



MILLTRONICS
C N C M A C H I N E S

VM22IL C Mechanical

11-19-2014
12-04-2014
Rev 2

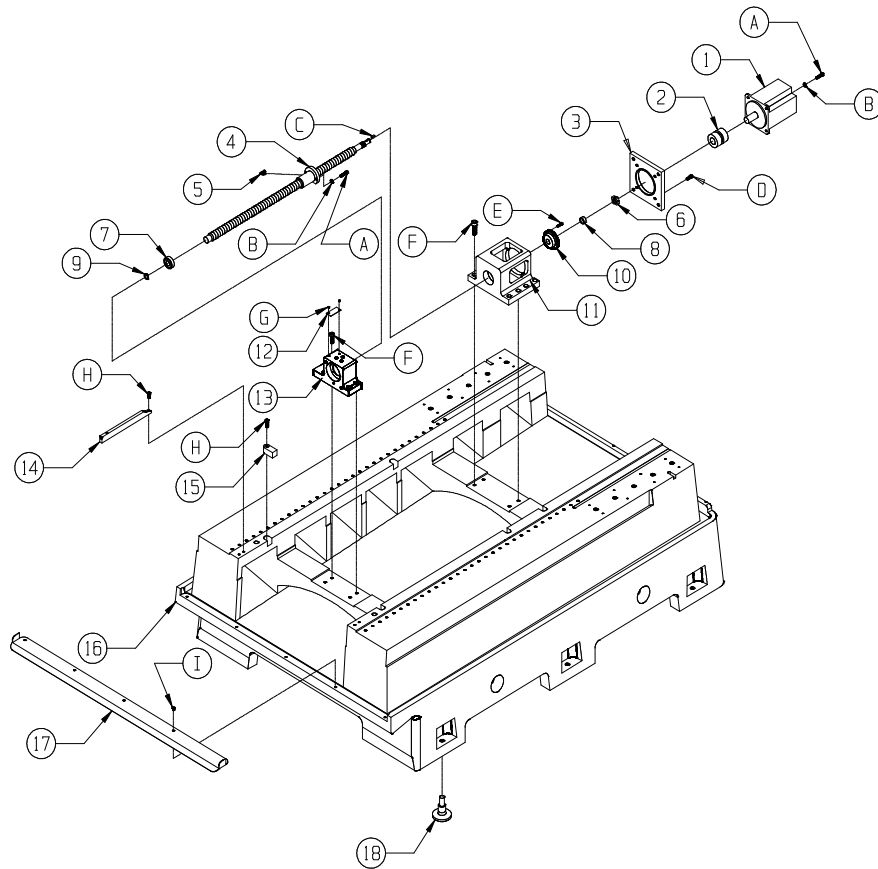
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Manual Discrepancy Sheet

1. Page 11 cable track part numbers are as shown.
2. Page 13 item #21 is M8 hardware as shown.
3. Page 23 item #8 is 01018838 as shown.

Machine Base Assembly

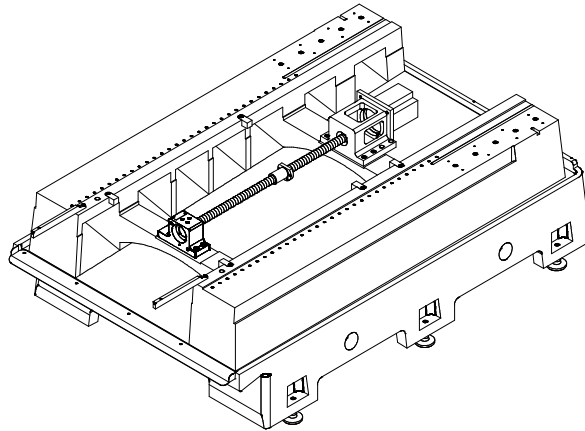


D	ADD 2kw MOTOR	6481		02/08
C	ADD MITSUBISHI TO LIST	6269	N.M.	02/07
B	ADD BALL SCREW TABLE	5904	N.M.	02/05
A	ADD MOTOR, COUPLER CHART	5724	N.M.	03/04
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE

MATERIAL/FINISH	 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA			
STOCK/ASSY No.	TITLE VM22 PEDESTAL SUB-ASSEMBLY APPLICATION PARTNER VI SCALE 16:1 DWG No. 6-10-027-028 SIZE B DATE 16 JUN 03 DRAWN BY DAHLKE SHEET No. 1 OF 2			

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TOLERANCE UNLESS SPECIFIED	
X.XXX	+/-
X.XX	+/-
X.X	+/-
ANGLE	+/-


PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	SEE TABLE	AXIS MOTOR
2	1	SEE TABLE	MOTOR COUPLER
** 3	1	MP6-231	MOTOR PLATE
4	1	SEE TABLE	Y - AXIS BALL SCREW
5	1	NU-161	1/8 NPT 4mm 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	SEE TABLE	Y - AXIS REAR MOTOR MOUNT
12	1	LB-27	PULLEY MOTOR WARNING LABEL
13	1	MX-64	FRONT BALL SCREW RADIAL MOUNT
14	2	SEE TABLE	Y - AXIS FRONT WAY COVER BRACKET
15	5	MP-707	HARD STOP BLOCK
16	1	MX6-40	PEDESTAL - MACHINED
17	1	MP6-252	PEDESTAL DRIP LIP
18	6	MP1-29	LEVELING PAD

BALL SCREW TABLE

No.	DESCRIPTION	PART No.
4	STANDARD RAPID	MPB-02
	HIGH SPEED RAPID	MP-801

FRONT WAY COVER BRACKET

No.	DESCRIPTION	PART No.
14	BALL RAIL	MP6-228
	ROLLER RAIL	MP6-250

MOTOR & COUPLER LIST

No.	YASKAWA	FANUC	SIEMENS	MITSUBISHI
1	MD-125 (.9kw) MD-127 (1.5kw) MD-144 (2kw)	8Nm A06B-0227-B200	11Nm 1FK7063-SAF71-1EA0 16Nm 1FK7083-SAF71-1EA0	MD-184 (1.5kw)
2	MA-242 (.9kw) MA-241 (1.5kw) MA-248 (2kw)	MA-242	MA-260 (11Nm) MA-261 (16Nm)	MA-260
11	MX-51	MX-51	MX-51 (11Nm) MXS-03 (16Nm)	MX-51

HARDWARE LIST

No.	QTY	DESCRIPTION
* A	6	M8-1.25 x 30mm SHCS
* B	6	M8 LOCK WASHER
C	1	3/16 x 3/16 x 1/2 KEY
** D	4	M8-1.25 x 20mm SHCS
E	6	M6-1 x 25mm SHCS
F	8	M10-1.5 x 30mm SHCS
G	2	1/4 DRIVE PIN
H	9	M6-1 x 20mm SHCS
I	5	M6-1 x 10mm BHCS

* 16Nm SIEMENS MOTOR USES (4)
M10-1.5 x 30 SHCS & (4) M10 LOCK WASHERS.
2kw MOTOR USES (4) M12-1.75 x 35mm
SHCS & M12 LW.

** NOT USED WITH .9kw OR 1.5kw MOTOR.

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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 +/-

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

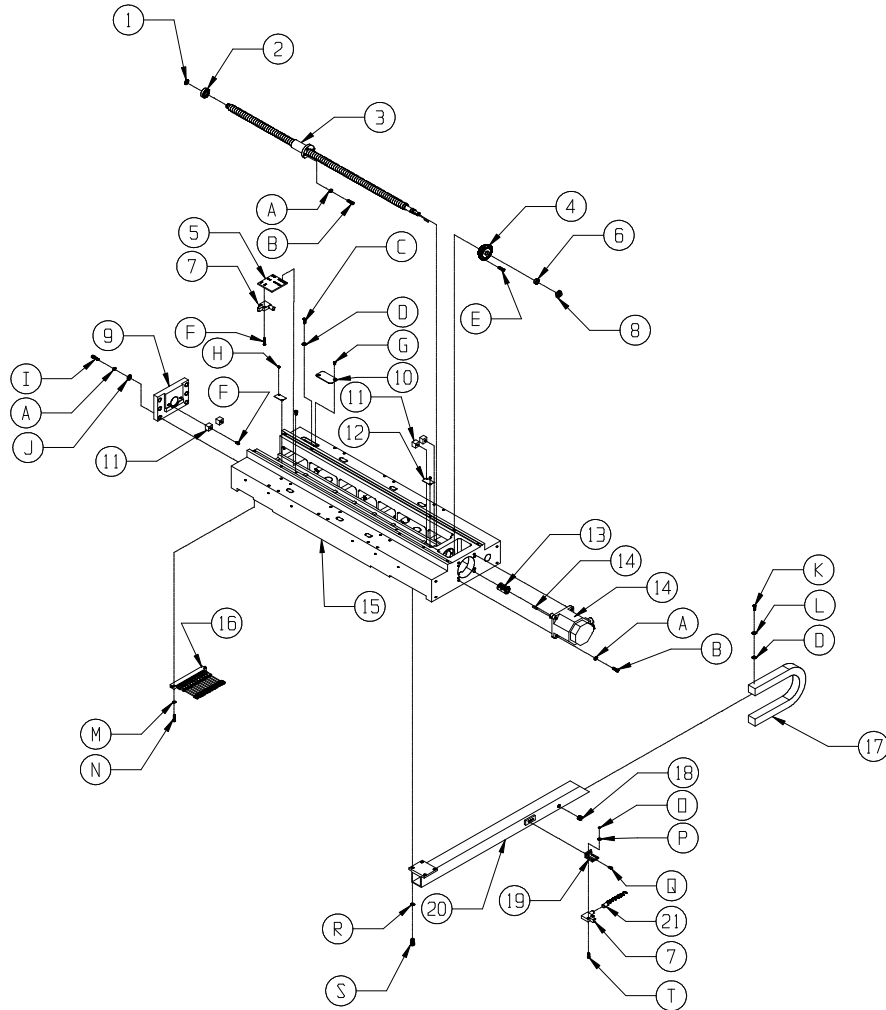
TITLE VM22 PEDESTAL SUB-ASSEMBLY

APPLICATION PARTNER VI

SCALE 16:1 DWG No. 6-10-027-028 SIZE B

DATE 16 JUN 03 DRAWN BY DAHLKE SHEET No. 2 OF 2

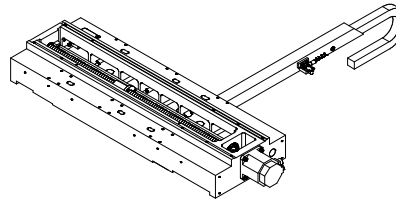
Machine Saddle Assembly



C	ADD MITSUBISHI TO LIST	6274		02/07
B	ADD BALL SCREW TABLE	5905	N.M.	02/05
A	ADD MOTOR, COUPLER TABLE	5726	N.M.	03/04
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 VM22 SADDLE SUB-ASSEMBLY		
X.XXX +/-		APPLICATION PARTNER VI		
X.XX +/-		SCALE 20:1		DWG No. 6-10-027-032
X.X +/-		DATE 07 JUL 03		SIZE B
ANGLE +/-		DRAWN BY DAHLKE		SHEET No. 1 OF 2

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HARDWARE LIST		
No.	QTY	DESCRIPTION
A	12	M8 LOCK WASHER
B	6	M8-1.25 x 30mm SHCS
C	2	M6-1 x 25mm BHCS
D	6	M6 FLAT WASHER
E	6	M6-1 x 25mm SHCS
F	6	M5-.8 x 16mm SHCS
G	2	M4-.7 x 10mm FHCS
H	4	1/4 DRIVE PIN
I	6	M8-1.25 x 40mm SHCS
J	6	M8 FLAT WASHER
K	4	M6-1 x 16mm BHCS
L	4	M6 LOCK WASHER
M	2	M5 LOCK WASHER
N	2	M5-.8 x 30mm SHCS
O	2	M5 HEX NUT
P	2	M5 FLAT WASHER
Q	2	M5-.8 x 10mm BHCS
R	4	M10 LOCK WASHER
S	4	M10-1.5 x 30 SHCS
T	2	M5-.8 x 20mm SHCS



PARTS LIST			
No.	QTY	STOCK No.	DESCRIPTION
1	1	MP1-108	SNAP RING
2	1	BG-02	6204 BEARING
3	1	SEE TABLE	X BALL SCREW
4	1	BG-94	BALL SCREW SUPPORT BEARING
5	1	MP-309	X AXIS SWITCH PLATE
6	1	MP1-107	BEARING LOCKNUT SPACER
7	2	SW-193	LIMIT SWITCH
8	1	MP1-94	BALL SCREW LOCKNUT
9	1	MP6-230	VM RADIAL SUPPORT PLATE
10	1	MP-236	Y AXIS SWITCH SLOT COVER
11	4	MP-718	PDM HARD STOP BLOCK
12	2	LB-27	PULLEY MOTOR WARNING LABEL
13	1	SEE TABLE	MOTOR COUPLER
14	1	SEE TABLE	AXIS MOTOR
15	1	MX6-42	VM SERIES SADDLE - MACHINED
16	1	SEE TABLE	X & Y MANIFOLD ASSEMBLIES
17	1	MP6-220	Y AXIS CABLE TRACK
18	1	WX-287	RUBBER GROMMET
19	1	MP1-387	Y AXIS LIMIT SWITCH MOUNTING BRACKET
20	1	MP6-223	Y AXIS CABLE CARRIER
21	2	SW-191	Y AXIS SWITCH CORD

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	

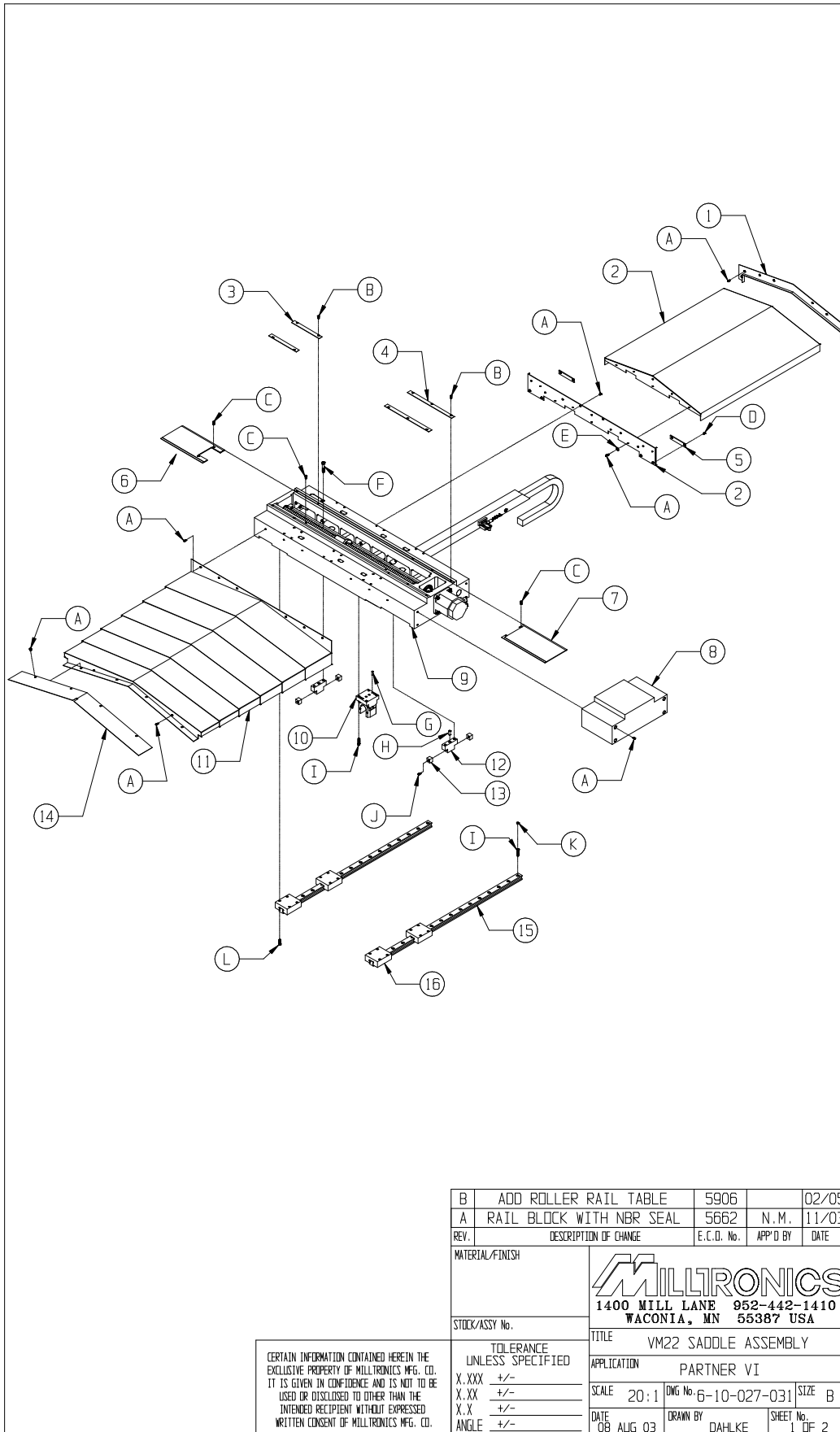
MOTOR & COUPLER LIST				
No.	YASKAWA	FANUC	SIEMENS	MITSUBISHI
13	MA-242 (.9kw)	MA-242	MA-260	MA-260
	MA-241 (1.5kw)			
14	MD-125 (.9kw)	8Nm A06B-0227-B200	11Nm 1FK7063-5AF71-1EA0	MD-184 (1.5kw)
	MD-127 (1.5kw)			

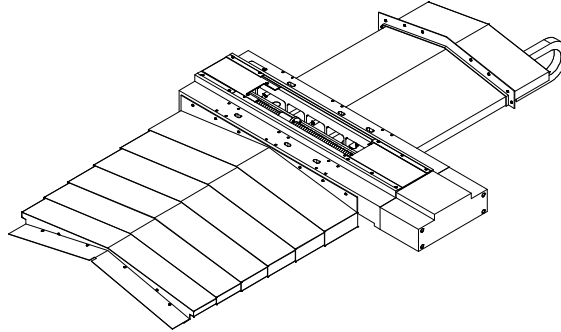
BALL SCREW TABLE		
No.	DESCRIPTION	PART No.
3	STANDARD RAPID	MP-570
	HIGH SPEED RAPID	MP-821

C	ADD MITSUBISHI TO LIST	6274		02/07
B	ADD BALL SCREW TABLE	5905	N.M.	02/05
A	ADD MOTOR, COUPLER TABLE	5726	N.M.	03/04
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 VM22 SADDLE SUB-ASSEMBLY		
X .XXX +/-		APPLICATION PARTNER VI		
X .XX +/-		SCALE 20:1		DWG No. 6-10-027-032
X .X +/-		DATE 07 JUL 03		SHEET No. 2 OF 2
ANGLE +/-		DRAWN BY DAHLKE		

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Saddle & Way Cover Assembly





PARTS LIST			
No.	QTY	STOCK No.	DESCRIPTION
1	1	MP6-216	REAR WAY COVER WIPER
2	1	MP6-215	Y AXIS REAR COVER
3	2	MP-311	X AXIS WAY COVER BRACKET - LEFT
4	2	MP-289	X AXIS WAY COVER BRACKET - RIGHT
5	2	9800-8	SADDLE WIPER
6	1	MP-287	X AXIS BALL SCREW COVER - LEFT
7	1	MP-288	X AXIS BALL SCREW COVER - RIGHT
8	1	MP6-227	X AXIS MOTOR COVER
9	1	6-10-027-032	VM22 SADDLE SUB-ASSEMBLY
10	1	9800-18	VM SERIES CARRIER - MACHINED
11	1	MP6-213	Y AXIS FRONT WAY COVER
12	2	MP1-410	SADDLE HARD STOP BLOCK
13	4	MP-718	PDM HARD STOP BLOCK
14	1	MP6-239	Y AXIS FRONT WAY COVER EXT.
15	2	SEE TABLE	35mm RAIL
16	4	SEE TABLE	35mm RAIL BLOCK

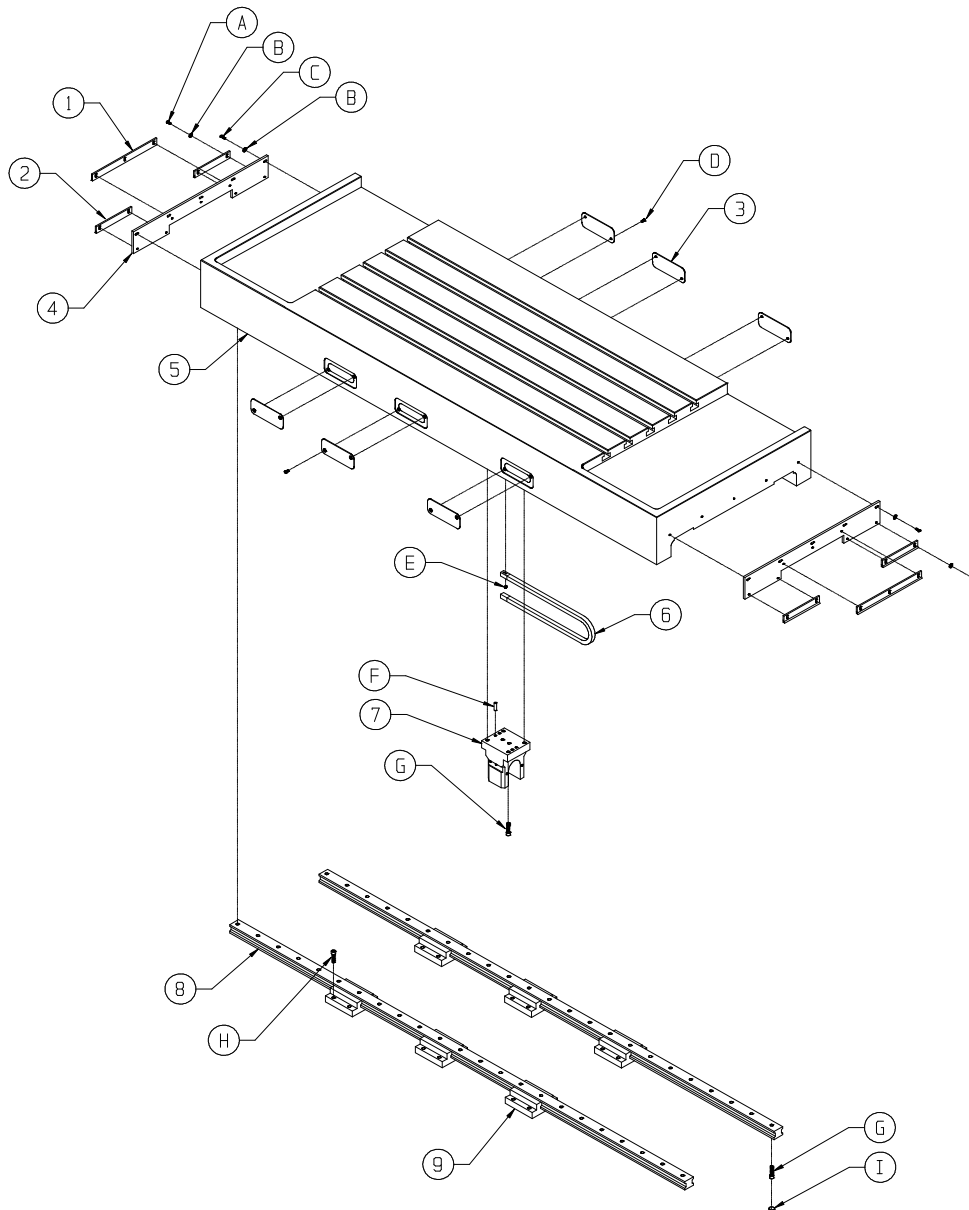
HARDWARE LIST			
No.	QTY	DESCRIPTION	
A	40	M6-1 x 10mm BHCS	
B	10	M4-.7 10mm FHCS	
C	8	M5-.8 x 10mm SHCS	
D	4	M5-.8 x 16mm BHCS	
E	6	M6 LOCK WASHER	
F	4	M10-1.5 x 40mm SHCS	
G	2	1/4 x 1 DOWEL PIN	
H	2	12mm x 25mm DOWEL PIN	
I	38	M8-1.25 x 40mm SHCS	
J	4	M5-.8 x 16mm SHCS	
K	32	RAIL PLUG	
L	16	M8-1.25 x 30mm SHCS	

BALL & ROLLER RAIL TABLE		
No.	DESCRIPTION	PART No.
15	BALL RAIL	MP-642
	ROLLER RAIL	MP-829
16	BALL RAIL BLOCK	MP-774
	ROLLER RAIL BLOCK	MP-815

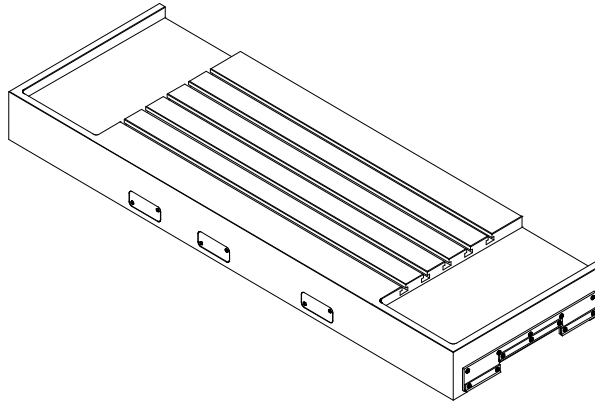
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B	ADD ROLLER RAIL TABLE	5906		02/05
A	RAIL BLOCK WITH NBR SEAL	5662	N.M.	11/03
REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE VM22 SADDLE ASSEMBLY		
X .XXX +/-		APPLICATION PARTNER VI		
X .XX +/-		SCALE 20:1		DWG No. 6-10-027-031
X .X +/-		DATE 08 AUG 03		SHEET No. 2 OF 2
ANGLE +/-		DRAWN BY DAHLKE		

Milling Table Assembly



A	ADD ROLLER RAIL TABLE	5907		02/05
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 VM22 TABLE SUB-ASSEMBLY		
X .XXX		APPLICATION PARTNER VI		
X .XX		SCALE 12:1 DWG No. 6-10-027-033 SIZE B		
X .X		DATE 25 SEP 03 DRAWN BY DAHLKE SHEET NO. 1 OF 2		
ANGLE				



PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	2	9800	TABLE/SADDLE WIPER - UPPER
2	4	9800-1	TABLE/SADDLE WIPER - LOWER
3	6	MP-315	TABLE SLOT COVER
4	2	MP-310	TABLE/SADDLE WIPER PLATE
5	1	MX-19	VM SERIES 71 x 24 TABLE - MACHINED
6	1	MPT-96	X AXIS OIL/ CABLE TRACK (55 LINKS)
7	1	9800-18	VM SERIES CARRIER - MACHINED
8	2	SEE TABLE	35mm 1800 RAILS
9	6	SEE TABLE	35mm RAIL BLOCK

RAIL & BLOCK TABLE

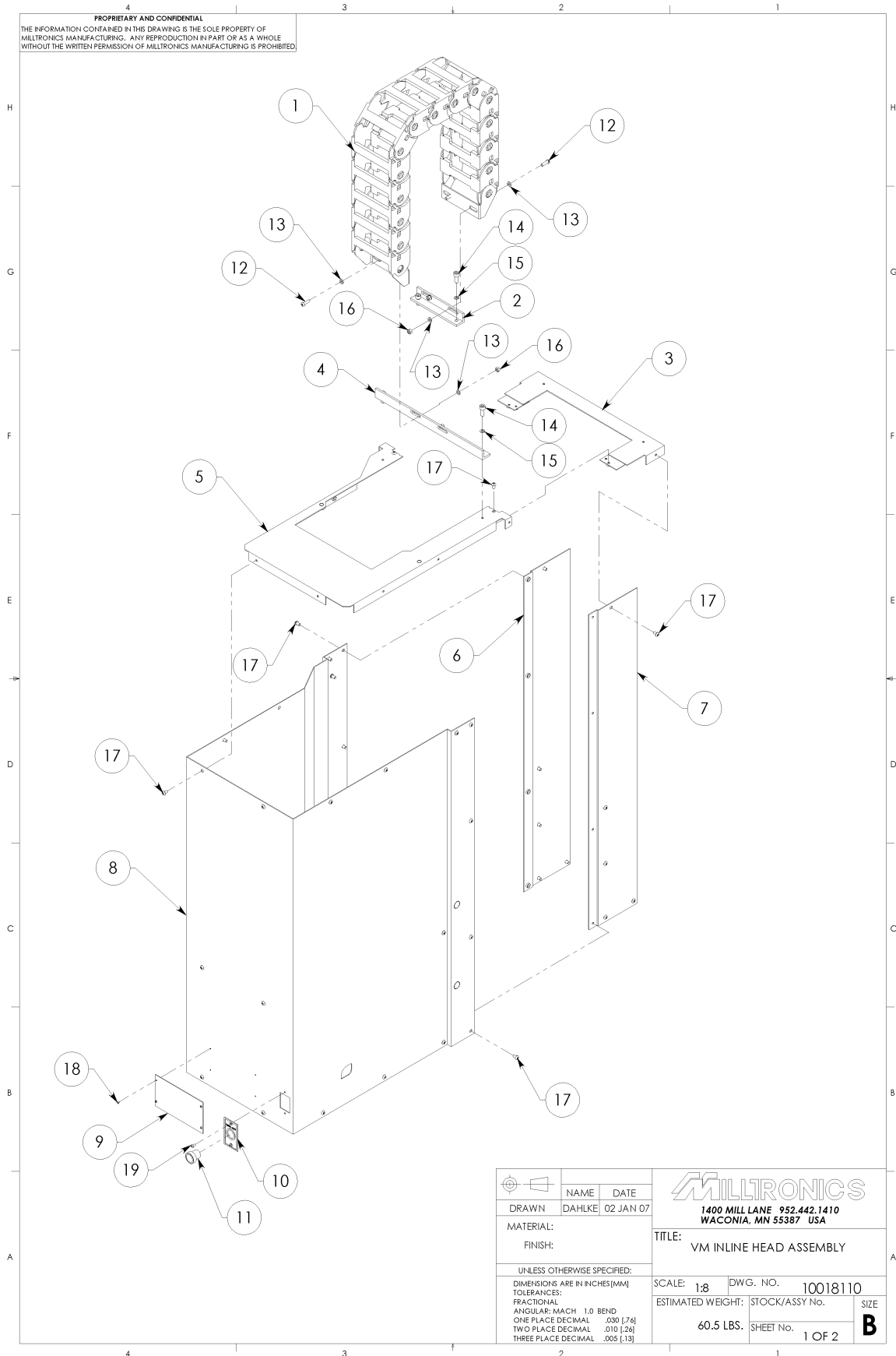
No.	DESCRIPTION	PART No.
8	BALL RAIL	MP6-202
	ROLLER RAIL	MP-830
9	BALL RAIL BLOCK	MP-641
	ROLLER RAIL BLOCK	MP-815

HARDWARE LIST

No.	QTY	DESCRIPTION
A	14	M5-.8 x 10mm BHCS
B	24	M5 FLAT WASHER
C	10	M5-.8 x 15mm BHCS
D	12	M4-.7 x 8mm FHCS
E	2	M3-.5 x 5mm BHCS
F	2	1/4 x 1 DOWEL PIN
G	52	M8-1.25 x 40mm SHCS
H	24	M8-1.25 x 30mm SHCS
I	46	RAIL PLUGS

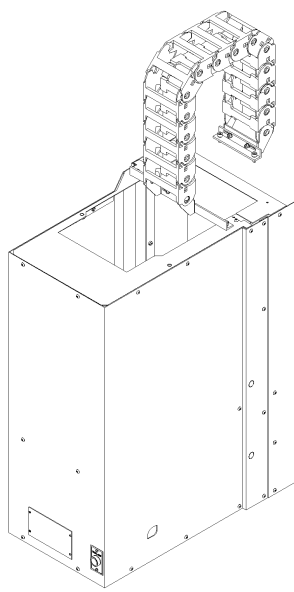
A	ADD ROLLER RAIL TABLE	5907		02/05
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE VM22 TABLE SUB-ASSEMBLY		
X .XXX		APPLICATION PARTNER VI		
X .XX		SCALE 12:1 DWG No. 6-10-027-033 SIZE B		
X .X		DATE 25 SEP 03 DRAWN BY DAHLKE SHEET NO. 2 OF 2		
ANGLE				

Machine Head Assembly



4 3 2 1

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ITEM NO.	QTY	PART NO.	DESCRIPTION
1	1	SEE TABLE	SPINDLE CABLE TRACK
2	1	MP00316	SPINDLE CABLE SUPPORT BRACKET
3	1	SEE TABLE	VM HEAD COVER - TOP
4	1	MP00664	VM SPINDLE CABLE SUPPORT BRACKET
5	1	MP00639	UNIVERSAL HEADCOVER - TOP
6	1	SEE TABLE	VM HEAD COVER - LEFT
7	1	SEE TABLE	VM HEAD COVER - RIGHT
8	1	MP00635	UNIVERSAL HEAD COVER
9	1	LB00001	SAFETY STICKER
10	1	LB00181	TOOL OUT LABEL
11	1	SW00067	TOOL OUT SWITCH
12	4	BHCS M6-1.0 x 20	M6 - 1.0 x 20 BHCS
13	8	WASHER FLAT M6	M6 WASHER FLAT
14	4	SHCS M6-1.0 x 20	M6-1.0 x 20 SHCS
15	4	WASHER LOCK M6	M6 WASHER LOCK
16	4	NUT M6-1	M6-1 NYLOCK NUT
17	41	BHCS M6-1.0 x 10	M6-1.0 x 10 BHCS
18	4	BHCS M3-0.5 x 5	M3-0.5 x 5 BHCS
19	2	BHCS M4-0.7 x 8	M4-0.7 x 8 BHCS

VM TABLE				
ITEM No.	VM20	VM22	VM25	VM30
1	SEE CABLE TRACK TABLE BELOW			
3	MP10461	MP60218	MP00633	MP00638
6	MP10459	MP60219	MP00634	MP00637
7	MP10460	MP60217	MP00632	MP00636

Item #1 Cable Track		
Model (s)	Links	Brackets
VM20 IL	18 x MP-1163	1 set MP-1164
VM22-30 IL	21 x MP-1163	1 set MP-1164
VM22-30 XP	22 x MP-1163	1 set MP-1164

	NAME	DATE
DRAWN	DAHLKE	02 JAN 07
MATERIAL:		
FINISH:		
UNLESS OTHERWISE SPECIFIED:		
DIMENSIONS ARE IN INCHES (MM) TOLERANCES: FRACTIONAL ANGULAR: MACH 1.0 BEND ONE PLACE DECIMAL .030 [.76] TWO PLACE DECIMAL .010 [.26] THREE PLACE DECIMAL .005 [.13]		



1400 MILL LANE 952.442.1410
WACONIA, MN 55387 USA

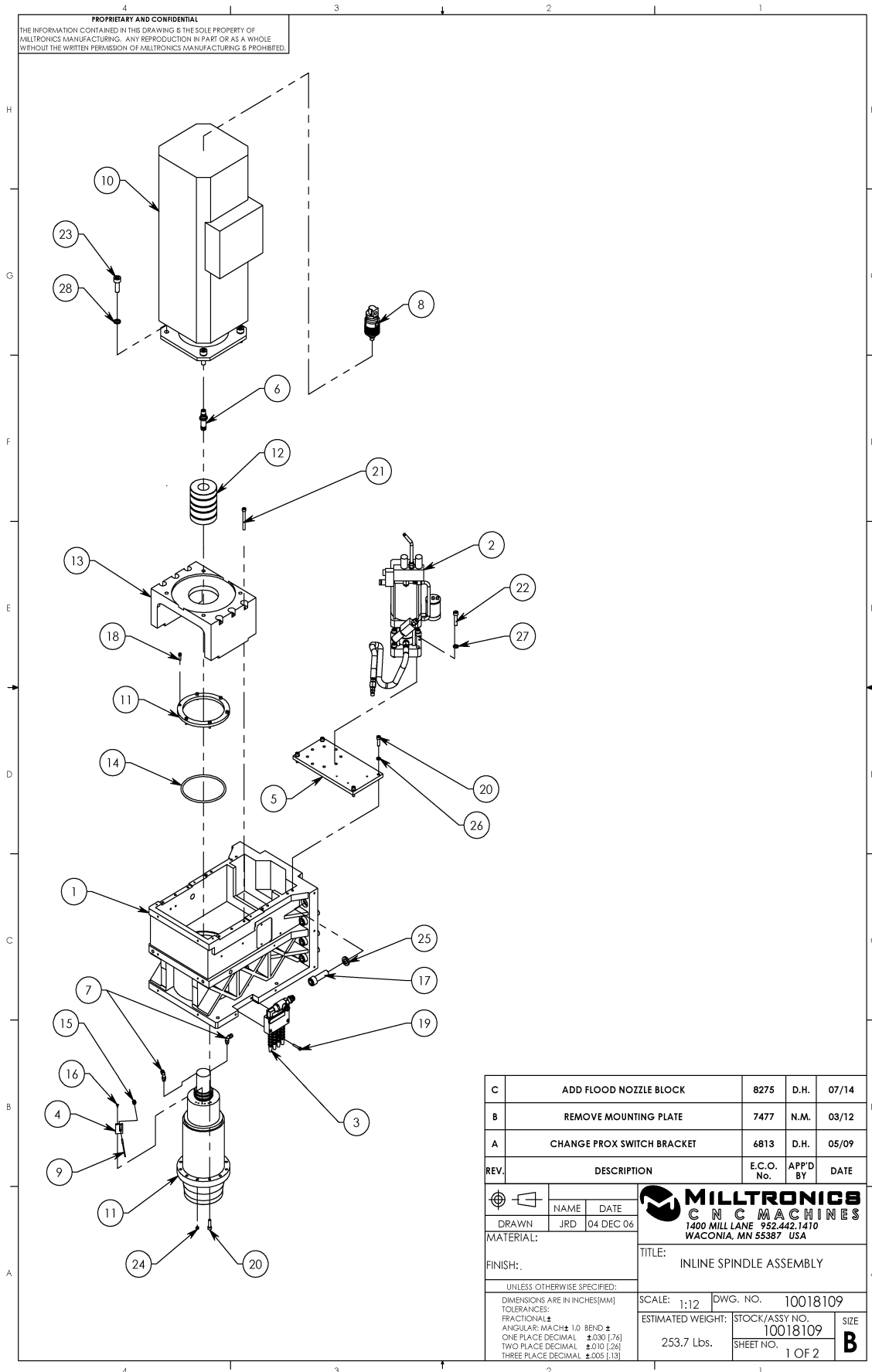
TITLE: VM INLINE HEAD ASSEMBLY

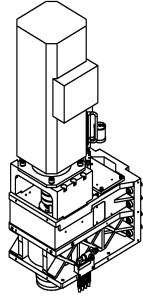
SCALE: 1:12 DWG. NO. 10018110

ESTIMATED WEIGHT: STOCK/ASSY No. 60.5 LBS. SHEET No. 2 OF 2

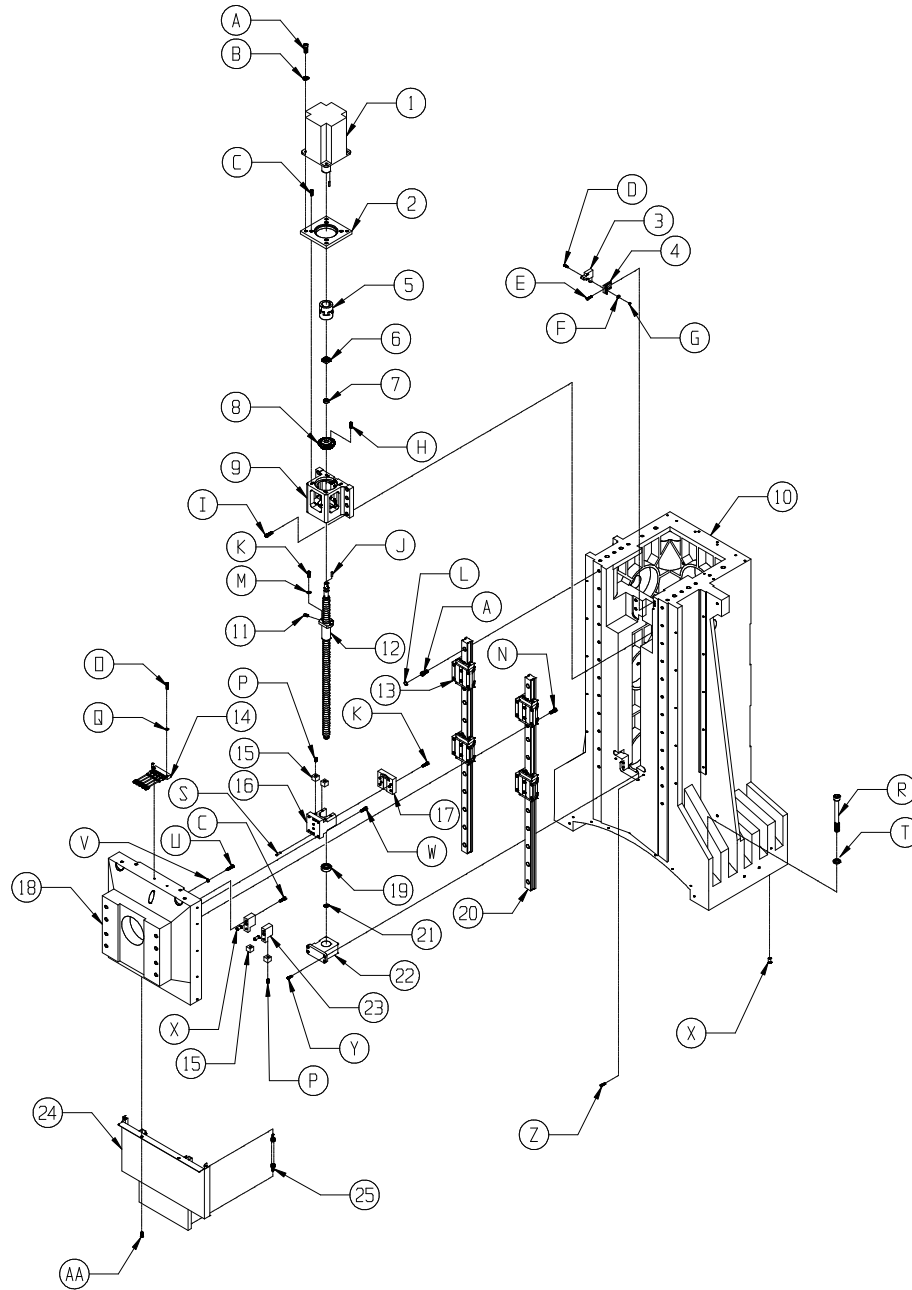
B

Inline Spindle Assembly



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<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: center;">SPINDLE MOTOR TABLE</th> </tr> <tr> <th style="width: 10%;">ITEM NO.</th> <th style="width: 30%;">STOCK NO.</th> <th style="width: 60%;">DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td rowspan="2" style="text-align: center;">11</td> <td>MP001023</td> <td>10K RPM</td> </tr> <tr> <td>MP001129</td> <td>15K RPM</td> </tr> </tbody> </table>		SPINDLE MOTOR TABLE			ITEM NO.	STOCK NO.	DESCRIPTION	11	MP001023	10K RPM	MP001129	15K RPM	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: center;">MOTOR COUPLER TABLE</th> </tr> <tr> <th style="width: 10%;">ITEM NO.</th> <th style="width: 40%;">MOTOR-END HUB 1 DIA. (MM)</th> <th style="width: 50%;">SPINDLE -END HUB 2 DIA. (MM)</th> </tr> </thead> <tbody> <tr><td rowspan="8" style="text-align: center;">12</td><td>24</td><td>50</td></tr> <tr><td>28</td><td>50</td></tr> <tr><td>32</td><td>50</td></tr> <tr><td>38</td><td>50</td></tr> <tr><td>40</td><td>50</td></tr> <tr><td>42</td><td>50</td></tr> <tr><td>48</td><td>50</td></tr> <tr><td>50</td><td>50</td></tr> <tr><td>55</td><td>50</td></tr> </tbody> </table>		MOTOR COUPLER TABLE			ITEM NO.	MOTOR-END HUB 1 DIA. (MM)	SPINDLE -END HUB 2 DIA. (MM)	12	24	50	28	50	32	50	38	50	40	50	42	50	48	50	50	50	55	50																																																																																
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Machine Column Assembly

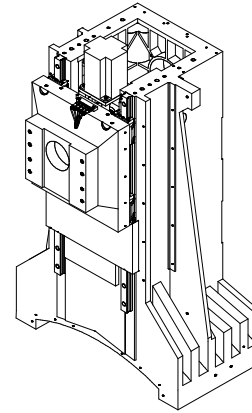


C	ADD MITSUBISHI TO LIST	6275		02/07
B	ADD ROLLER RAIL TABLE	5909	N.M.	02/05
A	ADD MOTOR, COUPLER TABLE	5725	N.M.	03/04
REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE VM22 COLUMN SUB-ASSEMBLY		
X.XXX +/-		APPLICATION PARTNER VI		
X.XX +/-		SCALE 20:1 DWG No. 6-10-027-030		
X.X +/-		DATE 07 JUL 03		
ANGLE +/-		DRAWN BY DAHLKE		
		SHEET No. 1 OF 2		

CERTAIN INFORMATION CONTAINED HEREIN IS THE EXCLUSIVE PROPERTY OF MILLTRONICS 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 MILLTRONICS MFG. CO.

PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	SEE TABLE	AXIS MOTOR
2	1	SEE TABLE	Z-AXIS MOTOR PLATE
3	1	SW-193	LIMIT SWITCH
4	1	MP1-387	X & Z LIMIT SWITCH MOUNTING BRACKET
5	1	SEE TABLE	MOTOR COUPLER
6	1	MP1-94	BALL SCREW LOCK NUT
7	1	MP1-107	BEARING LOCK NUT SPACER
8	1	BG-94	VM BEARING CUP ASSEMBLY
9	1	MX-51	REAR MOTOR MOUNT Y/Z - AXIS
10	1	MX6-39	VM SERIES COLUMN - MACHINED
11	1	NU-154	1/8 NPT 4mm TUBE M/S
12	1	SEE TABLE	Z BALL SCREW
13	4	SEE TABLE	45mm RAIL BLOCKS
14	1	SEE TABLE	Z - AXIS MANIFOLD ASSEMBLY
15	4	MP-718	PDM HARD STOP BUMPER
16	1	MX-18	VM SERIES CARRIER - MACHINED
17	1	MP6-229	Z - AXIS BALL SCREW SAFETY CATCH
18	1	MX6-41	VM22 HEAD EXTENSION - MACHINED
19	1	BG-02	6204 BEARING
20	2	SEE TABLE	45mm RAILS
21	1	MP1-108	SNAP RING
22	1	MP-248	VM BALL SCREW SUPPORT
23	2	MP6-237	VM22 HEAD EXTENSION HARD STOP BLOCK
24	1	MP6-214	Z - AXIS WAYCOVER
25	2	HD-62	WAYCOVER SPRING


MOTOR, COUPLER & MOTOR PLATE LIST

No.	YASKAWA	FANUC	SIEMENS	MITSUBISHI
1	MD-138 (3kw)	22Nm A06B-0247-B500	18Nm 1FK7100-5AF71-1EB0	MD-186 (3.5kw)
	MD-130 (4.4kw)	30Nm A06B-0253-B500	27Nm 1FK7101-5AF71-1EB0	MD-188 (5kw)
2	MP6-231	MP6-231	SMN-09	MP6-231
5	MA-248	MA-248	MA-288	MA-248

HARDWARE LIST

No.	QTY	DESCRIPTION
A	28	M12-1.75 x 35mm SHCS
B	4	M12 LOCK WASHER
* C	8	M8-1.25 x 20mm SHCS
D	2	M5-.8 x 20mm SHCS
E	2	M5-.8 x 16mm BHCS
F	2	M5 FLAT WASHER
G	2	M5-.8 HEX NUT
H	6	M6-1 x 25mm SHCS
I	8	M10-1.5 x 30mm SHCS
J	1	3/16 x 3/16 x 1/2 BALL SCREW KEY
K	8	M8-1.25 x 30mm SHCS
** L	24	RAIL PLUGS
M	2	M8 LOCK WASHER
N	24	M10-1.5 x 35mm SHCS
O	2	M5-.8 x 30mm SHCS
P	4	M5-.8 x 16mm SHCS
Q	2	M5 LOCK WASHER
R	10	3/4-10 x 7 1/2 SHCS
S	2	1/4 x 1 DOWEL PIN
T	10	3/4 LOCK WASHER
U	1	M8-1.25 x 40mm BHCS
V	1	M8-1.25 HEX NUT
W	6	M8-1.25 x 40mm SHCS
X	4	12 x 26mm DOWEL PIN
Y	4	M6-1 x 20mm SHCS
Z	2	M6 SHOULDER BOLT
AA	4	M6-1 x 10mm BHCS

**ROLLER RAILS USE AN ADDITIONAL (24)
 RAIL PLUGS & (24) M12-1.75 x 35mm SHCS.

*18Nm & 27Nm MOTORS USE M8-1.25 x 30mm SHCS.

Z-AXIS MANIFOLD ASSEMBLIES

No.	DRAWING No.	DESCRIPTION
14	6-10-018-050	VM Z-AXIS OIL MANIFOLD ASSEMBLY
	6-10-008-059	Z-AXIS AIR/OIL MANIFOLD ASSEMBLY

BALL SCREW TABLE

No.	DESCRIPTION	PART No.
12	STANDARD RAPID	MPB-02
	HIGH SPEED RAPID	MP-801

RAIL & BLOCK TABLE

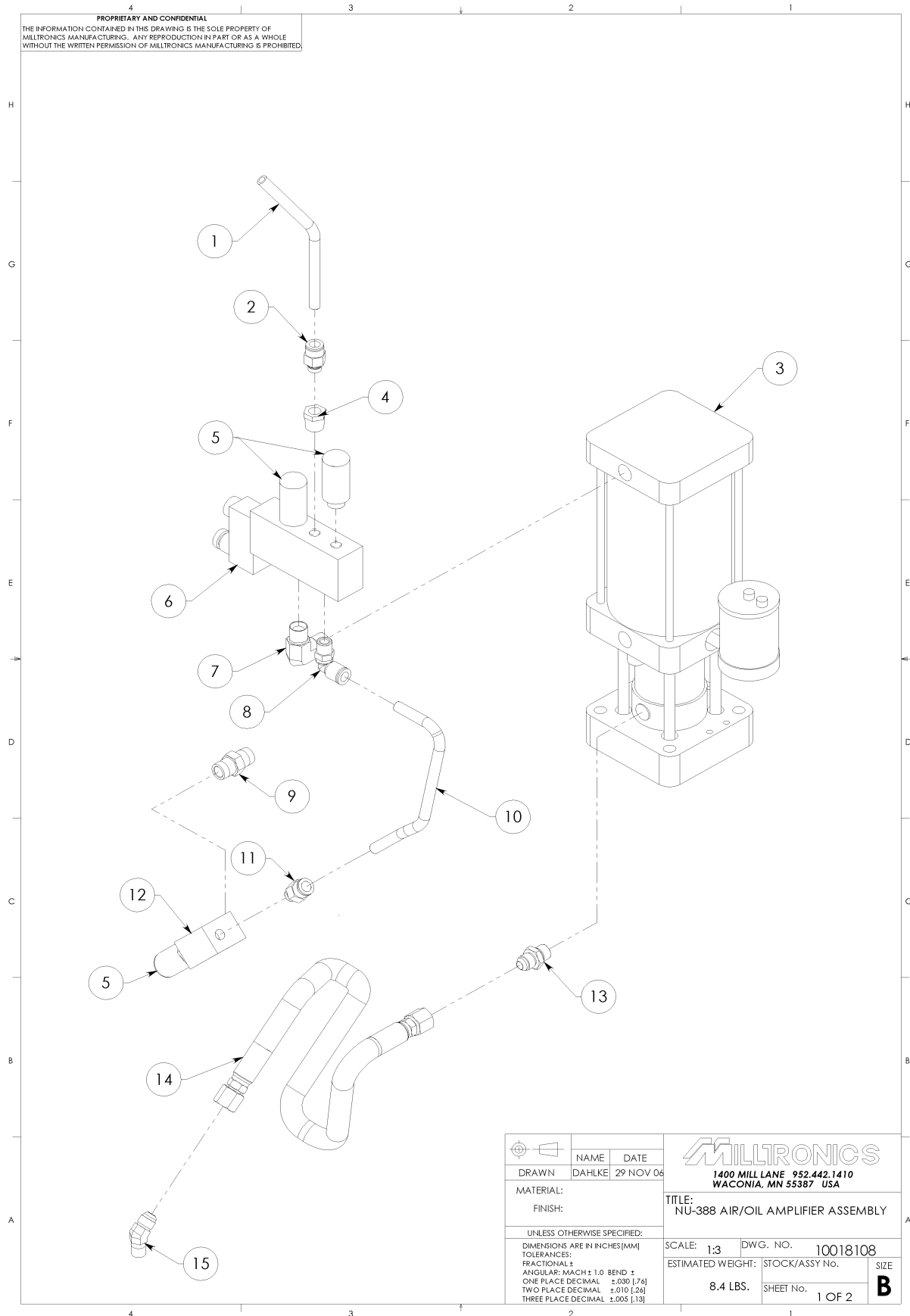
No.	DESCRIPTION	PART No.
13	BALL RAIL BLOCK	MP-728
	ROLLER RAIL BLOCK	MP-819
20	BALL RAIL	MP-727
	ROLLER RAIL	MP-818

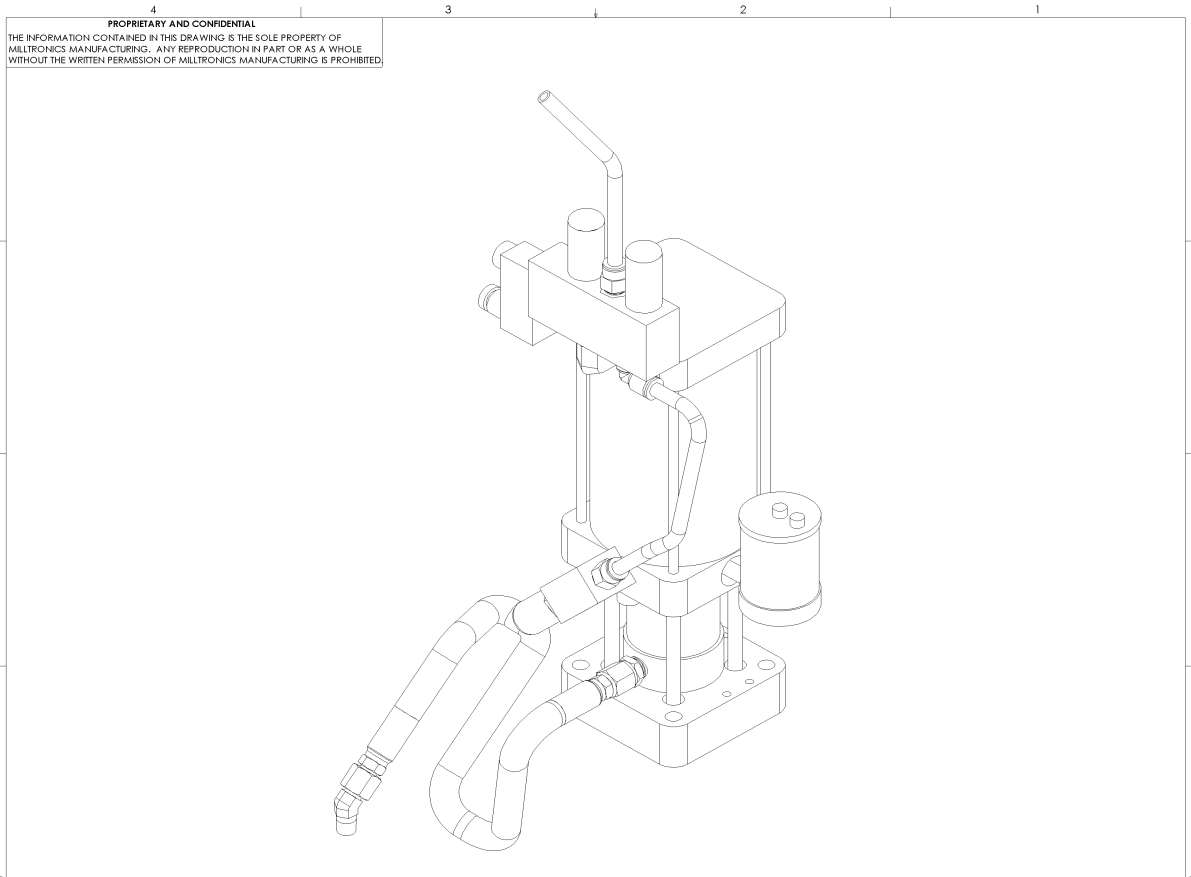
C	ADD MITSUBISHI TO LIST	6275		02/07
B	ADD ROLLER RAIL TABLE	5909	N.M.	02/05
A	ADD MOTOR, COUPLER TABLE	5725	N.M.	03/04
REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE

MATERIAL/FINISH	 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA	
STOCK/ASSY No.	TITLE VM22 COLUMN SUB-ASSEMBLY	
TOLERANCE UNLESS SPECIFIED	APPLICATION PARTNER VI	
X.XXX +/-	SCALE 20:1	DWG No. 6-10-027-030 SIZE B
X.XX +/-	DATE 07 JUL 03	DRAWN BY DAHLKE SHEET No. 2 OF 2
X.X +/-		
ANGLE +/-		

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Power Drawbar Cylinder Assembly



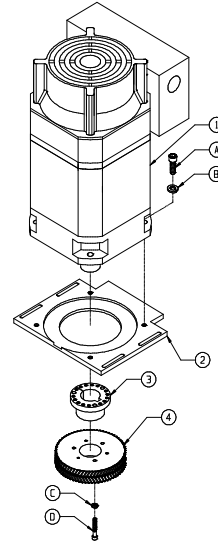


ITEM NO.	QTY	PART NO.	DESCRIPTION
1	1	NU00078	3/8 AIR LINE
2	1	NU00095	TUBE CONNECTOR - M/S 3/8 TUBE 1/4NPT
3	1	NU00408	AIR/OIL AMPLIFIER SYSTEM
4	1	NU00027	REDUCER - 3/8 x 1/4NPT
5	3	NU00375	MUFFLER
6	1	NU00293	SOLENOID VALVE
7	1	NU00292	MALE ELBOW - 3/8NPT
8	1	NU00412	SWIVEL ELBOW - M/S 10mm TUBE 3/8NPT
9	1	NU00235	NIPPLE - 3/8NPT
10	1	NU00306	10mm AIR LINE
11	1	NU00297	TUBE CONNECTOR - M/S 10mm TUBE 3/8NPT
12	1	NU00402	EXHAUST VALVE
13	1	NU00409	FLARE FITTING - 3/8NPT
14	1	NU00403	19" INLINE AMPLIFIER HOSE
15	1	NU00410	ELBOW FLARE FITTING - 1/8NPT x 45°

	NAME	DATE	
	DRAWN	DAHLKE/29 NOV 06	
MATERIAL:		TITLE:	
FINISH:		NU-388 AIR/OIL AMPLIFIER ASSEMBLY	
UNLESS OTHERWISE SPECIFIED:		SCALE: 1:3	DWG. NO. 10018108
DIMENSIONS ARE IN INCHES (MM)		ESTIMATED WEIGHT: 8.4 LBS.	STOCK/ASSY No.
TOLERANCES:		SHEET No. 2 OF 2	
FRACTIONAL: ±		SIZE B	
ANGULAR: MACH ± 1.0 BEND ±			
ONE PLACE DECIMAL ±.030 [.76]			
TWO PLACE DECIMAL ±.010 [.26]			
THREE PLACE DECIMAL ±.005 [.13]			

Spindle Motor and Pulley Assembly

SPINDLE MOTORS		
No.	STOCK No.	DESCRIPTION
1	M000121	18 kW UAASKD-19LYA41 - YASKAWA
	10152	11 kW UAASKD-11LYA51 - YASKAWA
	M000131	7.5 kW UAASKD-08LYA21 - YASKAWA
	M000114	7.5 kW UAASKA-08FZ1 - YASKAWA
	M000150	11 kW UAASKA-11LYA31 - YASKAWA
	FANUC	8 kW A06B-1407-B103
	FANUC	12 kW A06B-1428-B103
	FANUC	22 kW A06B-1451-B113
	FANUC	8 kW A06B-1477-B133
	FANUC	15 kW A06B-1479-B133
	SIEMENS	11 kW 1PH7131-2QF02-OLKO
	SIEMENS	12 kW 1PH7163-2QB03-OLKO
	SIEMENS	16 kW 1PH7167-2QB03-OLKO
	SIEMENS	7.5 kW 1PM6105-2LF81-1AR1-Z
	SIEMENS	11 kW 1PM6133-2LF81-1AR1-Z
	SIEMENS	18.5 kW 1PM6137-2LF81-1AR1-Z



MOTOR PLATES		
No.	STOCK No.	DESCRIPTION
2	MP00548	M000121 & M000131 & 10152 - YASKAWA 12 kW & 22 kW - FANUC
	MP00587	M000114 & M000150 - YASKAWA (8 kW - FANUC)
	MPB0045	M000114 & M000150 - YASKAWA (BRIDGE MILL ONLY)
	MPB0040	M000131 & M000132 - YASKAWA (BRIDGE MILL ONLY)
	SMN0008	11 kW - SIEMENS
	SMN0061	7.5 kW - SIEMENS & 8 kW - FANUC
	SMN0062	11 kW & 18.5 kW - SIEMENS
	MPT045	15 kW - FANUC

BUSHINGS		
No.	STOCK No.	DESCRIPTION
3	PY00097	48mm ID SK BUSHING(USED WITH M000121, M000131, 10152, M000150 - YASKAWA) (8 kW & 12 kW - FANUC)
	PY00184	32mm ID SK BUSHING(USED WITH M000114 - YASKAWA)
	PY00215	55mm ID SK BUSHING(USED WITH 16 kW - SIEMENS & 22 kW - FANUC)
	PY00216	38mm ID SK BUSHING(USED WITH 7.5 kW - SIEMENS & 8 kW - FANUC)
	PY00217	42mm ID SK BUSHING(USED WITH 11 kW & 18.5 kW - SIEMENS)
	PY00280	TLK 110-48-62 BUSHING (USED ON 50 TAPER MACHINES)

SPINDLE MOTOR PULLEYS								
No.	RPM	7.5 kW M000114	11 kW M000150	7.5 kW M000131	11 kW 10152	18 kW M000121	FANUC	SIEMENS
4	6K/8K	PY00201	PY00201	PY00192	PY00192	PY00192	PY00192	PY00192
	12K/15K	PY00188	PY00188	PY00188	PY00188	PY00188	PY00188	PY00281

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

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

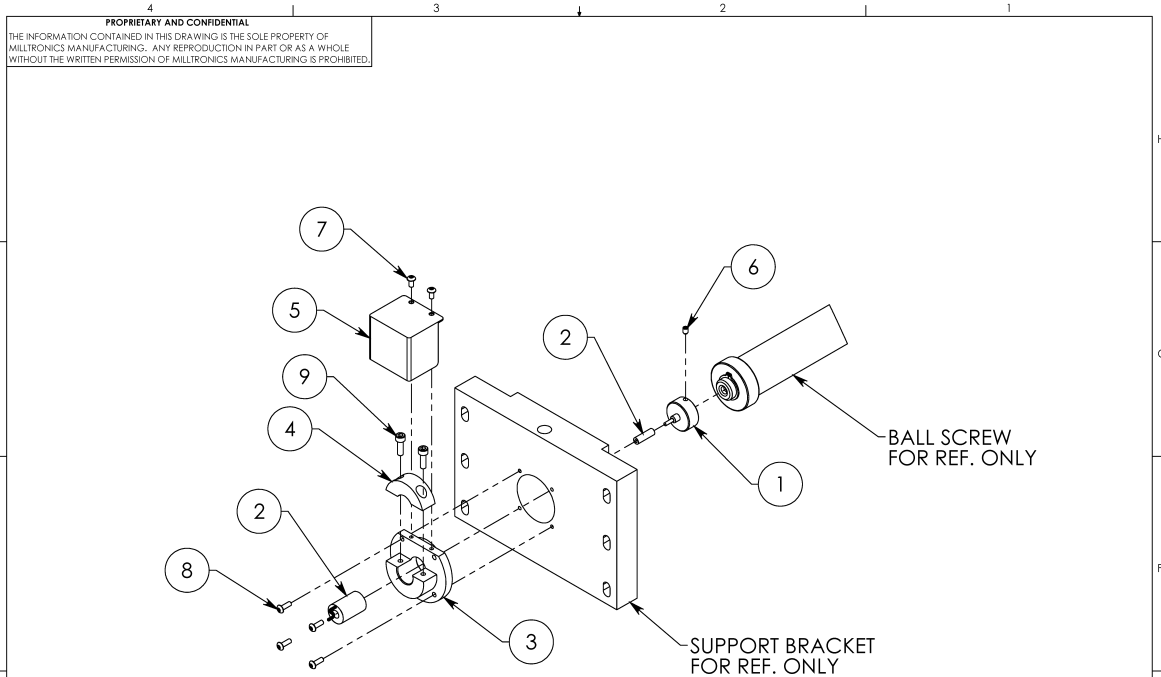
K	Replace M000132 With 10152	7978	N.M.	10/13
J	ADD 50 TAPER TO CHART	7078	N.M.	05/11
I	ADD FANUC/SIEMENS TO CHART	6314	N.M.	03/07
H	EDIT CHART	5953	N.M.	05/05
G	ADD M000150	5826	N.M.	11/04
F	MODIFY CHART	5697	N.M.	01/04
E	ADD M000121 MOTOR	5509	N.M.	03/03
D	CHANGE 15 HP SPINDLE MOTOR	5257	N.M.	02/02
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		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.		TITLE: GOODYEAR MOTOR AND PULLEY ASSEMBLY APPLICATION: GENERAL PRODUCTS SCALE: 10:1 DWG No 6-10-018-089 SIZE B DATE: 04 AUG 00 DRAWN BY: DAHLKE SHEET NO: 1 OF 1		

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TOLERANCE UNLESS SPECIFIED	
X.XXX	±
X.XX	±
X.X	±
ANGLE	±

Thermal Compensation Assembly



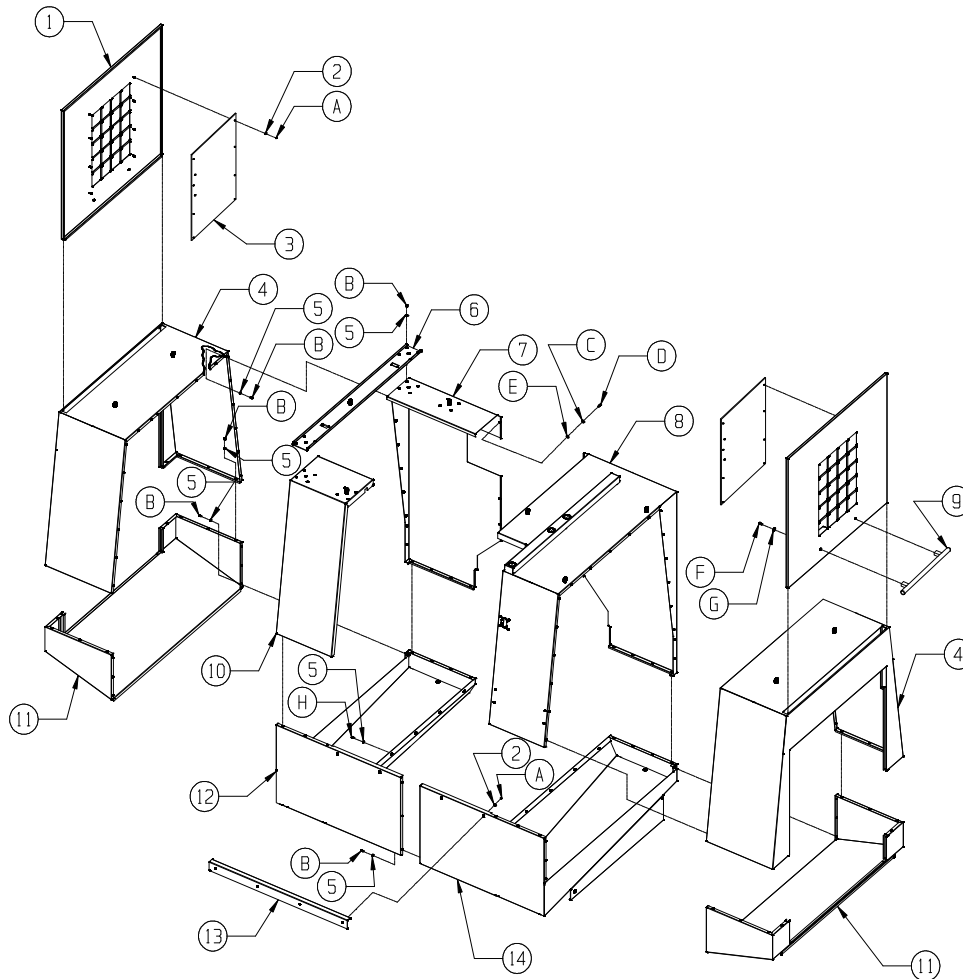
ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	MP00858	THERMAL BALL SCREW CAP
2	1	PR00043	THERMAL COMP SENSOR
3	1	MP00848	THERMAL SENSOR RING
4	1	MP00849	THERMAL SENSOR - CLAMP
5	1	MP00886	X AXIS THERMAL COVER
6	1	SHSSBT 10-32 x .188	10/32 x 3/16 BRASS TIPPED SHSS
7	2	BHCS M4-0.7 x 8	M4-0.7 x 8mm BHCS
8	4	BHCS M4-0.7 x 12	M4-0.7 x 12mm BHCS
9	2	SHCS M5-0.8 x 16	M5-0.8 x 16mm SHCS

NOTES:

- ITEMS 3 & 4 ARE REVERSED ON SOME AXES
- ITEMS 5 & 7 ARE NOT USED ON SOME AXES

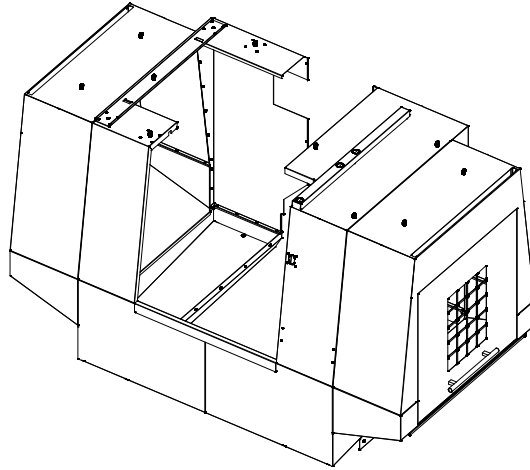
	NAME	DATE	
	DRAWN: JRD	24 JAN 07	
MATERIAL:			TITLE: THERMAL COMP ASSEMBLY
FINISH:			
UNLESS OTHERWISE SPECIFIED:			SCALE: 1:4
DIMENSIONS ARE IN INCHES(MM)			DWG. NO. 10018111
TOLERANCES:			ESTIMATED WEIGHT: 16.0 Lbs.
FRACTIONAL ±			STOCK/ASSY NO.
ANGULAR: MACH ± 1.0 BEND ±			SHEET NO. 1 OF 1
ONE PLACE DECIMAL ±.030 [.76]			SIZE B
TWO PLACE DECIMAL ±.010 [.26]			
THREE PLACE DECIMAL ±.005 [.13]			

Chip Pan Assembly



A	ADD 60" ENDS TO CHART	6054		01/06
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 VM22/25/30 CHIP PAN		
X.XXX +/-		APPLICATION GENERAL PRODUCTS		
X.XX +/-		SCALE 30:1 DWG No. 6-10-018-102 SIZE B		
X.X +/-		DATE 04 DEC 03 DRAWN BY DAHLKE SHEET No. 1 OF 2		
ANGLE +/-				

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PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	2	MP-749	SIDE DOOR
2	20	HD-58	M5 RUBBERIZED WASHER
3	2	MP6-163	LEXAN
4	2	SEE TABLE	ENCLOSURE END - TOP
5	97	HD-12	M6 RUBBERIZED WASHER
6	1	MP-742	TOP STIFFENER
7	1	MP-741	REAR PANEL - LEFT
8	1	MP-738	TOP PAN - RIGHT
9	2	WX-297	HANDLE
10	1	MP-740	FRONT PANEL - LEFT
11	2	SEE TABLE	ENCLOSURE END - BOTTOM
12	1	MP-739	BOTTOM PAN - LEFT
13	1	MP-754	FRONT DOOR LEDGE
14	1	MP-737	BOTTOM PAN - RIGHT

HARDWARE LIST

No.	QTY	DESCRIPTION
A	20	M5-.8 NYLOCK NUT
B	87	M6-1 x 12mm BHCS
C	8	M6 LOCK WASHER
D	8	M6-1 x 20mm SHCS
E	8	M6 FLAT WASHER
F	4	M8-1.25 x 20mm BHCS
G	4	M8 FLAT WASHER
H	10	M6-1 x 16mm BHCS

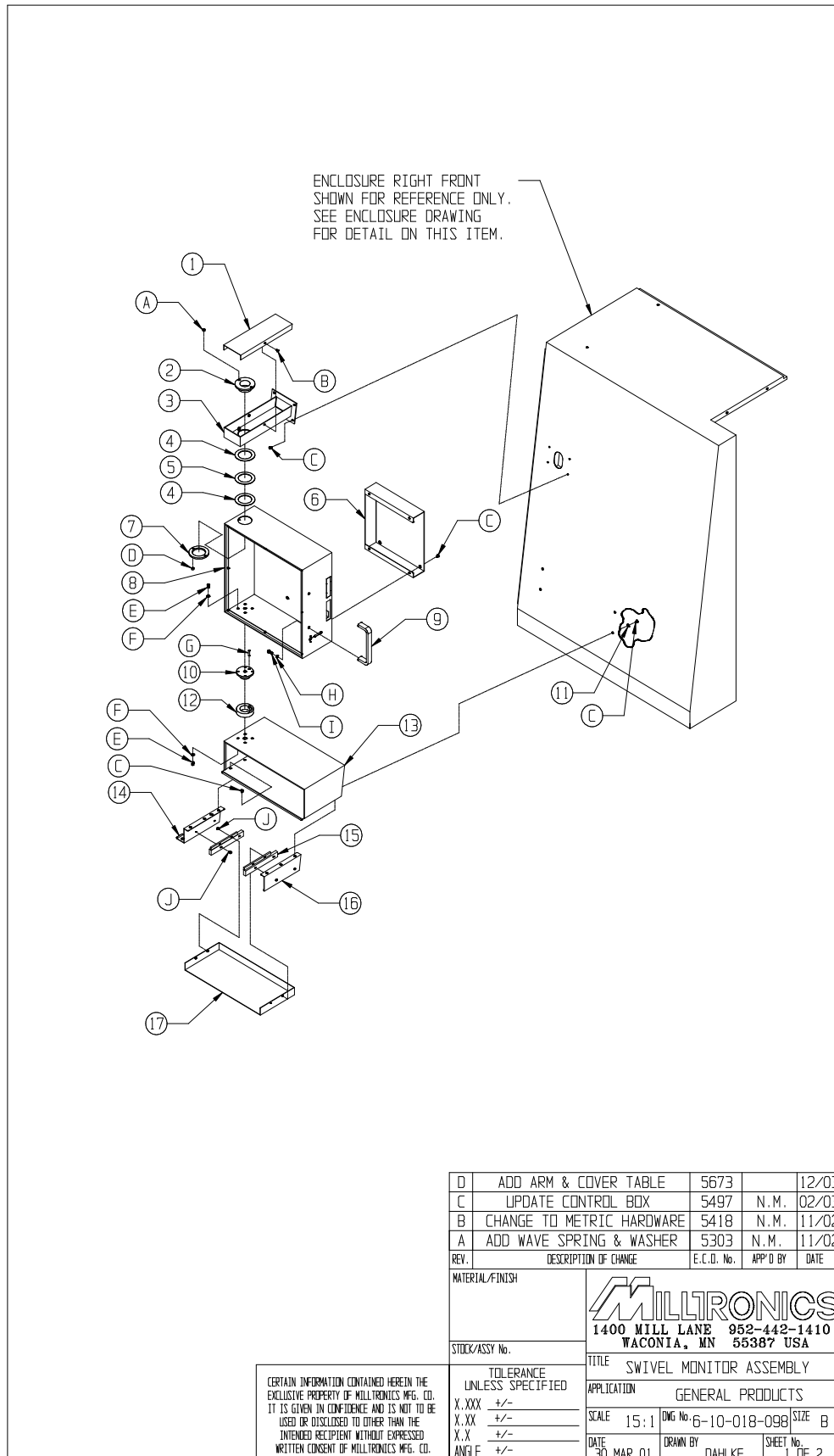
ENCLOSURE END TABLE

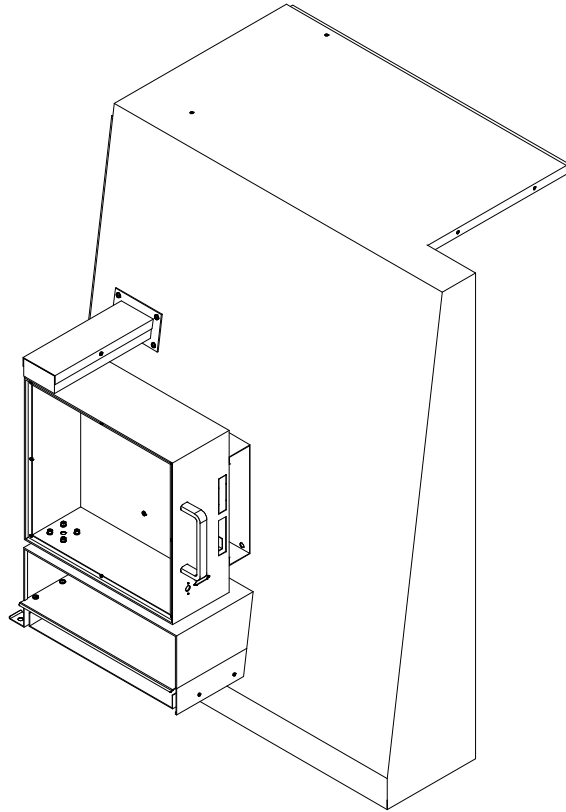
No.	VM22	VM25/30 (50"X)	VM25/30 (60"X)			
			TOP	LEFT	RIGHT	END
4	MP6-235	MP-744	MP7-88	MP7-90	MP7-91	MP7-92
11	MP6-236	MP-743	MP7-89			

A	ADD 60" ENDS TO CHART	6054		01/06
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 VM22/25/30 CHIP PAN			
X.XXX +/-	APPLICATION GENERAL PRODUCTS			
X.XX +/-	SCALE 30:1			
X.X +/-	DATE 04 DEC 03			
ANGLE +/-	DRAWN BY DAHLKE			
	SHEET No. 2 OF 2			

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Chip Pan Swivel Monitor Assembly




PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	SEE TABLE	COVER SWIVEL MONITOR UPPER SUPPORT ARM
2	1	MP-663	FLANGED BUSHING - SWIVEL MONITOR
3	1	SEE TABLE	UPPER SUPPORT ARM - SWIVEL MONITOR
4	2	WX-295	WASHER - SWIVEL MONITOR
5	1	MP3D-12	WAVE WASHER
6	1	MP-653	3-RING BINDER POCKET - SWIVEL MONITOR
7	1	MP-647	COLLAR - SWIVEL MONITOR
8	1	SEE TABLE	SWIVEL MONITOR BOX
9	1	#01018838	HANDLE
10	1	MP-648	SWIVEL PIVOT BUSHING
11	4	HD-12	RUBBERIZED WASHER
12	1	MP-649	SWIVEL PIVOT BASE
13	1	MP-624	SWIVEL MONITOR BASE
14	1	MP-651	UTILITY TRAY - SWIVEL MONITOR
15	1	MP-654	8" FULL EXTENSION ACCURIDE SLIDE
16	1	MP-652	BRACKET - SWIVEL MONITOR DRAWER OPTION
17	1	MP-626	TRAY - KEYBOARD PULL-OUT

PARTS LIST

No.	QTY	DESCRIPTION
A	2	M6-1 NYLOCK NUT
B	2	M5-.8 X 10mm BHCS
C	18	M6-1 X 10mm BHCS
D	2	M5-.8 NYLOCK NUT
E	8	M6-1 X 10mm SHCS
F	8	M6 LOCK WASHER
G	1	1/4 x .5 DOWEL PIN
H	2	M8 FLAT WASHER
I	2	M8-1.25 x 20mm BHCS
J	8	M3-.5 X 10mm BHCS

UPPER SUPPORT ARM & COVER TABLE

No.	VM15, 16, 17	VM22, 25, 30	INT. CONTROL
1	MP-650	MP-650	MPIC-01
3	MP-646	MP6-232	MPIC-02

SWIVEL BOX TABLE

No.	
8	#01018838

D	ADD ARM & COVER TABLE	5673		12/03
C	UPDATE CONTROL BOX	5497	N.M.	02/03
B	CHANGE TO METRIC HARDWARE	5418	N.M.	11/02
A	ADD WAVE SPRING & WASHER	5303	N.M.	05/02

REV. DESCRIPTION OF CHANGE E.C.D. No. APP'D BY DATE

MATERIAL/FINISH

STOCK/ASSY No.


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

TITLE SWIVEL MONITOR ASSEMBLY

APPLICATION GENERAL PRODUCTS

SCALE 10:1 DWG No. 6-10-018-098 SIZE B

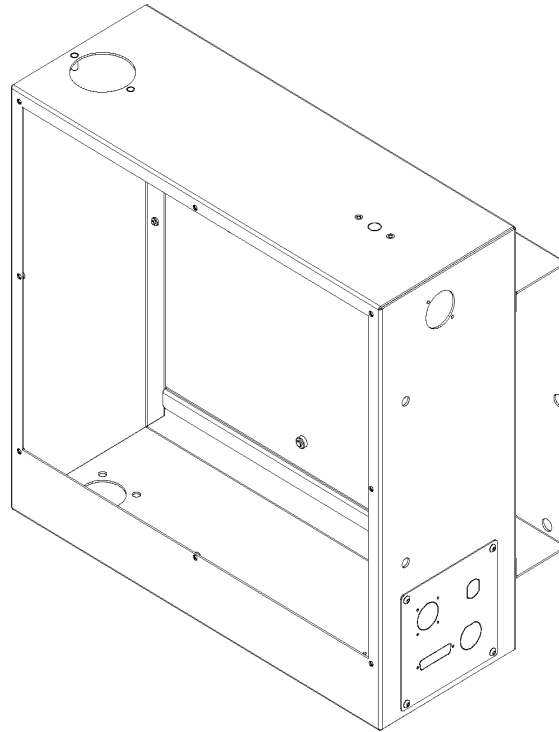
DATE 30 MAR 01 DRAWN BY DAHLKE SHEET No. 2 OF 2

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 TOLERANCE UNLESS SPECIFIED
 X.XXX +/-
 X.XX +/-
 X.X +/-
 ANGLE +/-

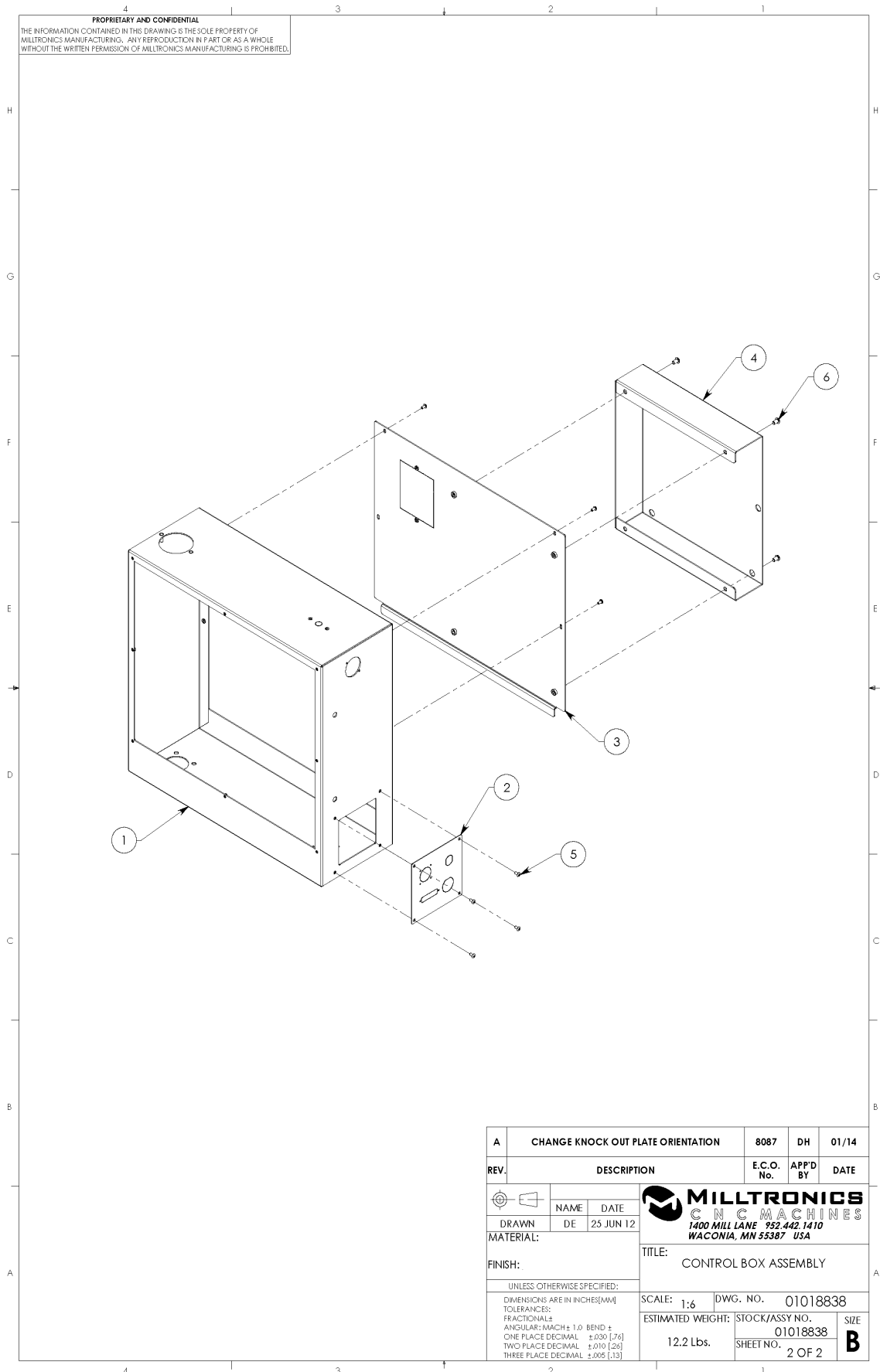
Control Box Assembly #01018838

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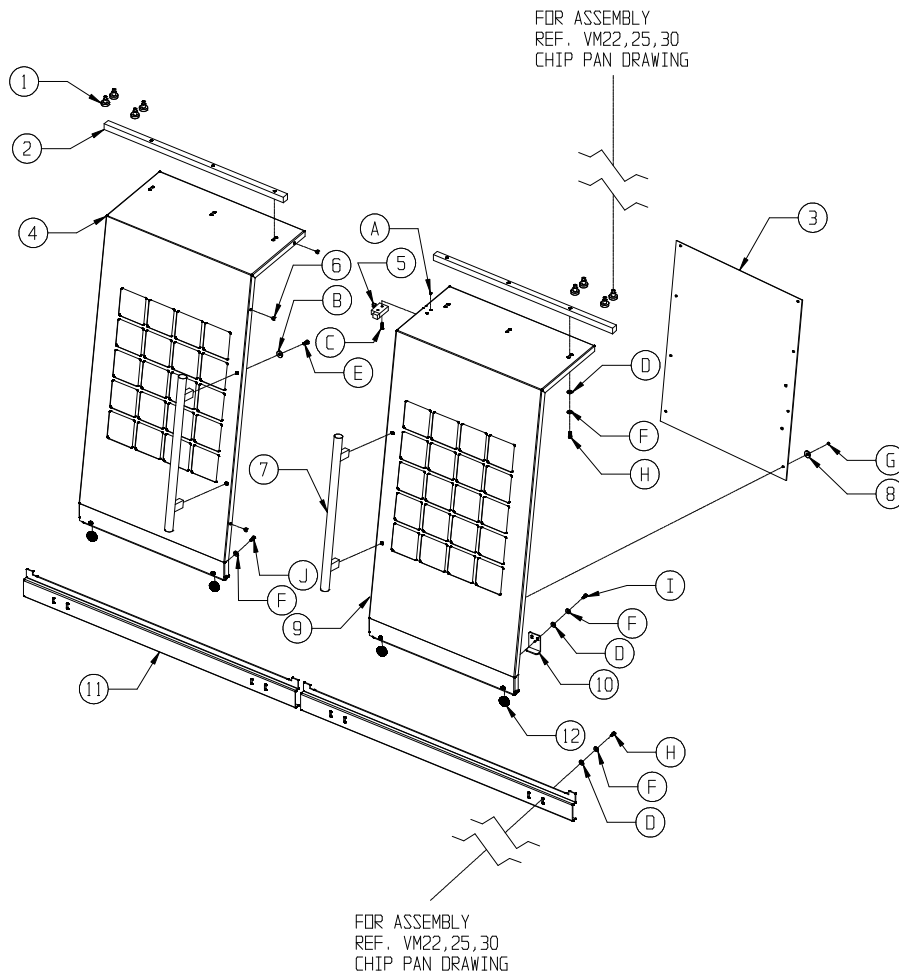


ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	01018836	CONTROL BOX - ONE PIECE CONSTRUCTION
2	1	01018855	CONTROL BOX ACCESS PANEL WITH USB
3	1	01040054	CONTROL PANEL- BACK COVER
4	1	MP00653	3 RING BINDER POCKET-SWIVEL MONITOR
5	8	BHCS M4-0.7 x 8	M4-0.7 x 8mm BHCS
6	4	BHCS M6-1.0 x 10	M6-1.0 x 10mm BHCS

A	CHANGE KNOCK OUT PLATE ORIENTATION	8087	DH	01/14
REV.	DESCRIPTION	E.C.O. No.	APP'D BY	DATE
	NAME	DATE	 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA	
DRAWN	DE	25 JUN 12		
MATERIAL:				
FINISH:		TITLE: CONTROL BOX ASSEMBLY		
UNLESS OTHERWISE SPECIFIED:				
DIMENSIONS ARE IN INCHES(MM) TOLERANCES: FRACTIONAL: ANGULAR: MACH ± 1.0 BEND ± ONE PLACE DECIMAL ±.030 [.76] TWO PLACE DECIMAL ±.010 [.26] THREE PLACE DECIMAL ±.005 [.13]				
SCALE: 1:4		DWG. NO. 01018838		SIZE B
ESTIMATED WEIGHT: 12.2 Lbs.		STOCK/ASSY NO. 01018838		
		SHEET NO. 1 OF 2		

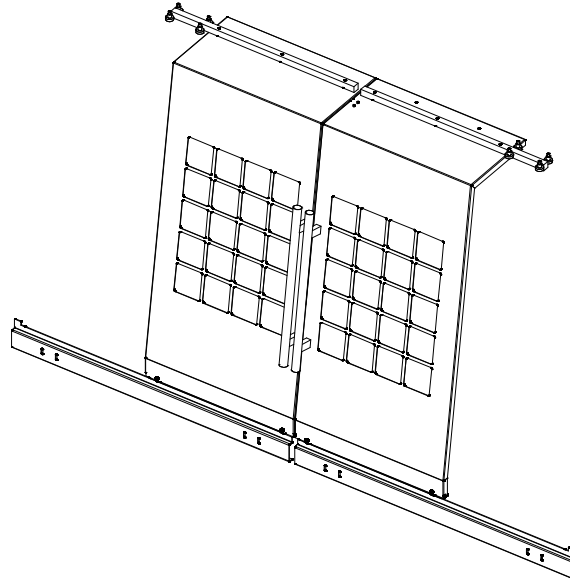


Chip Pan Door Assembly



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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 VM22,25,30 DOOR ASSEMBLY		
X.XXX ±		APPLICATION GENERAL PRODUCTS		
X.XX ±		SCALE 15:1	DWG No. 6-10-018-103	SIZE B
X.X ±		DATE 11 DEC 03	DRAWN BY DAHLKE	SHEET No. 1 OF 2
ANGLE ±				


PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	8	BG-100	CHIP PAN BEARING
2	2	MP6-224	UPPER DOOR RAIL
3	2	MP6-163	LEXAN
4	1	MP-746	LEFT FRONT DOOR
5	1	SW-194	NON-LOCKING AUGER SWITCH
6	3	WX-310	BUMPER
7	2	WX-297	HANDLE
8	16	HD-58	M5 RUBBERIZED WASHER
9	1	MP-745	RIGHT FRONT DOOR
10	4	MP-748	DOOR STOP
11	2	MP-747	LOWER TRACK
12	4	BG-56	ROLLER BEARING

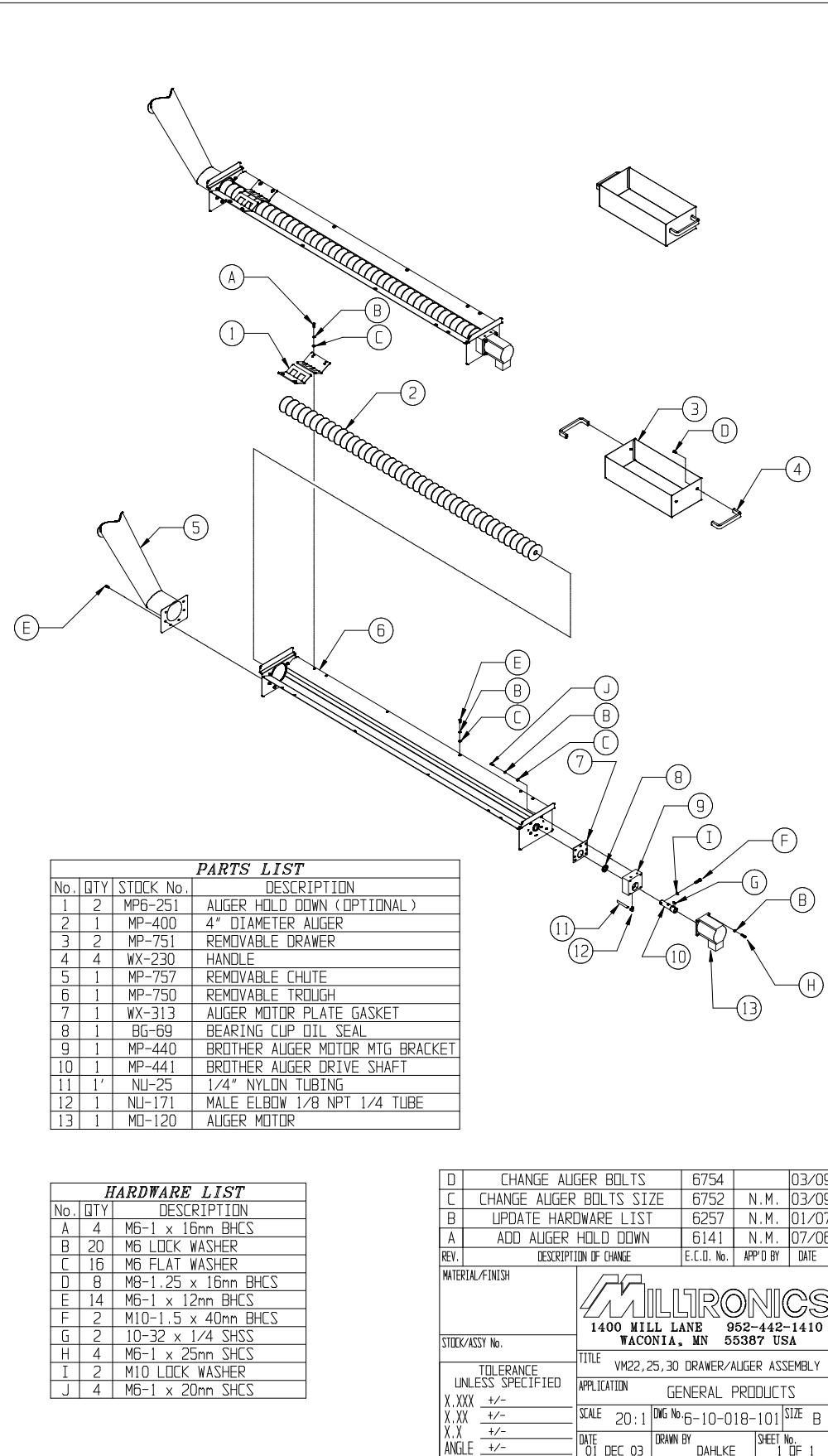
HARDWARE LIST

No.	QTY	DESCRIPTION
A	2	M4 NYLOCK NUT
B	4	M8 FLAT WASHER
C	2	M4-.7 x 30mm BHCS
D	26	M6 FLAT WASHER
E	4	M8-1.25 x 20mm BHCS
F	30	M6 LOCK WASHER
G	16	M5 NYLOCK NUT
H	14	M6-1 x 20mm SHCS
I	12	M6-1 x 16mm BHCS
J	4	M6-1 x 20mm BHCS

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 VM22, 25, 30 DOOR ASSEMBLY		
X .XXX ±		APPLICATION GENERAL PRODUCTS		
X .XX ±		SCALE 15:1	DWG No. 6-10-018-103	SIZE B
X .X ±		DATE 11 DEC 03	DRAWN BY DAHLKE	SHEET No. 2 OF 2
ANGLE ±				

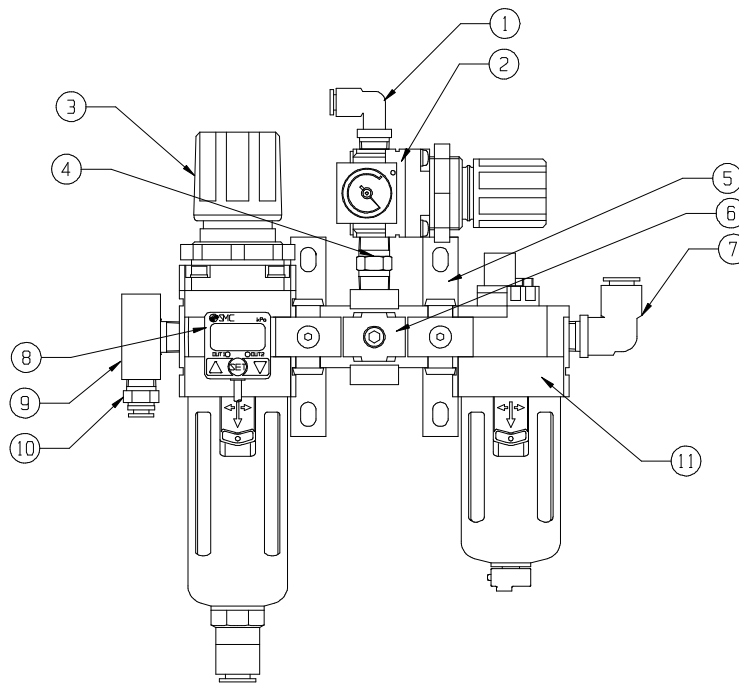
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Chip Auger Assembly



Air Filter / Lubricator / Filter Assembly

PARTS LIST			
ITEM	QTY	STOCK No.	DESCRIPTION
1	1	NU-199	1/4 NPT 3/8 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-430	DIGITAL AIR GAUGE 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

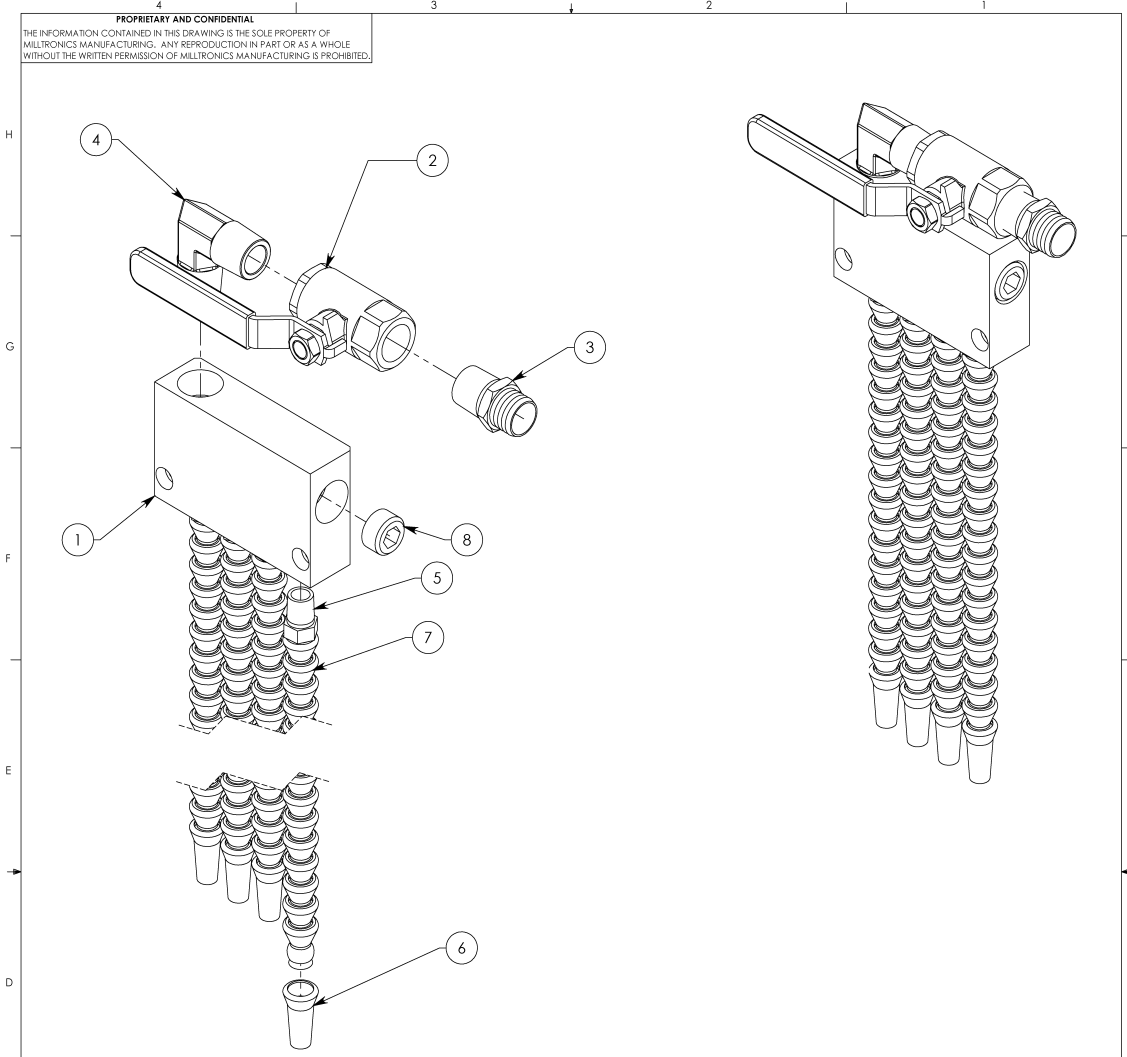


REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE NU-417 FRL ASSEMBLY		
X .XXX +/-		APPLICATION GENERAL PRODUCTS		
X .XX +/-		SCALE 3:1		DWG NO. 6-10-018-112
X .X +/-		DATE 14 APR 08		SIZE B
ANGLE +/-		DRAWN BY DAHLKE		SHEET NO. 1:1

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Flood Coolant Valve Handle Assembly

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	01018860	FOUR NOZZLE FLOOD BLOCK	1
2	NU00064	1/2" NPT BALL VALVE	1
3	NU00066	FITTING 1/2" NPT - 3/4" BARB	1
4	NU00140	1/2 NPT MALE ELBOW	1
5	MA00019	CONNECTOR LOC LINE .25"	4
6	MA00216	LOC-LINE NOZZLE 1/4	4
7	MA00022	LOC-LINE LINKS 1/4	64
8	SSCONESKT 0.75-10x0.625-HX-N	1/2" NPT PLUG	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES(MM)

TOLERANCES:

FRACTIONAL: ±

ANGULAR: MACH ± 1.0 BEND ±

ONE PLACE DECIMAL ±.030 [.76]

TWO PLACE DECIMAL ±.010 [.26]

THREE PLACE DECIMAL ±.005 [.13]



MILLTRONICS
 CNC MACHINES
 1400 MILL LANE 952.442.1410
 WACONIA, MN 55387 USA

TITLE: FLOOD HANDLE SUB ASSEMBLY

SCALE: 1:2 DWG. NO. 10040024

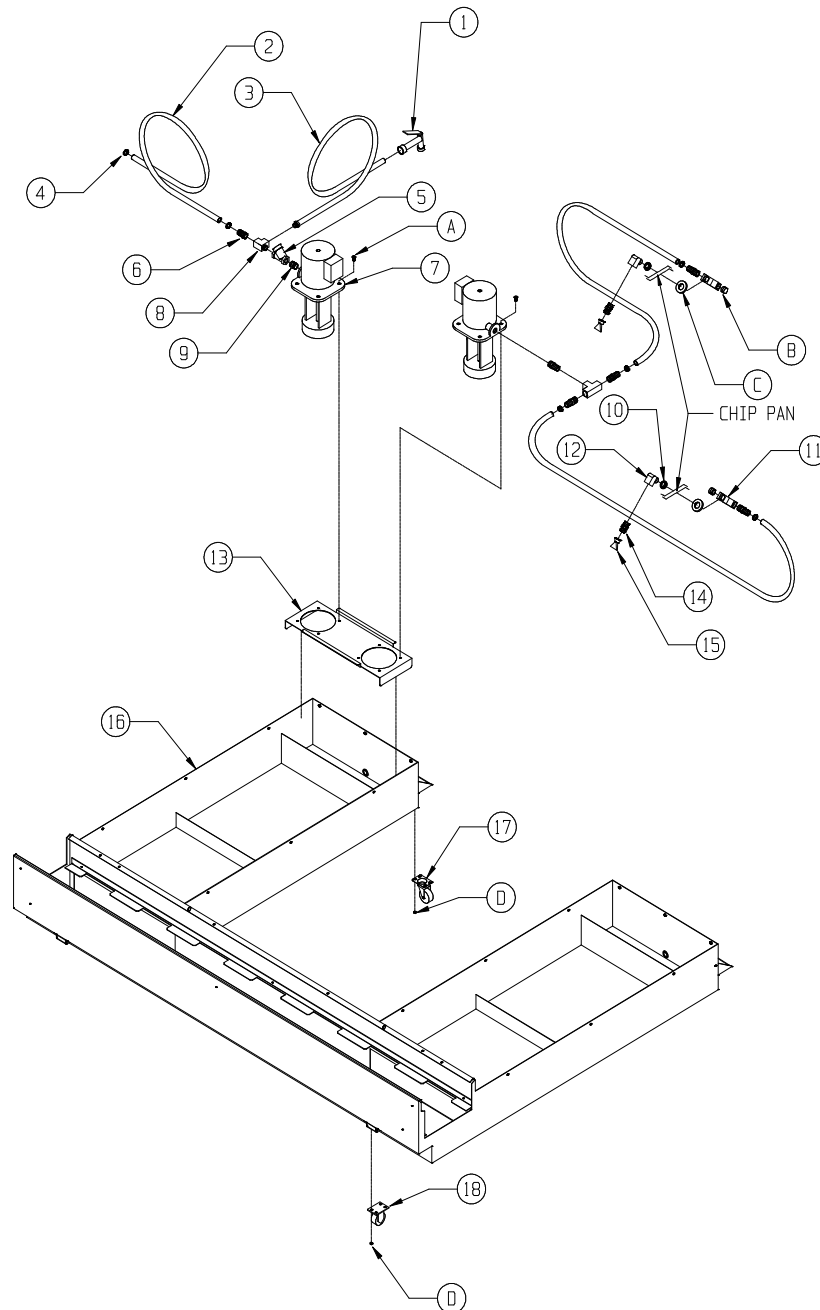
ESTIMATED WEIGHT: 0.8 Lbs. STOCK/ASSY NO. 10040024

SHEET NO. 1 OF 1

SIZE **B**

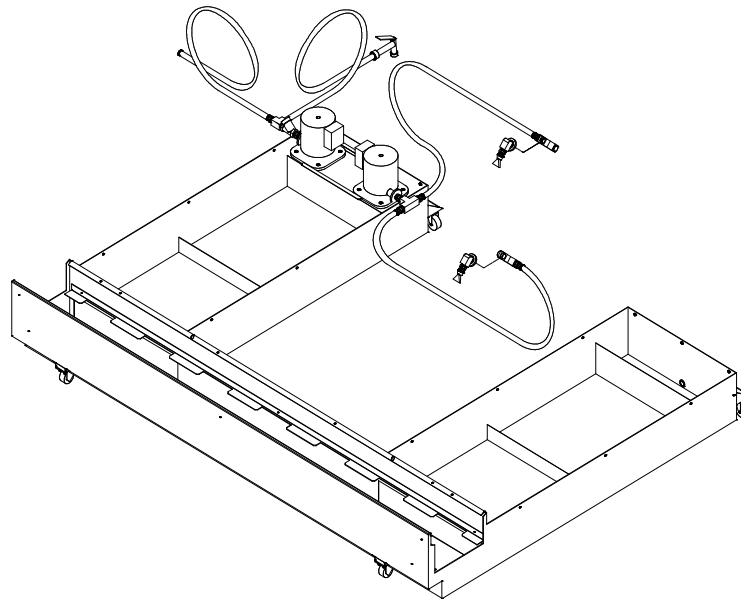
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Coolant Tank With Washdown Assembly



A	ONE PIECE COOLANT TANK	6017		11/05
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 VM22, 25, 30 FLOOD TANK W/WASHDOWN ASSEMBLY		
X .XXX ±		APPLICATION GENERAL PRODUCTS		
X .XX ±		SCALE 15:1	DWG No. 6-10-018-104	SIZE B
X .X ±		DATE 18 DEC 03	DRAWN BY DAHLKE	SHEET No. 1 OF 2
ANGLE ±				

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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	MP-755	COOLANT PUMP MOUNTING PLATE
14	2	NU-176	1/2" CONNECTOR
15	2	NU-175	1 1/4" FLARE NOZZLE
16	1	MP-808	COOLANT TANK
17	4	EL-88	CASTER - SWIVEL
18	2	EL-98	CASTER - RIGID

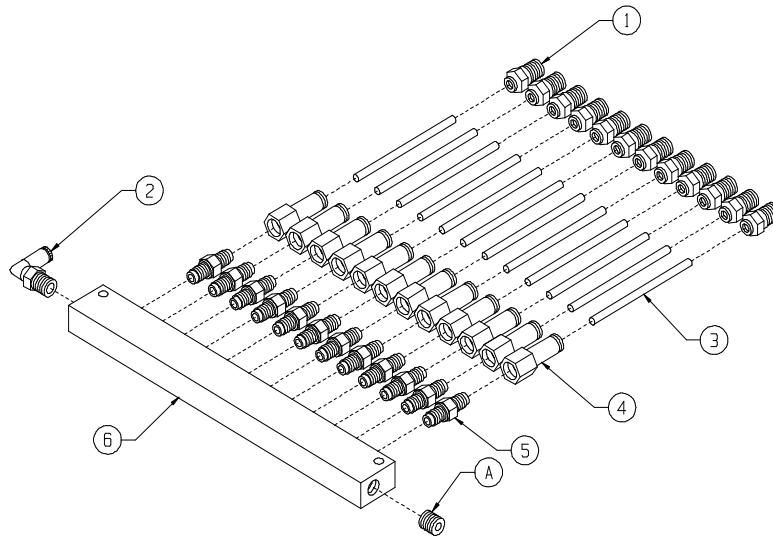
HARDWARE LIST

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	12	M6-1 NYLOCK HEX NUT

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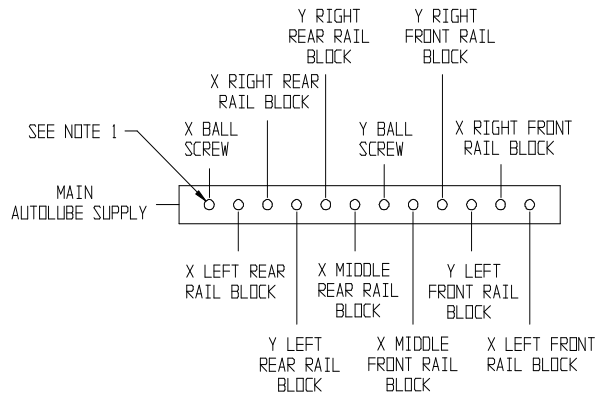
A	ONE PIECE COOLANT TANK	6017		11/05
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH	 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA			
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED	TITLE VM22, 25, 30 FLOOD TANK W/WASHDOWN ASSEMBLY			
X .XXX ±	APPLICATION GENERAL PRODUCTS			
X .XX ±	SCALE 15:1 DWG No: 6-10-018-104 SIZE B			
X .X ±	DATE 18 DEC 03 DRAWN BY DAHLKE SHEET No. 2 OF 2			
ANGLE ±				

X & Y Axis Autolube Manifold Assembly



NOTES:-

1. X MIDDLE RAILBLOCK PORTS, FRONT AND REAR ARE PLUGGED IF NOT USED.

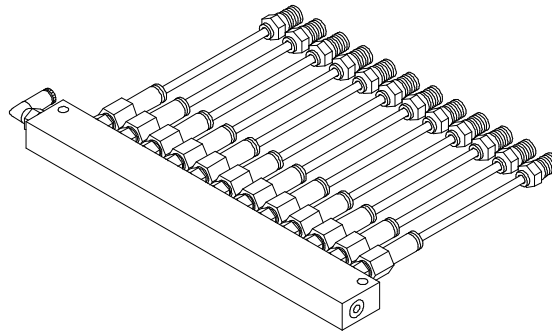


AUTOLUBE LINE DESTINATIONS

B	UPDATE OIL METER FITTINGS	6760		03/09
A	ADD FRAMES TO CHART	5996	N. M.	08/05
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 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 DRAWN BY THOMPSON SHEET NO. 1 OF 2		
ANGLE ±				

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THIS ASSEMBLY IS USED ON
 VM15, VM16, VM20, VM25 & VM30



PARTS LIST

No.	QUANTITY	STOCK No.	DESCRIPTION
1	12	NU-154	5/32 TUBE 1/8 NPT M/S
2	1	NU-161	1/8 NPT-.156 SWIVEL 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	VM15-16	VM20	VM22	VM25/30(50)	OIL METER
X LEFT REAR RAIL BLOCK	20	20	24	24	#3 (NU-156)
X RIGHT REAR RAIL BLOCK	27	27	44	44	#3 (NU-156)
Y LEFT REAR RAIL BLOCK	12	12	24	24	#3 (NU-156)
Y RIGHT REAR RAIL BLOCK	24	30	44	44	#3 (NU-156)
X MIDDLE REAR RAIL BLOCK	-	-	38	38	#3 (NU-156)
Y BALL SCREW	26	32	39	39	#2 (NU-155)
X MIDDLE FRONT RAIL BLOCK	-	-	38	38	#3 (NU-156)
Y RIGHT FRONT RAIL BLOCK	24	30	44	44	#3 (NU-156)
Y LEFT FRONT RAIL BLOCK	12	12	24	24	#3 (NU-156)
X RIGHT FRONT RAIL BLOCK	27	27	44	44	#3 (NU-156)
X LEFT FRONT RAIL BLOCK	20	20	24	24	#3 (NU-156)
X BALL SCREW	40	40	60	60	#2 (NU-155)

ALL MEASUREMENTS ARE IN INCHES

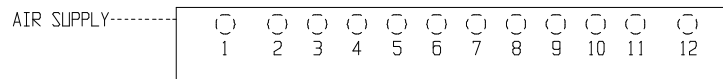
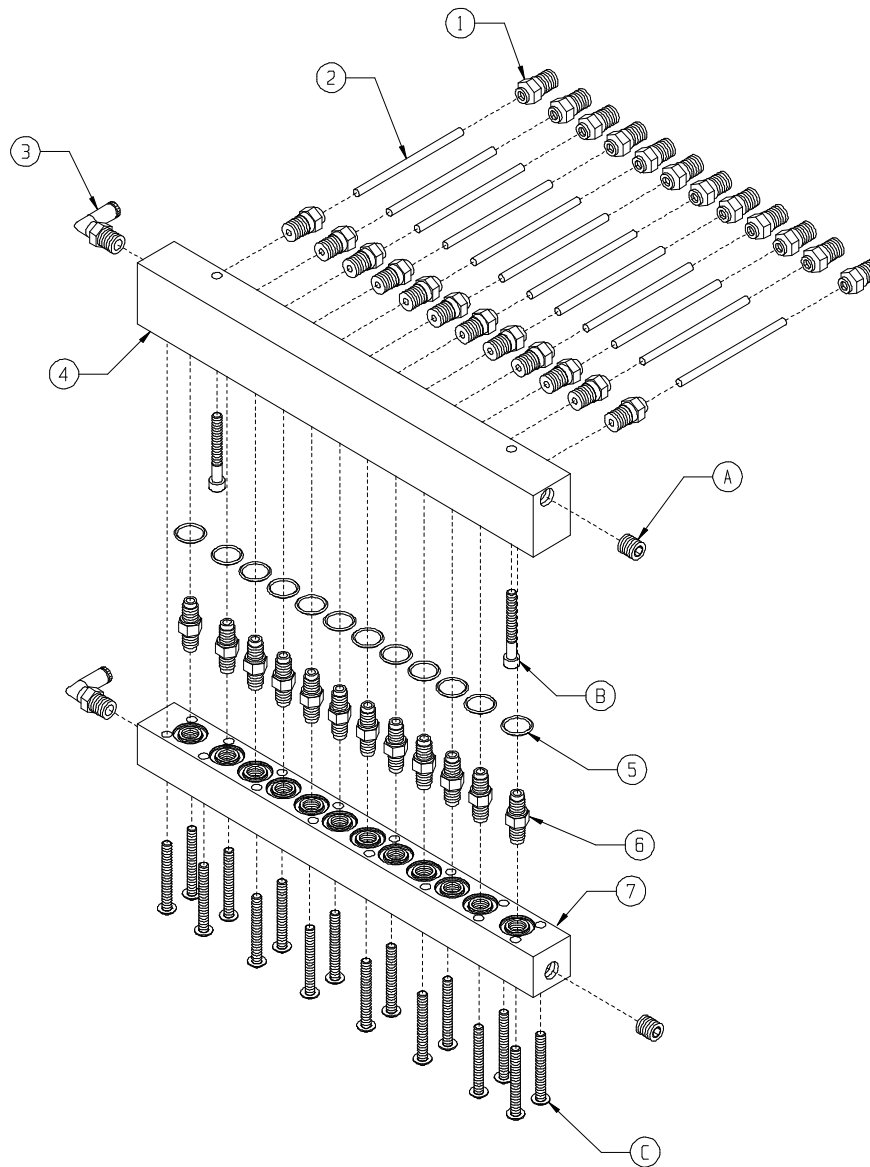
HARDWARE LIST

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

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B	UPDATE OIL METER FITTINGS	6760		03/09
A	ADD FRAMES TO CHART	5996	N.M.	08/05
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 X & Y AXIS AUTOLUBE MANIFOLD ASSEMBLY		
X, .XXX X, .XX X, .X ANGLE		APPLICATION GENERAL PRODUCTS		
		SCALE 2:1		
		DATE 25 JUL 97		
		DRAWN BY THOMPSON		
		SHEET NO. 2 OF 2		

X & Y Axis Air/Oil Manifold Assembly

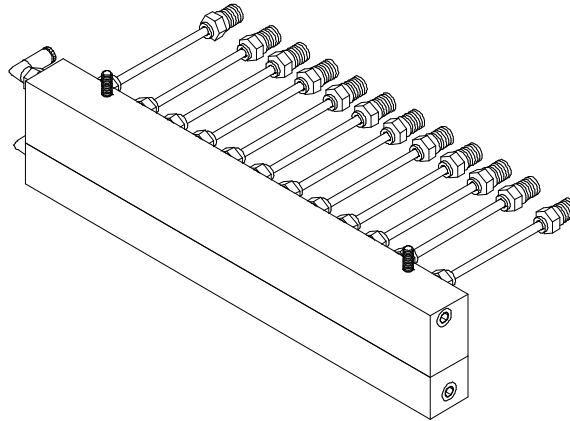


AIR/OIL LINE DESTINATIONS

No.	RAIL BLOCK/BALL SCREW
1	X BALL SCREW
2	X LEFT REAR RAIL BLOCK
3	X RIGHT REAR RAIL BLOCK
4	Y LEFT REAR RAIL BLOCK
5	Y RIGHT REAR RAIL BLOCK
6	X MIDDLE REAR RAIL BLOCK
7	Y BALL SCREW
8	X MIDDLE FRONT RAIL BLOCK
9	Y RIGHT FRONT RAIL BLOCK
10	Y LEFT FRONT RAIL BLOCK
11	X RIGHT FRONT RAIL BLOCK
12	X LEFT FRONT RAIL BLOCK

F	CHANGE TO METRIC HARDWARE	7984	N.M.	10/13
E	CHANGE TABLE	6060	N.M.	01/06
D	ADD FRAMES	5995	N.M.	08/05
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.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 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	DRAWN BY HERME	SHEET No. 1 OF 2
ANGLE +/- 1.0°				

THIS ASSEMBLY IS USED ON VM15, VM16, VM17, VM20, VM22, VM25/30(50)



PARTS LIST

No.	QUANTITY	STOCK No.	DESCRIPTION
1	32	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	16	WX-248	O-RING BUNA 1/2 ID x 5/8 OD
6	-	SEE TABLE	OIL METER
7	1	MP-661	16 PORT 1/8 NPT MANIFOLD - OIL

NU-117 TUBING LENGTH

	VM15/16	VM20	VM22	VM25/30(50)	OIL METER
X LEFT REAR RAIL BLOCK	20	20	24	24	#3 (NU-156)
X RIGHT REAR RAIL BLOCK	27	27	44	44	#3 (NU-156)
Y LEFT REAR RAIL BLOCK	13	12	24	24	#3 (NU-156)
Y RIGHT REAR RAIL BLOCK	33	30	44	44	#3 (NU-156)
X MIDDLE REAR RAIL BLOCK	-	-	38	38	#3 (NU-156)
Y BALL SCREW	26	32	39	39	#2 (NU-155)
X MIDDLE FRONT RAIL BLOCK	-	-	38	38	#3 (NU-156)
Y RIGHT FRONT RAIL BLOCK	30	30	44	44	#3 (NU-156)
Y LEFT FRONT RAIL BLOCK	12	12	24	24	#3 (NU-156)
X RIGHT FRONT RAIL BLOCK	27	27	44	44	#3 (NU-156)
X LEFT FRONT RAIL BLOCK	20	20	24	24	#3 (NU-156)
X BALL SCREW	40	40	60	60	#2 (NU-155)

ALL MEASUREMENTS ARE IN INCHES

NOTES:

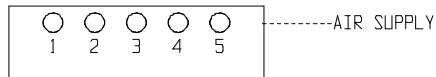
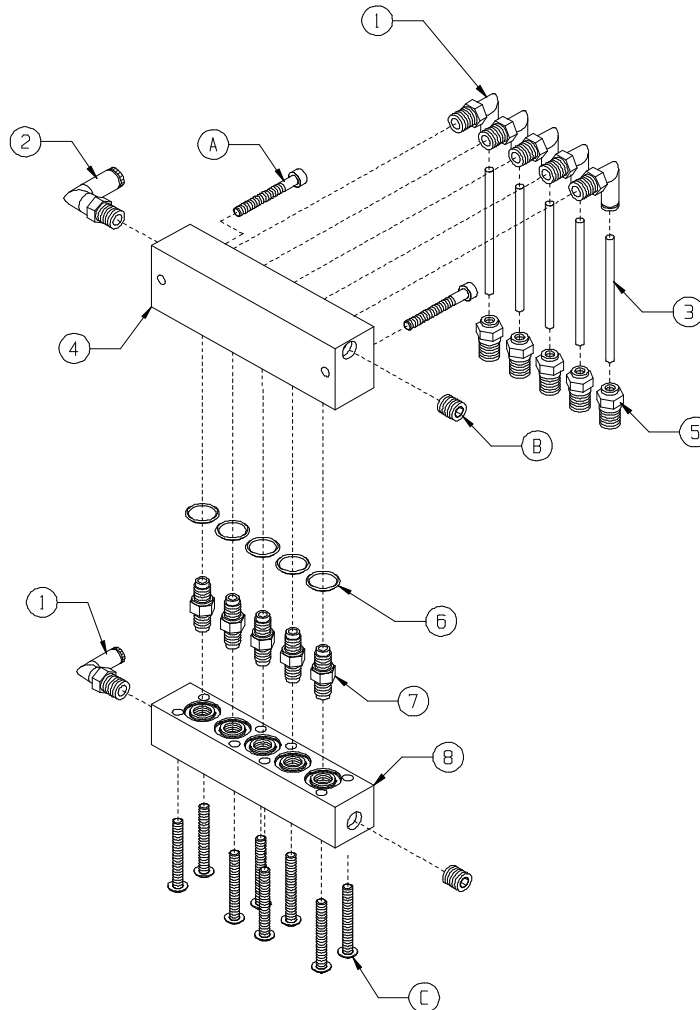
- IF REFERENCED WITH A (-) PLUG
AIR/OIL LINE HOLE AND OIL METER
HOLE IN MANIFOLD WITH 1/8 NPT PLUG.

HARDWARE LIST

No.	QTY	DESCRIPTION
A	2	1/8-27 NPT SHPP
B	2	M5-.8 x 30 SHCS
C	20	M5-.8 x 30 SHCS

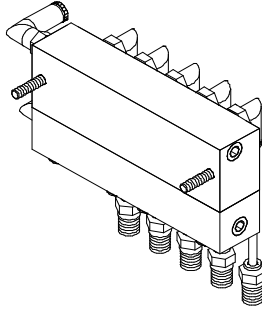
F	CHANGE TO METRIC HARDWARE	7984	N.M.	10/13
E	CHANGE TABLE	6060	N.M.	01/06
D	ADD FRAMES	5995	N.M.	08/05
C	CHANGED METERS	4988	D.H.	02/01
B	ADD VMG17 TO NOTE	4729	N.M.	10/00
A	ADD VMG24 TO NOTE	4327	N.M.	12/99
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.		TITLE X & Y AXIS AIR/OIL MANIFOLD ASSEMBLY APPLICATION PARTNER I		
TOLERANCE UNLESS SPECIFIED		SCALE 2:1	ENG No. 6-10-008-058	SIZE B
X.XXX	+/- .005	DATE 10 JUN 99	DRAWN BY HERME	SHEET No. 2 OF 2
X.XX	+/- .010			
X.X	+/- .030			
ANGLE	+/- 1.0°			

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

E	CHANG TO METRIC HARDWARE	7985	N.M.	10/13
D	CHANGE TO ALL FRAMES	6002	N.M.	11/05
C	REMOVED VMG24	4987	N.M.	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				
X .XXX	+/- .005	TITLE Z AXIS AIR/OIL MANIFOLD ASSEMBLY APPLICATION PARTNER I SCALE 2:1 DWG No. 6-10-008-059 SIZE B DATE 11 JUN 99 DRAWN BY HERME SHEET No. 1 OF 2		
X .XX	+/- .010			
X .X	+/- .030			
ANGLE	+/- 1.0°			


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		OIL METER
CONNECTION	ALL FRAMES	
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

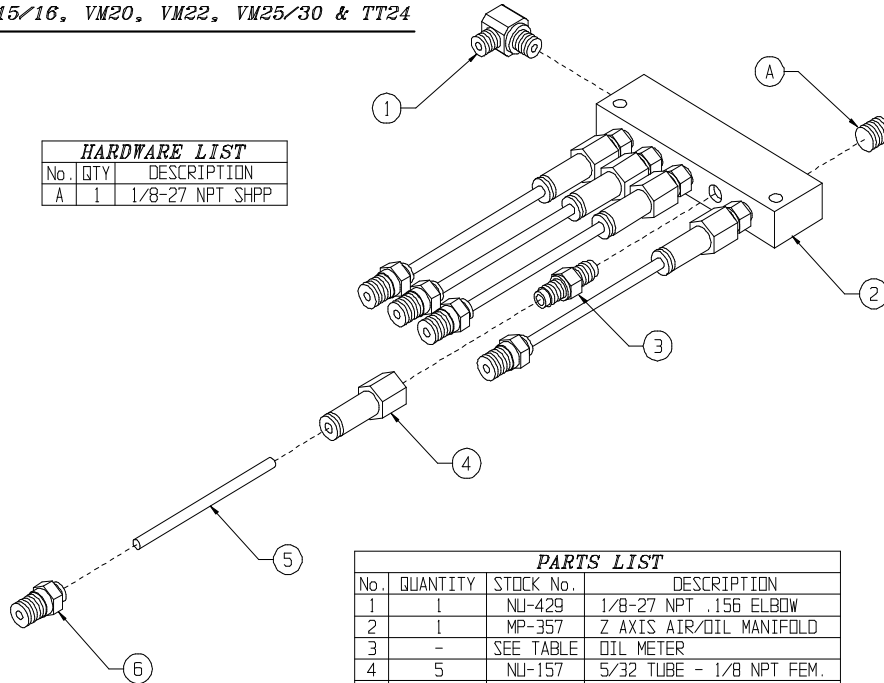
No.	QTY	DESCRIPTION
A	2	M5-.8 x 25 SHCS
B	2	1/8-27 NPT SHPP
C	8	M5-.8 x 25 SHCS

E	CHANG TO METRIC HARDWARE	7985	N.M.	10/13
D	CHANGE TO ALL FRAMES	6002	N.M.	11/05
C	REMOVED VMG24	4987	N.M.	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 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
 VM15/16, VM20, VM22, VM25/30 & TT24

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



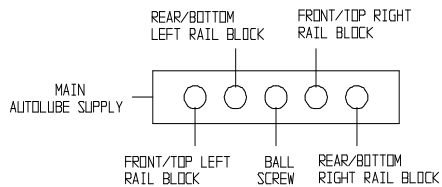
PARTS LIST			
No.	QUANTITY	STOCK No.	DESCRIPTION
1	1	NU-429	1/8-27 NPT .156 ELBOW
2	1	MP-357	Z AXIS AIR/OIL MANIFOLD
3	-	SEE TABLE	OIL METER
4	5	NU-157	5/32 TUBE - 1/8 NPT FEM.
5	SEE TABLE	NU-117	5/32 NYLON TUBING
6	5	SEE TABLE	5/32 TUBE-1/8 NPT M/S

NU-117 TUBING LENGTH						OIL METER
CONNECTION	VM15/16	VM20	VM22	VM25/30	TT24	
FRONT/TOP LEFT RAIL BLOCK	18	20	30	30	10	No. 3 (NU-156)
REAR/BOTTOM LEFT RAIL BLOCK	35	14	42	42	20	No. 3 (NU-156)
BALL SCREW	24	15	30	30	8	No. 2 (NU-155)
REAR/BOTTOM RIGHT RAIL BLOCK	35	8	42	42	20	No. 3 (NU-156)
FRONT/TOP RIGHT RAIL BLOCK	18	11	30	30	10	No. 3 (NU-156)

ALL MEASUREMENTS ARE IN INCHES

No.	DESCRIPTION	VM15/16	VM20	VM22	VM25/30	TT24
6	ROLLER RAIL	NU-315	NU-315	NU-315	NU-315	NU-315
	BALL RAIL	NU-315 NU-154	NU-315	NU-315	NU-315	NU-315

AUTOLUBE LINE DESTINATIONS



NOTES:

1. USED ON ASSEMBLY No.

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B	ADD TT24	6750		03/09
A	ADD FRAMES TO CHART	6001	N.M.	08/05
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.		TITLE 5 PORT AUTOLUBE MANIFOLD ASSEMBLY APPLICATION GENERAL PRODUCTS SCALE 1.5:1 DWG No. 6-10-018-050 SIZE B DATE 20 AUG 97 DRAWN BY THOMPSON SHEET NO. 1 OF 1		
TOLERANCE UNLESS SPECIFIED				
X.XXX		±		
X.XX		±		
X.X		±		
ANGLE		±		

Retention Knob Chart

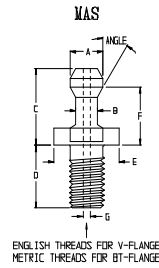
NOTE: STANDARD RETENTION KNOBS FOR 40 TAPER SPINDLES

MAS RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.59	.39	1.27	.86	.90	.99	.19	BR50, BR60, BR80, MM18, RH20, RH30, RH33, RH35, RV15, VM15, VM16, VM20, VM22, VM25, VM30, VM2016, VM15, VM16, VM20, VM22, VM25, VM30	BR50, BR60, BR80, HM20, HK35, RH20, RH30, RH33, RH35, TT24, TT40, TT60, TT80, VM16, VM20, VM22, VM25, VM30, VM3224, VM4224, HMC20, HMC35, TTC24, TTC40, TTC60, TTC80, VM16, VM20, VM22, VM25, VM30

MAS RETENTION KNOBS STYLE BT-FLANGE 40 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.59	.39	1.38	.98	.90	1.10	.18	BR50, BR60, BR80, MM18, RH20, RH30, RH33, RH35, RV15, VM15, VM16, VM20, VM22, VM25, VM30, VM2016, VM15, VM16, VM20, VM22, VM25, VM30	BR50, BR60, BR80, HM20, HK35, RH20, RH30, RH33, RH35, TT24, TT40, TT60, TT80, VM16, VM20, VM22, VM25, VM30, VM3224, VM4224, HMC20, HMC35, TTC24, TTC40, TTC60, TTC80, VM16, VM20, VM22, VM25, VM30



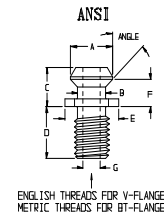
NOTE: STANDARD RETENTION KNOBS FOR 50 TAPER SPINDLES

ANSI RETENTION KNOBS STYLE CT-FLANGE 50 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
1.14	.83	1.00	1.32	1.42	.70	.45	45°	HBM110, RH33XP, RH35XP, TT40XP, VM22XP, VM25XP, VM30XP, TTC40XP, VM22XP, VM25XP, VM30XP

ANSI RETENTION KNOBS STYLE BT-FLANGE 50 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
1.14	.83	1.00	1.32	1.42	.70	.45	45°	HBM110, RH33XP, RH35XP, TT40XP, VM22XP, VM25XP, VM30XP, TTC40XP, VM22XP, VM25XP, VM30XP



NOTE: OPTIONAL RETENTION KNOBS FOR 40 TAPER SPINDLES

ANSI RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.74	.49	.64	.86	.93	.44	.27	45°	SELECTION NOT AVAILABLE

ANSI RETENTION KNOBS STYLE BT-FLANGE 40 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.74	.49	.75	.86	.90	.55	.28	45°	SELECTION NOT AVAILABLE

MAS RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.59	.39	1.27	.86	.90	.99	.19	45°	SELECTION NOT AVAILABLE

MAS RETENTION KNOBS STYLE BT-FLANGE 40 TAPER

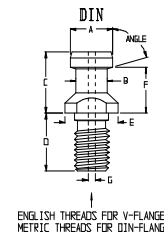
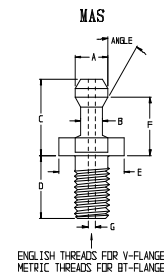
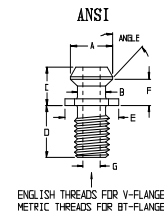
DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.59	.39	1.38	.98	.90	1.10	.18	45°	SELECTION NOT AVAILABLE

DIN 69872 RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.75	.55	1.02	.86	.90	.79	.24	75°	SELECTION NOT AVAILABLE

DIN 69872 RETENTION KNOBS STYLE DIN-FLANGE 40 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.75	.55	1.02	.99	.90	.79	.28	75°	SELECTION NOT AVAILABLE



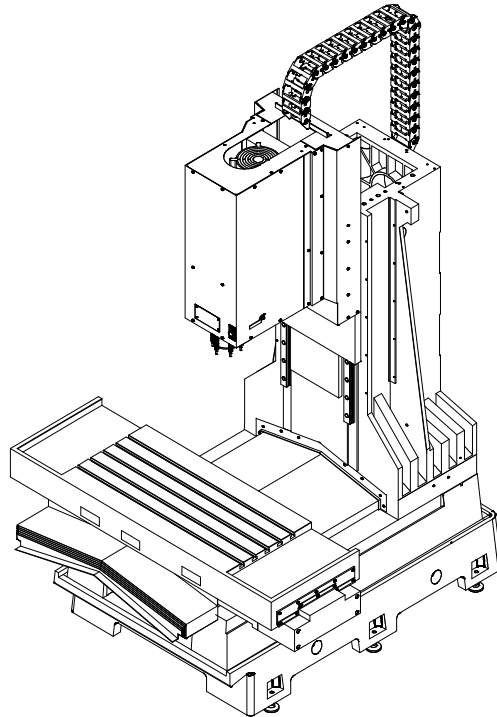
- NOTES:**
- FOR SPINDLES OF 8000 RPM AND GREATER YOU MUST USE BALANCED TOOLING TO A G2.5 SPEC. OR IT WILL VOID THE SPINDLE WARRANTY.
 - IN-LINE SPINDLES, IN THEIR RESPECTIVE FRAME SIZE, USE THE SAME RETENTION KNOB AS THE NON IN-LINE SPINDLES
 - ALL DIMENSIONS ARE IN INCHES

J	REMOVE MFG. PART NUMBERS & ADD DIMENSIONS	7749	N.M.	03/13
I	ADD VM2016, VM3224, TT60, TT80, TT40XP, TTC40, TTC40XP, HBM110	7573	N.M.	07/12
H	ADD VM22XP, RH33XP FRAMES TO 50 TAPER	6715	N.M.	01/09
G	ADD MM18 AND MOVE HMC70 FRAMES TO 50 TAPER	6193	N.M.	10/06
F	ADD VMC, TT, AND HMC FRAMES	6175	N.M.	09/06
E	UPDATE CHART	5992	N.M.	08/05
D	ADD RH/RW12 & RH19	5146	N.M.	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.D. NO.	APP'D BY	DATE
	TITLE	RETENTION KNOB CHART	SCALE 1.75:1	DWG No. 6-11-018-054
	APPLICATION	GENERAL PRODUCTS	DATE 30 APR 99	DRAWN BY DAHLKE
				SHEET NO. 1 OF 1

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, SUNOCO 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.



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 LUBRICATION DRAWING		
X.XXX ±		APPLICATION PARTNER VI		
X.XX ±		SCALE 20:1	DWG No 6-11-027-004	SIZE B
X.X ±		DATE 17 DEC 03	DRAWN BY DAHLKE	SHEET NO. 1 OF 2
ANGLE ±				

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, mg D 2882 (MOD)	-
CMCQ, 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 PASSED DIN 51534	12

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	LUBRICATION DRAWING		
	APPLICATION	PARTNER VI		
	SCALE	15:1	DWG No. 6-11-027-004	SIZE B
	DATE	17 DEC 03	DRAWN BY DAHLKE	SHEET NO. 2 OF 2

