



# Nebraska

## MDC 003 Snowplow Installation Manual

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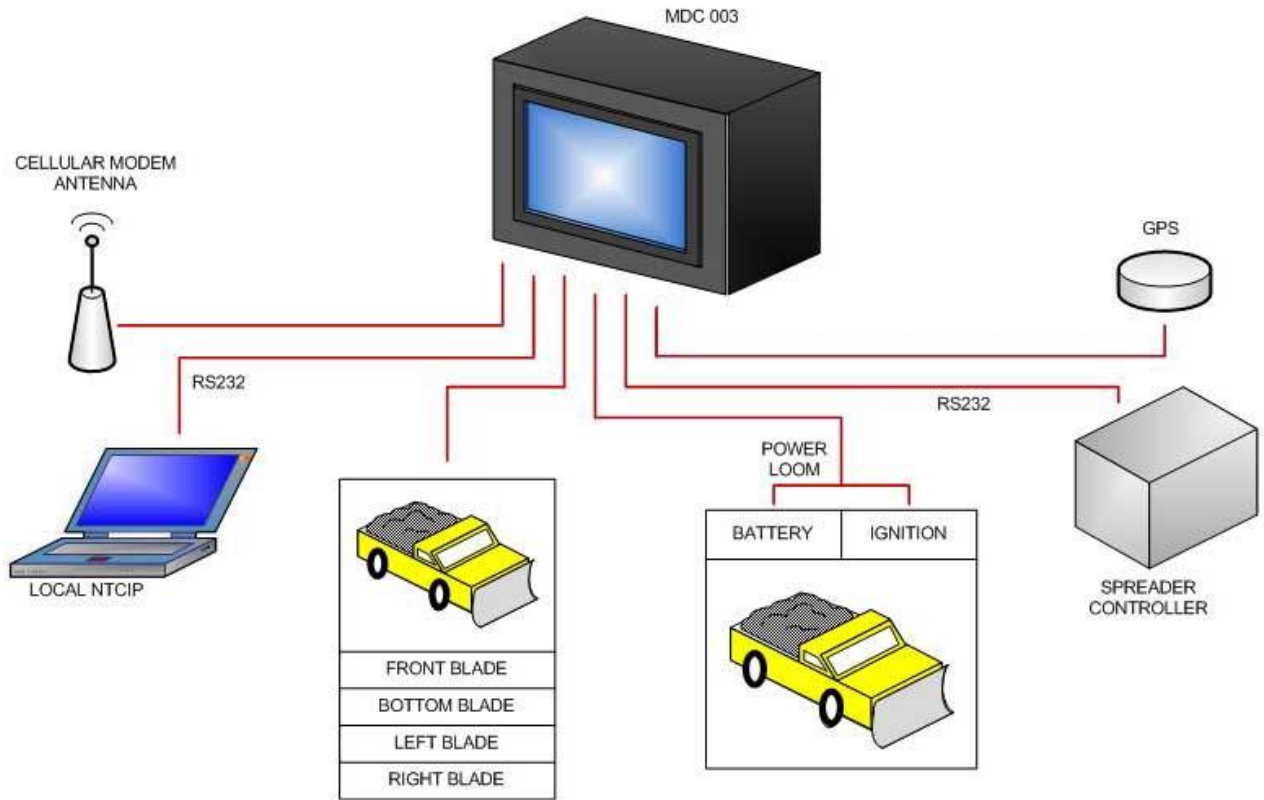
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# System Overview



**MDC003 System Diagram**

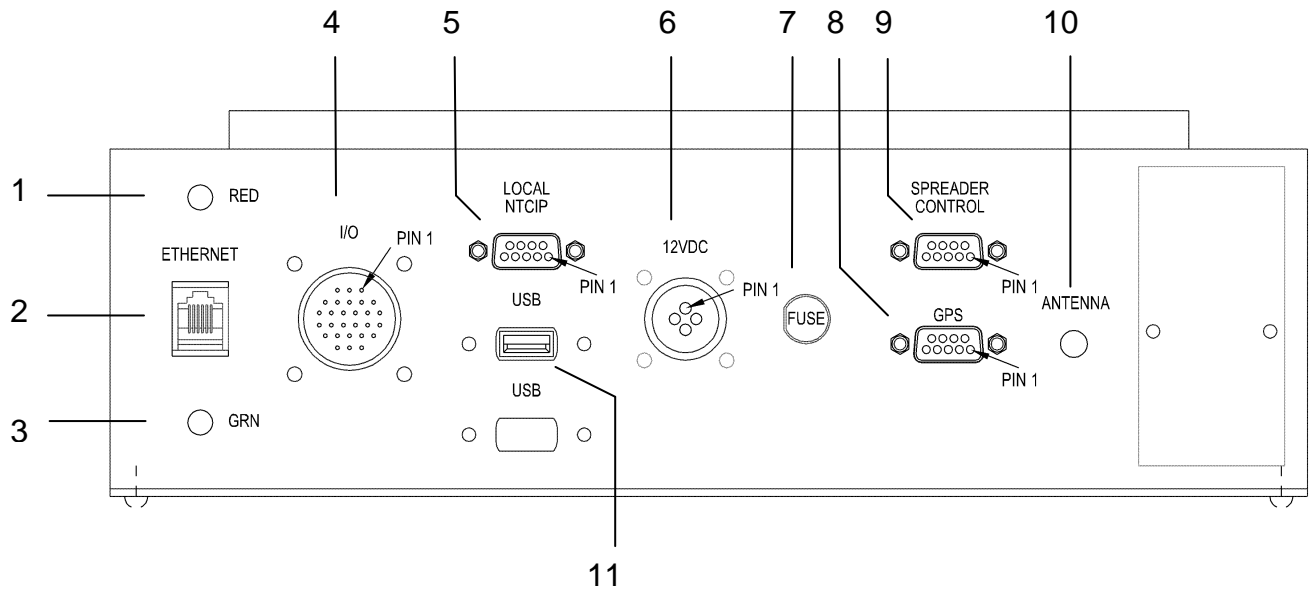
The MDC 003 is mounded on an adjustable bracket between the driver and passenger seats of the truck. The bracket adjustments allow the MDC 003's to swivel and tilt and also allows the height of the unit to be changed.

The MDC 003 is powered directly from the trucks battery and requires a connection to the ignition system to trigger power up of the unit when the vehicle is started.

## Parts making up the system:

- MDC 003 with Touch Screen
- Mounting Assembly with All Necessary Parts
- I/O Cable
- Power Cable
- MDC Software
- GPS Unit

# MDC 003 Connectors



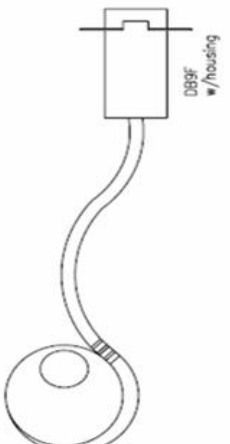
**MDC003 Connector layout (Bottom View)**

**Connectors:**

1. Mic (RED)
2. Ethernet
3. Speaker (GREEN)
4. I/O Connector
5. Local NTCIP (RS232 serial port)
6. Power Connector
7. Fuse
8. GPS (RS232 serial port)
9. Spreader Control (RS232 serial port)
10. Modem Antenna
11. USB

# GPS Diagram

The following is an installation diagram for the GPS sensor:



**GPS SENSOR, MODIFIED**

MANUFACTURING

1. Remove six pin connector from end of GPS cable.
2. Strip 1/8" (3mm) of insulation from end of all wires except yellow.
3. Crimp female sockets onto all wires except yellow.

INSTALLATION

1. Secure GPS antenna to roof of vehicle or highest point of device.
2. Route cable through to controller, making sure not to damage sockets.
3. Insert individual wires into DB9 female connector according to Table 1.
4. Install housing over connector, making sure that housing is secure over outer jacket of cable, not over individual wires.
5. For proper operation, unit must be connected to GPS Serial Port that provides +5VDC.

**NOTE:** Unit can be tested by connecting to serial port of PC along with source of +5VDC to pin 1. Communications is 4800 baud, 8N1. Note that unit will not work indoors, and so should be placed outside window or door.

**TABLE 1 – GPS Sensor Modifications**

| Color  | DB9F Pin# | Signal                 |
|--------|-----------|------------------------|
| Yellow | Not used  | PPS (pulse per second) |
| Red    | 1         | Vin (+5VDC)            |
| Black  | 5         | Ground                 |
| White  | 2         | TXD                    |
| Black  | 5         | Ground                 |
| Green  | 3         | RXD                    |

Drawn By: R. Brookshire    Date: 15Jul2008

Approved By: R. Brookshire    Date: 15Jul2008

Revision: A    Size: 8.5" x 11"    Scale: N.T.S.

Drawing Number: 223-00002

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Garmin GPS18LVC Wiring Diagram – Standalone

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STANDARD

# GPS Unit and Cellular Antenna Installation

## Hardware need for this Installation

| <i>Part</i>                              | <i>Qty</i> |
|--|------------|
| Metal Angles                             | 2          |
| 1/4" Bolt                                | 4          |
| Nut, 1/4", galvanized                    | 4          |
| Washer, split-ring lock, 1/4" galvanized | 4          |
| Washer, fender, 1/4" x 0.5"od            | 4          |
| 1/4" to 3/8" Plastic Conduit             | 10'        |

The first step in the GPS and Cellular Antenna installation process is to locate an area on the headache rack that can provide both suitable protection and an unobstructed line of sight of the sky for the two devices. You will need two metal angles similar to the ones shown in the figure below, which will be used to mount the GPS and cellular antenna. Once the metal angles have been securely installed, attach the GPS puck with the screw provided in the GPS box to ensure the GPS puck is secure. The cellular antennas come in several varieties, so the method of mounting to the metal angle is up to the individual shops. Your installation should look similar to the picture below when you are done with this step.

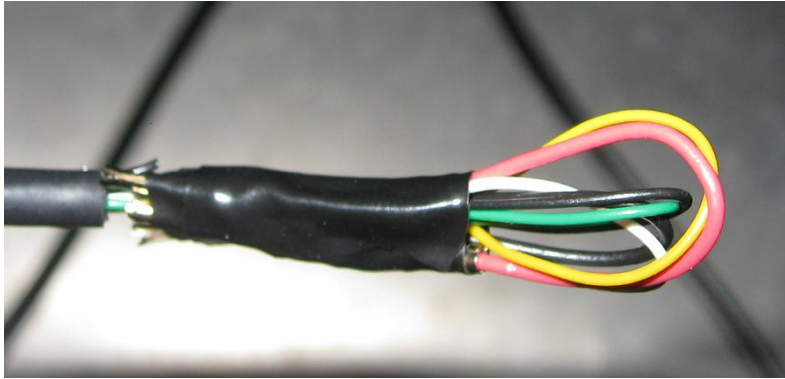


Once the GPS puck and cellular antenna have been secured to the metal brackets, thread both the GPS and Cellular antenna cables through the plastic conduit. This should be done to provide additional protection to the cables from the elements. Once the cables have been threaded through the plastic conduit, secure the conduit to the rear exterior wall of the cab. When you are done with this step, your installation should look like the picture below.

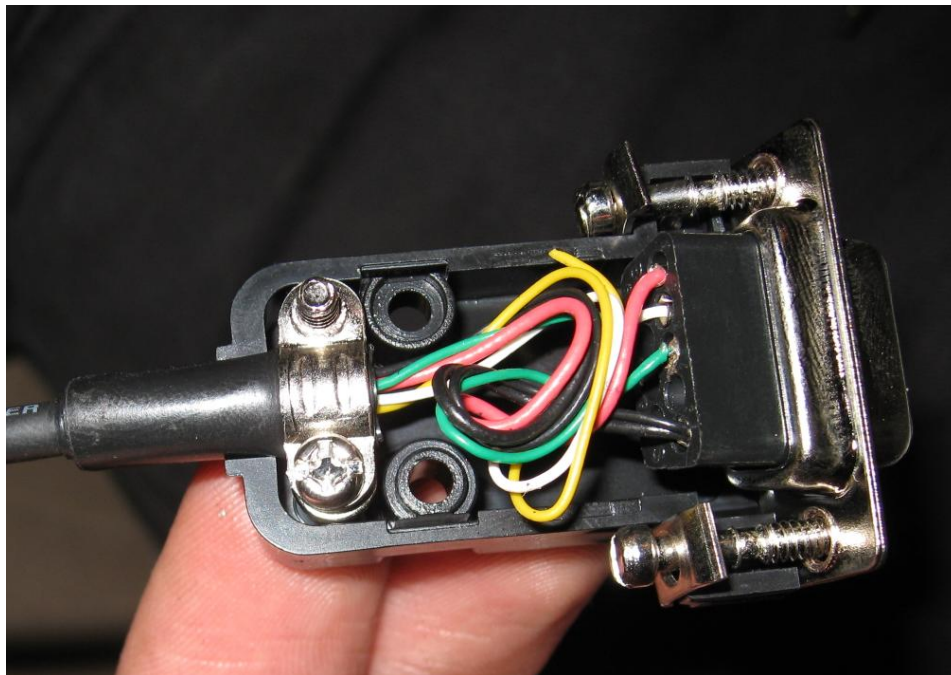




The next step is to tape the leads for the GPS cable back onto the GPS cable as shown below, electrical tape works best. This should be done to prevent the crimp pins from coming loose when pulling the GPS cable through the rear exterior wall of the truck cab. It should look like the picture below when you are finished with this step.



Once the GPS cable is through the rear exterior wall of the truck cab, plug the crimp pins into the proper connector slots as detailed in the GPS diagram above. After plugging in the crimp pins, use electrical tape to tape the individual wires together an inch and a half below where the wires are plugged into the DB9. This should be done so that the bundle of wires will be thick enough for the metal catch in the plastic housing to have a firm grasp of the wires to provide effective strain relief for the crimp pin connections. When you are finished with the step, the GPS connector should look like the picture below.





The next step is to attach the front part of the plastic housing and to the DB9 Connector. When you are finished, the GPS connector should look like the picture below.



## Mounting Pole Installation and Assembly

The Mounting Pole consists of three parts. The first part is a base plate which will be mounted onto the floor of the trucks cab between the driver and passenger seats. The second part is a telescopic pole which slides into the pole on the base plate. The third part is a "U" Bracket which is mounted on top of the telescopic pole and holds the MDC003 in place allowing it to tilt and swivel.

### Hardware need for this Installation:

#### For Mounting Base Plate to Floor

| <i>Part</i>                             | <i>Qty</i> |
|---|------------|
| Bolt, 3/8"x 1.5", galvanized            | 4          |
| Washer, fender, 3/8"x1.0"OD, galvanized | 8          |
| Washer, split-ring lock, galvanized     | 4          |
| Nut, 3/8", galvanized                   | 4          |

#### Top Pole Rests on this Bolt

| <i>Part</i>                                     | <i>Qty</i> |
|---|------------|
| Bolt, 1/4-20x4, zinc-plated, partially threaded | 1          |
| Wingnut, 1/4-20, zinc-plated                    | 1          |

#### Prevents Top Pole from Rotating

| <i>Part</i>                            | <i>Qty</i> |
|--|------------|
| Thumbscrew, 1/4-20 x 0.5", zinc-plated | 2          |

#### Connect U-Bracket to Top Plate

| <i>Part</i>                   | <i>Qty</i> |
|-------------------------------|------------|
| Bolt, 1/4-20x3/4", Grade 5    | 4          |
| Washer, fender, 1/4" x 0.5"od | 8          |
| Washer, split-ring lock, 1/4" | 4          |
| Nut, 1/4-20                   | 4          |

#### Securing Housings to Mounting Assembly

| <i>Part</i>                           | <i>Qty</i> |
|---------------------------------------|------------|
| Screw, M6x14, phillips, zinc-plated   | 4          |
| Washer, flat, M6, nylon, white, 1.5mm | 4          |

### Mounting the Base Plat to the Cab:

1. Position the Mounting Pole as close to the passenger seat as possible so that it is easily accusable to the driver.
2. Take care to mount the unit where there is easy access to drilling the mounting hole and where there are no obstacles below the cab of the truck that can be drilled into. The mounting positions should be accessible from the inside of the cab as well as from the below so that the unit can be fastened down securely.
3. Use the Base Plate as a template to mark the position of the mounting pole with a piece of chalk.
4. Drill the four mounting holes to a size of **3/8"**
5. Place the base of the mounting pole onto its position and insert the four 3/8"x 1.5" bolts with a flat washer on each bolt through the hole on the Base Plate and the holes drilled in the cab.
6. From below, fasten the Base Plate down using four 3/8" nuts with split-ring lock washer for each bolt.
7. Be sure to tighten the bolts down completely so that the split-ring lock washers are fully compressed.

When you have finished these steps your mounting poll assembly should look like the picture below.



### Assembling the mounting poll:

1. Insert the telescopic pole into the pole of the base plate.
2. The height of the telescopic pole can be set by inserting a bolt through one of the holes provided on the base pole and allowing the telescopic pole to rest on the bolt.
3. Lift the telescopic pole and insert the ¼-20x4 bolt through one of the provided holes of your choice and then allow the top pole to rest on the bolt. **Make sure that the pole is not set too high as to block the driver's view of the passenger side mirror.**
4. Fasten the bolt in position with a wingnut.

When you are finished with these steps your installation should look similar to the picture below.





### Assembling U Bracket to Mounting Pole

1. Place the "U" Bracket on top of the telescopic pole and fasten in position with four  $\frac{1}{4}$ -20x $\frac{7}{8}$ " bolts.
2. Insert the bolts with a  $\frac{1}{4}$ " x0.875"OD flat washer on each bolt through the top of the "U" Bracket and then through the plat on top of the telescopic pole.
3. From the bottom place one  $\frac{1}{4}$ " x0.875"OD flat washer, one split-ring lock washer, and one  $\frac{1}{4}$ -20 nut on each of the bolts and tighten down.
4. Be sure to tighten the bolts down completely so that the split-ring lock washers are fully compressed.
5. Swivel the mounting pole as needed and secure in place with two  $\frac{1}{4}$ -20 x 0.5" thumbscrews.

When you are finished with these steps your installation should look like the picture below.



## Mounting the MDC003 onto the Mounting Pole Assembly

The MDC003 is mounted onto the "U" Bracket of the mounting assembly using four screws which will allow the MDC003 to be tilted backward or forward and tightened in the chosen position.

1. Position the MDC003 housing between the two uprights of the "U" Bracket on top of the mounting assembly so that it aligns with the holes and slots provided.
2. Insert the four M6x14 screws through the holes in the "U" Bracket and through a nylon washer into the MDC003 housing so that there is a nylon washer between the MDC003 housing and the "U" Bracket at each screw. This is important to prevent scratching of the metal parts on both components.
3. Adjust the angle of the MDC003 to the desired position and then fasten the screws down.

When you are finished with these steps your installation should look like the picture below.



## Connecting the MDC 003 to the Truck's Power

The MDC003 is powered directly from the 12VDC battery of the truck and is fitted with a timer which is triggered from a connection to the trucks ignition system. Once the truck is turned on the MDC003 will power up and remains powered as long as the truck is switched on. Once the truck is switched off the MDC003 remains on for 10 minutes and then powers down.

### Hardware need for this Installation:

| <i>Part</i>                          | <i>Qty</i> |
|--------------------------------------|------------|
| I/O Cable supplied with MDC003 unit. | 1          |
| Cable ties                           | 4-6        |

### Wiring the MDC 003 to the Truck's Power:

The MDC 003 power cable should be terminated to the trucks battery and **ignition** system as follows:

| MDC003 Power Cable Pin Number | Wire Color | Connections              |
|-------------------------------|------------|--------------------------|
| 1                             | Black      | Common Ground to Battery |
| 2                             | Red        | Battery Positive         |
| 3                             | Red        | Ignition                 |

1. Run the power cable down the mounting pole assembly to the floor of the cab.
2. Be sure to leave sufficient play in the power cables when fastening it to the mounting pole for the pole and the MDC 003 unit to be adjusted with all the cable connected.
3. Route the power cable through the cab using channels in the cab provided for this purpose so that they are out of the way of the driver and can not be damaged.
4. Run pins 2 and 1 of the power cable to the battery of the truck.
5. Terminate pin 1 to the batteries negative terminal.
6. Terminate pin 2 to the batteries positive terminal.
7. Run pin 3 to the trucks ignition switch.
8. Terminate pin 3 to the accessory terminal on the truck ignition switch so that pin 3 dose not receive power when the truck is switched off, but receives power when the ignition is turned to the accessory position and when the truck is running.



## Connecting the MDC 003 to the Spreader Controller

The MDC 003 is provided with a RS232 serial port which can be connected to the Spreader Controller inside the truck.

### Hardware need for this Installation:

| <i>Part</i>                    | <i>Qty</i> |
|--------------------------------|------------|
| DB9 Serial cable from spreader | 1          |
| Cable ties                     | 4-6        |

### Wiring the MDC003 to the Plow Blades:

1. Connect the DB9 serial cable to the port labeled Spreader Controller of the MDC 003 unit.
2. Screw the cable firmly into the serial port using the screws provided on the cable and add some blue / medium strength Lock-tight to prevent the screws coming loose with vibration.
3. Run the cable down the mounting pole and secure in place using cable ties as required, but be sure to leave sufficient play for the MDC 003 unit to be adjusted with all the cable connected.
4. Connect the other end of the serial cable to the Spreader Controllers local port.
5. Screw the cable firmly into the serial port of the Spreader Controller using the screws provided on the serial cable and add some blue / medium strength Lock-tight to prevent the screws coming loose with vibration.

## Wiring the MDC 003 to the Plow Blades

The MDC 003 is provided with an I/O cable which is plugged into the MDC 003 housing and provides for a means of connecting inputs to the MDC 003 such as switches for monitoring the position of the blades on the snowplow

### Hardware need for this Installation:

| <i>Part</i>                         | <i>Qty</i> |
|-------------------------------------|------------|
| I/O Loom supplied with MDC 003 unit | 1          |
| Cable ties                          | 4-6        |
| Mercury switches, 1 per blade       | 1-3        |

### Wiring the MDC 003 to the Plow Blades:

The plow blade switches should be wired to pins 13 to 17 as shown in the table below:

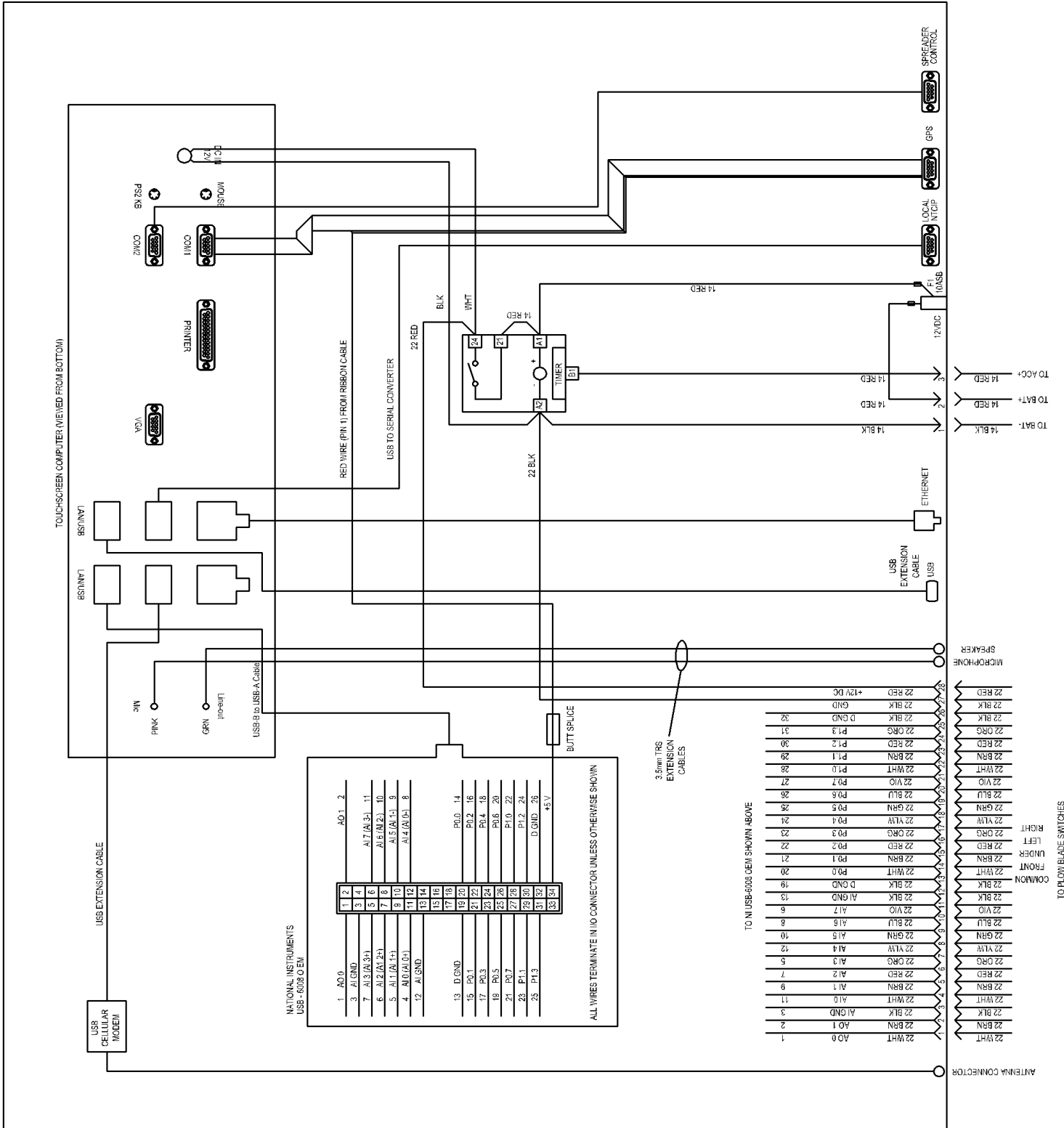
| MDC 003 I/O Pin Number | Wire Color | Plow Blade |
|------------------------|------------|------------|
| 13                     | Black      | Common     |
| 14                     | White      | Front      |
| 15                     | Brown      | Under      |
| 16                     | Red        | Left Side  |
| 17                     | Orange     | Right Side |

1. After securing the I/O cable to the MDC 003, run the I/O cable down the mounting pole assembly to the floor of the trucks cab.
2. Be sure to leave sufficient play in the I/O cable when fastening it to the mounting pole for the pole and the MDC 003 unit to be adjusted with all the cable connected.
3. If there is a port on the floor the trucks cab for feeding cable through run the cables used for the plow blades to this point and feed them through to the outside of the cab.
4. If possible do not cut off any of the remaining wires coming out of the loom. These may be needed for future expansion of the system. Roll the remanding cables up and place them under one of the seats or safely out of the way.
5. Run the appropriate cable each of the plow blades fastening the cable to the truck as you go along.
6. Be sure to leave an enough slack in the cable to allow any parts of the truck to move without damaging the cable. This is especially important at the plow blades.

**7. Attach the switches in the plow blades and wire in the cables.**

8. If you wish to have any blade display the same up/down status as another blade, for example the front and a right blade, connect the black (13) wire to the white (14) and orange (17) wires with the output wires from the mercury switch. This is a way to bypass manual entry if only one blade is outfitted with a mercury switch and it is desired that another blade ALWAYS display the same status as the monitored blade. Please note that it is also possible to delete the arrow icon for the wings on the Truck Menu in the software setup. A password is required to make this change.

# MDC 003 Wiring Diagram



**MDC003 Wiring Diagram**