

VM15xtA Mechanical

1-23-2003
Rev 4

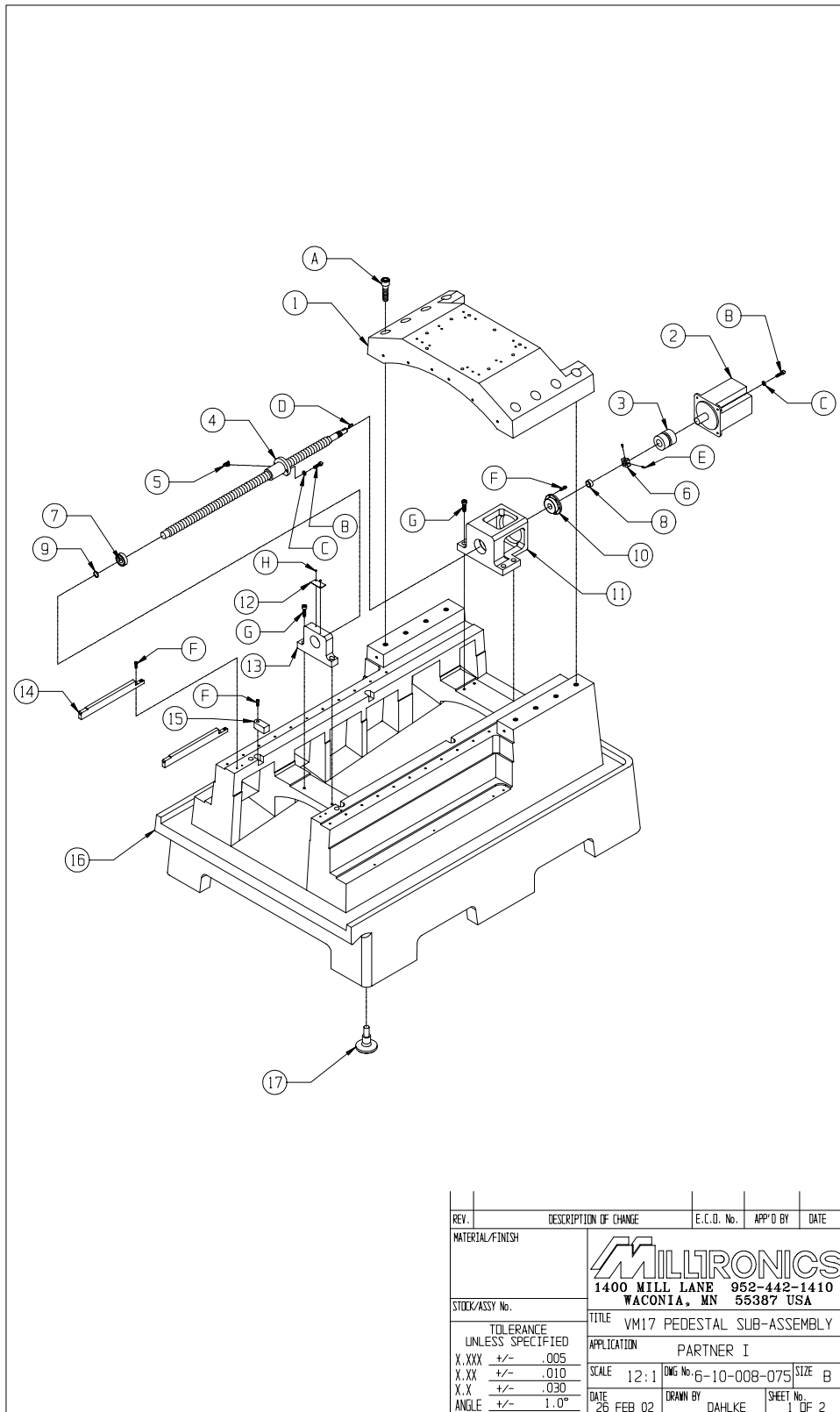
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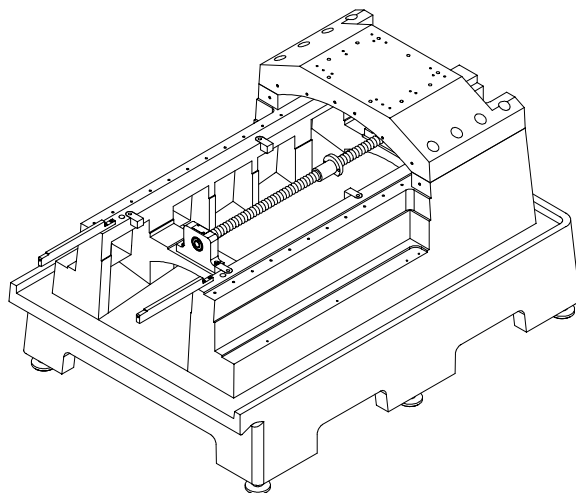
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Manual Discrepancy Sheet

1. Enclosure swivel monitor assembly, item 1 deleted. See enclosure drawing, page 14

Machine Base Assembly





PARTS LIST

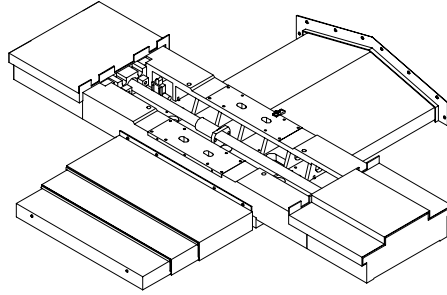
No.	QTY	STOCK No.	DESCRIPTION
1	1	MX1-52	VM17 COLUMN SPACER - MACHINED
2	1	MD-123	SIGMA II MOTOR
3	1	MA-242	5/8 x 19mm MOTOR COUPLER
4	1	MPB-02	Y - AXIS BALL SCREW
5	1	NU-161	1/8 NPT 5/32 SWIVEL ELBOW
6	1	MP1-94	BALL SCREW LOCK NUT
7	1	BG-02	BEARING 6204 ZZ
8	1	MP1-107	BEARING LOCK NUT SPACER
9	1	MP1-108	BALL SCREW SNAP RING
10	1	BG-94	BALL SCREW SUPPORT BEARING
11	1	MX-51	Y - AXIS REAR MOTOR MOUNT
12	1	LB-27	PULLEY MOTOR WARNING LABEL
13	1	MP-680	FRONT BALL SCREW RADIAL MOUNT
14	2	MP1-391	Y - AXIS FRONT WAY COVER BRACKET
15	4	MP-707	HARD STOP BLOCK
16	1	MX1-51	VM17 PEDESTAL - MACHINED
17	6	MP1-29	LEVELING PAD

HARDWARE LIST

No.	QTY	DESCRIPTION
A	8	3/4-10 x 2 3/4 SHCS
B	6	M8-1.25 x 30mm SHCS
C	6	M8 LOCK WASHER
D	1	3/16 x 3/16 x 1/2 KEY
E	2	10-32 x 3/16 BRASS TIPPED SHSS
F	14	M6-1 x 20mm SHCS
G	6	M10-1.5 x 30mm SHCS
H	2	1/4 DRIVE PIN

REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH STOCK/ASSY No. TOLERANCE UNLESS SPECIFIED X.XXX +/- .005 X.XX +/- .010 X.X +/- .030 ANGLE +/- 1.0° 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA TITLE VM17 PEDESTAL SUB-ASSEMBLY APPLICATION PARTNER I SCALE 12:1 DATE 26 FEB 02 DRAWN BY DAHLKE SHEET No. 2 OF 2				
DWG No. 6-10-008-075 SIZE B				

Machine Saddle Assembly



PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	MP1-383	REAR WAYCOVER WIPER
2	1	MP1-108	SNAP RING
3	1	BG-02	6204 BEARING
4	1	MP1-382	REAR WAYCOVER
5	1	MP-569	39.72 - 10mm X AXIS BALL SCREW
6	2	SW-193	HOME SWITCH
7	1	NU-161	1/8 NPT SWIVEL ELBOW 5mm TUBE
8	1	BG-94	BALLSCREW SUPPORT BEARING
9	1	MP-429	BEARING LOCKNUT SPACER
10	2	SW-191	X AXIS SWITCH CORD
11	1	MP1-94	BALL SCREW LOCKNUT
12	1	MP1-387	HOME SWITCH BRACKET
13	8	MP-718	PDM HARD STOP BUMPER
14	1	MP1-385	X AXIS WAY COVER - LEFT
15	1	BR-111	VM17 CONDUIT BRACKET
16	2	LB-27	PULLEY MOTOR WARNING LABEL
17	1	MP1-388	VM17 Y AXIS CABLE BRACKET
18	1	MP1-418	OIL LINE BRACKET
19	1	MP1-389	X AXIS RADIAL SUPPORT BRACKET
20	1	MX1-55	VM17 SADDLE
21	1	SEE TABLE	VM17 X & Y AXIS MANIFOLD ASSEMBLY
22	1	MP1-386	X AXIS WAY COVER - RIGHT
23	1	MP1-235	YASKAWA MOTOR SPACER - RIGHT
24	1	MP1-236	YASKAWA MOTOR SPACER - LEFT
25	1	MA-242	5/8 x 19mm MOTOR COUPLER
26	2	MP1-410	VM17 SADDLE HARD STOP BLOCK
27	4	HD-62	X AXIS WAYCOVER SPRING
28	1	9800-21	Y/Z AXIS BALL SCREW CARRIER - MACHINED
29	1	MD-123	.5 KW MOTOR
30	2	MP-640	820 35mm INA RAIL
31	4	NU-107	OIL FITTING
32	4	MP-641	35mm RAIL BLOCKS
33	1	MP1-384	FRONT WAYCOVER

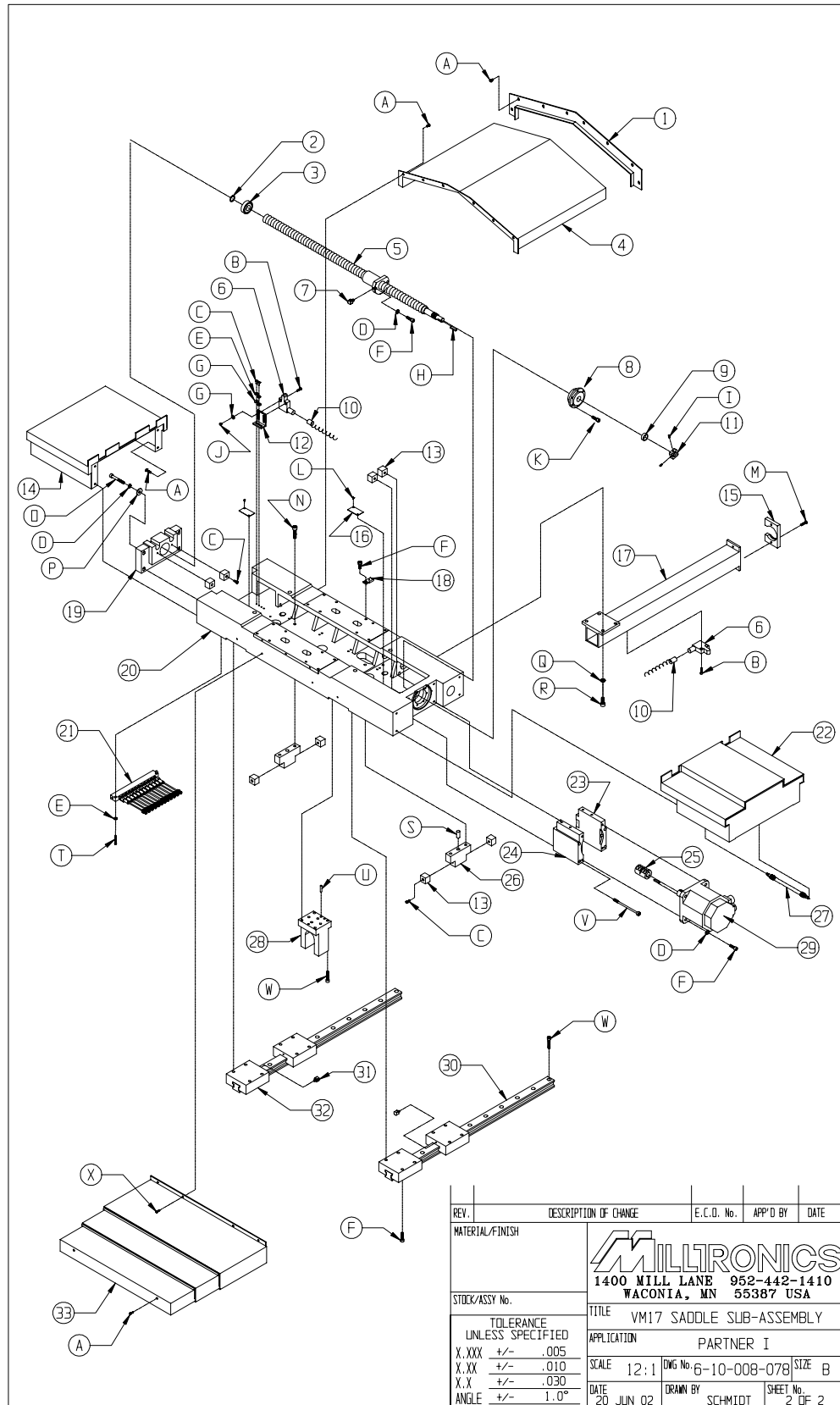
HARDWARE LIST

No.	QTY	DESCRIPTION
A	24	M6-1 x 12mm BHCS
B	2	M5-.8 x 20mm SHCS
C	12	M5-.8 x 16mm SHCS
D	10	M8 LOCK WASHER
E	4	M5 LOCK WASHER
F	23	M8-1.25 x 30mm SHCS
G	4	M5 FLAT WASHER
H	1	3/16 x 3/16 x 1/2 KEY
I	2	10-32 x 3/16 BRASS TIPPED SHSS
J	2	M5-.8 HEX NUT
K	6	M6-1 x 25mm SHCS
L	4	1/4 DRIVE RIVIT
M	2	M6-1 x 25mm BHCS
N	4	M10-1.5 x 40mm SHCS
O	4	M8-1.25 x 45mm SHCS
P	4	M8 FLAT WASHER
Q	4	M10 LOCK WASHER
R	4	M10-1.5 x 30mm SHCS
S	2	12mm x 25mm DOWEL PIN
T	2	M5-.8 x 25mm SHCS
U	2	1/4 x 1 DOWEL PIN
V	6	M6-1 x 130mm SHCS
W	28	M8-1.25 x 40mm SHCS
X	4	M5-.8 x 10mm BHCS

MANIFOLD ASSEMBLY

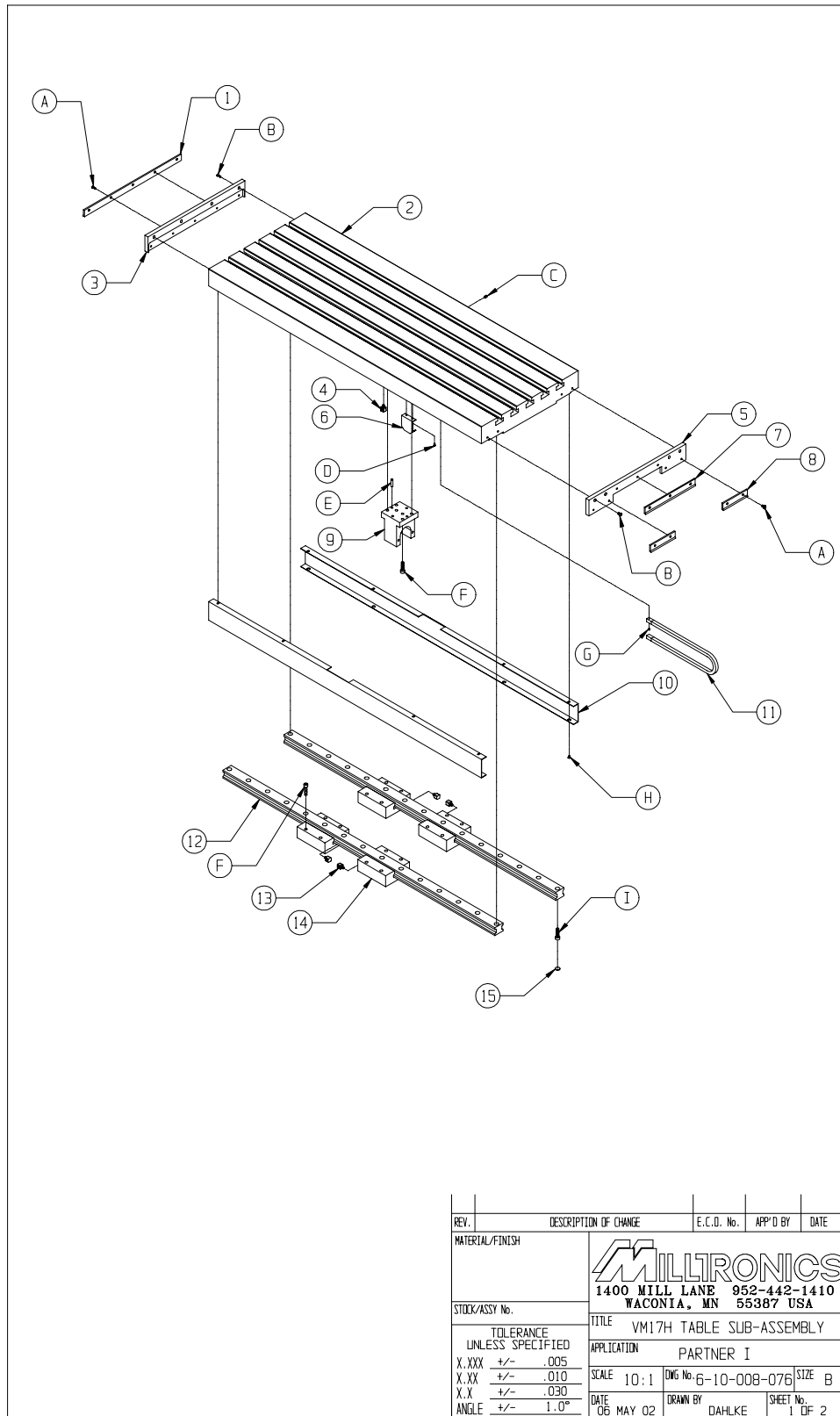
DRAWING No.	DESCRIPTION
6-10-008-058	X & Y AIR/OIL MANIFOLD ASSEMBLY
6-10-018-049	VM X & Y AXIS OIL MANIFOLD ASSEMBLY

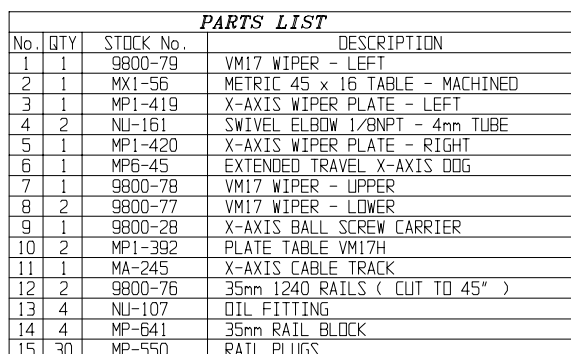
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MATERIAL/FINISH				
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED				
X.XXX	+/- .005			
X.XX	+/- .010			
X.X	+/- .030			
ANGLE	+/- 1.0°			
 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA				
TITLE VM17 SADDLE SUB-ASSEMBLY				
APPLICATION PARTNER I				
SCALE 12:1	DWG No 6-10-008-078	SIZE B		
DATE 20 JUN 02	DRAWN BY SCHMIDT	SHEET No 1 OF 2		



REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MILLIRONICS 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA				
STOCK/ASSY No.		TITLE VM17 SADDLE SUB-ASSEMBLY		
TOLERANCE UNLESS SPECIFIED X.XXX +/- .005 X.XX +/- .010 X.X +/- .030 ANGLE +/- 1.0°		APPLICATION PARTNER I		
DATE 20 JUN 02		SCALE 12:1	DWG No. 6-10-008-078	SIZE B
DRAWN BY SCHMIDT		SHEET No. 2 OF 2		

Milling Table Assembly

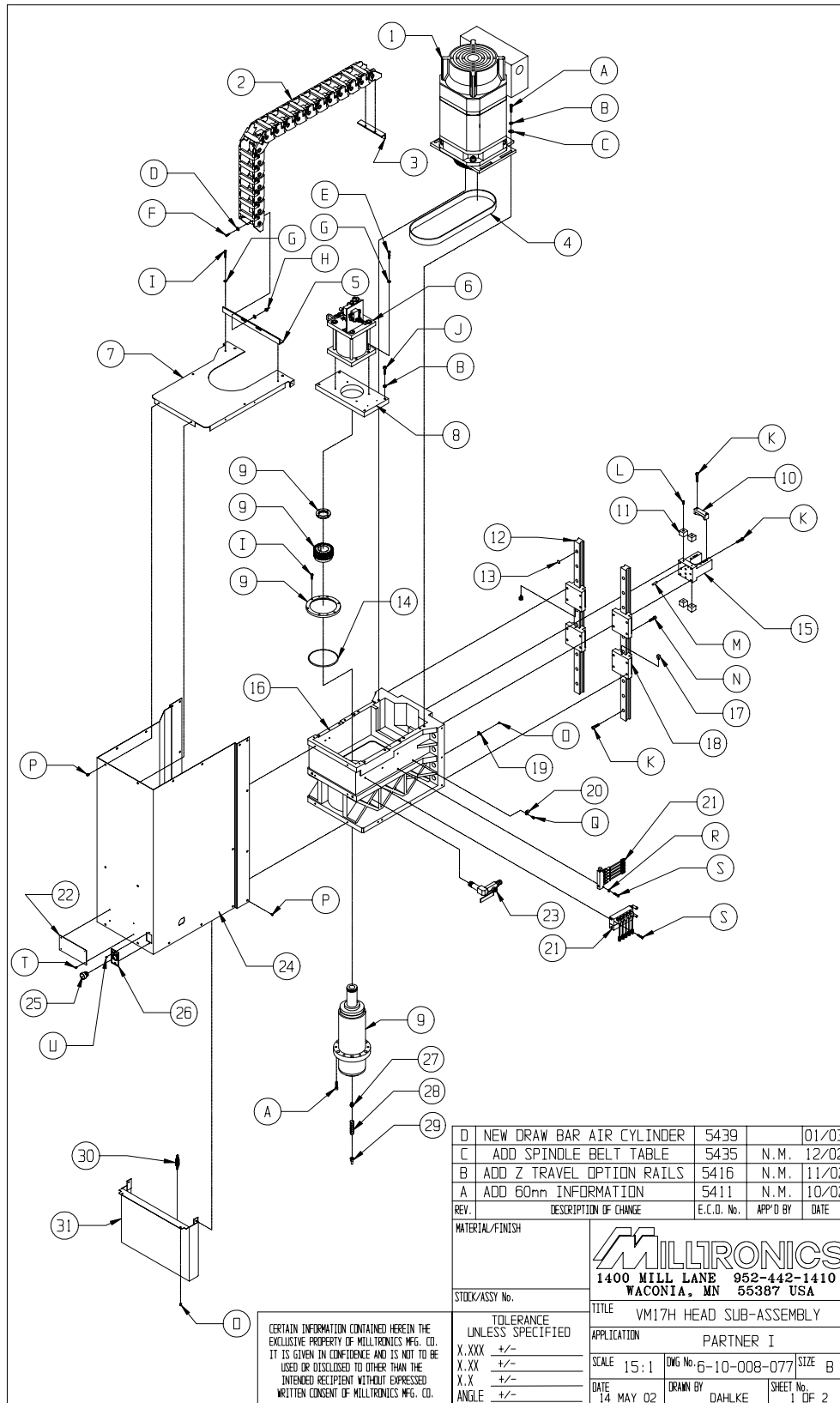




HARDWARE LIST		
No.	QTY	DESCRIPTION
A	12	M6-1 x 12nn. BHCS
B	8	M6-1 x 25nn. BHCS
C	1	1/8-27 NPT SHCP
D	2	M3-.5 x 6nn BHCS
E	2	1/4 x 1 DOWEL PIN
F	22	M8-1.25 x 30nn. SHCS
G	4	M3-.5 x 20nn BHCS
H	8	M4-.7 6nn BHCS
I	30	M8-1.25 x 40nn. SHCS

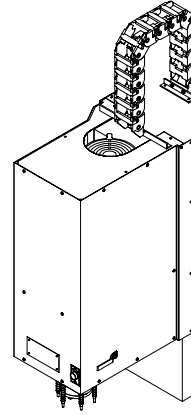
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MATERIAL/FINISH		 MILLTRONICS 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.		TITLE VM17H TABLE SUB-ASSEMBLY		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X .XXX	+/- .005	SCALE 10:1	DWG NO. 6-10-008-076	SIZE B
X .XX	+/- .010	DATE 06 MAY 02	DRAWN BY DAHLKE	SHEET NO. 2 OF 2
X .X	+/- .030			
ANGLE	+/- 1.0°			

Machine Head Assembly



PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	6-10-018-089	SPINDLE MOTOR ASSEMBLY
2	1	MP-443	SPINDLE CABLE TRACK
3	1	MP-316	SPINDLE CABLE SUPPORT BRACKET
4	1	SEE TABLE	SPINDLE BELT
5	1	MP-664	VM SPINDLE CABLE SUPPORT BRACKET
6	1	6-10-018-100	NU-313 DRAWBAR CYLINDER ASSEMBLY
7	1	MP-639	UNIVERSAL HEADCOVER - TOP
8	1	MP-284	PDB AIR CYLINDER MOUNT PLATE
9	1	SEE TABLE	SPINDLE ASSEMBLY
10	1	MP-109	Z-AXIS BALL SCREW SAFETY CATCH
11	4	MP-718	PDM HARD STOP BUMPER
12	2	SEE TABLE	LINEAR RAILS
13	22	MP-550	RAIL PLUGS
14	1	SEE TABLE	O' RING REAR SEAL
15	1	9800-21	Z-AXIS BALL SCREW CARRIER - MACH.
16	1	SEE TABLE	60mm OR 70mm HEAD - MACHINED
17	4	NU-107	OIL FITTING
18	4	MP-641	35 mm RAIL BLOCK
19	5	NU-36	CLAMP 5/32 OILER
20	1	WX-82	WIRE TIE DOWN
21	1	SEE TABLE	Z-AXIS MANIFOLD ASSEMBLY
22	1	LB-01	SAFETY STICKER
23	1	6-10-008-039	VM 17 FLOOD HANDLE SUB-ASSEMBLY
24	1	MP-635	UNIVERSAL HEADCOVER
25	1	SW-67	TOOL OUT SWITCH
26	1	LB-181	BOLT ON TOOL OUT LABEL
27	6	NU-111	1/4 LOCKLINK 1/8 NPT
28	24	MA-22	LOCKLINK HOSE
29	6	MA-216	1/4 NOZZLE
* 30	2	HO-62	WAYCOVER SPRING
31	1	SEE TABLE	Z-AXIS WAYCOVER



Z-AXIS WAYCOVER

STOCK No.	DESCRIPTION
MP1-424	1 BOX WAYCOVER
MP1-425	2 BOX WAYCOVER

HEADS TABLE

STOCK No.	DESCRIPTION
MX-54	60mm HEAD MACHINED
MX-43	70mm HEAD MACHINED

* - THIS IS ONLY USED WITH THE MP1-425 2 BOX WAYCOVER

SPINDLE ASSEMBLY SELECTION

HP	RPM	60mm SPINDLE				70mm SPINDLE			
		6000	8000	12000	15000	6000	8000	12000	15000
10/15 1-SPEED	9897	9897-1	9899-4	9899-5	9899	9899-1			
10/15 2-SPEED	9900	9900-1	9899-4	9899-5	9899	9899-1	9899-2	9899-3	
15/22 2-SPEED	9900	9900-1	9899-4	9899-5	9899	9899-1			

SPINDLE BELT

STOCK No.	DESCRIPTION
BT-62	W-896 SPINDLE BELT
BT-70	800-5GT-30 SPINDLE BELT

Z-AXIS MANIFOLD ASSEMBLY

DRAWING No.	DESCRIPTION
6-10-018-050	VM Z-AXIS OIL MANIFOLD ASSEMBLY
6-10-008-059	Z-AXIS AIR/OIL MANIFOLD ASSEMBLY

HARDWARE LIST

No.	QTY	DESCRIPTION
A	14	M8-1.25 x 30mm SHCS
B	12	8mm LOCK WASHER
C	8	8mm HARDENED FLAT WASHER
D	8	6mm FLAT WASHER
E	4	M6-1 x 30mm SHCS
F	4	M6-1 x 20mm BHCS
G	6	6mm LOCK WASHER
H	4	M6-1 NYLOCK NUT
I	8	M6-1 x 20mm SHCS
J	4	M8-1.25 x 45mm SHCS
K	30	M8-1.25 x 40mm SHCS
L	4	M5-.8 x 16mm SHCS
M	2	1/4 x 1 DOWEL PIN
N	16	M8-1.25 x 30mm SHCS
D	7	M4-.7 x 10mm BHCS
P	23	M6-1 x 10mm BHCS
Q	1	M5-.8 x 12mm BHCS
R	2	5mm LOCK WASHER
S	2	M5-.8 x 40mm SHCS
T	4	M3-.5 x 6mm BHCS
U	2	M4-.7 x 8mm BHCS

LINEAR RAILS SELECTION

Z-TRAVEL	STOCK No.	DESCRIPTION
20"	MP-640	35mm 820 RAILS
26"	MPB-47	35mm 1000 RAILS

O-RING REAR SEAL SELECTION

SPINDLE	STOCK No.	DESCRIPTION
60mm	WX-182	60mm O-RING REAR SEAL
70mm	WX-270	70mm O-RING REAR SEAL

D	NEW DRAW BAR AIR CYLINDER	5439		01/03
C	ADD SPINDLE BELT TABLE	5435	N.M.	12/02
B	ADD Z TRAVEL OPTION RAILS	5416	N.M.	11/02
A	ADD 60mm INFORMATION	5411	N.M.	10/02
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	+/-



TITLE VM17H HEAD SUB-ASSEMBLY

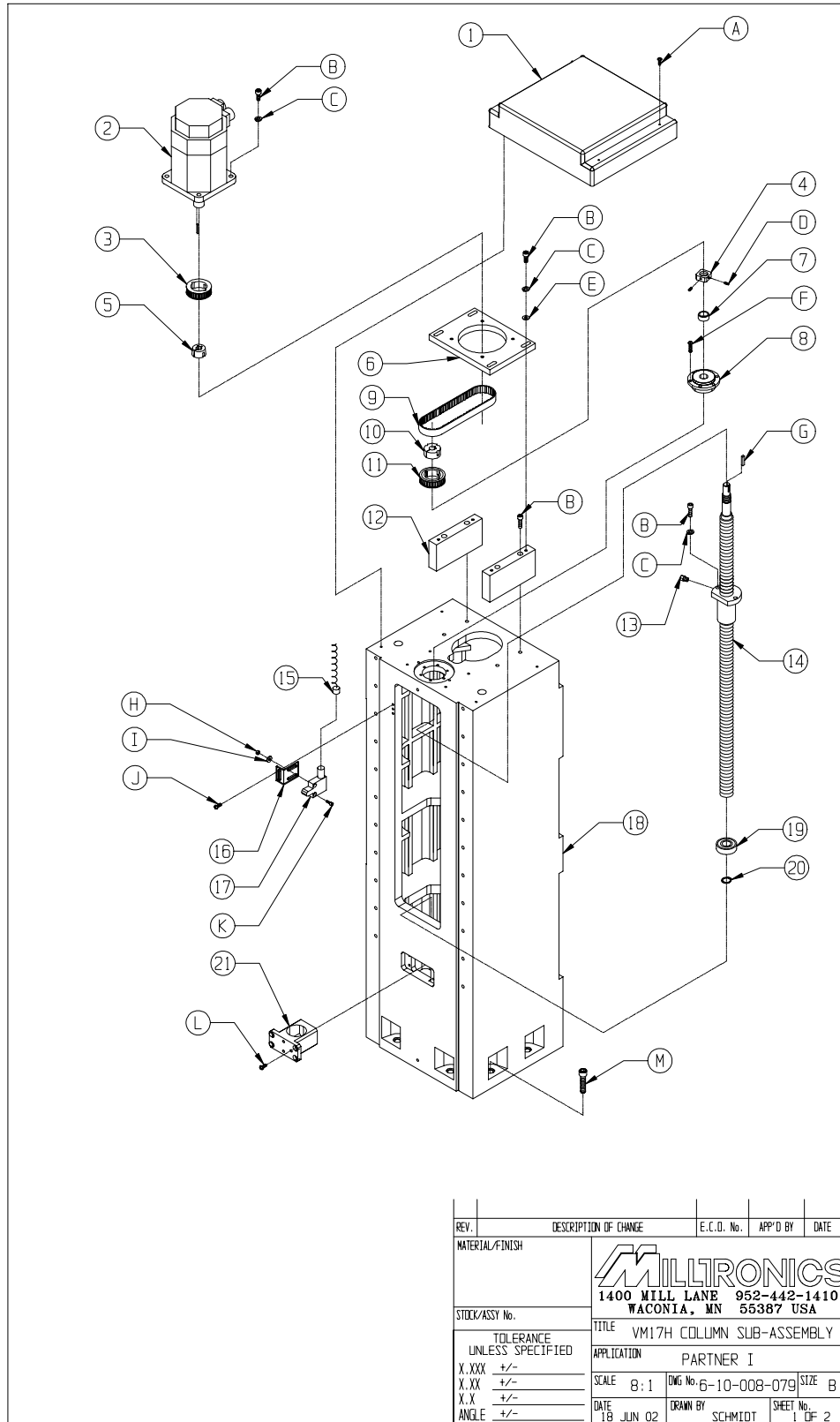
APPLICATION PARTNER I

SCALE 15:1 DWG No. 6-10-008-077 SIZE B

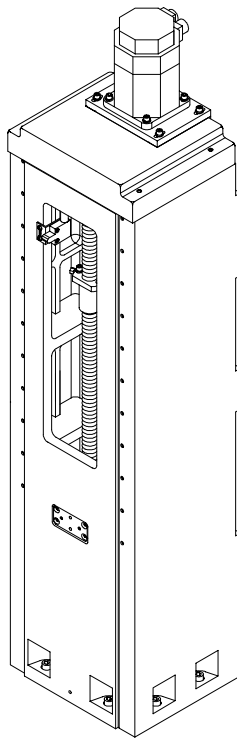
DATE 14 MAY 02 DRAWN BY DAHLKE SHEET No. 2 OF 2

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Machine Column Assembly



REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH	 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA			
STOCK/ASSY No.	TITLE VM17H COLUMN SUB-ASSEMBLY			
TOLERANCE UNLESS SPECIFIED	APPLICATION PARTNER I			
X.XXX +/-	SCALE 8:1 DWG No. 6-10-008-079 SIZE B			
X.XX +/-	DATE 18 JUN 02 DRAWN BY SCHMIDT SHEET No. 1 OF 2			
X.X +/-				
ANGLE +/-				



PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	VM1-08	Z-AXIS MOTOR COVER
2	1	MD-128	74 IN-LB MOTOR W/BRAKE
3	1	PY-204	P24-8MGT-30 PULLEY
4	1	MP1-94	BALL SCREW LOCK NUT
5	1	PY-206	22mm ID 1108 BUSHING
6	1	MP-631	YASKAWA Z AXIS MOTOR PLATE
7	1	MP1-107	BEARING LOCK NUT SPACER
8	1	BG-94	BALLSCREW SUPPORT BEARING
9	1	BT-73	560-8MGT-30 TIMING BELT
10	1	PY-32	5/8 ID 1210 BUSHING
11	1	PY-205	P32-8MGT-30 PULLEY
12	2	MP1-374	Z AXIS MOTOR SPACER
13	1	NU-154	1/8 NPT MS 5/32 TUBE
14	1	MPB-02	10mm Z AXIS BALL SCREW
15	1	SW-191	X AXIS SWITCH 24 PKT CORD
16	1	MP1-387	X & Y LIMIT SWITCH MTG BRACKET
17	1	SW-193	X AXIS SWITCH
18	1	SEE TABLE	COLUMN - MACHINED
19	1	BG-02	6204 BEARING
20	1	MP1-108	SNAP RING
21	1	MX1-28	Y-Z RADIAL SUPPORT BRACKET

HARDWARE LIST

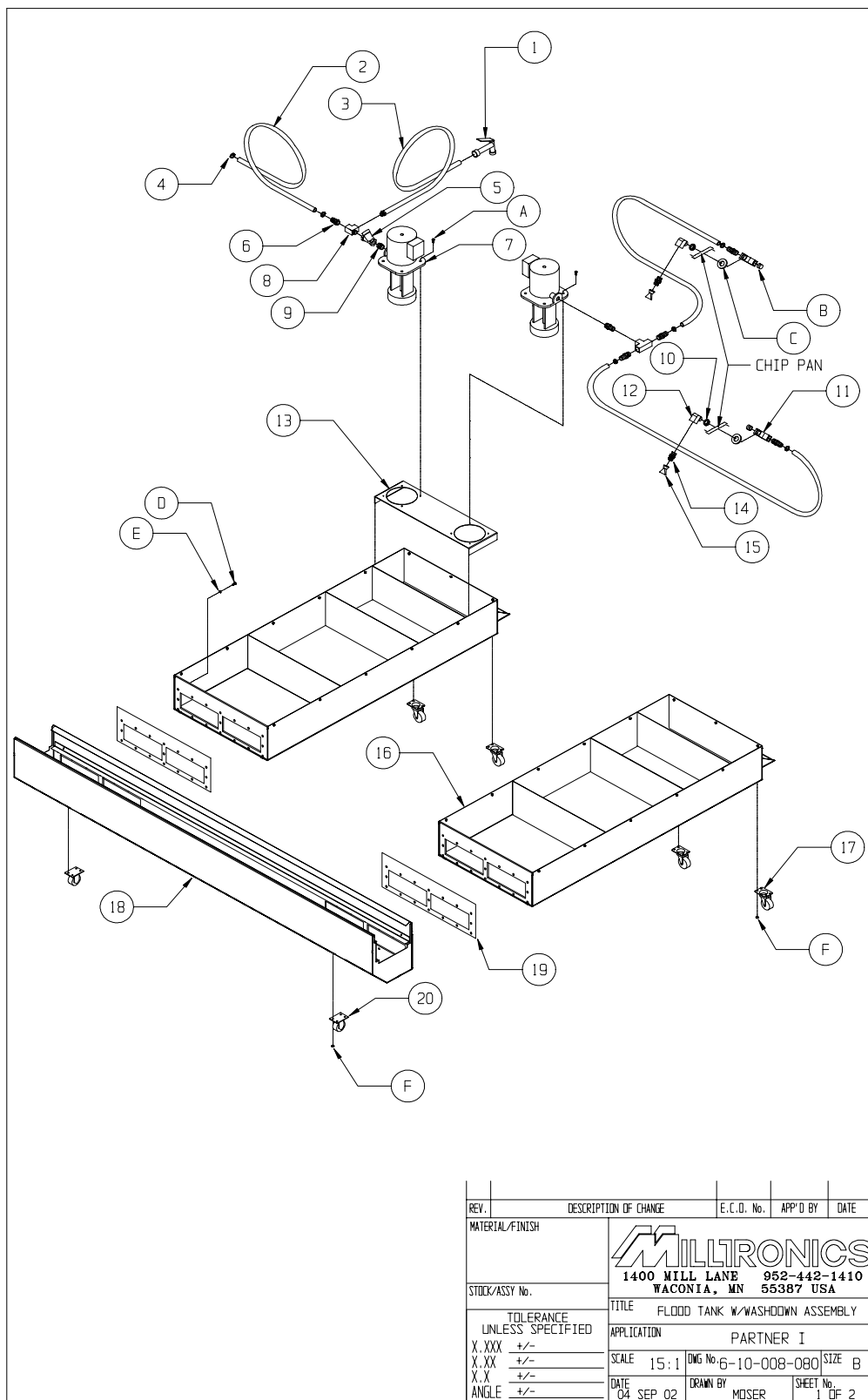
No.	QTY	DESCRIPTION
A	4	M5-.8 x 60mm BHCS
B	14	M8-1.25 x 30mm SHCS
C	10	M8 LOCK WASHER
D	2	10/32 x 3/16 BRASS TIPPED SHSS
E	4	M8 FLAT WASHER
F	6	M6-1 x 25mm BHCS
G	1	3/16 x 3/16 x 1/2 BALL SCREW KEY
H	2	M5-.8 HEX NUT
I	2	M5 FLAT WASHER
J	2	M6-1 x 12mm BHCS
K	2	M5-.8 x 20mm SHCS
L	4	M6-1 x 15mm BHCS
M	9	M12-1.75 x 50mm SHCS

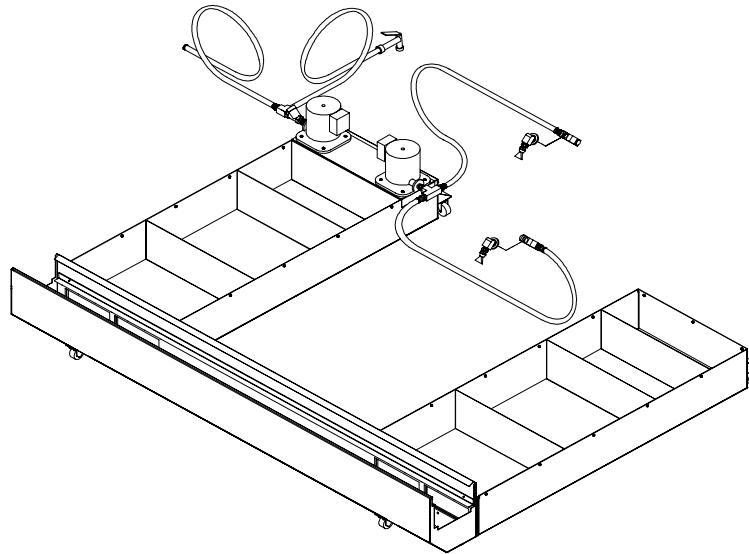
VM17 COLUMN

STOCK No.	DESCRIPTION
MX1-53	44" COLUMN - MACHINED
MX1-54	50" COLUMN - MACHINED

REV.	DESCRIPTION OF CHANGE	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		TITLE VM17H COLUMN SUB-ASSEMBLY		
X.XXX +/-		APPLICATION PARTNER I		
X.XX +/-		SCALE 8:1	DWG No. 6-10-008-079	SIZE B
X.X +/-		DATE 18 JUN 02	DRAWN BY SCHMIDT	SHEET No. 2 OF 2
ANGLE +/-				

Flood Tank W/Washdown Assembly





PARTS LIST

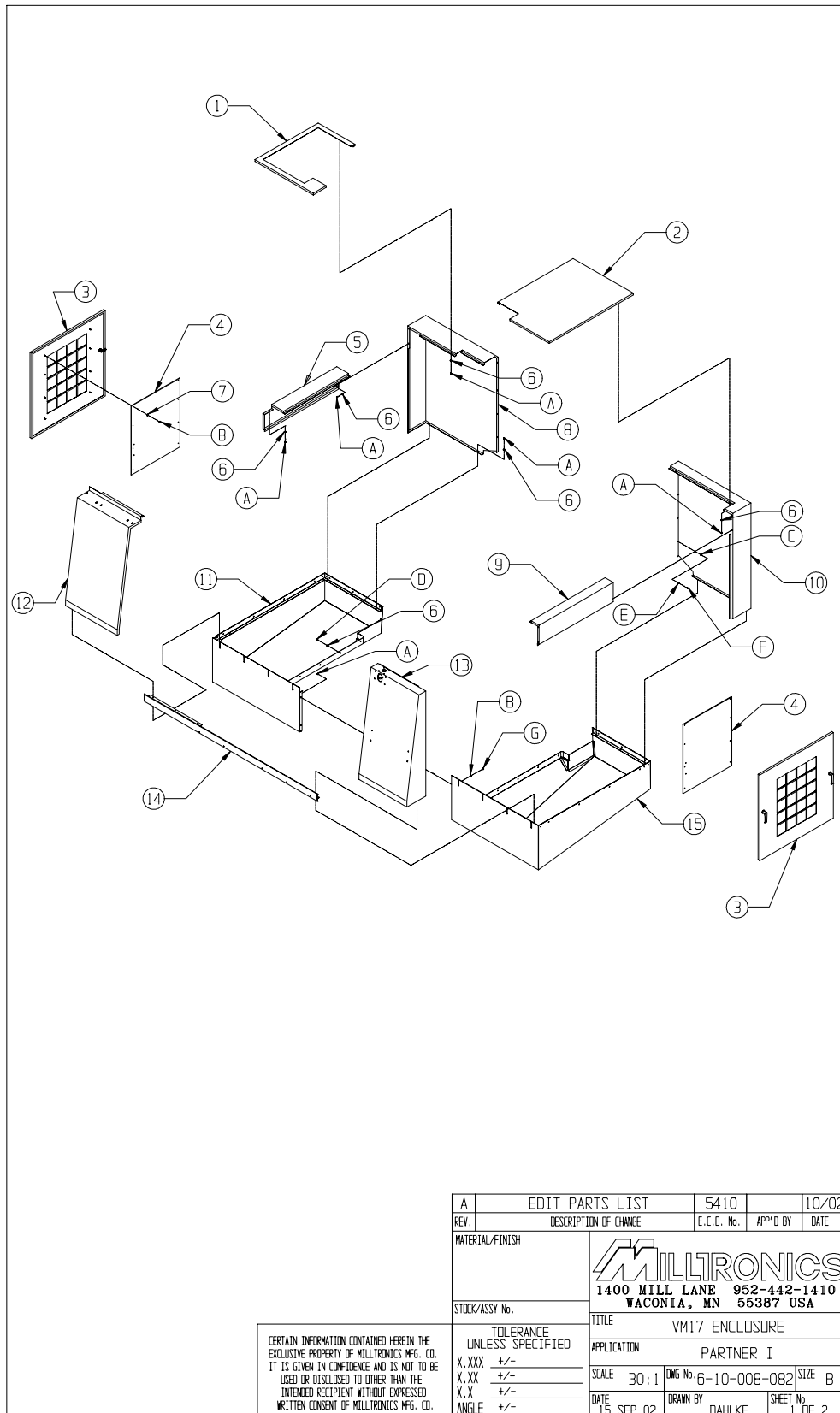
No.	QTY	STOCK No.	DESCRIPTION
1	1	NU-124	WATER HOSE NOZZLE
2	30'	NU-69	3/4" NYLOBRAID HOSE
3	1	NU-130	WASHDOWN HOSE ASSEMBLY
4	6	NU-141	1" HOSE CLAMP
5	1	NU-128	1/2" SWING CHECK VALVE
6	5	NU-66	1/2 NPT - 3/4 BARB FITTING
7	2	MA-162	FLOOD PUMP 1/4 HP MOTOR
8	1	NU-127	1/2" STREET T
9	1	NU-65	1/2" NIPPLE
10	2	WX-38	O' RING
11	3	NU-61	1/2" FEMALE T
12	2	NU-125	1/2" STREET ELBOW
13	1	MP1-411	COOLANT PUMP MOUNTING PLATE
14	2	NU-176	1/2" CONNECTOR
15	2	NU-175	1 1/4" FLARE NOZZLE
16	2	MP1-415	COOLANT TANK - REAR
17	4	EL-88	CASTER - SWIVEL
18	1	MP1-416	COOLANT TANK - FRONT
19	2	WX-309	COOLANT TANK - GASKET
20	2	EL-98	CASTER - RIGID

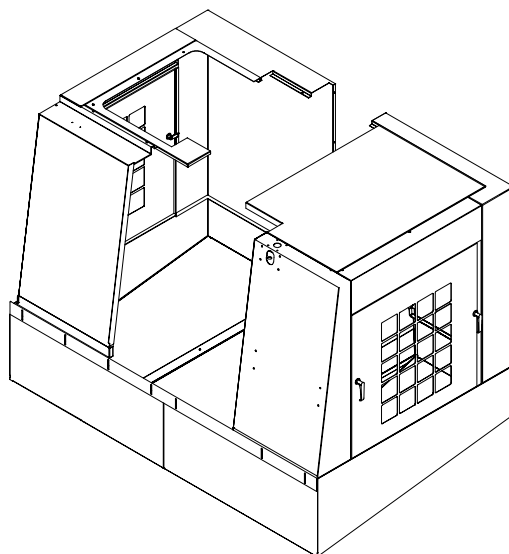
HARDWARE LIST

No.	QTY	DESCRIPTION
A	8	M6-1 x 12mm BHCS
B	2	1/2-14 NPT SHPP
C	2	7/8 FLAT WASHER 3/8 THICK
D	34	M8-1.25 x 20mm BHCS
E	34	M8 FLAT WASHER
F	12	M6-1 NYLOCK HEX NUT

REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH	 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA			
STOCK/ASSY No.	TITLE FLOOD TANK W/ WASHDOWN ASSEMBLY			
TOLERANCE UNLESS SPECIFIED	APPLICATION PARTNER I			
X .XXX +/-	SCALE 15:1	DWG No. 6-10-008-080	SIZE B	
X .XX +/-	DATE 04 SEP 02	DRAWN BY MOSER	SHEET No. 2 OF 2	
X .X +/-				
ANGLE +/-				

Enclosure Assembly





PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	SEE TABLE	TOP LEFT COVER
2	1	MP1-404	TOP RIGHT COVER
3	2	MP1-397	SIDE DOOR
4	2	MP6-163	LEXAN
5	1	MP1-395	SIDE LEFT
6	51	HD-12	M6 RUBBERIZED WASHER
7	16	HD-58	M5 RUBBERIZED WASHER
8	1	MP1-393	REAR LEFT
9	1	MP1-396	SIDE RIGHT
10	1	MP1-394	REAR RIGHT
11	1	MP1-401	BOTTOM LEFT
12	1	MP1-399	FRONT LEFT
13	1	MP1-400	FRONT RIGHT
14	1	MP1-405	DOOR LEDGE
15	1	MP1-402	BOTTOM RIGHT

HARDWARE LIST

No.	QTY	DESCRIPTION
A	43	M6-1 x 10mm
B	24	M5-.8 NYLOCK NUT
C	8	M6 FLAT WASHER
D	8	M6-1 x 20mm BHCS
E	8	M6 LOCK WASHER
F	8	M6-1 x 20mm SHCS
G	8	M5 FLAT WASHER

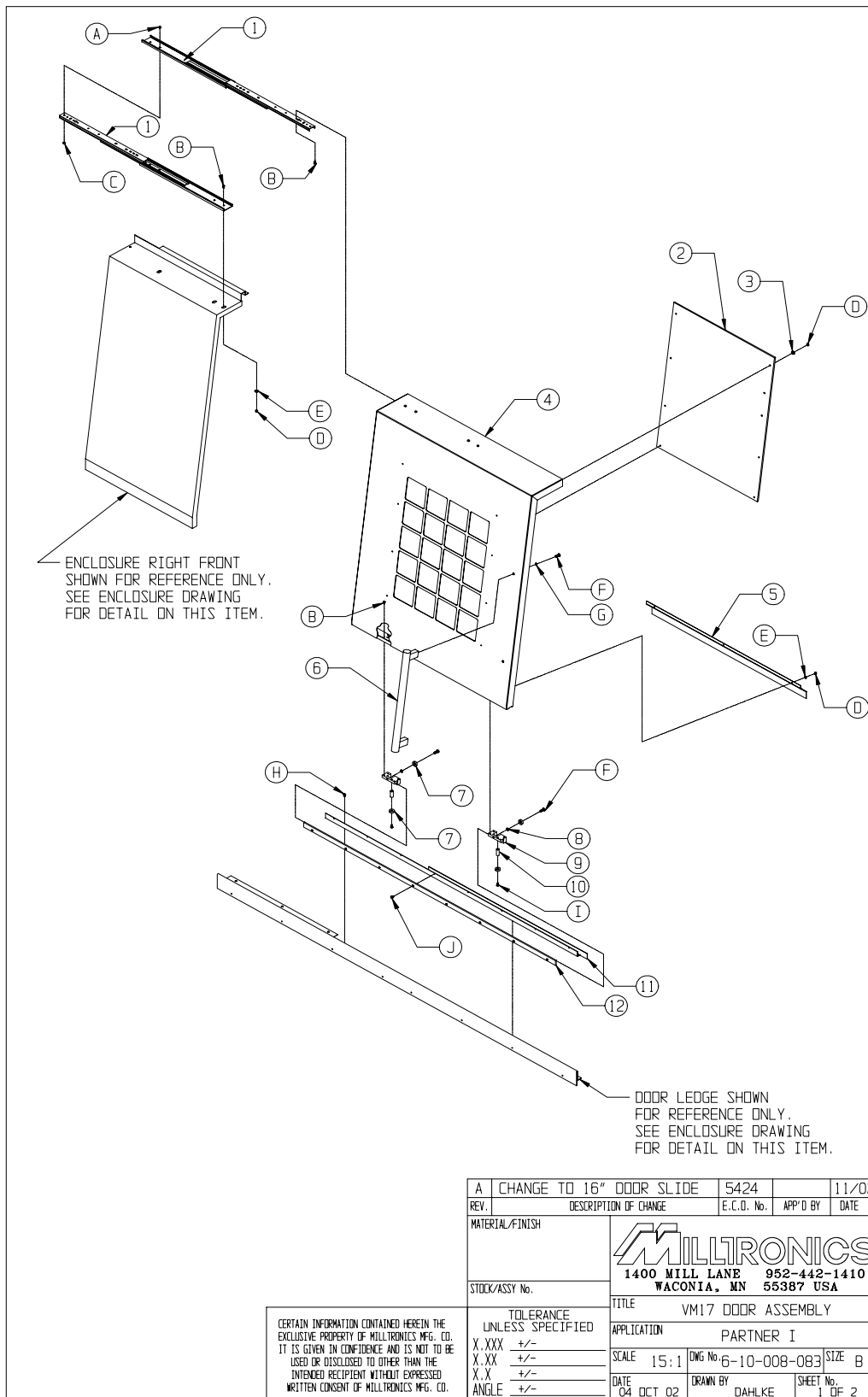
LEFT TOP COVER TABLE

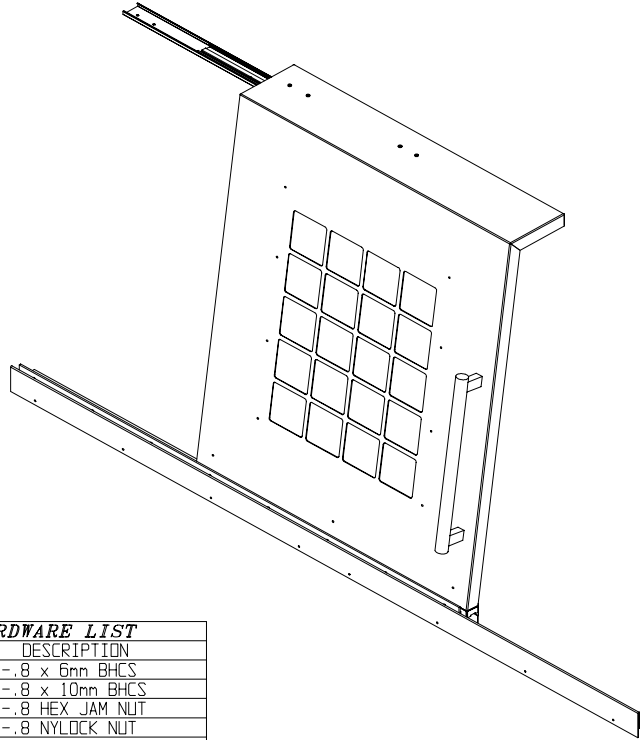
No.	QTY	16 PKT SWING ARM	16+20 PKT CAROUSEL
1	1	MP1-408	MP1-403

A		EDIT PARTS LIST		5410		10/02
REV.		DESCRIPTION OF CHANGE		E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA				
STOCK/ASSY No.						
TOLERANCE UNLESS SPECIFIED		TITLE VM17 ENCLOSURE				
X.XXX +/-		APPLICATION PARTNER I				
X.XX +/-		SCALE 20:1 DWG No. 6-10-008-082 SIZE B				
X.X +/-		DATE 15 SEP 02 DRAWN BY DAHLKE SHEET No. 2 OF 2				
ANGLE +/-						

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Enclosure Door Assembly





HARDWARE LIST

No.	QTY	DESCRIPTION
A	3	M5-.8 x 6mm BHCS
B	15	M5-.8 x 10mm BHCS
C	3	M5-.8 HEX JAM NUT
D	14	M5-.8 NYLOCK NUT
E	6	M5 FLAT WASHER
F	4	M8-1.25 x 20mm BHCS
G	2	M8 FLAT WASHER
H	8	M6-1 x 10mm BHCS
I	2	M8-1.25 x 45mm BHCS
J	8	M5-.8 x 10mm FHCS

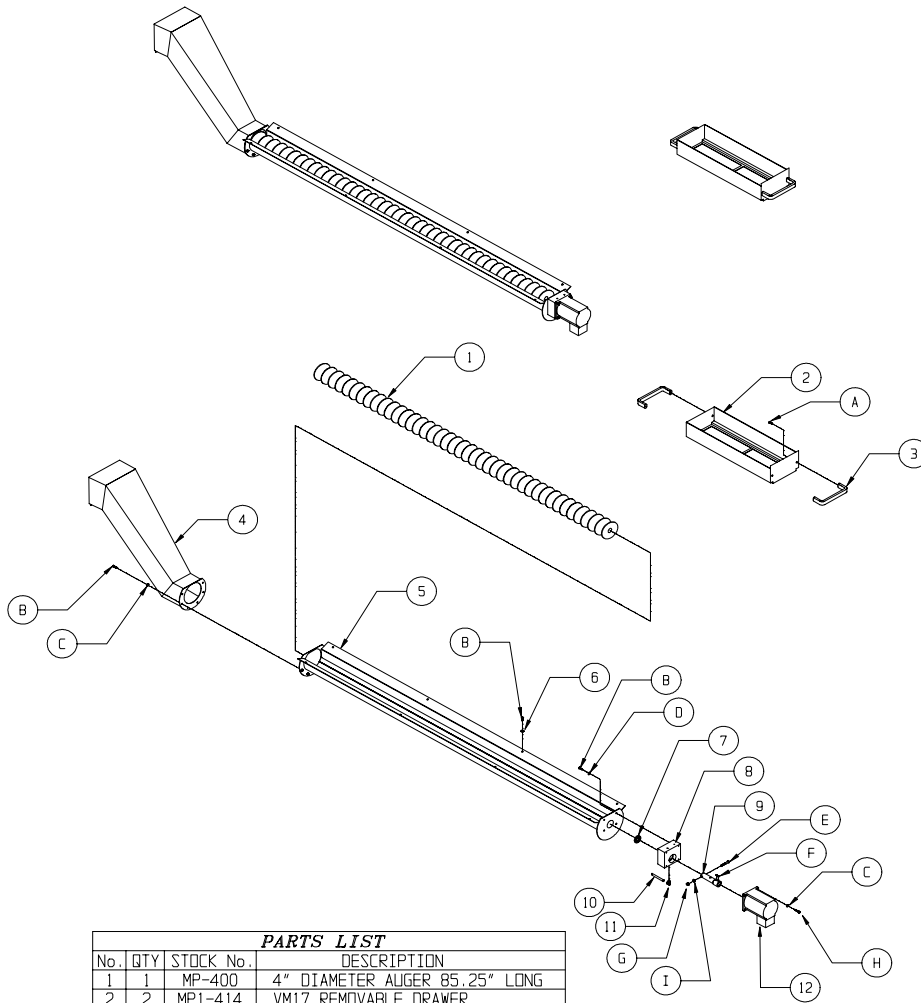
PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	MP1-426	SLIDE-3 MEMBER LOW PROFILE
2	1	MP6-163	LEXAN DOOR
3	8	HD-58	RUBBERIZED WASHER
4	1	MP1-398	FRONT DOOR
5	1	MP1-407	DOOR SPLASH SHIELD
6	1	WX-297	DOOR HANDLE
7	4	BG-37	POT BEARING
8	2	SP-102	.04" SPACER
9	2	MP1-417	WHEEL BEARING BLOCK
10	2	SP-99	1.20" SPACER
11	1	MP1-406	DOOR U-RAIL
12	1	MP1-292	DOOR TOP METAL

CERTAIN INFORMATION CONTAINED HEREIN IS THE EXCLUSIVE PROPERTY OF MILLIRONICS MFG. CO. IT IS GIVEN IN CONFIDENCE AND IS NOT TO BE USED OR DISCLOSED TO OTHER THAN THE INTENDED RECIPIENT WITHOUT EXPRESSED WRITTEN CONSENT OF MILLIRONICS MFG. CO.

A	CHANGE TO 16" DOOR SLIDE	5424		11/02
REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE VM17 DOOR ASSEMBLY		
X .XXX +/-		APPLICATION PARTNER I		
X .XX +/-		SCALE 10:1 DWG No. 6-10-008-083 SIZE B		
X .X +/-		DATE 04 OCT 02		
ANGLE +/-		DRAWN BY DAHLKE SHEET No. 2 OF 2		

Chip Pan Drawer/Auger Assembly



PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	MP-400	4" DIAMETER AUGER 85.25" LONG
2	2	MP1-414	VM17 REMOVABLE DRAWER
3	4	WX-230	HANDLE
4	1	MP1-413	VM17 REMOVABLE CHUTE
5	1	MP1-412	VM17 REMOVABLE TROUGH
6	8	HD-12	RUBBERIZED WASHER
7	1	BG-76	BEARING CLIP OIL SEAL
8	1	MP-440	BROTHER AUGER MOTOR MTG BRACKET
9	1	MP-441	BROTHER AUGER DRIVE SHAFT
10	1'	NU-25	1/4" NYLON TUBING
11	1	NU-16	MALE ELBOW 1/8 NPT 1/4 TUBE
12	1	MD-120	AUGER MOTOR

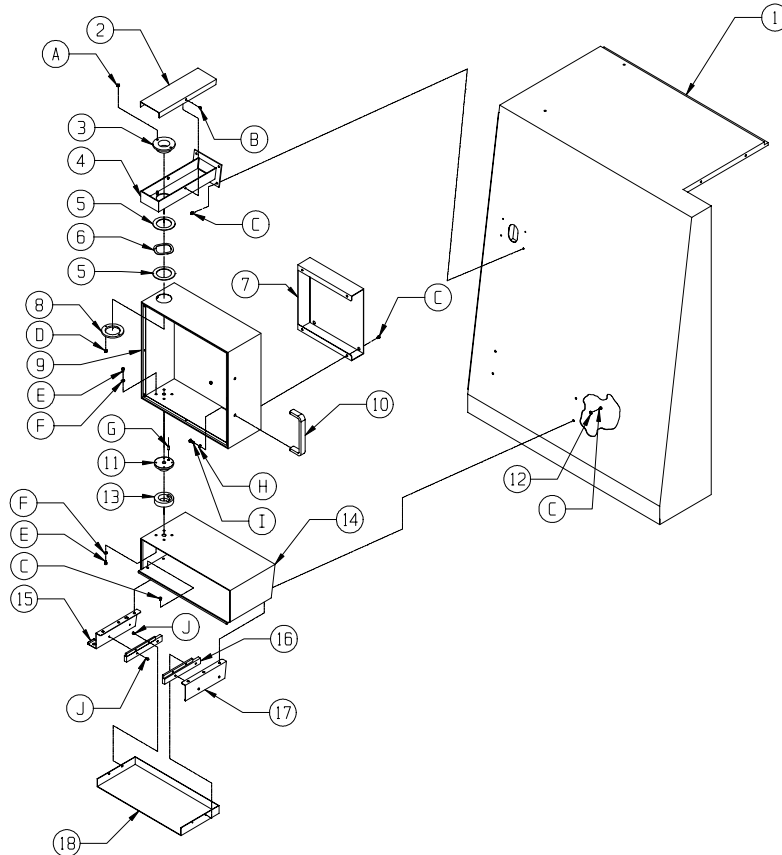
HARDWARE LIST

No.	QTY	DESCRIPTION
A	8	M8-1.25 x 20mm BHCS
B	18	M6-1 x 15mm BHCS
C	10	M6 LOCK WASHER
D	4	M6 FLAT WASHER
E	2	M8-1.25 x 50mm SHCS
F	2	10-32 x 1/4 SHSS
G	2	M8-1.25 HEX NUT
H	4	M6-1 x 25mm SHCS
I	2	M8 LOCK WASHER

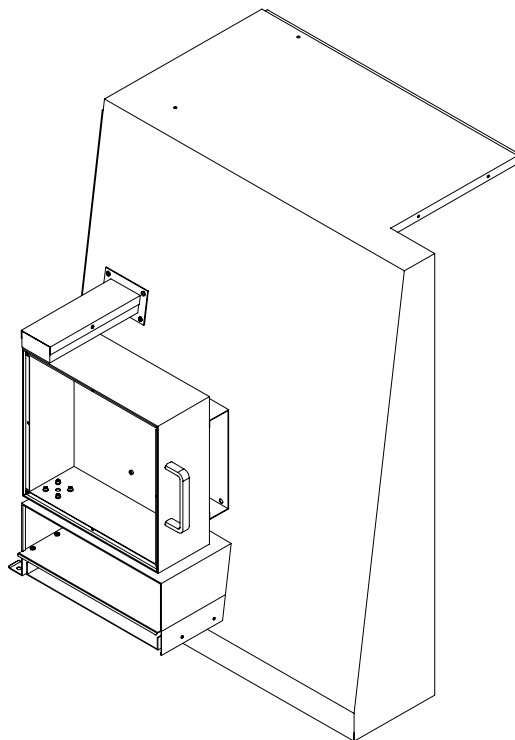
REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.		TITLE VM17 DRAWER/AUGER ASSEMBLY APPLICATION PARTNER I SCALE 20:1 DWG No. 6-10-008-081 SIZE B DATE 05 SEP 02 DRAWN BY MOSER SHEET No. 1 OF 1		
TOLERANCE UNLESS SPECIFIED				
X.XXX	+/-			
X.XX	+/-			
X.X	+/-			
ANGLE	+/-			

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Enclosure Swivel Monitor Assembly



A ADD WASHERS / UPDATE SWIVEL		5303	05/02	
REV.	DESCRIPTION OF CHANGE	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		TITLE SWIVEL MONITOR ASSEMBLY		
X.XXX +/-		APPLICATION GENERAL PRODUCTS		
X.XX +/-		SCALE 15:1	DWG No. 6-10-018-098	SIZE B
X.X +/-		DATE 30 MAR 01	DRAWN BY DAHLKE	SHEET No. 1 OF 2
ANGLE +/-				



PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	MP-662	VM25/30 ENCLOSURE RIGHT (FRONT)
2	1	MP-650	COVER SWIVEL MONITOR UPPER SUPPORT ARM
3	1	MP-663	FLANGED BUSHING - SWIVEL MONITOR
4	1	MP-646	UPPER SUPPORT ARM - SWIVEL MONITOR
5	2	WX-295	WASHER - SWIVEL MONITOR
6	1	MP30-12	WAVE WASHER
7	1	MP-653	3-RING BINDER POCKET - SWIVEL MONITOR
8	1	MP-647	COLLAR - SWIVEL MONITOR
9	1	MM-74	VM25/30 SWIVEL MONITOR BOX
10	1	WX-230	HANDLE
11	1	MP-648	SWIVEL PIVOT BUSHING
12	4	HD-12	RUBBERIZED WASHER
13	1	MP-649	SWIVEL PIVOT BASE
14	1	MP-624	VM25/30 SWIVEL MONITOR BASE
15	1	MP-651	UTILITY TRAY - SWIVEL MONITOR
16	1	MP-654	8" FULL EXTENSION ACCURIDE SLIDE
17	1	MP-652	BRACKET - SWIVEL MONITOR DRAWER OPTION
18	1	MP-626	TRAY - KEYBOARD PULL-OUT

See chip pan assembly drawing for item #1

PARTS LIST

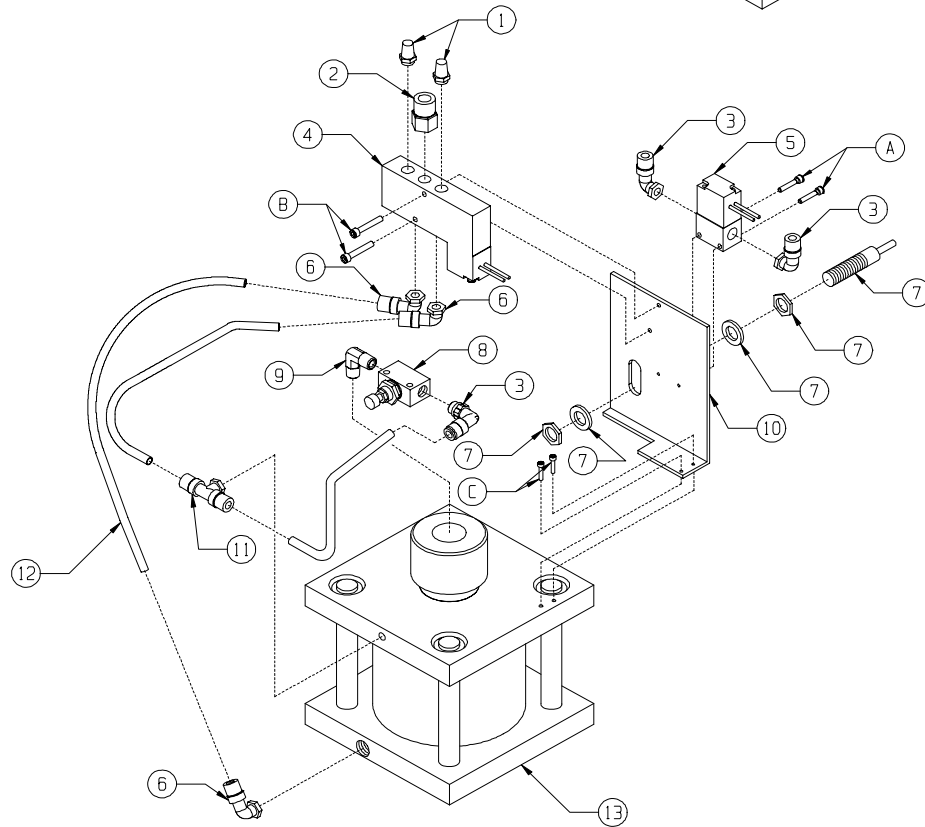
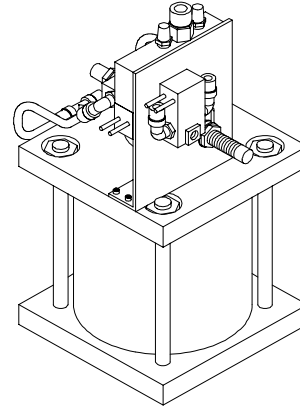
No.	QTY	DESCRIPTION
A	2	1/4-20 NYLOCK NUT
B	2	10-32 x 3/8 BHCS
C	18	1/4-20 x 3/8 BHCS
D	2	10-32 NYLOCK NUT
E	8	1/4-20 x 3/8 SHCS
F	8	1/4 LOCK WASHER
G	1	1/4 x .5 DOWEL PIN
H	2	M8 FLAT WASHER
I	2	M8-1.25 x 20mm
J	8	6-32 x 3/8 BHCS

A	ADD WAVE SPRING & WASHER		5303		05/02
REV.	DESCRIPTION OF CHANGE		E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH			 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.			TITLE SWIVEL MONITOR ASSEMBLY		
TOLERANCE UNLESS SPECIFIED			APPLICATION GENERAL PRODUCTS		
X.XXX	+/-	SCALE 10:1 DWG No. 6-10-018-098 SIZE B			
X.XX	+/-	DATE 30 MAR 01 DRAWN BY DAHLKE SHEET No. 2 OF 2			
X.X	+/-				
ANGLE	+/-				

Power Drawbar Cylinder Assembly

PARTS LIST			
ITEM	QTY	STOCK No.	DESCRIPTION
1	2	NU-177	1/8 NPT MUFLER
2	1	NU-95	MALE STRAIGHT 1/4 NPT - 3/8 TUBE
3	3	NU-187	SWIVEL ELBOW 1/8 NPT - 1/4 TUBE
4	1	NU-179	DRAW BAR - AIR VALVE
5	1	NU-320	AIR PURGE - AIR VALVE
6	3	NU-186	SWIVEL ELBOW 1/4 NPT - 1/4 TUBE
7	1	PR-33	DRAWBAR PROX SWITCH
8	1	NU-190	FLOW CONTROL FOR BLOW OUT
9	1	NU-189	MALE ELBOW 1/8 NPT
10	1	BR-145	DRAWBAR PROX SWITCH BRACKET
11	1	NU-321	SWIVEL T CONNECTOR - 1/4 TUBE
12	26'	NU-25	1/4" TUBING
13	1	NU-319	TRIPLE STACK DRAW BAR AIR CYLINDER

HARDWARE LIST		
ITEM	QTY	DESCRIPTION
A	2	6-32 x 3/4 SHCS
B	2	8-32 x 1 SHCS
C	2	8-32 x 3/8 SHCS



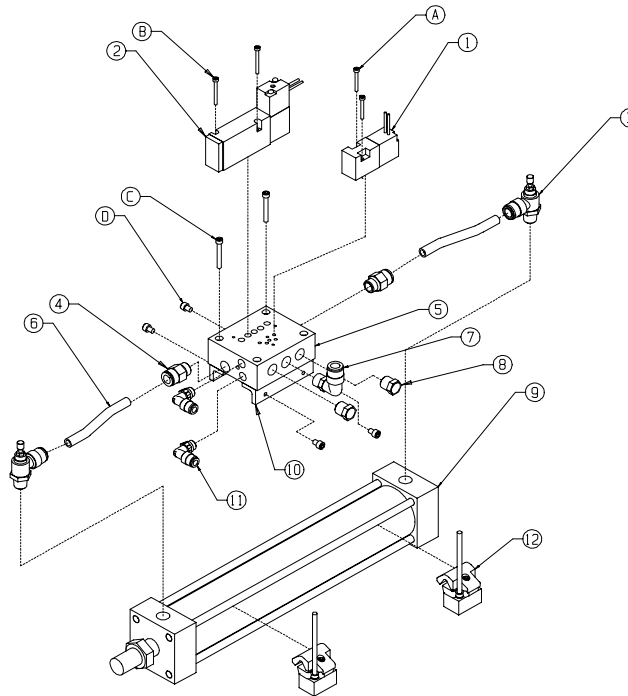
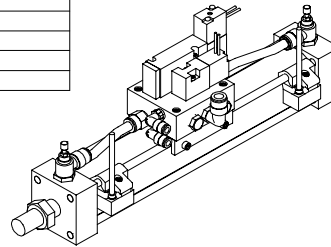
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH				
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED				
X.XXX +/-				
X.XX +/-				
X.X +/-				
ANGLE +/-				
 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA				
TITLE NU-313 DRAW BAR ASSEMBLY				
APPLICATION GENERAL PRODUCTS				
SCALE 3:1				
DATE 13 JAN 03				
DRAWN BY DAHLKE				
SHEET No. 1 OF 1				

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20 Pocket Air Cylinder Assembly

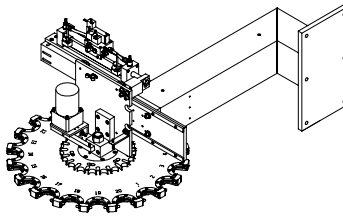
PARTS LIST			
ITEM	QTY	STOCK No.	DESCRIPTION
1	1	NU-185	AIR VALVE - DOOR - OPEN/CLOSE
2	1	NU-183	AIR VALVE - CAROUSEL - IN/OUT
3	2	NU-180	FLOW CONTROL
4	2	NU-95	MALE STRAIGHT CONNECTOR 1/4 NPT - 3/8 TUBE
5	1	NU-194	MANIFOLD
6	2	NU-78	3/8 NYLON TUBING
7	1	NU-199	SWIVEL ELBOW 1/4 NPT - 3/8 TUBE
8	2	NU-79	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.		TITLE NU-193 - 9" AIR CYLINDER ASSEMBLY		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X,XXX	+/-	SCALE 4:1	DWG No. 6-10-018-063	SIZE B
X,XX	+/-	DATE T9 FEB 99	DRAWN BY DAHLKE	SHEET NO. 1:1
X,X	+/-			
X,X	+/-			
ANGLE	+/-			

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		 1400 MILL LANE 612.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE 20 POCKET ATC		
X .XXX + X .XX + X .X + X . + ANGLE +		APPLICATION GENERAL PRODUCTS		
		SCALE 15:1 DWG No. 6-10-018-014 SIZE B		
		DATE 18 AUG 94 DRAWN BY THOMPSON SHEET NO. 1 OF 1		



PARTS LIST				HARDWARE LIST			
No.	QTY	STOCK No.	DESCRIPTION	No.	QTY	DESCRIPTION	
1	1	6-10-018-063	NU-193 9" AIR CYLINDER ASSEMBLY	A	4	5/16-18 x 1 5/8 SHCS	
2	1	MP-427	9 IN. AIR CYLINDER CLEVIS	B	8	5/16 LOCK WASHER	
3	1	MP-426	9 IN. AIR CYLINDER PLATE	C	20	5/16 HARDENED FLAT WASHER	
4	4	MP-143	V-RAIL GUIDE WHEEL	D	4	5/16-18 x 1 1/2 SHCS	
5	1	SEE TABLE	20 POCKET ARM	E	2	1/4-20 x 3 SHCS	
6	1	MP-117	20 POCKET AIR CYLINDER MOUNTING BRACKET	F	8	5/16-24 x 3/4 BHCS	
7	2	MP-145	STATIONARY BUSHING	G	2	8-32 x 1/2 BHCS	
8	2	MP-144	ADJUSTABLE BUSHING	H	4	5/16-18 HEX NUT	
9	3	WX-82	3/8 IN. CABLE CLAMP	I	2	1/4-20 x 3 1/2 SHCS	
10	1	MD-72	GENEVA MOTOR	J	6	1/2-13 x 2 SHCS	
11	1	MP-123	20 POCKET CAROUSEL SLIDING PLATE	K	8	1/4 LOCK WASHER	
12	1	MD-71	GEAR BOX W/KEY	L	6	1/2 LOCK WASHER	
13	1	MP-142	V-RAIL PLATE	M	2	#10 FLAT WASHER	
14	1	MP1-117	GENEVA WHEEL MOTOR MOUNT	N	4	1/4 x 1 DOWEL PIN	
15	2	MX-12	20 POCKET LINEAR V-RAIL MODS.	O	8	3/8 LOCK WASHER	
16	1	MP-120	20 POSITION GENEVA WHEEL	P	8	3/8-16 x 1 1/4 SHCS	
17	3	PR-19	SWITCH PROX	Q	6	1/4-20 x 3/4 BHCS	
18	1	BR-130	TOOL CHANGER PROX. SWITCH BRACKET	R	2	10-32 x 3/4 BHCS	
19	2	BG-33	CONE TAPERED BEARING	S	4	1/4-20 x 7/8 SHCS	
20	2	BG-34	CLIP TAPERED BEARING	T	10	1/4-20 x 5/8 BHCS	
21	1	MP-466	HOME/GENEVA PROX BRACKET	U	2	5/16-18 x 1/4 SHSS	
22	1	MP-116	UPPER CAROUSEL BEARING CLIP	V	6	5/16-18 x 1 3/4 SHCS	
23	1	MX-10	20 PKT ATC DRIVE CAM - MACHINED	W	80	1/4-20 x 3/4 SHCS	
24	20	SEE TABLE	20 POCKET INSERT	X	2	1/4-20 x 1/4 SHSS	
25	1	HD-39	1/2 x 5/16 DRILL BUSHING	Y	1	8-32 x 1/4 BHCS	
26	40	MP1-140	([^]) PUSH PIN GUIDE	Z	20	([^]) 8-32 x 1/4 SHCS	
27	1	HD-38	5/16 x 3/8 SHOULDER BOLT	AA	80	([^]) (*) No. 6 FLAT WASHER	
28	1	HD-07	1-8 UNC NYLOCK NUT	BB	4	3/8-16 x 1 SHCS	
29	20	SEE TABLE	([^]) 20 POCKET TOOL CHANGE KEY	CC	40	10-32 x 3/16 BRASS TIPPED SHSS	
30	1	MP-124	20 POCKET CAROUSEL MOUNTING BRACKET	DD	2	3/8-16 x 3 SHCS	
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 CLIP				
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

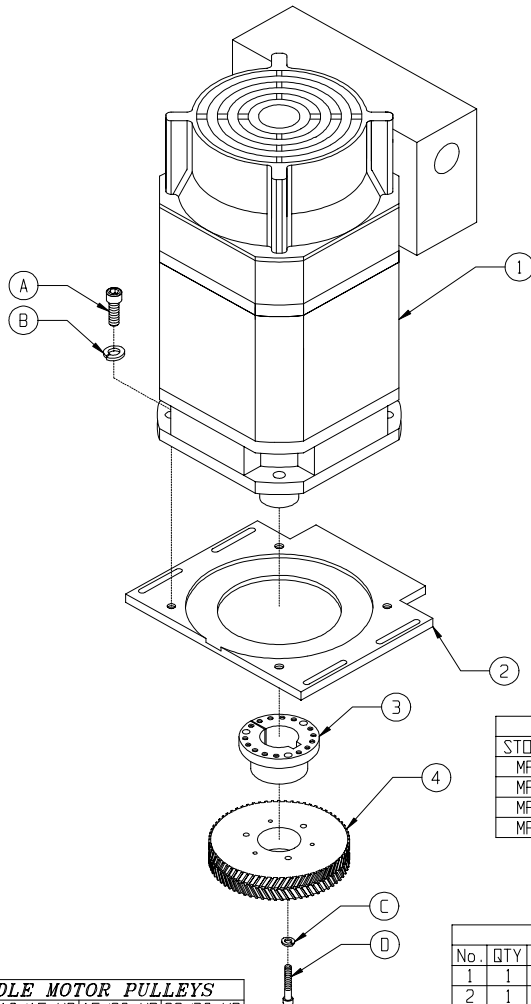
NOTES:

- 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

Spindle Motor and Pulley Assembly



SPINDLE MOTOR PULLEYS				
RPM	10/15 HP	15/20 HP	22/30 HP	
	1 SPEED	2 SPEED	2 SPEED	
6K/8K	PY-201	PY-192	PY-192	
12K/15K	PY-188	PY-188	PY-188	

MOTOR PLATES	
STOCK No.	DESCRIPTION
MP-548	15 H.P. & 22 H.P.
MP-587	10 H.P.
MPB-45	10 H.P. (BRIDGE MILL ONLY)
MPB-40	15 H.P. (BRIDGE MILL ONLY)

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 MO-131, MO-132 SPINDLE MOTOR)
PY-184	32mm ID SK BUSHING (USED WITH MO-114 SPINDLE MOTOR)

YASKAWA SPINDLE MOTORS	
STOCK No.	DESCRIPTION
MO-132	22 H.P. SPINDLE MOTOR - YASKAWA
MO-131	15 H.P. SPINDLE MOTOR - YASKAWA
MO-114	10 H.P. SPINDLE MOTOR - YASKAWA

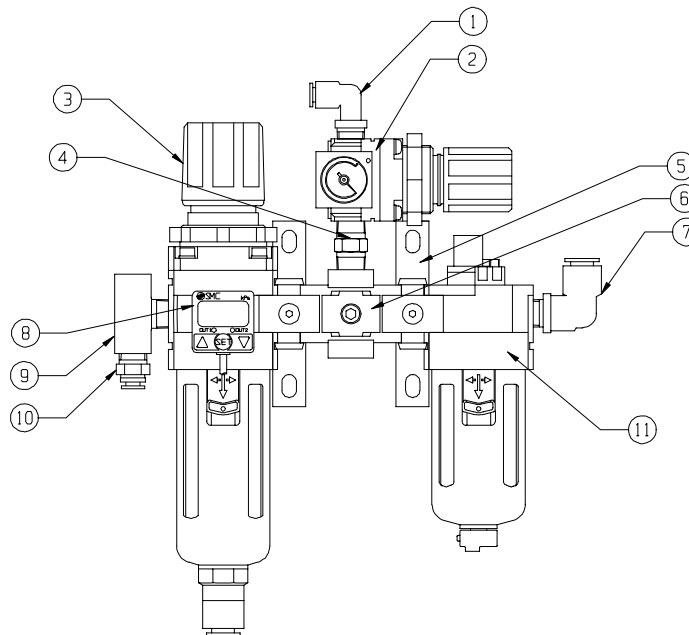
HARDWARE LIST		
No.	QTY	DESCRIPTION
A	4	1/2-13 x 1 1/4 SHCS
B	4	1/2 LOCK WASHER
C	3	5/16 LOCK WASHER
D	3	5/16-18 x 2 SHCS

D	CHANGE 15 HP SPINDLE MOTOR	5257		02/02
C	CHANGE MOTOR/PULLEY CHARTS	5251	N.M.	02/02
B	CHANGE 6K & 8K MOTOR PULLEY	5197	N.M.	12/01
A	ADD MOTOR PLATE TO CHART	5058	N.M.	04/01
REV.	DESCRIPTION	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				
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

Air Filter / Lubricator / Filter Assembly

PARTS LIST

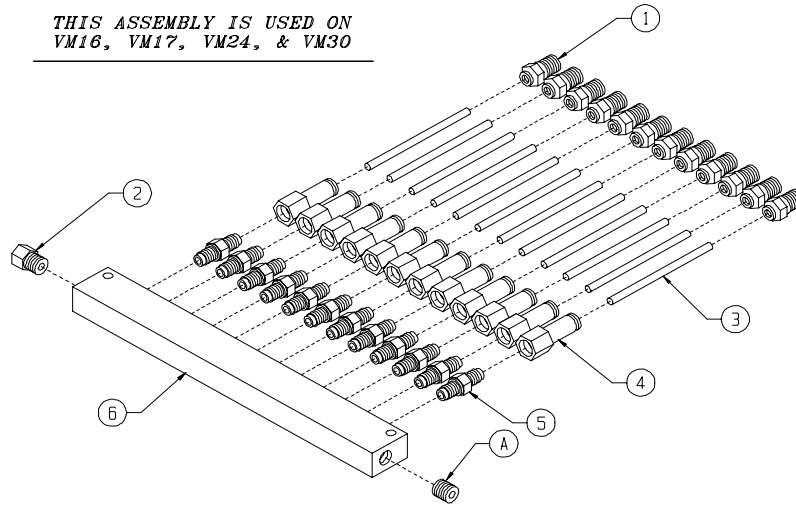
ITEM	QTY	STOCK No.	DESCRIPTION
1	1	NU-186	1/4 NPT 1/4 TUBE SWIVEL ELBOW
2	1	NU-262	LOW PRESSURE REGULATOR W/GAGE
3	1	NU-212	LARGE FILTER/HIGH PRESSURE REGULATOR
4	1	NU-30	1/4 NPT PIPE NIPPLE
5	2	NU-210	LARGE MOUNTING SPACER
6	1	NU-211	LARGE MANIFOLD SPACER
7	1	NU-199	1/4 NPT 3/8 TUBE SWIVEL ELBOW
8	1	NU-259	DIGITAL AIR GUAGE WITH PRESSURE SWITCH
9	1	NU-219	1/4 NPT BRANCH TEE
10	1	NU-32	1/4 NPT 1/4 TUBE MALE STRAIGHT
11	1	NU-209	LARGE LUBRICATOR



B	ADD DIGITAL GAGE	4860		12/00
A	CHANGE STOCK NUMBER	4813	N.M.	12/00
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		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 +/-				

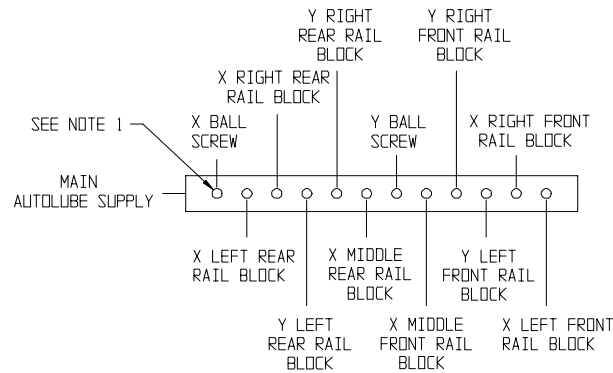
X & Y Axis Autolube Manifold Assembly

*THIS ASSEMBLY IS USED ON
VM16, VM17, VM24, & VM30*



NOTES:

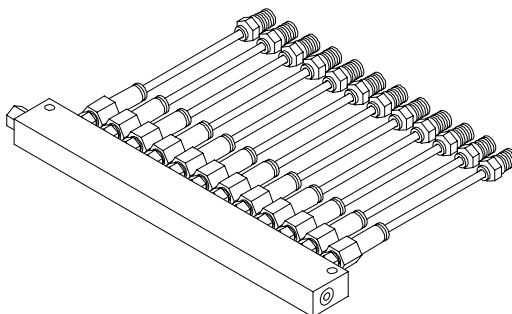
1. ON VM16 & VM17 MACHINES NU-154, NU-155, & NU-157
ARE REPLACED WITH NU-110 & NU-63 (#2 OIL METER).



AUTOLUBE LINE DESTINATIONS

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLIRONICS MANUFACTURING 1400 MILL LANE (612) 442-1410 WACONIA, MN 55387		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE X & Y AXIS AUTOLUBE MANIFOLD ASSEMBLY		
X .XXX ±		APPLICATION GENERAL PRODUCTS		
X .XX ±		SCALE 2:1		
X .X ±		DATE 25 JUL 97		
ANGLE ±		DRAWN BY THOMPSON		
		SHEET NO. 1 OF 2		

THIS ASSEMBLY IS USED ON
VM16, VM17, VM24, & VM30



PARTS LIST

No.	QUANTITY	STOCK No.	DESCRIPTION
1	12	NU-154	5/32 TUBE 1/8 NPT M/S
2	1	NU-110	1/8 NPT-M8-1 OIL FITTING
3	SEE TABLE	NU-117	5/32 NYLON TUBING
4	12	NU-157	5/32 TUBE-1/8 NPT FEM.
5	-	SEE TABLE	OIL METER
6	1	MP-356	X & Y AIR/OIL LUBE MANIFOLD

NU-117 TUBING LENGTH

CONNECTION	VM16	VM17	VM24	VM30	OIL METER
X LEFT REAR RAIL BLOCK	20	20	24	24	#3
X RIGHT REAR RAIL BLOCK	27	27	44	44	#3
Y LEFT REAR RAIL BLOCK	12	12	24	24	#3
Y RIGHT REAR RAIL BLOCK	24	30	44	44	#3
X MIDDLE REAR RAIL BLOCK	-	-	38	38	#3
Y BALL SCREW	32	26	39	39	#2
X MIDDLE FRONT RAIL BLOCK	-	-	38	38	#3
Y RIGHT FRONT RAIL BLOCK	24	30	44	44	#3
Y LEFT FRONT RAIL BLOCK	12	12	24	24	#3
X RIGHT FRONT RAIL BLOCK	27	27	44	44	#3
X LEFT FRONT RAIL BLOCK	20	20	24	24	#3
X BALL SCREW	-	-	60	60	#2

Oil Meter Part
Numbers.

#2 = NU-155

#3 = NU-156

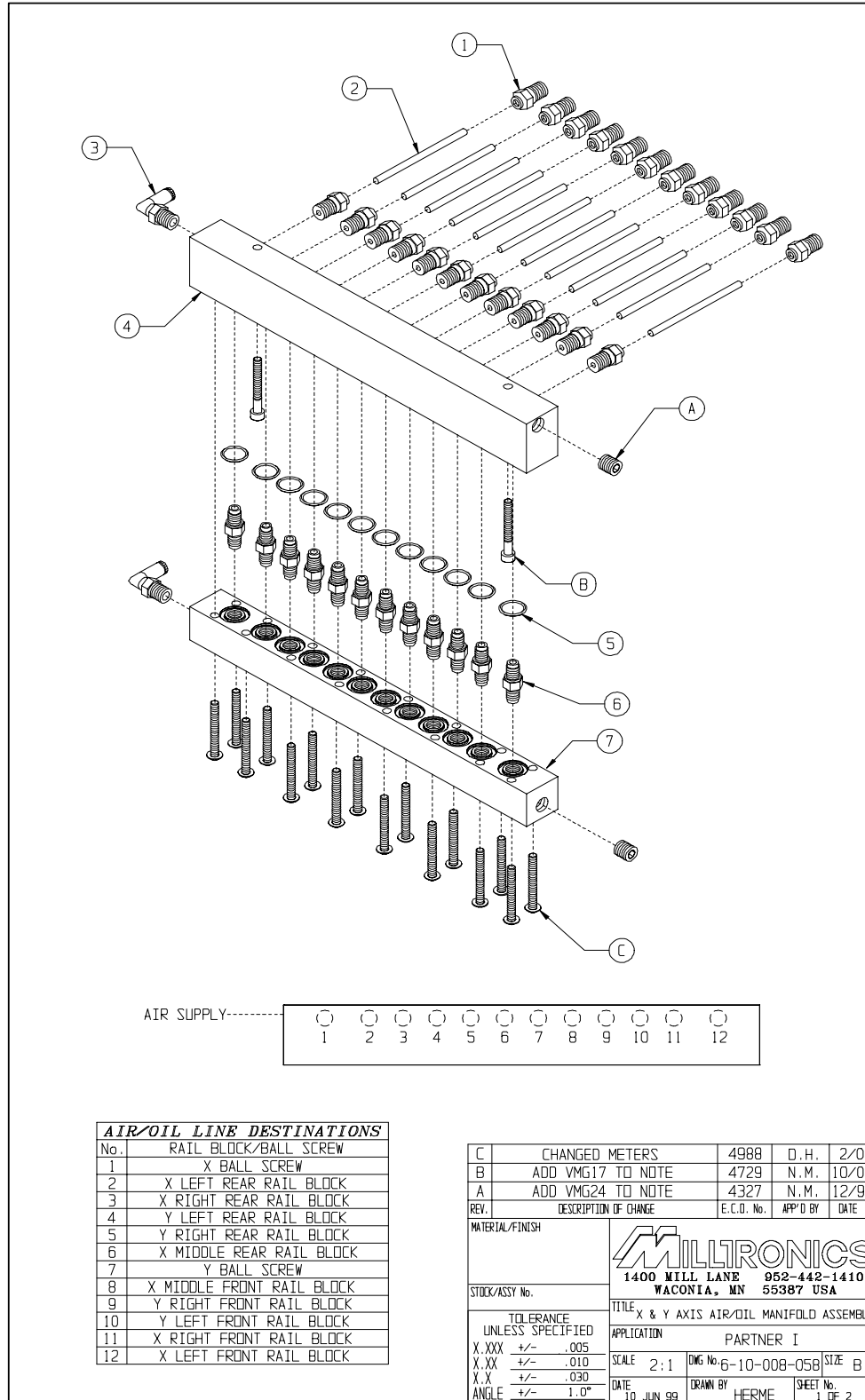
ALL MEASUREMENTS ARE IN INCHES

HARDWARE LIST

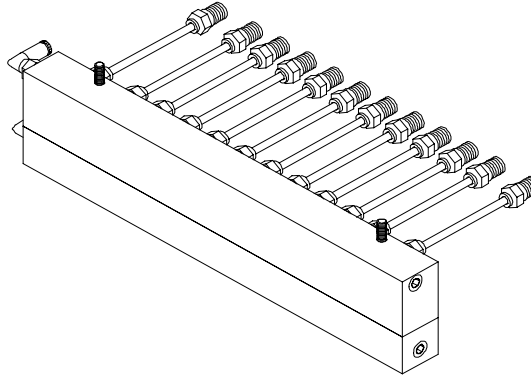
No.	QTY	DESCRIPTION
A	1	1/8-27 NPT SHPP

REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLIRONICS MANUFACTURING 1400 MILL LANE (612) 442-1410 WACONIA, MN 55387		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE X & Y AXIS AUTOLUBE MANIFOLD ASSEMBLY		
X, XXX ±		APPLICATION GENERAL PRODUCTS		
X, XX ±		SCALE 2:1 DWG No 6-10-018-049 SIZE B		
X, X ±		DATE 25 JUL 97		
ANGLE ±		DRAWN BY THOMPSON SHEET NO. 2 OF 2		

X & Y Axis Air/Oil Manifold Assembly



THIS ASSEMBLY IS USED ON VMG17, VMG24.



PARTS LIST

No.	QUANTITY VMG17/VMG24	STOCK No.	DESCRIPTION
1	20 24	NU-154	5/32 TUBE 1/8 NPT M/S
2	SEE TABLE	NU-117	5/32 NYLON TUBING
3	2	NU-161	ELBOW - SWIVEL 5/32 TUBE 1/8 NPT
4	1	MP6-183	X & Y AIR/OIL MANIFOLD - AIR
5	10 12	WX-248	O-RING Buna 1/2 ID x 5/8 OD
6	-	SEE TABLE	OIL METER
7	1	MP-661	12 PORT 1/8 NPT MANIFOLD - OIL

NU-117 TUBING LENGTH

CONNECTION	VMG17	VMG24	OIL METER
X BALL SCREW	40	60	#2 (NU-155)
X LEFT REAR RAIL BLOCK	20	24	#3 (NU-156)
X RIGHT REAR RAIL BLOCK	27	44	#3 (NU-156)
Y LEFT REAR RAIL BLOCK	13	24	#3 (NU-156)
Y RIGHT REAR RAIL BLOCK	33	44	#3 (NU-156)
X MIDDLE REAR RAIL BLOCK	SEE NOTE 1	38	#3 (NU-156)
Y BALL SCREW	26	39	#2 (NU-155)
X MIDDLE FRONT RAIL BLOCK	SEE NOTE 1	38	#3 (NU-156)
Y RIGHT FRONT RAIL BLOCK	30	44	#3 (NU-156)
Y LEFT FRONT RAIL BLOCK	12	24	#3 (NU-156)
X RIGHT FRONT RAIL BLOCK	27	44	#3 (NU-156)
X LEFT FRONT RAIL BLOCK	20	24	#3 (NU-156)

ALL MEASUREMENTS ARE IN INCHES

NOTES:

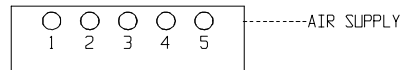
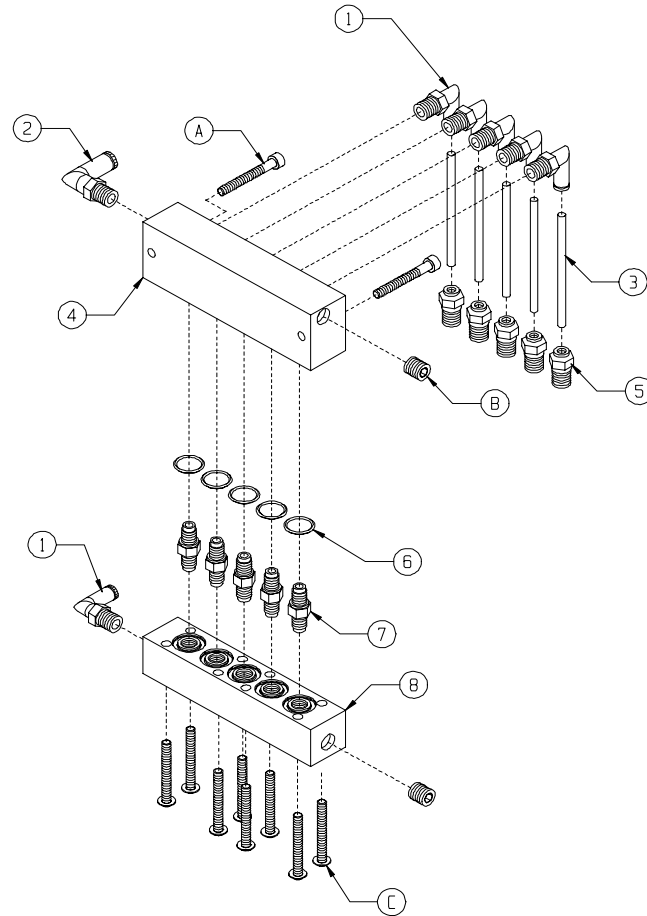
1. PLUG AIR/OIL LINE HOLE AND OIL METER HOLE IN MANIFOLD WITH 1/8 NPT PLUG.

HARDWARE LIST

No.	QTY	DESCRIPTION
A	2	1/8-27 NPT SHPP
B	2	10-32 x 1 1/2 SHCS
C	16	10-32 x 1 1/4 BHCS

C	CHANGED METERS	4988	D.H.	2/01
B	ADD VMG17 TO NOTE	4729	N.M.	10/00
A	ADD VMG24 TO NOTE	4327	N.M.	12/99
REV.	DESCRIPTION OF CHANGE	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		TITLE X & Y AXIS AIR/OIL MANIFOLD ASSEMBLY		
X.XXX +/- .005		APPLICATION PARTNER I		
X.XX +/- .010		SCALE 2:1 DWG No. 6-10-008-058 SIZE B		
X.X +/- .030		DATE 10 JUN 99		
ANGLE +/- 1.0°		DRAWN BY HERME SHEET No. 2 OF 2		

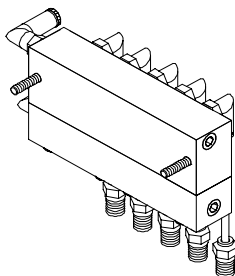
Z-Axis Air/Oil Manifold Assembly



AIR/OIL LINE DESTINATIONS	
No.	RAIL BLOCK/BALL SCREW
1	Z RIGHT UPPER RAIL BLOCK
2	Z RIGHT LOWER RAIL BLOCK
3	Z BALL SCREW
4	Z LEFT LOWER RAIL BLOCK
5	Z LEFT UPPER RAIL BLOCK

C	REMOVED VMG24	4987		2/01
B	ADD VMG24 NOTE	4338	N.M.	1/00
A	UPDATED TUBE LENGTHS	4077	N.M.	7/99
REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE Z AXIS AIR/OIL MANIFOLD ASSEMBLY		
X.XXX +/- .005		APPLICATION PARTNER I		
X.XX +/- .010		SCALE 2:1		DWG No. 6-10-008-059
X.X +/- .030		DATE 11 JUN 99		SIZE B
ANGLE +/- 1.0°		DRAWN BY HERME		SHEET No. 1 OF 2

THIS ASSEMBLY IS USED ON VM17



PARTS LIST

No.	QUANTITY	STOCK No.	DESCRIPTION
1	6	NU-161	ELBOW-SWIVEL 5/32 TUBE 1/8 NPT
2	1	NU-171	ELBOW - SWIVEL 1/4 TUBE 1/8 NPT
3	SEE TABLE	NU-117	5/32 NYLON TUBING
4	1	MP1-301	Z AIR/OIL MANIFOLD - AIR
5	5	NU-154	5/32 TUBE 1/8 NPT M/S
6	5	WX-248	O-RING BUNA 1/2 ID x 5/8 OD
7	-	SEE TABLE	OIL METER
8	1	MP-660	Z AIR/OIL MANIFOLD - OIL

NU-117 TUBING LENGTH

CONNECTION	VM17	OIL METER
Z LEFT UPPER RAIL BLOCK	37	#3 (NU-156)
Z LEFT LOWER RAIL BLOCK	31	#3 (NU-156)
Z RIGHT UPPER RAIL BLOCK	29	#3 (NU-156)
Z RIGHT LOWER RAIL BLOCK	23	#3 (NU-156)
Z BALL SCREW	26	#2 (NU-155)

ALL MEASUREMENTS ARE IN INCHES

HARDWARE LIST

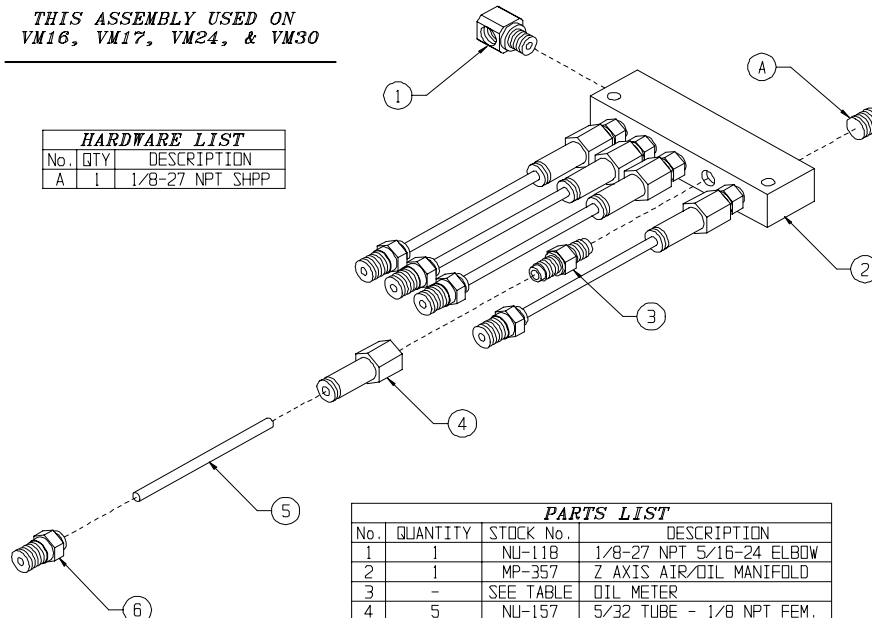
No.	QTY	DESCRIPTION
A	2	10-32 x 1 1/2 SHCS
B	2	1/8-27 NPT SHPP
C	8	10-32 x 1 1/2 BHCS

C	REMOVED VMG24	4987		2/01
B	ADD VMG24 NOTE	4338	N.M.	1/00
A	UPDATED TUBE LENGTHS	4077	N.M.	7/99
REV.	DESCRIPTION OF CHANGE	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		TITLE Z AXIS AIR/OIL MANIFOLD ASSEMBLY		
X.XXX +/- .005		APPLICATION PARTNER I		
X.XX +/- .010		SCALE 2:1 DWG No. 6-10-008-059 SIZE B		
X.X +/- .030		DATE 11 JUN 99 DRAWN BY HERME SHEET No. 2 OF 2		
ANGLE +/- 1.0°				

Z-Axis Autolube Manifold Assembly

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

HARDWARE LIST		
No.	QTY	DESCRIPTION
A	1	1/8-27 NPT SHPP



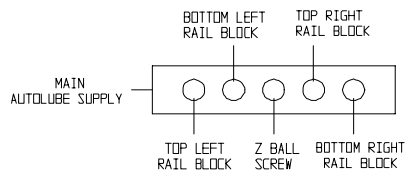
PARTS LIST			
No.	QUANTITY	STOCK No.	DESCRIPTION
1	1	NU-118	1/8-27 NPT 5/16-24 ELBOW
2	1	MP-357	Z AXIS AIR/OIL MANIFOLD
3	-	SEE TABLE	OIL METER
4	5	NU-157	5/32 TUBE - 1/8 NPT FEM.
5	SEE TABLE	NU-117	5/32 NYLON TUBING
6	5	NU-154	5/32 TUBE-1/8 NPT M/S

NU-117 TUBING LENGTH					OIL METER
CONNECTION	VM16	VM17	VM24	VM30	
TOP LEFT RAIL BLOCK	18	20	27	27	No.3
BOTTOM LEFT RAIL BLOCK	35	13 1/4	28	38	No.3
Z BALL SCREW	24	14 3/4	14 3/4	14 3/4	No.2
BOTTOM RIGHT RAIL BLOCK	35	7 1/2	36 1/2	36 1/2	No.3
TOP RIGHT RAIL BLOCK	18	10 1/8	25	25	No.3

ALL MEASUREMENTS ARE IN INCHES

NOTES:

- ON VM17 "1" & "A" POSITIONS ARE REVERSED.
- ON VM24, VM30 & VMD30 "1" IS REPLACED WITH NU-161, 1/8 NPT 5/32 TUBE MALE ELBOW.



AUTOLUBE LINE DESTINATIONS

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 ±				
DATE 20 AUG 97				
DRAWN BY THOMPSON				
SHEET NO. 1 OF 1				

MILLIRONICS MANUFACTURING
1400 MILL LANE (612) 442-1410
WACONIA, MN 55387

TITLE Z AXIS AUTOLUBE MANIFOLD ASSEMBLY

APPLICATION GENERAL PRODUCTS

SCALE 1.5:1 ENG No. 6-10-018-050 SIZE B

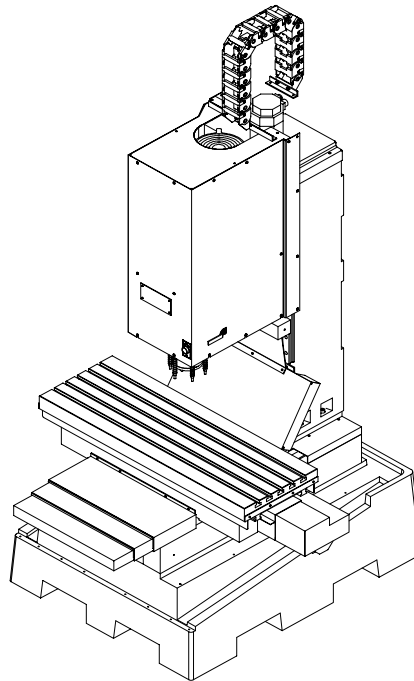
DATE 20 AUG 97 DRAWN BY THOMPSON SHEET NO. 1 OF 1

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Machine Lubrication Instructions

NOTES:

1. USE MOBILITH AW SERIES MULTIPURPOSE EP GREASE OR OTHER EQUIVALENT FOR ALL LUBE POINTS. MACHINE SHOULD BE SERVICED ONCE A MONTH FOR PROPER OPERATION AND ACCURACY OF MACHINE. SEE PAGE TWO FOR SPECIFICATIONS.
2. CLEAN AND FILL AIR FILTER / REGULATOR / OILER EVERY WEEK FOR PROPER OPERATION OF ALL PNEUMATIC PARTS FILL WITH MARVEL No. 085, MOBIL VELOCITE No. 10 OR OTHER EQUIVALENT QUALITY AIR TOOL OIL. SEE PAGE TWO FOR SPECIFICATIONS.
3. MACHINES WITH AUTOLUBE OPTION USE MOBIL OIL VACTRA 2, AMOCO WAYTAC No. 68, SUNDOD SUNWAY LUBE No. 1180, OR EQUIVALENT QUALITY WAY OIL SEE PAGE TWO FOR SPECIFICATIONS.
4. MACHINES WITH 15,000 RPM AIR/OIL OPTION USE MOBIL OIL DTE 24, OR EQUIVALENT QUALITY SPINDLE OIL.



E	CHANGED HEAD COVERS	5021		3/01
D	ADD DTE 24 TABLE	4703	N.M.	10/00
C	REMOVE HEAT EXCHANGER	3909	N.M.	3/99
B	CHANGE GREASE SPECS.	3411	N.M.	2/98
A	ADD SPECIFICATIONS	3133	N.M.	6/97
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE VM17 LUBRICATION DRAWING		
X.XXX	+	APPLICATION PARTNER VM17		
X.XX	+	SCALE 15:1	DWG NO. 6-10-008-044	SIZE B
X.X	+	DATE 02 JUN 97	DRAWN BY THOMPSON	SHEET NO. 1 OF 2
ANGLE	+			

THIS ASSEMBLY USED ON VM16, VM17

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

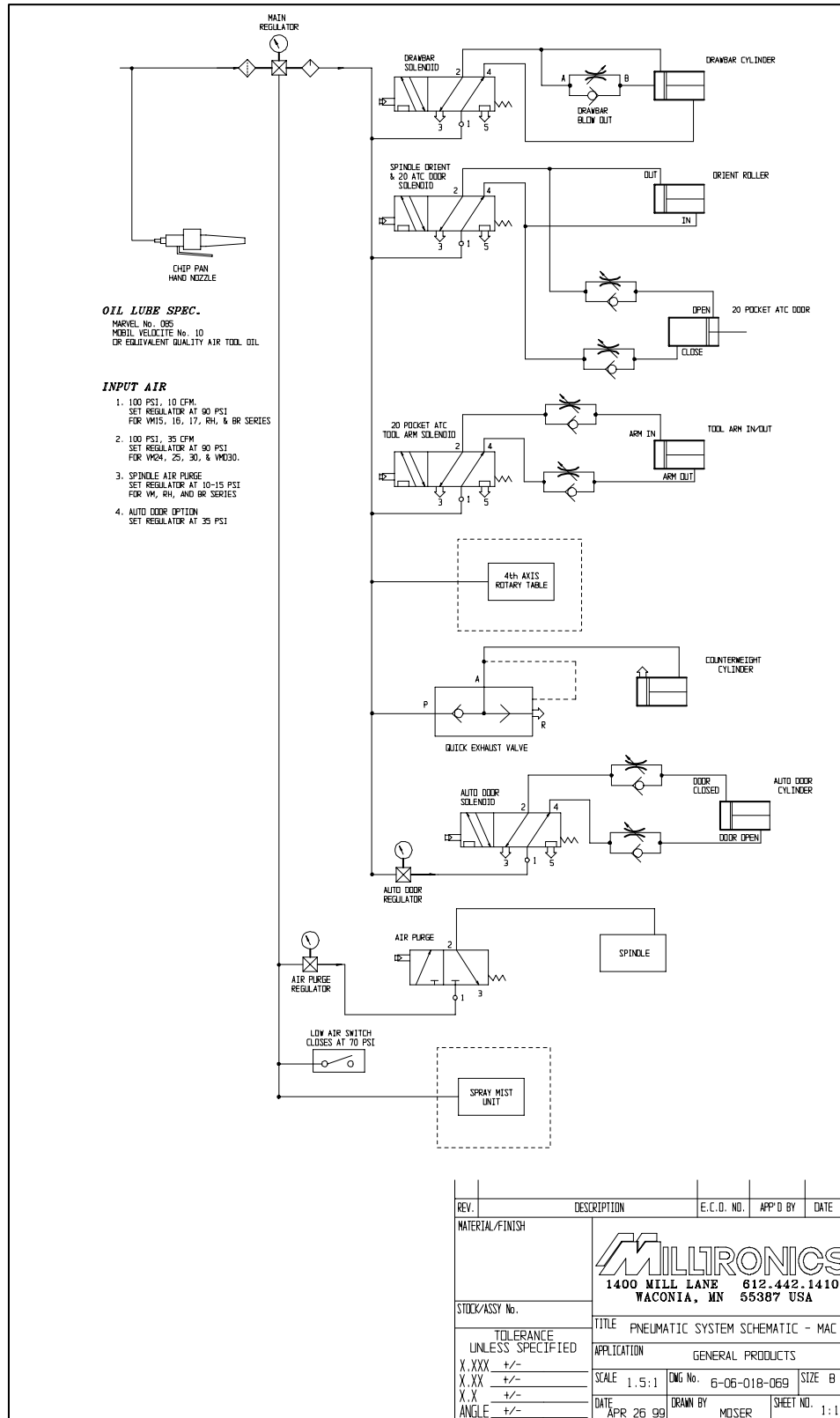
MOBIL VELOCITE OIL No. 10	
PRODUCT NUMBER	60068-4
GRAVITY, API	32.0
POUR, °C (°F), max.	-4 (25)
FLASH, °C (°F), min.	182 (360)
VISCOSITY	
cST AT 40° C	22.0
cST AT 100° C	4.0
SUS AT 100° F	115
SUS AT 210° F	40
ISO VG	22
VISCOSITY INDEX	95
COLOR, ASTM D 1500	2.0
RUST PROTECTION, ASTM D 665	PASS
CINCINNATI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

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)	-
CMCO, P-SPEC, APPROVAL	P-47
BIJUR PT 37-1 APPROVAL	PASS
OKUMA APPROVAL	PASS

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,	
ASTM D 665, A & B	PASS
COLOR, ASTM D1500, max	3.5
FZG GEAR TEST STAGES	12
PASSED DIN 51534	

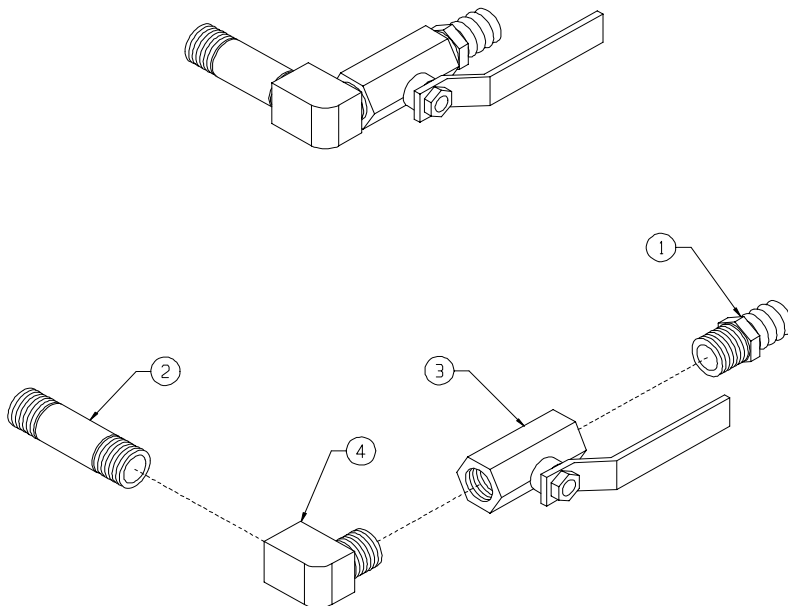
E	CHANGED HEAD COVERS	5021		3/01
D	ADD DTE 24 TABLE	4703	N.M.	10/00
C	REMOVE HEAT EXCHANGER	3909	N.M.	3/99
B	CHANGE GREASE SPECS.	3411	N.M.	2/98
A	ADD SPECIFICATIONS	3133	N.M.	6/97
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH				
STOCK/ASSY No.		1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
TOLERANCE UNLESS SPECIFIED		TITLE VM17 LUBRICATION DRAWING		
X.XXX	±	APPLICATION PARTNER VM17		
X.XX	±	SCALE 15:1		
X.X	±	Dwg No 6-10-008-044		
ANGLE	±	SIZE B		
		DATE 02 JUN 97	DRAWN BY THOMPSON	SHEET NO. 2 OF 2

Pneumatic System Schematic



Flood Coolant Valve Handle Assembly

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



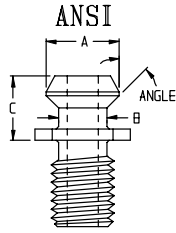
PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	NU-66	3/4" BARB FITTING
2	1	NU-257	3 IN. PIPE NIPPLE
3	1	NU-64	1/2" BRASS BALL VALVE
4	1	NU-125	STREET ELBOW

B	CHANGE PIPE NIPPLE	4778		11/00
A	CHANGE PIPE NIPPLE	3851	N. M.	2/99
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		TITLE VM17 FLOOD HANDLE SUB-ASSEMBLY		
X.XXX ±		APPLICATION PARTNER I		
X.XX ±		SCALE 2:1	DWG No 6-10-008-039	SIZE B
X.X ±		DATE 29 APR 97	DRAWN BY THOMPSON	SHEET NO. 1 OF 1
ANGLE ±				

Retention Knob Chart

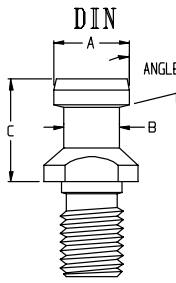
ANSI RETENTION KNOBS STYLE V-FLANGE 50 TAPER									
RET. KNOB ASSEMBLY SELECTION	DIMENSIONS				MILLTRONICS MACHINE	COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
N/A	1.14	.83	1.00	45°	RW30B	RC6E-0001	DWG RK11144	N/A	C50-STD
ANSI RETENTION KNOBS STYLE BT-FLANGE 50 TAPER									
RET. KNOB ASSEMBLY SELECTION	DIMENSIONS				MILLTRONICS MACHINE	COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
N/A	1.14	.83	1.00	45°	RW30B	RS6M-0105	DWG RK11144A	N/A	N/A
ANSI RETENTION KNOBS STYLE V-FLANGE 40 TAPER									
RET. KNOB ASSEMBLY SELECTION	DIMENSIONS				MILLTRONICS MACHINE	COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
4836	.74	.49	.64	45°	RH20F, RH25D, RH30D, BR50C, BR60C, BR80C VM16G, VM17E, VMG17D, VM24E, VMG24B, VM25C, VM30F, VMD30E	RC4E-0001	RK11122	PT-475C	C40-STD
ANSI RETENTION KNOBS STYLE BT-FLANGE 40 TAPER									
RET. KNOB ASSEMBLY SELECTION	DIMENSIONS				MILLTRONICS MACHINE	COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
4837	.74	.49	.75	45°	RH20F, RH25D, RH30D, BR50C, BR60C, BR80C VM16G, VM17E, VMG17D, VM24E, VMG24B, VM25C, VM30F, VMD30E	RS4M-0115	RK11126A	N/A	B40-FADAL
DIN 69872 RETENTION KNOBS STYLE V-FLANGE 40 TAPER									
RET. KNOB ASSEMBLY SELECTION	DIMENSIONS				MILLTRONICS MACHINE	COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
4838	.75	.55	1.02	75°	RH20F, RH25D, RH30D, BR50C, BR60C, BR80C VM16G, VM17E, VMG17D, VM24E, VMG24B, VM25C, VM30F, VMD30E	RS4E-0114-C	DWG RK71125	N/A	C40-1500
DIN 69872 RETENTION KNOBS STYLE DIN-FLANGE 40 TAPER									
RET. KNOB ASSEMBLY SELECTION	DIMENSIONS				MILLTRONICS MACHINE	COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
4839	.75	.55	1.02	75°	RH20F, RH25D, RH30D, BR50C, BR60C, BR80C VM16G, VM17E, VMG17D, VM24E, VMG24B, VM25C, VM30F, VMD30E	RS4M-0114-C	DWG RK71124	N/A	B40-1500



ANSI

↑

ENGLISH THREADS FOR V-FLANGE
METRIC THREADS FOR BT-FLANGE



DIN

↑

ENGLISH THREADS FOR V-FLANGE
METRIC THREADS FOR DIN-FLANGE

D	ADD RH/RW12 & RH19	5146		09/01
C	ADD RETENTION KNOBS TO CHART	4859	N.M.	12/00
B	CHANGE 70mm BT-FLANGE CHART	4730	N.M.	10/00
A	ADD LYNDEX CORP. IN CHART	4351	N.M.	1/00
REV.	DESCRIPTION	E.C.B. NO.	APP'D BY	DATE
		TITLE RETENTION KNOB CHART APPLICATION GENERAL PRODUCTS DATE 30 APR 99 SCALE 1:1 DWG No. 6-11-018-054 SIZE B DRAWN BY DAHLKE SHEET NO. 1 OF 2		

MAS RETENTION KNOBS STYLE V-FLANGE 40 TAPER

RET. KNOB ASSEMBLY SELECTION	DIMENSIONS			ANGLE	MILLTRONICS MACHINE	COMMAND PART No.	KENAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
4831	.59	.39	1.27	45°	RH20F, RH25D, RH30D, BR50C, BR60C, BR80C, RW20A*, VM16G, VM17E, VMG17D, VM24E, VMG24B, VM25C, VM30F, VMD30E	RB4E-0001	RK31114	PT-532-45	C40-4500

MAS RETENTION KNOBS STYLE BT-FLANGE 40 TAPER

RET. KNOB ASSEMBLY SELECTION	DIMENSIONS			ANGLE	MILLTRONICS MACHINE	COMMAND PART No.	KENAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
4832	.59	.39	1.38	45°	RH20F, RH25D, RH30D, BR50C, BR60C, BR80C, RW20A*, VM16G, VM17E, VMG17D, VM24E, VMG24B, VM25C, VM30F, VMD30E	RB4M-0001	RK31113	PT-444-45	B40-4500

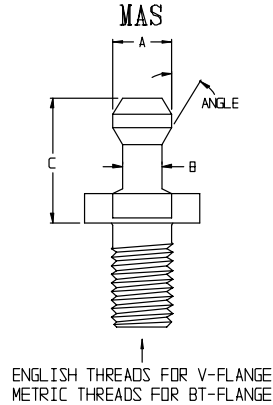
MAS RETENTION KNOBS STYLE V-FLANGE 40 TAPER

RET. KNOB ASSEMBLY SELECTION	DIMENSIONS			ANGLE	MILLTRONICS MACHINE	COMMAND PART No.	KENAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
4833	.59	.39	1.27	60°	RH12, RH19, RH20F, RH25D, RH30D, RW12, BR50C, BR60C, BR80C, VM16G, VM17E, VMG17D, VM24E, VMG24B, VM25C, VM30F, VMD30E	RB4E-0002	RK31114A	PT-532-60	C40-6000

MAS RETENTION KNOBS STYLE BT-FLANGE 40 TAPER

RET. KNOB ASSEMBLY SELECTION	DIMENSIONS			ANGLE	MILLTRONICS MACHINE	COMMAND PART No.	KENAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
4834	.59	.39	1.38	60°	RH12, RH19, RH20F, RH25D, RH30D, RW12, BR50C, BR60C, BR80C, VM16G, VM17E, VMG17D, VM24E, VMG24B, VM25C, VM30F, VMD30E	RB4M-0002	RK31113A	PT-444-60	B40-6000

NOTES:



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

2. CHART IS GOOD FOR ALL MACHINE VERSIONS LISTED AND ALL FUTURE VERSIONS.

3. COMMAND CORPORATION
TEL: 1-800-328-2197
FAX: 1-763-576-6911

4. KENAMETAL
TEL: 1-800-446-7738
FAX: 1-800-962-4910

5. VALENITE
TEL: 1-800-544-3336
FAX: 1-800-488-0695

6. LYNDEX CORPORATION
TEL: 1-800-543-6237
FAX: 1-847-509-2909

* RW20 ONLY COMES WITH ONE RETENTION KNOB. NO RETENTION KNOB ASSEMBLY SELECTION IS USED.

D	ADD RH/RW12 & RH19	5146		09/01
C	ADD RETENTION KNOBS TO CHART	4859	N.M.	12/00
B	CHANGE 70mm BT-FLANGE CHART	4730	N.M.	10/00
A	ADD LYNDEX CORP. IN CHART	4351	N.M.	1/00
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
	RETENTION KNOB CHART	SCALE 1:1	DATE 6-11-01B-054	SHEET 8
	APPLICATION GENERAL PRODUCTS	DATE 30 APR 99	DRAWN BY DAHLKE	SHEET NO. 2 OF 2