



MILLTRONICS USA®
LET'S INVENT

VM16R Mechanical

11-30-2015
Rev 3

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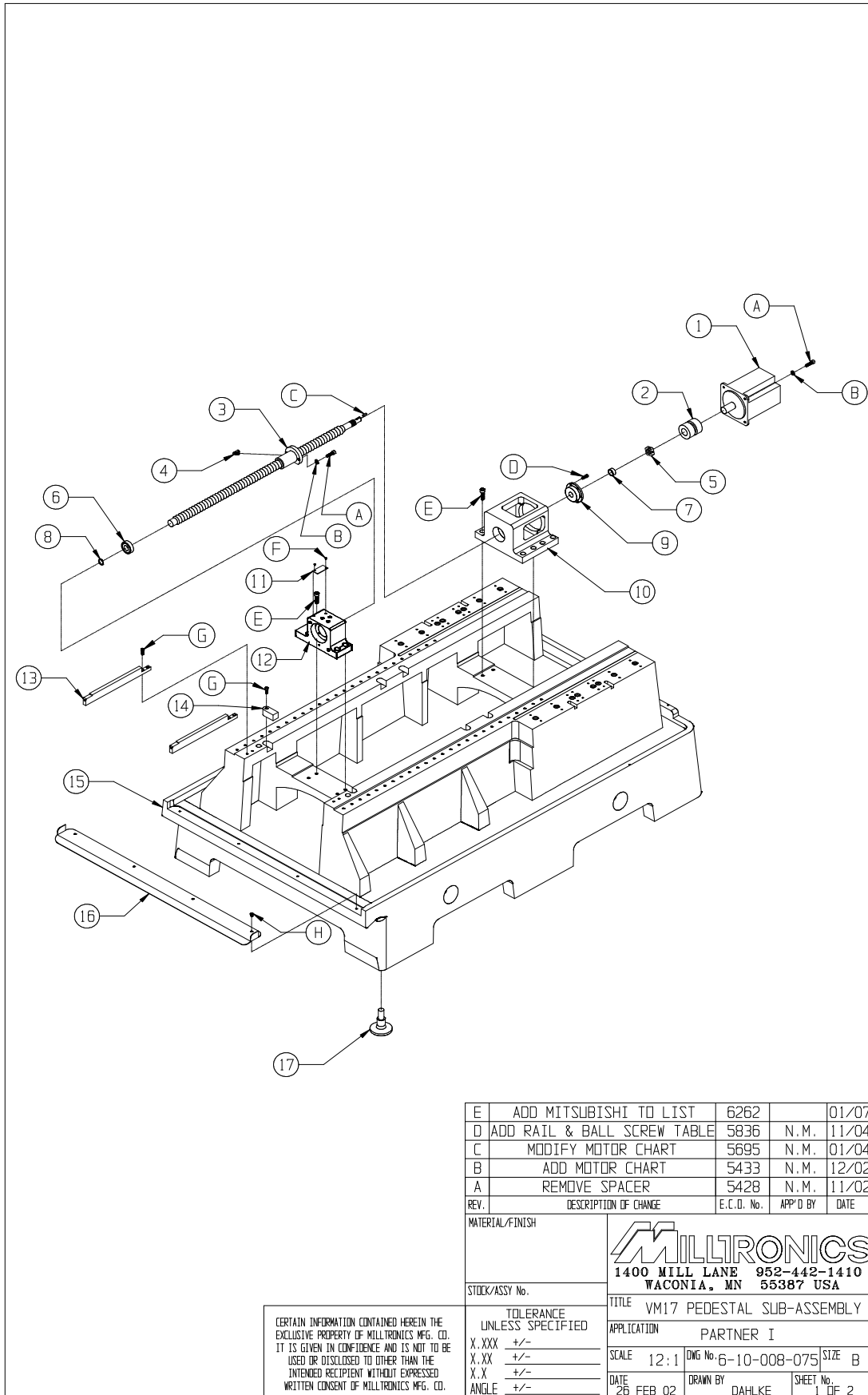
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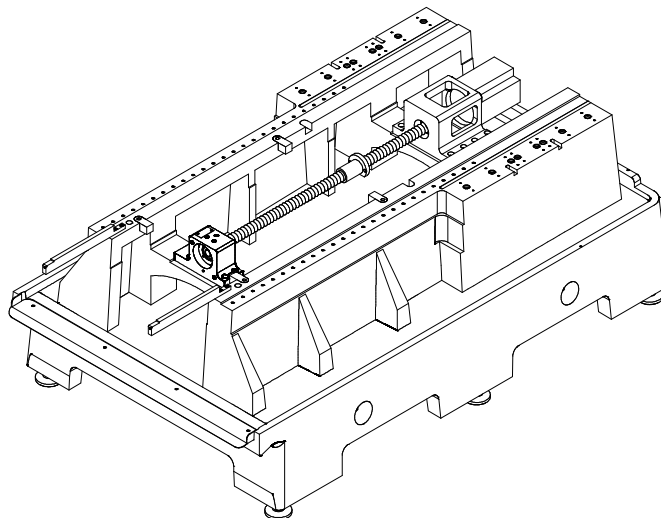
Manual Discrepancy Sheet

1. Pages 3, 5, 11, & 13 axis motor part numbers are changed for Sigma5.
2. Page 7 Item #11 is MP00844 & MP00845 as shown.
3. Page 9 tables have been updated for accuracy.
4. Page 13 #L is M5.8x12mm as shown.
5. Page 35 #9 & #16 on are qty 2 & 1 as shown.
6. Page 37 Item #9 is #01018838 as shown.



Machine Base Assembly





BALL SCREWS		
3	STANDARD RAPIDS	MPB-02
	HIGH SPEED OPTION	MP-801

PARTS LIST			
No.	QTY	STOCK No.	DESCRIPTION
1	1	SEE TABLE	AXIS MOTOR
2	1	SEE TABLE	MOTOR COUPLER
3	1	SEE TABLE	Y - AXIS BALL SCREW
4	1	NU-161	1/8 NPT 4mm SWIVEL ELBOW
5	1	MP1-94	BALL SCREW LOCK NUT
6	1	BG-02	BEARING 6204
7	1	MP1-107	BEARING LOCK NUT SPACER
8	1	MP1-108	BALL SCREW SNAP RING
9	1	BG-94	BALL SCREW SUPPORT BEARING
10	1	MX-51	Y - AXIS REAR MOTOR MOUNT
11	1	LB-27	PULLEY MOTOR WARNING LABEL
12	1	MX-64	FRONT BALL SCREW RADIAL MOUNT
13	2	SEE TABLE	Y - AXIS FRONT WAY COVER BRACKET
14	4	MP-707	HARD STOP BLOCK
15	1	MX1-61	PEDESTAL - MACHINED
16	1	MP1-473	PEDESTAL DRIP LIP
17	6	MP1-29	LEVELING PAD

FRONT WAY COVER BRACKET		
13	BALL RAIL STANDARD	MP1-391
	ROLLER RAIL OPTION	MP1-472

MOTOR & COUPLER LIST				
No.	YASKAWA	FANUC	SIEMENS	MITSUBISHI
1	MO-242 (.5kw) MO-244 (1kw) MO-246 (1.5kw)	4Nm A06B-0223-B200 8Nm A06B-0227-B200	6Nm 1FK7060-5AF71-1EA0 11Nm 1FK7063-5AF71-1EA0	MO-184
2	MA-242 (.5kw/1.0kw) MA-241 (1.5kw)	MA-242	MA-260	MA-260

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	6	M6-1 x 25mm SHCS
E	8	M10-1.5 x 30mm SHCS
F	2	1/4 DRIVE PIN
G	8	M6-1 x 20mm SHCS
H	4	M6-1 x 10mm BHCS

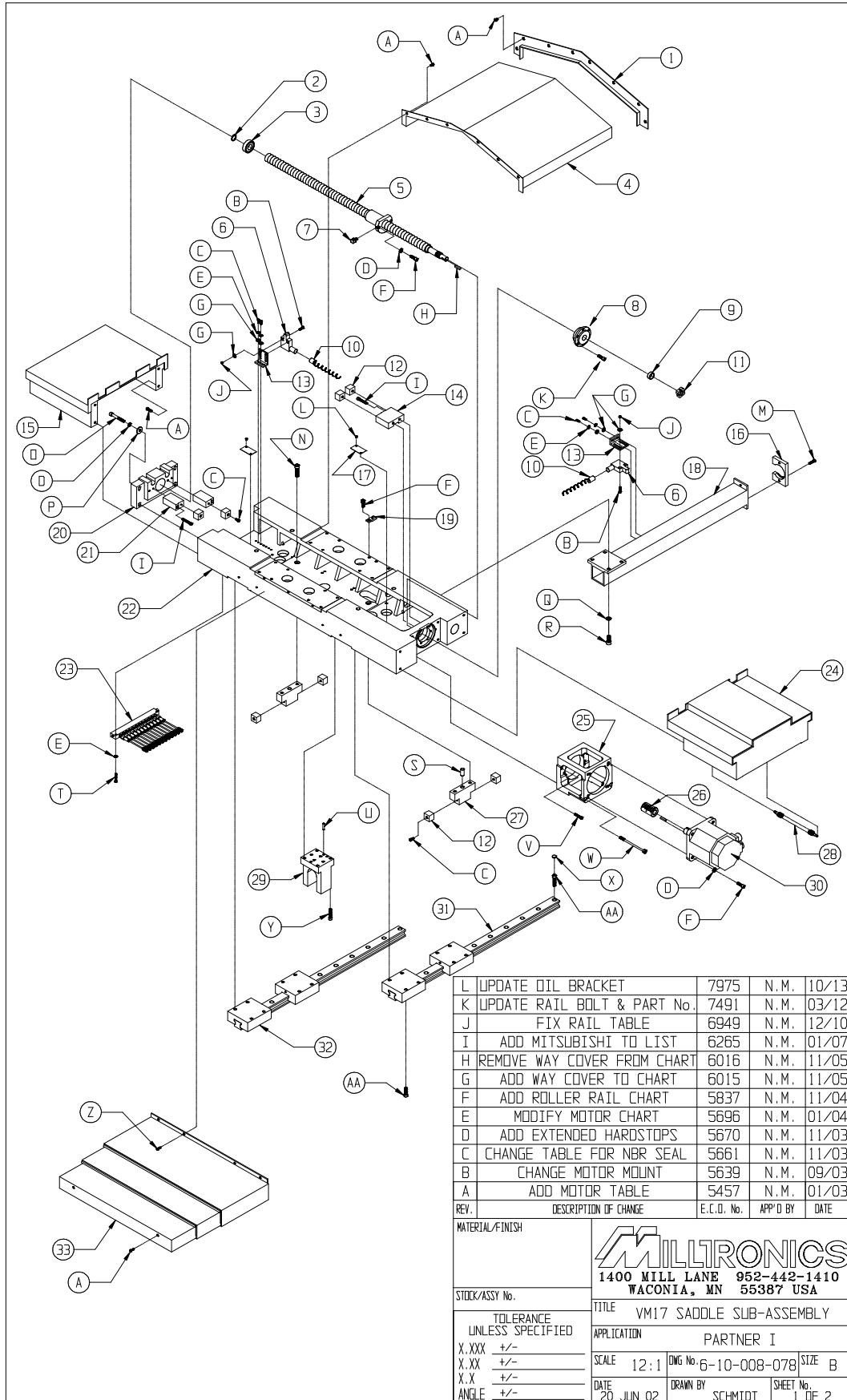
E	ADD MITSUBISHI TO LIST	6262		01/07
D	ADD RAIL & BALL SCREW TABLE	5836	N.M.	11/04
C	MODIFY MOTOR CHART	5695	N.M.	01/04
B	ADD MOTOR CHART	5433	N.M.	12/02
A	REMOVE SPACER	5428	N.M.	11/02
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE

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

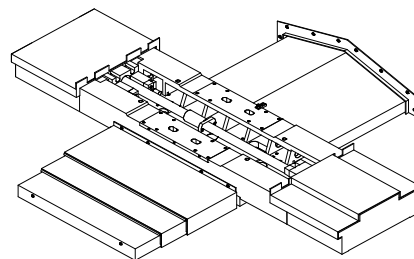
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Machine Saddle Assembly



PARTS LIST			
No.	QTY	STOCK No.	DESCRIPTION
1	1	MP10383	REAR WAY COVER WIPER
2	1	MP10108	SNAP RING
3	1	BG00002	6204 BEARING
4	1	SEE TABLE	REAR WAY COVER
5	1	SEE TABLE	X AXIS BALL SCREW
6	2	SW00193	HOME SWITCH
7	1	NJ00161	1/8 NPT SWIVEL ELBOW 4mm TUBE
8	1	BG00094	BALLSCREW SUPPORT BEARING
9	1	MP10107	BEARING LOCKNUT SPACER
10	2	SW00191	X AXIS SWITCH CORD
11	1	MP10094	BALL SCREW LOCKNUT
12	8	MP00718	PDM HARD STOP BUMPER
13	2	MP10387	HOME SWITCH BRACKET
14	1	MP10446	HARD STOP BLOCK RIGHT
15	1	SEE TABLE	X AXIS WAY COVER - LEFT
16	1	BR00111	CONDUIT BRACKET
17	2	LB00027	PULLEY MOTOR WARNING LABEL
18	1	MP10388	Y AXIS CABLE BRACKET
19	1	O1018834	OIL LINE BRACKET
20	1	MP10389	X AXIS RADIAL SUPPORT BRACKET
21	2	MP10447	HARD STOP BLOCK LEFT
22	1	SEE TABLE	SADDLE
23	1	SEE TABLE	X & Y AXIS MANIFOLD ASSEMBLY
24	1	SEE TABLE	X AXIS WAY COVER - RIGHT
25	1	MX10059	MOTOR MOUNT
26	1	SEE TABLE	MOTOR COUPLER
27	2	MP10410	SADDLE HARD STOP BLOCK
28	4	SEE TABLE	X AXIS WAY COVER SPRING
29	1	MX10011	Y/Z AXIS BALL SCREW CARRIER - MACHINED
30	1	SEE TABLE	AXIS MOTOR
31	2	SEE TABLE	35mm Y AXIS RAIL
32	4	SEE TABLE	35mm RAIL BLOCKS
33	1	MP10500	FRONT WAY COVER



MANIFOLD ASSEMBLY		
No.	DRAWING No.	DESCRIPTION
23	10008058	X & Y AIR/OIL MANIFOLD ASSEMBLY
	10018049	VM X & Y AXIS OIL MANIFOLD ASSEMBLY

* THESE PARTS REMOVED FOR 30" & 40" X - AXIS TRAVEL

MOTOR & COUPLER LIST				
No.	YASKAWA	FANUC	SIEMENS	MITSUBISHI
26	MA00242 (.5/1.0kW)	MA00242	MA00260	MA00260
	MA00241 (1.5kW)			
30	MO-242 (.5kW) MO-244 (1kW) MO-246 (1.5kW)	4Nn A06B-0223-B200 8Nn A06B-0227-B200	6Nn 1FK7060-5AF71-1EA0 11Nn 1FK7063-5AF71-1EA0	MD00184 (1.5kW)

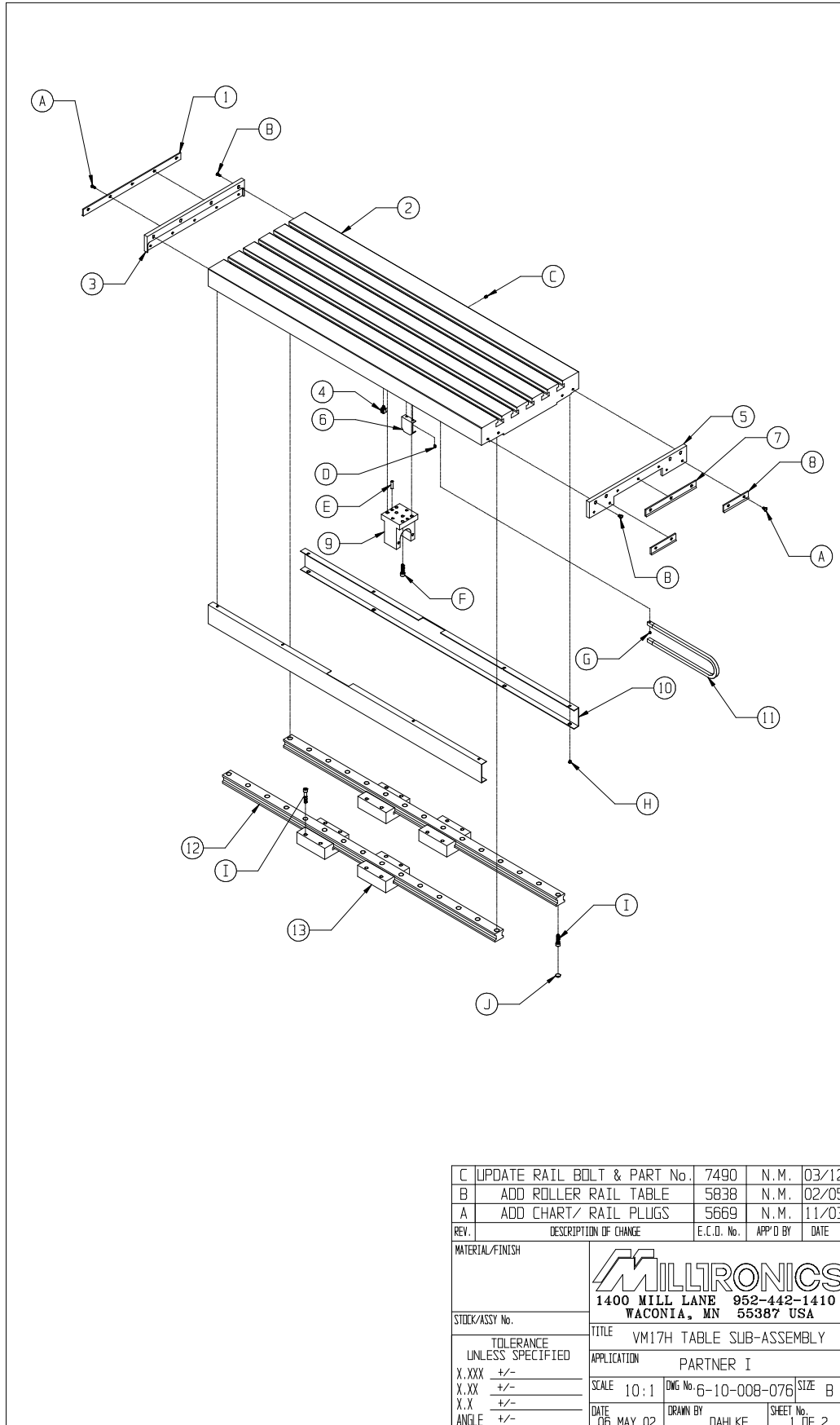
MACHINE VARIATION TABLE					
No.	DESCRIPTION	VM15/16/17 PART No.		VM20 PART No.	
		25" TRAVEL	30" TRAVEL	30" TRAVEL	40" TRAVEL
4	REAR WAY COVER	MP10382	MP10382	MP10462	MP10462
5	X AXIS BALL SCREW STANDARD	MP00569	MP00569	MP00569	MP00570
	X AXIS BALL SCREW RAPID	-	MP00802	MP00802	MP00821
15	X AXIS WAY COVER - LEFT	MP10385	MP10385	MP10385	MP10455
22	SADDLE - MACHINED	MX10055	MX10055	MX10055	MX10063
24	X AXIS WAY COVER - RIGHT	MP10442	MP10442	MP10442	MP10454
28	X AXIS WAY COVER SPRING	HD00062	HD00062	HD00062	HD00033
31	BALL RAIL	MP00640 (820)	MP00640 (820)	MPB0047 (1000)	MPB0047 (1000)
	ROLLER RAIL	-	MP00831 (844)	MP00811 (1024)	MP00811 (1024)
32	BALL RAIL BLOCK	MP00641	MP00641	MP00641	MP00641
	ROLLER RAIL BLOCK	-	MP00815	MP00815	MP00815

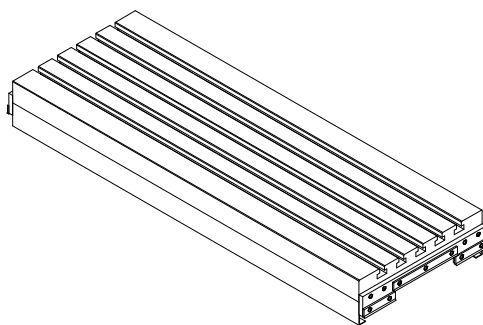
HARDWARE LIST		
No.	QTY	DESCRIPTION
A	24	M6-1 x 12mm BHCS
B	4	M5-.8 x 20mm SHCS
C	12	M5-.8 x 16mm SHCS
D	10	M8 LOCK WASHER
E	6	M5 LOCK WASHER
F	7	M8-1.25 x 30mm SHCS
G	8	M5 FLAT WASHER
H	1	3/16 x 3/16 x 1/2 KEY
I	4	M6-1 x 40mm SHCS
J	4	M5-.8 HEX NUT
K	6	M6-1 x 25mm SHCS
L	4	1/4 DRIVE RIVIT
M	2	M6-1 x 25mm BHCS
N	4	M10-1.5 x 40mm SHCS
O	4	M8-1.25 x 45mm SHCS
P	4	M8 FLAT WASHER
Q	4	M10 LOCK WASHER
R	4	M10-1.5 x 30mm SHCS
S	2	12mm x 25mm DOWEL PIN
T	2	M5-.8 x 25mm SHCS
U	2	1/4 x 1 DOWEL PIN
V	4	M6-1 x 30mm SHCS
W	2	M6-1 x 130mm SHCS
X	22	RAIL PLUGS MP00640 (820) BALL RAIL
	42	RAIL PLUGS MP00831 (844) ROLLER RAIL
	26	RAIL PLUGS MPB0047 (1000) BALL RAIL
	50	RAIL PLUGS MP00811 (1024) ROLLER RAIL
Y	6	M8-1.25 x 40mm SHCS
Z	4	M5-.8 x 10mm BHCS
AA	44	M8-1.25 x 30mm SHCS MP00640 (820) BALL RAIL
	66	M8-1.25 x 35mm SHCS MP00831 (844) ROLLER RAIL
	48	M8-1.25 x 30mm SHCS MPB0047 (1000) BALL RAIL
	72	M8-1.25 x 35mm SHCS MP00811 (1024) ROLLER RAIL

L	UPDATE OIL BRACKET	7975	N.M.	10/13
K	UPDATE RAIL BOLT & PART No.	7491	N.M.	03/12
J	FIX RAIL TABLE	6949	N.M.	12/10
I	ADD MITSUBISHI TO LIST	6265	N.M.	01/07
H	REMOVE WAY COVER FROM CHART	6016	N.M.	11/05
G	ADD WAY COVER TO CHART	6015	N.M.	11/05
F	ADD ROLLER RAIL CHART	5837	N.M.	11/04
E	MODIFY MOTOR CHART	5696	N.M.	01/04
D	ADD EXTENDED HARDSTOPS	5670	N.M.	11/03
C	CHANGE TABLE FOR NBR SEAL	5661	N.M.	11/03
B	CHANGE MOTOR MOUNT	5639	N.M.	09/03
A	ADD MOTOR TABLE	5457	N.M.	01/03
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		
TOLERANCE UNLESS SPECIFIED		TITLE VM17 SADDLE SUB-ASSEMBLY		
X.XXX +/-		APPLICATION PARTNER I		
X.XX +/-		SCALE 15:1	DWG No. 6-10-008-078	SIZE B
X.X +/-		DATE 20 JUN 02	DRAWN BY SCHMIDT	SHEET No. 2 OF 2
ANGLE +/-				



Milling Table Assembly




PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	MP10423	VM17 WIPER - LEFT
2	1	SEE TABLE	TABLE - MACHINED
3	1	MP10419	X-AXIS WIPER PLATE - LEFT
4	2	NJ00161	SWIVEL ELBOW 1/8NPT - 4mm TUBE
5	1	MP10420	X-AXIS WIPER PLATE - RIGHT
6	1	MP60045	EXTENDED TRAVEL X-AXIS DOG
7	1	MP10422	VM17 WIPER - UPPER
8	2	MP10421	VM17 WIPER - LOWER
9	1	MX60016	X-AXIS BALL SCREW CARRIER
10	2	SEE TABLE	TABLE PLATE
11	1	MP-844 & MP-845	X-AXIS CABLE TRACK
12	2	SEE TABLE	35mm RAILS
13	4	SEE TABLE	35mm RAIL BLOCK

HARDWARE LIST

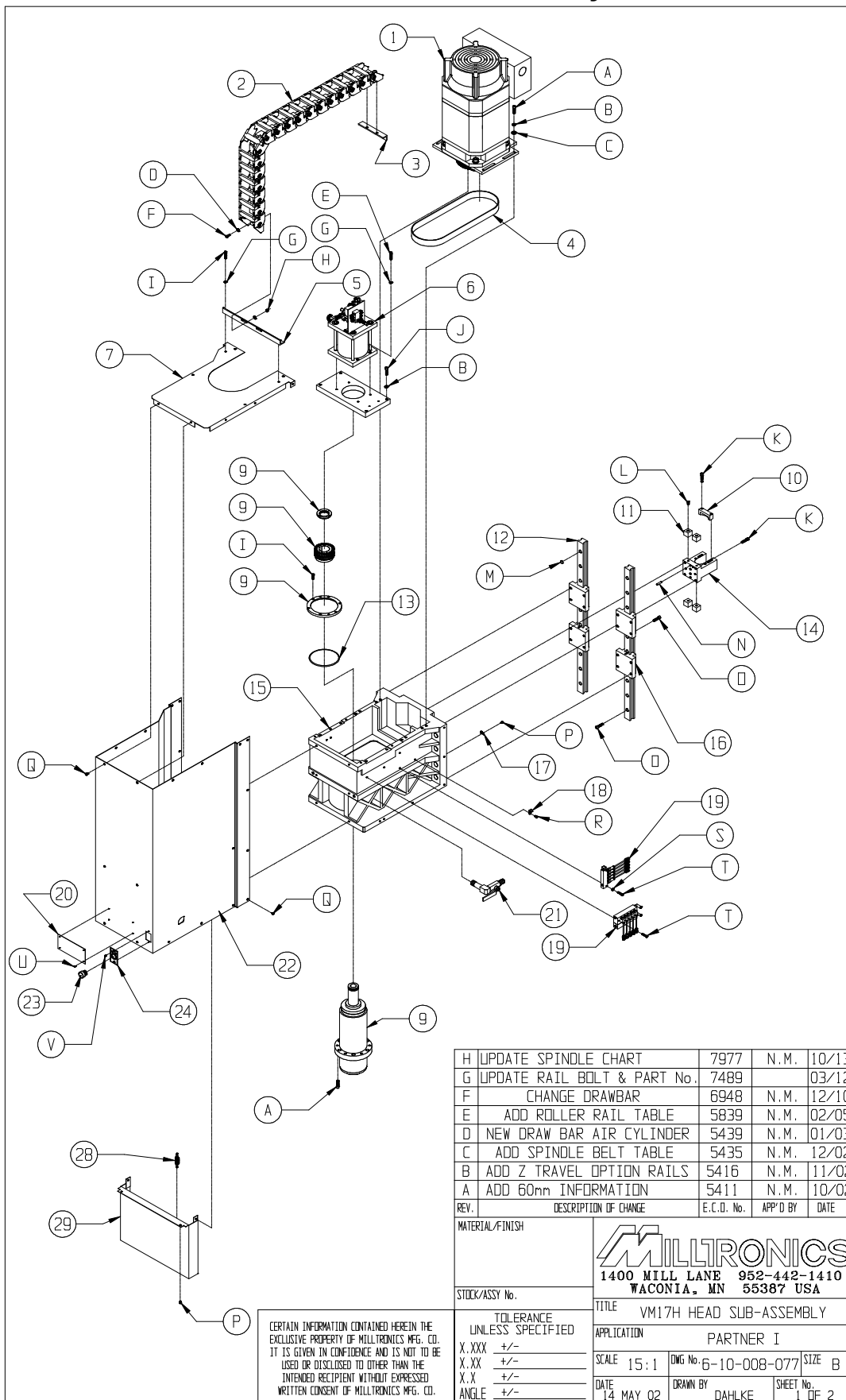
No.	QTY	DESCRIPTION
A	12	M6-1 x 12mm BHCS
B	8	M6-1 x 25mm BHCS
C	1	1/8-27 NPT SHPP
D	2	M3-.5 x 6mm BHCS
E	2	1/4 x 1 DOWEL PIN
F	6	M8-1.25 x 35mm SHCS
G	4	M3-.5 x 20mm BHCS
H	8	M4-.7 x 6mm BHCS
I	42	M8-1.25 x 30mm SHCS - 25" BALL RAIL
	46	M8-1.25 x 30mm SHCS - 30" BALL RAIL
	74	M8-1.25 x 35mm SHCS - 30" ROLLER RAIL
J	26	RAIL PLUG - 25" BALL RAIL
	30	RAIL PLUG - 30" BALL RAIL
	58	RAIL PLUG - 30" ROLLER RAIL

TABLE TRAVEL

No.	DESCRIPTION	25" TRAVEL	30" TRAVEL
2	TABLE - MACHINED	MX10060	MX10056
10	TABLE PLATE	MP10448	MP10392
12	BALL RAIL	MPB0047	MP00732
	ROLLER RAIL	-	MP00812
13	BALL RAIL BLOCK	MP00641	MP00641
	ROLLER RAIL BLOCK	-	MP00815

C	UPDATE RAIL BOLT & PART No.	7490	N.M.	03/12
B	ADD ROLLER RAIL TABLE	5838	N.M.	02/05
A	ADD CHART/ RAIL PLUGS	5669	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 VM17H TABLE SUB-ASSEMBLY		
X.XXX	+/-	APPLICATION GENERAL PRODUCTS		SIZE B
X.XX	+/-	SCALE 10:1	DWG No. 6-10-008-076	
X.X	+/-	DATE 06 MAY 02	DRAWN BY DAHLKE	
ANGLE	+/-	SHEET No. 2 OF 2		

Machine Head Assembly



No.	QTY	STOCK No.	DESCRIPTION
1	1	SEE PAGE	SPINDLE MOTOR ASSEMBLY
2	1		CABLE TRACK MP-1157, QTY. 18 & MP-1158, QTY. 1
3	1	MP-316	CABLE SUPPORT BRACKET
4	1	SEE TABLE	SPINDLE BELT
5	1	MP-664	CABLE SUPPORT BRACKET
6	1	SEE TABLE	DRAWBAR CYLINDER ASSEMBLY
7	1	MP-639	UNIVERSAL HEAD COVER - TOP
8	1	SEE TABLE	DRAWBAR CYLINDER ASSEMBLY
9	1	SEE TABLE	SPINDLE ASSEMBLY
10	1	MP-109	Z-AXIS BALL SCREW SAFETY CATCH
11	4	MP-718	POM HARD STOP BUMPER
12	2	SEE TABLE	LINEAR RAILS
13	1	WX-270	O-RING REAR SEAL
14	1	MX1-11	Z-AXIS BALL SCREW CARRIER - MACHINED
15	1	MX-43	70mm HEAD MACHINED
16	4	SEE TABLE	35mm RAIL BLOCK
17	5	NU-36	CLAMP 5/32 OILER
18	1	WX-82	WIRE TIE DOWN
19	1	SEE TABLE	Z-AXIS MANIFOLD ASSEMBLY
20	1	LB00001	SAFETY STICKER
21	1	SEE PAGE 88	10040024 FLOOD HANDLE ASSEMBLY
22	1	MP-635	UNIVERSAL HEAD COVER
23	1	SW-67	TOOL OUT SWITCH
24	1	LB00181	BOLT ON TOOL OUT LABEL
28	2	HD-62	WAYCOVER SPRING
29	1	SEE TABLE	Z-AXIS WAYCOVER

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

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

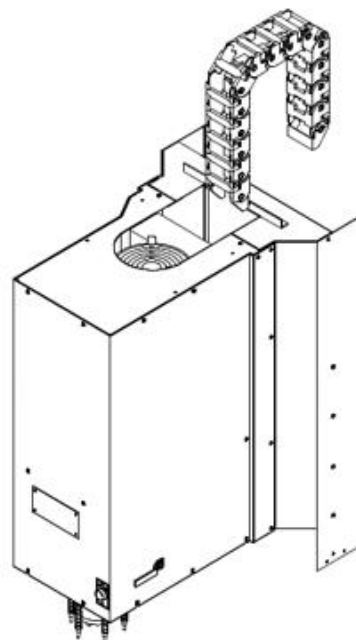
DRAW BAR CYLINDER ASSEMBLY		
No.	STOCK No.	DESCRIPTION
6	SEE PAGE 14	CTS
	SEE PAGE 16	NON-CTS

SPINDLE ASSEMBLY		
No.	STOCK No.	DESCRIPTION
9	VM-765	10007, 8K
	VM-755	10006, 15K

LINEAR RAIL/WAY COVER TABLE			
No.	DESCRIPTION	20" TRAVEL	26" TRAVEL
12	BALL RAIL	MP-640	MPB-47
	ROLLER RAIL	MP-831	MP-811
16	BALL RAIL BLOCK	MP-641	MP-641
	ROLLER RAIL BLOCK	MP-815	MP-815
29	Z-AXIS WAYCOVER	MP1-424	MP1-425

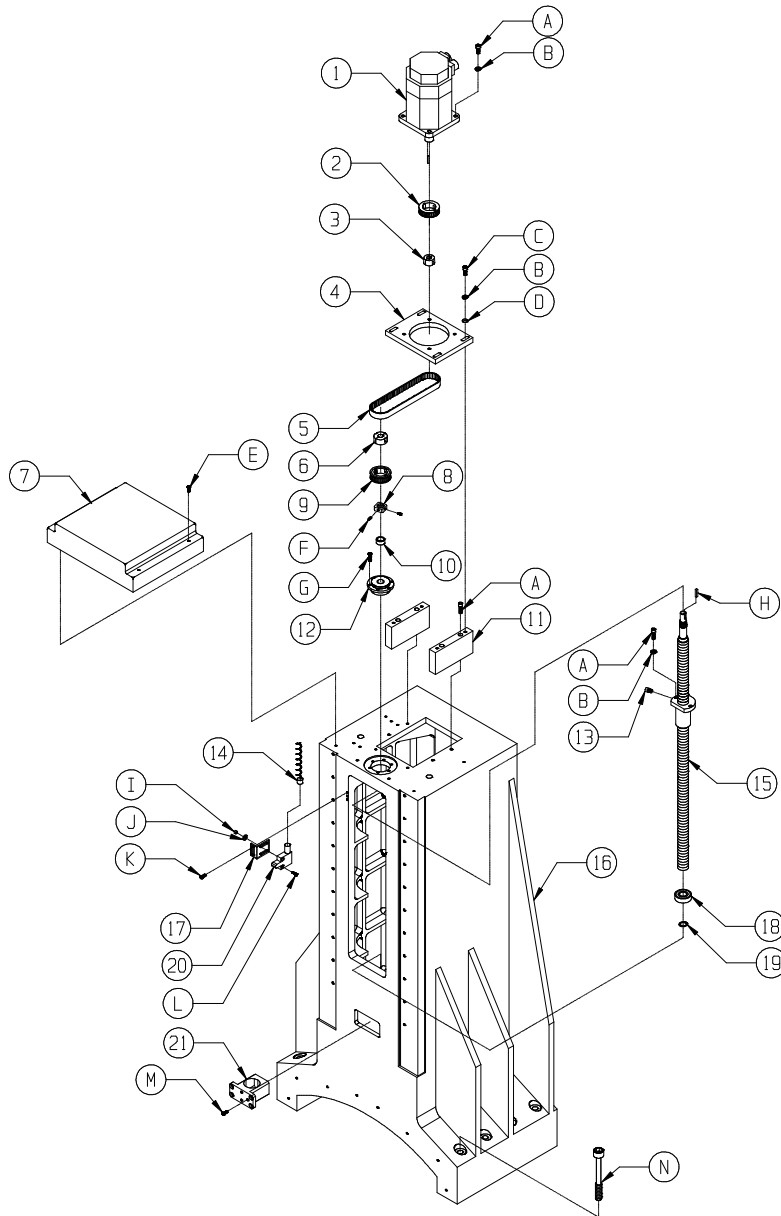
Z-AXIS MANIFOLD ASSEMBLY		
No.	DRAWING No.	DESCRIPTION
19	10018050	Z-AXIS OIL MANIFOLD
	10008059	Z-AXIS AIR/OIL MANIFOLD

HARDWARE LIST		
No.	QTY	DESCRIPTION
A	14	M8-1.25 x 30mm SHCS
B	12	M8 LOCK WASHER
C	8	M8 HARDENED FLAT WASHER
D	8	M6 FLAT WASHER
E	4	M6-1 x 30mm SHCS
F	4	M6-1 x 20mm BHCS
G	6	M6 LOCK WASHER
H	4	M6-1 NYLOC NUT
I	8	M6-1 x 20mm SHCS
J	4	M8-1.25 x 45mm SHCS
K	8	M8-1.25 x 40mm SHCS
L	4	M5-.8 x 16mm SHCS
M	22	RAIL PLUG - BALL RAIL 20"
	26	RAIL PLUG - BALL RAIL 26"
	42	RAIL PLUG - ROLLER RAIL 20"
	50	RAIL PLUG - ROLLER RAIL 26"
N	2	1/4 x 1 DOWEL PIN
O	38	M8-1.25 x 30mm SHCS - BALL RAIL 20"
	42	M8-1.25 x 30mm SHCS - BALL RAIL 26"
	58	M8-1.25 x 35mm SHCS - ROLLER RAIL 20"
	66	M8-1.25 x 35mm SHCS - ROLLER RAIL 26"
P	7	M4-.7 x 10mm BHCS
Q	23	M6-1 x 10mm BHCS
R	1	M5-.8 x 12mm BHCS
S	2	M5 LOCK WASHER
T	2	M5-.8 x 40mm SHCS
U	4	M3-.3 x 6mm BHCS
V	2	M4-.7 x 8mm BHCS





Machine Column (Belt Drive) Assembly

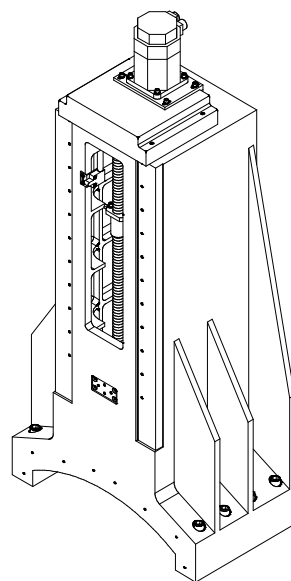


D	CHANGE HARDWARE LIST	7844	N.M.	06/13
C	EDIT TABLE	5841	N.M.	02/05
B	ADD MOTOR TABLE	5707	N.M.	01/04
A	CHANGE COLUMNS	5434	N.M.	12/02
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE

MATERIAL/FINISH	 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA
STOCK/ASSY No.	

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TOLERANCE UNLESS SPECIFIED	TITLE VM17H COLUMN SUB-ASSEMBLY		
X.XXX +/-	APPLICATION PARTNER I		
X.XX +/-	SCALE 12:1	DWG No. 6-10-008-079	SIZE B
X.X +/-	DATE 18 JUN 02	DRAWN BY SCHMIDT	SHEET No. 1 OF 2
ANGLE +/-			



HARDWARE LIST		
No.	QTY	DESCRIPTION
A	10	M8-1.25 x 30mm SHCS
B	10	M8 LOCK WASHER
C	4	M8-1.25 x 35mm SHCS
D	4	M8 FLAT WASHER
E	4	M5-.8 x 60mm BHCS
F	2	10/32 x 3/16 BRASS TIPPED SHSS
G	6	M6-1 x 20mm SHCS
H	1	3/16 x 3/16 x 1/2 BALL SCREW KEY
I	2	M5-.8 HEX NUT
J	2	M5 FLAT WASHER
K	2	M5-.8 x 12mm BHCS
L	2	M5-.8 x 20mm SHCS
M	4	M6-1 x 15mm BHCS
N	8	3/4-10 x 7" SHCS

PARTS LIST		
No.	QTY	STOCK No. DESCRIPTION
1	1	SEE TABLE Z AXIS MOTOR W/BRAKE
2	1	PY00204 P24-8MGT-30 PULLEY
3	1	SEE TABLE MOTOR BUSHING
4	1	MP00631 YASKAWA Z AXIS MOTOR PLATE
5	1	BT00073 560-8MGT-30 TIMING BELT
6	1	PY00032 5/8 ID 1210 BUSHING
7	1	VM10008 Z-AXIS MOTOR COVER
8	1	MP10094 BALL SCREW LOCK NUT
9	1	PY00205 P32-8MGT-30 PULLEY
10	1	MP10107 BEARING LOCK NUT SPACER
11	2	MP10374 Z AXIS MOTOR SPACER
12	1	BG00094 BALLSCREW SUPPORT BEARING
13	1	NU00154 1/8 NPT MS 5/32 TUBE
14	1	SW00191 X AXIS SWITCH 24 PKT CORD
15	1	MPB0002 10mm Z AXIS BALL SCREW
16	1	SEE TABLE COLUMN - MACHINED
17	1	MP10387 X & Y LIMIT SWITCH MTG BRACKET
18	1	BG00002 6204 BEARING
19	1	MP10108 SNAP RING
20	1	SW00193 X AXIS SWITCH
21	1	MX10028 Y-Z RADIAL SUPPORT BRACKET

VM17 COLUMN		
STOCK No.	DESCRIPTION	
MX10057	50" x 16" RIBBED COLUMN - MACHINED	
MX10058	56" x 16" RIBBED COLUMN - MACHINED	

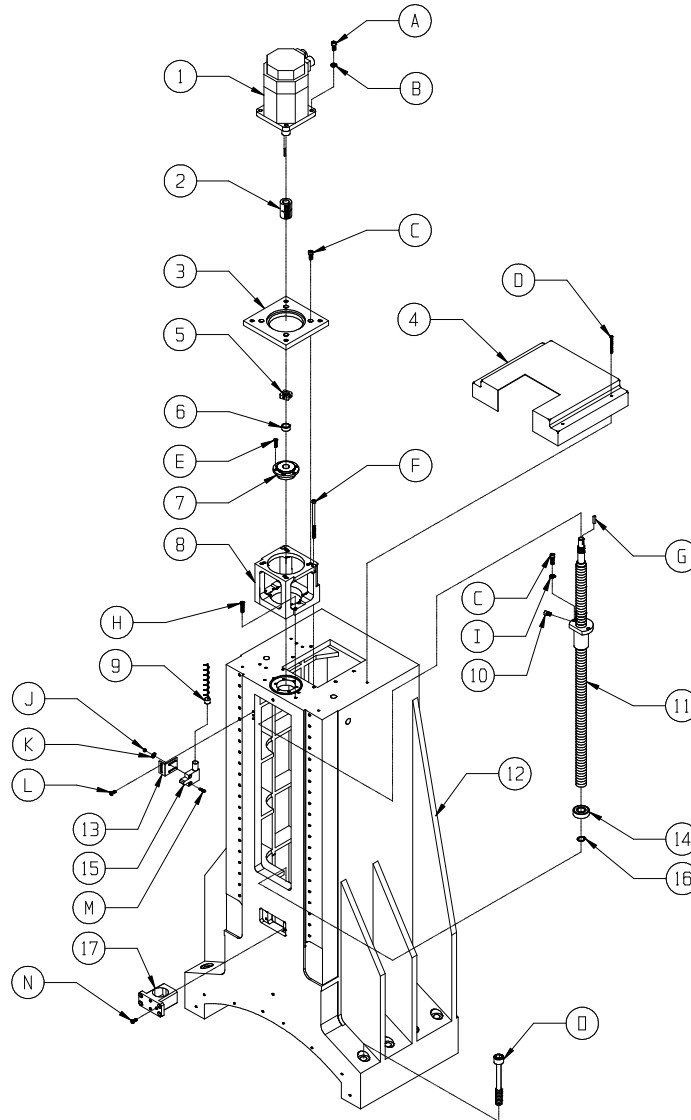
MOTOR & BUSHING TABLE		
No.	MO-247 (1.5kw)	FANUC
1	MD00128 (1.5kw)	8Nm A06B-0227-B200
3	PY00206	PY00212

D	CHANGE HARDWARE LIST	7844	N.M.	06/13
C	EDIT TABLE	5841	N.M.	02/05
B	ADD MOTOR TABLE	5707	N.M.	01/04
A	CHANGE COLUMNS	5434	N.M.	12/02
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 VM17H COLUMN SUB-ASSEMBLY		
TOLERANCE UNLESS SPECIFIED		APPLICATION PARTNER I		
X.XXX +/-		SCALE 12:1		DWG No. 6-10-008-079
X.XX +/-				SIZE B
X.X +/-		DATE 18 JUN 02		DRAWN BY SCHMIDT
ANGLE +/-				SHEET No. 2 OF 2

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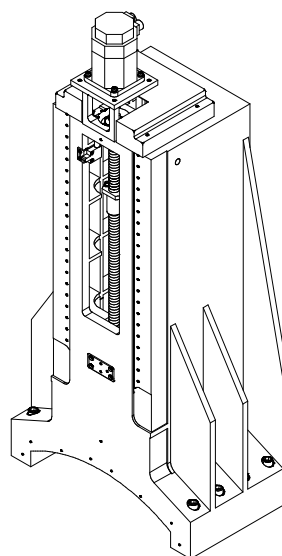


Machine Column (Direct Drive) Assembly



B	ADD MITSUBISHI TO LIST	6266		01/07
A	ADD BALL SCREW TABLE	5840	N.M.	02/05
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 VM17H DIRECT DRIVE COLUMN SUB-ASSEMBLY		
X.XXX ±		APPLICATION PARTNER I		
X.XX ±		SCALE 12:1 DWG No. 6-10-008-084 SIZE B		
X.X ±		DATE 13 JAN 04 DRAWN BY DAHLKE SHEET No. 1 OF 2		
ANGLE ±				

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HARDWARE LIST		
No.	QTY	DESCRIPTION
A	4	M12-1.75 x 35mm SHCS
B	4	M12 LOCK WASHER
C	6	M8-1.25 x 30mm SHCS
D	4	M5-.8 x 60mm BHCS
E	6	M6-1 x 25mm SHCS
F	2	M6-1 x 130mm SHCS
G	1	3/16 x 3/16 x 1/2 BALL SCREW KEY
H	4	M6-1 x 30mm SHCS
I	2	M8 LOCK WASHER
J	2	M5-.8 HEX NUT
K	2	M5 FLAT WASHER
L	2	M5-8x12mm BHCS
M	2	M5-.8 x 20mm SHCS
N	4	M6-1 x 15mm BHCS
O	8	3/4-10 x 7" SHCS

PARTS LIST			
No.	QTY	STOCK No.	DESCRIPTION
1	1	SEE TABLE	AXIS MOTOR W/BRAKE
2	1	SEE TABLE	MOTOR COUPLER
3	1	SEE TABLE	Z AXIS MOTOR PLATE
4	1	VM1-08	Z AXIS MOTOR COVER
5	1	MP1-94	BALL SCREW LOCK NUT
6	1	MP1-107	BEARING LOCK NUT SPACER
7	1	BG-94	BALLSCREW SUPPORT BEARING
8	1	MX1-59	Z MOTOR MOUNT
9	1	SW-191	X AXIS SWITCH CORD
10	1	NU-154	1/8 NPT MS 5/32 TUBE
11	1	SEE TABLE	Z AXIS BALL SCREW
12	1	SEE TABLE	COLUMN - MACHINED
13	1	MP1-387	X/Y/Z LIMIT SWITCH MOUNTING BRACKET
14	1	BG-02	6204 BEARING
15	1	SW-193	Z AXIS SWITCH
16	1	MP1-108	SNAP RING
17	1	MX1-28	Y-Z RADIAL SUPPORT BRACKET

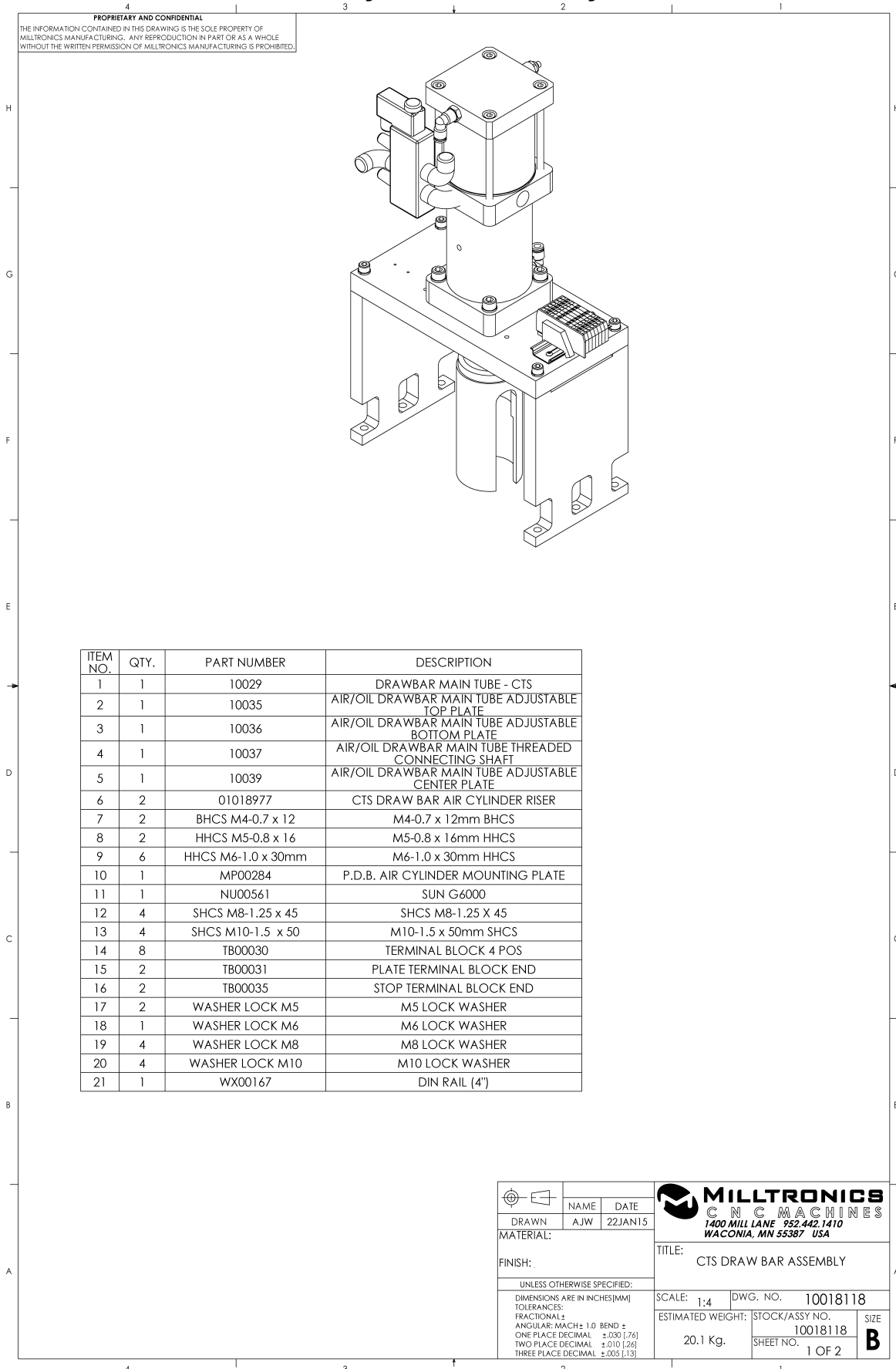
VM17 COLUMN			
No.	STOCK No.	DESCRIPTION	
12	MX1-57	50" x 16" RIBBED COLUMN - MACHINED	
	MX1-58	56" x 16" RIBBED COLUMN - MACHINED	

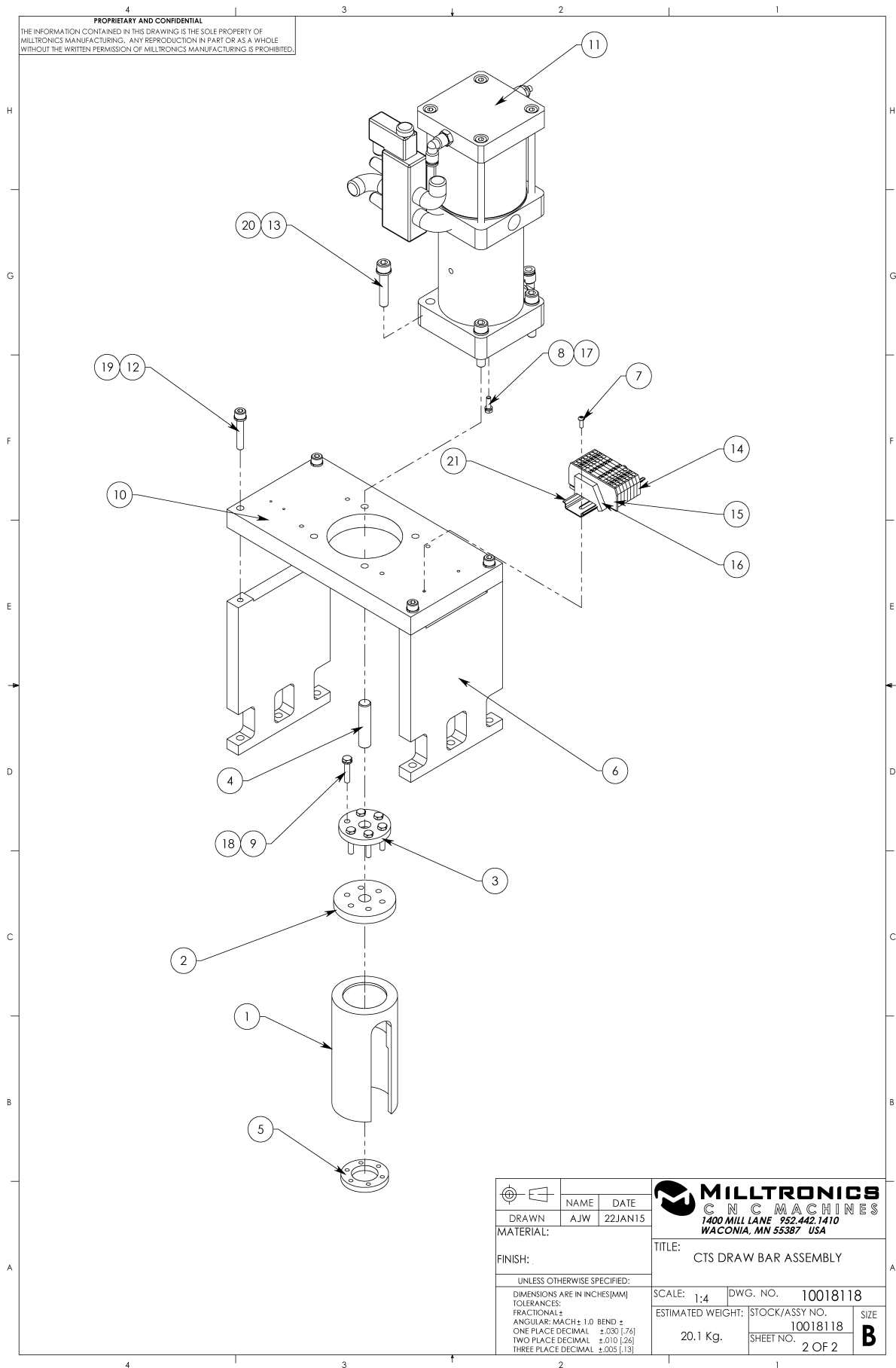
AXIS MOTOR, COUPLER & MOTOR PLATE TABLE				
No.	YASKAWA	FANUC	SIEMENS	MITSUBISHI
1	MO-251 (3 kw)	12 Nm A06B-0243-B500	11 Nm 1FK7063-5AF71-1EB0 18 Nm 1FK7100-5AF71-1FB0	MD-186 (3.5kw) MD-188 (5kw)
2	MA-248	MA-248	MA-260 (<11Nm) MA-261 (<16Nm)	MA-248
3	MP1-453	MP1-453	- (<11Nm) SMN-09 (18Nm)	MP1-453

BALL SCREW TABLE		
No.	DESCRIPTION	PART No.
11	STANDARD RAPID	MPB-02
	HIGH SPEED RAPID	MP-801

B	ADD MITSUBISHI TO LIST	6266		01/07
A	ADD BALL SCREW TABLE	5840	N.M.	02/05
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.		TITLE VM17H DIRECT DRIVE COLUMN SUB-ASSEMBLY		
TOLERANCE UNLESS SPECIFIED		APPLICATION PARTNER I		
		SCALE 12:1 DWG No. 6-10-008-084 SIZE B		
		DATE 13 JAN 04 DRAWN BY DAHLKE SHEET No. 2 OF 2		

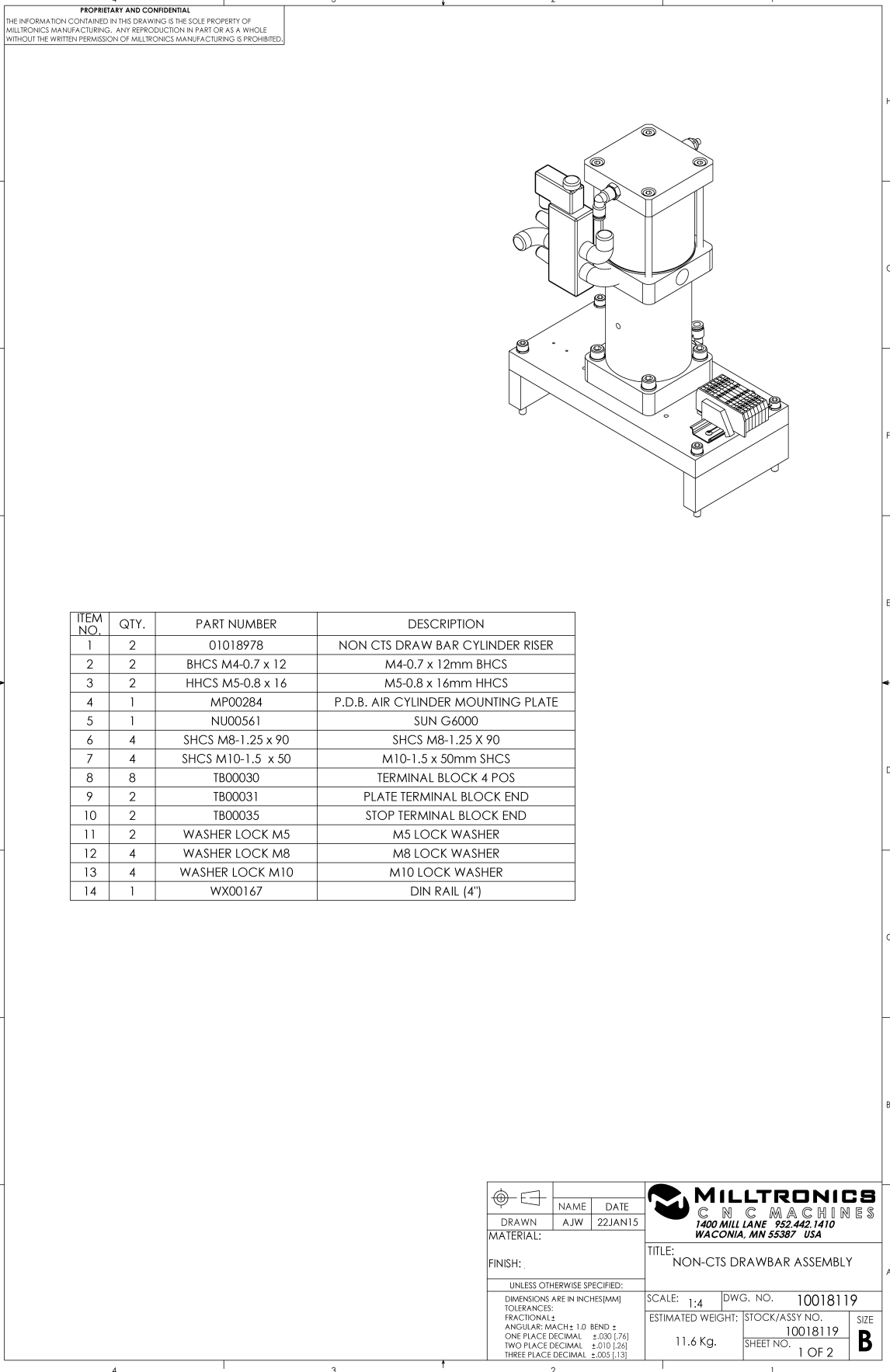
Drawbar Cylinder Assembly - CTS





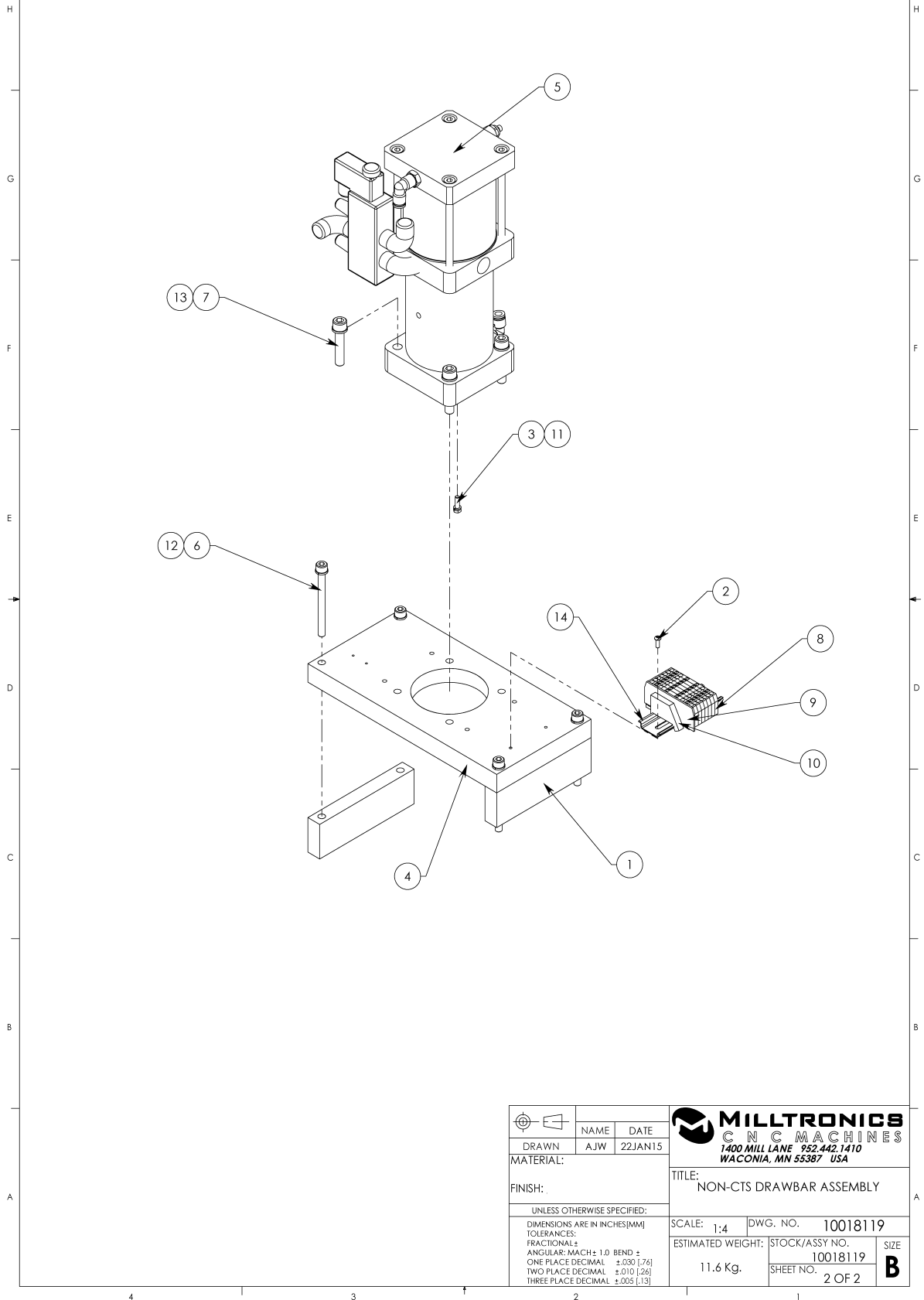


Drawbar Cylinder Assembly – Non-CTS





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		MILLTRONICS CNC MACHINES 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA	
DRAWN	NAME	DATE	
AJW		22JAN15	
MATERIAL:		TITLE:	
FINISH:		NON-CTS DRAWBAR ASSEMBLY	
UNLESS OTHERWISE SPECIFIED:		SCALE: 1:4	DWG. NO. 10018119
DIMENSIONS ARE IN INCHES(MM)		ESTIMATED WEIGHT: 11.6 Kg.	STOCK/ASSY NO. 10018119
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

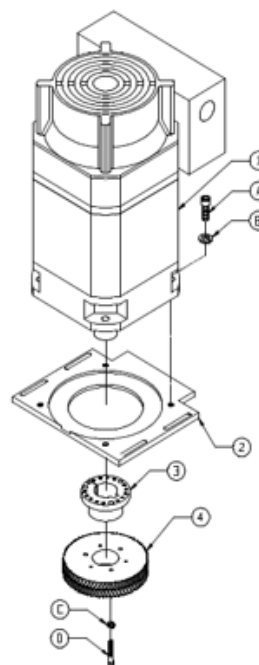
SPINDLE MOTORS		
No.	STOCK No.	DESCRIPTION
1	10151	18/12HP Single Speed, 13/9 kW UAASKA-08LYA31
	MO00150	24/15HP Single Speed, 18/11 kW UAASKA-11LYA31
	100152	24/15HP Dual Speed, 18/11 kW UAASKD11LYA51
	MO00121	35/25HP Dual Speed, 26/18 kW UAASKD-19LYA41

MOTOR PLATES		
No.	STOCK No.	DESCRIPTION
2	MP00548	10152 & MO00121
	MP00587	10151 & MO00150

BUSHINGS		
No.	STOCK No.	DESCRIPTION
3	PY00097	48mm ID SK bushing used with 10152, MO00150, & MO00121
	PY00184	32mm ID SK bushing used with 10151
	PY00280	TLK110-48-62 bushing used with 50 taper

SPINDLE MOTOR PULLEYS						
No.	RPM	10151	10152	MO00150	MO00121	50 TAPER
4	8K/10K	PY00201 (5GT)	PY00201 (5GT)	PY00201 (5GT)	PY00192 (W56)	PY00281
	15K	PY00188 (W68)	PY00188 (W68)	PY00188 (W68)	PY00188 (W68)	--

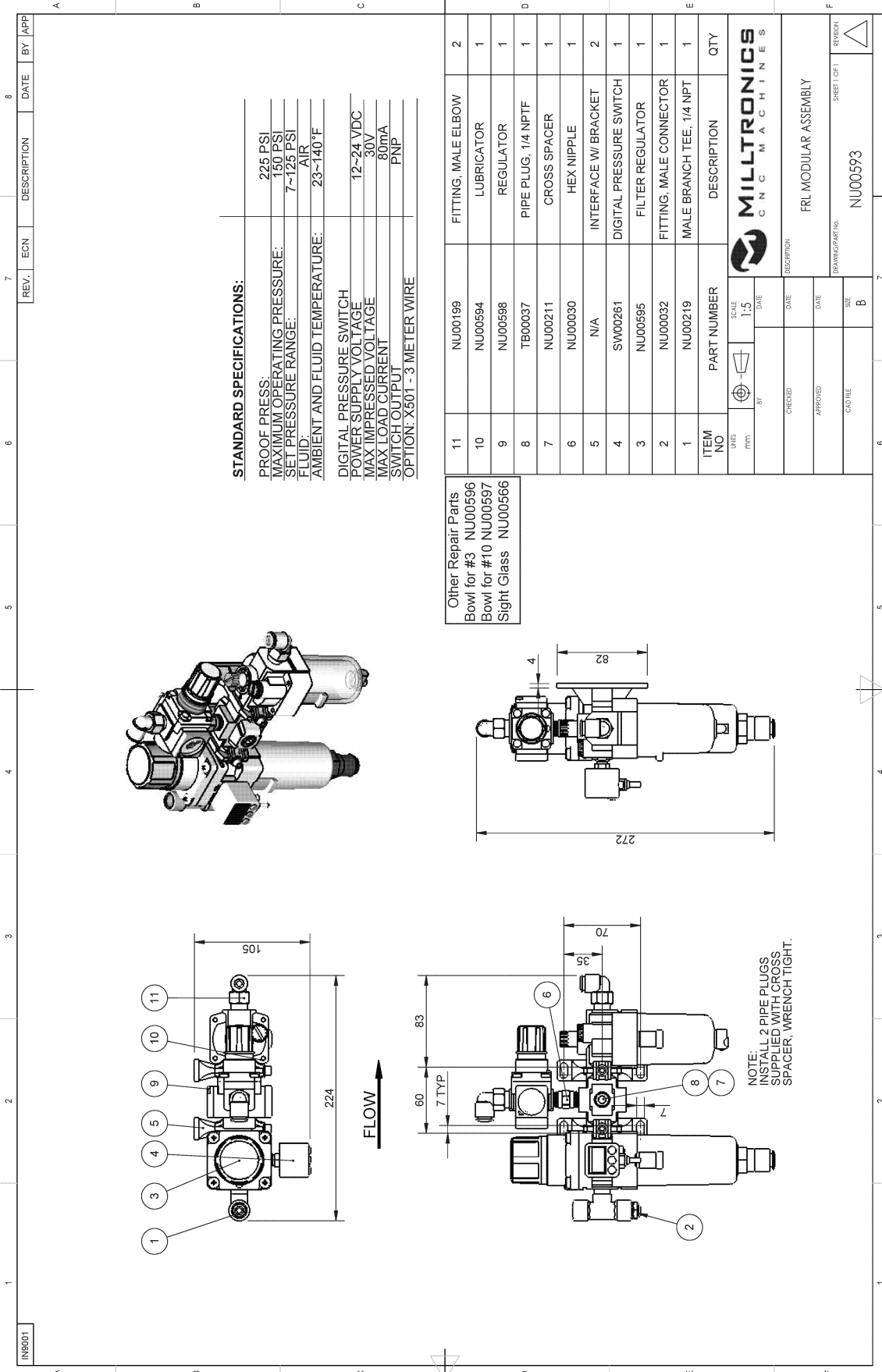
HARDWARE LIST		
No.	Qty	Description
A	4	1/2-13 x 1-1/4 SHCS
B	4	1/2" Lock Washer
C	3	5/16" Lock Washer
D	3	5/16-18 x 2" SHCS



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

Air Filter / Lubricator / Filter Assembly



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Waylube Pump MA00458

The on time and off time can be adjusted using MISC control parameters “Way Lube ON time (sec)”, and “Way Lube OFF time (min)”.

Oiler Comparison

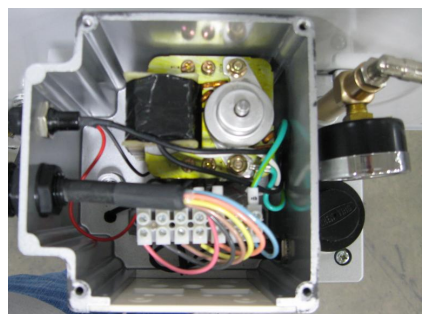
	Old style	New style
Model #	CESD	CEN01
Part #	MA00219	MA00458
Timer function ON/OFF	Built-in controls	Via CNC #66
Audible alarm	YES	NO
Oil pressure gauge	NO	YES
Manual override button	YES	YES

Software & control

All 8200 versions have the functionality. 7200 version 77401 or higher is required to have the functionality.

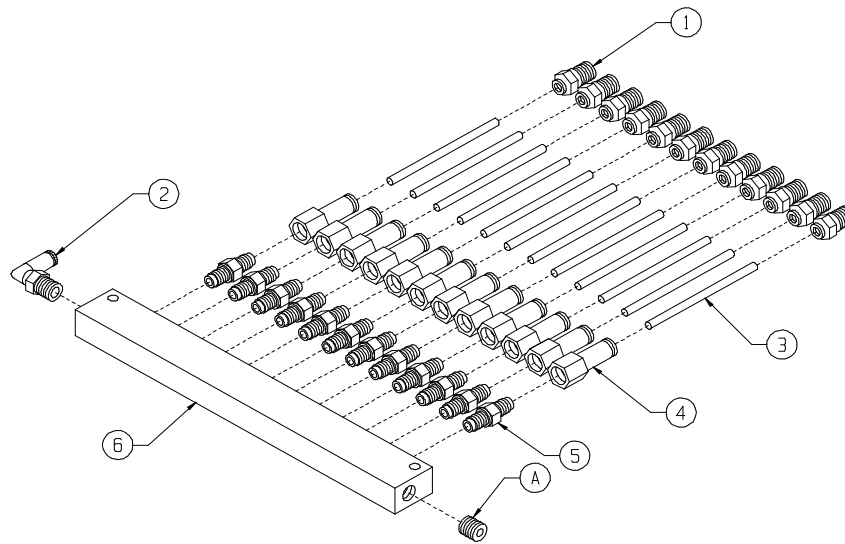
The oiler timer is functional only when the “Grease Cycle Time” parameter is set to Zero, and the Way Lube ON and OFF time parameters are non-zero.

Pictures of MA00458



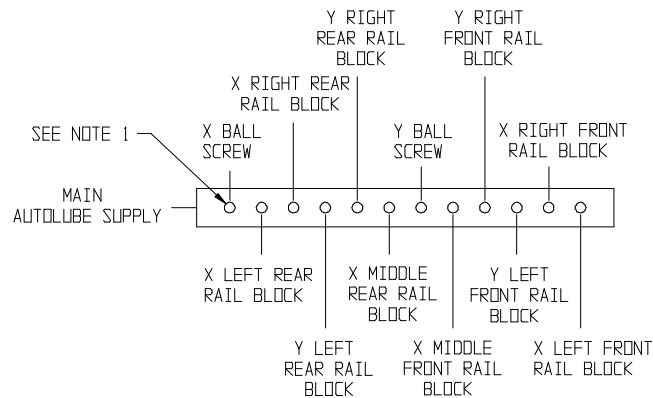


X & Y Axis Autolube Manifold Assembly



NOTES:

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



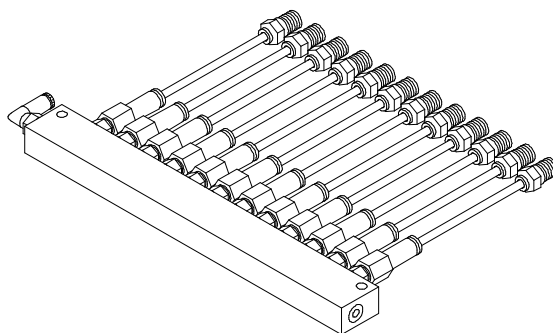
AUTOLUBE LINE DESTINATIONS

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

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

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

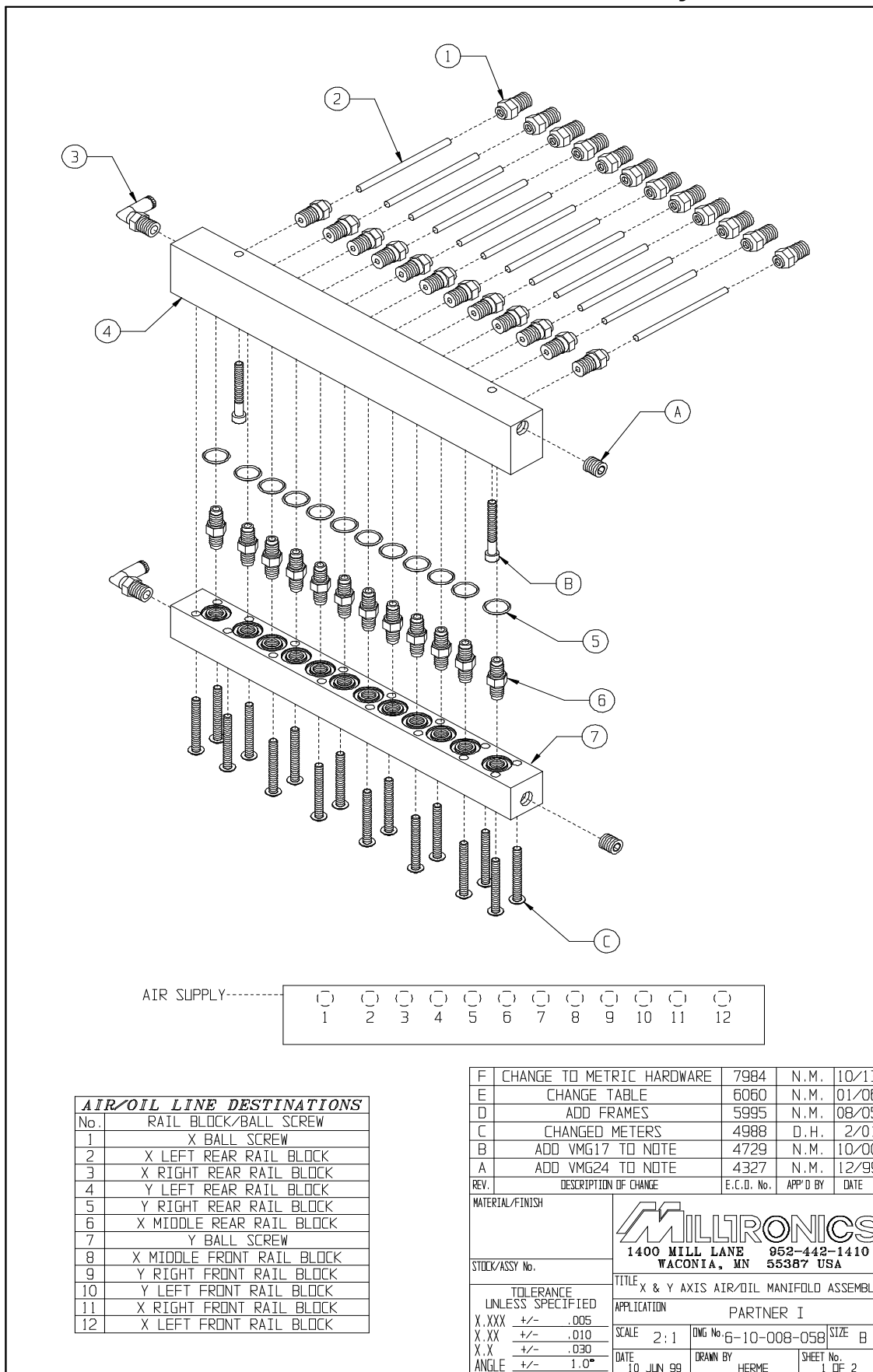
HARDWARE LIST

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

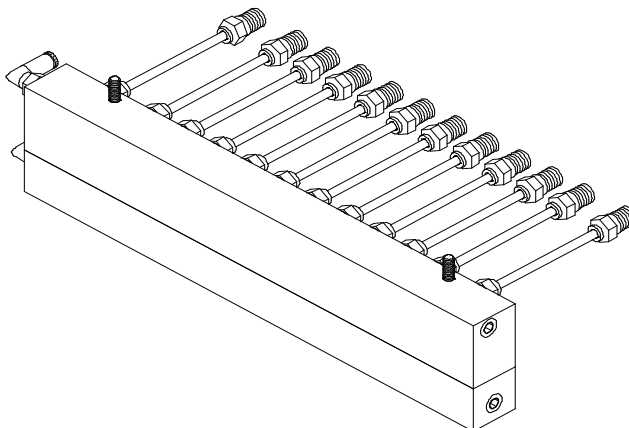
B	UPDATE OIL METER FITTINGS	6760		03/09
A	ADD FRAMES TO CHART	5996	N.M.	08/05
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE X & Y AXIS AUTOLUBE MANIFOLD ASSEMBLY		
X .XXX ±		APPLICATION 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. 2 OF 2		
ANGLE ±				

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X & Y Axis Air/Oil Manifold Assembly



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:

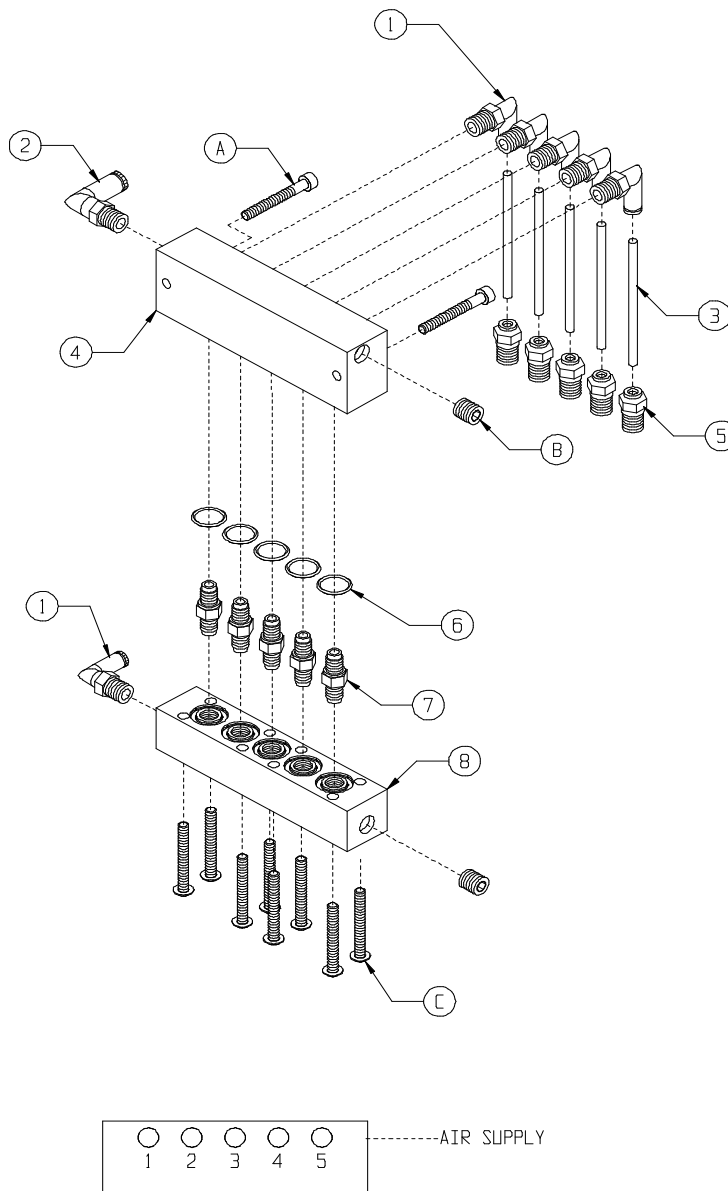
- IF REFERENCED WITH A (-) PLUG AIR/OIL LINE HOLE AND OIL METER HOLE IN MANIFOLD WITH 1/8 NPT PLUG.

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

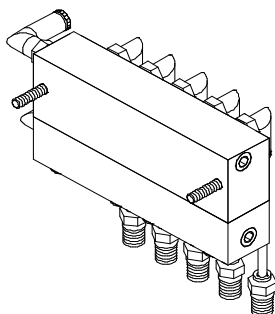
F	CHANGE TO METRIC HARDWARE	7984	N.M.	10/13
E	CHANGE TABLE	6060	N.M.	01/06
D	ADD FRAMES	5995	N.M.	08/05
C	CHANGED METERS	4988	D.H.	02/01
B	ADD VMG17 TO NOTE	4729	N.M.	10/00
A	ADD VMG24 TO NOTE	4327	N.M.	12/99
REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.		TITLE X & Y AXIS AIR/OIL MANIFOLD ASSEMBLY		
TOLERANCE UNLESS SPECIFIED		APPLICATION PARTNER I		
X.XXX	+/- .005	SCALE 2:1		DWG No. 6-10-008-058
X.XX	+/- .010	DATE 10 JUN 99		SIZE B
X.X	+/- .030	DRAWN BY HERME		SHEET No. 2 OF 2
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	CHANGE 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.		TITLE Z AXIS AIR/OIL MANIFOLD ASSEMBLY			
TOLERANCE UNLESS SPECIFIED		APPLICATION PARTNER I			
X.XXX	+/- .005	SCALE 2:1		DMG No 6-10-008-059	SIZE B
X.XX	+/- .010	DATE 11 JUN 99		DRAWN BY HERME	
X.X	+/- .030	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 BUNA 1/2 ID x 5/8 OD
7	-	SEE TABLE	OIL METER
8	1	MP-660	Z AIR/OIL MANIFOLD - OIL

NU-117 TUBING LENGTH			
CONNECTION	ALL FRAMES	OIL METER	
Z LEFT UPPER RAIL BLOCK	37	#3 (NU-156)	
Z LEFT LOWER RAIL BLOCK	31	#3 (NU-156)	
Z RIGHT UPPER RAIL BLOCK	29	#3 (NU-156)	
Z RIGHT LOWER RAIL BLOCK	23	#3 (NU-156)	
Z BALL SCREW	26	#2 (NU-155)	

ALL MEASUREMENTS ARE IN INCHES

HARDWARE LIST		
No.	QTY	DESCRIPTION
A	2	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.D. No.	APP'D BY	DATE

MATERIAL/FINISH	 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA
STOCK/ASSY No.	

TOLERANCE UNLESS SPECIFIED		TITLE Z AXIS AIR/OIL MANIFOLD ASSEMBLY	
X.XXX	+/- .005	APPLICATION PARTNER I	
X.XX	+/- .010	SCALE 2:1 DWG No. 6-10-008-059 SIZE B	
X.X	+/- .030	DATE 11 JUN 99 DRAWN BY HERME SHEET No. 2 OF 2	
ANGLE	+/- 1.0°		



Thermal Compensation Assembly

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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:
1. ITEMS 3 & 4 ARE REVERSED ON SOME AXES
2. ITEMS 5 & 7 ARE NOT USED ON SOME AXES

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

TITLE: THERMAL COMP ASSEMBLY

SCALE: 1:4 **DWG. NO.** 10018111

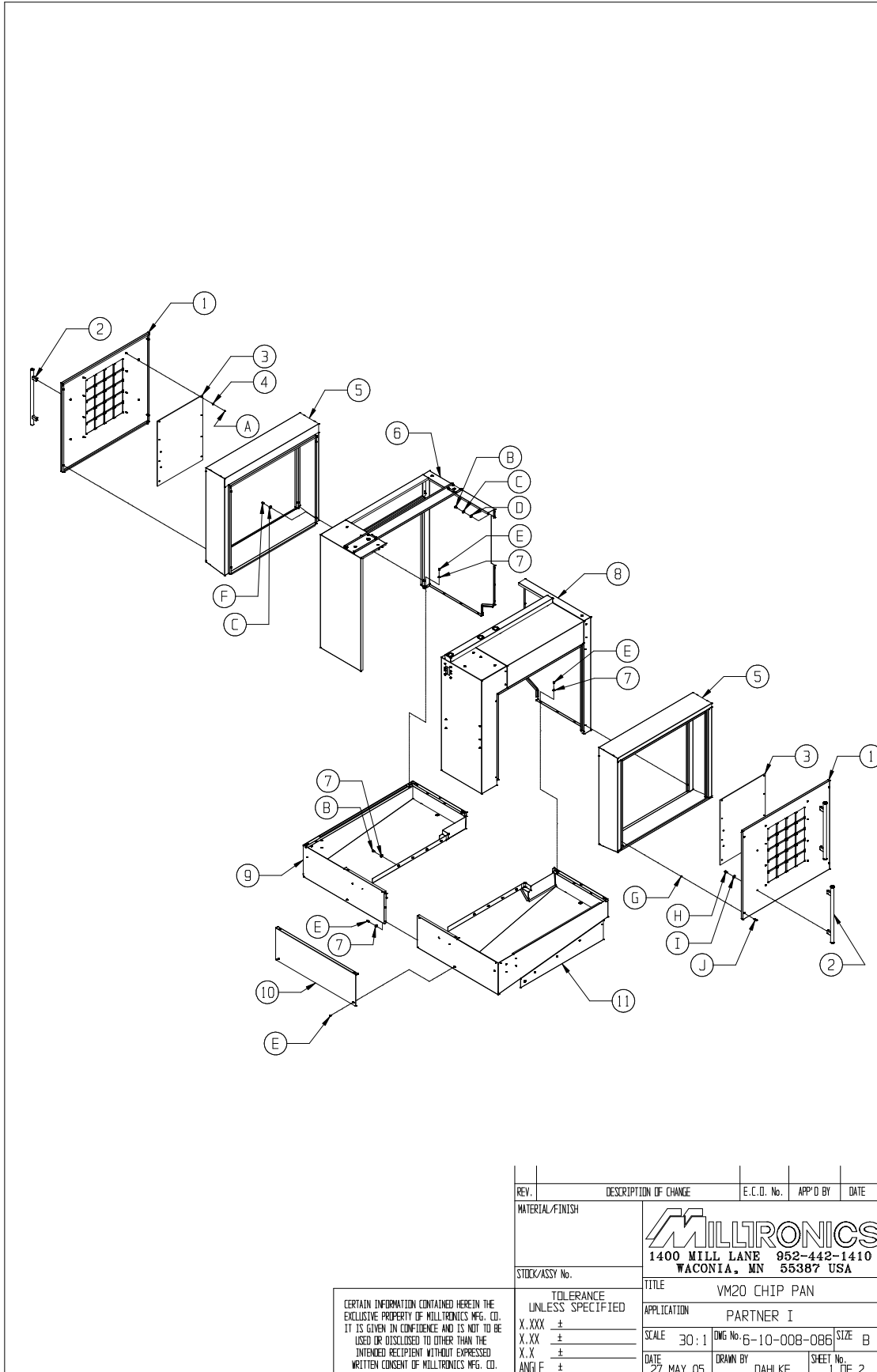
ESTIMATED WEIGHT: 16.0 Lbs. **STOCK/ASSY NO.** **SIZE** B

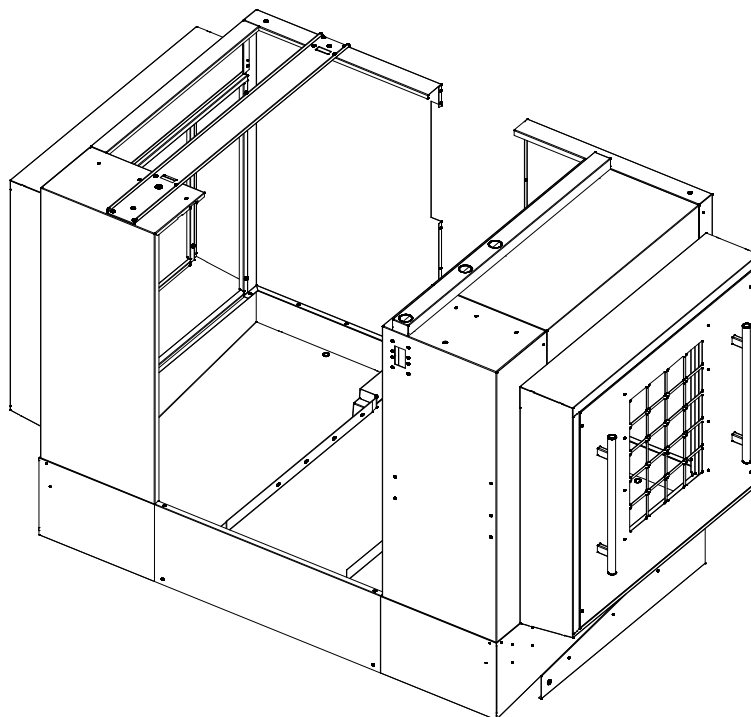
SHEET NO. 1 OF 1

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES(MM)
TOLERANCES:
FRACTIONAL: ±.005
ANGULAR: MACH ± 1.0 BEND ±
ONE PLACE DECIMAL ±.030 [.76]
TWO PLACE DECIMAL ±.010 [.26]
THREE PLACE DECIMAL ±.005 [.13]



Enclosure Assembly





HARDWARE LIST			
No.	QTY	STOCK NO.	DESCRIPTION
1	2	MP1-483	SIDE DOOR
2	4	WX-297	25" HANDLE
3	2	MP6-163	SIDE DOOR LEXAN
4	16	HD-58	M5 RUBBERIZED WASHER
5	2	MP1-490	ENCLOSURE BUMP-OUT
6	1	MP1-479	ENCLOSURE-LEFT
7	27	HD-12	M6 RUBBERIZED WASHER
8	1	MP1-480	ENCLOSURE-RIGHT
9	1	MP1-477	CHIP PAN BOTTOM-LEFT
10	1	MP1-485	CENTER STAINLESS STEEL
11	1	MP1-478	CHIP PAN BOTTOM-RIGHT

* USE ONLY ON 40" TRAVEL

HARDWARE LIST		
No.	QTY	DESCRIPTION
A	16	M5-.8 NYLOCK NUT
B	9	M6-1 x 20mm SHCS
C	17	M6 LOCK WASHER
D	9	M6 FLAT WASHER
E	23	M6-1 x 12mm BHCS
F	8	M6-1 x 12mm SHCS
G	8	M6-1 NYLOCK NUT
H	8	M8-1.25 x 20mm BHCS
I	8	M8 FLAT WASHER
J	8	M6-1 x 30mm SHCS

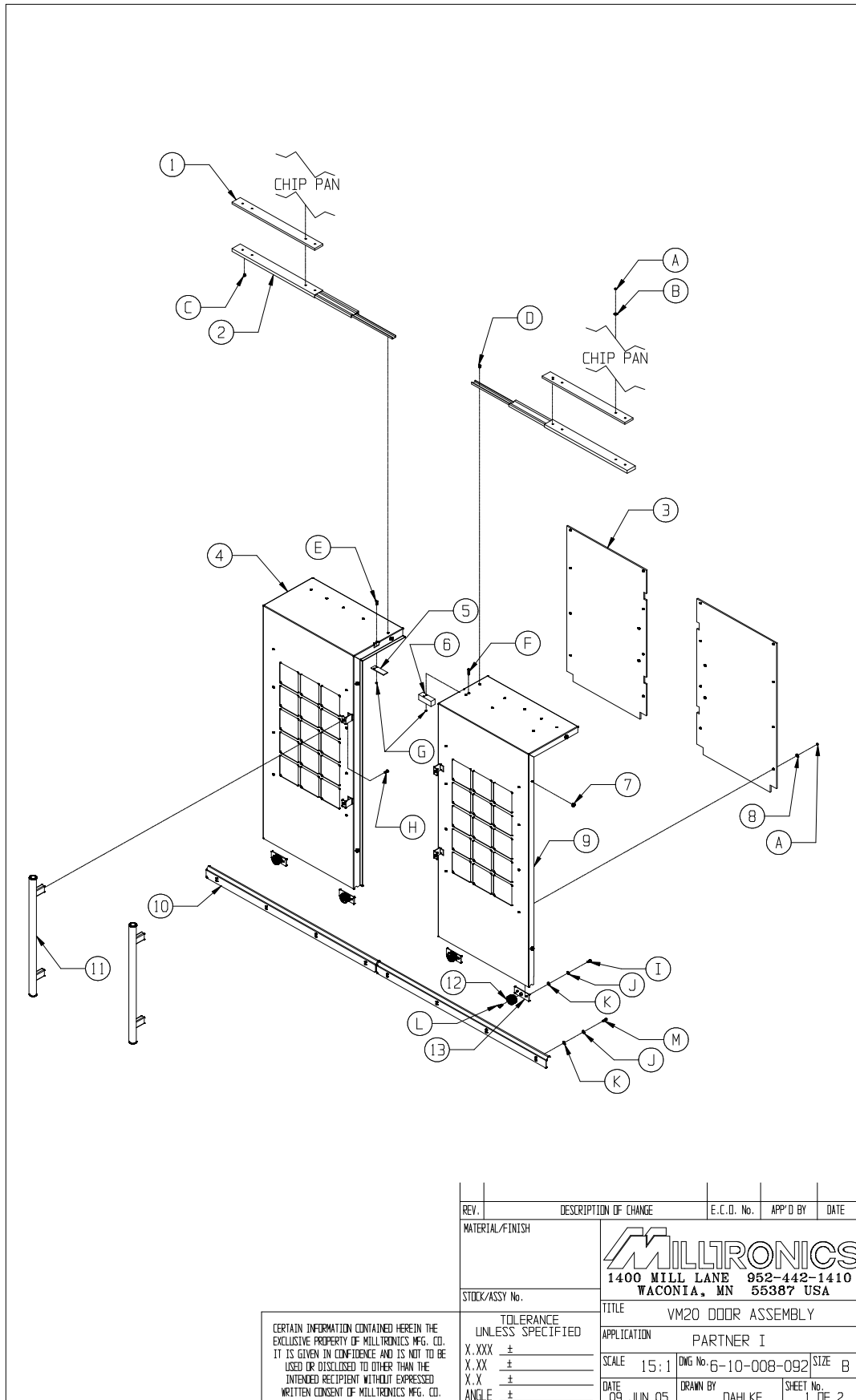
REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH				
STOCK/ASSY No.				
 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA				
TITLE VM20 CHIP PAN				
APPLICATION PARTNER I				
SCALE 16:1		DWG No. 6-10-008-086	SIZE B	
DATE 27 MAY 05		DRAWN BY DAHLKE	SHEET No. 2 OF 2	

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

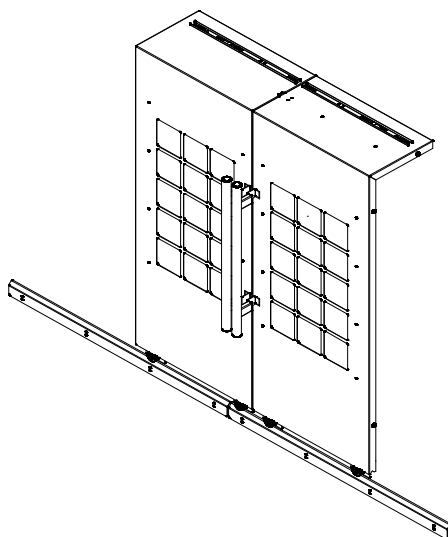


Enclosure Door Assembly



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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 VM20 DOOR ASSEMBLY			
TOLERANCE UNLESS SPECIFIED	APPLICATION PARTNER I			
X.XXX ±	SCALE 15:1			
X.XX ±	DWG No. 6-10-008-092			
X.X ±	SIZE B			
ANGLE ±	DATE 09 JUN 05			
	DRAWN BY DAHLKE			
	SHEET No. 1 OF 2			


PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	2	MP1-501	SLIDE SPACER
2	2	MP-838	SLIDE
3	2	MP-239	LEXAN
4	1	MP1-482	FRONT DOOR - LEFT
5	1	SW-244	SWITCH KEY
6	1	SW-243	DOOR SWITCH
7	9	WX-310	BUMPER
8	16	HD-58	M5 RUBBERIZED WASHER
9	1	MP1-481	FRONT DOOR - RIGHT
10	2	MP1-484	VM20 LOWER DOOR TRACK
11	2	WX-297	HANDLE
12	4	MP1-495	ROLLER
13	4	MP1-496	FRONT DOOR ROLLER PLATE

HARDWARE LIST

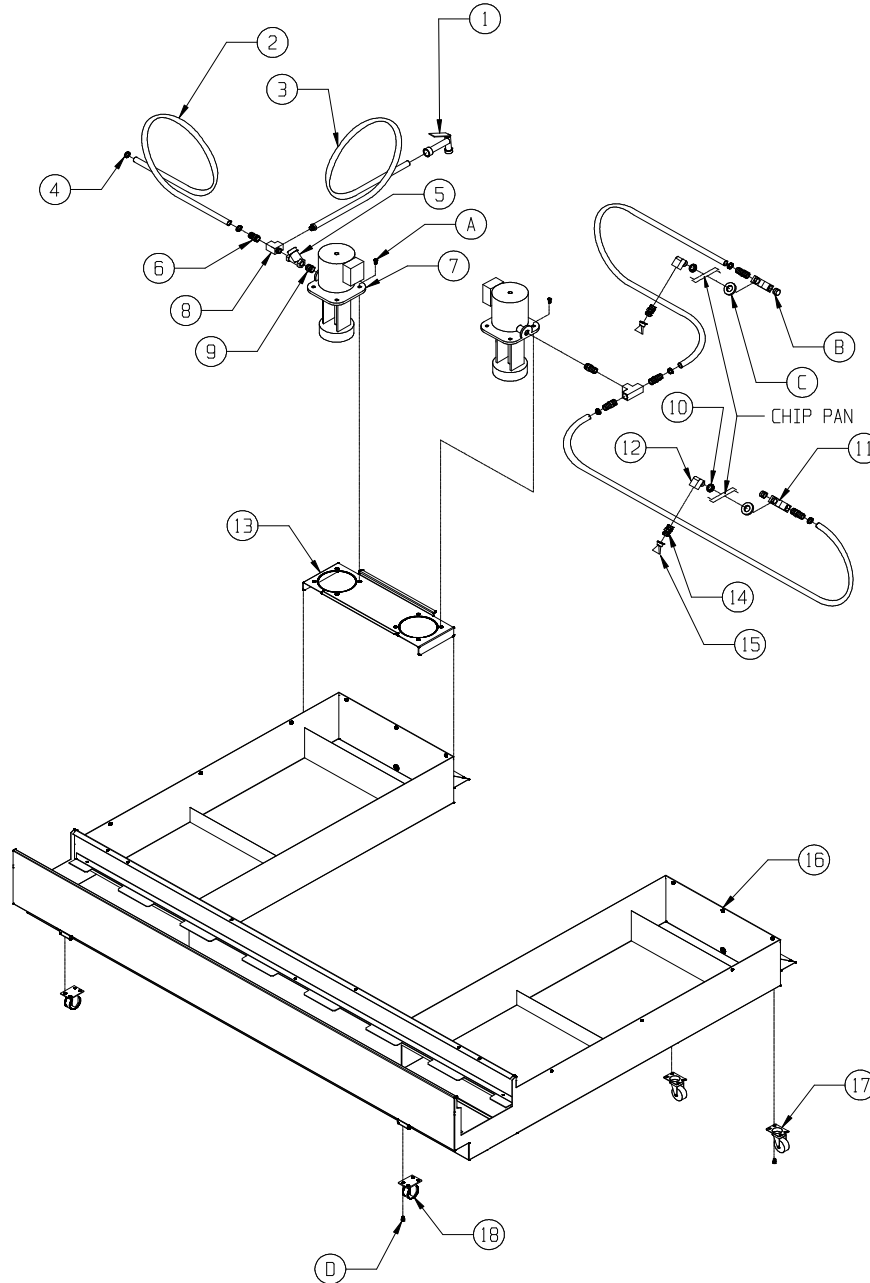
No.	QTY	DESCRIPTION
A	24	M5 NYLOCK NUT
B	8	M5 FLAT WASHER
C	8	M5-.8 x 20mm BHCS
D	10	M4-.7 x 10mm BHCS
E	2	M4-.7 x 20mm BHCS
F	2	M4-.7 x 35mm BHCS
G	4	M4-.7 NYLOCK NUT
H	4	M8-1.25 x 20mm BHCS
I	8	M6-1 x 12mm BHCS
J	16	M6 LOCK WASHER
K	16	M6 FLAT WASHER
L	4	M8-1.25 x 16mm BHCS
M	8	M6-1 x 12mm SHCS

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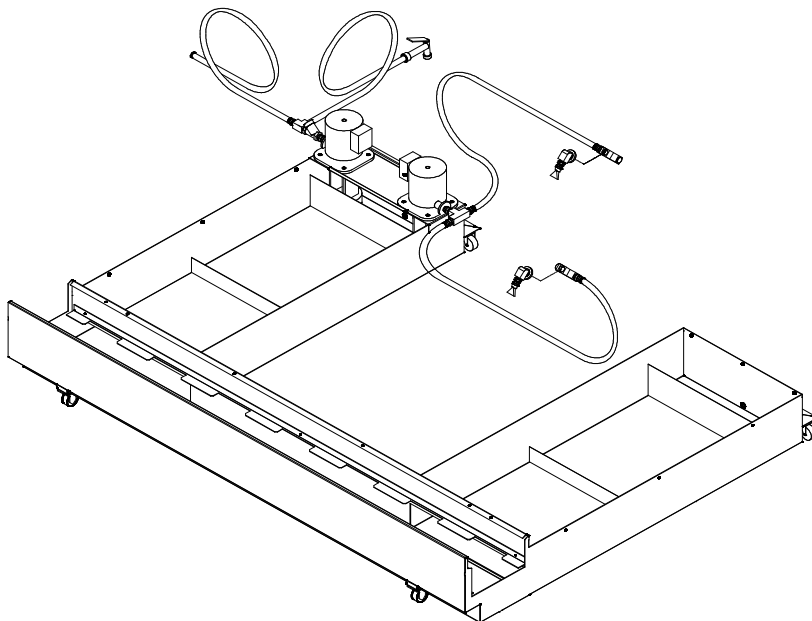
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE VM20 DOOR ASSEMBLY		
X.XXX ±		APPLICATION PARTNER I		
X.XX ±		SCALE 15:1 DWG No. 6-10-008-092 SIZE B		
X.X ±		DATE 09 JUN 05 DRAWN BY DAHLKE SHEET No. 2 OF 2		
ANGLE ±				



Flood Tank W/Washdown Assembly



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 VM20 FLOOD TANK W/WASHDOWN ASSEMBLY			
TOLERANCE UNLESS SPECIFIED	APPLICATION PARTNER I			
X .XXX +/-	SCALE 15:1 DWG No. 6-10-008-085 SIZE B			
X .XX +/-	DATE 27 MAY 05 DRAWN BY DAHLKE SHEET No. 1 OF 2			
X .X +/-				
ANGLE +/-				



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	2	NU-65	1/2" NIPPLE
10	2	WX-38	O' RING
11	3	NU-61	1/2" FEMALE T
12	2	NU-125	1/2" STREET ELBOW
13	1	MP1-489	COOLANT PUMP MOUNTING PLATE
14	2	NU-176	1/2" CONNECTOR
15	2	NU-175	1 1/4" FLARE NOZZLE
16	1	MP1-486	ONE PIECE COOLANT TANK
17	4	EL-88	CASTER - SWIVEL
18	2	EL-98	CASTER - RIGID

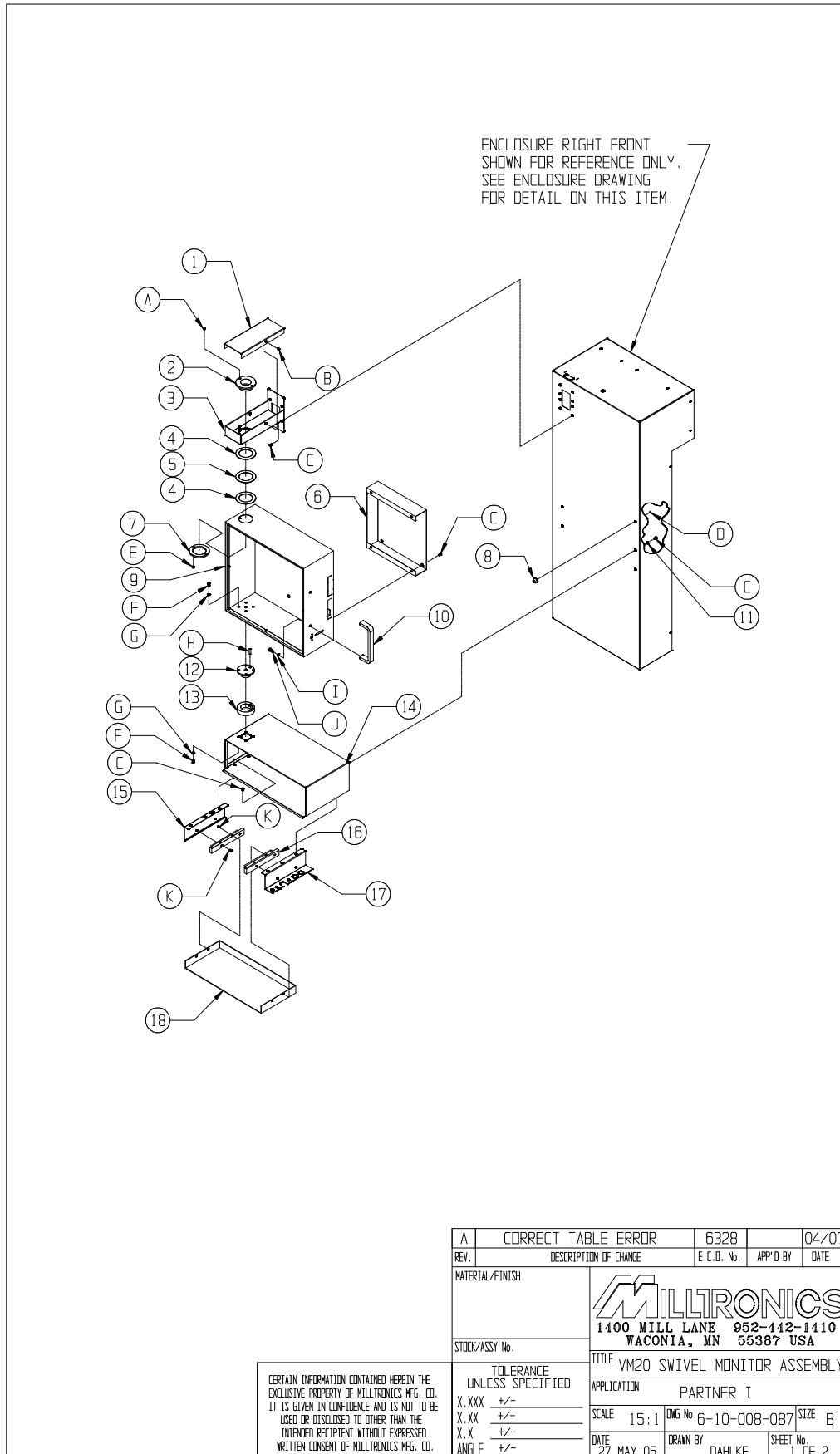
HARDWARE LIST

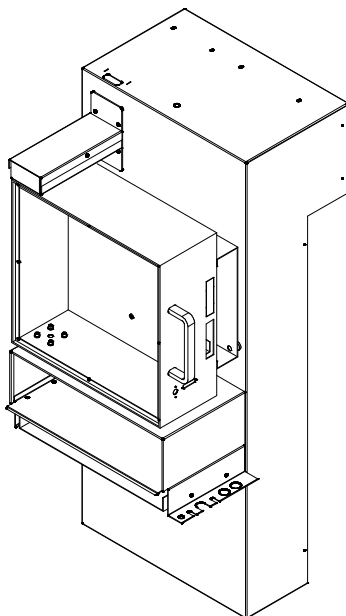
No.	QTY	DESCRIPTION
A	8	M6-1 x 12mm BHCS
B	2	1/2-14 NPT SHPP
C	2	7/8 FLAT WASHER 3/8 THICK
D	12	M6-1 x 12mm SHCS

REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH				
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED				
X.XXX	+/-			
X.XX	+/-			
X.X	+/-			
ANGLE	+/-			
 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA				
TITLE VM20 FLOOD TANK W/WASHDOWN ASSEMBLY				
APPLICATION PARTNER I				
SCALE 15:1	DWG No. 6-10-008-085	SIZE B		
DATE 27 MAY 05	DRAWN BY DAHLKE	SHEET No. 2 OF 2		



Enclosure Swivel Monitor Assembly





Not Shown		
Qty	Part #	Description
1	MA-495	Cycle light
2	MA-494	LED work light

PARTS LIST			
No.	QTY	STOCK No.	DESCRIPTION
1	1	MP1-494	COVER SWIVEL MONITOR UPPER SUPPORT ARM
2	1	MP-663	FLANGED BUSHING - SWIVEL MONITOR
3	1	MP1-491	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	WX-156	BLACK BUMPER
9	1	#01018838	SWIVEL MONITOR BOX
10	1	WX-230	HANDLE
11	4	HD-12	RUBBERIZED WASHER
12	1	MP-648	SWIVEL PIVOT BUSHING
13	1	MP-649	SWIVEL PIVOT BASE
14	1	MP1-492	SWIVEL MONITOR BASE
15	1	MP1-498	BRACKET - SWIVEL MONITOR DRAWER OPTION
16	1	MP-654	8" FULL EXTENSION ACCURIDE SLIDE
17	1	MP1-497	UTILITY TRAY - SWIVEL MONITOR
18	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	1	8-32 NYLOCK NUT
E	2	M5-.8 NYLOCK NUT
F	8	M6-1 x 10mm SHCS
G	8	M6 LOCK WASHER
H	1	1/4 x .5 DOWEL PIN
I	2	M8 FLAT WASHER
J	2	M8-1.25 x 20mm BHCS
K	8	M3-.5 x 10mm BHCS

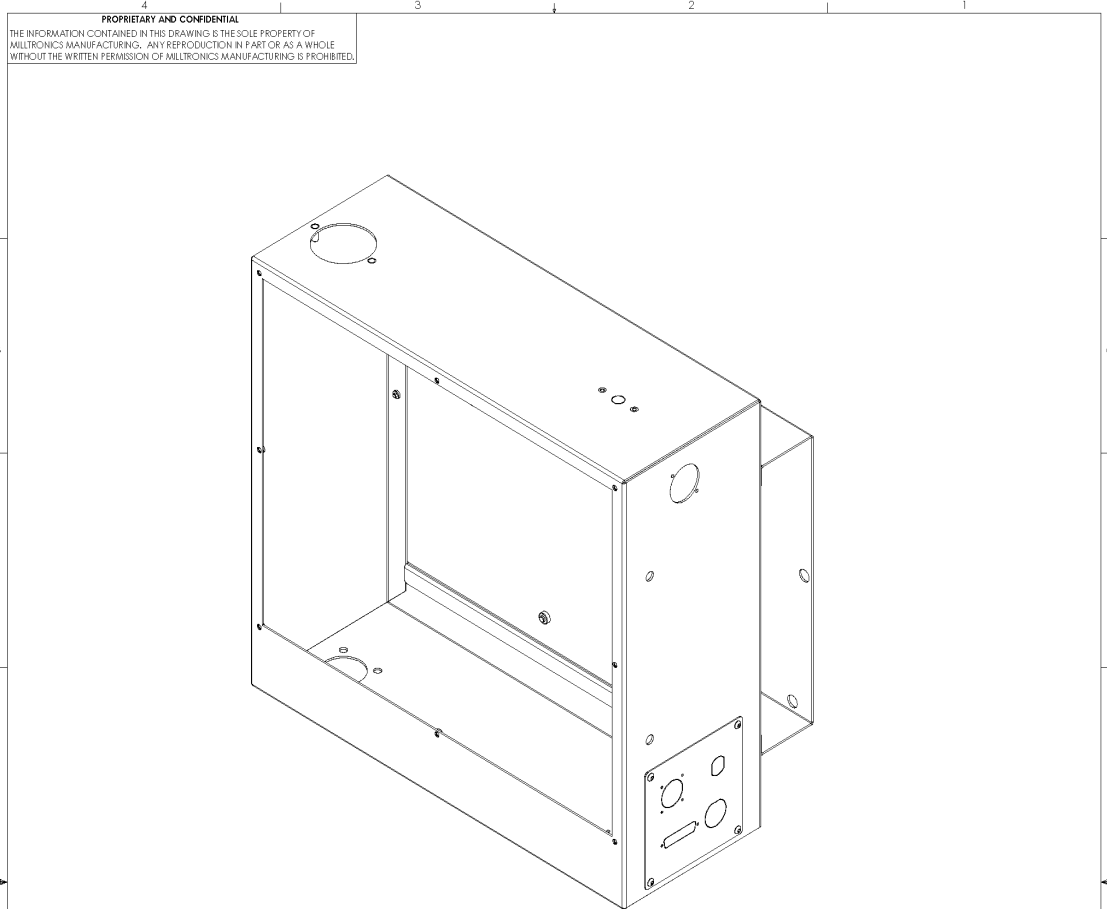
SWIVEL BOX TABLE	
No.	#01018838
g	

A	CORRECT TABLE ERROR	6328		04/07
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 VM20 SWIVEL MONITOR ASSEMBLY		
X .XXX +/-		APPLICATION PARTNER I		
X .XX +/-		SCALE 10:1		DWG No. 6-10-008-087
X .X +/-		DATE 27 MAY 05		SHEET No. 2 OF 2
ANGLE +/-		DRAWN BY DAHLKE		

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Control Box Assembly #01018838

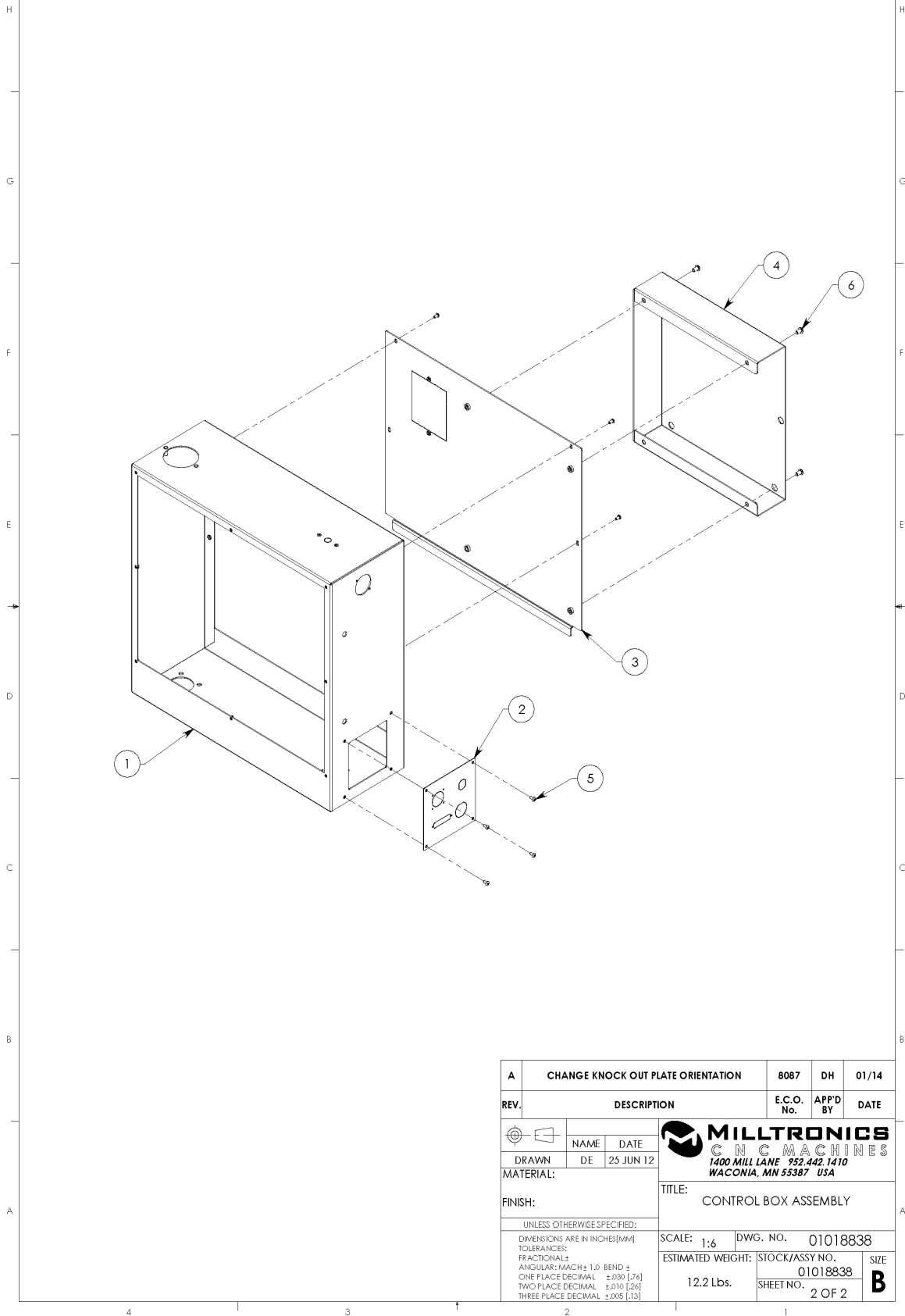


ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	01018836	CONTROL BOX - ONE PIECE CONSTRUCTION
2	1	01018855	CONTROL BOX ACCESS PANEL WITH USB
3	1	01040054	CONTROL PANEL- BACK COVER
4	1	MP00653	3 RING BINDER POCKET-SWIVEL MONITOR
5	8	BHCS M4-0.7 x 8	M4-0.7 x 8mm BHCS
6	4	BHCS M6-1.0 x 10	M6-1.0 x 10mm BHCS

A	CHANGE KNOCK OUT PLATE ORIENTATION	8087	DH	01/14
REV.	DESCRIPTION	E.C.O. No.	APP'D BY	DATE
	NAME	DATE	 MILLTRONICS CNC MACHINES 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA	
DRAWN	DE	25 JUN 12	TITLE: CONTROL BOX ASSEMBLY	
MATERIAL:		FINISH:		
UNLESS OTHERWISE SPECIFIED:		SCALE: 1:4 DWG. NO. 01018838		
DIMENSIONS ARE IN INCHES(MM) TOLERANCES: FRACTIONAL: ANGULAR: MACH ± 1.0 BEND ± ONE PLACE DECIMAL ±0.00 [76] TWO PLACE DECIMAL ±0.10 [26] THREE PLACE DECIMAL ±0.05 [13]		ESTIMATED WEIGHT: 12.2 Lbs.	STOCK/ASSY NO. 01018838	SIZE B
		SHEET NO. 1 OF 2		

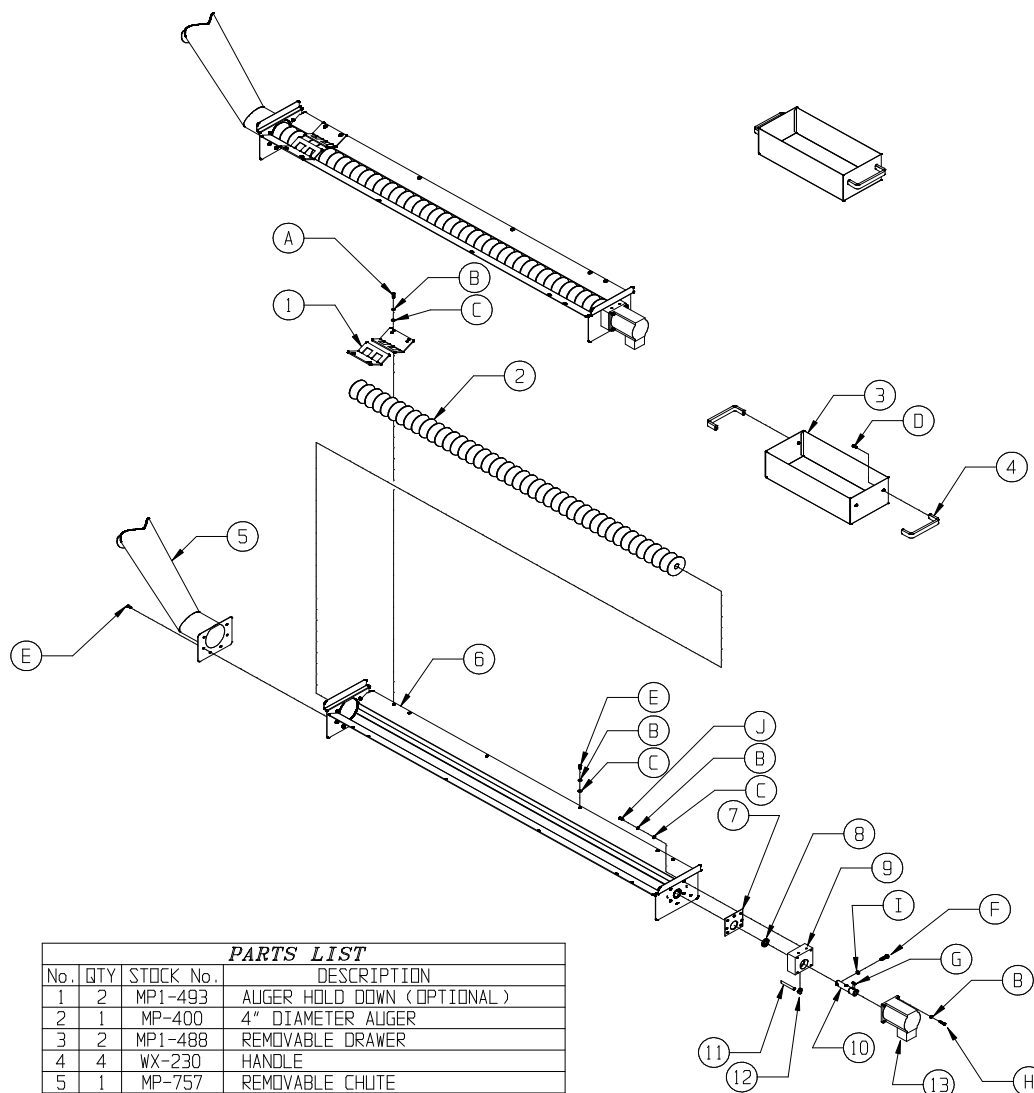


PROPRIETARY AND CONFIDENTIAL
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A		CHANGE KNOCK OUT PLATE ORIENTATION			8087	DH	01/14
REV.		DESCRIPTION			E.C.O. No.	APP'D BY	DATE
		NAME		DATE	 MILLTRONICS CNC MACHINES 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA		
DRAWN		DE	25 JUN 12				
MATERIAL:							
FINISH:				TITLE: CONTROL BOX ASSEMBLY			
UNLESS OTHERWISE SPECIFIED:							
DIMENSIONS ARE IN INCHES [MM]		SCALE: 1:6		DWG. NO.		01018838	
TOLERANCES:		ESTIMATED WEIGHT:		STOCK/ASSY NO.		01018838	
FRACTIONAL: ±		12.2 Lbs.		SHEET NO.		2 OF 2	
ANGULAR: MACH ± 1.0 BEND ±							
ONE PLACE DECIMAL ±.030 [.76]							
TWO PLACE DECIMAL ±.010 [.25]							
THREE PLACE DECIMAL ±.005 [.13]							

Chip Pan Drawer/Auger Assembly



PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	2	MP1-493	AUGER HOLD DOWN (OPTIONAL)
2	1	MP-400	4" DIAMETER AUGER
3	2	MP1-488	REMOVABLE DRAWER
4	4	WX-230	HANDLE
5	1	MP-757	REMOVABLE CHUTE
6	1	MP1-487	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 20 SHCS

D	CHANGE AUGER BOLTS	6753		03/09	
C	CHANGE AUGER BOLT SIZE	6751	N.M.	03/09	
B	UPDATE HARDWARE LIST	6256	N.M.	01/07	
A	ADD AUGER GASKET	6144	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.					
TOLERANCE UNLESS SPECIFIED		TITLE VM20 DRAWER/AUGER ASSEMBLY			
		APPLICATION PARTNER I			
X.XXX	+/-	SCALE 20:1		DWG No. 6-10-008-089	SIZE B
X.XX	+/-	DATE 08 JUN 05		DRAWN BY DAHLKE	SHEET No. 1
X.X	+/-				
ANGLE	+/-				

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

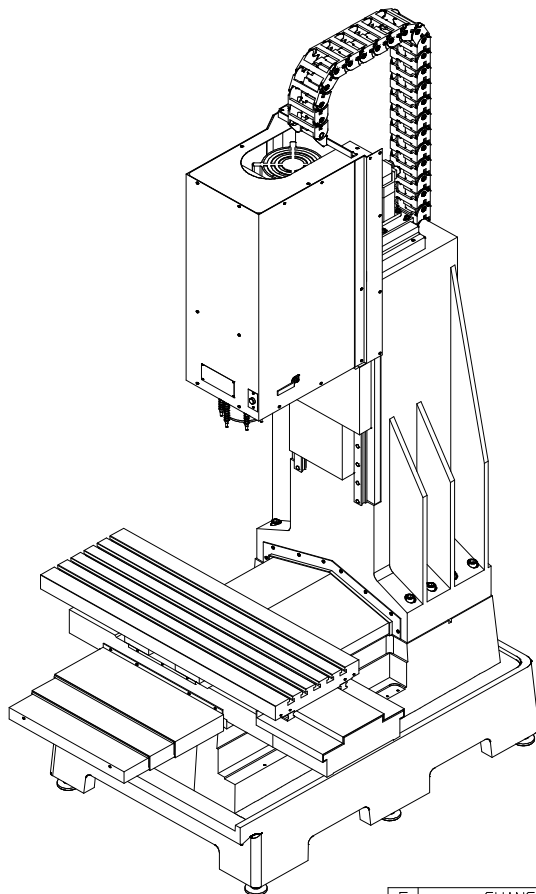
 DRAWN: AJW DATE: 29 SEP 14 MATERIAL: FINISH: UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES: FRACTIONAL: ± ANGULAR: MACH ± 1.0 BEND ± ONE PLACE DECIMAL: ±.030 (.76) TWO PLACE DECIMAL: ±.010 (.26) THREE PLACE DECIMAL: ±.005 (.13)	NAME	DATE	 1400 MILL LANE • 952.442.1410 WACONIA, 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**

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.



F	CHANGE FRAME	5671		12/03
E	CHANGED HEAD COVERS	5021	N.M.	3/01
D	ADD DTE 24 TABLE	4703	N.M.	10/00
C	REMOVE HEAT EXCHANGER	3909	N.M.	3/99
B	CHANGE GREASE SPECS.	3411	N.M.	2/98
A	ADD SPECIFICATIONS	3133	N.M.	6/97
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE VM17 LUBRICATION DRAWING		
X.XXX ±		APPLICATION PARTNER VM17		
X.XX ±		SCALE 15:1 DWG No. 6-10-008-044 SIZE B		
X.X ±		DATE 02 JUN 97 DRAWN BY THOMPSON SHEET NO. 1 OF 2		
ANGLE ±				

THIS ASSEMBLY USED ON VM16, VM17

The grease detailed below has been superceded by:
 Mobilgrease XHP221, Product Code 642454-00, 3-7-2014.

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

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

F	CHANGE FRAME	5671		12/03
E	CHANGED HEAD COVERS	5021	N.M.	3/01
D	ADD DTE 24 TABLE	4703	N.M.	10/00
C	REMOVE HEAT EXCHANGER	3909	N.M.	3/99
B	CHANGE GREASE SPECS.	3411	N.M.	2/98
A	ADD SPECIFICATIONS	3133	N.M.	6/97
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.		TITLE VM17 LUBRICATION DRAWING		
TOLERANCE UNLESS SPECIFIED		APPLICATION PARTNER VM17		
X.XXX	±	SCALE 15:1	DWG No 6-10-008-044	SIZE B
X.XX	±			
X.X	±			
ANGLE	±	DATE 02 JUN 97	DRAWN BY THOMPSON	SHEET NO. 2 OF 2

Retention Knob Chart

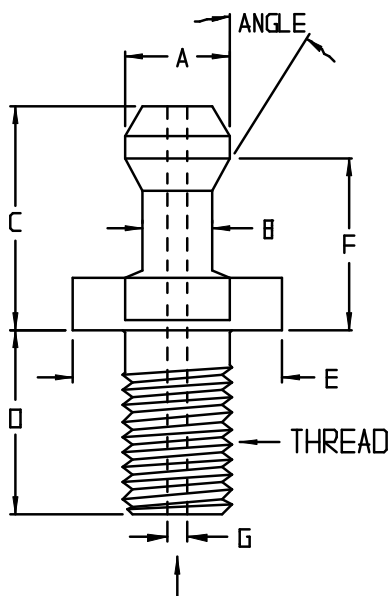
40 Taper Tooling

		Dimension								
Standard	Flange	A	B	C	D	E	F	G	Angle	Thread
MAS 60°	CT	.59	.39	1.27	.86	.90	.99	.19	60°	5/8"-11
	BT	.59	.39	1.38	.99	.90	1.10	.16	60°	M16-2
Optional										
ANSI 45°	CT	.74	.49	.64	.86	.93	.44	.27	45°	5/8"-11
	BT	.74	.49	.75	.86	.90	.55	.28	45°	M16-2
MAS 45°	CT	.59	.39	1.27	.86	.90	.99	.19	45°	5/8"-11
	BT	.59	.39	1.38	.99	.90	1.10	.16	45°	M16-2
DIN 69872	CT	.75	.55	1.02	.86	.90	.79	.24	75°	5/8"-11
	BT	.75	.55	1.02	.99	.90	.79	.28	75°	M16-2

50 Taper Tooling

		Dimension								
Standard	Flange	A	B	C	D	E	F	G	Angle	Thread
ANSI 45°	CT	1.14	.83	1.00	1.32	1.42	.70	.45	45°	1"-8
	BT	1.14	.83	1.00	1.32	1.42	.70	.45	45°	M24-3

MAS - ANSI - DIN Dimension Diagram



English threads for CT-Flange
 Metric threads for BT-Flange

Notes:

- Balanced tooling (G2.5 Spec) is required for spindle speeds in excess of 8000 RPM. Spindle warranty will be void if balanced tooling is not used.
- Always tighten retention knobs to the manufacturers recommended torque specification.
- Inline spindles, in their respective frame sizes, use the same retention knobs as belted models.
- All dimensions above are in inches.

