	1	H0300802
	Lockwasher, 1/4 Int. Tooth	1	H0112705
D	Right-Hand Side Plate	1	D-300136-1
	Hex socket Hd. Cap Screw (3/8"-16 x 1-3/4") Zn. Pl.]	6	H0451418
	∇ Hex Socket Hd. Cap Screw (3/8"-16 x 1-3/4")(SS)]	ONLY	H0451302
E	◆Label (Adjustment)	1	A-195774
F	◆Nameplate	1	A62245
	Label Warning	4	B225294
G	◆ Label (Disc. Elec.)	2	A-125694
H	HH Shoulder Scr 1/2-20	2	B-300007
	Flat Washer 5/8 Zn. Pl. }	2	H0117501
	∇ Flat Washer 5/8 (SS) }	ONLY	H0117502
	Belleville Washer 5/8]	2	0013X115
	∇ Belleville Washer 5/8 (SS)]	ONLY	0013X131
K	Hex Socket Hd. Cap Screw (3/8"-24 x 1-3/4") Full Thread }	1	H0452428
	∇ Hex Socket Hd. Cap Screw (3/8"-24 x 1-3/4") Full Thread (SS) }	ONLY	H0452534
	Hex Socket Hd. Cap Screw (3/8"-24 x 2-1/4") Full Thread(Upper)]	1	H0454628
	∇ Hex Socket Hd. XP Screw (3/8"-24 x 2-1/4") Full Thread (SS)]	ONLY	H0454734
	* Urethane Compression Spring	1	0241X030
	* Teflon Washer	1	0336X010
	Flat Washer 3/8 Zn.Pl. }	1	H0117001
	∇ Flat Washer 3/8 (SS) }	ONLY	H0117002
	Loctite #242 Threadlocker Adhesive/Sealant	As Req'd	0185X012
M	Side Gasket	2	D-300140-1
P	Carbon/Epoxy Spring 0.134 Tk (4 Rear, 4 Front)	8	C-300138-3
	Carbon/Epoxy Spring 0.084 Tk	As Req'd	C-300138-4
Q	Spring Spacer	24	B-300141-1
R	Strain Relief	1	0102X080
S	Hex Socket Hd. Cap Screw (7/8"-9 UNRC-3A x 2-1/2") Zn.Pl.]	16	H0454233
	∇ Hex Socket Hd. Cap Screw (7/8"-9 UNRC-3A x 2-1/2") (SS)]	ONLY	H0454133
T	Spring Clamp Bar	8	B-300142-1
U	Base and Armature Assembly	1	D-300274-A
	∇ Hex Soc Set Screw 1/4" – 20 x 3/8" (SS)	1	H0431402
V	Left-Hand Side Plate	1	D-300136-2
	Hex Socket Hd. Cap Screw (3/8"-16 x 1-3/4") Zn. Pl. }	6	H0451418

PARTS LIST (cont'd)

	∇ Hex Socket Hd. Cap Screw (3/8"-16 x 1-3/4")(SS)	}	ONLY	H0451302
W	Isolator Housing		4	D-300531-AA
X	Neoprene Spring Cap		8	0241X022
Y	Coil Spring		4	0274X016
Z	Hex Head Cap Scw 3/8"-16 x 1 1/2" Zn. Pl.	]	4	H0310601
	∇ Hex Head Cap Scw 3/8"-16 x 1 1/2" (SS)	]	Only	H0340296
	Lockwasher 3/8" Zn. Pl.	}	4	H0113209
	Lockwasher 3/8" (SS)	}	Only	H0113210
AA	Acorn Nut 1/2" – 13		4	H0104007
	Hex Head Cap Screw 1/2" - 13 x 1 1/2" Z Pl.	]	4	H315401
	∇ Hex Head Cap Screw 1/2" - 13 x 1 1/2" (SS)	]	Only	H315403
	Lockwasher 1/2" Z Pl.	}	4	H0113609
	∇ Lockwasher 1/2" (SS)	}	Only	H0113610
	Plainwasher 1/2" Z Pl.	]	4	H0117301
	∇ Plainwasher 1/2" (SS)	]	Only	H0117202
AB	Ground Strap		1	6510-014-D
AC	Drive Screws		2	H0457102

◆ Do not remove or paint over safety labels or nameplate.

∇ Indicates Stainless Steel Hardware

* Used with Upper Core Adjustment Screw

TORQUE SPECIFICATIONS

TORQUE VALUES			
ITEM	DRY FASTENERS	*LUBRICATED FASTENERS (EEZ Instead-A-Led or Equivalent	**LOCKTITE APPLIED (#242)
H	55 ft lb (74.6 Nm)	40 ft lb (54.2 Nm)	
D,V	47 ft lb (67.7 Nm)	35 ft lb (47.5 Nm)	
A	---	---	23 ft lb (31.2 Nm)
S	---	350 ft lb (474.5 Nm)	
K (lower only)	---	---	37 ft lb (50 Nm)

* Standard zinc plated fasteners are considered "Lubricated"

** Stainless steel fasteners are considered "Dry)

Important

This service manual is provided to assist in the operation and maintenance of your Syntron Material Handling LLC equipment.

Requests for additional manuals or replacement parts should be directed to the address listed at the end of this page:

Please be sure to include the following information when ordering replacement parts:

1. Machine model name
2. Factory Order Number
3. Quantity of parts required
4. Syntron part number (from manual)
5. Description of part
6. Shipping instructions

Syntron Material Handling reserves the right to alter at any time, without notice and without liability or other obligations on its part, materials, equipment specifications, and models. Syntron Material Handling also reserves the right to discontinue the manufacture of models, parts, and components thereof.

Your satisfaction is very important to us. Please direct any comments, questions, or concerns to our Marketing Communications Department.

Syntron Material Handling

Corporate Office

P.O. Box 1370

Tupelo, Mississippi 38802

Phone: 662.869.5711

Fax: 662.869.7449

Form No. SM0527_122214 Printed in U.S.A

Syntron®
Link-Belt®

Tupelo

2730 Hwy 145 South
Saltillo, Mississippi 38866

Phone: 662.869.5711

Fax: 662.869.7493

Toll Free: 800.356.4898

info@syntronmh.com

Changshu

#2 Road No. 1

Changshu Export Processing Zone

Changshu, Jiangsu, China 215513

Phone: +86 0512.52299002

Fax: +86 0512.52297228

info@syntronmh.com