



# **SERVO FEED / RAPID MASTER OPERATING INSTRUCTIONS**

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# INTRODUCTION

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## The Rapid Master

The Rapid Master that you have just received is fully assembled and ready to be put into production. Due to shipment vibration and handling, the machine should be checked to ensure all screws and bolts are tight. Remove the cover to the electrical controls and visually inspect that all parts are in place and secure. If the machine was damaged in shipment, contact the carrier first to report the damage and then Rapid-Air.

### CAUTION:

THE RAPID MASTER MACHINE IS TOP HEAVY WHEN NOT SITTING ON ITS BASE LEGS. USE EXTREME CAUTION WHEN MOVING THIS MACHINE!

Install machine on a level surface with sufficient clearance for loading and unloading process material. The machine should be secured to the floor through the four holes provided in the feet of the machine using 7/16 tie-down bolts. Or, can be installed using 1/2-13

leveling bolts and machine pads. The pads keep the machine from walking during operation and also act as a noise reduction device.

The machine has two other requirements that need attention before putting the Rapid Master into production.

- 1) The customer must provide minimum CFM Air, at 75 to 120 PSI of clean, dry, lightly lubed air to the machine. Connect a minimum of 5/8" ID hose into the filter regulator provided on the machine. The inlet to the FRL is a NPT female thread.
- 2) The customer must provide 120 volt, 20 amp, 60 cycle electrical power. If an extension cord is used between the source and the machine, it should be a minimum 12 gauge wire to keep the voltage loss down and for electrical safety reasons.

In order to maximize your learning time and troubleshoot any interface problems, we would like to request that the following items be complete before calling us:

1. Servo unit should be completely installed and aligned to a die on the press.
2. 220 Vac electrical wiring, if required, should be in place and unit turned on.
3. Air should be connected and ready to be used.
4. All servo interface questions should be directed to Rapid-Air prior to a start-up visit. Please call 815-397-2578 and ask to have these questions directed to the proper personnel.

## The Servo Feed / Rapid Master Feed System

The Rapid-Air Servo / Rapid Master Feed system carries with it the quality and reliability you have grown to expect from a Rapid-Air product. The motion control system is a programmable industrial computer and this advanced technology, combined with a highly engineered precision roll feed, is an unchallenged combination in the press industry.

The compact mechanical package, direct coupled with a brushless servo drive motor, offers response and feed speed accuracy unparalleled in any other powered roll feed. Operator interface is so simplified, a typical setup person can have the servo feed programmed and running in a matter of minutes. A step-by-step prompt appears on a four line 88-character

display, which asks simple questions of the operator. Entry of feed length, cutter dwell time, and % maximum speed are all that is required for a new setup. Routine jobs can be stored, recalled, changed and saved or run with a simple 2 digit job number entry. Up to 99 jobs may be stored and recalled at will.

A resolver, direct coupled to the servo drive motor for precise digital position feedback, enable roll positioning accuracy to +/- .0025 for any programmed feed length or speed.

Operator programmed feed length, up to 999.999 inches and % max speed selection along with full jog features on a pendant unit, allow the operator to thread the material and inch it into position. The inch feature enables the

operator to jog the servo feed forward or reverse at a slow rate. The operator can select jog to length or jog continuous to aid in threading up material.

The Rapid-Air Servo Roll Feed has been designed to mount on a free-standing table as close as possible to the press

The precision mechanical roll feed unit has been designed for compactness, ease of setup and installation. Three cables with twist lock connectors, two cables for the servo, one connected to the cutter, and one air line are the only external connections required. The electrical controls are housed in a small cabinet which should be mounted close to the press working area. The operator keypad and display are mounted on top of the control cabinet.

# INSTALLATION, SET-UP, AND CABLING

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## Installation And Mechanical Set-Up Of Servo And Press

If you purchased the Servo/Rapid Master combination already mounted on a base then the servo and press were aligned at the factory. A good practice is to check all hold down bolts to be sure that they did not come loose during shipment.

If you purchased the servo and press and are going to mount it on a base at your facility, then a base

should be selected that will hold the weight of the servo and the press and also the cycling shocks incurred during production.

When mounting the two devices. The pass line height of the press and the servo roller center line should be equal. Even more critical is the parallelism between the two devices. The press should be

mounted first then the servo center line should be aligned to the press center line with the servo rollers parallel to the press blade.

The servo should be mounted as close to the press as possible and depending on thickness of the material a bridge should be installed between the servo and press to minimize material droop or buckling during feed.

## Electrical Cables And Air Line

### 120 VAC INPUT

The alternate input voltage to the control is 120 Vac, 1 Ph, 60 Hz. The max amperage needed is 7.5 amps and the control has a circuit breaker with a trip amperage of 10 amps.

### 230 VAC INPUT

The required input voltage to the control is 230 Vac, 3 Ph, 60 Hz. The amperage needed is 10-20 amps depending on the motor size. If unsure of the amperage needed, the name plate on the side of the Pacific Scientific drive will give the number of the control or check the disconnect fuses for the correct fuse size.

### 460 VAC INPUT

If your plant has only 460 Vac power then a step down transformer is needed in order to run the servo feed.

If you purchased the transformer from Rapid-Air, then all that is needed is to connect and wire the 460 volt line to the transformer. If you did not purchase a transformer from Rapid-Air then a transformer, 3 KVA for the 100S and 200S servos and 6KVA for the 300S servos, 460/230 Vac 3 Ph, 60Hz step down transformer is needed before proceeding with the electrical portion of the installation.

The electrical control enclosure is shipped completely ready to be connected to the mechanical feed. Connected to the bottom of the enclosure are (2) cables with keyed screw type connectors for connection to the motor. If the series 200 was purchased, (1 or 2) push-on connectors for connection to the air valves for solenoid actuation of the pilot release and or

anti-backup valve are included. The third connector is used to interface the press to the controls.

Position the electrical enclosure at a convenient location near the mechanical feed and attach the cables. The motor cables are easily identifiable by the amount of pins in the plugs. The solenoid cables if any can now be attached and checked for proper location when the feed is up and running.

An air line must be connected from the shop air to the air inlet of the servo feed. The air should be at least 80 PSI continuous and should be dry filtered and lightly lubricated for the best operation of the servo feed. The air inlet on the servo feed is a 3/8-18 NPT pipe tap. The minimum air line size requirement is 1/2" ID hose. - (2 CFM)

# PRETEST

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## Pretest For Servo Feed And Press Without Material

Now that your servo/press combination is in place, and the cables have been attached, you can proceed with testing the unit. The first step is to turn on the main disconnect switch on the electrical enclosure. Next, at the operator's console, pull the power on-off button to the on position. The button should illuminate to indicate that there is power to the system.

The Pacific Scientific drive performs an initial sequence to check its internal program. At this time the display should show the Rapid-Air screen for 5 seconds before starting the main setup program. If you are comfortable with programming a job then continue, if not, please refer to the "Programming Procedure" located in this manual.

Follow the programming sequence for the operators terminal to input parameters into job storage. Your servo feed has been fully tested before it was shipped to your facility and this

procedure is merely a test to insure that all functions are still functional and the cables are properly seated.

Once you have programmed the required parameters, select the manual mode of operation. If the option of air regulated upper feed roll was purchased, check that the main air is at least 80 psi and check that the roll pressure gauge is functional by adjusting the pressure up and down, this is accomplished by turning the pressure adjusting knob. If you did not purchase the air regulated roll option then check that you have enough tension on the material to avoid slipping during feeding. Open and close the feed and anti-backup rolls electrically and/or manually. Visually inspect that the rolls open and close as you press the appropriate keys on the keypad or when using the manual levers.

Select the "inch" function (F2 on keypad) on the manual mode screen. Visually check that the rolls rotate

both forward and reverse with the corresponding key. The speed is pre-set to creep the rolls at a slow speed for manual positioning of the material.

**CAUTION:** Do not attempt to place your fingers or any foreign material into the rolls. Injury to the operator or damage to the servo rolls could result.

After you have verified that the rolls and air logic are operational, you can experiment with the single cycle moves. The procedure is outlined in the programming section of this manual.

After all the checks have been made and you feel comfortable with the programming of the servo controller, place the servo in automatic mode. Now cycle the press in either the inch, single stroke or continuous run, the servo feed should react upon the closure of the press window and signal and simulate a feed progression of material.

# INTERFACING

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## Servo Interfacing Explanation

### A. TAUT STOCK INPUT (J52)TBI-3)

This is a normally open contact from a switch or device that monitors the loop of material prior to the servo feed. When the material reaches a point that it trips the switch, a taut stock has been reached. This input, when received, immediately drops the automatic which stops the feed in progress. The material should be repositioned in the die before restarting the automatic sequence, as the progression was lost when the taut stock occurred.

This input also could be used as a "No Stock" switch that would monitor whether or not there is material available to feed.

### B. ENABLE INPUT (J4-Pin 5 & 6)

The enable input is shipped from the factory, jumpered, so that the Pac-Sci unit is ready to work after the initialization procedure is complete.

If it is desired that the servo controls are not functional until other equipment or safety source is activated then a normally open contact can be interfaced to this input. If at any time during the feed cycle the input changes state then the feed will stop at this position. If feeding stock, the reference will be lost and the stock will have to be manually repositioned to the correct location. The automatic cycle will be dropped and have to be restarted.

### C. ENABLE OUTPUT (J52)TB2-22)

This output must be tied to a solid state relay to interface to the outside world. The solid state relay must have a D.C. coil and should have a rating of 3-30 VDC. The Rapid-Air #69100165 is recommended for this application. This output is high whenever the enabled input is activated.

### D. PRESS OUTPUT (J52)TB2-21)

This output must be tied to a solid state relay to interface to the outside world. The solid state relay must have a D.C. coil and should have a rating of 3-30 VDC. The Rapid-Air #69100165 is recommended for this application. This output goes high at the end of every feed cycle and stays high for programmed press time before going low. To adjust this time, go to programming the job number and adjust the time needed for the press.

### E. AUTOMATIC OUTPUT (J52)TB2-20)

This output must be tied to a solid state relay to interface to the outside world. The solid state relay must have a D.C. coil and should have a rating of 3-30 VDC. The Rapid-Air #69100165 is recommended for this application. This output goes high whenever automatic is selected on the program panel. Any faults will cause the automatic output to go low.

### F. KEYPAD AND DISPLAY INTERFACE (RS232 PORT)

The keypad/display is the interface between the operator and the resident program. The Pacific Scientific drive is purchased with a great many capabilities, none of which can be used unless a program is written to utilize these capabilities. Rapid-Air put a great deal of time making a program that is user-friendly and yet gets the job done efficiently. We took all the questions and constructive criticism and came up with a program that would cover all the applications, yet be easy to interface and program by a customer.

If an operator reads the programming procedure in this manual and then reads the screen parameters listed as they are displayed and acts on them by inputting data as needed, the servo can be up and running in a very short time.

1. Select a job number.
2. Input or review parameter for that job number.
3. Thread up material in manual mode.
4. If properly interfaced, go into automatic mode.

# JOB PARAMETERS

## Reset Job Parameters

The reset job parameters routing should be used with special caution. We incorporated it as a user function for two reasons.

The first reason is if a problem caused the displayed parameters to be garbled because of a program glitch, then by resetting the job parameters the problem could be cleared.

The second reason is if there were a number of different jobs in memory that were no longer required, then by resetting the job parameters, all the job numbers would be reset to their default values, which includes putting all zeros in the feed length and strokes per minute area of the program.

### **CAUTION!! CAUTION!! CAUTION!!**

Keep a hard copy record of program numbers and data associated with them for reference if needed. If this function is used in a way other than what it was designed for then all previous data is lost and cannot be recovered.

To enter this function, turn off the program by depressing the master stop button. Turn on the program again and push and hold the "clear entry" key, once the program has started the following screen will be displayed.

**\*\*DEFAULT VALUE SETUP  
PRESS F1 TO RESET TO  
DEFAULT VALUES, PRESS  
F4 TO IGNORE CHANGES**

\*\*Once F1 has been pressed then all data that had been entered will be reset.

### **PROGRAM NUMBER DISPLAY**

Each servo unit that is shipped has a program number assigned to it. If a problem occurs and cannot be solved by reloading the program then you will be asked the program number associated with this servo.

To view the program number, press and hold the "back space" key during the power up sequence. The program number will be displayed for about 30 seconds. Please find and write down the program number in case it is needed in the future.

## To Help You Enter A Job From The Keypad, Let's Create An Example:

We will use a feed length of three inches and want to run the feed rate at 100 percent.

The main menu is currently displayed. First we select the job number and we will use job #1.

1. Press F1 to select the job number.
2. Enter job number "01" - press the F4 key when finished.
3. The job number screen shows two choices:
  - A. F1 = program parameters. This choice is used if a job has already been programmed and you would like to adjust the parameters that were preset for the job or if entering a new job number.

To move around in this screen, press the "enter" key in the lower right corner of the keypad. Once the feed length and strokes per

minute are entered, then press the F4 key to exit the screen. The program now calculates the accel/ decel and speed for the parameters entered. At this time the "F4 key" review parameter should be used to check to be sure that you entered the correct parameters.

- B. F4 = don't alter parameters. Run the job as previously entered.
4. Press "F2" to select the manual mode.
  - A. Press F1 to select the "inch" or jog mode. This mode will move the material slowly forward or reverse to position the material at its proper location. F2 being used for forward and F3 for reverse movement. Press F4 to leave the "inch" mode.
  - B. Press F2 to select the "single feed" mode. At this time each press on the F1 key

will rotate the rolls to move the material three inches, the feed length that was entered, at the same feed rate as the feed would move the material in the automatic mode. Press the F4 key {exit} to leave this screen.

5. Press "F3" to select automatic cycle. In this mode the servo can be run in the batch or continuous mode.
  - A. Press F1 to select the batch mode. In the batch mode, the servo will feed each time it is commanded until the batch count reaches "0", then the automatic cycle drops out.
  - B. Press F2 to select the continuous mode. In the continuous mode, the servo will feed each time it is commanded until the command stops or the operator presses the "F4" return key.

# LOADING MATERIAL

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## Loading Material Into The Servo Feed

Upon the satisfactory completion of all the tests, you should be ready to load a strip of material into the servo feed.

Step number one is to select the manual mode of operation on the operators console. Then choose "Operate Rolls". This will allow you to open the feed rolls and anti-backup rolls to accept the material but only if you have purchased the option. You could also open the rolls manually by lifting the lever mounted on the side of the servo feed. Position the leading edge of the material with the center of the entry rolls. Adjust the edge guides on the cascade rolls to the proper width setting. Open the feed rolls and or anti-

backup rolls. Hand feed the material into the servo unit until it protrudes out of the feed rolls and starts into the guide on the press. Close the anti-backup rolls (if purchased) to capture the material, then close the feed rolls.

Check the roller force pressure to be sure that there is enough pressure to prevent slippage but not too much to induce camber into the material. The pressure setting is the amount of force necessary to move the material into the press at the speed and feed programmed. You may find it necessary to readjust the force as you finalize the setup procedure. The amount of force needed will vary depending on the width and type of

material being fed. Make a note of the final setting to aid in the setup of the servo feed the next time the same material is run.

You are now ready to begin testing the complete system under power. To check the progression, cycle the servo and press first in the manual mode then in the single cycle mode. If the progression is correct, no further adjustments are necessary. If the progression is either short or long, go to the troubleshooting chart and perform the sequences described there for inaccurate feeding, once the feed progression has been accurately set and the repeatability is satisfactory, you are ready for full automatic mode.

# PROGRAMMING PROCEDURE

## Operator Input Terminal – Programming Procedure – Standard Software

The intent of this section is to familiarize the operator with the program flow and what to expect with every keypress. Each screen on the display will be reviewed with special comments to help clarify what is being asked on the screen. The program flow is broken down into 5 sections with the main menu being the home position.

The first screen to be displayed on the operator terminal will look like this

**RAPID-AIR CORPORATION  
4601 KISHWAUKEE STREET  
ROCKFORD, IL 61109  
815-397-2578**

After a few seconds, the display will clear and the following display will appear:

**MAIN SELECTION MENU  
F1=JOB NUM F2=MANUAL  
F3=AUTOMATIC CYCLE  
F4=REVIEW PARAMETERS**

### SELECT F1=JOB #

The first step in programming the servo feed is to select a job number which will be used to store the parameters the operator inputs or recall the parameters which have been previously loaded into the servo controller program. When the operator selects F1 on the keypad, the screen will change to:

**JOB # SELECTION MENU  
ENTER IN NEW JOB #=XX  
PRESS F4 KEY AFTER  
CORRECT # IS ENTERED**

The operator must enter a 2-digit number before proceeding to any other function. If the job number the operator has entered has been

previously stored in memory, or entering a new job, the following display will appear:

**JOB NUMBER-01 LOADED  
F1=PROGRAM PARAMETERS  
F4=DON'T ALTER VALUES  
THAT ARE PROGRAMMED!**

If entering in a new job then select (F1) "program parameters" and follow the directions.

The job number screen displays (2) choices for the operator. In the first choice, F1=Program new values, the operator can enter or change the, pilots, feed length, % of max speed and cut time. This then calculates the optimum speed of the material movement. The second choice, F4= Don't alter values that are programmed, puts the job number entered in memory for running at this time. If F1 was selected the following display would appear.

**FEED ADVISOR JOB#=00  
FEED LENGTH=000.000  
CUT = XXX % RATE=100  
F4=EXIT FEED ADVISOR**

This window is displayed during job setup calculations.

**CALCULATING THE FEED  
SPEED, ACCEL VALUES  
PLEASE WAIT FOR MAIN  
MENU TO BE DISPLAYED**

Pressing the F4 key at any time returns you to the main menu.

**MAIN SELECTION MENU  
F1=JOB # F2=MANUAL  
F3=AUTOMATIC CYCLE  
F4=REVIEW JOB PROGRAM**

In order to advance material into the die, using the servo feed, the operator has to be in the manual mode. Pressing the F2 on the keypad will cause the screen to change to the manual mode screen. (Cycle rolls with keys) - If the keypad has keys with open rolls or closed rolls on it then the keys are active at this time and the rolls can be electrically released for inserting the material into the servo feed.

**MANUAL MODE F1=INCH  
F2=SINGLE FEED MODE  
F4=EXIT MANUAL MODE  
CYCLE ROLL WITH KEYS**

### F1=INCH MODE

Pressing the F1 key will let the operator select a jog mode type, continuous or jog to length. In the continuous mode, the servo will run at a slow rate of speed until the button is released. In the jog to length mode, the servo will run at a slow rate of speed until the job number feed length is reached then it will stop. The key has to be released and depressed to jog again.

Depressing the F2 key will direct the servo to feed forward and pressing the F3 key will direct the servo to feed in reverse.

**JOG! TYPE=CONTINUOUS  
F1=ALTER TYPE OF JOG  
F2=FORWARD F3=BACKUP  
F4=EXIT (INCH MODE)**

Pressing the F4 key once will reset the program to the jog mode screen so that jog is now active. Pressing the F4 key twice will reset the program to the manual mode screen. If the F4 key was pressed twice then the following screen is displayed.

# PROGRAMMING PROCEDURE (CONTINUED)

## Operator Input Terminal – Programming Procedure – Standard Software

**MANUAL MODE F1=INCH  
F2=SINGLE FEED MODE  
F4=EXIT MANUAL MODE  
CYCLE ROLL WITH KEYS**

### F2=SINGLE FEED

If the operator presses F2 then the following screen is displayed. The single feed mode is active and every time the F1 key is pressed then the feed will cycle and move the distance indicated on the feed length line.

**JOB#=00 FL=000.000  
F1=FEED SINGLE LENGH  
F2=CUT F3=SINGLE CYC  
F4=EXIT (SINGLE FEED)**

Pressing F4 once resets the program to the manual mode display. Pressing the F4 key twice resets the program to the main menu display. If the F4 key was pressed twice the following screen is displayed.

**MAIN SELECTION MENU  
F1=JOB# F2=MANUAL  
F3=AUTOMATIC CYCLE  
F4=REVIEW JOB PROGRAM**

### F3=AUTOMATIC CYCLE

You can now select between batch or continuous mode

**SELECT CONTINUOUS OR  
BATCH CYCLE F1=BATCH  
F2=CONTINUOUS CYCLE  
F4=EXIT TO MAIN MENU**

### F2=CONTINUOUS

If the F2 key was pressed then the servo will be in the auto total mode and the following screen appears.

**AUTOMATIC TOT=000000  
JOB#=00 CUT=0.150  
FL=000.000 SPEED=100  
ACCEL=001% F4=RETURN**

Pressing the F4 key, stops the automatic cycle and the main menu screen appears.

**MAIN SELECTION MENU  
F1=JOB# F2=MANUAL  
F3=AUTOMATIC CYCLE  
F4=REVIEW JOB PROGRAM**

### F3=AUTOMATIC CYCLE

If the feed has been properly set up, tested in manual, press electrically interlocked with feed, feed and pilot switches wired to the correct terminals, then pressing the F3 key will display the following screen.

**SELECT CONTINUOUS OR  
BATCH CYCLE F1=BATCH  
F2=CONTINUOUS CYCLE  
F4=EXIT TO MAIN MENU**

### F1 =BATCH

If the F1 key was pressed then the servo will be in the auto batch mode and the following screen appears.

**BATCH SETTING=000000  
BATCH COUNTER=000000  
F1=RESET BATCH COUNT  
F4=CONTINUE WITH COUNT**

If F1 (reset batch count) is pressed then the batch count will be reset to its preset value. If F4 (continue with count) is pressed the batch count will remain at its present value. Either F1 or F4 will lead to the following screen.

**AUTOMATIC BATCH=000000  
JOB#=XX CUT=0.XXX  
FL=XXX.XXX SPEED=XXX%  
ACCEL=XXX% F4=RETURN**

Pressing the F4 key, stops the automatic cycle and the main menu screen appears.

When the automatic screen is displayed, all keys except the F4 key are inactive. Every time the press cycles and trips the feed switch, the feed will cycle once per the parameters displayed on the screen. If the feed encounters excessive material drag while feeding or the material being moved encounters a restriction that stops the material forward movement then a servo fault can occur. If this happens then the following screen is displayed.

**DRIVE FAULT OCCURED  
NOTE TYPE OF FAULT—  
(xxx)**

Example of fault – (2) = motor over temperature.

### Look up fault code printout listed in this manual.

To reset the fault, the master on-off switch has to be cycled which will reset the controller. The material path should be checked for obstruction and parallelism to the die. If all this seems to be satisfactory and another fault occurs the factory should be consulted.

**MAIN SELECTION MENU  
F1=JOB# F2=MANUAL  
F3=AUTOMATIC CYCLE  
F4=REVIEW JOB PROGRAM**

# PROGRAMMING PROCEDURE (CONTINUED)

## Operator Input Terminal – Programming Procedure – Standard Software

The last section to be covered is the ramp/counters section. To get into this mode, press the ramp push-button and the following screen appears.

**SELECT RAMP/COUNTERS**  
**F1=BATCH/TOTAL COUNT**  
**F2=ACCEL/DECEL RAMPS**  
**F4=EXIT TO MAIN MENU**

### F1 =BATCH/TOTAL COUNTS

Pressing the F1 key will bring up the batch/total screen, which is used for presetting the batch count or resetting the total count. The following screen appears.

**BATCH COUNTER=000000**  
**TOTAL COUNTER=000000**  
**SET:F1=BATCH F2=TOT**  
**F4=RETURN TO RAMP COUNT**

Pressing the F1-batch counter key allows the operator to preset a batch count.

Pressing the F2-total counter key resets the total count to zero. This cannot be undone so be sure that the counter should be reset to zero before pressing F2 key.

Pressing the F4 key brings up the following screen.

**SELECT RAMP/COUNTERS**  
**F1=BATCH/TOTAL COUNT**  
**F2=ACCEL/DECEL RAMPS**  
**F4=EXIT TO MAIN MENU**

The only section that has not been covered in this write-up is the ramp adjust mode. The ramp adjusts how fast the servo motor gets up to speed and how fast it stops. This feature is an asset that is seldom adjusted but can be a sure cure if material slippage seems to be a problem. With the main menu screen displayed the key labeled ramp is active. Pressing the ramp key produces this display.

**RAMP PARAMETER MODE**  
**F1=ACCEL% F2=DECEL%**  
**F3=PERCENT MAX SPEED**  
**F4=RETURN RAMP/COUNT**

### PRESS F1 OR F2

Pressing the F1 or F2 keys will produce one of the following displays. The lower the number entered, the longer the ramp cycle. Press F1 or F2 now.

**ENTER IN %ACCEL RATE**  
**MAX%=75000 RPM/SEC**  
**MAX ACCEL%=XXX%**  
**F4=EXIT %ACCEL MENU**

**ENTER IN %DECEL RATE**  
**MAX%=75000 RPM/SEC**  
**MAX DECEL% = XXX%**  
**F4=EXIT %DECEL MENU**

The ramp usually is factory set at .015 on the series 100 drives and .035 on the series 200 & 300 drives. There is some deviation to this when the factory runs the unit, but this is a basic starting point.

# PARALLELISM

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## Drive Roll Parallelism Adjustment

Every servo feed has an eccentric adjustment screw to adjust the upper roller to be in parallel to the lower roller. The maximum adjustment is .008" on the eccentric.

The adjustment screw is located behind the belt cover and is held fast by a 10-32 socket head cap screw. The actual adjustment screw is a slotted eccentric pin which is turned clockwise or counter-clockwise to raise or lower one end of the upper roll.

The parallel adjustment is factory set when the unit is manufactured but if material tracking seems to be a problem then this could be a way of solving the problem. To test if the rolls need adjustment, do the following.

1. Remove the front and rear roll covers.

2. Raise the anti-backup rolls. (If any) main rolls should be closed.
3. Shine a light from the rear of the feed toward the main rollers.
4. Inspect from the main rolls side to see if the rollers are parallel. If they are then the material could be the cause of the material walking. If they are not parallel then an adjustment has to be made.
5. To make the adjustment:
  - a. Remove manual roll release arm by removing roll pin.
  - b. Remove belt cover.
  - c. Locate eccentric screw and loosen 10-32 screw.
  - d. Turn slotted eccentric screw while viewing rolls until the rolls are parallel.
  - e. Tighten 10-32 screw and reassemble parts, then retry running material.

For a more accurate adjustment use a feeler gauge to check the parallelism. This completes the eccentric adjustment write-up, if there are further questions, please call the factory.

- \* Before attempting to solve a possible roll parallelism problem by readjusting the rolls or calling the factory, perform the following test.

Step 1) A 3 to 5 foot length of material should be cut from the storage loop proceeding the servo feed.

Step 2) Lay the material next to a straight line to see if the material is cambered. If it is then this could be the reason that the material is walking. If not, then turn the material upside down from the way it was being fed and insert into the feed. If the material walks in the opposite direction then the material could be to blame.

# TROUBLESHOOTING

<b>Problem</b>	<b>Cause</b>	<b>Remedy</b>
No power indication	<ul style="list-style-type: none"> <li>– Disconnect off</li> <li>– Blown fuse</li> <li>– Master button in</li> </ul>	<ul style="list-style-type: none"> <li>– Turn disconnect on</li> <li>– Check / replace fuse</li> <li>– Pull button out</li> </ul>
No display on operators console	<ul style="list-style-type: none"> <li>– Program fault</li> <li>– Faulty wiring</li> </ul>	<ul style="list-style-type: none"> <li>– Check lights on P.C.</li> <li>– Check plug on console</li> </ul>
Power on – no motion	<ul style="list-style-type: none"> <li>– Program fault</li> <li>– Drive fault</li> <li>– Program error</li> </ul>	<ul style="list-style-type: none"> <li>– Check lights on drive</li> <li>– Check lights on servo drive readout</li> <li>– Check parameters</li> </ul>
No roll action	<ul style="list-style-type: none"> <li>– No air</li> <li>– Low air pressure</li> </ul>	<ul style="list-style-type: none"> <li>– Check air line</li> <li>– Check air regulator</li> </ul>
Material will not enter rolls	<ul style="list-style-type: none"> <li>– Anti-backup closed</li> <li>– Feed roll adjusting mechanism too close</li> <li>– Material too thick</li> </ul>	<ul style="list-style-type: none"> <li>– Open rolls</li> <li>– Open adjustment mechanism</li> <li>– Check servo parameters</li> </ul>
Material will not feed	<ul style="list-style-type: none"> <li>– Low roller force</li> <li>– Oily material</li> <li>– Program fault</li> <li>– Obstruction in die</li> </ul>	<ul style="list-style-type: none"> <li>– Raise roller pressure</li> <li>– Clean material</li> <li>– Check parameters</li> <li>– Check die</li> </ul>
Material feeds short	<ul style="list-style-type: none"> <li>– Accel to fast</li> <li>– Lower roller force</li> <li>– Oily material</li> <li>– Obstruction in die</li> <li>– Feed signal to close to pilot release</li> </ul>	<ul style="list-style-type: none"> <li>– Lower accel speed</li> <li>– Raise roller pressure</li> <li>– Clean material</li> <li>– Check die</li> <li>– Move feed signal input so rolls are closed to feed</li> </ul>
Material feeds long	<ul style="list-style-type: none"> <li>– High % max speed</li> <li>– Material slippery</li> <li>– Decel set too high</li> </ul>	<ul style="list-style-type: none"> <li>– Lower % max feed speed</li> <li>– Lower % decel</li> <li>– Lower % decel</li> </ul>
Material camber	<ul style="list-style-type: none"> <li>– High roller force</li> <li>– Bad stock</li> </ul>	<ul style="list-style-type: none"> <li>– Lower roller pressure</li> <li>– Check stock at input for camber</li> </ul>

# TROUBLESHOOTING (CONTINUED)

<b>Problem</b>	<b>Cause</b>	<b>Remedy</b>
Material feeds off center	<ul style="list-style-type: none"> <li>– Edge guides not set properly</li> <li>– Material not centered to feed</li> <li>– Bad material</li> </ul>	<ul style="list-style-type: none"> <li>– Set edge guides</li> <li>– Center material</li> <li>– Try new roll of material</li> </ul>
No automatic cycle	<ul style="list-style-type: none"> <li>– No press signal</li> <li>– Controller fault</li> <li>– Servo fault</li> <li>– Program error</li> </ul>	<ul style="list-style-type: none"> <li>– Check limit switch input to servo control</li> <li>– Check lights on drive</li> <li>– Check lights on drive</li> <li>– Check parameters on display</li> </ul>
Servo hum	<ul style="list-style-type: none"> <li>– Servo velocity gain too high</li> <li>– Belt too loose or tight</li> </ul>	<ul style="list-style-type: none"> <li>– Consult factory</li> <li>– Readjust belt tension</li> </ul>
Fault signal on Pac-Sci is displayed	<ul style="list-style-type: none"> <li>– Servo fault</li> <li>– Material jam</li> <li>– Power surge / failure</li> </ul>	<ul style="list-style-type: none"> <li>– Recycle power</li> <li>– Check die</li> <li>– Check / recycle power</li> </ul>
Cannot program unit from display	<ul style="list-style-type: none"> <li>– Program fault</li> <li>– Data Instruments interface jumper loose</li> </ul>	<ul style="list-style-type: none"> <li>– Check Pac-Sci &amp; call factory</li> <li>– Check Data Instruments connection</li> </ul>
Mechanical pilot release sticks down	<ul style="list-style-type: none"> <li>– Too much overtravel</li> <li>– Broken spring</li> <li>– Needs lube</li> </ul>	<ul style="list-style-type: none"> <li>– Restrict travel of mechanical actuating arm</li> <li>– Remove plate and check springs</li> <li>– Remove plate and lubricate release bar</li> </ul>

# MOTOR SERVICE AND FAULT DISPLAY

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## Servo Motor Service

The servo motor is flanged mounted and secured with four socket head cap screws. The motor removal has to be done in a sequence as described below.

1. The manual roll release handle has to be removed. The inner roll pin holds the handle to the shaft. Once this is removed the handle should slide off the shaft.
2. The belt guard has to be removed. It is fastened with four 1/4-20 socket head cap screws on the 100 & 200 servos and five 5/16-18 socket head capscrews on the 300B.
3. Remove the belt tension then remove the motor.
4. Install new motor and reassemble in reverse order of the previous instructions.
5. When reinstalling the belt, the tension on the belt should be 1/64" deflection per inch

distance between the center lines of the pulleys using 1.5 to 2 lbs. force to cause the deflection. The best way is to tension the belt and try running the servo for a few cycles. If you get a high vibration on the belt when the feed stops then you have to readjust the belt tension. It will have to have more or less tension to stop the vibration of the belt.

### MANIFOLD ASSEMBLY

The manifold assembly was designed to give the customer easy access to the components. The valve for the electric roll release and if supplied, the anti-backup valve is mounted on the side of the feed. The air regulator and pressure gauge is mounted on the input side of the feed. All can be easily replaced if needed.

### ROLLER AND GEAR BOX ASSEMBLY

At this stage of disassembly, all field maintenance components are exposed and easily accessible. No further field service should be necessary on the roller and gear box assembly unless the gear train is suspected of a malfunction. The drive rolls should be checked for erroneous wear pattern while they are exposed and cleaned before reassembly.

### MAINTENANCE PROCEDURES

#### DAILY

Wipe off feed rolls.  
Clean any dirt from servo unit.  
Clean any dirt from operators pendant.

#### WEEKLY

Check wear pattern of rolls.

#### MONTHLY

Check oil level.  
Check cables for cuts or wear.

## Servo Fault Display

The Pacific Scientific drive has a list of internal faults and displays the number of that fault on its readout located on the front of the drive.

Rapid-Air now displays the fault on the keypad display. If a fault occurs the screen will display the number and the name of the fault, but there will not be an explanation accompanying the

fault. This is a tool to help you to troubleshoot if the servo fails to perform when commanded.

If a fault was displayed the servo controller will have to be turned off and re-started to clear the fault. If the fault is still present when the Pacific Scientific unit is restarted, the fault may not be

displayed on the keypad screen as the fault will not let the internal program restart. The control panel will have to be opened to view the fault again.

A list of probable faults and some explanation is included in this section. If more help is required, then Rapid-Air will have to be contacted.

# TROUBLESHOOTING

## Fault Code

(Predefined Variable, Integer, Status Variable, Read-Only)

Guidelines - 0 means the drive is not faulted and not enabled, while 8 means the drive is not faulted and enabled. Alternating 8.> means actively inhibiting CW motion and alternating 8.< means actively inhibiting CCW motion

Status LED	Value	Fault Meaning
(Blinking) 1	1	Velocity feedback (VelFB) over speed
(Blinking) 2	2	Motor Over-Temp
(Blinking) 3	3	Drive Over-Temp
(Blinking) 4	4	Drive I*t
(Blinking) 5	5	1-n Fault (9x3)
(Blinking) 6	6	Control ±12 V supply under voltage
(Blinking) 7	7	Output over current or bus over voltage
(Blinking) 9	9	Not Assigned
(Blinking) A	10	Bus OV detected by DSP
(Blinking) b	11	Auxiliary ±5V Low
(Blinking) C	12	Not assigned
(Blinking) D	13	Not assigned
(Solid) E*	14	Processor throughput fault
(Blinking) E*	14	Power Up Self Test Failure
(Alternating) E1	225	Bus UV, Bus Voltage VBUSTHRESH
(Alternating) E2	226	Ambient Temp Too Low
(Alternating) E3	227	Encoder commutation align failed (Only CommSrc=1)
(Alternating) E4	228	Drive software incompatible with NV memory version
(Alternating) E5*	229	Control Card hardware not compatible with drive software version
(Alternating) E6	230	Drive transition from unconfigured to configured while enabled
(Alternating) E7	231	Two AlnNull events too close together
(Alternating) F1	241	Excessive Position Following Error
(Alternating) F3	243	Parameter Checksum Error (Memory Error)

\* FaultReset cannot reset these faults.

See ExtFault for further information on Blinking E, Blinking 1 and Alternating F3.

# REASSEMBLY AND LUBRICATION

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## Reassembly Of Unit

Prior to assembly, attention must be given to three points of contact that require an application of Moly-Cote, Lubriplate or other suitable heavy grease.

The three points are:

1. The antibackup piston which is located at the feed entrance.
2. The main roll piston and the spiral pins in the main roller tie plate which can be seen by

- viewing straight down through the center of the feed at approximately halfway from the inlet to the exit roller. The piston is positioned horizontally at the base of the feed and approximately in the center of the feed if viewing from the gear box to the belt cover.
3. The mechanical roll release shaft located at the exit side of the

feed. Three screws have to be removed and then the keeper plate can be removed. The inner shaft should be thoroughly greased to prevent sticking.

Do not apply excessive grease as it may fall onto the drive rollers and cause misfeeding due to material slippage. All bearings are sealed and need no additional lubrication.

## Lubrication Of Unit

The gear box oil must be kept up to sight gauge level and changed after every 2000 hours of use.

Recommended oil is Mobil #SHC630 or equivalent. The oil reservoir capacity is 3.5 oz. The oil can be drained by removal of the drain plug located near the base of the gear housing cover, just below the sight gauge. The oil reservoir is filled through the pipe thread port occupied by the air breather plug

near the upper edge of the gear housing cover.

**NOTE:** THE ORIGINAL BREAK-IN OIL IN THE GEAR BOX SHOULD BE CHANGED AFTER 100 HOURS OF CYCLE TIME AND EXAMINED FOR CHIPS OR FOREIGN MATTER. REPLACE THE GEAR BOX OIL PER INSTRUCTIONS.

The anti-backup rollers have been

lubricated at the factory and should need no further attention. If they are found to slip in the reverse direction, consult the factory for further assistance.

### **PINCH ROLL & ANTI-BACK UP ACTUATING PISTONS**

Periodically grease with lubriplate or equivalent grease to anti-backup and pinch roll actuating piston nose where it contacts the pressure plate.

# PRECAUTIONS & SAFETY

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## Precautions & safety

- NEVER** – Put screwdrivers or foreign materials in feed rolls
- NEVER** – Hold onto material as it is being fed through the servo
- NEVER** – Wear neckties around the servo feed rolls
- NEVER** – Force the rolls open by prying on them
- NEVER** – Modify the mechanical aspects of the servo feed
- CAUTION** – Contact the factory before drilling any holes in the unit
- CAUTION** – Wear proper eye protection when working around the servo
- CAUTION** – Do not wear loose clothing around the servo feed rolls

# WARRANTY

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## Warranty Terms & Conditions

**ALL SALES BY THE COMPANY ARE MADE SUBJECT TO THE FOLLOWING TERMS AND CONDITIONS. PLEASE READ.**

**WARRANTY** – The Company warrants, for a period of one year from date of shipment by the Company, that the product shipped is free from defects in material and workmanship. **THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL IMPLIED WARRANTIES IN LAW, INCLUDING MERCHANT - ABILITY.** The Company obligation under this warranty is limited to repairing or replacing, F.O.B. Madison, SD, any part or parts proved to have been defective when shipped. In no event shall the Company be liable for special or consequential damages. Provisions set forth in specifications are descriptive and subject to change and are not intended as warranties.

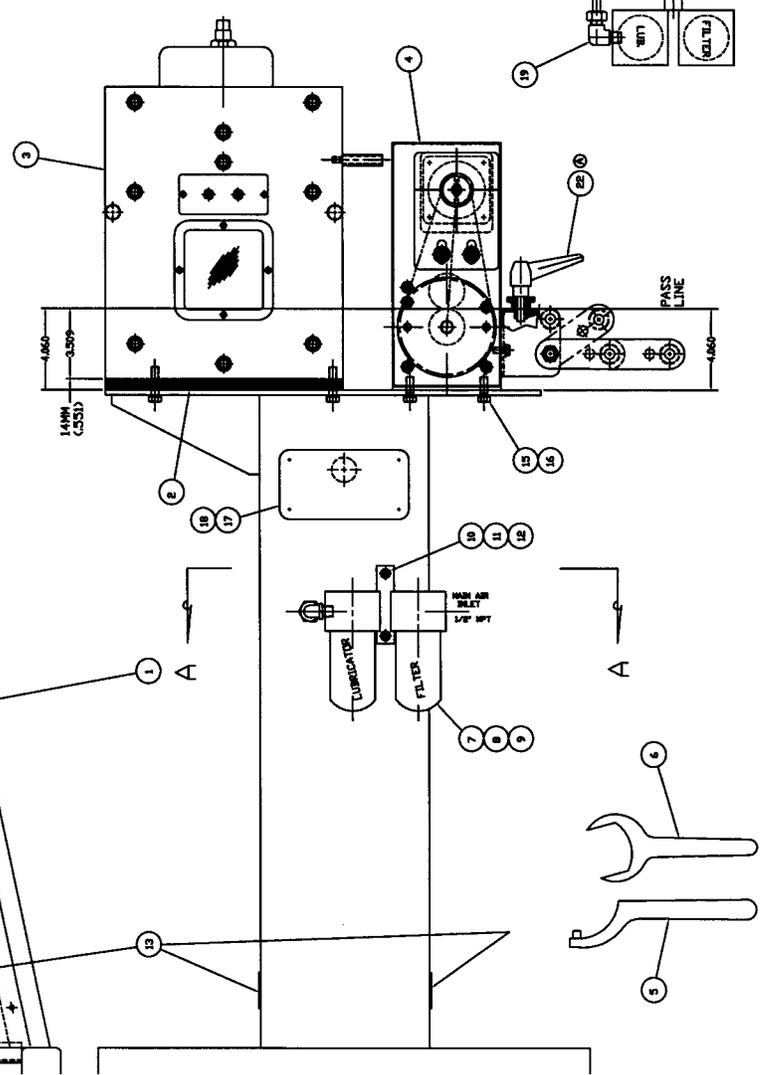
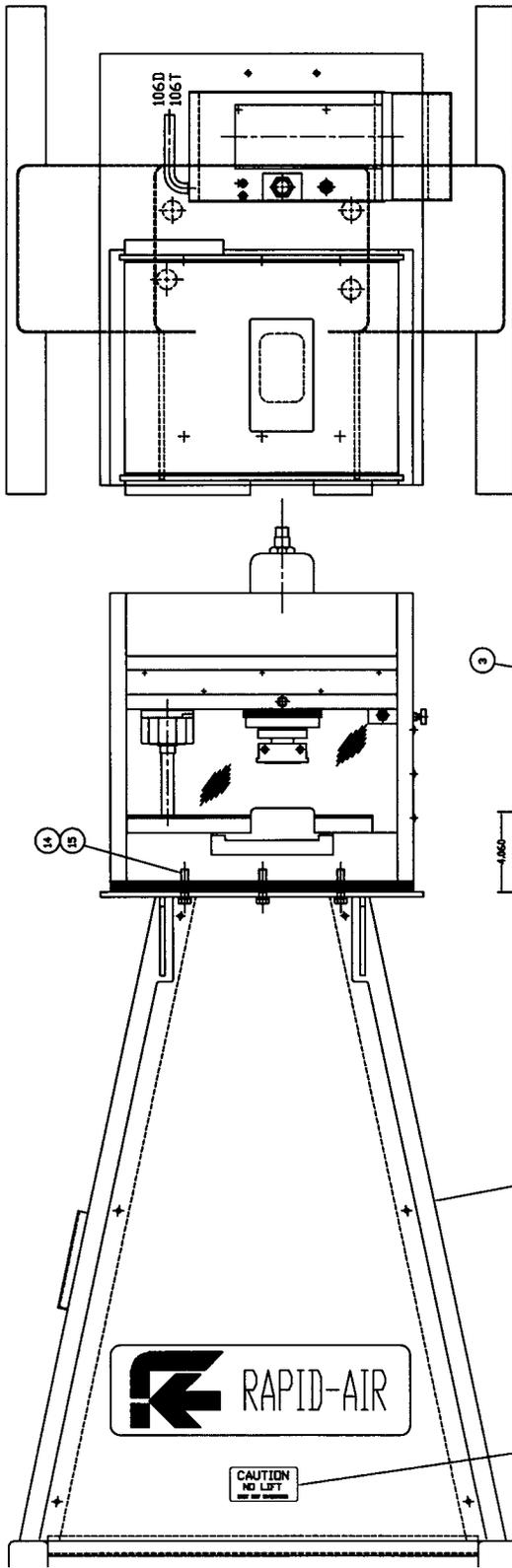
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You may use the program only on the programmable servo computer furnished with the system and only in conjunction with the servo feed supplied with the system.

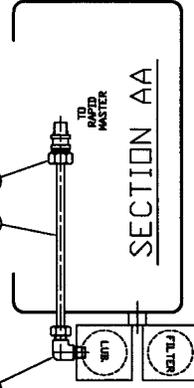
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- A. Copy, distribute, or document the program for others.
- B. Modify or merge any portion of the program for use on non compatible hardware.
- C. Make alterations to the program.

# Rapid-Master/106 Servo CTL



QTY	PART NO.	DESCRIPTION
22	10900250	10900250 CASCADE ASSEMBLY
21	67100146	67100146 FITTING
20	67100145	67100145 TUBING
19	67100140	67100140 FITTING
18	66610037	66610037 M3CS 810-3E X 3/8
17	21500468	21500468 COVER
16	6596100	6596100 HEX BOLT 3/8-16 X 1
15	6596100	6596100 HEX BOLT 3/8-16 X 1 1/2
14	6596150	6596150 CAUTION LABEL
13	39500206	39500206 LUBRICATOR
12	6596100	6596100 HEX BOLT 3/8-16
11	6596100	6596100 HEX BOLT 3/8-16
10	6596100	6596100 HEX BOLT 3/8-16
9	6596100	6596100 HEX BOLT 3/8-16
8	6596100	6596100 HEX BOLT 3/8-16
7	6596100	6596100 HEX BOLT 3/8-16
6	6596100	6596100 HEX BOLT 3/8-16
5	6596100	6596100 HEX BOLT 3/8-16
4	13000411	13000411 SPANNER WRENCH
3	24000001	24000001 RAPID MASTER ASSEMBLY
2	25500003	25500003 RAPID MASTER CHECK PAB
1	21600107	21600107 CABINET ASSEMBLY



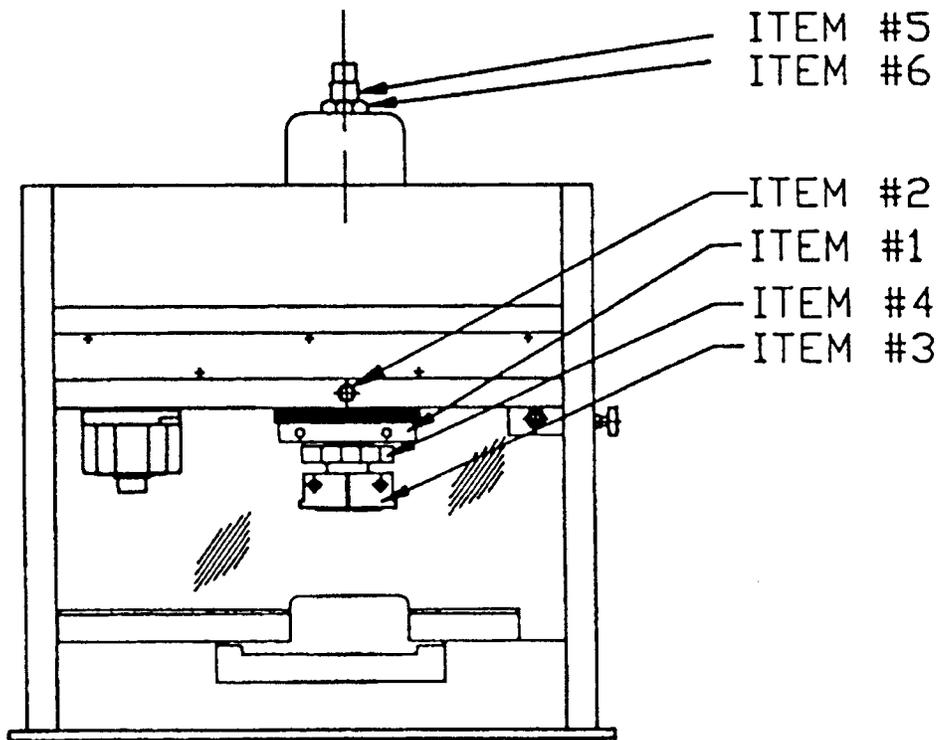
QTY	PART NO.	DESCRIPTION
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FOR RAPID-MASTER  
VALVE USE PART 1

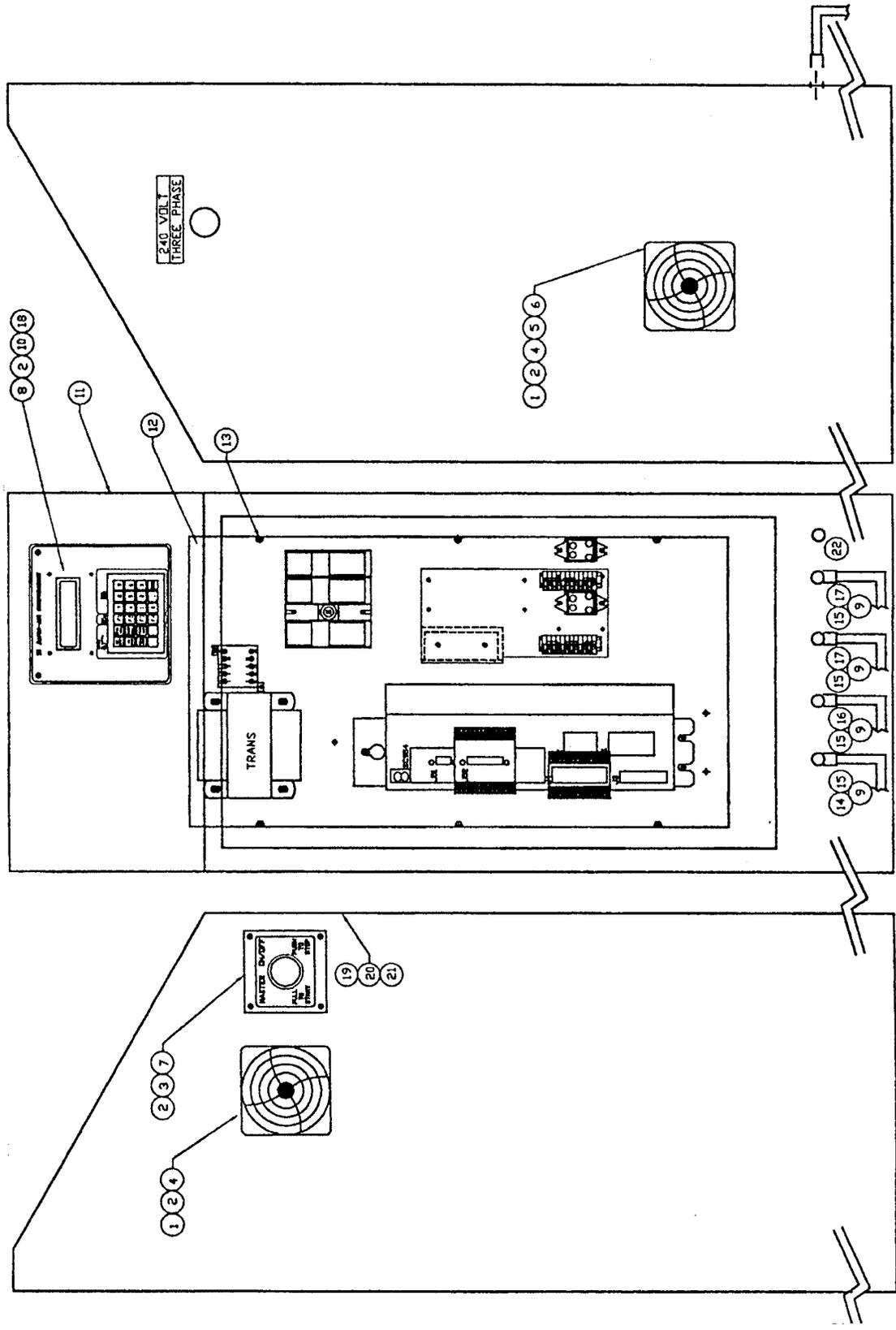
# SET-UP

## Mechanical Set-Up Of Die Or Punch

- 1) Secure the die set to the bolster plate.
- 2) The piston adjustment sleeve (item #1), establishes the stroke to a maximum of .50 inches when fully extended. The stroke is reduced by 1.8 inches with each full inward rotation, using the 3-3/4 spanner wrench provided. The piston stroke adjustment sleeve is locked in place with a nylon tipped set screw (item #2).
- 3) Lift the punch holder plate and loosely connect it to the inner shaft ram adjustment screw with the two half shell clamps (item #3) provided.
- 4) Adjust the inner shaft (item #4) for proper open height, using the wrench provided.
- 5) Tightly secure the punch holder plate to the inner shaft.
- 6) Lower the piston, piston shaft and piston sleeve by rotating the adjustment screw on top of the head assembly (item #5) with the crank provided. This is done to check the full stroke set up. If all adjustment are within limits, the top adjustment screw should be retracted to fully raise the piston and ram assembly.
- 7) Lock the upper adjustment screw (item #6) in the up position.



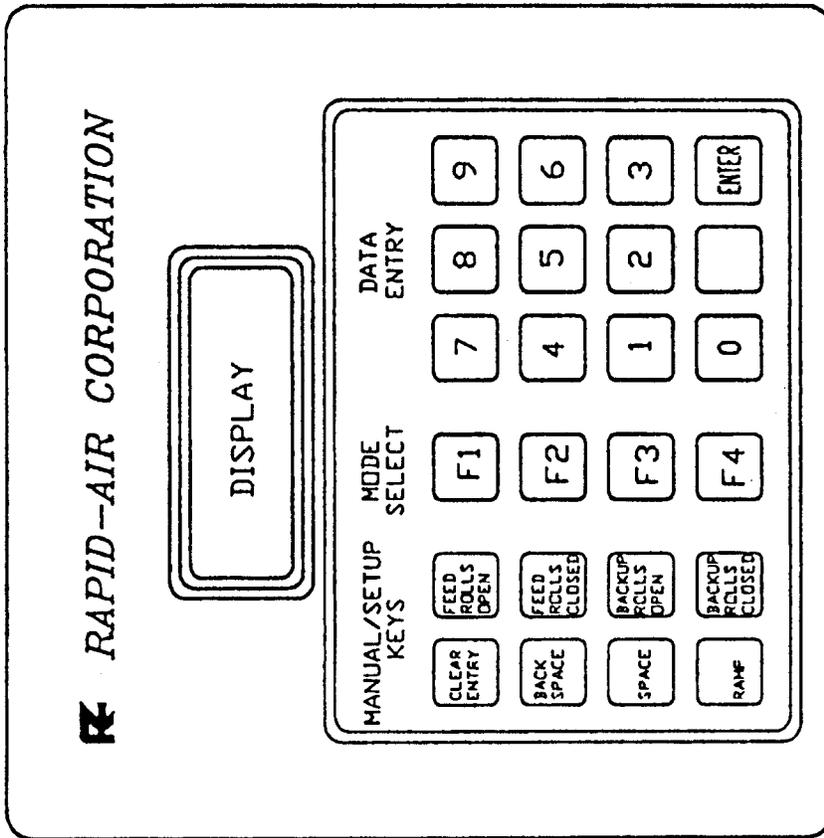
# Electrical Schematic



MTR. RESOLVER ROLL ANTI-  
 CABLE. CABLE. RELEASE BACKUP  
 CABLE. CABLE. INTERFACE  
 INPUT

855XX275

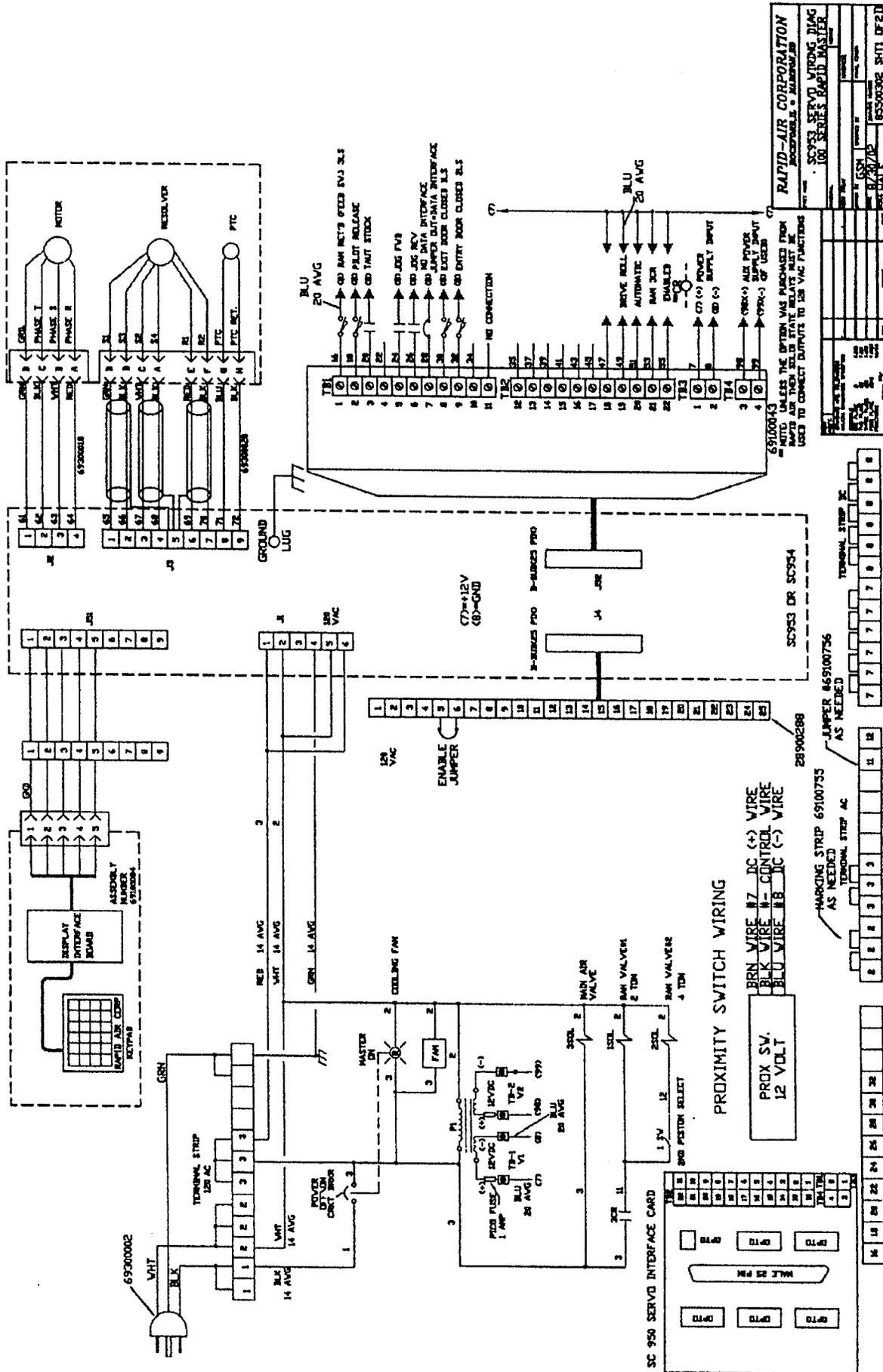
# Keypad



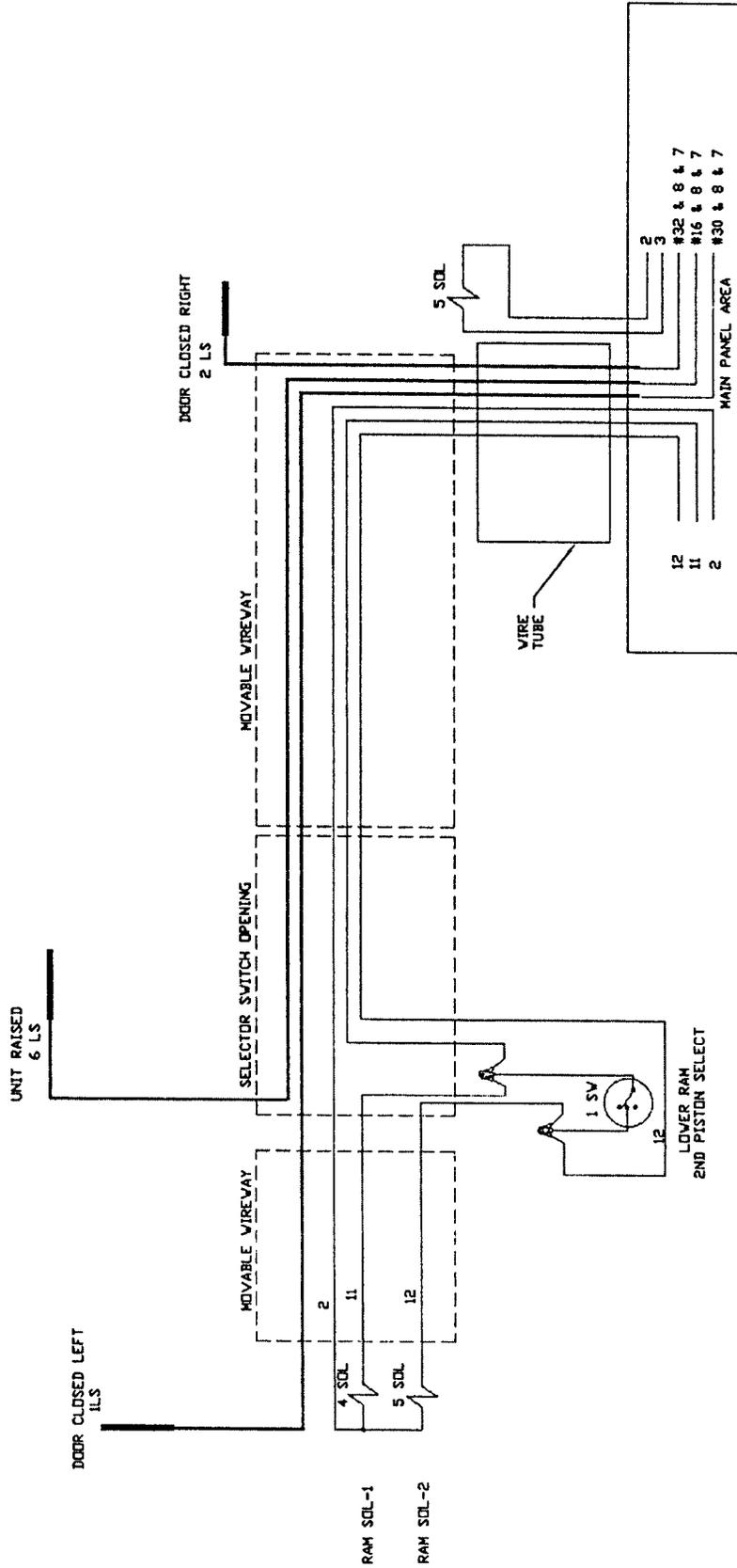
\*\* Keypad shown with all options .  
Left 2 rows may vary depending  
on options purchased.

TOP VIEW

# 100 Series Rapid Master - SC953 Servo Wiring Diagram



# Inter-Connect Wiring Diagram



PROXIMITY SWITCH WIRING  
 BRN WIRE #7 - IC (+) WIRE  
 BLK WIRE # - CONTROL WIRE  
 BLU WIRE #8 - IC (-) WIRE  
 PROX SW.  
 12 VOLT

### CABLE ASSEMBLY

PIN #	WIRE COLOR	WIRE #
PIN 1	GREEN BLACK (PAIR)	GROUND
PIN 2	WHITE BLACK (PAIR)	#2
PIN 3	RED BLACK (PAIR)	#3
PIN 4	BROWN BLACK (PAIR)	#11
PIN 8	BLACK OF BLUE BLACK	#7
PIN 9	BLUE OF BLUE BLACK	#8
PIN 10	YELLOW OF YELLOW BLACK	#16
PIN 11	BLACK OF YELLOW BLACK	#30
PIN 12	ORANGE OF ORANGE BLACK	#32

RAPID-AIR CORPORATION ROCKFORD, IL • MADISON, SD	
FORM NO.	INTER-CONNECT WIRING
REV.	DIAGRAM RAPID MASTER
DATE	8/31/02
BY	CSM
CHKD	CSM
APP'D	CSM
SCALE	FULL
FIG. NO.	85500302 SH12 DF2

