JEM INTERNATIONAL INC.

EQUIPMENT SALES | PARTS | MANUFACTURING

USER'S OPERATION MANUAL

CUSTOMER: ————————

S/O#: ————————

SERIAL #: ————————

MODEL: **JM-DT-31SGVD**

CONTROLLER: **663 S.S. JMGVPS 2_26.TXT**

ELECTRICAL (CONTROL): ————————

ELECTRICAL (MOTOR): ————————

AIR PSI: ————————

SPECIAL FEATURES:

JEM International 6873 Martindale Shawnee, Kansas USA 66218-9354
Phone: 913-441-4788 Fax: 913-441-1711 email: info@jemscales.com

SUMMING and LOAD CELL COLOR CODE CHART FOR CM-780 and JM scales with 600 SERIES CONTROLLERS

LOAD CELL

+EXC.....RED
-EXC.....BLACK
+SIG.....GREEN
-SIG.....WHITE
SHLD.....BARE

SUMMING CABLE

+EXC.....RED
+SEN.....BLUE
-EXC.....BLACK
-SEN.....YELLOW
+SIG.....GREEN
-SIG.....WHITE
SHLD.....BARE

600 SERIES CONTROLLER

+EXC.....RED
-EXC.....BLACK
+SIG.....GREEN
-SIG.....WHITE
+SEN.....BLUE
-SEN.....YELLOW
SHD.....BARE

NOTE: +SEN and –SEN ARE FOR OPTIONAL USE AND SHOULD ALWAYS BE USED WHEN THE SUMMING CABLE LENGTH IS GREATER THAN TWENTY-FIVE FEET

RESISTANCE IN K OHMS		LOAD CELL CAPACITY IN POUNDS				
		25#	50#	150#	250#	500#
RED	BLACK	.391	.376	.384	.401	.401
RED	GREEN	.284	.276	.280	.289	.288
RED	WHITE	.284	.276	.280	.289	.288
BLACK	GREEN	.284	.276	.280	.289	.288
BLACK	WHITE	.284	.276	.280	.289	.288
GREEN	WHITE	.351	.351	.351	.351	.351

NOTE: READINGS NEED TO BE TAKEN WITH THE LOAD CELL DISCONNECTED FROM SUMMING BOX AND REMOVED FROM IT'S WORKING LOCATION SO THAT THE LOAD CELL IS FREE OF ANY STRESS POINTS. THIS MUST BE DONE TO PROVIDE PROPER READINGS.

600 Series

LCD

Programmable Controller

Instruction Manual

VERSION 1-28 CM-780 or 5-GV

JEM INTERNATIONAL INC.

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6873 Martindale Road
Shawnee, Kansas 66218
U.S.A

Phone: (913) 441-4788
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info@jemscales.com

CALIBRATION PROCEDURE

FROM THE MAIN MENU PRESS SETUP KEY AND THEN PRESS [F4] KEY
ID=CALIBRATION WILL APPEAR ON LOWER DISPLAY

CALIBRATION: Pressing ID on the keypad puts controller in the CALIBRATION mode.
(Follow the prompts on the upper display, remembering ENTER=yes / CLR= no)

Sci#: When more than one scale is being used (such as a duplex or triplex scale) the Sci# must be entered..

New Zero? : Tells the controller what will be established as a ZERO point. PRESS ENTER

Units = : Using the UNITS key, toggle through the available units until the correct one is selected.

Key in Calibration Weight: Place calibration mass on or in weigh hopper and key in the exact weight of the mass including any other objects used to support or suspend the mass from the weigh hopper. PRESS ENTER

Calibration OK? : If upper display is equal to the amount keyed in PRESS ENTER.

If upper display is not equal to the amount keyed in press CLR and start at (New Zero?)

WHEN FINISHED WITH LAST SCALE Sci# WILL APPEAR
PRESS CLR KEY TO EXIT. DUPLEX AND TRIPLEX ONLY!

If the display reads Code 39 check *AID* Cal press CLR key

If the display reads Setup ENTER= CAL press CLR key

If the display reads Setup ENTER = SAVE press the ENTER key

If the display reads Setup ENTER= EXIT press the ENTER key

When the following appears on the lower display you are finished.

MODEL OF SCALE
PROGRAM
VERSION

Keypad Operation

Fl: Toggles ON/OFF

F2: Toggles HOLD/RUN
(When HOLD is selected, bag clamp will not automatically release after weigh complete)

F3: Releases bag clamp.
(Key not functional when in the SETUP mode)

F4: Releases an out of tolerance weighment.
(An asterisk will appear to the right of[F4] TOL ACCEPT when out of tolerance)

SCALE SELECT: Brings controlfer out of SETUP mode and returns to main menu.

ZERO: This key will zero off any unwanted weight value displayed.

UNITS: Toggles through the available weighing units.
(Pounds/kilograms)

SELECT: Toggles through BAG COUNTER, NET, GROSS and DATE/TIME.
(Bag Counter counts only weigh complete and in tolerance discharges.
Can be cleared by pressing the CLR key and then the ENTER key)

TARE: Performs an auto-tare. (Normally, only used on a GROSS weighing system to tare off the value of the bag weight)

ENTER/yes: When a change is made in the SETUP mode the new value must be entered.
(Also doubles as a YES command)

CLR/no: When an unwanted value is keyed in, it can be cleared before pressing the ENTER key.
(Also doubles as a NO command)

PRINT: When the PRINT key is pressed three printing options appear on lower display. (OPTIONAL)
[Fl] Enables CONTINUAL printing of individual weighments.
[F2] Prints SUBTOTALS of individual Product #'s.
[F3] Prints GRANDTOTALS of all Product #'s.

NOTE: AUTO ADUST MUST BE TURNED ON AND WILL ONLY CAPTURE WEIGHMENTS ACCORDING TO THE AUTO COMP START AND AUTO COMP FREQUENCY COUNTERS

SETUP: Puts controller in the setup mode where a number of changes can be made to the Main Menu and determine how the controller will operate. (SCALE SELECT takes the controller out of the SETUP mode)
Fl will scroll through the Main Menu forwards.
F4 will scroll through the Main Menu backwards.

NOTE: THE FOLLOWING HAVE CHANGEABLE ENTRY CAPABILITIES AND WILL ONLY MAKE CHANGES TO THE PRODUCT AND SCALE NUMBER SELECTED !!!

PRODUCT NUMBER: There are 100 available product numbers and are set at a range between 00-99.
(These numbers are used to setup different products and/or different FINAL TARGET WEIGHT'S- for the same product)

FINAL TARGET WEIGHT: Displays the final weight.

PRELIM WEIGHT: Displays how much of final weight will be slow fill.

FREE FALL WEIGHT: Determines the slow fill cut-offto allow for product in suspension.

AUTO ZERO: Automatically zeros the weight display after first discharge and is controlled by the AUTO ZERO START and AUTO ZERO FREQUENCY counters.

AUTO ADJUST: Automatically adjusts the free fall after first discharge and is controlled by the AUTO COMP. START COUNTER and AUTO COMP. FREQUENCY counters.

TOLERANCE: Will only discharge the weighment if it is within the positive and negative settings for TOLERANCE WEIGHT. (Refer to the F4 key)

+TOLERANCE WEIGHT: Weight that is acceptableFINAL TARGET WEIGHT.

-TOLERANCE WEIGHT: Weight that is acceptable hrlmY: FINAL TARGET WEIGHT.

START FILL DELAY (sec.): The amount of time allowed from when the bag switch is made to the beginning of the fill cycle.

CLAMP RELEASE DELAY (sec.): The amount of time, after weigh complete, before the bag is released.

AUTO ZERO START COUNTER: The number of times the controller will ZERO the weight display, after first discharge, when selected scale is set from the OFF to ON setting.

AUTO ZERO FREQUENCY COUNTER: The number of times the controller will ZERO the weight display after AUTO ZERO START COUNTER is completed.

AUTO COMP. START COUNTER: The number of times the controller will adjust the FREE FALL weight, after first discharge, when selected scale is set from the OFF to ON setting.

AUTO COMP. FREQUENCY COUNTER: The number of times the controller will adjust the FREE FALL weight after the AUTO COMP. START COUNTER is completed.

TOLERANCE CHECK COUNTER: The number of times the controller will check the weighment to determine whether it is within positive and negative TOLERANCE.

TOTAL BAG COUNT: Total discharges made from selected scale. (Re-settable)

MASTER CYCLE COUNT: Total discharges made from selected scale's history. (Non re-settable)

CALffiRATION: Pressing ID on the keypad puts controller in the CALffiRATION mode. (See CALffiRATION PROCEDURE)

ACCESS TO THE CONTROLLER: Hold the CLR key for 10 seconds while powering-up the controller.
100 SELECT/23640 ID ENTER

Changing TIME:

502 SELECT (Make sure P502 is set for "Enbld". This can be done using the ENTER key)
500 SELECT The new TIME is entered by keying in "HH.MM.SS" (ENTER) Leading zeros need not be entered.

Changing DATE:

502 SELECT (Make sure P502 is set for "Enbld". This can be done using the ENTER key)
501 SELECT The new DATE is entered by keying in "MO.DA.YR" (ENTER) Leading zeros need not be entered.

Changing from U.S.A. to International TIME/DATE:

504 SELECT Change can be made by pressing the ENTER key.

Viewing mvN output of load cells:

61099 SELECT Specifies the scale number from which to view the information.
61100 SELECT Displays an approximation of the current mvN output of the connected load cell.

Viewing the voltage of the battery on the database memory board:

60018 SELECT If this voltage falls below 2.5 volts, this message and a warning message display alternately indicating that the battery should be replaced.
The warning message is also displayed during power-up. When the voltage is above 2.0 volts then data in memory will be retained. The voltage on a new battery should be slightly above
· 3.0 volts. A battery should last several years minimum, possibly over 10 years, depending on conditions.

EXITING THE ACCESS MODE:

PRESS THE **ZERO** KEY

If the display reads Code 39 check *AID* Cal press CLR key

If the display reads Setup ENTER = CAL press CLR key

If the display reads Setup ENTER= SAVE press the ENTER key

If the display reads Setup ENTER= EXIT press the ENTER key

When the following appears on the lower display you are finished.
MODEL OF SCALE
PROGRAM
VERSION

600 Series Process Controller Set-Up Procedure (gross weigh)

PRODUCT#: - 100 DIFFERENT PRODUCT NUMBERS MAY BE STORED USING CODES 00- 99. CODES CAN BE SELECTED BY PRESSING THE SETUP KEY, TYPE IN THE DESIRED PRODUCT NUMBER, THEN PRESS ENTER.

NOTE: SCALES MUST BE IN THE OFF POSITION TO CHANGE PRODUCT#:

FINAL -ACTUAL WEIGHT OF BAG DESIRED (EXAMPLE 50.00)

PRELIM- SLOW FILL WEIGHT (EXAMPLE 12.00)

FREE FALL- WEIGHT OF PRODUCT IN SUSPENSION (EXAMPLE .90)

SET-UP

1. SELECT PRODUCT#: CODE WHERE VALUES WILL BE STORED.

2. SET FINAL TO DESIRED BAG WEIGHT (EXAMPLE 50.00).

3. FREE FALL .00, AND PRELIM SAME AS FINAL (EXAMPLE 50.00).

4. RUN ONE BAG WITH SCALE IN THE HOLD POSITION TO PREVENT THE CLAMP FROM RELEASING AUTOMATICALLY.
   NOTE WEIGHT (EXAMPLE 50.70)

5. ENTER EXCESS INTO FREE FALL (EXAMPLE .70). THE EXCESS WEIGHT IS PRODUCT THAT IS IN THE AIR WHEN THE WEIGHT IS REACHED AND MUST BE COMPENSATED FOR.

6. RUN A SECOND OR THIRD BAG TO BE SURE THAT WEIGHT IS CORRECT. AT THIS POINT WE HAVB RUN ENTIRE BAG IN SLOW FILL TO ACHIEVE THE CORRECT WEIGHT. ONCE THE CORRECT WEIGHT HAS BEEN SET BY ADJUSTING FREE FALL, WE CAN NOW START INCREASING THE SPEED OF FILLING.

7. THE SPEED IS SET USING THE CYCLE LIGHT AND PRELIM WEIGHT. THE CYCLE LIGHT IS USED TO ASSIST THE OPERATOR IN ADJUSTING THE PRELIM WEIGHT AS FOLLOWS. LONG CYCLE LIGHT PRELIM TOO HIGH- VERY SHORT OR NO CYCLE LIGHT PRELIM TOO LOW. DEPENDING ON PRODUCT AND SPEED OF CYLINDERS PRELIM CAN VARY GREATLY FROM PRODUCT TO PRODUCT. NORMALLY PRODUCTS DO NOT CHANGE WITH SIZE (EXAMPLE CODE 00 (50# PELLETS)
   FINAL 50.00- FREE FALL .70- PRELIM 10.00 CODE 01 (25# PELLETS)
   FINAL 25.00- FREE FALL .70- PRELIM 10.00)

NOTE: FOR BEST RESULTS SLOW FILLING SHOULD BE APPROXIMATELY 5 LB OR 2.5 KG PER SECOND. MANUALLY ADJUST FLOW RESTRICTOR FOR THIS SPEED. (EXAMPLE 50 LB BAG ALL ENTIRELY IN SLOW FILLING SHOULD FILL IN APPROXIMATELY 10 SECONDS.

Appendix E Error Codes / Messages

This sections describes all error codes generated by 60 Series instruments. Most error codes show a two-digit code reference along with a short text message. Possible causes and remedies are described for each error.

OPERATIONAL MODE ERROR CODES

MESSAGE	DESCRIPTION
CodE02 Under Load!	Input signal less than negative full scale. If this is due to excessive loading, reduce the load. Otherwise check the load cell connections. If a 4 wire load cell cable is being used, check that the sense jumpers are in place. Verify that the capacity selection **P110** is correct. Use the information parameters, especially **P61103** and **P61104**, to check the setup and input signal.
CodE03 Over- Load!	Input signal is greater than positive full scale. Use same check as for underload.
CodE04 #> Dsply	Number to be displayed will not fit within 6 digits. This will not normally occur for the Gross, Net or Tare Weights but may result while displaying the accumulated totals if the amount exceeds 999,999. Either clear the totals or settle for only being able to transmit the totals.
CodE05 Zero> Max.!	An attempt was made to zero out more than allowed per **P118** selection. Use the **[TARE]** key for subtracting off container weights or if large dead-load is always to be present, apply this dead-load during the No Load? prompt during calibration to permanently eliminate the offset.
CodE06 Tare> F.S.!	Tare entry was greater than full scale. Most likely the entered tare value was incorrect.
CodE07 Tare< 0!	Negative tare attempted, but not allowed per **P162**. For auto-tares, the GROSS Weight must be greater than zero unless **P162** is changed to allow negative tares.
CodE08 Check Conn	The signal into the A/D is greater than +/- 2 times the expected full scale signal. For example if the full scale capacity at P110 is 100, then the error message will be displayed at +/- 208 taking into consideration the 4% overload. This error usually indicates a defective or incorrectly wired load cell.

SETUP MODE ERROR CODES

MESSAGE	DESCRIPTION
CodE 10 Entry >Max!	An entry was made which had more characters than allowed. The most likely cause is making an entry for an ID that is longer than the programmed size of that ID.
CodE 11 WRONG CODE!	The incorrect access code was entered, thus preventing changes. In order to access the Setup Mode, either the proper code must be entered or the **[ENTER]** key must be pressed alone (to view selections without making changes).
CodE 12 No Mods!	The Setup Mode is being accessed, but changes are prevented.
CodE 13 Outof Range	An entry made for a selection was beyond the range of valid choices. Also, an out of range error will occur during the execution of a macro utilizing the "%m" command. For example, If the command wants to strip out characters 5 through 8 and the string is only set for 2 characters, this error will occur.
CodE 14 Must Keyin	The choice for the current parameter must be keyed in.
CodE 15 Size >Max!	The size of one of the input interpreter, macro or custom transmit tables has exceeded it's limit. Input interpreter size is limited to 198 for 660 Series, 98 for all other products; macro size is limited to 9996; custom transmit size is limited to 3997.
CodE 16 CHECK JUMPR	A programming operation was attempted when the program jumper is installed. Installation of this jumper will prohibit any programming changes.

HARDWARE PROBLEM ERROR CODES

MESSAGE	DESCRIPTION
CodE 17 A/D BAD!	The processor has detected a problem with the A/D chip. Several situations could cause this error message to be displayed. The most severe situation would be a damaged or defective A/D. In this case it will have to be replaced. Other possibilities include: 1. **Faulty chip solder:** The solder on the surface mount chip (U4) is faulty and should be re-soldered. This task should be performed by a technician qualified for surface mount repair. 2. **Wet/damp:** The unit was water damaged or is simply in a damp environment and condensation has built up on the A/D and is shorting the component. A heat gun or common blow dryer used *carefully* will sufficiently dry the area.
CodE 18 BufSz Max!	The accumulative *total* buffer size for both the TX and RX buffers of all COMM ports exceeds the reserved storage capacity (8192 bytes for the 660 Series; 4096 bytes for the 460 Series). If entries to the "buffer size" parameters (P207-P208) exceed this total, this error message will be displayed.
CodE 19 ✓Data &Stop	Certain combinations of protocol are not available. The protocol combination selections are in P201, P202 and P203. This error occurs if an illegal protocol combination is selected. Refer to *Chapter 8, Communications* for more information.

Message	Description
CodE20 Defit A/D	The A/D calibration data is corrupt. When the information modes are accessed (P61100) this message will be displayed for 1 second and P61113 – P61116 are defaulted to a factor of 1. This will also happen on power-up if the check-sum for the A/D data are corrupted.
CodE21 Write NVErr	Error **reading** data from the EEPROM. Possible U27 or U28 problem.
CodE22 Read NVErr	Error **writing** data to the EEPROM. Possible U27 or U28 problem.
CodE23 Check NVPar	Supplementary error message for above errors.
CodE24 NVPar Full!	The setup being attempted requires more EEPROM than is currently installed.
CodE25 Defit Setup	Upon power-up the indicator has **not** found the proper codes. Therefore, all parameters have been reset to factory default values.
CodE26 Bad Setup	The stored data has a checksum error. Check all parameters or re-load setup.
CodE27 RE-BOOT!	The indicator cannot use the EEPROM for data storage and is attempting to power-up again to cure the problem.
CodE29 PIN error	The E^2 is corrupted in the PIN section. Check E^2 for problems. The access code is then defaulted to the manufacturer (GSE) access code. Also refer to Error 11.

CALIBRATION ERROR CODES

Message	Description
CodE30 F.S.> MAX!	The entered calibration weight, together with the currently applied signal, indicates that the full scale signal will be greater than the allowed maximum of the controller. Verify that correct entries have been made for the capacity, **P110**, and for the calibration weight. If all appears correct, refer to the use of the information parameter **P61100**, and determine the output (in mV / volt) of the connected load cell.
CodE31 F.S.< .1mVv	The entered calibration weight, together with the currently applied signal, indicates that the full scale signal will be less than the allowed minimum of the controller. Verify the proper entries for the capacity, **P110**, and for the calibration weight. If all appears correct, refer to the use of the information parameters, **P61100**, and determine the output (in mV / volt) of the connected load cell.
CodE32 ADD MORE!	The applied weight during calibration was less than 0.1% of capacity. More weight than this is required. Refer to **P61100** if this is incorrect.
CodE33 ReCAL Req'd	The just completed calibration is insufficient to guarantee accurate results due to either the cal weight being less than 5% of capacity or this was the first calibration of this platform to this Indicator and, therefore, the coarse gain was adjusted by the Indicator.
CodE34 RES> 25K!	The current combination of capacity **P110** and increment **P111** result in a resolution greater than 25,000 graduations. This is simply a warning in case this was not intended.
CodE35 RES> 100K!	The current combination of capacity **P110** and increment **P111** result in a resolution greater than 100,000 graduations. This is not allowed and as soon as any key is pressed the controller will jump back into the setup mode to parameter **P110** to verify the settings.

Message	Description
CodE36 RES< 100!	The current combination of capacity **P110** and increment **P111** result in a resolution less than 100 graduations. This is simply a warning in case this was not intended.
CodE37 RES< 1!!	The current combination of capacity **P110** and increment **P111** result in a resolution less than 1 graduation (for example, the increment is greater than capacity). This is not allowed and as soon as any key is pressed the controller will jump back into the Setup Mode to parameter **P110** to verify the settings.
CodE38 Range Error	In the multi-range setup, the low range exceeds the full scale capacity, or the middle range is less than the low range. Pressing any key will automatically select the parameter and allow you to correct it.
CodE39 ✓A/D Cal	The A/D calibration values for one of the scales (shown as an inverse digit) have not been entered. Refer to *Restoring A/D Calibration Values* in Chapter 4.

General Error Codes

Message	Description
CodE40 No PDIO	PDIO channel #8 is enabled on a 660 Series controller with an LCD display and Modbus configured for RTU mode. This combination is not allowed. PDIO channel #8 must be set to "None" at P851 or Modbus set to ASCII at P210.
CodE41 Idnot Used!	If a string type variable that has not been setup (for example, had its size set to a non-zero value.) is accessed (by pressing **[3] [ID]** for example), or if no string type variables have been setup, then this message will occur.
CodE42 Check Setup	A sample operation was performed with a sample size of "0" at parameter P34.
CodE43 dbNOT SETUP	An attempt to access an undefined database occurred. Make sure the intended database is configured beginning at P699. This error could also indicate that the database option has not yet been initialized at P65010.
CodE44 Name Macro	No macros were *named* when attempting to invoke the macro menu. If P806 is configured as "Menu", make sure there is at least one macro named at P9991.
CodE45 dbCol error	Cannot change the *type* of a variable after it is associated in a column of a database. For example, changing a variable from a string type to a float type is not acceptable. When this error message is displayed, pressing any key will proceed to the column of the database associated with the variable which has been redefined. This will allow the operator to clear the database or prompt him to redefine the variable back to its original type. This message will occur for each variable that has been redefined and associated with a database.
CodE48 E2Typ Error	Both FRAM and standard EERPOM are installed in U27 & U28. Memory types cannot be intermixed. Power down and install one or two FRAM chips ***or*** one or two EEPROM chips and power up.
CodE51 Too Small	The sample placed on the platform is too small to accurately compute the piece weight. Increase the sample size.
CodE52 Can't Count	There is an insufficient quantity on the platform to perform an accurate count.
CodE53 Accy< Req'D	The accuracy is less than required. The accuracy requirements specified at P183 has not been achieved. Increase the sample size.
CodE54 Scale Disbl	An attempt to select a *disabled* scale was made. Make sure the intended scale is enabled and properly configured beginning at P108.

Message	Description
CodE60 New FLASH	A new FLASH file has been uploaded via the ReFlash or BDM flash utilities in order to upgrade the firmware. Press any key to acknowledge.
CodE61 Need Code	The setup mode access code has not been entered prior to attempting to change the configuration of a setup parameter. Key in the access code (i.e. **100 [SELECT] 23640 [ID] [ENTER]**).
CodE62 Comm# Error	An entry error occurred at the "EnterCOMM#" prompt. This message appears during a setup download (P64000, P64001), database download, database print, etc. if the COMM port number was omitted or invalid.
CodE71 TxNot Exist	The specified custom transmit does not exist. An invalid custom transmit was entered at the "Which Tx#?" prompt or incorrectly specified with a %Q macro command. Make sure the intended custom transmit is configured beginning at P989.
CodE72 ConTx >Max!	The maximum number of continuous transmits have been exceeded (16 for the 660 Series controllers; 4 for the 460 Series indicators).
CodE73 TxNot Cont	A request was made to disable a continuous custom transmit using the D%Q command for a transmit that was **not** currently being continuously transmitted.
CodE74 TxRat >Max!	A request was made to set the continuous transmit interval larger than the maximum value using the I%Q macro command.
CodE75 Tx is Cont.	A request was made to enable a continuous custom transmit using the C%Q command for a transmit that **was** currently being continuously transmitted.

Macro Error Codes

Message	Description
No Macro	An attempt was made to abort a macro when no macros were defined.
Macro error	An error occurred during macro execution. Check for proper syntax. Analyze the macro debug buffer to help determine the cause of the error.
No Start	A serial or A/D database collection command (%' or %*) was executed prior to the "start collection" command.
Must Free	A serial or database start collection command (S%' or S%*) was issued without first freeing memory with the F%' or F%* command.
Wrong Parm	The parameter specified for data collection using the %* command was invalid or not of type float.
CodE81 Macro Stack	The maximum number of macros pushed onto the stack has been exceeded. This error usually indicates that macros are being invoked faster than they can be executed (for example, macros invoked by continuous, short-interval input setpoints, multiple macro "calls", etc.) The maximum number of macros on the stack is 200.
CodE82 Macro Abort	A macro was aborted from within a macro via one of the macro abort operations or from the front keypad by pressing **[CLR] + [SELECT]**.
CodE83 Macro UnDef	A call or similar reference to an undefined macro occurred. Make sure the intended macro is configured beginning at P9990.
CodE84 Math error	An incorrect math operation has been performed. This could be caused by trying to divide by zero or any other non-acceptable algebraic operation. This message will also occur if trying to take the negative or zero modulus of a number.
CodE85 Syntx Error	An error occurred during macro execution as the result of invalid syntax. Re-check the macro or analyze the macro debug table to find out where the error occurred. Refer to *Chapter 9* for proper macro syntax.

Message	Description
CodE86 Macro Brace	The number of opening and closing braces within a macro are different. When nesting conditional statements or grouping conditional Boolean statements, make sure the proper use the %{ and %} brace commands.
CodE87 NoTag Found	An attempt was made to jump to an undefined tag. When using simple jump-tag commands, make sure the intended tag is properly specified and that the tag command is executed **before** the jump. When using macro-independent jump-tag commands, make sure the correct macro number is specified and that the jump text matches that of the tag.

Setup Error Codes

Message	Description
CodE92 ✓Strt Setup	A parameter entry is required for a setpoint's Activation Limit, Deactivation Limit, or Compare parameter. Pressing any key will automatically select the offending parameter and allow you to correct it.
CodE95 SyErr NvRam	The EEPROM size is too small to allocate the database requested.
CodE96 Erase Boot!	An attempt was made to enter an instrument serial number or board serial number with the flash already programmed.
CodE99 Can't Set!	An attempt to enter a value for a parameter which is not field changeable, such as the serial numbers or the audit trail counter results in this message.
Cksum error	Upon each power-up, the indicator tests the integrity of its firmware. If the result is not correct this message is displayed and the indicator is not usable. ReFlash the indicator.

Communications Error Messages

Message	Description
prtyX error	The parity of a received character did not match the parity specified in the setup mode at P202. This could also result if the baud rate (P200) or the number of data bits (P201) are incorrect. The 'X' in the error message represents the COMM port number on which the problem occurred.
ovrnX error	An overrun error occurred where additional characters were received while the receive buffer was full. The additional characters will be lost. The 'X' in the error message represents the COMM port number on which the problem occurred.
frmgX error	The stop bit of a received character did not occur when it was expected. This could be the result of an incorrect baud rate (P200), incorrect number of data bits (P201), or incorrect parity setting (P202). The 'X' in the error message represents the COMM port number on which the problem occurred.

Message	Description
portX error	The indicator did not check its receive data register in time, thus missing a character. To prevent the problem, try reducing the baud rate (P200). The 'X' in the error message represents the COMM port number on which the problem occurred.
NoTxX Allow	Associated with Modbus. This is selected at P205. This message indicates that a transmission out the specified port was attempted. This is not acceptable if the port is set for Modbus. The 'X' in the error message represents the COMM port number on which the problem occurred.
tx on hold	Occurs if a data transmission is held up for two seconds of more due to a deasserted handshake. Refer to the description of parameter P209 for more information.
tx abort	Occurs if the **[CLR]** key is pressed when the tx on hold error message is shown or if P209 is set for abort and the transmit buffer becomes full.
tx Con'd	Appear briefly when the handshake is re-asserted after the tx on hold message occurs.
BadTx Port	Appears briefly after an attempt was made to put a byte in an invalid comm port receive buffer.
Wrong Comm#	An invalid communication port number was specified.

Miscellaneous Messages

Message	Description
Entry Error	An invalid entry was made. When entering data, make sure the values are within the acceptable limits and of the proper type as required by the entry mode.
Enter Comm#	This prompt appears during a setup download (P64000, P64001), database download, database print, etc. if a COMM port was not specified.
Which Tx#?	This prompt will appear when the instrument is setup with more than one custom transmit with parameter P991 set for "Prmpt" (Prompt) and the **[PRINT]** key is pressed. The "WhichTx#?" message is asking for a custom transmit number to be entered. Key in the custom transmit desired and then press **[ENTER]**. For example, **[2] [ENTER]**, for custom transmit number 2.
Clear All?	This prompt will appear when the **[CLR]** key is pressed when the cursor is at the end of a custom transmit table or macro table. Press **[ENTER]** to clear all information or any other key to retain the table information.
Enter toCLR	This prompt is used at P65010. When **[ENTER]** is pressed this message will appear. It is then followed by "Enter=Dflt".
Sure? ???	This prompt is displayed for verification of resetting or clearing information. This message occurs at parameters such as P65001, P65002, P65010, etc. Press **[ENTER]** to clear or reset all information or any other key to retain the information.
No Instn	Indicates an instance was specified when entering an operating parameter that does not have multiple instances.
Insuf OpRAM	There is not enough operational RAM available to perform the requested function.
NoOpt RAM!	There is no database present or it has not been initialized at P65010.
OVER-WRITE	The maximum number of DSD data rows has been exceeded (P594). The oldest row in the DSD database has been overwritten with a new row of data.
Rows: < XXX	The number of DSD data rows has exceeded the warning threshold. "XXX" represents the number of warning rows specified at P595. Print and/or download

	the DSD database to prevent loss of data before the maximum number of DSD data rows is exceeded.
OutOf Memry	The current setup requires more RAM than is currently installed.
>Max Rows	Number of rows received during upload exceeded 2,147,483,648. Contact GSE if this error occurs.
Invld Data1	Occurs during upload new or upload update, followed by the row location (relative to the beginning of the upload) of the error and the column in which it was found. This code means that a float, int or unsigned value could not be interpreted and was therefore regarded as a zero (0) value. It was mostly likely caused by a string entry occurring where a numeric entry was expected. The upload will continue. Check the error codes at P60021 after an upload or use the %_ macro after the upload macros to test for this error.
Invld Data2	Occurs during upload new or upload update, followed by the row location (relative to the beginning of the upload) of the error and the column in which it was found. This code means that a float, int or unsigned value contained extra characters that were ignored. It was mostly likely caused by a string entry containing at least some numbers being where a numeric entry was expected. Some of the numbers will be used for the data in this case. The upload will continue. Check the error codes at P60021 after an upload or use the %_ macro after the upload macros to test for this error.
< Col /Row	Occurs during upload new or upload update, followed by the row location (relative to the beginning of the upload) of the error and the # of columns found. Missing columns are filled with zeros (0). This may be intentional if for example you are creating a database where a column will be filled in later. The upload will continue. Check the error codes at P60021 after an upload or use the %_ macro after the upload macros to test for this error.
> Col /Row	Occurs during upload new or upload update, followed by the row location (relative to the beginning of the upload) of the error and the # of columns found. Extra columns were encountered and ignored. This may be intentional if for example you are creating a database from an another database which does need all the columns of the existing database. The upload will continue. Check the error codes at P60021 after an upload or use the %_ macro after the upload macros to test for this error.
Colmn > Max	Occurs during upload new or upload update when a row of data is contains more than the maximum number of columns in the database. Uploading stops immediately when this occurs. This is most like due to upload data containing no carriage returns. Ensure the presence of carriage returns and not some other character at the end of each row of data. Check the error codes at P60021 after an upload or use the %_ macro after the upload macros to test for this error.

JM-600 or JMDT-2 DIGITAL GROSS WEIGH SCALE INSTRUCTION MANUAL

The JM-600 or JMDT-2 scale is a gross weigh bagging scale meaning the product is weighed in the bag. The scale is designed to handle between 7-9 50 lb. bags per minute at plus or minus 3 oz. accuracy or better which is rated at 2 Sigma (95%).

The scale is shipped in separate components (scale housing, spout and programmable controller) and calibrated at the factory. The scale has been separated into three sections for protection during shipping. The three sections are the **scale housing, spout and programmable controller**. The first step is to hang the scale housing from the discharge bin. The inlet opening of the scale is 9" x 7" and the overall height is approximately 26 to 28.5" depending on the type spout. Generally speaking, the top of the scale should be somewhere in the area of 6' 2" from floor, thus making the bottom of the spout 4 ft. from the floor, which is ideal working height. However, if other restrictions such as longer bag sizes or height limitations apply, this 6' 2" dimension can be modified slightly. Once the scale housing is in place, the spout may be attached by using the two 1/4" cap screws. The air lines must be reattached. The programmable controller panel may be installed normally within the operators sight and reach. The programmable controller must be connected to the scale head by simply matching the control wire terminal on the scale head. Refer to the Input/Output chart of the programmable controller (this conduit and wire is not furnished as location of the control panel and other restriction vary on installation).

The load cell cable is then connected to the summing box located on the back of the scale housing. If the cable provided is too short, contact our service department at 913-441-4788, and we'll be happy to send out the length you require. A power supply of 11OV-1 phase is required and 100 P.S.I. air pressure at approximately 3 to 4 CFM at maximum speed.

The air is connected into our filter regulator system. We have two regulators. One regulator controls the air pressure to the spout system which is used for clamping the bag in place. This regulator is on the left hand side and is normally set between 50 and 80 lbs. depending on the exact amount of air required to hold your bag. Circumstances that affect this are the weight of the bag and the type of material used in the bag.

For example, a 50 lb. bag would require more air pressure to hold than a 25 lb. bag. The right hand regulator controls the air to the internal radial arm gate of the scale. This has been factory set at approximately 40 lbs. and really should not need to be adjusted any further. It is extremely important that you understand the two regulators and their purposes. If, the internal gate is turned up to 80 or 90 psi. to match the air pressure on the bag clamps, this can cause damage to the housing of the scale.

The air system on the JM-600 or JMDT scale consists of a complete set of valves to provide the air pressure to the air cylinders. These valves are located directly underneath the control cabinet on the right hand side of the scale. The valves are base mounted so that they can be easily removed and cleaned if necessary without having to do rewire.

The air fittings used on the entire scale are swivel type quick disconnect so that the air lines can easily be removed. The valves have speed control adjusts on their sides. This is so you can adjust the speeds of all air cylinders throughout the scale. These have been set at the factory, however, if you would like the clamps to open faster or close slower, this is a very easy adjustment that can be made with a screwdriver.

In regard to the filter systems on the face of the JM-600 scale, this is for catching water in the air line and should be checked and drained periodically.

The JM-600 scale can be supplied with either a clam shell spout which is our standard, or it can also be supplied with a dust tight spout which is referred to as DT model on your name plate. Either way the system schematic is identical. The operator places the bag on the spout. The spout is then automatically closed with either a wand hand switch or a foot pedal whichever was ordered. When the clamps start to close the start delay timer is engaged as well.

This timer (after timing out) sends impulse to open the internal gravity gate. The gate is held open through the filling cycle and closed after the final weight (less prelim) is reached.

Understanding flow characteristics of your individual product is extremely important. If you will note, the air cylinders can be adjusted so that you have more or less opening size for the slow filling stage of your product.

Heavy products such as minerals will require a smaller opening and lighter products such as seed, oats, etc., will require larger openings.

Basically, a 50 lb. bag should have an overall fill time of between 4 and 6 seconds. The dribble mode or second filling should be no less than 1 second.

After you have the basic understanding of the scale functions, please proceed slowly in the following order:

1. Install scale on surge hopper, making sure it is level.
2. Connect electric service required.
3. Provide air into the filter regulator systems.
4. Install spout on scale. Be careful not to stress load cells.
5. Be careful not to weld.
6. Connect all electrical and pneumatic lines by schematic.
7. Turn scale on using F1 or start key on the programmable controller.
8. Set controller per programmable controller instruction manual.
9. Place bag on spout and begin operating scale.

Since the JM series scale is controlled by the programmable controller, it is extremely important that the sequence of events as described is followed. For example, if the scale is overfilling a bag, simply touch the F3 or STOP key and everything will shut down.

The JM-600 is truly a simple scale to understand and use and will provide many years of reliable service.

TROUBLE SHOOTING JM-600 & JMDT (single or two speed)

CLAMPS WON'T CLOSE	1. Power on 2. Air pressure applied 3. Bag clamp valve energized (Check light on valve) Check wire connection on valve and terminal 4. Air line restriction or blockage 5. Binding of air cylinder
CLAMPS CLOSE AND GATE WILL NOT OPEN	1. Gate valve energized (2 valves on 2 speed) Check wire connection on valve and terminal 2. Air line restriction or blockage 3. Binding of air cylinder
CLAMPS CLOSE AND GATE WILL NOT OPEN, THEN RELEASE BAG	1. Check settings on programmable controller
SCALE FILLS VERY SLOW	1. Check flow restrictor 2. Check cutoff valves 3. Check for restriction in chute area

GRAVITY/VIBRATOR
(GROSS WEIGHT-D)

The gravity vibrator is used for free flowing products. The gravity system is air operated and works a radial gate, operated by a single air cylinder. With the unit in fast feed, the cylinder will retract to open the gate and the vibrator will run. The opening of the gate can be controlled by the slide regulator on the front of the housing. When the feeder changes to slow, the gate will close and the vibrator will continue to run until weigh complete is achieved.

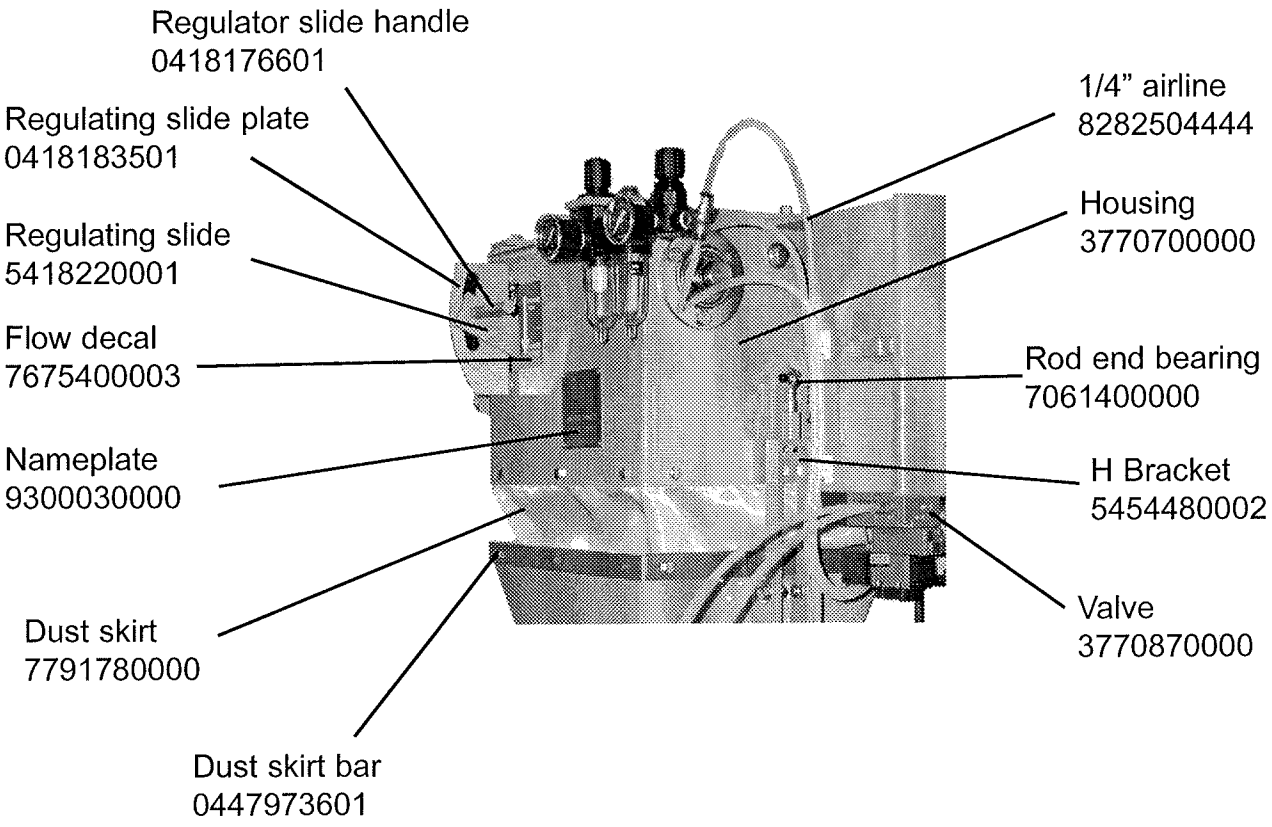
Adjustment for slow fill should be made first. The unit should be set to run the entire cycle in slow fill. The adjustment for slow fill using the variable speed adjustment provided for the vibrator. After several bags have been run, all slow fill and weights are correct, then the fast filling adjustment can be made. The fast fill adjustment is made by adjusting the slide regulator on the front of the housing. Screw the handle in to decrease and out to increase. The flow should be set at a flow rate and slowly increased until there is a uniform filling. Each time the fill rate is increased an adjustment may need to be made to the PS-1 valve or time.

Maintenance

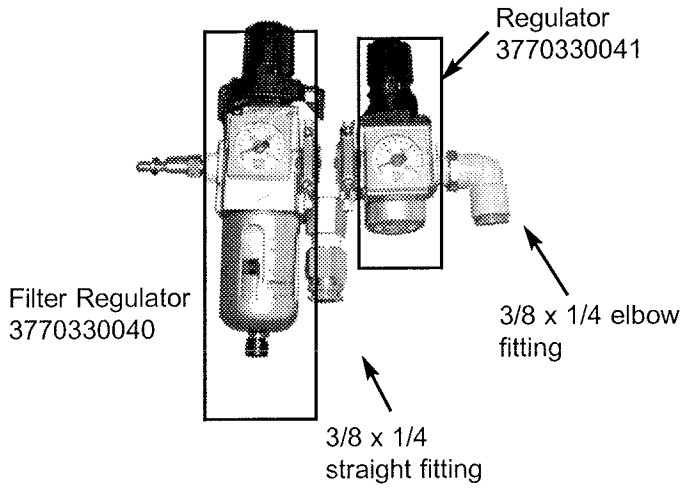
1. Periodically check rubber seals in housing. Adjust as needed and replace when rubber feels brittle.

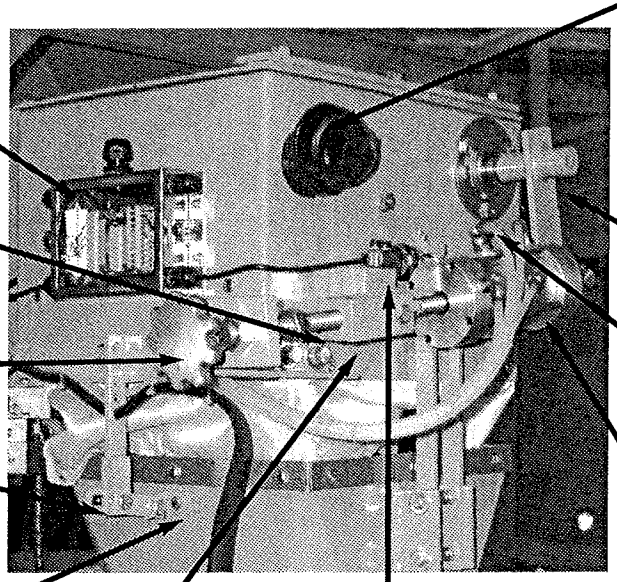
PARAMETER VALUES

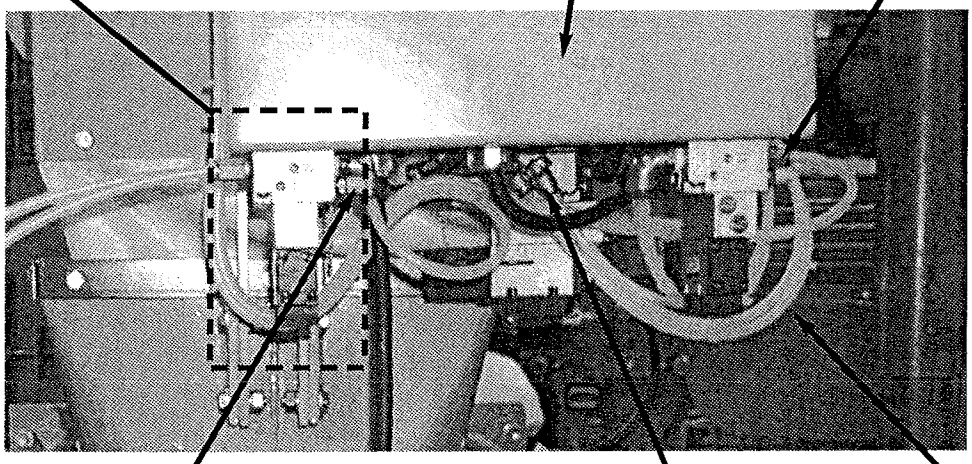
	Product #		Product #		Product #	
	Scale 1	Scale 2	Scale 1	Scale 2	Scale 1	Scale 2
FINAL TARGET WEIGHT						
PRELIM WEIGHT						
FREE FALL WEIGHT						
FAST FILL BELT/AUGER SPEED						
SLOW FILL BELT/AUGER SPEED						
FAST FILL VIBRATOR SPEED						
SLOW FILL VIBRATOR SPEED						
START FILL DELAY						
DISCHARGE DURATION						
CLAMP RELEASE DELAY						
AUTO FREE-FALL ON/OFF						
AUTO FREE-FALL START COUNTER						
AUTO FREE-FALL FREQUENCY COUNTER						
AUTO ZERO ON/OFF						
AUTO ZERO START COUNTER						
AUTO ZERO FREQUENCY COUNTER						
□□TOLERANCE ON/OFF						
+TOLERANCE WEIGHT						
-TOLERANCE WEIGHT						
TOLERANCE CHECK COUNTER						
MULTI-DUMP ON/OFF						
MULTI-DUMP CYCLE COUNTER						
TOTAL BAG COUNTER						
MASTER CYCLE COUNTER						



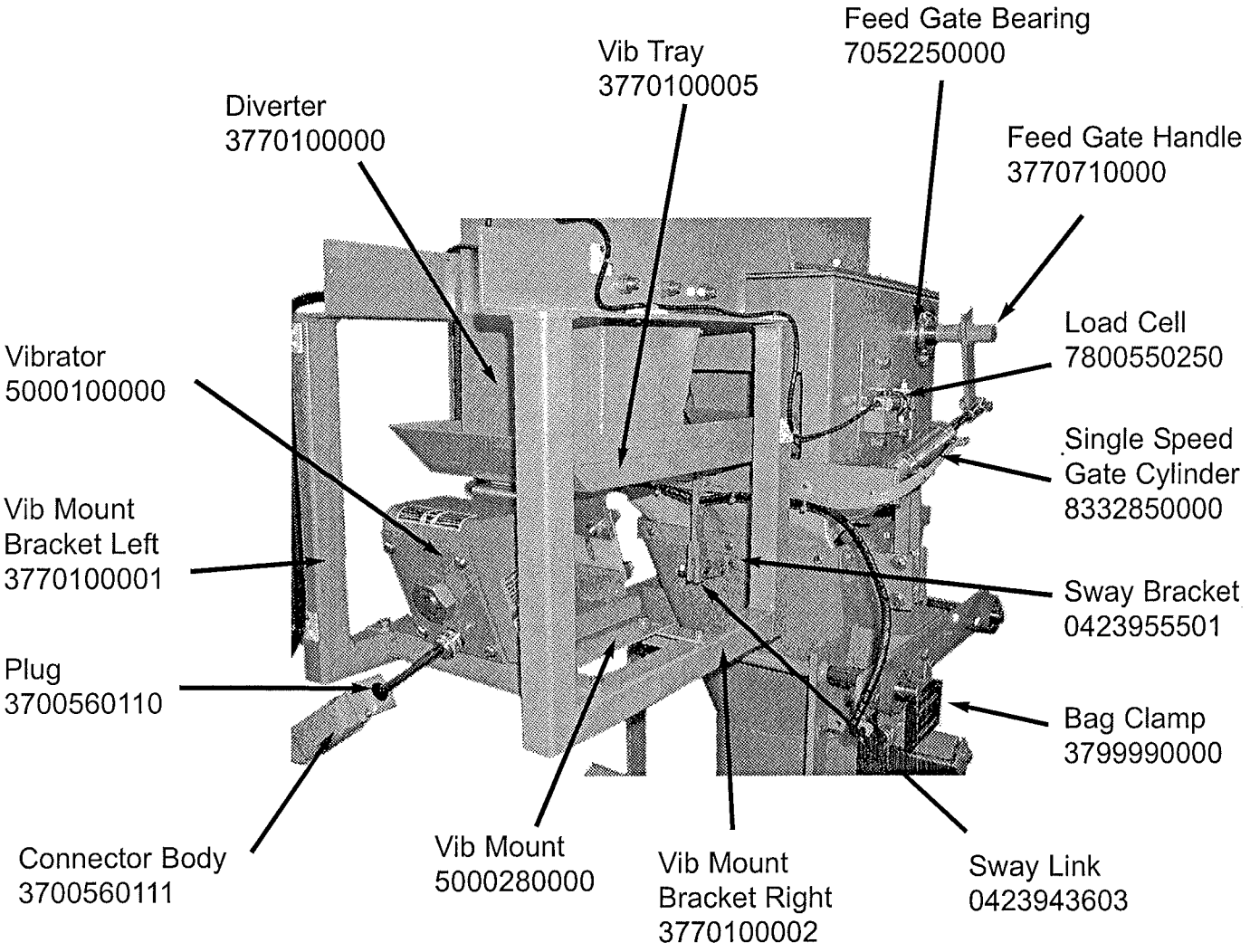
Filter Regulator Ass'y
3770330046

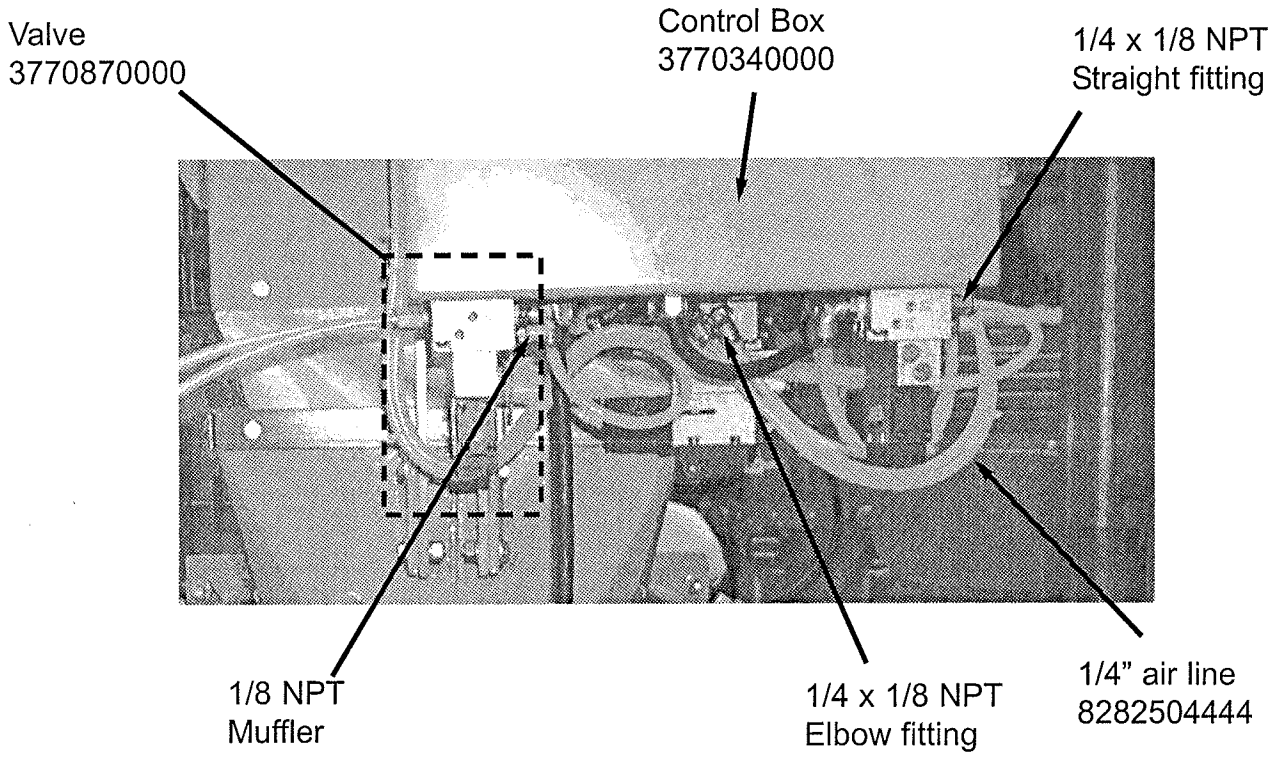



Dust Port
8282509999
Summing Box
7800550604
Rod, gate adjust
3600520000
Adjust Knob
7800650001
Sway Link
0423943603
Sway Bracket
0423955501
Rear clevis
3900140000
Load cell
7800550250
7800550150
(Canadian)
Feed gate handle
3770710000
Feed gate bearing
7052250000
Feed gate cylinder
83NQ250GDF0145
(not shown)
Single speed gate cylinder
8332850000


Valve
3770870000
Control Box
3770340000
1/4 x 18
Straight fitting
1/8 NPT
Muffler
1/4 x 1/8 NPT
Elbow fitting
1/4" air line
8282504444

GRAVITY VIBRATOR





JEM INTERNATIONAL, INC.
PHONE: 913-441-4788 FAX: 913-441-1711

JM MAIN SCALE AND HOUSING PARTS LIST

	PART#	DESCRIPTION	CODE	Simplex
	0001425194	Muffler		
	0015480000	Beam clevis		
	0024257910	Chute seal	R	1
	0098363801	"V" block bearing		
	0270063801	Pivot		
	0379833601	Slide bar spacer		
	0379943601	Gate stop bar		
	0397083501	Shipping clip		
	0418176601	Regulator Slide handle		
	0418183501	Regulating slide plate		
	0467603501	Restrictor Plate		
	2795900000	Switch	R	1
	3600520000	Rod, gate adjust		
	3700510000	Foot switch		
	3700560112	Plug		
	3703740000	Control box		
	3770190000	Air cylinder bracket (2 speed)		
	3770330041	Regulator		
	3770330004	Gauge		
	3770330040	Filter Regulator	R	1
	3770330057	FR bowl	R	2
	3770330046	Whole FR assembly		
	3770800000	Weight rod		
	3770840000	Proximity switch bracket complete		

	PART#	DESCRIPTION	CODE	Simplex
	3770840001	Proximity bracket		
	3770870000	Valve	R	1
	3770920000	2 Speed control		
	3799990000	Bag clamp	R	2
	3900140000	Rear clevis (2 speed only)		
	4425120000	Special washer		
	4425150000	Wingnut		
	5418220001	Regulating slide		
	5448200005	Spring		
	5460180001	Beam stop bracket		
	6000420000	Main beam		
	6000470001	Dashpot		
	7052250000	Feed gate bearing		
	7061150000	Rod end bearing (2 speed)		
	7061400000	Rod end 1/4 RH		
	7061490000	Rod end bearing (1 speed)		
	7623140002	Spout bearing		
	7675400003	Flow decal		
	7791780000	Dust skirt fabric	R	1
	7800510000	Proximity switch	R	1
	7800550150	Load Cell #150, Canadian series		
	7800550250	Load Cell #250, standard series	R	1
	7800550604	Summing box		
	7800552003	Fuse	R	10
	7800650001	Knob		
	7800700000	Timer	R	1
	7800800003	Socket		
	7800800110	Relay	R	1
	8282500000	Brass fittings elbow or straight	R	15
	8282504444	1/4" airline	R	30[1]
	8282509999	Vent		
	83NC1A200-PS	Seal kit, spout	R	1

	PART#	DESCRIPTION	CODE	Simplex
	8333260002	Clevis		
	83NQ250GDF145	Gate cylinder (2 speed)	R	1
	9250400000	Weight box cover		
	9267080000	Weight box		
	9500150000	Bulb	R	10
	9500150100	Selector switch		
	9500150131	Red cycle light		
	9500150134	Green "on" pilot		
	9500380000	Terminal block		
	9500410000	Terminal ground		
	9500440000	Terminal fuse holder		

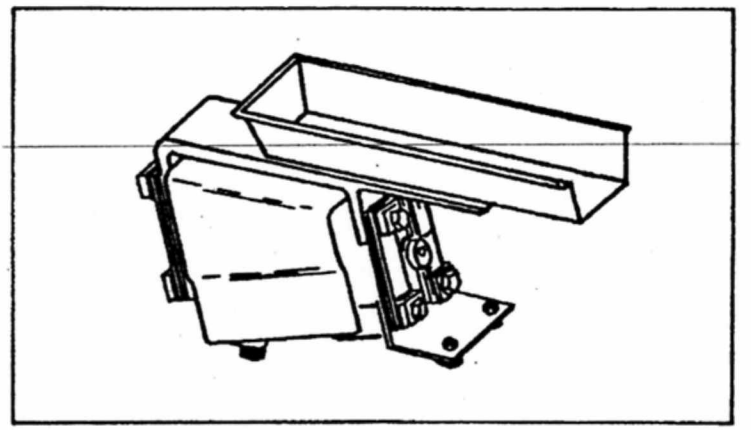
R=RECOMMENDED SPARE PARTS

When ordering parts be sure to advise scale construction (ex. Mild steel, stainless) and serial number

Some part pictures may differ from your scale as we do update parts occasionally

FMC Technologies

Service Instructions
Syntron®
Vibrating Feeder
Model: **BF Series**



Contents

FMC Technologies Inc. reserves the right to make changes at any time, without notice and without any liability or other obligation on its part, in material, equipment, specifications and model. FMC Technologies also reserves the right to discontinue the manufacture and sale of models, and the parts and components thereof.

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

This manual applies to general instructions for BF Model Feeders. Instructions for spring replacement and magnet replacement, a parts list and operating specifications for specific models are furnished in separate instructions.

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

INTRODUCTION

The "BF" Feeder assembly is an electromagnetic unit, consisting of a dynamically balanced, two-mass vibrating system. This system consists of a trough and trough connecting bracket coupled to an electromagnetic drive by means of leaf springs.

The electromagnetic drive (a coil and core assembly) is located within the base housing. This assembly is connected directly to the rear of drive unit housing. An armature assembly, also included as part of the drive unit, is located opposite the core and coil and is connected directly to the trough mounting bracket.

Leaf springs are located at the front and rear of the drive unit housing. These springs are clamped at the bottom to the drive unit housing, at the top to the trough mounting bracket. The trough, trough connecting bracket and armature become an assembly, joined to the drive unit through the spring assemblies.

THEORY OF OPERATION

Model "BF" Feeder operation produces a vibrating stroke on the surface of the feeder trough. The stroke is obtained by the electromagnet pulling the trough sharply down and back and then allowing it to spring up and forward. Repeated at high speeds (3600 v.p.m. at 60 cycle power supply), this action produces a definite vibrating movement on the trough surface.

The "BF" Feeder requires the use of separate controller which contains a rectifier, used to convert alternating current into rectified current.

Figure 1 illustrates a typical a-c sine wave and a typical r-c sine wave (the type of pulsating current which is required to operate the feeder). The coil is energized only by the portion of the sine wave shown as a solid line of the r-c sine wave. The broken line represents the portion of the sine wave which is blocked by the rectifier. The blocked portion does not reach the feeder coil and during this time the feeder coil is de-energized.

When the coil is energized, the core becomes magnetized and attracts the armature assembly. This pulls the armature, trough mounting bracket and trough down and back towards the core. This pull is against the mid-point of the leaf spring stack, flexing the springs.

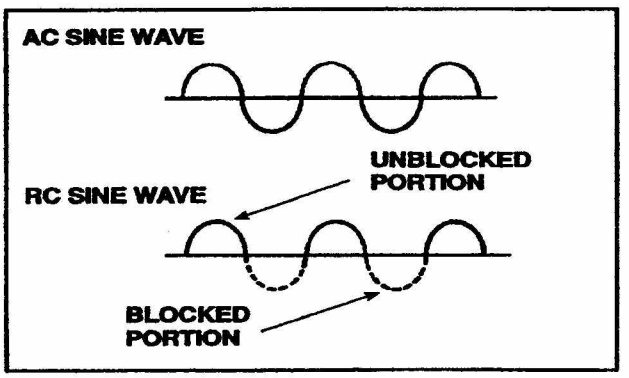


FIGURE 1 – THE RECTIFIED SINE WAVE

The unit is mechanically adjusted to limit the travel of the armature so it does not strike against the face of the core. The space between the armature and core is called the "air gap" and its setting is critical to good feeder operation. Instructions concerning the air gap are on page 6.

The magnetic pull between the armature and core exists during the time and current is passing through the unblocked, or power, half cycle.

Each power half cycle is followed by a half cycle of blocked current flow. During this half cycle, power is not available to the coil and the coil becomes de-energized. With the coil de-energized, the magnetic pull between the core and armature is released and the leaf spring system is permitted to spring back to (and slightly through) its normal position. This pulls the trough, bracket and armature assembly up and forward.

On the next power half cycle, the trough, trough mounting bracket and armature are again pulled down and back. On the next no power half cycle, the trough, trough mounting bracket and armature assembly are again pulled up and forward. Thus, during operation, the trough is continually vibrating along a straight line path.

The following explanation will provide a general description of material flow and how it is achieved by the vibrating stroke of the trough.

Figure 2 illustrates the action of a single particle of the material moving along the trough surface. During a vibration 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 surface 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. Each cycle imparts a forward and upward motion of the material and it lands further along the trough toward the discharge.

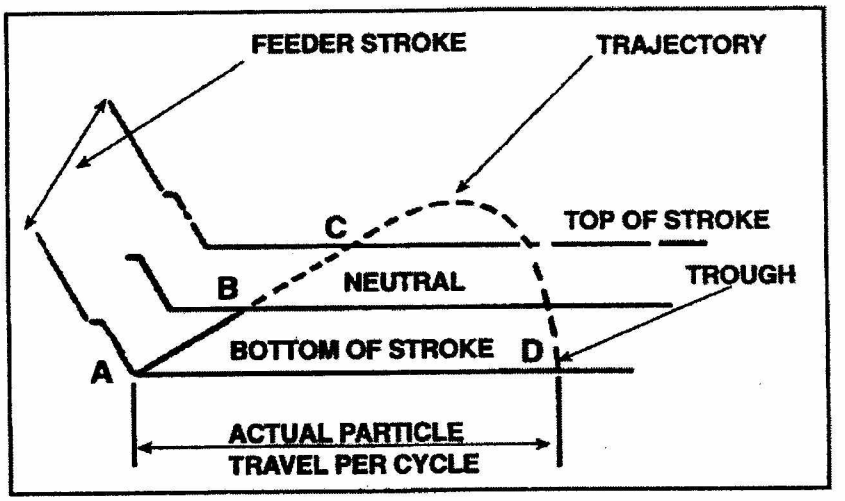


FIGURE 2 - MATERIAL FLOW ON TROUGH

The rate of feed is controlled by the intensity of the magnetic pull which is varied by the controller.

LONG TERM STORAGE

When received, the equipment should be carefully uncrated. If the feeder assembly is shipped mounted on skids, the skids should remain attached to the feeder until installation.

Give the equipment a thorough visual inspection to reveal any damage that may occurred during shipment. If damage is found, contact FMC and the shipping carrier at once.

⚠ CAUTION: Do not support the weight of the unit by the trough assembly. This will distort and damage the springs.

When storing the controller, plug all openings in the control box to prevent dirt, rodents and insects from entering. FMC advises placing a corrosion preventive inside control box. Cover the controller and place it in an area protected from extreme heat. Do not drop controller. The force of the impact may damage the components.

INSTALLATION

⚠ CAUTION: Do not lift the unit by the trough.

When received, the feeder and controller should be carefully unpacked. All packing bands, paper, etc., must be removed. Check the controller components for protective shipping blocks, tape etc.

Inspect all the equipment received and report any damage which may have occurred during shipment. If damage is found, notify the shipping carrier and FMC's Material Handling Equipment Division.

NOTE: When installing the feeder, consideration must be given to the area of support. Some of the heavier Model "BF" feeders can weigh over 65 pounds and a support must be selected that will safely carry the full weight of the unit under loaded operating conditions.

Most Model "BF" Feeders can be furnished with a choice of mounting feet:
(1) Standard rubber
(2) * Rubber foot with 1/4"-20 mounting stud
(3) * Rubber foot with 1/4"-20 tapped hole
(4) * Meatal enclosed foot with four 1/8" diameter mounting holes (available only with Model BF-T0)

* These mounting feet are designed for bolting the unit directly to the mounting structure.

⚠

CAUTION: The feeder must not come in contact with any rigid object or adjacent surface that could hamper its vibrating action, A 1" (25 mm) clearance must be maintained. Any connections (such as dust seals) between the trough and adjacent objects must be flexible, preferably cloth or rubber.

The separate controller assembly should be installed as close to the feeder as possible. Installation on a wall in a clean dry location, free from excessive vibration is recommended.

WARNING: The electrical power supply connection to the FMC supplied controller must be made through a customer supplied safety disconnect switch which must be mounted next to the controller. If possible, install the controller at a location where it will receive adequate ventilation. This will insure prolonged component life.

CAUTION: The conductor between the feeder and controller must be of a size sufficient to carry the current and voltage as stamped on the equipment name plate.

WARNING: Be certain the equipment is properly grounded

With the feeder and controller properly installed and all wiring completed, the equipment is ready for operation.

OPERATION

CAUTION: Unauthorized modification of the feeder or use of unauthorized replacement parts may damage the feeder.

FMC will not assume responsibility for feeder performance as a result of any unauthorized alterations to the equipment. Consult FMC's Material Handling Equipment Operation before modifying your feeder.

WARNING: Before operating feeder make sure controller is closed and secured.

Before starting the equipment, rotate the control knob on the controller to a low counterclockwise position. Turn the switch to its "ON" position and the feeder will begin operating at a low rate of feed. While the feeder is running at this reduced rate, check all external bolts on the feeder assembly for tightness.

CAUTION: When operating normally, the feeder should perform with a smooth even stroke. If a loud "striking" noise occurs, immediately turn off the unit.

Striking is the result of the faces of the core and armature making contact. Striking can result in serious damage to the unit! Refer to the Air Gap section on page 6 for correcting striking condition.

With the feeder operating satisfactorily, load the trough with the material to be conveyed and adjust the control knob to the desired output. Clockwise rotation will increase the feed rate. The material will flow along the trough surface in a smooth controlled rate of feed toward the discharge end of the trough.

MAINTENANCE

WARNING: Before performing any maintenance work, the electrical power supply must be disconnected at the safety disconnect switch.

Some materials, due to their nature, adhere to the trough surfaces. These deposits increase dead weight to the feeder pan, and if permitted to build-up excessively, will alter the natural frequency (tuning) of the feeder. Material build-up on the trough should be removed as a daily practice. Look for material build-up at the rear of the feeder trough, particularly around and under hopper openings. Wet or sticky material build-up can be prevented by using factory installed electrically heated liner plates.

A clean, dry compressed air supply is recommended for general cleaning of these units. Water is not recommended.

WARNING: Never oil the spring assembly. This destroys the clamping effect of the spring pads against one another.

In the event repairs are necessary, take immediate action to avoid possible injury to personnel and damage to the feeder parts from faulty operation. When ordering replacement parts, include all information given on the nameplate.

CAUTION: Any signs of excessive heat or burned components is an indication of trouble. At first notice of an overheating condition, immediately investigate and correct the cause. This could eliminate a potential major component failure. Feeder coils, under normal operating conditions, run warm but never too hot to touch.

TROUBLE SHOOTING

PROBLEM	CAUSE	CORRECTION
Feeder operates too slow	Line voltage below designated rating	Increase line voltage as designated on the name plate
	Unit in contact with rigid object or surface	Isolate unit
	Spring action may be hampered	Clean spring assemblies
	Defective leaf springs	*Replace
	Worn or cracked trough	*Replace
Feeder operates too fast	Line voltage above designated rating. High voltage will cause a "striking" condition.	Reduce line voltage as designated on the nameplate
Unit hums, will not vibrate	Defective SCR within controller (refer to controller instructions)	*Replace

Unit fails to operate	No power to controller	Check for broken or grounded lines
	Defective switch or fuse	*Replace
	Defective SCR within controller (refer to controller instructions)	*Replace
	Feeder coil burned out or grounded	*Replace burned out coil, Repair grounded coil
	Short circuit in wiring	Repair
	Open winding on rheostat	*Replace

* Replace parts only with those supplied or recommended by FMC

SPRING REPLACEMENT

Replacement springs must be of the same size and thickness as those removed. FMC recommends replacing all springs rather than just one.

Before replacing springs, disconnect the feeder from the power supply. Work on one spring assembly at a time (first the rear spring stack). Make a note of the location and arrangement of each spring, spacer and clamp. Remove the bolts which secures the leaf springs to the base, then the bolts which hold the springs to the trough mounting bracket.

Install the new spring assembly in reverse order of that removed. Replace cap screws and torque as specified in the separate instructions pertaining to specific Model "BF" Feeders.

AIR GAP

The air gap is the spacing that exists between the face of the armature and core assemblies. Proper adjustment of this space is extremely important for good feeder operation.

If the air gap is adjusted so the armature and core are too close, the faces of these items will make contact during feeder operation. This is called "striking".

⚠ CAUTION: If a loud striking noise occurs, immediately turn the unit off.

When operating normally, the feeder should perform with a smooth even stroke.

If the air gap is adjusted so the armature and core are too far apart, the feeder current may climb to a dangerous level. A high current condition will result in coil burn-out, failure of control components or a reduced material feed.

The air gap is properly set at the factory, re-adjustment should rarely be required. However, if high voltage is applied to the feeder or if the air gap has been altered due to improper handling during shipment or installation, an adjustment may be in order.

Adjustment Procedure for BF-01 and BF-2:

(Refer to the illustration in separate manual.)

Locate the air gap adjusting screw at the front of the feeder base. With the feeder running empty, set the control knob at maximum feed rate (extreme clockwise position).

If armature and core are "striking", rotate cap screw in a CLOCKWISE direction to increase the air gap spacing.

Adjustment Procedure for BF-T0 and BF-T01:

Locate the air gap adjustment screw (slotted core) at the rear of the feeder base. The core is locked in position with the locknut.

With the feeder running empty, set the control knob at maximum feed rate (extreme clockwise position). Loosen the locknut and rotate the core in a CLOCKWISE direction to decrease the air gap or COUNTERCLOCKWISE to increase the air spacing. The limit of movements being established just before the armature and core "strike" under full load condition.

Securely tighten the locknut.

If the feeder lacks power at 100% control setting, or draws excessive current, rotate screw in a COUNTERCLOCKWISE direction to decrease air gap spacing. The limit of movements being established just before armature and core "strike" under full load condition.

NOTE: The air gap adjustment is a very delicate procedure and may require a little time to properly obtain the desired setting. The correct air gap spacing will be obtained when the armature and core faces are as close as possible without "striking" when maximum current is applied to the feeder magnet.

⚠ CAUTION: If the air gap adjusting screw is rotated to an extreme position, the tension disc springs may be relieved of any pressure. This will be evident as a "jingling" sound caused by the disc springs vibrating against one another. Adjusting screws should never be rotated to this extreme!

CHECKING FEEDER CURRENT

When checking feeder current with a tong meter, the meter reading must always be multiplied by a value of 1.7. A tong meter does not reveal the same current as designated on the name plate due to the wave form characteristics of the feeder, when operating. Therefore, the 1.7 multiplier must be used.

STROKE GAUGE

Feeder stroke is the distance the trough travels in one complete cycle of vibration. This is measured from the forward upward limit of the vibrating stroke to the downward backward limit of the vibrating stroke.

This stroke can be read from the stroke gauge to the feeder trough. Under vibration, a black "V" will appear on the gauge. The stroke of the unit can be read at the apex of this black "V". The lines should appear solid black. Refer to Figure 3 (page 8).

FMC Technologies
Material Handling Solutions

FMC Technologies, Inc.
Homer City, Pennsylvania 15748
Phone (724) 479-4500 / (800) 362-8999
After hour assistance (877) 438-1534
Fax: (724) 479-3400
Email: fmcsyntron.info@fmcti.com
www.fmcsyntron.com

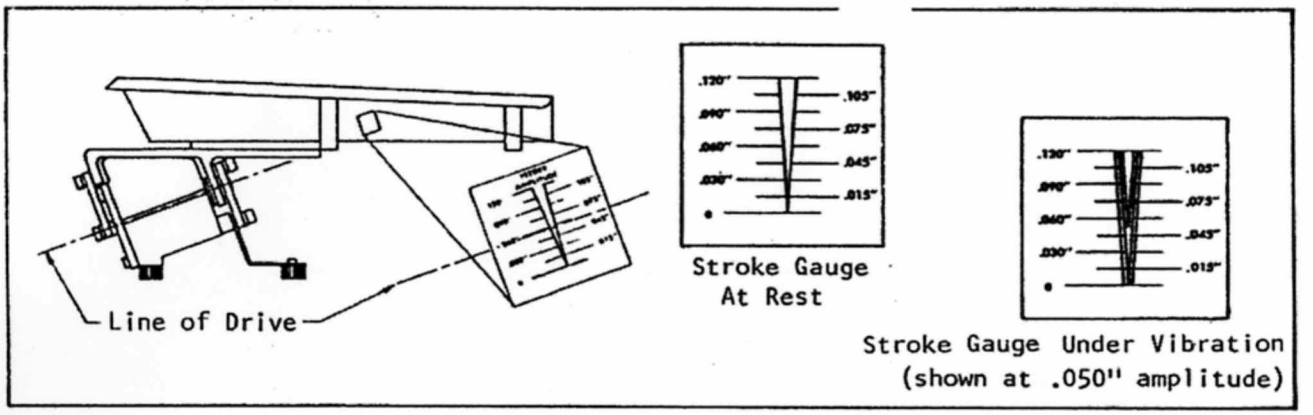


FIGURE 3 – STROKE GAUGE

FEEDER MODEL	OPERATING AMPLITUDE RANGE
BF-T0	.045" - .050"
BF-T01	.045" - .050"
BF-01	.055" - .060"
BF-2	.055" - .060"

TABLE 1 – OPERATING AMPLITUDE

Syntron®
BF-2-A/BF-2-AS
Electromagnetic Vibratory Feeder

◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆SPECIFICATIONS◆◆◆PARTS LIST

Thank you for buying your equipment from FMC Technologies. This manual will help you to understand how your equipment operates and what is required to maintain peak performance. Please read it thoroughly and keep it on file for reference.

Your satisfaction is important to us, so please direct any comments to our Marketing Communications Department.

CHECKING THE CURRENT

When using an analog clamp on meter to read the current of the feeder, the meter reading must always be multiplied by a value of 1.7 due to the wave characteristics of the feeder when operating. When using a true RMS meter, the current is as indicated. All current readings must be taken at the control.

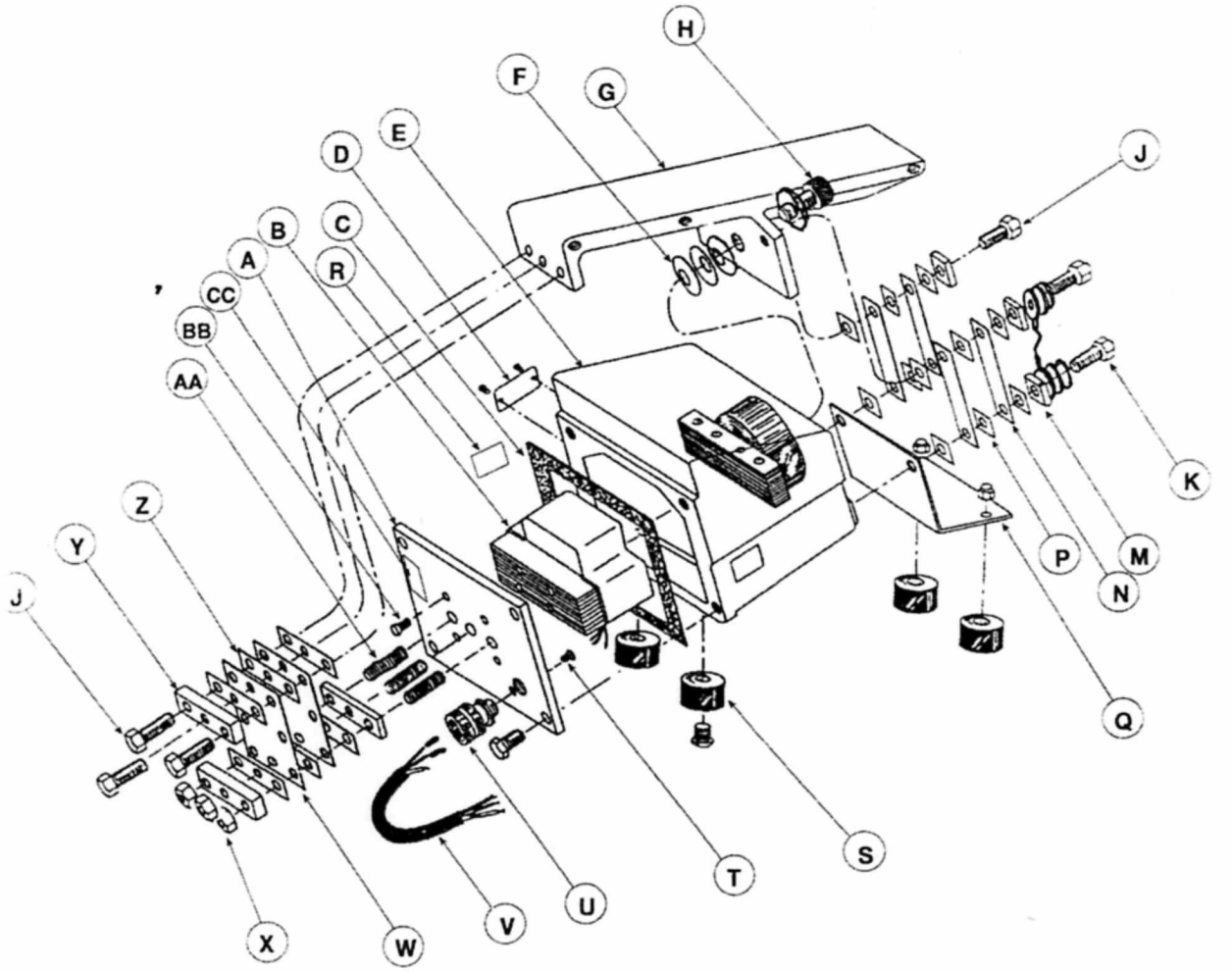
OPERATING SPECIFICATIONS

Maximum Trough Weight:	20 lbs (9 kg)
Minimum Trough Weight:	12 lbs (5.44 kg)
Trough Stroke Range:	15 – 20 lb trough- .055 to .060 inches (1.4 to 1.5 mm) 12 – 14 lb trough- .070 inches (1.78mm)
Minimum Natural Frequency:	3900 Vpm (60 Hz) 3250 Vpm (50 Hz)
* Maximum Current Rating: (Nameplate)	4.0 Amps (115V/50/60 Hz) 2.0 Amps (230V/50/60 Hz) 1.0 Amps (460V/50/60 Hz)

*Refer to the instructions above.

TORQUE SPECIFICATIONS

ITEM	DRY	LUBRICATED
A,J,K,X	350 in-lb (39.6 Nm)	260 in-lb (29 Nm)
BB	300 in-lb (33.9Nm)	225 in-lb (25.4 Nm)



PARTS LIST –BF-2-A & BF-2-AS ELECTROMAGNETIC FEEDERS

ITEM	DESCRIPTION	PART NO	QTY
A	Back Plate	B-152538	1
	Cap Screw, Hex Hd., Ni. Pl. (3/8"-16 x 1")	H0310222]	4
	Cap Screw, Hex Hd., S.S. (3/8"-16 x 1")	H0310203]	Only
B	Magnet Assembly (115V/60 Hz)	D-160176-A]	
	Magnet Assembly (230V/60 Hz)	D-160176-B]	
	Magnet Assembly (460V/60 Hz)	D-160176-C]	1
	Magnet Assembly (115V/50 Hz)	D-160176-D]	Only
	Magnet Assembly (230V/50 Hz)	D-160176-E]	
	Magnet Assembly (460V/50 Hz)	D-160176-F]	
C	Gasket	A-122625	1
D	* Nameplate	A-62245	1
E	Armature & Base Assembly	B-115905	1
F	Disc Spring	0013X125	3
G	Trough Mounting Bracket	C-115873-A	1
H	Air Gap Adjustment Screw	H0404410]	1
	Air Gap Adjustment Screw	H0431202]	Only
	Plain Washer Ni. Pl. (1/2")	H0117356]	1
	Plain Washer S.S. (1/2")	H0117207]	Only

PARTS LISTS (cont'd)

ITEM	DESCRIPTION		PART NO	QTY
J	Cap Screw, Hex Hd., Ni. Pl. (3/8"-16 x 1 1/2")	60 Hz	H0310622]	7
	Cap screw Hex Hd., S.S. (3/8"-16 x 1 1/2")	60 Hz	H0340926]	Only
	Cap Screw Hex Hd., Ni. Pl. (3/8"-16 x 1 1/2")	50 Hz	H0310622]	3
	Cap Screw Hex Hd., S.S. (3/8"-16 x 1 1/2")	50 Hz	H0340926]	Only
K	Cap Screw Hex Hd.,Ni. Pl. (3/8"-16 x 1 1/4")	50 Hz	H0310322]	4
	Cap Screw Hex Hd., S.S. (3/8"-16 x 1 1/4")	50 Hz	H0340826]	Only
M	Front Spring Clamp, Ni. Pl.		A-115888]	4
	Front Spring Clamp, S.S.		B-224637-001]	Only
N	Front Spring	60 Hz	A-115884-C01	8
	Front Spring	60 Hz	A-115884-B01]	If
	Front Spring	60 Hz	A-115884-A01]	Req'd.
	Front Spring	50 Hz	A-115884-C01	4
	Front Spring	50 Hz	A-115884-B01]	If
	Front Spring	50 Hz	A-195884-A01]	Req'd.
P	Front Spring Spacer	60 Hz	A-115887	20
	Front Spring Spacer	50 Hz	A-115887	12
Q	Foot Mounting Bracket		A-115875	1
R	* Label (Adjustment)		A-195774	1
S	Rubber Foot		0207X038]	4
	Rubber Foot (Double Stud)		0207X035]	Only
	Rubber Foot (Sandwich Type)		0207X039]	
	Acorn Nut Chr. Pl. (1/4"-20)		H0101607]	2
	Acorn Nut S.S. (1/4"-20)		H0110502]	Only
	Lock Washer, Nl. Pl. (1/4")		H0112858]	2
	Lock Washer, S.S. (1/4")		H0112802]	Only
T	Mach. Screw, Rd. Hd., Br. (#10-32 x 3/8")		H0203102	1
	Lock Washer, Ni. Pl. (#10)		H0112458]	1
	Lock Washer, S.S. (1/4")		H0112402]	Only
U	Cable Grip (115/230V Units Only)		0102X001]	1
	Cable Grip (460V Units Only)		0102X010]	Only
V	Cable Assembly (115/230V Units Only)		C-160136-C]	1
	Cable Assembly (460V Units Only)		C-160136-M]	Only
	Butt Connector (115/230V Units Only)		0202X003]	2
	Butt Connector (460V Units Only)		0202X005]	Only
W	Rear Spring		A-66201-A01	1
	Rear Spring		A-66201-B01	2
	Rear Spring		A-66201-C01	If Req'd.
X	Hex Nut, Ni. Pl. (3/8"-16)		H0103059]	3
	Hex Nut, S.S. (3/8"-16)		H0111580]	Only
Y	Rear Spring Seat & Clamp Bar, Ni. Pl.		A-115885]	3
	Rear Spring Seat & Clamp Bar, S.S.		B-224636-001]	Only
Z	Rear Spring Spacer		A-115886	8
AA	Stud, Ni. Pl.		A-115938]	3
	Stud, S.S.		B-224635-001]	Only
BB	Cap Screw, Fl. Hd., Ni.Pl. (5/16"-18 x 5/8")		H0435511]	4
	Cap Screw, Hex Hd., S.S. (5/16"-18 x 5/8")		H0431311]	Only
	Sealant		0185X053	As Req'd.
CC	* Label (Caution)		A-125694	1

* Do not remove or paint over safety labels or the nameplate. If safety labels need replaced, contact FMC Technologies for an additional supply free of charge.