



MINI-SERVO FEED OPERATING INSTRUCTIONS

MODELS

MS SERIES

(INCLUDES MS2, MS4 & MS8. 115VAC, 1PH, 60HZ)

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INTRODUCTION

Rapid-Air Introduction to MS-Series

The MS-Series servo has many features found in the more expensive models. Some of its features are:

Input:

120 VAC, 50/60 Hz

Amperage required at input:

10 amps maximum

Accuracy:

.0025 per feed length at the rolls

Maximum feed length input:

999.999 inches

Job storage:

99 jobs

Display:

4 rows by 80 characters, backlit

Fault type:

Displayed on the drive if a fault occurs otherwise an "8." is displayed.

Rolls:

Hardened and ground.

Drive roll parallelism adjustment:

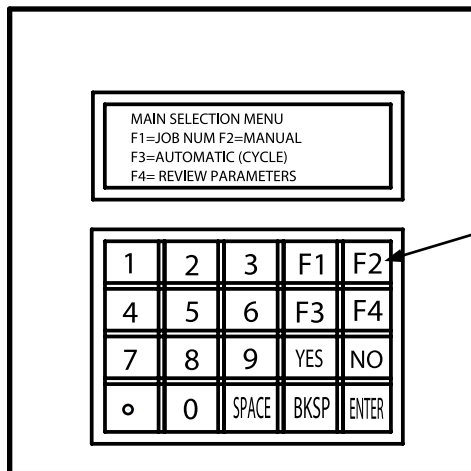
Used to tune the rolls to the material if needed.

The Rapid-Air MS-Series feed uses the same type of programming procedures as it has in its more expensive models. Input a feed length, strokes per minute, and a feed arc and the program will adjust the servo

acceleration/deceleration and maximum servo speed parameters to the requirement needed to keep up to the press strokes per minute.

The precision mechanical roll feed has been designed for compactness, ease of setup and installation. A 120 VAC receptacle is all that is required of the customer. Two cables are supplied with the control and need to be connected to the proper locations of the motor. The electrical controls are housed in a small box that can be mounted on the press or if purchased, on a post that can be positioned close to the press.

Note:



KEYPAD

4 keys were chosen to have a double meaning, arrows and "F" keys. The arrows were brought out as the primary instead of the "F" keys. If you would bear with us, we are looking at a correction.

INSTALLATION, ROLL PRESSURE & RELEASE, PILOT RELEASE

Installation

The Rapid-Air servo was run and fully tested before being shipped from our plant. Carefully inspect all parts when uncrating them. If you find any damaged parts, please report it to the carrier that delivered the servo drive and at the same time, report the damage to your distributor.

The servo feed container should contain:

- 1) servo feed – standard
- 1) console – standard

- 1) console stand – optional
- 1) servo mounting bracket – optional
- 1) cascade roller assembly – optional

Please contact someone at your facility to verify what options you purchased.

If a mounting bracket was purchased, then it should be mounted first being careful that the center line of the bracket lines up with the centerline of the die area. The servo can then be

mounted on the bracket. A print of the bracket can be found in the back of this manual.

If a bracket was not purchased, then the servo will have to be mounted on the press bed or customer provided bracket. Line up the rolls to be centered and perpendicular to the center line of the die area. Included in the back of this manual is a hole pattern layout print for the MSA2 servo.

Roll Pressure

The roll pressure knob is located on the entrance side of the feed and is a knurled knob with a locking nut located right behind it. It is positioned parallel to the inlet face and uses a compression spring for adjusting roll pressure.

Gear Box

The gear box is located within the feed body on the same side as the roll release handle. It has a non-lubricated gear box so it is essentially maintenance free.

Roll Release Handle

The roll release handle is located on the side of the feed. Lifting the handle opens the rolls and lifting to its stop will lock the rolls in place. This is a true statement if the pilot release stop is not set. If the stop is set, then the roll will only raise until the stop is reached just like in automatic for pilot release.

Electric Pilot Release

The optional electric pilot release can be mounted on the entrance side of the servo at the place labeled "inlet." It is the customer's responsibility to interface the pilot release valve with the customer supplied, press-mounted, activating switch. The air requirements for the release to work correctly is 80 to 120 psi, dry filtered and lightly lubricated air. There should be a minimum of 2 CFM available at all times.

FEED ROLLS, PILOT RELEASE STOP, ENTRANCE GUIDE

Feed Rolls

The rolls are case hardened and ground solid rolls which make them good for profiling, if you are running a part that would need clearances ground into the roll. Useful information that you might need in the future is that one revolution of the rolls is 3.173 inches. This can be used to check if the program and motor are working correctly. Put a line on the lower roll and program the feed to feed to feed 3.173 inches. The line should return to the same spot after every feed. If it does not, then call Rapid-Air. If it does, then something in the setup, such as roll pressure or an obstruction in the die, could cause a short feed.

Pilot Release Stop

A pilot release stop may be added for higher speeds. The pilot release stop is mounted next to the roll pressure knob and should be set to let the rolls open about .005/.010 to free the material during piloting.

Adjustable Entrance Guide

The adjustable entrance guide is an add-on feature that can and should be used on the entrance and exit of the servo feed. It has screwdriver slotted adjustable stops for quick stop adjustment. By having one on each end of the feed, the set-up time for aligning the material in the feed is decreased considerably as you will now know that the material is straight through the feed before entering the die.

OPERATOR INPUT SECTION

Operator Input Section

The intent of this section is to familiarize the operator with the flow of the program and what to expect with each key press. Each program screen of the servo will be displayed and also comments to clarify possible questions. There are four sections that will be explained and they are as follows:

SECTION 1 —

JOB NUMBER

SECTION 2 —

MANUAL MODE

SECTION 3 —

AUTOMATIC MODE

SECTION 4 —

REVIEW JOB PARAMETERS

When the servo is first started, and has performed its startup procedure, the first screen displayed should look like this:

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

***SELECT F1=JOB NUM**

The first step in programming a job is to select a two digit job number which will be used to store the parameters that the operator inputs or to recall an existing job number that was previously loaded. When the operator presses F1 on the keypad, the screen will change to:

JOB SELECTION MENU
ENTER JOB NUMBER= _____
PRESS F4 KEY AFTER
CORRECT # IS ENTERED

The next screen lets you program parameters or exit with the existing parameters.

JOB NUMBER= _____
F1=PROG. PARAMETERS
F4=DON'T ALTER VALUES

Pressing the "F1 PROG. PARAMETERS" key initiates the following screen. Key in the required parameters.

FEED LENGTH= _____
PRESS SPEED= _____
FEED ANGLE= _____

* Once the parameters have been entered, the program will complete the math routine which selects the proper accel./decell. and motor speed for the parameters listed and then the main menu is displayed again.

*** SELECT F2 MANUAL**

If the operator elects to move the material from the feed to the die electrically, the manual mode has to be selected. Pressing the F2 key will bring up the manual mode screen.

MANUAL LENGTH= _____
F1=SINGLE _ FEED
F2=GO TO INCH MODE
F4=RETURN

Each time the F1 key is pressed, the servo will move the material the feed length entered for the job number. The material will move at the speed required to keep up with the programmed press strokes per minute.

If the operator would like the material to move a slower rate than the inch mode should be selected. Press F2 now to display the inch mode screen.

INCH MODE:
F1=JOG FORWARD
F2=JOG REVERSE
F4=RETURN

When the F1 key is pressed, the feed will advance the material at a slow rate of speed. When the F2 key is pressed, the feed will reverse the material and run at a slow rate of speed. Press F4 to return to the main screen.

With the main menu displayed and pressing the "F3 AUTOMATIC (CYCLE)", the following screen appears:

AUTOMATIC JOB=01
FEED LENGTH= _____
PRESS SPEED= _____
F4=RETURN

In the automatic mode, the feed length and operator entered press speed will be displayed. Whenever the press mounted feed switch is activated, the servo will feed the feed length displayed on the screen. Because there is not an interface in the control for the pilot release it will be up to the customer to wire the pilot release switch to the solenoid that operates the raising of the rolls.

Press F4 button to return to the main menu and deactivate the automatic control.

Press F4 again and the final mode is review parameters, the parameters for the job number will then be displayed.

OPERATOR INPUT SECTION (CONTINUED)

Operator Input Section

The last function on the keypad is the "RESET JOB PARAMETERS." This function should be used with special caution as all the jobs being used will reset to the default parameters and cannot be restored without keying each job number's parameters.

The following screen is displayed when the period is pressed while the "Main Selection menu" is displayed.

**RESET JOB PARAMETERS
TO DEFAULT VALUE
F1=RESET VALUES
F4=RETURN – DON'T RESET**

It is very important that the operator make a hard copy of the jobs on a sheet of paper so there is a permanent record.

TROUBLESHOOTING (7.3.1 FATAL FAULT ERROR CODES)

Error #	Status Display	Fault Message	Possible Cause
1	t	Power stage OverTemp	overload, fan malfunction, power stage failure
2	o	OverVoltage	excessive decel rate*
3	p	OverCurrent	power stage surge current*
4.0	r0	External feedback fault	feedback signal through C8 not correctly detected
4.1	r1	Resolver line break	break in resolver feedback detected
4.2	r2	RDC error	fault in resolver-to-digital converted detected
4.3	r3	Sinc Encoder init fail	sinc encoder card has not initialized properly
4.4	r4	A/B line break	break in encoder A/B input lines detected
4.5	r5	Index line break	break in encoder index line
4.6	r6	Illegal halls	illegal hall combination detected
4.7	r7	C/D line break	break in sinc encoder C/D line detected
4.8	r8	A/B out of range	sinc encoder A/B level out of range
4.9	r9	Burst pulse overflow	sinc encoder fault
5	u	Under voltage	bus voltage is too low
6	ll	Motor over temperature	motor overload caused overheating
7.1	A1	Positive analog supply fail	failure in +12V supply
7.2	A2	Negative analog supply fail	failure in -12V supply
8	J	OverSpeed	velocity \geq VOspd
8.1	J1	OverSpeed	velocity \geq 1.8 x VLIM
9	E	EEPROM failure	faulty EEPROM
10	e	EEPROM checksum fail	EEPROM checksum invalid on power up*
12	F	Foldback	system in foldback mode
14.1	d5	Positive over travel fault	PFB exceeded PMAX with PLIM=1
14.2	d6	Negative over travel fault	PFB exceeded PMIN with PLIM=1
15.1	d1	Numeric position deviation	internal fault
15.2	d2	Excessive position deviation	PE > PEMAX
16	c	Communication interface	a communications fault has occurred

* These faults can only be cleared by cycling power.

TROUBLESHOOTING (7.3.3 NO MESSAGE FAULTS)

Fault Description	Fatal	Non-Fatal	Flashing Status Display	Steady Status Display
Watchdog (DSP)	X		■	
Watchdog (HPC)	X			■
No compensation	X		-1	
Invalid velocity control	X		-2	
Encoder not initialized on attempt to enable	X		-3	
Encoder initialization failure	X		-4	
Auto-config failure	X		-5	
Hardware CW limit switch open		X	L1	
Hardware CCW limit switch open		X	L2	
Hardware CW and CCW limit switches open		X	L3	
Software CW limit switch is tripped (PFB>P _{MAX} & PLIM=2)		X	L4	
Software CCW limit switch is tripped (PFB<P _{MIN} & PLIM=2)		X	L5	
Positive and negative analog supply fail	X		A3	
RAM failure (during init)	X			I
EPROM checksum (during init)	X			c
Altera load failure (during init)			E101	
Altera DPRAM failure (during init)			E102	

PRECAUTIONS & SAFETY

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

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

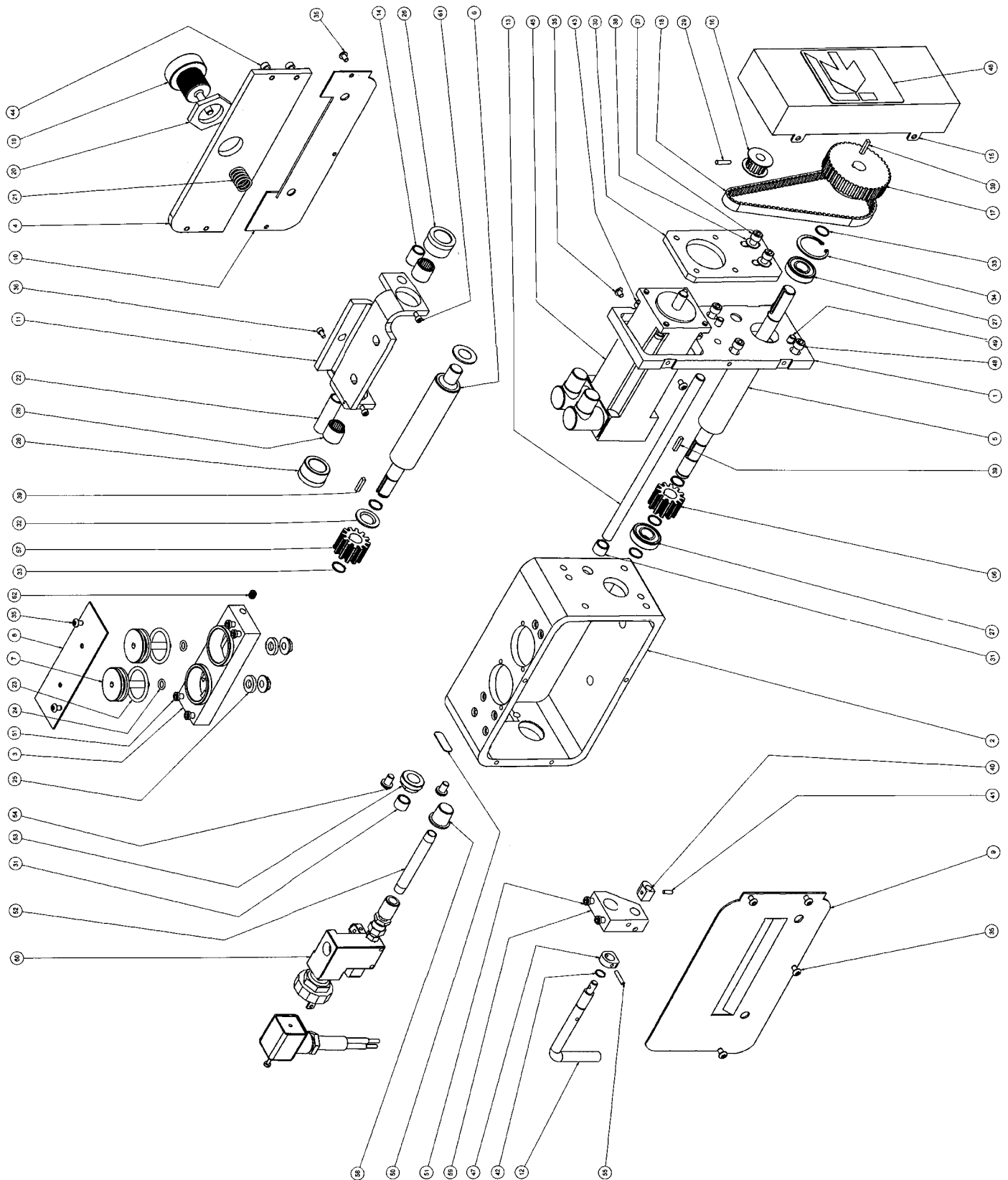
Rapid-Air reserves the rights in its software. The software program is licensed by Rapid-Air to the original purchaser of the equipment which contains the software for use only on the terms set forth in this license.

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.

MINI-SERVO PARTS ILLUSTRATION (SEE LISTING ON NEXT PG.)

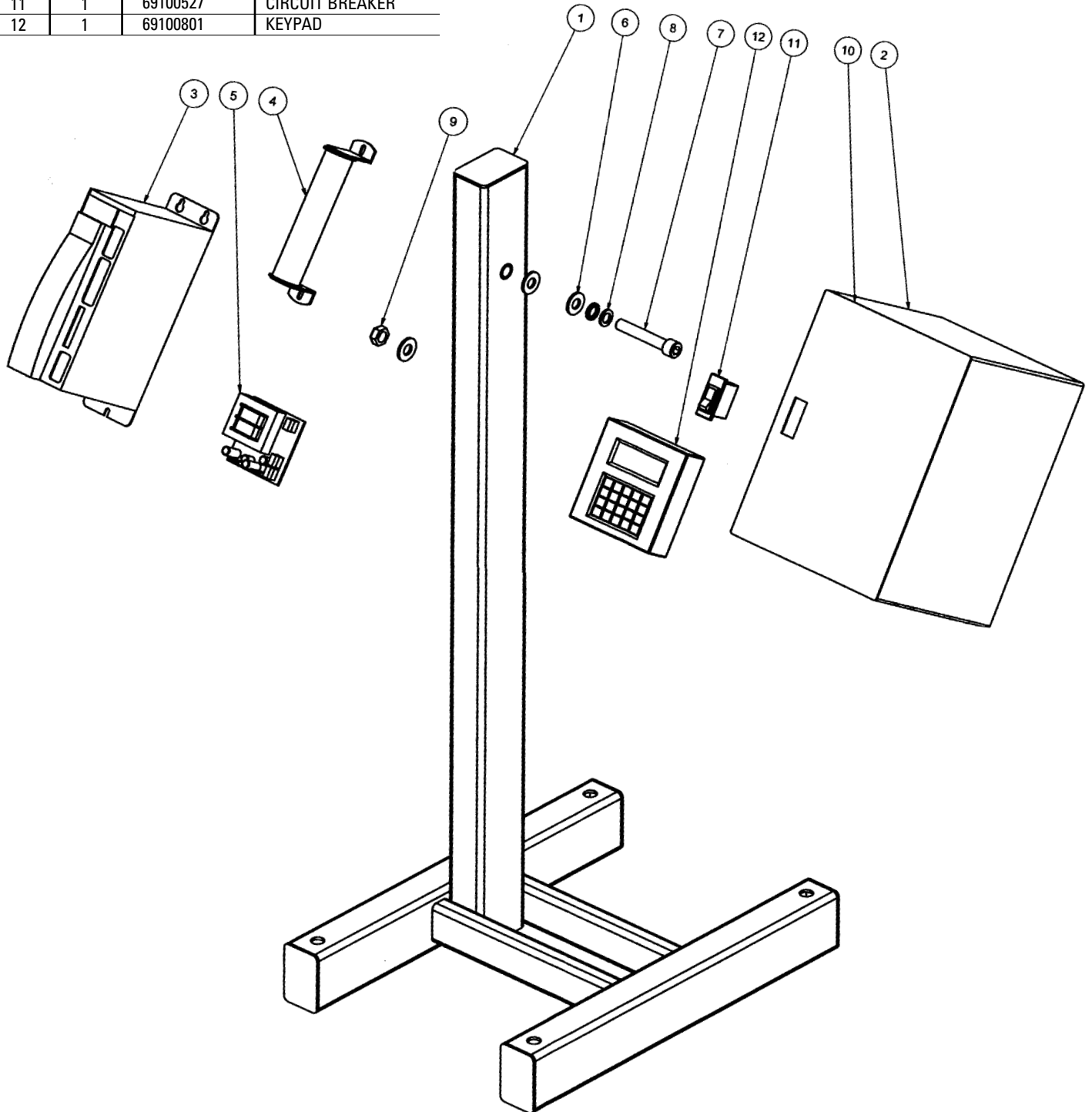


MINI-SERVO PARTS LIST (SEE DIAGRAM ON PREVIOUS PG.)

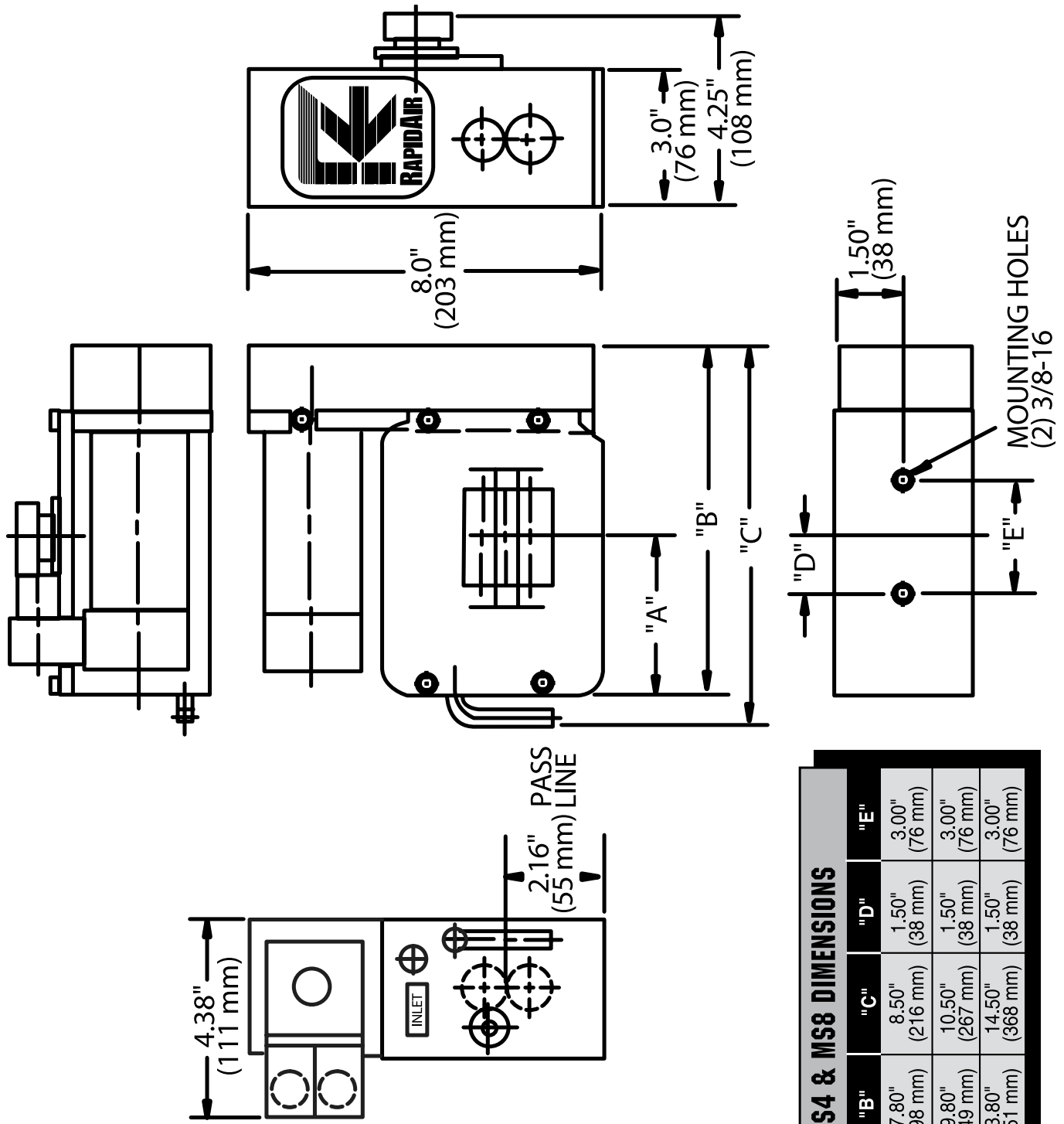
Item	Qty.	MS2 Ass'y Part No.	MS4 Ass'y Part No.	MS8 Ass'y Part No.	Description
62	1	-----	66228025	66228025	SET SCREW 1/4-28 X 1/4 W/NYLOK
61	2	65906037	65906037	65906037	SHCS #6-32 X 3/8
60	1	10900575	10900575	10900575	PILOT RELEASE KIT
59	1	31702083	31702083	31702083	CAM HANDLE PLATE
58	1	62900006	62900006	62900006	CAP PLUG
57	1	32600230	32600230	32600230	UHMW SPUR GEAR
56	1	32600229	32600229	32600229	STEEL SPUR GEAR
55	1	62412062	62412062	62412062	ROLL PIN 1/8 X 5/8
54	2	66620037	66620037	66620037	BHSCS 1/4-20 X 3/8
53	1	32900849	32900849	32900849	ECCENTRIC ADJUSTMENT SHAFT
52	1	67100147	67100147	67100148	PIPE NIPPLE
51	6	66700070	66700070	66700070	SHCS LOW HEAD #10-32 X 1/2
50	1	39900175	39900175	39900175	"INLET" LABEL
49	2	62325050	62325050	62325050	DOWEL PIN 1/4 X 1/2
48	4	65920062	65920062	65920062	SHCS 1/4-20 X 5/8
47	1	36500042	36500042	36500042	CAM
46	1	39900245	39900245	39900245	RAPID-AIR LOGO
45	1	69000035	69000035	69000035	MOTOR
44	--	65912050 (4)	65912050 (6)	65912050 (6)	SHCS #10-32 X 1/2
43	4	65912062	65912062	65912062	SHCS #10-32 X 5/8
42	1	60910037	60910037	60910037	RETAINING RING
41	1	62412437	62412037	62412037	ROLL PIN 1/8 X 3/8
40	1	36500041	36500041	36500041	CAM
39	3	36800031	36800031	36800031	KEY
38	2	61200015	61200015	61200015	FLAT WASHER 1/4
37	2	65920075	65920075	65920075	SHCS 1/4-20 X 3/4
36	1	65906025	65906025	65906025	SHCS #6-32 X 1/4
35	--	66608025 (11)	66608025 (16)	66608025 (19)	BHSCS #8-32 X 1/4
34	1	60900112	60900112	60900112	RETAINING RING
33	6	60910050	60910050	60910050	RETAINING RING
32	2	34100304	34100304	34100304	SPACER
31	2	64100066	64100066	64100066	BRONZE BUSHING
30	1	31702039	31702039	31702039	MOTOR MOUNTING PLATE
29	1	62500005	62500005	62500005	TAPER PIN
28	2	64500065	64500065	64500065	NEEDLE BEARING
27	2	64600033	64600033	64600033	BALL BEARING
26	2	33900262	33900262	33900262	UPPER ROLLER BEARING SLEEVE
25	--	69400084 (1)	69400084 (2)	69400084 (2)	SPHERICAL NUT & WASHER SET
24	--	60108010 (1)	60108010 (2)	60108010 (2)	"O" RING
23	--	60108215 (1)	60108215 (2)	60108215 (2)	"O" RING
22	1	34100317	34100317	34100317	SPACER
21	1	37500158	37500158	37500158	COMPRESSION SPRING
20	1	36200041	36200041	36200041	ADJUSTING SCREW LOCKNUT
19	1	36100097	36100097	36100097	ADJUSTING SCREW
18	1	32500033	32500033	32500033	TIMING BELT
17	1	32500031	32500031	32500031	LOWER PULLEY
16	1	32500032	32500032	32500032	MOTOR PULLEY
15	1	31500422	31500422	31500422	BELT COVER HOUSING
14	1	34100316	34100316	34100316	SPACER
13	1	32900848	32900850	32900851	PIVOT SHAFT
12	1	36600034	36600034	36600034	CAM HANDLE
11	1	31900631	31900632	31900633	UPPER ROLLER BRACKET
10	1	31400537	31400539	31400541	REAR GUARD
9	1	31400536	31400538	31400540	FRONT GUARD
8	1	31500424	31500427	31500427	PISTON COVER
7	--	35500230 (1)	35500230 (2)	35500230 (2)	PISTON
6	1	34200359	34200361	34200363	UPPER ROLLER
5	1	34200358	34200360	34200362	LOWER ROLLER
4	1	31702075	31702076	31702077	ADJUSTING SCREW PLATE
3	1	30100278	30100280	30100280	PISTON HOUSING
2	1	30100277	30100279	30100281	ROLLER HOUSING
1	1	31702074	31702074	31702074	SIDE PLATE

MINI-SERVO CONTROL ASSEMBLY

Item	Qty.	Part No.	Description
1	1	10900513	STAND ASSEMBLY
2	1	31400463	CONTROL BOX FRONT
3	1	69100800	DRIVE
4	1	69100297	REGEN RESISTOR
5	1	69100031	POWER SUPPLY
6	3	61200034	FLAT WASHER 1/2
7	1	65953300	SHCS 1/2-13 X 3
8	2	69400069	FRICTION WASHER
9	1	65105013	HEX NUT 1/2-13
10	1	31400464	CONTROL BOX BACK
11	1	69100527	CIRCUIT BREAKER
12	1	69100801	KEYPAD

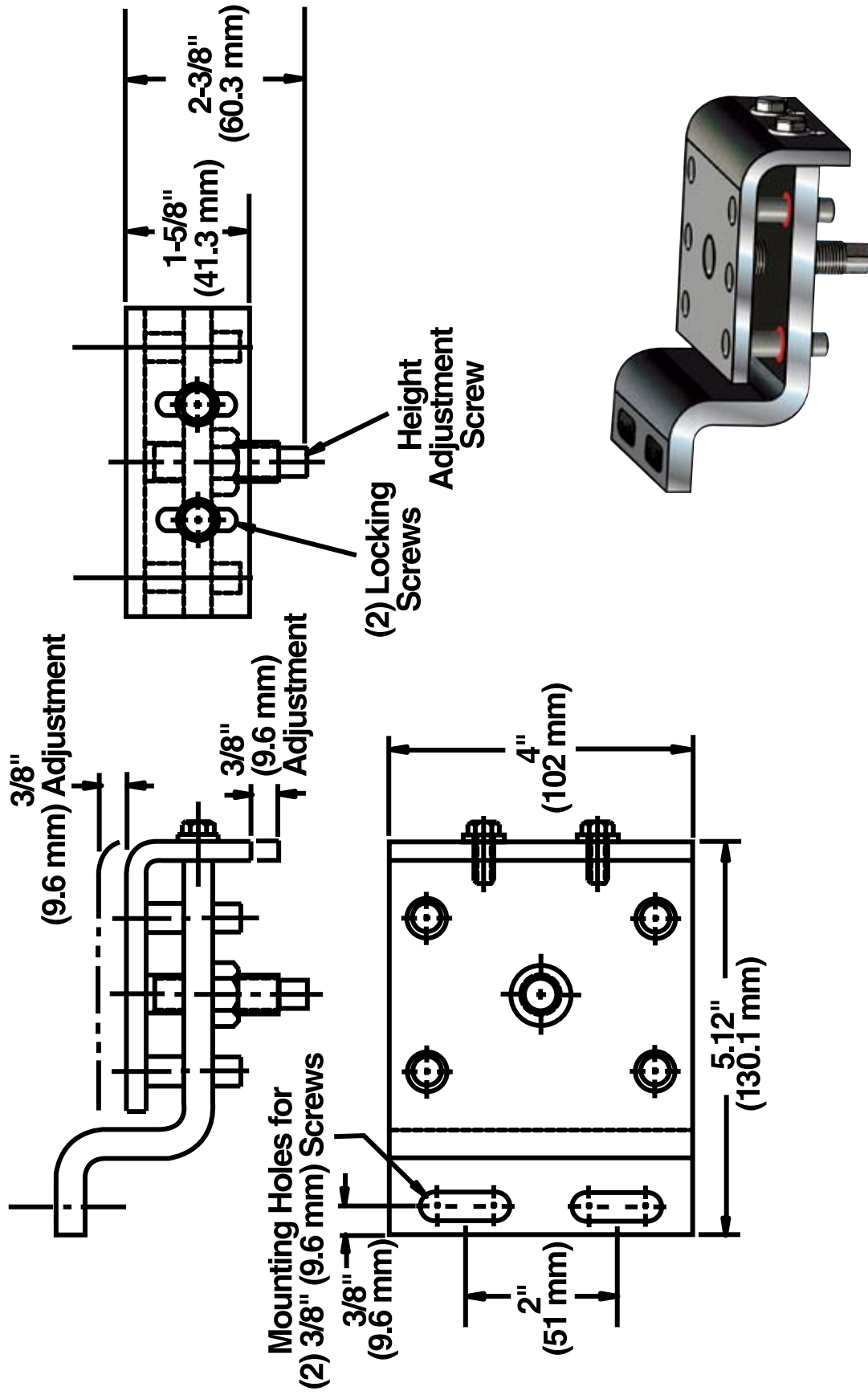


MS Series Servo



MINISERVO MS2, MS4 & MS8 DIMENSIONS					
Model	"A"	"B"	"C"	"D"	"E"
MS2	3.50" (89 mm)	7.80" (198 mm)	8.50" (216 mm)	1.50" (38 mm)	3.00" (76 mm)
MS4	4.50" (114 mm)	9.80" (249 mm)	10.50" (267 mm)	1.50" (38 mm)	3.00" (76 mm)
MS8	6.50" (165 mm)	13.80" (351 mm)	14.50" (368 mm)	1.50" (38 mm)	3.00" (76 mm)

MS2 Servo Adjustable Mounting Bracket



Keypad

