



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

HM20 A Mechanical

10-2-2008
Rev 1

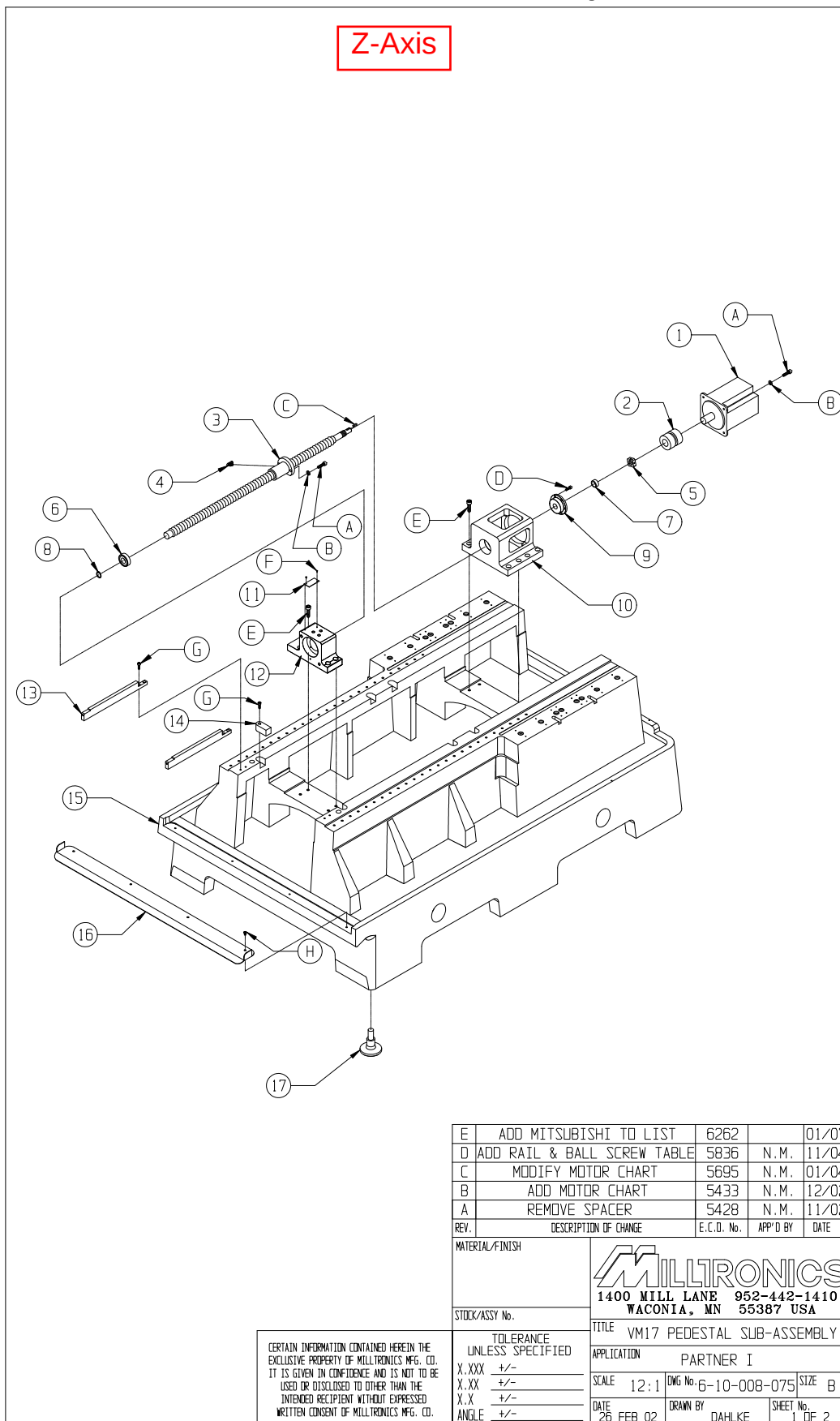
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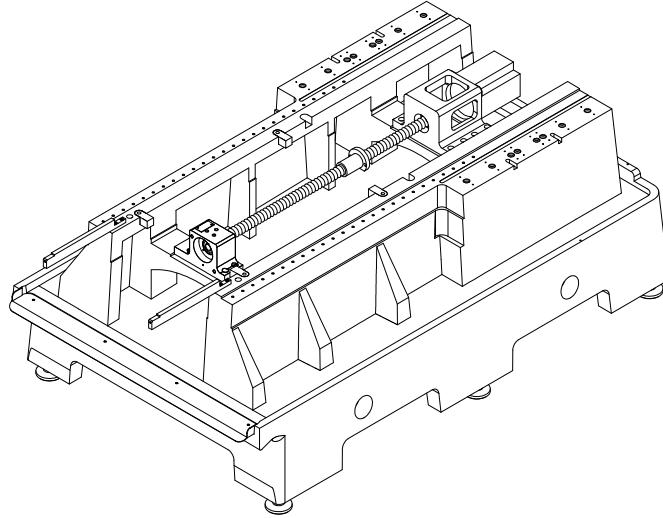
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Manual Discrepancy Sheet

1. On page 10, #3 ballscrew assembly is MP-570 and not MP-274

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	- - 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	- - 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	- - 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)	4Nm A06B-0223-B200	6Nm 1FK7060-5AF71-1EA0	MD-184
	MD-125 (1.0kw)	8Nm A06B-0227-B200	11Nm 1FK7063-5AF71-1EA0	
	MD-127 (1.5kw)			
2	MA-242 (.5kw/1.0kw)	MA-242	MA-260	MA-260
	MA-241 (1.5kw)			

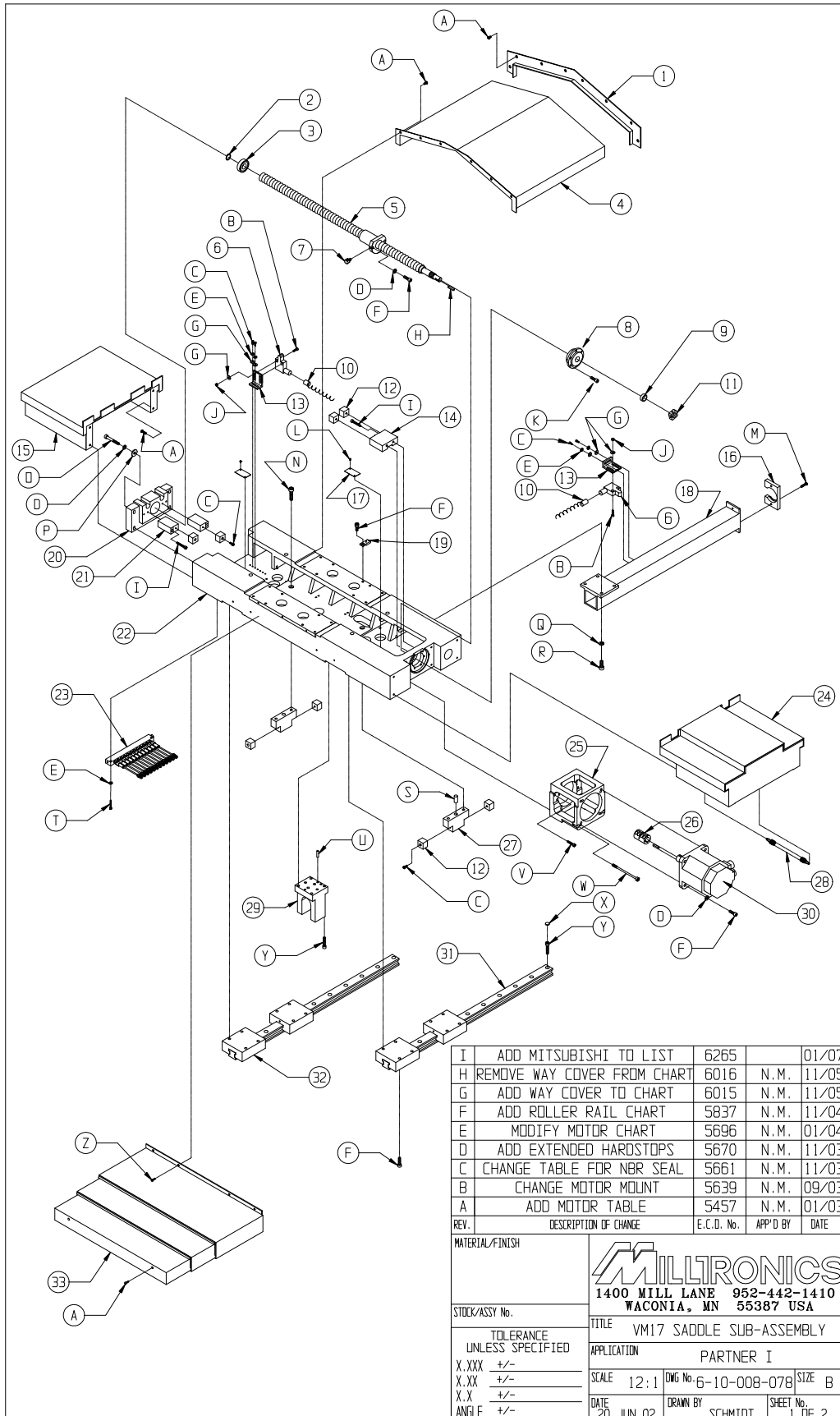
HARDWARE LIST		
No.	QTY	DESCRIPTION
A	6	M8-1.25 x 30mm SHCS
B	6	M8 LOCK WASHER
C	1	3/16 x 3/16 x 1/2 KEY
D	6	M6-1 x 25mm SHCS
E	8	M10-1.5 x 30mm SHCS
F	2	1/4 DRIVE PIN
G	8	M6-1 x 20mm SHCS
H	4	M6-1 x 10mm BHCS

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

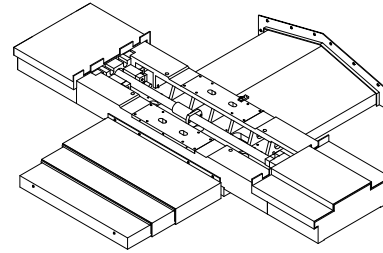
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA			
STOCK/ASSY No.		TITLE VM17 PEDESTAL SUB-ASSEMBLY			
TOLERANCE UNLESS SPECIFIED		APPLICATION PARTNER I			
X .XXX	+/-	SCALE 12:1		DWG No. 6-10-008-075	SIZE B
X .XX	+/-	DATE 26 FEB 02		DRAWN BY DAHLKE	SHEET No. 2 OF 2
X .X	+/-				
X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

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Machine Saddle Assembly



PARTS LIST			
No.	QTY	STOCK No.	DESCRIPTION
1	1	MP1-383	REAR WAY COVER WIPER
2	1	MP1-108	SNAP RING
3	1	BG-02	6204 BEARING
4	1	SEE TABLE	REAR WAY COVER
5	1	SEE TABLE	X AXIS BALL SCREW
6	2	SW-193	HOME SWITCH
7	1	NU-161	1/8 NPT SWIVEL ELBOW 4mm TUBE
8	1	BG-94	BALLSCREW SUPPORT BEARING
9	1	MP1-107	BEARING LOCKNUT SPACER
10	2	SW-191	X AXIS SWITCH CORD
11	1	MP1-94	BALL SCREW LOCKNUT
12	8	MP-718	PDM HARD STOP BUMPER
13	2	MP1-387	HOME SWITCH BRACKET
14	1	MP1-446	HARD STOP BLOCK RIGHT
15	1	SEE TABLE	X AXIS WAY COVER - LEFT
16	1	BR-111	CONDUIT BRACKET
17	2	LB-27	PULLEY MOTOR WARNING LABEL
18	1	MP1-388	Y AXIS CABLE BRACKET
19	1	MP1-418	OIL LINE BRACKET
20	1	MP1-389	X AXIS RADIAL SUPPORT BRACKET
21	2	MP1-447	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	MX1-59	MOTOR MOUNT
26	1	SEE TABLE	MOTOR COUPLER
27	2	MP1-410	SADDLE HARD STOP BLOCK
28	4	SEE TABLE	X AXIS WAY COVER SPRING
29	1	MX1-11	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	MP1-500	FRONT WAY COVER



MANIFOLD ASSEMBLY		
No.	DRAWING No.	DESCRIPTION
23	6-10-008-058	X & Y AIR/OIL MANIFOLD ASSEMBLY
	6-10-018-049	VM X & Y AXIS OIL MANIFOLD ASSEMBLY

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

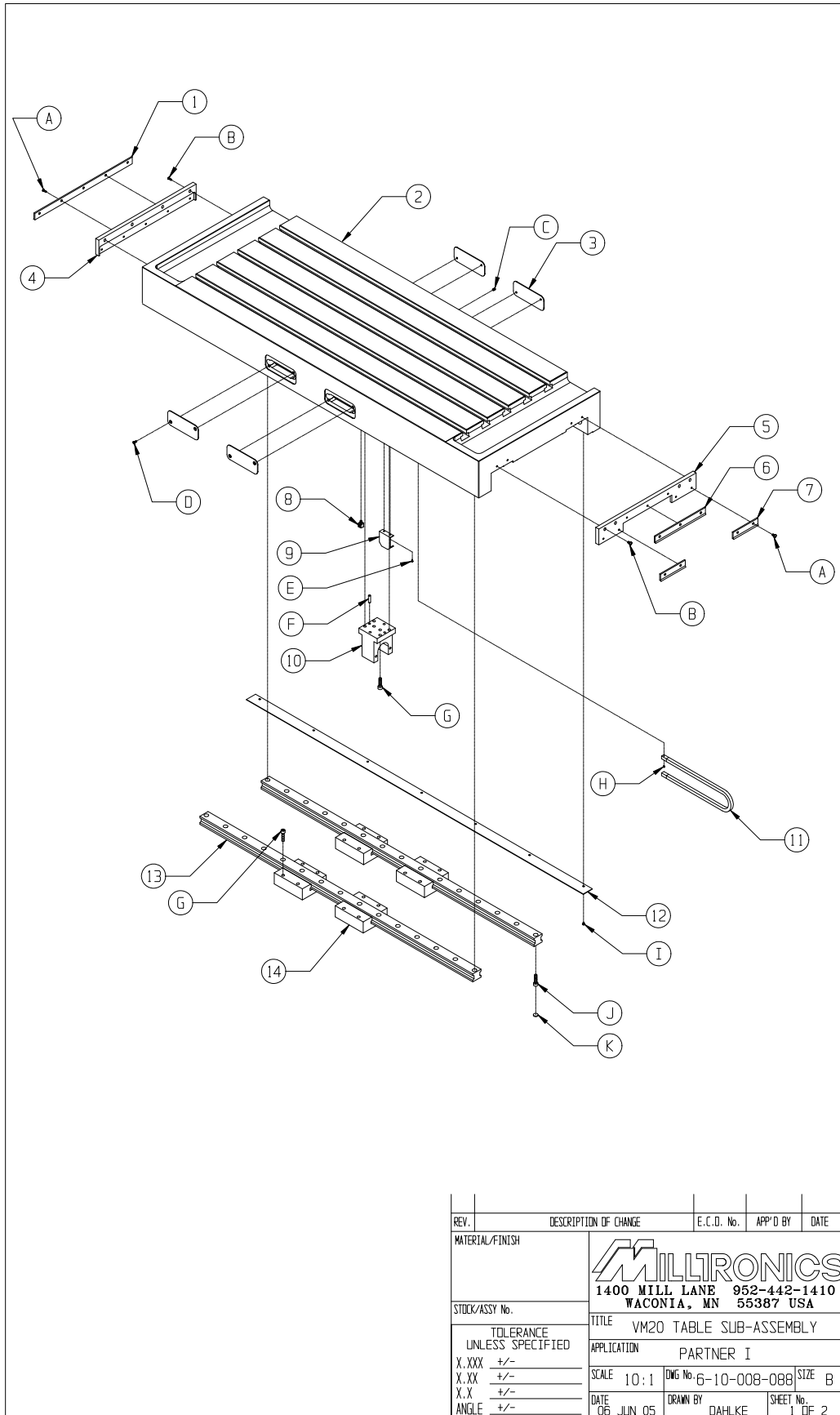
MOTOR & COUPLER LIST				
No.	YASKAWA	FANUC	SIEMENS	MITSUBISHI
26	MA-242 (.5/1.0kw)	MA-242	MA-260	MA-260
	MA-241 (1.5kw)			
	MD-123 (.5kw)	4Nn A06B-0223-B200	6Nn 1FK7060-SAF71-1EA0	
30	MD-125 (1.0kw)	8Nn A06B-0227-B200	11Nn 1FK7063-SAF71-1EA0	MD-184 (1.5kw)
	MD-127 (1.5kw)			

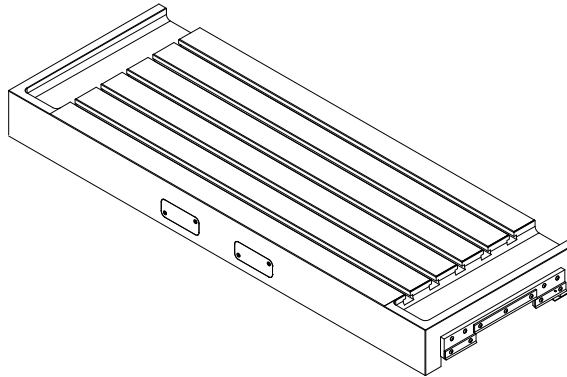
MACHINE VARIATION TABLE					
No.	DESCRIPTION	VM15/16/17 PART No.			
		25" TRAVEL	30" TRAVEL	30" TRAVEL	40" TRAVEL
4	REAR WAY COVER	MP1-382	MP1-382	MP1-462	MP1-462
5	X AXIS BALL SCREW STANDARD	MP-569	MP-569	MP-569	MP-570
	X AXIS BALL SCREW RAPID	-	MP-802	MP-802	MP-821
15	X AXIS WAY COVER - LEFT	MP1-385	MP1-385	MP1-385	MP1-455
22	SADDLE - MACHINED	MX1-55	MX1-55	MX1-55	MX1-63
24	X AXIS WAY COVER - RIGHT	MP1-442	MP1-442	MP1-442	MP1-454
28	X AXIS WAY COVER SPRING	HD-62	HD-62	HD-62	HD-33
31	BALL RAIL	MP-640 (820)	MP-640 (820)	MP-640 (820)	MPB-47 (1000)
	ROLLER RAIL	-	MP-831 (844)	MP-831 (844)	MP-811 (1024)
32	BALL RAIL BLOCK	MP-774	MP-774	MP-774	MP-774
	ROLLER RAIL BLOCK	-	MP-815	MP-815	MP-815

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	23	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 MP-640 (820) BALL RAIL
	42	RAIL PLUGS MP-831 (844) ROLLER RAIL
	26	RAIL PLUGS MPB-47 (1000) BALL RAIL
	50	RAIL PLUGS MP-811 (1024) ROLLER RAIL
Y	28	M8-1.25 x 40mm SHCS MP-640 (820) BALL RAIL
	48	M8-1.25 x 40mm SHCS MP-831 (844) ROLLER RAIL
	32	M8-1.25 x 40mm SHCS MPB-47 (1000) BALL RAIL
	56	M8-1.25 x 40mm SHCS MP-811 (1024) ROLLER RAIL
Z	4	M5-.8 x 10mm BHCS

I	ADD MITSUBISHI TO LIST	6265		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 SCHMIOT SHEET No. 2 OF 2		
ANGLE +/-				

Milling Table Assembly





PARTS LIST

No.	QTY	STOCK No.	DESCRIPTION
1	1	9800-79	VM17 WIPER - LEFT
2	1	SEE TABLE	TABLE - MACHINED
3	4	MP-315	TABLE SLOT COVER
4	1	MP1-419	X-AXIS WIPER PLATE - LEFT
5	1	MP1-420	X-AXIS WIPER PLATE - RIGHT
6	1	9800-78	VM17 WIPER - UPPER
7	2	9800-77	VM17 WIPER - LOWER
8	2	NU-161	SWIVEL ELBOW 1/8NPT - 4mm TUBE
9	1	MP6-45	EXTENDED TRAVEL X-AXIS DOG
10	1	9800-28	X-AXIS BALL SCREW CARRIER
11	1	MA-245	X-AXIS CABLE TRACK
12	1	SEE TABLE	TABLE PLATE
13	2	SEE TABLE	35mm RAILS
14	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	8	M4-.7 x 8mm FHCS
E	2	M3-.5 x 6mm BHCS
F	2	1/4 x 1 DOWEL PIN
G	22	M8-1.25 x 30mm SHCS
H	4	M3-.5 x 20mm BHCS
I	7	M5-.8 x 12mm BHCS
J	30	M8-1.25 x 40mm SHCS
K	30	RAIL PLUGS

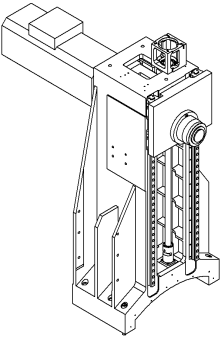
TABLE TRAVEL

No.	DESCRIPTION	30" TRAVEL	40" TRAVEL
2	TABLE - MACHINED	MX1-64	MX1-65
12	TABLE PLATE	MP1-463	MP1-464
13	BALL RAIL	MP-732	MP-823
	ROLLER RAIL	MP-812	MP-824
14	BALL RAIL BLOCK	MP-641	MP-641
	ROLLER RAIL BLOCK	MP-815	MP-815

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 TABLE SUB-ASSEMBLY		
X .XXX	+/-	APPLICATION PARTNER I		
X .XX	+/-	SCALE 10:1	DWG No. 6-10-008-088	SIZE B
X .X	+/-	DATE 06 JUN 05	DRAWN BY DAHLKE	SHEET No. 2 OF 2
ANGLE	+/-			

Machine Column/Head Assembly

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Y-Axis			
SPINDLE MOTOR MOUNTING PLATE			
ITEM No.	QTY.	PART No.	DESCRIPTION
8	1	MPIT036	7.5kw MOTOR PLATE
	1	MPT045	11kw MOTOR PLATE
SPINDLE MOTOR TABLE			
ITEM No.	QTY.	PART No.	DESCRIPTION
9	1	MO00166	7.5kw SPINDLE MOTOR
	1	MO00167	11kw SPINDLE MOTOR
ITEM NO. QTY PART NO. DESCRIPTION			
1	1	MXH0002	COLUMN MACHINING
2	1	MX10059	Y MOTOR MOUNT MACHINED
3	1	MP-570	50" BALL SCREW ASSEMBLY
4	1	MPH0022	BALL SCREW END SUPPORT
5	1	MPH0002	SUPPORT PLATE
6	1	MXH0003	SPINDLE MOTOR MOUNT
7	1	MXH0004	Y MOTOR MOUNT MACHINED
8	1	SEE TABLE	SPINDLE MOTOR MOUNTING PLATE
9	1	SEE TABLE	SPINDLE MOTOR
10	1	BG00094	BALL SCREW SUPPORT BEARING
11	1	BG00002	BEARING NACHI 6204ZZ
12	1	MP10108	RETAINING RING EXTERNAL 19mm X 1.3mm
13	2	SEE TABLE	RAIL 45"
14	32	HD00090	MITEEBITE CLAMP
15	4	SEE TABLE	RAIL BLOCK
16	4	MP00718	POM HARDSTOP BLOCK
17	1	SEE TABLE	SPINDLE
18	1	MA00369	MOTOR COUPLER
19	4	SHCS M5-0.8 x 16	M5 - 0.8 x 16mm SHCS
20	10	SHCS M6-1.0 x 25	M6-1.0 X 25mm SHCS
21	4	SHCS M6-1.0 x 30	M6-1.0 x 30 SHCS
22	2	SHCS M6-1.0 x 130	SHCS M6-1.0 x 130mm
23	28	SHCS M8-1.25 x 30	M8-1.25 x 30mm SHCS
24	6	SHCS M6-1.0 x 20	M6-1.0 x 20 SHCS
25	62	SHCS M8-1.25 x 40	M8 - 1.25 x 40mm SHCS
26	6	SHCS M10-1.5 x 60	M10 - 1.5 x 60 SHCS
27	6	SHCS M12-1.75 x 60	M12-1.75 x 60 SHCS
28	4	SHCS M14-2.0 x 55	M14-2.0 x 45mm SHCS
29	8	SHCS .75-10 X 7.00	SHCS 3/4-10 X 7.00
30	4	WASHER FLAT M6	M6 FLAT WASHER
31	4	WASHER FLAT M8	M8 FLAT WASHER
32	4	WASHER LOCK M6	M6 LOCK WASHER
33	6	WASHER LOCK M8	M8 LOCK WASHER
34	6	WASHER LOCK M12	M12 LOCK WASHER
35	4	WASHER LOCK M14	M14 LOCK WASHER
RAIL BLOCK TABLE			
ITEM No.	QTY.	PART No.	DESCRIPTION
15	4	MP00641	BALL RAIL BLOCK
	4	MP00815	ROLLER RAIL BLOCK
RAIL TABLE			
ITEM No.	QTY.	PART No.	DESCRIPTION
13	2	MP00642	BALL RAIL
	2	MP00829	ROLLER RAIL
SPINDLE TABLE			
ITEM No.	QTY.	PART No.	DESCRIPTION
17	1	MP00864	10000 RPM SPINDLE
	1	MP00865	15000 RPM SPINDLE





NAME	DATE
DRAWN SES	21 SEP 06



1400 MILL LANE 952.442.1410
WACONIA, MN 55387 USA

MATERIAL:

FINISH: PAINT MMC
LIGHT GRAY

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]

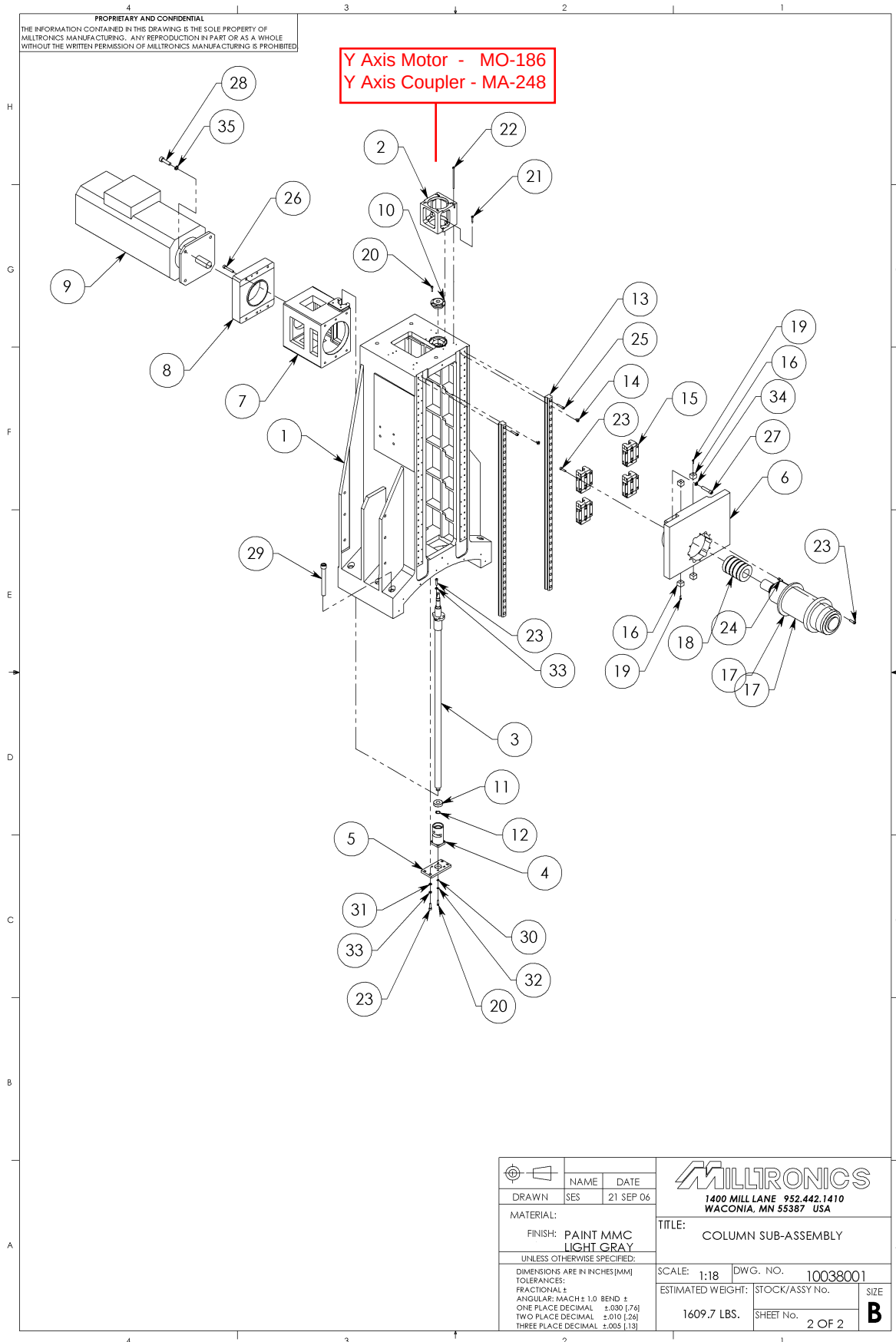
TITLE: COLUMN SUB-ASSEMBLY

SCALE: 1:24 DWG. NO. 10038001

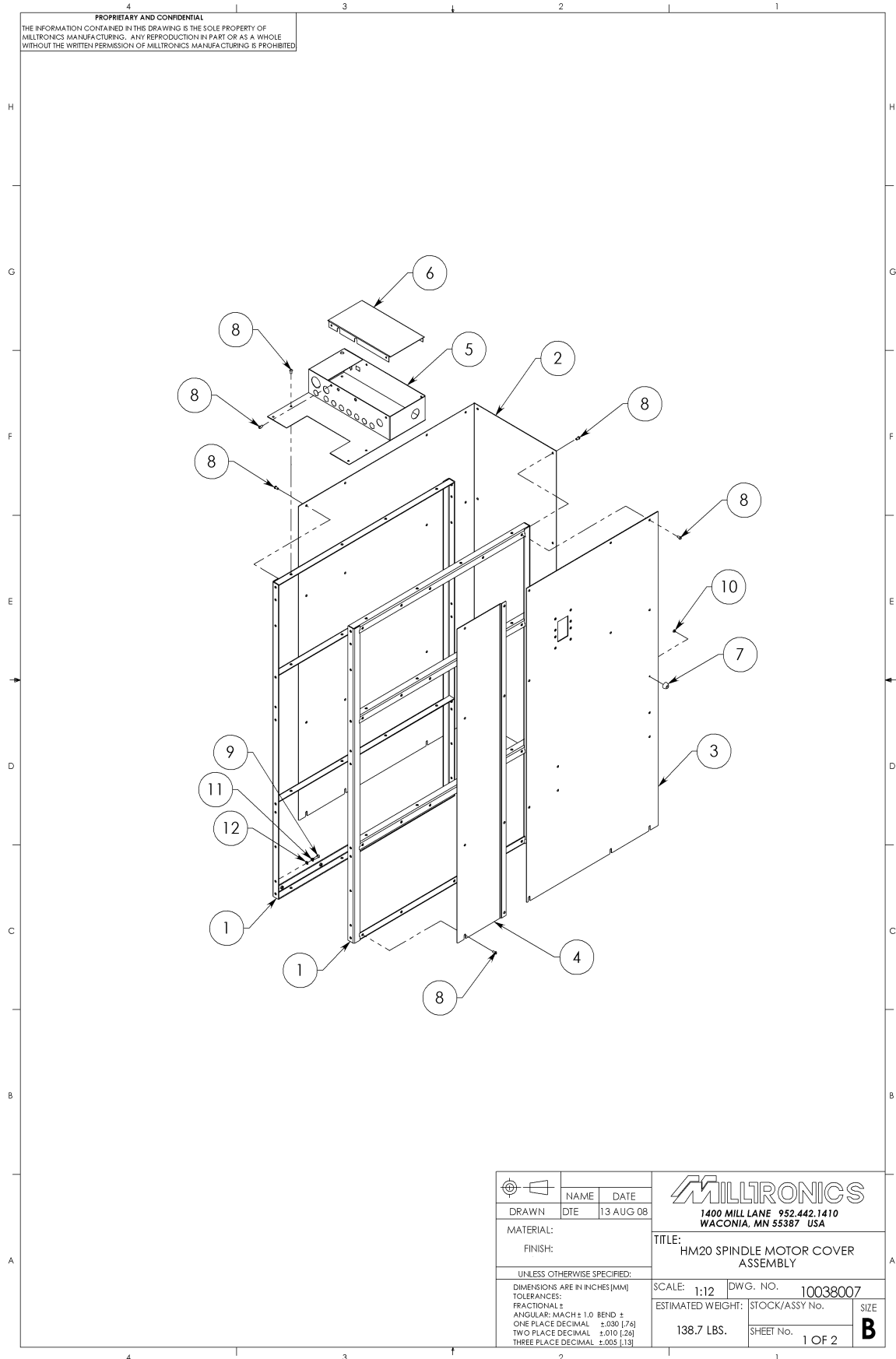
ESTIMATED WEIGHT: STOCK/ASSY No.

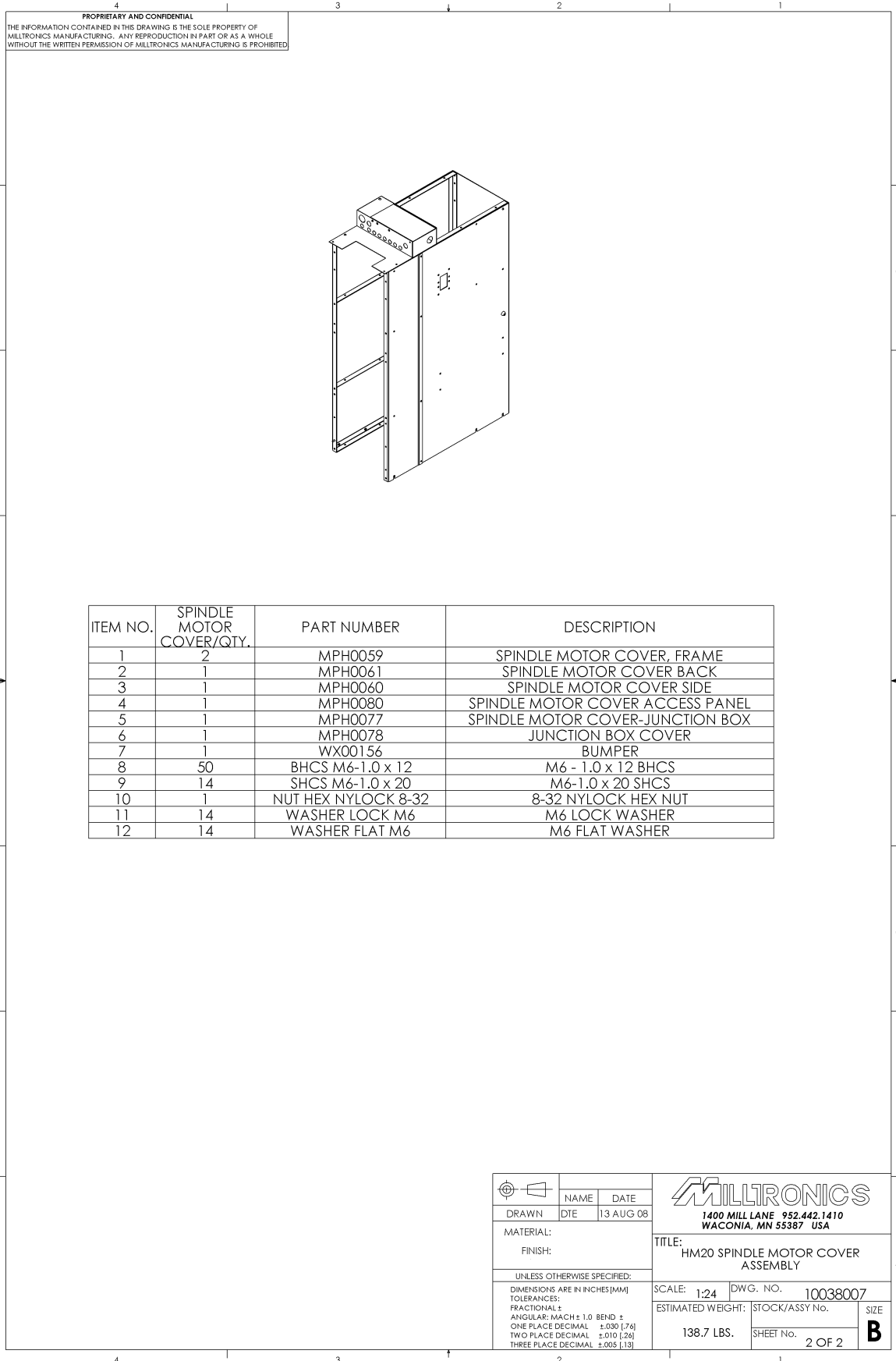
1609.7 LBS. SHEET No. 1 OF 2

B

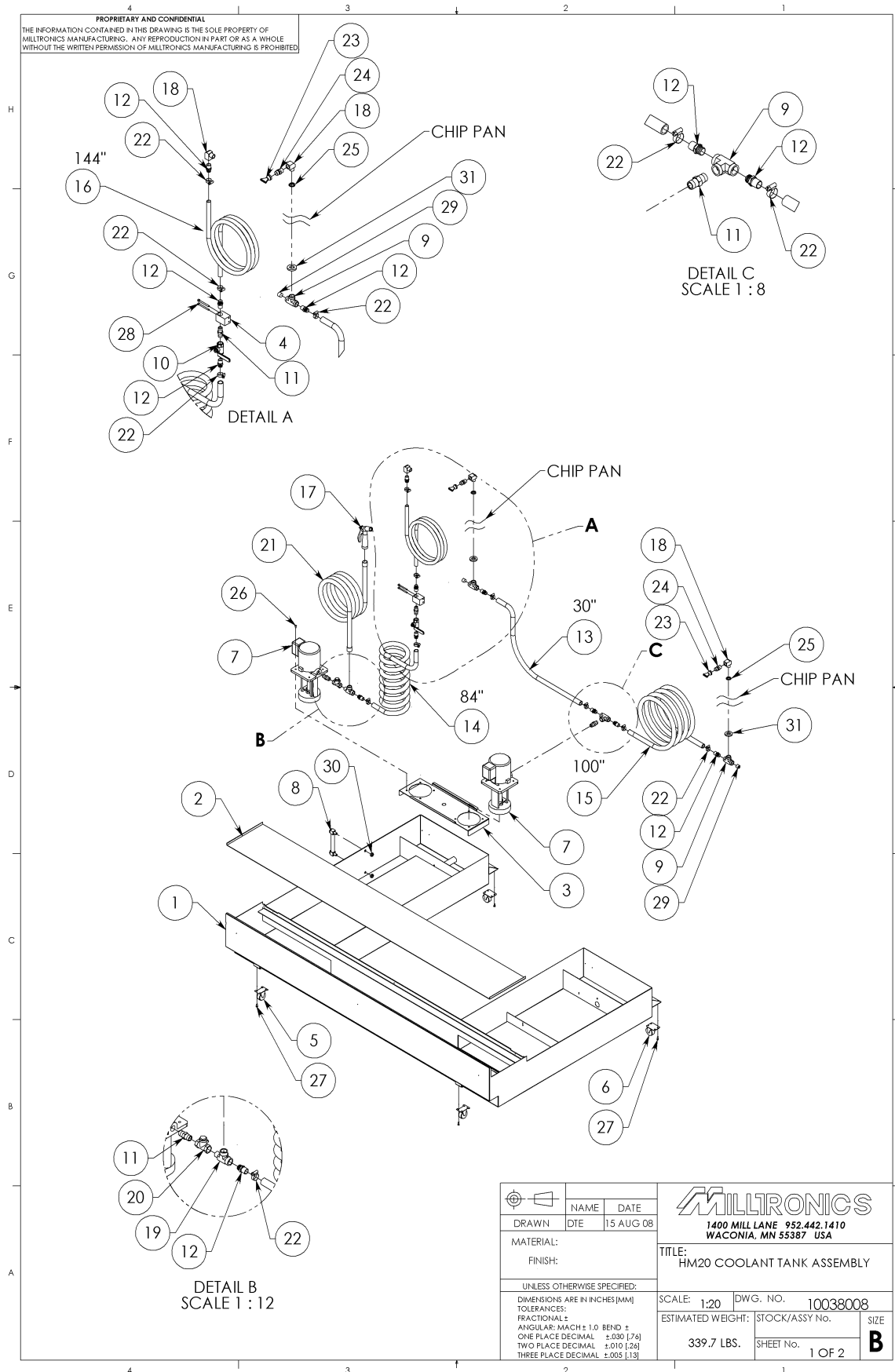


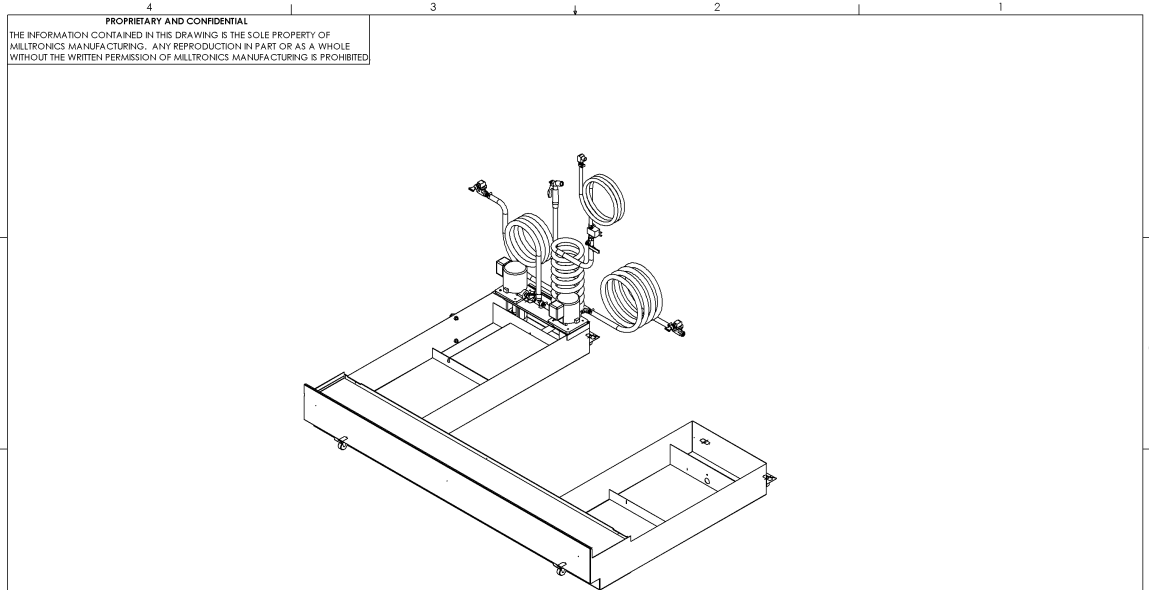
Spindle Motor Cover Assembly





Flood Tank W/Washdown Assembly

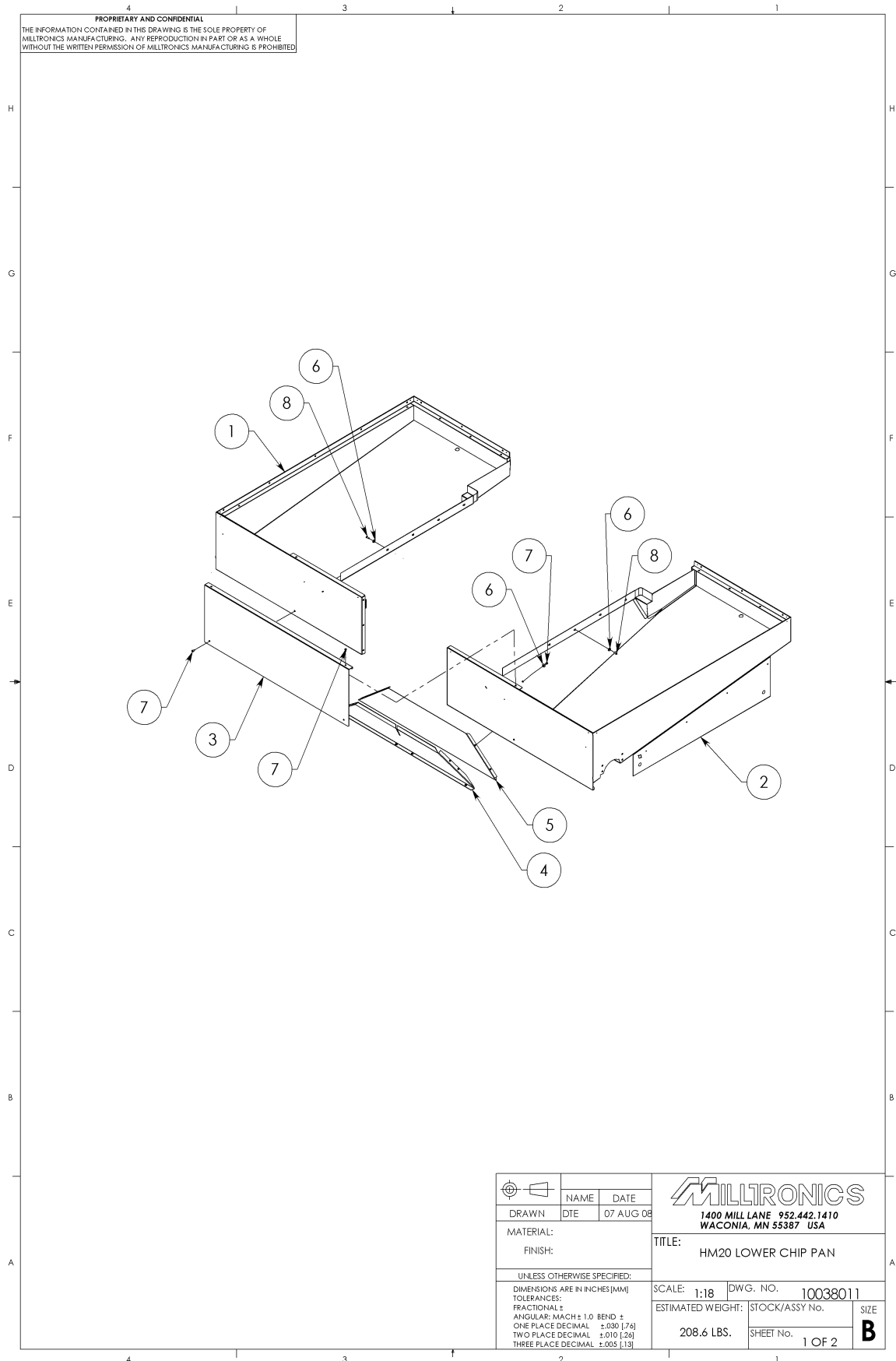


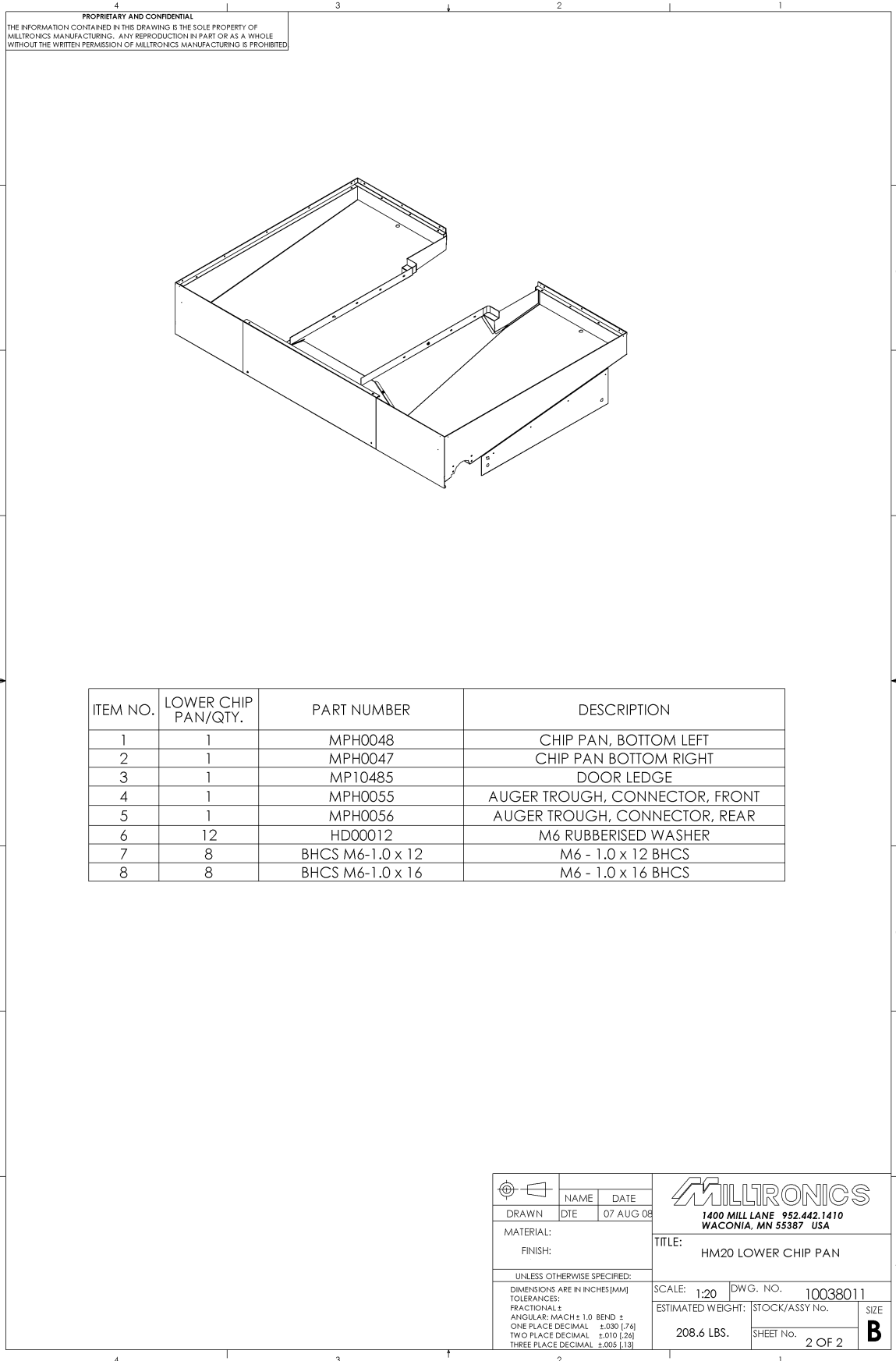


ITEM NO.	COOLANT TANK/ QTY.	PART NUMBER	DESCRIPTION
1	1	MPH0057	COOLANT TANK
2	1	MPH0058	COOLANT TANK SCREEN
3	1	MP10489	PUMP PLATE
4	1	MPH0106	COOLANT VALVE BLOCK
5	2	EL00098	STRAIGHT CASTER
6	4	EL00088	WHEEL CASTER
7	2	MA00162	FLOOD PUMP MOTOR
8	1	MP001035	COOLANT LEVEL GAUGE
9	3	NU00061	1/2" FEMALE T
10	1	NU00064	1/2"NPT BALL VALVE
11	3	NU00065	1/2-14 NPT MALE/MALE NIPPLE
12	8	NU00066	FITTING 1/2NPT - 3/4 BARB
13	1	NU00069	NYLABRAID 3/4" 4511-0751 30"
14	1	NU00069	NYLABRAID 3/4" 4511-0751 84"
15	1	NU00069	NYLABRAID 3/4" 4511-0751 100"
16	1	NU00069	NYLABRAID 3/4" 4511-0751 144"
17	1	NU00124	NOZZEL WATER HOSE
18	3	NU00125	1/2" STREET ELBOW
19	1	NU00127	TEE 1/2"NPT STREET 2225P-8
20	1	NU00128	1/2" SWING CHECK VALVE
21	1	NU00130	WASHDOWN HOSE ASSEMBLY 20'
22	8	NU00141	1" HOSE CLAMP
23	2	NU00175	1-1/4" FLARE NOZZLE
24	2	NU00176	1/2" CONNECTOR
25	2	WX00038	O-RING .5"
26	8	BHCS M6-1.0 x 12	M6 - 1.0 x 12 BHCS
27	12	SHCS M6-1.0 x 12	M6-1.0 x 12 SHCS
28	2	SHCS M6-1.0 X 65	M6-1.0 X 65 SHCS
29	2	SHPP .50-14 NPT	1/2-14 NPT SHPP
30	2	NUT HEX JAM .50-20	1/2-20 HEX JAM NUT
31	2	WASHER FLAT .875	7/8" X .25 THICK FLAT WASHER

	NAME	DATE	 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA
	DRAWN	DTE	
MATERIAL:		TITLE:	
FINISH:		HM20 COOLANT TANK 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: 1:24	DWG. NO. 10038008
		ESTIMATED WEIGHT: 339.7 LBS.	STOCK/ASSY NO. SIZE B
		SHEET NO. 2 OF 2	

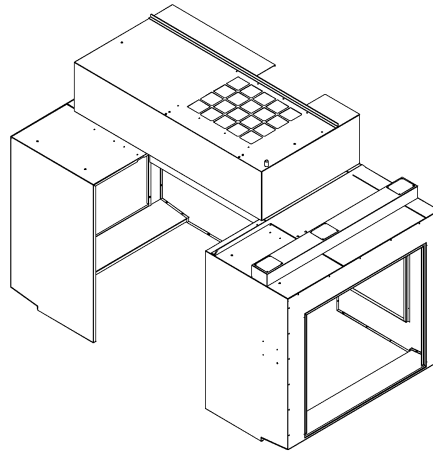
Enclosure Bottom Assembly





Enclosure Top Assembly

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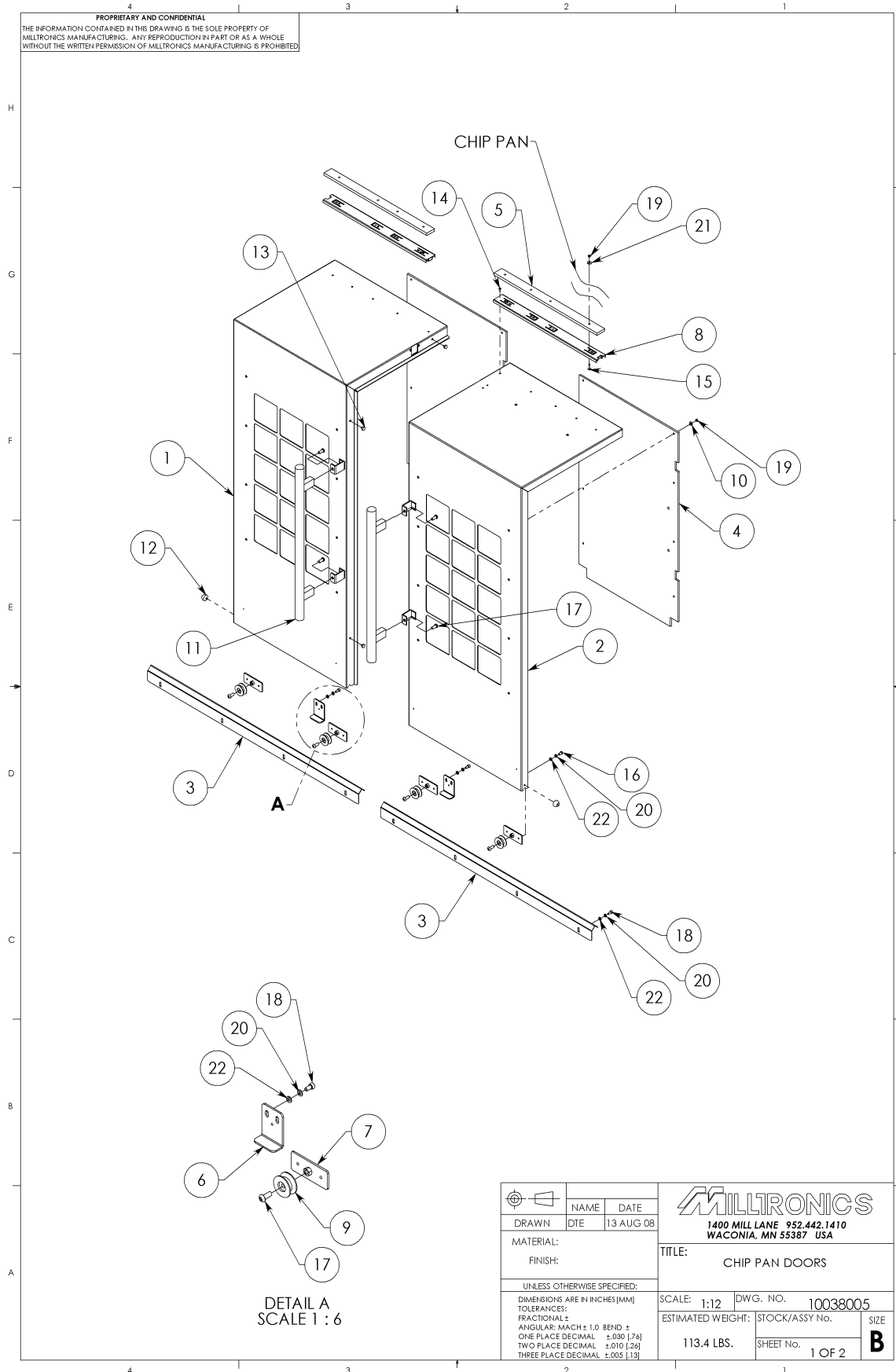


ITEM NO.	HM20 CHIP PAN/QTY.	PART NUMBER	DESCRIPTION
1	1	MPH0043	CHIP PAN RIGHT SIDE
2	1	MPH0041	CHIP PAN RIGHT TOP
3	1	MPH0040	CHIP PAN RIGHT FRONT
4	1	MPH0042	CHIP PAN RIGHT, REAR
5	1	MPH0049	CHIP PAN LEFT FRONT
6	1	MPH0053	ATC REAR DRAIN PAN
7	1	MPH0051	CHIP PAN LEFT REAR
8	1	MPH0052	CHIP PAN LEFT SIDE
9	1	MPH0050	CHIP PAN LEFT TOP
10	1	MPH0038	TOP COVER
11	1	MP60163	OPERATOR DOOR - LEXAN
12	1	MPH0079	TOP WIRE CHANNEL
13	1	MPH0071	HMC20 CHIP PAN TOP STIFFENER
14	3	MPH0079	COVER PLATE
15	2	MPH0075	REMOTE SWITCH BOX
16	61	HD00012	M6 RUBBERISED WASHER
17	8	HD00058	M5 RUBBERIZED WASHER
18	20	BHCS M5-0.8 x 10	M5-0.8 x 10 BHCS
19	97	BHCS M6-1.0 x 12	M6 - 1.0 x 12 BHCS
20	8	SHCS M6-1.0 x 20	M6-1.0 x 20 SHCS
21	8	NUT HEX M5-0.8	M5 - 0.8 NYLOCK HEX NUT
22	23	WASHER FLAT M6	M6 FLAT WASHER
23	8	WASHER LOCK M6	M6 LOCK WASHER

	NAME	DATE	 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA
	DRAWN	DTE 07 AUG 08	
MATERIAL:		TITLE: CHIP PAN BODY	
FINISH:		SCALE: 1:96 DWG. NO. 10038004	
UNLESS OTHERWISE SPECIFIED:		ESTIMATED WEIGHT: STOCK/ASSY No.	
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]		495.0 LBS.	SHEET No. 1 OF 2 SIZE B



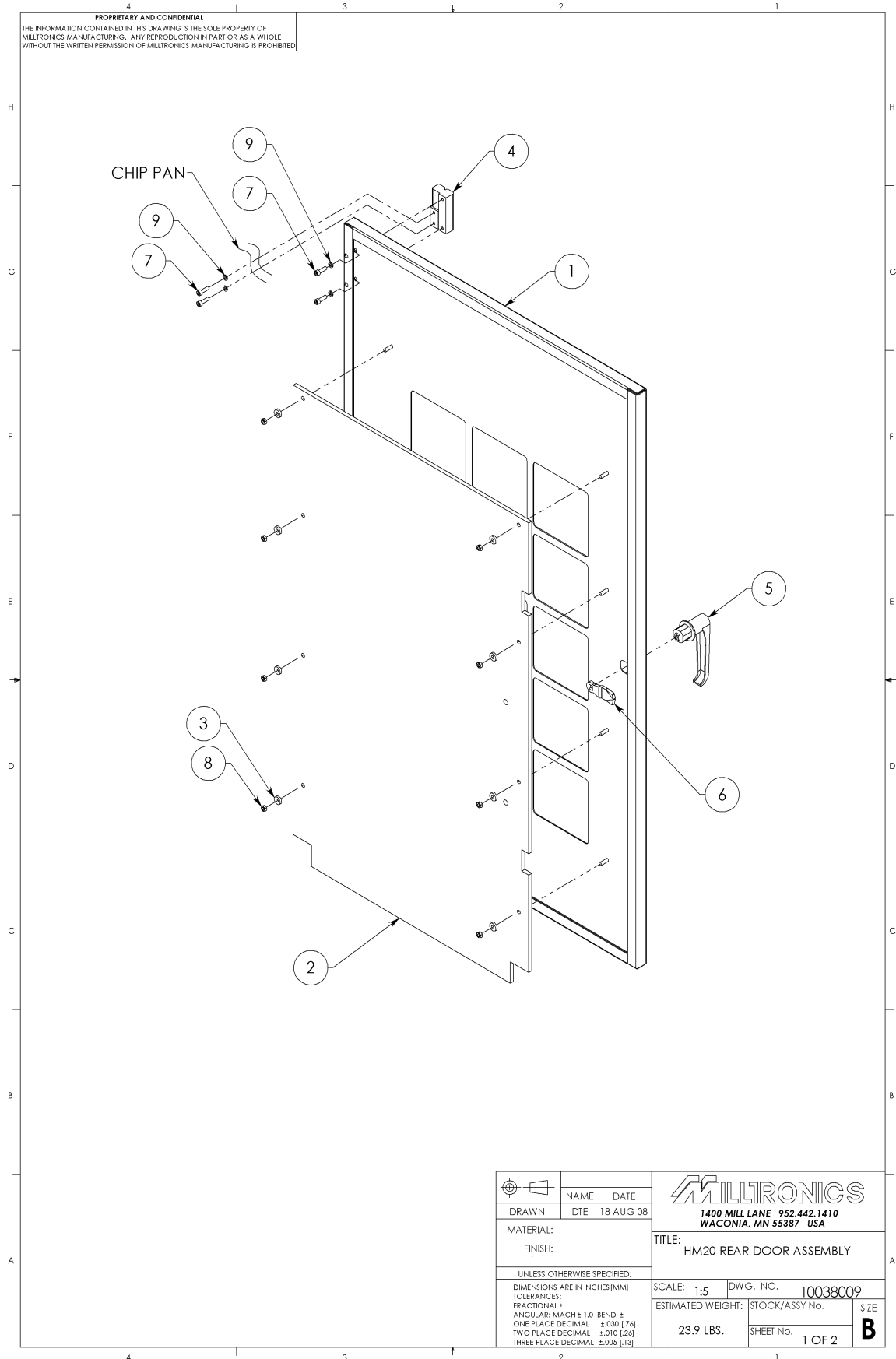
Enclosure Front Door Assembly

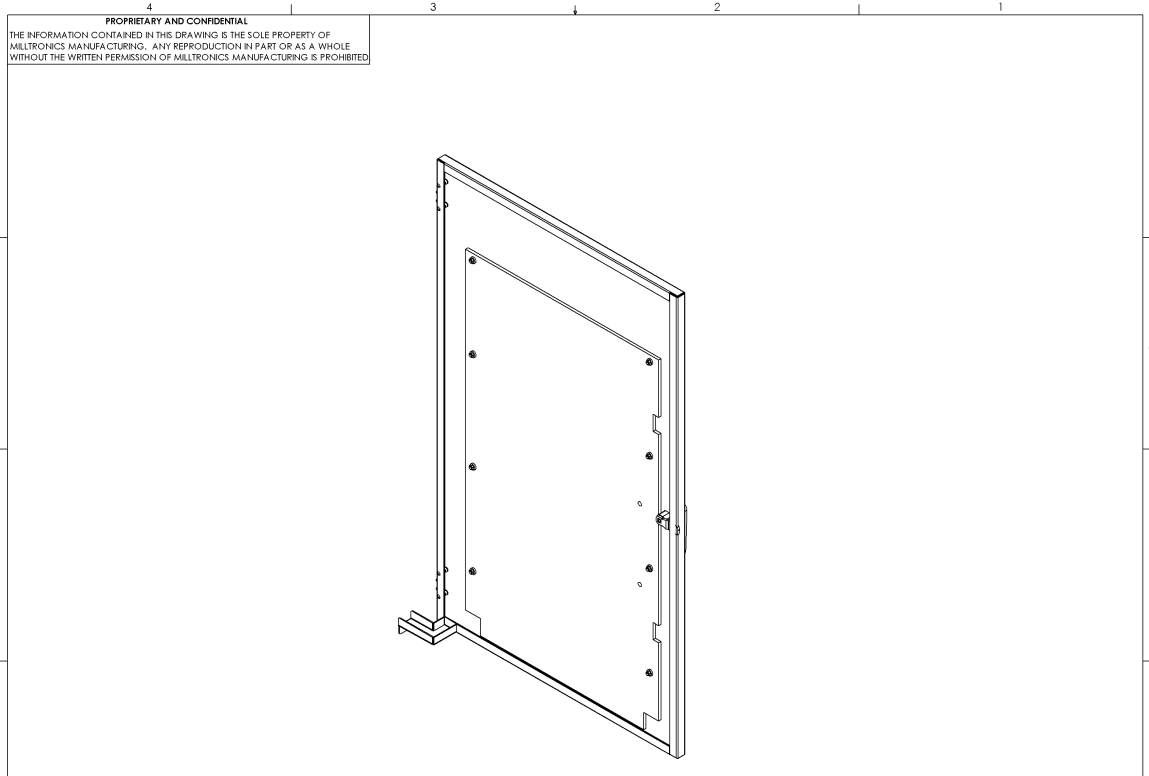


ITEM NO.	HM20 CHIP PAN/QTY.	PART NUMBER	DESCRIPTION
1	1	MPH0046	CHIP PAN, FRONT DOOR, LEFT
2	1	MPH0045	CHIP PAN, FRONT DOOR, RIGHT
3	2	MP10484	LOWER DOOR TRACK
4	2	MP00239	OPERATOR DOOR - LEXAN
5	2	MP10501	VM20 DOOR SLIDE SPACER
6	2	MP00748	DOOR STOP
7	4	MP10496	WHEEL BRACKET, FRONT DOORS
8	2	MP00838	20" K&V 100lb 8400 SLIDE
9	4	MP10495	ROLLER, VM20/RW CHIP PAN DOOR
10	1	HD00058	M5 RUBBERIZED WASHER
11	2	WX00297	HANDLE
12	2	WX00156	BUMPER
13	3	WX00310	BUMPER
14	10	BHCS M4-0.7 x 10	M4-0.7 x10 BHCS
15	8	BHCS M5-0.8 x 20	M5-0.8 x 20 BHCS
16	1	BHCS M6-1.0 x 12	M6 - 1.0 x 12 BHCS
17	8	BHCS M8-1.25 x 16	M8 - 1.25 x 16 BHCS
18	12	SHCS M6-1.0 x 12	M6-1.0 x 12 SHCS
19	24	NUT HEX M5-0.8	M5 - 0.8 NYLOCK HEX NUT
20	20	WASHER LOCK M6	M6 LOCK WASHER
21	8	WASHER FLAT M5	M5 FLAT WASHER
22	20	WASHER FLAT M6	M6 FLAT WASHER

	NAME	DATE	 MILLTRONICS 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA
	DRAWN	DTE	
MATERIAL:		TITLE:	
FINISH:		CHIP PAN DOORS	
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: 1:24	DWG. NO. 10038005
		ESTIMATED WEIGHT: 113.4 LBS.	STOCK/ASSY No.
		SHEET No. 2 OF 2	SIZE B

Enclosure Rear Door Assembly





ITEM NO.	REAR DOOR/ QTY.	PART NUMBER	DESCRIPTION
1	1	MPH0044	CHIP PAN REAR DOOR
2	1	MP00239	OPERATOR DOOR - LEXAN
3	8	HD00058	M5 RUBBERIZED WASHER
4	2	WX00350	HM20 CONCEALED HINGE MOUNT
5	1	WX00348	NON LOCKING HANDLE
6	1	WX00349	1/4 TURN CAM LATCH
7	8	SHCS 10-32 x .625	10-32 x .625 SHCS
8	8	NUT HEX M5-0.8	M5 - 0.8 NYLOCK HEX NUT
9	8	WASHER LOCK #10	WASHER LOCK #10

	NAME	DATE	 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA
	DRAWN	DTE	
MATERIAL:		TITLE:	
FINISH:		HM20 REAR DOOR 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: 1:8	DWG. NO. 10038009
ESTIMATED WEIGHT: 23.9 LBS.		STOCK/ASSY No.	SIZE B
		SHEET No.	2 OF 2

4
3
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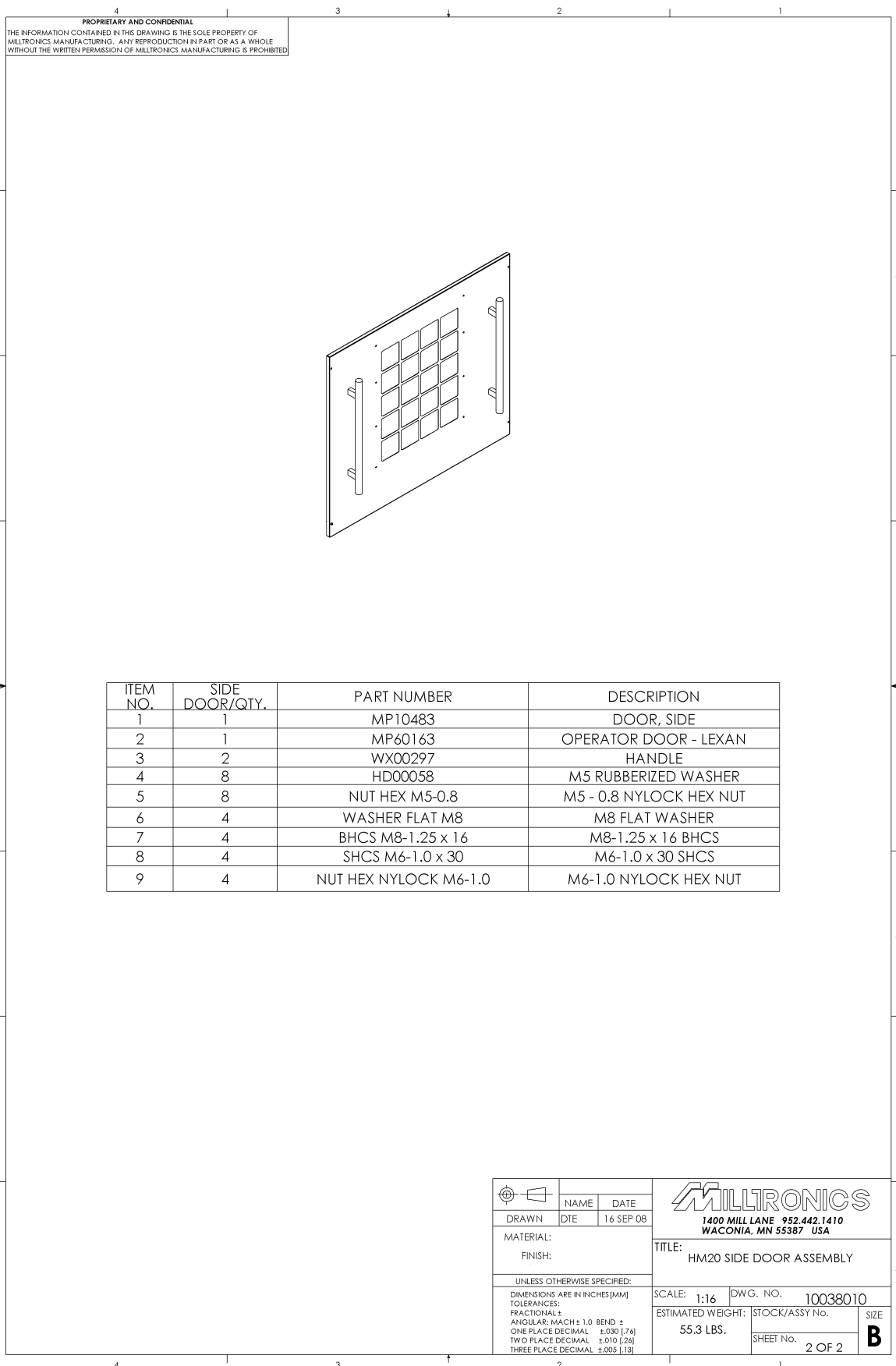
DRAWN		DATE	
DTE		16 SEP 08	
MATERIAL:			
FINISH:			
UNLESS OTHERWISE SPECIFIED:			
DIMENSIONS ARE IN INCHES [MM]			
TOLERANCES:			
FRACTIONAL ±			
ANGULAR: MACH ± 1.0 BEND ±			
ONE PLACE DECIMAL ±.030 [.76]			
TWO PLACE DECIMAL ±.010 [.25]			
THREE PLACE DECIMAL ±.005 [.13]			

SCALE: 1:8		DWG. NO. 10038010	
ESTIMATED WEIGHT: 55.3 LBS.		STOCK/ASSY No.	
		SHEET No. 1 OF 2	

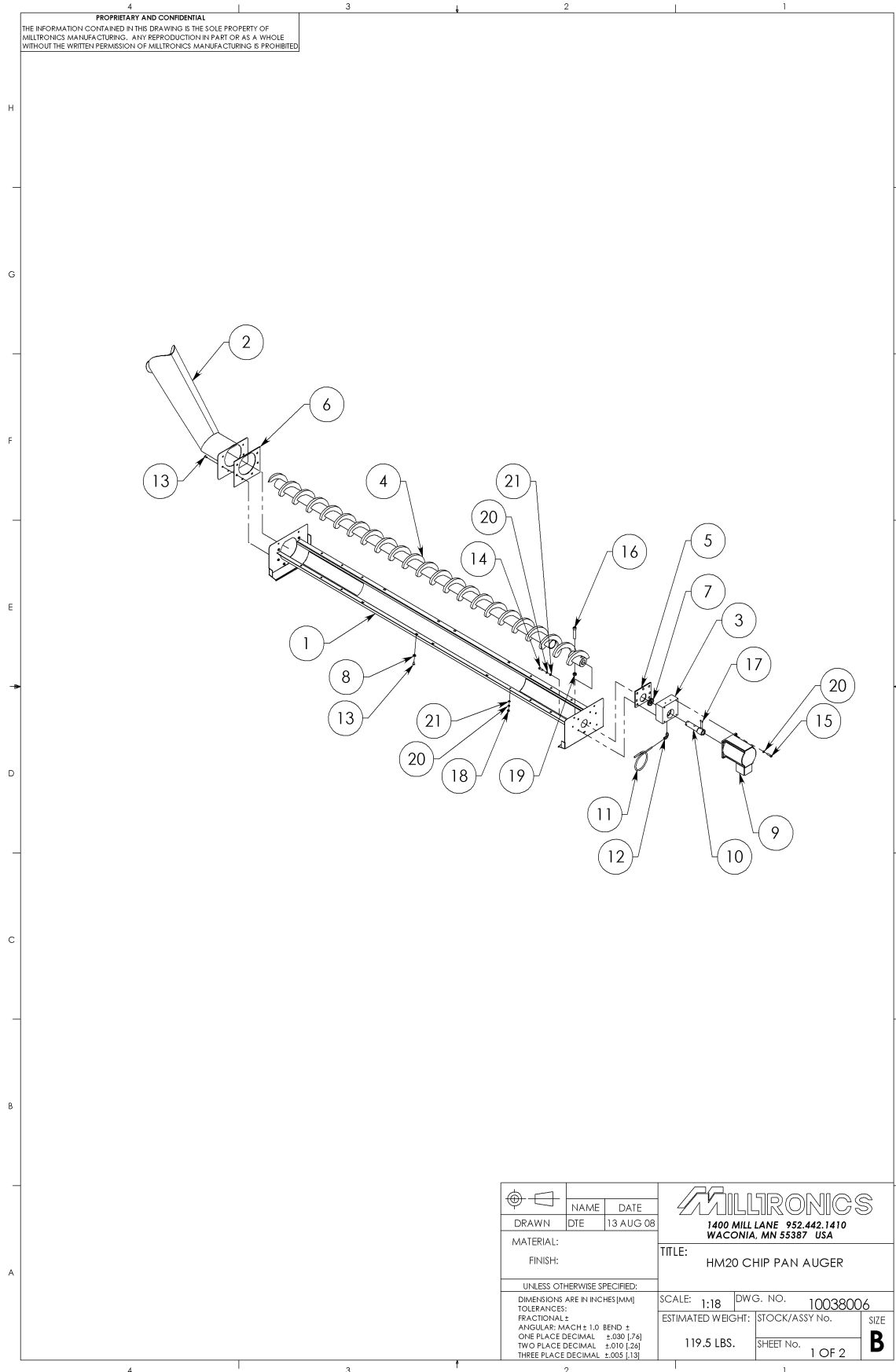
MILLTRONICS
1400 MILL LANE 952.442.1410
WACONIA, MN 55387 USA

TITLE: HM20 SIDE DOOR ASSEMBLY

SIZE **B**



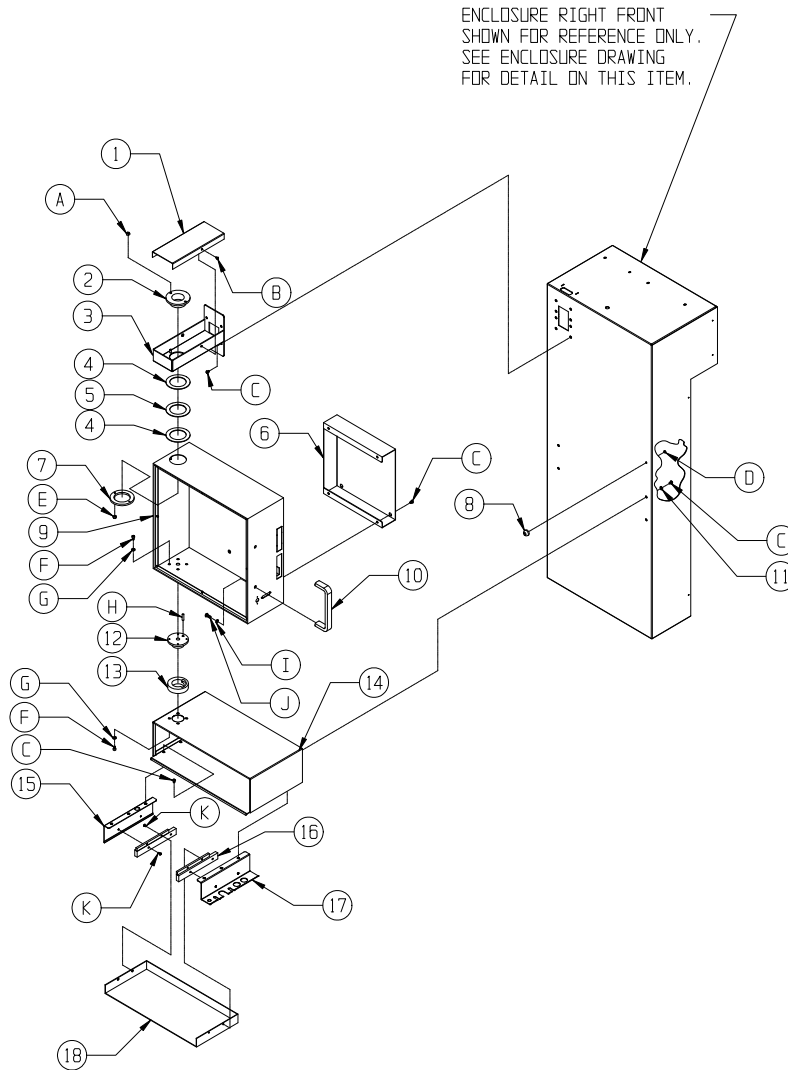
Chip Auger Assembly



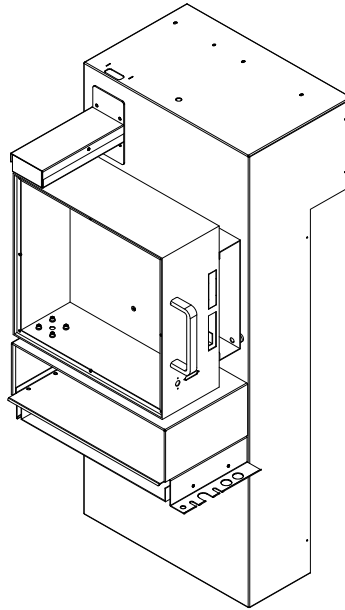
ITEM NO.	AUGER ASSY./QTY.	PART NUMBER	DESCRIPTION
1	1	MPH0054	AUGER TROUGH
2	1	MP00757	AUGER CHUTE
3	1	MP00440	BROTHER AUGER MOTOR MOUNTING BRACKET
4	1	MP00400	4" DIA. AUGER
5	1	WX00313	AUGER MOTOR PLATE GASKET
6	1	WX00361	AUGER CHUTE GASKET
7	1	BG00069	BEARING CUP OIL SEAL
8	8	HD00012	M6 RUBBERISED WASHER
9	1	MO00120	AUGER MOTOR
10	1	MP00441	BROTHER AUGER DRIVE SHAFT
11	1	NU00025	PLASTIC TUBING .25" DIA 12"
12	1	NU00171	ELBOW - M/S 1/4 TUBE x 1/4NPT
13	2	BHCS M6-1.0 x 12	M6 - 1.0 x 12 BHCS
14	4	SHCS M6-1.0 x 20	M6-1.0 x 20 SHCS
15	4	SHCS M6-1.0 x 25	M6-1.0 x 25mm SHCS
16	2	SHCS M10-1.5 x 60	M10 - 1.5 x 60 SHCS
17	2	SHSS 10-32 x .25	10-32 x .25 SHSS
18	12	NUT HEX NYLOCK M6-1.0	M6-1.0 NYLOCK HEX NUT
19	2	NUT HEX M10-1.5	M10-1.5 HEX NUT
20	20	WASHER LOCK M6	M6 LOCK WASHER
21	16	WASHER FLAT M6	M6 FLAT WASHER

		MILLTRONICS 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA	
DRAWN	NAME	DATE	TITLE: HM20 CHIP PAN AUGER
DTE		13 AUG 08	
MATERIAL:		SCALE: 1:32 DWG. NO. 10038006 ESTIMATED WEIGHT: 119.5 LBS. STOCK/ASSY No. SIZE SHEET No. 2 OF 2 B	
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)			

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.					
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		APPLICATION PARTNER I			
		SCALE 15:1	ENG No. 6-10-008-087	SIZE B	
		DATE 27 MAY 05	DRAWN BY DAHLKE	SHEET No. 1 OF 2	



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	SEE TABLE	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

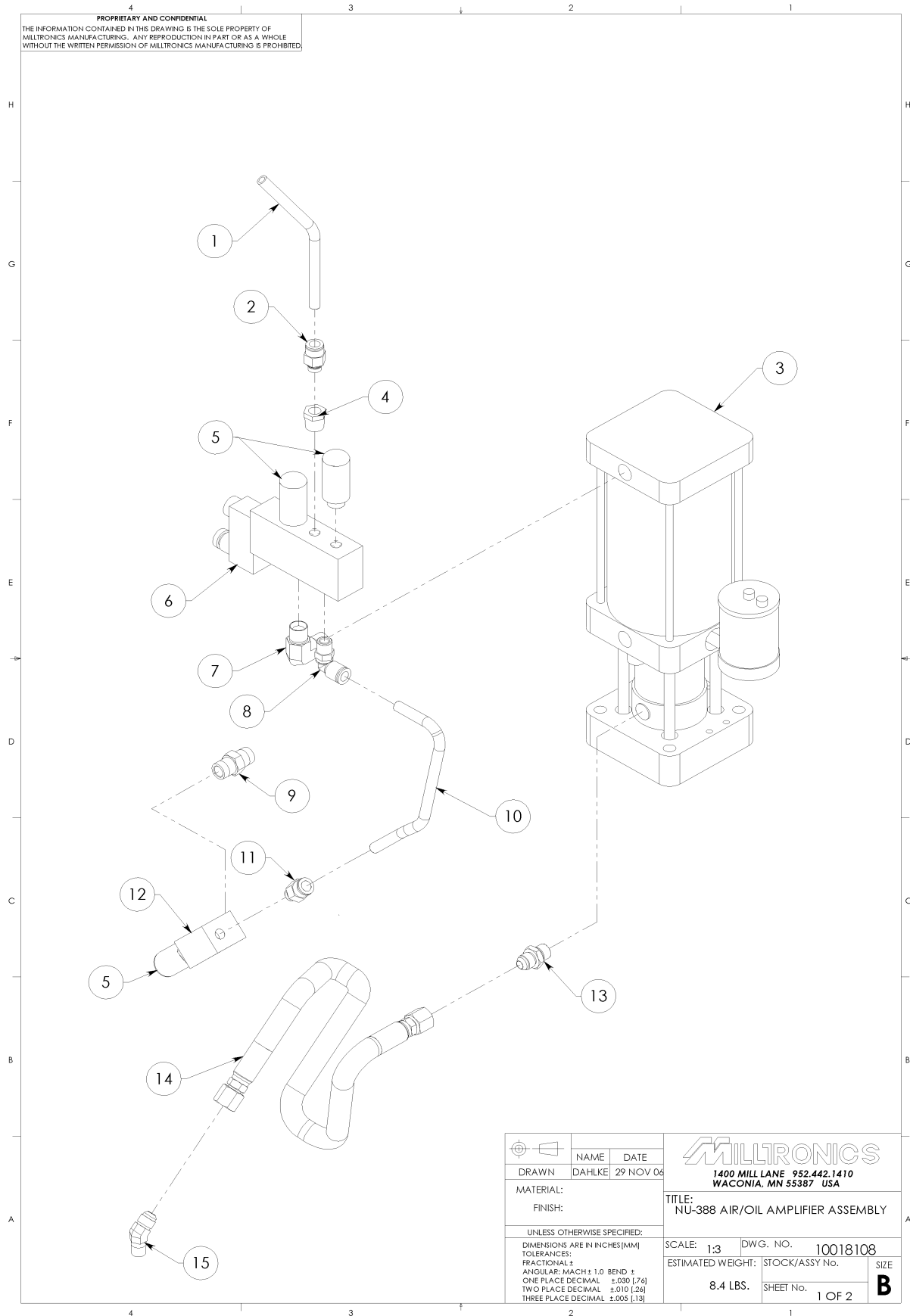
PARTS LIST		
No.	QTY	DESCRIPTION
A	2	M6-1 NYLOCK NUT
B	2	M5-.8 x 10mm BHCS
C	18	M6-1 x 10mm BHCS
D	1	8-32 NYLOCK NUT
E	2	M5-.8 NYLOCK NUT
F	8	M6-1 x 10mm SHCS
G	8	M6 LOCK WASHER
H	1	1/4 x .5 DOWEL PIN
I	2	M8 FLAT WASHER
J	2	M8-1.25 x 20mm BHCS
K	8	M3-.5 x 10mm BHCS

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.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		SIZE B
ANGLE +/-		DRAWN BY DAHLKE		SHEET No. 2 OF 2

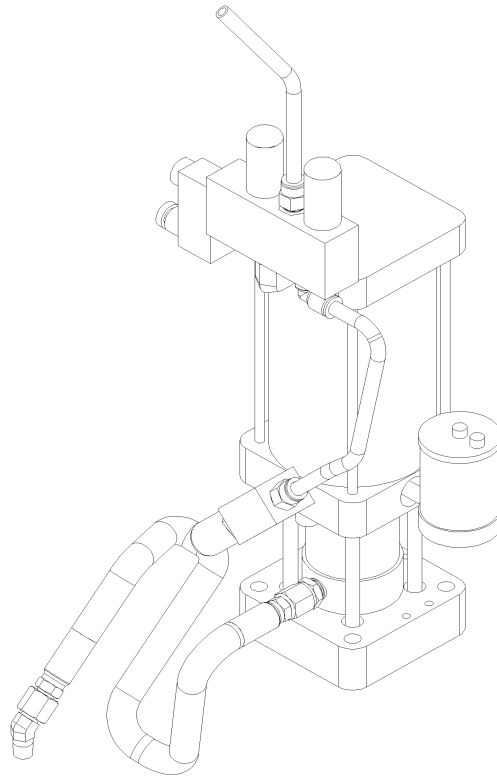
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Power Drawbar Cylinder Assembly



4 3 2 1

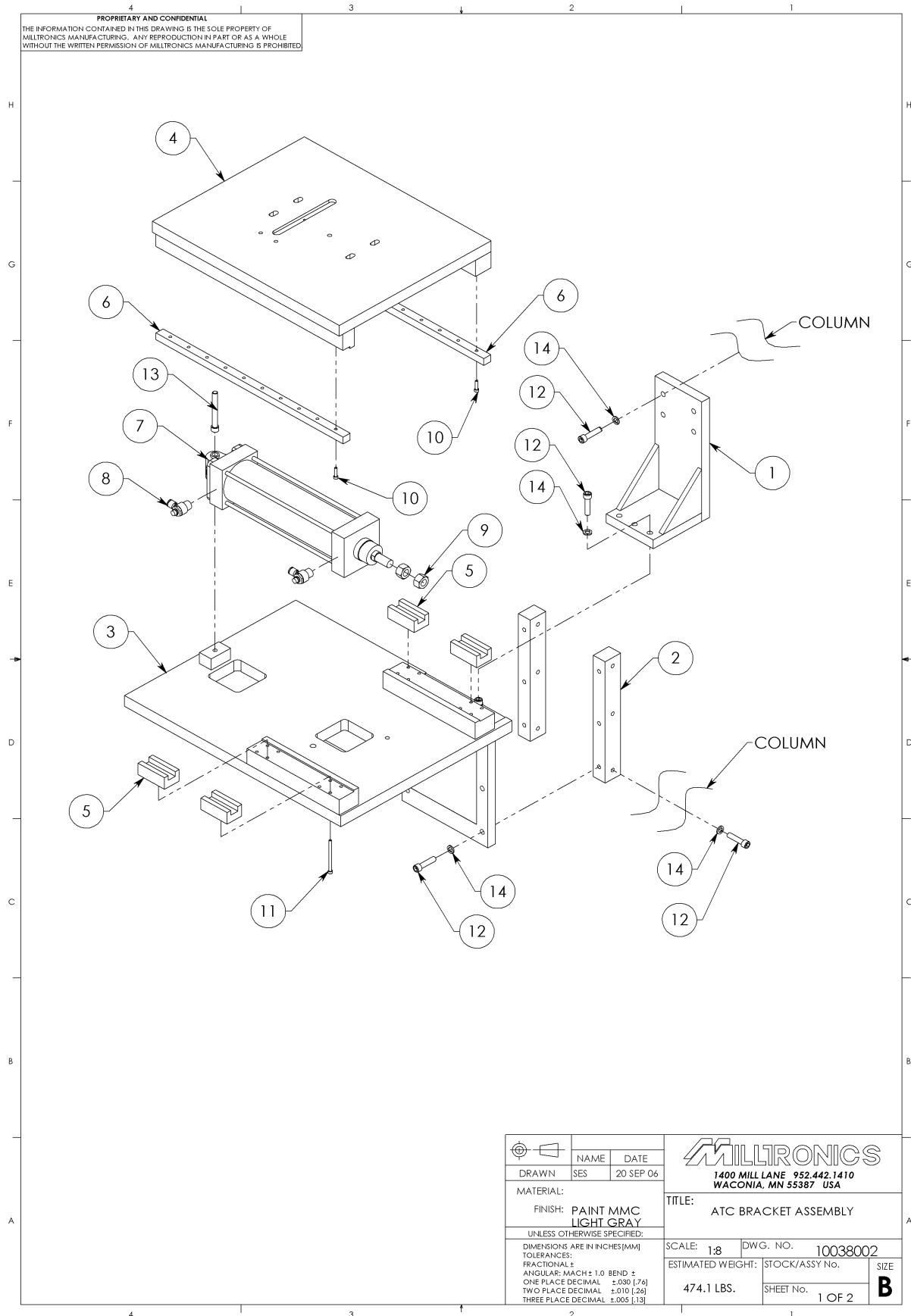
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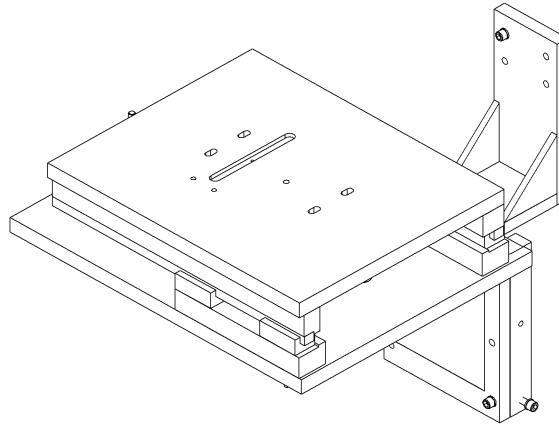
ITEM NO.	QTY	PART NO.	DESCRIPTION
1	1	NU00078	3/8 AIR LINE
2	1	NU00095	TUBE CONNECTOR - M/S 3/8 TUBE 1/4NPT
3	1	NU00408	AIR/OIL AMPLIFIER SYSTEM
4	1	NU00027	REDUCER - 3/8 x 1/4NPT
5	3	NU00375	MUFFLER
6	1	NU00293	SOLENOID VALVE
7	1	NU00292	MALE ELBOW - 3/8NPT
8	1	NU00412	SWIVEL ELBOW - M/S 10mm TUBE 3/8NPT
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:				
DIMENSIONS ARE IN INCHES (MM) TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± 1.0 BEND ± ONE PLACE DECIMAL ±.030 [.76] TWO PLACE DECIMAL ±.010 [.25] THREE PLACE DECIMAL ±.005 [.13]			SCALE: 1:3	DWG. NO. 10018108
			ESTIMATED WEIGHT: 8.4 LBS.	STOCK/ASSY No.
			SHEET No. 2 OF 2	SIZE B

Tool Changer Slide/Bracket Assembly



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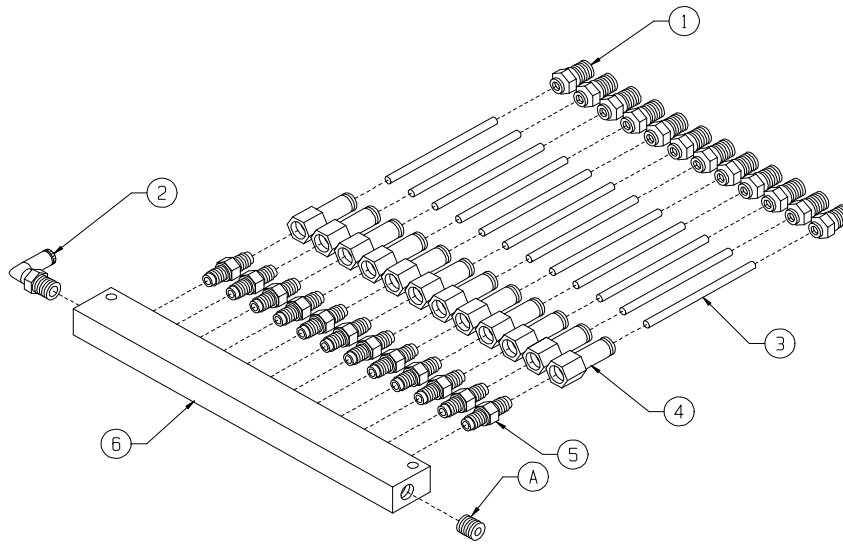


ITEM NO.	QTY	PART NO.	DESCRIPTION
1	1	MPH0020	ATC SUPPORT BRACKET
2	2	MPH0019	ATC AIR CYLINDER COLUMN BRACKET
3	1	MPH0021	ATC AIR CYLINDER BRACKET
4	1	MPH0023	ATC MOUNT BRACKET
5	4	MPH0028	ATC MOUNT RAIL BLOCK
6	2	MPH0027	ATC MOUNT RAIL
7	1	NU00422	CYLINDER ASSEMBLY
8	2	NU00423	FLOW CONTROL VALVE
9	2	HEX NUT M20-1.5	HEX NUT M20-1.5
10	20	SHCS M6-1.0 x 25	M6-1.0 X 25mm SHCS
11	16	SHCS M6-1.0 x 90	M6-1.0 x 90mm SHCS
12	19	SHCS M12-1.75 x 50	M12-1.75 x 50 SHCS
13	1	SHCS M12-1.75 X 100	M12-1.75 X 100mm SHCS
14	19	WASHER LOCK M12	M12 LOCK WASHER

Not shown, NU00382, 4-Way Air Valve

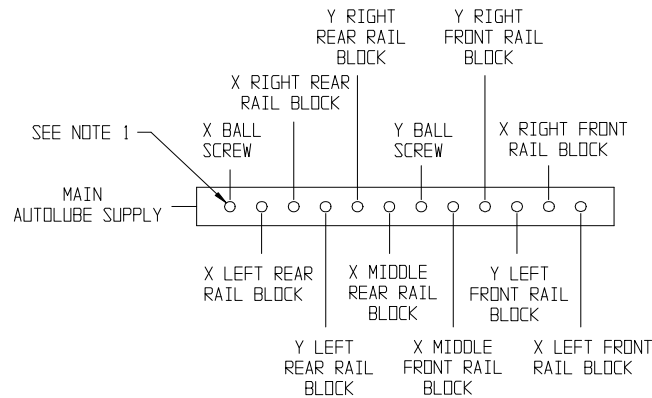
	NAME	DATE	
	DRAWN SES	20 SEP 06	
MATERIAL:			TITLE: ATC BRACKET ASSEMBLY
FINISH: PAINT MMC LIGHT GRAY			
UNLESS OTHERWISE SPECIFIED:			SCALE: 1:24 DWG. NO. 10038002
DIMENSIONS ARE IN INCHES [MM]			ESTIMATED WEIGHT: 474.1 LBS.
TOLERANCES:			STOCK/ASSY No.
FRACTIONAL ±			SHEET No. 2 OF 2
ANGULAR: MACH ± 1.0 BEND ±			SIZE B
ONE PLACE DECIMAL ±.030 [.76]			
TWO PLACE DECIMAL ±.010 [.26]			
THREE PLACE DECIMAL ±.005 [.13]			

X & Y Axis Autolube Manifold Assembly



NOTES:

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

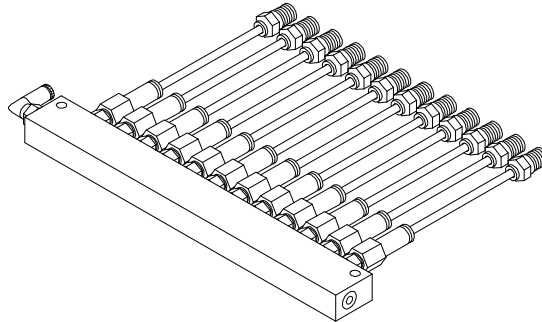


AUTOLUBE LINE DESTINATIONS

A	ADD FRAMES TO CHART	5996		08/05
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE X & Y AXIS AUTOLUBE MANIFOLD ASSEMBLY		
X .XXX ±		APPLICATION GENERAL PRODUCTS		
X .XX ±		SCALE 2:1 DWG No. 6-10-018-049 SIZE B		
X .X ±		DATE 25 JUL 97 DRAWN BY THOMPSON SHEET NO. 1 OF 2		
ANGLE ±				

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



PARTS LIST

No.	QUANTITY	STOCK No.	DESCRIPTION
1	12	NU-154	5/32 TUBE 1/8 NPT M/S
2	1	NU-161	1/8 NPT-.156 SWIVEL FITTING
3	SEE TABLE	NU-117	5/32 NYLON TUBING
4	12	NU-157	5/32 TUBE-1/8 NPT FEM.
5	-	SEE TABLE	OIL METER
6	1	MP-356	X & Y AIR/OIL LUBE MANIFOLD

NU-117 TUBING LENGTH

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

Oil Meter Part
 Numbers.

#2 = NU-155

#3 = NU-156

ALL MEASUREMENTS ARE IN INCHES

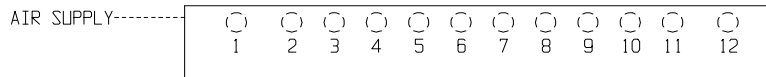
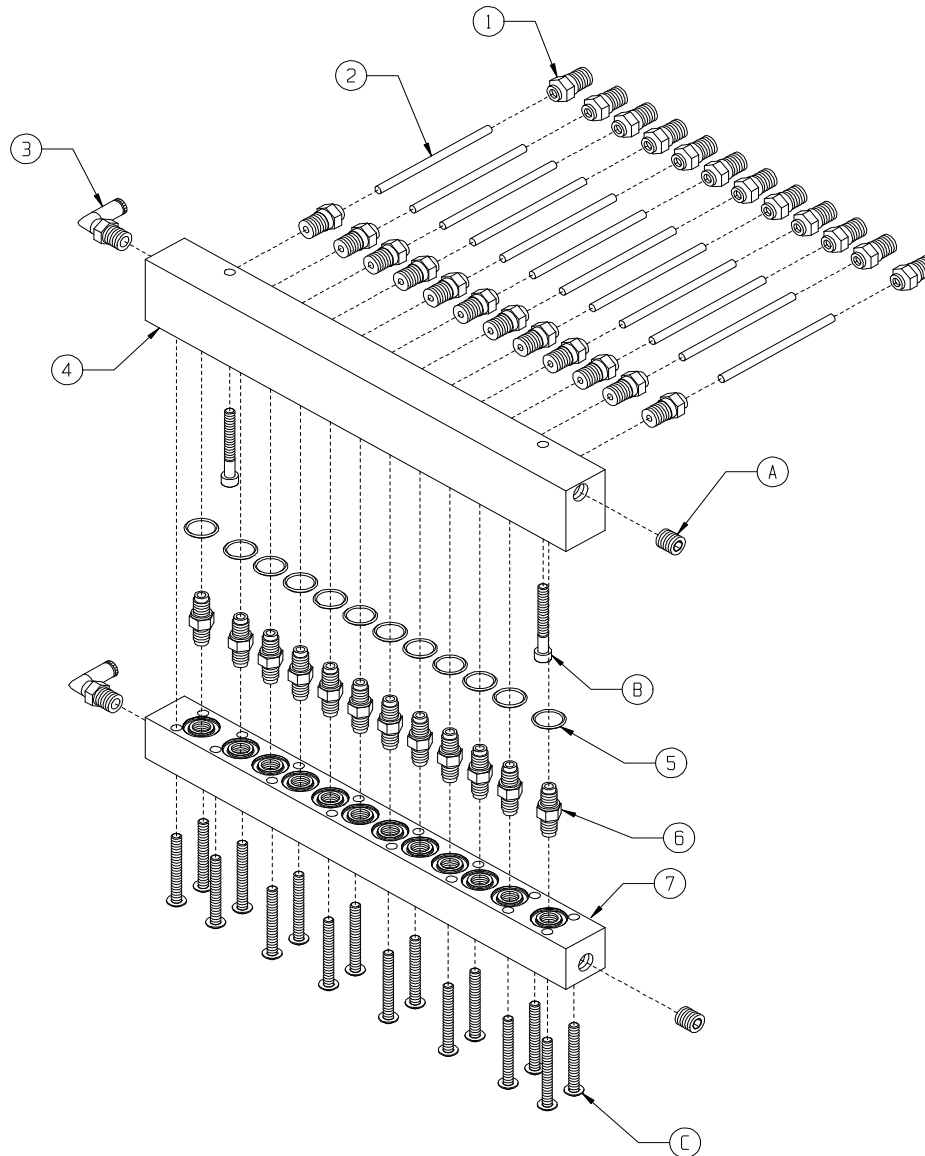
HARDWARE LIST

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

A	ADD FRAMES TO CHART	5996		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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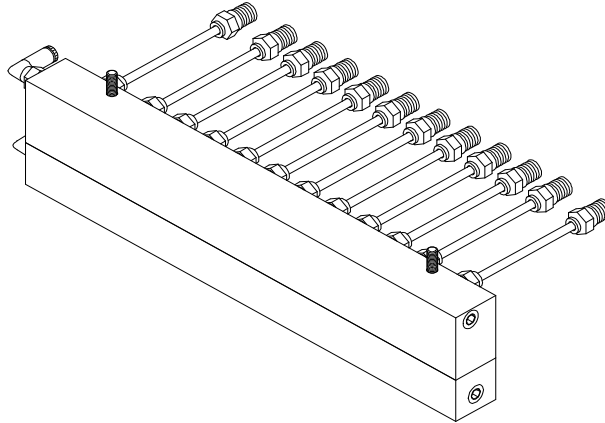
X & Y Axis Air/Oil Manifold Assembly



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

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

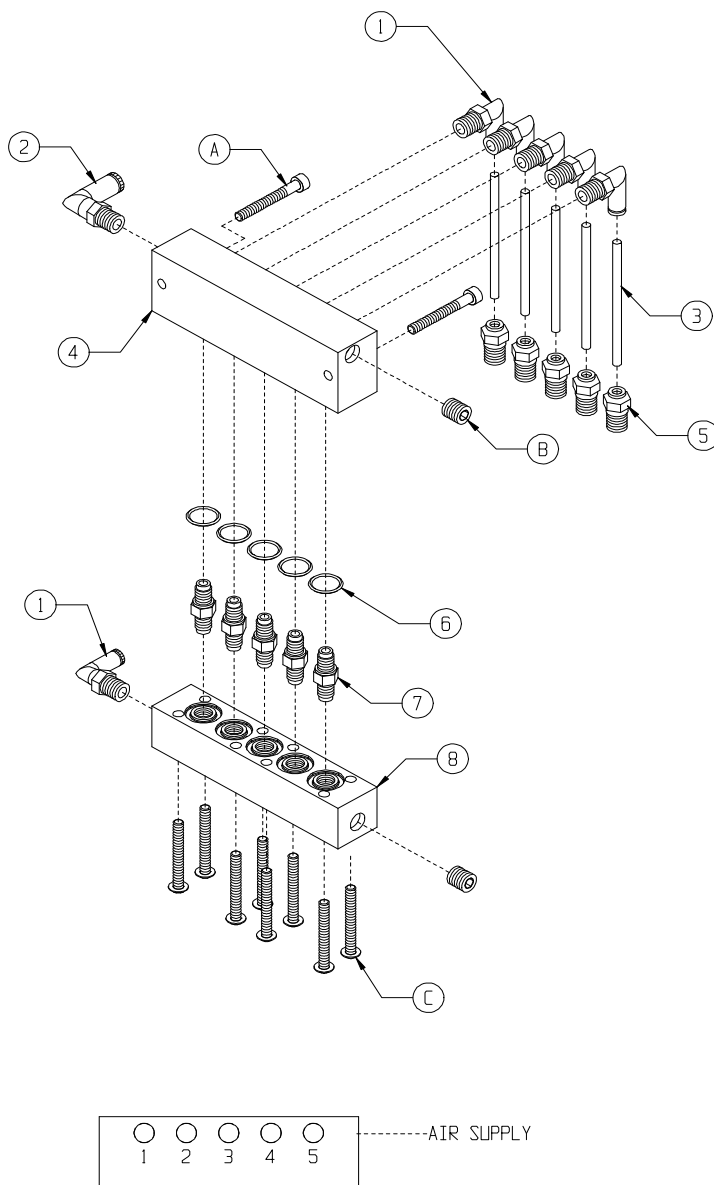
- IF REFERENCED WITH A (-) PLUG AIR/OIL LINE HOLE AND OIL METER HOLE IN MANIFOLD WITH 1/8 NPT PLUG.

HARDWARE LIST

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

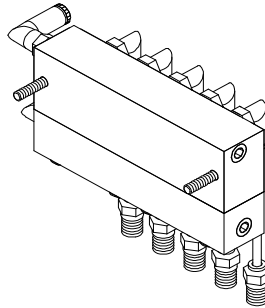
E	CHANGE TABLE	6060		01/06
D	ADD FRAMES	5995	N.M.	08/05
C	CHANGED METERS	4988	D.H.	02/01
B	ADD VMG17 TO NOTE	4729	N.M.	10/00
A	ADD VMG24 TO NOTE	4327	N.M.	12/99
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.			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

D	CHANGE TO ALL FRAMES	6002		11/05	
C	REMOVED VMG24	4987	N. M.	2/01	
B	ADD VMG24 NOTE	4338	N. M.	1/00	
A	UPDATED TUBE LENGTHS	4077	N. M.	7/99	
REV.	DESCRIPTION OF CHANGE	E.C.D. No.	APP'D BY	DATE	
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA			
STOCK/ASSY No.					
TOLERANCE UNLESS SPECIFIED		TITLE Z AXIS AIR/OIL MANIFOLD ASSEMBLY			
X.XXX +/- .005		APPLICATION PARTNER I			
X.XX +/- .010		SCALE 2:1		DWG No. 6-10-008-059	SIZE B
X.X +/- .030		DATE 11 JUN 99		DRAWN BY HERME	SHEET No. 1 OF 2
ANGLE +/- 1.0°					


PARTS LIST

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

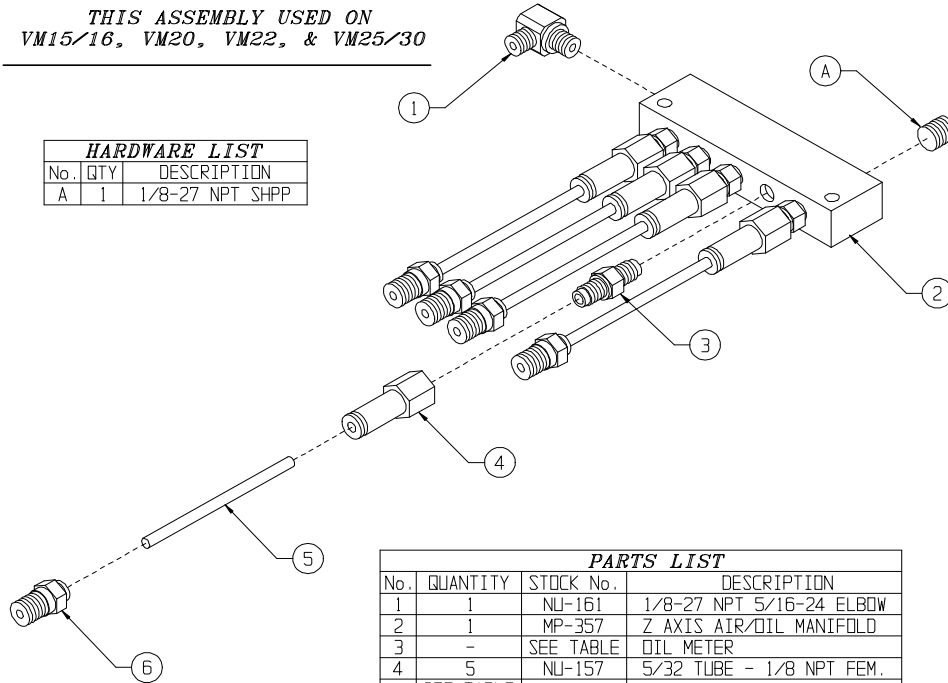
No.	QTY	DESCRIPTION
A	2	10-32 x 1 1/2 SHCS
B	2	1/8-27 NPT SHPP
C	8	10-32 x 1 1/2 BHCS

D	CHANGE TO ALL FRAMES	6002		11/05
C	REMOVED VMG24	4987	N.M.	2/01
B	ADD VMG24 NOTE	4338	N.M.	1/00
A	UPDATED TUBE LENGTHS	4077	N.M.	7/99
REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952-442-1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE Z AXIS AIR/OIL MANIFOLD ASSEMBLY		
X. XXX +/- .005		APPLICATION PARTNER I		
X. XX +/- .010		SCALE 2:1	DWG No 6-10-008-059	SIZE B
X. X +/- .030		DATE 11 JUN 99	DRAWN BY HERME	SHEET No. 2 OF 2
ANGLE +/- 1.0°				

Z-Axis Autolube Manifold Assembly

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

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



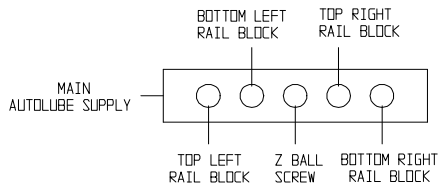
PARTS LIST				
No.	QUANTITY	STOCK No.	DESCRIPTION	
1	1	NU-161	1/8-27 NPT 5/16-24 ELBOW	
2	1	MP-357	Z AXIS AIR/OIL MANIFOLD	
3	-	SEE TABLE	OIL METER	
4	5	NU-157	5/32 TUBE - 1/8 NPT FEM.	
5	SEE TABLE	NU-117	5/32 NYLON TUBING	
6	5	NU-154	5/32 TUBE-1/8 NPT M/S	

NU-117 TUBING LENGTH					OIL METER	
CONNECTION	VM15/16	VM20	VM22	VM25/30	No.	
TOP LEFT RAIL BLOCK	18	20	30	30	No. 3	Oil Meter Part Numbers. #2 = NU-155 #3 = NU-156
BOTTOM LEFT RAIL BLOCK	35	14	42	42	No. 3	
Z BALL SCREW	24	15	30	30	No. 2	
BOTTOM RIGHT RAIL BLOCK	35	8	42	42	No. 3	
TOP RIGHT RAIL BLOCK	18	11	30	30	No. 3	

ALL MEASUREMENTS ARE IN INCHES

NOTES:-

1. USED ON ASSEMBLY No.



AUTOLUBE LINE DESTINATIONS

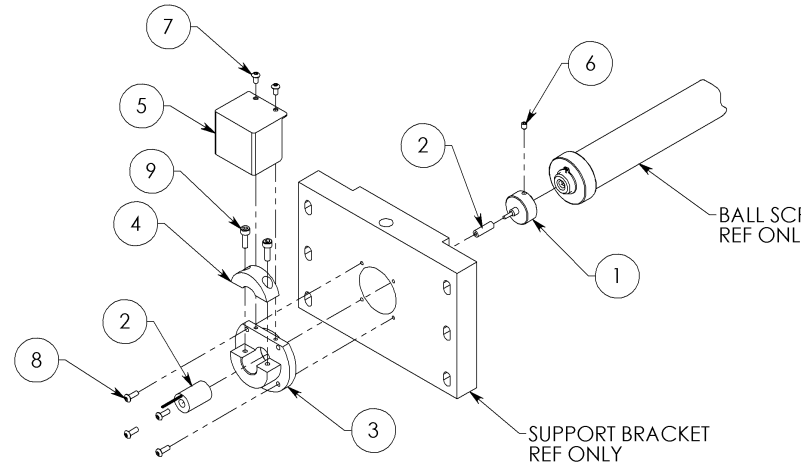
A	ADD FRAMES TO CHART	6001		08/05
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE Z AXIS AUTOLUBE MANIFOLD ASSEMBLY		
X.XXX ±		APPLICATION GENERAL PRODUCTS		
X.XX ±		SCALE 1.5:1 DWG No 6-10-018-050 SIZE B		
X.X ±		DATE 20 AUG 97		
ANGLE ±		DRAWN BY THOMPSON SHEET NO. 1 OF 1		

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Thermal Compensation Assembly

4 3 2 1

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BALL SCREW
REF ONLY

SUPPORT BRACKET
REF ONLY

ITEM NO.	EXPLODE/QTY.	PART NO.	DESCRIPTION
1	1	MP00858	THERMAL BALL SCREW CAP
2	1	PR00043	THERMO 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 8 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

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: THERMAL COMP ASSEMBLY

SCALE: 1:4 DWG. NO. 10018111

ESTIMATED WBGHT: 16.9 LBS.

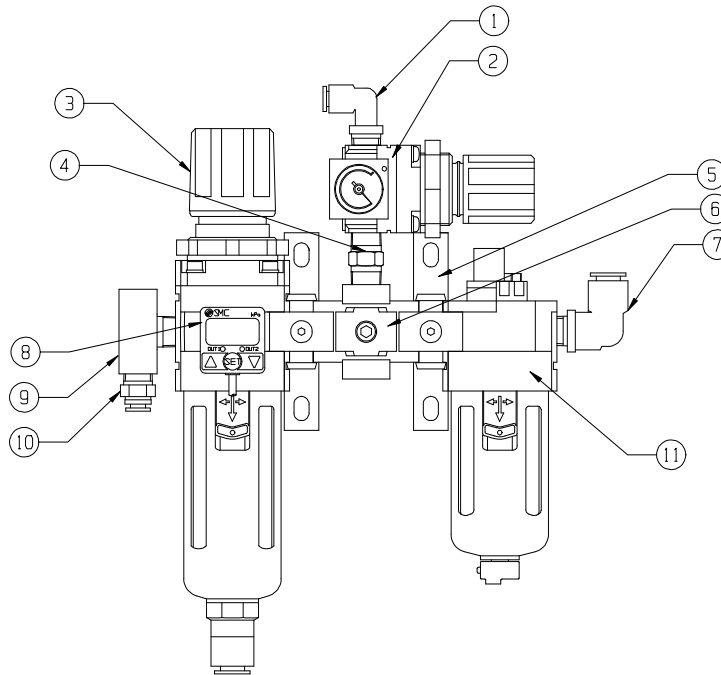
STOCK/ASSY NO. XXX-XXX

SHEET NO. 1 OF 1

SIZE **B**

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



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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		
X +/-		DRAWN BY DAHL KE		
ANGLE +/-		SHEET NO. 1:1		

Machine Lubrication Instructions

THIS ASSEMBLY USED ON VM16, VM17

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

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

MOBIL VACTRA OIL No. 2	
PRODUCT NUMBER	60049-4
SPECIFIC GRAVITY, 60/60F	0.88
POUR POINT, °C (°F), max.	-9 (16)
FLASH POINT, °C (°F), min.	244 (472)
VISCOSITY	
cST AT 40°C	68
cST AT 100°C	8.6
SUS AT 100°F	356
SUS AT 210°F	55
VISCOSITY INDEX	97
ISO VG	68
COLOR, ASTM D 1500	4
FZG, PASS STAGES	11
4 BALL WELD, kg, ASTM D 2783	160
4 BALL WEAR, mm, ASTM D 4172	0.22
COPPER CORROSION, ASTM D 130	1B
RUST, D665A	PASS
VICKERS V-104C, 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
9B 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.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 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		
ANGLE	±	DRAWN BY THOMPSON SHEET NO. 2 OF 2		

Retention Knob Chart

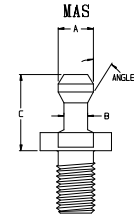
NOTE: STANDARD RETENTION KNOBS FOR 40 TAPER SPINDLES WITHOUT CTS

MAS RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

ASSEMBLY SELECTION	DIMENSIONS			ANGLE	MILLTRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C		60mm SPINDLE	70mm SPINDLE				
4833	.59	.39	1.27	60°	RH19, RH20, RH30, RH33, RH35, RH15, RH20E, BR50, BR50, BR80 VM15, VM16, VM20, VM22, VM25, VM30, VM35, VM16, VM20, VM25, VM30, VM18	RH20, RH30, RH33, RH35, BR50, BR80, VM16, VM20, VM22, VM25, VM30, VM16, VM20, VM25, VM30, TT24, TT40, HMC20, HMC35	RB4E-0002	RK31114A	PT-532-60	C40-6000

MAS RETENTION KNOBS STYLE BT-FLANGE 40 TAPER

ASSEMBLY SELECTION	DIMENSIONS			ANGLE	MILLTRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C		60mm SPINDLE	70mm SPINDLE				
4834	.59	.39	1.38	60°	RH19, RH20, RH30, RH33, RH35, RH15, RH20E, BR50, BR80, VM15, VM16, VM20, VM22, VM25, VM30, VM16, VM20, VM25, VM30, VM18	RH20, RH30, RH33, RH35, BR50, BR80, VM16, VM20, VM22, VM25, VM30, VM16, VM20, VM25, VM30, TT24, TT40, HMC20, HMC35	RB4M-0002	RK31113A	PT-444-60	B40-6000



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

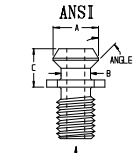
NOTE: STANDARD RETENTION KNOBS FOR 40 TAPER SPINDLES WITH CTS

ANSI RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

ASSEMBLY SELECTION	DIMENSIONS			ANGLE	MILLTRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C		60mm SPINDLE	70mm SPINDLE				
4836	.74	.49	.64	45°	SELECTION NOT AVAILABLE		RC4E-0001	RK11122	PT-475C	C40-STD

ANSI RETENTION KNOBS STYLE BT-FLANGE 40 TAPER

ASSEMBLY SELECTION	DIMENSIONS			ANGLE	MILLTRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C		60mm SPINDLE	70mm SPINDLE				
4837	.74	.49	.75	45°	SELECTION NOT AVAILABLE		RS4M-0115	RK11126A	N/A	B40-FADAL



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

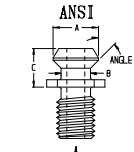
NOTE: STANDARD RETENTION KNOBS FOR 50 TAPER SPINDLES WITH OR WITHOUT CTS

ANSI RETENTION KNOBS STYLE CT-FLANGE 50 TAPER

ASSEMBLY SELECTION	DIMENSIONS			ANGLE	MILLTRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C		60mm SPINDLE	70mm SPINDLE				
N/A	1.14	.83	1.00	45°	VM25XP, VM30XP, RH35XP, HMC70		RC6E-0001	DWG RK11144	N/A	C50-STD

ANSI RETENTION KNOBS STYLE BT-FLANGE 50 TAPER

ASSEMBLY SELECTION	DIMENSIONS			ANGLE	MILLTRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C		60mm SPINDLE	70mm SPINDLE				
N/A	1.14	.83	1.00	45°	VM25XP, VM30XP, RH35XP, HMC70		RS6M-0105	DWG RK11144A	N/A	N/A



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

NOTE: OPTIONAL RETENTION KNOBS FOR 40 TAPER SPINDLES

MAS RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

ASSEMBLY SELECTION	DIMENSIONS			ANGLE	MILLTRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C		60mm SPINDLE	70mm SPINDLE				
4831	.59	.39	1.27	45°	SELECTION NOT AVAILABLE		RB4E-0001	RK31114	PT-532-45	C40-4500

MAS RETENTION KNOBS STYLE BT-FLANGE 40 TAPER

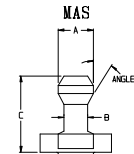
ASSEMBLY SELECTION	DIMENSIONS			ANGLE	MILLTRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C		60mm SPINDLE	70mm SPINDLE				
4832	.59	.39	1.38	45°	SELECTION NOT AVAILABLE		RB4M-0001	RK31113	PT-444-45	B40-4500

DIN 69872 RETENTION KNOBS STYLE CT-FLANGE 40 TAPER

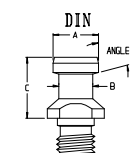
ASSEMBLY SELECTION	DIMENSIONS			ANGLE	MILLTRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C		60mm SPINDLE	70mm SPINDLE				
4838	.75	.55	1.02	75°	SELECTION NOT AVAILABLE		RS4E-0114-C	DWG RK71125	N/A	C40-1500

DIN 69872 RETENTION KNOBS STYLE DIN-FLANGE 40 TAPER

ASSEMBLY SELECTION	DIMENSIONS			ANGLE	MILLTRONICS MACHINE		COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.	LYNDEX PART No.
	A	B	C		60mm SPINDLE	70mm SPINDLE				
4839	.75	.55	1.02	75°	SELECTION NOT AVAILABLE		RS4M-0114-C	DWG RK71124	N/A	B40-1500



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



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

- FOR SPINDLES OF 6000 RPM AND GREATER YOU MUST USE BALANCED TOOLING TO A G2.5 SPEC. OR IT WILL VOID THE SPINDLE WARRANTY.
- CHART IS GOOD FOR ALL MACHINE VERSIONS LISTED FROM E.C.D. DATE REV. G ON THIS DRAWING

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	M.N.	08/05
D	ADD RH/RW12 & RH19				5146	N.M.	09/01
C	ADD RETENTION KNOBS TO CHART				4859	N.M.	12/00
B	CHANGE 70mm BT-FLANGE CHART				4730	N.M.	10/00
A	ADD LYNDEX CORP. IN CHART				4351	N.M.	1/00
REV.	DESCRIPTION				E.C.D. NO.	APP'D BY	DATE
 1400 MILL LANE VACAVILLE, CA 92687-1410					RETENTION KNOB CHART		
					SCALE 1.75:1		
					DWG No. 6-11-018-054		
APPLICATION GENERAL PRODUCTS					DATE 30 APR 99	DRAWN BY DAHLKE	SHEET NO. 1 OF 1

