

## Cut to Length with Multi Stroke Program

The standard multi-stroke 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 0 being entered for no repeats. Although this is the standard program, Rapid Air can program other configurations in any combination to meet the customer's requirements.

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

### GAG FEED

TOTAL JOBS	10
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TOTAL SEQUENCES	10
-----------------	----

TOTAL REPEATS	10
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The job, sequence and repeats are software programmable.

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## LISTING OF CHARTS AND DRAWINGS

PLAN 100 SERIES

PLAN 200 SERIES

PLAN 300 SERIES

ELECTRICAL PANEL LAYOUT

OPERATORS TERMINAL LAYOUT

PROGRAMMING MAP

JOB INPUT SEQUENCE

MANUAL SEQUENCE

AUTOMATIC SEQUENCE

STROKES PER MINUTE VS. FEED WINDOW

INTERFACE SCHEMATICS - 752

INTERFACE SCHEMATICS - 753

CUTTER MAINTENANCE

CUTTER BASE  
LAYOUTS

## INTRODUCTION

The Rapid-Air Servo Feed/Cutter (with multi stroke program) 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 with 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 greater response and feed accuracy than any other powered roll feed. Operator interface is so simple, a typical setup person can have the Rapid-Air 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 to the operator. Entry of job sequences, feed length, cutter dwell

time, are all that is required for a new setup. Routine jobs can be stored, recalled, changed, saved or run with a simple 2 digit job number entry. Up to 10 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  $\pm 0.0025$  for any programmed feed length or speed.

Operator can program feed lengths, 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 cutter.

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

## INSTALLATION AND MECHANICAL SETUP OF SERVO AND CUTTER

If you purchased the servo feed/cutter combination already mounted on a base then the servo and cutter 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 cutter 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 cutter and also the cycling shocks incurred during production.

When mounting the two devices. The pass line height of the cutter and the servo roller center line should be equal. Even more critical is the parallelism between the two devices. The cutter should be mounted first then the servo center line should be aligned to the cutter center line with the servo rollers parallel to the cutter blade.

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

Although the cutter and servo weights can be located in other sections of the manual. The following is a list of the weights.

Servo:

104 Servo-78 lbs.  
241 lbs.

204 Servo-119 lbs.

306 Servo-

108 Servo-87 lbs. 312 lbs.	208 Servo-159 lbs.	312 Servo-
112 Servo-101 lbs 339 lbs	212 Servo-187 lbs	318 Servo-
118 Servo-115 lbs. 493 lbs	218 Servo-203 lbs	336 Servo-

### Cutter:

4" Cutter-47 lbs.
6" Cuter-72 lbs.
8" Cutter-110 lbs.
12" Cutter-213 lbs.

The unit is now assembled and the next step is to attach the electrical and air lines to the servo and cutter.

## 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 to 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 also 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 it is required to connect and wire the 460 volt line to the enclosure. If you did not purchase a transformer from Rapid-Air then a 3 KVA, 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. The third connector is used to interface the cutter 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.

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 CUTTER

The servo drive unit is programmed to feed each time a signal is received from the cutter switch. The servo will feed one progression and wait for the next signal before it will feed again in automatic mode.

The command is in the form of a normally open contact from a proximity switch located on the cutter and is activated when the cutter is returned.

If the feed/cutter was purchased complete then the interfacing was done for you. If not then Rapid-Air has provided wiring to a terminal block for interconnection purposes. The interface schematic provides the wire numbers and how to connect the cutter to the feed.

This completes the initial setup of the servo feed to the cutter 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 CUTTER WITHOUT MATERIAL

Once the servo/cutter 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 initiate sequence to check it's 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 80psi and check that the roll pressure gage is functional by adjusting the pressure up and down. This is accomplished by turning the pressure adjust 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 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.

After all the checks have been made and you feel comfortable with the programming of the servo controller, place the servo in automatic mode. The servo will feed and when done the cutter will cycle. This will verify that the unit is working correctly.

## 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/cutter combination.

Step number one is to select the manual mode of operation on the operators console. If you purchased the series 100 servo and added the air operated roll release option then choose “Operate Rolls”. This will allow you to open

the feed rolls and anti-backup 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 near the center of the entry rolls and adjust the edge guides on the cascade rolls to the proper width setting. Open the feed rolls and 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 cutter. Close the feed rolls to capture the material.

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 feed and then cut or use 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.

## SERVO INTERFACING EXPLANATION

### A. TAUT STOCK INPUT (J52)TB1-6)

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)TB1-8)

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 was designed in for this program. If this 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 because 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 before this unit can function 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. ENABLE OUTPUT (J52)TB2-15)

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.

### E. CUTTER 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 the amount of time programmed by the operator when the job number was programmed.

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

## G. 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.

## H. STANDARD PROGRAM-INSTRUMENTS INTERFACE (J52)TB1-14)

With the jumper in place, the standard program is active. Remove jumper, recycle power and the Data Instruments is active. Only the manual mode will work with the keys at this time.

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.

## **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 at a reasonable cycles per minute.

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 shows two choices:

a) Program parameters - This should be used when programming or changing job parameters. The three inputs are feed length spm and cut time. Enter in the three inch feed length putting zeros where needed. (003.000) when finished, press the enter key and the selection underline moves to the spm input.

Enter is a stroke per minute. We will use 150 spm (0.150). Press the enter key again. The underline moves to the cut time selection. To start with, put in (0.150). This will cut the material in at a high rate and may not be enough time for thicker stock.

b) Don't alter parameters - this will just load the existing parameters without any changes. Exits to the main menu.

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 and the cutter will cycle for the max amount of time entered. Press F3 and the roll will move the material the feed length entered and then cut the material when the move is finished.

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.

## 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.

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 on	Disconnect off	Turn
Check/replace fuse	Blown fuse	
out	Master button in	Pull button
No display on operators console on	Program fault	Check lights on P.C.
	Faulty wiring	Check plug console
Power on-no motion lights on	Program fault	Check lights on P.C
	Drive fault	Check drive
parameters	Program error	Check

No roll action line	No air	Check air
regulator	Low air pressure	Check air
Material will not enter rolls adjustment	Anti-backup closed	Open rolls
mechanism	Feed roll adjusting mechanism too close	Open
servo parameters	Material too thick	Check
Material will not feed pressure	Low roller force	Raise roller
material	Oily material	Clean
cutter	Program fault	Check parameters
	Obstruction in cutter	Check
Material feeds short speed	Accel to fast	Lower accel

pressure	Low roller force	Raise roller
material	Oily material	Clean
cutter	Obstruction in cutter	Check
Material feeds long feed speed	High % max speed	Lower % max
Decell speed	Material slippery	Lower
Decell speed.	Decell set too fast	Lower
Material camber pressure	High roller force	Lower roller
stock at input	Bad stock	Check

## TROUBLESHOOTING CHART (cont.)

PROBLEM	CAUSE	REMEDY
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Material feeds off guides	Edge guides not set properly	Set edge
center material	Material not centered in feed	Center
No automatic cycle switch	No cutter returned signal	Check limit input to
servo control lights on P.C.	Controller fault	Check
lights on drive	Servo fault	Check
parameters	Program error	Check
Servo squeals while factory	Servo velocity gain too high	Consult
in position belt tension	Belt too loose or tight	Readjust

Fault signal on Pac-Sci power

Servo fault

Recycle

is displayed

Material jam

Check cutter

Power surge/failure

Check/recycle power

Cannot program unit

Program fault

Check Pac-Sci &

Call

factory.

Mechanical pilot release

Too much overtravel Restrict travel of

sticks down actuating arm

mechanical

plate and check

Broken spring

Remove

springs

plate and

Needs lube

Remove

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 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 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 MONTHLY

Wipe off feed rolls level

Clean any dirt from cables for cuts

servo unit

Clean any dirt from operators pendant

#### WEEKLY

Check wear pattern of rolls

Check oil

Check

or wear

## SERVO FAULT DISPLAY

The Pacific Scientific drive has a list of internal faults and displays the number of that fault on it's 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 trouble shoot if the servo fails to perform when commanded.

If a fault was displayed the servo controller will have to be turned off and restarted 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.

## 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

<b>STATUS LED</b>	<b>VALUE</b>	<b>FAULT MEANING</b>
(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 $\pm 12$ V supply under voltage
(Blinking) 7	7	Output over current or bus over voltage
(Blinking) 9	9	Not Assigned

(Blinking) <i>A</i>	10	Bus OV detected by DSP
(Blinking) <i>b</i>	11	Auxiliary +5V Low
(Blinking) <i>C</i>	12	Not assigned
(Blinking) <i>D</i>	13	Not assigned
(Solid) <i>E*</i>	14	Processor throughput fault
(Blinking) <i>E*</i>	14	Power Up Self Test Failure
(Alternating) <i>E1</i>	225	Bus UV, Bus Voltage VBUSTHRESH
(Alternating) <i>E2</i>	226	Ambient Temp Too Low
(Alternating) <i>E3</i>	227	Encoder commutation align failed (Only CommSrc=1)
(Alternating) <i>E4</i>	228	Drive software incompatible with NV memory version

(Alternating) <i>E5*</i> with	229	Control Card hardware not compatible drive software version
(Alternating) <i>E6</i>	230	Drive transition from unconfigured to configured while enabled
(Alternating) <i>E7</i>	231	Two AInNull events too close together
(Alternating) <i>F1</i>	241	Excessive Position Following Error
(Alternating) <i>F3</i>	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 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 BEAR 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 (if purchased) & 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**

## WARRANTY

**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.**

## CUSTOMER LICENSE AGREEMENT

**The RAPID-AIR CORPORATION reserves the rights in it's software. The software program is licensed by RAPID-AIR to the original purchaser of the equipment which contains the software for use only on the terms set forth in this license.**

**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.**

You may not without expressed permission from Rapid-Air:

- 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.

## 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 job number 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

TIME OF CUT = .XXX

F4=EXIT FEED ADVISOR

Input or change data at cursor. 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.

MAIN MENU

F1=JOB # F2=MANUAL

F3=AUTOMATIC CYCLE

F4=REVIEW JOB PROGRAM

SELECT F2=MANUAL

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

JOB#=00 SEQUENCE=00

FL=000.000 REPS-0000

PUSH ENTER TO SELECT

F4=PROGRAM NEXT STEP

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 cutter, 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

F1=FORWARD

F2=REVERSE - OR USE

EXTERNAL JOG PENDANT

F4=EXIT (INCH MODE)

F4=EXIT

Pressing the F4 key once will restart 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

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

SEQ#=00

F1=FEED F2=CUT

F3=FEED/CUT F4=EXIT

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

AND REPEATS POSITION

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 TOTAL=000000

JOB #=XX PILOTS=NO

LGTH=XXX.XXX SPM=XXX

SPEED=XXX% F4=RETURN

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

AUTOMATIC MODE

JOB =00 NUMBER OF SEQ=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.

START AUTOMATIC FROM  
F1=SEQUENCE NUMBER 1  
F2=PREVIOUS SEQUENCE  
AND REPEATS POSITION

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  
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 it's 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 CYCLE MODE

JOB =00 NUMBER OF SEQ=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 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

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 in 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  
SPEED=000 ACCEL=000  
F4=EXIT TO MAIN MENU

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 %

JOB NUMB=00 ENTER IN

MAX%=75000 RPM/SEC

PERCENT MAX VEL=000%

MAXIMUM ACCEL %=002%

PRESS F4 KEY ONCE

F4=EXIT (RAMP MENU)

CORRECT # IS ENTERED

## Multi-stroke Program Explanation

The Multi-stroke program is a cut-to-length program with the option of cutting different lengths with different quantities for each length within the same program or job

number.

The program consists of 10 jobs with 10 sequences per job. Each sequence has multiple repeats with a programmable timed output to the cutter.

The servo feed gets it's "go" signal to feed from the cutter returned switch and it in turn, the servo gives the cutter it's "go" signal in the cut time section of the programming. The cut time is actually how long the cut signal is to be energized or have the cutter valve turned on.

The program asks for a two digit job number and then the number of sequences required. This would be the number of different parts to be cut within the job number. The next step is the feed advisor section when the operator enters in the longest feed length at the strokes per minute required and the cut time. The stokes-per-minute usually is not the actual strokes-per-minute entered as the time required for the operation of each output varies with the actual operation of each component but this sets up the accel/decel and max speed of the servo motor.

The program then displays a window for each sequence with a feed length and repeats or number of parts required for that feed length.

The program then can be run in manual or automatic (continuous or batch) until the job is finished.

The Multi-stroke program remembers all aspects of the 10 jobs except for the batch section which has to be changed for each job. Each sequence within the job can be revised in the Review Parameters section so the job does not have to be completely reentered for a change in any one sequence.

## Example of sequences within a job.

### Job 01, 4 sequences

sequence 1

5.0 inch rep-100

sequence 2

8.0 inch rep-25

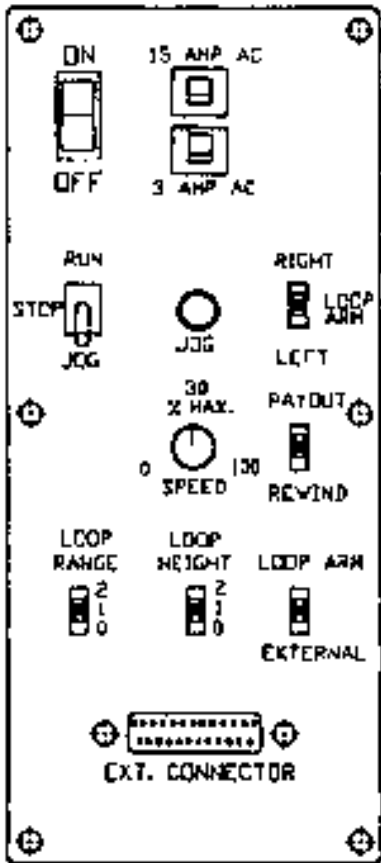
sequence 3

12.0 inch rep-10

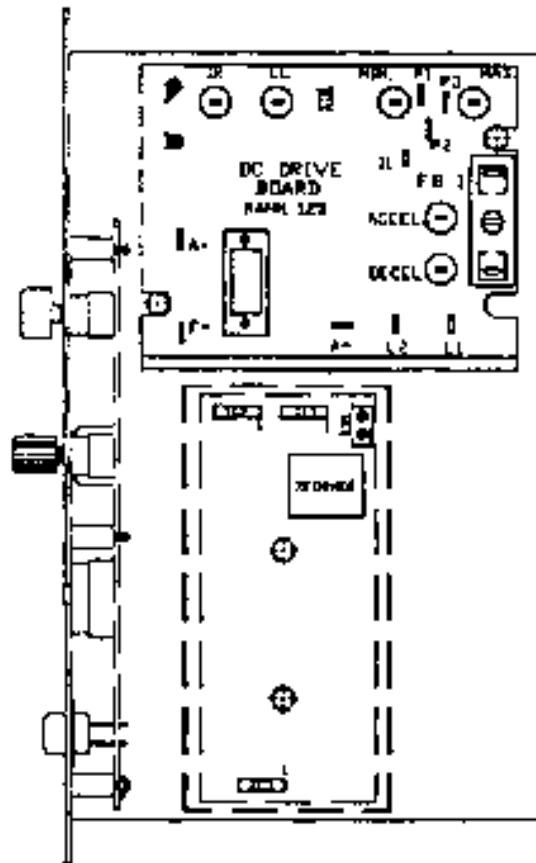
sequence 4

28.500 inch rep-2

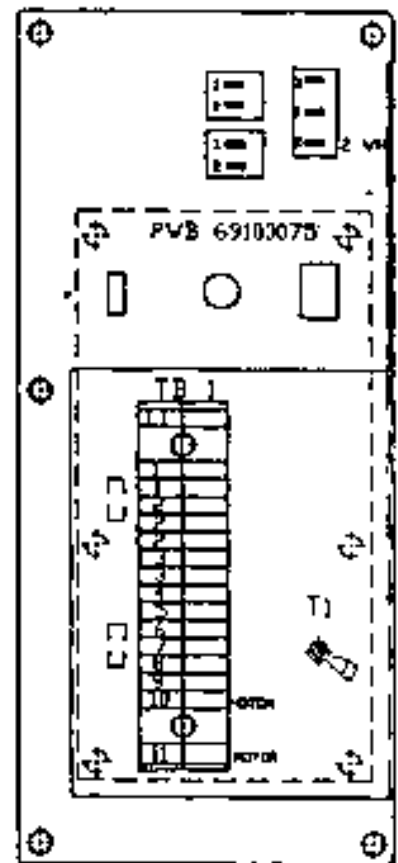
Fig Man 30



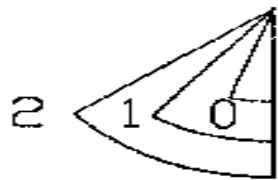
FRONT VIEW



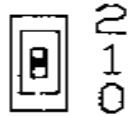
SIDE VIEW



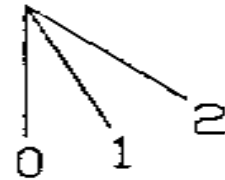
REAR VIEW



### LOOP RANGE



### LOOP HEIGHT



#### DANCER ARM LOOP HEIGHT ADJUSTMENT

Three different loop sensing arm operating positions are selected manually during set-up. By selecting the higher number, the zero point of the dancer arm is raised from its rest position to the angle shown (as indicated 0-2). The dancer arm will move from rest position to the angle selected before the pallet reel begins to rotate.

#### DANCER ARM LOOP RANGE FUNCTION



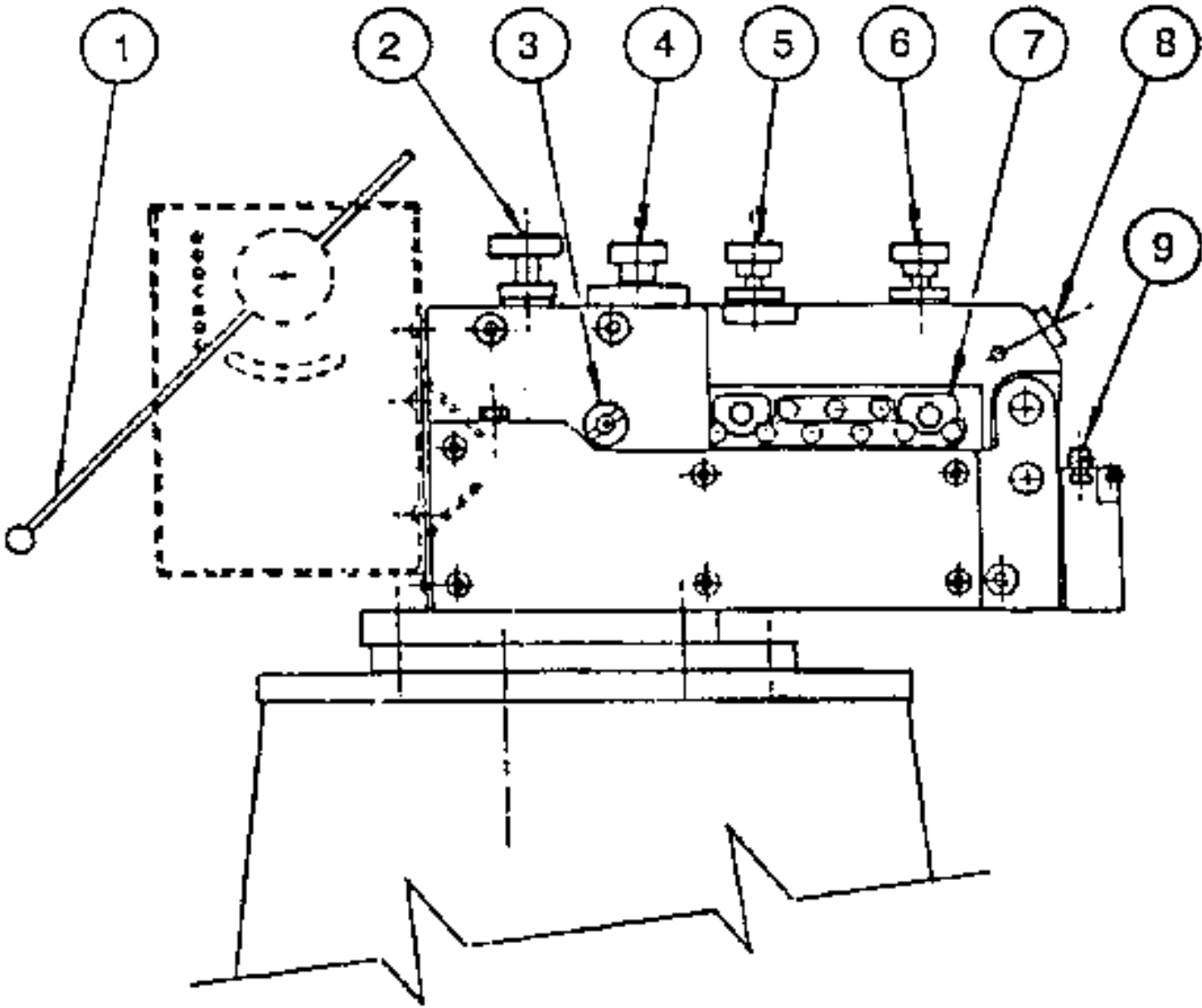
**30 degree** - Loop sensing arm travels through a full 30 degree arc to vary turntable rotation speed from slow to full speed as controlled by % speed pot.

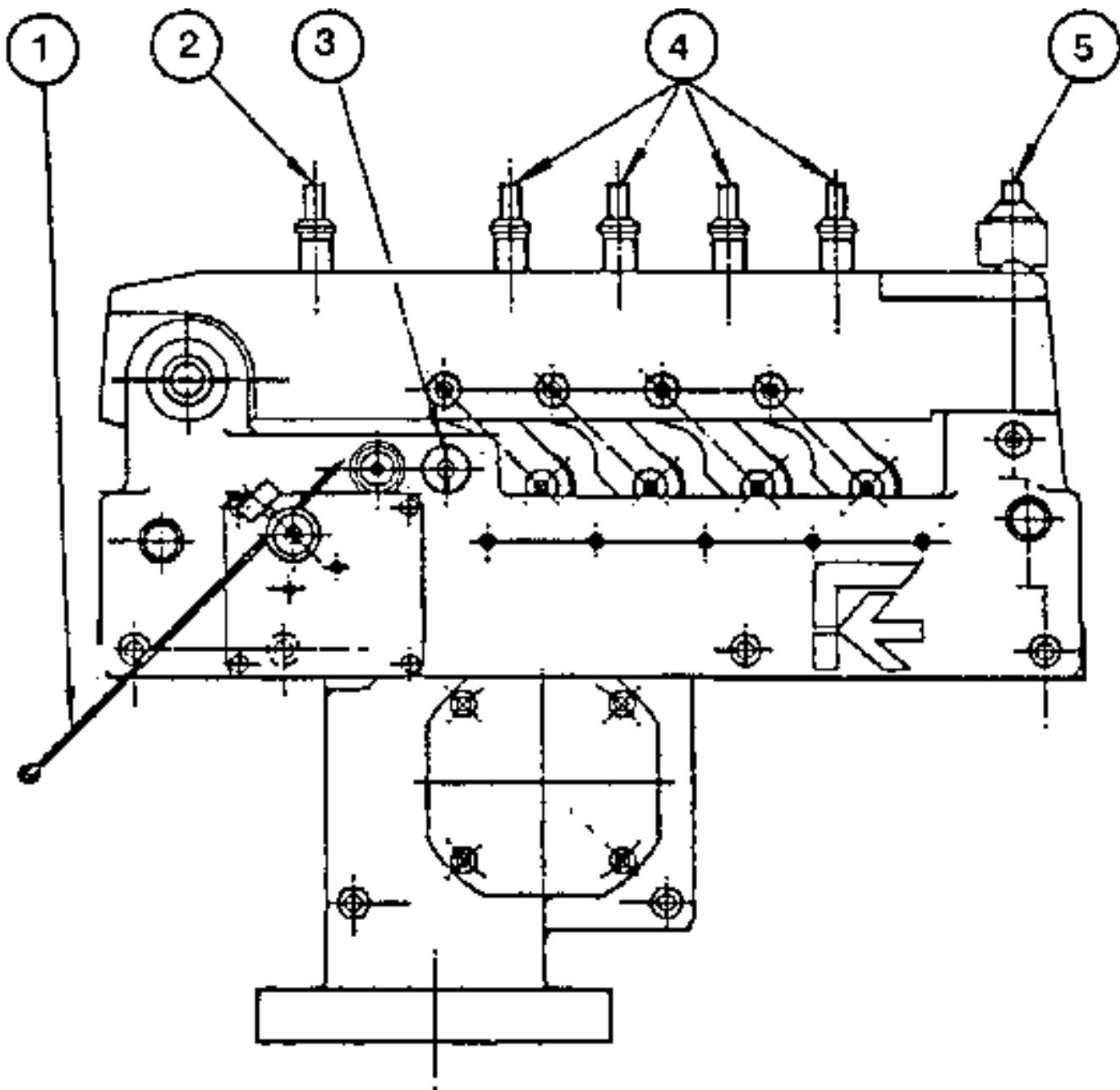


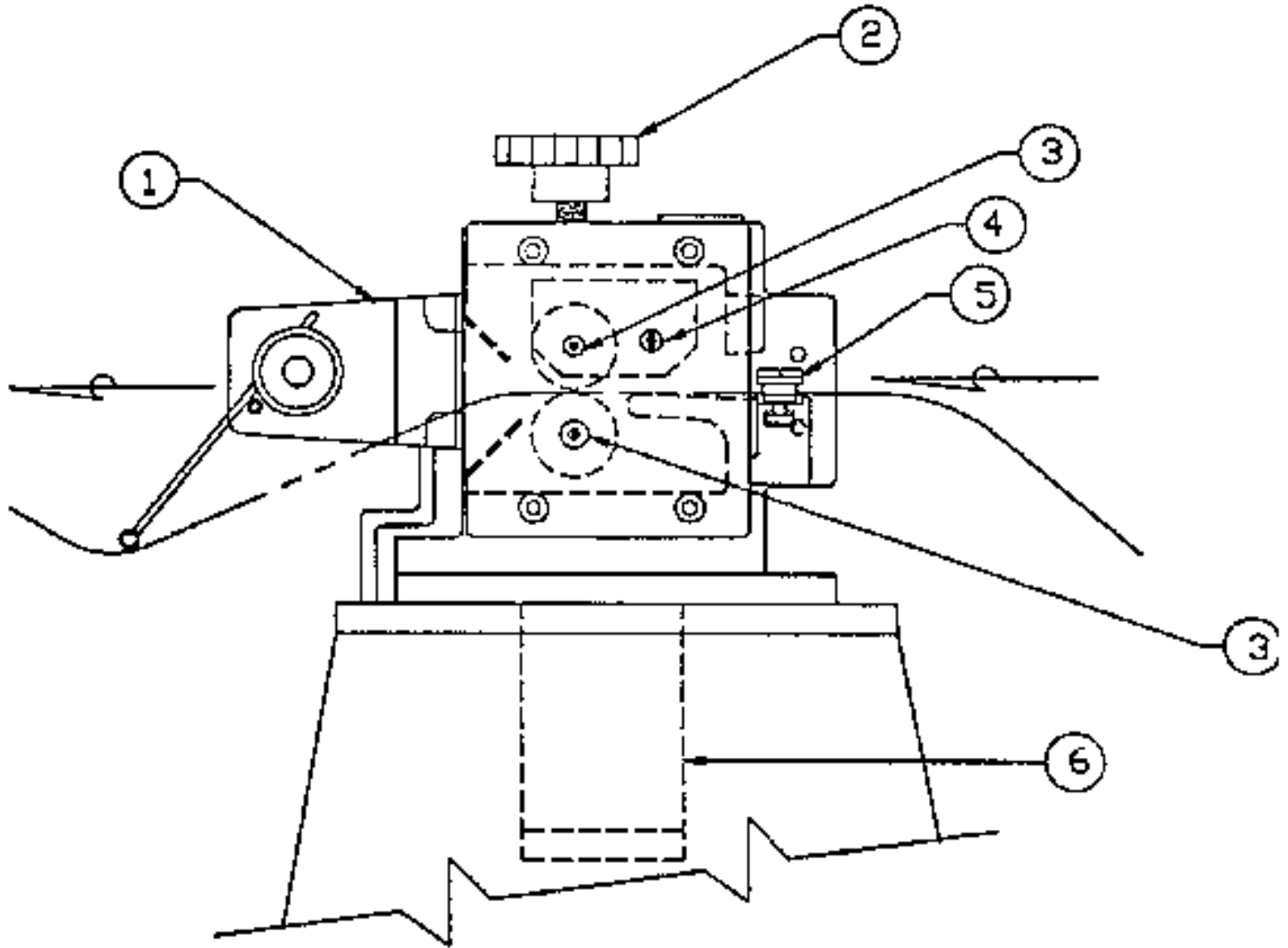
**20 degree** - Loop sensing arm travels through a 20 degree arc to vary turntable speed from slow to full speed as controlled by % speed pot.



**10 degree** - Loop sensing arm travels through a 10 degree arc to vary turntable rotation speed from slow to full speed as controlled by % speed pot.

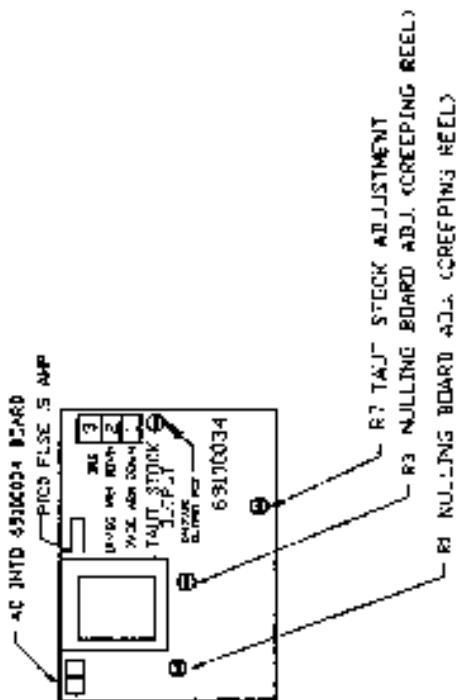












**RAPID-AIR CORPORATION**  
 ROCKFORD, IL • MADISON, SD

PART NAME TAUT STECK WRITE-UP DRAWING

MATERIAL	WEIGHT
HEAT TREAT	HARDNESS
DRAWN BY	CHECKED 3*
DATE	DRAWING NUMBER
SCALE HALF	REEL/HOLE B

