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Manual 99906392

TireHandler™ Radio Toggle Control Remote System

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Section - 1

Introduction

IMT Safety Precautions

- Read and follow all instructions
- Failure to abide by Safety Precautions may result in equipment failure, loss of authority to operate the equipment, and personal injury.
- Use and maintain proper wiring. Follow equipment manufacturer instructions. Improper, loose, and frayed wiring can cause system failure, equipment damage, and intermittent operation.
- Changes or modifications made to equipment not expressly approved by the manufacturer will void the warranty.
- Owner/operators of the equipment must abide by all applicable Federal, State, and Local laws concerning installation and operation of the equipment. Failure to comply could result in penalties and could void user authority to operate the equipment.
- Make sure that the machinery and surrounding area is clear before operating. Do not activate the remote control system until certain that it is safe to do so.
- Turn off the handheld remote and remove power from the base unit before attempting any maintenance. This will prevent accidental operation of the controlled machinery.
- Power can be removed from the Base Unit by detaching the 12-pin cables from the base unit connectors P1 and P2, or by removing the source power from the circuit.
- Use a damp cloth to keep units clean. Remove mud, concrete, dirt, etc. after use to prevent obstructing or clogging the buttons, levers, wiring, and switches.
- Do not allow liquid to enter the handheld or base unit enclosures. Do not use high pressure equipment to clean the handheld remote or base unit.
- Disconnect the radio base unit before welding on the machine. Failure to disconnect the base unit may result in destruction of or damage to the base unit.
- Operate and store units only within the specified operation and storage temperatures defined in the specifications of this document.
- Keep high-energy RF devices away from handheld remotes. Activation of high-power communication radios, for instance, in close proximity to handheld remotes can result in interference and “false” circuit activation.
- Do not key 2-way radios while using the handheld remote.


Section - 2

Equipment

Radio Remote System List of Equipment

QTY	MODEL	PART NUMBER	DESCRIPTION
1	MCB-2H02JS-10054	70735133	TRANSM-RAD REM TOGGLE TH 5K-36K
1	BU-2H18XF-10054	70735134	RECEIVER-RAD BASE TOGGLE TH 5K-36K



 **Note:** It is possible to order the system with one part number. Specify **WSMB-10054** in the purchase order to receive the parts listed in the table above. If an individual part needs to be ordered, use the part number listed in the table above.

Handheld Remote Layout and Labels



SWITCH / LED	FUNCTION	SWITCH TYPE / DESCRIPTION
S1+	Fallback Arm Forward	3 Position Momentary Toggle
S1	Fallback Arm Reverse	
S3+	Pad Rotate CW	3 Position Momentary Toggle – Proportional (Pulse Width Modulated)
S3	Pad Rotate CCW	
S4+	Side Shift Left	3 Position Momentary Toggle – Proportional (Pulse Width Modulated)
S4	Side Shift Right	
S5+	Body Rotate CW	3 Position Momentary Toggle – Proportional (Pulse Width Modulated)
S5	Body Rotate CCW	
S7+	Clamp	3 Position Momentary Toggle – Proportional (Pulse Width Modulated)
S7	Release Clamp	
S8+ (PRESSED)	Clamp Release Enable	Green Pushbutton
S9	Power/Associate Switch	Green Pushbutton
STOP	Stop	Red Button – Pull Up to Enable Start Push Down to Stop
LED1	Tx (Green)	Transmit
LED2	Rx (Amber)	Receive
LED3	Error (Red)	Error Indication
LED4	Battery (Amber)	Battery Indication

LED Diagnostic Information

LED INFORMATION	CONDITION	COLOR
TX Short Blinking	Handheld is transmitting	Green
TX Long Blinking	Switch active on handheld	
RX Blinking (indication of RF signal integrity)	Base unit messages received	Amber
ERR*	Switch fault at power-up	Red
ERR**	Machine Stop depressed at power-up	
BATT Slow Blinking***	Low battery Indication	Amber



****LED's 1 and 3 will blink alternately with 2 and 4.***

*****LED's 1 and 2 will blink alternately with 3 and 4***

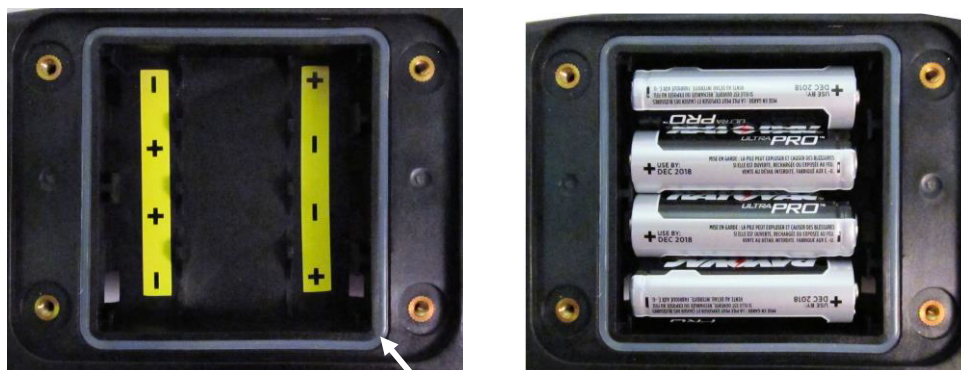
****** Replace batteries with four fresh batteries ASAP.***

Battery Installation

This SmaRT handheld unit is powered by four size AA batteries. When installing batteries, be sure to observe proper polarity as marked on the inside of the compartment to avoid damaging the unit.

To replace or install batteries in the handheld:

1. Loosen the four captive battery compartment cover screws on the rear of the remote and lift the cover from the handheld.
2. Install (or replace with) four (4) fresh size AA batteries. Observe the proper polarity by positioning the batteries as shown in Figure 3.
3. Replace the compartment cover and tighten the four screws. These screws should not be over-tightened, but they must be tight enough to assure the gasket provides a proper environmental seal.



Sealing Gasket



CAUTION

Be sure to observe proper polarity when placing batteries in the handheld battery compartment.



Note: Cover screws must be tightened enough to assure the sealing gasket is compressed. Do not over-tighten the screws.

Handheld Radio Operation

Turn ON the Unit

This remote is powered ON by pulling the large red STOP button UP and then pushing the green ON switch (S9).

Turn OFF the Unit

The remote is turned OFF by pushing the large red STOP button down.

MCB-2H02JS-10054 is programmed to power down after FOUR minutes of inactivity. If the unit powers down due to inactivity, the ON switch (Green S9) can be used to re-activate the unit.

Proportional Control

See Chapter 3

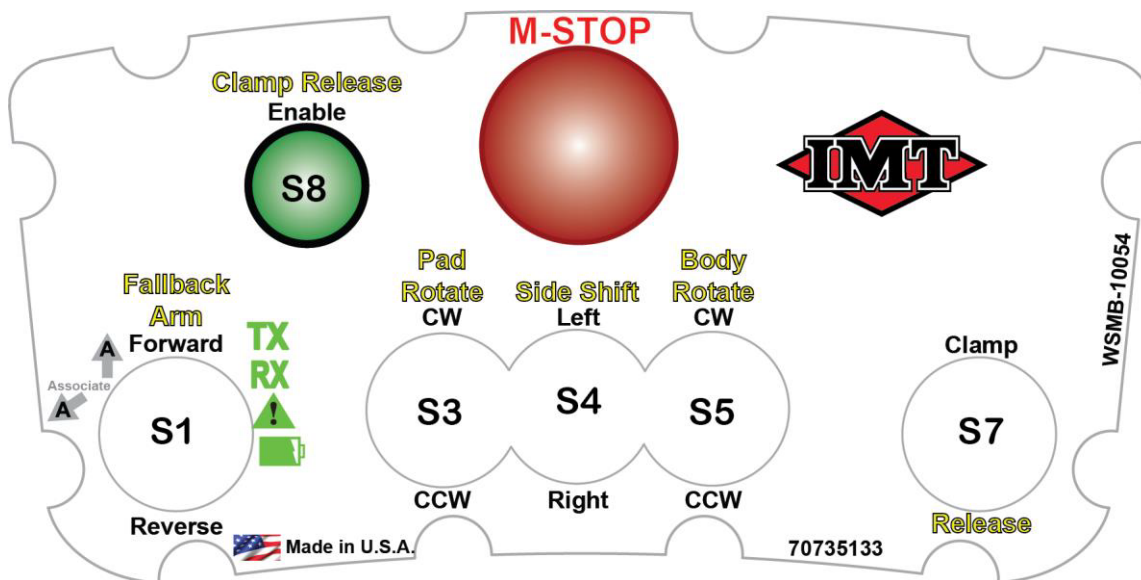
Toggle Switches

Toggle switches S1, S3, S4, S5, and S7 are three position momentary toggle switches.

Button Switches

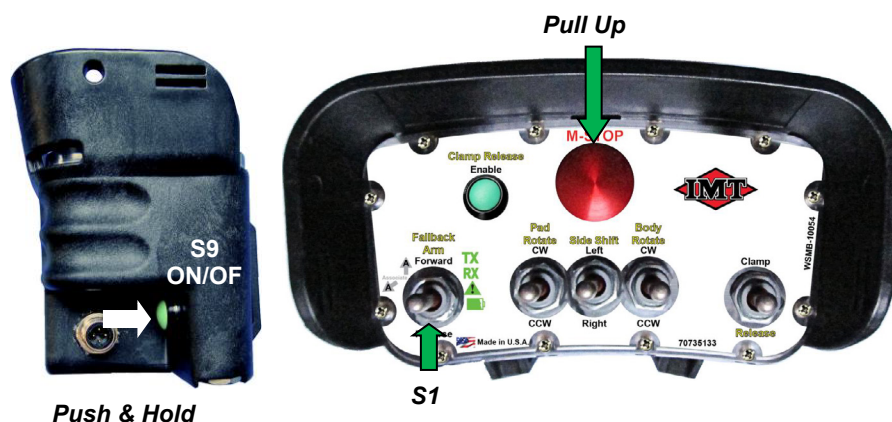
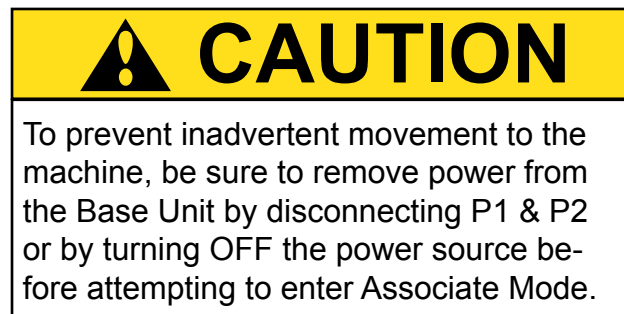
S8 pressed enables the Clamp Release function for S7– (down).

M-Stop must be in the up position to allow Start (S9). Pushed down shuts down the MCB thus stopping any controlled functions.



ASSOCIATE MODE:

Associate Mode is used to establish the communications link between a remote and base unit on a 1-to-1 association basis. To associate there must be a clear line of sight between the handheld and the base, and both units must be OFF (powered down). Note: The remote is turned off by pushing the oversized mushroom STOP button. The SmaRT base unit is safely powered down by disconnecting P1 and P2 or by removing/turning-OFF the power source from the unit.



TO ASSOCIATE:

1. Stand near to the base unit with the remote OFF and power removed from the base unit (disconnect P1 and P2 or turn the source power OFF).
2. Release the STOP button on the handheld by pulling up.
3. Push and hold the Green Start button S9 and then immediately push and hold S1 UP (Forward). All four LEDs light solid.
4. Observe the LEDs. When RX goes OFF, power up the base unit. When the RX LED blinks, release S9 and S1.

A successful Association is indicated when LEDs TX and RX are rapidly blinking while the Battery and Warning LEDs are unlit.

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Section - 3

Proportional Output

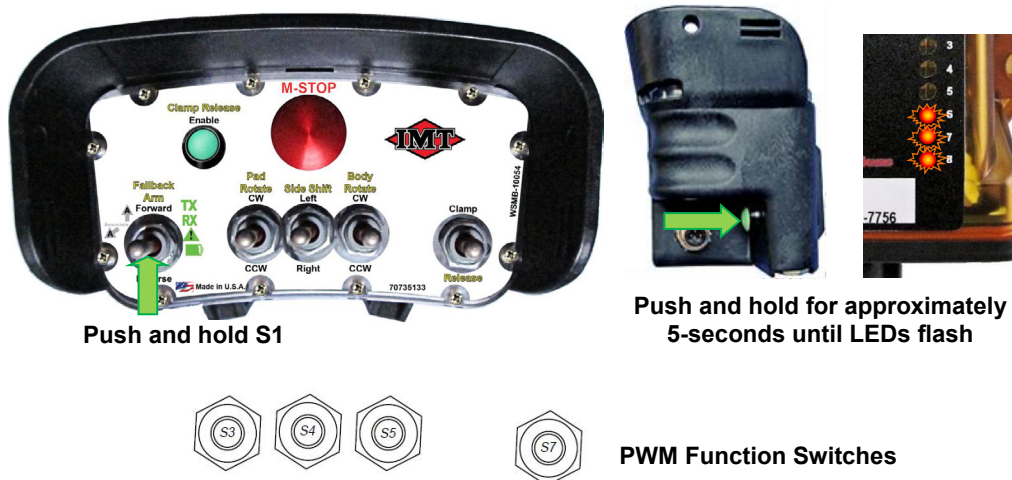
Proportional Output MIN (Low End) & MAX (High End) Adjustments

What You Need to Know Before You Adjust the Output Min and Max

- The operator must make sure the area around the controlled machine is safe to operate before performing dynamic MIN and MAX adjustments.
- The base unit must be powered for dynamic adjustment.
- The base unit LEDs and display should be close enough to be easily read.
- Adjust Mode timeout defaults to a ten (10) second window of opportunity, where the unit returns to normal operating mode if none of the switches are operated within the 10 second window. The timer resets to 10 seconds each time a toggle switch is operated while in Adjust Mode.
- Each toggle switch is adjusted using the following steps.

Enter Adjust Mode

- Both the handheld, MCB-2H02JS, and base unit, BU-2H18XF, must be powered up and communicating with each other.
- To enter Adjust Mode, push and hold switch S1UP and then press the green push button for approximately 4 to 5 seconds until the bottom three base unit LEDs begin to flash (Figure 6) and CAL will show in the base unit display.
- Release switch S1 and green push button.

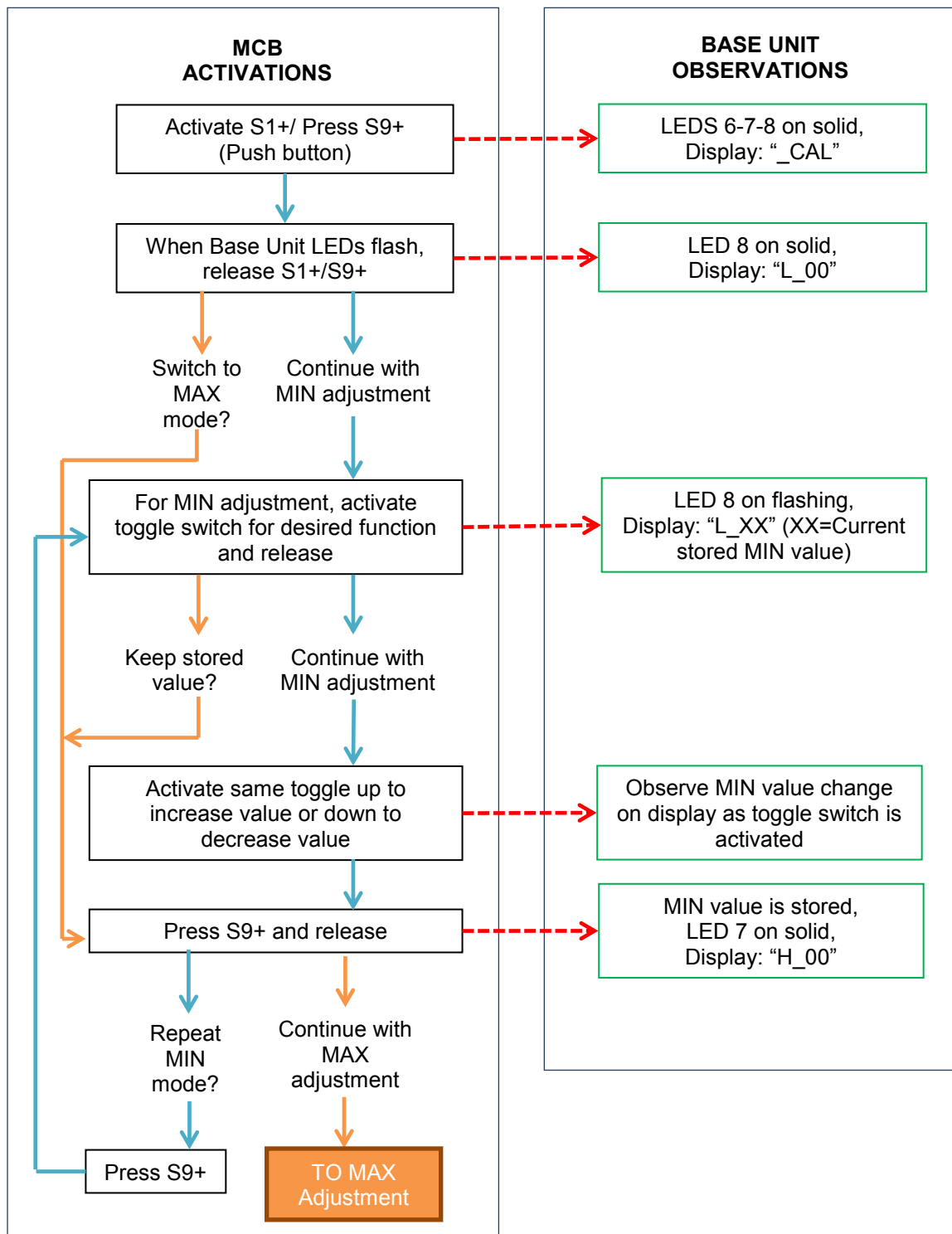


CAUTION

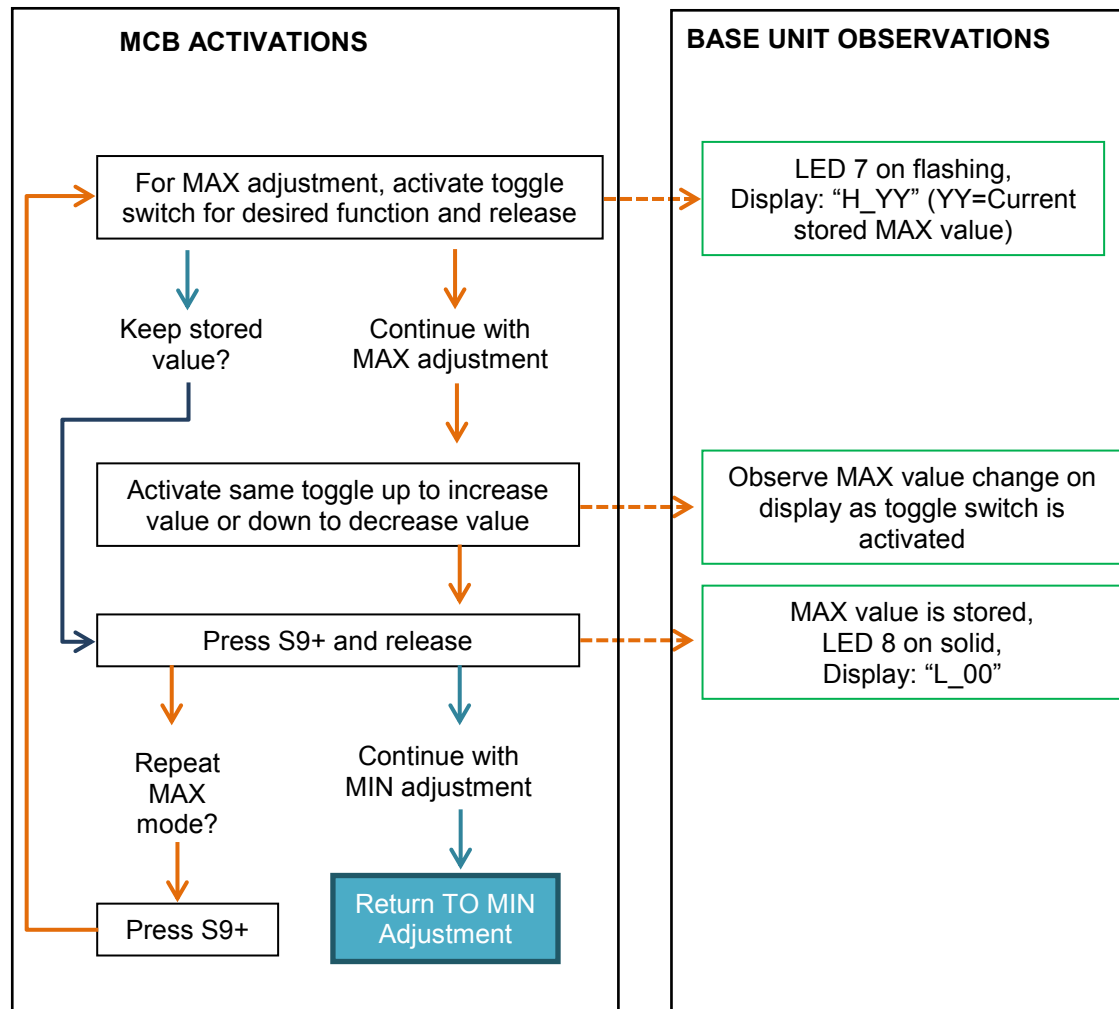
Be aware of toggle switches activation during this process. Base Unit outputs may be active during the toggle switch adjustment process.

Minimum Adjustment Procedure

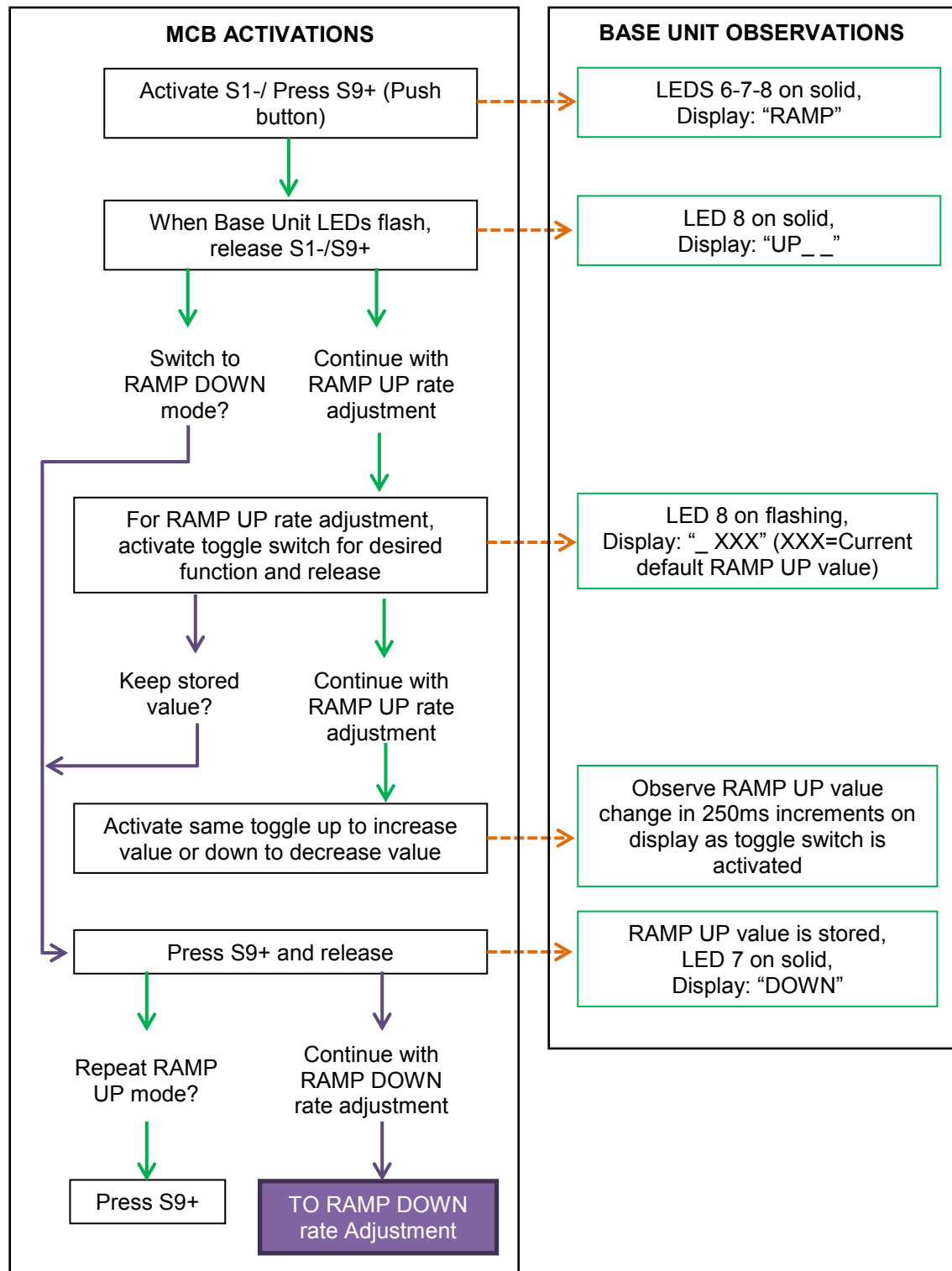
The following charts—Figure 7 through Figure 10—can be used to adjust the minimum, maximum, ramp-up rate, and ramp-down rate of Pad Rotate (S3), Side Shift (S4), Body Rotate (S5), and Clamp-functions (S7).



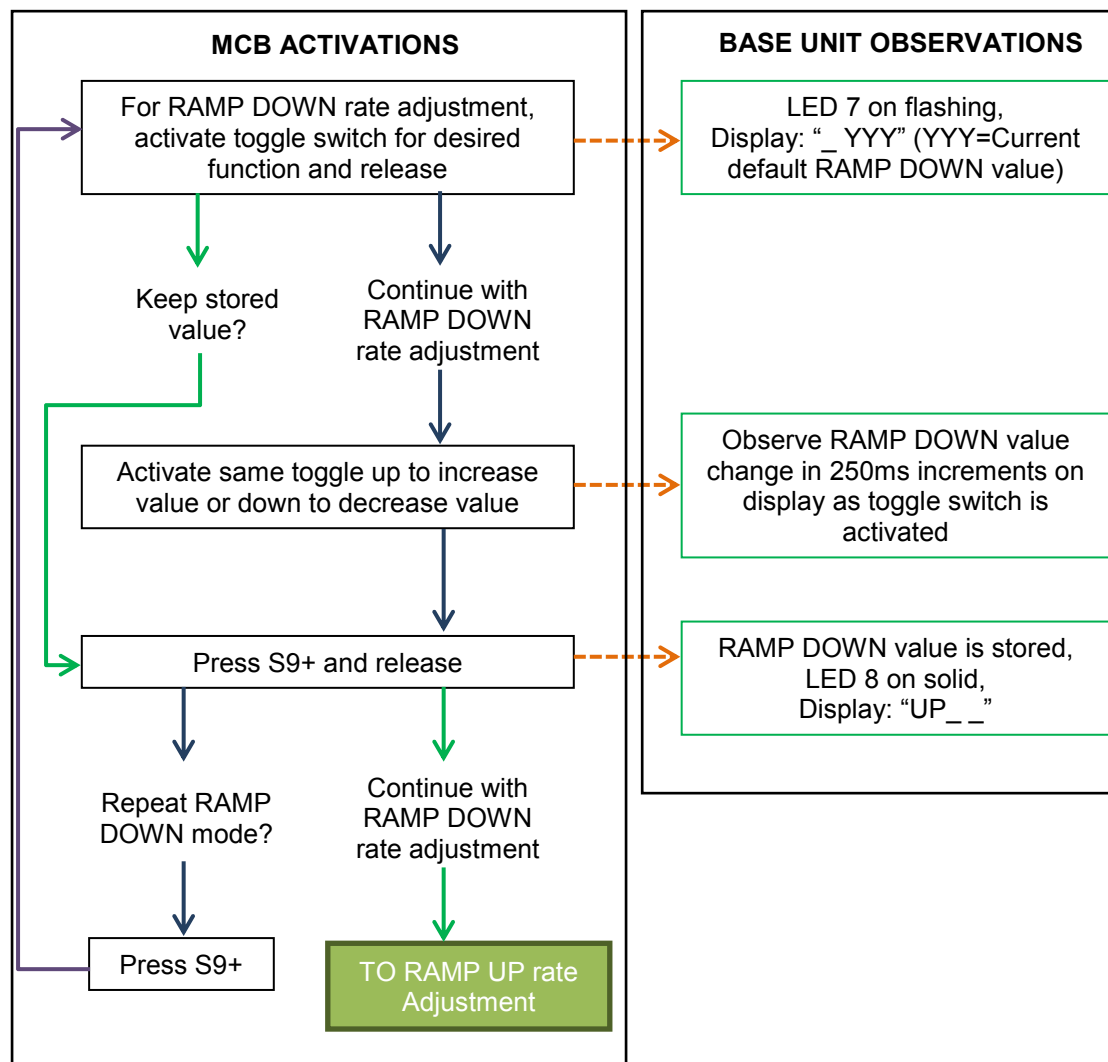
Maximum Adjustment Procedure



Ramp-Up Rate Adjustment Procedure



Ramp-Down Rate Adjustment



To Abandon Adjust Mode:

- At any point during adjustment, you can abandon Adjust Mode by pressing the M-Stop button.

Exit Adjust Mode:

- Waiting approximately ten seconds for the adjustment procedure to timeout (LED 7 or LED 8 must be on solid only)
- By pressing the MCB STOP button.

Function Default Settings:

- The values expressed in Table 4 are typical and may be adjusted depending on specific circumstances.

	PROPORTIONAL SETTINGS				RAMP SETTINGS			
	FACTORY DEFAULT		OPERATIONAL RANGE*		FACTORY DEFAULT		OPERATIONAL RANGE**	
	MIN (%)	MAX (%)	MIN (%)	MAX (%)	UP (ms)	DN (ms)	UP (ms)	DN (ms)
CLAMP RELEASE	28	53	20	80	250	250	0-3000	0-3000
CLAMP	28	50	20	80	250	250	0-3000	0-3000
BODY ROTATE CCW	28	57	20	80	250	250	0-3000	0-3000
BODY ROTATE CW	25	51	20	80	250	250	0-3000	0-3000
PAD ROTATE CW	26	53	20	80	250	250	0-3000	0-3000
PAD ROTATE CCW	27	53	20	80	250	250	0-3000	0-3000
SIDE SHIFT RIGHT	27	55	20	80	250	250	0-3000	0-3000
SIDE SHIFT LEFT	25	53	20	80	250	250	0-3000	0-3000

*1% increments

**250ms increments

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Section - 4

Base Unit

Hardware Configuration

REQUIRED FIELDS	DESCRIPTION	DETAILS / NOTES
Control Power	7-32VDC	Must be able to operate @ 32VDC
Radio Frequency (RF)	2400MHz @ 100mW	Frequency Channel Hopping DSSS
Antenna Option	Internal	
Discrete Channels	18 Available	FET, High-Side outputs
Digital Output Channels	13	8 PWM; 5 On/Off
Link Loss Criteria	0.5s	Five consecutively missed messages
Message Periodicity	10x/s	One message every 10ms
CAN Information	J1939	Refer to J1939 Standard
Internal CAN Termination	1.0k Ω (default)	
Proportional Channel Info	PWM Frequency: 250Hz Voltage: 24VDC Load Resistance: 4.7 Ω	

Safety Link

BASE UNIT SAFETY LINK	
X	
<p>ENABLED</p> <p>When any of the following occurs:</p> <ul style="list-style-type: none"> Machine Stop is pressed HH unit goes out of range HH unit deactivates due to loss of power, Inactivity timeout, or deliberate deactivation (off switch) <p>All latched outputs unlatch and all momentary outputs that are active deactivate. Upon activation of the HH, no outputs are allowed to be activated until all switches (unless masked) are first centered or returned to their neutral state.</p>	<p>DISABLED</p> <p>When any of the following occurs:</p> <ul style="list-style-type: none"> Machine Stop is pressed HH unit goes out of range HH unit deactivates due to loss of power, Inactivity timeout, or deliberate deactivation (off switch) <p>Then all latched outputs remain latched but all momentary commands that are active deactivate.</p> <p>NOTE: If HH unit is powered on and a momentary command that was deactivated due to range is still active when the HH returns in range, the output will immediately be active again</p>

Base Unit Channel Configuration

BASE UNIT CONFIGURATION						
CHANNEL	TYPE*	FUNCTION	ACTIVATED BY:	SETTINGS / COMMENTS		PIN
+VDC	+VDC IN	+VDC IN				1
M17	UNUSED					2
M9	LO-HS-M	Fallback Arms Rev	S1-			3
M10	LO-HS-M	Fallback Arms Fwd	S1+			4
M11	UNUSED					5
M12	LO-HS-M	Clamp Release Enable	S8(+)			6
M13	LO-HS-M	Crane Hourmeter	M1 OR M2 OR M3 OR M4 OR M5 OR M6 OR M7 OR M8			7
M14	UNUSED					8
M15	UNUSED					9
M16	LO-HS-M	LINK/STOP	RF LINK Loss of Link OR Stop			10
M18	UNUSED					11
-VDC	-VDC IN					12
M5	PWM	Clamp Release	S7- AND S8(+)	MIN: 20%	MAX: 80% See Note 1	1
M6	PWM	Clamp	S7+	MIN: 20%	MAX: 80%	2
M7	PWM	Body Rotate CCW	S5-	MIN: 20%	MAX: 80%	3
M8	PWM	Body Rotate CW	S5+	MIN: 20%	MAX: 80%	4
CAN H		(Optional To Mcb)	Operational	Connect to MCB umbilical connector pin 2		5
UMB PWR		(Optional To Mcb)	Operational	Connect to MCB umbilical connector pin 1		6
+VDC		+VDC IN				7
CAN L		(Optional To Mcb)	Operational	Connect to MCB umbilical connector pin 3		8
M1	PWM	Pad Rotate CW	S3+	MIN: 20%	MAX: 80%	9
M2	PWM	Pad Rotate CCW	S3-	MIN: 20%	MAX: 80%	10
M3	PWM	Side Shift Right	S4-	MIN: 20%	MAX: 80%	11
M4	PWM	Side Shift Left	S4+	MIN: 20%	MAX: 80%	12

Base Unit socket P1 (GRAY)

Base Unit Socket PLUG P2 (BLACK)

*TYPES
XX-XX-XX

AI = ANALOG INPUT
AO = ANALOG OUTPUT
LI = LEVEL INPUT
LO = LEVEL OUTPUT
PWM = PULSE WIDTH MOD

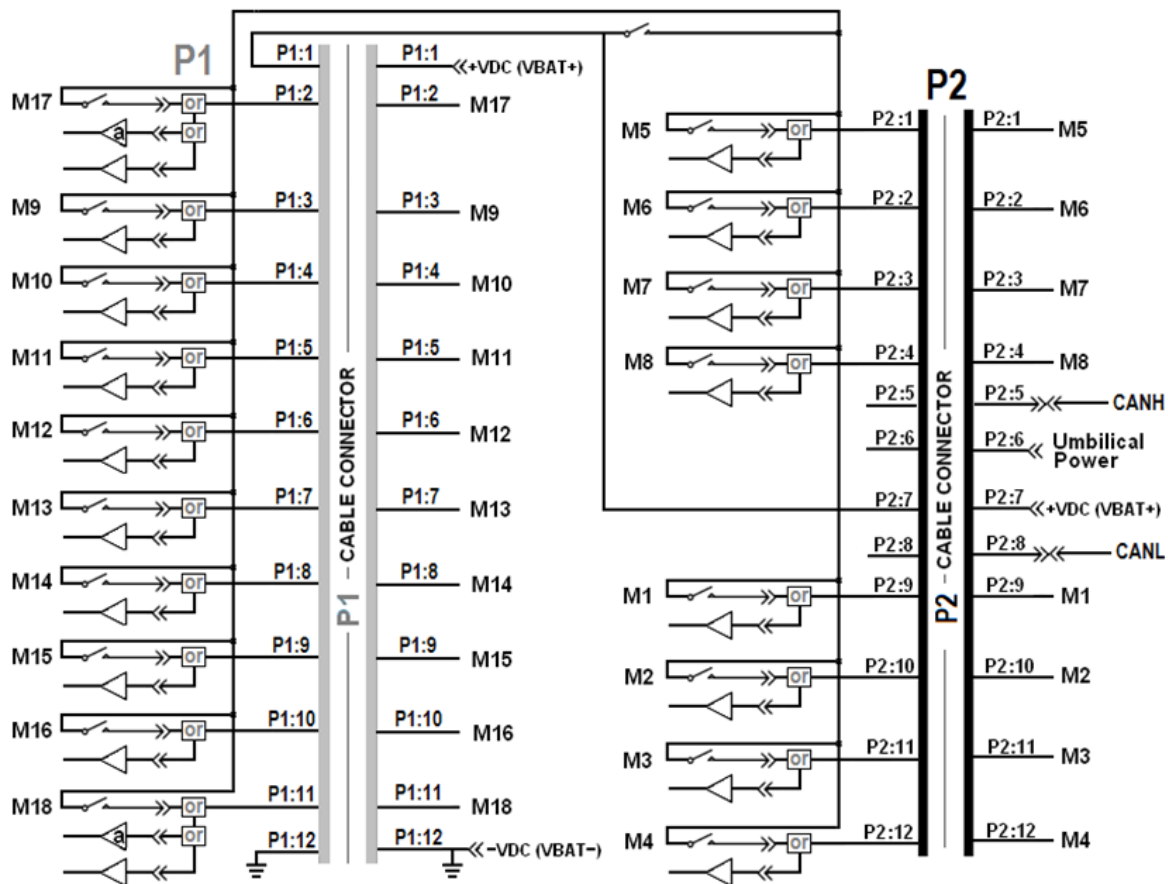
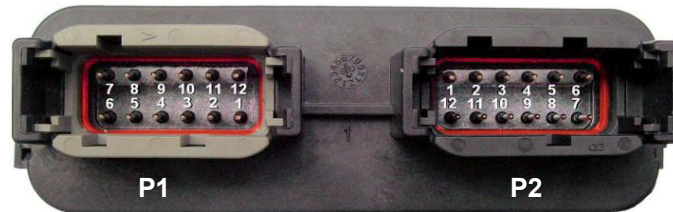
HS = HIGH SIDE
LS = LOW SIDE
NA = NOT APPLICABLE

M = MOMENTARY
LA = LATCHING
UN = UNLATCHING

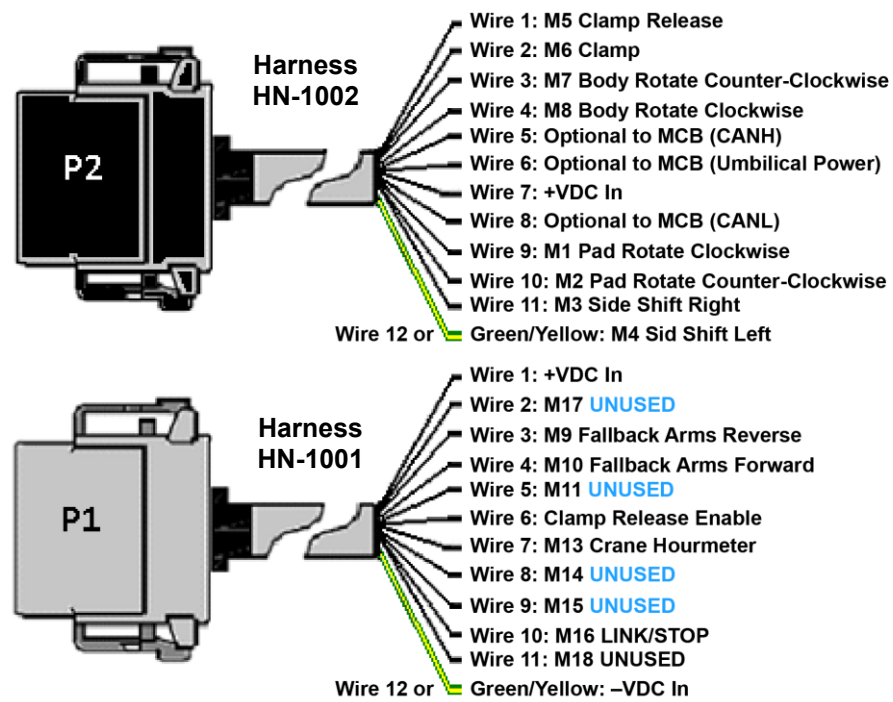
NOTES:

1. Switch 8 (+) is used to enable Clamp Release (S7-) function. Operator may use the function once output M12 is enabled. Must be enabled again if no activity for 5-seconds.
2. The Machine Stop latches all functions off.
3. Outputs are not active during the minimum and maximum adjustment process and the ramp up/down adjustment process.

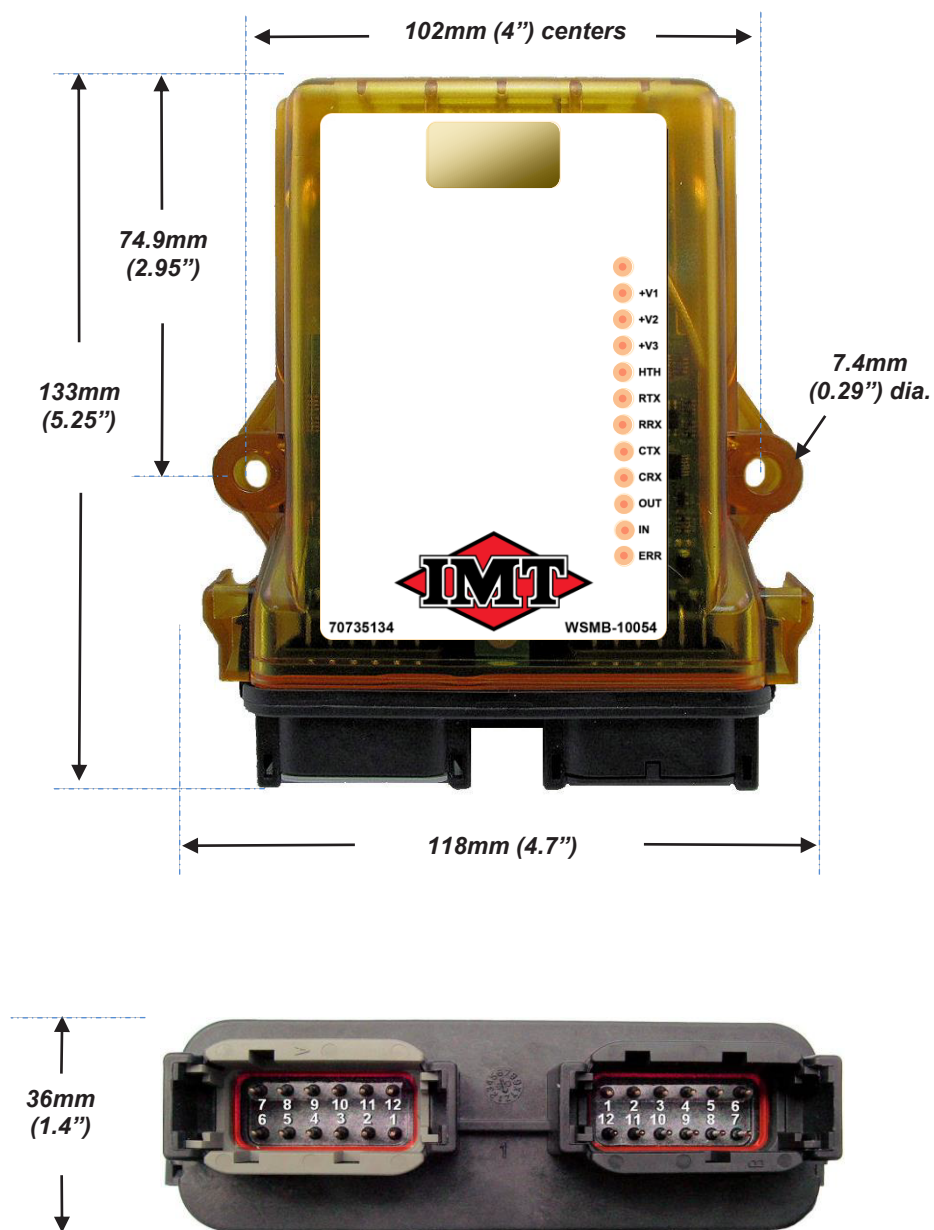
Internal P1 & P2 Schematic



Wiring Harness Connections (If Purchased)



Base Unit Mounting



Section - 5

Specifications

Base Unit Specifications

BASE UNIT SPECS		
POWER	VIN	DESCRIPTION
Radio	Frequency	2405 - 2480MHz
	RF Power	100mW
	License	No license required (license free)
	Modulation	DSSS
	Antenna	Internal
Environment	Operating Temp	See De-Rating Curve chart below for details
	Storage Temp	-40°C to 85°C (-40°F to 185°F)
	Humidity	0 to 100%
	Vibration / Shock	IEC60068-2-6
		10Hz to 150Hz @ 1.0g peak acceleration 10.0g peak shock acceleration
Indicators (11)	Unmarked	Polarity reversed when lit
	+V1	OK when active solid
	+V2	OK when active solid
	+V3	OK when active solid
	1 (Health)	OK when active blinking
	2 (RF TX)	Blinks when active
	3 (RF RX)	Solid when receiving
	4 (CAN TX)	Blinks when active
	5 (CAN RX)	Solid when active
	6 (OUT)	Solid when active
	7 (IN)	Solid when active
	8 (Error)	Solid—channel output high or low current Blink—global voltage problem

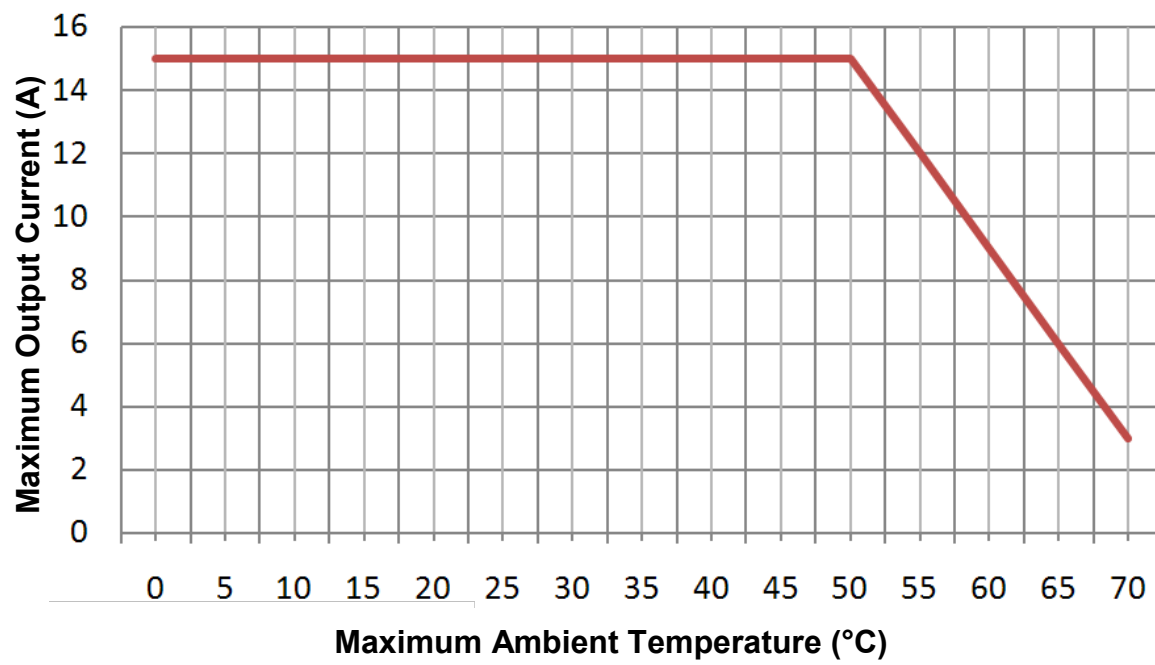
BASE UNIT (CONTINUED)		
POWER	VIN	DESCRIPTION
Enclosure	Dimensions	119mm x 133mm x 36mm(5.24" x 4.69" x 1.42")
	Durability	High Impact Polymer
	Mounting Holes	7.4mm (0.29") dia. 102mm center-to-center(4" center-to-center.
Outputs	Eighteen	FET—Open Drain
	Output Current	2A per channel 15A Max. total @ 55° C
Display	LCD	One line, four character
Umbilical	CAN Bus	SAE J1939

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Section - 6

Current Output

Output Current De-Rating Curve



Section - 7

Troubleshooting Guide

Base Unit Troubleshooting Guide

INDICATION	SUGGESTIONS
Power LED (+V1,+ V2, +V3) not active	<ul style="list-style-type: none"> • Is +VDC input power present? • Check input power polarity.
Health LED steady ON	<ul style="list-style-type: none"> • Indicates an internal component failure
TX/RX not active	<ul style="list-style-type: none"> • Check for obstructions preventing line-of-sight transmission • Check that the handheld remote is active • Re-associate the handheld remote to the base unit.
CTX/CRX not active	<ul style="list-style-type: none"> • Check CAN connection.
Out LED not active	<ul style="list-style-type: none"> • Check that the handheld LEDs are active when the appropriate buttons are pushed.
Error LED active	<ul style="list-style-type: none"> • Check the outputs for loose wiring, etc. • Over-temperature channel indication. • Over-current channel indication. • Error condition exists. Active channel current consumption less than 1A typical.(This is not a problem in cases where less than 1A draw is a normal condition.)
In LED not active when expected	<ul style="list-style-type: none"> • Check that the input signal is referenced to P1:12.

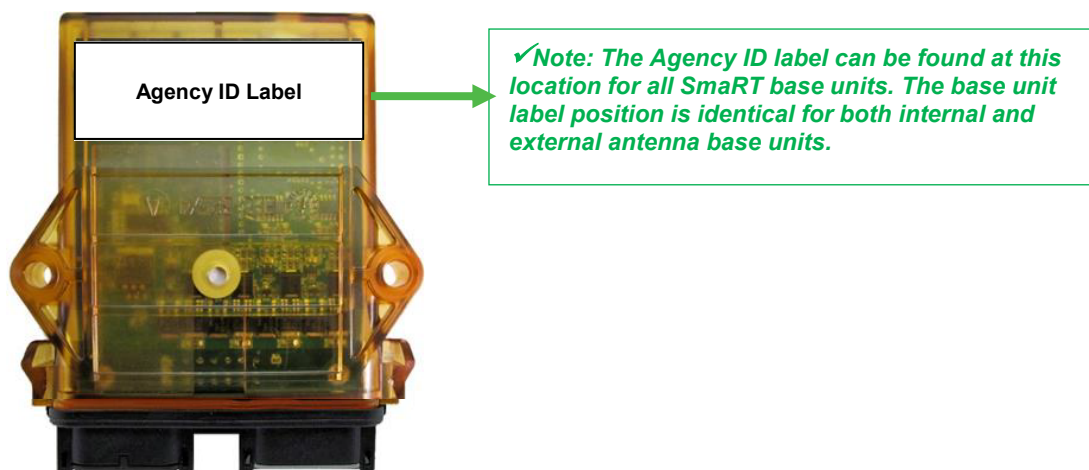
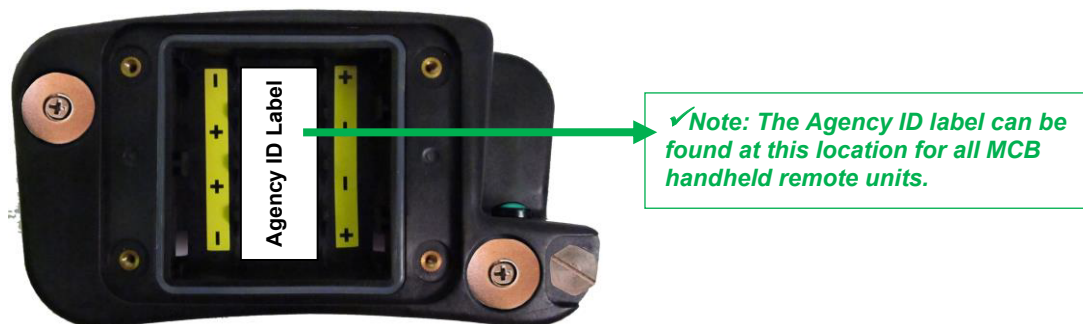
Section - 9

Appendix

Appendix A: Exposure to Radio Frequency Energy

SmaRT handheld remote units contain radio transceivers. When active, a handheld remote sends out radio frequency (RF) energy through its internal antenna. The SmaRT handheld remote complies with limits set by the FCC for operating distance from human tissue.

Appendix B: Agency Identification Label Locations



Agency Identification Label Location



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