

Gag Feed Program

The standard "GAG" feed program is a multiple feed length program within a specified job number. The different programmed feed lengths will be referred to as sequences. Each sequence can be repeated many times with a choice of using any combination of 8 outputs per sequence. Although this is the standard program, Rapid-Air can program other configurations in any combination to meet the customer's requirements.

The standard "GAG" feed program has 10 jobs with 10 programmable sequences per job. Each sequence can be a different feed length which can be repeated up to 99 times. The following chart depicts the previous write-up.

GAG FEED

TOTAL JOBS	10
TOTAL SEQUENCES	10
TOTAL REPEATS	99
TOTAL OUTPUTS	08

The job, sequence, repeats and outputs are software programmable. The output will activate when the sequence is activated and remain activated until the next sequence.

START UP SECTION (100-200-300 S SERIES)
12/98

Congratulations on purchasing a Rapid-Air Servo. Not only did you receive a complete servo unit but also telephone support by one of our engineering staff to guide you on using the new servo to it's maximum capability.

In order to maximize your learning time and trouble shoot 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 should be in place and unit turned on.
3. All interface switches should be wired and tested.
4. Air if needed should be connected and ready to be used.
5. All servo interface questions should be directed to your distributor first then to Rapid-Air. Please call 815-397-2578 and ask to have these questions directed to the proper personnel.

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CHARTS AND DRAWINGS

PLAN 100 SERIES

PLAN 200 SERIES

PLAN 300 SERIES

SERVO BRACKET SIDE 100 SERIES
200/300 SERIES - 4&8"

ELECTRICAL PANEL LAYOUT

OPERATORS TERMINAL LAYOUT

STROKES PER MINUTE VS. FEED WINDOW

PRESS-FEED AND PILOT SWITCH SETTINGS

INTERFACE SCHEMATICS 953

INTRODUCTION

The Rapid-Air Servo feed 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 stamping industry.

The compact mechanical package, direct coupled with a brushless servo drive motor, offers response and feed accuracies unparalleled in any other powered roll feed. Operator interface is so simplified, a typical setup person can have the Rapid-Air servo feed programmed and running in a matter of minutes. A step by step prompt, on the four line 80 character display, asks simple questions of the operator. Entry of feed length, strokes per minute, feed arc, and pilot 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 10 jobs and 10 sequences per job may be stored and recalled at will.

Operator programmed feed length, up to 999.999 inches and % max speed selection along with full jog features, 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 precision mechanical roll feed unit has been designed for compactness, ease of setup and installation. A 230 volt, 3 phase supply and an air line are all that is required of the customer. Two cables with twist lock plugs and one or two cables for the air valve control are supplied with the control and need only be connected to the proper locations. 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 area

INSTALLATION AND MECHANICAL SETUP OF SERVO FEED

The shipping container should contain:

- 1 Mechanical Servo Feed -Standard
- 1 Console Complete -Standard
- 1 Cascade Assembly -Optional (100 Series) (Standard 200-300 Series)
- 1 Servo Mounting Bracket -Optional
- 1 Guide Support Assy. -Optional

If a mounting bracket was purchased then it should be installed at this time. There are mounting bracket prints in the back of the manual for hole location dimensions and a bracket mounting instruction section can be found later in this section.

If a mounting bracket was not purchased then the feed should be positioned with the centerline of the drive roller in line with the centerline of the die entrance and at the proper pass line height to the die. Aligning the feed to the die (Parallelism) is very important to the accuracy of the feed. Drag due to misalignment can cause short feeds and servo faults.

If the feed is positioned as such that the material has to move unsupported from the exit side of the feed to the die and the material being moved is allowed to droop or buckle during a move, a short feed can occur. A guide should then be built between the feed and the die to solve this problem.

The following chart lists the servo size with the proper bolt size.

SERVO	BOLT	QUANTITY
Series 100 All	3/8-16	4
Series 200 4&8" Wide	3/8-16	4
12" Wide	1/2-13	4
Series 300 All	1/2-13	4

The servo mounting bolts should not penetrate into the servo body by more than .625".

INSTALLATION AND MECHANICAL SETUP OF MOUNTING BRACKET

The cast mounting bracket is available for mounting the servo feed directly to the bolster plate of the press. There are several sets of mounting holes in the bracket to afford the setup person an efficient means of mounting the bracket. Mounting holes are located on the top and front for securing the bracket firmly. It is very important that the servo bracket and the servo feed be secured and not allowed to float or vibrate.

Note: It is very important that the end of the bolster plate where the servo feed is to be mounted, be perpendicular to the top surface of the bolster plate within $\pm .005$ to assure the servo feed will be aligned for proper feeding.

Align the servo feed bracket with the center line of the bolster plate and transfer the mounting holes on the top face. There are two 1/2" holes on the smaller bracket and 3 1/2" holes on the large bracket.

Once the bracket has been aligned and secured to the bolster plate, the servo feed can now be put in place. The slotted holes in the mounting bracket allow for accurate alignment of the servo feed in the x-y axis. There is an elevating screw to position the servo feed to the proper tooling pass line height.

When the servo feed has been aligned and mounted to the bracket, loosen the elevator locking screws and position the servo to match the tooling pass line height. This is accomplished by turning the adjusting screw provided. When the servo is correctly positioned, tighten the elevator locking screws to prevent the unit from moving. There are 2 locking screws on the small bracket and 3 locking screws on the large bracket.

The unit is now assembled and the next step will be to attach the electrical and air to the servo feed unit.

Material alignment is critical. The servo feed rolls are so precise that they will move the material in whatever direction that they are presented to the die. The feed and die must be in line and square to one another. The servo feed does not have the power of a press driven roll feed so the feed will fault out if misaligned. This is a good warning and if corrected could result in better tool life.

MECHANICAL ROLL RELEASE SETUP

All Rapid-Air feeds are set up to add a mechanical pilot release. If the mechanical pilot release is used, and we recommend this for press speeds faster than 250 SPM, then a bracket must be fabricated and attached to the press ram to actuate the pilot release mechanism.

(Note: The roll release height adjustment screw should be backed off all the way to prevent jamming when using the mechanical release.

The bracket should be made adjustable for tuning to the press position in which the roll release should occur. Some attention should be given to the bracket stroke length so that the release mechanism is not jammed into the feed during the press stroke.

The 100 series pilot release actuator has a 1" stroke to full open with an additional .750" overtravel before bottoming out.

The series 200 and series 300 pilot release actuator has a 2" stroke to full open with an additional .750" overtravel before bottoming out.

We do not offer any manufactured bracket to assist you because there are as many combinations for stroke and clearance as there are presses manufactured today.

We do, however, ask that the bracket be designed to withstand considerable resistance as the mechanism has to defeat or overcome the incoming air pressure or roller pressure spring force depending on which servo unit you purchased.

ELECTRIC PILOT RELEASE

If an electric pilot release is used and the servo is a series 200 or series 300 then a switch from the press has to be wired into the control box to control when the release has to take place. If a series 100 was purchased then an optional pneumatic pilot release has to be purchased.

OPTIONAL PILOT RELEASE #10900449 (100 series)

The optional pilot release package consists of a valve, fitting, relay and solenoid cable. A switch signal from the press has to be wired to the control panel and an air line has to be connected to the valve from the main shop air. The relay and solenoid cable will have to be mounted and wired in the electric cabinet if it is to be used with the program.

Optional Mechanical Pilot Release - 100 series #10900483

Optional Mechanical Pilot Release - 200 series #10900489

Optional Mechanical Pilot Release - 300 series #10900490

ELECTRICAL CABLES AND AIR LINE

230 VAC INPUT

The required input voltage to the control is 230 Vac, 3 Ph, 60 Hz. The amperage needed is 10 amps for 953 control and 20 amps for the 954 control. 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, 6 KVA for the 100S and 200S servos and for the 300S servos, 460/230 VAC 3PH, 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 and if the series 200 or 300 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.

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)

INTERFACING SERVO FEED WITH A PRESS

The Servo Drive unit is a slave to the press therefore it needs a command from the press to operate in the automatic mode.

The command is in the form of a normally open contact from a limit switch, cam switch or an electronic feed interface device that can be programmed.

The contact should be commanded or activated at 270 degrees of the press stroke or when the tooling is clear of the material and released and turned off at around 350 degrees of the press stroke. The significance of the release position is to insure that the feed switch is released with the press top stopped. Once the program senses a closure of the feed input, it will command a move and will complete the move regardless of the switch position.

The air operated pilot release also has to have a signal input to operate. The pilot signal should be set to turn on when the point of the pilot is entering the hole. This signal then commands the air roll release to raise and release the material, letting the pin pull the material forward into position. The release should be then commanded to turn off at approximately 180 degrees, letting the rollers return to a holding position for the next move.

The roll release stop adjustment screw is located at the entrance of the feed. (See drawing for your servo) The screw is used to limit the travel of the roller during release. Adjustment may be necessary if using air pilot release at a somewhat high speed with the pilot release deactivating and feed switch activating at a close proximity with each other in degrees of press stroke. To adjust, insert material into the feed, lower rolls, adjust screw, using 3/16 hex wrench, to full in. Release rolls and adjust screw so the material is free to be pulled in by the pilot pin. The adjustment is now complete.

(NOTE: This adjustment does limit the manual roll release travel. If this causes a problem back off the adjustment a little.)

The schematic in the back of this manual points out the switch or contact connections for wiring the interface. Locate the feed and pilot signal input and wire per print. The feed input number is (J52)TBI-1) and the pilot input number is (J52)TBI-2).

This completes the initial setup of the servo feed to the press or other device. The servo is now ready to run as intended.

If more complete interfacing is needed, please refer to the section (interfacing) in this manual for an explanation of inputs and outputs available.

PRETEST FOR SERVO FEED AND PRESS WITHOUT MATERIAL

Now that your servo feed unit has been mounted 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 initiate 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 gage 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 preset 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.

Now, you can cycle the press and watch the rolls to verify that the signal from the press window switch signal is functional and actuating at the proper time.

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.

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 antibackup rolls to accept the material. 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 material near 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 press in the single cycle mode with the servo feed in the automatic 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.

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. ANTI-BACKUP INPUT (J52)TBI-4)

Whether the anti-backup rolls were purchased with the unit or came on the unit standard, they can be activated to raise in the automatic cycle. The anti-backup rolls, by design, keep the material from sliding back during the pilot operation. They can become a hindrance if the material tends to walk to one side or the other during the feed cycle.

The anti-backup switch can be used as a solution. If the material walking problem is being experienced then a switch or a cam switch with a normally open contact can be wired in from the press. Usually this switch is activated when the press is at 180 degrees or when the die is closed to be sure that the material is being held in position. The rolls will raise for the amount of degrees that the switch is activated, letting the material reposition itself in line with the die. It is crucial that this switch is not activated for too long a time as when the die releases the material, the material will slide back which will cause a misfeed. This feature has to be used in conjunction with the main rolls being raised or it will not give the desired results as one of the rolls will be holding the material from moving.

C. 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.

D. GAG OUPUTS J53(TB2-15) to (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. If using DC coils then 3-30 VDC sink, max 100 MA, per output.

E. END OF FEED OUTPUT ((J52)TB2-13)

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 and stays high for programmed duration before going low.

F. AUTOMATIC OUTPUT ((J52)TB2-11)

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 low whenever automatic is selected on the program panel. Any faults will cause the automatic output to go high.

G. KEYPAD AND DISPLAY INTERFACE (RS 232 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.

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.

SERVO

To help you to enter a job from the keypad, let's create an example.

We will use a feed length of three inches and want to run at 100 strokes per minute. We have a pilot pin on the die, so pilots will have to be used. The max feed arc will be 180 degrees.

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.
 - B. F2 = feed-advisor-calc. This should be used when entering a new job number. The two main inputs are the feed length and strokes per minute. The third input is to enter a "1" or a "0" for pilots. We will put in a "1" for "yes for pilots". The fourth input is the feed arc. This is preprogrammed as 180 degrees and need not be changed to set up a job unless specific move parameters in relation to press stroke position is required. To move around in this screen, press the "enter" key in the lower right corner of the key pad. Once the feed length and strokes per minute are entered, then 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.
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 it's 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.

FEED ARC

To explain how the “feed arc” is related to the servo feed calculation, we must first explain what the feed arc is in relation to a press.

The press has a die that has two halves. The lower half is stationary and the top half is moveable in an up and down motion which is one cycle from the full open to the full closed to the full open again. The component that makes all of this happen is named “crankshaft”. The crankshaft makes a 360 degree revolution for one cycle of the die from open to close to open again. When the die is fully open, the crankshaft would be at “0” degree position. When the die is fully closed the crankshaft is at 180 degrees or one-half of a revolution.

We ask that a switch be set at 270 degrees to activate the feed because at this position, the die is completely clear of the material. This is also a good starting point to explain the “feed arc” portion of the auto calculation in the Rapid Air program.

If the feed input switch was tripped at 270 degrees of the total revolution of the crankshaft and the arc calculation was 180 degrees then the servo feed would complete it's feed by 90 degrees of the press cycle or 180 degrees past the 270 degree mark.

The feed arc could be set at 90 degrees so the feed cycle would be complete by 360 degrees or when the press was at the top of the stroke.

The feed arc could be set at 270 degrees so the feed cycle would be complete when the press was at 180 degrees. This example would not work if the feed cycle started at 270 degrees as the feed would still be trying to move the material when the die was closed or together. To use a 270 degree feed arc the feed would have to start at 230 degrees or 240 degrees to be finished moving the material before the die was closed or together. This example could not be possible if the die had pilot pins installed in it for precise locating of the stamped part. The cam switch drawing in the back of the manual will help you visualize the above feed arc explanation.

In essence, the larger the feed arc number up to 270 degrees, the lower the acceleration/ deceleration rate. The smaller the feed arc the higher the acceleration/deceleration rate and the fewer strokes per minute for a given feed length.

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. Reviewing the flow chart in the back of this manual will help in understanding the sections.

SECTION1 — F1=JOB ENTRY

SECTION2 — F2=MANUAL MODE

SECTION3 — F3=AUTOMATIC

SECTION4 — F4=REVIEW JOB PARAMETERS

SECTION 5 — RAMP=ADJUST ACCELERATION AND DECELERATION

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 MENU
F1=JOB      F2=MANUAL
F3=AUTOMATIC CYCLE
F4=REVIEW JOB PROGRAM
```

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 JOB NUMBER=XX
PRESS F4 KEY ONCE
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 NEW VALUES
F4= DON'T ALTER VALUES
THAT ARE PREPROGRAMMED
```

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 number of sequences, repeats per sequence, pilots, feed length, strokes per minute that the press is running and feed arc angle. (Free travel of the press in which the feed can move material without a problem) 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.

```
JOB NUMB=XX ENTER IN  
NUMB OF SEQUENCES=XX  
PRESS F4 KEY ONCE  
CORRECT # IS ENTERED
```

By definition a sequence is an event. Within a specific jobnumber there is a maximum of 10 sequences or events. A different sequence could be a new feed length or a different output or both. After choosing the amount of sequences then press the F4 key and the following screen appears.

```
FEED ADVISOR JOB#=00  
FL=000.000 SPM=000  
FEED ARC (ANGLE)=180  
F4=EXIT FEED ADVISOR
```

Input or change data at curser. At this time, the longest feed length and the maximum strokes per minute for this job should be entered to test if the feed parameters are within the specifications of what the feed can perform. When complete press F4 to exit. A fault window will appear if the feed length is too long for SPM. Feed arc is press free travel for feeding material. Max feed arc =300 degrees. The % of speed and then % accel rate is automatically calculated.

This is the fault window that is displayed if the feed length and strokes per minute are not within maximum parameters.

```
FEED PARAMETER OUT  
OF RANGE. THE LENGTH  
IS TOO LONG FOR FEED  
ARC OR SPM F4=REPEAT
```

F4=Repeat this command returns to the previous screen so that the new parameters can be entered.

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

After pressing the F4 key and the parameters are within the operating range, the following screen appears.

```
JOB#=00 SEQUENCE=00
FL=000.000 REPEAT=00
OUT=00000000 PILOTS=0
PRESS ENTER FOR NEXT
```

This screen will repeat for all the sequences selected. Press enter key to move from FL, repeat, outputs and pilots. Press F4 key when all sequence parameters have been entered. When complete, the main menu will appear. If a feed rate is entered that is too long for the SPM then a fault screen will appear as previously described.

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 close 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 F2 key will only let the operator make a forward movement the amount that was programmed for the feed lengths of the job. Pressing F1 will display the following Jog Mode screen.

```
JOG MODE MOVE=X.XXX
F1=ENTER NEW LENGTH
F2=FWD F3=REV
F4=EXIT (MANUAL MODE)
F1=ENTER NEW LENGTH
```

Pressing the F2 or F3 button will command the servo to move the displayed move length at the top of the screen. Pressing the F1 key will let the operator decide the amount of travel each key press of forward or reverse will produce. The operator can input the amount of travel from .001 to 9.999 inches. Pressing F1 will display the following screen.

```
JOG MODE MOVE =X.XXX
ENTER IN DESIRED JOB
LGTH NEW LGTH=X.XXX
F4=RETURN (JOG 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

```
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#=000 FL=000.000
SEQUENCE=00 REP'S=00
F1=FEED SINGLE LNTH
F4=EXIT (MANUAL MODE)
```

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 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.

```
START AUTOMATIC FROM
F1=SEQUENCE NUMBER 1
F2=PREVIOUS SEQUENCE
```

After selecting one of the above choices the following screen appears.

```
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 FL=000.000
JOB #=00 SEQ=00 REP=00
TOTAL COUNTER=000000
F4=EXIT AUTO CYCLE
```

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

```
MAIN 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=COINTINUE 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 FL=000.000
JOB #=00 SEQ=00 REP=00
BATCH COUNTER=000000
F4=EXIT (AUTO CYCLE)
```

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 materail drag while feeding or the material being moved encounters a restriction taht 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

If this screen is displayed then the control cabinet has to be opened and the Pac-Sci drive has to be checked. 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 parrallelism to the die. If all this seems to be satisfactory and another fault occurs the factory should be consulted.

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

F4=JOB REVIEW

Pressing the F4 key will display the following screen. This screen asks for a sequence number to be reviewed or modified. The program only allows reviewing of a sequence in the job that is currently active. For an example, if job #1 had 4 sequences and sequence 1 was not functioning correctly then put ina 01 at this time.

```
REVIEW OR MODIFY SEQ
JOB NUMB=00 ENTER IN
THE SEQ=00 THEN
PRESS F4 TO CONTINUE
```

Pressing the F4 key will display the following screen.

```
JOB#=00 SEQUENCE#=00
FL=000.000 REPEAT=00
OUT=00000000 PILOTS=0
SPEED=000 ACCEL=000
```

The above screen displays the job number and the sequence that was selected. If all that was needed was to look at the sequence to verify that it was correct then pressing the F4 key will return you to the main menu. If there was a problem with this particular

sequence, like a length change, then the length could be adjusted now and the sequence would be changed in the job memory for any future running of the job. The repeats, outputs, pilots, speed and accel can also be adjusted at this time. When finished, press the F4 key and the main menu screen will be displayed.

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

```
SELECT RAMP/COUNTERS
F1=BATCH/TOTAL COUNT
F2=ALTER ACCEL/SPEED
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=TOTAL
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=ALTER ACCEL/SPEED
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. Pressing the F2 (alter accel/speed) key produces this display.

```
RAMP PARAMETER MODE
F1=CHANGE % OF ACCEL
F2= CHANGE % OF 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 ACCEL RAMP %
MAX%=75000 RPM/SEC
MAXIMUM ACCEL %=002%
F4=EXIT (RAMP MENU)

JOB NUMB=00 ENTER IN
PERCENT MAX VEL=000%
PRESS F4 KEY ONCE
CORRECT # IS ENTERED

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) and close main rolls.
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.
For a more accurate adjustment use a feeler gage to check the parallelism.
 - e. Tighten 10-32 screw and reassemble parts, then retry running material.

This completes the eccentric adjustment write-up, if there are further questions, please call the factory.

TROUBLESHOOTING CHART

PROBLEM	CAUSE	REMEDY
No power indication	Disconnect off Blown fuse Master button in	Turn disconnect on Check/replace fuse Pull button out
No display on operators console	Program fault Faulty wiring	Check lights on drive Check plug on console
Power on-no motion	Program fault Drive fault Program error	Check lights on drive Check lights on drive Check parameters
No roll action	No air Low air pressure	Check air line Check air regulator
Material will not enter rolls	Anti-backup closed Feed roll adjusting mechanism too close Material too thick	Open rolls Open adjustment mechanism Check servo parameters
Material will not feed	Low roller force Oily material Program fault Obstruction in die	Raise roller pressure Clean material Check parameters Check die
Material feeds short	Accel to fast Low roller force Oily material Obstruction in die Feed signal to close to pilot release	Lower accel speed Raise roller pressure Clean material Check die Move feed signal input so rolls are closed to feed.
Material feeds long	High % max speed Material slippery Decell set too fast	Lower % max feed speed Lower Decell speed Lower Decell speed.
Material camber	High roller force Bad stock	Lower roller pressure Check stock at input

TROUBLESHOOTING CHART (cont.)

PROBLEM	CAUSE	REMEDY
Material feeds off center	Edge guides not set properly Material not centered in feed	Set edge guides Center material
No automatic cycle	No press signal Controller fault Servo fault Program error	Check limit switch input to servo control Check lights on P.C. Check lights on drive Check parameters
Servo squeals while in position	Servo velocity gain too high	Consult factory
Fault signal on Pac-Sci is displayed	Servo fault Material jam Power surge/failure	Check fault chart Check die Check/recycle power
Cannot program unit	Program fault	Check Pac-Sci & Call factory.
Mechanical pilot release sticks down	Too much overtravel Broken spring Needs lube	Restrict travel of mechanical actuating arm Remove plate and check springs Remove plate and lubricate release bar

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.
3. Remove the belt tension and then the belt sheave has to be removed. To accomplish this, rotate the sheave until the large end of the tapered shaft is to the bottom. A support then has to be put under the center of the sheave to stop any deflection of the motor shaft when driving out the tapered pin that holds the sheave to the motor shaft. Drive out the pin and remove the sheave and then the motor.
4. Install new motor and reassemble in reverse order of the previous instructions.
Note: Use the sheave support when reassembling the tapered pin.
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.

MANIFOLD ASSEMBLY

The manifold assembly was designed to give the customer easy access to the components. The valve for the electric roll clamp and if supplied, the anti-backup valve are 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	WEEKLY	MONTHLY
Wipe off feed rolls	Check wear pattern of rolls	Check oil level
Clean any dirt from servo unit		Check cables for cuts or wear
Clean any dirt from operators pendant		

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 half way 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

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 & pinch roll actuating piston nose where it contacts the pressure plate.

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

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