Mako II ™

(Uni-Grip™ 820, 620, 412,

Multi-Stix™ 420, 320, 216)

Operation Manual

2010 Limited Warranty

Cirus Controls, LLC.

What and who is covered?

This warranty covers all defects in materials or workmanship in your Cirus Controls system under normal use, maintenance and service. This warranty coverage applies only to the original owner and is not transferable.

How long is the warranty period?

This warranty coverage runs for a period of 1 year from the date of initial installation (or 13 months from date of shipment from Cirus Controls), whichever occurs first. Replacement parts are warranted for the remaining portion of the original warranty period or thirty (30) days from date of shipment from our factory (whichever is greater).

How can you get service?

Cirus Controls' obligation under this warranty is limited to repairing and/or replacing, at Cirus Controls' option, any part or parts that are determined, by Cirus Controls, to be defective. To be eligible for any claim under this warranty, the owner (or Cirus authorized dealer) must return any defective part(s) to the factory, within the applicable warranty period (as set out above).

What will we do?

Cirus Controls' may, at its option, elect to grant adjustments in the field through an authorized representative and may thereby elect to waive the requirement that parts be returned to Cirus Controls' factory. The repair or replacement of defective parts under this warranty will be made without charge to the owner except for transportation of the part to our authorized repair location.

What is not covered under this warranty?

Cirus Controls will not assume any expense or liability for repairs made outside our plant without our prior written consent. We are not responsible for damage to any associated equipment or product and will not be liable for loss of time, profit, inconvenience, commercial loss or direct consequential, special or incidental damages.

The provisions of this warranty do not apply to any product or parts which have been subject to misuse, negligence or accident, or which have been repaired or altered outside of Cirus Controls' factory in any way (in the judgment of Cirus Controls) so as to affect adversely its performance or reliability. Neither does this warranty apply to normal maintenance service and parts or to normal deterioration due to wear and exposure.

This warranty is expressly in lieu of other warranties, expressed or implied, in fact or by law, including any implied warranty of merchantability of fitness for a particular purpose. The remedies of repair or replacement as set forth are the only remedies under this warranty, Cirus Controls' disclaims any obligations or liability for loss of time, profit, inconvenience, commercial loss or direct consequential, special or incidental damages. This warranty is in lieu of any other obligation or liability of Cirus Controls' of any nature whatsoever by reason of the manufacture, sale, lease or use of such products and Cirus Controls neither assumes, not authorizes anyone to assume for it, any other obligation or liability in connection with such products.

Revision level of this manual

Rev Letter	Date	Detail
A	10/12/08	Initial Release
B	6/14/10	Hoist limit update, Panic Button feature added;
C	8/4/10	Low Oil Circuit update, Auto-Blade update.
D	3/9/12	LED/Display warning updates

Cirus Controls reserves the right to make revisions and alterations to this manual from time to time without notice.

Package Contents

A complete ***Mako II ™*** control system contains the following items (note: some cables may not be included if their interfacing option is not met):

1) ***Mako II ™*** control unit;
2) ***Mako Trim ™*** program for the PC on a CD;
3) A CAN Bus cable for connecting the control unit to the joystick pod;
4) This manual;
5) Power cable;
6) Remote Blast and Pass cable;
7) Auxiliary function cable.
8) Hydraulic control cables ordered (TS-2031 or TS-2018);
9) Joystick Module with the ordered joysticks (***Uni-Grip™ or Multi-Stix ™***);

If any of these items are missing, please contact your distributor for replacement parts.

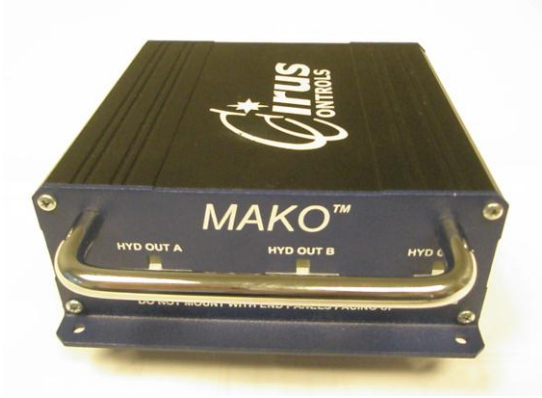
Functional Overview

The ***Mako II ™*** control system is a 20 channel proportional hydraulic controller. It translates movements from a joystick (***Uni-Grip™*** or ***Multi-Stix™***) to movements of truck implements such as plows, hoists, blades, and wings. The closer the joystick is to center (neutral) the slower the implement will move; the further from center the faster the implement will move. The ***Mako II™*** system is field-configurable using a PC connection. This allows the end user to tailor the speed of each individual function or to turn on and off certain functions. An example of this would be the ability to set the speed of the wing heel down different from the wing heel up speed or the ability to turn off the hoist button when an Anti-Ice tank or V-box is slid into a dump body, thus removing the ability to dump the Anti-Ice tank or V-box on the road.

Connections:

CAN Bus (Joystick control): M12 connector that runs up to the joystick pod;
Aux Inputs: 6-pin Molex connector used for digital auxiliary inputs. (Optional cable)
PC Port: standard PC serial connection used for field setting trims, etc. (Optional cable)
LCD: M12 connector used for ***Uni-Grip ™ 620 & 820*** dash display;
Cirus Bus: used for communication between Cirus Controls products. (Optional)
PWR / GND: 4-pin Molex used for connecting power and ground to system;
HYD C: 6-pin Molex connector used for controlling outputs 17-20;
HYD B: 10-pin Molex connector used for controlling outputs 9-16;
HYD A: 10-pin Molex connector used for controlling outputs 1-8;
Blast / Pass: 2-pin Molex for remote blast and pass from Cirus' spreaders.
Hoist Limit: input channel for limit/lockout circuit;
Cartridge: optional output channel for cartridge valve for open center un-loader valve;
DA Float: optional output channel for external float valve for direct acting function only;

Status LED: indicates power is "on" and then blinks slowly for normal operation.



Pre-Delivery System Setup Checklist

	Description	Completed By/Date
Step 1	Install System and connect cables	
Step 2	Test the Signal Outputs	
Step 3	Configure the Joystick	
Step 4	Trim hydraulics for all axes of motion	

Step 1

Installing the control unit

The blue control unit may be mounted on the floor, back wall of the truck, or underneath a seat. When mounting the control unit, make sure the M12 CAN bus cable coming from the arm unit will reach the blue ***Mako II*** ***TM*** plow control unit once it's mounted. **Do not mount the control unit with either cable end facing up.**

Connecting the cabling

Note: there are no installer connections needed inside the joystick pod. Modification of any factory wiring in the joystick pod, arm unit, *Mako II* ™ unit or drilling holes in any of the sheet metal housings voids the product(s) warranty.

1) Verify that power is off. Connect one end of the M12 cable (hanging from the arm unit tube) to the "joystick control port" on the ***Mako II*** ***TM*** plow control. Tighten the threaded sleeve.
2) Connect the hydraulic cables to the labeled ports. All cables are labeled on the sleeve with a HYD A, or HYD B, or HYD C. Plug them into the correct port on the ***Mako 2*** ***TM*** enclosure.
3) Connect the remote blast / pass cable up to the Cirus Controls spreader (if one is present).
4) Connect the Aux input plug, and wire it to the sensors out on the truck. To turn on an aux input there has to be +12 VDC applied to the wire. +12 VDC can be found on aux input pin 1, and this can be used to power truck sensors.
5) Plug in the LCD out 4-pin phone plug, and mount the display on the dash in a position that won't block the drivers view. This is only required on a ***Uni-Grip*** ***TM*** ***620 & 820***.
6) Finally, connect the power cable to the unit. Check to make sure that the power switch is off before connecting the power leads, and then connect power and ground to the cable. **The ground source must be direct to the battery. A chassis ground is not adequate.** The power cable can be connected either directly to the battery, as the unit is fused, or to a power circuit capable of delivering a minimum of 10 amps.

Step 2 - Testing the signal outputs

WARNING: KEEP ALL PERSONNEL CLEAR OF MOVING PARTS!

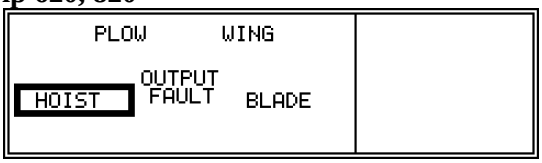
With the truck off, turn on the system and wait 5 seconds for self-test to complete. Select the hoist mode if system is a ***Uni-Grip*** ***TM*** and press the safety trigger or just move a joystick (if the system is a ***Multi-Stix*** ***TM***). Move the joystick up and check for the correct LED lighting up on the valve junction box out by the valve body. Repeat this for every function on the truck. Once this is complete, start the truck, and repeat. The implements should now move when each function is selected. The speeds of each function can be tailored using the ***Mako II Trim*** ***TM*** configuration tool, which is described in the Trimming Step 4.

Channel Safe ™ External Shorts and Opens Protection

Mako II **™** includes an external wiring detection feature called ***Channel Safe*** **™**. In event that wiring external to the ***Mako II*** **™** system develops a shorted or open circuit, ***Mako II*** **™** will warn the operator when he/she attempts to move the joystick with the safety trigger depressed.

a) Open Circuits: include broken wiring or "not plugged in" up to the hydraulic coil;
b) Short Circuits: include damaged hydraulic coils or cables shorting out;

Fault Indication – **Uni-Grip 620, 820**



Fault Indication – **Uni-Grip 412, Multi-Stix 216, 320**

- LED labeled "output fault" is lit when the safety trigger is depressed and the joystick is moved. LED turns off when stick returns to neutral position.

Step 3 – Configure the Joystick and Buttons

Joystick Damage Prevention

Joysticks can by damaged by incorrect wiring. Joysticks are installed, wired and tested at the factory and must not be wired in the field by anyone other than a qualified technician. Do not "plug in" or "un-plug" either joystick harness with power on or joystick may be damaged and warranty will be voided.

All ***Uni-Grip*****™** and ***Multi-Stix*****™** joysticks are true "Hall Effect" magnetic joysticks. When handled properly, these joysticks will give long service since there are no "contact parts" inside the joystick.

Safety Trigger

All ***Uni-Grip*****™** and ***Multi-Stix*****™** systems are configured with a safety trigger to protect against unintended movement of a device (plow, hoist etc). Cirus recommends that all safety triggers be used as designed to achieve the maximum system safety.

SafeStik™ Run time Joystick Check

All ***Uni-Grip*****™** and ***Multi-Stix*****™** joysticks are monitored for any joystick or cable failure at all times when power is on by a software mechanism called ***SafeStik*** **™**. In the event of a joystick or cable failure, the ***Mako II*** ***TM*** system disables the hydraulic output that is affected by the particular joystick and gives a warning to the operator:

Uni-Grip™ 620 & 820

Uni-Grip™ 412, Multi-Stix™ 320 & 216

- LED labeled 'joystick error" lights up when error is sensed.;

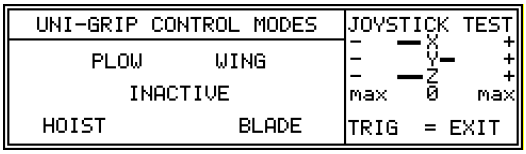
Note: in the event of this warning, the damaged joystick (or axis) is disabled until repairs can be made. The non-affected joystick(s) or joystick axes function normally.

Start up Self Test:

Mako II*™** conducts a self test during each power up cycle. After 5 seconds, the ***Mako II ***™*** will recognize the failed joystick (or axis), disable all outputs and light the LED.

Diagnostics tool for 3 axis joysticks:

Uni-Grip™ 820 & 620: From the joystick test screen one can verify if the ***Uni-Grip*™** joystick is sending its proper signals. With the joystick in its neutral position, no bars are displayed on the screen. As you move the joystick in the positive direction you will see the bar grows the further from neutral you get (or decrease as you move back to neutral). This display of signal will be the same for each joystick axes of motion. If a joystick axis is bad there will be a bar extending to max, while the joystick is in the held neutral position. To exit the joystick test screen simply press the trigger, and the Mako II will return to normal running mode, but the failed axis will stay disabled by ***SafeStik*™**.



Uni-Grip ™ 412 – System Description

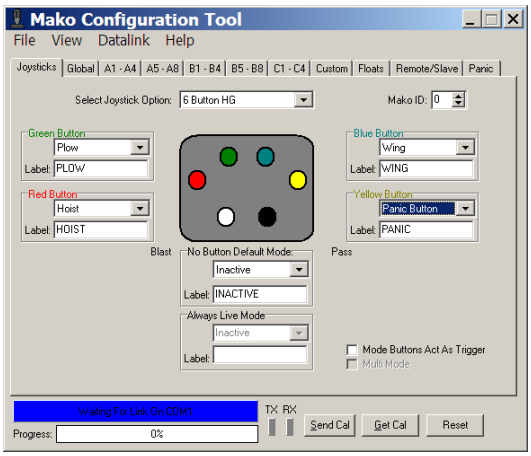
The ***Uni-Grip*** ***™*** 412 joystick is paired with the ***Mako II*** ***™*** plow control giving the operator the ability to control up to three independent devices using a single joystick.

Trigger Safety Switch: the joystick will not operate a device unless the trigger safety switch is engaged. This safety feature prevents accidental movement of devices.

3 Selectable Device Choices: once the plow control is configured, the operator then chooses the operating mode on the joystick by selecting one of these modes. Configuration of the plow control allows any or all of these modes to be active or inactive, depending on configuration settings. Not all systems will have all modes active.

- No Button, Default Mode: when this mode is active, squeezing the trigger safety switch and moving the joystick in the desired direction of motion will actuate the device assigned to it. This mode is indicated by the absence of lit LED's.
- Red Button Mode: actuating the red button, squeezing the trigger safety switch and move the joystick to operate this mode. When selected, red LED will light.
- Green Button Mode: actuating the green button, squeezing the trigger safety switch and moving the joystick to operate this mode. When selected, green LED will light.
- Remote Blast Button (white): when coupled with a Cirus Controls spreader, this button activates the "Blast" function as configured on the spreader control.
- Remote Pass Button (black): when coupled with a Cirus Controls spreader, this button activates the "Pass" as configured on the spreader control.

Configure Joystick Buttons on Uni-Grip™ 412 (Windows 2000, XP or Vista)
1) To adjust trims, or system parameters plug a standard serial cable into the PC port on the ***Mako II*** ***TM*** plow control. Validate that you are using the latest version of ***Mako Trim*** ***TM***. Current versions are available from Cirus Controls. Verify that the COM port on the PC is available. Open the ***Mako Trim*** ***TM*** configuration utility. The program opens on the "Joysticks" screen.
2) After the ***Mako Trim*** ***TM*** program is opened, turn on the blue ***Mako II*** ***TM*** plow control. The red bar that says waiting for link will turn green. At this point the PC has uploaded the current configuration in the ***Mako II*** ***TM*** and now controls the ***Mako II*** ***TM*** plow control. (note: that the current joystick's screen changes to display the current configuration of the ***Mako II*** ***TM*** unit you are communicating with). Use the pull down menu for Red Button, Green Button and No Button Default to change joystick options. You may change which button is assigned to which mode (hoist, plow, wing, or blade) and deactivate one or more buttons if the equipment is not attached to the truck.



3) Once buttons are configured, follow the instructions to trim each of the devices.
4) Click "send cal" to send new configuration to Mako II controller and save file.

Uni-Grip ™ 620 System Description

The ***Uni-Grip*** ***TM*** 620 joystick is paired with the ***Mako II*** ***TM*** plow control giving the operator the ability to control up to five independent devices (plow, hoist, wing, blade, other) using a single joystick. An externally mounted LCD displays operating modes.

Trigger Safety Switch: The joystick will not operate a device unless the trigger safety switch is engaged (prevents accidental movement of devices).

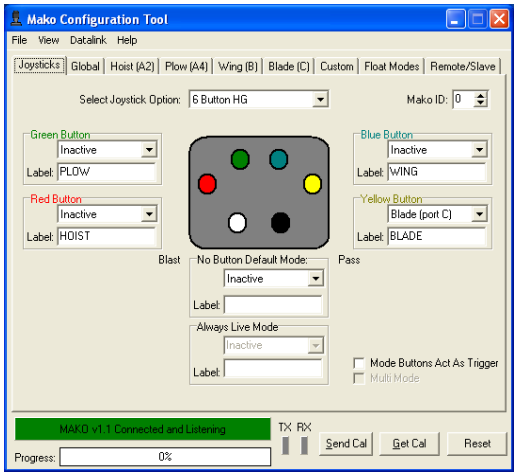
5 Selectable Device Choices: once the plow control is configured using ***Mako Trim*** ***™***, the operator then chooses the operating mode on the joystick. Configuration of the plow control allows any or all of these buttons to be active or inactive, depending on configuration settings. Not all systems will have all buttons active.

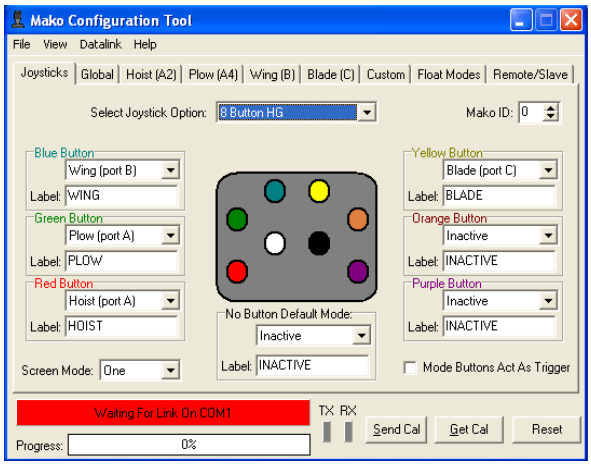
- No Button, Default: when this mode is active, squeezing the trigger safety switch and moving the joystick in the desired direction of motion will actuate the device assigned to it. When this mode is selected, it is indicated on the LCD screen.
- Red Button: actuating the red button, squeezing the trigger safety switch and moving the joystick to operate. When selected, it is indicated on the LCD.
- Green Button: actuating the green button, squeezing the trigger safety switch and moving the joystick to operate. When selected, it is indicated on the LCD.
- Blue Button: acting the blue button, squeezing the trigger safety switch and moving the joystick to operate. When selected, it is indicated on the LCD screen.
- Yellow Button: actuating the yellow button, squeezing the trigger safety switch and moving the joystick to operate. When selected, it is indicated on the LCD.

Remote Blast Button (white): when coupled with a Cirus' spreader, button activates "blast".
Remote Pass Button (black): when coupled with a Cirus' spreader, button activates the "Pass."

Configure Joystick Buttons on Uni-Grip 620 (Windows 98, 2000, XP or Vista).
1) To adjust trims or system parameters plug a standard serial cable into the PC port on the ***Mako II*** ***™*** plow control. Use the latest version of ***Mako Trim*** ***™***. Verify that the COM port on the PC is available. Open the ***Mako Trim*** ***™*** configuration utility and choose Mako from the view menu.

2) After the ***Mako Trim*** ***™*** program is opened, turn on the blue ***Mako II*** ***™*** plow control. The red bar that says waiting for link will turn green. At this point the PC has uploaded the current configuration in the ***Mako II*** ***™*** and now controls the ***Mako II*** ***™*** plow control. (note: that the current joystick's screen changes to display the current configuration of the ***Mako II*** ***™*** unit you are communicating with). Use the pull down menu for Red button, Green button, Blue button, Yellow button and No Button Default to change joystick options. You may change which button is assigned to which mode (hoist, plow, wing, or blade) and deactivate one or more buttons if the equipment is not attached to the truck.





3) Once buttons are configured, follow the instructions in the trim section to trim each device.

Uni-Grip ™ 820 System Description

The ***Uni-Grip*** ™ 820 joystick is paired with the ***Mako II*** ™ plow control giving the operator the ability to control up to seven independent devices (plow, hoist, wing, blade, other) using a single joystick. An external LCD displays operating modes.

Trigger Safety Switch: The joystick will not operate a device unless the trigger safety switch is engaged (prevents accidental movement of devices).
7 Selectable Device Choices: once the plow control is configured using ***Mako Trim*** ™, the operator then chooses the operating mode on the joystick. Configuration of the plow control allows any or all of these buttons to be active or inactive, depending on configuration settings. Not all systems will have all buttons active.

- No Button, Default: when this mode is active, squeezing the trigger safety switch and moving the joystick will actuate the device assigned to it. When this mode is selected, it is indicated on the LCD screen.
- Red Button: actuating the red button, squeezing the trigger safety switch and moving the joystick to operate this mode. When this mode is selected, it is indicated on the LCD.
- Green Button: actuating the green button, squeezing the trigger safety switch and moving the joystick to operate this mode. When this mode is selected, it is indicated on the LCD.
- Blue Button: actuating the blue button, squeezing the trigger safety switch and moving the joystick to operate this mode. When this mode is selected, it is indicated on the LCD.
- Yellow Button: actuating the yellow button, squeezing the trigger safety switch and moving the joystick to operate this mode. When mode is selected, it is indicated on LCD.
- Orange Button: actuating the orange button, squeezing the trigger safety switch and moving the joystick to operate this mode. When mode is selected, it is indicated on LCD.

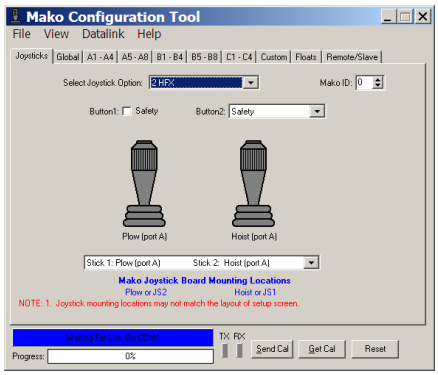
- Purple Button: actuating the purple button, squeezing the trigger safety switch and moving the joystick to operate this mode. When this mode is selected, it is indicated on the LCD screen.

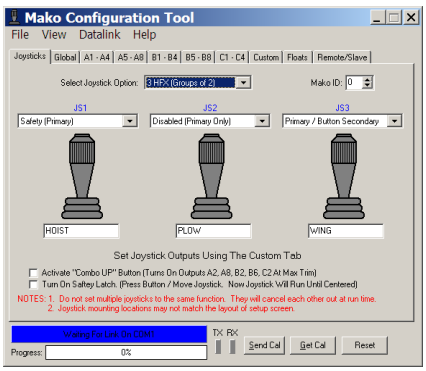
Remote Blast Button (white): when coupled with a Cirus' spreader, this button activates "blast."
Remote Pass Button (black): when coupled with a Cirus' spreader, this button activates "Pass."

Configure Joystick Buttons on Uni-Grip 820 (Windows 98, 2000, XP or Vista).
1) To adjust trims, or system parameters plug a standard serial cable into the PC port on the ***Mako II*** ***TM*** plow control. Use the latest version of ***Mako Trim*** ***TM***. Current versions are posted on Cirus Controls' website. Verify that the COM port on the PC is available. Open the ***Mako Trim*** ***TM*** configuration utility. The program opens on the "Joysticks" screen.
2) After the ***Mako Trim*** ***TM*** program is opened, turn on the blue ***Mako II*** ***TM*** plow control. The red bar that says waiting for link will turn green. At this point the PC has uploaded the current configuration in the ***Mako II*** ***TM*** and now controls the ***Mako II*** ***TM*** plow control. (note: that the current joystick's screen changes to display the current configuration of the ***Mako II*** ***TM*** unit you are communicating with. Use the pull down menu for Red button, Green button, Blue button, Yellow button, Orange button, Purple button and No Button Default to change joystick options. You may change which button is assigned to which mode (hoist, plow, wing, or blade) and deactivate one or more buttons if the equipment is not attached to the truck.
3) Once buttons are configured, follow the instructions to trim each of the devices.
4) Click "send cal" to send new configuration to Mako II controller and save file.

Multi-Stix 216 and 320 System Description

The ***Multi-Stix*** ***TM*** 216 and 320 joystick modules are paired with the ***Mako II*** ***TM*** plow control giving the operator the ability to control up to five independent devices (plow, hoist, wing, blade, other) using two or three mini joysticks to actuate a device.





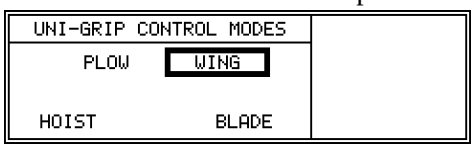
Configure Joysticks on Multi-Stix 216 & 320 (Windows 98, 2000, XP or Vista).
1) To adjust trims, or system parameters plug a standard serial cable into the PC port on the ***Mako II*** ***TM*** plow control. Use the latest version of ***Mako Trim*** ***TM***. Current versions are posted on Cirus Controls' website. Verify that the COM port on the PC is available. Open the ***Mako Trim*** ***TM*** configuration utility. The program opens on the "Joysticks" screen.
2) After the ***Mako Trim*** ***TM*** program is opened, turn on the blue ***Mako II*** ***TM*** plow control. The red bar that says waiting for link will turn green. At this point the PC has uploaded the current configuration in the ***Mako II*** ***TM*** and now controls the ***Mako II*** ***TM*** plow control. (note: the ***Mako Trim*** ***TM*** screen changes to display the configuration of the unit you are communicating with).

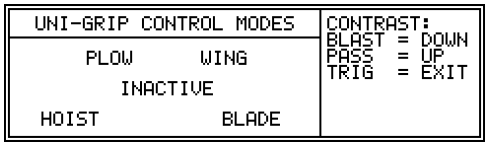
3) From the "select joystick option menu, choose "2 HFX" for the ***Multi-Stix 216*** ™ or "3HFX" for ***Multi-Stix 320*** ™. Then, use the other pull down menus to assign each joystick to the hydraulic function desired and to assign top switches as desired.
4) Once joysticks are configured, follow the instructions to trim each of the devices.
5) Click "send cal" to send new configuration to Mako II controller and save file.

Other Configuration Settings

LCD Screen Display:

Active mode is shown: the black box around the active function name and all enabled button names shown in their relative position on the joystick.



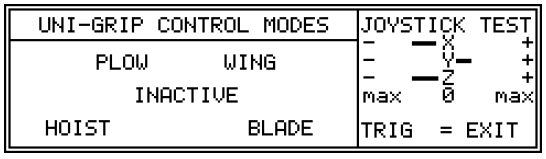


LCD Screen Contrast:

To enter the screen contrast mode and joystick test mode, press the remote blast and the remote pass buttons at the same time. The right side of the UG 620 LCD screen will display the instructions. Press the "remote blast" key to lower the contrast or the "remote pass" key to increase it. When your contrast is set, press the trigger, the contrast is saved and the screen will advance to the joystick test screen.

3 Axis Joystick Test

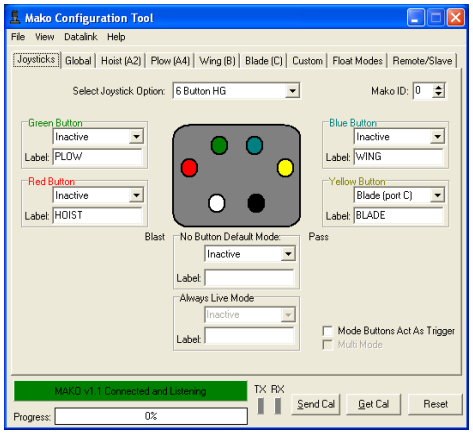
From the joystick test screen one can verify if the Uni-Grip joystick is sending its proper signals. With the joystick in its neutral position, no bars are displayed on the screen. As you move the joystick in the positive direction you will see a bar increase the further from neutral you get, and it will also decrease as you move back to neutral. If a joystick axis is bad there will be a bar extending to max, while the joystick is in the neutral position. To exit the joystick test screen, press the trigger, and the ***Mako II*** ™ will return to normal running mode.

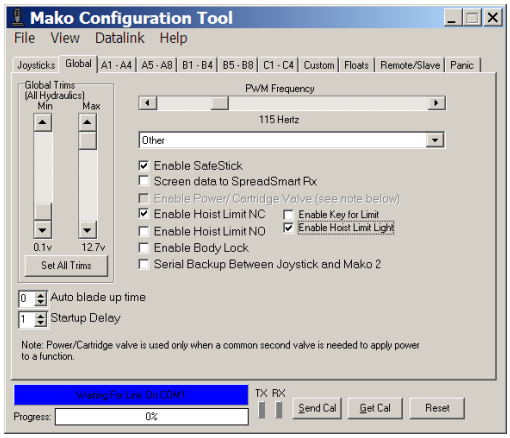


Hoist Limit, Hoist Limit Indicator and Hoist Lock / Over-Ride Options

Mako 2™ offers the ability to sense the position of the hoist to prevent it from being raised past that sensing position (such as 13'6" max height) using an IP 68 proximity sensor and a "positive control" circuit that stops the hoist from raising if the limit is reached or if any part of the sensing circuit fails. See the attached drawing for full details on the sensor circuit choices and the options for limit, warning and lock out.

1) **To enable the hoist limit function**, plug a serial cable into the PC port on the ***Mako2*** ™ plow control. Verify that the COM port on the PC is available. Open the ***Mako Trim*** ™ configuration utility and then power up the ***Mako 2*** ™ controller. Use the View tab to select the Mako version and open to the "Joysticks" screen. Select the global tab to view the Hoist limit and Light check boxes.





2) Choose Hoist Limit for Normally Closed (NC) or Normally Open (NO) operation: this selection depends on the type of sensing circuit chosen. See attached drawing.

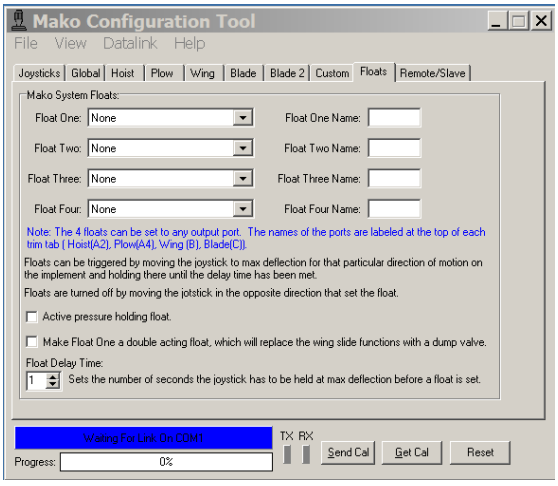
3) **Select the "Enable Hoist Limit Light"** to trigger a warning light when the hoist motion reaches its pre-set limit. The warning light is an accessory light normally installed in the joystick nose pod and wired to the DA cartridge valve port on the ***Mako 2*** **™** blue box.

4) **Select "send cal" button to send and save** the updated configuration file to the ***Mako 2*** **™** controller. Disconnect the computer, power cycle the ***Mako 2*** **™** and field test the hoist limit function to confirm functionality

Float Function Options:

Chain Lift Implements: In the ***Uni-Grip*™** and ***Multi-Stix*™** products, the "float" function is created by electrically terminating the hydraulic "down force" on chain lift implements and relying on the weight of the implement to hold it down. Plow, Wing, or Blade floats can be enabled or disabled for the system by using the ***Mako Trim*** ***™*** "float" tab and the proper password. Float should not be configured except by a qualified technician.

"DA Float" for Direct Acting Function – function cylinder is directly attached to the implement. This type of float requires an external "dump valve" or external float block. This block is electrically actuated using the joystick when wired to the DA Float port on the Mako 2. Mako Float #1 is the only selection that works with the DA Float option.



Engage Float Function: can be triggered in one of two ways.

1) External switch that the driver must turn on and off to engage or disengage the float (does not include wing toe float).
2) Move the joystick to max deflection in the direction of the desired float. To disengage the float, squeeze the trigger and move the joystick in the opposite direction of the float (typically, move the joystick in the "up" direction). "Wing toe" float can only be engaged using the joystick.

Display of Float Status: When float is active for an implement, operator indication is:

1) Uni-Grip™ 620, 820 the active float is displayed on the LCD screen, and disappears when float is disengaged.
2) Uni Grip™ 412, and ***Multi-Stix*** **™** 212:
   a. Hoist LED blinks once every 3 seconds when float 1 is engaged;
   b. Plow LED blinks once every 3 seconds when float 2 is engaged.
   c. Both LED's blink once every 3 seconds when blade float is engaged.
3) ***Multi-Stix*** **™** 316
   a. Hoist LED blinks once every 3 seconds when float 1 is engaged;
   b. Plow LED blinks once every 3 seconds when float 2 is engaged.
   c. Blade LED blinks once every 3 seconds when float 3 is engaged.

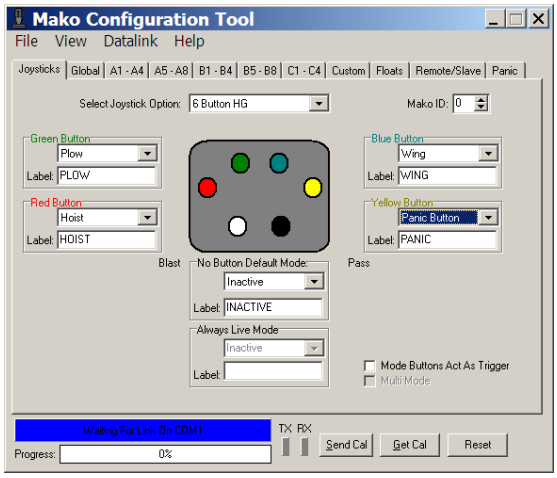
NOTE: Once in a float mode, the ***Mako II*** ***™*** box will deliver max trim to the implement in float until the float is removed.

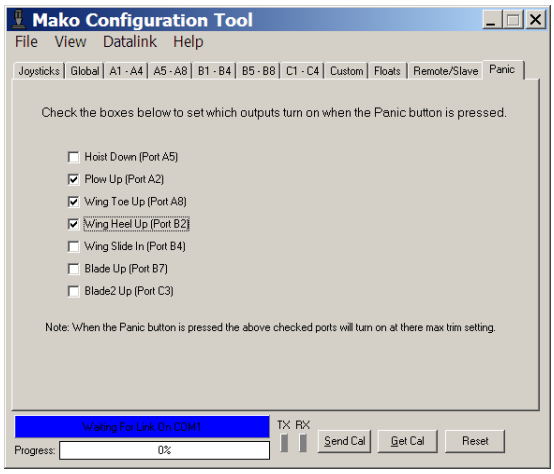
Panic Function – "button actuated" retracting function (without joystick motion)

This function allows the user to assign one or more implements to respond to the assigned panic button and retract the assigned implement (s) running at max trimmed speed of motion.

"Panic Button" triggers motion of the assigned devices while the operator is holding the panic button in the "on position" for as long as they need to move the implements. As soon as the panic button is released, motion will stop. This function is not an "automatic device parking function" since no position sensors are included in this system.

*****Warning: if you assign multiple functions to the panic button, multiple devices will move simultaneously. Motion will continue until the panic button is released.**





Panic button can be assigned to any of the ***Uni-Grip*™** switches or to any top switch of the ***Multi-Stix*™** groups of two drop down menu. More than one button can be assigned to "panic," but only one set of motions can be assigned (each button will operate the same set of functions).

Mode Buttons Act as Safety Trigger (Uni-Grip 620 & 820):

For Uni-Grip systems with LCD displays (6xx or the 8xx systems), ***Mako II*** ***™*** allows you to use the buttons as momentary contacts for controlling hydraulic functions. In this mode, the button must be selected and held down to operate a function. The safety trigger becomes inactive if this function is configured using ***Mako Trim*** ***™***.

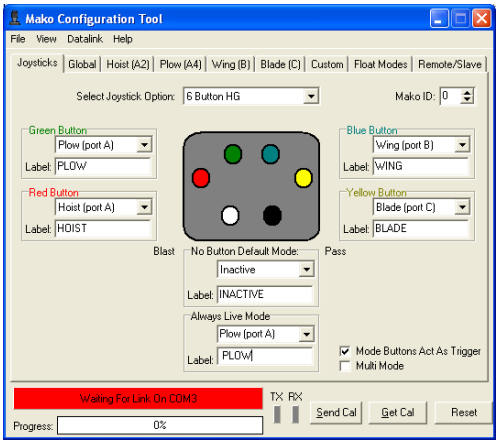
To re-assign the mode buttons from latched connections (which require the safety trigger to actuate the function) to mode buttons as momentary contacts (which then become their own safety triggers since they must be held down to operate), check the box on ***Mako Trim*** ***™***.

Configure joystick in "always live" mode (Uni-Grip 620 & 820)

For Uni-Grip systems with LCD displays (6xx or the 8xx systems), ***Mako II*** ***™*** can be configured so the joystick is "always live" for one of its standard function groups. In this mode, the pistol grip safety trigger or the buttons do not need to be depressed to actuate the mode assigned.
Caution: Use of this mode increases the chance that an operator can move a plow un-intentionally. For this reason, **Cirus Controls recommends that "always live mode" be left disabled for maximum operator safety.**
To configure your system in "always live" mode:

1) Open Mako II Trim and check the box labeled "buttons act as trigger"
2) Select the function you wish to operate in the "always live mode" from the drop down menu selection list titled "always live" mode.
3) Type in the label of the function you wish to appear on the screen.
4) Select "send cal," to send new configuration to ***Mako II*** ***™*** controller.

Note: the function assigned in the "always live" mode, will always default "on" shown by a black border around that function on the LCD. When another button is selected, the box will move to the selected function.

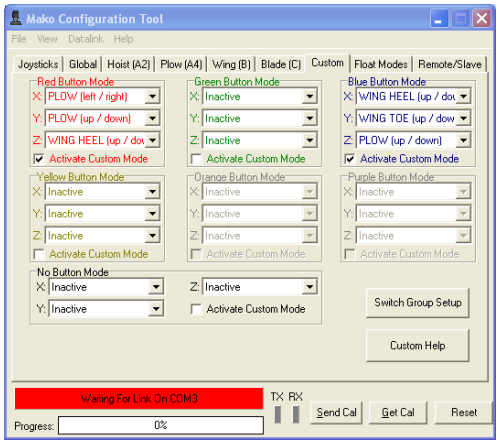


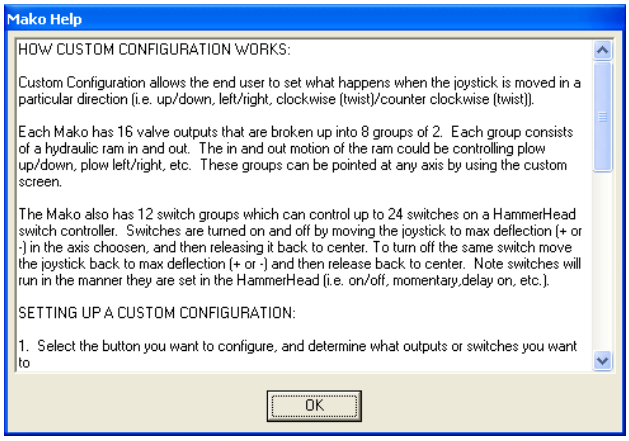
Custom Joystick axis assignment – hydraulic functions only

The Custom tab is a configuration table that allows the user to assign hydraulic groups in a manner that is flexible instead of using the default groups used normally. Selections should be made by a qualified technician only and are only available for Uni-Grip 620 and 820 systems. To access the selections:

1) Verify that "6 or 8 button HG system" is selected on Joysticks tab;

2) Click on “custom” tab;
3) Select the first button color you wish to customize and check “activate custom mode,” box.
    1) Custom configure hydraulic functions: use pull down menu to select the hydraulic function you wish to assign to a particular axis (x, y or z) on that button. Continue making selections until all hydraulic functions are assigned to a button and axis.
    2) Finally, click send cal to upload the configuration to the ***Mako II*** ™ box, and save your configuration file.





Linking Uni-Grip 6 & 8 Button with Hammerhead 12 Switch System

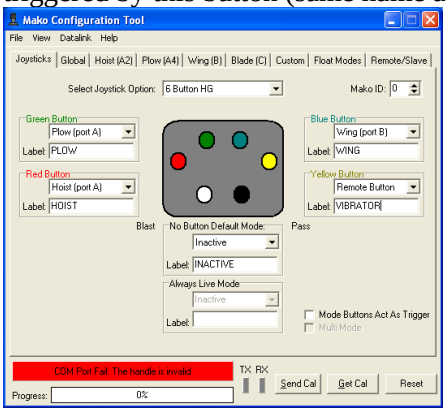
When linked with a ***Hammerhead*** ™ 12 Switch module, the Uni-Grip 6xx or the 8xx joystick can have some of its buttons assigned as remote actuators of functions controlled by the Hammerhead 12 switch accessory module. Once linked, the controlled function can be actuated with the joystick button or with the switch on the 12 switch panel. This feature is available on the 6xx or the 8xx joystick using the ***Mako II*** ™ to link the particular joystick button to the function controlled on the ***Hammerhead*** ™.

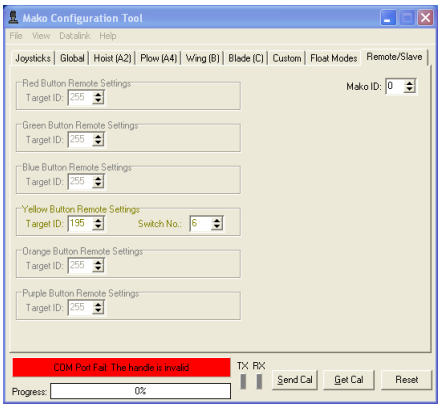
To link the functions between the Mako II and HammerHead

1) Plug one end of the “Cirus Bus cable- HH-1001” into the “bus” port on ***Mako II*** ™ and the other into the bus port on ***Hammerhead*** ™.

Configure *Mako II* ™ **after connecting your PC to the PC port:**

4) Open ***Mako II Trim*** ™ and select the joystick mode you are working with (6 / 8 button).
5) Select the select the button you want to make control a remote switch by clicking the pull down menu and selecting "Remote button" and type in the name of the function that will be triggered by this button (same name as on the HammerHead for that switch # -“Vib”).





6) Click the "remote/slave" tab;
7) On the "remote/slave" tab go the remote settings for the button you selected to be a remote switch. Now set the target ID (101-199) to match the ***Hammerhead*** ™ ID.
   If you haven't previously setup the ***Hammerhead*** ™ yet just pick a number and write it down for when setting up the ***Hammerhead*** ™. **Note: Do not use default value of 200 or 255.**
8) Set the switch you'd like to control: choose from 1 to 12.
9) Now upload the configuration to the ***Mako II*** ™ box, and save configuration file.

Companion *Hammerhead* ™ setup:

1) Configure all switch functions and names as you want them.
2) Match the ***Hammerhead*** ™ ID to the Target ID (101-199) used in the ***Mako II*** ™ box.
3) Upload the configuration file to the ***Hammerhead*** ™.

Configuration of both systems is complete and functions are linked.

Using Uni-Grip Joystick Axis to actuate switches on a Hammerhead

This capability allows you to use joystick motion in a specific direction/axis to actuate switch functions controlled by HammerHead switch controller (only available for ***Uni-Grip*™** 620 and 820 systems). In this application, the joystick is a remote switch actuation system and must be linked to a HammerHead system to operate.

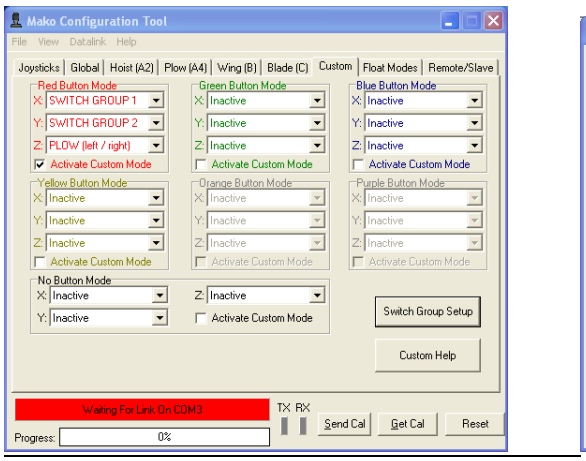
Once configured, operate the joystick as a remote trigger for switch functions by:

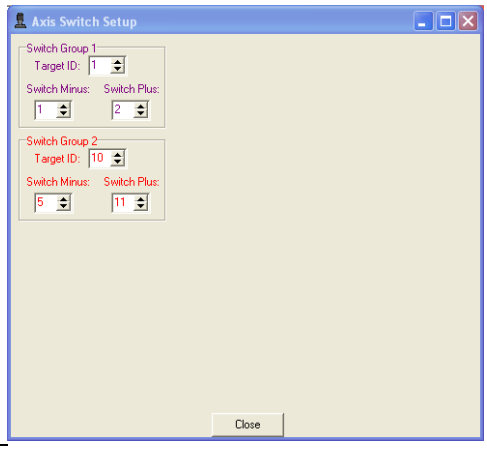
- Move joystick to max deflection in the configured direction and hold for 0.5 second.
- The linked switch (on HammerHead) will then activate in the manner defined on the HammerHead (momentary, on/off, delay etc).
- To turn off any switch with a latched function (on/off, delay on, etc.) return the joystick to maximum deflection in the configured axis/direction as before.

Note: switch behavior (momentary, on/off etc) is controlled in the HammerHead. Changes to switch behavior must be accomplished in the Hammer Configuration utility.

To begin configuration, open Mako Trim™ on your laptop PC:

1) Verify that "6 or 8 button HG system" is selected on Joysticks tab;
2) Click on "custom" tab and enter password;
3) Select the first button color you wish to customize and check "activate custom mode," box.
4) <u>Custom configure switch actuation using joystick</u>: use pull down menu to select the switch group you wish to control with a particular joystick axis (x, y, or z). Note that each switch group controls 2 switches (one in the plus direction, and one in the minus direction).





5) Link Joystick Axis to Switches on HammerHead system.
    a. Select "Switch group setup" button to assign linkage with a HammerHead system (target ID #) and with specific switch pairs on that system. Note: Joystick movement in the "minus direction" for the chosen axis, actuates the switch # chosen under "switch minus." Joystick movement in the "plus direction" for the chosen axis, actuates the switch # chosen under "switch plus." Any or all three joystick axes (x, y & z) can be assigned to switch functions. Click "close" when complete.

6) Finally, click "send cal" to upload the configuration to the ***Mako II ™*** box and save your configuration file.

Companion *Hammerhead ™* setup:

1) Configure all switch functions and names as you want them.
2) Match the ***Hammerhead ™*** ID to the Target ID used in the ***Mako II ™*** box.
3) Upload the configuration file to the ***Hammerhead ™***.

Configuration of both systems is complete.

To electrically link the HammerHead and Mako II systems,

1) Plug one end of the "Cirus Bus cable – HH-1001" into the "bus" port on ***Mako II ™*** and the other into the bus port on ***Hammerhead ™***.

Step 4 Set Up for Operation – Trimming

Overview of Trims for Proportional Control of Motion (Feathering)

Setting trims is the process of setting minimum and maximum signal voltages for the valve coil that result in a fine-tuning of the range of proportional control available to the operator. Proportional control of motion allows the operator to move the control joystick a small amount to control low-speed movement and a large amount to control high-speed movement. When properly set, the operator can "feather" the control joystick and move the implement (plow, dump body) at the rate of speed that is appropriate to the task at hand for maximum safety and efficiency.

Trims can be set at the outer limits of the electro-hydraulic system's capability for proportional control of motion or they can be narrowed to a tighter range of control. The larger the difference in voltage between the minimum and maximum settings, the larger the range of movement of the control joystick and the finer degree of proportional control of motion is available to the operator.

Minimum Trim: the minimum signal voltage delivered to the coil necessary to result in enough flow of hydraulic fluid to <u>begin to move</u> the implement selected. This voltage value will vary based on the valve coil in use, the size of the hydraulic system, the size of the hydraulic cylinder and the weight of the implement (dump body, plow, wing etc). Minimum settings can only be determined at operating engine RPM's with hydraulic fluid warmed to its normal operating temperature.

Maximum Trim: the maximum signal voltage delivered to the coil necessary to result in enough flow of hydraulic fluid to reach the <u>maximum speed of motion</u> of the implement intended. This voltage value will vary based on the valve coil in use, the size of the hydraulic system, the size of the hydraulic cylinder and the weight of the implement in use (dump body, plow, wing etc) and is normally pre-set at the factory.

Typical Settings (largest difference between min and max settings): choosing these settings results in the largest amount of proportional control available for that hydraulic system. The

operator will be able to make large and small adjustments to speed of motion by moving the control joystick a corresponding amount.

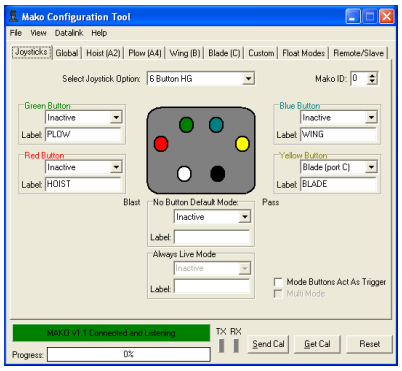
Bang /Bang Control (On/Off): Set the minimum and maximum trim voltage levels at 12V. Zero proportional control of speed is available at this setting.

Other Setting Combinations: because each implement has different performance characteristics, setting trims uniquely for each one will create the best sense of control for both safety and efficiency.

Instructions for Setting Trims and Button Configuration

In order for a ***Mako II*** ***TM*** plow control system to proportionally move implements the system may have to be trimmed. The unit comes factory set for a variety of different coils, which allows the unit to run without changes. However if some of the implements don't move as desired, they can be adjusted by setting new min and max trim settings via the ***Mako Trim*** ***TM*** configuration program which can be found on the CD accompanying the system user manual. ***Mako Trim*** ***TM*** is compatible with personal computers (PC) or laptops running Windows 2000, XP or Vista operating system.

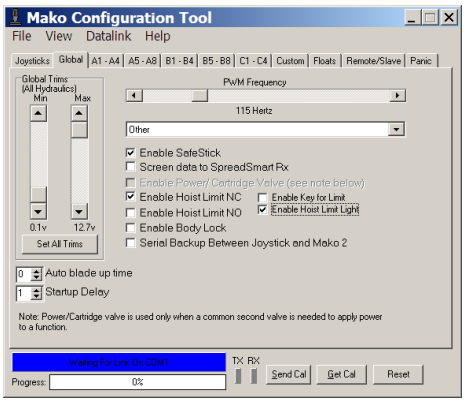
1) To adjust trims or parameters, plug a standard serial cable into the PC port on the ***Mako II*** ***TM*** plow control. Validate that you are using the latest version of ***Mako II*** ***TM***. Verify that the COM port on the PC is available. Open the ***Mako Trim*** ***TM*** configuration utility. Use the View tab to select the Mako version and open to the "Joysticks" screen.

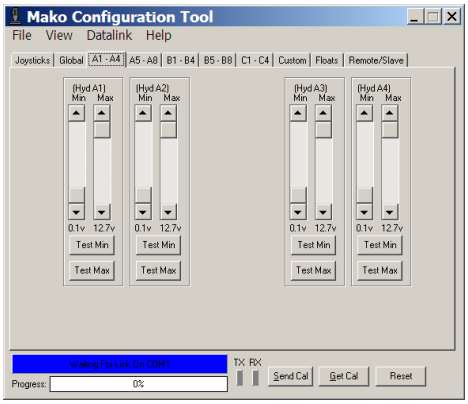


2) After the ***Mako Trim*** ***TM*** program is opened, turn on the blue ***Mako II*** ***TM*** plow control. The red bar that says waiting for link will turn green. At this point the PC has uploaded the current configuration in the ***Mako II*** ***TM*** and now controls the ***Mako II*** ***TM*** plow control. (note that the current joystick's screen changes to display the current configuration of the ***Mako II*** ***TM*** unit you are communicating with. Use the "joysticks screen" to change joystick options, change which button is assigned to which mode (hoist, plow, wing, or blade), and for deactivating buttons if the equipment is not attached to the truck.

Global Trims Tab

This screen is used for setting the coil type, coil frequency, and setting all the trims to be the same using the global trim sliders. Use the slider to select the voltage desired and then selects "set all trims" to apply those values to all channels on the system.





Test and Set Trims for Each Channel

If you wish to set trims individually for each implement, use the tabs for all the axes of motion.

Using the PC to Identify the Minimum Voltage:

Caution, the hoist will move, keep all personnel clear before beginning.

1)With the truck running, move the hoist up slider up in 0.1 volt increments. Each mouse click will move the value up 0.1V and the displayed value will change.
2) After each increase press and hold the "TEST MIN" button. This will tell the ***Mako II*** ™ box to move the hoist at the set level. It is not necessary to move the joystick.
3) If the hoist doesn't move, move the slider and repeat until the hoist just starts to move. "Ideal" min voltage is the point at which the hoist barely moves when you hit the "test min" button.
4) To set the next channel, select the tab for the implement to change and repeat these steps.

Maximum Trim Voltage

The maximum voltage setting is pre-set at the factory to match the valve coil in use on this system. The max trim can be reduced below the pre-set level to (from full on to barely moving) by moving the max slider downward. This type of "lowered maximum" is used to balance the speed of the wing toe and wing heel or to lower the speed of a "lighter" implement to keep it from banging when run at top speed. The procedure is the same for the plow, wing, and blade tabs. Increasing the maximum voltage will only increase speed of motion up to the maximum capacity of the hydraulic system, increasing above that point will not increase the speed of the system.

Using the PC to Set the Maximum Voltage:

Caution, the hoist will move, keep all personnel clear before beginning.
1) With the truck running, move the "hoist up max slider" down in 0.1 volt increments. Each mouse click will move the value down 0.1V and the displayed value will change.
2) After each increase press and hold the "TEST MAX" button. This will tell the ***Mako II*** ™ to move the hoist at the set level. Do not move the joystick.
3) Final setting will depend on the desired maximum speed you seek. Observe the speed at several Max settings and choose the speed that meets your needs.
4) To set the next channel independently, select the tab for the implement you want to change and repeat this process.

Upload and Store the Trim and Settings

Once all the trims are set to the users liking, they must uploaded to the ***Mako II*** ™ box by clicking the "Send Cal" button.

NOTE: TRIMS ARE NOT UPDATED OR SAVED IN THE SYSTEM UNTIL THE SEND CAL BUTTON IS PRESSED.
This file can also be saved on the PC by clicking the file menu and saving the configuration.

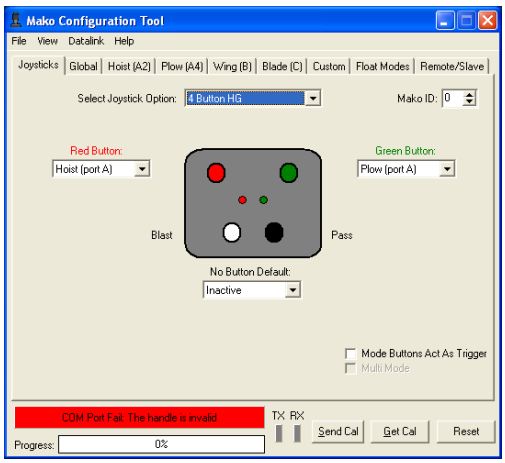
Downloading Trim and Settings – Backup Copy

In the event you wish to download the trim setting from a ***Mako II*** ***TM*** box. Connect the PC as before, and simply press the "Get Cal" button. Save the new file on your PC.

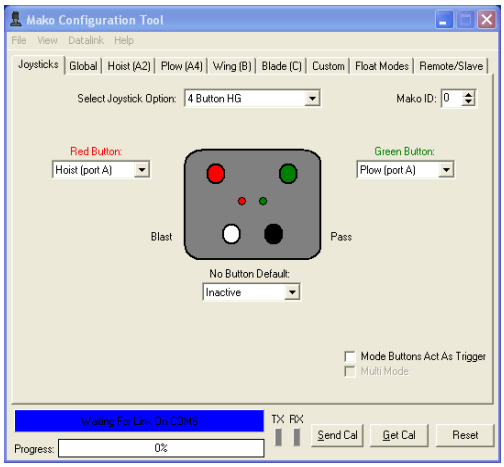
Using Stored Trims and Settings – Restore Settings

You may use a settings file stored on your PC to upload an existing configuration to a new (or repaired) ***Mako II*** ***TM*** plow control. Connect the PC to the ***Mako II*** ***TM*** plow control as before and click on "Send Cal." The ***Mako II*** ***TM*** plow control now is configured with the stored file.

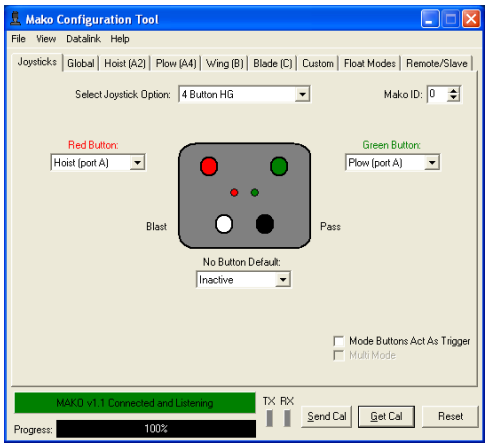
Trouble Shooting Communications Ports



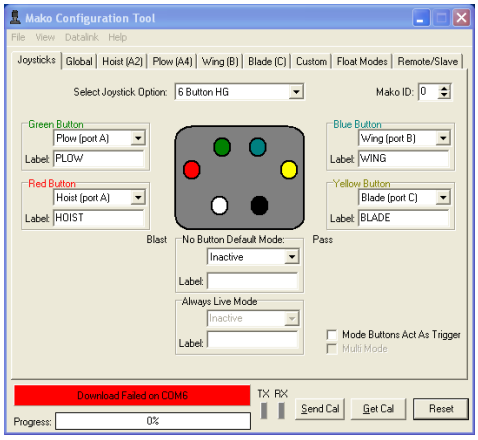
Red Bar: indicates serial port issue on PC in use; Close other programs using that serial port; Contact IT department;



Blue Bar: serial port ok, check cable and serial port number; Change to another serial port and try connection again;



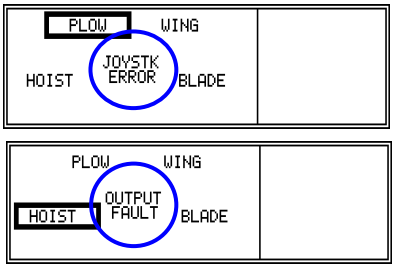
Green Bar: connected and listening, see progress bar for status of data transfer;



Red bar during download: download fail; Reset connection & cycle Mako II power.

Trouble Shooting – LED/Display Codes

Multi-Stix 216 & 320 Module **Uni-Grip 412 Stick** **Uni-Grip 620 & 820 Display**



Multistix 216, 320 or 420

LED Code	LED Indication/Correction
At first power up the LED's in the nose pod start to Flash for a few seconds what does that mean?	1.) At first power up the Mako's LEDs will alternately blink the Joystick firmware followed by the Mako firmware
The green LED is "ON" next to a joystick	1.) This signifies the Joystick is active without the need of the safety trigger, however, if there are two functions set to the specified joystick the LED will only light for the secondary function. 2.) The top button is being pressed on the joystick signifying secondary mode
Joystick Red Error LED is "ON"	1.) Bad Axis on the joystick. 2.) All good axis's will still work, however, the joystick will need to be replaced 3.) Joystick moved during startup test, repower the system and wait 10 seconds before moving any implement
Output error LED is On	1.) External failure in hydraulic output circuit "Open or Short". 2.) Release the joystick to see if it goes away. Troubleshoot wiring to hydraulic coil looking for opens and/or shorts; 3.)Verify that all joystick connections are plugged in tightly
"Output Error and Joystick Error" LED's flash fast at the same time after powering up the system	1.) Can-bus is not communicating with the joystick board; replace the Can-bus cable or joystick board
Green LEDS blink back and forth once per second	1.) The system is signifying float mode is active for the chosen implement
All the LED's flash when I am connected to a PC	1.) All LEDs flashing signifies a proper connection with a PC

Unigrip 420 Joystick	
LED Code	**LED Indication/Correction**
At first power up the LED's on the joystick flash back and forth for a few seconds what does that mean?	1.) At first power up the Mako's LEDs will alternately blink the Joystick firmware followed by the Mako firmware
Both LEDs on the joystick flash fast at the same time after powering up.	1.) Can-bus is not communicating with the joystick board; replace the Can-bus cable or joystick board
Both LEDS alternately blink	1.) The system is signifying float mode is active for the assigned implement
Unigrip 620 or 820 Joystick	
Display Code	
The display states Joystick Axis Error what does that mean?	1.) Bad Axis on the joystick. 2.) All good axis's will still work, however, the joystick will need to be replaced 3.) Joystick moved during startup test, repower the system and wait 10 seconds before moving any implement
I am displayed Output Error on the screen what does that mean?	1.) External failure in hydraulic output circuit "Open or Short". 2.) Release the joystick to see if it goes away. Troubleshoot wiring to hydraulic coil looking for opens and/or shorts; 3.)Verify that all joystick connections are plugged in tightly
Float is displayed on the screen	1.) The system is signifying float mode is active for the assigned implement
Mako 2 ™ CPU Box "Status" LED	
LED flashes around once per sec	Normal Operation
LED flashes around once per 2 sec	1.) Can-bus is not communicating with the joystick board 2.) Replace the Can-bus cable or joystick board

Trouble Shooting – Summary Table

Complaint	Cause (s)	Correction (s)
Set Up		
Power Isn't On	a) Master Power Off; b) Fuse is blown; c) Bad Power or Ground connection;	a) Turn on power; b) Replace Fuse c) Verify power/ground connections.
Mako II cuts out or acts strange;	Low power supply voltage from truck battery/alternator;	Minimum truck voltage must be > 12.0 volts;
Plow/Wing/Blade or Hoist Doesn't Move	a) PTO not engaged; b) Hydraulics not functioning; c) Electrical connection failure; d) Mako II power off; e) Joystick malfunction;	a) Engage PTO; b) Verify Hydraulics: actuate plow or hoist; manually operate using manual over-ride on valve; c) Check LED at coil connection and at valve junction box; Repair cable connections; d) Check wiring connections; e) "Power up" joystick self test; Repair/replace indicated joystick.
System doesn't respond to joystick (initial setup)	a) Mako II not configured to match the joystick system in truck; b) one or more joysticks have failed and Mako II has canceled the output signal to protect the hydraulic system;	a) Use Mako II Trim to configure the system to match the joystick installed in the truck. b) See Joystick Safety section in this manual to diagnose which joystick has failed;
Implement (plow) moves without actuating joystick;	a) Output signal on at all times;	a) Verify joystick cable is plugged in properly on both ends; b) Verify that individual joysticks are plugged into joystick PCB in arm unit. c) Joystick was damaged by incorrect wiring and must be replaced.
Display/LED's		
LCD too dark or too light (Uni-Grip 620 or 820 only)	Contrast setting needs to be changed;	Simultaneously push Blast and Pass buttons to enter contrast mode. Then push blast to raise, pass to lower.
LCD Display Changes	Some variation is normal	Re-set contrast as needed;
LCD is Blank or Locks Up	CPU Lock Up; LCD Failure; LCD Cable Failure	a) Master System Reset (power); b) Replace LCD; c) Replace LCD Cable;

Appendix A: Spare parts list

Uni-Grip 820, 620,412 (Mako II Style)

UG-620M-NP-0	Mako II UG 620 nose piece w/ Joystick no indicators
000865	UG 620 Joystick (6 button)
020283	16' LCD cable
UG412M-NP-0	Mako II UG-412 nose piece w/ Joystick - no indicators
000864	UG 412 Joystick (4 button)

Multi-Stix 216 and 320 (Mako II Style)

000848	HFX Dual Axis Joystick
000845	HFX Single Axis Joystick
001032	Printed Lens for Sprague switch

Parts that are Common to both Uni-Grip and Multi-Stix Systems

030188-Rev B	Mako II CPU in blue x tech enclosure w/ Mako Trim
0205086	M12 Male to Female CAN Bus Joystick Cable - 10' length
HH-1001	Cirus Bus cable (from Mako II to HammerHead)
MK-1003	Mako II Power Cable
MK-1004	Mako II Remote Blast/Pass cable
MK-1004E-M.5	Mako II Remote Blast/Pass cable -19”
MK-1004E-M3	Mako II Remote Blast/Pass cable -10ft
MK-1005	Mako II Aux inputs cable
MK-1006	Mako II indicator lights cable

IP 68 Valve Junction Box Parts

TS-2031	8 (active) Port Junction Box
TS-2018	4 (active) Port Junction Box
TS-2010	24" Pigtail with Weatherpak termination (2 pin, tower half)
TS-2011	24" Pigtail with AMP Jr termination (2 pin)
TS-2012	24" Pigtail with AMP termination (2 pin)
TS-2013	24" Pigtail with C2 (ITT Canon)Termination
TS-2014	24' Pigtail with DIN Terminations
TS-2016	24' Pigtail with 2-m12 to DIN Termination
TS-2017	24' Pigtail with Metri-pack Termination
TS-2020	24' Pigtail with Deutsch Termination

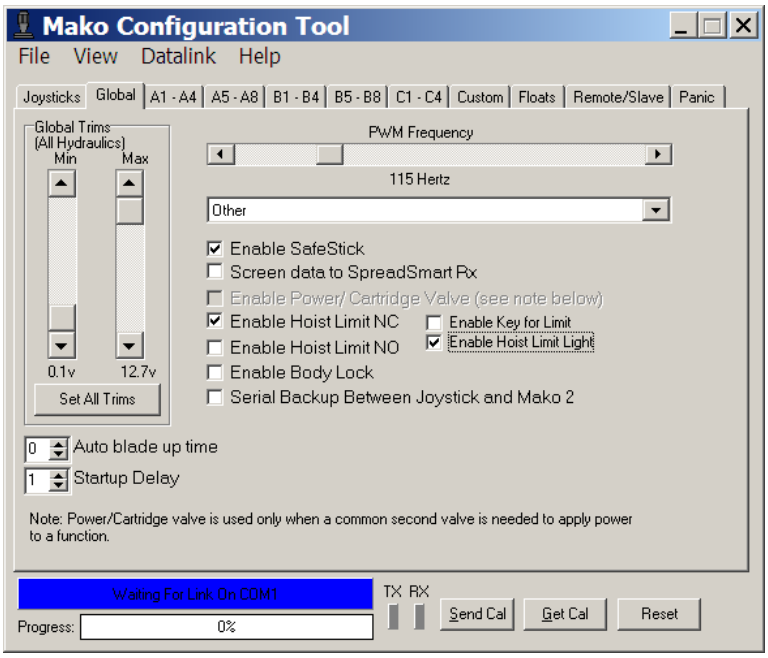
Appendix B – Glossary of Plow Control Terms

Uni-Grip ***TM***: Single joystick system for controlling plowing systems.
Multi-Stix ***TM :*** Multiple joystick system for controlling plowing systems.
Mako II ***TM***: Electronics backpack housing CPU and interconnections.
Mako Trim ***TM***: Windows compatible software for configuration of plow control system.
Proportional Control: the ability to control motion of a plow in a smooth, feathering manner from slowest to fastest speed of motion possible for a given hydraulic set up. The closer the joystick is to center (neutral) the slower the implement will move; the further from center the faster the implement will move.

Bang-Bang Control: the ability to control motion of a plow as either fully on or fully off resulting in a single speed of motion determined by the hydraulic system (no operator control).
Minimum Trim: the minimum signal voltage delivered to the coil necessary to result in enough flow of hydraulic fluid to begin to move the implement selected.
Maximum Trim: the maximum signal voltage delivered to the coil necessary to result in enough flow of hydraulic fluid to reach the maximum speed of motion of the implement intended.
Float Function: the automatic removal of hydraulic down pressure on a plow, wing or blade using the joystick that allows plow to "float" on the road with only its weight pushing down.
Active Mode: the joystick mode that has been selected by the operator, allowing him to move the device assigned to that mode.
Button Assignment: the device to which that joystick button is assigned. Example: the green button is assigned to operate the plow. Button assignments may only be changed by re-configuring the ***Mako II*** ***TM*** controller.
No Button Mode: the joystick control mode that does not require a button to be pushed. When assigned to a device, this mode operates without pushing one of the joystick buttons. Device movement is possible after depressing the joystick safety trigger.

Appendix C – Additional Features/Options

HLSW100-MK	Hoist Limit Sensor with Keyswitch
HBL100	Body Lock – locks out hoist function when dump body is locked in down position
ABU100	Auto Blade Up when truck is backing up
APHF100	Active pressure holding float – replaces accumulator on underbody blade



JOYSTICK OPTIONS:

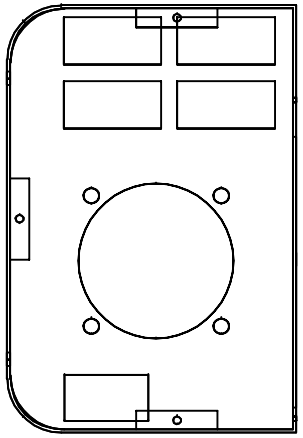
864 4-BUTTON JOYSTICK
865 6-BUTTON JOYSTICK
862 8-BUTTON JOYSTICK
848 DUAL AXIS HFX STICK
845 SINGLE AXIS HFX STICK

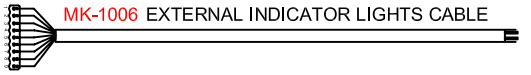
JOYSTICK POD OPTIONS:

910.2 UNI-GRIP 6.16, 6.32, 8.16, 8.32 SHEETMETAL
911.2 MULTI-STIX 210
911.3 MULTI-STIX 314
???????? POD JOYSTICK BOARD (USED IN ALL POD OPTIONS)

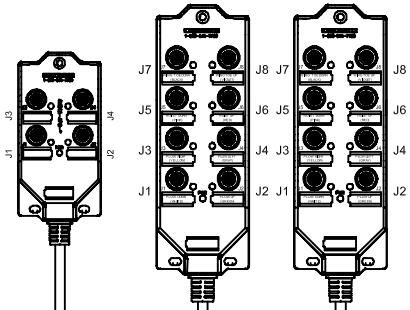
VALVE PIGTAIL OPTIONS

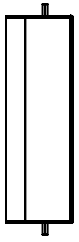
TS-2010 M12 TO WEATHERPACK
TS-2011 M12 TO AMP JUNIOR TIMER
TS-2012 M12 TO AMP
TS-2013 M12 TO ITT CANNON
TS-2014 M12 TO DIN
TS-2017 M12 TO METRI-PACK 150
TS-2020 M12 TO DEUTSCH
TS-2016 DUAL M12 TO DIN





MK-2001 INTERNAL INDICATOR LIGHTS CABLE
MK-1006 EXTERNAL INDICATOR LIGHTS CABLE





LCD
(UNI-GRIP 6.16,
6.32,8.16,8.32)

MK-1003 POWER — POWER
USED TO COMMUNICATE WITH PERSONAL COMPUTER — PC PORT
020283 — LCD
0205086 CAN BUS CABLE — CAN BUS
TS-2101 EXTENSION CABLE — HOIST LIMIT
HH-1001 BUS CABLE — CIRUS BUS
MK-2000 AUX INPUTS — AUX INPUTS
MK-1004 BLAST/PASS — BLAST / PASS
SF-1004 COIL CONTROL — CARTRIDGE
SF-1004 COIL CONTROL — DA FLOAT

ACCESORY CIRCUITS LIKE AUTO BLADE UP AND BODY LOCK ATTACH TO THE AUX INPUT CABLE

HYD C — TS-2018 BLADE 2 OUTPUTS
HYD B — TS-2031 WING HEEL, WING SLIDE & BLADE OUTPUTS
HYD A — TS-2031 HOIST, PLOW, & WING TOE OUTPUTS

MAKO 2 (UNI-GRIP 6.16,6.32, 8.16,8.32,MULTI-STIX TWIN, MULTI-STIX TRIO)

CIRUS CONTROLS LLC
9210 WYOMING AVE. N. SUITE 200
BROOKLYN PARK, MN 55445
Phone: (763) 493-9380
Fax: (763) 493-9340

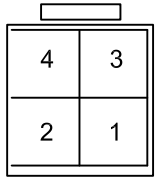
REV	DATE	DESCRIPTION
A	-	-
B	-	-
C	-	-
D	-	-
E	-	-

MAKO 2 CONTROL SYSTEM

CABLE OVERVIEW

DESIGN:	DRAWN:	AS BUILT:	PROJECT NUMBER:	SCALE:	DATE: 3-12-08	REV.
JTM	JTM	—	MAKO2-0V	NONE	SHT 1 OF 1	—

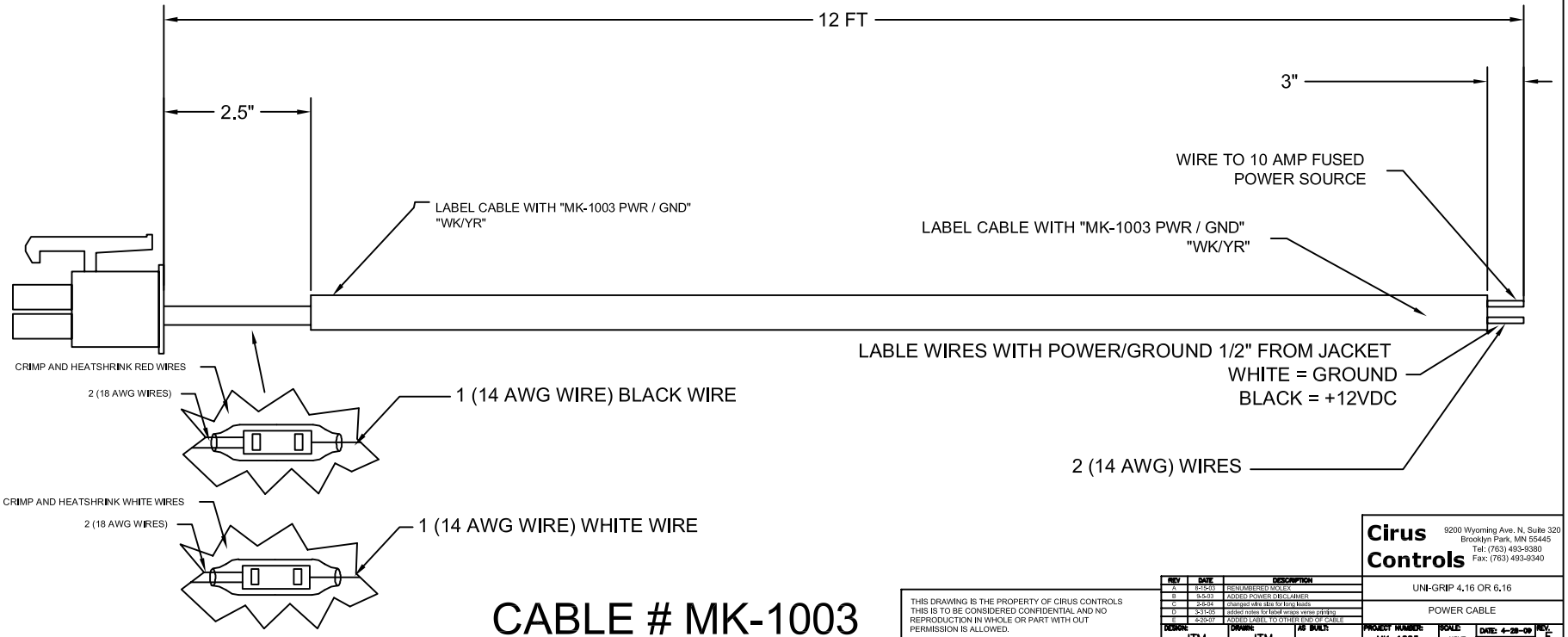
B.O.M.



BACK VIEW
(SIDE PINS ARE INSERTED FROM)

MOLEX PIN#	SIGNAL
1	GROUND : WHITE (18AWG)
2	+12 VDC : RED - BLACK (18AWG)
3	GROUND : WHITE (18AWG)
4	+12 VDC : RED - BLACK (18AWG)

QTY	PART NUMBER	DESCRIPTION
1	39-01-2040 (Digi-Key WM3701-ND)	MOLEX RECEPTACLE 4 PIN
4	39-00-0039 (Digi-Key WM2501-ND)	MOLEX TERMINALS FEMALE 18-24 AWG
12'	AUTOMOTIVE GRADE	2 CONDUCTOR 14 AWG CABLE



CABLE # MK-1003

REV	DATE	DESCRIPTION
A	8-15-03	RENUMBERED MOLEX
B	9-5-03	ADDED POWER DISCLAIMER
C	2-5-04	changed wire size for long leads
D	5-31-05	added notes for label wraps verse printing
E	5-20-07	ADDED LABEL TO OTHER END OF CABLE

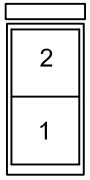
DESIGN:	DRAWN:	AS BUILT:
JTM	JTM	—

Cirus Controls
9200 Wyoming Ave, N, Suite 320
Brooklyn Park, MN 55445
Tel: (763) 493-9380
Fax: (763) 493-9340

UNI-GRIP 4,16 OR 6,16

POWER CABLE

PROJECT NUMBER:	SCALE:	DATE: 4-28-09	REV.
MK-1003	NONE	SHT 1 OF 1	F

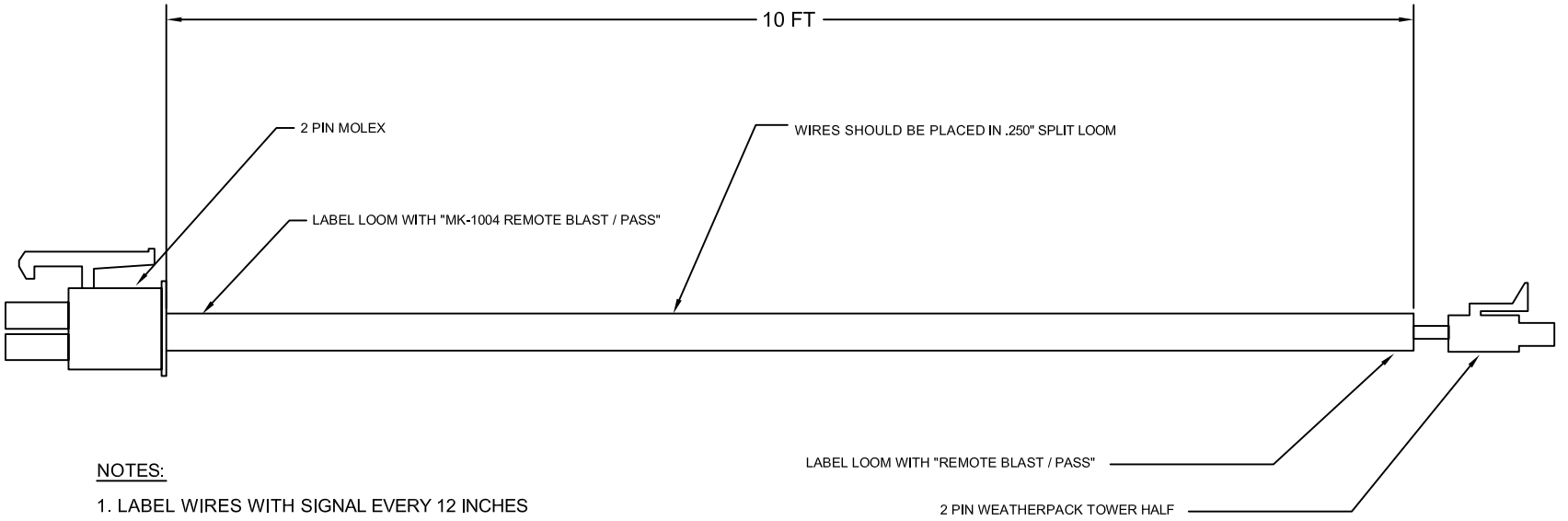


BACK VIEW
(SIDE PINS ARE INSERTED FROM)

MOLEX PIN#	SIGNAL	WEATHERPACK PIN#
2	BLAST : ORANGE (20AWG)	1
1	PASS : BLUE (20AWG)	2

B.O.M.

QTY	PART NUMBER	DESCRIPTION
1	39-01-2020 (Digi-Key WM3700-ND)	MOLEX RECEPTACLE 2 PIN
2	39-00-0039 (Digi-Key WM2501-ND)	MOLEX TERMINALS FEMALE 18-24 AWG
10 FT	LCP-250	.250" SPLIT LOOM
1	Waytek 38043	2-PIN WEATHERPACK (TOWER HALF)
2	Waytek 30035	FEMALE TERMINALS 18-20 AWG



NOTES:

1. LABEL WIRES WITH SIGNAL EVERY 12 INCHES
2. TAPE SPLIT LOOM EVERY 12 INCHES

CABLE # MK-1004

Cirus Controls
9200 Wyoming Ave. N, Suite 320
Brooklyn Park, MN 55445
Tel: (763) 493-9380
Fax: (763) 493-9340

REV	DATE	DESCRIPTION
A	6-15-03	RENUMBERED MOLEX
B	8-26-08	corrected molex pin count
C	-	-
D	-	-
E	-	-

DESIGN:	DRAWN:	AS BUILT:
JTM	JTM	—

UNI-GRIP 4.16 OR 6.16

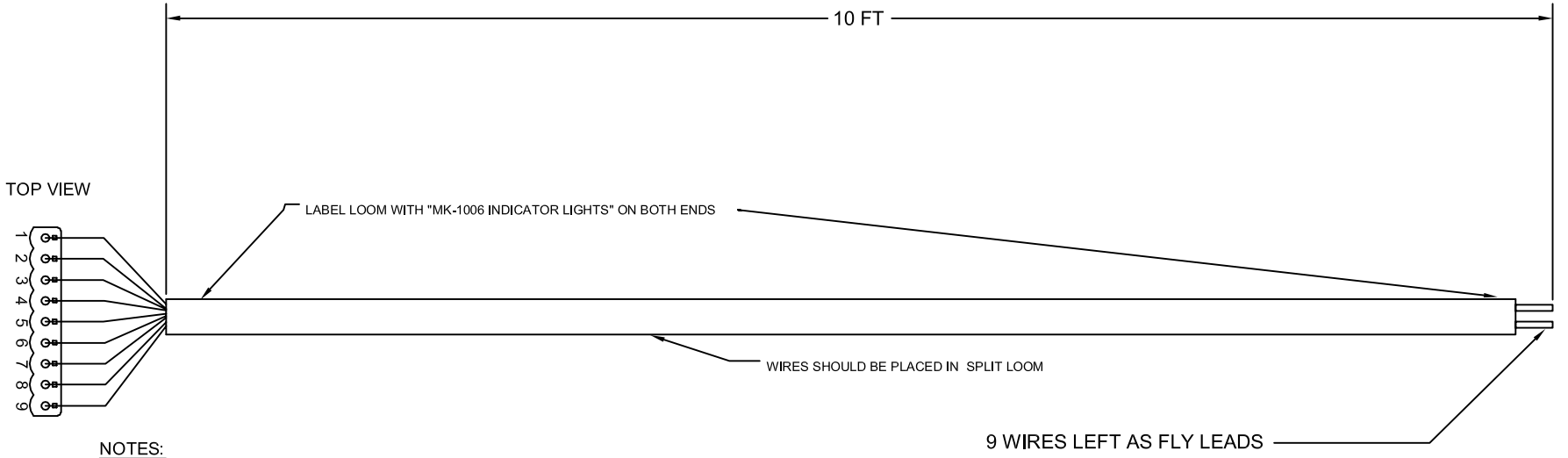
REMOTE BLAST PASS

PROJECT NUMBER:	SCALE:	DATE: 7-7-03	REV.
MK-1004	NONE	SHT 1 OF 1	B

PIN#	SIGNAL
1	INDICATOR 1 : BROWN (18AWG)
2	INDICATOR 2: PINK (18AWG)
3	INDICATOR 3: ORANGE (18AWG)
4	INDICATOR 4: BLUE (18AWG)
5	INDICATOR 5: YELLOW (18AWG)
6	INDICATOR 6 : GRAY (18AWG)
7	INDICATOR 7: PURPLE (18AWG)
8	INDICATOR 8: BLACK (18AWG)
9	INDICATOR +12 VDC : RED (18AWG)

B.O.M.

QTY	PART NUMBER	DESCRIPTION
1	231-309/037-000	9 PIN WAGO CONNECTOR
10 FT	LCP-413	.413" SPLIT LOOM



NOTES:

1. LABEL WIRES WITH SIGNAL EVERY 12 INCHES
2. TAPE SPLIT LOOM EVERY 12-24 INCHES

CABLE # MK-1006

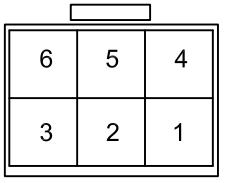
REV	DATE	DESCRIPTION
A	8-6-03	changed loom size
B	-	-
C	-	-
D	-	-
E	-	-

DESIGN:	DRAWN:	AS BUILT:	PROJECT NUMBER:	SCALE:	DATE: 8-6-03	REV.
JTM	JTM	—	MK-1006	NONE	SHT 1 OF 1	A

Cirus Controls
9200 Wyoming Ave, N, Suite 320
Brooklyn Park, MN 55445
Tel: (763) 493-9380
Fax: (763) 493-9340

UNI-GRIP 4.16 OR 6.16

INDICATOR LIGHTS

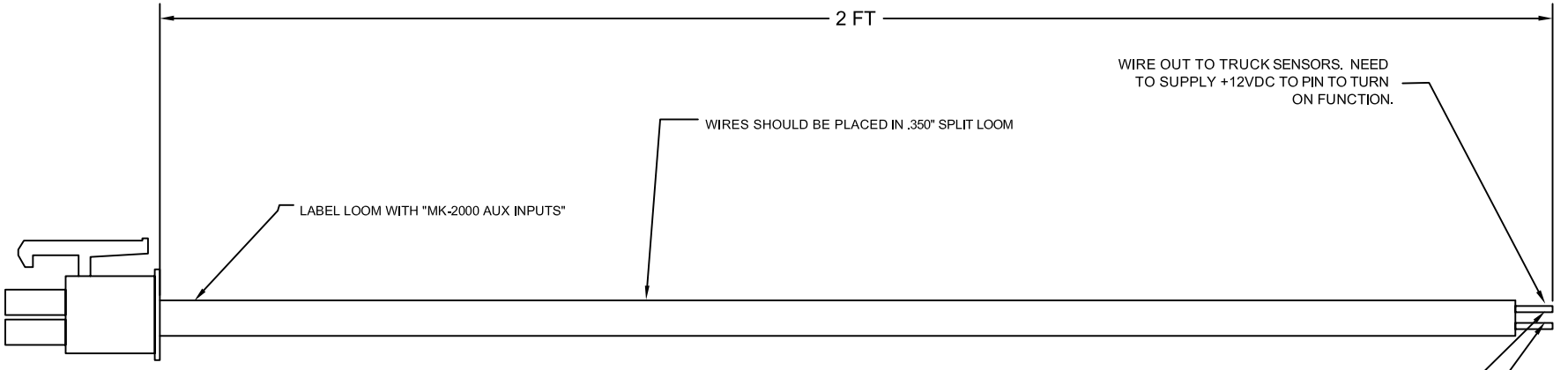


BACK VIEW
(SIDE PINS ARE INSERTED FROM)

MOLEX PIN#	SIGNAL
6	AUTO BLADE UP : YELLOW (18AWG)
5	FUTURE EXPANSION : WHITE (18AWG)
4	+12 VDC: RED (18AWG)
3	BODY LOCK OR LIMIT : PURPLE (18AWG)
2	FUTURE EXPANSION : GRAY (18AWG)
1	GROUND : BLACK (18AWG)

B.O.M.

QTY	PART NUMBER	DESCRIPTION
1	WM3702-ND	MOLEX RECEPTACLE 6 PIN
6	WM2501-ND	MOLEX TERMINALS FEMALE 18-24 AWG
2FT	LCP-350	.350" SPLIT LOOM
2	30512 (WAYTEK)	MALE TERMINALS



NOTES:

1. LABEL WIRES WITH SIGNAL EVERY 12 INCHES
2. TAPE SPLIT LOOM EVERY 12 INCHES

REV	DATE	DESCRIPTION
A	4-21-08	FIXED PART ERRORS
B	4-24-08	FIXED DESCRIPTION ERROR
C	5-29-08	moved male spade to black wire
D	-	-
E	-	-

DESIGN:	DRAWN:	AS BUILT:	PROJECT NUMBER:	SCALE:	DATE:	REV.
JTM	JTM	—	MK-2000	NONE	4-16-08 SHT 1 OF 1	C

Cirus Controls
9210 Wyoming Ave, N, Suite 200
Brooklyn Park, MN 55445
Tel: (763) 493-9380
Fax: (763) 493-9340

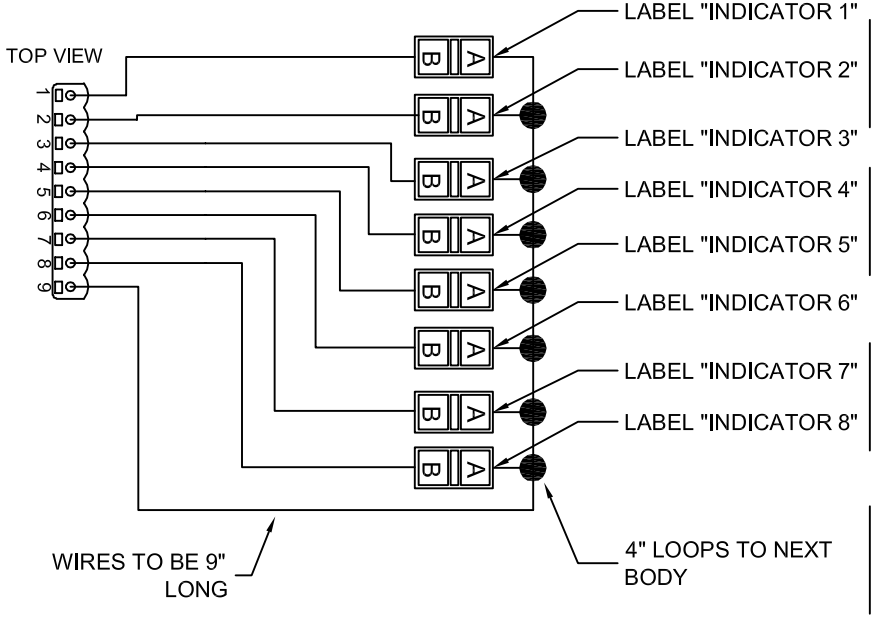
MAKO 2

AUX INPUTS

B.O.M. (CABLE HOUSE)

QTY	PART NUMBER	DESCRIPTION
1	231-639/019-000	9 PIN WAGO BULKHEAD CONNECTOR
16	SPC-2004	FEMALE SPADES FOR SPRAGUE PLUGS
8	SP913.328	SPRAGUE PLUG FOR LIGHT

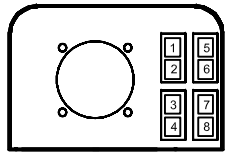
PIN#	SIGNAL	LENGTH
1	INDICATOR 1 : ORANGE (20AWG)	9"
2	INDICATOR 2: BLUE (20AWG)	9"
3	INDICATOR 3: GREEN (20AWG)	9"
4	INDICATOR 4: PURPLE (20AWG)	9"
5	INDICATOR 5: YELLOW (20AWG)	9"
6	INDICATOR 6 : GRAY (20AWG)	9"
7	INDICATOR 7: PINK (20AWG)	9"
8	INDICATOR 8: BLACK (20AWG)	9"
9	INDICATOR +12 VDC : RED (20AWG)	SEE DWG

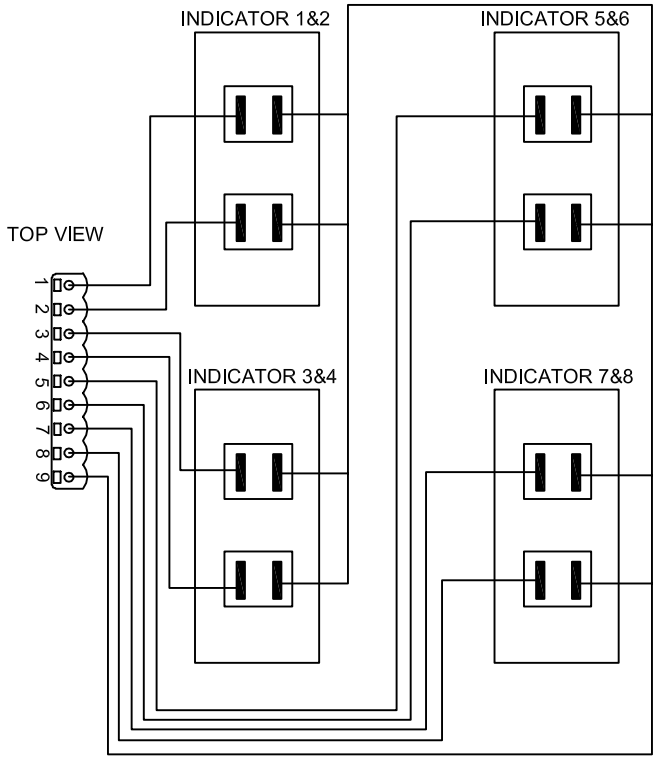


CABLE # MK-2001

B.O.M. (AT CIRUS)

QTY	PART NUMBER	DESCRIPTION
4	511.502	SPRAGUE LIGHT MODULE





REV	DATE	DESCRIPTION
A	-	-
B	-	-
C	-	-
D	-	-
-	-	-

DESIGN:	DRAWN:	AS BUILT:	PROJECT NUMBER:	SCALE:	DATE: 7-7-08	REV.
JTM	JTM	—	MK-2001	NONE	SHT 1 OF 1	—

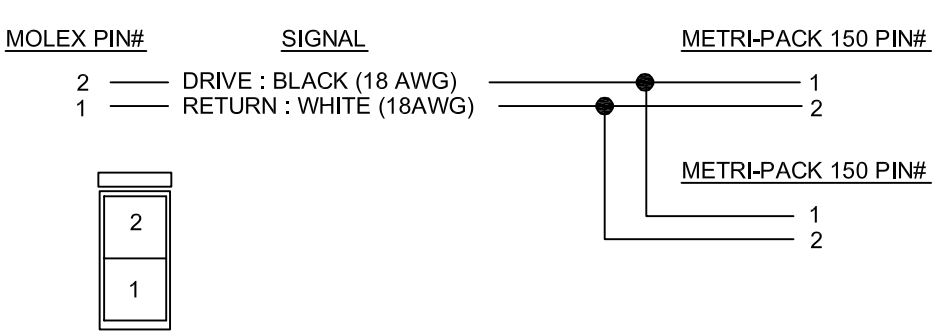
UNI-GRIP 4,16 OR 6,16

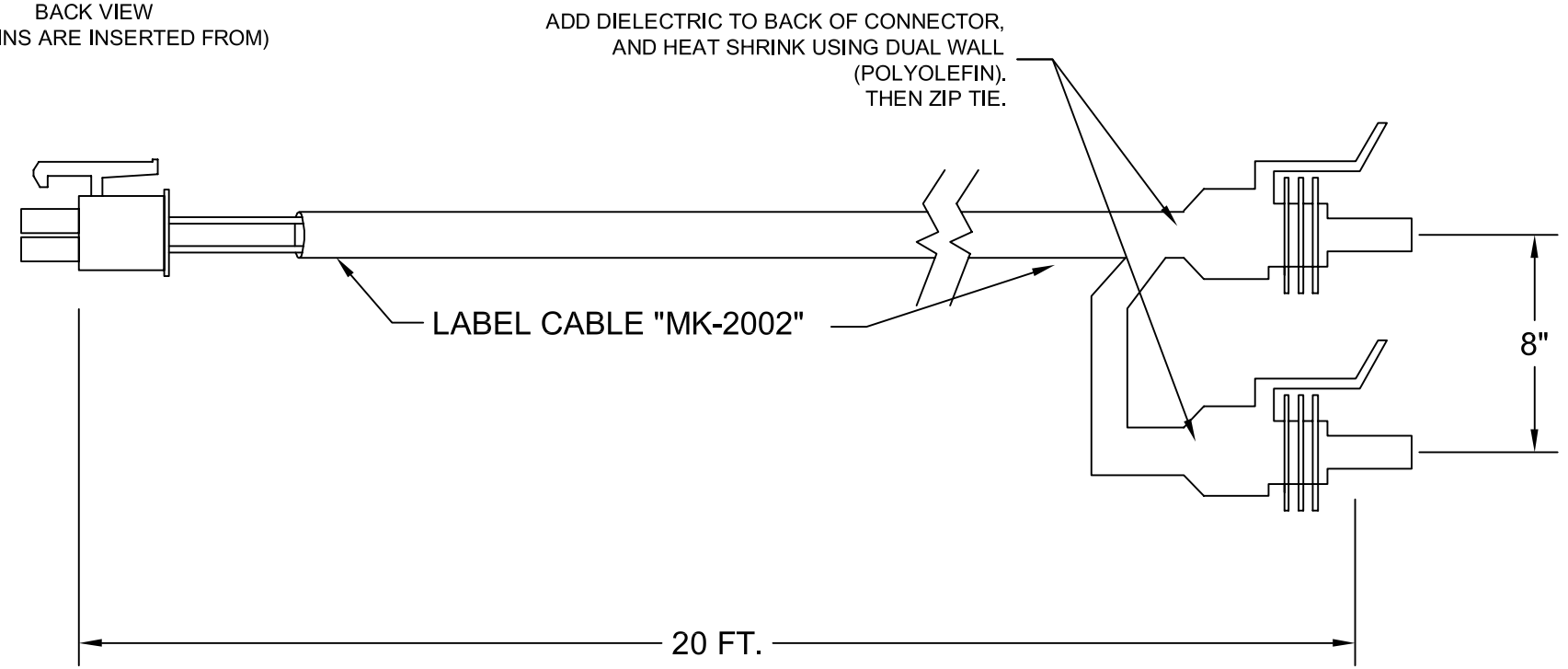
INDICATOR LIGHTS IN POD

Cirus Controls
9200 Wyoming Ave, N, Suite 320
Brooklyn Park, MN 55445
Tel: (763) 493-9380
Fax: (763) 493-9340

B.O.M.

QTY	PART NUMBER	DESCRIPTION
1	39-01-2020	MOLEX RECEPTACLE 2 PIN
2	39-00-0039	MOLEX TERMINALS FEMALE 18-24 AWG
18 FT	???	18 AWG, 2 COND. SVO CABLE or SIMILAR
2	38201 (waytek)	FEMALE METRI-PACK 150 2 pin
4	31077 (waytek)	FEMALE TERMINALS 16-18 AWG
2	38202 (waytek)	TPA LOCK
4	39008 (waytek)	CABLE SEALS





NOTES:
1. TWIST TIE CABLES IN A LOOP

MK-2002

REV	DATE	DESCRIPTION
A	-	-
B	-	-
C	-	-
D	-	-
E	-	-

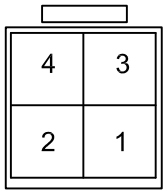
CIRUS CONTROLS LLC
9210 WYOMING AVE. N. SUITE 200
BROOKLYN PARK, MN 55445
Phone: (763) 493-9380
Fax: (763) 493-9340

MAKO II CABLE SYSTEM

CABLE FOR MANUAL POWER FLOAT BLOCK

DESIGN:	DRAWN:	AS BUILT:	PROJECT NUMBER:	SCALE:	DATE:	REV.
JTM	JTM	—	MK-2002	NONE	12-2-08 SHT 1 OF 1	—

CABLE # MK-3002



BACK VIEW
(SIDE PINS ARE INSERTED FROM)

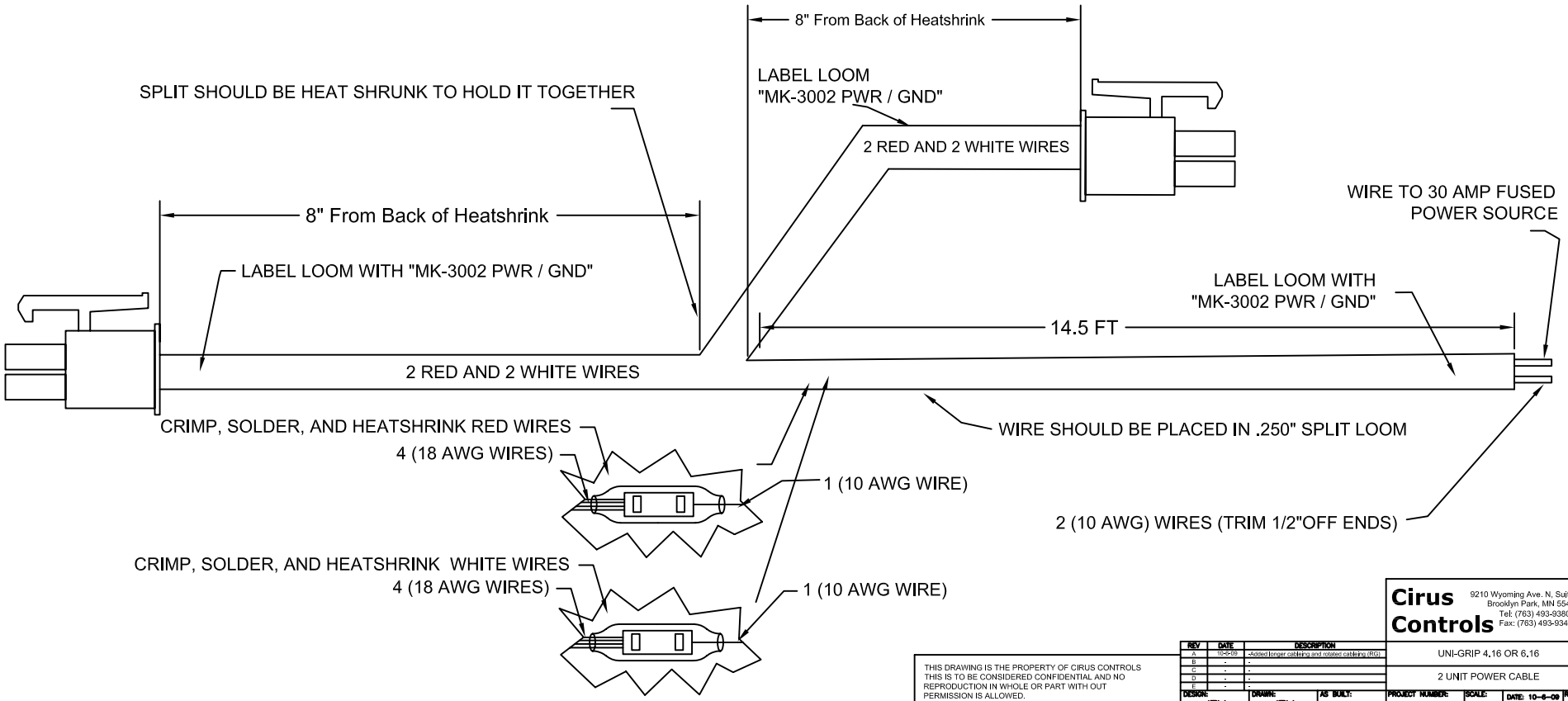
MOLEX PIN#	SIGNAL
1	GROUND : WHITE (18AWG)
2	+12 VDC : RED (18AWG)
3	GROUND : WHITE (18AWG)
4	+12 VDC : RED (18AWG)

B.O.M.

QTY	PART NUMBER	DESCRIPTION
2	39-01-2040 (Digi-Key WM3701-ND)	MOLEX RECEPTACLE 4 PIN
8	39-00-0039 (Digi-Key WM2501-ND)	MOLEX TERMINALS FEMALE 18-24 AWG
15-1/2 FT	LCP-250	.250" SPLIT LOOM

NOTES:

1. LABEL WIRES WITH SIGNAL EVERY 12 INCHES
2. TAPE SPLIT LOOM EVERY 12 INCHES



REV.	DATE.	DESCRIPTION
A	10-6-09	Added longer cabling and rotated cabling (RG)
B	-	-
C	-	-
D	-	-
E	-	-

DESIGN:	DRAWN:	AS BUILT:
JTM	JTM	–

Cirus Controls
9210 Wyoming Ave. N, Suite 200
Brooklyn Park, MN 55445
Tel: (763) 493-9380
Fax: (763) 493-9340

UNI-GRIP 4.16 OR 6.16

2 UNIT POWER CABLE

PROJECT NUMBER:	SCALE:	DATE:	REV.
MK–3002	NONE	10–6–09	A
		SHT 1 OF 1	

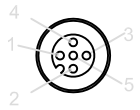
Notes:

1) Each cable to be bagged and labelled.

BILL OF MATERIALS

OUR #	PART #	QTY	DESCRIPTION
-	RSC 4.5T-5/CS...	1	5 PIN MALE M12 18 AWG CORDSET-5M
000361	DE09PDUCD1	1	DB9 MALE SOLDERABLE
000360	NORCOMP 993-009-010R031	1	DB9 BACKSHELL w/THUMBSCREWS

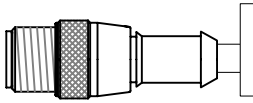
EuroFast
Male Pins,
Male Threads
or Coupling Nut



5 Pin

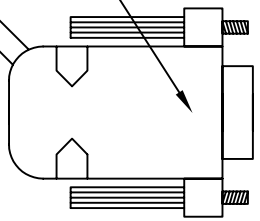
M12 PIN	COLOR	SIGNAL NAME	DB9 PIN
1	RED	GROUND	5
2	RED/WHITE	12V POWER	4
3	RED/BLACK	5V POWER	9
4	RED/YELLOW	TX	3
5	GREEN	RX	2

DB9 MALE END



PN:020283
(Display)

Warning Do Not
Pinch or Zip-tie
Cable Tightly
PN:020283
(C1001-LCD)



Label each cable

Cable #020283 (C1001-LCD)

Label each cable

REV	DATE	DESCRIPTION
A	02-21-08	Updated colors for custom wire
B	7-16-08	added label for both sides-
C	-	-
D	-	-
E	-	-
F	-	-
G	-	-
H	-	-
-	-	-
-	-	-

CIRUS
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BROOKLYN PARK, MN 55445
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Fax: (763) 493-9340

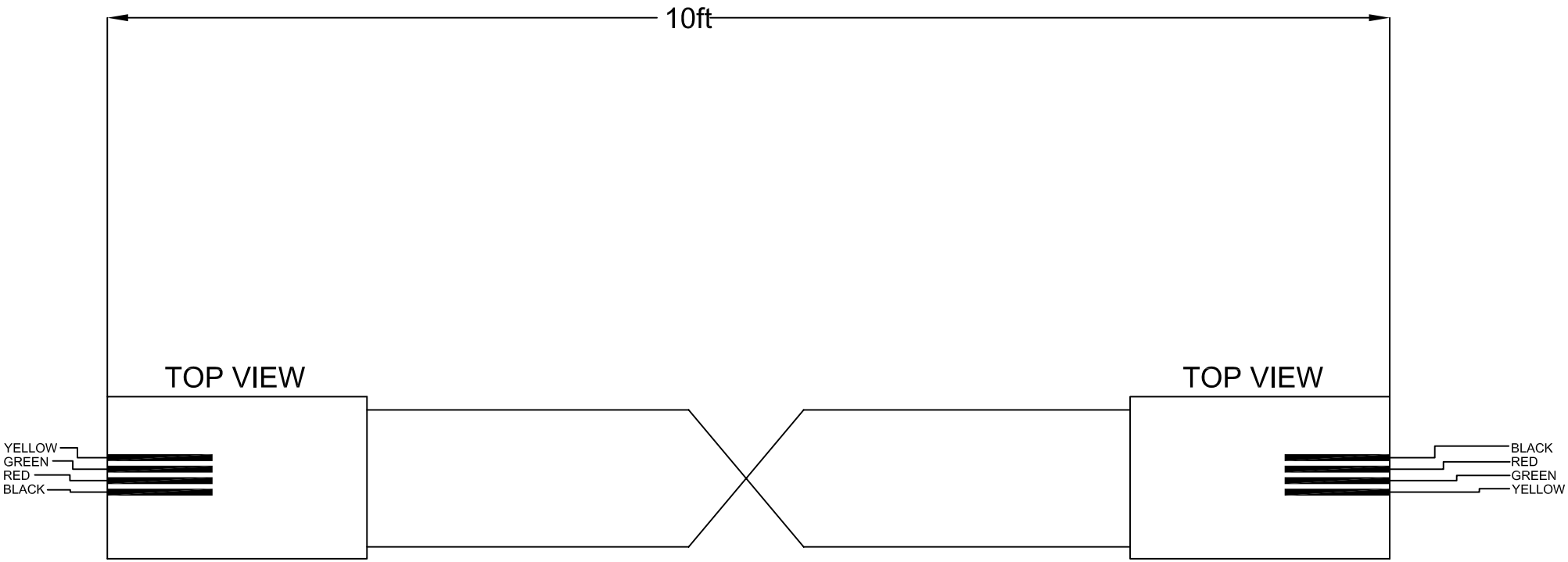
MINI TIGER SHARK

LCD/VFD CABLE FOR DISPLAY

DESIGN:	DRAWN:	AS BUILT:	PROJECT NUMBER:	SCALE:	DATE: 07-16-08	REV.
MVM	MVM	—	C1001-LCD	NONE	SHT 1 OF 1	B

BILL OF MATERIALS

OUR #	PART #	QTY	DESCRIPTION
000394	A9091-ND (NO SUBS)	2	4 PIN PLUG
001236	H0042-100-ND	10 FT	4 CONDUCTOR PHONE CORD



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REV	DATE	DESCRIPTION
A	1-20-05	SWITCHED PART TO AMP PLUG WITH NO SUBS
B	-	-
C	-	-
D	-	-
E	-	-

HAMMERHEAD

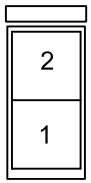
BUS CABLE

DESIGN:	DRAWN:	AS BUILT:	PROJECT NUMBER:	SCALE:	DATE: 5-22-07	REV.
JTM	JTM	—	HH-1001-3M	NONE	SHT 1 OF 1	A

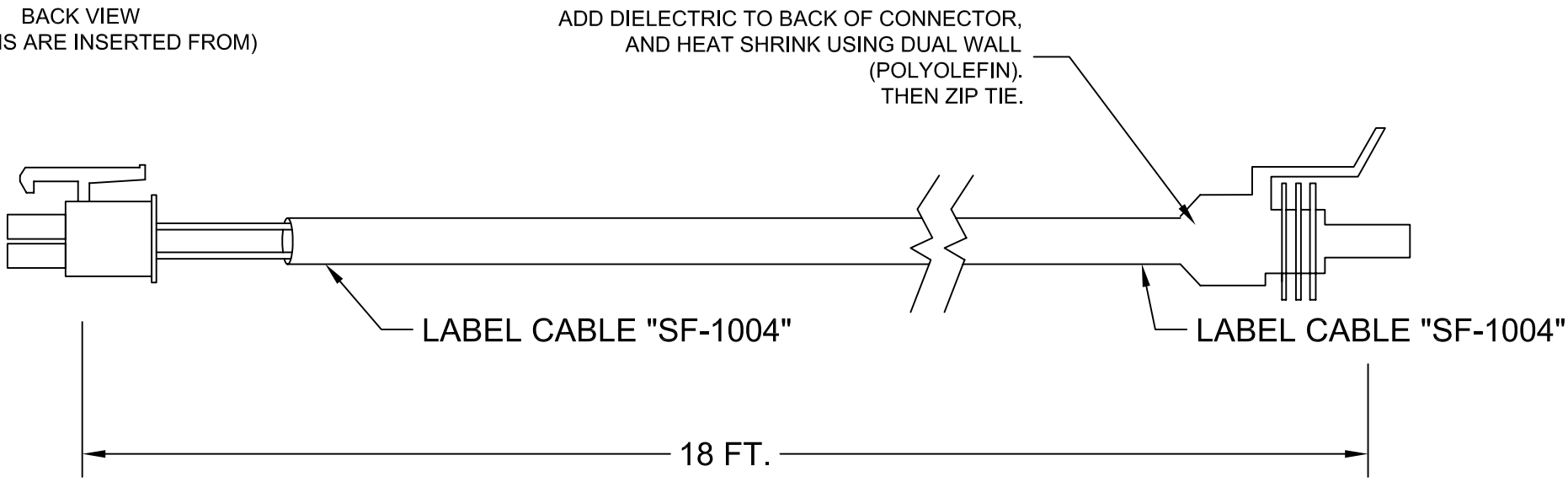
B.O.M.

QTY	PART NUMBER	DESCRIPTION
1	39-01-2020	MOLEX RECEPTACLE 2 PIN
2	39-00-0039	MOLEX TERMINALS FEMALE 18-24 AWG
18 FT	???	18 AWG, 2 COND. SVO CABLE or SIMILAR
1	38201 (waytek)	FEMALE METRI-PACK 150 2 pin
2	31077 (waytek)	FEMALE TERMINALS 16-18 AWG
1	38202 (waytek)	TPA LOCK
2	39008 (waytek)	CABLE SEALS

MOLEX PIN#	SIGNAL	METRI-PACK 150 PIN#
2	DRIVE : BLACK (18 AWG)	A
1	RETURN : WHITE (18AWG)	B



BACK VIEW
(SIDE PINS ARE INSERTED FROM)



NOTES:
1. TWIST TIE CABLES IN A LOOP

SF-1004

REV	DATE	DESCRIPTION
A	11-16-06	ADDED NOTES FOR LABEL AND TWIST TIE
B	4-20-07	ADDED LABELS
C	3-14-08	CORRECTED PART NUMBERS
D	-	-
E	-	-

CIRUS
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SWORDFISH SPREADER CABLE SYSTEM

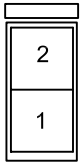
METRI-PACK 150 HYDRAULIC CABLE

DESIGN:	DRAWN:	AS BUILT:	PROJECT NUMBER:	SCALE:	DATE: 3-14-08	REV.
JTM	JTM	–	SF-1004	NONE	SHT 1 OF 1	C

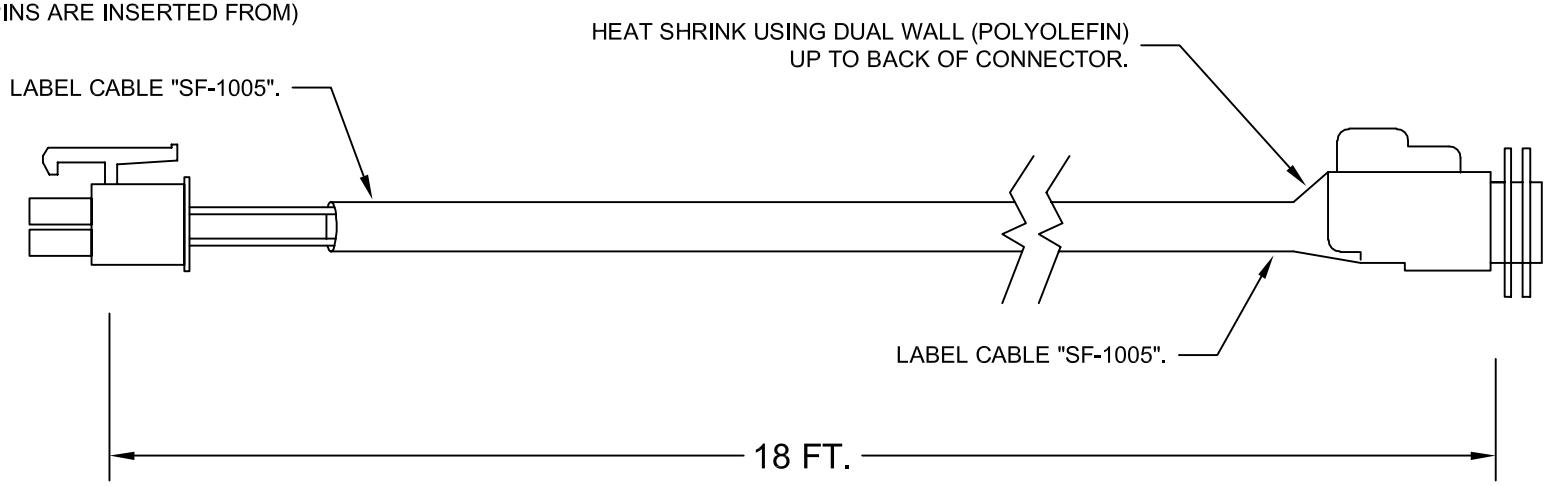
B.O.M.

MOLEX PIN#	SIGNAL	DEUTSCH
2	DRIVE : BLACK (18 AWG)	1
1	RETURN : WHITE (18AWG)	2

QTY	PART NUMBER	DESCRIPTION
1	39-01-2020	MOLEX RECEPTACLE 2 PIN
2	39-00-0039	MOLEX TERMINALS FEMALE 18-24 AWG
18 FT	???	18 AWG, 2 COND. SVO CABLE or SIMILAR
1	DT06-2S (LADD)	DEUTSCH PLUG
2	0462-201-16141 (LADD)	FEMALE TERMINALS 16-18 AWG
1	W2S (LADD)	DEUTSCH WEDGE LOCK



BACK VIEW
(SIDE PINS ARE INSERTED FROM)



SF-1005

REV	DATE	DESCRIPTION
A	4-20-07	ADDED LABELS
B	9-5-07	REMOVED HEAT SHRINK OVER CONNECTOR
C	-	-
D	-	-
E	-	-

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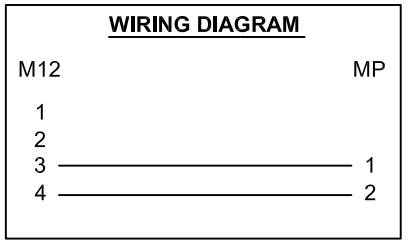
SWORDFISH SPREADER CABLE SYSTEM

DEUTSCH HYDRAULIC CABLE

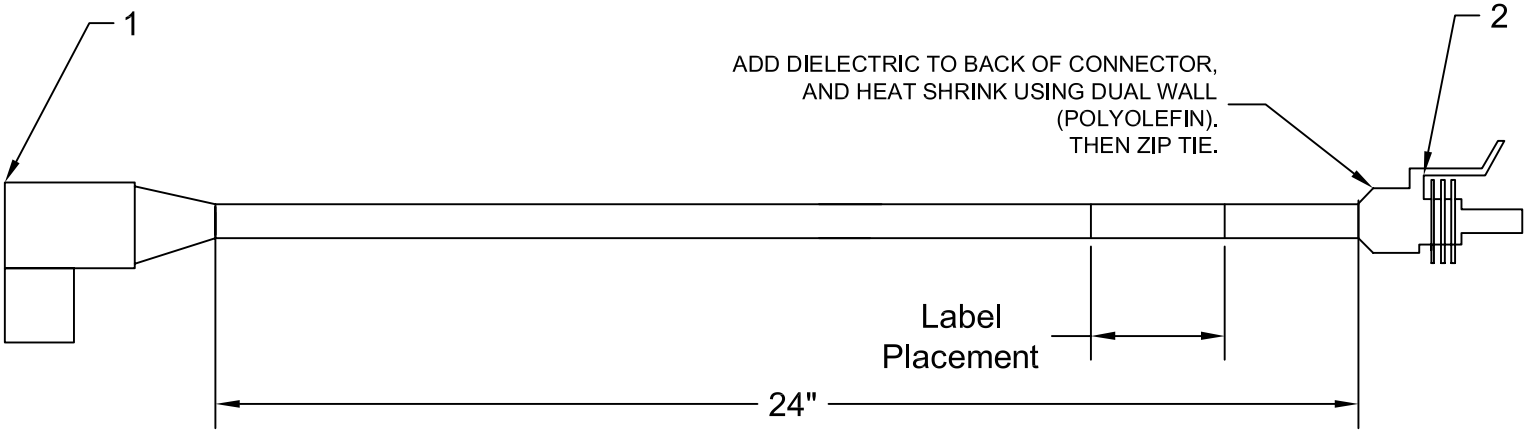
DESIGN:	DRAWN:	AS BUILT:	PROJECT NUMBER:	SCALE:	DATE: 4-20-07	REV.
JTM	JTM	—	SF-1005	NONE	SHT 1 OF 1	B

WIRING DIAGRAM



B.O.M.

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	WSC 4T - 0.62	M12 90 degree connector and cable
2	1	38201 (waytek)	FEMALE METRI-PACK 150 2 pin
3	2	31077 (waytek)	FEMALE TERMINALS 16-18 AWG
4	1	38202 (waytek)	TPA LOCK
4	2	39006 (waytek)	CABLE SEALS



Notes:
- 18 AWG, 2 Conductor cable
- Label to be white w/ black printing and located on cable per drawing. (mylar w/ clear cover, all caps, 15pt font)
- M12 MATES TO SENSOR BOX 4MB12-4P2

#TS-2017

REV	DATE	DESCRIPTION
A	-	-
B	-	-
C	-	-
D	-	-
E	-	-

DESIGN:	DRAWN:	AS BUILT:
JTM	JTM	—

Cirus Controls
9200 Wyoming Ave. N, Suite 320
Brooklyn Park, MN 55445
Tel: (763) 493-9380
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SPREADER CABLE SYSTEM

M12 TO METRI-PACK 150

PROJECT NUMBER:	SCALE:	DATE: 8-2-06	REV.
TS-2017	NONE	SHT 1 OF 1	—

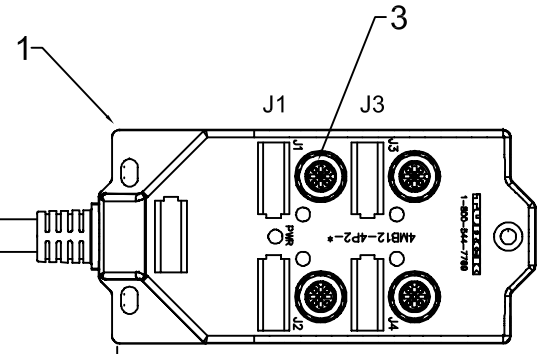
B.O.M.

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	4MB12Z - 4P2-6 /CS...	HYDRAULIC TRUNK AND BOX (TURCK)
2	1	39-01-2060 (Digi-Key #WM3702-ND	MOLEX 6 PIN
3	6	39-00-0039 (Digi-Key #WM2501-ND)	MOLEX TERMINALS 18-24 AWG

NOTES:
1. AVAILABLE CABLES FOR DIFFERENT VALVE TYPES (ORDER INDIVIDUALLY):
   PN# VAS 22-B653-.6M-WS 5.3T (DIN VALVE)
2. PLUG FOR PORTS NOT USED:
   PN# VZ-3

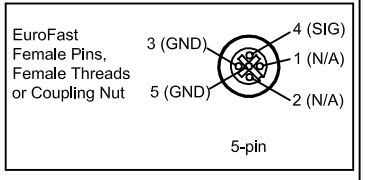
HEAT SHRINK & LABEL CABLE WITH "TS-2018 HYD OUT"

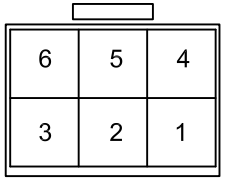
MOLEX PIN#	HYD C	SPDR	SIGNAL
1	GROUND	GROUND	BLUE
2	BLADE LEFT	ANTI-ICE	GRAY (J4)
3	BLADE UP	SPINNER	GREEN (J2)
4	GROUND	GROUND	GREEN/YELLOW
5	BLADE RIGHT	PRE-WET	YELLOW (J3)
6	BLADE DOWN	AUGER	WHITE (J1)



4 INCHES

15FT





BACK VIEW
(SIDE PINS ARE INSERTED FROM)

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BROOKLYN PARK, MN 55445

REV	DATE	DESCRIPTION
A	11-18-04	ADDED HYD C FUNCTIONS
B	3-18-05	ADDED HEAT SRINK NOTE
C	08-01-07	Added some extra length for strain relief near spade
D	3-14-07	removed spades
E	-	-

SPREADER CABLE SYSTEM

HYDRAULIC CABLE

DESIGN:	DRAWN:	AS BUILT:	PROJECT NUMBER:	SCALE:	DATE:	REV.
JTM	JTM	—	TS-2018	NONE	3-14-08	D

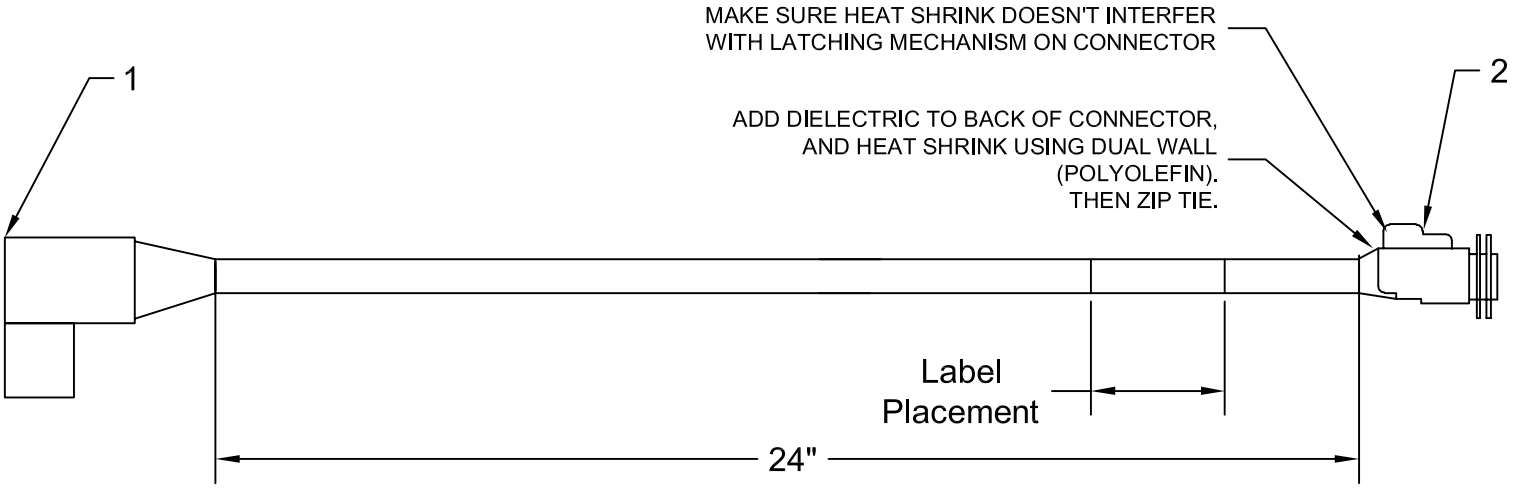
SHT 1 OF 1

WIRING DIAGRAM

M12		DEUTSCH
1		
2		
3	——	1
4	——	2

B.O.M.

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	WSC 4T - 0.62	M12 90 degree connector and cable
2	1	DT06-2S (LADD)	DEUTSCH PLUG
3	2	0462-201-16141 (LADD)	FEMALE TERMINALS 16-18 AWG
4	1	W2S (LADD)	DEUTSCH WEDGE LOCK



Notes:
- 18 AWG, 2 Conductor cable
- Label to be white w/ black printing and located on cable per drawing. (mylar w/ clear cover, all caps, 15pt font)
- M12 MATES TO SENSOR BOX 4MB12-4P2

#TS-2020

REV	DATE	DESCRIPTION
A	-	-
B	2-21-07	ADDED HEAT SHRINK NOTE
C	-	-
D	-	-
E	-	-

DESIGN:	DRAWN:	AS BUILT:
JTM	JTM	–

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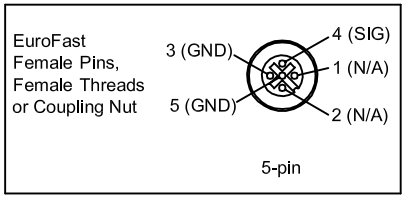
SPREADER CABLE SYSTEM

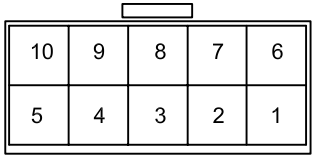
M12 TO DEUTSCH DT06-2S

PROJECT NUMBER:	SCALE:	DATE: 11-28-06	REV.
TS-2020	NONE	SHT 1 OF 1	B

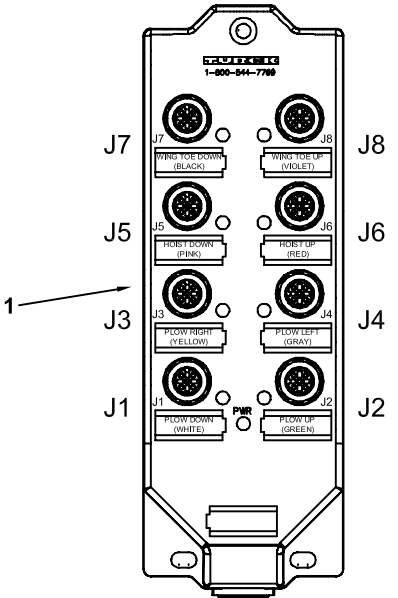
B.O.M.

QTY	PART NUMBER	DESCRIPTION
1	8MB12Z-4P2-6 /CS...	8 TERMINAL TURCK BOX 15' CABLE
1	39-01-2100 (Digi-Key WM3704-ND)	MOLEX RECEPTACLE 10 PIN
10	39-00-0039 (Digi-Key WM2501-ND)	MOLEX TERMINALS FEMALE 18-24 AWG





BACK VIEW
(SIDE PINS ARE INSERTED FROM)



MOLEX PIN#	BT108 HYD	BT210 HYD	MAKO II HYD A	MAKO II HYD B	SPREADER	COLOR (PORT#)
10	PLOW DOWN	PLOW DOWN	PLOW DOWN	HEEL DOWN	SPINNER FWD	WHITE (J1)
9	PLOW RIGHT	LT WING IN	PLOW RIGHT	SLIDE OUT	SPINNER REV	YELLOW (J3)
8	HOIST DOWN	HOIST DOWN	HOIST DOWN	BLADE DOWN	ANTI-ICE	PINK (J5)
7	GND	GND	GND	GND	GND	BLUE
6	SPINNER	RT WING IN	TOE DOWN	BLADE RIGHT	NOT USED	BLACK (J7)
5	PLOW UP	PLOW UP	PLOW UP	HEEL UP	AUGER FWD	GREEN (J2)
4	PLOW LEFT	LT WING OUT	PLOW LEFT	SLIDE IN	AUGER REV	GRAY (J4)
3	HOIST UP	HOIST UP	HOIST UP	BLADE UP	PRE-WET	RED (J6)
2	GND	GND	GND	GND	GND	GREEN / YELLOW
1	AUGER	RT WING OUT	TOE UP	BLADE LEFT	NOT USED	VIOLET (J8)

WIRES NOT USED SHOULD BE TRIMED BACK AND HEAT SHRUNK TO MAIN CABLE

LABEL CABLE TS-2031

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9200 Wyoming Ave. N, Suite 320
Brooklyn Park, MN 55445
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Fax: (763) 493-9340

REV	DATE	DESCRIPTION
A	4-16-08	ADDED MAKO II OUTPUTS
B	12-30-09	ADDED AUGER / SPINNER OUTPUTS
C	-	-
D	-	-
E	-	-

BLACK TIP CABLES

VALVE JUNCTION BOX 8 PORT

DESIGN:	DRAWN:	AS BUILT:	PROJECT NUMBER:	SCALE:	DATE: 4-16-08	REV.
JTM	JTM	–	TS-2031	NONE	SHT 1 OF 1	B

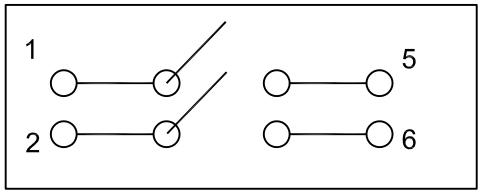
CABLE # TS-2031

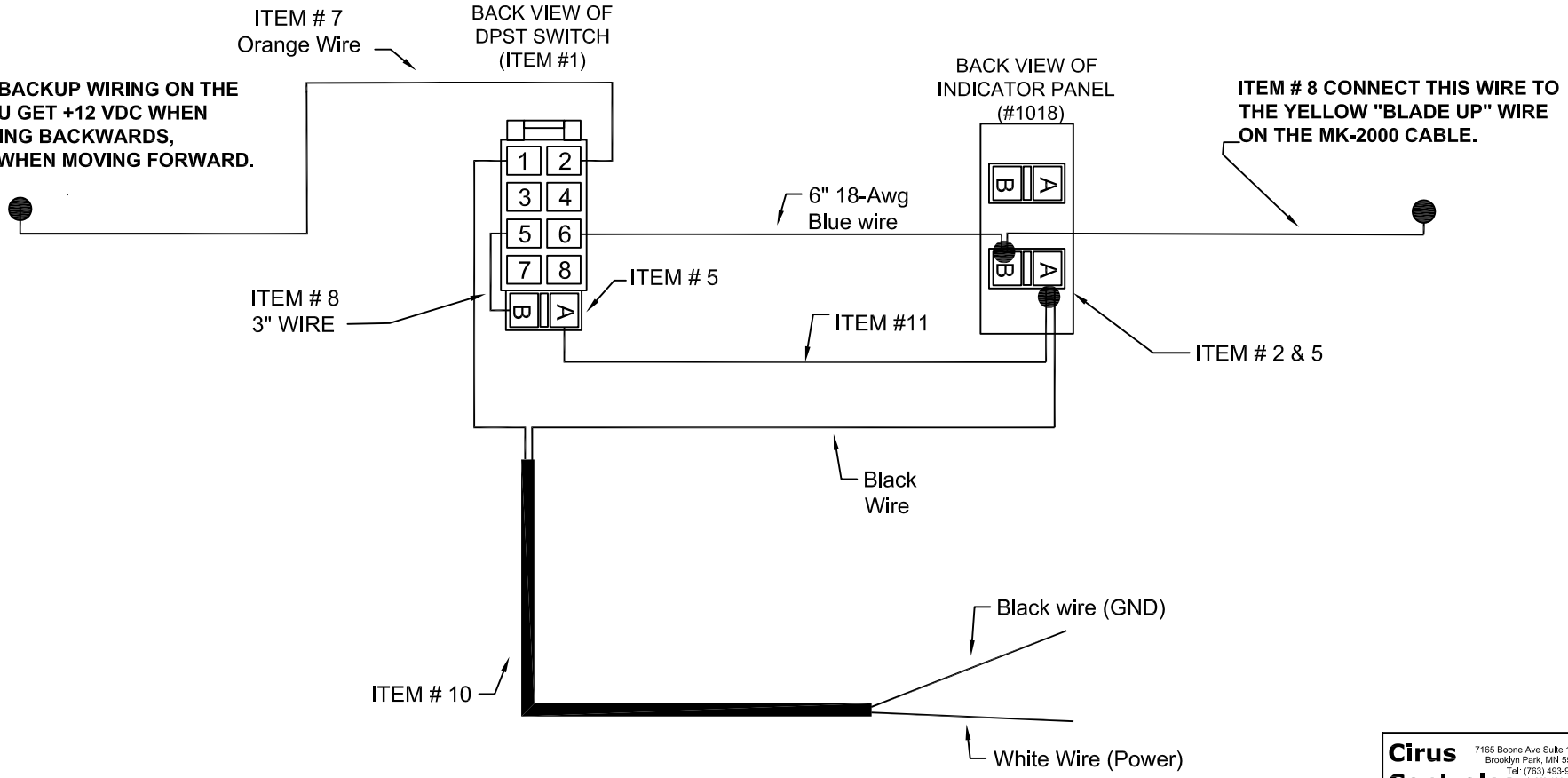
NOTES:
1. SPLIT LOOM BLUE AND ORANGE CABLE
2. LABEL ALL FLY LEADS WITH SIGNAL NAMES

B.O.M.

#	QTY	PART NUMBER	DESCRIPTION
1	1	1023	DPST ON/OFF SWITCH
2	1	1018	INDICATOR PANEL
3	2	1032	INDICATOR LABEL INSERT
4	8	1032.5	SPADE INSERT
5	2	1032.7	INDICATOR SOCKET
6	1	1032.6	SWITCH SOCKET
7	15'	1091	18-AWG ORANGE WIRE
8	10'.9"	1061	18-AWG BLUE WIRE
9	8'	1216.5	1/4" SPLIT LOOM
10	16'	1226	SVO 18-AWG CABLE
11	6"	1055	18-AWG BLACK WIRE

ITEM # 1 DPST SWITCH





AUTO BLADE UP CIRCUIT

REV.	DATE	DESCRIPTION
A	6-27-07	-added additional parts to wire inhouse
B	3-20-10	-added sprague sockets
C	8-3-10	-svo cable addition with dpst switch
D	-	-
E	-	-

DESIGN:	DRAWN:	AS BUILT:
RLG	RLG	—

Cirus Controls
7165 Boone Ave Suite 190A
Brooklyn Park, MN 55445
Tel: (763) 493-9380
Fax: (763) 493-9340

AUTO BLADE UP ON BACKUP

TRUCK WIRING

PROJECT NUMBER:	SCALE:	DATE:	REV.
ABU100	NONE	8-3-10	C

SHT 1 OF 1

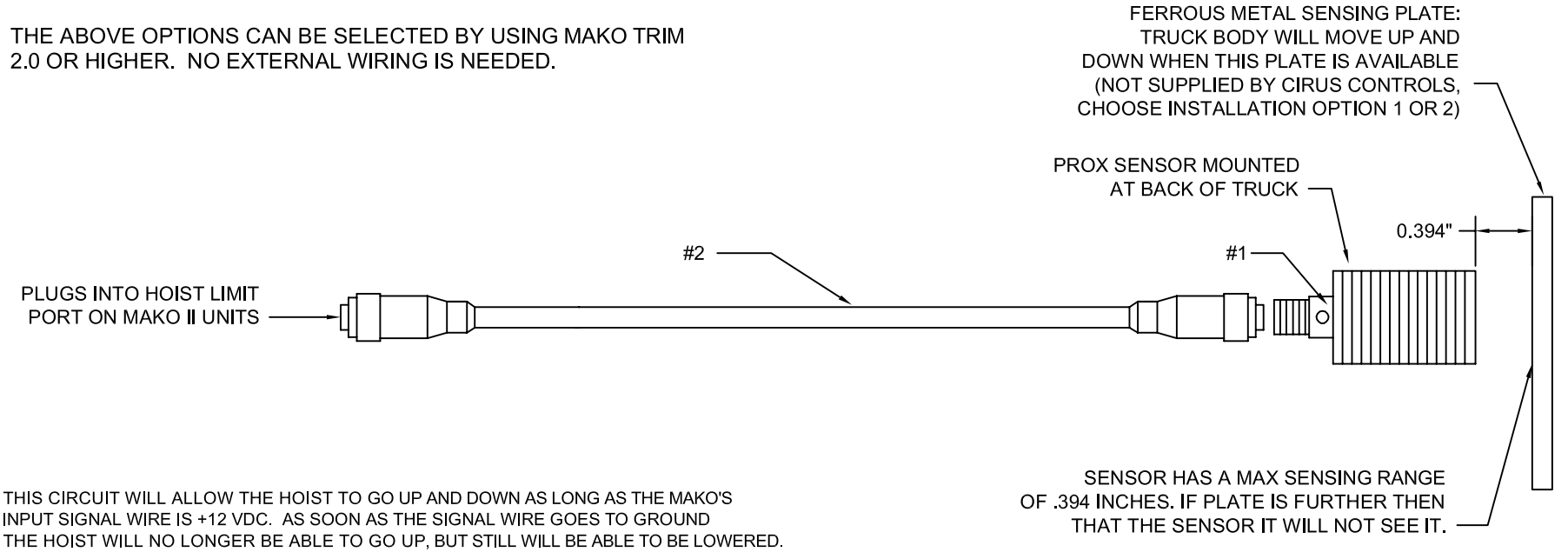
INSTALLATION OPTION # 1 LONG SENSING PLATE: USE THE NORMALLY OPEN WIRE WHEN THE PROXIMITY SENSOR WILL BE NEXT TO AN INSTALLED METAL SENSING PLATE FOR UP AND DOWN OPERATION, WHEN THE HOIST MOVES PAST THE PREDETERMINED SENSING PLATE THE SENSOR WILL STOP THE HOIST

INSTALLATION OPTION # 2 SHORT SENSING PLATE: USE THE NORMALLY CLOSED WIRE WHEN THE PROXIMITY SENSOR WILL NOT BE NEXT TO THE METAL SENSING PLATE FOR UP AND DOWN OPERATION, WHEN THE SENSOR REACHES ITS PREDETERMINED MAX HEIGHT AN INSTALLED METAL SENSING PLATE WILL BE SENSED WHICH WILL STOP THE HOIST

THE ABOVE OPTIONS CAN BE SELECTED BY USING MAKO TRIM 2.0 OR HIGHER. NO EXTERNAL WIRING IS NEEDED.

B.O.M.

QTY	PART NUMBER	DESCRIPTION
1	Bi10-M30-VP4X-H1141	PROX SENSOR FOR MONITORING HOIST LIMIT
1	TS-2101	30FT MALE M12 TO FEMALE M12
1	998	ON/OFF KEY SWITCH. BOTH POSITIONS REMOVABLE KEYED AS HC530 (OPTIONAL KEY SWITCH)



THIS CIRCUIT WILL ALLOW THE HOIST TO GO UP AND DOWN AS LONG AS THE MAKO'S INPUT SIGNAL WIRE IS +12 VDC. AS SOON AS THE SIGNAL WIRE GOES TO GROUND THE HOIST WILL NO LONGER BE ABLE TO GO UP, BUT STILL WILL BE ABLE TO BE LOWERED.

AN OPTIONAL KEY SWITCH MAY BE ADDED TO STOP THE HOIST FROM GOING UP IN A SUMMER/ WINTER MODE CONFIGURATION. THIS KEY SHOULD BE WIRED TO THE MK-2000 AUX INPUT CABLE.

HOIST LIMIT OPTION (MAKO II)

REV	DATE	DESCRIPTION
A	5-30-07	- Added Additional Parts & New Cable
B	7-24-08	Added typical wiring off of TS-2104
C	-	-
D	-	-
E	-	-

DESIGN:	DRAWN:	AS BUILT:
JTM	JTM	—

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9210 Wyoming Ave, N, Suite 200
Brooklyn Park, MN 55445
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HOIST LIMIT WITH LOCKOUT CIRCUIT

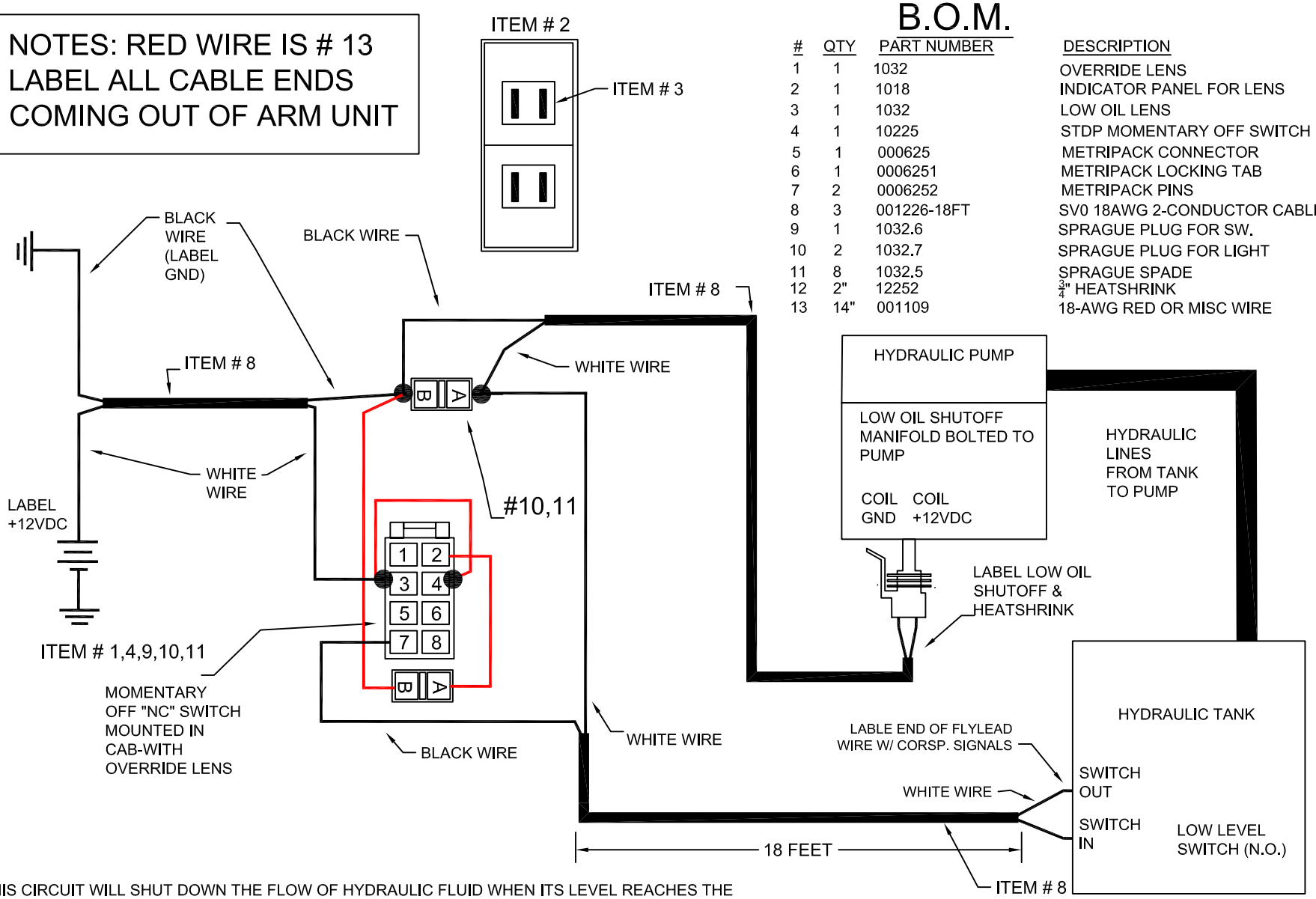
TRUCK WIRING

PROJECT NUMBER:	SCALE:	DATE: 7-24-08	REV.
HOIST LOCK	NONE	SHT 1 OF 1	B

NOTES: RED WIRE IS # 13
LABEL ALL CABLE ENDS
COMING OUT OF ARM UNIT

B.O.M.

#	QTY	PART NUMBER	DESCRIPTION
1	1	1032	OVERRIDE LENS
2	1	1018	INDICATOR PANEL FOR LENS
3	1	1032	LOW OIL LENS
4	1	10225	STDP MOMENTARY OFF SWITCH
5	1	000625	METRIPACK CONNECTOR
6	1	0006251	METRIPACK LOCKING TAB
7	2	0006252	METRIPACK PINS
8	3	001226-18FT	SV0 18AWG 2-CONDUCTOR CABLE
9	1	1032.6	SPRAGUE PLUG FOR SW.
10	2	1032.7	SPRAGUE PLUG FOR LIGHT
11	8	1032.5	SPRAGUE SPADE
12	2"	12252	4/0" HEATSHRINK
13	14"	001109	18-AWG RED OR MISC WIRE



THIS CIRCUIT WILL SHUT DOWN THE FLOW OF HYDRAULIC FLUID WHEN ITS LEVEL REACHES THE LOW SETTING IN THE TANK. WHEN THE LOW LEVEL IS REACHED THE INDICATOR LIGHT WILL COME ON INDICATING LOW OIL, AND AT THE SAME TIME ENGAGE THE LOW OIL MANIFOLD TO PROTECT THE PUMP. A MOMENTARY OFF SWITCH IS INTERGRATED INTO THE CIRCUIT TO ALLOW THE DRIVER TO MOMENTARY DISABLE THE PROTECTION TO MOVE AN IMPLEMENT.

LOW OIL SHUTDOWN WITH OVERRIDE

REV	DATE	DESCRIPTION
A	-	-
B	-	-
C	7-29-10	ADDED WIRING(REMOVED BLOCK DIAG)
D	-	-
E	-	-

Cirus Controls
7165 Boone Ave, Suite 190A
Brooklyn Park, MN 55445
Tel: (763) 493-9380
Fax: (763) 493-9340

LOW OIL SHUTDOWN W/OVERRIDE

TRUCK WIRING

DESIGN:	DRAWN:	AS BUILT:	PROJECT NUMBER:	SCALE:	DATE:	REV.
RLG	RLG	–	LOSD100	NONE	7-29-10	C

SHT 1 OF 1