



MILLTRONICS USA®
LET'S INVENT

VM16IL C Mechanical

11-18-2015
Rev 2

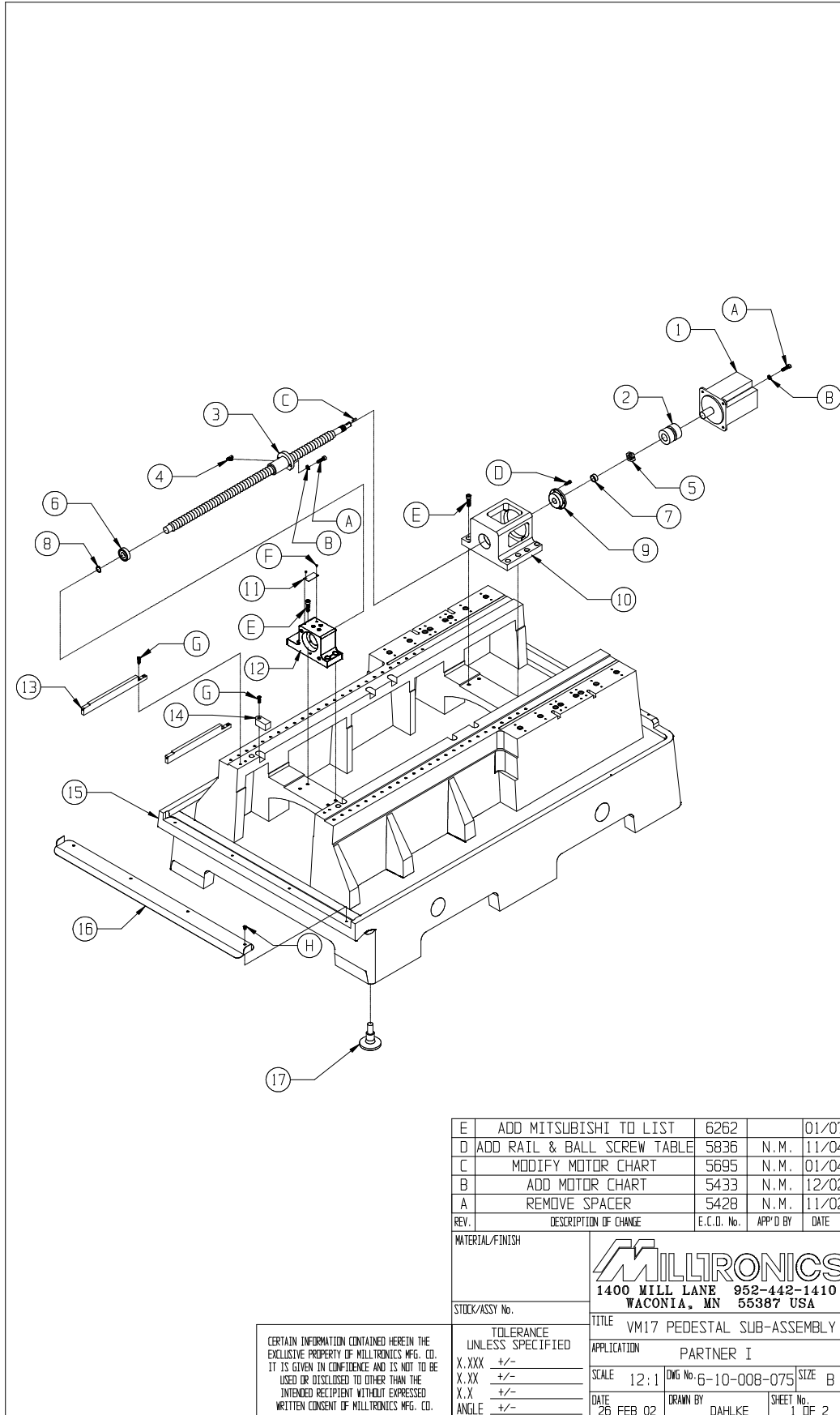
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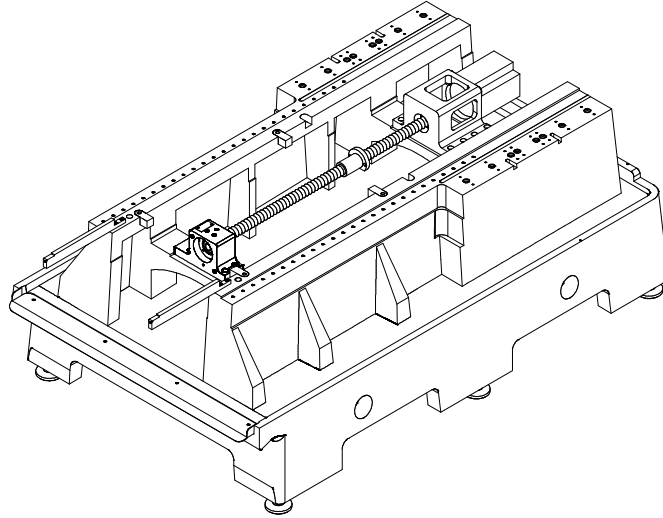
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Manual Discrepancy Sheet

1. On page 7 Item #11 is MP-844&845 as shown.
2. On page 11 item #21 is M8 hardware as shown.
3. On page 15 #L is M5.8x12mm as shown.
4. On page 33 #9 & #16 are qty 2 & 1 as shown.
5. On page 35 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	MD-123 (.5kw) MD-125 (1.0kw) MD-127 (1.5kw)	4Nm A06B-0223-B200 8Nm A06B-0227-B200	6Nm 1FK7060-5AF71-1EA0 11Nm 1FK7063-5AF71-1EA0	MD-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

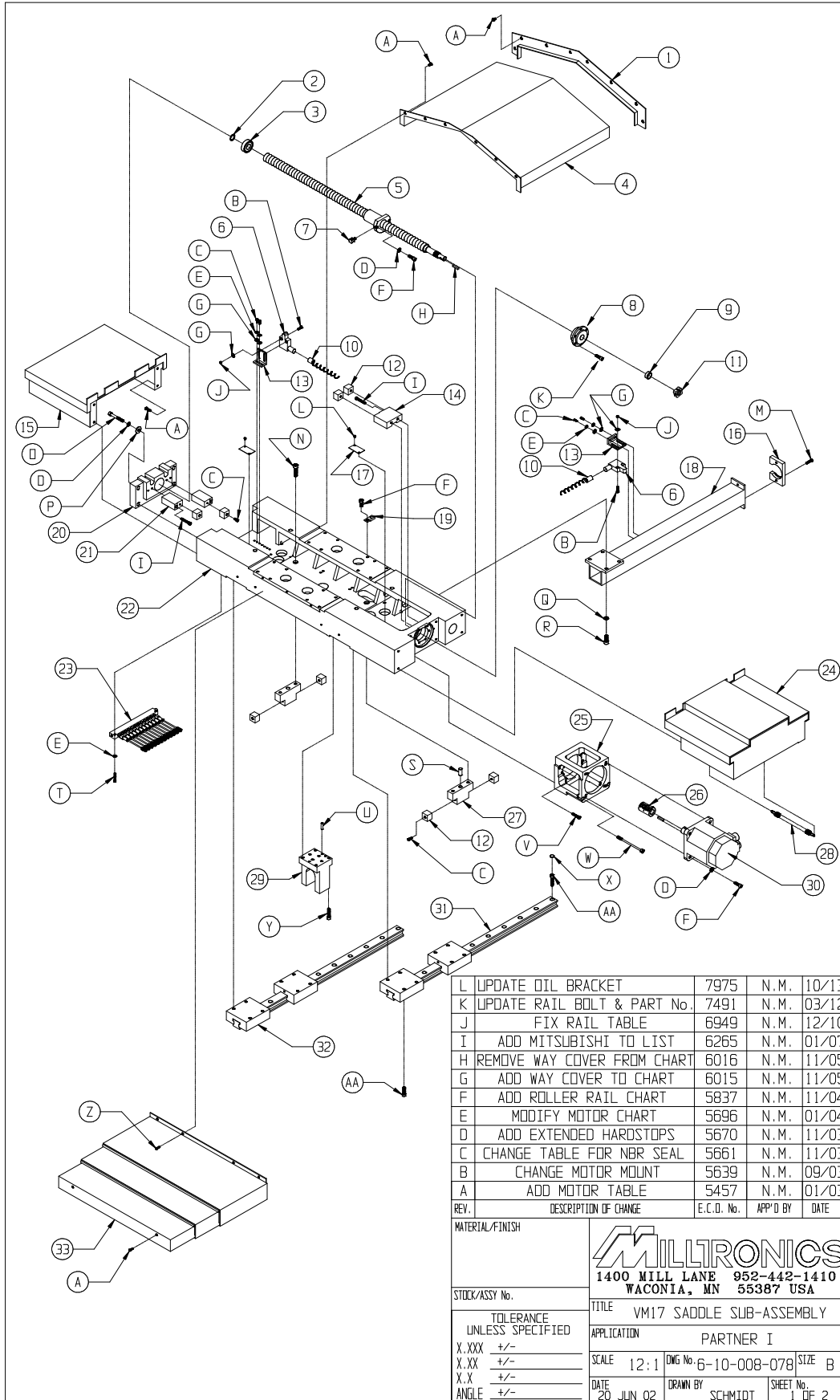
E	ADD MITSUBISHI TO LIST	6262		01/07
D	ADD RAIL & BALL SCREW TABLE	5836	N.M.	11/04
C	MODIFY MOTOR CHART	5695	N.M.	01/04
B	ADD MOTOR CHART	5433	N.M.	12/02
A	REMOVE SPACER	5428	N.M.	11/02
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE

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	+/-				
X.X	+/-				
ANGLE	+/-	DATE 26 FEB 02		DRAWN BY DAHLKE	SHEET No. 2 OF 2

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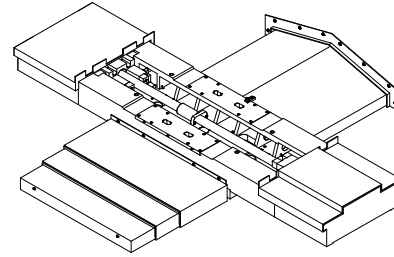


Machine Saddle Assembly





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	NU00161	1/8 NPT SWIVEL ELBOW 4mm TUBE
8	1	BG00094	BALL SCREW 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	01018834	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	SIMENS
26	MA00242 (.5/1.0kW)	MA00242	MA00260
	MA00241 (1.5kW)		MA00260
30	MD00123 (.5kW)	4Nn A06B-0223-B200	6Nn 1FK7060-5AF71-1EA0
	MD00125 (1.0kW)	8Nn A06B-0227-B200	11Nn 1FK7063-5AF71-1EA0
	MD00127 (1.5kW)		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

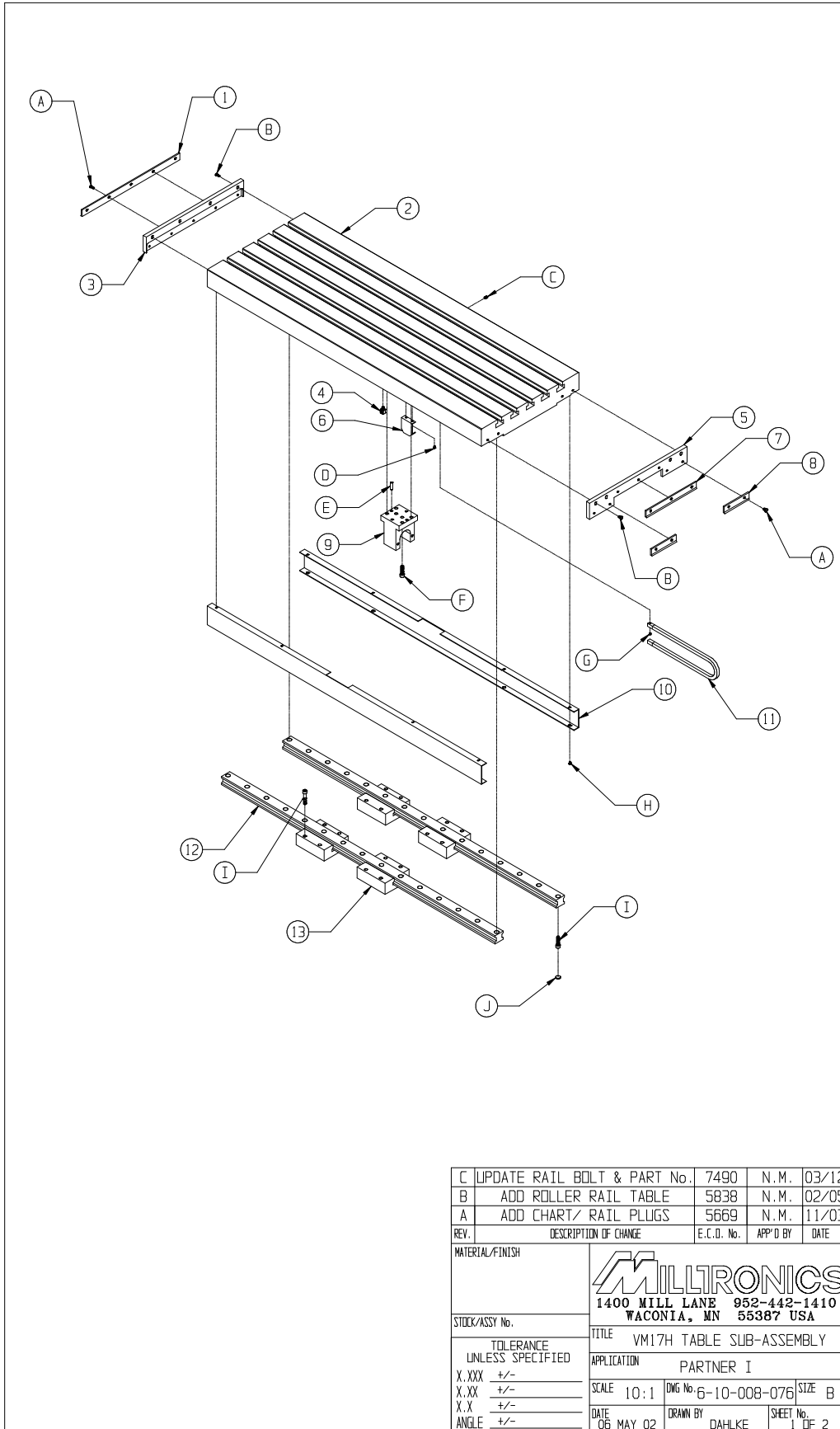
HARDWARE LIST		
No.	QTY	DESCRIPTION
A	24	M6-1 x 12mm BHCS
B	4	M5-.8 x 20mm SHCS
C	12	M5-.8 x 16mm SHCS
D	10	M8 LOCK WASHER
E	6	M5 LOCK WASHER
F	7	M8-1.25 x 30mm SHCS
G	8	M5 FLAT WASHER
H	1	3/16 x 3/16 x 1/2 KEY
I	4	M6-1 x 40mm SHCS
J	4	M5-.8 HEX NUT
K	6	M6-1 x 25mm SHCS
L	4	1/4 DRIVE RIVIT
M	2	M6-1 x 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 DDWEL PIN
T	2	M5-.8 x 25mm SHCS
U	2	1/4 x 1 DDWEL 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

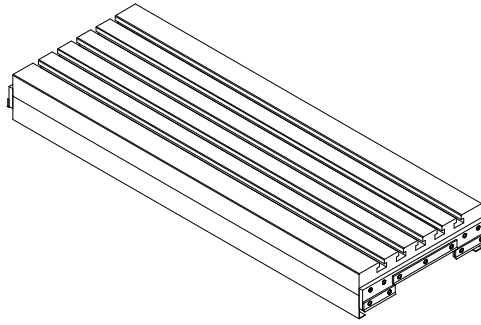
L	UPDATE OIL BRACKET	7975	N.M.	10/13
K	UPDATE RAIL BOLT & PART No.	7491	N.M.	03/12
J	FIX RAIL TABLE	6949	N.M.	12/10
I	ADD MITSUBISHI TO LIST	6265	N.M.	01/07
H	REMOVE WAY COVER FROM CHART	6016	N.M.	11/05
G	ADD WAY COVER TO CHART	6015	N.M.	11/05
F	ADD ROLLER RAIL CHART	5837	N.M.	11/04
E	MODIFY MOTOR CHART	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		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.		TITLE VM17 SADDLE SUB-ASSEMBLY		
TOLERANCE UNLESS SPECIFIED		APPLICATION PARTNER I		
X.XXX	+/-	SCALE 15:1		
X.XX	+/-	Dwg No. 6-10-008-078		
X.X	+/-	SIZE B		
ANGLE	+/-	DATE 20 JUN 02		
		DRAWN BY SCHMIDT		SHEET No. 2 OF 2



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	NU00161	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

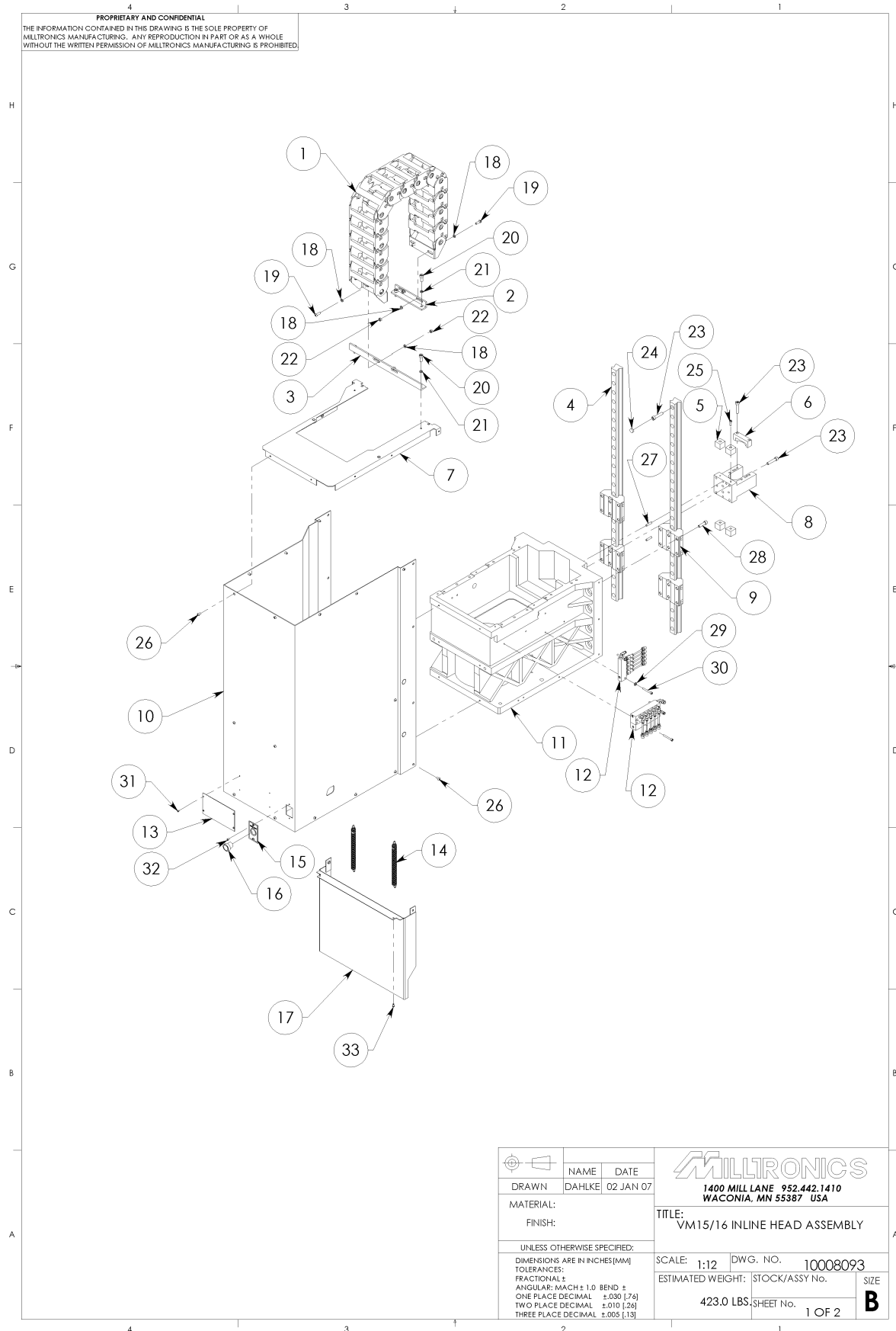
TABLE TRAVEL

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



Machine Head Assembly





ITEM No.	QTY	PART NO.	DESCRIPTION
1	1	MP00850	SPINDLE CABLE TRACK
2	1	MP00316	SPINDLE CABLE SUPPORT BRACKET
3	1	MP00664	VM SPINDLE CABLE SUPPORT BRACKET
4	2	SEE TABLE	LINEAR RAILS
5	4	MP00718	POM HARD STOP
6	1	MP00109	Z AXIS BALL SCREW SAFETY CATCH
7	1	MP00639	UNIVERSAL HEADCOVER - TOP
8	1	MX10011	Z AXIS BALLSCREW CARRIER
9	4	SEE TABLE	35mm RAIL BLOCK
10	1	MP00635	UNIVERSAL HEAD COVER
11	1	MX00043	70mm HEAD-CASTING
12	1	SEE TABLE	Z AXIS AUTOLUBE MANIFOLD ASSEMBLY
13	1	LB00001	SAFETY STICKER
14	2	SEE TABLE	WAY COVER SPRING
15	1	LB00181	TOOL-OUT LABEL
16	1	SW00067	TOOL OUT SWITCH
17	1	SEE TABLE	Z-AXIS WAYCOVER
18	8	WASHER FLAT M6	M6 FLAT WASHER
19	4	BHCS M6-1.0 x 20	M6 - 1.0 x 20 BHCS
20	4	SHCS M6-1.0 x 20	M6-1.0 x 20 SHCS
21	4	WASHER LOCK M6	M6 LOCK WASHER
22	4	NUT M6-1	M6-1 NYLOCK NUT
23	**30	SHCS M8-1.25 x 40	M8-1.25 x 40 SHCS
24	**22	RAIL PLUG	RAIL PLUG
25	4	SHCS M5-0.8 x 16	M5-0.8 x 16 SHCS
26	23	BHCS M6-1.0 x 10	M6-1.0 x 10 BHCS
27	2	DOWEL PIN .25 x 1.0	.25 x 1.0 DOWEL PIN
28	16	SHCS M8-1.25 x 30	M8-1.25 x 30 SHCS
29	2	WASHER LOCK M5	M5 LOCK WASHER
30	2	SHCS M5-0.8 x 40	M5-0.8 x 40 SHCS
31	4	BHCS M3-0.5 x 5	M3-0.5 x 5 BHCS
32	2	BHCS M4-0.7 x 8	M4-0.7 x 8 BHCS
33	2	BHCS M4-0.7 x 10	M4-0.7 x10 BHCS

** ROLLER RAILS USE AN ADDITIONAL 20 RAIL PLUGS & 20 M8-1.25 x 40 SHCS.

No.	DESCRIPTION	20" TRAVEL	26" TRAVEL
4	BALL RAIL	MP00640	MPB0047
	ROLLER RAIL	MP00831	MP00811
9	BALL RAIL BLOCK	MP00641	MP00641
	ROLLER RAIL BLOCK	MP00815	MP00815
14	WAY COVER SPRING	-	HD00062
17	Z AXIS WAY COVER	MP1-424	MP10425

No.	DRAWING No.	DESCRIPTION
12	6-10-018-050	VM Z AXIS OIL MANIFOLD ASSEMBLY
	6-10-008-059	Z AXIS AIR/OIL MANIFOLD ASSEMBLY

NAME: DAHLKE DATE: 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: VM15/16 INLINE HEAD ASSEMBLY

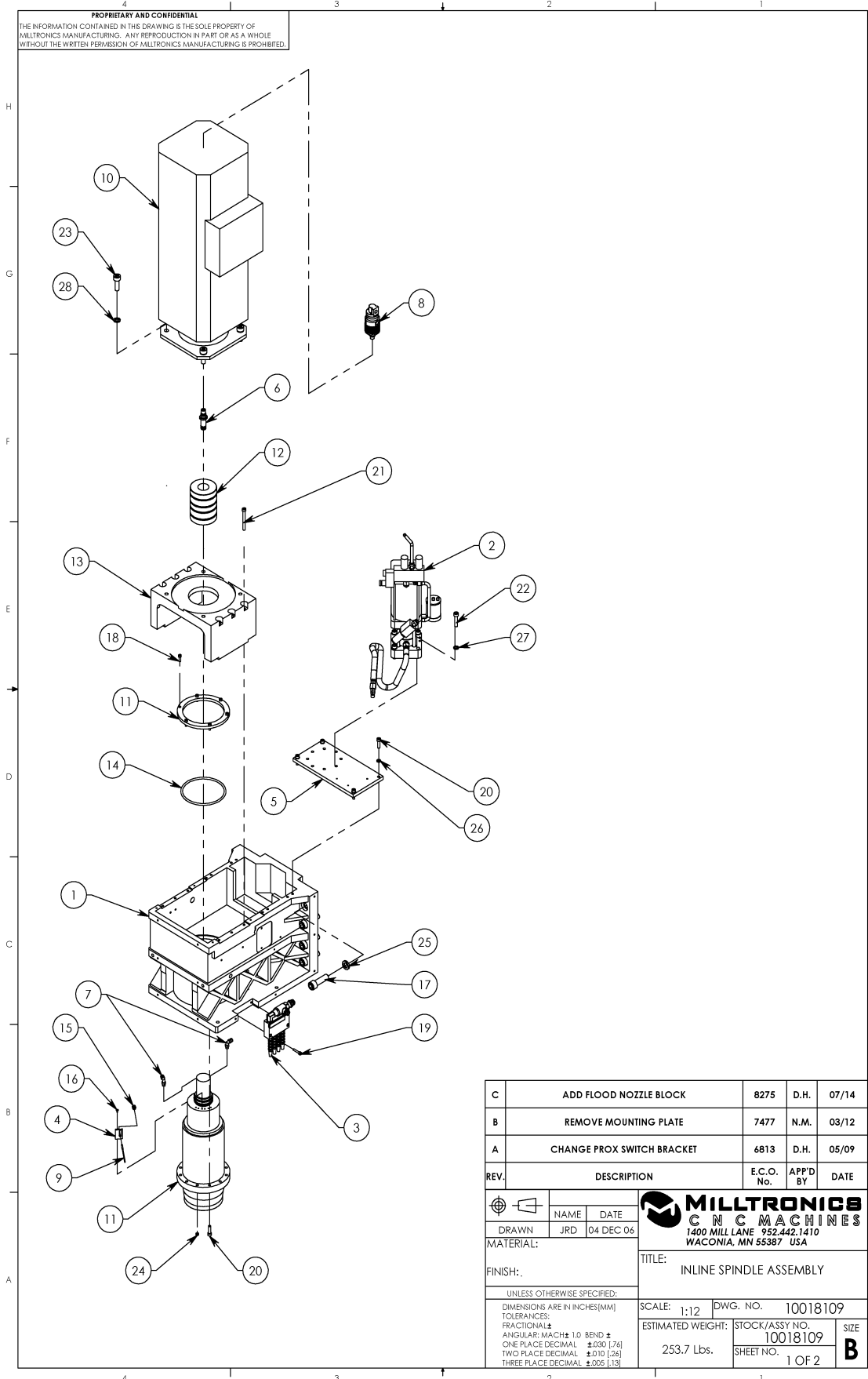
SCALE: 1:12 DWG. NO. 10008093

ESTIMATED WEIGHT: 423.0 LBS STOCK/ASSY No. SHEET No. 2 OF 2

SIZE B



Inline Spindle Assembly



SPINDLE MOTOR TABLE		
ITEM NO.	STOCK NO.	DESCRIPTION
11	MP001023	10K RPM
	MP001129	15K RPM

MOTOR COUPLER TABLE		
ITEM NO.	MOTOR-END HUB 1 DIA. (MM)	SPINDLE-END HUB 2 DIA. (MM)
12	24	50
	28	50
	32	50
	38	50
	40	50
	42	50
	48	50
	50	50
	55	50

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	MX00043	70mm HEAD-MACHINED
2	1	10018108	AIR/OIL AMPLIFIER SYSTEM
3	1	10040024	FLOOD HANDLE SUB ASSEMBLY
4	1	BR00166	SPINDLE PROX SWITCH BRACKET
5	1	MP00951	AIR OIL AMPLIFIER (NU00388) MOUNTING PLATE
6	1	MP00958	CTS SPINDLE MOTOR CONNECTING TUBE (CTS OPTION)
7	2	NU00171	ELBOW - M/S 1/4 TUBE x 1/8NPT
8	1	NU00226	DEUBLIN COOLANT UNION
9	1	PR00050	PROX SWITCH
10	1	SEE TABLE	SPINDLE MOTOR
11	1	SEE TABLE	SPINDLE ASSEMBLY
12	1	SEE TABLE	MOTOR COUPLER
13	1	SEE TABLE	MOTOR CASTING MITSUBISHI AND FANUC
14	1	WX00270	70mm REAR CARTRIDGE SEAL O-RING
15	1	WX00358	PROX SWITCH RESTRAINT
16	2	BHCS M4-0.7 x 8	M4-0.7 x 8mm BHCS
17	8	SHCS 3_4-10 x 2.5	3/4-10 x 2.5 SHCS
18	6	SHCS M6-1.0 x 20	M6-1.0 x 20mm SHCS
19	2	SHCS M6-1.0 x 30	M6-1.0 x 30mm SHCS
20	20	SHCS M8-1.25 x 30	M8-1.25 x 30mm SHCS
21	6	M8-1.25x160mm SHCS	M8-1.25x160mm SHCS With M8 flat washer and M8 split-ring lockwasher
22	4	SHCS M10-1.5 x 45	M10-1.5 x 45mm SHCS
23	4	SHCS M14-2.0 x 45	M14-2.0 x 45mm SHCS
24	6	SHPP 1/8-28 BSPP	1/8-28 BSPP SHPP
25	8	WASHER LOCK .75	3/4 LOCK WASHER
26	4	WASHER LOCK M8	M8 LOCK WASHER
27	4	WASHER LOCK M10	M10 LOCK WASHER
28	4	WASHER LOCK M14	M14 LOCK WASHER

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

SPINDLE MOTOR MOUNTING PLATE TABLE		
ITEM NO.	STOCK NO.	DESCRIPTION
13	MX00081	7.5kw MITSUBISHI/FANUC/SIEMENS
	MX00082	11.0kw MITSUBISHI/FANUC
	MXS0005	11.0kw SIEMENS

C	ADD NOZZLE BLOCK	8275	D.H.	07/14
B	REMOVE MOUNTING PLATE	7477	N.M.	03/12
A	CHANGE PROX SWITCH BRACKET	6813	D.H.	05/09
REV.	DESCRIPTION	E.C.O. No.	APP'D BY	DATE

NAME	DATE
DRAWN	JRD 04 DEC 06

MATERIAL:

FINISH:

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES[[MM]]

TOLERANCES:

FRACTIONAL±

ANGULAR: MACH± 1.0 BEND ±

ONE PLACE DECIMAL ±0.030 [1/64]

TWO PLACE DECIMAL ±0.010 [1/256]

THREE PLACE DECIMAL ±0.005 [1/2000]

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

TITLE:

INLINE SPINDLE ASSEMBLY

SCALE: 1:17

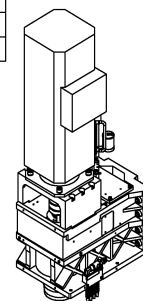
ESTIMATED WEIGHT: 253.7 Lbs.

DWG. NO. 10018109

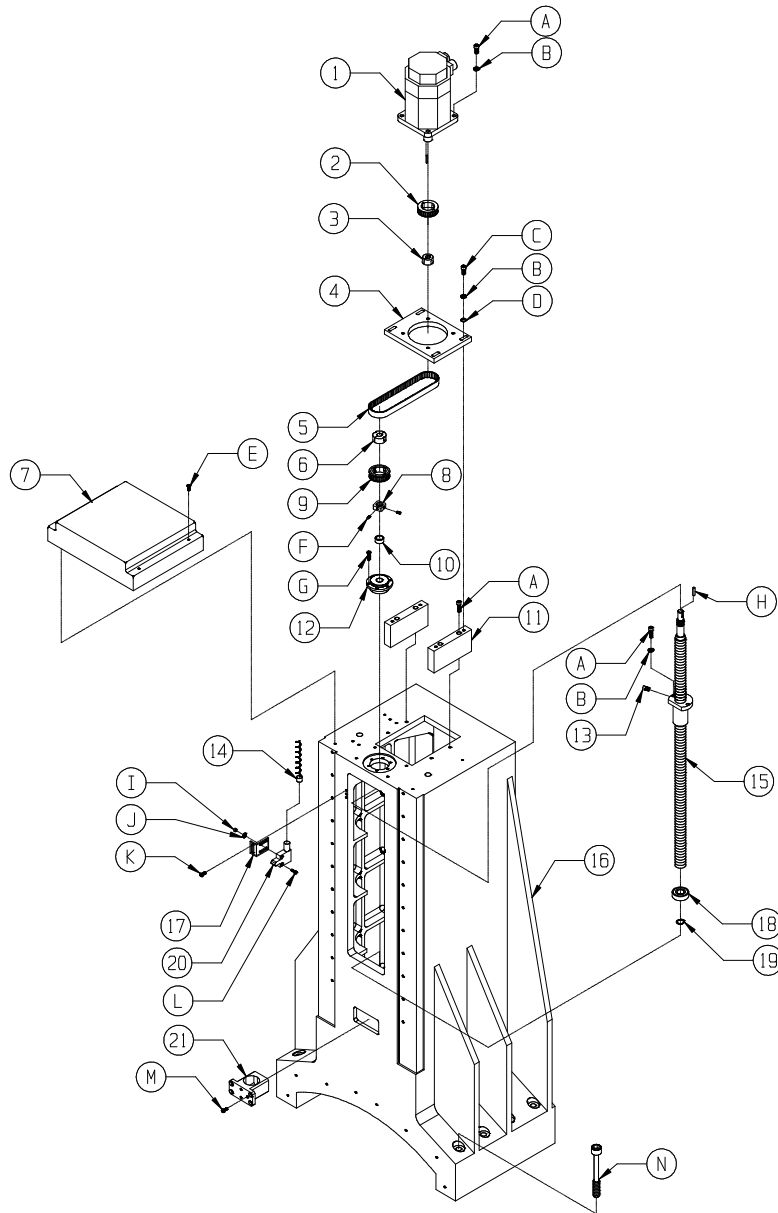
STOCK/ASSY NO. 10018109

SHEET NO. 2 OF 2

B

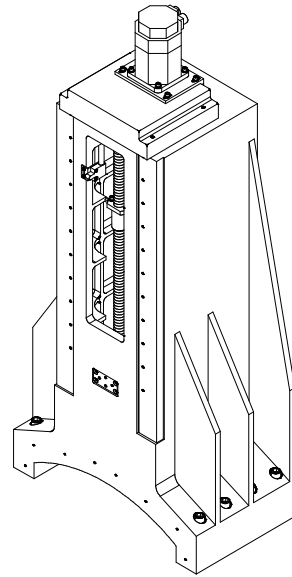


Machine Column (Belt Drive) Assembly



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.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 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 +/-				

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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	NJ00154	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.	YASKAWA	FANUC
1	MD00128 (1.5Kw)	8Nm A06B-0227-B200
3	PY00206	PY00212

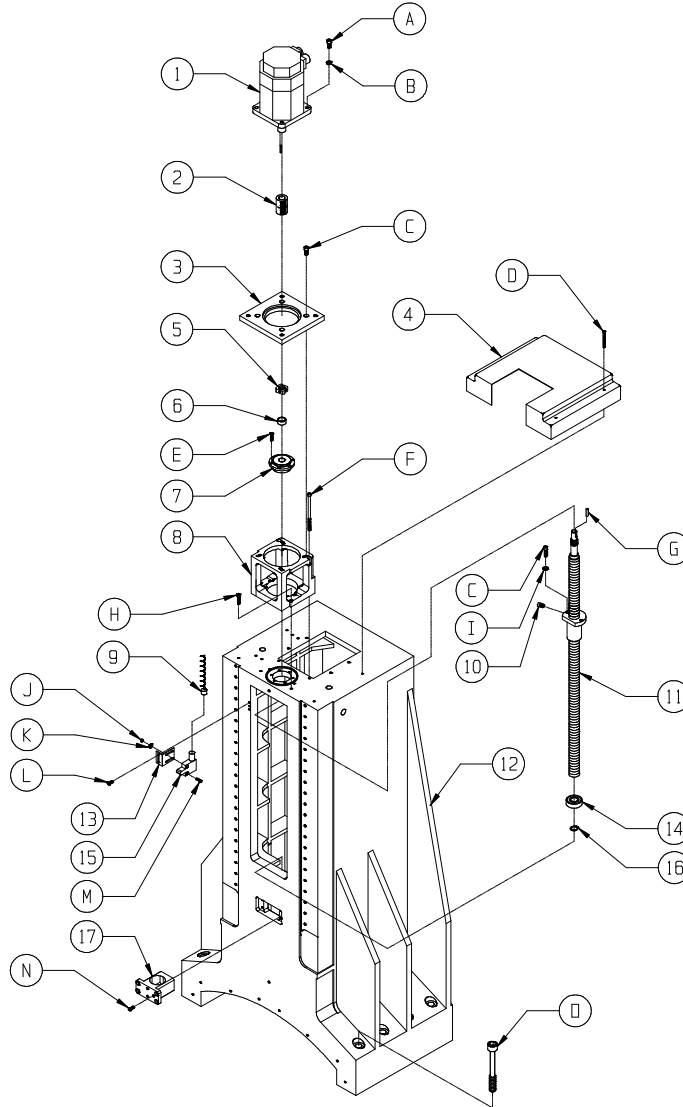
D	CHANGE HARDWARE LIST	7844	N.M.	06/13	
C	EDIT TABLE	5841	N.M.	02/05	
B	ADD MOTOR TABLE	5707	N.M.	01/04	
A	CHANGE COLUMNS	5434	N.M.	12/02	
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE	
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA			
STOCK/ASSY No.		TITLE VM17H COLUMN SUB-ASSEMBLY			
TOLERANCE UNLESS SPECIFIED X.XXX +/- X.XXX +/- X.X +/- ANGLE +/-		APPLICATION PARTNER I			
		SCALE 12:1		DWG No. 6-10-008-079	SIZE B
		DATE 18 JUN 02		DRAWN BY SCHMIDT	SHEET No. 2 OF 2

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

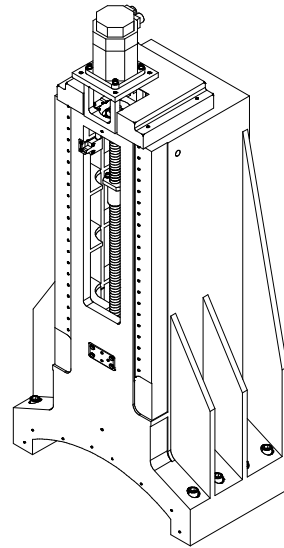


Machine Column (Direct Drive) Assembly



B	ADD MITSUBISHI TO LIST	6266		01/07
A	ADD BALL SCREW TABLE	5840	N.M.	02/05
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE VM17H 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	MD-138 (3kw)	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

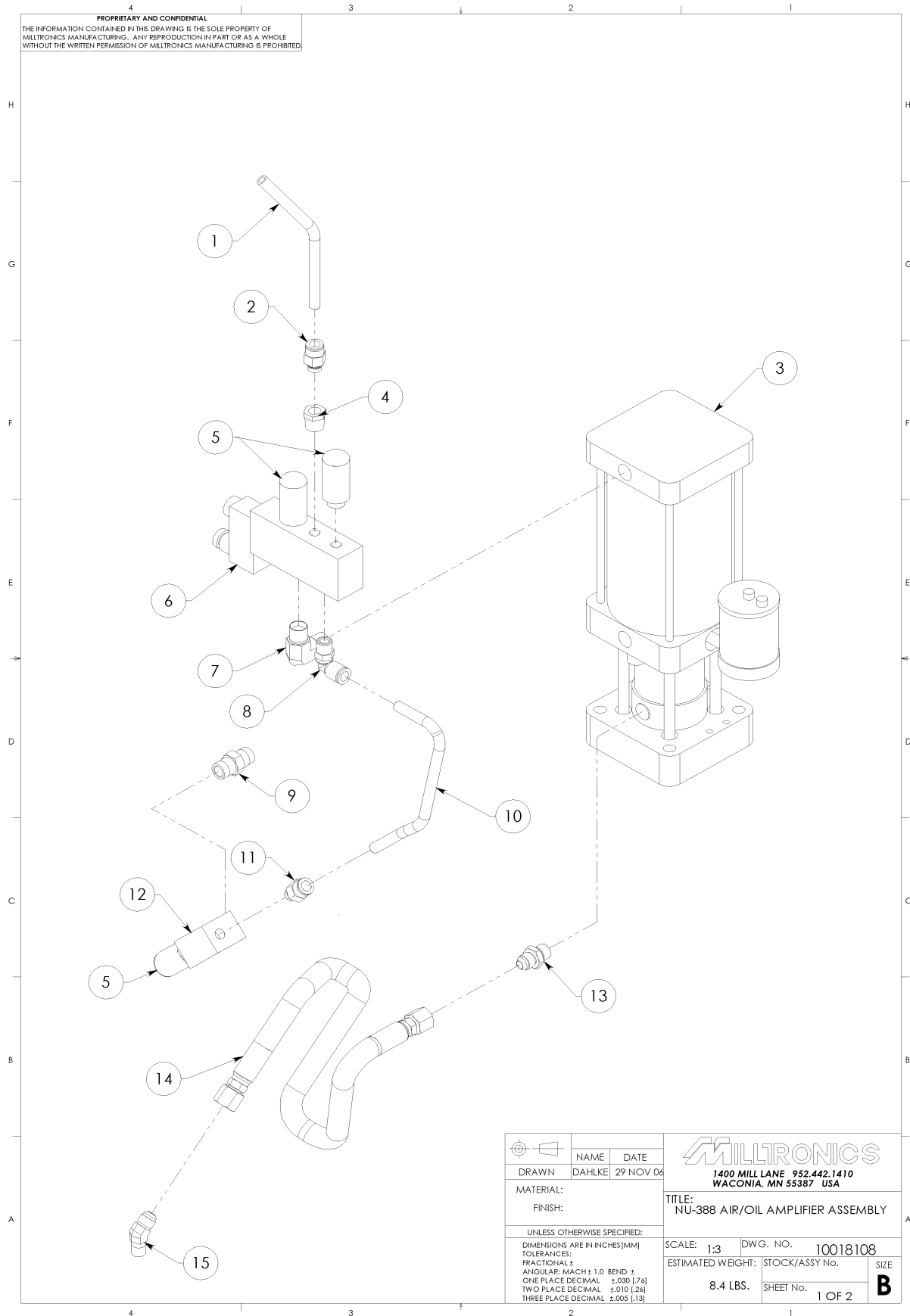
BALL SCREW TABLE		
No.	DESCRIPTION	PART No.
11	STANDARD RAPID	MPB-02
	HIGH SPEED RAPID	MP-801

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.				
TOLERANCE UNLESS SPECIFIED		TITLE VM17H DIRECT DRIVE COLUMN SUB-ASSEMBLY		
X.XXX ±		APPLICATION PARTNER I		
X.XX ±		SCALE 12:1		
X.X ±		DATE 13 JAN 04		
ANGLE ±		DRAWN BY DAHLKE		
		SHEET No. 2 OF 2		

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Power Drawbar Cylinder Assembly

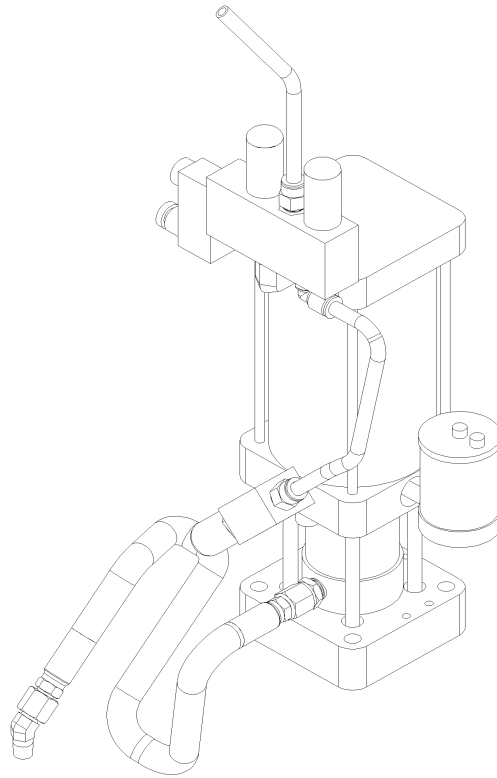


	NAME	DATE
	DRAWN DAHLKE	29 NOV 06
MATERIAL:	1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA	
	TITLE: NU-388 AIR/OIL AMPLIFIER ASSEMBLY	
FINISH:	SCALE: 1:3	DWG. NO. 10018108
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± 1.0 BEND ± ONE PLACE DECIMAL ±.030 (.76) TWO PLACE DECIMAL ±.010 (.26) THREE PLACE DECIMAL ±.005 (.13)	ESTIMATED WEIGHT: 8.4 LBS.	STOCK/ASSY No. 1 OF 2
	SHEET No. 1 OF 2	
	SIZE B	



4 3 2 1
H
G
F
E
D
C
B
A

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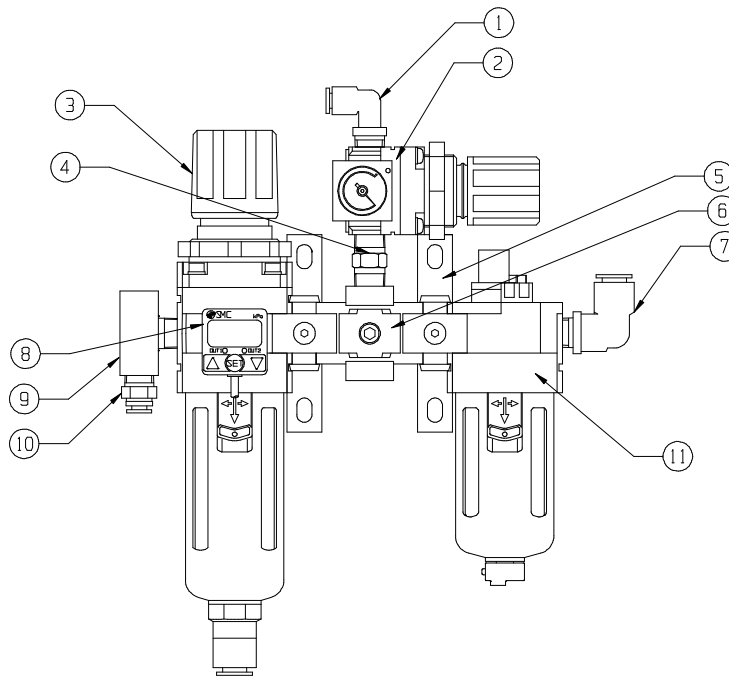
ITEM NO.	QTY	PART NO.	DESCRIPTION
1	1	NU00078	3/8 AIR LINE
2	1	NU00095	TUBE CONNECTOR - M/S 3/8 TUBE 1/4NPT
3	1	NU00408	AIR/OIL AMPLIFIER SYSTEM
4	1	NU00027	REDUCER - 3/8 x 1/4NPT
5	3	NU00375	MUFFLER
6	1	NU00293	SOLENOID VALVE
7	1	NU00292	MALE ELBOW - 3/8NPT
8	1	NU00412	SWIVEL ELBOW - M/S 10mm TUBE 3/8NPT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

	NAME	DATE	 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA	
	DRAWN	DAHLKE		
MATERIAL:		TITLE:		
FINISH:		NU-388 AIR/OIL AMPLIFIER ASSEMBLY		
UNLESS OTHERWISE SPECIFIED:		SCALE: 1:3 DWG. NO. 10018108		
DIMENSIONS ARE IN INCHES (MM)		ESTIMATED WEIGHT: 8.4 LBS.		SIZE
TOLERANCES:		STOCK/ASSY No.		B
FRACTIONAL ±		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]				



Air Filter / Lubricator / Filter Assembly

PARTS LIST			
ITEM	QTY	STOCK No.	DESCRIPTION
1	1	NU-199	1/4 NPT 3/8 TUBE SWIVEL ELBOW
2	1	NU-262	LOW PRESSURE REGULATOR W/GAGE
3	1	NU-212	LARGE FILTER/HIGH PRESSURE REGULATOR
4	1	NU-30	1/4 NPT PIPE NIPPLE
5	2	NU-210	LARGE MOUNTING SPACER
6	1	NU-211	LARGE MANIFOLD SPACER
7	1	NU-199	1/4 NPT 3/8 TUBE SWIVEL ELBOW
8	1	NU-430	DIGITAL AIR GAUGE WITH PRESSURE SWITCH
9	1	NU-219	1/4 NPT BRANCH TEE
10	1	NU-32	1/4 NPT 1/4 TUBE MALE STRAIGHT
11	1	NU-209	LARGE LUBRICATOR



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

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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

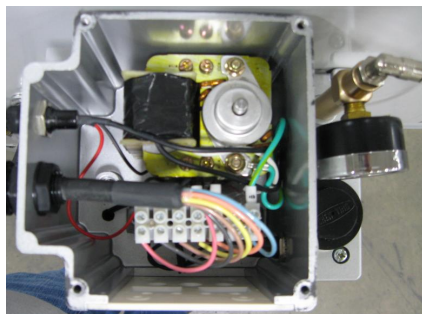
	Old style	New style
Model #	CESD	CEN01
Part #	MA00219	MA00458
Timer function ON/OFF	Built-in controls	Via CNC #66
Audible alarm	YES	NO
Oil pressure gauge	NO	YES
Manual override button	YES	YES

Software & control

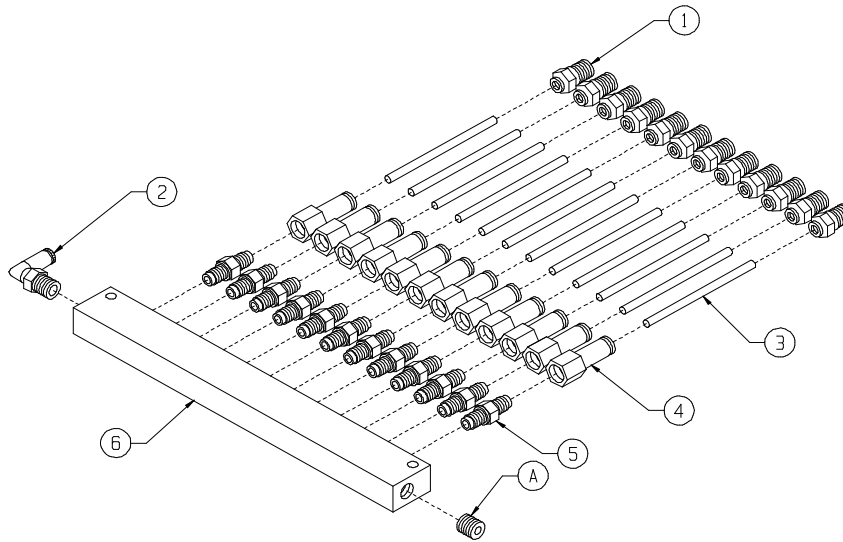
All 8200 versions have the functionality. 7200 version 77401 or higher is required to have the functionality.

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

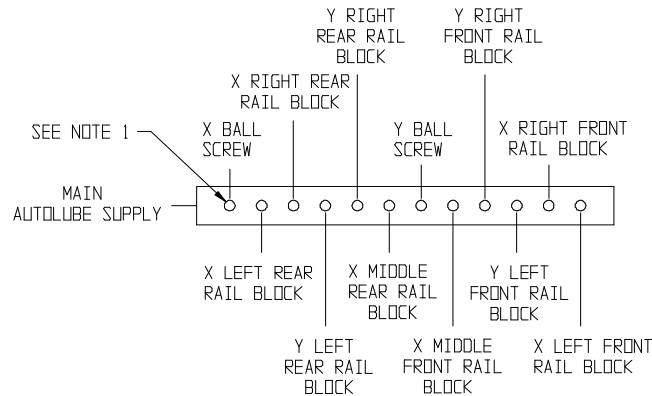


X & Y Axis Autolube Manifold Assembly



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

STOCK/ASSY No.

MILLTRONICS
1400 MILL LANE 952.442.1410
WACONIA, MN 55387 USA

TITLE X & Y AXIS

APPLICATION AUTOLUBE MANIFOLD ASSEMBLY

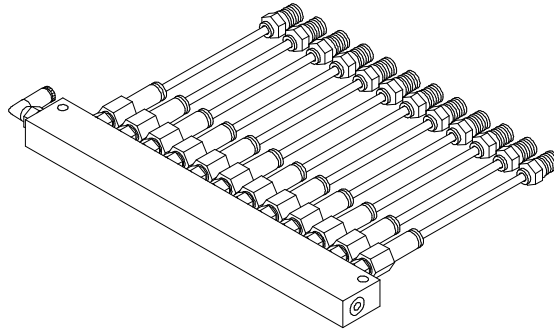
SCALE 2:1 DWG No. 6-10-018-049 SIZE B

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

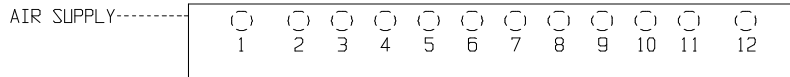
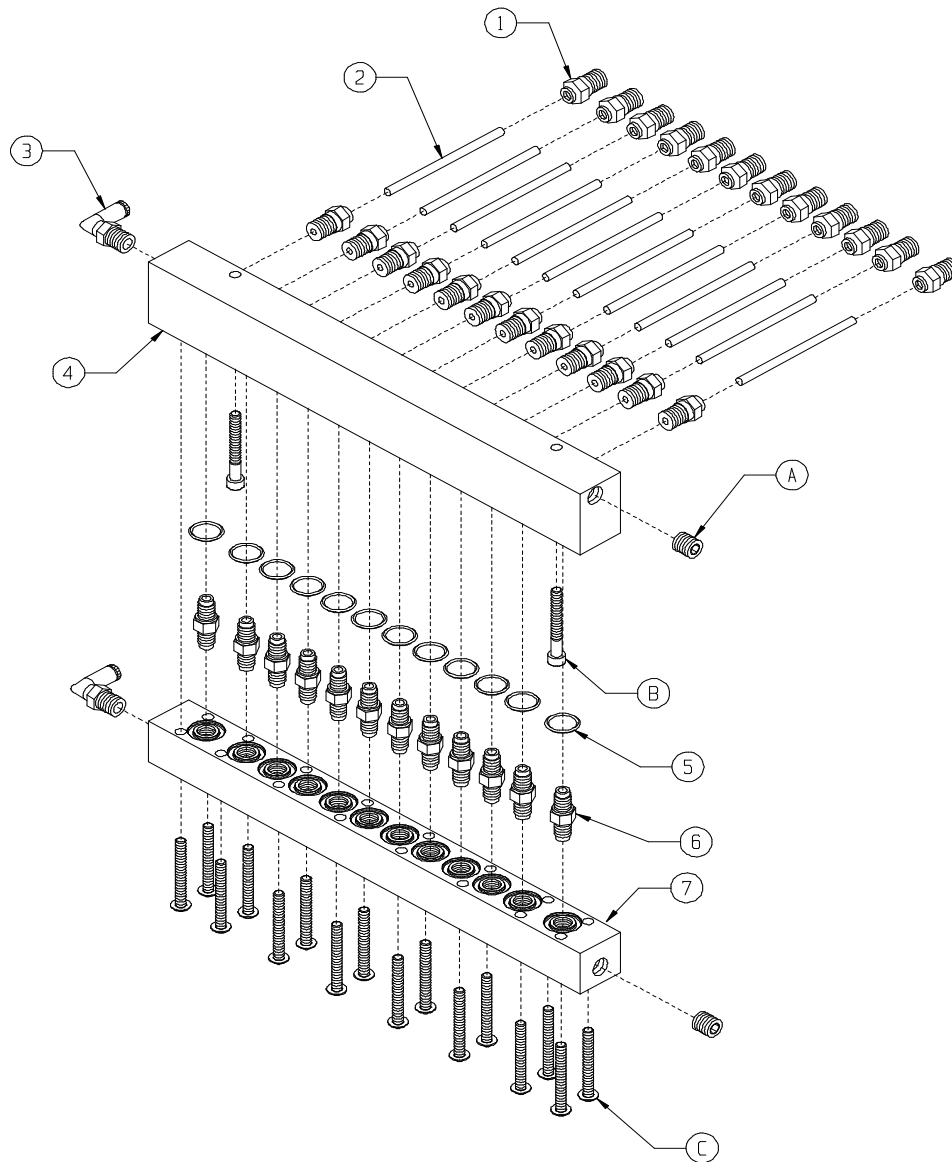
B	UPDATE OIL METER FITTINGS	6760		03/09		
A	ADD FRAMES TO CHART	5996	N.M.	08/05		
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE		
MATERIAL/FINISH		 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA				
STOCK/ASSY No.						
TOLERANCE UNLESS SPECIFIED					TITLE X & Y AXIS AUTOLUBE MANIFOLD ASSEMBLY	
X .XXX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

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



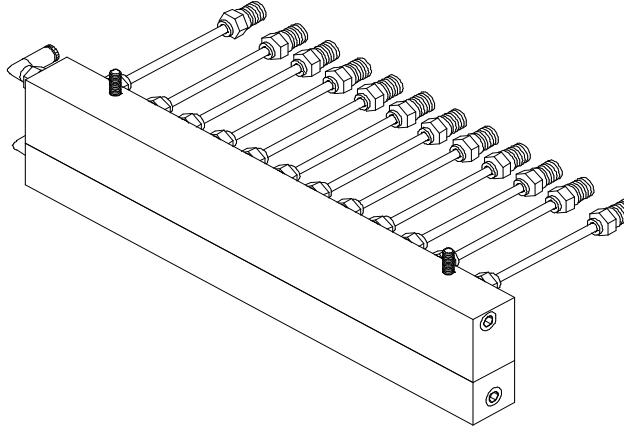
X & Y Axis Air/Oil Manifold Assembly



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

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

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



PARTS LIST

No.	QUANTITY	STOCK No.	DESCRIPTION
1	32	NU-154	5/32 TUBE 1/8 NPT M/S
2	SEE TABLE	NU-117	5/32 NYLON TUBING
3	2	NU-161	ELBOW - SWIVEL 5/32 TUBE 1/8 NPT
4	1	MP6-183	X & Y AIR/OIL MANIFOLD - AIR
5	16	WX-248	O-RING Buna 1/2 ID x 5/8 OD
6	-	SEE TABLE	OIL METER
7	1	MP-661	16 PORT 1/8 NPT MANIFOLD - OIL

NU-117 TUBING LENGTH

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

ALL MEASUREMENTS ARE IN INCHES

NOTES:-

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

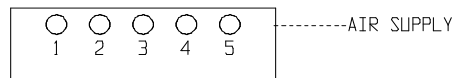
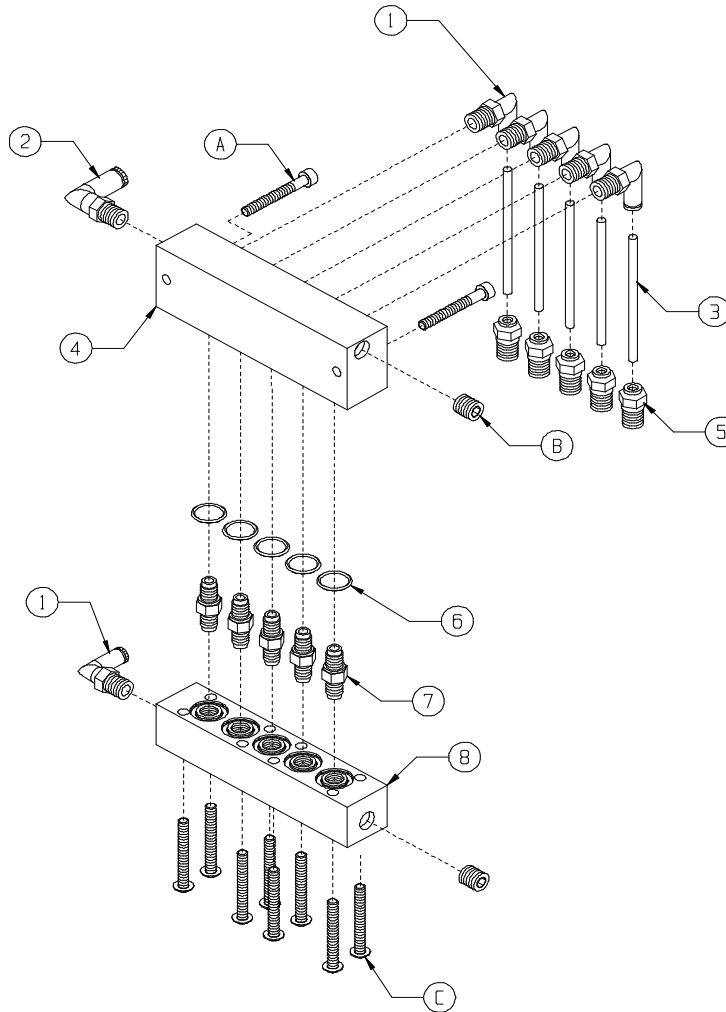
HARDWARE LIST

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

F	CHANGE TO METRIC HARDWARE	7984	N.M.	10/13
E	CHANGE TABLE	6060	N.M.	01/06
D	ADD FRAMES	5995	N.M.	08/05
C	CHANGED METERS	4988	D.H.	02/01
B	ADD VMG17 TO NOTE	4729	N.M.	10/00
A	ADD VMG24 TO NOTE	4327	N.M.	12/99
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
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. 2 OF 2
ANGLE +/- 1.0°				

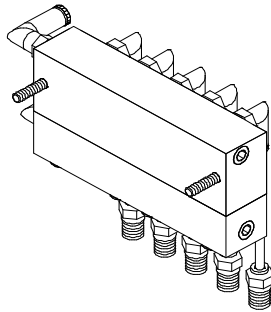


Z-Axis Air/Oil Manifold Assembly



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	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. 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

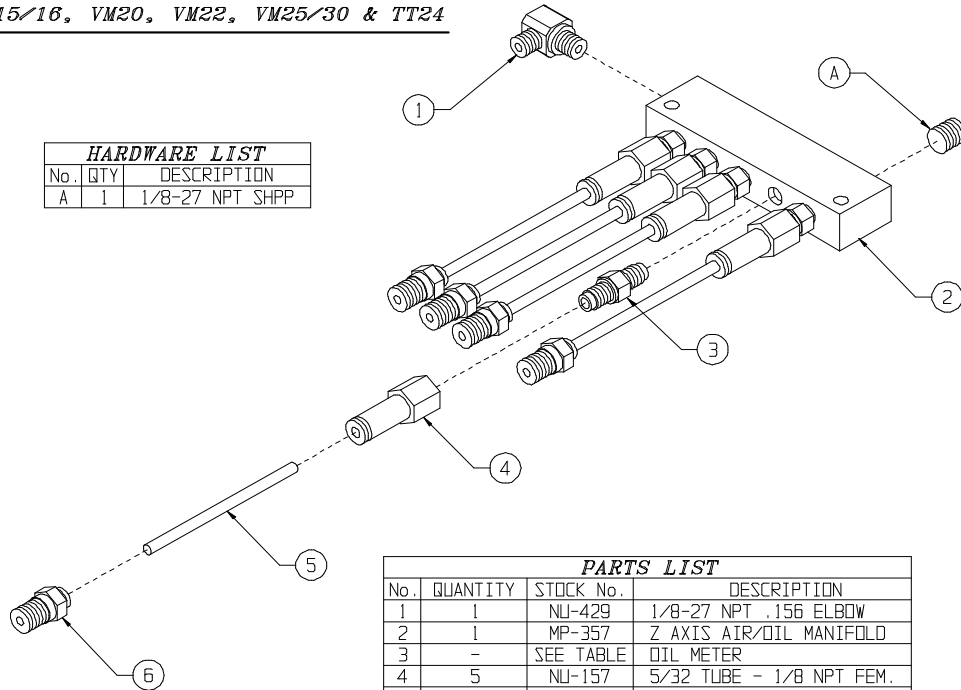
E	CHANG TO METRIC HARDWARE	7985	N.M.	10/13
D	CHANGE TO ALL FRAMES	6002	N.M.	11/05
C	REMOVED VMG24	4987	N.M.	2/01
B	ADD VMG24 NOTE	4338	N.M.	1/00
A	UPDATED TUBE LENGTHS	4077	N.M.	7/99
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
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		
X.X +/- .030		DATE 11 JUN 99		
ANGLE +/- 1.0°		DRAWN BY HERME		
		SHEET No. 2 OF 2		



Z-Axis Autolube Manifold Assembly

THIS ASSEMBLY USED ON
VM15/16, VM20, VM22, VM25/30 & TT24

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



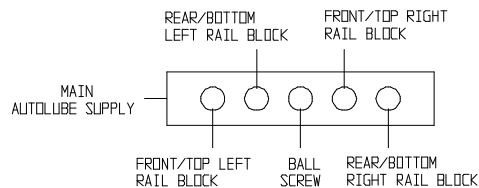
PARTS LIST			
No.	QUANTITY	STOCK No.	DESCRIPTION
1	1	NU-429	1/8-27 NPT .156 ELBOW
2	1	MP-357	Z AXIS AIR/OIL MANIFOLD
3	-	SEE TABLE	OIL METER
4	5	NU-157	5/32 TUBE - 1/8 NPT FEM.
5	SEE TABLE	NU-117	5/32 NYLON TUBING
6	5	SEE TABLE	5/32 TUBE-1/8 NPT M/S

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

ALL MEASUREMENTS ARE IN INCHES

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

AUTOLUBE LINE DESTINATIONS



NOTES:

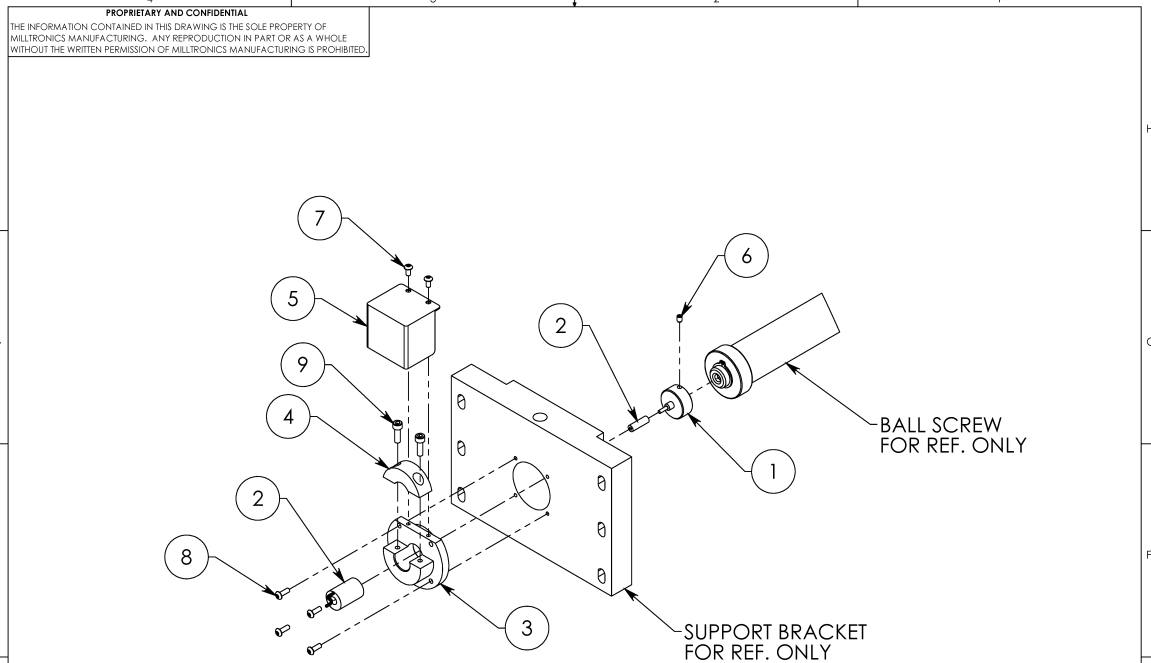
1. USED ON ASSEMBLY No.

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B	ADD TT24		6750		03/09
A	ADD FRAMES TO CHART		6001	N.M.	08/05
REV.		DESCRIPTION	E.C.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 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 ±					



Thermal Compensation Assembly



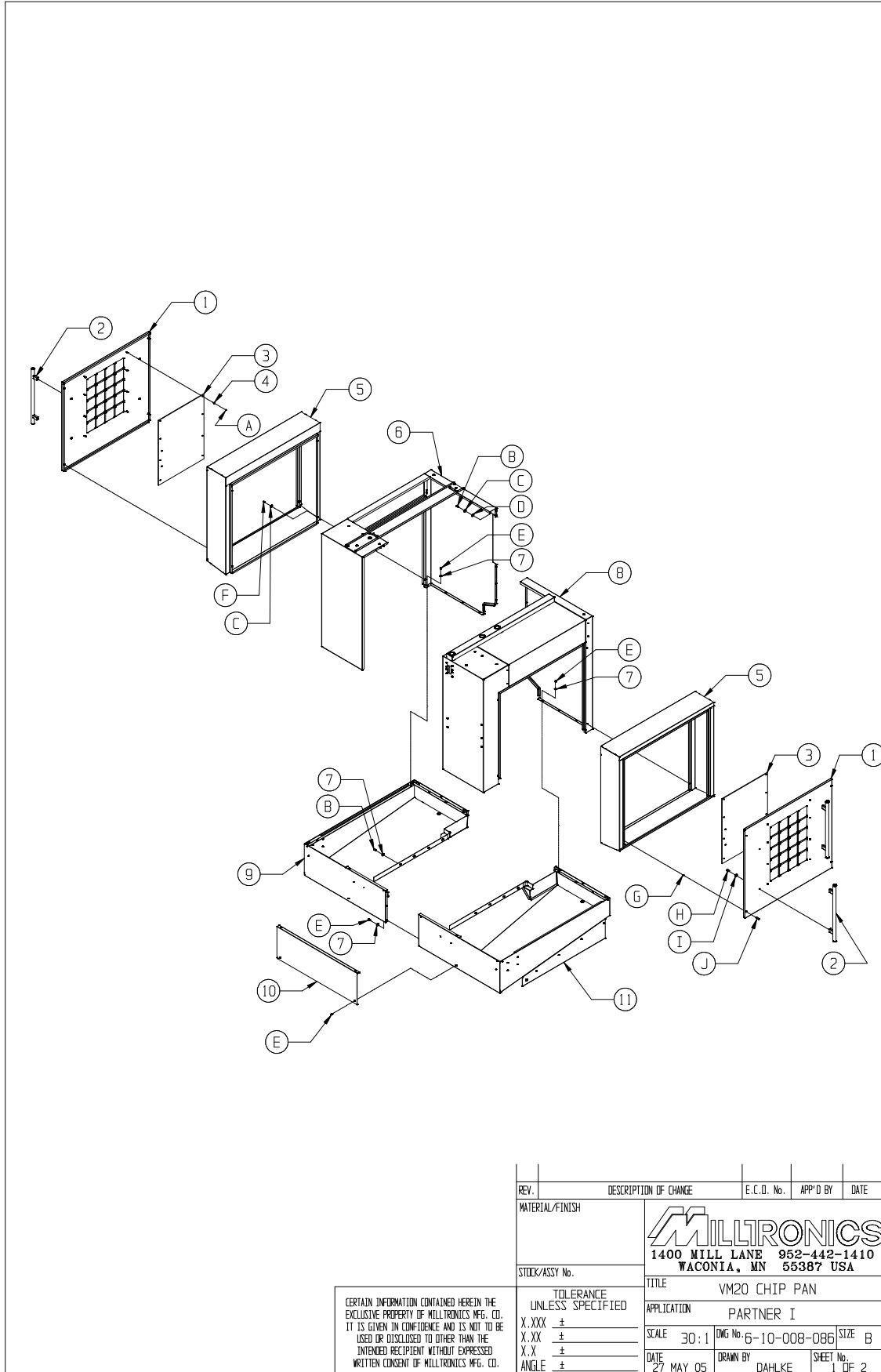
ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	MP00858	THERMAL BALL SCREW CAP
2	1	PR00043	THERMAL COMP SENSOR
3	1	MP00848	THERMAL SENSOR RING
4	1	MP00849	THERMAL SENSOR - CLAMP
5	1	MP00886	X AXIS THERMAL COVER
6	1	SHSSBT 10-32 x .188	10/32 x 3/16 BRASS TIPPED SHSS
7	2	BHCS M4-0.7 x 8	M4-0.7 x 8mm BHCS
8	4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

NOTES:

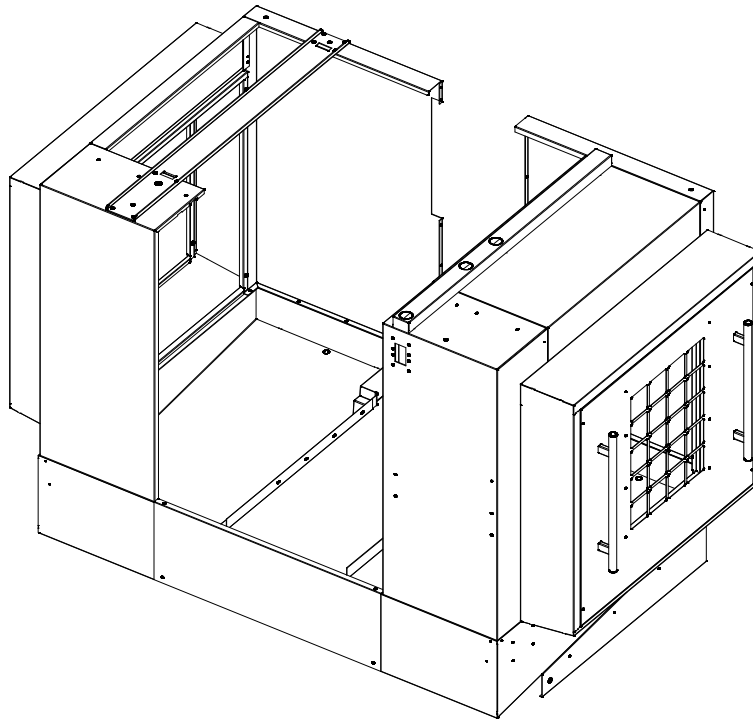
1. ITEMS 3 & 4 ARE REVERSED ON SOME AXES
2. ITEMS 5 & 7 ARE NOT USED ON SOME AXES

	NAME	DATE
	JRD	24 JAN 07
DRAWN		 MILLTRONICS CNC MACHINES 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA
MATERIAL:		
FINISH:		TITLE: THERMAL COMP ASSEMBLY
UNLESS OTHERWISE SPECIFIED:		SCALE: 1:4 DWG. NO. 10018111
DIMENSIONS ARE IN INCHES [MM]		ESTIMATED WEIGHT: 16.0 Lbs. STOCK/ASSY NO.
TOLERANCES:		SHEET NO. 1 OF 1
FRACTIONAL: ±		SIZE B
ANGULAR: MACH ± 1.0 BEND ±		
ONE PLACE DECIMAL ±.050 [1.27]		
TWO PLACE DECIMAL ±.010 [0.25]		
THREE PLACE DECIMAL ±.005 [0.13]		

Enclosure Assembly



REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.		TITLE VM20 CHIP PAN		
TOLERANCE UNLESS SPECIFIED		APPLICATION PARTNER I		
X.XXX ±		SCALE 30:1	DWG No. 6-10-008-086	SIZE B
X.XX ±				
X.X ±				
ANGLE ±		DATE 27 MAY 05	DRAWN BY DAHLKE	SHEET No. 1 OF 2



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

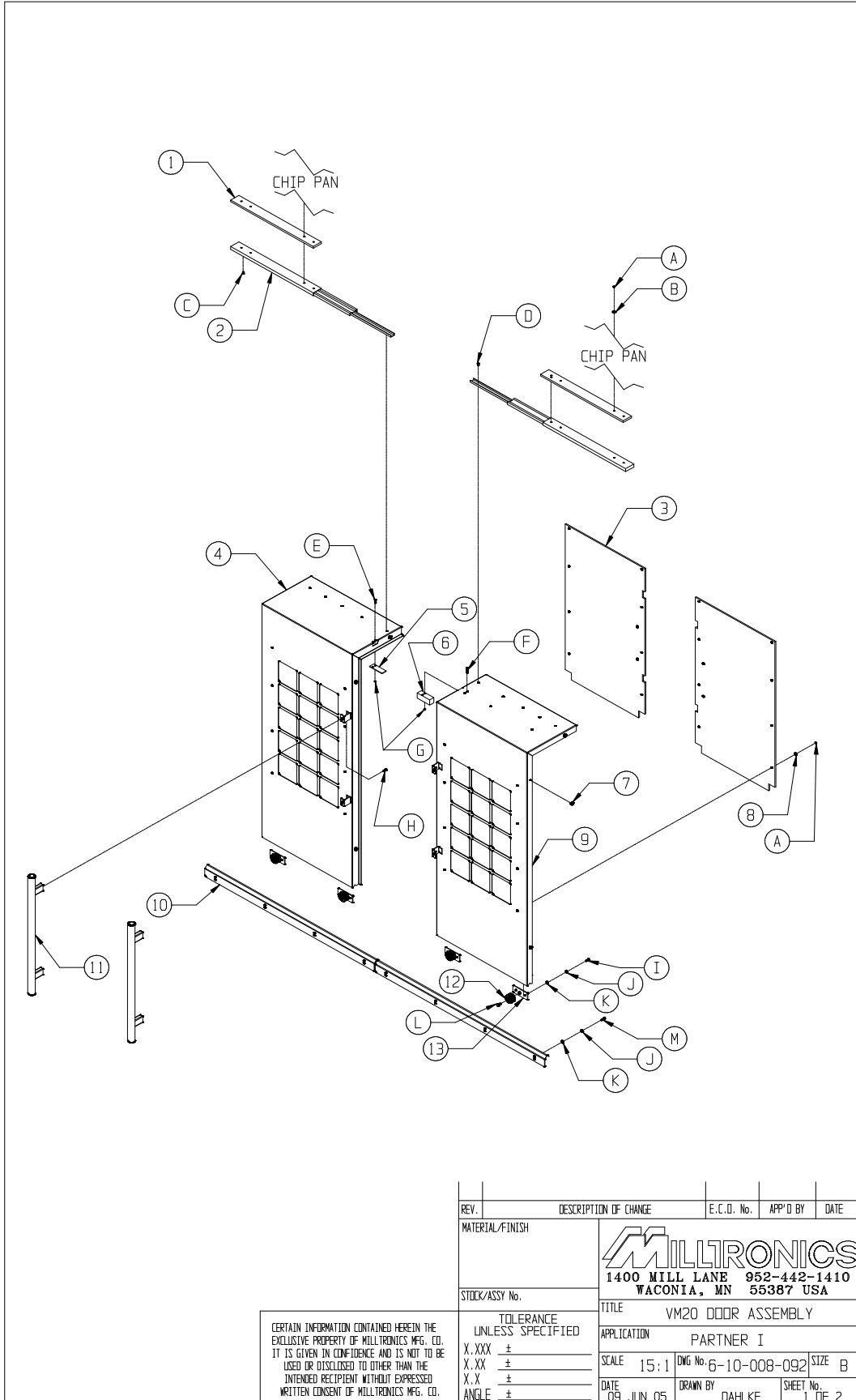
No.	QTY	DESCRIPTION
A	16	M5-.8 NYLOCK NUT
B	9	M6-1 x 20mm SHCS
C	17	M6 LOCK WASHER
D	9	M6 FLAT WASHER
E	23	M6-1 x 12mm BHCS
F	8	M6-1 x 12mm SHCS
G	8	M6-1 NYLOCK NUT
H	8	M8-1.25 x 20mm BHCS
I	8	M8 FLAT WASHER
J	8	M6-1 x 30mm SHCS

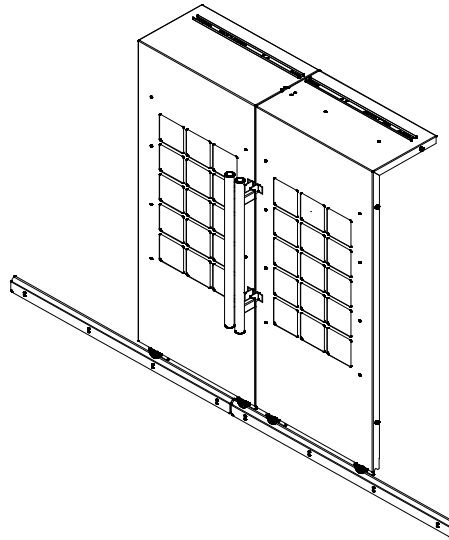
CERTAIN INFORMATION CONTAINED HEREIN THE EXCLUSIVE PROPERTY OF MILLTRONICS MFG. CO. IT IS GIVEN IN CONFIDENCE AND IS NOT TO BE USED OR DISCLOSED TO OTHER THAN THE INTENDED RECIPIENT WITHOUT EXPRESSED WRITTEN CONSENT OF MILLTRONICS MFG. CO.

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



Enclosure Door Assembly




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

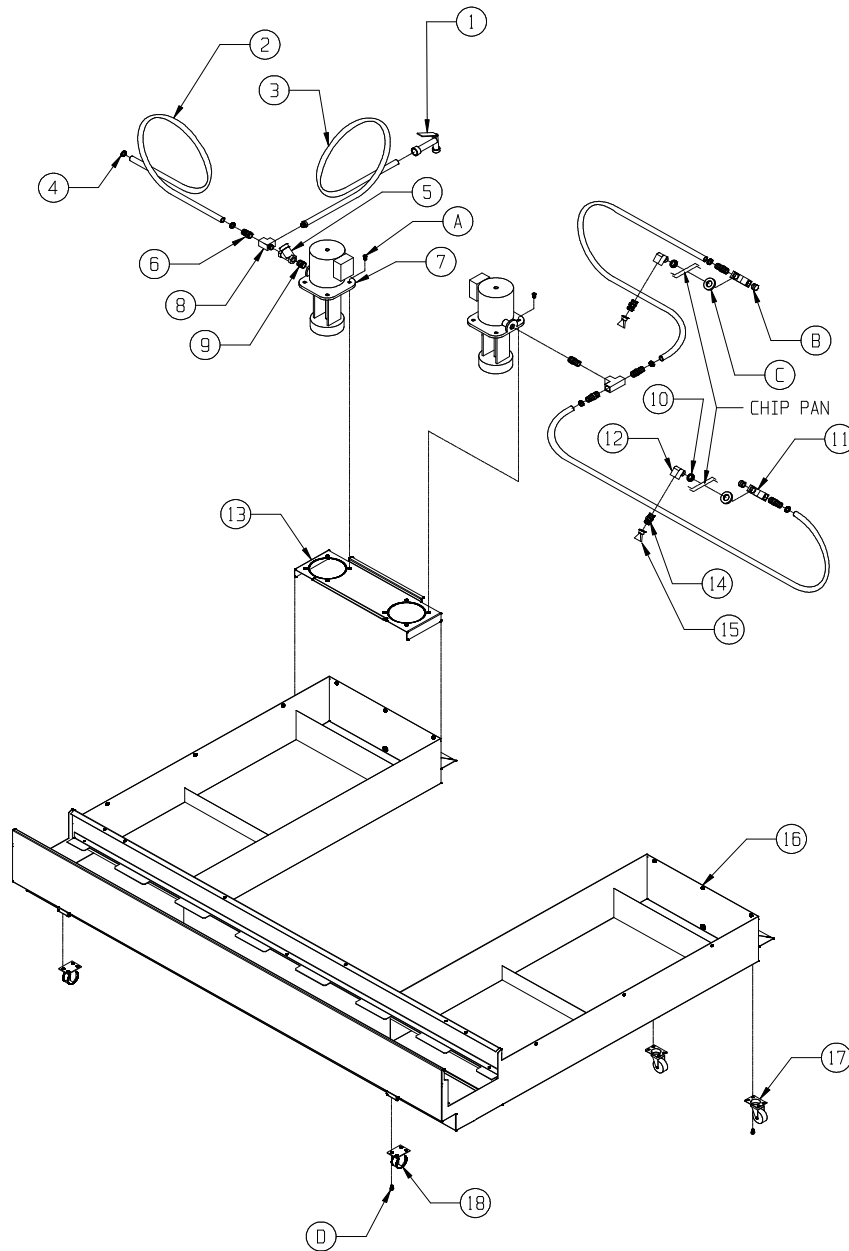
No.	QTY	DESCRIPTION
A	24	M5 NYLOCK NUT
B	8	M5 FLAT WASHER
C	8	M5-.8 x 20mm BHCS
D	10	M4-.7 x 10mm BHCS
E	2	M4-.7 x 20mm BHCS
F	2	M4-.7 x 35mm BHCS
G	4	M4-.7 NYLOCK NUT
H	4	M8-1.25 x 20mm BHCS
I	8	M6-1 x 12mm BHCS
J	16	M6 LOCK WASHER
K	16	M6 FLAT WASHER
L	4	M8-1.25 x 16mm BHCS
M	8	M6-1 x 12mm SHCS

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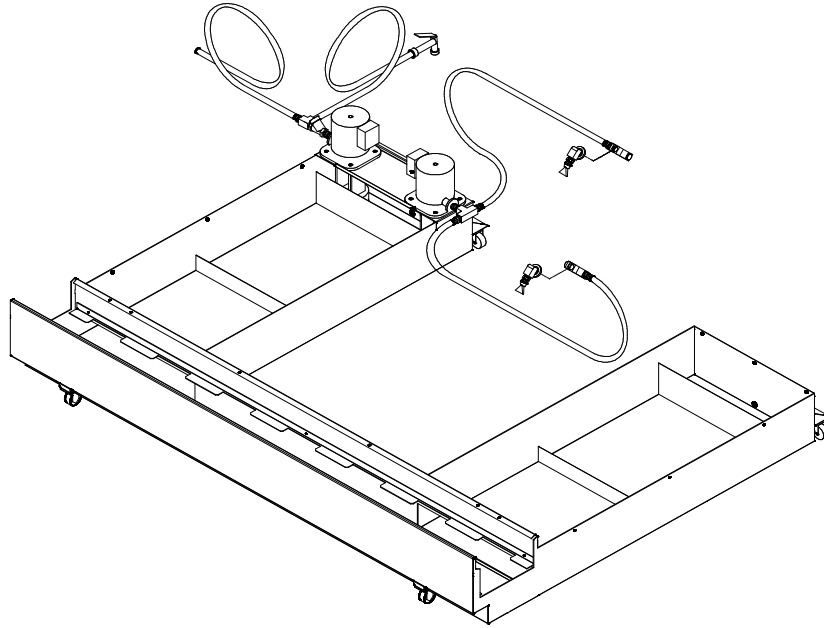
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE VM20 DOOR ASSEMBLY		
X.XXX ±		APPLICATION PARTNER I		
X.XX ±		SCALE 15:1 DWG No. 6-10-008-092 SIZE B		
X.X ±		DATE 09 JUN 05 DRAWN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



Flood Tank W/Washdown Assembly



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



PARTS LIST

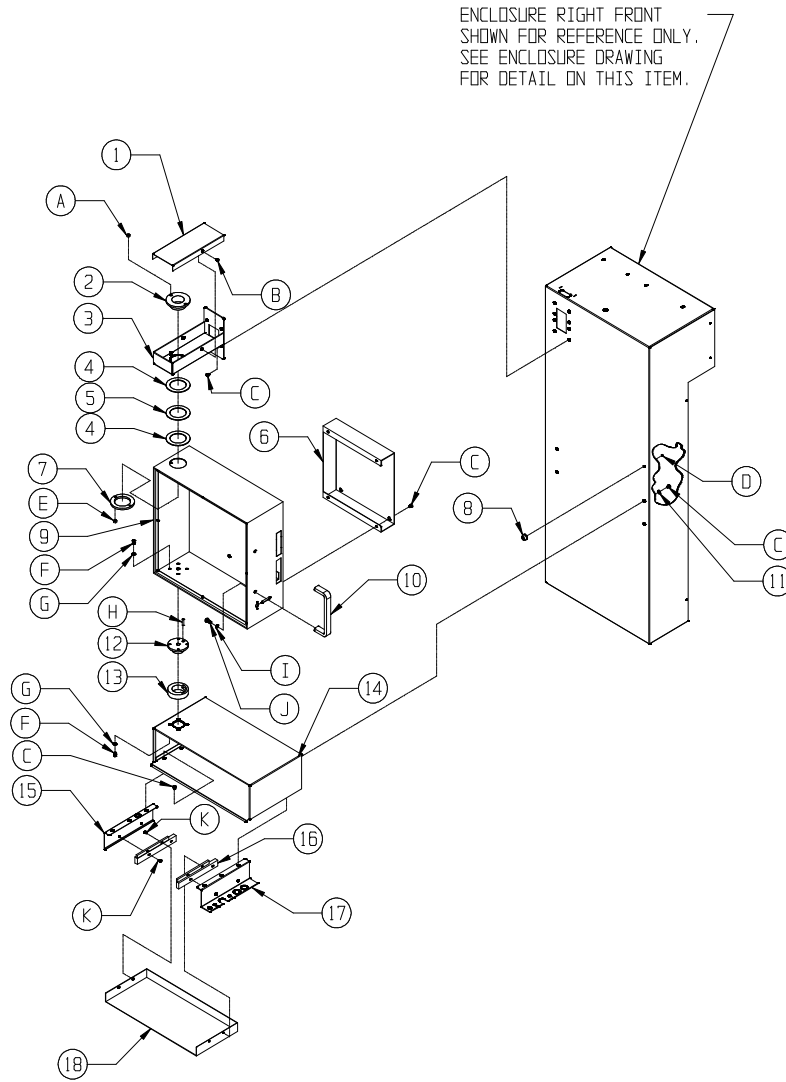
No.	QTY	STOCK No.	DESCRIPTION
1	1	NU-124	WATER HOSE NOZZLE
2	30'	NU-69	3/4" NYLOBRAID HOSE
3	1	NU-130	WASHDOWN HOSE ASSEMBLY
4	6	NU-141	1" HOSE CLAMP
5	1	NU-128	1/2" SWING CHECK VALVE
6	5	NU-66	1/2 NPT - 3/4 BARB FITTING
7	2	MA-162	FLOOD PUMP 1/4 HP MOTOR
8	2	NU-127	1/2" STREET T
9	1	NU-65	1/2" NIPPLE
10	2	WX-38	O' RING
11	3	NU-61	1/2" FEMALE T
12	2	NU-125	1/2" STREET ELBOW
13	1	MP1-489	COOLANT PUMP MOUNTING PLATE
14	2	NU-176	1/2" CONNECTOR
15	1	NU-175	1 1/4" FLARE NOZZLE
16	2	MP1-486	ONE PIECE COOLANT TANK
17	4	EL-88	CASTER - SWIVEL
18	2	EL-98	CASTER - RIGID

HARDWARE LIST

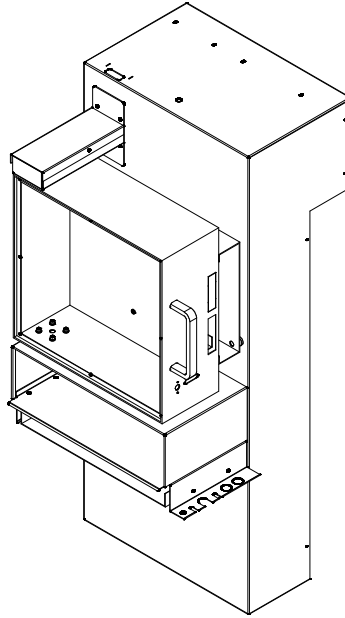
No.	QTY	DESCRIPTION
A	8	M6-1 x 12mm BHCS
B	2	1/2-14 NPT SHPP
C	2	7/8 FLAT WASHER 3/8 THICK
D	12	M6-1 x 12mm SHCS

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

Enclosure Swivel Monitor Assembly



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 15:1 DWG No. 6-10-008-087 SIZE B		
X.X +/-		DATE 27 MAY 05 DRAWN BY DAHLKE SHEET No. 1 OF 2		
ANGLE +/-				



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

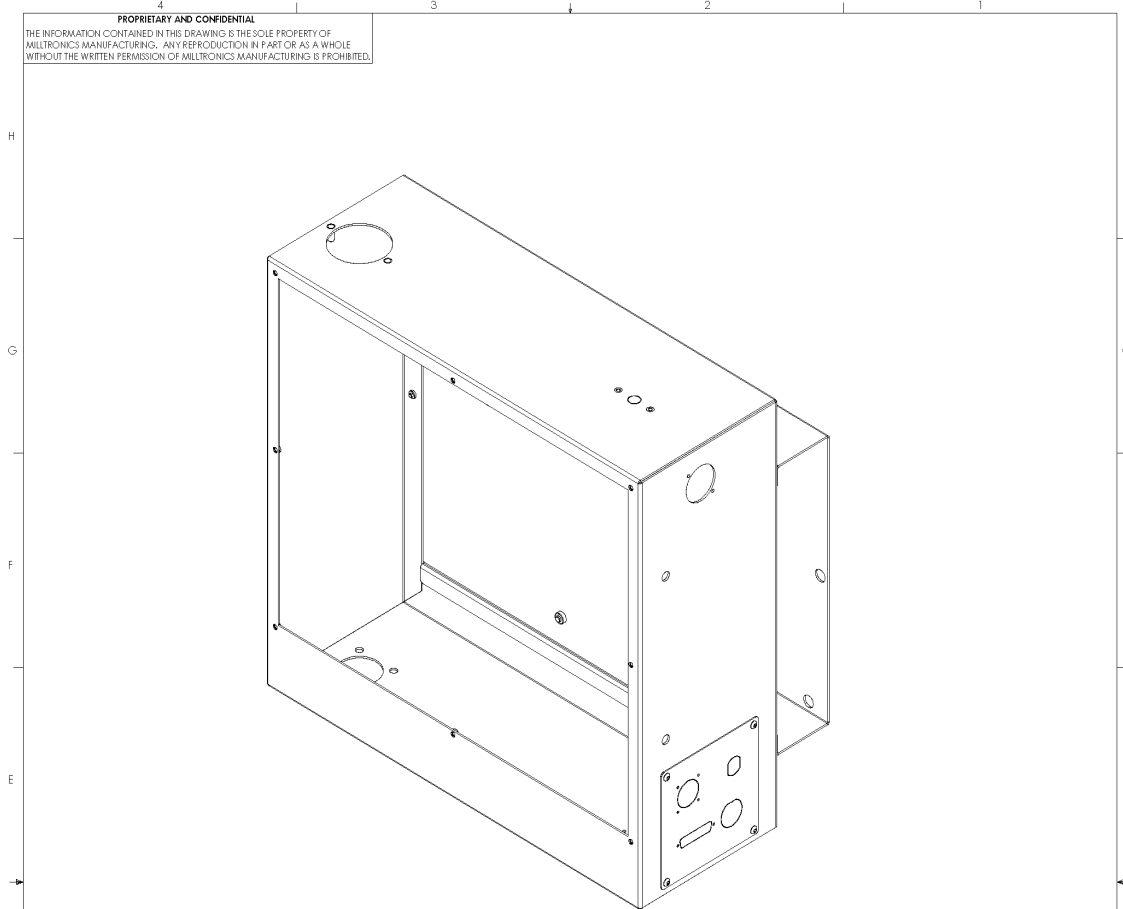
No.	CENT. 7	INT. CONTROL
9	MM-80	MPIC-03

A	CORRECT TABLE ERROR	6328		04/07
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TITLE				
APPLICATION				
TOLERANCE UNLESS SPECIFIED		PARTNER I		
X .XXX	+/-	SCALE	DWG No.	SIZE
X .XX	+/-	10:1	6-10-008-087	B
X .X	+/-	DATE	DRAWN BY	SHEET No.
ANGLE	+/-	27 MAY 05	DAHLKE	2 OF 2

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

Control Box Assembly #01018838

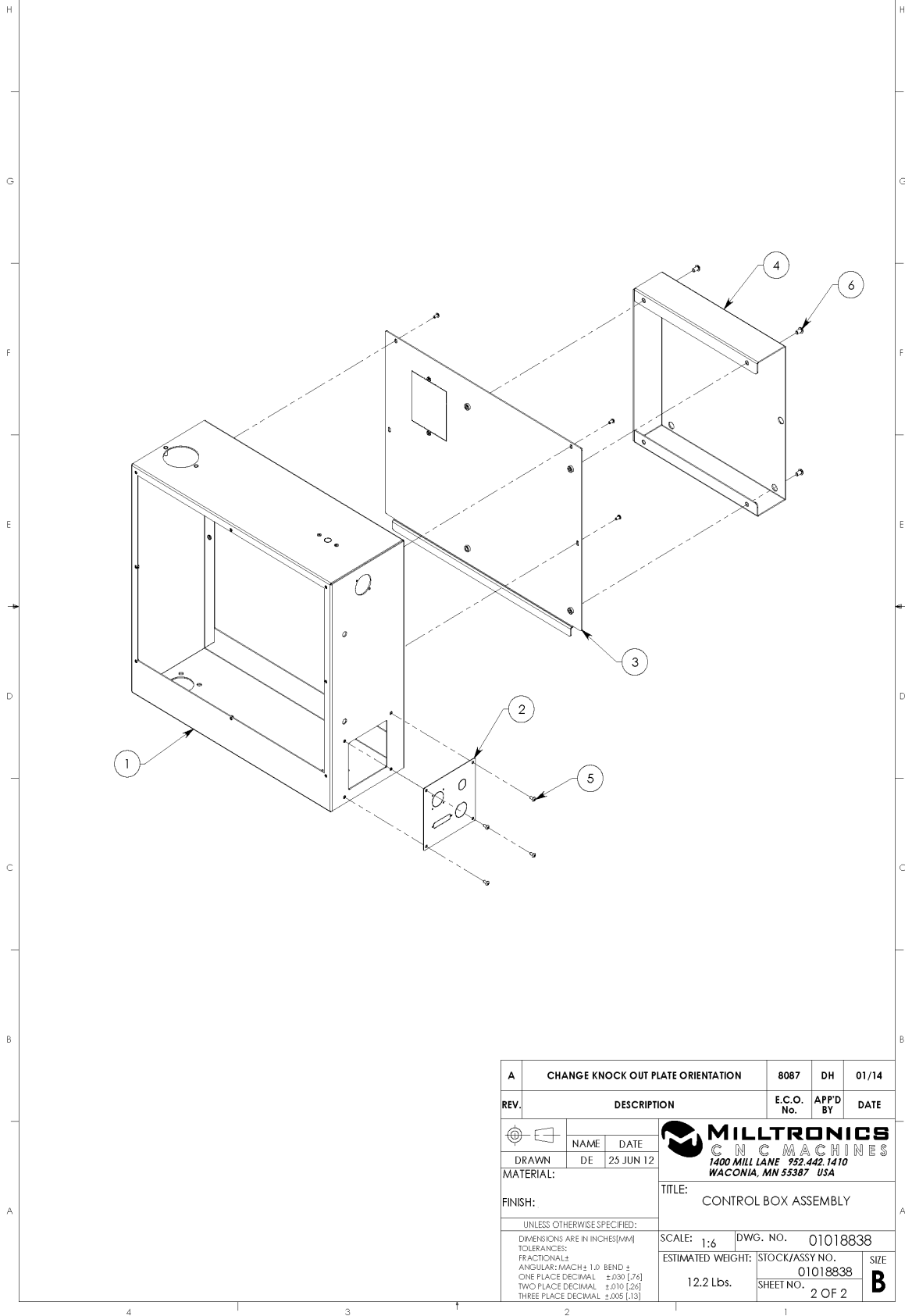


ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	01018836	CONTROL BOX - ONE PIECE CONSTRUCTION
2	1	01018855	CONTROL BOX ACCESS PANEL WITH USB
3	1	01040054	CONTROL PANEL- BACK COVER
4	1	MP00653	3 RING BINDER POCKET-SWIVEL MONITOR
5	8	BHCS M4-0.7 x 8	M4-0.7 x 8mm BHCS
6	4	BHCS M6-1.0 x 10	M6-1.0 x 10mm BHCS

A	CHANGE KNOCK OUT PLATE ORIENTATION				8087	DH	01/14
REV.	DESCRIPTION				E.C.O. No.	APP'D BY	DATE
				MILLTRONICS C N C MACHINES 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA			
DRAWN		DE	25 JUN 12				
MATERIAL:				TITLE:			
FINISH:				CONTROL BOX ASSEMBLY			
UNLESS OTHERWISE SPECIFIED:							
DIMENSIONS ARE IN INCHES[MM] TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± 1.0 BEND ± ONE PLACE DECIMAL ±0.030 [1.78] TWO PLACE DECIMAL ±0.010 [2.6] THREE PLACE DECIMAL ±0.005 [1.3]				SCALE: 1:4	DWG. NO.	01018838	
				ESTIMATED WEIGHT:	STOCK/ASSY NO.	01018838	SIZE
12.2 Lbs.					SHEET NO.	1 OF 2	B



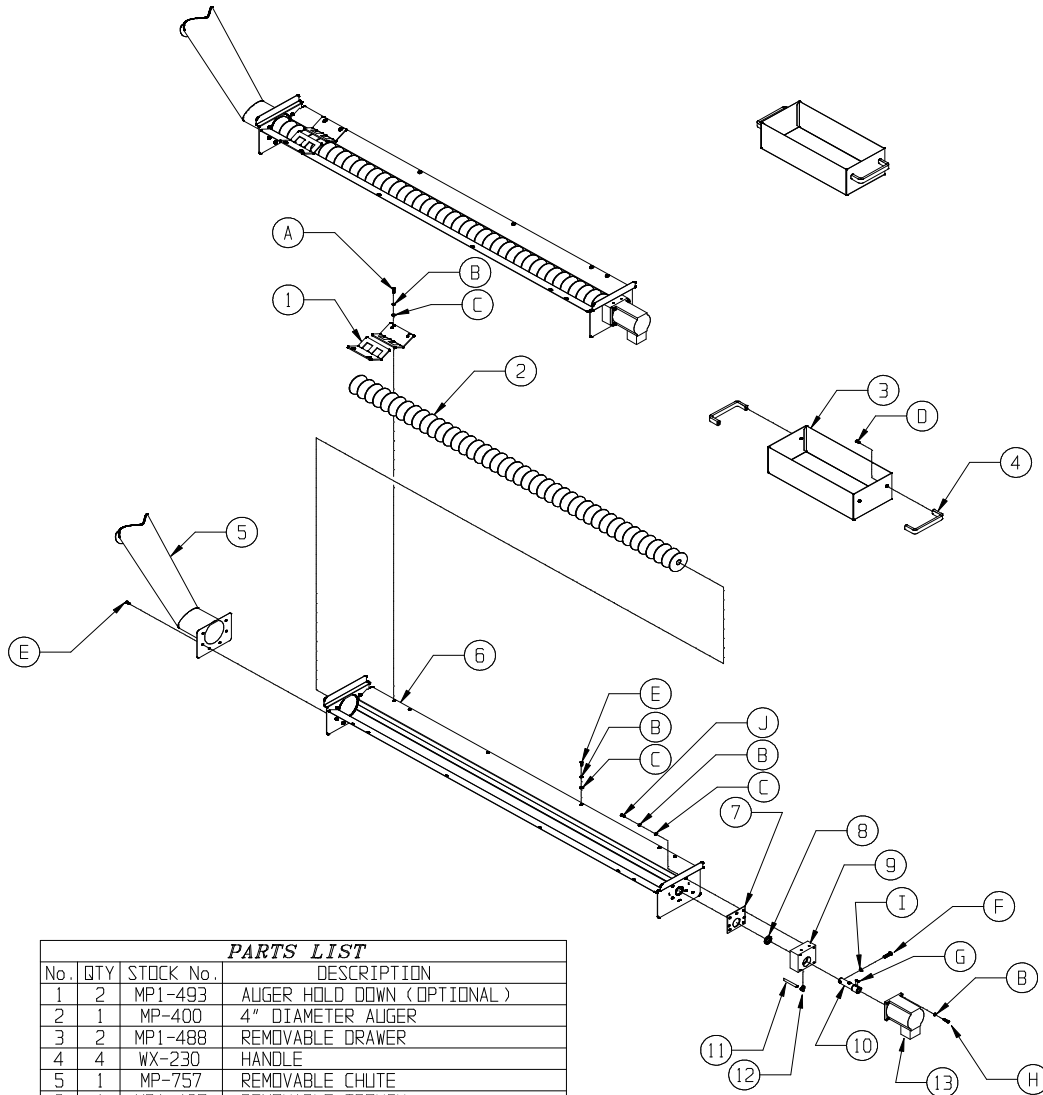
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A	CHANGE KNOCK OUT PLATE ORIENTATION				8087	DH	01/14	
REV.	DESCRIPTION				E.C.O. No.	APP'D BY	DATE	
		NAME		 MILLTRONICS CNC MACHINES 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA				
DRAWN		DATE						
DE		25 JUN 12						
MATERIAL:								
FINISH:								
UNLESS OTHERWISE SPECIFIED:				TITLE: CONTROL BOX ASSEMBLY				
DIMENSIONS ARE IN INCHES[MM]				SCALE: 1:6		DWG. NO. 01018838		
TOLERANCES:				ESTIMATED WEIGHT: 12.2 Lbs.		STOCK/ASSY NO. 01018838		SIZE B
FRACTIONAL: ±						01018838		
ANGULAR: MACH ± 1.0 BEND ±						SHEET NO. 2 OF 2		
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				
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 DRAWER/AUGER ASSEMBLY				
APPLICATION PARTNER I				
SCALE 20:1 DWG No. 6-10-008-089 SIZE B				
DATE 08 JUN 05 DRAWN BY DAHLKE SHEET No. 1 OF 1				



Flood Coolant Valve Handle 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.	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

NAME	DATE
DRAWN: AJW	29 SEP 14

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

TITLE: FLOOD HANDLE SUB ASSEMBLY

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

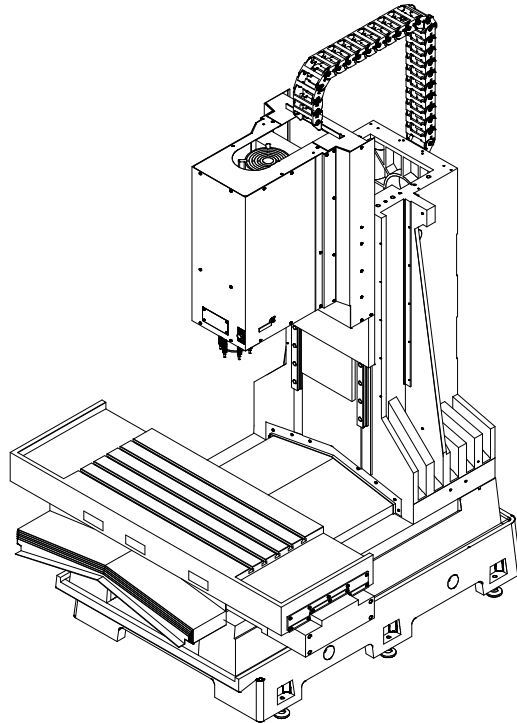
SCALE: 1:2 DWG. NO. 10040024
ESTIMATED WEIGHT: 0.8 Lbs. STOCK/ASSY NO. 10040024
SHEET NO. 1 OF 1

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.



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE LUBRICATION DRAWING		
X .XXX ±		APPLICATION PARTNER VI		
X .XX ±		SCALE 20:1 DWG No 6-11-027-004 SIZE B		
X .X ±		DATE 17 DEC 03 DRAWN BY DAHLKE SHEET NO. 1 OF 2		
ANGLE ±				



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

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

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

MOBIL DTE 24	
PRODUCT NUMBER	60262-3
98 CMCS CODE (DRUM)	98020E
SPECIFIC GRAVITY	0.871
POUR POINT, °C (°F), max	-18 (0)
FLASH POINT, °C (°F), min	200 (392)
VISCOSITY	
cST AT 40°C	32
cST AT 100°C	5.3
SUS AT 100°F	165
SUS AT 210°F	44
ISO VISCOSITY GRADE	32
VISCOSITY INDEX	95
RUST PROTECTION,	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



Retention Knob Chart

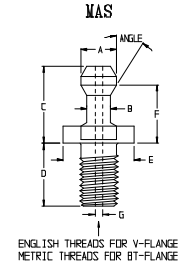
NOTE: STANDARD RETENTION KNOBS FOR 40 TAPER SPINDLES

MAS RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.59	.39	1.27	.66	.90	.99	.19	BR50, BR60, BR80, MM18, RH20, RH30, RH33, RH35, RW15, VM15, VM18, VM20, VM22, VM25, VM30, VM2016, VMC15, VMC16, VMC20, VMC22, VMC25, VMC30	BR50, BR60, BR80, HM20, HM35, RH20, RH30, RH33, RH35, TT24, TT40, TT60, TT80, VM16, VM20, VM22, VM25, VM30, VM3224, VM4224, VMC20, HMC35, TT24, TT40, TT60, TT80, VMC16, VMC20, VMC22, VMC25, VMC30

MAS RETENTION KNOBS STYLE BT-FLANGE 40 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.59	.39	1.38	.99	.90	1.10	.16	BR50, BR60, BR80, MM18, RH20, RH30, RH33, RH35, RW15, VM15, VM18, VM20, VM22, VM25, VM30, VM2016, VMC15, VMC16, VMC20, VMC22, VMC25, VMC30	BR50, BR60, BR80, HM20, HM35, RH20, RH30, RH33, RH35, TT24, TT40, TT60, TT80, VM16, VM20, VM22, VM25, VM30, VM3224, VM4224, VMC20, HMC35, TT24, TT40, TT60, TT80, VMC16, VMC20, VMC22, VMC25, VMC30



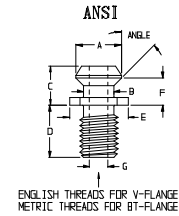
NOTE: STANDARD RETENTION KNOBS FOR 50 TAPER SPINDLES

ANSI RETENTION KNOBS STYLE CT-FLANGE 50 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
1.14	.83	1.00	1.32	1.42	.70	.45	HBM110, RH33XP, RH35XP, TT40XP, VM22XP, VM25XP, VM30XP, TTC40XP, VMC22XP, VMC25XP, VMC30XP	

ANSI RETENTION KNOBS STYLE BT-FLANGE 50 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
1.14	.83	1.00	1.32	1.42	.70	.45	HBM110, RH33XP, RH35XP, TT40XP, VM22XP, VM25XP, VM30XP, TTC40XP, VMC22XP, VMC25XP, VMC30XP	



NOTE: OPTIONAL RETENTION KNOBS FOR 40 TAPER SPINDLES

ANSI RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.74	.49	.64	.86	.93	.44	.27	SELECTION NOT AVAILABLE	BR50, BR60, BR80, HM20, HM35, RH20, RH30, RH33, RH35, TT24, TT40, TT60, TT80, VM16, VM20, VM22, VM25, VM30, VM3224, VM4224, VMC20, HMC35, TT24, TT40, TT60, TT80, VMC16, VMC20, VMC22, VMC25, VMC30

ANSI RETENTION KNOBS STYLE BT-FLANGE 40 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.74	.49	.75	.86	.90	.55	.28	SELECTION NOT AVAILABLE	BR50, BR60, BR80, HM20, HM35, RH20, RH30, RH33, RH35, TT24, TT40, TT60, TT80, VM16, VM20, VM22, VM25, VM30, VM3224, VM4224, VMC20, HMC35, TT24, TT40, TT60, TT80, VMC16, VMC20, VMC22, VMC25, VMC30

MAS RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.59	.39	1.27	.86	.90	.99	.19	SELECTION NOT AVAILABLE	BR50, BR60, BR80, HM20, HM35, RH20, RH30, RH33, RH35, TT24, TT40, TT60, TT80, VM16, VM20, VM22, VM25, VM30, VM3224, VM4224, VMC20, HMC35, TT24, TT40, TT60, TT80, VMC16, VMC20, VMC22, VMC25, VMC30

MAS RETENTION KNOBS STYLE BT-FLANGE 40 TAPER

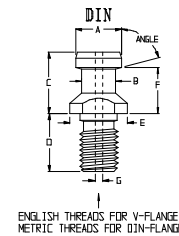
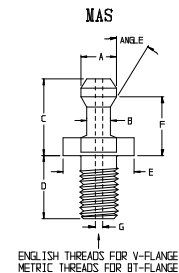
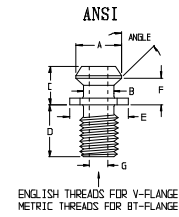
DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.59	.39	1.38	.99	.90	1.10	.16	SELECTION NOT AVAILABLE	BR50, BR60, BR80, HM20, HM35, RH20, RH30, RH33, RH35, TT24, TT40, TT60, TT80, VM16, VM20, VM22, VM25, VM30, VM3224, VM4224, VMC20, HMC35, TT24, TT40, TT60, TT80, VMC16, VMC20, VMC22, VMC25, VMC30

DIN 69872 RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.75	.55	1.02	.86	.90	.79	.24	SELECTION NOT AVAILABLE	BR50, BR60, BR80, HM20, HM35, RH20, RH30, RH33, RH35, TT24, TT40, TT60, TT80, VM16, VM20, VM22, VM25, VM30, VM3224, VM4224, VMC20, HMC35, TT24, TT40, TT60, TT80, VMC16, VMC20, VMC22, VMC25, VMC30

DIN 69872 RETENTION KNOBS STYLE DIN-FLANGE 40 TAPER

DIMENSIONS							MILLTRONICS MACHINE	
A	B	C	D	E	F	G	60mm SPINDLE	70mm SPINDLE
.75	.55	1.02	.99	.90	.79	.28	SELECTION NOT AVAILABLE	BR50, BR60, BR80, HM20, HM35, RH20, RH30, RH33, RH35, TT24, TT40, TT60, TT80, VM16, VM20, VM22, VM25, VM30, VM3224, VM4224, VMC20, HMC35, TT24, TT40, TT60, TT80, VMC16, VMC20, VMC22, VMC25, VMC30



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

J	REMOVE MFG. PART NUMBERS & ADD DIMENSIONS	7749	N.M.	03/13
I	ADD VM2016, VM3224, TT60, TT80, TT40XP, TTC24, TTC40, TTC40XP, HBM110	7573	N.M.	07/12
H	ADD VM22XP, RH33XP FRAMES TO 50 TAPER	6715	N.M.	01/09
G	ADD MM18 AND MOVE HMC70 FRAMES TO 50 TAPER	6193	N.M.	10/06
F	ADD VMC, TT, AND HMC FRAMES	6175	N.M.	09/06
E	UPDATE CHART	5992	N.M.	08/05
D	ADD RH/RW12 & RH19	5146	N.M.	09/01
C	ADD RETENTION KNOBS TO CHART	4859	N.M.	12/00
B	CHANGE 70mm BT-FLANGE CHART	4730	N.M.	10/00
A	ADD LYNDEX CORP. IN CHART	4351	N.M.	1/00
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
	RETENTION KNOB CHART	SCALE 1.75:1	DWG No. 6-11-018-054	SIZE B
	GENERAL PRODUCTS	DATE 30 APR 99	DRAWN BY DAHLKE	SHEET NO. 1 OF 1

