



SMART MINI SERVO GAG FEED OPERATING INSTRUCTIONS

TABLE OF CONTENTS

INTRODUCTION, INSTALLATION AND SET-UP pg. 3

ADJUSTMENT, CABLING AND INTERFACING pg. 4

PRETEST WITHOUT MATERIAL AND LOADING MATERIAL..... pg. 5

TROUBLESHOOTING pg. 6-7

MAINTENANCE PROCEDURES, PRECAUTIONS AND SAFETY..... pg. 7

PROGRAMMING PROCEDURE pg. 8-10

TROUBLESHOOTING pg. 11-12

LED STATUS SYMBOLS pg. 13-15

SMS CONTROL PANEL ASSEMBLY pg. 16

SMS WIRING SCHEMATIC..... pg. 17

WARRANTY pg. 18

INTRODUCTION, INSTALLATION AND SET-UP

Smart Mini Servo Gag Feed Introduction

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

The compact mechanical package, direct coupled with a brushless servo drive motor, offers response and feed speed accuracy unparalleled in any other powered roll feed. Operator interface is so simplified, a typical setup person can have the servo feed programmed and running in a matter of minutes. A step by step prompt appears on a four line 80-character display, which asks simple questions of the operator.

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

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

Operator programmed feed length, up to 99.999 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 con-

tinuous to aid in threading up material. Each job allows the operator to program up to 10 different feed lengths in one job.

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, ease of setup and installation. Two cables with twist lock connectors for the servo and one air line (if air pilot release is used) are the only external connections required. The electrical controls are housed in a small cabinet which should be mounted close to the press working area. The operator keypad and display are mounted on top of the control cabinet.

Installation And Mechanical Setup Of Servo

If you purchased the servo 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 also the cycling shocks incurred during production.

Align feed and die.

ADJUSTMENT, CABLING AND INTERFACING

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 opposite the belt cover and is held fast by a socket head cap screw. The actual adjustment screw is an eccentric sleeve 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. Shine a light from the rear of the feed toward the main rollers.

3. 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.

4. To make the adjustment:
 - a. Locate eccentric screw and loosen socket head lock screw.
 - b. Turn slotted eccentric sleeve while viewing rolls until the rolls are parallel.
 - c. Tighten 10-32 screw and reassemble parts, then retry running material.

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

* Before attempting to solve a possible roll parallelism problem by readjusting the rolls or calling the factory, perform the following test.
Step 1) A 3 to 5 foot length of material should be cut from the storage loop preceding the servo feed.
Step 2) Lay the material next to a straight line to see if the material is cambered. If it is, then this could be the reason that the material is walking. If not, then turn the material upside down from the way it was being fed and insert into the feed. If the material walks in the opposite direction then the material could be to blame.

Electrical Cables And Air Line

120 VAC INPUT

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

The electrical control enclosure is shipped completely ready to be connected to the mechanical feed. Connected to the enclosure are (2) cables with keyed screw type

connectors for connection to the motor.

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 is NPT pipe tap. The minimum air line size requirement is 3/8" ID hose. - (2 CFM)

Interfacing Servo Feed With A Press

The Servo Drive unit is programmed to feed each time a signal is received from the press. 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 switch, located on the press and is activated

when the press is finished.

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

PRETEST AND LOADING MATERIAL

Pretest For Servo Feed And Press Without Material

Now that your servo 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 switch on the electrical enclosure.

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 Operator Interface Terminal 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 (if air pilot release is used) and check that the roll pressure is functional by adjusting the pressure up and down, this is accomplished by turning the pressure adjusting knob. Check that you have enough tension on the material to avoid slipping during feeding. Open and close the feed rolls manually. Visually inspect that the rolls open and close when using the manual levers.

Select the "inch" function 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 are operational, you can experiment with the single cycle moves. The procedure is outlined in the programming section of this manual.

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

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. You 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. Hand feed the material into the servo unit until it protrudes out of the feed rolls.

Close the feed rolls.

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

material is run.

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

TROUBLESHOOTING

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

TROUBLESHOOTING (CONTINUED)

Problem	Cause	Remedy
Material feeds off center	<ul style="list-style-type: none"> – Edge guides not set properly. – Material not centered to feed. – Bad material. 	<ul style="list-style-type: none"> – Set edge guides. – Center material. – Try new roll of material.
No automatic cycle	<ul style="list-style-type: none"> – No Press signal. – Controller fault. – Servo fault. – Program error. 	<ul style="list-style-type: none"> – Check Press. SW. input to servo control. – Check lights on drive. – Check parameters on display.
Servo squeals	<ul style="list-style-type: none"> – Servo velocity gain too high. – Belt too loose or tight. 	<ul style="list-style-type: none"> – Consult factory. – Readjust belt tension.
Fault signal on drive is displayed	<ul style="list-style-type: none"> – Servo fault. – Material jam. – Power surge / failure. 	<ul style="list-style-type: none"> – Recycle power. – Check Die. – Check / recycle power.
Cannot program unit from display	<ul style="list-style-type: none"> – Program fault. 	<ul style="list-style-type: none"> – Check drive and call factory.

MAINTENANCE PROCEDURES, PRECAUTIONS AND SAFETY

Maintenance Procedures

DAILY

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

WEEKLY

Check wear pattern of rolls.

MONTHLY

Check cables for cuts or wear.

Precautions And 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.

PROGRAMMING PROCEDURE

Operator Interface Terminal

This section is to familiarize an operator with the terminal screen (program) flow. Also, the section will explain how to move from screen to screen. The screen flow is divided into five parts as set up in the home screen – “MAIN MENU”. These divisions are:

1. **F1 - JOB ENTRY**
2. **F2 - MANUAL MODE**
3. **F3 - AUTOMATIC MODE**
4. **F4 - REVIEW JOB VALUES**
5. **F5 - RAMP/COUNTER**
6. **F6 - CYCLE ROLLER**
7. **F7 - OUTPUTS DURATION**

The final section is the TROUBLE-SHOOTING and ERROR CODES.

OVERVIEW

The first screen displayed will look like:

RAPID-AIR CORPORATION ROCKFORD, IL 61109 WWW.RAPIDAIR.COM 815-397-2578

While the above screen is displayed, the system is starting up and doing a self-diagnostic test. If the self-diagnostic test passes, the program will start automatically. After a short delay the main screen will appear. The “MAIN SCREEN” will look like:

JOB VALUES	RAMP/COUNTER	CYCLE ROLLER
	MAIN MENU	
JOB #	MANUAL	AUTO

SCREEN HINTS

Movement from screen to screen uses the “F” keys. The “F” key functional descriptions usually appear above (F1 to F3) or below (F4 to F6) the keys. Occasionally, the text will describe the action caused by an “F” key.

To enter a value, locate the cursor (an underscore line) that will be found below the first character of the number the program is requesting. As each character is typed, the cursor will move to the next digit. The *Enter key* may be depressed at any time to enter current value into memory. When a value is entered, the program will check value to ensure that it is a valid value. A valid entry is a value, which is in the correct range. A value’s range is shown by parentheses. If an invalid number is entered, the cursor will return to the first character of the invalid value entered. The cursor will move to the beginning of the next value needed after a valid entry. Entering the last value on a screen will cause the display to move to the next screen.

SECTION 1 F1 - JOB NUMBER Entry

A job number must be active to do a manual single feed; an automatic move, review job values, or edit ramps or counters. The values entered for each job will be stored in memory and available each time that job is selected. To select an existing job or create a new job, press F1 while on the “MAIN SCREEN”. Pressing F1 will display the “ENTER A JOB SCREEN”. It is:


ENTER A JOB NUMBER NEW JOB NUMBER = 00 (JOB # RANGE 1-10)
--

A two-digit number must be entered. An invalid number will cause the cursor to return to the first digit. After entering a valid job number, depressing the enter key will display the following screen:

EXIT JOB NUMBER 00 ACTIVE ENTER JOB VALUES

F6 will **exit** to the “MAIN MENU” without entering or changing any values for that job. Selecting F1 will allow values for all the necessary data for a job to be entered.

JOB NUMBER 00 ACTIVE NUMBER OF SEQUENCES = 00 PUSH ENTER ONCE THE CORRECT # IS ENTERED

The number of sequences is required. A valid number of sequences must be entered (1-10). After entering the number press the . After entering the number of sequences the feed advisor screen, which will make calculations for the job, will appear:

FEED LENGTH = 00.000 SPM = 000 PILOT = 0 FEED ARC = 000
--

The **feed length** is first value required. A valid **feed length** distance is 0.001 inches to 99.999 inches. The **SPM** is strokes per minute. A valid **SPM** is between 1 and 999. The next item on this screen is the **pilot release**. The last item on the menu is the **feed arc** ranging from 10 to 300. A valid percent rate is between 1 and 100. After entering valid values for all four items, the first sequence screen will appear where the operator must enter the length, number of repetitions, output sequence and the pilot release data. The following screen will appear:

JOB # = 00	SEQUENCE = 01
FL = 00.000	REPEAT = 00
OUTPUT = 00000	PILOT = 0

Each job can have up to 10 sequences. Each sequence can be repeated up to 99 times. The output sequence allows the operator to program five outputs to turn on or remain off following each feed. The first digit

PROGRAMMING PROCEDURE (CONTINUED)

corresponds to Output 1 in the electrical wiring diagram. Entering 1 will turn an output on at the end of each feed. Entering 0 will keep the output turned off. If the speed, accel and decel are within acceptable limits, the main screen will reappear. If the values are outside acceptable limits, the following screen will appear.

**VALUES OUT OF RANGE
MAX SPEED EXCEEDED
FEED IS LONG OR % IS
SHORT F6 TO RETURN**

Pushing F4 will take an operator back to the feed advisor screen. After entering valid data, the "MAIN MENU" will be displayed.

NOTE: If a job number is not selected and the selected task requires a job with a feed length and speed to be active, the following screen will appear. After a valid job is entered the program will return to the original task.

**A VALID JOB # MUST
BE ACTIVE TO GO ON
GO TO JOB ENTER SCRN
JOB SCR N F6=EXIT**

SECTION 2 F2 - MANUAL MODE

Pressing F2, **manual mode** while on the "MAIN MENU", will cause the following the screen.

	EXIT
MANUAL MODE	
INCH	FEED SGL
MODE	LENGTH

F1, **inch mode**, produces the following:

	EXIT
CONTINUOUS JOG: USE X KEYS TO JOG + OR -	

This allows an operator to jog each

axis in either direction. The X-axis keys move the feed axis.

F3, **feed sgl length**, produces the following:

	EXIT
JOB 00	LENGTH = 00.000
FEED 1	
LENGTH	

F6, **exit**, in both screens moves the display back to "MANUAL MODE".

SECTION 3 F3 - AUTOMATIC MODE

Pressing F3, **automatic mode** while on the "MAIN MENU", will cause the following the screen.

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

Pushing F1 will start the job from sequence number 1. Pushing F2 will resume the job at the sequence at which it was either stopped or interrupted. The machine will remember the previous sequence even after the power has been reset as long as the active job number hasn't been changed.

	EXIT
AUTOMATIC MENU:	
BATCH	AUTO
MODE	MODE

F1, **batch mode**, controls batches from the "BATCH START" screen.

	EXIT
BATCH SIZE = 000000	
BATCH COUNT = 000000	
ST_CYC	SET_CNT
	CONT

The F1 key, **ST_CYC** (start cycle), will begin the feed/cut cycle. The "BATCH MENU" screen appears as follows.

**CURRENT TOTAL = 000000
BATCH SIZE = 000000
JOB # =00 % SPEED = 000
LGHT = 00.000 F6 = EXIT**

The F2 key, **SET_CNT** (set count), will allow the operator to set the batch size or change the batch size. The "BATCH SET" screen is:

**INPUT A BATCH SIZE
BATCH SIZE = 000000
START
CYCLE F6 = EXIT**

The F3 key, **CONT** (continue), will restart a batch stopped before reaching the full batch size by exiting with the F6 key. The "BATCH MENU" screen is:

**CURRENT TOTAL = 000000
BATCH SIZE = 000000
JOB#=00 %SPEED = 000
FEED LENGTH = 00.000 F6 = EXIT**

NOTE: If the batch size is set to 000000, the "BATCH SET" screen will appear. The "BATCH SET" screen will allow an operator to set the batch count. The "BATCH SET" screen can also be found under **ramp/count** selection on the "MAIN MENU" screen. The "BATCH SET" screen is shown above under F2. After the batch size is entered and F1 (**start cycle**) is pressed, the program will return to "BATCH SET" screen.

When the **batch total** equals the **batch size**, the feed will stop and will display this screen.

**EXIT
BATCH CYCLE COMPLETE
BATCH COUNT = 000000
NEW CYCLE**

F6, **exit**, will return to the "MAIN MENU" screen. F1, **start new cycle**, will reset the batch count total to 000000 and will start feeding another batch.

PROGRAMMING PROCEDURE (CONTINUED)

Depressing **F3, auto mode**, while on the "AUTOMATIC MODE" screen will display:


EXIT	
AUTO TOTAL = 000000	
JOB # =00	LENGTH = 00.000
SPM = 000	SPEED = 000 %

The automatic cycle will continue until the **F6** key, **exit**, is pressed.

SECTION 4 F4 - JOB VALUES REVIEW

F4, job values, on the "MAIN MENU" screen displays the following screen until **F6, exit**, is pushed. The following screen appears:

JOB # 00	SEQUENCE = 01
ENTER THE SEQUENCE #	
THEN PUSH THE ENTER KEY	

Enter the sequence which is to be reviewed and press . The next screen lists the current active job number, sequence, the feed length, number of repetitions, output sequence, speed, and whether the pilot release is used:

JOB # 00	SEQUENCE = 01
FL = 00.000	REPEAT = 00
OUTPUT = 11111	PILOT = 0
SPEED = 003	F6 = EXIT

F6 exits to the MAIN MENU.

SECTION 5 F5 - RAMP/COUNTER

F5, ramp/counter, on the "MAIN MENU" screen displays the following screen:

EXIT	
BATCH/	SPEED/
TOTAL	ACC/DEC

F1, batch/total, on the "RAMP/COUNTER" screen leads to:

EXIT	
SET COUNTER VALUES	
SET	RESET
BATCH/	TOTAL

F1, set batch, on the "SET COUNTER VALUES" screen leads to "BATCH SET" screen discussed above in SECTION 3.

F2, reset totals, on the "SET COUNTER VALUES" screen resets the total counter to 000000.

F6, exit, will return to the "RAMP/COUNTER" screen.

F2, speed/acc/dec, on the "RAMP/COUNTER" screen leads to:

EXIT		
ALTER PERCENTAGES		
%ACC	%DEC	%SPEED

F6, exit, will return to the "RAMP/COUNTER" screen.

F1, % acc, allows the acceleration percentage to be altered with:

ENTER PERCENT OF ACC	
MAX ACCEL = 000 %	
MAXIMUM RATE (1 - 100) %	
ENTER KEY TO EXIT	

The **enter** key returns the display to the "ALTER PERCENTAGES" screen.

F2, % dec, allows the deceleration percentage to be altered with:

ENTER PERCENT OF DEC	
MAX DECEL = 000 %	
MAXIMUM RATE (1 - 100) %	
ENTER KEY TO EXIT	

The **enter** key returns the display to the "ALTER PERCENTAGES" screen.

F3, % speed, allows the speed percentage to be altered with:

ENTER PERCENT OF SPEED	
MAX SPEED = 000 %	
MAXIMUM RATE (1 - 100) %	
ENTER KEY TO EXIT	

The **enter** key returns the display to the "ALTER PERCENTAGES" screen.

SECTION 6 F6 - CYCLE ROLLER

F6, cyclor roller, on the "MAIN MENU" screen displays the following screen.

EXIT	
CYCLE FEED ROLLERS	
OPEN	CLOSE
ROLLER	ROLLER

This allows the operator to manually open and close the rollers.

SECTION 7 "." - OUTPUTS DURATION

Pushing a ".", outputs duration, while in the "MAIN MENU" screen displays the following screen:

OUTPUT DURATION	
ENTER 0.000 FOR NONE	
END FEED TIME=0.000	
OUTPUTS TIME=0.000	

This allows the operator to set the duration of the END OF FEED and SEQUENCE OUTPUTS. The default duration of outputs is 250 milliseconds. Please refer to the wiring schematic for the locations of the END OF FEED and SEQUENCE OUTPUTS.

TROUBLESHOOTING

A normally running drive will display an 8 in the LED box, top center. The LED box will display error and fault codes. The keypad can display additional error codes and information about system operational problems.

LED Box Error Codes

Display	Description
0.	Internal communications error
1.	DC Bus overvoltage level – possibly too high of deceleration
2.	Internal overcurrent, short circuit, over temperature or under voltage fault
3.	Drive overcurrent – check motor cable
4.	DC Bus voltage is below the minimum value – too high an acceleration rate
5.	Feedback trip – check feedback cable
6.	Motor or drive I ² T overload – motor overloaded or stalled
7 (not flashing)	Motor I ² T foldback – motor overloaded or stalled for too long a time
7.	Drive over temperature – check internal drive fan
8	Drive enabled (normal operating mode)
9	Drive is in torque mode – Not used in Rapid-Air Smart Mini
A	Drive in Analog Mode – Not used in Rapid-Air Smart Mini
b.	Power base not ready (only on 3 phase drives) – loss of a phase
c	Cam profile active – Not used in Rapid-Air Smart Mini
E.	General error – error number is on keypad display (see run-time errors below)
F.	Position or velocity following error – possible motor or resolver failure
I	Drive in electronic gearing mode
H	Drive in a hold state – DIP switch change or PLC request
h or h.	Homing – Not used in Rapid-Air Smart Mini
I	Incremental move
J	Jog move
J.	Preset jog active
o	Offset move
°.	Overspeed
P. (.flashing)	Positional move
P. (.steady)	Preset trapezoidal move active – Not used in Rapid-Air Smart Mini
r.	DB (regen resistor) overload
S	Stop command active
-	Drive disabled
-.	Crash
=	Suspend command active
S	Drive under speed control
1.	Initialization error at power up

TROUBLESHOOTING (CONTINUED)

Can Status LEDs

There are two CAN LEDs, the left LED shows activity on the CAN1 (CANopen) bus. The right LED shows activity on the CAN2 (Baldor CAN) bus. Each LED can appear green or red. The states have the following meanings:

- = **NOT LIT: No power to the card.**
- = **GREEN: The bus is operational; it is experiencing little or no errors.**

- = **RED, FLASHING: The bus is passive; it is experiencing some errors.**
- = **RED: The bus is off; it has experienced a fatal number of errors.**

ERROR CODES IN GENERAL

Various error codes can be displayed on the operator keypad display. Errors are divided into two categories – Run-time Errors and Compilation Errors.

Compilation errors have numbers 2100 to 2400. Compilation errors are based on programming rules are probably not arise in normal use, therefore, are not listed below. If an error with a number between 2100 and 2400 appears, please consult the Rapid-Air representative. The most common Run-time errors and possible causes are listed below.

RUN TIME MML ERROR CODES














Errors 0 to 500 are caused by specialized keywords, and are known as Mint Motion Library (MML) errors. Errors 3100 and up are general keywords. The most common are also below.

Number	Name	Description
1	Synchronous MML error	Generic error generated when no more specific info is available.
3	Data out of range	Data values out of acceptable range for a variable.
9	Out of heap memory	Controller is out of memory space.
10	Action not possible	Tried to write to a motion keyword while the axis is in motion.
14	Unable to initialize CAN	A node returned an error message, other than synchronous or remote.
21	CAN node failed to reply	Communication over the CAN bus has timed-out.
22	CAN node not live	This error will be generated if you try accessing a node that has died.
27	Problem writing to EEPROM	Communication with a remote node timed-out.
28	CAN node - Baud rate	The CAN node does not support the requested baud rate.
29	CAN node reported error	An error has occurred and cannot be determined further.
34	CAN transmit buffer full	This error number should not be reported.
37	Non-volatile data corrupted	An error accessing EEPROM or NVRAM data has occurred.
40	Drive is not enabled	You have tried starting a move while the drive is disabled.
41	No connection exists	There is no connection between the CAN open nodes.
50	Error programming flash	The controller has failed to write data to the flash memory.
90	Action not possible	The command is not possible whilst the drive is enabled.
121	Error accessing EEPROM	EEPROM access has failed.
135	Axis/drive not commissioned	The axis/drive is not commissioned.
137		Feedback device comms message is corrupt.
138		Feedback device comms are busy.
139		Feedback device has an error.
147	Static data overrun	Static variable is filled, but data remains.

RUN TIME GENERAL ERROR CODES

Number	Name	Description
3100	Division by zero	This occurs when the denominator of a division is zero.
3102	Out of memory	Array too large to fit in the remaining memory, or function does not terminate before the internal stacks run out of free storage.









LED STATUS SYMBOLS

Symbol	Description
	Drive / comms watchdog. Internal communications failure. Clear the error; if the problem persists then contact Baldor technical support.
	Over volts. The DC Bus voltage has exceeded the overvoltage level. Check the AC supply voltage is correct for the unit. Check the DC Bus level. This should be close to the nominal voltage. If the input voltage is correct, then this error may be the result of high deceleration rates. If it is not possible to reduce the deceleration rate, then an external regen resistor should be used. To help you determine the cause of this fault, use the WorkBench v5 Scope tool to monitor the DC Bus level during moves.
	Intelligent Power Module (IPM) trip. The IPM has detected an internal overcurrent, short circuit, over temperature or under voltage fault. Clear the error. If the problem persists, contact Baldor Technical Support or Rapid-Air.
	Overcurrent trip. Current has exceeded 300% of Drive Rated Current. Check the motor cable and connections for short circuits.
	Under volts. The DC Bus voltage has fallen below the minimum undervolts level. This error will only be generated if the drive is in the enabled state. Check the AC supply voltage is correct for the unit. The error could also occur during high acceleration profiles; to prevent this, reduce the acceleration rate.
	Feedback trip. This error indicates loss of encoder/resolver feedback and may indicate that the feedback cable has become detached, one of the signals has broken, or noise is present. Check the wiring in the Feedback cable; check the cable screens; check the feedback device fitted to the motor (if possible).
	Motor or Drive I ² T overload. The motor I ² T or the drive I.T current protection algorithms have exceeded their limit and disabled the drive.
	(Symbol not flashing) Motor I ² T / It foldback. Motor I ² T or Drive I.T algorithm has resulted in the demand current being folded back to a level where the drive/motor can recover. The motor / drive can run with demand currents greater than their rated value for a period of time; after that time the drive will either trip or automatically foldback the demand current.
	Overtemperature. The temperature of the drive has exceeded the trip level or the Motor overtemperature trip input has been activated. Check that the drives internal fans are functioning. Increase ventilation to the drive or reduce the ambient temperature.
	Drive enabled. The drive is enabled.
	Torque mode. The drive is in Torque mode.
	Hold to Analog. The axis is in Hold To Analog mode.
	Auto tune test driving motor. Autotune is active and driving the motor. Warning! The motor shaft may move.

LED STATUS SYMBOLS (CONTINUED)

Symbol	Description
	Power base not ready. This error condition applies only to 3-phase models. These drives have a pre-charge circuit which must activate after power-up before the drive can be enabled. If the drive is enabled before this then the error occurs. The error could also indicate the loss of one or more of the input phases.
	Cam. A cam profile is in progress.
	General error. The motion toolbar displays the status of AXISERROR, which is a bit pattern of all latched errors.
	Position or velocity following error. A following error has occurred. Following errors could be caused by a badly tuned drive/motor, especially at high acceleration and deceleration rates where the following error will typically be greater. The following error limit can be adjusted to suit your application. Following error could also be the caused by encoder/resolver loss. Confirm that the motor is not overloaded or stalling. Check the tuning of the drive using the WorkBench v5 Fine-tuning tool. The KVELFF parameter can be used to reduce following errors during moves.
	Follow mode. The drive is in pulse follower or electronic gearing modes.
	Hold. The Hold DIP switch is active or the PLC Task has requested a Hold state. Motion will be ramped to zero demand and will then hold on position while the switch is active.
	Homing. The drive is currently homing.
	Preset homing active. The drive is currently homing. This motion has been triggered from a Preset move table.
	Incremental move. An incremental move is in progress.
	Jog. The drive is Jogging.
	Preset jog move active. The drive is Jogging. The Jog was triggered from a Preset jog table.
	Offset move. The drive is performing an offset move.
	Overspeed. The measured speed of the motor has exceeded the trip level defined by DRIVESPEEDFATAL. When accelerating to a demand speed close to the trip level, there will typically be a certain amount of overshoot. Using the Fine-tuning tool, check the amount of overshoot you get with the acceleration and demand speeds being used in your application.
	Positional Move. A point-to-point move is in progress.
	(Decimal point flashing) Preset moves are active, but currently idle (no motion)





LED STATUS SYMBOLS (CONTINUED)

Symbol	Description
	Preset trapezoidal move active (in motion).
	DB Overload. The regeneration resistor (Dynamic Brake) has been overloaded.
	Stop. A STOP command has been issued or the stop input is active.
	Drive disabled. The drive must be enabled before operation can continue. A number of actions are required to enable the drive. See the installation manual supplied with your product.
	Crash (various). The drive enable input or the Enable DIP switch have become inactive whilst the drive was in the enable state (or the drive was enabled whilst they were inactive) - bit 13 in AXISERROR will be set. The drive can be programmed to ignore this state using DRIVEENABLEINPUTMODE.
	Suspend. The SUSPEND command has been issued and is active. Motion will be ramped to zero demand whilst active.
	Speed demand. The drive is under speed control.
	Initialization error. An initialization error has occurred at power on.

FlexDrive", Flex+Drive" And MintDrive" Options






CAN OPTION / CAN & AUXILIARY I/O OPTION

There are two CAN LEDs on these option cards. On both options, the left LED shows activity on the CAN1 (CANopen) bus. When the CAN & Auxiliary I/O option is fitted in a MintDrive", the right LED shows activity on the CAN2 (Baldor CAN) bus. Each LED can appear green or red. The states have the following meanings:

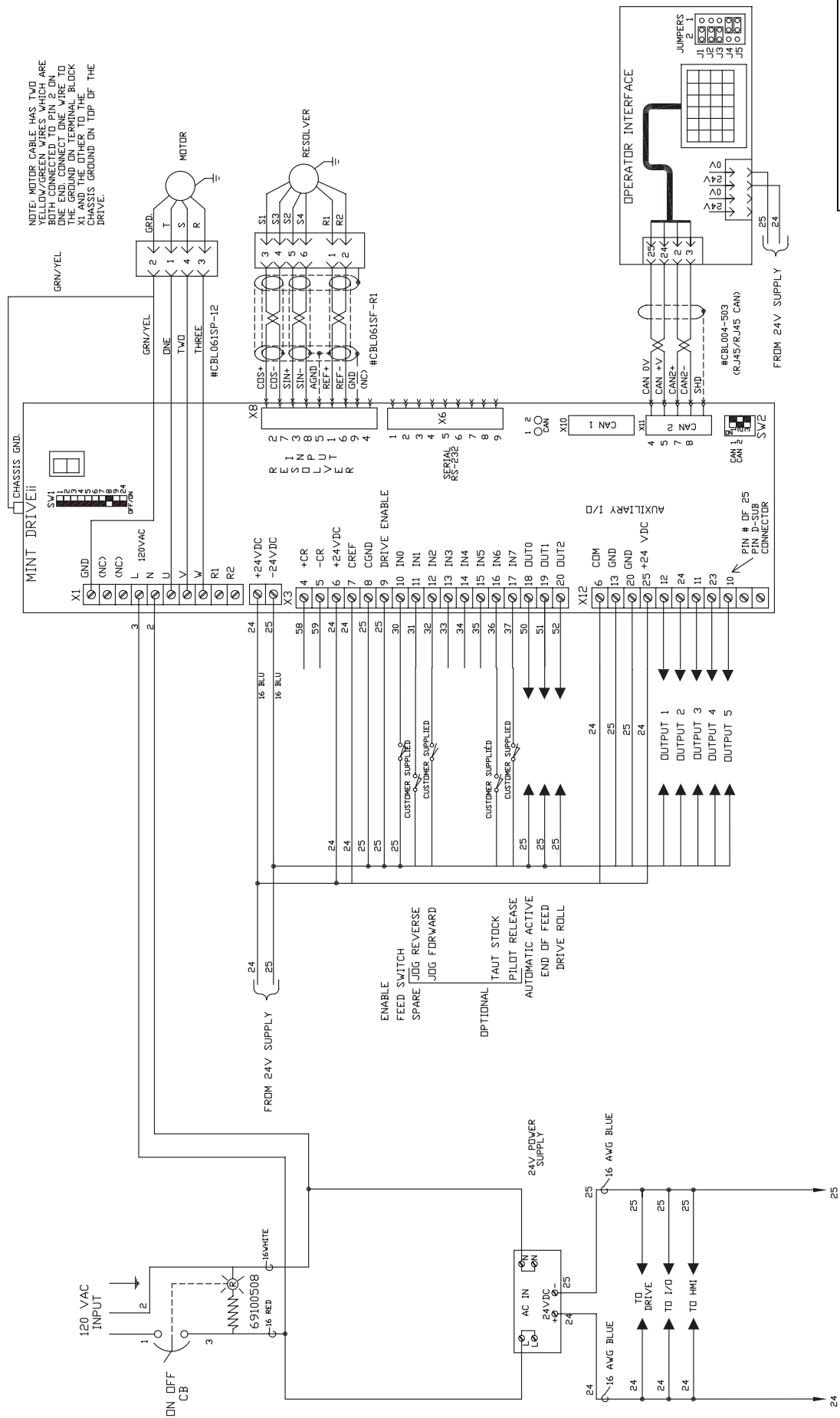
-  = Not lit: No power to the option card.
-  = Green: The bus is operational; it is experiencing little or no errors.
-  = Red, flashing: The bus is passive; it is experiencing some errors.
-  = Red: The bus is off; it has experienced a fatal number of errors.

DeviceNet Option

There is one Bus Activity LED on this option, which can appear green or red. The states have the following meanings:

-  = Not lit: No power to the option card or there is no DeviceNet master on the bus.
-  = Green, flashing: There are one or more devices on the bus, but there is no communication with this unit.
-  = Green: The option is being polled by the master and is operating correctly.
-  = Red, flashing: Minor fault, for example an I/O connection may have timed out.
-  = Red: Major communications fault, for example, an incorrect baud rate, a duplicated node ID (MAC ID), or a bus-off fault.

SMS Wiring Schematic



RAPID-AIR CORPORATION ROCKFORD, IL • MADISON, SD	
PART NAME SMS GAG PROGRAM WIRING	DRAWN BY MJB
CHECKED BY DATE 6/25/08	DRAWING NUMBER 85500320
MATERIAL HEAT TREAT FINISH FULL	SCALE FULL
REVISIONS NO. DATE BY 1 08/01/08 MJB 2 08/01/08 MJB 3 08/01/08 MJB 4 08/01/08 MJB 5 08/01/08 MJB 6 08/01/08 MJB 7 08/01/08 MJB 8 08/01/08 MJB 9 08/01/08 MJB 10 08/01/08 MJB 11 08/01/08 MJB 12 08/01/08 MJB 13 08/01/08 MJB 14 08/01/08 MJB 15 08/01/08 MJB 16 08/01/08 MJB 17 08/01/08 MJB 18 08/01/08 MJB 19 08/01/08 MJB 20 08/01/08 MJB 21 08/01/08 MJB 22 08/01/08 MJB 23 08/01/08 MJB 24 08/01/08 MJB 25 08/01/08 MJB 26 08/01/08 MJB 27 08/01/08 MJB 28 08/01/08 MJB 29 08/01/08 MJB 30 08/01/08 MJB 31 08/01/08 MJB 32 08/01/08 MJB 33 08/01/08 MJB 34 08/01/08 MJB 35 08/01/08 MJB 36 08/01/08 MJB 37 08/01/08 MJB 38 08/01/08 MJB 39 08/01/08 MJB 40 08/01/08 MJB 41 08/01/08 MJB 42 08/01/08 MJB 43 08/01/08 MJB 44 08/01/08 MJB 45 08/01/08 MJB 46 08/01/08 MJB 47 08/01/08 MJB 48 08/01/08 MJB 49 08/01/08 MJB 50 08/01/08 MJB 51 08/01/08 MJB 52 08/01/08 MJB 53 08/01/08 MJB 54 08/01/08 MJB 55 08/01/08 MJB 56 08/01/08 MJB 57 08/01/08 MJB 58 08/01/08 MJB 59 08/01/08 MJB 60 08/01/08 MJB 61 08/01/08 MJB 62 08/01/08 MJB 63 08/01/08 MJB 64 08/01/08 MJB 65 08/01/08 MJB 66 08/01/08 MJB 67 08/01/08 MJB 68 08/01/08 MJB 69 08/01/08 MJB 70 08/01/08 MJB 71 08/01/08 MJB 72 08/01/08 MJB 73 08/01/08 MJB 74 08/01/08 MJB 75 08/01/08 MJB 76 08/01/08 MJB 77 08/01/08 MJB 78 08/01/08 MJB 79 08/01/08 MJB 80 08/01/08 MJB 81 08/01/08 MJB 82 08/01/08 MJB 83 08/01/08 MJB 84 08/01/08 MJB 85 08/01/08 MJB 86 08/01/08 MJB 87 08/01/08 MJB 88 08/01/08 MJB 89 08/01/08 MJB 90 08/01/08 MJB 91 08/01/08 MJB 92 08/01/08 MJB 93 08/01/08 MJB 94 08/01/08 MJB 95 08/01/08 MJB 96 08/01/08 MJB 97 08/01/08 MJB 98 08/01/08 MJB 99 08/01/08 MJB 100 08/01/08 MJB	DATE 6/25/08
REVISIONS NO. DATE BY 1 08/01/08 MJB 2 08/01/08 MJB 3 08/01/08 MJB 4 08/01/08 MJB 5 08/01/08 MJB 6 08/01/08 MJB 7 08/01/08 MJB 8 08/01/08 MJB 9 08/01/08 MJB 10 08/01/08 MJB 11 08/01/08 MJB 12 08/01/08 MJB 13 08/01/08 MJB 14 08/01/08 MJB 15 08/01/08 MJB 16 08/01/08 MJB 17 08/01/08 MJB 18 08/01/08 MJB 19 08/01/08 MJB 20 08/01/08 MJB 21 08/01/08 MJB 22 08/01/08 MJB 23 08/01/08 MJB 24 08/01/08 MJB 25 08/01/08 MJB 26 08/01/08 MJB 27 08/01/08 MJB 28 08/01/08 MJB 29 08/01/08 MJB 30 08/01/08 MJB 31 08/01/08 MJB 32 08/01/08 MJB 33 08/01/08 MJB 34 08/01/08 MJB 35 08/01/08 MJB 36 08/01/08 MJB 37 08/01/08 MJB 38 08/01/08 MJB 39 08/01/08 MJB 40 08/01/08 MJB 41 08/01/08 MJB 42 08/01/08 MJB 43 08/01/08 MJB 44 08/01/08 MJB 45 08/01/08 MJB 46 08/01/08 MJB 47 08/01/08 MJB 48 08/01/08 MJB 49 08/01/08 MJB 50 08/01/08 MJB 51 08/01/08 MJB 52 08/01/08 MJB 53 08/01/08 MJB 54 08/01/08 MJB 55 08/01/08 MJB 56 08/01/08 MJB 57 08/01/08 MJB 58 08/01/08 MJB 59 08/01/08 MJB 60 08/01/08 MJB 61 08/01/08 MJB 62 08/01/08 MJB 63 08/01/08 MJB 64 08/01/08 MJB 65 08/01/08 MJB 66 08/01/08 MJB 67 08/01/08 MJB 68 08/01/08 MJB 69 08/01/08 MJB 70 08/01/08 MJB 71 08/01/08 MJB 72 08/01/08 MJB 73 08/01/08 MJB 74 08/01/08 MJB 75 08/01/08 MJB 76 08/01/08 MJB 77 08/01/08 MJB 78 08/01/08 MJB 79 08/01/08 MJB 80 08/01/08 MJB 81 08/01/08 MJB 82 08/01/08 MJB 83 08/01/08 MJB 84 08/01/08 MJB 85 08/01/08 MJB 86 08/01/08 MJB 87 08/01/08 MJB 88 08/01/08 MJB 89 08/01/08 MJB 90 08/01/08 MJB 91 08/01/08 MJB 92 08/01/08 MJB 93 08/01/08 MJB 94 08/01/08 MJB 95 08/01/08 MJB 96 08/01/08 MJB 97 08/01/08 MJB 98 08/01/08 MJB 99 08/01/08 MJB 100 08/01/08 MJB	DATE 6/25/08

*** NOTE: UNLESS THE OPTION WAS PURCHASED FROM RAPID AIR THEN SOLID STATE RELAYS MUST BE USED TO CONNECT OUTPUTS TO 24VDC FUNCTIONS
 RAPID AIR # 69240165

WARRANTY

Warranty Terms & Conditions

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

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

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.