



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

VM22IL B Mechanical

3-05-2012
Rev 3

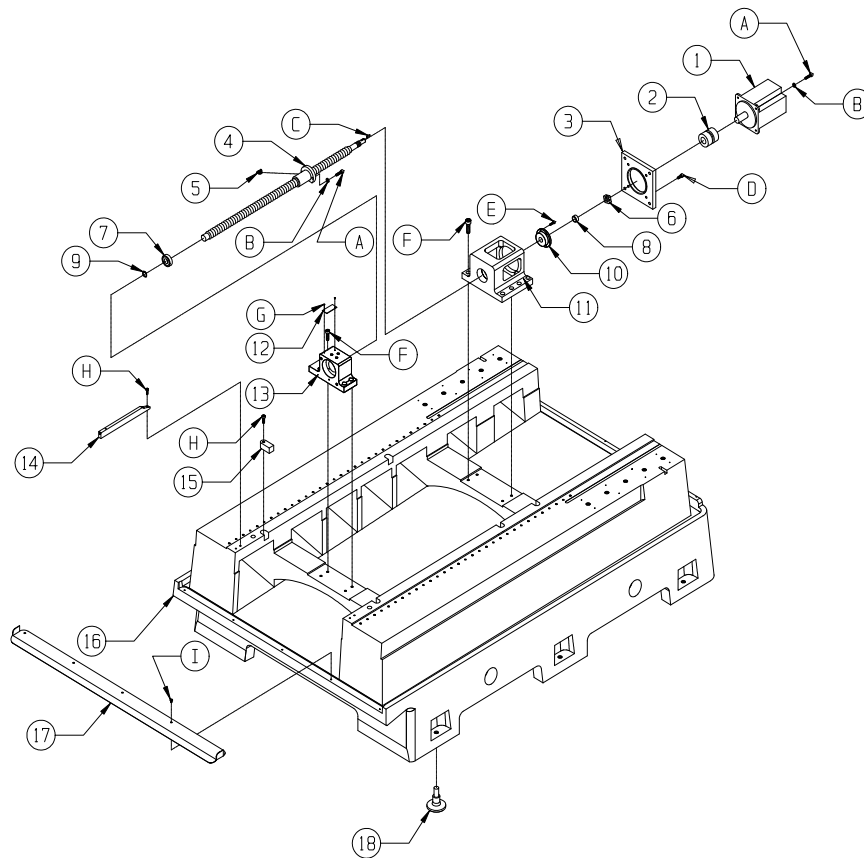
Table Of Contents

Manual Discrepancy Sheet	1
Machine Base Assembly	2
Machine Saddle Assembly	4
Saddle & Way Cover Assembly	6
Milling Table Assembly.....	8
Machine Head Assembly.....	10
Inline Spindle Assembly	12
Machine Column Assembly.....	14
Power Drawbar Cylinder Assembly	16
Spindle Motor and Pulley Assembly.....	18
Thermal Compensation Assembly.....	19
Chip Pan Assembly.....	20
Chip Pan Swivel Monitor Assembly.....	22
Chip Pan Door Assembly	24
Chip Auger Assembly.....	26
Air Filter / Lubricator / Filter Assembly.....	27
Flood Coolant Valve Handle Assembly	28
Coolant Tank With Washdown Assembly.....	30
X & Y Axis Autolube Manifold Assembly	32
X & Y Axis Air/Oil Manifold Assembly.....	34
Z-Axis Air/Oil Manifold Assembly	36
Z-Axis Autolube Manifold Assembly.....	38
Retention Knob Chart.....	39
Machine Lubrication Instructions.....	40

Manual Discrepancy Sheet

1. On pages 12 & 13 drawing has been modified eliminating item #6 "spindle motor mounting plate".

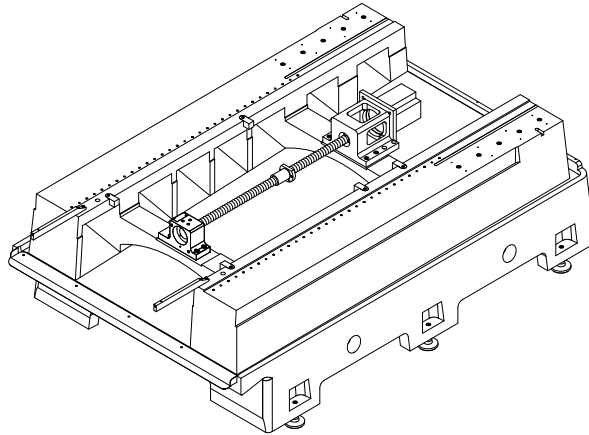
Machine Base Assembly



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.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 PEDESTAL SUB-ASSEMBLY		
X .XXX +/-		APPLICATION PARTNER VI		
X .XX +/-		SCALE 16:1		
X .X +/-		DWG No. 6-10-027-028		
ANGLE +/-		SIZE B		
		DATE 16 JUN 03		
		DRAWN BY DAHLKE		
		SHEET 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.

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)	8Nn A06B-0227-B200	11Nn 1FK7063-5AF71-1EA0 16Nn 1FK7083-5AF71-1EA0	MD-184 (1.5kw)
2	MA-242 (.9kw) MA-241 (1.5kw) MA-248 (2kw)	MA-242	MA-260 (11Nn) MA-261 (16Nn)	MA-260
11	MX-51	MX-51	MX-51 (11Nn) MXS-03 (16Nn)	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

* 16Nn 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.

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

STOCK/ASSY No.

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

TITLE VM22 PEDESTAL SUB-ASSEMBLY

APPLICATION PARTNER VI

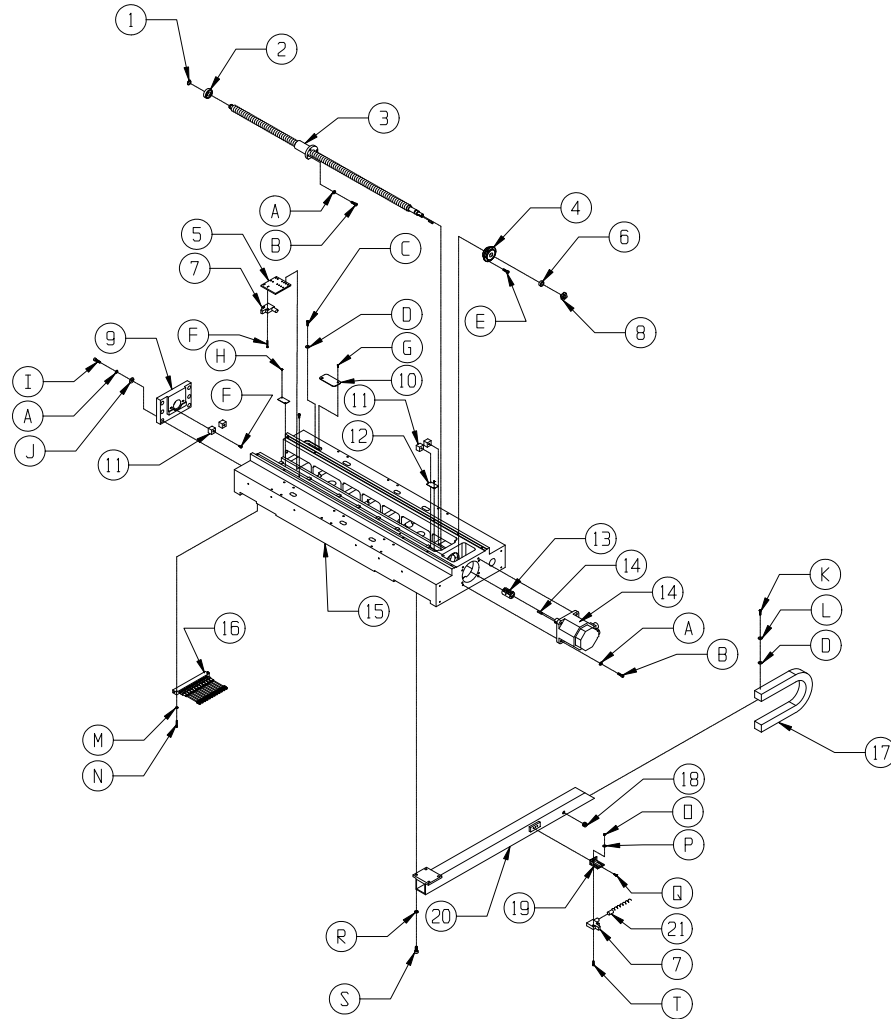
SCALE 16:1 DWG No. 6-10-027-028 SIZE B

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

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.

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

Machine Saddle Assembly

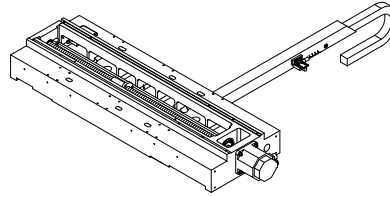


C	ADD MITSUBISHI TO LIST	6274		02/07
B	ADD BALL SCREW TABLE	5905	N.M.	02/05
A	ADD MOTOR, COUPLER TABLE	5726	N.M.	03/04
REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE

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	ENG No. 6-10-027-032	SIZE B	
X .X +/-	DATE 07 JUL 03	DRAWN BY DAHLKE	SHEET No. 1 of 2	
ANGLE +/-				

CERTAIN INFORMATION CONTAINED HEREIN 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.

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

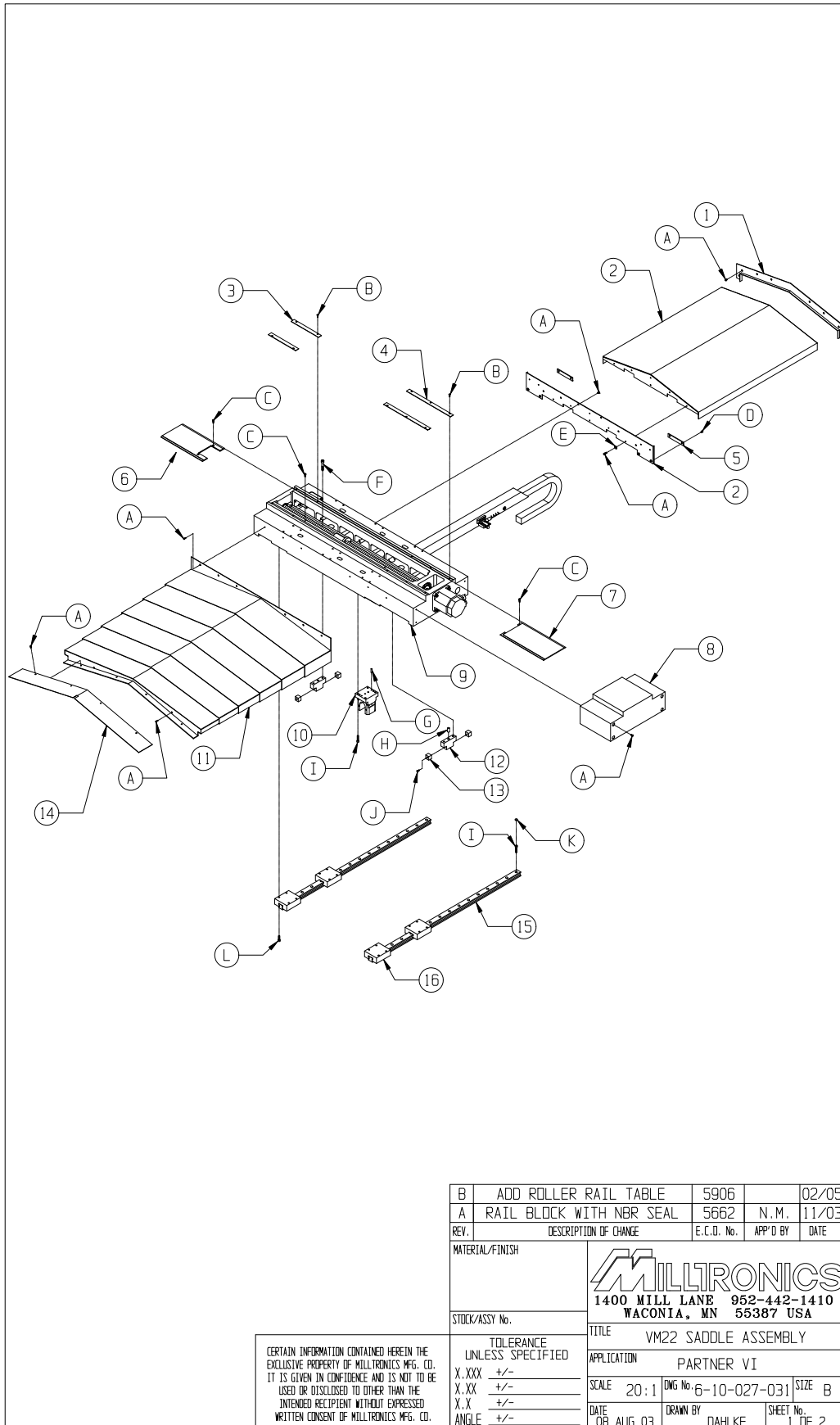
MOTOR & COUPLER LIST				
No.	YASKAWA	FANUC	SIEMENS	MITSUBISHI
13	MA-242 (.9kw)	MA-242	MA-260	MA-260
	MA-241 (1.5kw)			
14	MD-125 (.9kw)	8Nm A06B-0227-B200	11Nm 1FK7063-5AF71-1EA0	MD-184 (1.5kw)
	MD-127 (1.5kw)			

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.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.		TITLE VM22 SADDLE SUB-ASSEMBLY		
TOLERANCE UNLESS SPECIFIED		APPLICATION PARTNER VI		
		SCALE 20:1	DWG No. 6-10-027-032	SIZE B
		DATE 07 JUL 03	DRAWN BY DAHLKE	SHEET No. 2 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.

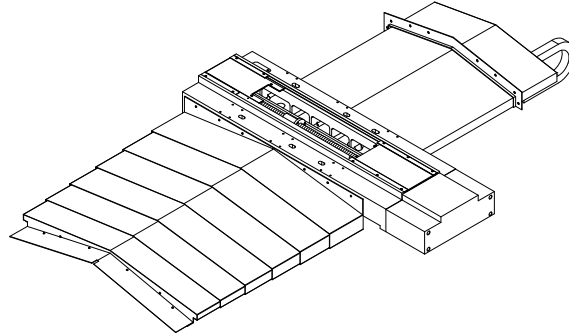
Saddle & Way Cover Assembly



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.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 ASSEMBLY		
X.XXX +/-		APPLICATION PARTNER VI		
X.XX +/-		SCALE 20:1 DWG No. 6-10-027-031 SIZE B		
X.X +/-		DATE 08 AUG 03 DRAWN BY DAHLKE SHEET No. 1 OF 2		
ANGLE +/-				

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.

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


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

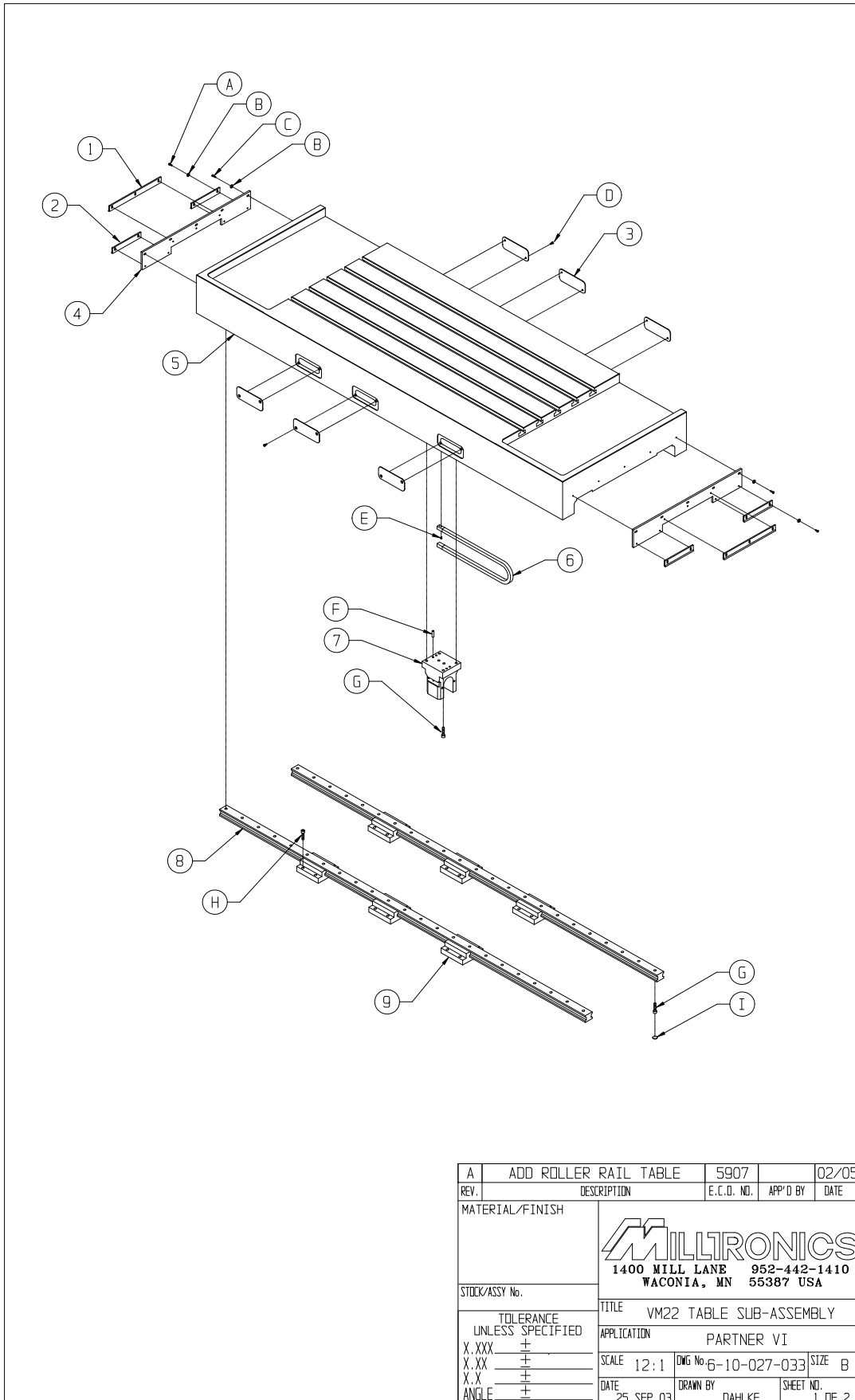
BALL & ROLLER RAIL TABLE

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

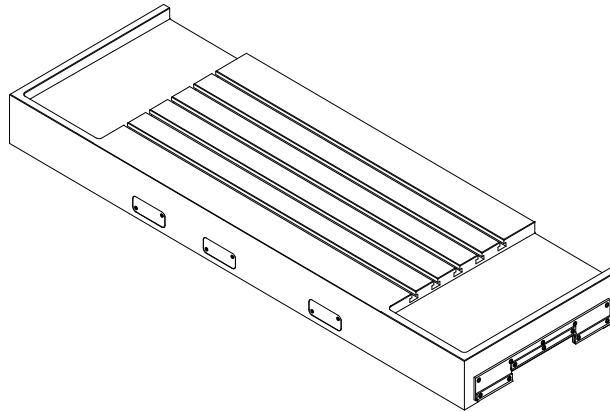
CERTAIN INFORMATION CONTAINED HEREIN IS THE EXCLUSIVE PROPERTY OF MILLTRONICS MFG. CO. IT IS GIVEN IN CONFIDENCE AND IS NOT TO BE USED OR DISCLOSED TO OTHER THAN THE INTENDED RECIPIENT WITHOUT EXPRESSED WRITTEN CONSENT OF MILLTRONICS MFG. CO.

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 +/-		SIZE B		
ANGLE +/-		DATE 08 AUG 03 DRAWN BY DAHLKE		
		SHEET No. 2 OF 2		

Milling Table Assembly



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
X.X ±		DATE 25 SEP 03		SIZE B
ANGLE ±		DRAWN BY DAHLKE		SHEET NO. 1 OF 2


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

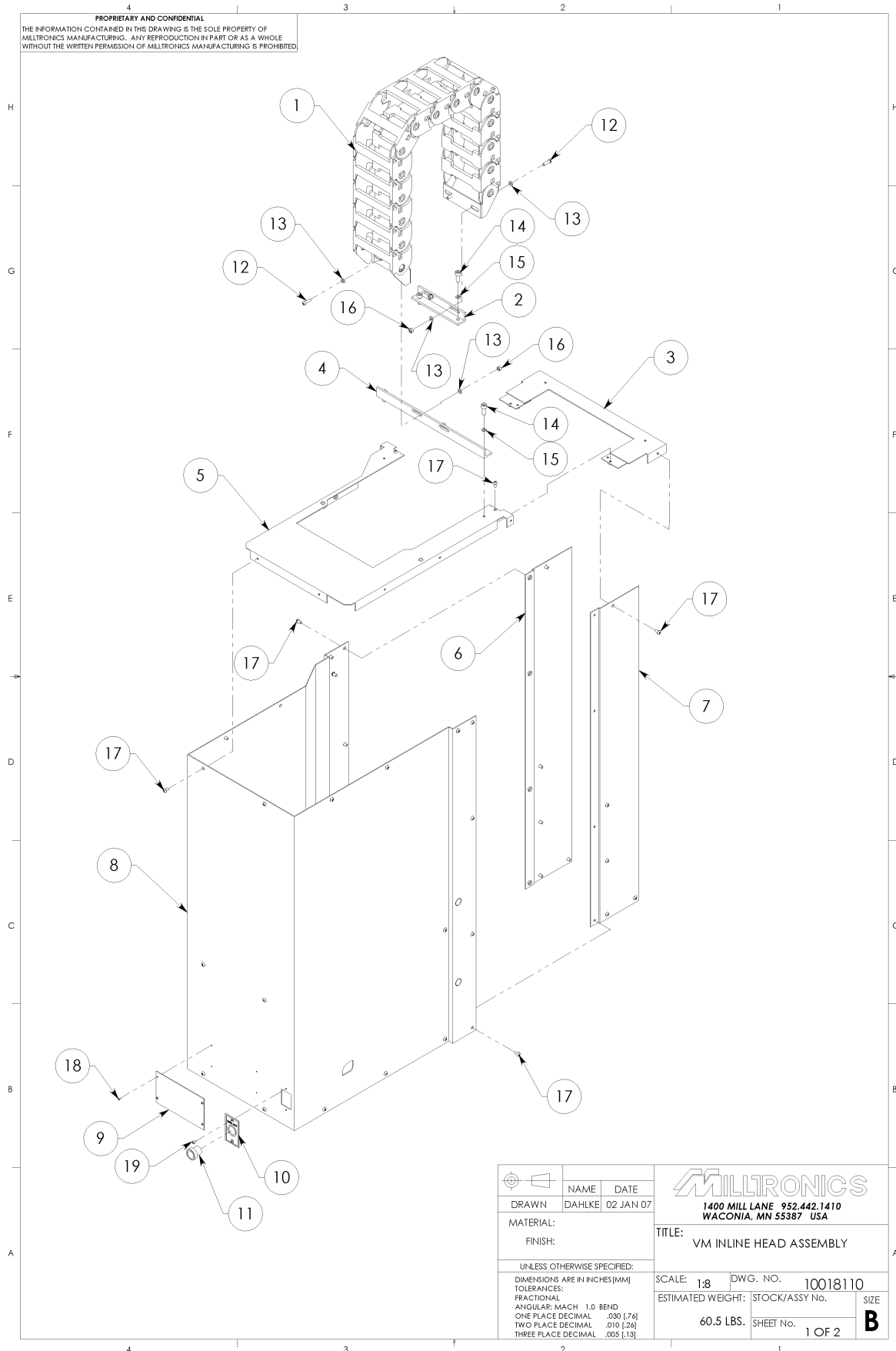
No.	DESCRIPTION	PART No.
8	BALL RAIL	MP6-202
	ROLLER RAIL	MP-830
9	BALL RAIL BLOCK	MP-641
	ROLLER RAIL BLOCK	MP-815

HARDWARE LIST

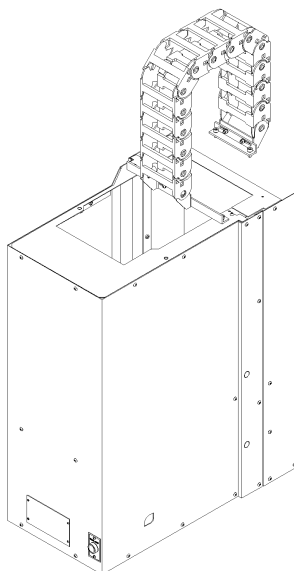
No.	QTY	DESCRIPTION
A	14	M5-.8 x 10mm BHCS
B	24	M5 FLAT WASHER
C	10	M5-.8 x 15mm BHCS
D	12	M4-.7 x 8mm FHCS
E	2	M3-.5 x 5mm BHCS
F	2	1/4 x 1 DOWEL PIN
G	52	M8-1.25 x 40mm SHCS
H	24	M8-1.25 x 30mm SHCS
I	46	RAIL PLUGS

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.		TITLE VM22 TABLE SUB-ASSEMBLY		
TOLERANCE UNLESS SPECIFIED		APPLICATION PARTNER VI		
X.XXX ±		SCALE 12:1		DWG No 6-10-027-033
X.XX ±		DATE 25 SEP 03		SIZE B
X.X ±		DRAWN BY DAHLKE		SHEET NO. 2 OF 2
ANGLE ±				

Machine Head Assembly



PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MILLTRONICS MANUFACTURING. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MILLTRONICS MANUFACTURING IS PROHIBITED.



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	MP00443	MP00760 *	MP00760 *	MP00760 *
3	MP10461	MP60218	MP00633	MP00638
6	MP10459	MP60219	MP00634	MP00637
7	MP10460	MP60217	MP00632	MP00636

* XP MACHINES USE MP-850 CABLE TRACK.

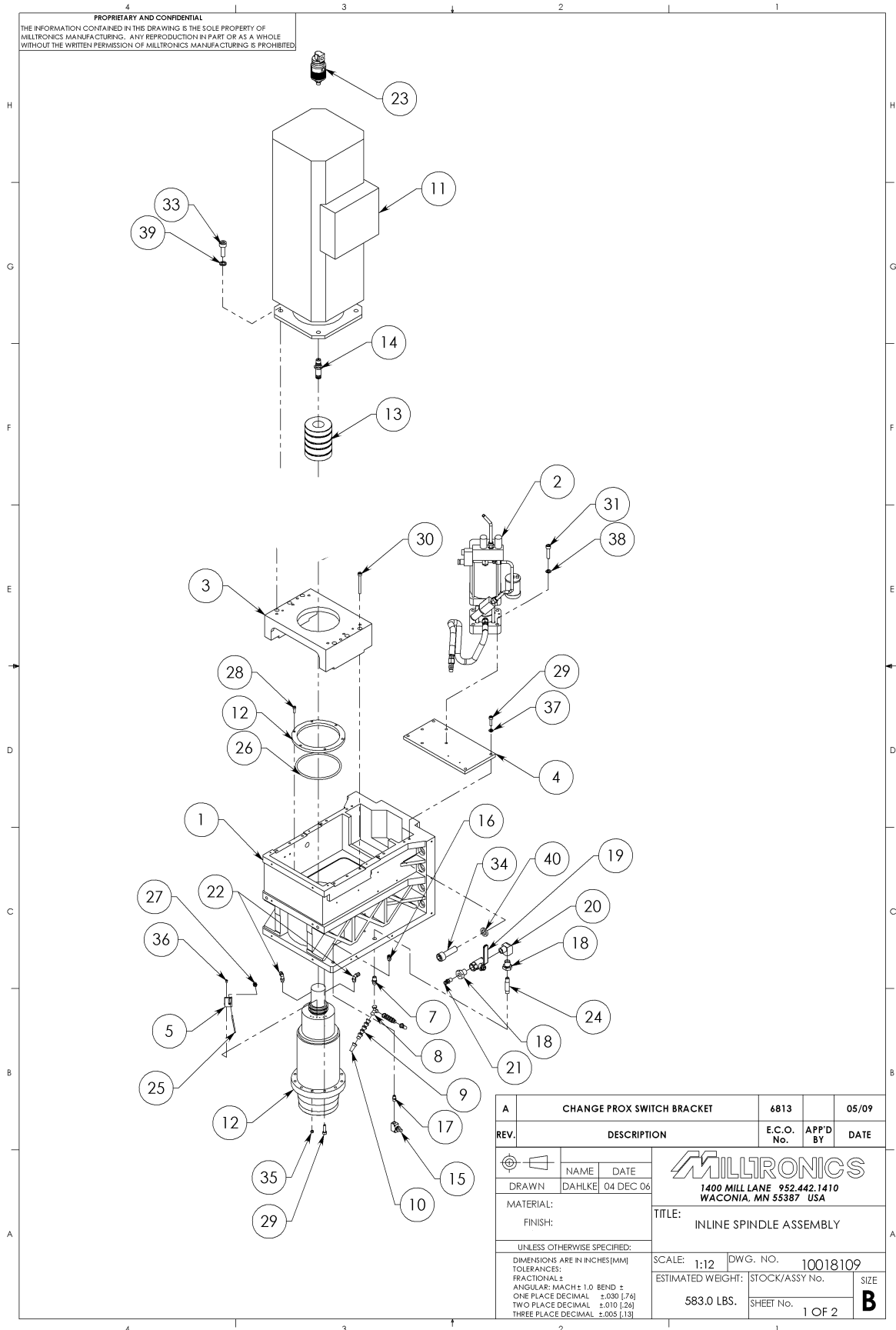
	NAME	DATE
DRAWN	DAHLKE	02 JAN 07
MATERIAL:		
FINISH:		
UNLESS OTHERWISE SPECIFIED:		
DIMENSIONS ARE IN INCHES (MM)		
TOLERANCES:		
FRACTIONAL		
ANGULAR: MACH 1.0 BEND		
ONE PLACE DECIMAL .030 [.76]		
TWO PLACE DECIMAL .010 [.26]		
THREE PLACE DECIMAL .005 [.13]		

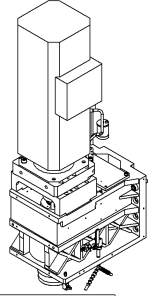


1400 MILL LANE 952.442.1410
WACONIA, MN 55387 USA

TITLE: VM INLINE HEAD ASSEMBLY	
SCALE: 1:12	DWG. NO. 10018110
ESTIMATED WEIGHT: 60.5 LBS.	STOCK/ASSY No. 2 OF 2
SIZE B	

Inline Spindle Assembly



PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MILLTRONICS MANUFACTURING. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MILLTRONICS MANUFACTURING IS PROHIBITED.				MOTOR COUPLER TABLE		
ITEM NO.	MOTOR-END		SPINDLE -END			
	HUB 1 DIA. (MM)		HUB 2 DIA. (MM)			
13	24		50			
	28		50			
	32		50			
	38		50			
	40		50			
	42		50			
	48		50			
	50		50			
55		50				

ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	MX00043	70mm HEAD-CASTING
2	1	10018108	AIR/OIL AMPLIFIER SYSTEM
3	1	SEE TABLE	VM INLINE SPINDLE PLATE
4	1	MP00951	AIR OIL AMPLIFIER (NU-388) MOUNTING PLATE
5	1	BR00166	SPINDLE PROX SWITCH BRACKET
7	1	MA00019	CONNECTOR LOC LINE .25"
8	1	MA00020	SNAP LOC 1/4" Y
9	44	MA00022	LOC-LINE LINKS 1/4
10	2	MA00216	LOC-LINE NOZZLE 1/4
11	1	SEE TABLE	SPINDLE MOTOR
12	1	SEE TABLE	SPINDLE MOTOR/COUPLER ASSEMBLY
13	1	SEE TABLE	MOTOR COUPLER
14	1	MP00958	CTS SPINDLE MOTOR CONNECTING TUBE (CTS OPTION)
15	1	NU00007	AIR RESTRICTOR
16	1	NU00017	COUPLING AIR 1/8"NPT X 1/4 TUBE
17	1	NU00024	1/8 NPT BRASS NIPPLE UNION
18	2	NU00028	1/2" NPT (MALE) - 1/4" NPT(FEMALE)
19	1	NU00064	1/2" NPT BALL VALVE
20	1	NU00125	1/2" STREET ELBOW
21	1	NU00139	FITTING 1/4NPT-1/2 BARB
22	2	NU00171	ELBOW - M/S 1/4 TUBE x 1/8NPT
23	1	NU00226	DEUBLIN COOLANT UNION
24	1	NU00263	NIPPLE .25NPT x 2.50
25	1	PR00050	PROX SWITCH
26	1	WX00270	70mm REAR CARTRIDGE SEAL O-RING
27	1	WX00358	PROX SWITCH RESTRAINT
28	6	SHCS M6-1.0 x 20	M6-1.0 x 20mm SHCS
29	10	SHCS M8-1.25 x 30	M8-1.25 x 30mm SHCS
30	6	SHCS M8-1.25 x 80	M8-1.25 X 80 SHCS
31	4	SHCS M10-1.5 x 45	M10-1.5 X 45mm SHCS
33	4	SHCS M14-2.0 x 45	M14-2.0 x 45mm SHCS
34	8	SHCS 3/4-10 x 2.5	3/4-10 x 2.5 SHCS
35	6	SHPP 1/8-28 BSPP	1/8-28 BSPP SHPP
36	2	BHCS M4-0.7 x 8	M4-0.7 x 8mm BHCS
37	4	WASHER LOCK M8	M8 LOCK WASHER
38	4	WASHER LOCK M10	M10 LOCK WASHER
39	4	WASHER LOCK M14	M14 LOCK WASHER
40	8	WASHER LOCK .75	3/4 LOCK WASHER

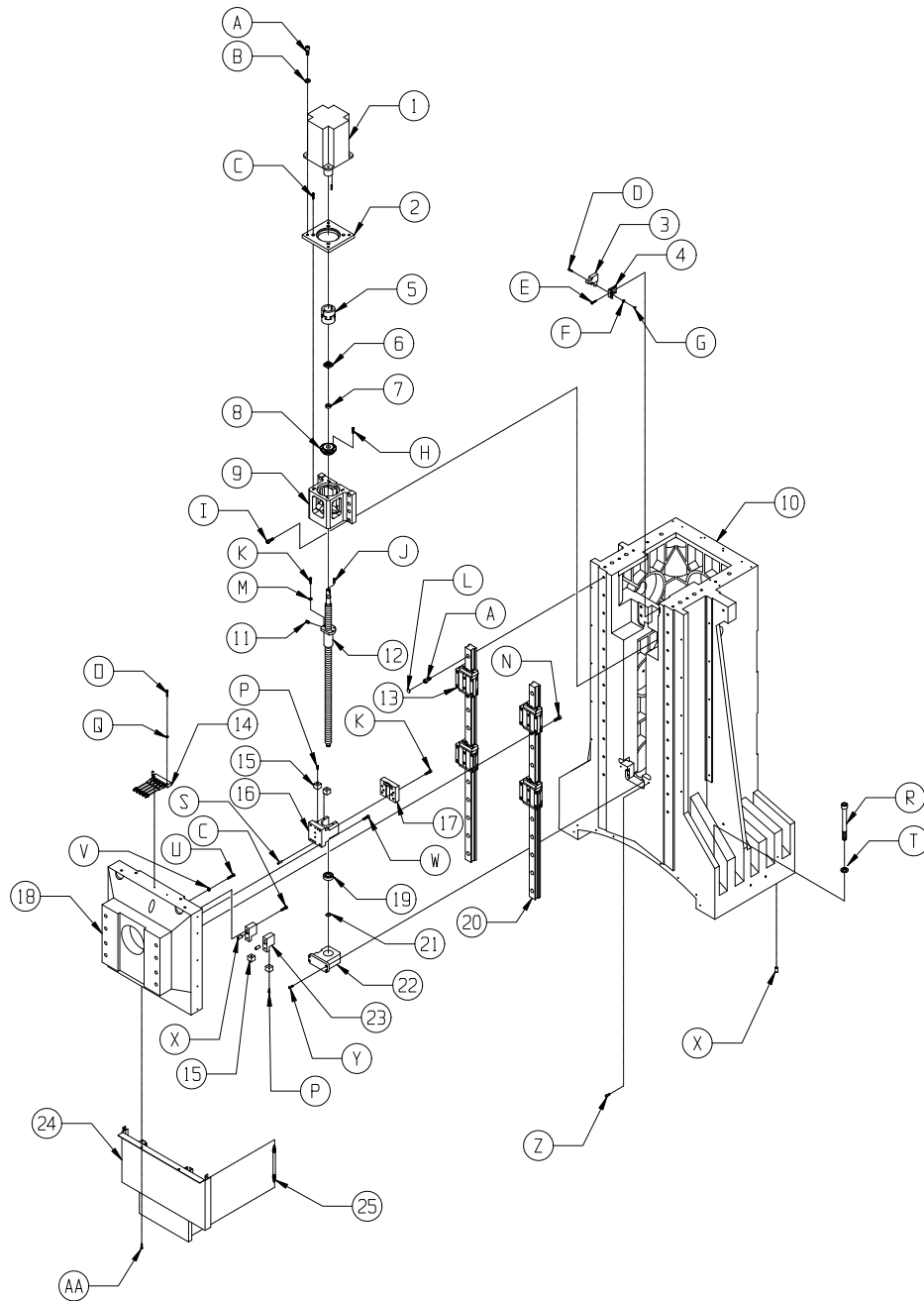
SPINDLE MOTOR TABLE		
ITEM NO.	STOCK NO.	DESCRIPTION
11	A06B-1477-B133#0121	FANUC
	A06B-1479-B133#0221	FANUC
	MO00166	MITSUBISHI
	MO00167	MITSUBISHI
	1PM 6137	SIEMENS
	1PM 6105	SIEMENS
1PM 6133	SIEMENS	

INLINE SPINDLE TABLE		
ITEM NO.	STOCK NO.	DESCRIPTION
12	MP00864	10K RPM
	MP00865	15K RPM

SPINDLE MOTOR MOUNTING PLATE TABLE		
ITEM NO.	STOCK NO.	DESCRIPTION
3	MX00081	7.5KW, MITSUBISHI/FANUC/SIEMENS
	MX00082	11KW MITSUBISHI/FANUC
	MXS0005	11KW SIEMENS

A	CHANGE PROX SWITCH BRACKET	6813	05/09
REV.	DESCRIPTION	E.C.O. No.	APP'D BY DATE
	NAME DATE		
DRAWN	DAHLKE 04 DEC 06	1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA	
MATERIAL:		TITLE:	
FINISH:		INLINE SPINDLE ASSEMBLY	
UNLESS OTHERWISE SPECIFIED:		SCALE: 1:16 DWG. NO. 10018109	
DIMENSIONS ARE IN INCHES (MM)		ESTIMATED WEIGHT: STOCK/ASSY No.	
TOLERANCES:		583.0 LBS. SHEET No. 2 OF 2	
FRACTIONAL ±		SIZE	
ANGULAR: MACH ± 1.0 BEND ±		B	
ONE PLACE DECIMAL ±.030 [.76]			
TWO PLACE DECIMAL ±.010 [.25]			
THREE PLACE DECIMAL ±.005 [.13]			

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.D. No.	APP'D BY	DATE

MATERIAL/FINISH

STOCK/ASSY No.

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



TITLE VM22 COLUMN SUB-ASSEMBLY

APPLICATION PARTNER VI

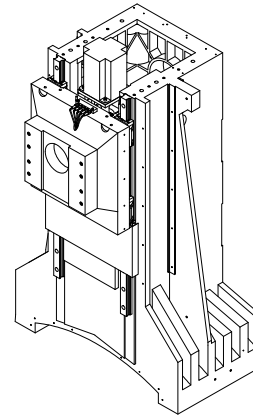
SCALE 20:1 DWG No. 6-10-027-030 SIZE B

DATE 07 JUL 03 DRAWN BY DAHLKE SHEET No. 1 OF 2

CERTAIN INFORMATION CONTAINED HEREIN 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	POM 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.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 COLUMN SUB-ASSEMBLY

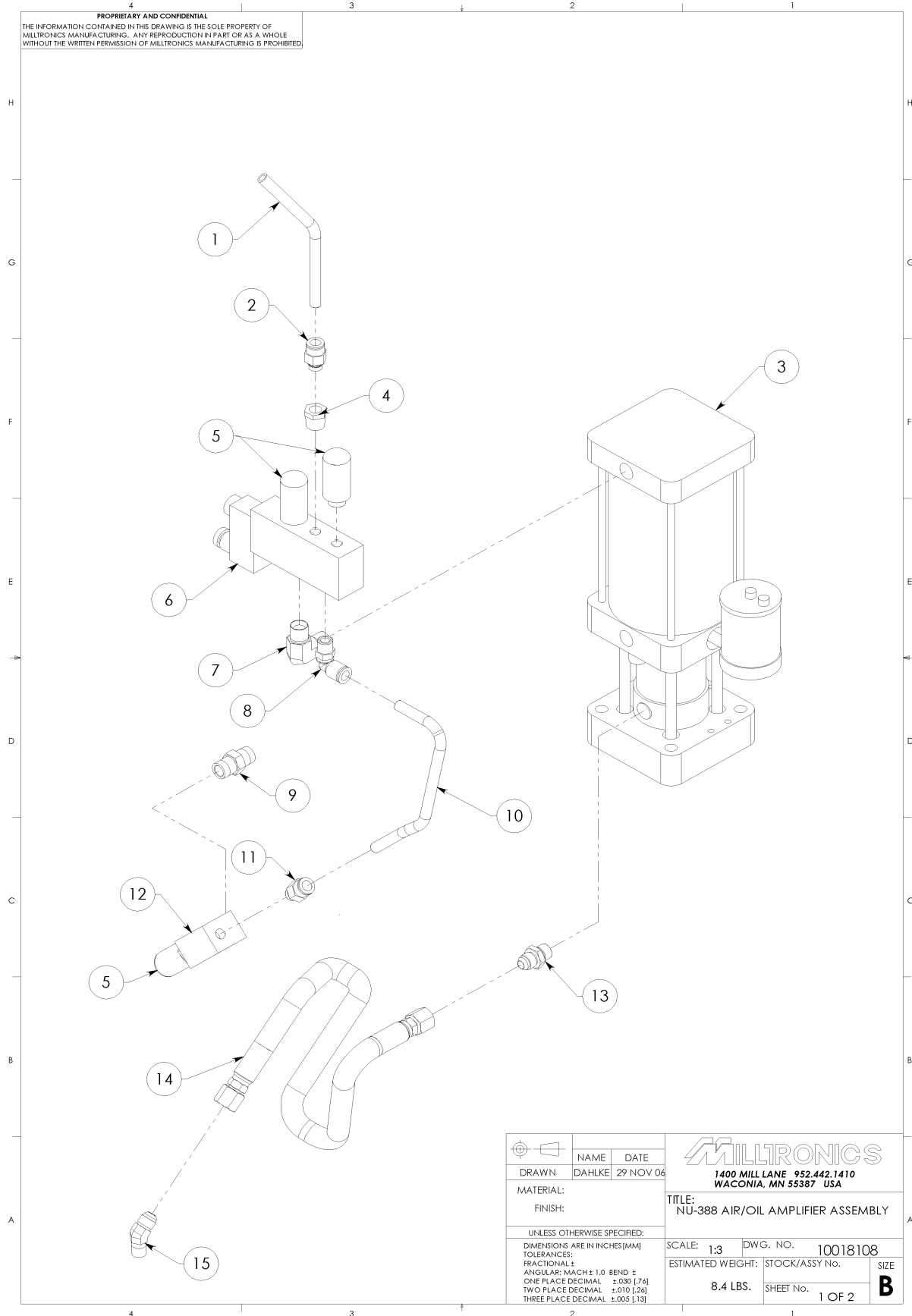
APPLICATION PARTNER VI

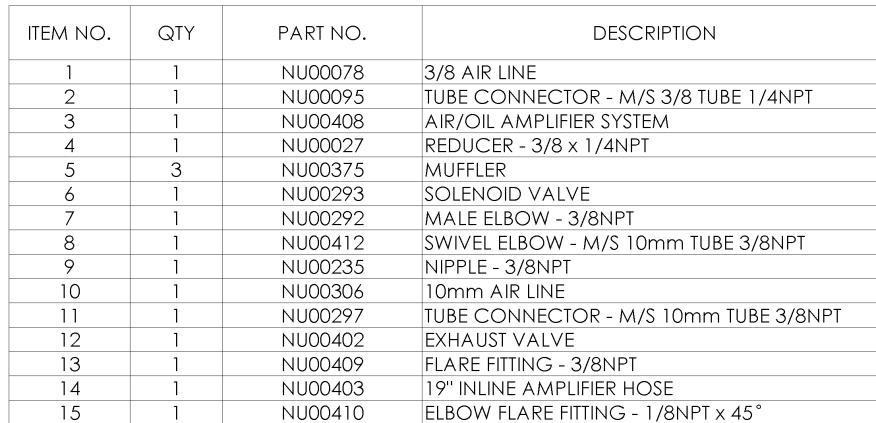
SCALE 20:1 DWG No. 6-10-027-030 SIZE B

DATE 07 JUL 03 DRAWN BY DAHLKE SHEET No. 2 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.

Power Drawbar Cylinder Assembly



Rev.3

Spindle Motor and Pulley Assembly

SPINDLE MOTORS		
No.	STOCK No.	DESCRIPTION
1	MD-121	18 kW UAASKD-19LYA41 - YASKAWA
	MD-132	11 kW UAASKD-11LYA41 - YASKAWA
	MD-131	7.5 kW UAASKD-08LYA21 - YASKAWA
	MD-114	7.5 kW UAASKA-08FZ1 - YASKAWA
	MD-150	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

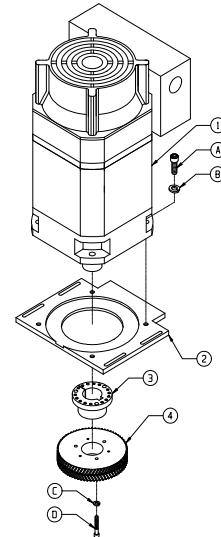
MOTOR PLATES		
No.	STOCK No.	DESCRIPTION
2	MP-548	MD-121 & MD-131 & MD-132 - YASKAWA 12 kW & 22 kW - FANUC
	MP-587	MD-114 & MD-150 - YASKAWA (8 kW - FANUC)
	MPB-45	MD-114 & MD-150 - YASKAWA (BRIDGE MILL ONLY)
	MPB-40	MD-131 & MD-132 - YASKAWA (BRIDGE MILL ONLY)
	SMN-08	11 kW - SIEMENS
	SMN-61	7.5 kW - SIEMENS & 8 kW - FANUC
	SMN-62	11 kW & 18.5 kW - SIEMENS
	MPTT-45	15 kW - FANUC

BUSHINGS		
No.	STOCK No.	DESCRIPTION
3	PY-97	48mm ID SK BUSHING(USED WITH MD-121, MD-131, MD-132, MD-150 - YASKAWA) (8 kW & 12 kW - FANUC)
	PY-184	32mm ID SK BUSHING(USED WITH MD-114 - YASKAWA)
	PY-215	55mm ID SK BUSHING(USED WITH 16 kW - SIEMENS & 22 kW - FANUC)
	PY-216	38mm ID SK BUSHING(USED WITH 7.5 kW - SIEMENS & 8 kW - FANUC)
	PY-217	42mm ID SK BUSHING(USED WITH 11 kW & 18.5 kW - SIEMENS)

SPINDLE MOTOR PULLEYS								
No.	RPM	7.5 kW MD-114	11 kW MD-150	7.5 kW MD-131	11 kW MD-132	18 kW MD-121	FANUC	SIEMENS
4	6K/8K	PY-201	PY-201	PY-192	PY-192	PY-192	PY-192	PY-192
	12K/15K	PY-188	PY-188	PY-188	PY-188	PY-188	PY-188	PY-188

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



I	ADD TO CHART	6314		03/07
H	EDIT CHART	5953	N.M.	05/05
G	ADD MD-150	5826	N.M.	11/04
F	MODIFY CHART	5697	N.M.	01/04
E	ADD MD-121 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		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X .XXX		SCALE 10:1 DWG No 6-10-018-089 SIZE B		
X .XX		DATE 04 AUG 00 DRAWN BY DAHLKE SHEET NO. 1 OF 1		
X .X				
ANGLE				

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.

PROPRIETARY AND CONFIDENTIAL

THE INFORMATION CONTAINED IN THE DRAWING IS THE SOLE PROPERTY OF MILLTRONICS MANUFACTURING. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MILLTRONICS MANUFACTURING IS PROHIBITED.

The diagram shows an exploded view of a thermal compensation assembly. Component 1 is a ball screw cap. Component 2 is a thermal compensation sensor mounted on a support bracket. Components 3 and 4 are thermal sensor rings. Component 5 is an X-axis thermal cover. Components 6, 7, 8, and 9 are screws used to secure the various parts of the 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	24 JAN 07

MATERIAL:

FINISH:

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES/DIN
TOLERANCES:
FRACTIONAL ±
ANGULAR: MAX ± 1.0 BOND ±
ONE PLACE DECIMAL ± 0.001 (7M)
TWO PLACE DECIMAL ± 0.0005 (4M)
THREE PLACE DECIMAL ± 0.0001 (2M)

MILLTRONICS
1400 MILL LANE 952.442.1410
WACONA, MN 55387 USA

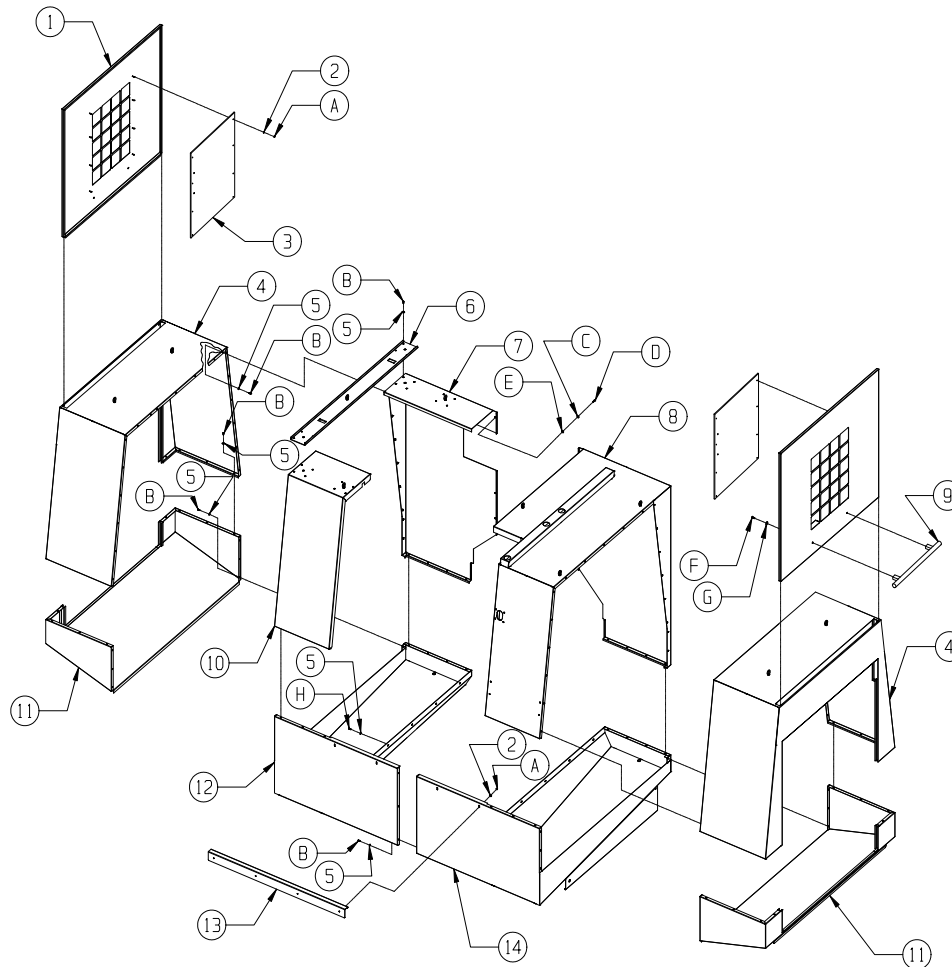
TITLE: THERMAL COMP ASSEMBLY

SCALE: 1X **DWG. NO.** 10018111

ESTIMATED WEIGHT: STOCK/ Assy No.
1.00 LBS. SHEET No. 1 OF 1

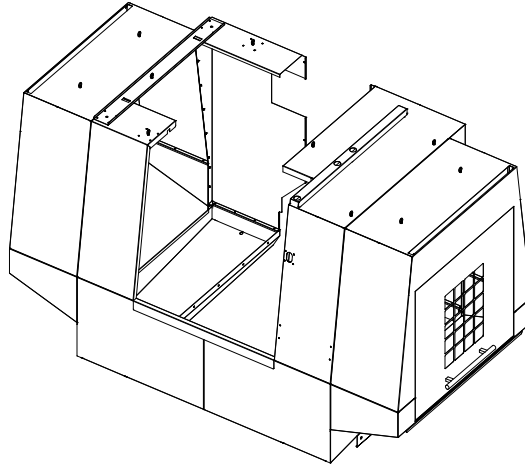
SIZE
B

Chip Pan Assembly



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 DWG No. 6-10-018-102 SIZE B		
X.X +/-		DATE 04 DEC 03 DRAWN BY DAHLKE SHEET No. 1 OF 2		
ANGLE +/-				

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	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

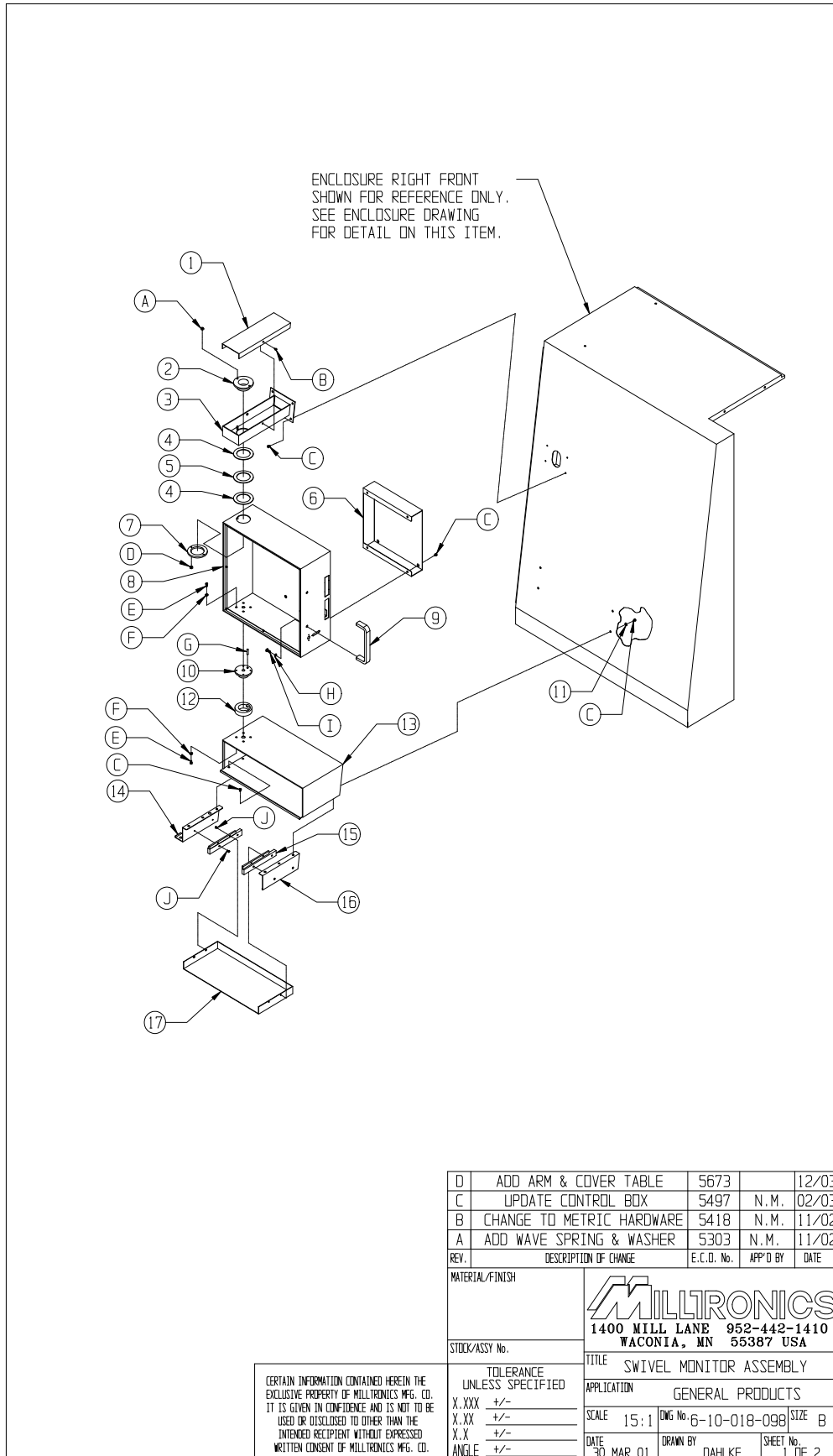
ENCLOSURE END TABLE

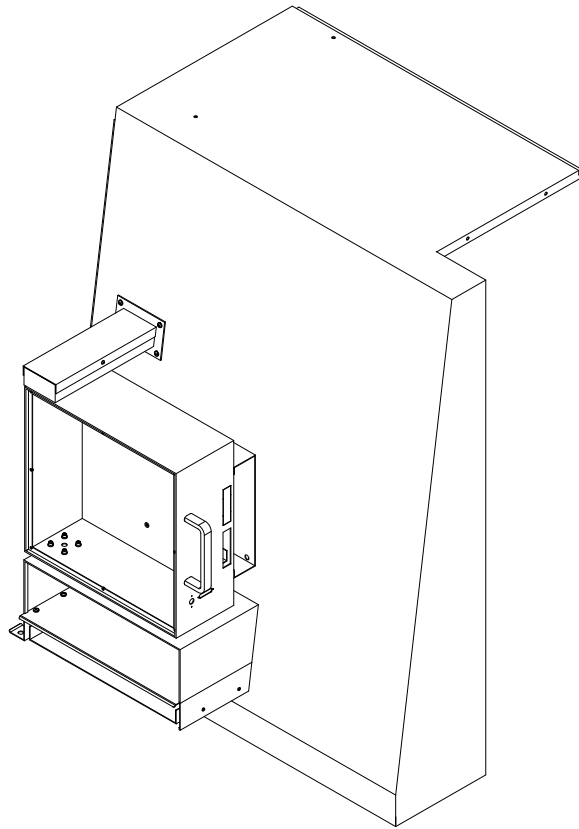
No.	VM22	VM25/30 (50"X)	VM25/30 (60"X)			
			TOP	LEFT	RIGHT	END
4	MP6-235	MP-744	MP7-88	MP7-90	MP7-91	MP7-92
11	MP6-236	MP-743	MP7-89			

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 GENRAL 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. 2 OF 2		
ANGLE +/-				

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.

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	WX-230	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

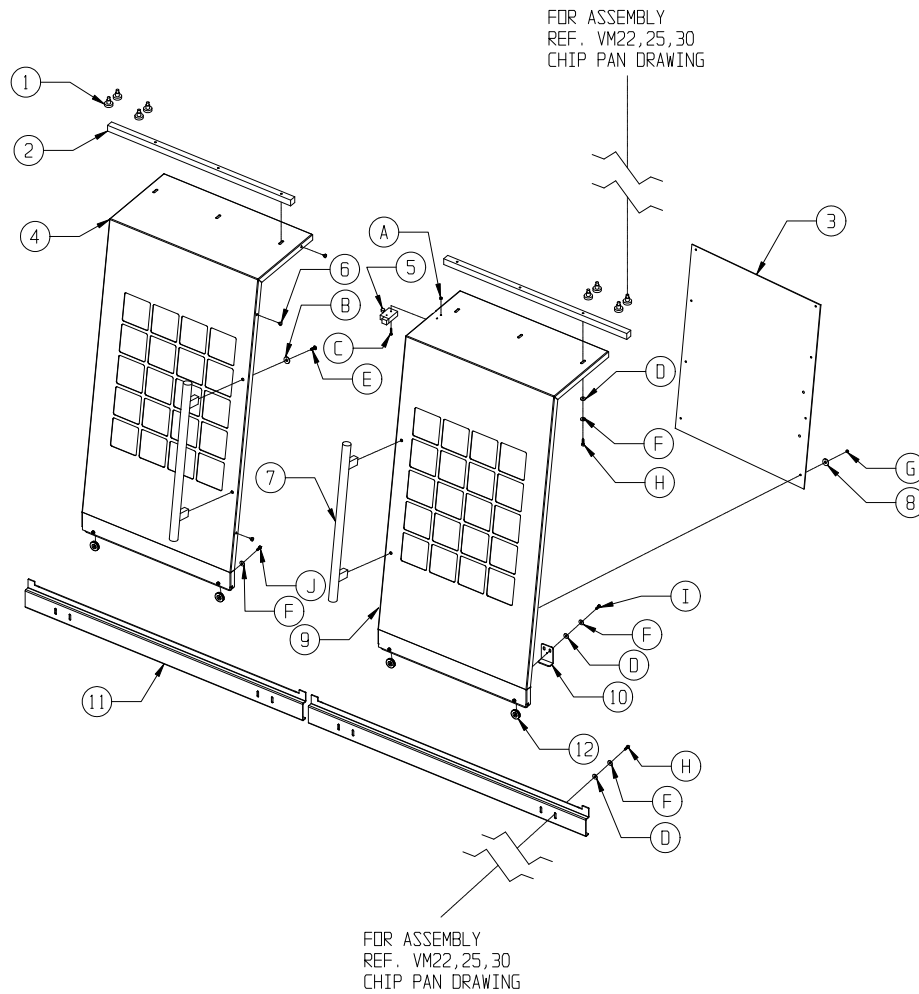
SWIVEL BOX TABLE

No.	CENT. 7	INT. CONTROL
8	MM-80	MPIC-03

CERTAIN INFORMATION CONTAINED HEREIN 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.

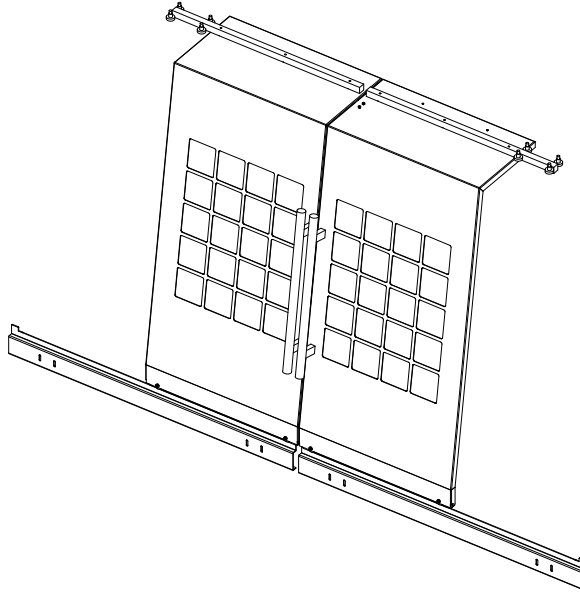
D	ADD ARM & COVER TABLE	5673		12/03
C	UPDATE CONTROL BOX	5497	N.M.	02/03
B	CHANGE TO METRIC HARDWARE	5418	N.M.	11/02
A	ADD WAVE SPRING & WASHER	5303	N.M.	05/02
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.		TITLE SWIVEL MONITOR ASSEMBLY		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X.XXX +/-		SCALE 10:1		DWG No. 6-10-018-098
X.XX +/-		DATE 30 MAR 01		SIZE B
X.X +/-		DRAWN BY DAHLKE		SHEET No. 2 OF 2
ANGLE +/-				

Chip Pan Door Assembly



CERTAIN INFORMATION CONTAINED HEREIN 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.

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

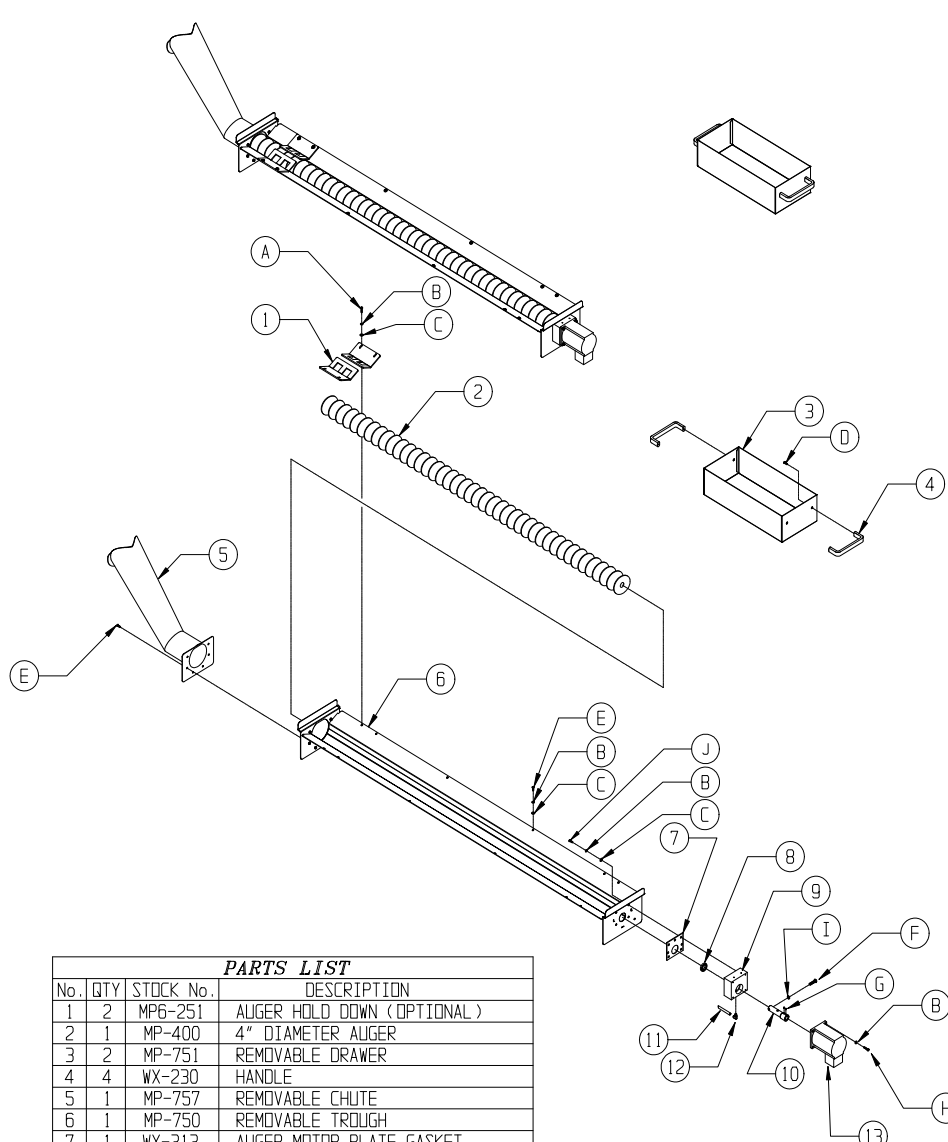
HARDWARE LIST

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.D. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.		TITLE VM22,25,30 DOOR ASSEMBLY		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X.XXX ±		SCALE 15:1		ENG No. 6-10-018-103 SIZE B
X.XX ±				
X.X ±				
ANGLE ±		DATE 11 DEC 03		DRAWN BY DAHLKE SHEET No. 2 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.

Chip Auger Assembly



PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	2	MP6-251	AUGER HOLD DOWN (OPTIONAL)
2	1	MP-400	4" DIAMETER AUGER
3	2	MP-751	REMOVABLE DRAWER
4	4	WX-230	HANDLE
5	1	MP-757	REMOVABLE CHUTE
6	1	MP-750	REMOVABLE TROUGH
7	1	WX-313	AUGER MOTOR PLATE GASKET
8	1	BG-69	BEARING CUP OIL SEAL
9	1	MP-440	BROTHER AUGER MOTOR MTG BRACKET
10	1	MP-441	BROTHER AUGER DRIVE SHAFT
11	1'	NU-25	1/4" NYLON TUBING
12	1	NU-171	MALE ELBOW 1/8 NPT 1/4 TUBE
13	1	MD-120	AUGER MOTOR

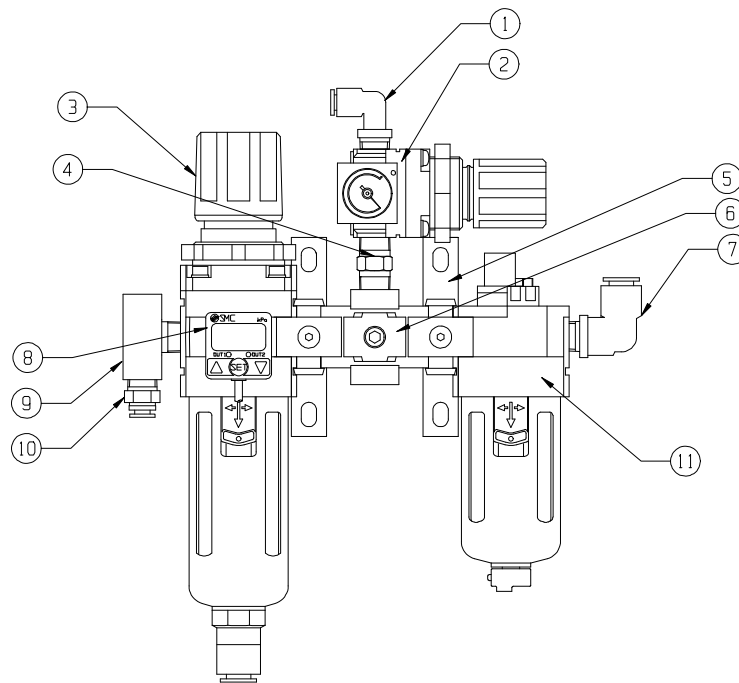
HARDWARE LIST

No.	QTY	DESCRIPTION
A	4	M6-1 x 16mm BHCS
B	20	M6 LOCK WASHER
C	16	M6 FLAT WASHER
D	8	M8-1.25 x 16mm BHCS
E	14	M6-1 x 12mm BHCS
F	2	M10-1.5 x 40mm BHCS
G	2	10-32 x 1/4 SHSS
H	4	M6-1 x 25mm SHCS
I	2	M10 LOCK WASHER
J	4	M6-1 x 20mm SHCS

D	CHANGE AUGER BOLTS	6754		03/09
C	CHANGE AUGER BOLTS SIZE	6752	N.M.	03/09
B	UPDATE HARDWARE LIST	6257	N.M.	01/07
A	ADD AUGER HOLD DOWN	6141	N.M.	07/06
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.		TITLE VM22,25,30 DRAWER/AUGER ASSEMBLY		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X.XXX	+/-	SCALE 20:1	DWG No. 6-10-018-101	SIZE B
X.XX	+/-	DATE 01 DEC 03	DRAWN BY DAHLKE	SHEET No. 1 OF 1
X.X	+/-			
ANGLE	+/-			

Air Filter / Lubricator / Filter Assembly

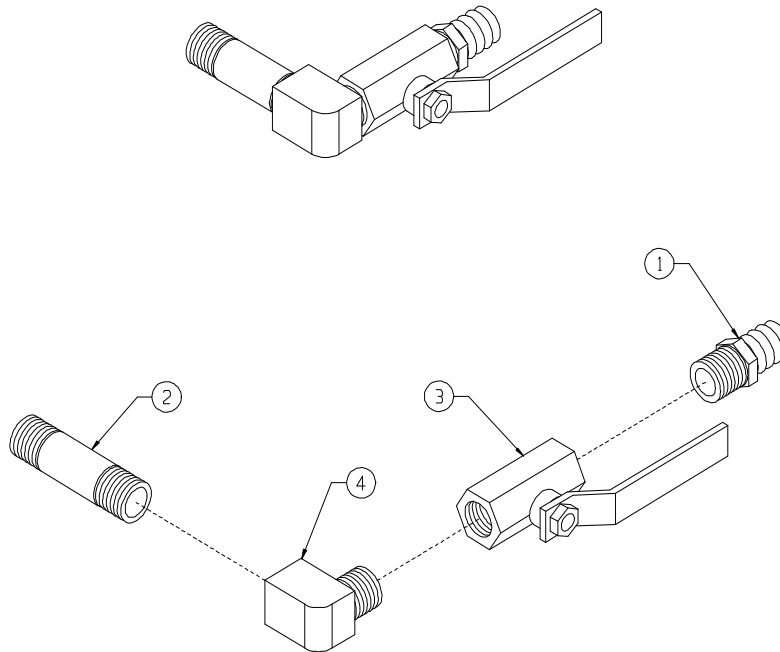
PARTS LIST			
ITEM	QTY	STOCK No.	DESCRIPTION
1	1	NU-199	1/4 NPT 3/8 TUBE SWIVEL ELBOW
2	1	NU-262	LOW PRESSURE REGULATOR W/GAGE
3	1	NU-212	LARGE FILTER/HIGH PRESSURE REGULATOR
4	1	NU-30	1/4 NPT PIPE NIPPLE
5	2	NU-210	LARGE MOUNTING SPACER
6	1	NU-211	LARGE MANIFOLD SPACER
7	1	NU-199	1/4 NPT 3/8 TUBE SWIVEL 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.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
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.		TOLERANCE UNLESS SPECIFIED X.XXX +/- X.XX +/- X.X +/- ANGLE +/-		
TITLE		NU-417 FRL ASSEMBLY		
APPLICATION		GENERAL PRODUCTS		
SCALE		3:1		Dwg No. 6-10-018-112
DATE		14 APR 08		DRAWN BY DAHLKE
				SHEET NO. 1:1

Flood Coolant Valve Handle Assembly

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



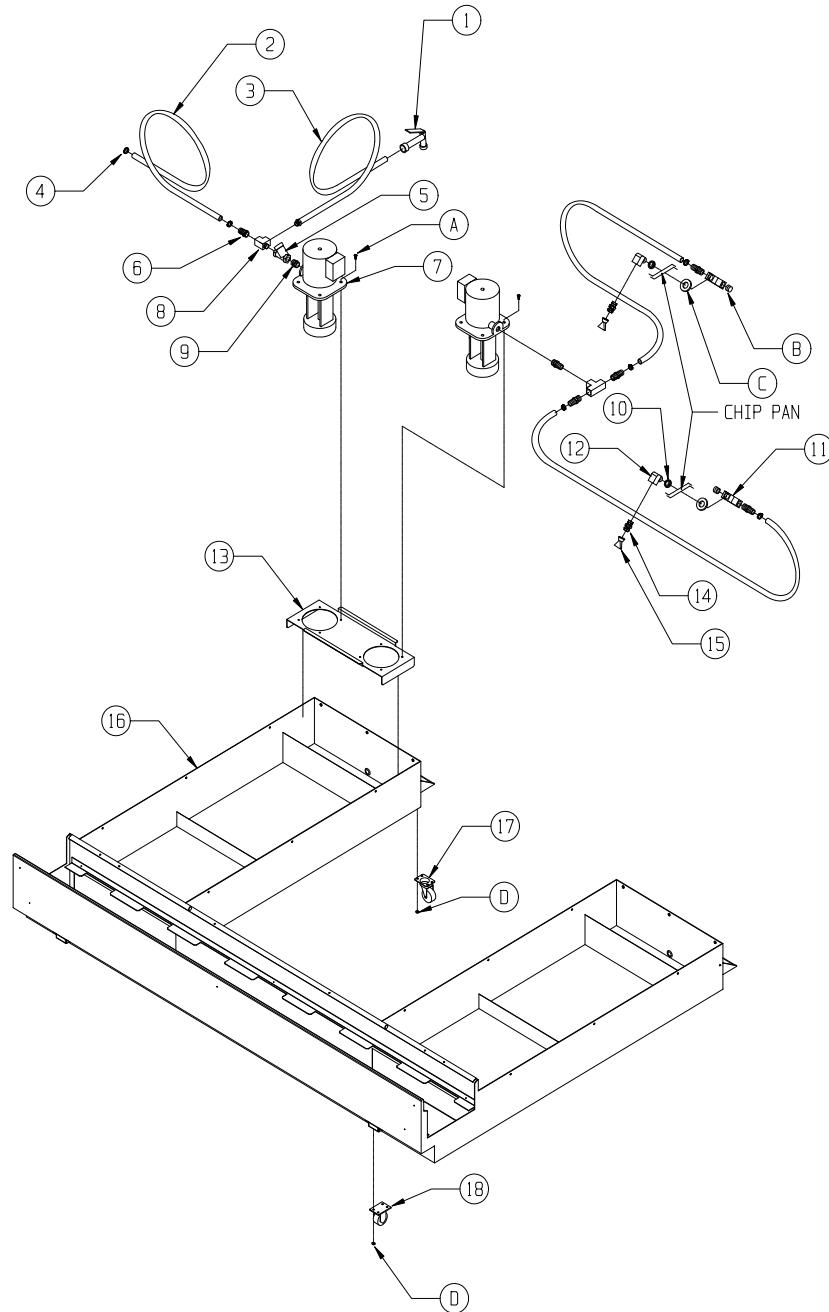
PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	NU-66	3/4" BARB FITTING
2	1	NU-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 ±				

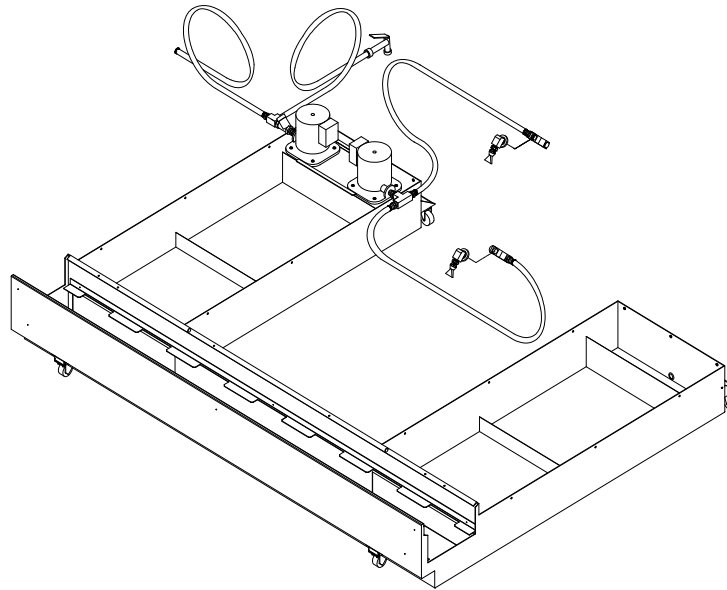
This page intentionally left blank

Coolant Tank With Washdown Assembly



A	ONE PIECE COOLANT TANK	6017		11/05
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 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		
ANGLE ±		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	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

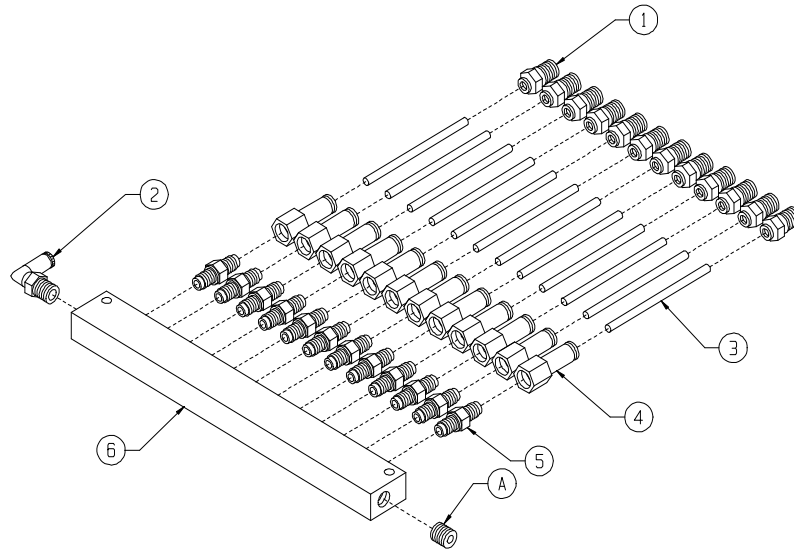
HARDWARE LIST

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

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.

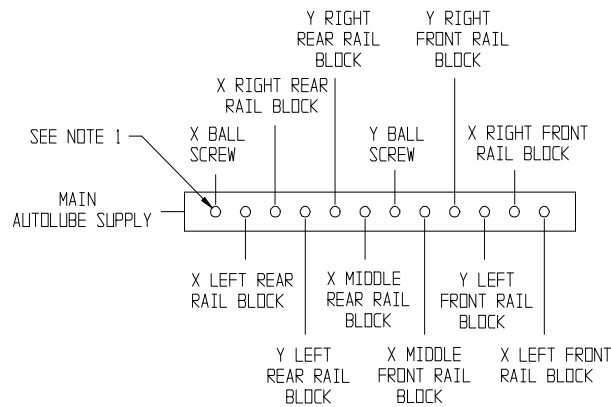
A	ONE PIECE COOLANT TANK	6017		11/05
REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE VM22,25,30 FLOOD TANK W/WASHDOWN ASSEMBLY		
X.XXX ±		APPLICATION GENERAL PRODUCTS		
X.XX ±		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.

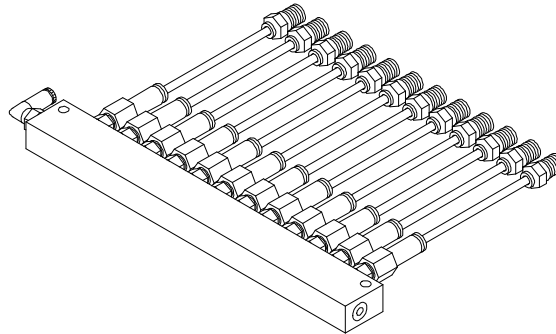


AUTOLUBE LINE DESTINATIONS

B	UPDATE OIL METER FITTINGS	6760		03/09
A	ADD FRAMES TO CHART	5996	N. M.	08/05
REV.	DESCRIPTION	E.C.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 ±		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 ±				

CERTAIN INFORMATION CONTAINED HEREIN 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.

*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

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

STOCK/ASSY No.

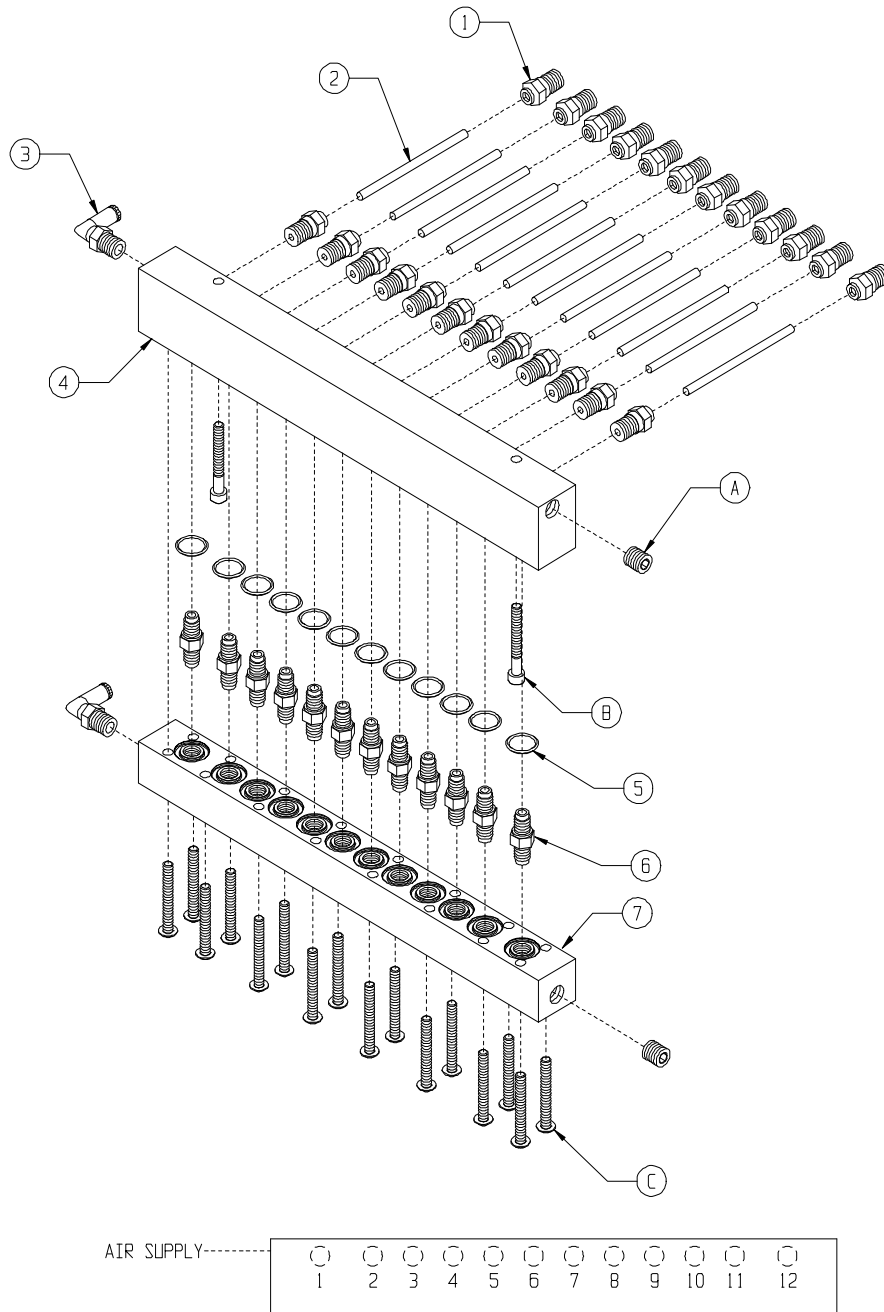
TOLERANCE UNLESS SPECIFIED
X .XXX
X .XX
X .X
ANGLE



TITLE	X & Y AXIS AUTOLUBE MANIFOLD ASSEMBLY		
APPLICATION	GENERAL PRODUCTS		
SCALE	2:1	DWG No. 6-10-018-049	SIZE B
DATE	25 JUL 97	DRAWN BY THOMPSON	SHEET NO. 2 OF 2

CERTAIN INFORMATION CONTAINED HEREIN 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.

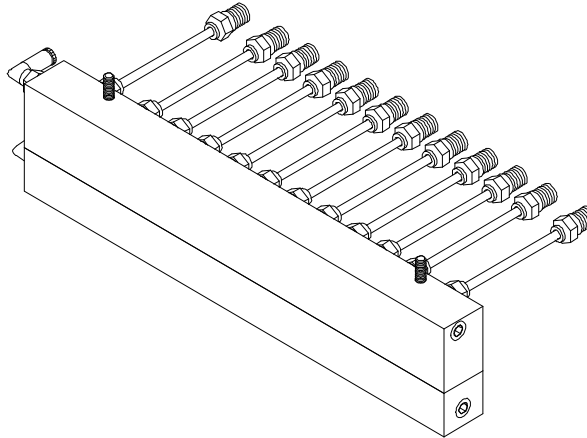
X & Y Axis Air/Oil Manifold Assembly



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

E	CHANGE TABLE	6060		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.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 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:

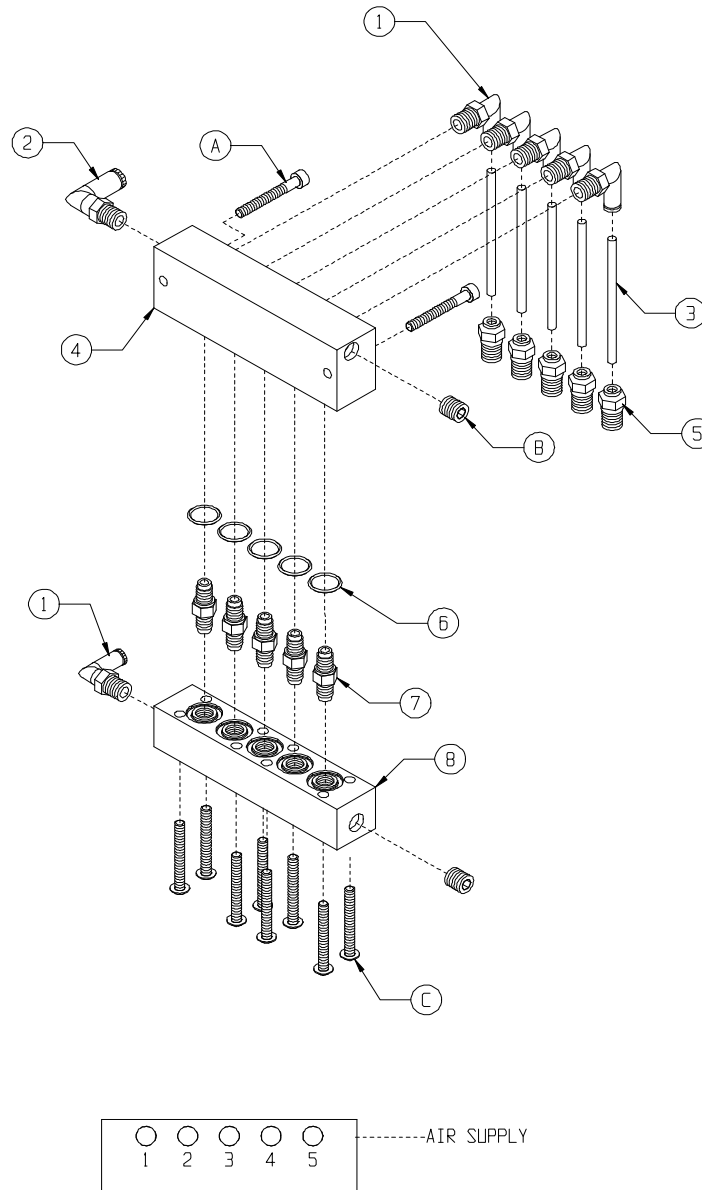
- IF REFERENCED WITH A (-) PLUG
AIR/OIL LINE HOLE AND OIL METER
HOLE IN MANIFOLD WITH 1/8 NPT PLUG.

HARDWARE LIST

No.	QTY	DESCRIPTION
A	2	1/8-27 NPT SHPP
B	2	10-32 x 1 1/2 SHCS
C	20	10-32 x 1 1/4 BHCS

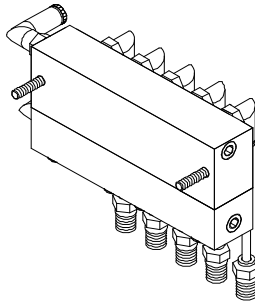
E	CHANGE TABLE	6060		01/06
D	ADD FRAMES	5995	N.M.	08/05
C	CHANGED METERS	4988	D.H.	02/01
B	ADD VMG17 TO NOTE	4729	N.M.	10/00
A	ADD VMG24 TO NOTE	4327	N.M.	12/99
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.			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

D	CHANGE TO ALL FRAMES	6002		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		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. 1 OF 2
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 BJNA 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

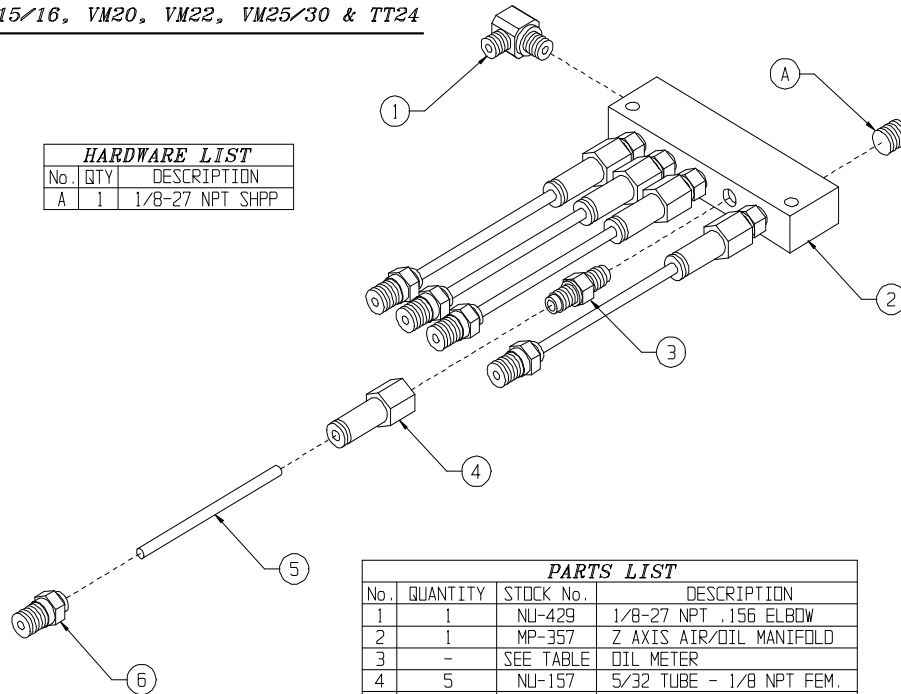
HARDWARE LIST		
No.	QTY	DESCRIPTION
A	2	10-32 x 1 1/2 SHCS
B	2	1/8-27 NPT SHPP
C	8	10-32 x 1 1/2 BHCS

D	CHANGE TO ALL FRAMES	6002		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



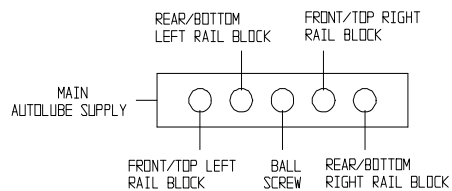
PARTS LIST			
No.	QUANTITY	STOCK No.	DESCRIPTION
1	1	NU-429	1/8-27 NPT .156 ELBOW
2	1	MP-357	Z AXIS AIR/OIL MANIFOLD
3	-	SEE TABLE	OIL METER
4	5	NU-157	5/32 TUBE - 1/8 NPT FEM.
5	SEE TABLE	NU-117	5/32 NYLON TUBING
6	5	SEE TABLE	5/32 TUBE-1/8 NPT M/S

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.

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.

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.				
TOLERANCE UNLESS SPECIFIED		TITLE 5 PORT AUTOLUBE MANIFOLD ASSEMBLY		
X .XXX ±		APPLICATION GENERAL PRODUCTS		
X .XX ±		SCALE 1.5:1 DWG No. 6-10-018-050 SIZE B		
X .X ±		DATE 20 AUG 97 DRAWN BY THOMPSON SHEET NO. 1 OF 1		
ANGLE ±				

Retention Knob Chart

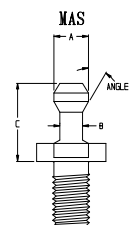
NOTE: STANDARD RETENTION KNOBS FOR 40 TAPER SPINDLES WITHOUT CTS

MAS RETENTION KNOBS STYLE CT-PLANGE 40 TAPER

ASSEMBLY SELECTION	DIMENSIONS				MILL/TRONICS		MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C	ANGLE	60mm SPINDLE		70mm SPINDLE					
4833	.59	39	1.27	60°	RH19, RH20, RH30, RH33, RH35, RW15, RW20E, BR50, BR60, BR80 VM15, VM16, VM20, VM22, VM25, VM30, VM15, VM16, VM20, VM22, VM25, VM30, VM16, VM20, VM25, VM30, VM24, TT40, VM25, VM30, VM18	RH20, RH30, RH33, RH35, BR50, BR60, BR80, VM16, VM20, VM22, VM25, VM30, VM16, VM20, VM25, VM30, TT24, TT40, VM20, VM35			RB4E-0002	RK3114A	PT-532-60	C40-6000

MAS RETENTION KNOBS STYLE BT-FLANGE 40 TAPER

ASSEMBLY SELECTION	DIMENSIONS				MILLITRONICS MACHINE		COMMAND PART No.	KENAMETAL PART No.	VALENTE PART No.	LYNDEX PART No.
	A	B	C	ANGLE	60mm SPINDLE					
					70mm SPINDLE					
4834	.59	39	1.38	60°	RH19, RH20, RH30, RH33, RH35, RW15, RW20E, BR50, BR60, BR80 VM15, VM16, VM20, VM22, VM25, VM30, VM15, VM16, VM20, VM20, VM25, VM30, VM16, VM20, VM20, VM25, VM30, TT24, TT40, VM25, VM30, VM16	RH20, RH30, RH33, RH35, BR50, BR60, BR80, VM16, VM20, VM22, VM25, VM30, VM16, VM20, VM20, VM25, VM30, TT24, TT40, VM25, VM30, VM16	RB4M-0002	RC1311A	PT-444-60	B40-0000



ENGLISH THREADS FOR V-FLANGE
METRIC THREADS FOR RT-FLANGE

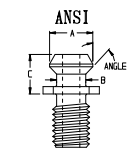
NOTE: STANDARD RETENTION KNOBS FOR 40 TAPER SPINDLES WITH CTS

ANSI RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

ASSEMBLY SELECTION	DIMENSIONS				MILLITRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENTE PART No.	LYNDEX PART No
	A	B	C	ANGLE	60mm SPINDLE	70mm SPINDLE				
4836	74	49	.64	45°	SELECTION NOT AVAILABLE	RH20, RH30, RH33, RH35, GR50, BR60, BR80, VM16, VM20, VM22, VM30, VM32, VM16, VM20, VM25, VM30, TT24, TT40, HMC20, HMC35	RC4E-0001	RK11122	PT-475C	[40-STD

ANSI RETENTION KNOBS STYLE BT-FLANGE 40 TAPER

ASSEMBLY SELECTION	DIMENSIONS				MILLITRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENTE PART No.	LYNDEX PART No.
	A	B	C	ANGLE	60mm SPINDLE	70mm SPINDLE				
4837	.74	.49	.75	45°	SELECTION NOT AVAILABLE	RH20, RH30, RH33, RH55, BR50, BR60, VM30, VM16, VM20, VM22, VM25, VM30, VM16, VM20, VM25, VM30, TT24, TT40, HMC20, HMC35	RS4M-0115	RK11126A	N/A	B40-FADAL



ENGLISH THREADS FOR V-FLANGE
METRIC THREADS FOR RT-FLANGE

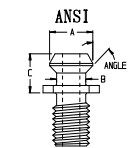
NOTE: STANDARD RETENTION KNOBS FOR 50 TAPER SPINDLES WITH OR WITHOUT CTS

ANSI RETENTION KNOBS STYLE CT-FLANGE 50 TAPER

ASSEMBLY SELECTION	DIMENSIONS				MILLITRONICS MACHINE	COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C	ANGLE					
N/A	1.14	.83	1.00	45°	VM22XP, VM25XP, VM30XP, RH33XP, RH35XP, HMC70	RCBE-0001	DWG RK11144	N/A	C50-ST0

ANSI RETENTION KNOBS STYLE BT-FLANGE 50 TAPER

ASSEMBLY SELECTION	DIMENSIONS				MILLITRONICS MACHINE	COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C	ANGLE					
N/A	1.14	.83	1.00	45°	VM22XP, VM25XP, VM30XP, RH33XP, RH35XP, HMC70	RSEM-0105	DWG RK11144A	N/A	N/A



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

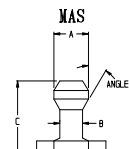
NOTE: OPTIONAL RETENTION KNOBS FOR 40 TAPER SPINDLES

MAS RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

ASSEMBLY SELECTION	DIMENSIONS				MILL/TRONICS MACHINE		COMMAND PART No.	KENAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C	ANGLE	60mm SPINDLE	70mm SPINDLE				
4831	59.39	1.27	45°	SELECTION NOT AVAILABLE		RH20, RH30, RH33, RH35, GR50, BR60, BR80, VM16, VM20, VM22, VM25, VM30, VM16, VM20, VM25, VM30, TT24, TT40, HMC20, HMC35	RB4E-0001	RK31114	PT-532-45	C40-4500

MAS RETENTION KNOBS STYLE BT-FLANGE 40 TAPER

ASSEMBLY SELECTION	DIMENSIONS				MILL/TRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C	ANGLE	60mm SPINDLE	70mm SPINDLE				
4832	.59	.39	1.38	45°	SELECTION NOT AVAILABLE	RH20, RH30, RH33, RH35, BR50, BR60, BR80, VM16, VM20, VM22, VM25, VM30, VMC16, VMC20, VMC25, VMC30, TT24, TT40, HMC20, HMC35	RB4M-0001	RIK1133	PT-444-45	B40-4500



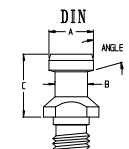
ENGLISH THREADS FOR V-FLANGE
METRIC THREADS FOR BT-FLANGE

DIN 69872 RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

ASSEMBLY SELECTION	DIMENSIONS				MILL/TRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C	ANGLE	50mm SPINDLE	70mm SPINDLE				
4838	.75	.55	1.02	75°	SELECTION NOT AVAILABLE	RH20, RH30, RH33, RH35, BR50, BR60, BR80, VM16, VM20, VM22, VM25, VM30, VM16, VMC20, VMC25, VMC30, TT24, TT40, HMC20, HMC35	RS4E-014-C	DWG RK71125	N/A	C40-1500

DIN 69872 RETENTION KNOBS STYLE DIN-FLANGE 40 TAPER

ASSEMBLY SELECTION	DIMENSIONS				MILL/TRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C	ANGLE	60mm SPINDLE	70mm SPINDLE				
4839	75	55	1.02	75°	SELECTION NOT AVAILABLE	RH20, RH30, RH33, RH35, BR50, BR60, BR80, VM16, VM20, VM22, VM25, VM30, VM16, VM20, VM25, VM30, TT24, TT40, HMC20, HMC35	RS4M-014-C	DWG RK71124	N/A	B40-1500



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

NOTES:

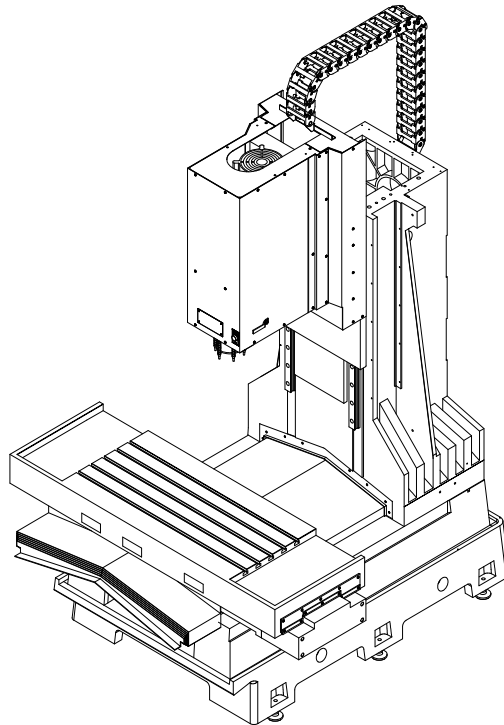
1. FOR SPINDLES OF 8000 RPM AND GREATER YOU MUST USE BALANCED TOOLING TO A G2.5 SPEC. OR IT WILL VOID THE SPINDLE WARRANTY.
2. CHART IS GOOD FOR ALL MACHINE VERSIONS LISTED FROM ECO DATE REV. G ON THIS DRAWING.

H	ADD VM22XP, RH33XP FRAMES TO 50 TAPER	6715		01/09
F	ADD MM18 AND MOVE HMC70 FRAMES TO 50 TAPER	6193	N.M.	10/06
G	ADD VMC, TT, AND HMC FRAMES	6175	N.M.	09/06
E	UPDATE CHART	5992	M.N.	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
 1400 WILLY LAKE RD. 850-442-1410 PHOENIX, AZ 85021		TITLE RETENTION KNOB CHART		SCALE 1.75:1
APPLICATION		GENERAL PRODUCTS	DATE 30 APR 99	DRAWN BY PAH KF
				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 / DILER 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, ng 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,	PASS
ASTM D 665, A & B	
COLOR, ASTM D1500, max	3.5
FZG GEAR TEST STAGES	12
PASSED DIN 51534	

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	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

