.MI , d/b/a
RO SPRAYER SYSTEMS

E – 500

POWDER DELIVERY SYSTEM

MANUAL

MODEL_____

SERIAL NUMBER_____

TUBE SIZE_____

PRESS TYPE_____

DATE INSTALLED_____

901 GREENLEAF AVENUE, ELK GROVE VILLAGE, ILLINOIS 60007, USA
TELEPHONE: 847/439-9292 FAX: 847/439-9324

TERMS AND CONDITIONS

This invoice is subject to the following terms and conditions as well as those appearing on the reverse side hereof:

1. CONDITIONS OF SALE: All orders for Electro Sprayer Systems, Inc. ("ESS") equipment or services shall be subject to these conditions of sale. No modified or other conditions will be recognized by ESS unless specifically agreed to in writing by an authorized officer of ESS. The failure of ESS to object to provisions contained in any order or other communication from a Purchaser shall not be construed as a waiver of these conditions nor as an acceptance of any such provisions.

2. TERMS OF SALE: The price(s) of the goods, their quantity(ies) and shipment date(s) are shown on the reverse side hereof.

If, in the opinion of ESS, the financial condition of the Purchaser at any time does not justify the continuance of production or shipment on the terms of payment specified, ESS may require full or partial payment in advance.

3. ERRORS: All stenographic and clerical errors of ESS are subject to correction by ESS.

4. TRANSPORTATION: Unless otherwise indicated in writing, ESS's equipment is sold F.O.B. point of shipment. Transportation to the destination is the responsibility of the Purchaser (and shall be pre-paid or collected as ESS shall determine in its sole discretion).

Unless specific instructions are given by the Purchaser and specifically accepted by ESS, ESS will (1) select the method and route of shipment, and (2) forward shipment collect or ship prepaid and invoice the Purchaser for transportation charges (all as determined in the sole discretion of ESS).

5. DELIVERY: ESS will make every reasonable effort to make shipments in accordance with the Purchaser's requirements to the extent that they are specifically agreed to in writing by ESS; provided, however, that ESS will not pay or be liable for any penalty, either liquidated or otherwise, for late delivery or installation.

6. PENALTY CLAUSES: No penalty clause of any description in any specific order will be effective, unless specifically approved in writing by a principal officer of ESS.

7. CANCELLATION OR CHANGES: Any order or contract may be cancelled or exchanged by the Purchaser only upon payment of reasonable charges based upon expenses already incurred and commitments already made by ESS and a reasonable profit factor.

8. PATENTS: ESS's liability for patent infringement is limited to those instances where the charge of infringement or the suit or proceedings brought against the Purchaser is based on a claim that the equipment furnished hereunder by ESS in accordance with ESS's design constitute an infringement of a patent of the United States. ESS's foregoing liability is contingent on ESS being notified promptly of all such notices of infringement and efforts involved in defending or settling such suits or proceedings, and the foregoing is also contingent on the Purchaser's full cooperation with ESS (but without unreasonable expense to Purchaser) in furnishing the relevant evidence that may be useful to the defense where such evidence is reasonably available to Purchaser. The Purchaser shall be solely responsible for suits, claims or proceedings based on application or use of ESS's equipment or based on equipment built by ESS according to the Purchaser's designs.

9. SUBSTITUTE MATERIAL: ESS shall have the right to furnish suitable substitutes for materials which cannot be obtained because of priorities or regulations established by any Federal, state or other governmental authority or because of non-availability of materials from suppliers.

10. FORCE MAJEURE: ESS shall not be liable for delay due to causes beyond its reasonable control, such as, but not limited to, Acts of God, acts of the Purchaser, fire, strikes, floods, epidemics, quarantine restrictions, war, insurrection or riots, civil or military authority, priorities, preferences given to orders of or requisitions by the U.S. Government or any instrumentality thereof or for the National Defense, freight embargoes, car shortages, wrecks or delays in transportation, unusually severe weather or inability to obtain necessary labor, materials or manufacturing facilities due to such causes.

11. DAMAGE CLAIMS: ESS takes great care in packing its equipment, and it cannot be held responsible for breakage or damage in transit after having received "in good order" receipts from the transportation companies. ESS's responsibility ceases when it has made delivery to the carrier and has received its signed bill of lading, at which time title to the merchandise shipped passes to the Purchaser. Claims for all shortages, damage, breakage or delays must be made to the carrier by the Purchaser. In cases of concealed damage, it is essential that such damage be reported to the delivery carrier within a period of one week or less following receipt of the equipment and that a concealed damage report be obtained from the carrier.

12. WARRANTY: ESS warrants all of its equipment (except for the glass discharge tubes and coater roll coverings) against defects in materials and workmanship which are not commercially acceptable and against defects in title for a period of one year from the date of shipment. ESS's obligation under this warranty is limited solely to repairing or replacing its equipment F.O.B. its factory when a unit of equipment has been returned to ESS and has proved by ESS's examination to be defective.

THIS LIMITED WARRANTY DOES NOT COVER ANY LOSSES, DAMAGE, EXPENSE OR LIABILITY RESULTING FROM SHIPMENT TO OR FROM THE CUSTOMER, DELAY IN SUPPLYING EQUIPMENT TO THE PURCHASER, IMPROPER INSTALLATION, ENVIRONMENT, ABUSE, OR ANY MODIFICATIONS, ADJUSTMENTS OR REPAIR BY OTHER THAN ESS AUTHORIZED PERSONNEL.

THIS WARRANTY AND ALL OTHER WARRANTIES STATED ON THE FACE HEREOF ARE EXCLUSIVE AND ARE IN LIEU OF ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR PURPOSES OF OTHER WARRANTIES, AFFIRMATIONS OF FACT OR PROMISES WITH REFERENCE TO THE EQUIPMENT OR THEIR QUALITY, WHETHER EXPRESSED OR IMPLIED, AND ALL OTHER WARRANTIES, AFFIRMATIONS OF FACT OR PROMISES SHALL BE DEEMED TO BE WAIVED

IN NO EVENT SHALL ESS BE LIABLE FOR LOST PROFITS, LOST GOOD WILL OR ANY OTHER INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES.

ANY CLAIM ON ACCOUNT OF ESS'S FAILURE TO COMPLY WITH THE AFOREGOING WARRANTIES SHALL CONCLUSIVELY BE DEEMED WAIVED BY PURCHASER UNLESS WRITTEN NOTICE THEREOF IS GIVEN TO ESS WITHIN 365 DAYS AFTER DATE OF SHIPMENT.

13. RESPONSIBILITY: ESS is not responsible for damage to its equipment because of misapplication or improper handling, storage or installation of the equipment, any modifications or repairs by other than authorized ESS personnel, impairment of the function of the equipment or damage due to wear and tear.

ESS agrees to replace defective parts at no charge during the warranty period, subject to the following:

14. RETURNING EQUIPMENT: Purchaser is entitled to a thirty (30) day trial period of the equipment, which may be returned at any time within the thirty days for credit as follows:

A. 20% of the list price will be charged for restocking, plus freight charges both ways and installation charges, all of which are not refundable.

B. Repairs necessary due to damage to the equipment caused by insufficient packing or rough handling will be billed at time and material rates.

C. In no case is equipment to be returned without first obtaining ESS's approved RMA Form and return instructions.

D. Equipment built to order is not subject to return for credit under any circumstances.

E. Any equipment returned and not authorized will remain the property of the purchaser, and ESS will not be liable for its loss by fire, theft or damage.

F. Equipment must be securely packed to reach ESS without damage. Any cost incurred by ESS to put the equipment in first class condition will be charged to the Purchaser.

G. ESS is not responsible to provide a serviceman to replace or repair parts on the Purchaser's premises. Servicemen will be available to make repairs at Purchaser's expense during the warranty period. Purchaser shall be responsible to pay for each serviceman's time, travel and sustenance.

15. GOVERNMENT REGULATIONS: If the equipment is, or hereafter becomes subject to, governmental control, allocation, regulation or restriction, the necessary and proper preferences rating certificate or certificates shall be supplied by the Purchaser.

16. PACKING: Prices include ESS's standard packing for domestic shipments. Additional packing expenses for export or special packing to meeting the Purchaser's specifications will be paid by the Purchaser.

17. SPECIAL INSPECTION AND TESTING: Unless specifically included in ESS's quotation, orders requiring special inspection and testing are subject to price adjustment to reflect the increased cost of these services.

18. JIGS, DIES, AND TOOLS: Regardless of any charges made for special jigs, dies or tools, such items shall remain the property of ESS unless otherwise specifically agreed. They may be disposed of when, in ESS's opinion, they have become obsolete.

19. LIMITATION ON ACTIONS: Any cause of action for any alleged breach by ESS of the contract between the parties shall be barred unless commenced by Purchaser within one year of the accrual of such cause of action.

20. NOTICES: Any notice or other communication under or in respect to this contract shall be sufficiently given and shall be deemed given when delivered or mailed by registered or certified mail, postage prepaid, or sent by telegram, addressed to Purchaser or ESS, as the case may be, at the respective address thereof specified herein, or made by telephone, telex or telecopy, provided such communication is confirmed in writing within twenty (20) days thereof by actual personal delivery. Each party hereto may designate in a written notice to the other party hereof any further or different addresses to which subsequent notices and other communications shall be sent.

21. ACCEPTANCE: Purchaser's acceptance of any equipment or services hereunder (or any payments by Purchaser hereunder) shall constitute Purchaser's acceptance hereof.

22. GOVERNING LAW; INTERPRETATION: This document shall be construed, interpreted and enforced in accordance with the laws of the State of Illinois, United States of America. Application of the United Nations Convention of Contracts for the International Sale of Goods is specifically excluded from this agreement. Any reference to this agreement shall be deemed to include a reference to the Exhibits (if any) hereto which are signed by the Purchaser, and all of such Exhibits (if any) are hereby made a part hereof. The terms "hereof," "hereto," "herein" and "this invoice" shall be deemed to refer to this instrument as a whole and not to any particular portion hereof. Section headings and titles used herein are for the convenience of reference and shall not be deemed to alter, control or limit the meaning of the language contained in any such section or any portion hereof. Any right, remedy or power of ESS provided herein is cumulative and not exclusive of any other right, remedy or power of ESS contained herein or otherwise provided for, and no single or partial exercise of same shall preclude any other or further exercise thereof or the exercise of any other right, remedy or power of ESS.

23. RESOLVING DISPUTES: Any controversy or claim arising out of or relating to this agreement or the breach thereof shall be settled by arbitration to be conducted in the City of Chicago, State of Illinois, United States of America. The arbitrator shall be appointed by, and such arbitration shall be conducted in accordance with, the then existing rules and procedures of the American Arbitration Association in Chicago. The arbitrator's decision shall be final. Litigation shall be restricted solely to the enforcement of the arbitration award so made, but with respect to such litigation, Purchaser hereby consents to the jurisdiction of Courts of the State of Illinois and the United States District Courts located in such State, and (unless its above-mentioned address is within the State of Illinois, and Purchaser remains in such state at such address) Purchaser hereby designates and constitutes C T Corporation System as its Attorney-in-Fact for the purpose of accepting service of process upon Purchaser incident to any litigation to enforce any such award.

ELECTRO SPRAYER SYSTEMS

Installation Policy

Effective: June 15, 1999

Electro Sprayer Systems will make mechanical installation of its products following the procedures listed below:

1) All work to be scheduled with the ESS Service Department in advance.

2) ESS personnel perform ONLY the mechanical installation of the supplied components.

3) It is the purchasers responsibility to provide and install any additional air source not included with the actual ESS equipment ordered, at time of installation.

4) It is the purchasers responsibility to provide the required electrical interconnection in accord with your local electrical codes and to supply an electrician and related electrical supplies for this purpose, at time of installation.

5) Without this electrical interconnect your ESS product can not be tested under operating conditions, and your personnel cannot be trained as to its proper use.

6) THE PRESS MUST BE IN A FULL OPERATIONAL STATE WITH GRIPPER BARS IN THE PRESS DELIVERY, SO THAT A RECALL WILL BE PREVENTED WHEN SUCH CONDITIONS EXIST.

Delays in an installation or callbacks resulting from a lack of electrical power, air source or from the presence of a non-operational press as described in (5) five above, will result in additional billing to the customer, to cover additional labor and expenses.

1090 FARGO AVENUE, ELK GROVE VILLAGE, ILLINOIS 60007, USA
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E-500 Powder Delivery System

ILLUSTRATIONS

GENERAL

The SYSTEM E 500 is a microprocessor controlled powder delivery system. The System consists of a main unit with associated devices and a remote control panel. The panel provides complete control of the System and displays the selected operating mode and system status at a convenient location selected by the user.

The devices associated with the main unit include an air line dryer, a compressor, a high voltage transformer, and a spray bar with static tube.

The powder feed rate is set at the remote panel and is maintained by electronic regulation of the feed motor speed.

Controls are provided to allow operation from the main unit.

See Figure 1 for an overall view of the System Components.

SYSTEM FEATURES

A) Remote Control Panel With Visual System Status Display

B) Microprocessor control of powder feed rate from 0 to 100%.

C) Manual Mode allows the user to select a feed rate which is constant for all press speeds.

D) Auto Mode allows the feed rate to vary with the press speed (pre-programmed setting or user selected settings).

E) Powder supply level is sensed and reported to remote panel. An alarm sounds when powder is low during powder feed.

F) Feed roller motion is sensed and signalled to the remote panel. An alarm sounds when there is no motion.

G) Agitator shaft motion is sensed and signalled to the remote panel. An alarm sounds when there is no motion.

H) Air pressure is sensed and signalled to the remote panel. An alarm sounds when pressure is low during powder feed.

I) Static tube on/off status is sensed and signalled to the remote panel. An alarm sounds if the tube is off during powder feed.

J) The outside spray blocks are remotely controlled on/off when a change of sheet width is required.

K) Powder spray continues for 0-9 seconds after press goes off impression. The time delay can be adjusted by the operator.

L) Manual Purge, immediate purge of powder lines is available while the press is off impression.

M) Automatic purge with user programmed delay is available for use every time the press goes off impression.

N) Variable wiper block allows the user to select Light, Medium or Heavy powder feed rates, with 0 to 100% control of each selection.

O) Test switch (main unit) allows operation without press "on impression."

REMOTE PANEL KEYS - See FIGURE 3

A) ON/OFF Key
Activates panel keys for mode selection after status check and before press is "on impression"

B) MANL/AUTO Key
Selects Manual or Auto mode

C) TEST Key
Provides substitute on/off activity of press impression contacts for system testing

D) ALARM RESET Key
Turns off alarm temporarily for two minutes when low powder is sensed

E) WIDE/NARROW Key
Provides on/off control of the spray bar end blocks

F) PURGE Key
Used to purge (air without powder) powder delivery path for ten seconds when "off impression"

G) AUTO PURGE Key
Provides on/off control of an automatic ten second purge (after user programmed delay) following "On to Off" impression transition

H) DELAY Key
Selects 0 to 9 seconds of continued powder spray after "On to Off" impression transition

I) RESET Key
Activates pre-programmed speed matching settings for Auto Mode

J) ENTER Key
Enters new powder feed percent rates, Wide/Narrow command, or Test command. When in Auto Mode, this Key is used to recall or activate previously selected speed matching settings

K) 0 through 9 Keys
Select powder feed percent rates (0-100%) and/or delay time

L) UP/DOWN Arrow Keys
Increase/decrease powder feed percent rate in 1% increments

NOTE: When using the TEST or WIDE/NARROW Keys, you must press the ENTER Key afterwards in order for the Test or Wide/Narrow function to become effective

STARTUP OF SYSTEM

Use Figure 2A to familiarize yourself with the System before Startup

A) The REMOTE/MAIN Switch must be in the REMOTE Position.

B) The TEST Switch must be in the OFF Position.

C) Turn the Main Disconnect Switch ON (left side of Junction Box).

D) Turn the Control Switch on (left side of Junction Box).

1) The POWER indicator on the Remote Panel will light.

2) The System STATUS is checked automatically - The feed motor, agitator motor, air compressor (or house air solenoid valve), and static tube are all operated for ten seconds and the respective sensors are checked for proper response.

IF PRESS IMPRESSION IS OFF:

The Remote Panel will display

---- READY ----
ON/OFF TO START

1) The operator then presses the ON/OFF Key on the Remote Panel.

a) The Panel will display the same mode which existed when the System was turned off. For Example, the display will read

MANUAL WIDE 10
IMPRESSION OFF

The feed motor, agitator motor, air compressor (or solenoid valve), and static tube will not be turned on until the press is "on impression."

IF PRESS IMPRESSION IS ON:

The Remote Panel will automatically display the mode which existed before the System was turned off. For Example, the display will read

MANUAL WIDE 10
IMPRESSION ON

1) The feed motor, agitator motor, air compressor (or solenoid valve), and static tube will all be turned on.

E) The operator can now choose the desired operating mode.

NOTE: THE AIR LINE DRYER MUST BE ON AT ALL TIMES!!

OPERATING MODES

A) MANUAL (Remote Control)

1) In the Manual mode, you can select the powder rate (%) which will be constant for all press speeds. Operation in this mode is explained below.

   Example: If the Manual Mode was previously used with the end spray blocks "on" and the powder percentage set at 10, the display will read

   MANUAL WIDE 10
   IMPRESSION ON

2) Press the UP or DOWN arrow keys to change the powder percentage.

3) The numeric keypad can also be used to change the powder percentage. The new rate will be displayed (blinking) but will not be effective until the ENTER key is pressed. Example: If this method is used, the display will read

   MANUAL WIDE 10
   "E" sets 22 PCT

   NOTE: Both the ARROW keys and the NUMBER keys can be used to change the powder percentage. However, if you use the NUMBER keys, YOU MUST PRESS THE ENTER KEY in order for the new percentage to become effective. If you press the ARROW keys after pressing the NUMBER keys but before pressing the ENTER key, the percentage rate will change, but will not become effective until you press the ENTER key.

4) If the RESET key is pressed before the ENTER key, the display of the new rate will be cleared.

5) Numeric key entries may be one, two, or three digits depending on the desired rate, up to a maximum of 100%. Leading zeroes will be suppressed.

B) AUTO (Remote Control)

   NOTE: PLEASE READ THIS ENTIRE SECTION BEFORE ATTEMPTING TO USE THE AUTO MODE/SPEED MATCHING FEATURE

   In the AUTO mode, the powder feed rate automatically changes to match the press speed. The System is delivered with the pre-programmed speed matching setting shown in FIGURE 4. You can easily generate a different speed matching setting to suit the needs of a particular job.

Speed matching is achieved by setting powder rates at two different press speeds, one lower setting and one higher setting. The powder rate will then vary in proportion to the press speed. See FIGURE 4 and note that the speed matching functions above and below the press speeds used to enter the powder values.

The operator can use the pre-programmed settings provided with the unit, change both the low and high settings or change either the low/high setting. The System retains the settings most recently selected, which can be adjusted as desired.

Summary of Keys Used in AUTO Mode

MANL/AUTO	-	alternates between Manual and Auto Modes
E	-	selects previous user settings
R	-	selects pre-programmed settings
1	-	selects new powder percent rate for lower speed setting
2	-	selects new powder percent rate for higher speed setting

HELPFUL HINTS

1) The desired powder percent feed rates are always chosen while in the MANUAL Mode, and then locked in when the operator switches to AUTO Mode.

2) The higher setting may be entered first.

3) The pre-programmed settings and the last user settings are stored in the system and can be recalled after a period of manual operation or System Power Off. However, if the pre-programmed settings are used, the last user settings will be erased from the System's memory.

4) The pre-programmed settings or previous user settings can be selected at any press speed.

5) Pressing Keys #1 and #2 will replace whatever powder settings were previously in effect.

6) If press impression is OFF, the low and high settings cannot be changed. You can only choose the pre-programmed or previously selected user settings.

7) If no action is taken after 7 seconds while in the AUTO mode, the System automatically reverts back to the MANUAL mode.

Operation of the AUTO MODE/SPEED MATCHING FEATURE is as follows:

TO CHANGE BOTH LOW AND HIGH SPEED MATCHING SETTINGS

1) Make sure the unit is ON and in the MANUAL Mode.

2) Run the press at the desired lower speed (low end of operating speed range).

3) Key in the desired powder percent rate and press ENTER.

4) Press the MANL/AUTO Key. Display will read

E or R or 1 or 2

5) Press Key #1 to lock in the desired powder percent rate for the lower press speed.

6) Increase the press speed to the desired higher speed.

7) Press the MANL/AUTO Key to return to MANUAL Mode.

8) Key in the desired powder percent rate and press ENTER.

9) Press the MANL/AUTO Key. Display will read

E or R or 1 or 2

10) Press Key #2 to lock in the desired powder percent rate for the higher press speed.

TO CHANGE ONLY THE LOWER SPEED MATCHING SETTING

1) Make sure the unit is ON and in the MANUAL Mode.

2) Run the press at the desired lower speed (low end of operating speed range).

3) Key in the desired powder percent rate and press ENTER.

4) Press the MANL/AUTO Key. Display will read

E or R or 1 or 2

5) Press Key #1 to lock in the desired powder percent rate for the lower press speed.

6) The speed matching feature will now operate using the NEW lower setting and the previously chosen higher setting.

TO CHANGE ONLY THE HIGHER SPEED MATCHING SETTING

1) Make sure the unit is ON and in the MANUAL Mode.

2) Run the press at the desired higher speed.

3) Key in the desired powder percent rate and press ENTER.

4) Press the MANL/AUTO Key. Display will read

E or R or 1 or 2

5) Press Key #2 to lock in the desired powder percent rate for the higher press speed.

6) The speed matching feature will now operate using the NEW higher setting and the previously chosen lower setting.

TO USE THE PRE-PROGRAMMED SPEED MATCHING SETTINGS

1) Press the MANL/AUTO Key for AUTO Mode. Display will read

E or R or 1 or 2

2) Press Key R to use the pre-programmed settings.

3) NOTE: The pre-programmed settings can be selected at any press speed.

TO USE PREVIOUSLY CHOSEN SPEED MATCHING SETTINGS

1) Press the MANL/AUTO Key for AUTO Mode. Display will read

E or R or 1 or 2

2) Press Key E to use the low and high settings previously selected.

3) NOTE: The user settings previously chosen can be selected at any press speed.

SEE FIGURE 4 FOR EXAMPLES OF SPEED MATCHING SETTINGS

C) MAIN CONTROL MODE

This mode will provide emergency operation if the normal remote control is inoperable. The press impression contacts will still control the system operation. However, the various sensors will not provide system status information. The controls, which are accessible through the main cover door, function as follows:

1) The MAIN Control is turned on by moving the toggle switch handle toward MAIN. (See FIGURE 2)

2) The Powder feed rate is set with the dial numbered 0 to 10.

The dial numbers correspond to the Remote Panel percentages shown below -

Dial Numbers	Remote %
0	1
1	2
2	14
3	23
4	32
5	42
6	55
7	75
8	95
9	97
10	100

3) The TEST Switch acts like the press impression contacts and allows the system to operate for testing. This switch also allows you to position the coupling prior to reinstallaion of the feed block.

NOTE: The TEST Switch or the press impression contacts will turn on the System whether it is in the REMOTE or MAIN mode. Both the TEST Switch and the press impression contacts must be open to stop the System.

Display Messages-

ADD POWDER NOW	-- Powder below sensor level
AIR PRESSURE OK	-- Air Pressure Was Sensed
AUTO	-- Auto Mode
AUTO BAD-GO MANL	-- Speed Sensor Failure, Use Manual Mode
AUTO PURGE OFF	-- No Purge When Impression Goes Off
AUTO PURGE ON	-- Purge AFTER Impression Goes Off (see Delay x 10min =N, below)
AGITATOR OK	-- Agitator Motion Was Sensed
BAD POINTS	-- Bad Data, Re-enter
CAN'T PURGE NOW	-- Impression On, Can't Purge
CAN'T SET POINT	-- Unacceptable Powder Rate vs Press Speed
CHECK AGITATOR	-- Agitator Motion Not Sensed
CHECK FEED MOTOR	-- Feed Motor Motion Not Sensed
CHECK STATIC SYS	-- Static Tube Voltage Not Sensed
DELAY SEC = N	-- Number Of Seconds Of Powder Delivery After "ON To OFF" Impression Transition
DELAY x 10MIN = N	-- Number of 10 minute delays before Auto Purge, after "On To Off" Impression Transition
ENTER = TEST ON	-- Enter Key Required To Activate Test Key
ENTRY ACCEPTED	-- Powder Rate vs Press Speed Acceptable
E OR R	-- Menu For Entry To Auto Mode With Press Off
E OR R OR 1 OR 2	-- Menu For Entry To Auto Mode With Press Running
"E" SETS -- PCT	-- Enter Key Will Set New Powder Rate
"E" = WIDTH CHANGE	-- Enter Key Required To Activate Spray Width Change (Wide/Narrow Function)
ESS	-- Company Logo
FEED MOTOR OK	-- Feed Motor Motion Was Sensed
IMPRESSION OFF	-- Press Off Impression

D) VARIABLE FEED BLOCK

The Variable Feed Block controls the flow of powder to the spray bar. You may select a High, Medium or Low powder setting. Each selection can then be varied through the REMOTE unit or the MAIN unit potentiometer, from the minimum to maximum powder rate. The maximum rate of a selection overlaps the minimum rate of the next higher selection.

DO NOT position the selection lever between the designated H,M or L positions. An in-between position may cause serious problems with the flow of powder through the system.

If disassembly of the feed block become necessary (for inspection, removal of foreign material, etc.), please see the MAINTENANCE Section for the proper procedure.

MAIN CONTROL ENABLED	-- Main Unit Control On, Remote Off
MANUAL	-- Manual Mode
NARR	-- Narrow Spray (Outer Spray Blocks Off)
NO AIR PRESSURE	-- Air Pressure Not Sensed
NOT ABLE TO RUN	-- Status Check Not OK
----READY----	-- System Ready To Operate
ON/OFF TO START	-- Press ON/OFF Key To Select Mode Before "On Impression"
--- PURGING ---	-- System In Purge Mode
STATIC TUBE OK	-- Static Tube "On" Was Sensed
STATUS REPORT	-- Results Of Status Check
SYSTEM E 500	-- System Name
TEST ON	-- Test Key Used To Operate System Without Press Impression "On" Required
TIME EXCEEDED	-- Waited Too Long To Enter Data
USING DEFAULTS	-- Reset Key Used To Enter Pre-programmed Speed Matching Settings
USING PREVIOUS	-- Enter Key Used To Recall Previously Selected Speed Matching Settings
WIDE	-- Wide Spray (All Spray Blocks On)

MAINTENANCE OF YOUR SYSTEM E500

GENERAL INFORMATION

A CLEAN powder supply is VITAL for continual, top performance of your System E500. The System requires regular, periodic inspection of the Split Amplifier portion of the Feed Block Assembly.

Very humid air entering the "makeup" air hole and/or a powder supply exposed to humid air for a long period of time can cause a buildup of powder on components in the split amplifier.

We recommend that, initially, you inspect the components monthly until the buildup rate for your particular unit and operation can be determined. The inspection and cleaning procedure is given below.

It is ESSENTIAL that hard, foreign material be prevented from coming through the powder funnel, or problems will occur which will require you to remove/disassemble the feed block. The procedures for feed block removal, disassembly, inspection, and reassembly are given below.

SPLIT AMPLIFIER INSPECTION -

1) Press the release lever on each Quick Disconnect while sliding the respective air line away from the Split Amplifier. Do this for all air lines.

2) Remove the four (4) screws which will allow you to remove the front half of the Split Amplifier.

3) Examine all parts for powder buildup. Remove any buildup you find without marring the original surface.

4) Reassemble the Amplifier, tighten the four (4) screws, making sure the cone end is on the LEFT.

5) Reconnect all air lines.

FEED BLOCK REMOVAL -

NOTE: **See Figure 2A to familiarize yourself with the Feed Block installed in your System.**

Figure 2A

1) Set the REMOTE/MAIN Switch to the MAIN Position and the POWDER % Dial to a low setting (1 or 2).

2) Press the release lever on each Quick Disconnect while sliding the respective air line away from the Feed Block. Do this for both air lines.

3) Rotate the sensor bracket and slip it over the coupler to separate it from the Feed Block. If your unit has the sensor mounted separately, skip this step.

4) Note how the Feed Block is held by locking supports on the left and right. Hold the Feed Block in one hand. Caution: Prepare for a significant weight when the Feed Block is fully released. With your other hand, push each support slightly down and away from the Feed Block, toward the cabinet walls. When the Feed Block is totally free, move it slightly forward (toward you) so that step 5 can be performed.

5) Discard any and all powder which is piled on and/or in the Feed Block cavity so that any foreign material present is not reinserted into your System.

6) Further disassembly is generally not required at this point, as long as the sprocket can be rotated with only a light to moderate, even drag.

FEED BLOCK DISASSEMBLY -

1) Remove the four (4) screws in the top plate. Remove the plate to expose the variable feed components.

2) Note the relative position of each component.

3) Remove the seal and washer.

4) Use the lever/pin to work the adjusting gear up and off the dowel pin.

5) To remove the aperture gear and wiper block base, turn the Feed Block upside down, the aperature gear and wiper block base should come out of the Feed Block. Blow any loose powder from these components and remove any hard buildup, taking care not to mar the original surfaces.

6) To remove the roller, remove the four (4) screws from the gear side of the plate and slide the assembly out. DO NOT REMOVE THE COUPLER OR GEAR/SPROCKET.

7) The roller may be cleaned with a firm bristle brush or you can use compressed air to clean the Block.

FEED BLOCK REASSEMBLY -

1) Install the roller assembly in the Block, making sure the side plate's top edge will not interfere with the top plate. The roller should turn easily in the Block.

2) Install the wiper block base and position the aperture gear, flat side down, to completely uncover the short slot at 45 degrees in the base.

3) Position the adjusting gear lever in the Medium Position and mesh with the aperture gear. Check the Low and High settings at this time.

4) Install the seal flat face down after lightly dusting it with clean powder.

5) Install the dowel pin washer with the paper side up.

6) Install the top plate, counter-bored side of screw holes up, making sure that the seal is centered so that the inner lip enters the top plate hole evenly. A slight swiveling motion may be necessary to engage the seal properly.

7) Install the four (4) screws, making sure the top plate is aligned evenly with the Block.

FEED BLOCK REINSTALLATION -

NOTE: See Figure 2A to familiarize yourself with the Feed Block mounting installed in your System.

1) Make sure the REMOTE/MAIN Switch is in the MAIN Position, and the Powder % Dial is on a low setting (1 or 2). Use the TEST Switch to position the motor shaft so that the bar on the drive side of the coupler is horizontal.

2) Position the black plastic portion of the couple onto the drive side of the coupler.

3) Install the sensor bracket as shown in Figure 7.

4) Move the Feed Block coupler so that the bar is vertical.

5) Reinstall the Feed Block with a vertical motion, making sure that:

   a) The Feed Block coupler bar fits into the vertical slot on the black plastic center piece;

   b) The dowel pin protruding from the Feed Block top plate fits into the hole of the support plate;

   c) The agitator wire fits into the center hole of the wiper block;

   d) The Feed Block itself is fully seated against the support plate.

6) Holding the Feed Block in one hand, push slightly down on one lever and move it toward the Feed Block until it touches the Feed Block. Repeat this step with the other lever, making sure everything is secured before letting go of the Block.

7) Reconnect the air lines to complete the reinstallation.

GENERAL INFORMATION

The following information will assist you in responding to the warning messages which appear on the REMOTE Display along with the sound of an alarm. The messages indicate a component problem/failure or a sensor misadjustment.

CHECK FEED MOTOR -

1) With the MAIN Power and Control Switches ON, raise the door of the Main Unit, and set the REMOTE/MAIN Switch the the MAIN Position.

2) Set the POWDER % Dial to 0.

3) Set the TEST Switch to the ON Position.

4) Check for rotation of the motor shaft and gear/sprocket. If they are turning, disregard Steps 5-7, and proceed to Step 8. If the shaft and gear/sprocket are NOT turning, continue with Step 5.

5) Gradually increase the POWDER % Dial setting until the gear/sprocket turns or the maximum setting is reached. TURN THE POWER OFF AFTER PERFORMING THIS STEP.

   NOTE: Failure of the gear/sprocket to turn at any setting or only at a higher setting may be caused by a jammed feed block, motor failure, or Control Board failure.

6) Remove the Feed Block (See MAINTENANCE Section), and check the motor operation again. If the motor now turns, examine the Feed Block as described in the MAINTENANCE Section.

7) If the motor fails to run with the Feed Block removed, check for motor voltage as follows:

   a) Disconnect the motor wires.

   b) Connect voltage meter leads to the disconnected wires (+ to Red/- to Black), and check for these values ---

Dial Setting	Voltage (DC)
0	2 - 3
5	17 - 19
10	32 - 34

   c) If voltages are present, the motor must be replaced.

   d) If voltages are not present, or are significantly lower, remove the electronics cover and check voltages again at J6-3 (+) and J6-4(-). See Figure 5 for J6 location. If the proper voltages are not present at J6, the Control Board must be replaced.

8) If the motor runs (as noted in Step 4) there was most likely a sensor failure which caused the message "Check Feed Motor" to appear. You will need to check whether the sensor is working. First, note how your sensor is mounted:

A) gear and sensor mounted on motor feed block shaft -or-

B) sprocket installed on motor feed block shaft and sensor mounted on a separate bracket

See Figure 7 to determine which style mounting your unit has. If Style A, proceed to Step 9. If Style B, call ESS Service for further instructions.

9) If the sensor is flashing as the gear turns, disregard Step 10 and proceed to Step 11.

10) If the ring-mounted sensor is not flashing, remove the electronics cover and check the connections at J1 (See Figure 5). If the J1 connections appear satisfactory, proceed to Step 12.

11) Remove the electronics cover and check LED 5. (See Figure 6) If LED 5 is not flashing as each tooth of the gear moves past the feed sensor, the Control Board is defective and must be replaced. (See Figure 2 for sensor location)

12) Remove the Feed Block (See MAINTENANCE Section) and carefully place a steel object, such as a screwdriver tip, against the plastic face of the sensor. Check whether LED 5 flashes in response to the metal movement toward and away from the sensor's face.

13) If LED 5 responds to Step 12, an adjustment of the sensor bracket toward the gear position is required. See Figure 7 for bracket adjustment. If LED 5 does not respond, replace the Control Board.

CHECK AGITATOR -

1) With the Main Power Switch and Control Switch ON, raise the door of the Main Unit, and set the Remote/Main Switch to the MAIN Position.

2) Set the TEST Switch to the ON Position.

3) Check for agitator shaft rotation. If the shaft is rotating, disregard Step 4 and proceed to Step 5.

4) If the shaft is not rotating, check for motor voltage as follows:

   a) Disconnect the motor leads.

   b) Check for 12 Volts at the leads (Red = +/Black = -) If there is voltage at the leads, the motor must be replaced.

   c) If there is no voltage at the motor leads, remove the electronics cover and check for voltage at J6-1 (+) and J6-2 (-). (See Figure 5) If voltage is OK, check connections and wires leading to motor.

   d) If there is no voltage at J6, the Control Board must be replaced. Lack of voltage here will also prevent the operation of the compressor and the static tube.

5) Remove the electronics cover, and check LED 6 for an ON flash each time the agitator shaft turns. See Figure 6 for the location of LED 6.

   a) No signal from LED 6 indicates a defective or misadjusted agitator sensor. To check, lower the powder level in the jar to expose the agitator sensor holder. (See Figure 2) If the sensor is misadjusted, realign as shown in Figure 7.

6) In the unlikely event that you get a proper LED response but still have the CHECK AGITATOR message when you return to the REMOTE Position, the Control Board must be replaced.

NO AIR PRESSURE -

1) With the MAIN Power Switch and Control Switch ON, raise door of the MAIN UNIT and set the REMOTE/MAIN Switch to the MAIN Position.

2) Set the TEST Switch to the ON Position.

3) If the Compressor is not operating, proceed to Step 4.
If the Compressor is operating, proceed to Step 6.
If House Air is being used, proceed to Step 7.

4) Remove the junction box cover to determine why the Compressor is not operating. Check for either 12 VDC or 24VDC at Terminal 3 (+) and Terminal 4 (-) on the solid state relay.

a) If voltage is present at these terminals, proceed to Step 5.

b) If there is no voltage at the relay terminals, remove the electronics cover and check for voltage at J5-3 (+) and J5-4 (-). See Figure 5 for the location of J5.

c) If there is no voltage at J5, the Control Board must be replaced. Lack of voltage at J5 will also prevent the operation of the agitator motor and static tube.

5) Check for line voltage at the relay (Terminal 1) and at the white wire on the upper receptacle (where the Compressor cord is plugged). If there is no voltage, check the junction box line cord and the source supplying power to the Compressor.

a) If there is voltage at Terminal 1, check for voltage at Terminal 2 and the same white wire. If there is not voltage, the relay must be replaced.

6) If the air pressure gauge indicates less than 20 PSI, the pressure sensor (switch point = 20 PSI) has properly caused the NO AIR PRESSURE alarm to sound. The System must be checked for air leaks between the Compressor and the Split Amplifier. If no leaks are found, the Compressor may have to be replaced.

7) If the air pressure gauge shows less than 20 PSI, low house air pressure has properly caused the NO AIR PRESSURE alarm to sound. Check the filter-regulator adjustment. The System must also be checked for air leaks before the Split Amplifier.

CHECK STATIC SYSTEM -

1) With the MAIN POWER SWITCH and CONTROL SWITCH ON, raise the door of the MAIN UNIT and set the REMOTE/MAIN Switch to the MAIN Position.

2) Set the TEST Switch to the ON Position.

3) If the static tube is on, disregard Steps 4-7 and proceed to Step 8.

4) Check the 1.5 Amp Slow Blow fuse on the receptacle side of the junction box.

5) If the fuse is OK, check for 120 AC line voltage, approx., at TS3 and TS4 on the terminal strip. (TS1 is at the left end of the terminal strip in the junction box)

6) If there is no voltage at TS3 and TS4, check the junction box wiring from the solid state relay terminal 2 to the fuse holder and then through the rheostat to TS3.

7) If voltage is present at TS3 and TS4, turn the MAIN switch OFF and check the connections from the junction box to the high voltage transformer. Also check the connections from the transformer to the static tube. Continue with the next step if the connections appear satisfactory.

8) If a CHECK STATIC SYSTEMS message appears even though the static tube is on, there is a problem with the static tube sensing circuits. Turn the MAIN Switch OFF and check the wire connections from the static tube to the junction box.

   a) The connections at the tube must have the shield wire (black lead) connected to the spray bar, and the sensing wire (white lead) connected to the insulated tube clip.

   b) The junction box connections must have the shield wire (black lead) connected to TS11 and the sensing wire (white lead) connected to TS12. (TS1 is at the left end of the terminal strip in the junction box)

   Note: See Figure 4 for the above

9) With the main switch in the OFF position, check the transformer output as follows:

   a) Remove the white plastic connector (attached to the wire) from the static tube.

   B) Push the wire through the plastic insulator until the 4 pronge clip emerges. Place the clip on a non-metalic surface that is not grounded. Keep all grounded material at least 6 inches away.

   C) Attach a volt meter and high voltage probe capable of measuring 10,000 volts A.C. to the clip and to ground.

D) Turn the main power switch to the ON position and read the Voltage output on the meter.

E) Turn OFF the main power switch and disconnect the Voltmeter. Replace the transformer if the voltage reading is below 8000 volts A.C..

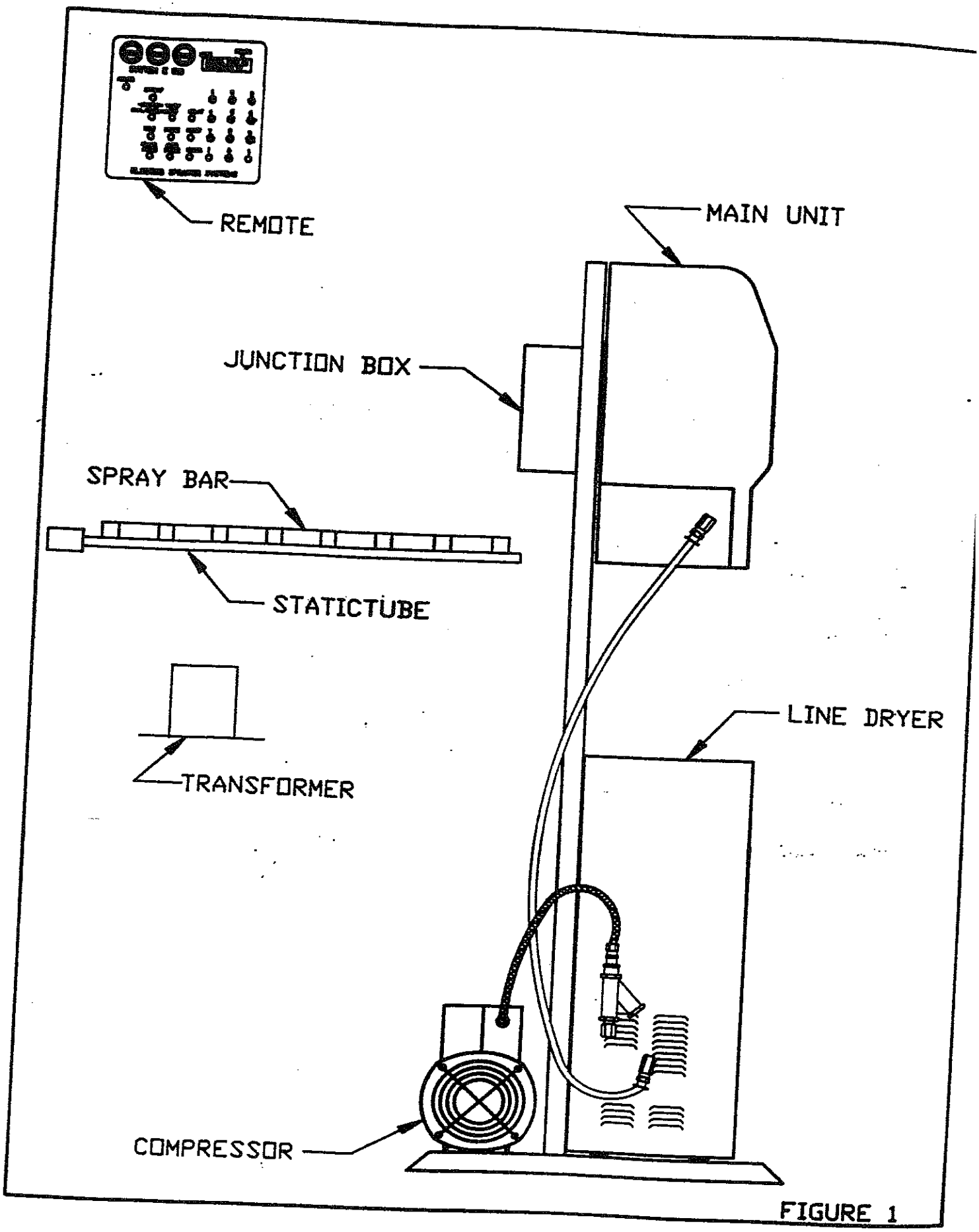
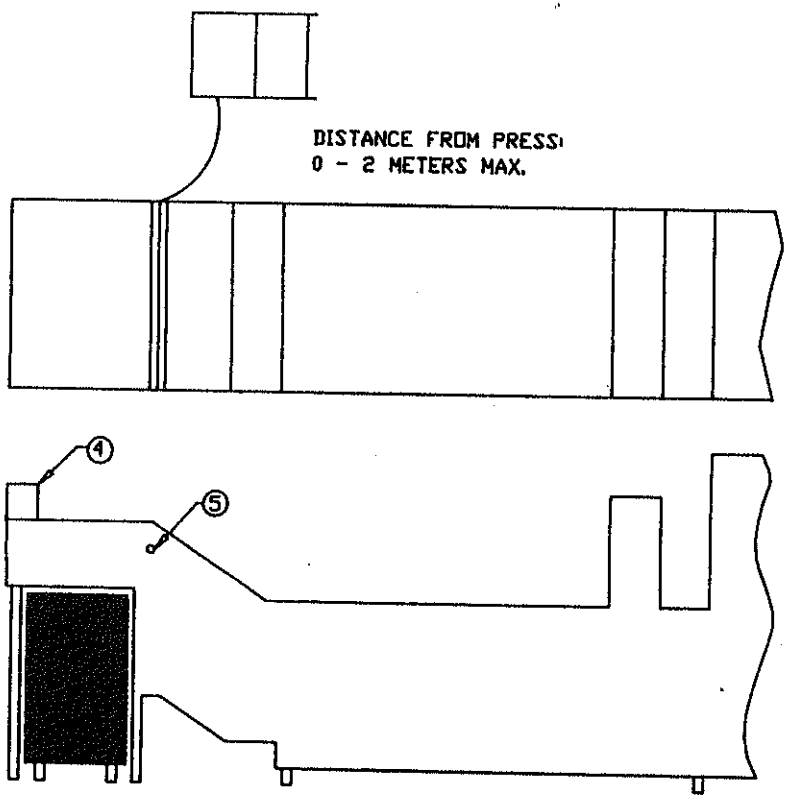

REMOTE
MAIN UNIT
JUNCTION BOX
SPRAY BAR
STATICTUBE
TRANSFORMER
LINE DRYER
COMPRESSOR

FIGURE 1

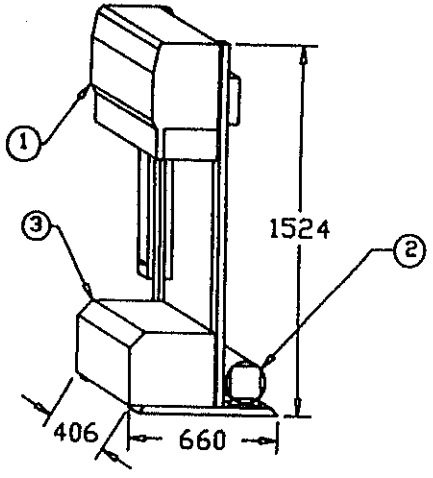


ELECTRICAL SERVICE

(2) 115 VAC - 15 AMP LINES
(SAME PHASE SOURCE REQ'D)

ELECTRICAL LOADS

	ITEM	V.	AMP.
1	METERING UNIT	115 V.	2.0 A.
2	COMPRESSOR	115 V.	10.4 A.
3	LINE DRYER	115 V.	4.2 A.
4	REMOTE CONTROL	-	-
5	SPRAY HEAD	-	-
		TOTAL	16.6 A.



SPEEDMASTER SM74, 74+L, 74+L+X
SM102, SM102+L+X
CD102, CD102+L
CD102+L+X

ess ELECTRO SPRAYER SYSTEMS		
	SCALE	DRAWN BY MM
PART NAME E500 SPRAYER SYSTEM		APPROVED BY
DATE 3-18-96	FILE NAME	NUMBER

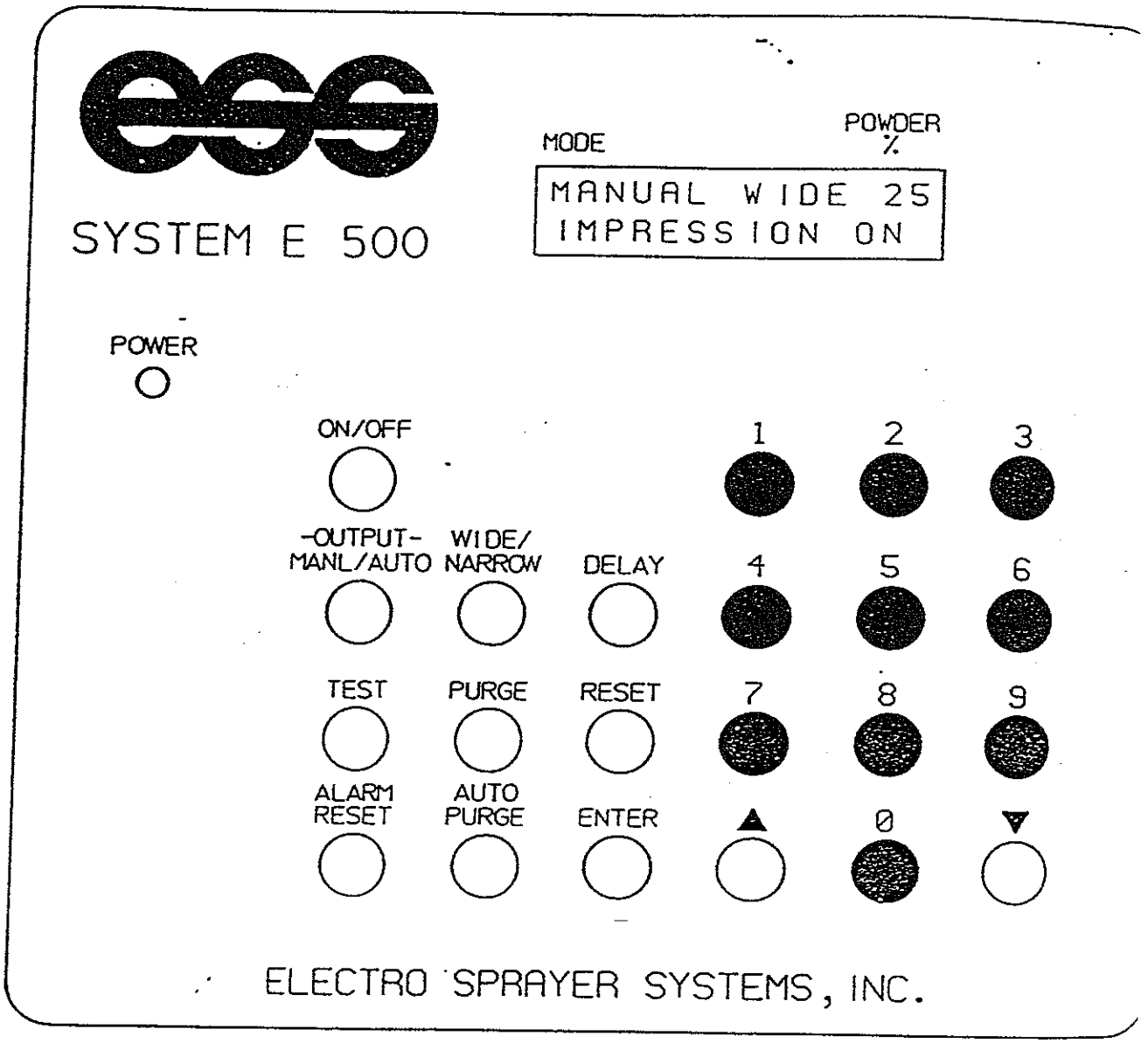
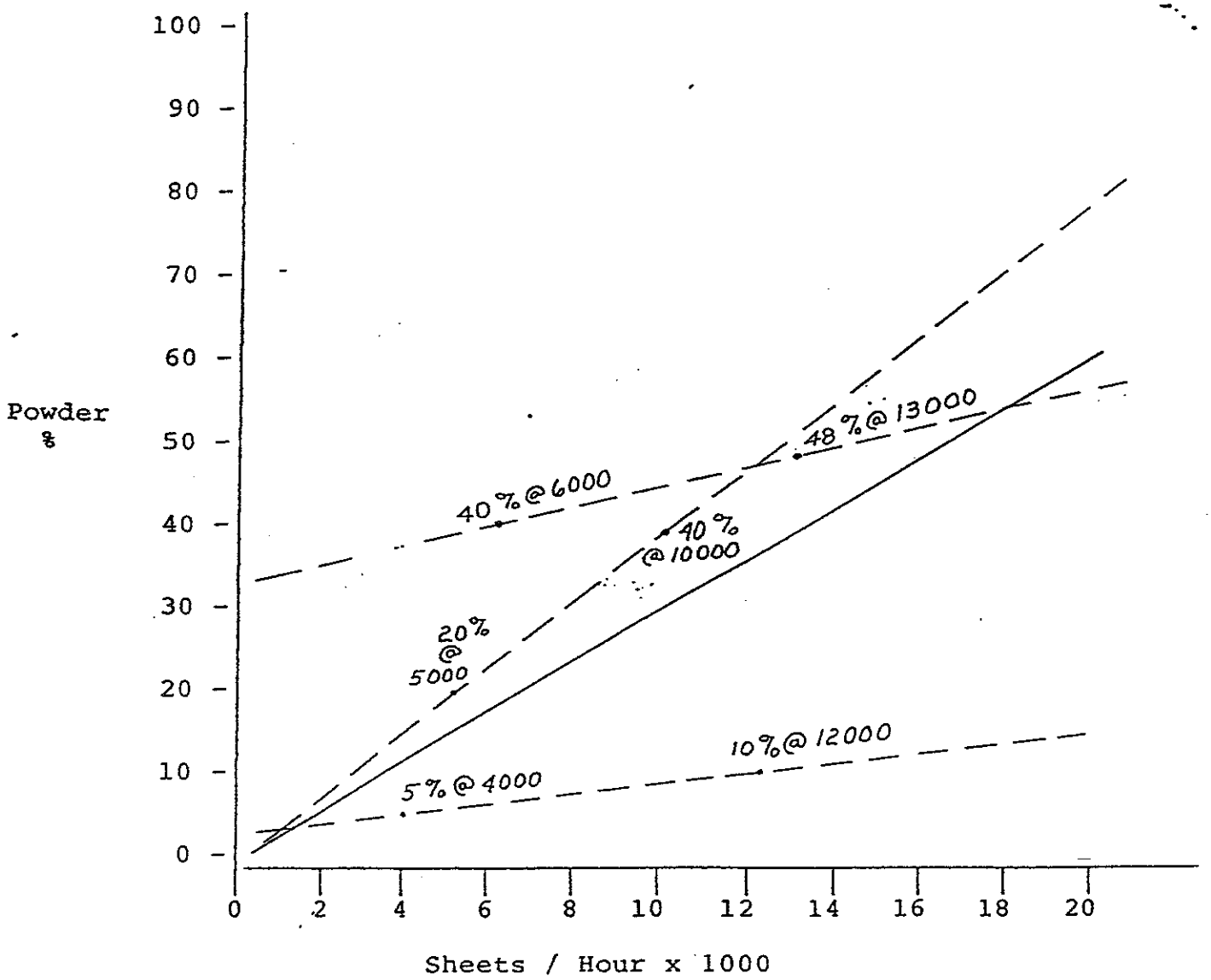

SYSTEM E 500
MODE
POWDER %
MANUAL WIDE 25
IMPRESSION ON
POWER
ON/OFF
-OUTPUT- MANL/AUTO
WIDE/ NARROW
DELAY
TEST
PURGE
RESET
ALARM RESET
AUTO PURGE
ENTER
1
2
3
4
5
6
7
8
9
0
ELECTRO SPRAYER SYSTEMS, INC.

Figure 3

SPEED MATCHING CURVES



———— Default Curve

- - - - - Examples of User Installed Curves

Figure 4

CONTROL BOARD

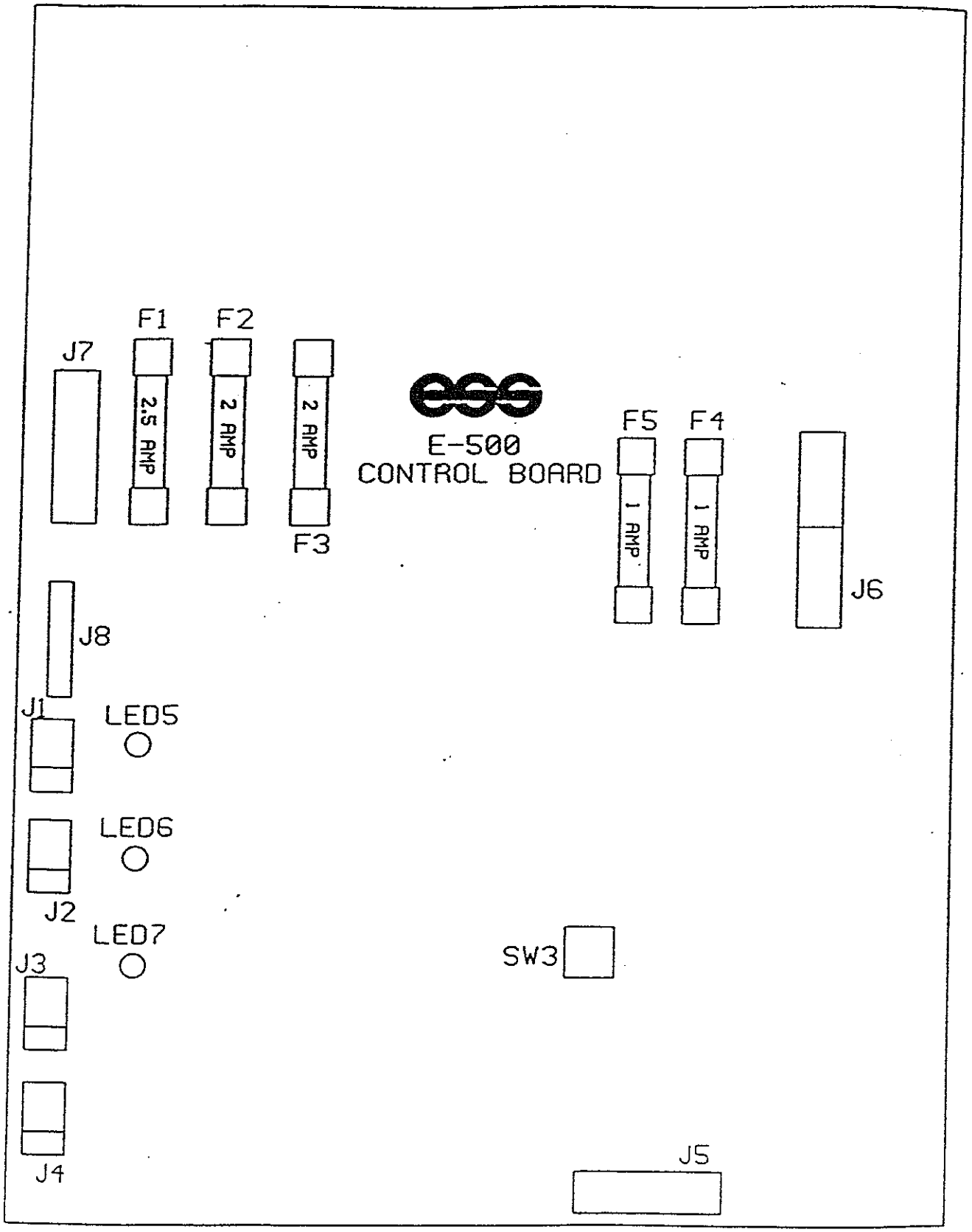
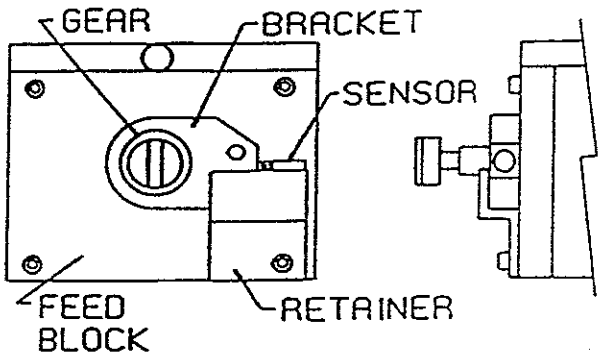
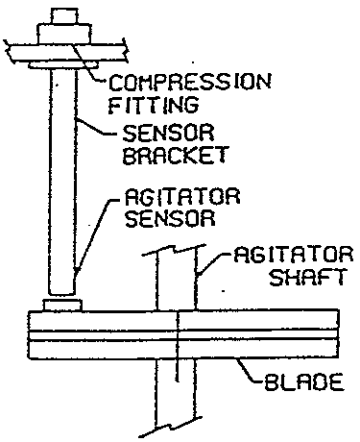


Figure 6



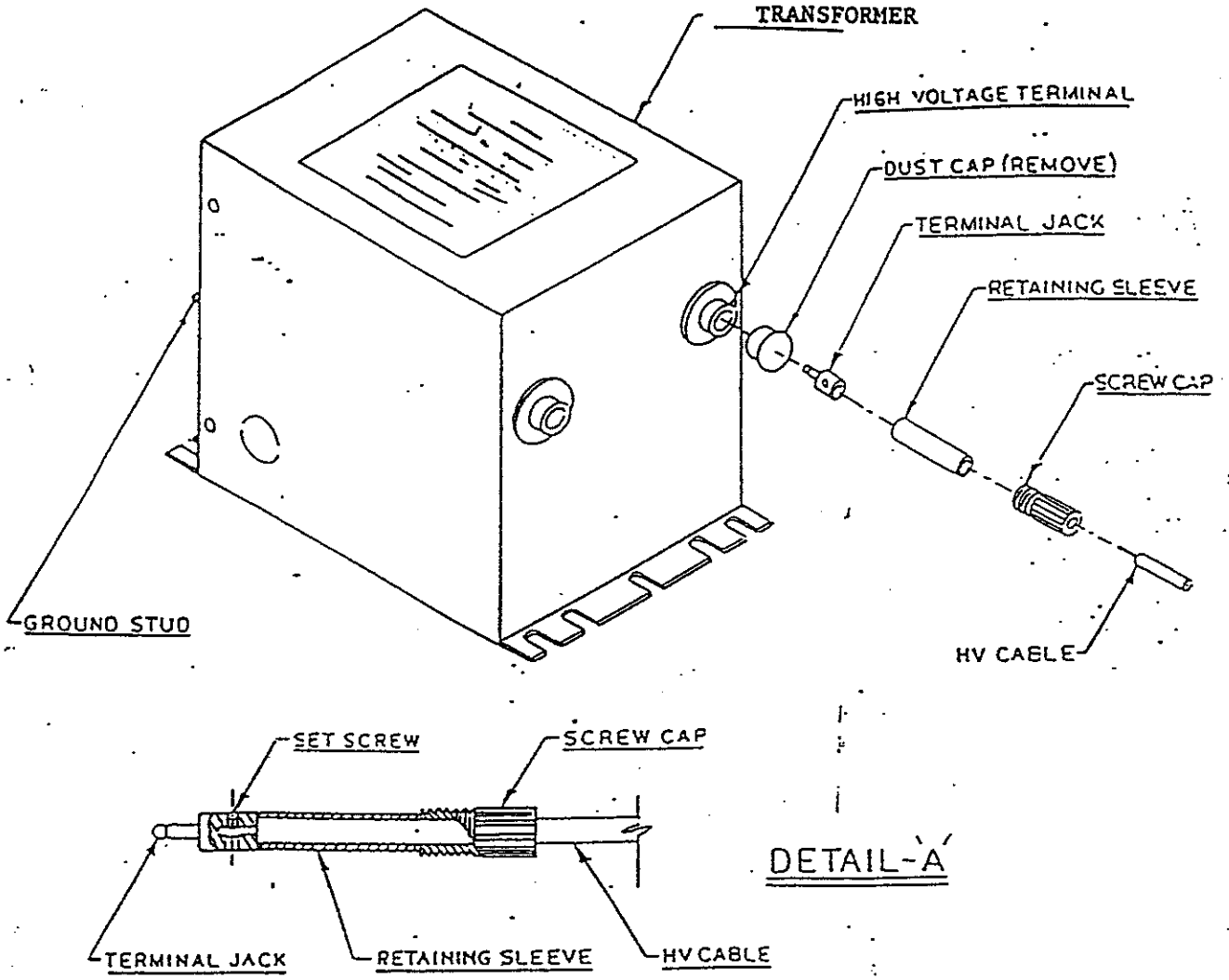
FEED SENSOR INSTALLATION
(NO ADJUSTMENT REQUIRED)



ADJUSTMENT OF AGITATOR SENSOR

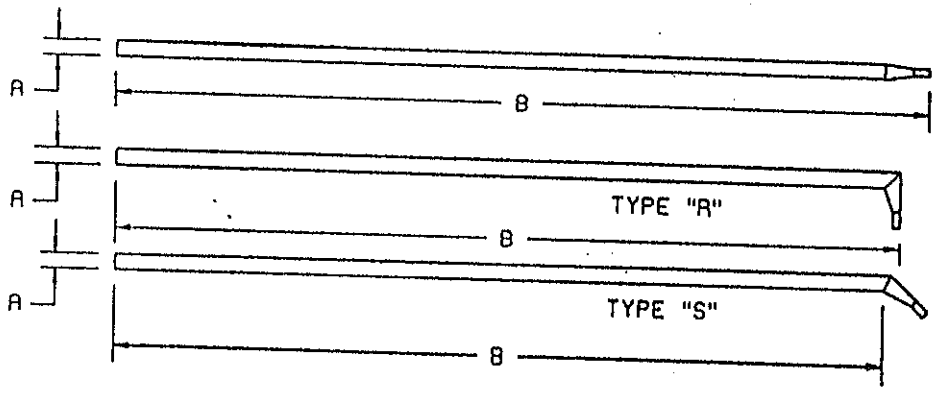
1) LOWER POWDER LEVEL TO EXPOSE BOTTOM OF SENSOR BRACKET.
2) POSITION BLADE SO THAT BOLT HEAD IS INLINE WITH BRACKET.
3) LOOSEN COMPRESSION FITTING AND POSITION BRACKET END APPROX. 1/32" ABOVE BOLT HEAD.
4) TIGHTEN FITTING AND CAREFULLY JOG (TEST SW. ON/OFF) AGITATOR MOTOR TO CHECK FOR CLEARANCE.
5) IF NO INTERFERENCE, RUN AGITATOR MOTOR AND OBSERVE LED 6 FOR PROPER RESPONSE.

Figure 7



NOTES: INSTALL TRANSFORMER SECURELY. KEEP FREE OF DIRT, OIL, WATER OR EXCESSIVE HEAT. IF TRANSFORMER IS NOT GROUNDED THRU LINE CORD, CONNECT A 16 GA. COPPER WIRE BETWEEN GROUND STUD & COLD WATER PIPE OR GROUNDED MACHINE FRAME. CLEAN GROUNDING SURFACE OF PAINT, DIRT, ETC. (DO NOT CONNECT TO GAS, HOT WATER, OR STEAM PIPE). DETERMINE NECESSARY LENGTH OF HI VOLTAGE POWER CABLE & CUT TO SIZE. STRIP APPROXIMATELY 3/8" TO 7/16" OF INSULATION FROM CABLE. SLIDE SCREW CAP & RETAINING SLEEVE OVER POWER CABLE. LOOSEN SET SCREW IN TERMINAL JACK & INSERT STRIPPED LEAD INTO UNTHREADED HOLE. TIGHTEN SET SCREW UNTIL FLUSH WITH OR BELOW SURFACE OF JACK (SEE DETAIL "A"). REMOVE DUST CAP & INSERT TERMINAL JACK UNTIL IT ENGAGES HIGH VOLTAGE CONNECTOR SPRING, TIGHTEN SCREW CAP INTO HIGH VOLTAGE TERMINAL.
NAMEPLATE SPECIFICATIONS.

Figure 8



A = DIAMETER OF GLASS TUBE : 10mm (APPROX. 3/8")
12mm (APPROX. 1/2")
18mm (APPROX. 3/4")
25mm (APPROX. 1")

B = LENGTH OF GLASS TUBE : MEASURE THE OVERALL STRAIGHT LENGTH (CONSIDER THE LENGTH TO BE: EQUAL TO THE SHORTEST CARTON INTO WHICH THE TUBE COULD BE PLACED EXCEPT FOR "S" TUBES WHICH WOULD REQUIRE A CARTON 2" LONGER.

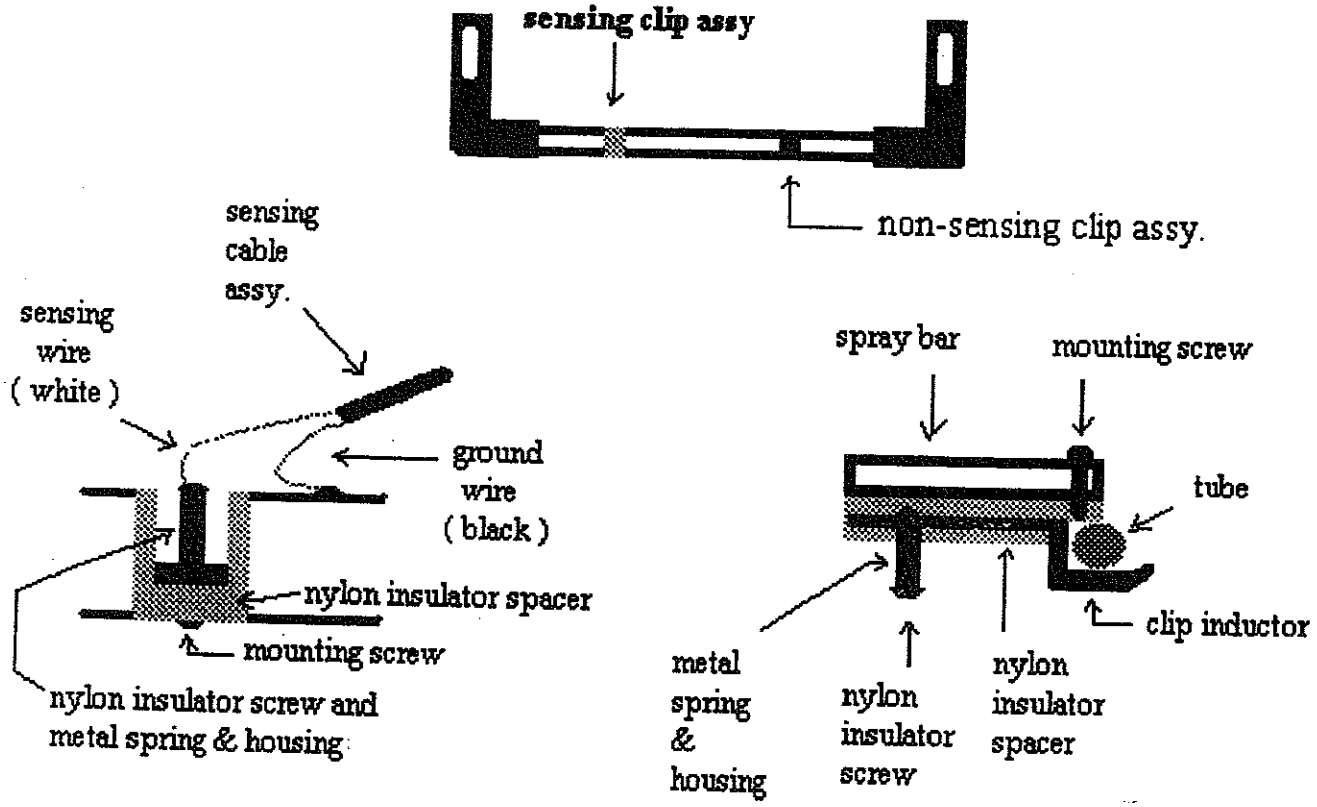
EXAMPLES OF IDENTIFICATION, USING A AND B MEASUREMENTS :

1. STRAIGHT TUBE WITH 12mm DIAMETER AND 44" LENGTH = 1244
2. TYPE "R" TUBE WITH 25mm DIAMETER AND 61" LENGTH = 2561-R
3. TYPE "S" TUBE WITH 18mm DIAMETER AND 48" LENGTH = 1848-S

MATERIAL	LTR	ECO	REVISION	BY / DATE
FINISH	ELECTRO SPRAYER SYSTEMS, INC.			
TOLERANCE UNLESS SPECIFIED 2 PLACE DECIMAL ± .01 3 PLACE DECIMAL ± .005 ANGLES ± 1° REMOVE ALL BURRS BREAK ALL SHARP CORNERS AND EDGES .015 MAX.	SCALE: NONE	DRAWN BY: D. KERRIGAN	APPROVED BY	
	PART NAME: TUBE, ELECTROSTATIC DISCHARGE			
	DATE: 1-2-90		NUMBER: 20-122699	

Figure 9

E-500 Spring Mounted clip for 40" press



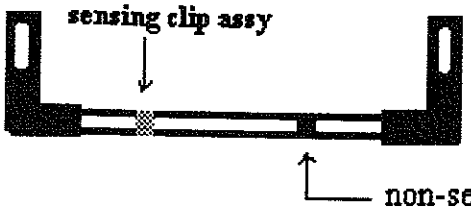
The White Sensing Wire, senses the static field around the tube and tells the Main Board that the field is present at the tube.

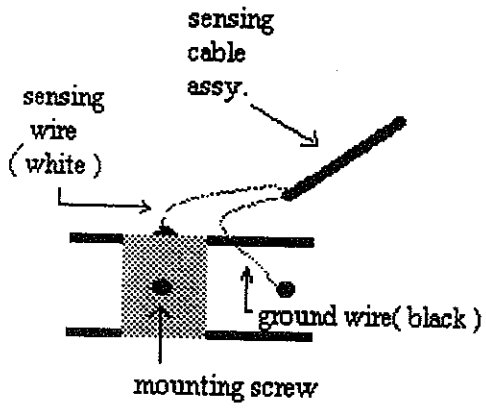
To test Clip concerns, bypass the Clip Assy. by removing the white wire from the Clip and touch it directly to the tube.

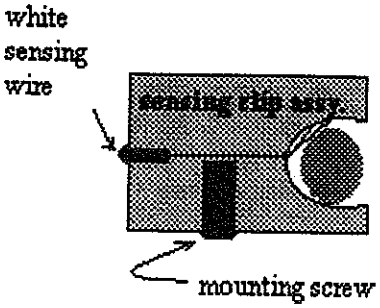
---------- **If the alarm goes away while in the test mode (IN REMOTE) your problem is in the Clip Assy. The Clip Assy. is grounding out to the spray bar.**

---------- **If the alarm does not go away, your problem lies in the Static Sensing Cable Assy. or the Main Board. The Static Sensing Cable Assy. is a two wire shielded cable assy. These two wires are at some point making contact. Their should be no continuity between these two wires. If everything else is checked out and it looks like the Main Board is the cause, notify your Dealer or E.S.S. for further direction.**

E-500 Half Moon clip for 28" press







The White Sensing Wire, senses the static field around the tube and tells the Main Board that the field is present at the tube.

To test Clip concerns, bypass the Clip Assy. by removing the white wire from the Clip and touch it directly to the tube.

---------- **If the alarm goes away while in the test mode (IN REMOTE) your problem is in the Clip Assy. The Clip Assy. is grounding out to the spray bar.**

---------- **If the alarm does not go away, your problem lies in the Static Sensing Cable Assy. or the Main Board. The Static Sensing Cable Assy. is a two wire shielded cable assy. These two wires are at some point making contact. Their should be no continuity between these two wires. If everything e is checked out and it looks like the Main Board is the cause, notify your Dealer or E.S.S. for further direction.**