

RH20F Mechanical

10-26-2000
Rev 2

Table Of Contents

Table Of Contents	iii
Manual Discrepancy Sheet	1
Machine Base Assembly	2
Machine Table and Saddle Assembly	4
Machine Column Assembly	6
Machine Head Assembly	8
Spindle Motor and Pulley Assembly	10
Power Drawbar Cylinder Assembly	11
Pneumatic Schematic	12
Air Filter / Regulator / Lubricator Assembly	13
20 Pocket Rotary Tool Changer Assembly	14
20 Pocket Air Cylinder Assembly	16
20 Pocket ATC Top Cover Assembly	17
Pick and Place Tool Changer Assembly	18
Pick and Place Air Cylinder Assembly	20
Table Guard Assembly	22
Flood Coolant Valve Handle Assembly	23
Lubrication Specifications	24
Retention Knob Chart	25
Maintenance Section	26
Adjusting Table Gib	26
Adjustment of Saddle Gib	26
Adjustment of head Bolster gib.	26
Checking and Adjusting Backlash	27
RH Machine Lubrication (MA-212):	28
Procedure to adjust CESD (MA-219) Lubrication Unit	29

Manual Discrepancy Sheet

Machine Base Assembly

MB/RH20 Base

[...-20-1]

Item	Description	Q'ty	Remarks	Mill Part #
1	Base	1		
2				
3	Gear Box	1		
4&5	Y Ballscrew & Nut	1	English	MPS-42
	Y Ballscrew & Nut	1	Metric	MPS-657
6	Key	1		
7	Key	1	4x4x45l	
8	Key	1	4x4x20l	
9	Bearing, thrust	2	7205DB	BG-67
10	Spacer	1		
11	Spacer	1		
12	Spacer	1		
13	Nut	1		MBC-47
14	Bearing Cap	1		
15	Pulley, Ball screw	1		PY-***
16	Cover	1		
17	Bearing	2	6004Z	BG-115
18	Bearing Seat	1		
19	Sleeve	1		
20	Graduated Ring	1		
21	Nut	1		
22	Handwheel	1		
23	Nut	1		
24	Pulley, Motor	1		PY-***
25	Belt	1		BT-***
26	Motor Plate	1		
27	Servo Motor	1		MO-***
28	Leveling Block	6		MBB-57
29	Leveling Screw	6		MBB-58
30	Radial bearing	1		BG-24
	Home & Limit Switch	1		SW-**

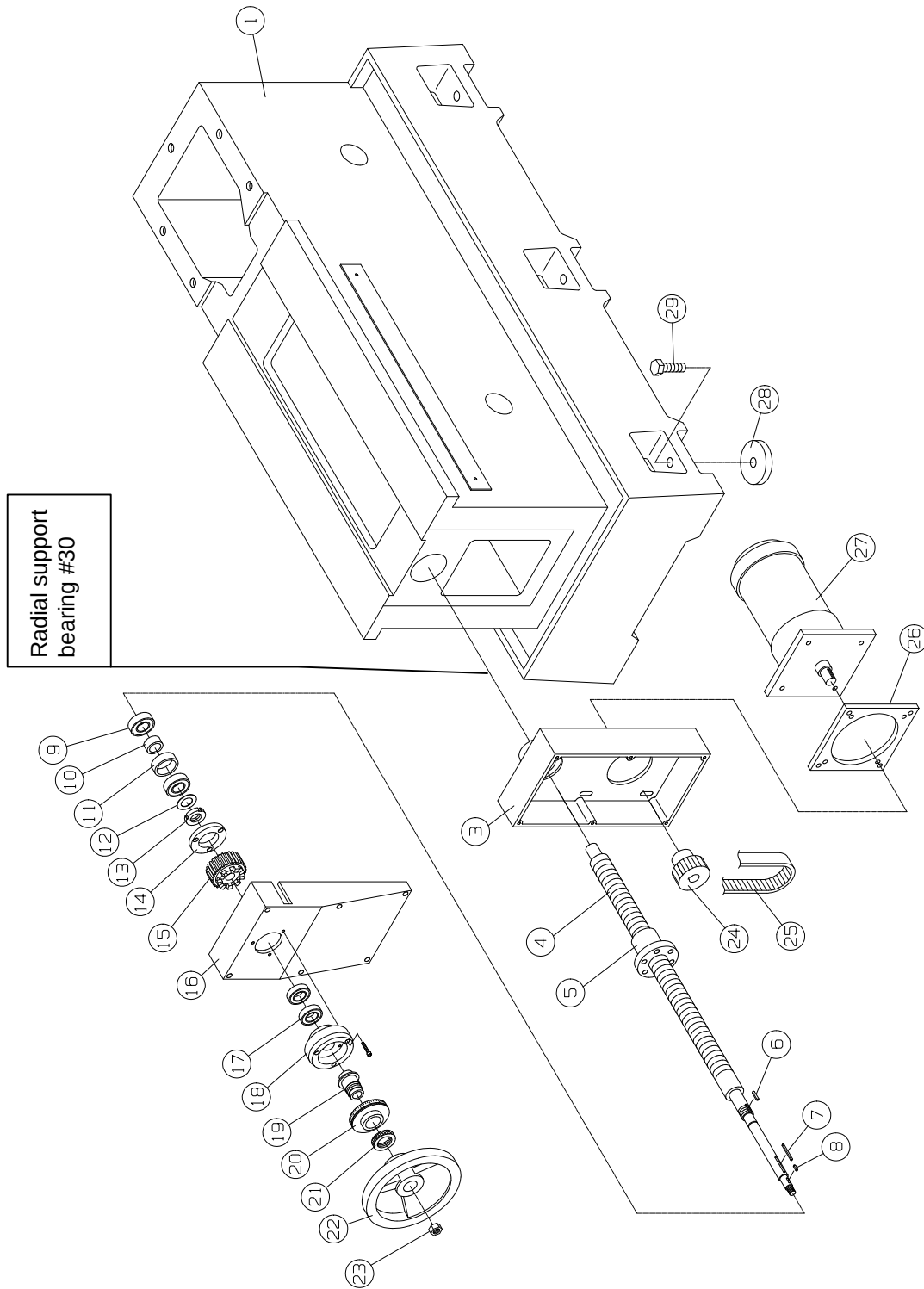
** Use the table below to match the machine series with the correct part.

Series	Home and Limit Switch
RH20A-D	SW-259 & WX-306
RH20E-M	SW-203

*** Use the table below to match the machine series with the correct part.

Series	#15 pulley	#24 pulley	#25 belt	#27 Motor	Drive Amp
RH20A-B	PY-31/106	PY-21	BT-11	MO-02	AM-25 DC
RH20C-G	PY-135/110	PY-135/95	BT-15	MO-94	AM-43 Sig 1
RH20H1&H2	PY-135/110	PY-135/95	BT-15 (210)	MO-125	AM-58 Sig 2
RH20H3 *	PY-135/110	PY-135/95	BT-18* (225)	MO-125	AM-58 Sig 2
RH20H4-L3	PY-135/110	PY-135/95	BT-15 (210)	MO-125	AM-58 Sig 2
RH20M	PY-135/110	PY-135/95	BT-15 (210)	MO-125	AM-90 Sig 5

* Not built



Machine Table and Saddle Assembly

MB/RH20 Table-saddle

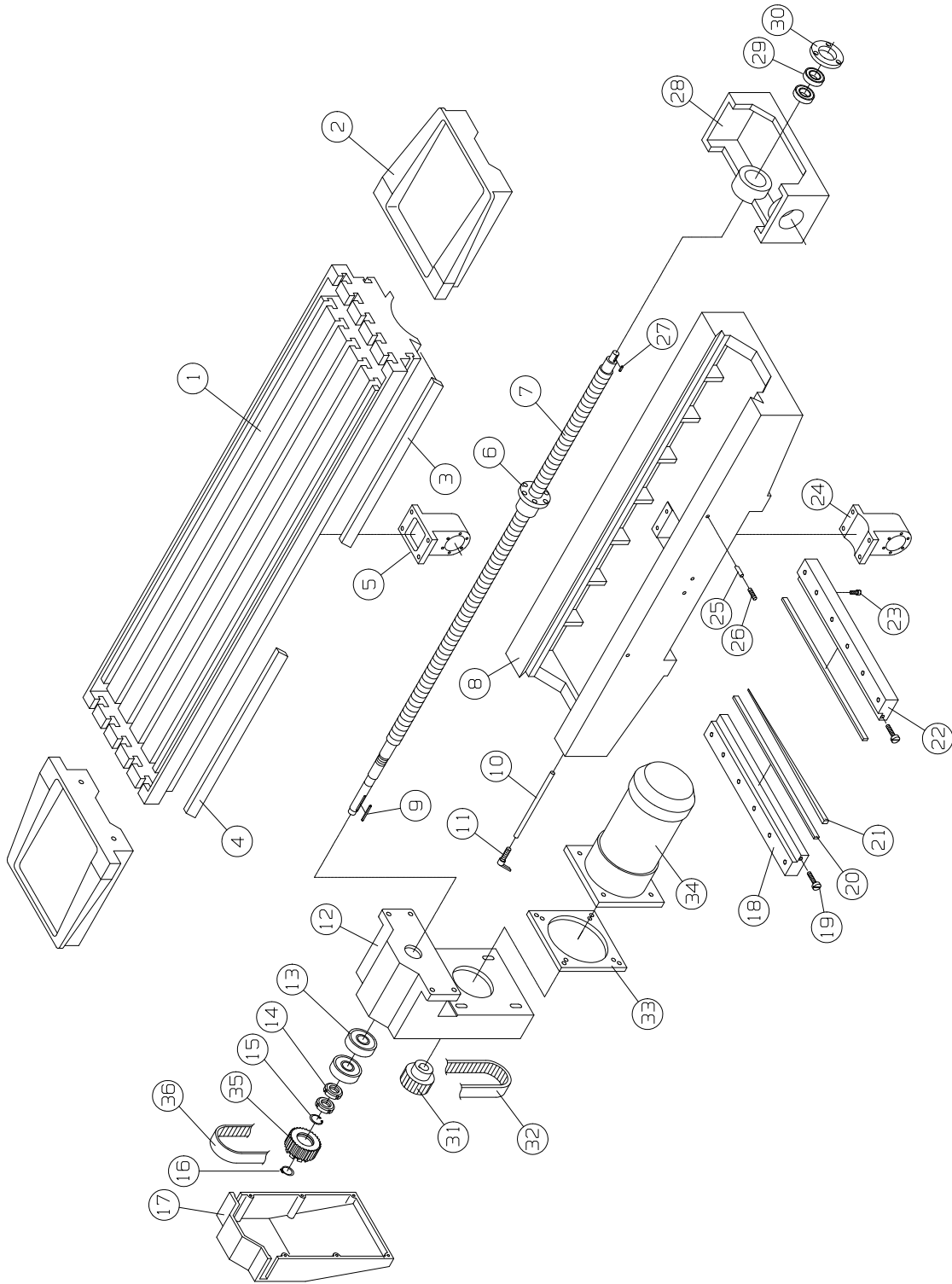
Item	Description	Q'ty	Remarks	Mill Part #
1	Table	1		
2	Tool Tray	2		
3	Gib	1		
4	Gib	1		
5	Nut Bracket	1		MBT-57
6 & 7	X Ballscrew & Nut	1	English	MBT-59
	X Ballscrew & Nut	1	Metric	MPS-656
8	Saddle	1		
9	Key	1		
10	Screw	2		
11	Fixed Plate	2		
12	Gear Box	1	MPS-619 / MBT-64	
13	Bearing, thrust	2		BG-67
14	Nut M25-1.5 P	2	Spec	MBC-47
15	C-Snap	1	R42	
16	Nut	1		
17	Cover	1		MPS-619 (set)
18	Clamp Plate	1		
19	Screw	4	Gib screw	HD-87
20	Gib	1		MPS-611
21	Gib	1		MPS-612
22	Clamp Plate	1		
23	Screw	12		
24	Nut Bracket	1		MBT-76
25	Pin	2		
26	Screw	2		
27	Ball screw key	1		
28	Bracket	1		
29	Bearing, radial	2	6205Z	BG-24
30	Bearing cap	1		
31	Pulley - motor	1		PY-***
32	Belt	1		BT-***
33	Motor plate	1		
34	Servo motor	1		MO-***
35	Pulley - ballscrew	1		PY-***
36	Belt	1		#32
	Home and Limit Switch	1		SW-**

** Use the table below to match the machine series with the correct part.

Series	Home and Limit Switch
RH20A-B	SW-259 & WX-306
RH20C-L	SW-203

*** Use the table below to match the machine series with the correct part.

Series	#35 pulley	#31 pulley	#32 belt	#34 Motor	Drive Amp
RH20A-B	PY-31/106	PY-21	BT-11	MO-02	AM-25
RH20C-G	PY-135/110	PY-135/95	BT-13	MO-94	AM-43
RH20H-L	PY-135/110	PY-135/95	BT-13	MO-125	AM-58
RH20M	PY-135/110	PY-135/95	BT-13	MO-125	AM-90



Machine Column Assembly

MB/RH20 Column

[MB-20-3a]

Item	Description	Q'ty	Remarks	Mill Part #
1	Nut	1		MBC-145
2	Spacer	1		
3	Screw	4		
4	Pulley	1		PY-142
5	Screw	4		
6	Bearing Cap	1		
7	Spacer	1		
8	Bearing, thrust	2		BG-89
9	Bearing Seat	1		MBC-89
10	Screw	4		
11	Key	1	5x5x20l	
12	Z Ballscrew & nut	1	English	MBC-58
	Z Ballscrew & nut	1	Metric	MPS-658
13	Key	1	5x5x20l	
14	Servo Motor	1		MO-***
15	Motor Plate	1		
16	Screw	4		
17	Belt	1		BT-***
18	Set Screw	1		
19	Pulley	1		PY-***
20	Bracket	1		
21	Chain Wheel Shaft	4		MBC-67
22	C-Snap	4		
23	Chain Wheel Shaft	X	Use #21	MBC- 69
24	Bearing	4		BG-24
25	C-Snap	4		
26	Chain Wheel	4		MBC-72
27	Clamp Plate	1		MPS-645
28	Screw	12		
29	Bolt	4		MBC-75
30	Counter Balance Block	1		
31	Column	1		
32	Screw	5		
33	Screw	4		
34	Cover	1		
35	Bolster	1		
36	Nut Bracket	1		
37	Chain	2		MP6-27
37a	Connecting Link for #37	4		MP6-29
38	Clamp Plate	1		MPS-644
39	Screw	4		MPS-608
40	Gib	1		MPS-642
41	Gib	1		MPS-643
42	Bearing, radial	2		BG-24
43	Bracket - ball screw	1		
44	Screw	4		
	Home and Limit Switch	1		SW-**

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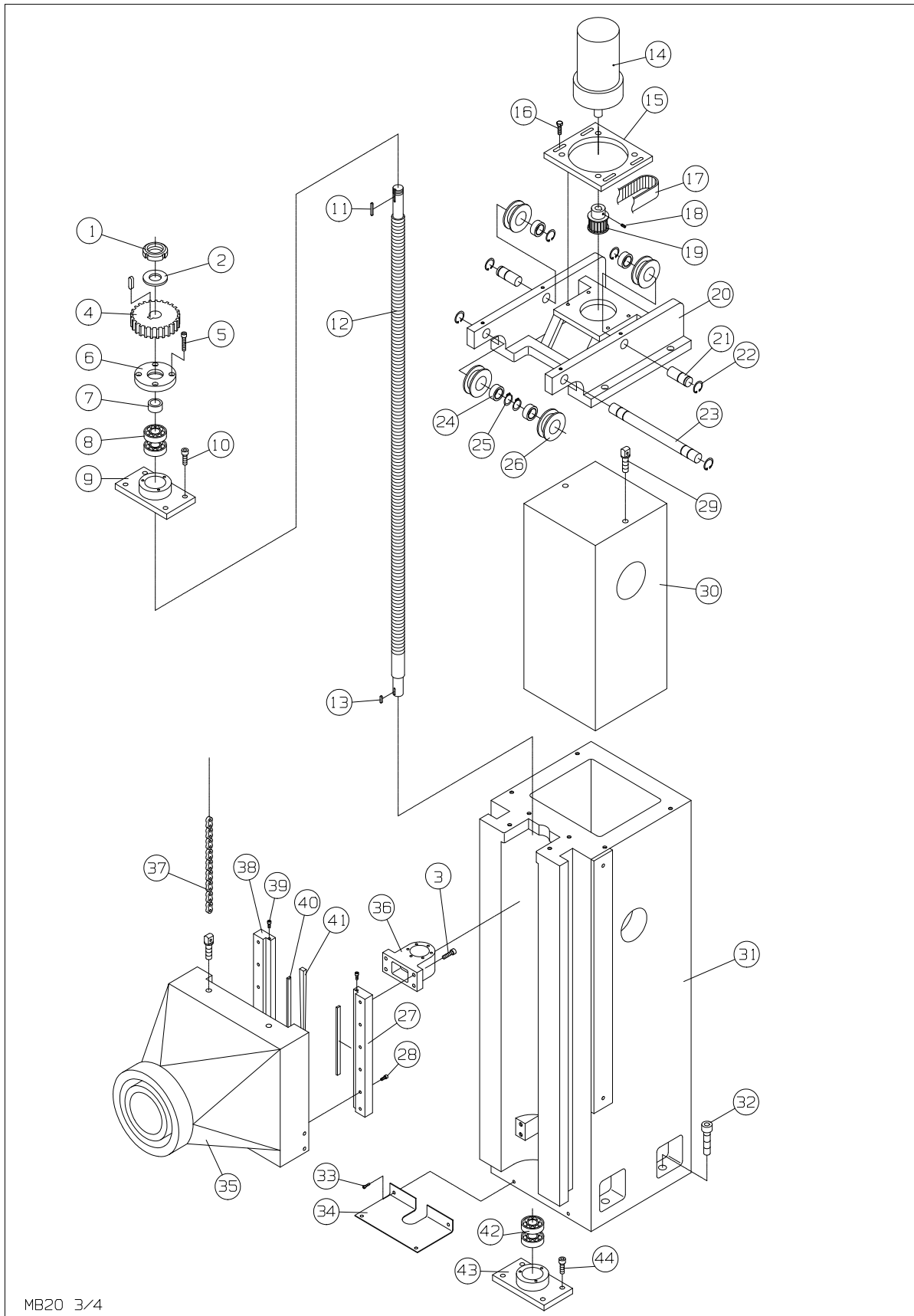
** Use the table below to match the machine series with the correct part.

Series	Home and Limit Switch
RH20A-B	SW-259 & WX-306
MB20C-L	SW-203

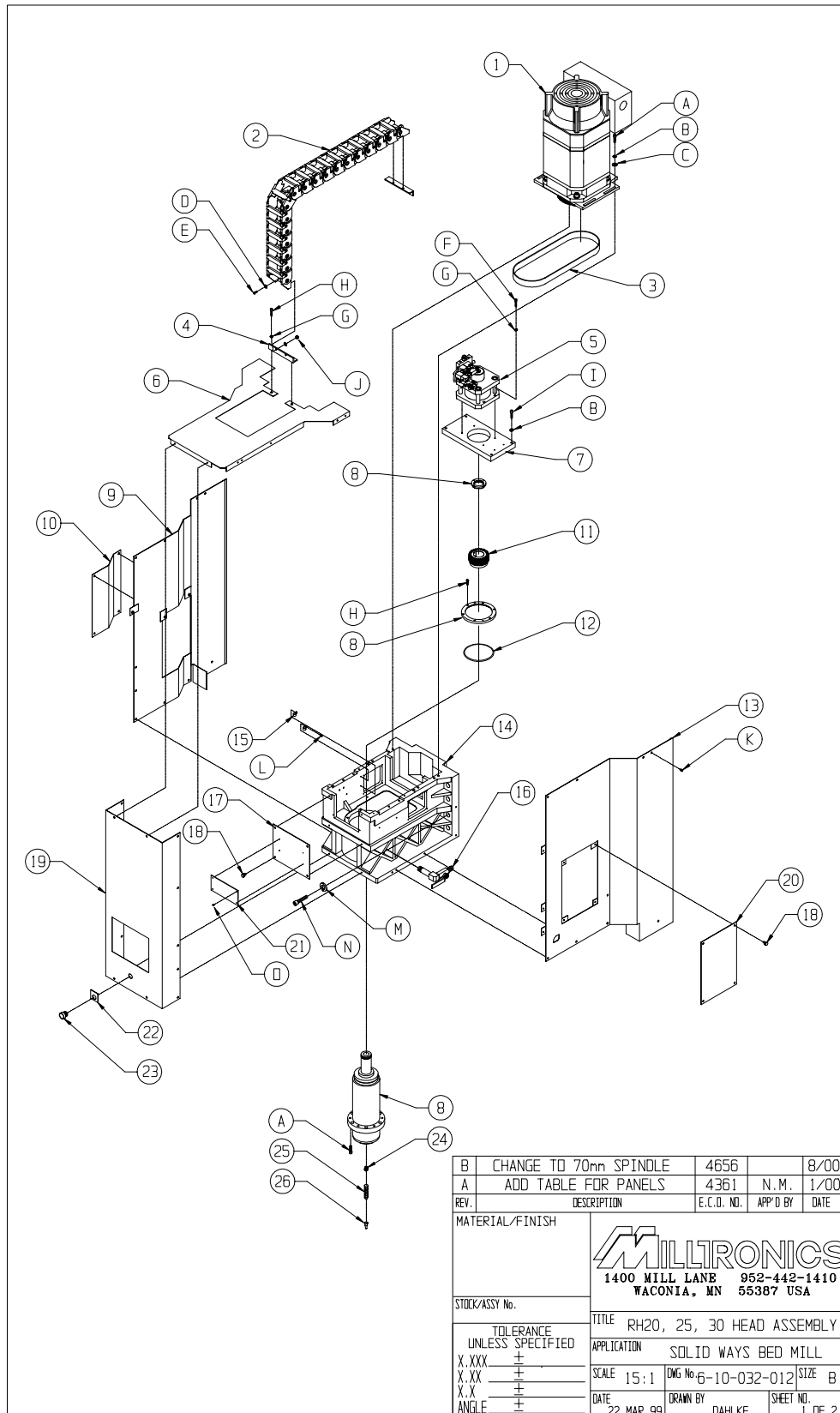
*** Use the table below to match the machine series with the correct part.

Series	#19 pulley	#17 belt	#14 Motor	Drive Amp
RH20A-B	PY135/34	BT-44	MO-70	AM-25
RH20C-G	PY-135/95	BT-02	MO-95	AM-43
RH20H-L	PY-135/95	BT-02* (322)	MO-126	AM-58
RH20M	PY-135/95	BT-02* (322)	MO-126	AM-90
*except RH20I 2,3, & 6,7,8,9		BT-44 (300)	MO-126	AM-58

Machine Column Assembly

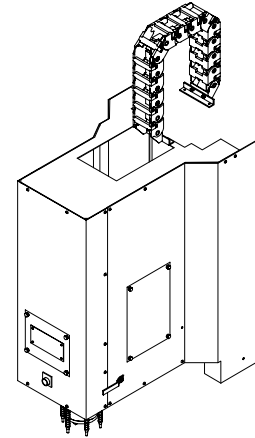


Machine Head Assembly



PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	6-10-018-089	SPINDLE MOTOR ASSEMBLY
2	1	MP-534	SPINDLE CABLE TRACK
3	1	BT-62	W-896 SPINDLE BELT
4	2	MP-316	SPINDLE CABLE SUPPORT BRACKET
5	1	6-10-018-090	TRIPLE STACK DRAWBAR CYLINDER ASSEMBLY
6	1	SEE TABLE	HEAD COVER W/FLOOD - TOP
7	1	MP-284	PDB AIR CYLINDER MOUNT PLATE
8	1	SEE TABLE	SETCO SPINDLE ASSEMBLY
9	1	SEE TABLE	HEAD COVER - LEFT
10	1	MP-306	SIDE ACCESS HEAD COVER
11	1	SEE TABLE	SPINDLE PULLEY
12	1	WX-270	O' RING REAR SEAL
13	1	SEE TABLE	HEAD COVER W/FLOOD - RIGHT
14	1	MX-43	70mm HEAD - MACHINED
15	2	WX-82	3/8" CABLE CLAMP
16	1	6-10-008-039	VM 17 FLOOD HANDLE SUB-ASSEMBLY
17	1	MP-307	FRONT ACCESS HEAD COVER
18	12	WX-160	KNURLED THUMB SCREW
19	1	MP-529	HEAD COVER W/FLOOD - FRONT
20	1	MP-530	RIGHT SIDE ACCESS COVER
21	1	LB-01	SAFETY STICKER
22	1	LB-15	TOOL OUT LABEL
23	1	SW-67	TOOL OUT SWITCH
24	6	NU-111	1/4 LOCKLINK 1/8 NPT
25	24	MA-22	LOCKLINK HOSE
26	6	MA-21	1/8 NOZZLE



PANELS LIST

MACHINE	HEADCOVER-TOP	HEADCOVER-LEFT	HEADCOVER-RIGHT
RH20	MPS-209	MPS-199	MPS-198
RH25	MPS-158	MPS-172	MPS-173
RH30	MPS-152	MPS-174	MPS-175

HARDWARE LIST

No.	QTY	DESCRIPTION
A	14	5/16-18 x 1 1/4 SHCS
B	13	5/16 LOCK WASHER
C	8	5/16 HARDENED FLAT WASHER
D	8	1/4 FLAT WASHER
E	4	1/4-20 x 3/4 BHCS
F	4	1/4-20 x 1 1/4 SHCS
G	8	1/4 LOCK WASHER
H	10	1/4-20 x 3/4 SHCS
I	5	5/16-18 x 1 3/4 SHCS
J	4	1/4-20 NYLOCK NUT
K	44	1/4-20 x 3/8 BHCS
L	2	8-32 x 3/8 BHCS
M	8	3/4 LOCK WASHER
N	8	3/4-10 x 2 1/2 SHCS
O	4	6-32 x 1/4 BHCS

SETCO SPINDLE ASSEMBLY

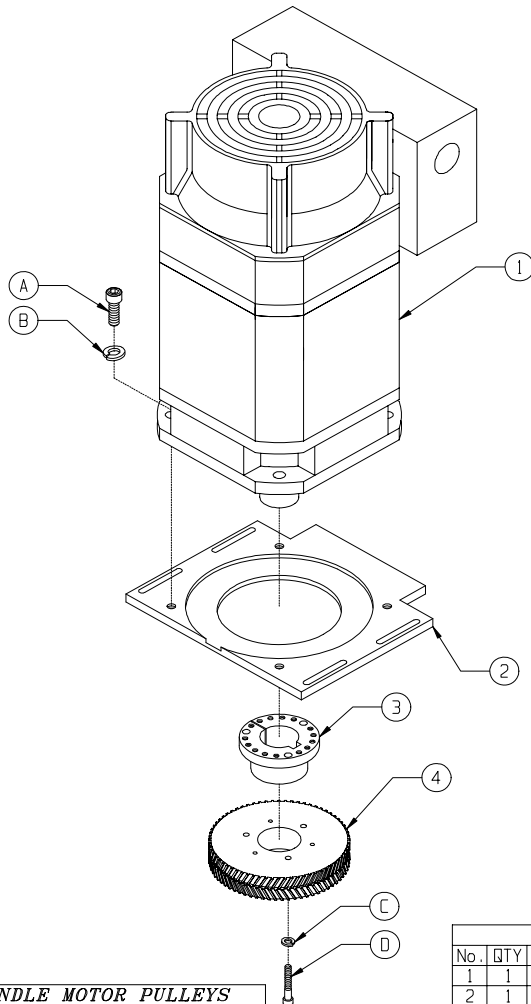
STOCK No.	DESCRIPTION
MP-561	6,000 RPM SPINDLE
MP-562	8,000 RPM SPINDLE
MP-563	12,000 RPM SPINDLE
MP-581	15,000 RPM SPINDLE

SPINDLE PULLEY

STOCK No.	DESCRIPTION
PY-190	12,000 RPM & 15,000 RPM
PY-191	6,000 RPM & 8,000 RPM

B	CHANGE TO 70mm SPINDLE	4656		8/00
A	ADD TABLE FOR PANELS	4361	N. M.	1/00
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH				
 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA				
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED				
X.XXX	±			
X.XX	±			
X.X	±			
ANGLE	±			
TITLE RH20, 25, 30 HEAD ASSEMBLY				
APPLICATION SOLID WAYS BED MILL				
SCALE 15:1		DWG No 6-10-032-012		SIZE B
DATE 22 MAR 99		DRAWN BY DAHLKE		SHEET NO. 2 OF 2

Spindle Motor and Pulley Assembly



SPINDLE MOTOR PULLEYS	
STOCK No.	DESCRIPTION
PY-188	12,000 RPM & 15,000 RPM
PY-192	6,000 RPM & 8,000 RPM

MOTOR PLATES	
STOCK No.	DESCRIPTION
MP-548	15 H.P. & 22 H.P.
MP-587	10 H.P.

PARTS LIST			
No.	QTY	STOCK No.	DESCRIPTION
1	1	SEE TABLE	YASKAWA SPINDLE MOTORS
2	1	SEE TABLE	MOTOR PLATES
3	1	SEE TABLE	BUSHINGS
4	1	SEE TABLE	SPINDLE MOTOR PULLEYS

BUSHINGS	
STOCK No.	DESCRIPTION
PY-97	48mm ID SK BUSHING (USED WITH MD-107, MD-111 SPINDLE MOTOR)
PY-184	32mm ID SK BUSHING (USED WITH MD-114 SPINDLE MOTOR)

YASKAWA SPINDLE MOTORS	
STOCK No.	DESCRIPTION
MD-107	22 H.P. SPINDLE MOTOR - YASKAWA
MD-111	15 H.P. SPINDLE MOTOR - YASKAWA
MD-114	10 H.P. SPINDLE MOTOR - YASKAWA

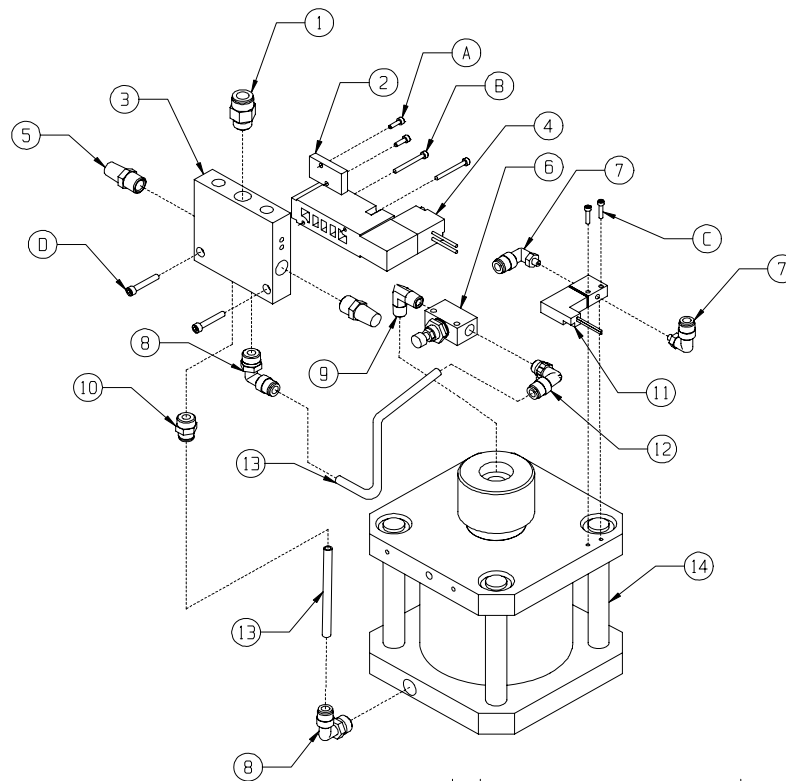
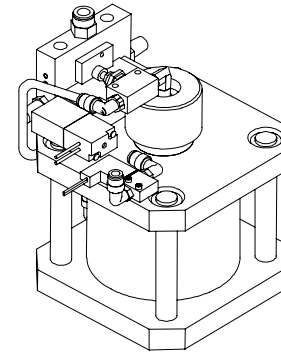
HARDWARE LIST		
No.	QTY	DESCRIPTION
A	4	1/2-13 x 1 1/4 SHCS
B	4	1/2 LOCK WASHER
C	3	5/16 LOCK WASHER
D	3	5/16-18 x 2 SHCS

REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
	MATERIAL/FINISH			
	STOCK/ASSY No.			
	TOLERANCE UNLESS SPECIFIED			
	X .XXX			
	X .XX			
	X .X			
	ANGLE			
				
	1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA			
	TITLE GOODYEAR MOTOR AND PULLEY ASSEMBLY APPLICATION GENERAL PRODUCTS SCALE 5:1 DWG No 6-10-018-089 SIZE B DATE 04 AUG 00 DRAWN BY DAHLKE SHEET NO. 1 OF 1			

Power Drawbar Cylinder Assembly

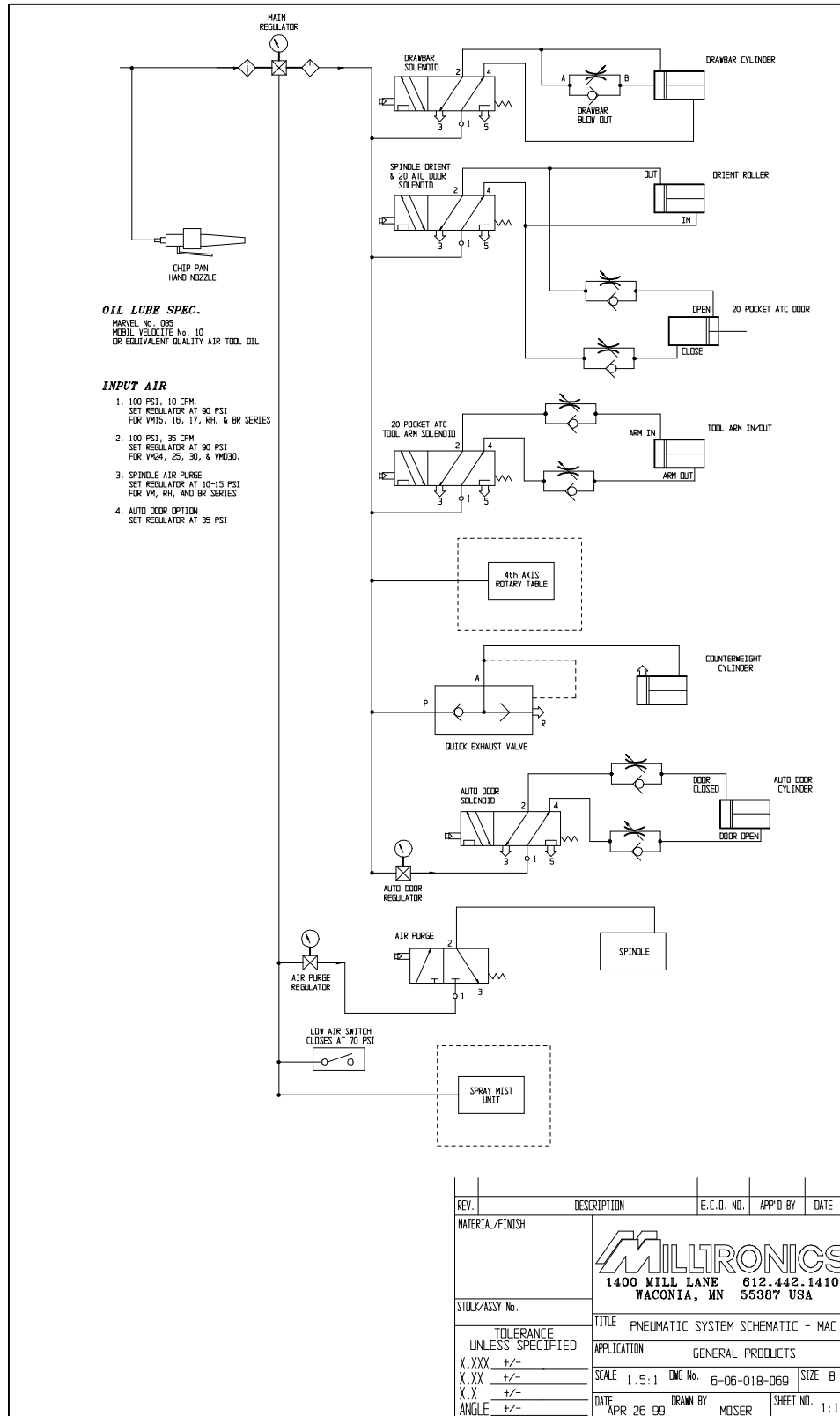
PARTS LIST			
ITEM	QTY	STOCK No.	DESCRIPTION
1	1	NU-95	MALE STRAIGHT 1/4 NPT - 3/8 TUBE
2	1	NU-240	MAC BLANKING PLATE
3	1	NU-184	MANIFOLD
4	1	NU-183	DRAW BAR - AIR VALVE
5	2	NU-79	1/4 NPT MUFFLER
6	1	NU-190	FLOW CONTROL FOR BLOW OUT
7	2	NU-192	SWIVEL ELBOW 10-32 - 1/4 TUBE
8	2	NU-186	SWIVEL ELBOW 1/4 NPT - 1/4 TUBE
9	1	NU-189	MALE ELBOW 1/8 NPT
10	1	NU-32	MALE STRAIGHT 1/4 NPT - 1/4 TUBE
11	1	NU-191	AIR PURGE - AIR VALVE
12	1	NU-187	SWIVEL ELBOW 1/8 NPT - 1/4 TUBE
13	4"	NU-25	1/4" TUBING
14	1	NU-255	TRIPLE STACK DRAW BAR AIR CYLINDER

HARDWARE LIST			
ITEM	QTY	DESCRIPTION	
A	2	M3-.5 x 10mm SHCS	
B	2	M3-.5 x 30mm SHCS	
C	2	4-40 x 1/2 SHCS	
D	2	8-32 x 1 SHCS	



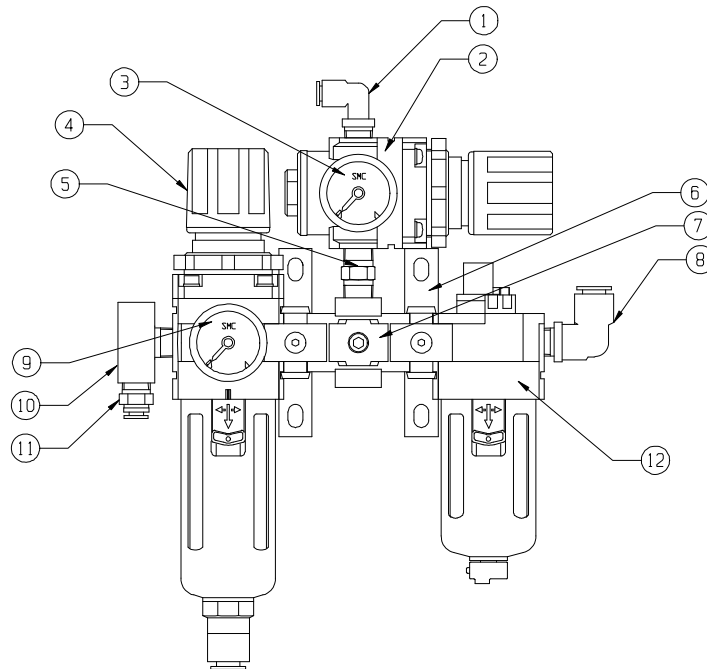
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
1400 MILL LANE WACONIA, MN 55387 USA TITLE NU-238 DRAW BAR ASSEMBLY APPLICATION GENERAL PRODUCTS SCALE 3:1 DATE 09 AUG 00				
STOCK/ASSY No. TOLERANCE UNLESS SPECIFIED X.XXX +/- X.XX +/- X.X +/- ANGLE +/- DWG No. 6-10-018-090 SIZE B DRAWN BY DAHLKE SHEET No. 1 OF 1				

Pneumatic Schematic



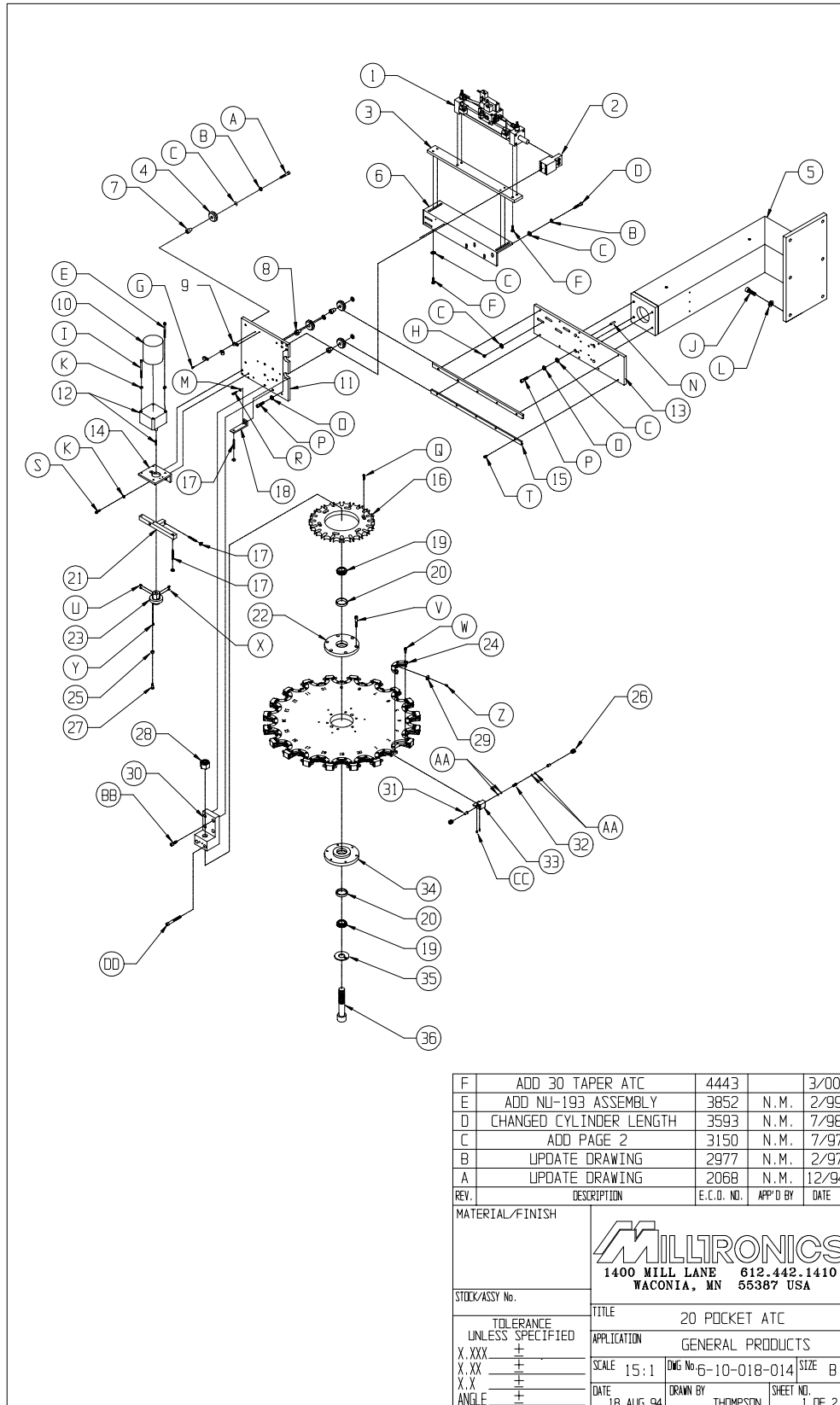
Air Filter / Regulator / Lubricator Assembly

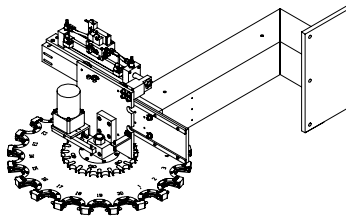
PARTS LIST			
ITEM	QTY	STOCK No.	DESCRIPTION
1	1	NU-186	1/4 NPT 1/4 TUBE SWIVEL ELBOW
2	1	NU-214	LOW PRESSURE REGULATOR
3	1	NU-216	LOW PRESSURE GAUGE
4	1	NU-212	LARGE FILTER/HIGH PRESSURE REGULATOR
5	1	NU-30	1/4 NPT PIPE NIPPLE
6	2	NU-210	LARGE MOUNTING SPACER
7	1	NU-211	LARGE MANIFOLD SPACER
8	1	NU-199	1/4 NPT 3/8 TUBE SWIVEL ELBOW
9	1	NU-208	AIR GAUGE WITH PRESSURE SWITCH
10	1	NU-219	1/4 NPT BRANCH TEE
11	1	NU-32	1/4 NPT 1/4 TUBE MALE STRAIGHT
12	1	NU-209	LARGE LUBRICATOR



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 612.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE NU-232 FRL ASSEMBLY		
X. XXX +/-		APPLICATION GENERAL PRODUCTS		
X. XX +/-		SCALE 3:1 DWG No. 6-10-018-085		SIZE B
X. X +/-		DATE 14 JAN 00 DRAWN BY DAHLKE		SHEET NO. 1:1
ANGLE +/-				

20 Pocket Rotary Tool Changer Assembly





PARTS LIST			HARDWARE LIST		
No.	QTY	STOCK No.	DESCRIPTION	No.	QTY
1	1	6-10-018-063	NU-193 9" AIR CYLINDER ASSEMBLY	A	4
2	1	MP-427	9 IN. AIR CYLINDER CLEVIS	B	8
3	1	MP-426	9 IN. AIR CYLINDER PLATE	C	20
4	4	MP-143	V-RAIL GUIDE WHEEL	D	4
5	1	SEE TABLE	20 POCKET ARM	E	2
6	1	MP-117	20 POCKET AIR CYLINDER MOUNTING BRACKET	F	8
7	2	MP-145	STATIONARY BUSHING	G	2
8	2	MP-144	ADJUSTABLE BUSHING	H	4
9	3	WX-82	3/8 IN. CABLE CLAMP	I	2
10	1	MD-72	GENEVA MOTOR	J	6
11	1	MP-123	20 POCKET CAROUSEL SLIDING PLATE	K	8
12	1	MD-71	GEAR BOX W/KEY	L	6
13	1	MP-142	V-RAIL PLATE	M	2
14	1	MP1-117	GENEVA WHEEL MOTOR MOUNT	N	4
15	2	MX-12	20 POCKET LINEAR V-RAIL MODS.	O	8
16	1	MP-120	20 POSITION GENEVA WHEEL	P	8
17	3	PR-19	SWITCH PROX	Q	6
18	1	BR-130	TOOL CHANGER PROX. SWITCH BRACKET	R	2
19	2	BG-33	CONE TAPERED BEARING	S	4
20	2	BG-34	CUP TAPERED BEARING	T	10
21	1	MP-466	HOME/GENEVA PROX BRACKET	U	2
22	1	MP-116	UPPER CAROUSEL BEARING CUP	V	6
23	1	MX-10	20 PKT ATC DRIVE CAM - MACHINED	W	80
24	20	SEE TABLE	20 POCKET INSERT	X	2
25	1	HD-39	1/2 x 5/16 DRILL BUSHING	Y	1
26	40	MP1-140	([^]) PUSH PIN GUIDE	Z	20
27	1	HD-38	5/16 x 3/8 SHOULDER BOLT	AA	80
28	1	HD-07	1-8 UNC NYLOCK NUT	BB	4
29	20	SEE TABLE	([^]) 20 POCKET TOOL CHANGE KEY	CC	40
30	1	MP-124	20 POCKET CAROUSEL MOUNTING BRACKET	DD	2
31	40	MP1-144	([^]) PUSH PIN		
32	20	MP1-141	([^]) COIL SPRING		
33	20	MP-121	20 ATC LOCKING PIN BLOCK		
34	1	MP-115	LOWER CAROUSEL BEARING CUP		
35	1	HD-10	1 IN. HARDENED SERIES 'N' WASHER		
36	1	HD-09	1-8 x 5 1/2 UNC SHCS BOLT		

(*) IS USED FOR BT FLANGE OPTION ONLY

([^]) IS REMOVED FOR 30 TAPER ATC SEE NOTE 1

20 POCKET TOOL CHANGE KEY CHART	
V-FLANGE	MP1-45
BT	MP1-121

20 POCKET INSERT CHART	
V-FLANGE	MX-11
BT	MX-13
30 TAPER	MX-41

NOTES:

- ON 30 TAPER OPTION, 40 QTY. HD-76 SPRING PLUNGERS REPLACE MP1-140, MP1-141, MP1-144, AND TOOL CHANGE KEYS.

20 POCKET ARM CHART

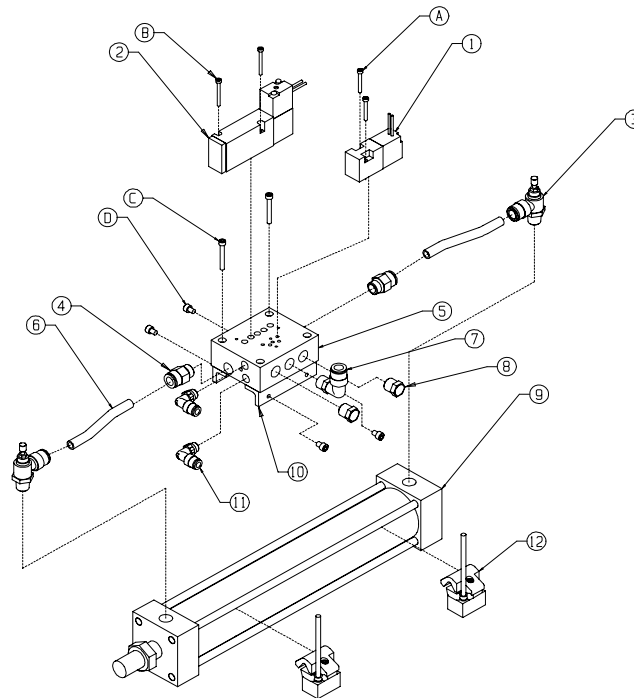
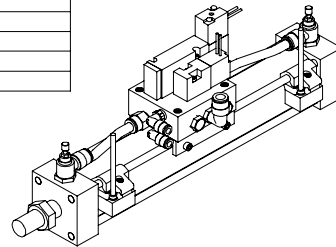
MACHINE	STOCK No.
VM15/16D	MP1-193
VM16E/VM-17	MP1-327
VM-24	MP6-126
VM-30	MP7-61
VMD-30	MP7-61
RH-20	MPS-05
RH25	MPS-200
RH30	MPS-207

F	ADD 30 TAPER ATC	4443		3/00
E	ADD NU-193 ASSEMBLY	3852	N.M.	2/99
D	CHANGED CYLINDER LENGTH	3593	N.M.	7/98
C	ADD PAGE 2	3150	N.M.	7/97
B	UPDATE DRAWING	2977	N.M.	2/97
A	UPDATE DRAWING	2068	N.M.	12/94
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH				
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED				
X.XXX	+			
X.XX	+			
X.X	+			
ANGLE	+			
MILLIRONICS				
1400 MILL LANE 612.442.1410 WACONIA, MN 55387 USA				
TITLE 20 POCKET ATC				
APPLICATION GENERAL PRODUCTS				
SCALE	15:1	DWG No.	6-10-018-014	SIZE B
DATE	18 AUG 94	DRAWN BY	THOMPSON	SHEET NO. 2 OF 2

20 Pocket Air Cylinder Assembly

PARTS LIST			
ITEM	QTY	STOCK No.	DESCRIPTION
1	1	NU-185	AIR VALVE - DOOR - OPEN/CLOSE
2	1	NU-183	AIR VALVE - CAROUSEL - IN/OUT
3	2	NU-180	FLOW CONTROL
4	2	NU-95	MALE STRAIGHT CONNECTOR 1/4 NPT - 3/8 TUBE
5	1	NU-194	MANIFOLD
6	2	NU-78	3/8 NYLON TUBING
7	1	NU-199	SWIVEL ELBOW 1/4 NPT - 3/8 TUBE
8	2	NU-79	MUFFLER
9	1	NU-167	9" AIR CYLINDER
10	2	NU-195	MANIFOLD BRACKET
11	2	NU-187	SWIVEL ELBOW 1/8 NPT - 1/4 TUBE
12	2	SW-158	REED SWITCH

HARDWARE LIST		
ITEM	QTY	DESCRIPTION
A	2	M3-.5 x 25mm SHCS
B	2	M3-.5 x 30mm SHCS
C	4	8-32 x 1 1/4 SHCS
D	4	10-32 x 1/4 SHCS



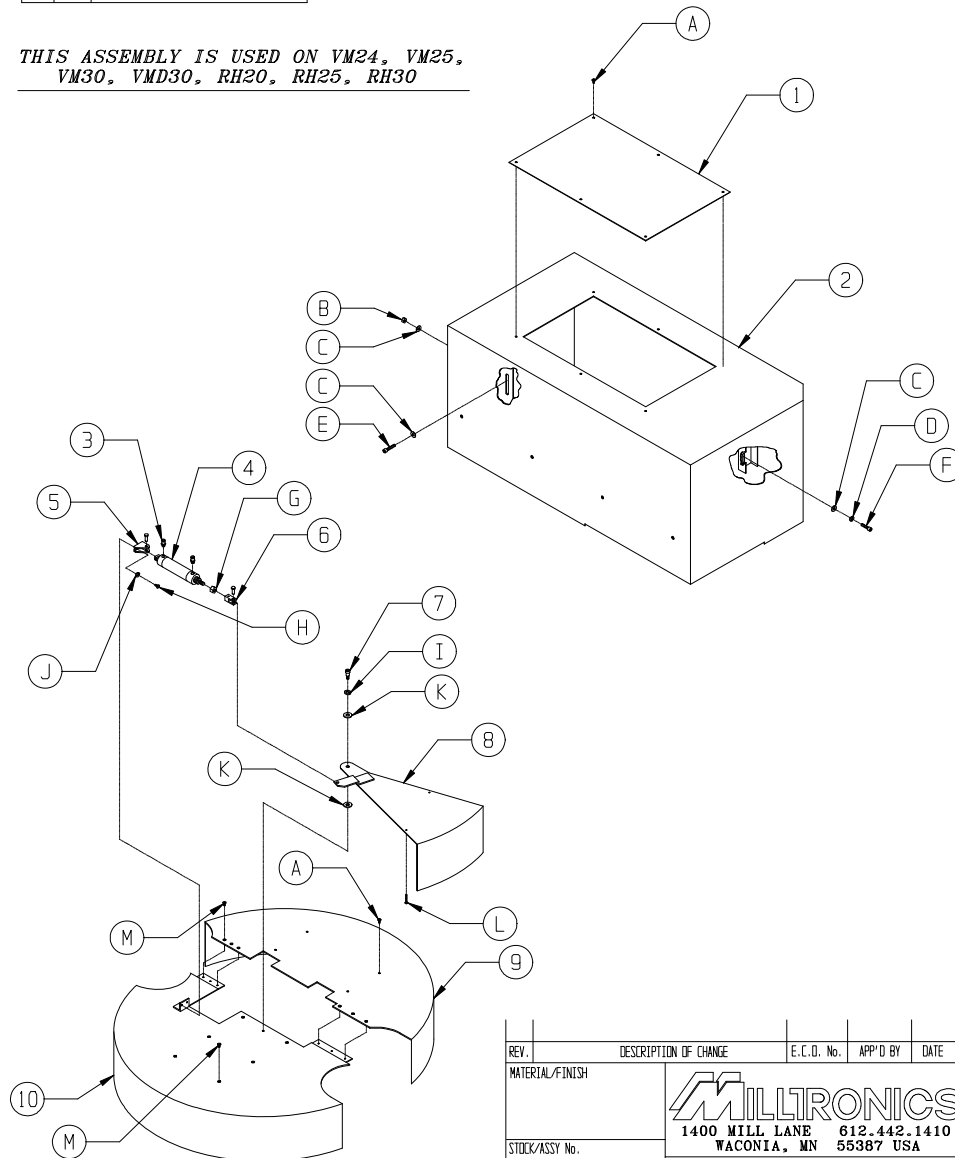
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 612.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE NU-193 - 9" AIR CYLINDER ASSEMBLY		
X .XXX +/-		APPLICATION GENERAL PRODUCTS		
X .XX +/-		SCALE 4:1	DWG No. 6-10-018-063	SIZE B
X .X +/-		DATE 19 FEB 99	DRAWN BY DAHLKE	SHEET NO. 1:1
ANGLE +/-				

20 Pocket ATC Top Cover Assembly

HARDWARE LIST		
No.	QTY	DESCRIPTION
A	10	8-32 x 3/8 BHCS
B	2	1/4-20 NYLOCK HEX NUT
C	7	1/4 FLAT WASHER
D	3	1/4 LOCK WASHER
E	2	1/4-20 x 1 SHCS
F	3	1/4-20 x 3/4 SHCS
G	1	5/16-24 JAM NUT
H	2	10-32 x 3/8 BHCS
I	1	5/16 LOCK WASHER
J	2	#10 LOCK WASHER
K	2	5/16 FLAT WASHER
L	2	6-32 x 1/8 RHMS NYLON
M	12	8-32 x 3/8 FHCS

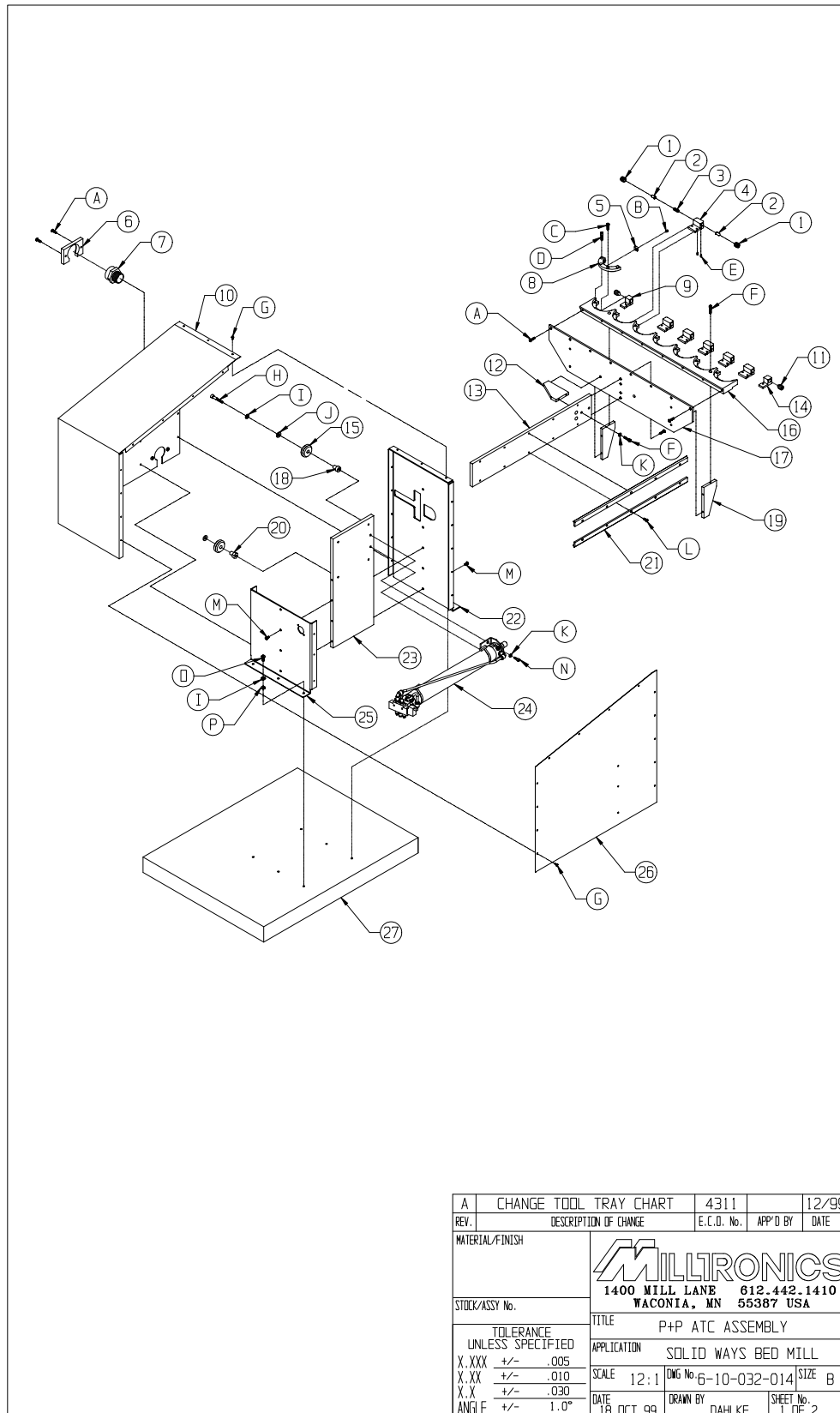
PARTS LIST			
No.	Qty.	PART No.	DESCRIPTION
1	1	MM-60	TOP COVER ACCESS PANEL
2	1	MM-61	TOP COVER ASSEMBLY
3	2	NU-201	FLOW CONTROL
4	1	NU-129	AIR CYLINDER 1"x2"
5	1	NU-04	CYLINDER BASE AND PIN
6	1	NU-03	CYLINDER CLEVIS AND PIN
7	1	HD-38	5/16 x 3/8 SHOULDER BOLT
8	1	MM-64	CAROUSEL DOOR
9	1	MM-63	CAROUSEL COVER REAR
10	1	MM-62	CAROUSEL COVER FRONT

THIS ASSEMBLY IS USED ON VM24, VM25,
VM30, VMD30, RH20, RH25, RH30



REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH	 1400 MILL LANE 612.442.1410 WACONIA, MN 55387 USA			
STOCK/ASSY No.	TITLE 20 POCKET ATC TOP COVER ASSEMBLY - VM24, VM25, VM30, VM300			
TOLERANCE UNLESS SPECIFIED	APPLICATION GENERAL PRODUCTS			
X.XXX +/-	SCALE 10:1			
X.XX +/-	DATE 21 DEC 99			
X.X +/-	DRAWN BY DAHLKE			
ANGLE +/-	SHEET No. 1 OF 1			

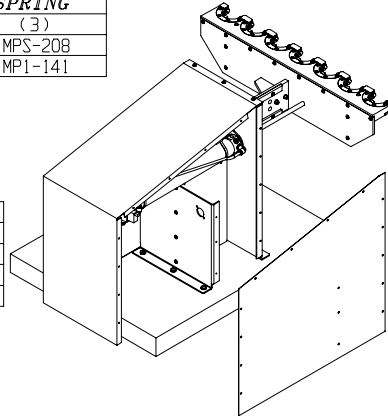
Pick and Place Tool Changer Assembly



A	CHANGE TOOL TRAY CHART	4311		12/99
REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH	 1400 MILL LANE 612.442.1410 WACONIA, MN 55387 USA			
STOCK/ASSY No.	TITLE P+P ATC ASSEMBLY APPLICATION SOLID WAYS BED MILL SCALE 12:1 DWG No. 6-10-032-014 SIZE B DATE 18 OCT 99 DRAWN BY DAHLKE SHEET No. 1 OF 2			
TOLERANCE UNLESS SPECIFIED				
X.XXX	+/-	.005		
X.XX	+/-	.010		
X.X	+/-	.030		
ANGLE	+/-	1.0°		

POCKET TOOL CHANGER CHART			
	POCKET INSERT	KEY	SPRING
ITEM No.	(8)	(5)	(3)
V-FLANGE	MX-11	MP1-45	MPS-208
BT	MX-13	MP1-121	MP1-141

TOOL AND BACK PLATE CHART		
	BACK PLATE	TOOL PLATE
5 POCKET	MPS-203	MPS-202
6 POCKET	MPS-188	MPS-189
7 POCKET	MPS-205	MPS-204



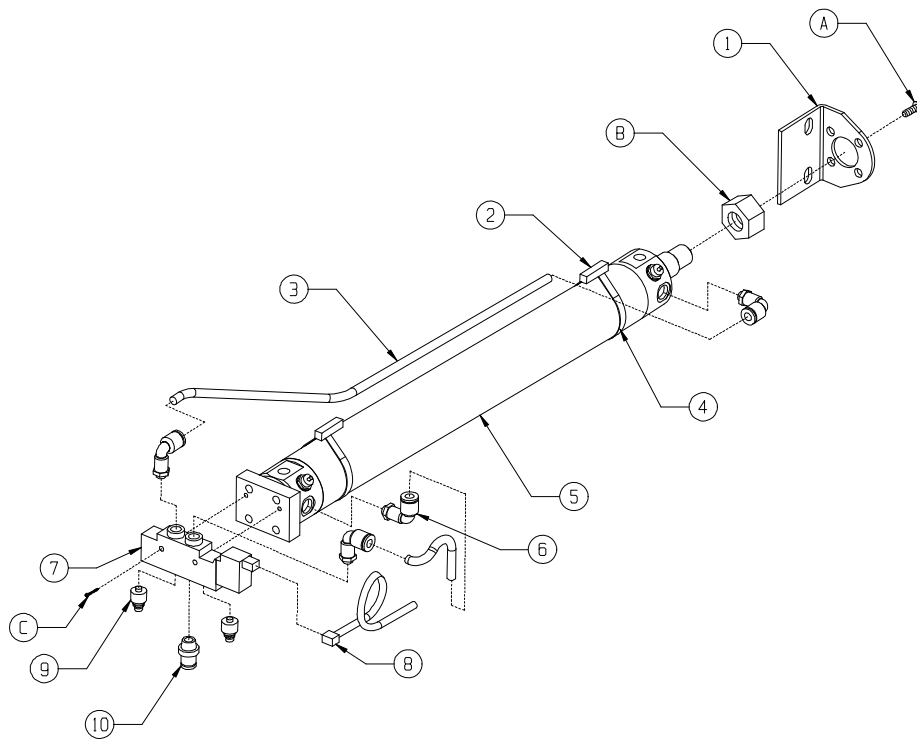
PARTS LIST			
No.	QTY	STOCK No.	DESCRIPTION
1	12	MP1-140	PUSH PIN GUIDE
2	12	MP1-144	PUSH PIN
3	6	SEE TABLE	SPRING
4	6	MPS-197	DOUBLE LOCKING PIN BLOCK
5	7	SEE TABLE	ATC POCKET TOOL KEY
6	2	BR-111	CONDUIT BRACKET
7	2	WX-246	FITTING - END
8	7	SEE TABLE	ATC POCKET INSERT
9	1	MPS-182	P+P LOCKING PIN BLOCK - LEFT
10	1	MPS-195	P+P COVER - REAR
11	2	HD-76	END SPRING PLUNGER
12	1	MPS-186	P+P ATC - CENTER BRACKET
13	1	MPS-180	P+P ATC SLIDING PLATE
14	1	MPS-183	P+P LOCKING PIN BLOCK - RIGHT
15	4	MP-143	V-RAIL GUIDE WHEEL
16	1	SEE TABLE	P+P ATC - TOOL PLATE
17	1	SEE TABLE	P+P ATC - BACK PLATE
18	2	MP-144	ADJUSTABLE BUSHING
19	2	MPS-187	P+P ATC - SIDE BRACKET
20	2	MP-145	STATIONARY BUSHING
21	2	MX-12	LINEAR V-RAILS
22	1	MPS-185	P+P ATC MAIN UPRIGHT - FRONT
23	1	MPS-184	P+P GUIDE WHEEL PLATE
24	1	6-10-018-082	NJ-205 15" AIR CYLINDER ASSEMBLY
25	1	MPS-181	P+P ATC MAIN UPRIGHT - REAR
26	1	MPS-196	P+P COVER PLATE - FRONT
27	1	SEE TABLE	P+P TOOL TRAY

TOOL TRAYS	
RH20	MPS-190
RH25	MPS-191
RH30	MPS-192

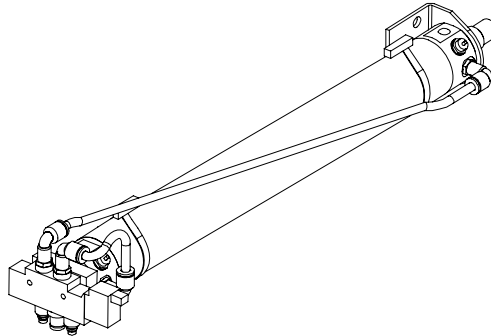
HARDWARE LIST		
No.	QTY	DESCRIPTION
A	21	1/4-20 x 3/4 BHCS
B	7	8-32 x 1/4 SHCS
C	14	1/4-20 x 1/2 SHCS
D	14	1/4-20 x 3/4 SHCS
E	14	10-32 x 3/16 BRASS TIPPED SHCS
F	4	1/4-20 x 1 SHCS
G	27	10-32 x 3/8 BHCS
H	4	5/16-18 x 1 5/8 SHCS
I	10	5/16 LOCK WASHER
J	4	5/16 HARDENED FLAT WASHER
K	4	1/4 LOCK WASHER
L	10	1/4-20 x 5/8 BHCS
M	9	1/4-20 x 1/2 BHCS
N	2	1/4-20 x 5/8 SHCS
O	6	5/16-18 x 1 BHCS
P	6	5/16 FLAT WASHER

A	CHANGE TOOL TRAY CHART	4311		12/99
REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH				
STOCK/ASSY No.		1400 MILL LANE 612.442.1410 WACONIA, MN 55387 USA		
TOLERANCE UNLESS SPECIFIED		TITLE P+P ATC ASSEMBLY		
X.XXX	+/- .005	APPLICATION SOLID WAYS BED MILL		
X.XX	+/- .010	SCALE 12:1		
X.X	+/- .030	DATE 18 OCT 99		
ANGLE	+/- 1.0°	DRAWN BY DAHLKE		
		SHEET No. 2 OF 2		

Pick and Place Air Cylinder Assembly



REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 612.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE NU-205 15" AIR CYLINDER ASSEMBLY		
X. XXX +/-		APPLICATION GENERAL PRODUCTS		
X. XX +/-		SCALE 3.5:1 Dwg No. 6-10-018-082 SIZE B		
X. X +/-		DATE 02 DEC 99 DRAWN BY DAHLKE SHEET No. 1 OF 2		
ANGLE +/-				



PARTS LIST

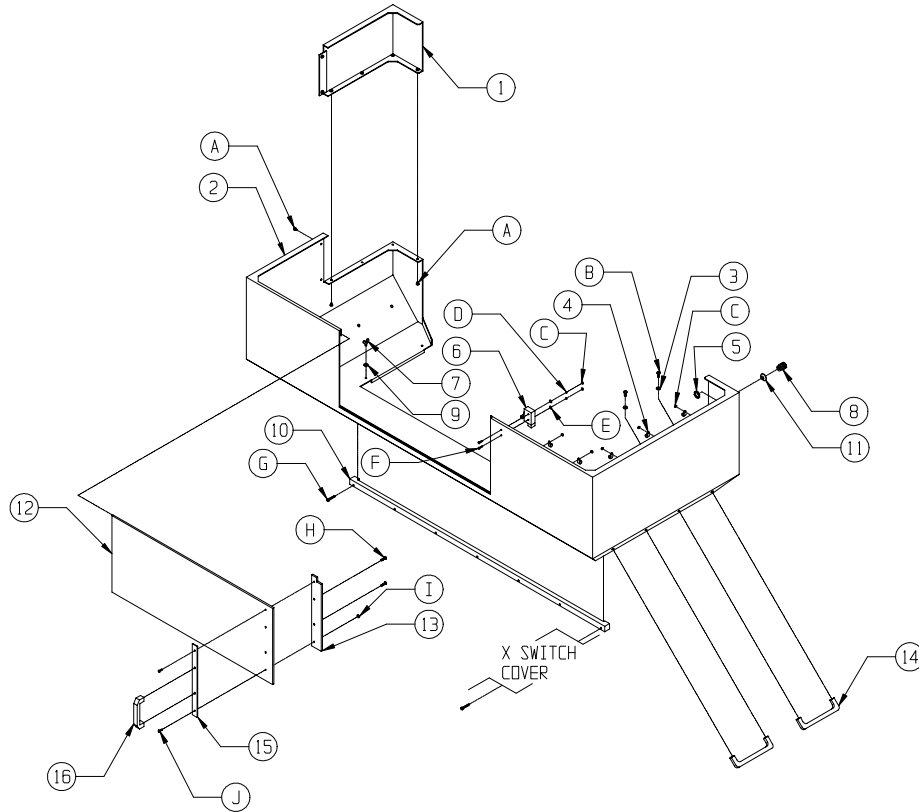
No.	QTY	STOCK No.	DESCRIPTION
1	1	BR-129	BRACKET FOOT MOUNT
2	2	SW-195	REED SWITCH
3	2'	NU-25	1/4" NYLON TUBING
4	2	SW-196	REED SWITCH BRACKET
5	1	NU-231	15" CYLINDER
6	4	NU-187	1/8 NPT 1/4 TUBE SWIVEL ELBOW FITTING
7	1	NU-230	2 POSITION 4 WAY VALVE
8	1	NU-229	DUST COVER AND CABLE FOR VALVE
9	2	NU-228	FLOW CONTROL VALVE W/SILENCER
10	1	NU-17	1/8 NPT 1/4 TUBE M/S

HARDWARE LIST

No.	QTY	DESCRIPTION
A	4	M6-1 x 15mm SHCS
B	1	7/16-20 HEX JAM NUT
C	2	M3-.5 x 20 mm SHCS

REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 612.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE NU-205 15" AIR CYLINDER ASSEMBLY		
X .XXX	+/-	APPLICATION GENERAL PRODUCTS		
X .XX	+/-	SCALE 3.5:1	DWG No. 6-10-018-082	SIZE B
X .X	+/-	DATE 02 DEC 99	DRAWN BY DAHLKE	SHEET No. 2 OF 2
ANGLE	+/-			

Table Guard Assembly



HARDWARE LIST

No.	QTY	DESCRIPTION
A	6	1/4-20 x 1/2 BHCS
B	8	M8-1.25 x 20mm BHCS
C	7	8-32 HEX NUT
D	2	#8 LOCK WASHER
E	2	#8 FLAT WASHER
F	2	8-32 x 1 1/4 BHCS
G	7	M6-1 x 50mm SHCS
H	2	1/4-20 x 1 BHCS
I	2	10-32 HEX NUT
J	2	10-32 x 5/8 BHCS

TABLE GUARD LIST

No.	QTY	MB/RH19	MB/RH20	MB/RH25	MB/RH30
1	1	N/A	MPS-179	MPS-220	MPS-217
2	1	MPS-222	MPS-177	MPS-219	MPS-216
10	1	MPS-223	MPS-178	MPS-221	MPS-218

PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	SEE TABLE	TABLE GUARD CORNER
2	1	SEE TABLE	TABLE GUARD
3	8	HD-80	M8 BONDED WASHER
4	5	WX-82	TIE DOWN
5	1	WX-96	1/2" LOCKING NUT
6	1	SW-194	LIMIT SWITCH
7	4	WX-284	WINGED THUMB SCREW
8	1	WX-23	1/2" CORD GRIP
9	4	HD-12	M6 BONDED WASHER
10	1	SEE TABLE	MOUNTING BAR
11	1	WX-38	1/2" O-RING
12	1	MPS-212	LEXAN DOOR
13	1	MPS-211	BACK DOOR PLATE
14	4	WX-230	DOOR HANDLE 8"
15	1	MPS-210	FRONT DOOR PLATE
16	1	WX-142	HANDLE

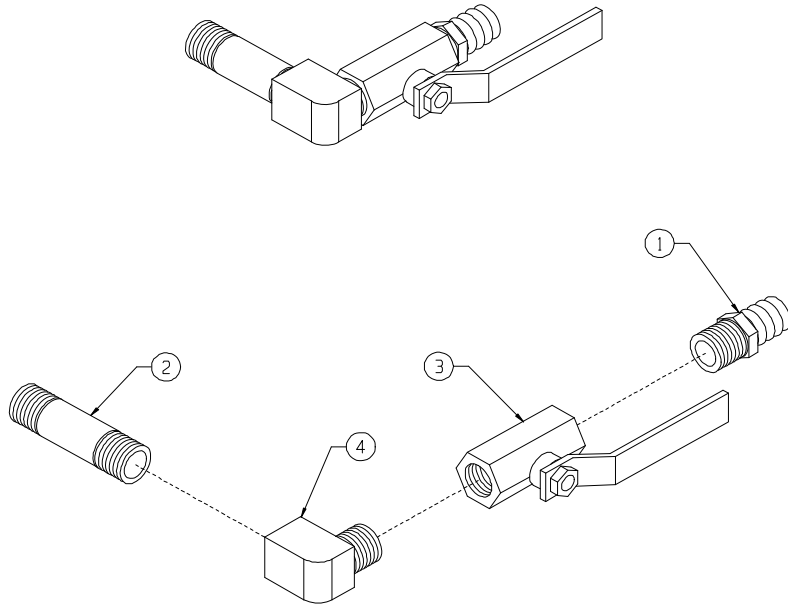
REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH				
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED				
X.XXX	+/-			
X.XX	+/-			
X.X	+/-			
ANGLE	+/-			

1400 MILL LANE 952-442-1410
WACONIA, MN 55387 USA

TITLE	TABLE GUARD 2000
APPLICATION	SOLID WAYS BED MILL
SCALE	15:1
DATE	30 MAY 00
DRAWN BY	DAHLKE
SHEET No.	1 OF 1

Flood Coolant Valve Handle Assembly

THIS ASSEMBLY USED ON VM16, VM17, VM24, VM30, VMD30, & MC20



PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	NU-66	3/4" BARB FITTING
2	1	NU-181	3 IN. PIPE NIPPLE
3	1	NU-64	1/2" BRASS BALL VALVE
4	1	NU-125	STREET ELBOW

A	CHANGE PIPE NIPPLE	3851		2/99
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE (612) 442-1410 WACONIA, MN 55387		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE VM17 FLOOD HANDLE SUB-ASSEMBLY		
X.XXX ±		APPLICATION PARTNER I		
X.XX ±		SCALE 2:1	ENG No 6-10-008-039	SIZE B
X.X ±		DATE 29 APR 97	DRAWN BY THOMPSON	SHEET NO. 1 OF 1
ANGLE ±				

Lubrication Specifications

USE MOBILITH AW SERIES MULTIPURPOSE EP GREASE OR OTHER EQUIVALENT FOR ALL LUBE POINTS.

MOBILITH AW SERIES, MULTIPURPOSE EP GREASE	
PRODUCT NUMBER	64352-8
NLGI GRADE	1
COLOR	GREEN
STRUCTURE	SMOOTH/TACKY
SOAP TYPE	LITHIUM COMPLEX
MINERAL OIL VISCOSITY	
cST AT 40°C	150
cST AT 100°C	13
SUS AT 100°F	750
SUS AT 210°F	70
ISO VISCOSITY GRADE	150
PENETRATION AT 23°C (77°F), WORKED	325
DROPPING POINT, ASTM D 2265, °F	475
TIMKEN OK LOAD, ASTM D 2509, lb	40
FOUR-BALL EP TEST, ASTM D 2596,	
WELD LOAD, kg	250
LOAD WEAR INDEX	40
FOUR-BALL WEAR TEST, ASTM D 2266,	
SCAR DIAMETER, mm, MAX	0.5
CORROSION PREVENTION, ASTM D 1743	PASS
WHEEL BEARING TEST, ASTM D 4290	
MODIFIED, LEAKAGE, GRAM	5

MACHINES WITH AUTOLUBE OPTION USE MOBIL OIL VACTRA 2, AMOCO WAYTAC No. 68, SUNOCO SUNWAY LUBE No. 1180, OR EQUIVALENT QUALITY WAY OIL.

MOBIL VACTRA OIL No. 2	
PRODUCT NUMBER	60049-4
SPECIFIC GRAVITY, 60/60F	0.88
POUR POINT, °C (°F), max.	-9 (16)
FLASH POINT, °C (°F), min.	244 (472)
VISCOSITY	
cST AT 40°C	68
cST AT 100°C	8.6
SUS AT 100°F	356
SUS AT 210°F	55
VISCOSITY INDEX	97
ISO VG	68
COLOR, ASTM D 1500	4
FZG, PASS STAGES	11
4 BALL WELD, kg, ASTM D 2783	160
4 BALL WEAR, mm, ASTM D 4172	0.22
COPPER CORROSION, ASTM D 130	1B
RUST, D665A	PASS
VICKERS V-104C, ng D 2882 (MOD)	-
CMCD, P-SPEC, APPROVAL	P-47
BIJUR PT 37-1 APPROVAL	PASS
OKUMA APPROVAL	PASS

MACHINES WITH 15,000 RPM AIR/OIL OPTION USE MOBIL OIL DTE 24, OR EQUIVALENT QUALITY SPINDLE OIL.

MOBIL DTE 24	
PRODUCT NUMBER	60262-3
98 CMCS CODE (DRUM)	98020E
SPECIFIC GRAVITY	0.871
POUR POINT, °C (°F), max	-18 (0)
FLASH POINT, °C (°F), min	200 (392)
VISCOSITY	
cST AT 40°C	32
cST AT 100°C	5.3
SUS AT 100°F	165
SUS AT 210°F	44
ISO VISCOSITY GRADE	32
VISCOSITY INDEX	95
RUST PROTECTION,	PASS
ASTM D 665, A & B	
COLOR, ASTM D1500, max	3.5
FZG GEAR TEST STAGES	12
PASSED DIN 51534	

CLEAN AND FILL AIR FILTER / REGULATOR / OILER EVERY WEEK FOR PROPER OPERATION OF ALL PNEUMATIC PARTS. FILL WITH MOBIL VELOCITE No. 10 OR OTHER EQUIVALENT QUALITY AIR TOOL OIL.

MOBIL VELOCITE OIL No. 10	
PRODUCT NUMBER	60068-4
GRAVITY, API	32.0
POUR, °C (°F), max.	-4 (25)
FLASH, °C (°F), min.	182 (360)
VISCOSITY	
cST AT 40° C	22.0
cST AT 100° C	4.0
SUS AT 100° F	115
SUS AT 210° F	40
ISO VG	22
VISCOSITY INDEX	95
COLOR, ASTM D 1500	2.0
RUST PROTECTION, ASTM D 665	PASS
CINCINNATI MILACRON SPECIFICATION	P-45

REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
1	MB/RH LUBRICATION DRAWING	SCALE 15:1	ENG No. 6-10-032-016	SIZE B
	APPLICATION SOLID WAYS BED MILL	DATE 20 SEP 00	DRAWN BY DAHLKE	SHEET NO. 1 OF 1

Retention Knob Chart

RETENTION KNOBS 60mm STYLE V-FLANGE

V-FLANGE TAPER	DIMENSIONS				MILLIRONICS MACHINE	COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C	ANGLE					
40	.59	.39	1.27	60°	RH20, RH25, RH30, BR50, BR60, BR80 PARTNER VM15, VM16, VM17, VMG17, VM24, VMG24, VM25, VM30, VMD30	RB4E-0002	RK31114A	PT-532-60	C40-6000

RETENTION KNOBS 60mm STYLE BT-FLANGE

BT-FLANGE TAPER	DIMENSIONS				MILLIRONICS MACHINE	COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C	ANGLE					
40	.59	.39	1.38	60°	RH20, RH25, RH30, BR50, BR60, BR80 PARTNER VM15, VM16, VM17, VMG17, VM24, VMG24, VM25, VM30, VMD30	RB4M-0002	RK31113A	PT-444-60	B40-6000

RETENTION KNOBS 70mm STYLE V-FLANGE

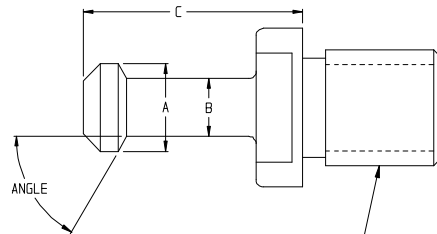
V-FLANGE TAPER	DIMENSIONS				MILLIRONICS MACHINE	COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C	ANGLE					
40	.74	.49	.64	45°	RH20, RH25, RH30, BR50, BR60, BR80 VM16, VM17, VMG17, VMH17, VM24, VMG24, VMH24, VM25, VM30, VMD30	RC4E-0001	RK111-22	PT-475C	C40-STD

RETENTION KNOBS 70mm STYLE BT-FLANGE

BT-FLANGE TAPER	DIMENSIONS				MILLIRONICS MACHINE	COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C	ANGLE					
40	.74	.49	.75	45°	RH20, RH25, RH30, BR50, BR60, BR80 VM16, VM17, VMG17, VMH17, VM24, VMG24, VMH24, VM25, VM30, VMD30	RS4M-0115	RK111-26A	N/A	B40-STD

NOTES:

- FOR SPINDLES OF 8000 RPM AND GREATER YOU MUST USE BALANCED TOOLING TO A G2.5 SPEC. OR IT WILL VOID THE SPINDLE WARRANTY.



NOTES:

- COMMAND CORPORATION
TEL: 1-800-328-2197
FAX: 1-763-576-6911
- KENNAMETAL
TEL: 1-800-446-7738
FAX: 1-800-962-4910
- VALENITE
TEL: 1-800-544-3336
FAX: 1-800-488-0695
- LYNDEX CORPORATION
TEL: 1-800-543-6237
FAX: 1-847-509-2909

A	ADD LYNDEX CORP. IN CHART	4351	1/00
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY DATE
MATERIAL/FINISH			
STOCK/ASSY No.		1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA	
TOLERANCE UNLESS SPECIFIED		TITLE RETENTION KNOB CHART	
X.XXX	+/-	APPLICATION GENERAL PRODUCTS	
X.XX	+/-	SCALE 1.5:1	
X.X	+/-	DATE 30 APR 99	
ANGLE	+/-	DRAWN BY DAHLKE	
		SHEET NO. 1 OF 1	

Maintenance Section

Adjusting Table Gib

The table gibs adjusting screw is on the left side. To take up the gib, tighten the large screw slightly until a slight drag is felt when moving the table by hand. (Fig. 1)

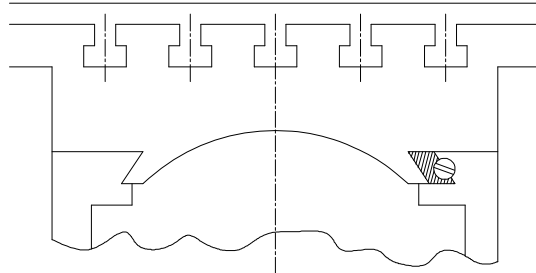


Fig. 1
Table-saddle gib

Adjustment of Saddle Gib

Tighten gib using the same method as above however, the chip wiper must be removed first. (Fig. 2)

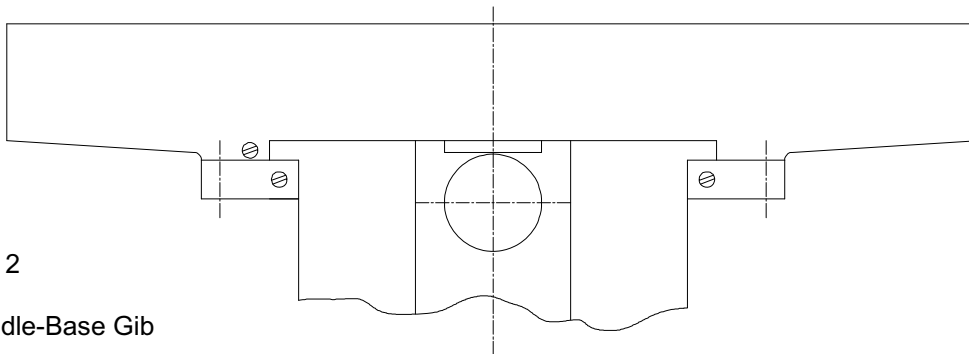


Fig. 2
Saddle-Base Gib

Adjustment of head Bolster gib.

Remove Chip wiper and adjust screw until smooth movement is attained. (Fig. 3)

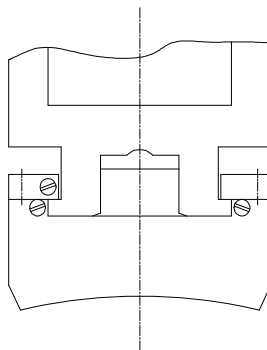


Fig. 3

Bolster Gib

Checking and Adjusting Backlash

Use a good solid magnetic base and a .0005 Inch indicator. Install the magnetic base on the machine table in close proximity to the spindle. Clean the area that the indicator will be in contact with.

Go into PARAMETERS/AXIS arrow down to BACKLASH press F1 EDIT and set X, Y and Z to zero. *(Before setting them to zero note original settings)*

Find the high spot on the spindle by moving the indicator back and forth and set indicator to zero. *(See point **a** on Fig. 4)*

The next step is easiest if done in jog mode. *(Select distance and 1 inch increments)*
You may have to press the jog key several times for the desired direction to clear the spindle.

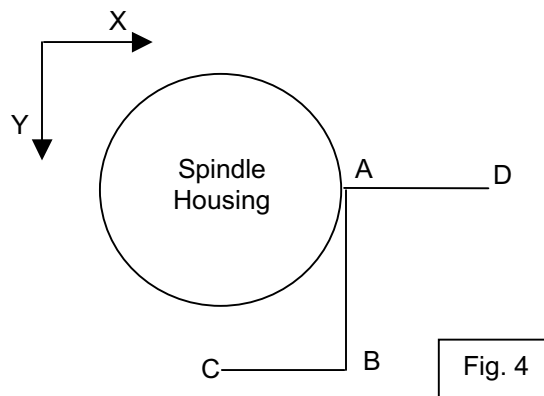
Press the jog key for the desired direction for **A** to move towards **D** *(see Fig. 4)* and then back to **A**, the indicator may have moved, adjust it back to zero and repeat this step until it stays at zero.

Jog the desired axis or tool *(see Fig. 4)* from point **A** to **B** to **C** back to **B** then back to the start point **A**. The reading on the indicator is backlash and should be put into the backlash parameter under PARAMS-SETUP-AXIS.

After putting the backlash into the table, repeat the procedure to ensure the numbers took affect. If the indicated error seems to increase this is addlash, and you may have to subtract the indicated number from the backlash chart.

The X axis procedure is *shown, repeat procedure for Y and Z*.
Remember to save these new changes to your parameter disk.

(The diagram below is an example of checking your backlash in the X-axis.)



RH Machine Lubrication (MA-212):

AUTO LUBRICATOR:

The auto oiler should be checked weekly. Make sure the oiler is filled and is working properly.

DISCHARGE VOLUME PER CYCLE:

Adjustable from 2.5 CC minimum to 5.0 CC maximum. To reduce oil delivery remove the lock screw, measure A (Fig. 5), turn Adjusting screw clockwise increasing dimension A in the increment (corresponding to the desired discharge) as shown. (Table 1)

IN.	DISCHARGE	NOTES:
.400	2.5 c.c.	
.320	3.0 c.c.	
.240	3.5 c.c.	
.160	4.0 c.c.	
.080	4.5 c.c.	
0.00	5.0 c.c.	Break in setting

Table 1

DISCHARGE PRESSURE: 60 psi Maximum.

Peak system Pressure will decrease when:

- (a) discharge volume decreases,
- (b) number of Meter-Units in system increases,
- (c) oil viscosity decreases.

OIL VISCOSITY RANGE: See specification sheet

RECOMMENDED OIL: Mobil Vactra Oil No. 2

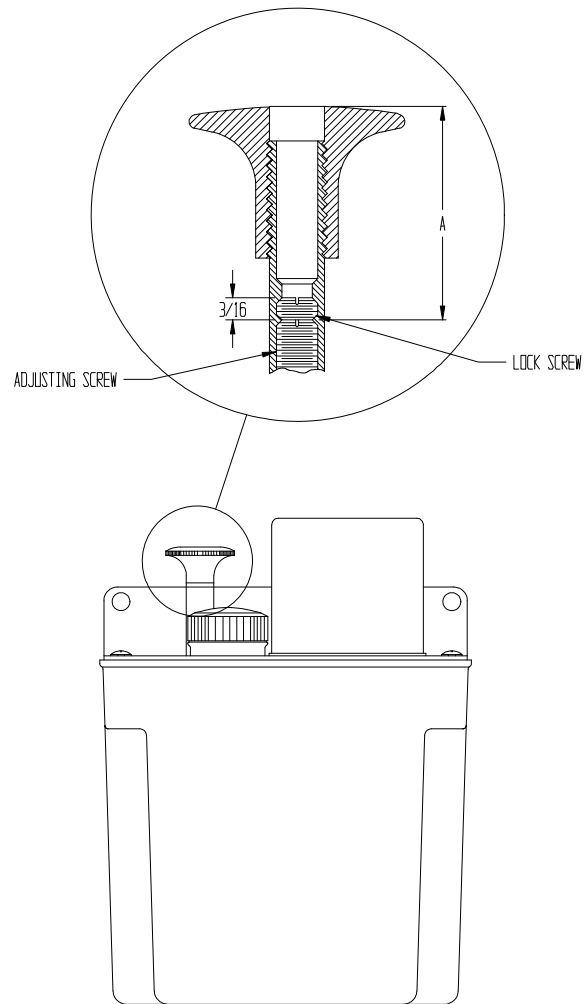


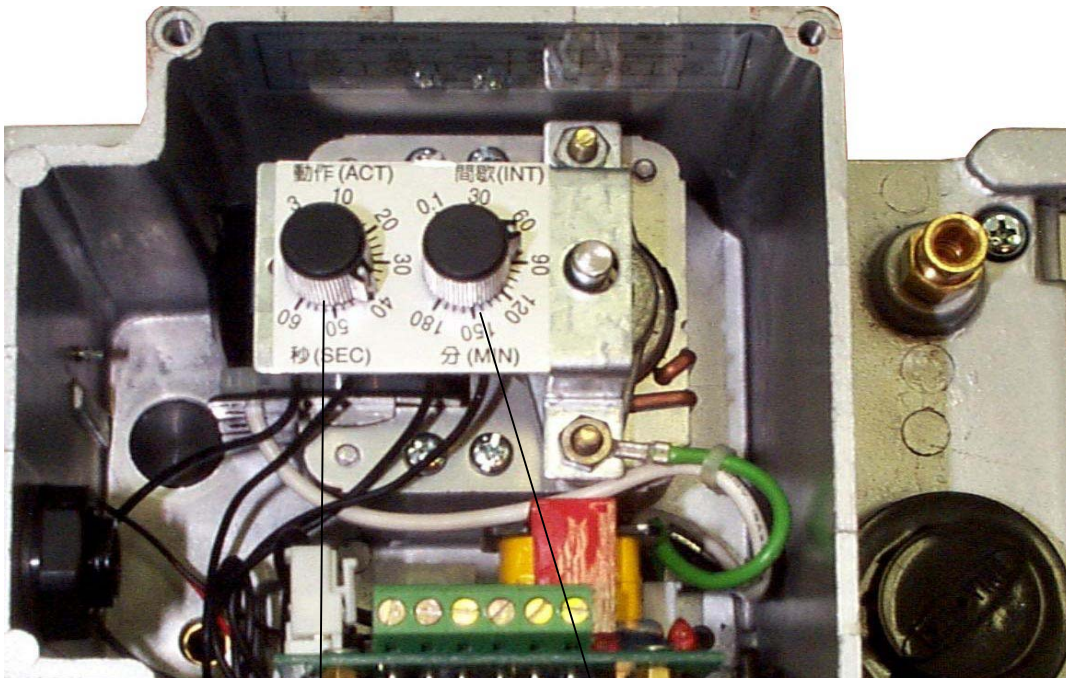
Fig. 5

Procedure to adjust CESD (MA-219) Lubrication Unit

As long as the machine is “reset”, the oiler will be pumping. In the event that the tank falls below the **MIN** line on the tank an audible alarm will sound. The machine will not let a program start with a low lube alarm (**451 Low Lube Fault**)

The **MA-219** has the ability to set the time between each pump cycle. It will pump the same amount of way lube (**.13 Liters/Min**) each pump cycle. We are not varying the amount of oil but the interval between each pump cycle. A new machine shipped from Milltronics will have the oiler pumping Aprox. 5 seconds every 25 to 30 minutes. Adjusting the Seconds knob (left) will change the length of time in seconds the pump cycle for (.13 Liters/Min). Adjusting the Minute knob (right) will change the time between each pump interval. It will always pump the same amount

To adjust the intervals between each cycle of the pump:
Remove the 4 screws holding the top cover.
Adjust the two knobs shown below.
The dials are very sensitive. Turn them very slowly.



Turn this dial to vary the seconds that it pumps for each minute interval.

Turn this dial to vary the minutes between each pump cycle.