

# Robotronics®

*The Leader In Safety Education Products*

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[Robotronics.com](http://Robotronics.com)

## Vehicle Robot™ Operating Manual

Version 6.6

# Vehicle Operating Manual

**Congratulations** on your purchase of a ROBOTRONICS, Inc. robot. Your robot has been carefully constructed of the highest quality components. Its design is the result of years of experience building robots. You will find it an extremely effective spokesperson for safety and your organization. It is built for ease of operation, maintenance and repair. It is built so that you can easily expand its functions making its value grow as your needs grow.

Please read this manual carefully. It will help you make the most of your robot. Attention to maintenance and proper training will greatly prolong the life of your robot. Train users to take care of the robot and keep the robot covered and indoors. Most problems you encounter will be minor and the manual will provide an answer. Please feel free to contact us if you have unanswered questions relating to operation, maintenance, and repair. Call 801-489-4466. Also, if you have technical questions relating to expanding the functions of your robot, we would be happy to help.

Sincerely,

**ROBOTRONICS, Inc.**



**ROBOTRONICS INC.**  
Springville, Utah 84663  
[www.Robotronics.com](http://www.Robotronics.com)  
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## Limited Warranty

All robots and accessories have a limited one year warranty, which covers all parts and labor. This period covers the normal burn-in for electronic components. Experience has shown that this warranty period catches most component defects and other possible flaws. If you have a problem, we are anxious to help. Our desire is to be certain you receive a quality product and excellent service.

Warranty work is specifically limited to correction of defects by repair or replacement of faulty equipment or parts. The robot or part shall be repaired or replaced at Seller's option. Equipment returned to the factory for repair must have pre-authorization from our service department and must be sent freight pre-paid, and will be returned freight pre-paid by UPS ground or common carrier. If you need parts returned by air shipment, you will be responsible to pay the additional shipping charges. The end user is responsible to contact our service department about any problem and install replacement parts or make adjustments if needed on the robot.

In no event shall ROBOTRONICS, Inc. be liable for any incidental or consequential damages in connection with or arising from the use of the robot, this manual or any procedures herein.

The buyer is further responsible to ensure that proper and complete training is given to those operating the robot system as all aspects of such operation cannot be covered in a brief manual such as this.

|   |
|---|
| Record the vital information from your robot here for future access |
| Date Received: _____  |
| Customer Number: _____  |
| Robot Model Number: _____   |
| Robot Serial Number: _____  |
| Brand of Radio Control: _____                                       |
| Frequency of Radio Control: _____                                   |
| <u>Voice Frequencies</u>  |
| Operator Transmitter: _____   |
| Operator Receiver: _____  |

### If You Have a Problem Call Service 801-489-4466

- Call our service department and explain the problem. Most difficulties are minor and can be solved easily over the phone. If possible, have the robot near the phone when you call.
- **Important:** Have the robot serial number and model number ready. This will help our technician identify the model of robot you have. The serial and model number sticker is located on the robot frame on the right side. In the Appendix, the Lower Robot - Top View shows the location of the serial number sticker
- Have the robot near the phone so that we can help you immediately.

## If you need to send a part back to Robotronics for repairs

- Go to our website, [Robotronics.com](http://Robotronics.com) and under the service tab find the return form. Fill this out and send it back with the part or robot.
- If you have saved the robot boxes and packaging this will make it easier to return the robot.
- Call the service dept. before shipping the robot or part back to the factory. Pack it carefully and send it prepaid.
- Parts of the robot are best sent by a carrier such as UPS, FedEx. or U.S. mail. A freight company can be used to ship the entire robot. Be sure to insure the shipment for the correct value.
- For international shipments, you will be responsible for paying customs duties, taxes and other fees. The shipment must be labeled on the paperwork and on the outside of the container that it is “**For Educational Purposes**”. If it is a “**warranty replacement**” or a “**repair return**” this also must be indicated both ways on the customs documentation. Contact your customs agency on how to document the shipment correctly to avoid unnecessary customs charges.

## After The Warranty Repair and Help

Our technical staff is always available to help with your questions. Again, most problems are easily solved. The robot design is very modular to make removal of a part of the robot very easy. For example the main electronics box, which houses most of the electronic circuitry, can be removed from the frame of the robot. If you do need technical help or replacement parts, call our Service Dept. We can usually ship them the following day you call.

**Service Department phone number: 801-489-4466.**

## What’s Available on our Website

**Parts for your robot:** Our website contains a parts listing with pricing for some of the parts of the robot such as batteries, chargers, wireless voices, headsets, RC, lights, plastic parts, servo motors, drive motors etc. For any other parts, give us a call.

**Maintenance and repair information:** If your robot ever needs maintenance work to be done, you can send a part or the complete robot to Robotronics. The website contains information about packaging and shipping. There is a return form on the internet to fill out to print and send with your part.

**Photo gallery of other robots:** You can look at other robots and how they have been painted, customized and decaled.

**Program Support Material:** Educational material to handout and reinforce your safety message as well as music that can be used in the robot.

# Part 1 General Operating Instructions

## CHAPTER 1 Getting Started

### Operating Tips and Safety Information

ROBOTRONICS, Inc. robots are a unique and exciting tool in the hands of a skilled and trained operator. The operator provides much of the excitement the robot conveys. The selection and training of the operator should be done carefully, so as to provide a person with good judgment and an outgoing personality. Nevertheless, with a little practice anyone can learn to operate the robot and even those with a shy personality can be very effective using the robot. It is important that you observe the following safety guidelines. Include this in any operator training. Practicing with the robot and having a program outline or script will help you have success the first few times out.



- **The operator must have the radio control in their hands when the robot is on. If you need to set the radio control down, turn the robot off first.**



- **Always have a trained person (escort) near the robot for safety purposes**, to help in crowd control, and to protect the robot from vandalism. This person is also available to answer questions and interact with the robot.



- **When using the robot on a stage, the area just in front of the stage should be clear of children for at least 10 feet.**

- **Neck Strap.** There is a hook on the RC that you can attach a neck strap to. This will help prevent drops.
- Keep the robot indoors with the cover on when not in use. This will keep the robot clean and the color at its best. Direct sunlight/UV light can fade the plastic over time.
- You can paint the body if it fades or if you want to change the color of the body/trim. See the painting instructions for tips.
- Operate the robot with charged batteries in the transmitter and robot.
- Never operate the robot out of line-of-sight.
- Make sure trims (sliders) on the RC are centered prior to turning on the RC and the robot.
- Operating distance should never exceed **100 feet**. When moving the robot through crowds, the robot should be operated slowly and smoothly without any sudden changes of direction. Walls, turns, and other obstacles are hazards to be avoided. Never leave the robot "ON" when unattended or in direct sunlight for extended periods of time.
- The robot is designed to be operated on hard, smooth surfaces and carpet. Avoid extra deep shag carpet, dirt, gravel, or grass surfaces. Avoid steep inclines or large uneven surfaces such as curbs, gutters, or uncovered electrical lines.
- If there are other radio controlled robots at the same event, confirm that they are not on the same frequencies. See the diagrams showing your RC and wireless voices to locate these frequencies.
- When attempting to operate the robot for the first time, do so in a large flat area without obstacles. The operation of the controls should be done in a smooth, fluid manner. Avoid jerking starts and stops or overreacting to the controls. When first practicing movement, it is sometimes helpful to follow behind the robot, as robot movement will match stick movement. (Controls respond opposite when the robot is facing the operator.)

The robot can be a highly successful tool for education and entertainment. Appropriate jokes, stories and general conversation can be very effective. Children of all ages are strongly attracted to the robot. They will talk to it, hug it, kiss it, and generally treat it as a good friend. The smaller sized robots are very effective with children. They are light in weight and just the right size to communicate with children. The most important ingredient to the use and effective operation of the robot is common sense. The following instructions will help you get set up and start using the robot.

# Setup and How to Operate the Robot

## 1 Read the manual

Read and study this manual completely before operating the robot. If you have any questions about operation of the robot, call our service group.

## 2 Charge the batteries

Be certain that the robot battery and radio control transmitter battery are fully charged before operating the robot.

Install the robot battery. Open the rear door or trunk to gain access.

1. Put the robot battery in the compartment in the back.
2. Connect the robot battery connector to the robot connector. Red will go to red and black to black. This connection is polarity protected and can be connected only the correct way.
3. The battery is secured in place with a battery strap. Tighten the strap very tight.

### CAUTION

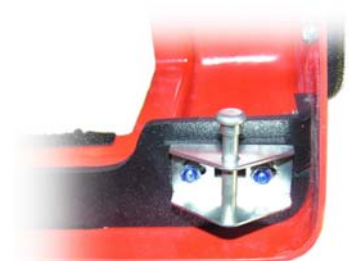
**The robot battery posts should never contact the metal of the main electronics box or the metal of the drive base. This will result in damage to electronic components especially inside the main electronics box.**

## 3 Attach the upper robot to the lower

1. Set the upper robot on the lower robot body.
2. As you put the top on, connect the 37-pin connector, which is a round connector and wire bundle running from the upper robot to the lower robot. When connecting this rotate it until it sits down into its mate connection and turn the plastic ring until it is secure.



3. Locate the four body latches (just two on certain robots) and push the pins into the body to secure the upper robot to the lower. If you have a Character driving, two of the latches are located in the compartment where the Character sits. The pins are to the left and right of Character. The other two are at the back of the robot. To latch these you will need to reach in through the back trunk or door. If you want to see a picture of the latches see page 5.





## CAUTION

Before operating the robot or transporting the robot on the cart or in a vehicle, the upper robot must be properly latched to the lower by pushing the latch pins in. Failure to do this could cause damage to the upper robot if it fell off.



Location of Body Latches for each style of top



## 4 Powering up

The **radio control transmitter** will be referred to as the “**RC**” in this manual. Turn the RC “ON” first and then turn the robot “ON”. Check that the RC battery level meter reads to the right. The “ON/OFF” switch for the robot is located inside the rear door or trunk on the main electronics panel. Push the switch up to turn the robot on. On some robots there is a hinged rear door to access this switch. **Tip:** There is a hook on the RC that you can attach a

neck strap to. You can use a RC or camera type neck strap.

## 5 Set the volumes

Check that the volume of the voice and MP3 player are at the level that you want. The volume for the robot’s voice can be adjusted on the UHF Wireless Receiver in the robot or on the level adjustment on the Nady UB4 transmitter. If you have the tape player, adjust the volume on the player itself.

**Tip:** If you want to change your voice volume quickly, move the mic closer or further from your mouth.

**Tip:** To change the volume of the MP3 player hold the mp3 switch on while moving the left joystick. There is a master volume on the Road Rage Amp. This amp is located on the main box in the lower robot. This acts as a master volume, so after changing it you may have to re-adjust the voice volume on the UHF Receiver in the robot. Do not go above the 1:00 position on the amp level adjustment.

## 6 Test all the functions

Test all of the robot's functions: Character' voice both ways, head turning, mouth, steering wheel, eyelids, eyes, tape, siren, lights, and drive movement for proper operation. The robot is now ready to operate.

**Note:** Keep the sliders on the RC centered and be sure they are centered before turning on the robot.

## 7 Optional accessories setup

For information about these, see the optional accessories section. This includes options such as the *voice modifier* and *water squirter*. These sections will give you step by step instructions for setup and related diagrams. You can put your own music and even sound effects on the MP3 player SD card. See the MP3 player section for details.

## 8 Powering down

1. Turn off the voice units that you wear on your belt before turning off the robot.
2. Turn off the robot.
3. Finally turn off the Radio Control Transmitter.

## 9 Charge the batteries again

Connect the Robot battery to the charger and bring it back to a full charge before leaving the robot. This battery should not be left with a partial charge. The transmitter battery should be charged if it is low. Before a storage period, charge both batteries to a full charge.

- **All of the major functions of the robot each have a section in the manual with more details and diagrams. Refer to these for more in depth information. The Appendix has pictures and diagrams of where various parts are in the robot. These will help you become familiar with where the parts are located and their function.**
- **For parts that you need for the robot, go to [Robotronics.com](http://Robotronics.com). This includes radio controls, voice units, headsets, batteries and chargers.**
- **When doing programs in large open locations you may want to use a separate wireless mic with a portable amp or the PA system. You can play music through the main system and even do the voice of the robot if you have at least two mics. This will take some practice to get it set up.**
- **It is possible to use a cell phone headset with the two way voice system if you get an adapter that goes from a 2.5 mm jack to two 3.5mm(1/8") plugs. This will give some added flexibility in choosing what type of headset that you can use.**

## Transporting the Robot

Before transporting the robot, remove the robot battery from the robot. The vehicle that you use to transport the robot should have adequate shock absorption. Vans and cars used for passengers would be the best. Transporting the robot in a trailer is not recommended because trailers typically do not have the same level of shock absorption as a car or van. A good rule of thumb to follow is that if the vehicle is adequate for transporting a computer it should also be fine for the robot.

Double check that the upper robot is latched and secure. There are four latches (two on certain robots) that must be latched to secure the upper robot to the lower robot (See the diagram below). These pins must be pushed in to secure the upper robot. Reach in through the trunk to access these latches.

**⚠ CAUTION** If the upper robot is not properly latched, it could come off while moving the robot, causing damage to the upper robot.

To strap the robot on the cart, roll the robot on with the back wheels first. The back wheels will drop in to the recesses. Put the cart's wheels against a wall if necessary. There are four eye bolts under the front and rear bumpers. Attach the hooks from the cart to the eye bolts. Loosen the straps if you need to reach the eye. Tighten the straps.

To lift the cart there is a strap-handle that is used to lift the cart off the ground and set it back down. There is a foam covered handle for moving the cart. Have the robot cover on the robot to keep the body from getting scratched. The cover can also help hold the top on if the string is tightly pulled around the bottom of the robot. Use elevators for upper levels when possible. You can simply drive the robot in to some locations, especially if the location does not have stairs. Use two people to move the robot upstairs.

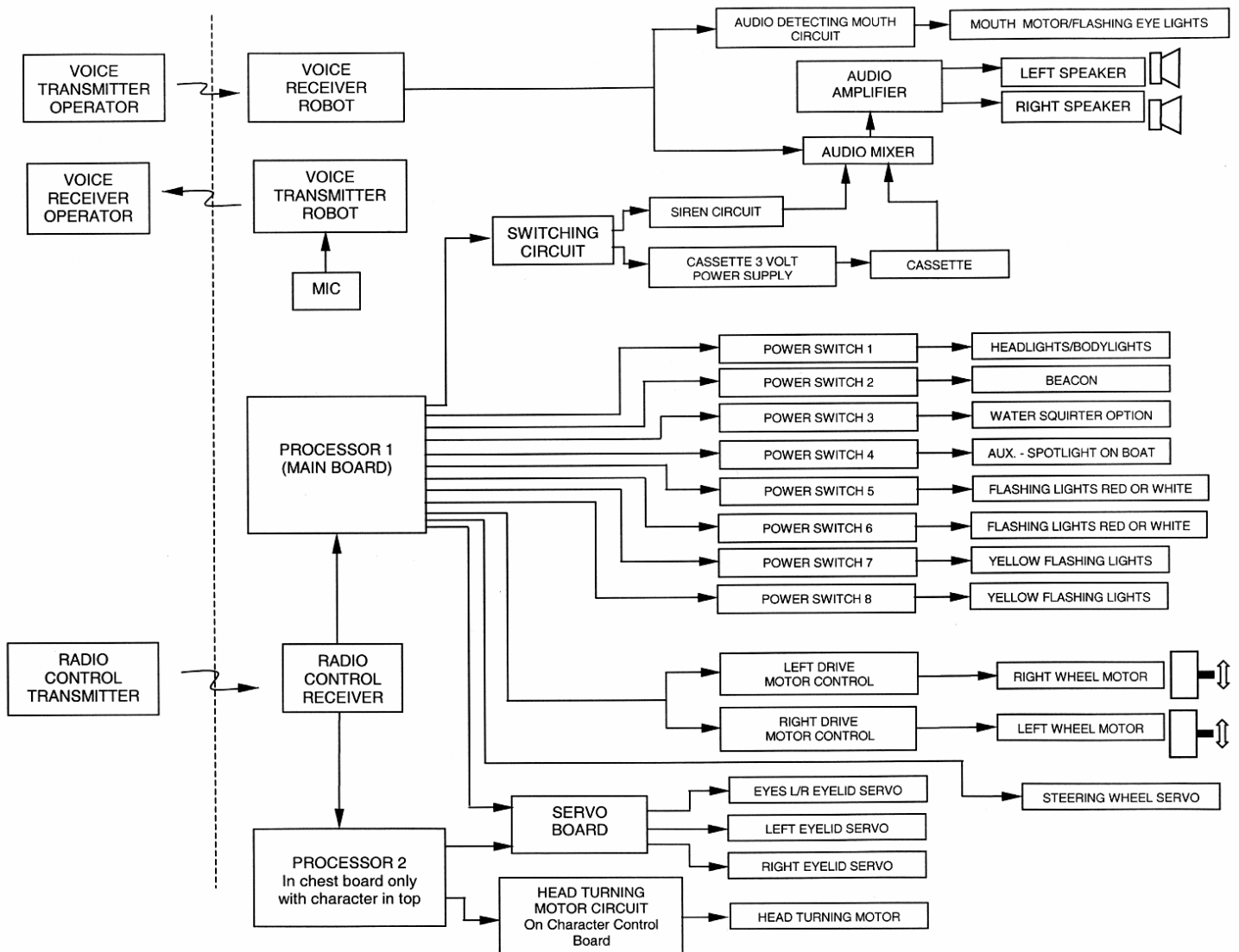


# Part 2 Subsystems of the Robot

Functionally, the robot is made up of the following basic subsystems:

- A. Radio Control System
- B. Voice System
- C. Cassette Tape Player
- D. Siren
- E. Robot Battery Systems
- F. Drive Motors
- G. Eyelids and Eyes Left and Right

Following are explanations of each subsystem, some operating instructions, and trouble shooting hints where appropriate.



## CHAPTER 2 Radio Control System

The Radio Control System consists of the control transmitter unit held by the operator and the receiver with its associated components in the robot.

The Radio Control Transmitter converts movements of the control sticks and switches into a coded radio signal, which is transmitted by radio to the Radio Control Receiver within the robot. The signal is received and then decoded by the micro-controller, which is on the main circuit board in the vehicle. The micro-controller controls functions based on what was sent from the radio control transmitter.

### Radio Control Operating Instructions

Refer to the diagram showing the radio control transmitter for the location of controls. Check all of the trim adjustments on the transmitter and make sure they are in their center position. Extend the Radio Control Transmitter Antenna 1/4 to 1/2 way. Turn the Radio Control Transmitter on first and then turn on the main robot power switch. It is necessary for the robot to always have an operating signal when it is on, if there is no signal you will not have full control of the robot.

The right hand joystick controls movement of the robot's drive wheels. Pushing the stick forward will cause the robot to move forward. Pulling the stick back will cause the robot to move backward. Moving the stick to the right or left will cause the robot to turn to the right or left respectively. Movement is fully proportional so any variation or combination of movement is possible. The horizontal and vertical trim tabs to the left and below the joystick are for centering and should be typically left in the center. The only time that you would need to move these trims is if the robot started moving slightly on its own. In this case move them slightly until the robot stops.

Control of the left and right eyelids is on the left joystick. The left and right eyelids are controlled in the corners forward and blink to the back. The eyes left and right move when you turn the head. The eyes will look in the direction that you are turning, adding animation to the robot.

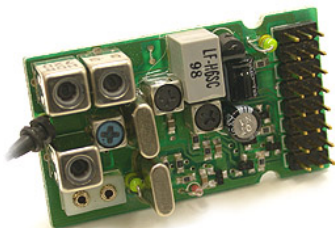
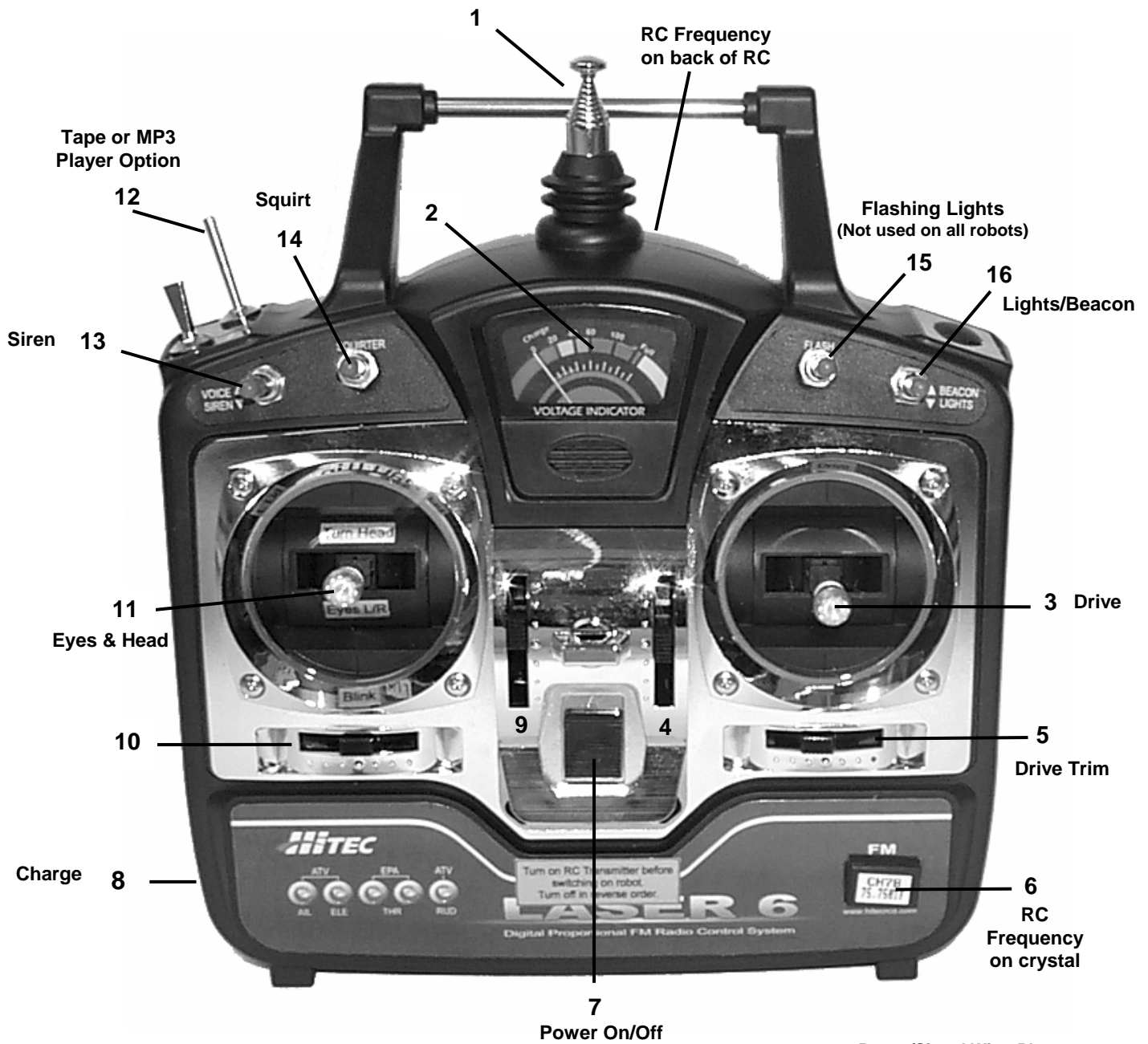
The left joystick left and right moves the Character' head on robots with a Character driving it. On other robots this stick controls the eyes left and right. The slider control below the stick should be left in the center so that the head stays in the center.

For a detail of other functions, see the radio control diagram on the next page. All of these functions are labeled on the radio control itself.

A charge plug is provided on the transmitter for recharging its internal battery. The transmitter power switch must be in the off position before charging the batteries. A charge light on the charger will come on while charging.

There is a RC battery (NiMH) provided with all robots. There is an extra Ni-MH battery provided with the package. These will give you about 5 hours operation each.

# Radio Control Transmitter



RC Receiver located in the robot



# RC Transmitter Controls

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**Note:** The following information on the transmitter controls includes information for a variety of similar robots.

---



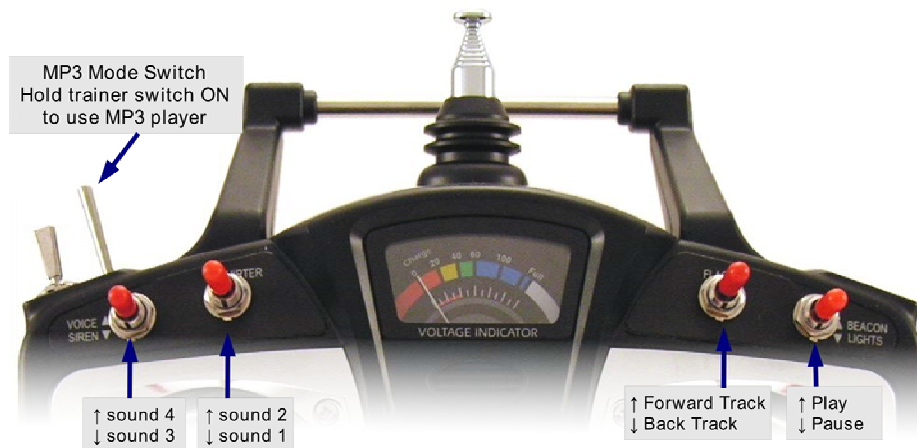
1. Telescopic Transmitter Aerial.
2. Transmitter Battery Voltage Meter (Expand Scale Voltmeter)
3. Right control Stick-  
Up and Down – Robot drive motors, forward and reverse.  
Right and Left – Robot drive motors steering. Left and right turns.  
**Tip:** Speed adjust- To reduce the drive speed you can adjust the ATV adjustments, ALL and ELEV, down. You will need to adjust them proportionally to maintain straightness of drive. You may want to add a label that this has been adjusted so that the future operators are aware of this change. **Note:** This can make the robot slower for easier operation indoors but will limit your speed for outdoor or large space use.
4. Forward/Reverse Trim lever for right control stick. Normal = Center. Neutralizes the drive motors. If the robot is moving slightly slide this a few clicks until robot stops moving.
5. Left and right Trim lever for right control stick. Normal = Center. Neutralizes the drive motors. If the robot is moving slightly slide this a few clicks until robot stops moving.
6. Crystal. Transmitter Crystal. Has RC frequency channel on label.
7. On/Off Switch.
8. Recharge jack. Plug the RC battery charger in here to recharge the internal battery. The charge light will come on, on the charger.
9. Forward and reverse trim lever for the left control stick. Normal = Center. Unused.
10. Left and right Trim lever for left control stick. Normal = Center. Centers the head on robots with head movement (Character in Vehicle).
11. Left Control Stick  
Left and right movement - Turning of the head left and right (Character in Vehicle) and eyes left and right.  
Up – Left lid and Right lid  
Down – Blink

## Top Switch Functions

12. Tape player
13. Voice and Siren
14. Squirter
15. Up- Flashing Lights- Red (Buster and Andy) or Red & Blue(K.C./McGruff Cruisers)  
Down- Flashing Lights- Yellow (Buster)
16. Beacon and Lights

## Controls for the Integrated MP3 Player Option

The MP3 player is located in the robot and has a SD or MM memory card that you can load music onto. If you have the MP3 player option then your switches will take on other functions when the MP3 mode switch is held on. Two of the switches are for sound effects on the SD memory card. The other two are for playing and selecting songs that you load on to the SD card. You can also change the volume on the remote with the left joystick.



**Hold the MP3 switch on to use MP3 Player and to change volume with the left stick.**

## Battery Compartment View of Switches



Switches must stay in the normal position except for mixing which should be off.



## The NiMH (Nickel Metal Hydride) RC Battery

The NI-MH RC transmitter battery will last about 5-6 hours on a full charge. Charge the battery for about **14 hours**. A charge jack is provided on the transmitter for recharging its internal batteries. This round jack is located on the right side of the radio control. (See the radio control diagram) The RC power switch must be in the off position when the charger is plugged into it and must remain in the off position while charging. A light on the charger will be on, when charging.



**Caution:** Do not overcharge the batteries as this could cause permanent damage to the transmitter batteries. (Doubling the normal charging time is the type of over charging that is meant here, and the battery getting hot.) When the battery level needle goes in the red, the robot should be turned off because the robot could act erratic without the transmitter signal.

To avoid a RC battery going dead during a presentation, start the program with a fully charged battery or be aware of how much charge there is left in the battery. If you have an extra battery you can change batteries and keep going.

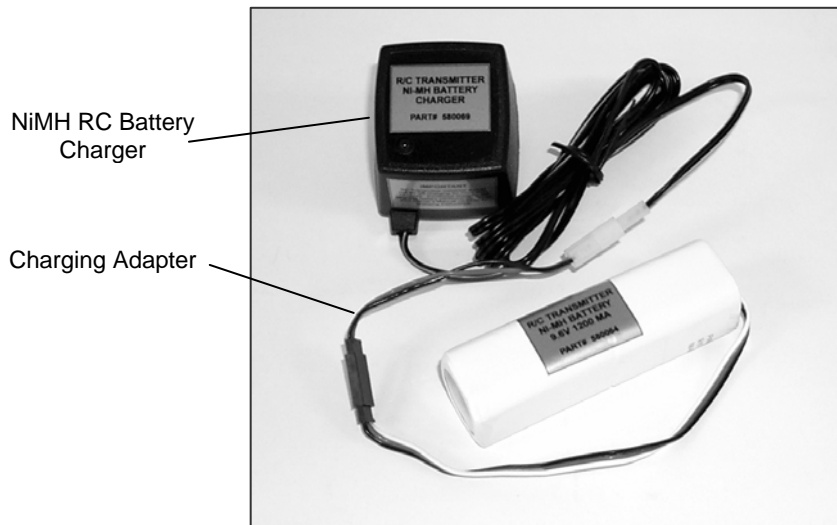
To install the NI-MH battery pack you need to take the battery cover off the RC. Disconnect the RC battery and put the NI-MH battery in its place.

### NI-MH RC Battery and Charger Specifications

|                                      |            |         |
|--------------------------------------|------------|---------|
| NI-MH RC transmitter battery         | 9.6 Volts  | 1500mAH |
| NI-MH RC transmitter battery charger | 11.6 Volts | 130mA   |

## Adapter for Charging an Extra NI-MH RC Transmitter Battery

If you have an extra NI-MH RC battery, you can charge this outside the RC. You may need to do this while you are using the robot or if you need to charge both batteries at the same time. The adapter needed to do this is in the control case or it is on your charger. It has a white connector on one side and a connection on the other end that will go directly to your battery. If the barrel adapter is currently on the charger, disconnect it and connect the other adapter. The charging time is still about 14 hours.



| Problem/Cause  | Action   |
|--|--|
| <b>Radio Control System</b>  |  |
| <b><u>No robot operations</u></b>  |  |
| 1. Switches in RC battery compartment moved in to the middle.                                  | 1. Put all switches in normal position except for mixing which should be off. See the battery compartment picture below. |
| 2. Crystal bad   | 2. Replace transmitter and receiver crystal or send RC in for repair.  |
| 3. Wire is not plugged in correctly to the receiver. This is typically a red-black-white wire. | 3. Hitec Receiver has a channel labeled B/8. This is the correct position.   |
| <b><u>One or two functions on the robot not working.</u></b>                                   |  |
| 1. Typically not the RC unless a switch or wire is broken.                                     | 1. Look for any broken or loose wiring inside the RC.  |
| <b><u>RC not maintaining power. Power meter will not go up.</u></b>                            |  |
| 1. Bad RC battery.   | 1. Try a new RC battery.   |
| 2. Charger not working.  | 2. Make sure your charger light is coming on.  |
| 3. If power goes on and off, could be a bad connection in RC.                                  | 3. Send your RC in for repair or replace it.   |
| <b><u>Joystick functions not working correctly.</u></b>  |  |
| 1. Trim adjustments not in the center.   | 1. Put trims (sliders) in the middle.  |



Switches must stay in the normal position except for mixing which should be off.

## CHAPTER 3 Wireless Voice System

The Voice System consists of two separate communication links. One link transmits the operator's voice to the robot. When you speak into the headset mic, this audio goes to a transmitter on your belt. This audio is transmitted to a receiver in the robot. The audio signal then goes from the receiver through a mixing circuit on the main board. It is then fed into the amplifier which amplifies the signal through the robot's speakers.

The second voice link transmits the audio detected by the Mic element (located in the front of the robot) to the 151 receiver (which is worn by the operator). This is amplified and sent to the speaker in the operator's headset. When putting the headset on, adjust the earphone so that you can hear well and the mic so that the volume is good.

---

**Note:** The operator's transmitter and receiver can be worn next to each other. If you want you can use a belt pack. The 151 Receiver antenna can be put out of view, in your pocket.

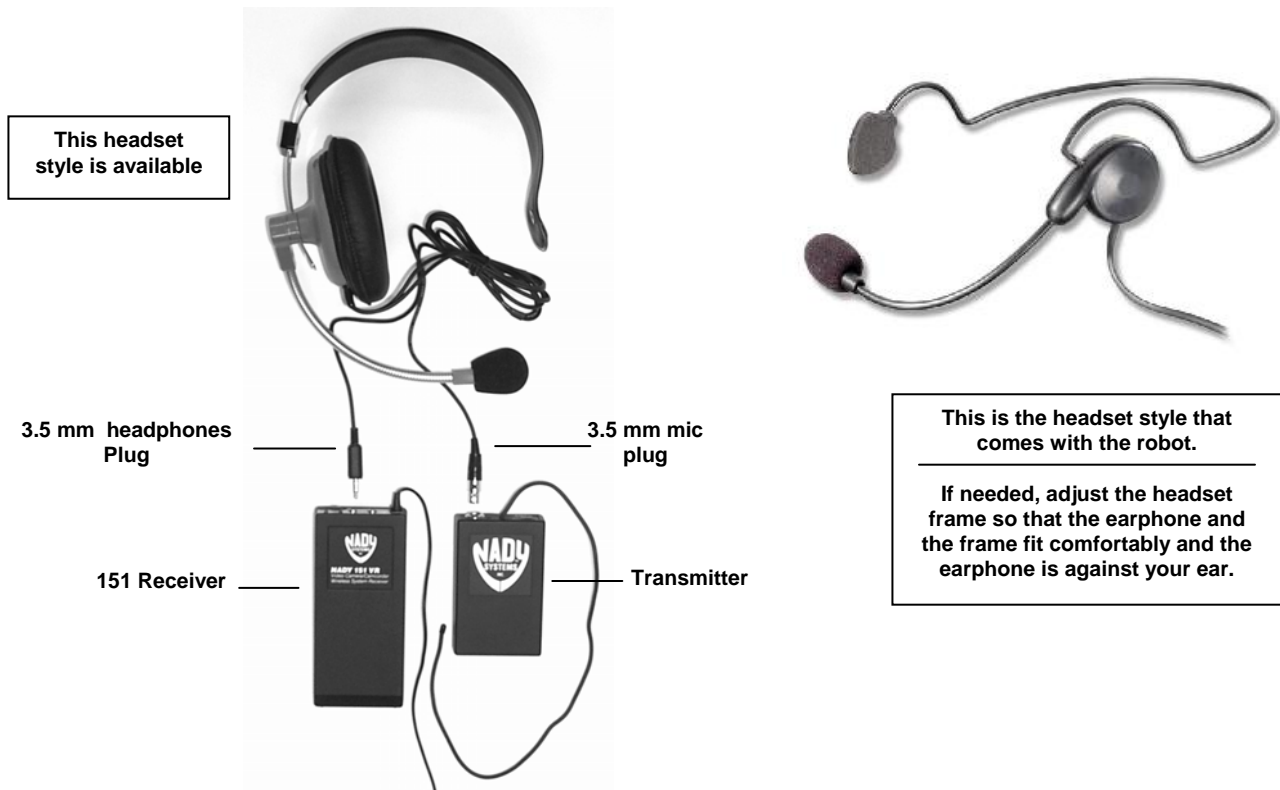
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### Location of Voice Units

|                    |  |
|--------------------|--|
| Voice Transmitter- | Operator wears   |
| Voice Receiver-    | On the main electronics box in the lower robot.          |
| 151 Transmitter-   | On the frame in the robot. The robot mic connects to it. |
| 151 Receiver-      | Operator wears   |

**Note:** For the location of the transmitter and receiver in the robot, see the **robot top view** diagram in the appendix.

### Operator's Voice Transmitter, Receiver, and Headset



## How to Operate the Operator's Transmitter

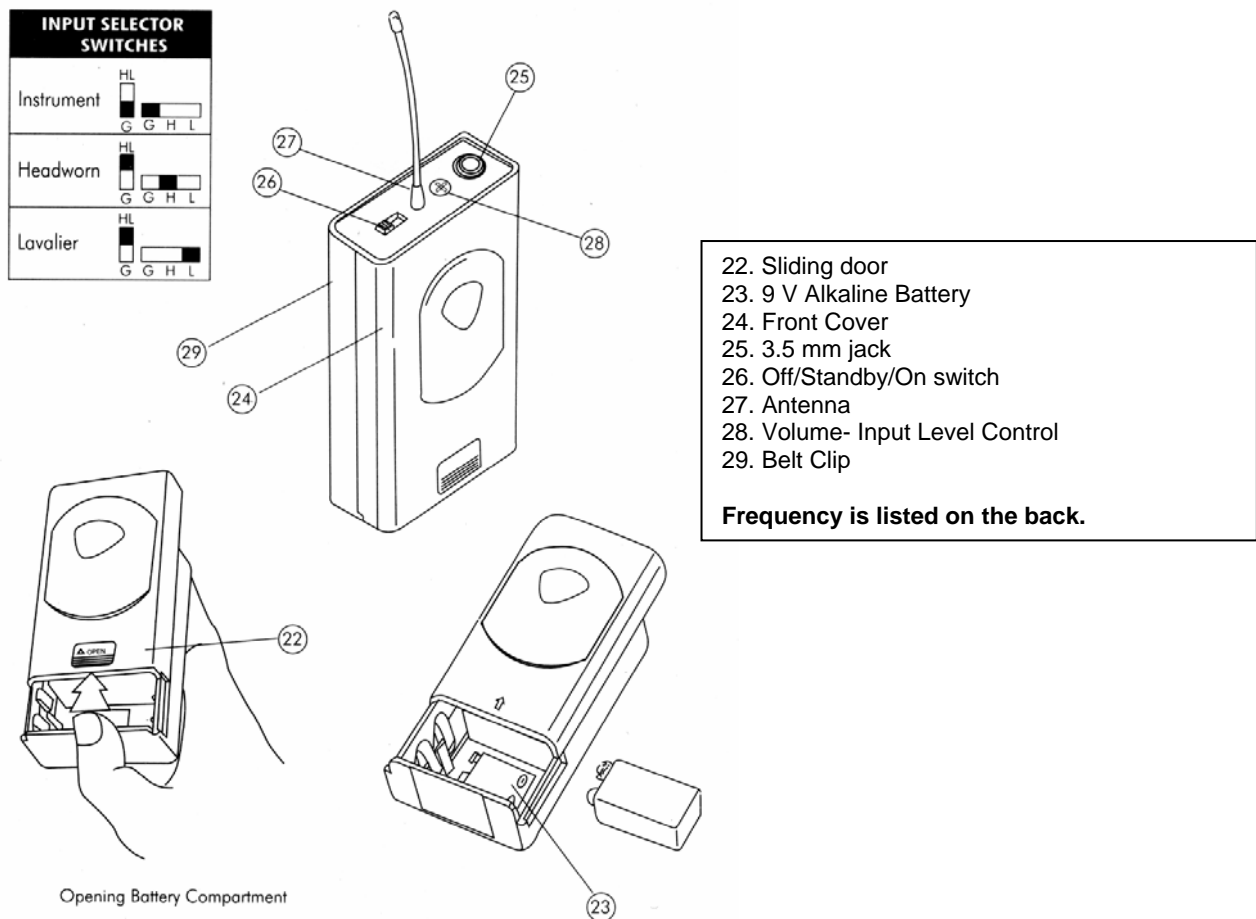
1. Open the battery door. This may be the front cover of the case that slides open.
2. Use a 9 Volt alkaline battery and insert it according to the diagram inside the battery compartment.
3. Place the headset on your head and adjust the microphone to approximately 1 inch from your mouth. If needed, adjust the headset frame so that the earphone and the frame fit comfortably and the earphone is against your ear.
4. Plug the mic plug from the headset into the top of the transmitter.
5. Move slide switches to the "ON" position.
6. On the UB4 there is a Volume input level adjust on the unit.

**Frequency channel- Located on the back of the transmitter.**

### Function of the LED

When turning on the power switch, with a fresh alkaline 9-Volt, the battery light will blink momentarily and go out. This indicates that it is powering up and that the battery is good. Because the light is a low battery indicator, when the light is on constant, this indicates the battery is too low-below 7 Volts. Replace with a new alkaline battery.

**Tip:** The operator's voice units both have metal clips that contact the posts of the 9-volt battery. These must be bent out from time to time to keep this contact good.



## How to Operate the Receiver (in Robot)

There are two adjustments on the receiver. The **volume** is on the back of the receiver, which you may set to the desired volume. The other adjustment is the **sensitivity**. This is factory preset to maximum sensitivity. This effects how sensitive the receiver is to the transmitter signal. Typically you would never need to adjust this. The only exception would be if you get squelch when the transmitter is off. You can deal with this by simply turning on the belt transmitter whenever the robot is turned on. You could turn the sensitivity down slightly but turn the adjustment as little as possible, because adjusting it will affect the range.

**Frequency label- Located on the side of the receiver.**

### Function of the LEDs

**TX LED-** This indicates that you are receiving a signal from the transmitter. On some units it is a single TX light. On other units it may have an A or B that it will alternate between.

**AF LED-** This light indicates that audio is going through the receiver. It will flash as you speak into your headset mic.

**Tip:** For best range extend the receiver antenna(s) as much as possible, not allowing it to touch metal.



1. Power On LED Indicator
2. Diversity LED Indicators
3. AF Peak LED Indicator
4. Antennas
5. Power Switch (Leave On)
6. Frequency Label
7. Audio Output
8. DC Input Jack 12V
9. Aux. Volume Control
10. Balanced Mic Audio Output XLR
11. Squelch Control

## How to Operate the 151 Transmitter (in Robot)

Located in the front left of the lower robot. The wire from the hood mic connects to it. No adjustment is needed. The switches will be preset to on at the factory. It receives its power from the robot. No 9 Volt battery is needed.

### Function of the LED

When the robot is turned on, this light flashes and then goes out. This indicates that the transmitter is getting power.

## How to Operate the 151 Receiver (Operator)

1. Remove the battery door. Use a 9-Volt alkaline battery and insert it according to the diagram in the battery compartment.
2. Plug the small round connector from the headset into the headphone jack on the top of the 151 receiver.
3. Turn the volume knob clockwise to the desired volume (if volume is too loud you will hear a loud high-pitched feedback noise. Turn the volume down until the feedback is gone.

**Frequency label- Located on the back of the receiver.**

### Function of LEDs

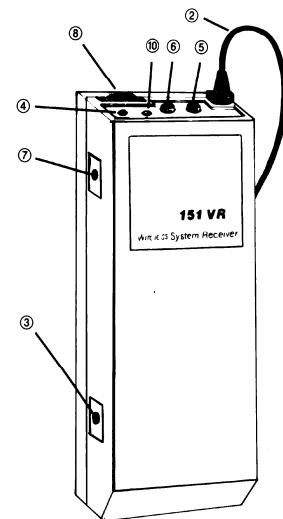
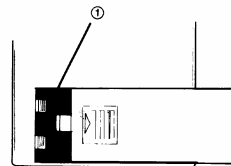
When turning the volume knob on with a fresh alkaline battery, the red light will blink on momentarily and go out. This indicates that it is powering up and that the battery has enough charge on it. As labeled, the light is a low battery indicator. When the light is on constant, this indicates that the battery is below 7 Volts. It then would need to be replaced.

**Tip:** The operator's voice units both have metal clips that contact the posts of the 9-Volt battery. These must be bent out from time to time to keep this contact good.



1. Off/Mute/On Switch
  2. Low Battery Indicator
  3. Audio Level Trim
  4. Audio Jack for mic
  5. Antenna
- 9 Volt Battery not needed in robot.**

Frequency listed on back



1. Battery door
2. Antenna
3. Mute control- Used if RF causes squelch. Leave Fully counter-clockwise for best range and reception.
4. Green TX LED- Indicates signal being received.
6. Headphones jack
8. Volume On/Off
10. Low Battery LED- On steady means low battery



## **Warnings**

1. **Do not unplug or plug in the DC power plug on the robot receiver with the robot power on.** If the power is left on, the plug will short out and could damage the receiver. The fuse in line on the power wire that is plugged into this receiver may blow. This fuse is a round black fuse holder. If this fuse is not blown but no RX power light is on, check the audio fuse on the main fuse block in the electronics box.
2. Do not leave the voice units in direct sunlight or in a damp place for any length of time.
3. Remove batteries if voices will not be used for an extended period of time.
4. Keep voices and headset in the carrying case when not in use.
5. Generally when the robot is on, the operator's transmitter should be on. This will avoid the receiver on the robot picking up radio frequency interference and putting out static (see intermittent static problem of Voice System Troubleshooting).
6. Turn off the 151 receiver or remove the headset before turning off the robot. You can get a squelch in your headset when you turn off the robot.

## **Troubleshooting the Voice**

**For any voice problem, perform the following steps first:**

1. Check to see that the batteries are good in the operator's transmitter and in the 151 receiver. Normally when you turn the 151 receiver on, the low battery light should blink on and go off. When turning on the power switch of the transmitter, the light should blink on and go off. If either of these lights stays on constant, the 9-volt battery is too low and must be replaced.
2. Check that the battery is in the correct polarity and confirm that the battery contacts are making a solid connection to the spring clips inside the compartment. Bend them out slightly if necessary. If the battery is making intermittent contact in the Transmitter, try a different brand battery. Certain brand batteries are bigger than others.
3. Check all switch positions both on the operator and robot voice units. This includes the audio and the power switches. See the Voice Unit Diagrams for details about the correct position of these switches.
4. Check all plugs to and from the voices for proper connection.
5. Check the LED lights. When operating normally, the Receiver in the robot has a red TX light on. The UHF10 or UHF4 Receiver has two LEDs, A and B to indicate that a signal is being received. The 151 Receiver has a green TX light. These lights indicate that a signal is being sent from the respective transmitter and that the receiver is receiving this signal.

**See the next page for specific problems and their solutions.**

| Problem   | Cause  | Solution  |
|---|--|---|
| <b>Voice System</b><br><u>Always do the following first:</u> <ol style="list-style-type: none"> <li>1. Replace the 9 Volt batteries with new ones. USE ALKALINE!</li> <li>2. Bend the battery contact out for better contact with the post of the 9 Volt battery.</li> <li>3. Check power and audio switches, and lights on all voice units.</li> <li>4. Check plugs to and from the voices for proper connection. Some plugs have covers that can be opened. Look for a broken wire.</li> <li>5. Check if the transmit (TX) lights are coming on.</li> </ol> |  |   |
| Operator cannot talk  | 1. Low Battery. LED on steady or no LED flash.                               | 1. Replace the 9 Volt battery. Is battery inserted in correct polarity?   |
|   | 2. Battery posts not touching the metal clips in the operator's transmitter. | 2. Bend out the metal clips. Put foam under clips.  |
|   | 3. No power to the UHF10 or UHF4 Receiver. If yes, continue.                 | 3. Check the in line fuse to the Receiver in robot and audio fuse on main fuse block.   |
|   | 4. No TX light on the Receiver. If yes, continue.                            | 4. Check Sensitivity adjustment on back of Receiver. It should be on Max. Sens.   |
|   | 5. Audio wires going through pitch shifter connected wrong.                  | 5. The wire should go from audio out of receiver to <b>input</b> of pitch shifter, then from <b>output A</b> into the main box and plug on to the main board. |
|   | 6. Headset plug to transmitter broken.                                       | 6. Take apart and look for broken wire or solder joint. TEST- Connect robot mic to transmitter. If it now works, problem is in headset. Repair or replace.    |
|   | 7. Still not working. Call Robotronics.                                      | Send transmitter, receiver, and headset in.   |
| Operator cannot hear  | 1. Low Battery. LED on steady or no LED flash.                               | 1. Replace the 9 Volt battery.  |
|   | 2. Battery posts not touching the metal clips in the operator's receiver     | 2. Bend out the metal clips. Put foam under clips.  |
|   | 3. Headset plug to 151 RX has a broken wire.                                 | 3. Unscrew cover of plug and look for broken wire.  |
|   | 4. Robot 151 transmitter not turned on.                                      | 4. Turn on audio and power.   |
|   | 5. Power plug to robot 151 transmitter unplugged.                            | 5. Find wire and plug it back in.   |
|   | 6. If you have no TX light on 151 RX mute could be out of adjustment         | 6. Adjust the mute on the 151 RX to max. which is fully CCW.  |
|   | 7. Robot microphone in robot is bad.   | 7. Order a replacement. TEST- Plug your headset into the robot transmitter in place of the robot microphone and test.   |
|   | 8. Still not working. Call Robotronics.                                      | 8. Send robot mic, transmitter, receiver, and headset.  |
| Voice Operates but cuts out. Should get 50 feet without any cutouts.  | 1. Low Battery.  | 1. Replace the 9 Volt battery.  |
|   | 2. Sensitivity Adjustment down too far.                                      | 2. Sensitivity adjustments should be at max. on the 151 Receiver and robot receiver.  |
|   | 3. Broken, loose or retracted antenna  | 3. Extend robot receiver antenna or replace broken antenna.   |
| Squelch coming from robot   | 1. No signal being sent to the robot   | 1. Turn on the operator's transmitter.  |
|   | 2. Sensitivity is too sensitive.   | 2. Very slightly adjust sensitivity down from max. (This will decrease your range)  |
| Squelch in headset when turning robot off.  | 1. 151 Receiver slightly too sensitive.                                      | 1. Adjust 151 RX mute slightly CW   |
|   | 2. 151 RX picking up interference in your area.                              | 2. Always turn off 151 RX and remove headset before you turn off robot.   |



## Moving Mouth

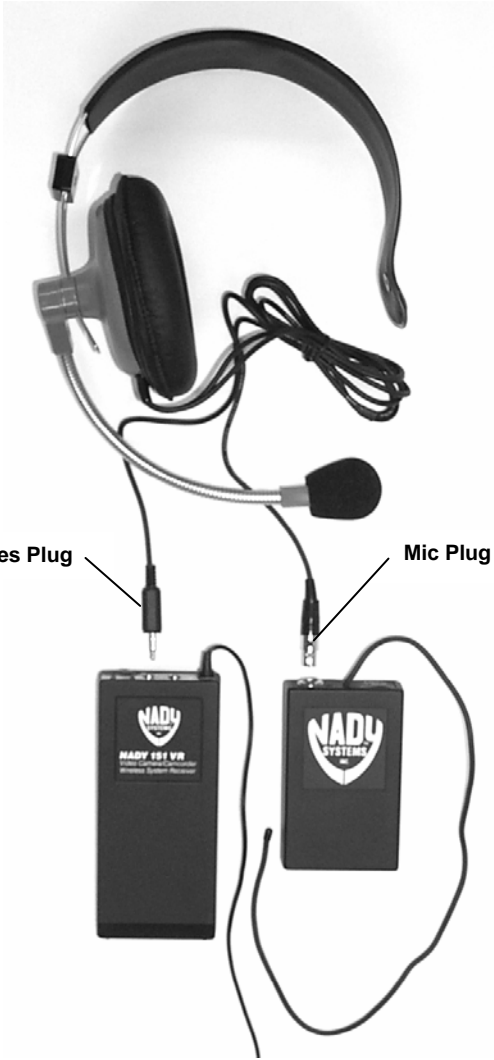
Function- The moving mouth is a feature where the mouth moves as the operator speaks through the robot. The amount of the movement is affected by the level of volume of the voice. This level is affected by the Receiver volume level and the position of the headset microphone to the operator's mouth. The sensitivity is set based on a typical voice volume and the headset microphone being about 1 inch from the operator's mouth.

Adjustment- The adjustment is preset at the factory and should not need any adjustment. If an adjustment is necessary, see the Main Circuit Board diagram in the Appendix for the location of it. It is labeled Moving Mouth sensitivity. When this pot is adjusted clockwise this makes the mouth more sensitive to your voice and turning it counter-clockwise makes it less sensitive.

### Location of the Adjustment

Main Electronics Box in Vehicle.

# Operator's Voice Transmitter and Receiver



3.5mm Headphones Plug

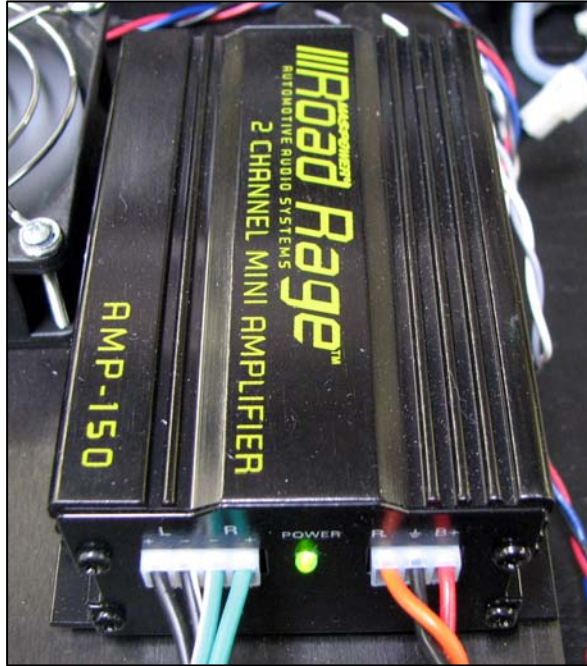
Mic Plug - 3.5mm



Headset style that comes with the robot.

## CHAPTER 4 Audio Amplifier System

The audio amplifier boosts the all audio from the main circuit board and drives the speakers. The level adjustment adjusts the volume for any audio projected from the speakers. There are individual volumes for the voice, mp3 player, and siren. Set the Filter to middle because this gives you the best mid-range sound. If your sound is bassy or too high pitched, check this switch position. Set the level at about 2:00. If this is too high you will get some distortion.



Speakers

Power 12V



| Problem/Cause  | Action  |
|--|---|
| <b>Siren</b>   |   |
| <b>No audio</b><br>1. Audio fuse blown<br>2. Speaker wires are disconnected  | 1. Replace fuse. See fuse block diagram.<br>2. Re-connect speaker wires.  |
| <b>One speaker not working</b><br>1. One channel of booster bad.<br>2. Speaker wire broken or disconnected.<br>3. Speaker bad. | 1. Replace booster.<br>2. Connect or replace wire.<br>3. Replace speaker. |
| <b>Audio Sounds muffled and low</b><br>1. Filter is in low position.   | 1. Switch to off position.  |

# CHAPTER 5 MP3 Player Option

## Integrated MP3 Player Features

- Ability to play MP3 files through the robot.
- Memory Storage Card: SD Card.
- Four sound effects stored on the card varies with robot type.
- Space on the card to load your own music.
- Selection of songs is done with the RC.
- New feature: Adjust the volume of the music and effects from the RC.



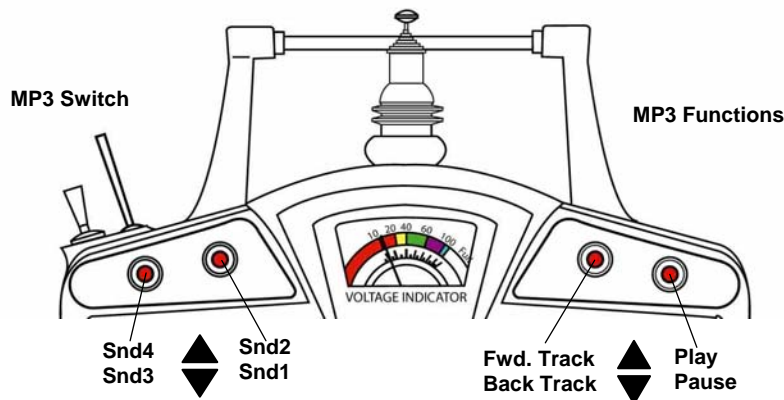
The Integrated MP3 player will only play mp3 format files. The 128kbps compression rate is the best choice for this player for best cueing speed. File names cannot be more than 20 characters long. Abbreviate your file names to accommodate this. When loading music it is important that you load your songs outside the soundfx folder on the card or they will not play.

### Important

To use the MP3 player you will need access to software that converts audio files to the mp3 format and a card reader or slot on your computer for SD memory cards.

## Play Music

When you first turn on the robot, the MP3 player will take a few seconds to start up before you can operate it. To play a song, hold the MP3 mode switch and push the play switch shown on the diagram below.



Hold the MP3 switch on to use MP3 Player and to change volume with the left stick.

## Tips

- After you move forward or back to a new track, the music will start right when you release the switch.
- When you scroll to the last track it will stop there. If you want to go to the first track you need to back track.
- If you stop on a song, it will remember that position when you start the mp3 player again, unless you turn off the robot.

- There is an additional way to change the volume of the music/effects. It is to go to the Road Rage audio amp and adjust the volume. When you do this, you may also need to adjust the volume of the voice on the voice receiver. Do not turn the amp up too high; not much past 1:00, because you may get some audio distortion.
- You can customize the songs and sound effects that you use for different programs by getting additional cards and adding your own set of sound effects and music.

### To Load Music on the Memory Card

Place the card in a card reader or in a SD card slot on your computer. Go into 'My Computer' on your desktop and find the drive that represents the card. Open this and you will see the sound effects folder. Open the source folder where you have your MP3 music or sound effects to transfer to the card. Drag and drop a copy of these files to the card. Make sure to put these files separate from the sound effects folder. You can place the files in the order that you want to use them. Put the memory card back in the MP3 player.

### Play Sound Effects

If you want to play a sound effect, hold the MP3 mode switch while you hit the sound effect you want (See the diagram above). You can play any of the sound effects: snd1, snd2, snd3, or snd4 with the switch as shown. If you add sound effects or songs to be played in the place of snd1-4 they must have the filename of **snd1**, **snd2**, **snd3**, **snd4** to play in their place. The sound effects files must be in the soundfx folder.

### Removing the SD Card

Open the back door of the robot to locate the MP3 player. Push on the memory card and it will slide out part way. Remove the card. Now you can load music on the card. If you need more storage space, get a card with additional capacity. If you need to add the sound effects to a new card, make a copy of the folder with the sound effects on and place it on the new card.

**Tip:** Have multiple cards with different music customized for the presentations.

### Changing the Volume

While holding the MP3 switch, move the left stick right for volume up and left for volume down.

### Order of songs playing

The songs will play in the order that you transfer them to the SD card. Transfer one song at a time in the order that you want them to play.

## CHAPTER 6 Cassette Tape System

If you have the **MP3 Player Option** on your robot, you will not have a cassette player.

The cassette tape system is located inside the robot on the metal electronics box. The system is activated by remote control from the remote control box. (Additional instructions are on the next page.)

### How to Play a Cassette Tape

1. Insert a regular type cassette tape into the player.
2. Depress the play button on the cassette player.
3. Move the radio tape select switch to the tape position.
4. Activate the tape from the control box.
5. Adjust the volume to desired level.
6. Press F FWD to move the tape to the next song.

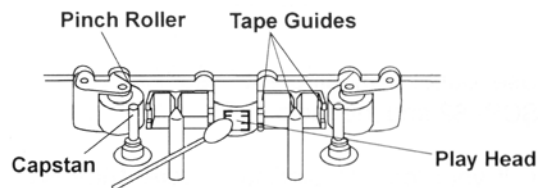


The tape head of the cassette player should be cleaned after every 25 to 30 hours of use. Always remove the cassette tape when not in use. This will prevent flat spots on the capstan roller.

### Specifications

Output Jack- 3.5mm stereo

Power Input- DC 3V Center negative



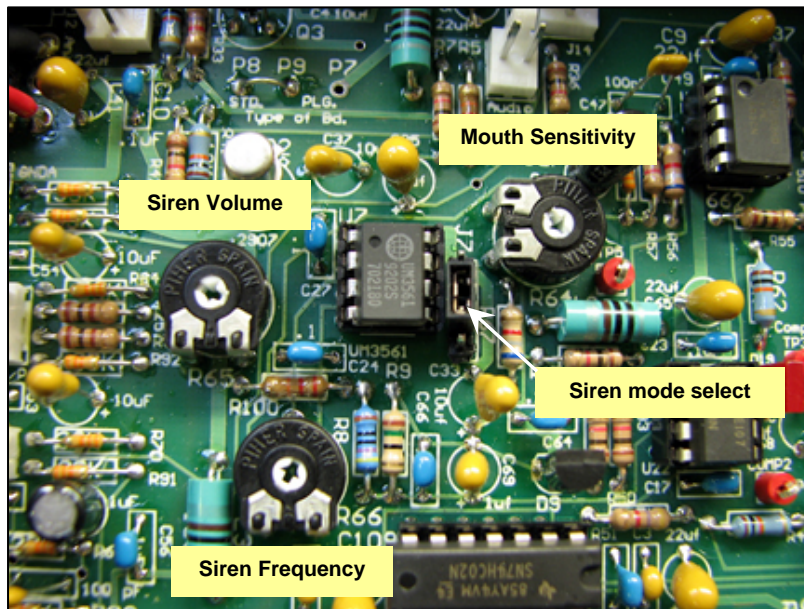
### Troubleshooting - Cassette Player

| Problem/Cause  | Action   |
|--|--|
| <b>Cassette Player</b>   |  |
| <b><u>No tape operation</u></b>                                      |  |
| 1. Tape player not on tape mode or volume not turned up.             | 1. Put mode select to tape and turn volume up.                           |
| 2. Play button not pushed  | 2. Must push play button before hitting the switch on the radio control. |
| 3. Bad Tape.   | 3. Check tape in other tape player.                                      |
| 4. Tape is too tight.  | 4. Loosen with a pencil by spinning tape.                                |
| 5. Player is not getting power because power wire or plug is broken. | 5. Check for 3 Volts at power plug. Replace plug or repair the wire.     |
| 6. Power or audio wire has come disconnected from the main board.    | 6. Open the main box and re-connect to board.                            |
| 7. Radio control or tape circuit not working                         | 7. Contact Robotronics for help.   |
| <b><u>No siren, or voice either.</u></b>                             |  |
| 1. Audio fuse blown.   | 1. Replace the fuse. See fuse block diagram.                             |
| <b><u>Poor quality sound or slow.</u></b>                            |  |
| 1. Belts worn out and slipping.                                      | 1. Replace cassette player or belts.                                     |

## CHAPTER 7 Siren

The robot siren is operated by remote control from the Radio Control Transmitter. The siren circuitry is located on the main circuit board. See the Main Circuit Board diagram, in the Appendix, for the location of the siren volume, mode select and oscillation frequency adjust. The **volume of the siren** is controlled by a trim pot on the main board. Turning the pot clockwise will increase the volume of the siren. Turn the pot counterclockwise to decrease volume. Three different sirens are available. Choose the siren you want by moving the jumper located on the **siren mode select**. To control the oscillating speed, adjust the **siren frequency trim pot** in the siren circuit. The siren mode select is set to the common siren for your robot. If the siren mode select is changed, the siren frequency will very likely need to be adjusted.

**NOTE:** The volume and oscillation are preset at the factory and do not need to be adjusted unless you want a different volume level or oscillation speed.



### Troubleshooting – Siren

| Problem/Cause   | Action  |
|---|---|
| <b>Siren</b>  |   |
| <b><u>No siren</u></b><br>1. Audio fuse blown   | 1. Replace fuse. See fuse block diagram.  |
| <b><u>Siren volume not loud enough</u></b><br>1. Booster problem if tape and voice vol. also are not loud enough.<br>2. Adjust siren volume if tape and voice okay. | 1. Replace or have booster repaired.<br>2. See siren volume adjust on main board. |

# CHAPTER 8 Robot Battery System

## Robot Battery

The battery in the robot is a rechargeable sealed lead-acid Gel type battery **12 Volt 33AH**. This type of battery is very dependable and safe. It can be repeatedly charged and discharged.

### How to Recharge

1. To recharge the robot battery, first open the trunk or rear door and unplug the battery from the main component board. You could also remove the battery from the robot.
2. Connect the charger wires to the battery, red to the red (POSITIVE +) post and black to the black (NEGATIVE -) post.
3. Plug the line cord of the charger into a 110-volt AC outlet. Leave the trunk cover off or open during charging for ventilation. Keep the AC power connection as short as possible especially when using an extension cord.
4. The red LED will come on during charging and the green when the battery is charged and ready to use. Both red and green on indicates that you are in the middle stage of charging.



The robot is supplied with an automatic type battery charger. This will recharge the battery full in about 8-12 hours depending on how long you have operated the robot. It will not overcharge the battery if left "ON" indefinitely. It goes to a float charge mode once the battery is fully charged.

### Taking Care of the Robot Battery

- The number one rule for battery care is to keep the batteries fully charged at all times.
- Like all batteries, there is some discharge that occurs every day. Because of this you should charge up the battery **monthly** during periods when the robot is not being used.
- Also, the automatic battery charger can be left connected for extended periods of time to keep the batteries at full.
- It is a good practice to rotate the batteries if you have two or more.
- For a battery that is outside the robot, store the battery on a wood or rubber surface not concrete floors.

#### Caution



If the wires to the battery have been removed, observe properly polarity when re-connecting. The red wire goes to the positive terminal and black wire to the negative terminal. Damage to electronics could result if the polarity is wrong.

#### Important

**Charge the battery to a full charge right after each use of the robot and monthly when not in constant use.**



## Robot Battery Charger

The charger supplied with the robot is designed to both recharge your battery, and extend your battery's life. It produces 12 Volts DC at a full 6/3 Amps. It will charge the battery in about 8-12 hours depending on how long you have used the robot. After the battery is charged, the green LED will come on and the battery is ready to use. At this point the charger is charging at a FLOAT or maintenance rate. At this rate you can leave the charger connected for extended periods of time.

**Robots with recharge jack:** Certain robots have a recharge jack on the body for recharging. If your robot does, then the on-off switch will have a recharge position also.

### Charge Pro Model 2606A 6 Amp Battery Charger

#### Status Indicating Lights

**Red on-**The battery is discharged and is being recharged at the maximum 6 Amp rate of the charger (stage 1).

**Red and green both on-**The battery is charging at the stage 2 rate of 1.5 to 5 Amps.

**Green on-**Your battery is charged and ready to use. It is now on float charge (stage 3).



### Schumacher 3 Amp Battery Charger

#### Status Indicating Lights

**Amber-** Charging

**Green-** Charged and is now in float charge.

**Red-** Check battery. The charge clips may be on wrong or the battery may be bad.



### Personal Safety Precautions

#### Warnings

##### HAZARD OF EXPLOSIVE GAS MIXTURE

When charging, a lead acid battery gives off hydrogen gas. The Gel type battery is a lead acid battery with pressure relief type vents. Although it only gives off a small percentage of the gas that a wet lead acid battery does, the following precautions should be observed:

1. **Connect the charger clips to the battery first, then connect the cord to an outlet.**
2. **Warning:** Battery chargers get hot during operation and must have proper ventilation. Do not set the charger on flammable materials like carpeting, upholstery, paper, cardboard, etc.

3. Charge the battery in a dry, well ventilated area. This is why it is important that you leave the trunk or door open. You can also remove the battery from the robot.
4. Do not position your face over the battery, at any time while making connections.
5. Do not smoke, strike a match, or cause a spark in the vicinity of the battery during charging.
6. Always unplug the AC supply cord before connecting or disconnecting the charger leads from the battery or arcing may result.
7. Do not drop a metal tool onto the battery.
8. Do not expose the charger to rain.
9. Replace defective cords and wires immediately.
10. Do not operate this charger with a two bladed adapter plug or extension cord. Doing so can result in serious personal injury.
11. To reduce the risk of shock, connect only to a properly grounded outlet.
12. Remove personal metal items such as rings, bracelets, necklaces and watches when working near a lead acid battery.

### **If the Battery is not taking a Charge**

Make sure that the charger is working by connecting it to a battery that is known to be good.

Leave the charger on for a few days and see if the battery starts taking a charge. Turn the robot on and try to operate it. Connect to the charger again. If it still will not take a charge, it's time to replace the battery.

## CHAPTER 9 Drive Motor System



Your robot is provided with two high quality industrial grade drive motors. Each motor controls a drive wheel-left and right. Steering of the robot is accomplished by varying the speed and direction of these motors. For example, when the left motor runs faster than the right, the robot turns to the right.

Each drive motor is connected to its drive wheel via pulleys and 1/2" wide rubber timing belts. The pulley set screws and bolts should be kept tight.

### Trouble-Shooting – Drive System

Perform the following steps first when trouble-shooting a drive problem:

1. **Check drive belts and motor pulley set screws.** Especially if you hear the motors activate but the robot does not move. It may be a belt off or loose set screws on the pulley.
2. **Check connections to motor controls and motor leads.** These are blue and yellow wires coming from the electronics box and going to the drive motors. There is a white connector in line. The joystick could be pushed in the on position while the connector is being checked for an intermittent connection. If there is a bad connection, the connector and/or pins should be replaced. While doing the test just explained, have the robot wheels off the ground.

---

**Note:** Get the wheels off the ground to look at each wheel independently.

---

#### Neither drive operates

- Check both fuses in the fuse block. Check set screws on the motor pulleys.

#### One drive motor does not operate either direction

- **Set screw is loose on the motor pulley.** Tighten the Allen set screw(s) on the pulley on the motor shaft.
- **Drive motor is bad-** To test the motor for operation, swap the motor wires. Get the wheels off the ground to see which motor and wheel are not working. The motor wires are blue/yellow wires hanging down below the electronics box. You may have to remove the robot battery, to make the swap. If now the wheel/motor on the side in question operates and sounds fine then the motor is good.
- **Drive circuit problem** (motor control)- If the drive motor is good, the drive circuit could be the problem. Each motor has a drive circuit on the main board. If you have a Voltmeter you can check that there is power (about 12 Volts) on the blue wire from the fuse block. Contact Robotronics for additional help.
- **Fuse blown or bad wire.** Check the drive fuse in the fuse block. See the fuse block detail.

#### One drive motor operates only in one direction

- The motor control circuit is likely the cause of this. The problem is in the drive circuit. Send the main electronics to Robotronics for repair or contact our Service Department.

**The robot is not driving straight** (Veering when you drive)

**Note:** Before making this adjustment, be sure that your motor pulley set screws are tight and that both motors appear to be working forward and reverse. To check this prop the back of the robot off the ground.

- To locate the adjustment, see the Robot Main Electronics Box diagram in the Appendix. They are labeled **Forward Drive adjust** and **Reverse Drive adjust**. You will need a small flat head precision screwdriver to make the adjustment. The cover of the main electronics box would need to be removed to access the adjustment. Take the cover of the box completely off and set outside the robot so that it cannot touch the post(s) of the robot battery.

Forward Drive Adjust Pot - Effects forward straightness of drive.

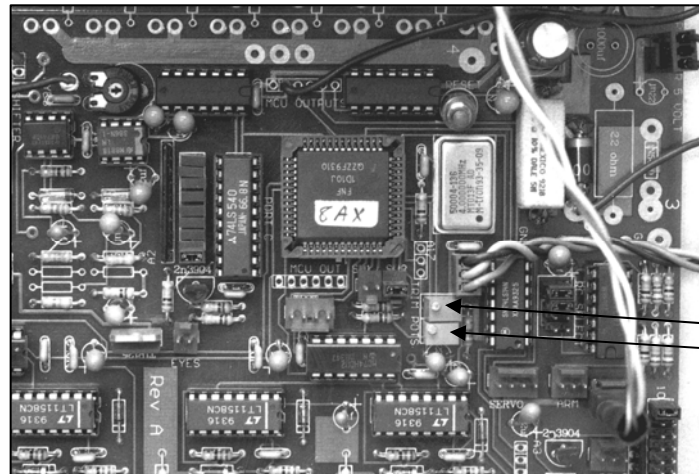
Robot veering left- Adjust it counter-clockwise

Robot veering right- Adjust it clockwise

Reverse Drive Adjust Pot- Effects reverse straightness of drive.

Robot veering left- Adjust it counter-clockwise

Robot veering right- Adjust it clockwise



Drive Straightness Adjustments:  
**Forward**  
**Reverse**

If the robot veers, the reason is that one motor is going faster than the other at any given position of the joystick. For example if at full speed, the robot veers to the right, this means that the left motor is going faster than the right motor. To correct this you would adjust the forward drive adjust pot clockwise. You may need to do some trial and error to get it just right. It is best to use full speed during the adjusting, because this will act as a good reference point.

### **The robot is moving slightly even though the drive stick is at neutral**

- Move the sliders next to the drive stick until the robot neutrals out. This is called trimming the stick.
- The joystick is broken or a wire has broken off the potentiometer of the joystick. Send the RC in for repair. We need the Hitec receiver out of the robot also.

# CHAPTER 10 Character Head Turning System

Vehicle robots that have characters driving them will have this system. The main components of this system consist of the head turning motor, motor control circuit, and the feedback pot. When you move the joystick on the radio control, a signal is sent to the receiver in the Robot. The receiver sends this signal to the microcontroller on the Character board. The motor control circuit is on the Character board. The motor control circuit is directed by the signal to send 12 Volts to the motor and in what polarity. What polarity is sent to the motor will cause the motor to move right or left.

The job of the feedback pot is to track the position of the head and continually relay information to the motor control circuit and micro-controller so that when you release the joystick and it goes back to center, the head also goes back to center.

## Location of Parts

**Motor control circuit**-On the Character Board mounted on the inside the chest of Character.

**Feedback potentiometer**- directly below the motor.

**Set screw**- on the inside of the neck.

## Troubleshooting – Head Movement

### **The head is out of position but operates**

The head could have been hit out of position or the setscrew is loose. Try to move the head manually. If you can, move it back into the correct position and make sure the setscrew is tight. The setscrew can be accessed through hole in the plastic below the neck. If you cannot manually move the head, you may need to loosen the setscrew, re-position the head and then tighten the setscrew. When re-positioning the head, have the robot on so that the motor will maintain the motor center position.

### **The head motor is keeping the head position to the extreme left or right**

- The in line connector to the blue feedback potentiometer has come disconnected. Check if one of the wires has broken off the pot.
- The feedback pot could have slipped. The pot could be loose or the head needs to be re-centered. There are two ways to re-center the head. **Option1:** Find the hole in the plastic just below the neck, as you look at the neck from the front. You have to pull down the fur. To access the set screw the head has to be looking straight forward. Loosen the set screw (3/16" Allen wrench). With the robot on, position the head and tighten the set screw. **Option 2:** The feedback pot which is a blue pot just below the head turning motor will need to be lowered clear of the tubing that joins its shaft to the shaft of the head turning motor. Now you will have access to be able turn the shaft of the feedback pot until the head comes back into center position. Bolt the pot back up into its correct position.
- Feedback pot is bad and needs to be replaced. It is a 5K 360 degree single turn pot.

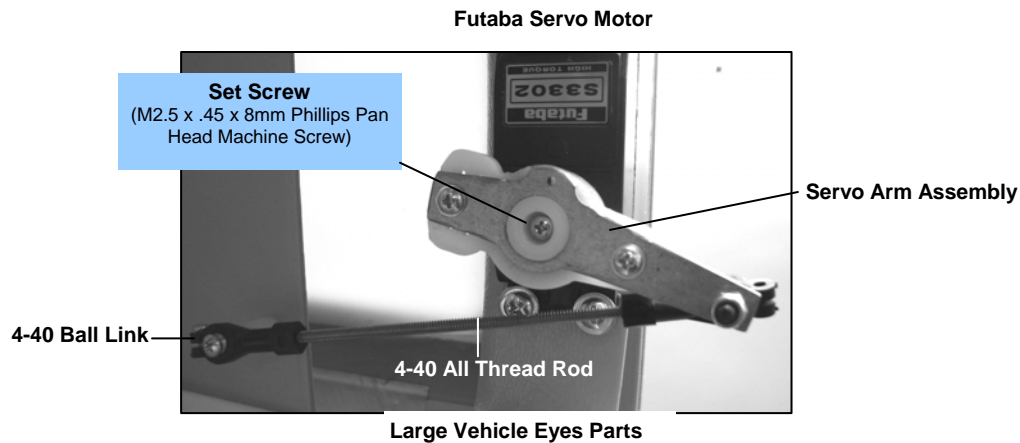
### **The head motor is not operating**

- Check the motor wire to see if it came disconnected at its in line connection (blue/yellow).
- The Character board is not getting power- if this is the case you would not be getting eyelid movement. Check the fuse inside the main electronics box. See the main electronics box diagram for location of the fuse.

Look at the red and black wire bringing power to the Character board. If you have a Voltmeter, check for 12 Volts going to the board. Is there 12 Volts; a broken wire?

## CHAPTER 11 Eyelids and Eyes Left and Right

The eyelid and eyes left and right movement is accomplished by three servo motors in the Character or upper robot. When the switch on the radio control is activated, this signal is sent to the radio control receiver in the robot. The micro-processor in the robot decodes this signal and a new signal is sent to the eyes servo board. The eyes servo board is located on the underside of the top of the robot. To see it, the top would need to be removed and the top turned on its side. The wires connected to this board take the signal to the servo itself and operate the shaft of the servo motor to turn clockwise or counter-clockwise for opening or closing. The rotation of the servo motor shaft is coupled to the eyelid and eyeballs with a servo arm and then an eyelid rod.



### Troubleshooting - Eyes

#### An eyelid or the eyes left and right does not operate:

- **Linkage problem.** Check the linkage from the servo motor. Look for the servo arm off the servo shaft or the ball link off the eyelid. Put the servo arm back on and get a set screw to hold it on.
- **Wire broken.** Follow the wires from the specific servo motor with the problem. The wire will run to the eye servo board. If it is disconnected, reconnect according to the eye servo board diagram. If the servo does not work correctly (wrong direction), try one of the other outputs on the eye servo board. See the diagram showing the eye servo board on the next page.
- **Bad servo.** Replace the servo motor.

#### One of the eyelids is at a different level than the other:

- **Bent rod.** If the eyelid rod is bent, bend it back into position or replace the threaded rod.
- **Adjust the level.** The eyelid can be positioned to match the other eyelid. To remove the servo saver arm, the set screw must be removed. The eyelid level can be changed by altering the length of the eyelid rod or changing the position of the servo saver arm on the servo motor shaft.

#### There is no operation of any of the eye functions:

- **Five pin wire disconnected, broken or in the wrong place.** The wires that bring the signal to the eyes servo board are gray and yellow. 5 Volts power is the black and red wires that connect to the eyes servo board. You can check for 5 Volts here. If these wires are connected, follow them back to the board that they originate. Typically these wires go to the

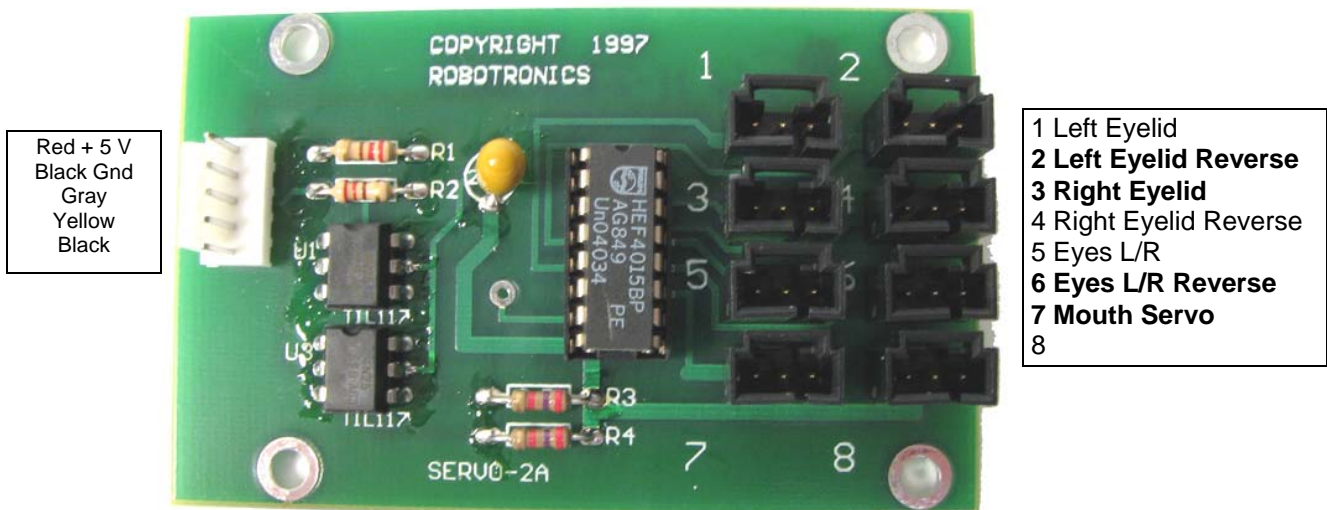
37 pin connector. Check the wiring here to see if there is a broken wire. On robots with characters driving, these wires go to the Character Control Board in the chest area. Check these connections and look at the Character Control Board in the end of this manual for correct placement on the circuit board.

- **Check the fuse on the fuse block.**

### The eyes work but not properly:

- Check switches 3 and 4 in the battery compartment of the RC transmitter. They should be in the normal (blue) position.
- Put the joystick sliders in the middle.

### Eye and Mouth Servo Board



# CHAPTER 12 OPTIONAL ACCESSORIES

## Water Squirter System

The new system has a reservoir in the robot that you remove to refill. It is held by an elastic band.



### Fill the Water Bottle

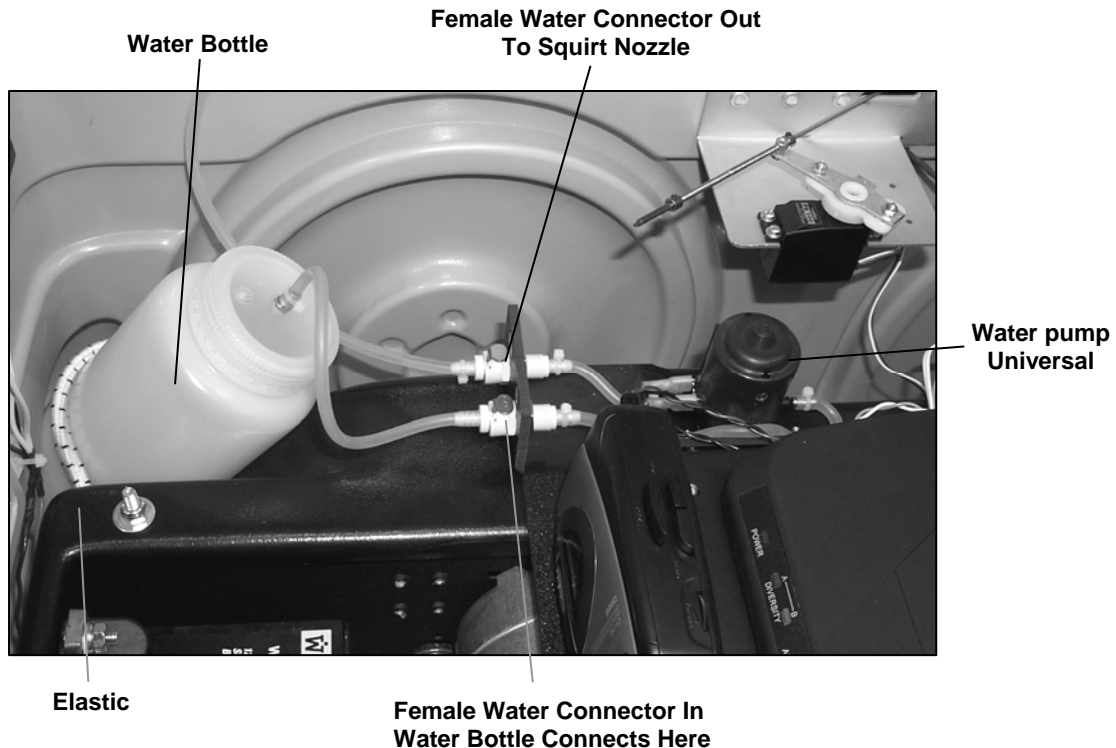
Remove the water bottle inside the rear of the robot by disconnecting the tube from the water connector. Push on the metal clip to release it. Fill with water and replace. Connect the tube to the water connection labeled bottle. Make sure you have the elastic around the bottle when you put it back in.

### Squirt Water

Just hit the switch on the radio control to squirt. This is a momentary spring loaded switch so that you can get short bursts of squirting. If you have problems squirting but you hear the motor, try cleaning out the nozzle in the front of the robot.

### CAUTION

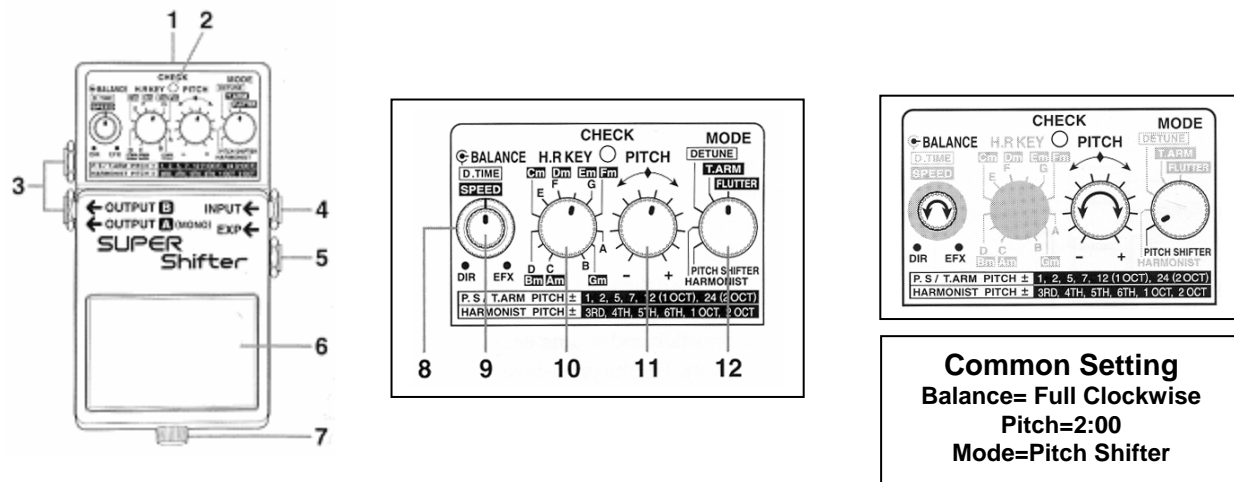
The water squirter system should not be operated without water in it. If you hear the motor but there is no water squirting, check your tube connections. Next try priming the pump by taking the bottle out and squeezing on the bottle while operating the pump.





## Optional Accessory: Voice Modifier (Pitch Shifter)

The pitch shifter (voice modifier) can change the operator's voice to disguise it and create a robot character type voice. The operator's voice signal is received like normal by the voice receiver in the robot. The signal is then sent from the audio out of the receiver to the **Input Jack** of the pitch shifter. It is modified and sent from the shifter **Output A** to the voice 'audio in' on the main circuit board.



1. Power Jack – 9 Volts center negative
2. Check indicator – Power indicator and show whether an effect is on or off.
3. Output Jacks. Output A is what we use.
4. Input Jack. Audio input wire from the wireless receiver plugs in here.
5. EXP Jack. Not used.
6. Pedal Switch. Turns it on or off.
7. Thumbscrew. To release pedal.
8. D.Time Speed Knob – Delay time. Not used in pitch shifter or harmonist mode.
9. Balance knob – This adjust the output balance between the direct sound and the effect sound. Typically set this on EFX for the full effect.
10. H.R. Key switch. Not used.
11. Pitch Switch. Adjusts the amount of pitch shift.
12. Mode Switch. Selects the mode. Typically use the pitch shifter mode.

The pedal on the pitch shifter is used to turn it on and off. When the pitch shifter is on, the power light labeled 'check' will be lit. The shifter will take a few seconds to power up. To turn it off, push the pedal again. If the pitch shifter is not turned on, your unmodified voice will come through.

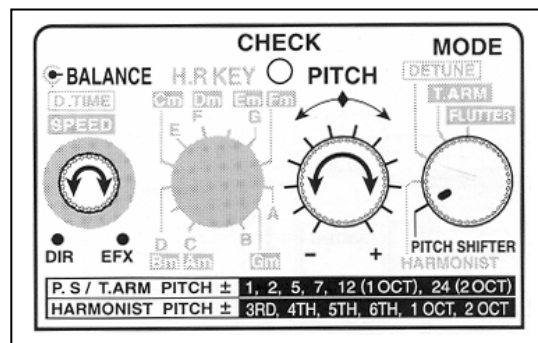
The pitch shifter has two basic effects; a digital pitch shifter and a delay. There are many variations of these two effects. When used as a pitch shifter, you can vary the shift within +/- 2 octaves. Set the mode knob to Pitch shifter and then vary the pitch knob until you get the sound of voice that you want. You can get a similar effect with the harmonist position but the pitch shifter gives you the best sound. These are the most common modes used because these

modes give you the ability to adjust the shift of your voice to exactly what you want whether up or down. About 2:00 on the pitch knob gives you a good voice.

The shifter gets power from the robot battery; no internal battery is needed. If the cover of the main electronics box ever needs to be removed, do not allow the shifter power wire plug, to contact the metal box. The metal box surface has a ground connection. The fuse related to the shifter is the audio fuse located on the fuse block.

Below is a typical setting for the robot voice. This will give you a shifted cartoon character or robot type voice. If you do not want any change to your voice you can turn the balance knob all the way down.

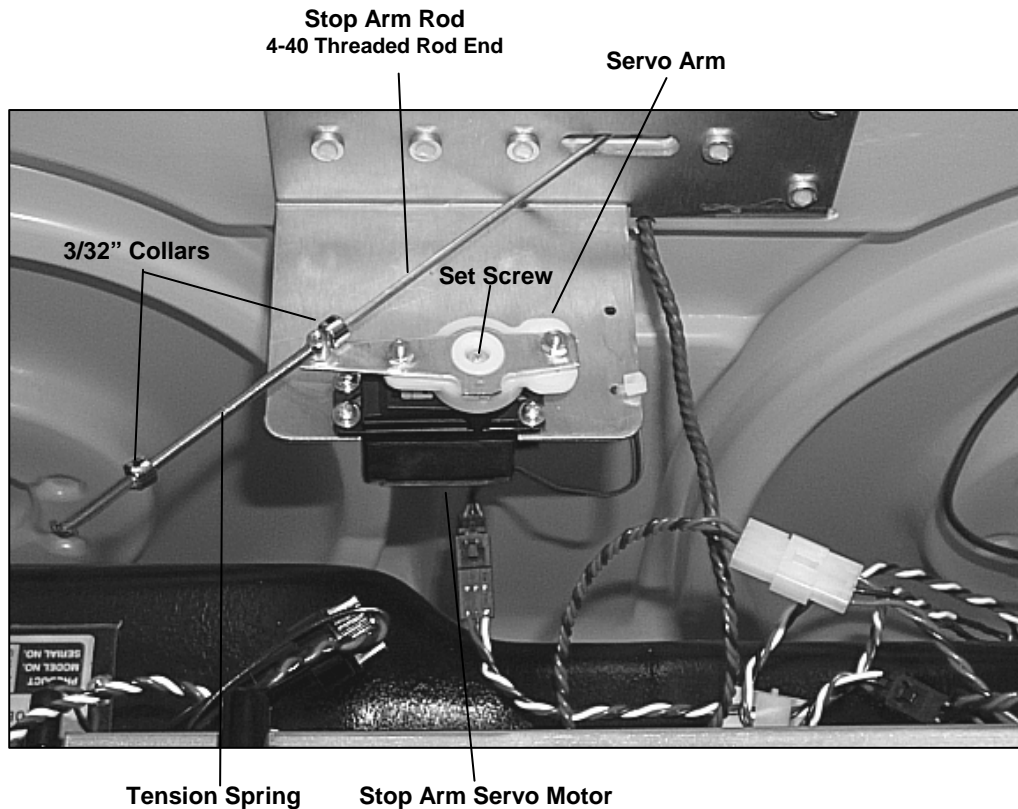
**Balance**-clockwise  
**Pitch**-About 2:00  
**Mode**-pitch shifter



# Stop Arm and Crossing Arm for School Bus Robots – Barney and Buster

## Stop Arm

To activate the stop arm function, the operator will hit the switch on the RC that is labeled stop arm/reds. The signal from the RC is sent to the receiver in the robot. This signal goes to the main processor and two signals are in turn sent from the processor. One is sent to the red light output transistors to flash the red lights. The other is a servo signal that is sent out to the servo motor via the 3-pin servo output from the main board. See the main board diagram to locate these outputs. The servo signal goes to a circuit board that provides the 5 Volt power for the servo and isolates the signal from noise. This board is the 5- Volt Isolation circuit board and is located off the back left corner of the main board. Parts of the stop arm include the stop sign, servo, ball link, rod, spring, servo arm and set screw. To adjust the pull in tension and position of the arm, loosen the set- screw on the rod and increase or decrease the tension on the spring.



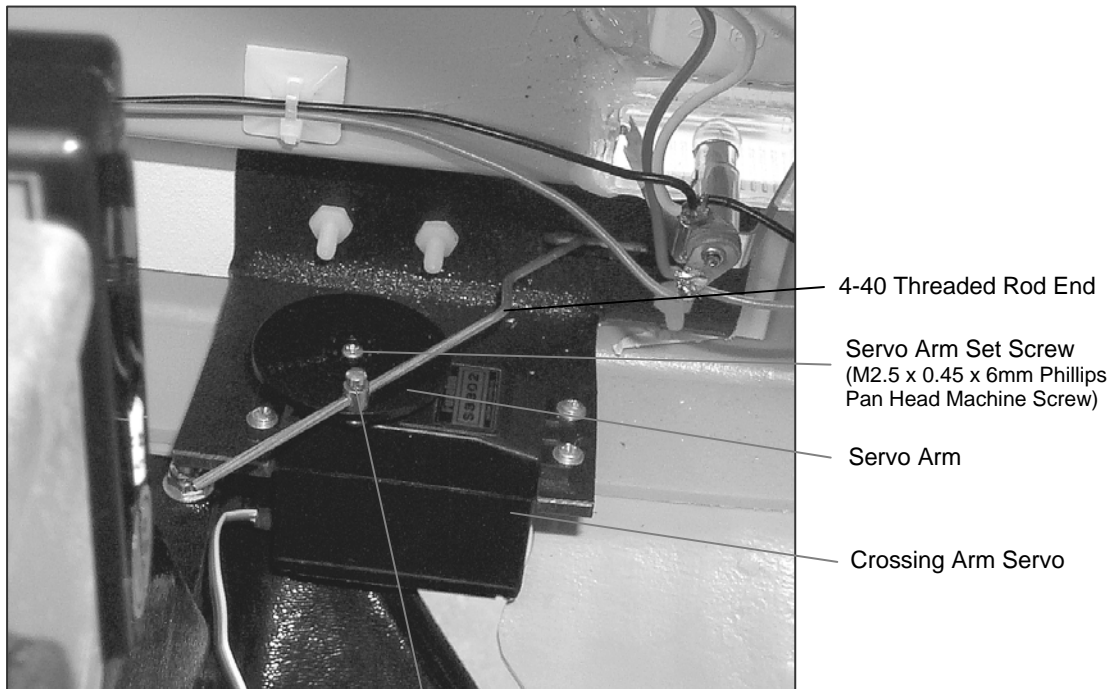
| Description                   | Part #              | Description                 | Part # |
|-------------------------------|---------------------|-----------------------------|--------|
|                               | <b>Stop Arm</b>     |                             |        |
| Servo Motor Futaba 3003/FS100 | 722004              | Tension Springs             | 712001 |
| Servo Arm Assembly            | 500014              | Stop Arm Sticker            | 715017 |
| 4-40 Threaded Rod End         | 791144              | Stop Sign                   | 990089 |
| 4-40 Ball Link                | 791259              | Stop Arm Metal Bracket      | 930401 |
| 3-32 Collar                   | 791138              | Stop Sign Bulb              | 800024 |
| 3/4 inch Stop Sign Red Lens   | 800025              |                             |        |
|                               | <b>Crossing Arm</b> |                             |        |
| Futaba S3302 Servo            | 722002              | Servo Arm for Crossing Gate | M      |

|                                |        |                                      |        |
|--------------------------------|--------|--------------------------------------|--------|
| EZ connector                   | 791121 | 4-40 Threaded Rod End                | 791144 |
| Crossing Arm metal bracket     | 930402 | Crossing Arm with Ball and Pivot Rod | 500405 |
| Crossing Arm Gate Plastic Only | 700409 |                                      |        |

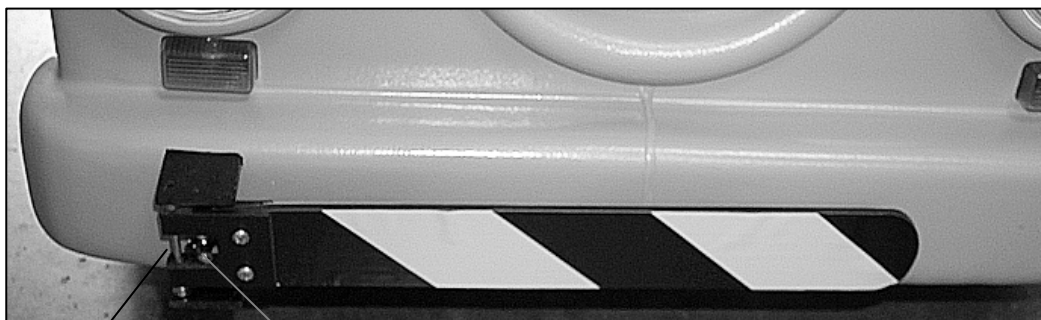
## Crossing Arm

The same servo signal that opens the stop arm will open the crossing arm. The signal comes from the same place on the main board and then continues on to the 5 Volt Isolation board before it goes to the servos. The crossing arm mechanical parts include the bracket, servo arm, rod, ball links, and set screw as shown in the diagram below. To adjust the pull in tension and the out position of the arm, loosen the set- screw on the rod and move the position of the arm accordingly. Make sure that the arm does pull in tightly against the bumper, so that it does not move out at all when driving the robot.

**Caution: Do not move the robot when the crossing arm is in the open position.**



E-Z connector/set screw  
Loosen this set screw to  
change how tight arm pulls in.



# PART 3

## CHAPTER 13 Assembly & Disassembly

### Interchanging or removing the body:

1. Remove the upper robot (top).
2. Remove the four nuts under the front and rear bumper that hold the body on the frame. You will need a 3/8" socket or wrench.
3. Disconnect the headlights wire and microphone wire from the transmitter.
4. Disconnect the speaker wires at the white in line connector.
5. Lift the body off the frame.
6. Install the new body, re-connect the wires and put the nuts back on under the bumpers.
7. Put the upper robot on; connect the 37-pin connection and pop the body latch pins outward to hold the top on.

### Installing or removing the upper robot on the lower:

1. Set the upper robot on the lower robot body.
2. Connect the 37-pin connector that is a round connector and wire bundle running from the upper robot to the lower robot. When connecting this rotate it until it sits down into its mate connection and turn the ring until it is secure.
3. Locate the four body latches and push the pins outward into the body to secure the upper robot to the lower. If you have a typical vehicle robot, two are in the middle left and right and two at the back. To latch these you will need to reach in through the rear hatch or door. If you have a character in the top, two of the latches are located in the compartment where the Character sits. The pins are to the left and right of the Character.

Reverse order for removal.



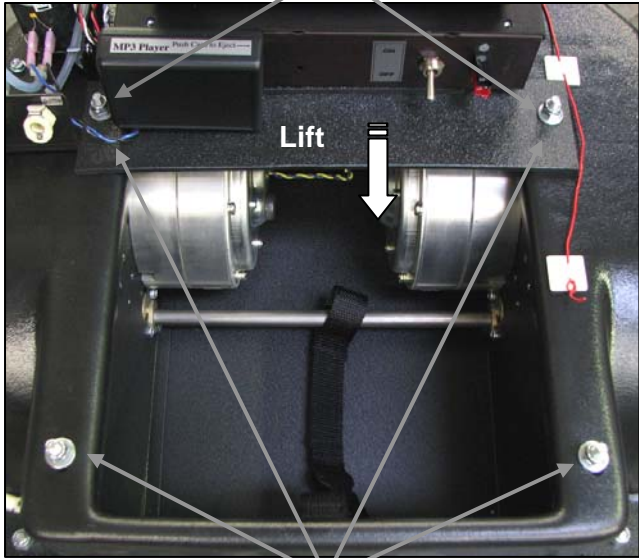
### **CAUTION**

**If the upper robot is not properly latched before transport, it could come off while moving the robot with the transport cart or in a vehicle, causing damage to the upper robot.**

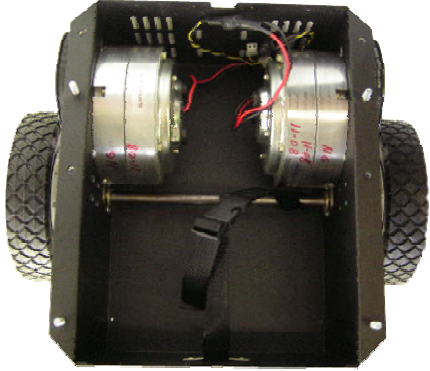
### Removing the main electronics box from the robot:

1. Disconnect the battery connector before working with or removing the main electronics box. There are 2 nuts to remove at the back bracket of the main box. There are some wires to disconnect also. These include the speaker wires, headlights, drive motor wires (blue and yellow), power wire to the 151-voice transmitter, and removing the receiver antenna wire from the clips.
2. Now lift up on the back of the panel until it clears the studs, then slide the box back and out. When removing, do it slowly, making sure that all wires are disconnected.

**Removal of Main Box**  
Remove 2 nuts, lift plate up to clear studs,  
and slide main box back to remove.



**Removal of Drive Base**  
Remove these 4 nyloc nuts to  
remove the drive base  
(7/16" socket)



**Drive Base Removed**

**Removing the drive base from the plastic frame (Increases access to the motors):**

1. Remove the 4 nuts holding the drive base to the plastic frame.
2. Disconnect the drive motor wires at the in line connection. These wires are blue and yellow wires going to each drive motor.
3. Lift the back of the robot up and roll the drive base out from under it.

**Installing the drive base back into the frame:**

1. Lift the back of the robot up enough to roll the drive base under and into position.
2. Line up the 4 threaded studs with their holes and lower the robot onto them.
3. You may need to put the electronics panel on now.
4. Put the nuts back on which hold the metal drive base on to the frame.

Reverse steps for disassembly or assembly.

# PART 4

## CHAPTER 14 Maintenance

### Regular Maintenance Checklist

Periodically the robot should receive a thorough inspection.

1. To prolong the life of your robot system, always store it indoors. Store in a safe place away from **light, dust, moisture**, and excessive heat. **To keep dust and light away from the robot, a robot cover should be used.**
2. The plastic may fade from the effects of UV light over time; especially white bodies. To avoid this you can paint the body. See the painting instructions in this manual.
3. The robot and Radio Control Transmitter batteries should be stored fully charged. The robot battery should be brought to a full charge after each use of the robot so that it always has a full charge on it.
4. Examine the exterior of the robot and make repairs as necessary. See the robot body repair instructions if needed.
5. Remove the upper robot. Check all bolts and nuts for tightness.
6. Examine electrical wiring and connectors for looseness and wear.
7. Clean and lubricate mechanical parts of the robot such as the front wheel casters as needed with a light machine oil or LPS-1. Inspect the drive belt and pulley system making sure that the motor pulley set screws are tight. You can use belt dressing on the drive belts if they are dry or squeaky.
8. Wash the robot body with mild soap and water and a soft cloth and reattach the body. Isopropyl alcohol or Citrol® may be used on stains that won't come off with soap. If this causes the finish of the plastic to become dull, apply ARMOR-ALL brand protectant. Do NOT use alcohol on windows or pupils.
9. Check the Radio Control System and Voice Transceiver for broken wires, antennas, controls, cases, etc. The metal clips that are in the voice units and contact the 9 Volt battery, should be bent out routinely to maintain good contact.
10. Part of your maintenance of the robot may include sending the robot or parts of it back for repair and tune-up. This may include the RC, voice equipment and the main electronics panel. Go to **Robotronics.com** and **service** for more information.

For a list of recommended tools for a tool kit, see the next page.

## Recommended Tool Kit

Fuses- 1, 3, 5, 15, 20, Amp (AGC Type)

#53 Miniature bayonet bulbs (automotive panel type) for eyelights

Precision regular Phillips screw drivers

Screwdrivers (Regular and Phillips)

Socket and ratchet set

Needle nose pliers

Crimper/Wire strippers

Wire cutters (diagonal cutters)

7/16" & 3/8" wrenches

Set of Allen wrenches (Especially 3/32" and 1/8" sizes) – Short and long length sets

Extra 9 Volt alkaline batteries

Fine tip soldering iron and solder

Solder wick and solder

Small bottle of all purpose lubricant

**Digital Multimeter (Volts/Ohms)**

4" cable ties, universal wire clips and wire tie downs



## Fabric and Fur Care

General maintenance of your robot should include caring for the robot's fur. After each use, clean and brush the robot's fur and clothing so the oils and dirt do not become permanent. This may be done with a cloth or brush. Keep the robot covered when not in use to keep dust and dirt off and to protect the fur and clothing. A good idea is to have two people operate the robot, one to operate it and the second to help people interface with the robot. This person can protect the robot from sticky fingers, dirty shoes, ball point pens, etc. This person can pass out stickers, coloring books and help give your safety presentation. The following is a list of specific ways to care for the fur:

- Brush the fur regularly with a soft brush, or white terry cloth towel to avoid matting over time. This will help to keep it clean and looking fresh and new. Be careful to be gentle, excess friction may cause excess wear.
- For regular cleaning maintenance use a damp soft cloth and warm water. A drop or two of mild liquid detergent in the warm water before applying it with a damp cloth should remove most skin oils and other dirt buildup.
- You can use a fabric cleaner such as 303 Fabric/Vinyl cleaner. You can purchase this from an automotive store. You can also use Woolite mixed with water. To get the fur fluffed up again brush it or use clean compressed air to blow across the fur.
- The body fur with the paws can be cleaned in a washing machine and dried on warm in the dryer. The jacket can be cleaned the same way.
- **Do not get the robot wet!**

## Painting of the Robot Body

The following information is only suggestions of painting methods. Contact a professional for assistance.

### Preparing the surface

The robot body is an **ABS plastic** and should be cleaned before painting to remove oils and dirt. This is especially true if the surface has had a silicone-based product such as Armor-All put on it. Clean the plastic with a plastic cleaner designed to clean before painting. Use a 600-grit sandpaper or Scotch-Brite 7448 pad to smooth the scratches. This also improves the adhesion of the paint. You can use a body filler, like Bondo to fill the scratches then sand them out again after it's dry.

### Painting the surface

#### **Method 1- Quick but less durable**

Enamel spray paints such as Krylon Interior/Exterior enamel does adhere to the body. This method can be touched up easily if the paint ever gets scratched. This is typically a method for painting trim, bumpers, gauge plates etc. Carefully cover parts that are not to be painted with masking tape and paper, to protect against over spray. Use a very narrow masking tape to tape the line and then much larger tape and paper beyond that.

#### **Method 2 – More durable**

Note: If you use method 2, you should contact a professional painter that has had experience painting on various types of surfaces. These are automotive type paints and typically include a primer and base coat. For a glossy look you can use a glossy base coat or a clear coat.

#### ***Brand-Dupont***

Primer: Acrylic Urethane Flexible Primer Surfacer. Use a Dupont Primer.

Paint: Acrylic Enamel. Dupont ChromaBase Basecoat. ChromaBase requires a clear coat for a glossy look. Dupont also has some single stage paints where a clear coat is not required.

#### ***Brand-PPG***

Primer: Check with painter.

Paint: Deltron DBU

#### ***Brand-Sikkens***

Primer: Plastoflex primer by Sikkens

Paint: Autocryl by Sikkens (two-part acrylic urethane enamel)

For future reference, keep the information on file about who painted the robot and ask them for the paint brand and mix information. This will help you to get touch up paint and a new paint job when needed.

The information listed includes suggestions and general information. This material is designed for application only by trained professional painters, using proper equipment. If you have any questions, call our service department at 801-489-4466.

## Repair of the Robot Body

### General

The plastic body is ABS plastic. PVC or ABS glue is the best glue for this material. You can get PVC in a clear version. We typically use Weldon PVC 710.

### Materials

Super glue

ABS or PVC clear medium bodied glue

Fiberglass mesh

Rubber gloves

1. Hold the crack or seam together tightly so that the glue you put on the inside of the body does not run through the crack on to the outside of the body. This would etch into the plastic.
2. You can use two types of materials for support behind the crack. You can use 1/8" ABS plastic or fiberglass mesh. The plastic pieces provide more strength. Call Robotronics if you cannot get these materials locally.
3. Cut a piece of fiberglass mesh or ABS plastic to cover the crack.
4. Position the body, so that the seam or crack is horizontal to the table. This will keep the glue from running. Apply some of the PVC glue along the seam, only on the inside of the body. Check to make sure that the glue is not running through the crack on to the outside of the body. Note: Avoid getting the glue on your hands by using latex or latex free gloves.
5. Immediately put the fiberglass mesh or plastic piece on the glue and pat it down to saturate into the glue. If you using an ABS plastic strip, hold it on with a clamp.
6. Apply some more PVC glue over the fiberglass mesh to saturate it some more. Avoid any pooling of the glue as this can cause the body to melt and change shape.
7. It will dry to the touch in about 30 minutes. Allow 24 hours for complete drying.

**Bead Glue** – If you need to create a new bead on the outside of the body, you will need to call us for plastic shavings. You can mix PVC glue with this and create a colored glue that is the color of the body. The best mix is something similar to the thickness of maple syrup.

### General Precautions:


Use in a well ventilated area.

Use latex gloves to avoid getting glue on your hands.

Avoid getting the fiberglass on your skin or clothing. The fiberglass will not hurt you, but could cause skin irritation.

For further precautions, read the super glue, PVC, and ABS container labels.

## Storage

1.  Charge the robot battery. **(Storing the battery for any length of time without being fully charged will permanently damage the battery.)**
2. Charge the RC battery as per instructions.
3. Remove batteries from operator's transmitter and receiver.
4. The RC Transmitter and voice pieces should always be stored in the carrying case; this will extend the life and help insure proper operation.
5. Inspect robot for loose bolts or any additional maintenance that may need to be done.
6. Clean the body and top as per instructions in maintenance section. (If robot is stored with a dirty body it may be harder to clean at a later date, as stains may become permanent.)
7. Storing your robot with a dust cover on it will keep the robot clean and protect the body from scratches. It will also keep ultra-violet light from affecting the ABS plastic body.
8. The robot and batteries should be stored in a dry place between 55-75 degrees F. Storing the robot in a safe place will prevent scratches and extend the life.
9. After storing the robot for any length of time always test the robot well in advance of any scheduled activity as it is impossible to anticipate problems. This will ensure time to correct the problem.

# APPENDIX A

# Quick Reference Troubleshooting

More detailed troubleshooting by system is included with each subsystem. For additional help or parts call our service dept. at 801-489-4466.

| Problem   | Cause  | Solution   |
|---|--|--|
| <b>General</b>  |  |  |
| No functions operate  | 1.RC battery not charged   | 1. Fully charge until the needle is up.  |
|   | 2.Broken wire from the receiver to main board                                | 2. Resolder or repair wire.  |
|   | 3.Fuse blown.  | 3. Check 5 Volt Reg. and processor fuse.   |
|   | 4.Main board in robot not getting power                                      | 4. Check pins of battery and robot connector. Check on/off switch wires. Check ground wires.   |
|   | 5.Radio Control transmitter or Receiver Crystal broken.                      | 5. Replace crystals. Send RC and Receiver in to determine if it is a crystal.  |
| <b>Voice System</b>   |  |  |
| <u>Always do the following first:</u>   |  |  |
| 6. Replace the 9 Volt batteries with new ones. USE ALKALINE!                            |  |  |
| 7. Bend the battery contact out for better contact with the post of the 9 Volt battery. |  |  |
| 8. Check power and audio switches, and lights on all voice units.                       |  |  |
| 9. Check plug to and from the voices for proper connection.                             |  |  |
| 10. Check if the transmit (TX) lights are coming on.                                    |  |  |
| Operator cannot talk  | 1. Low Battery. LED on steady or no LED flash.                               | 1. Replace the 9 Volt battery. Is battery inserted in correct polarity?  |
|   | 2. Battery posts not touching the metal clips in the operator's transmitter. | 2. Bend out the metal clips. Put foam under clips.   |
|   | 3. No power to the 101 Receiver. If yes, continue.                           | 3. Check the in line fuse to the Receiver in robot and audio fuse on main fuse block.  |
|   | 4. No TX light on the Receiver. If yes, continue.                            | 4. Check Sensitivity adjustment on back of Receiver. It should be on Max. Sens.  |
|   | 5. Audio wires going through pitch shifter connected wrong.                  | 5. The wire should go from audio out of receiver to <b>input</b> of pitch shifter, then from <b>output A</b> into the main box and plug on to the main board.                      |
|   | 6. Headset plug to transmitter has a broken wire.                            | 6. Unscrew the cover of the male plug and look for broken wire or solder joint. TEST- Connect robot mic to transmitter. If it now works, problem is in headset. Repair or replace. |
|   | 7. Still not working. Call Robotronics.                                      | Send transmitter, receiver, and headset in.  |
| Operator cannot hear  | 1. Low Battery. LED on steady or no LED flash.                               | 1. Replace the 9 Volt battery.   |
|   | 2. Battery posts not touching the metal clips in the operator's receiver     | 2. Bend out the metal clips. Put foam under clips.   |
|   | 3. Headset plug to 151 RX has a broken wire.                                 | 3. Unscrew cover of plug and look for broken wire.   |
|   | 4. Robot 151 transmitter not turned on.                                      | 4. Turn on audio and power.  |
|   | 5. Power plug to robot 151 transmitter unplugged.                            | 5. Find wire and plug it back in.  |
|   | 6. If you have no TX light on 151 RX mute could be out of adjustment         | 6. Adjust the mute on the 151 RX to max. which is fully CCW.   |
|   | 7. Robot microphone in robot is bad.   | 7. Order a replacement. TEST- Plug your headset into the robot transmitter in place of the robot microphone and test.  |
|   | 8. Still not working. Call Robotronics.                                      | 8. Send robot mic, transmitter, receiver, and headset.   |
| Voice Operates but cuts out. Should get 50 feet without any cutouts.                    | 1. Low Battery.  | 1. Replace the 9 Volt battery.   |
|   | 2. Sensitivity Adjustment down too far.                                      | 2. Sensitivity adjustments should be at max. on the 151 Receiver and robot receiver.   |
|   | 3. Broken, loose or retracted antenna  | 3. Extend robot receiver antenna or replace broken antenna.  |
| Squelch coming from robot   | 1. No signal being sent to the robot   | 1. Turn on the operator's transmitter.   |
|   | 2. Sensitivity is too sensitive.   | 2. Very slightly adjust sensitivity down from max. (This will decrease your range)   |
| Squelch in headset when turning robot off.  | 1. 151 Receiver slightly too sensitive.                                      | 1. Adjust 151 RX mute slightly CW  |
|   | 2. 151 RX picking up interference in your area.                              | 2. Always turn off 151 RX the robot.   |

| Problem  | Cause   | Solution  |
|--|---|---|
| <b>Audio System</b><br>No audio at all. No voice. No siren.  | 1. Audio Fuse Blown.<br>2. Speaker wire disconnected.<br>3. Audio wire to main board unplugged from the board.  | 1. Replace audio fuse.<br>2. Connect both speaker wires.<br>3. Find white and gray wire and re-connect. See the main board diagram.   |
| Thumping sound   | 1. Road Rage Amp volume is too high.  | 1. Turn down volume until thumping stops. Adjust voice receiver volume up if needed.  |
| MP3 sound effects and volume is too loud.  | 1. Road Rage Amp master volume is too high.   | 1. Turn down the volume on the road rage.   |
| <b>Cassette Player</b><br>No tape operation  | 1. Tape player not on tape mode or volume not turned up.<br>2. Play button not pushed<br>3. Bad Tape.<br>4. Tape is too tight.<br>5. Player is not getting power because power wire or plug is broken.<br>6. Power or audio wire has come disconnected from the main board.<br>7. Radio control or tape circuit not working | 1. Put mode select to tape and turn volume up.<br>2. Must push play button before hitting the switch on the radio control.<br>3. Check tape in other tape player.<br>4. Loosen with a pencil by spinning tape.<br>5. Check for 3 Volts at power plug. Replace plug or repair the wire.<br>6. Open the main box and re-connect to board.<br>7. Contact Robotronics for help. |
| No siren, or voice either.   | 1. Audio fuse blown.  | 1. Replace the fuse. See fuse block diagram.  |
| Poor quality sound or slow.  | 1. Belts worn out and slipping.   | 1. Replace cassette player or belts.  |
| <b>Siren</b><br>No siren   | 1. Audio fuse blown.  | 1. Replace fuse. See fuse block diagram.  |
| Siren volume not loud enough   | 1. Booster problem if tape and voice vol. also are not loud enough<br>2. Adjust siren volume if tape and voice okay.  | 1. Replace or have booster repaired.<br>2. See siren volume adjust on main board.   |
| <b>Robot Battery System</b><br>No functions will operate.  | 1. Check wires and connector from battery to the robot.<br>2. Battery is very low or bad.   | 1. Push battery connector pins in until it clicks in place. Pin could have slipped out of position.<br>2. Charge battery or replace if it will not charge. Also test charger.   |
| Battery will not take a full charge. Needle on charger will not move.  | 1. Battery has not been kept fully charged  | 1. Charge and discharge repeatedly. Replace battery if it does not start charging.  |
| <b>Drive Motors</b><br>Neither drive operates only.<br>To correctly evaluate drive problems, look at wheels off the ground.  | 1. Both drive fuses blown.<br>2. Radio control drive section problem. Contact Robtronics for help.  | 1. Replace drive fuses on fuse block.   |
| One drive only does not operate.<br><br>Determine first if it is the drive motor or drive circuit. To do this swap the wires that go to the motors at white connector. Same motor still not working then motor is bad. Problem switches to other motor, then problem is in main box possibly the drive circuit itself. | 1. Drive motor pulley loose.<br>2. Broken connection at motor connector.<br>3. Drive circuit not getting power.<br>4. Drive motor damaged.<br>5. Drive Circuit on main board problem.   | 1. Tighten motor pulley set screws.<br>2. Check blue/yellow wires and in line motor connector at motor<br>3. Check drive motor fuses on fuse block (blue wires). Check wires coming from fuse block to motor circuit on the main board. Broken solder joint?<br>4. Repair or replace motor.<br>5. Send main electronics box back to Service Dept.                           |
| Drive motors moving on their own even when the stick is in the center.   | 1. Drive trim sliders not in center.<br>2. Joystick potentiometer broken.   | 1. Move drive stick sliders to center or position to neutral the robot.<br>2. Send to Robotronics for repair.   |
| Robot not driving straight.  | 1. One motor pulley set screw loose.<br>2. Straight drive adjustment needs to be adjusted.  | 1. Tighten set screws.<br>2. Find adjustment on the main circuit board. See diagram of main board in Appendix.  |
| <b>Character Head Turning System</b><br>Head is out of position but operates.  | 1. Loose head set screw or head was hit.  | 1. Re-position head and tighten set screw. Better to do this with the robot on.   |
| Head motor is keeping head in not centered position  | 1. Head turning pot or pot shaft slipped  | 1. Re-center head by adjusting head turning feedback pot- blue pot below motor. Then tighten the set screws on the metal tube. See procedure in head section.   |
| Head motor is not operating  | 1. Character board is not getting power<br>2. Broken wire.  | 1. Check fuse on main fuse block.<br>2. Check power (red/black) and motor wire (blue/yellow).   |

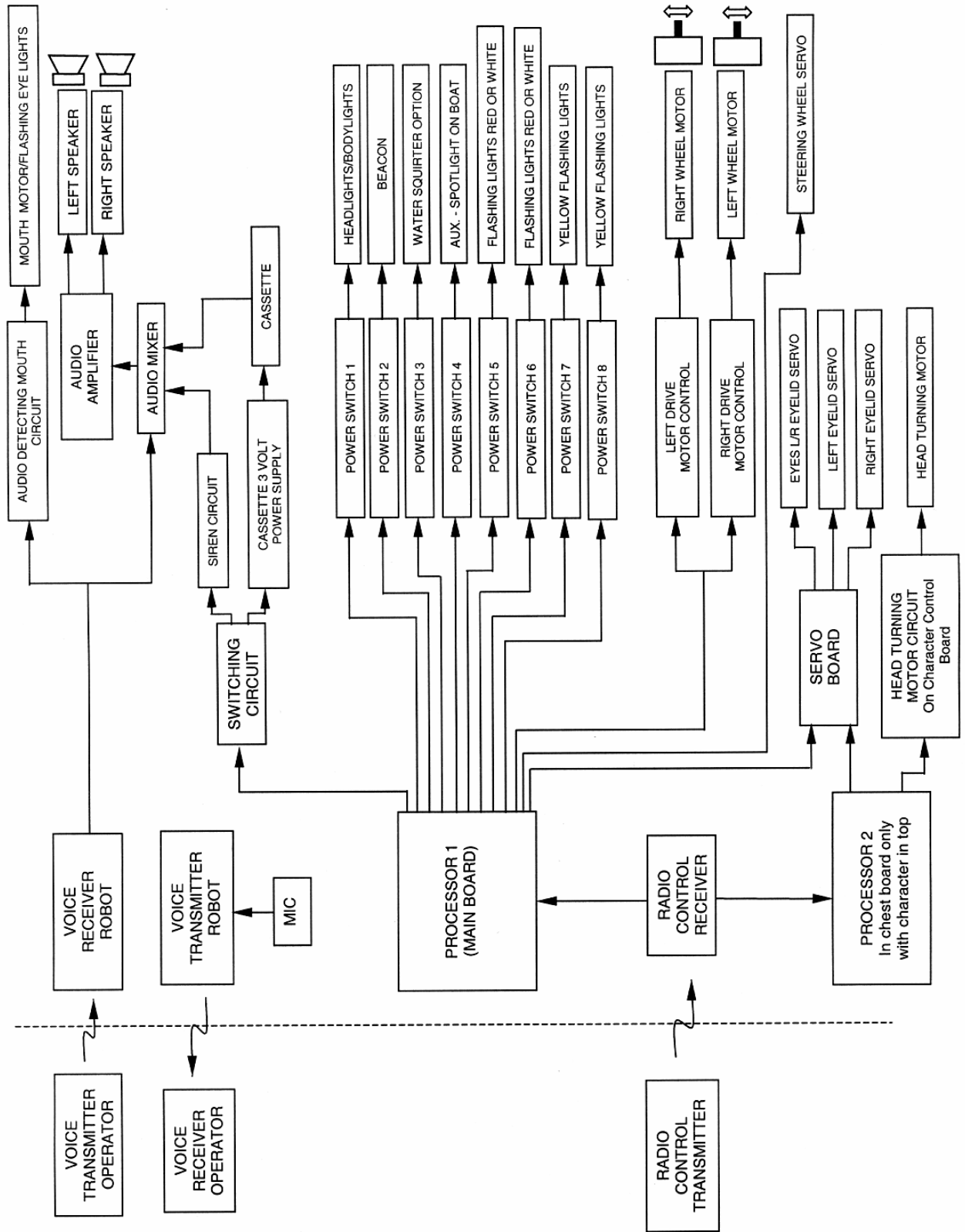
| Problem  | Cause  | Solution  |
|--|--|---|
| <b>Eyelids and Eyes Left and Right</b><br>An eyelid or eyes L/R does not operate | 1. Rod linkage came off.   | 1. Get to eyelid rods and ball links and re-attach.   |
|  | 2. Servo wire broken or wire came out of eye servo board   | 2. Trace wires from servo motor of the eyelid or eyes and follow this wire to the eye servo board to find problem.  |
| One of the eyelids is at a different level                                       | 1. Eyelid rod bent or eyelid out of adjustment   | 1. Straighten bent rod or change eyelid position by removing the servo arm. Then shorten or lengthen the rod by twisting the servo arm. You can also change the position of the servo arm on the servo shaft.       |
| No operation of any eye functions.   | 1. Connection at eye servo board has come off.   | 1. Vehicle- located on underside of upper robot. Robots with Character- located in character.   |
|  | 2. Wire(s) bringing 5 Volts and signal to servo board are not making a connection. Broken out of 37 pin connector. | 2. Vehicles- locate the wires (red/black/gray/yellow/black) going from the 37 pin up to the eye servo board. Repair broken wiring. Robots with Character- Check gray/yellow/black and red black to eye servo board. |
|  | 3. No 5 Volts going to eye servo board.  | 3. Find broken wire on red/black or check fuse for eye servos on fuse block. Check the 5 Volt Regulator on the main circuit board.  |
| <b>Water Squirter</b><br>Cannot fill reservoir                                   | 1. In-line fuse blown or fuse blown on the fuse block-yellow wire.   | 1. Replace the 5 Amp fuse which is in-line on the wire. Follow wire from water squirter switch.   |
|  | 2. Broken wire at water squirter switch or coming from main box  | 2. Repair break.  |
| Cannot squirt: no pump sound.  | 1. Water squirter switch is not in on position.  | 1. On position is not the center position.  |
| Cannot squirt: pump sound yes  | 2. Broken wire at pump or W.S. switch.   | 2. Repair/re-solder broken wire.  |
|  | 1. Reservoir empty   | 1. Fill Reservoir with filler bottle.   |
|  | 2. Water line is not connected to water connector  | 2. Connect it.  |
| <b>Voice Modifier</b><br>Voice not being modified                                | 3. Overflow tube and squirt tube are switched at the reservoir.  | 3. Swap them back. Overflow tube is the one that is in the top of the bottle and the tube runs to an outlet on the bottom of the frame.   |
|  | 1. Modifier not turned on.   | 1. Push pedal on modifier. Light should come on.  |
|  | 2. Audio wires not plugged in correctly  | 2. Jumper wire goes from Nady Receiver to <b>Input</b> of Modifier. Wire in <b>Output A</b> of modifier goes to the main board.   |
|  |  |   |
|  |  |   |

More detailed troubleshooting by system is included with each subsystem. For additional help or parts call our service dept. at 801-489-4466.



# Robot Block Diagram

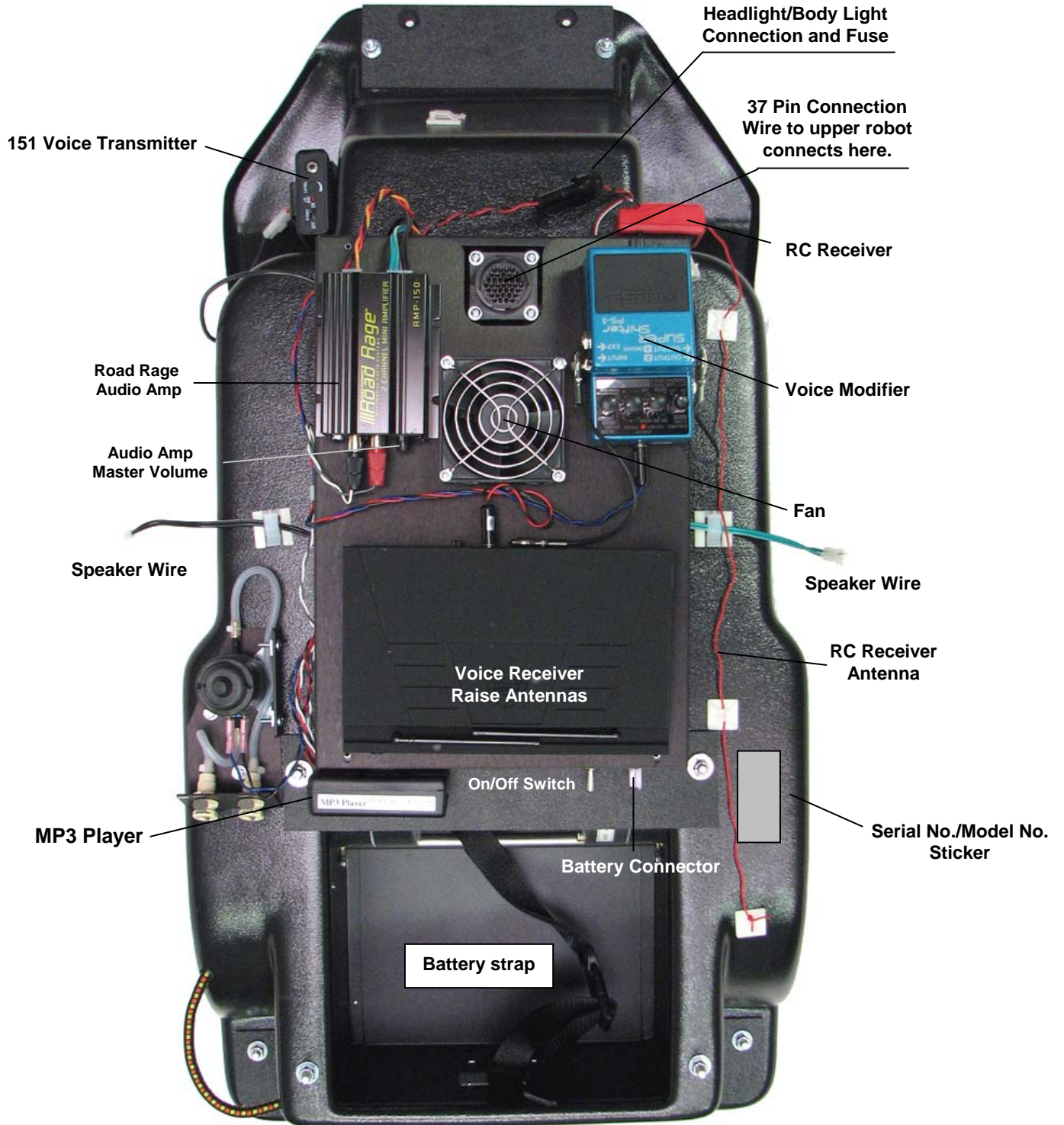
## Robot Block Diagram



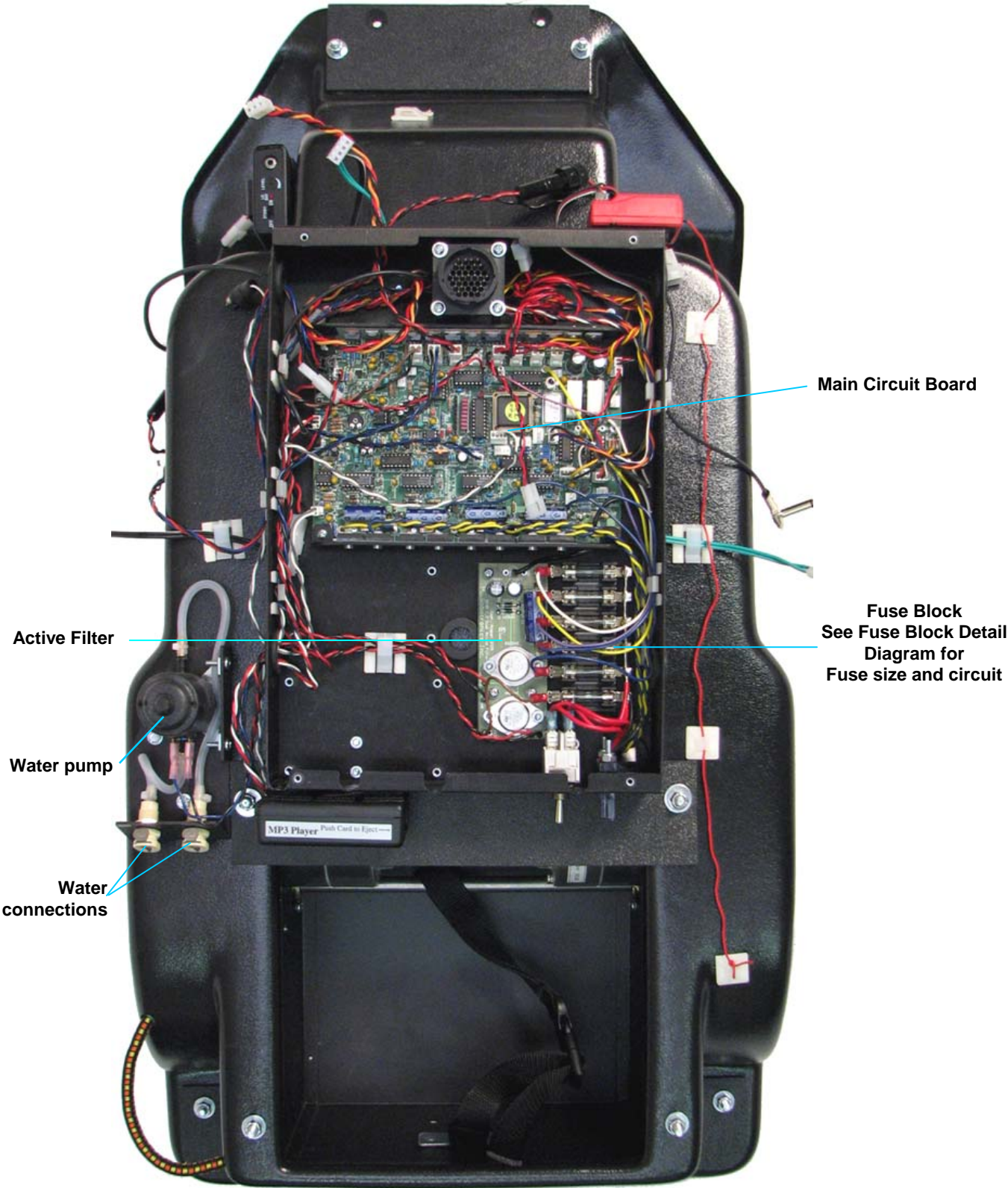
# **APPENDIX B**

## **ROBOT PARTS IDENTIFICATION**

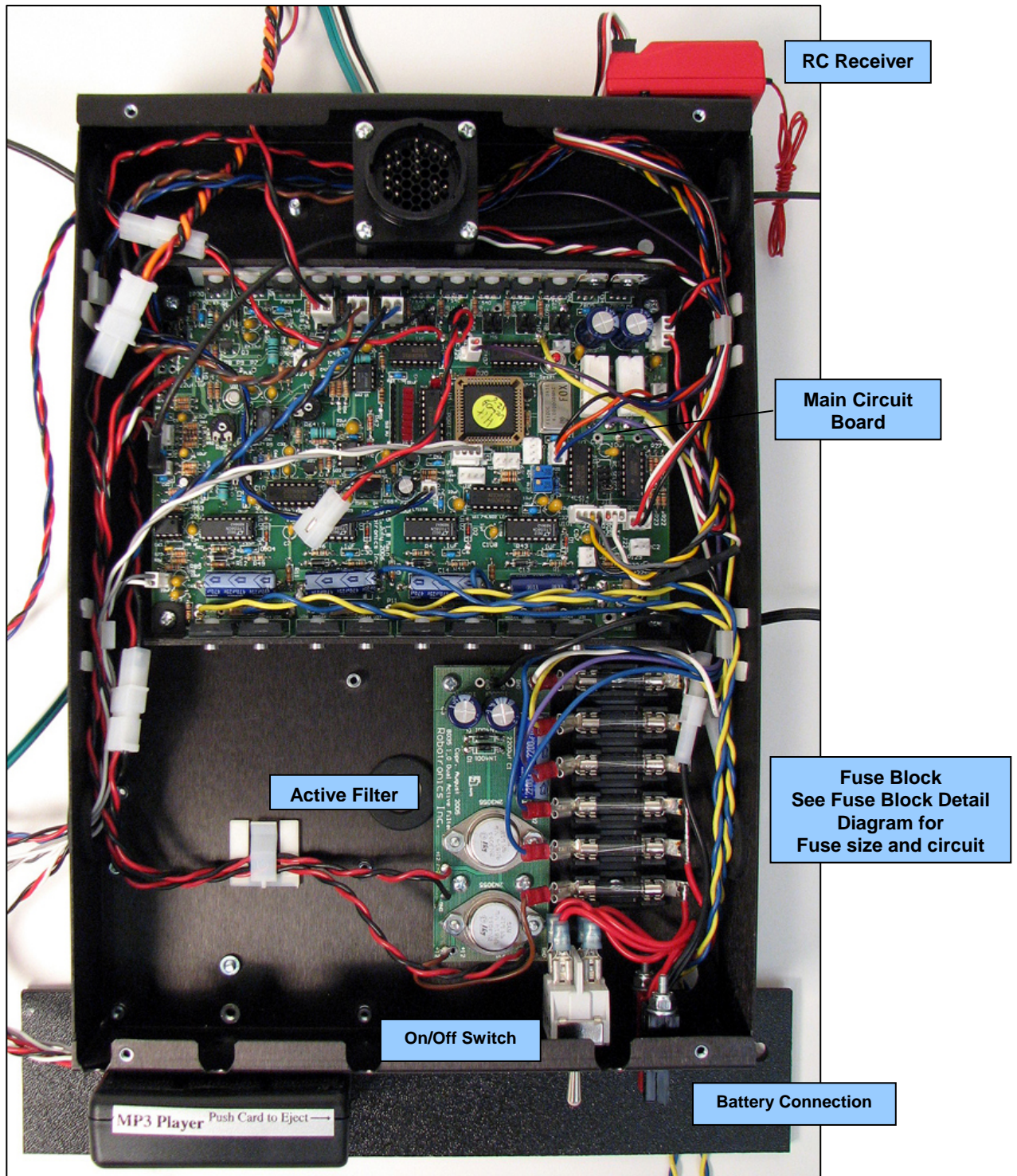
# Robot Frame - Top View 1



# Robot Frame - Top View Box Open

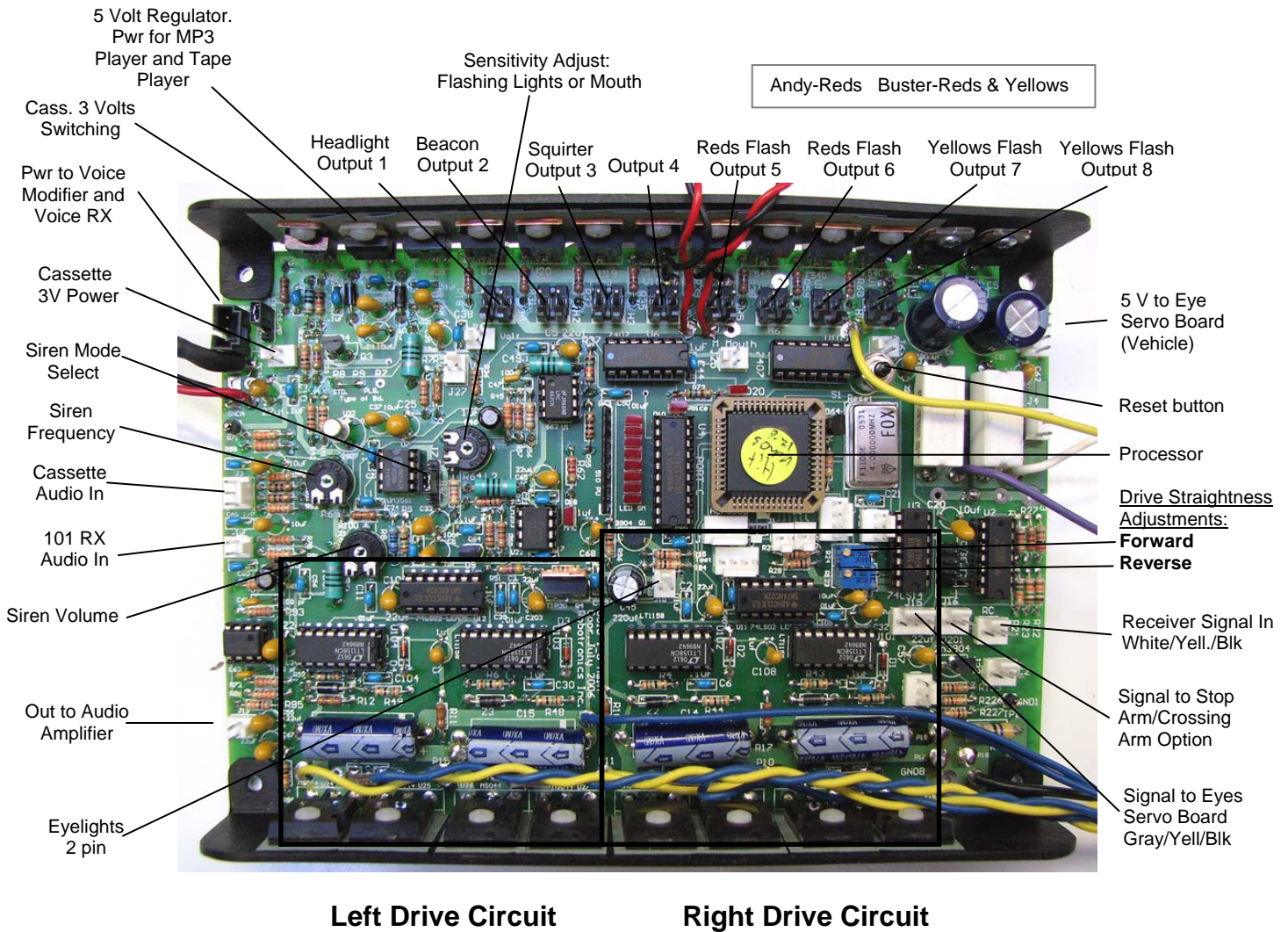


# Main Electronics Box

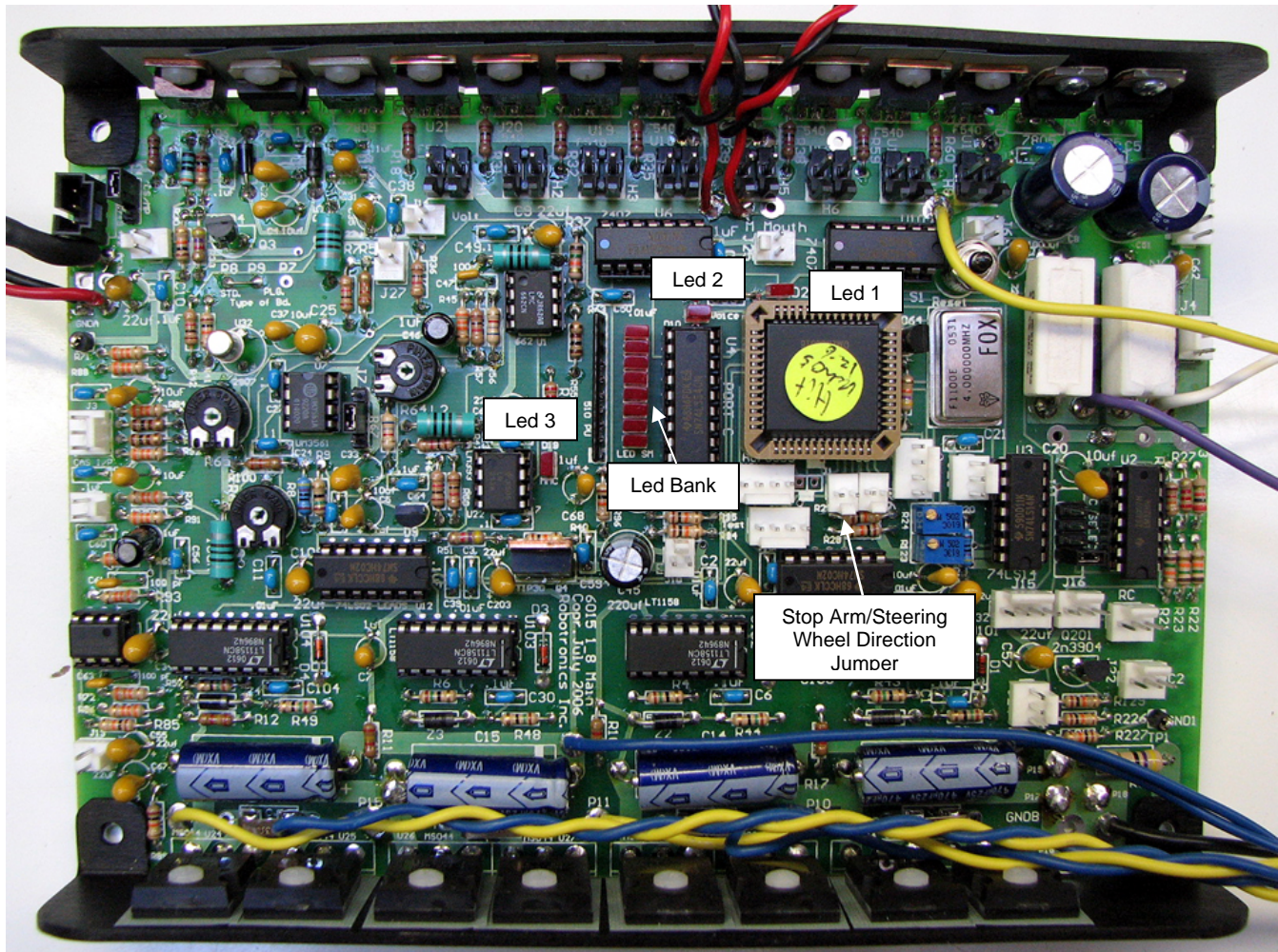


MP3 Player Option or Tape Player

# Vehicle Main Electronics Board



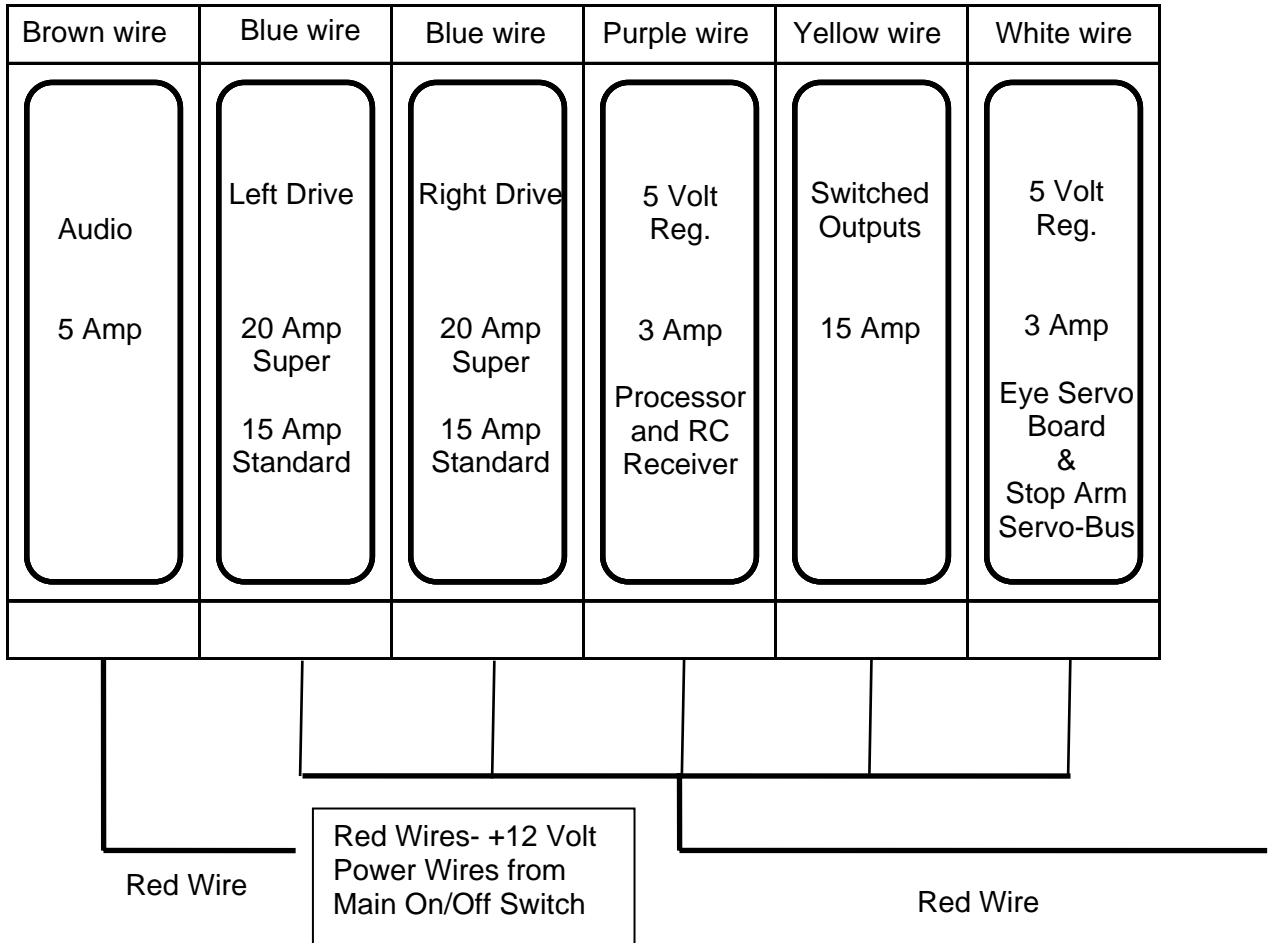
# Main Board – LED Functions



**Led 1-** Failsafe and presence of RC signal status.  
Failsafe-led on and no signal is present from RC  
RC signal present- led is off  
**Led 2-** Moving mouth or flashing eye-lights detection. This flashes if there is audio coming through.  
**Led 3-** Half-way point of the audio detection. Flashes when there is audio present.  
**Led Bank-** Used for looking at states of the processor, outputs etc. If these are on, the processor is getting 5 V.

# Vehicle Fuse Block Detail

Use AGC type fuses



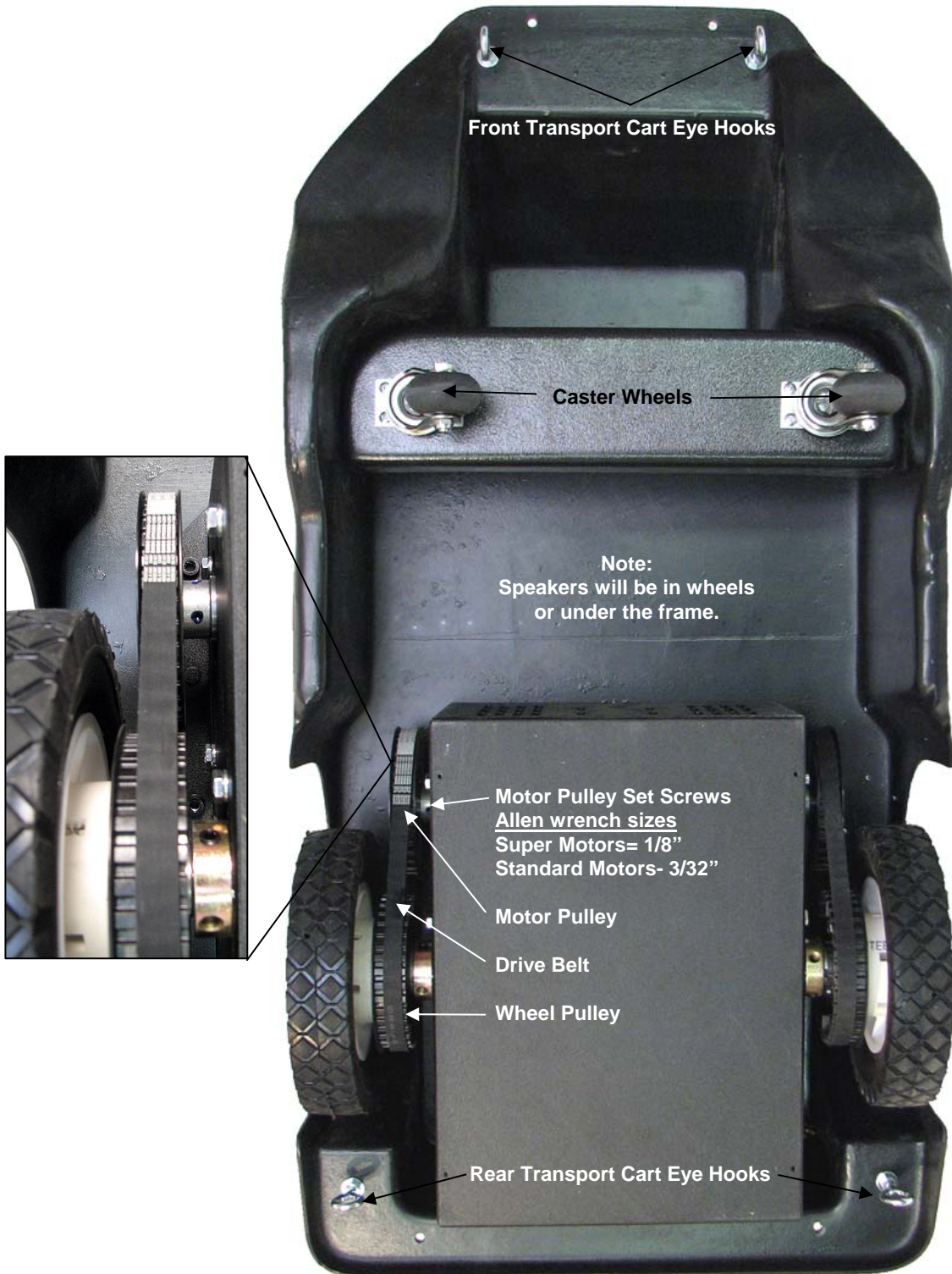
Audio - (Fuse 0) Robot voice transmitter (151), Robot voice receiver (101), audio booster, active filter, cassette player, siren.

Switched Outputs - (Fuse 4) Switched outputs include headlights, light bar and flashing lights. Flashing lights- red/amber on bus, red/white on Andy, and red/blue on Cruisers.

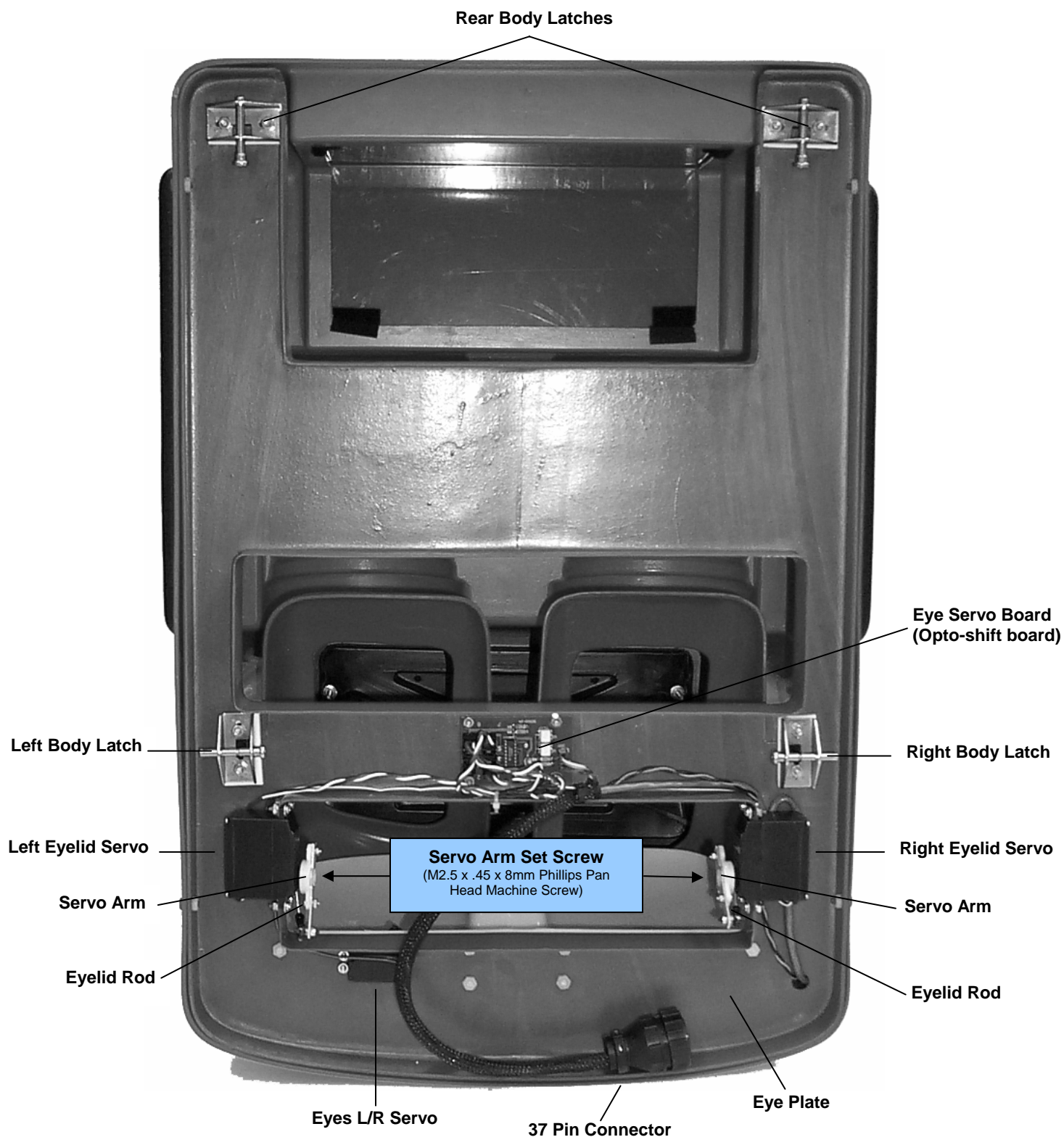
Power to Character control board - includes head turning, mouth, steering servo, and eyes servos (eye servo board). Comes off the switched output fuse.



# Robot Frame - Bottom View

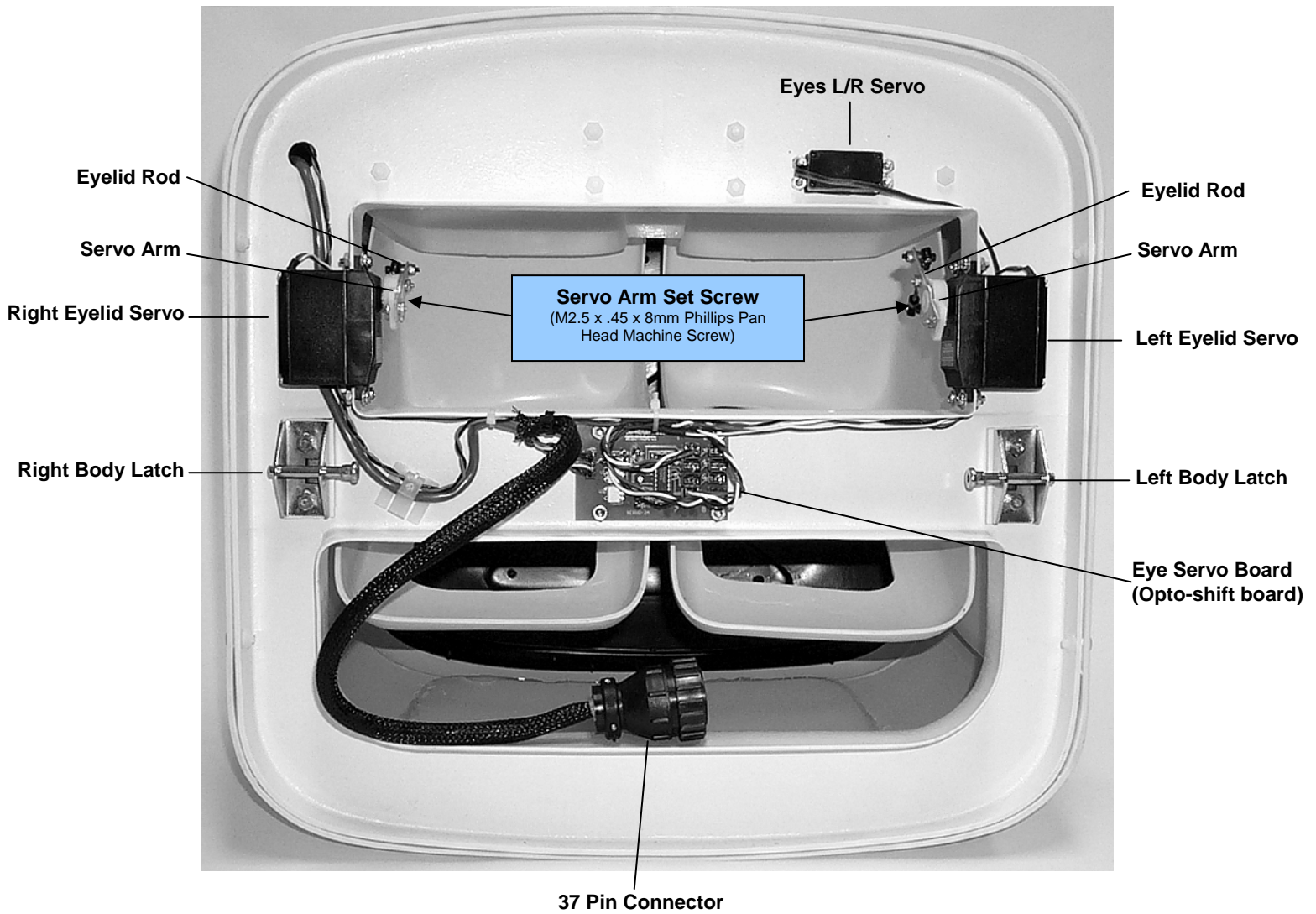


# Vehicle Top 1 – Underside View

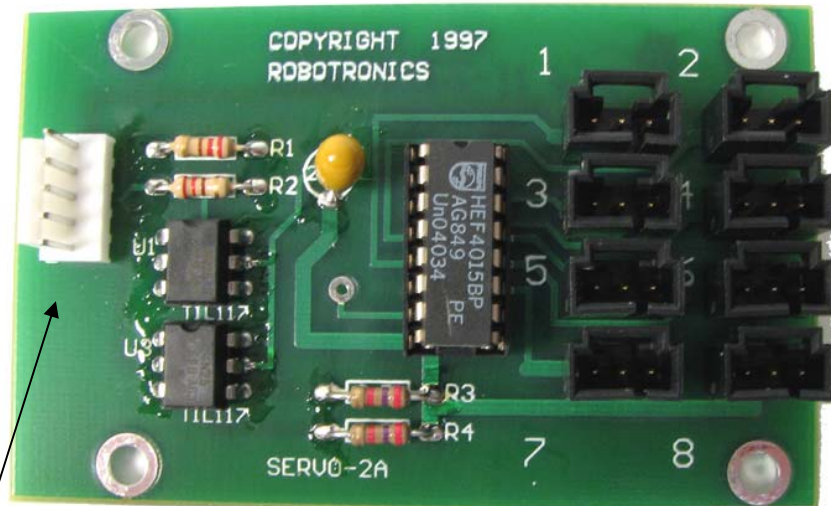


Top Style 1 Robots: Freddie, Buster, Andy, Barney, Toby

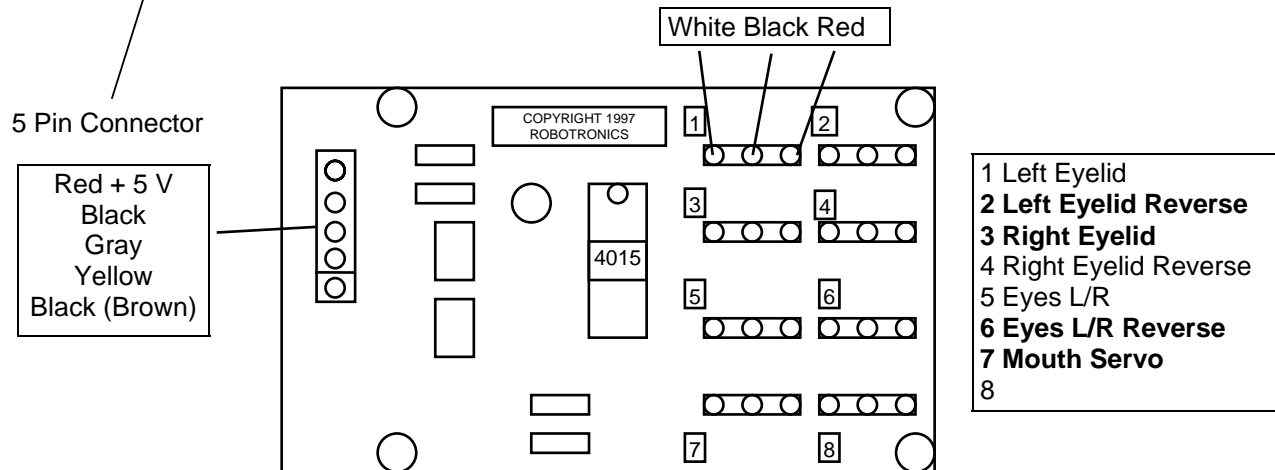
# Vehicle Top 2 – Underside View (P.C.™)



# Eyes Servo Board (Opto-Shift Register Board)

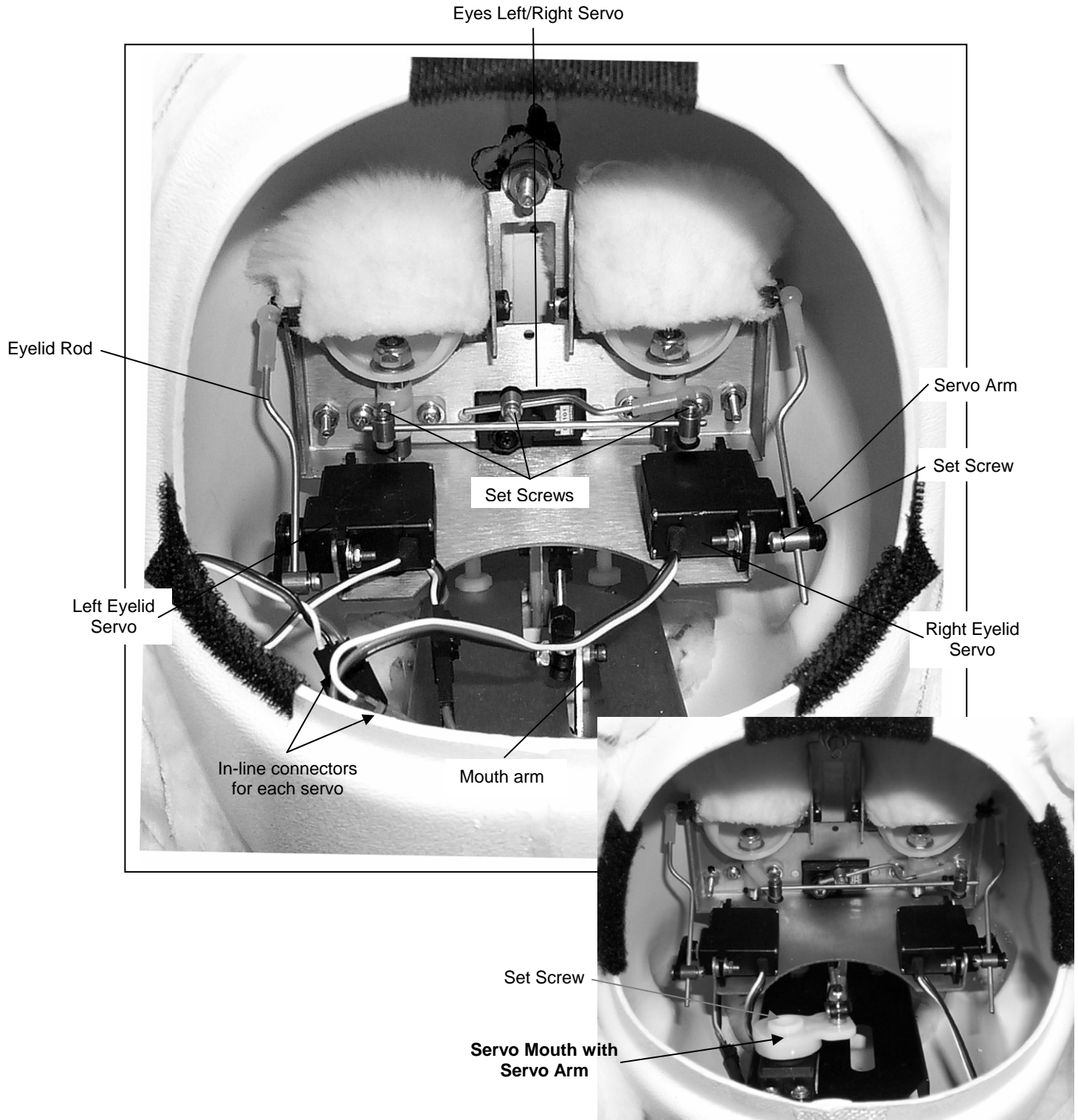


## Version With One 5 Pin Connection

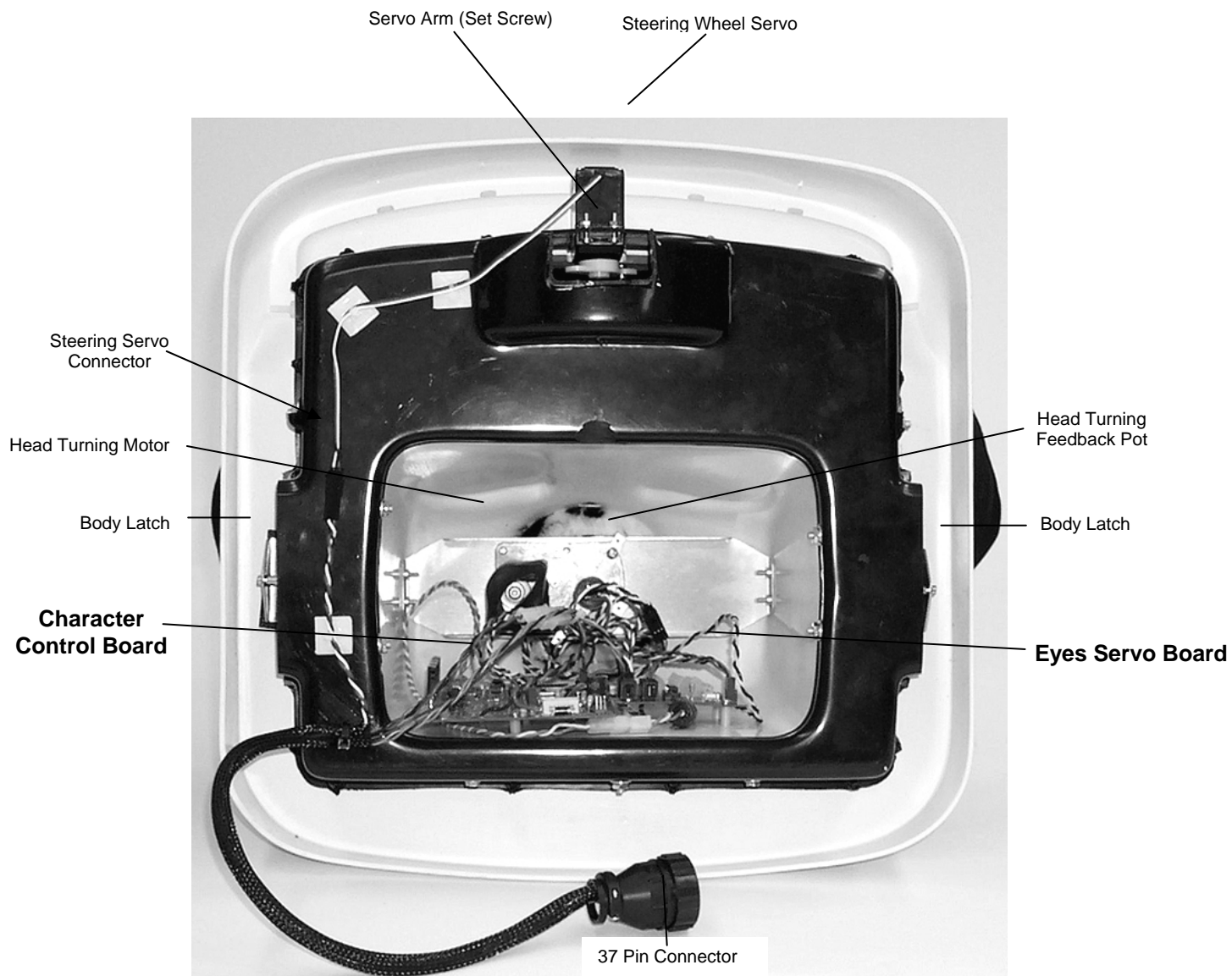


| Robot         | Typical Connection | Location of Board in Robot |
|---------------|--------------------|----------------------------|
| Vehicle robot | 2,3,6,7            | In Upper robot             |

# Character Head - Inside View

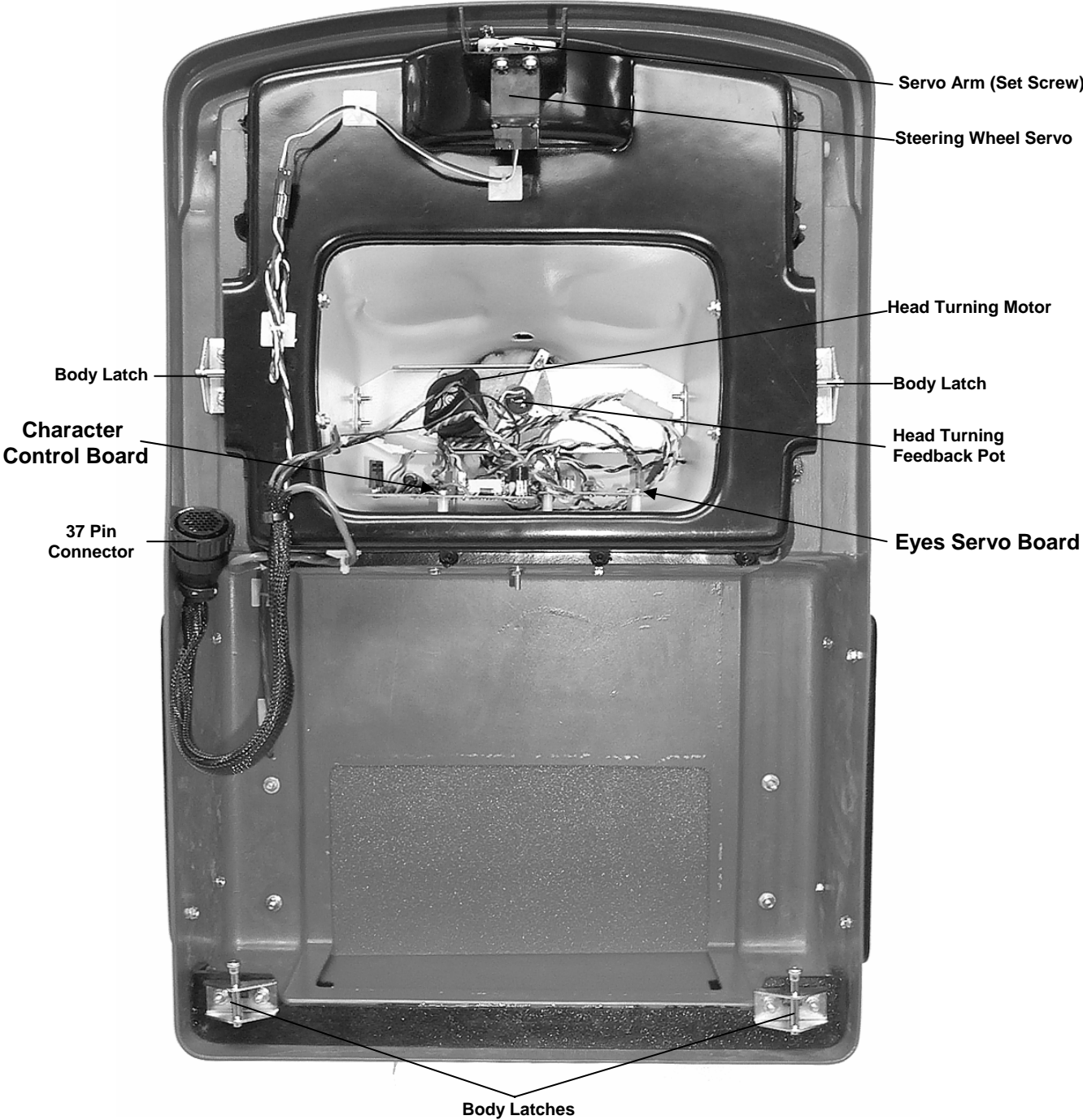


# Character Top 1 – Underside View (K.C.™/McGruff®)



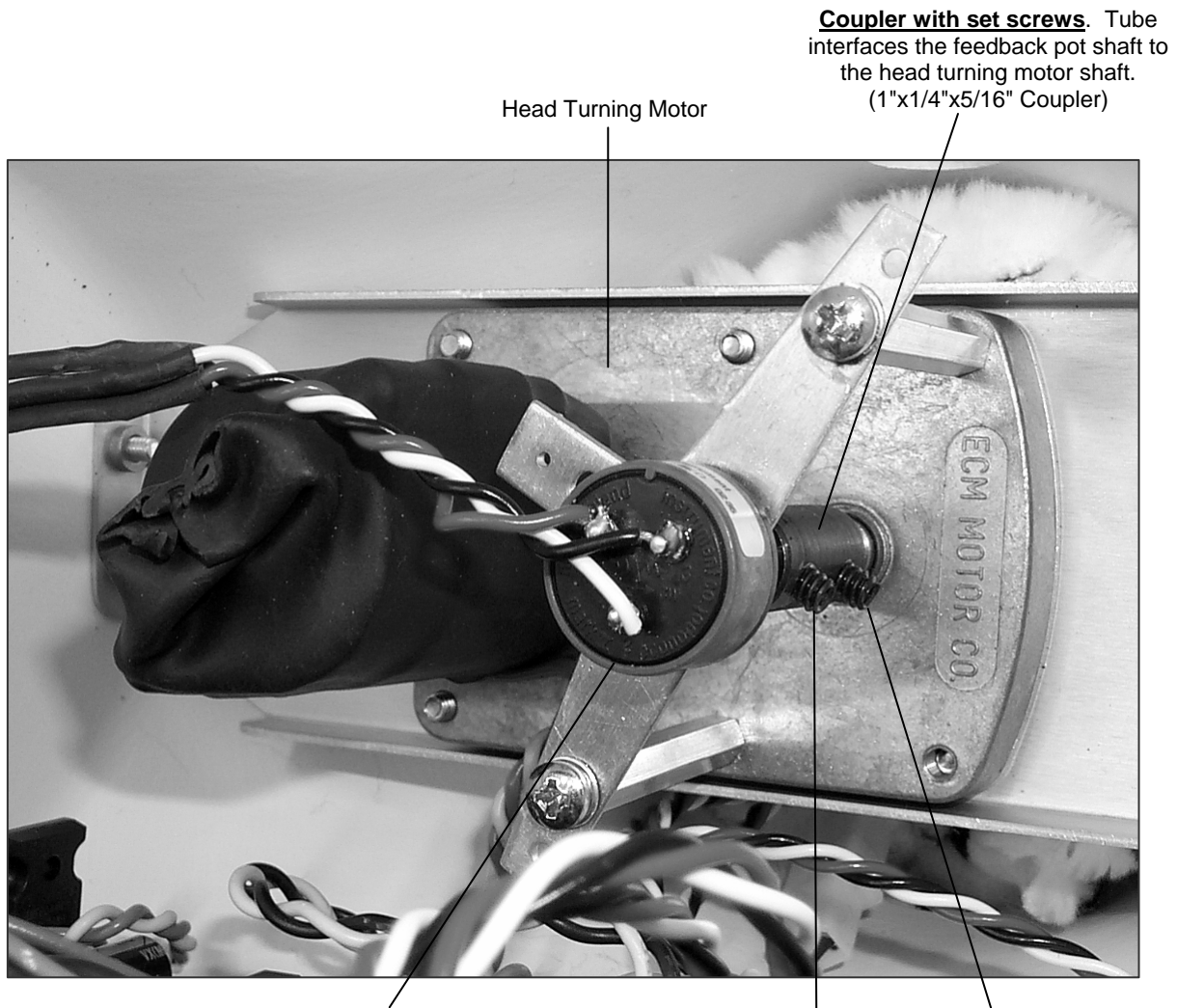
See Character Board Diagram for detail of connections on the Character board.

# Character Top 2 - Underside View (Patches™/Sparky®)



See Sparky Control Board Diagram for detail of connections on the Sparky board.

# Character Head Turning Motor Detail



**Coupler with set screws.** Tube interfaces the feedback pot shaft to the head turning motor shaft.  
(1"x1/4"x5/16" Coupler)

Head Turning Motor

**Head Turning Feedback Pot**  
5K 360 degree single turn pot  
Tracks with movement of the head sending head position to processor.

Set Screw on  
Pot Shaft  
3/32" Allen

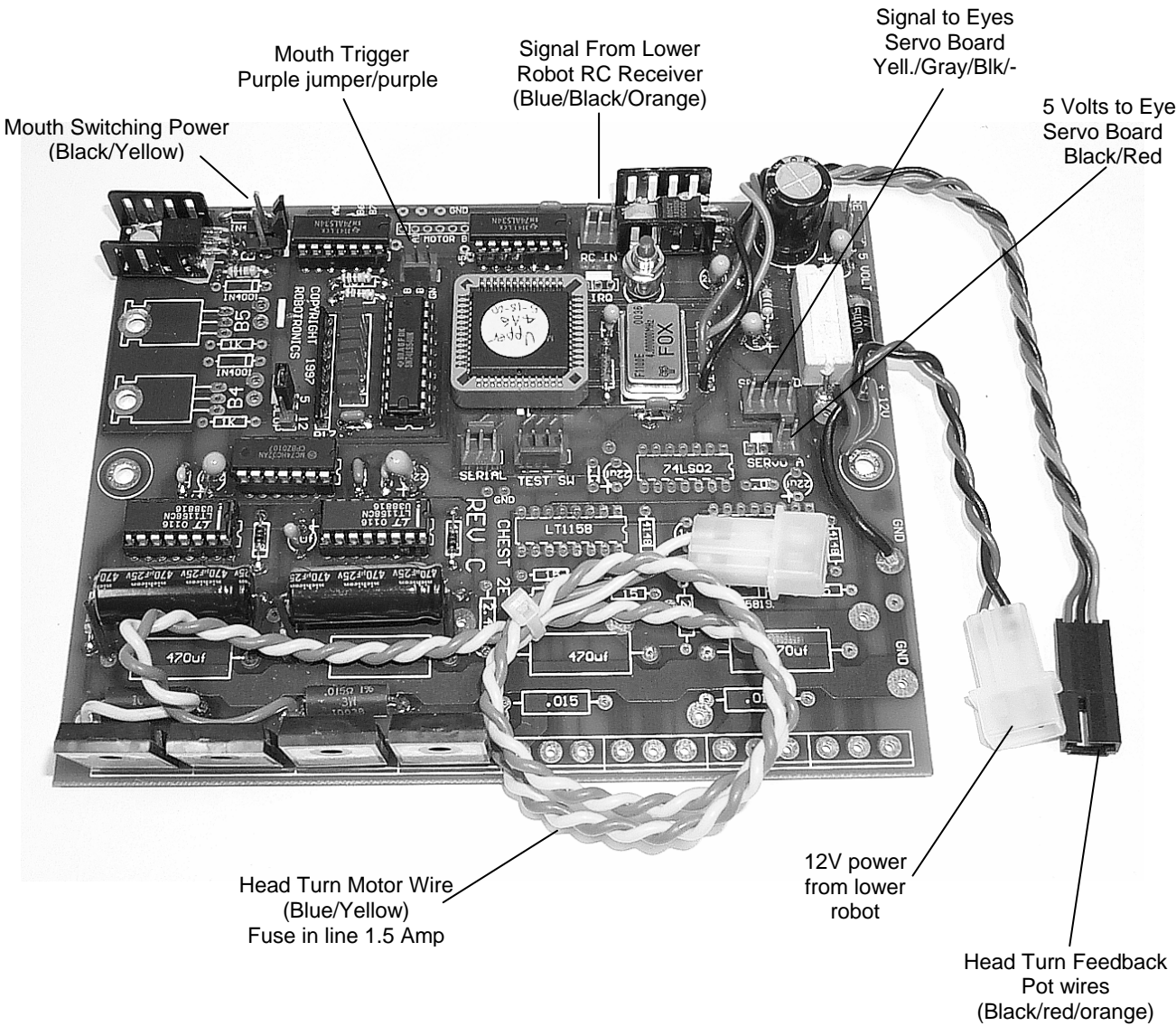
Set Screw on  
Motor Shaft  
3/32" Allen

## Head Position

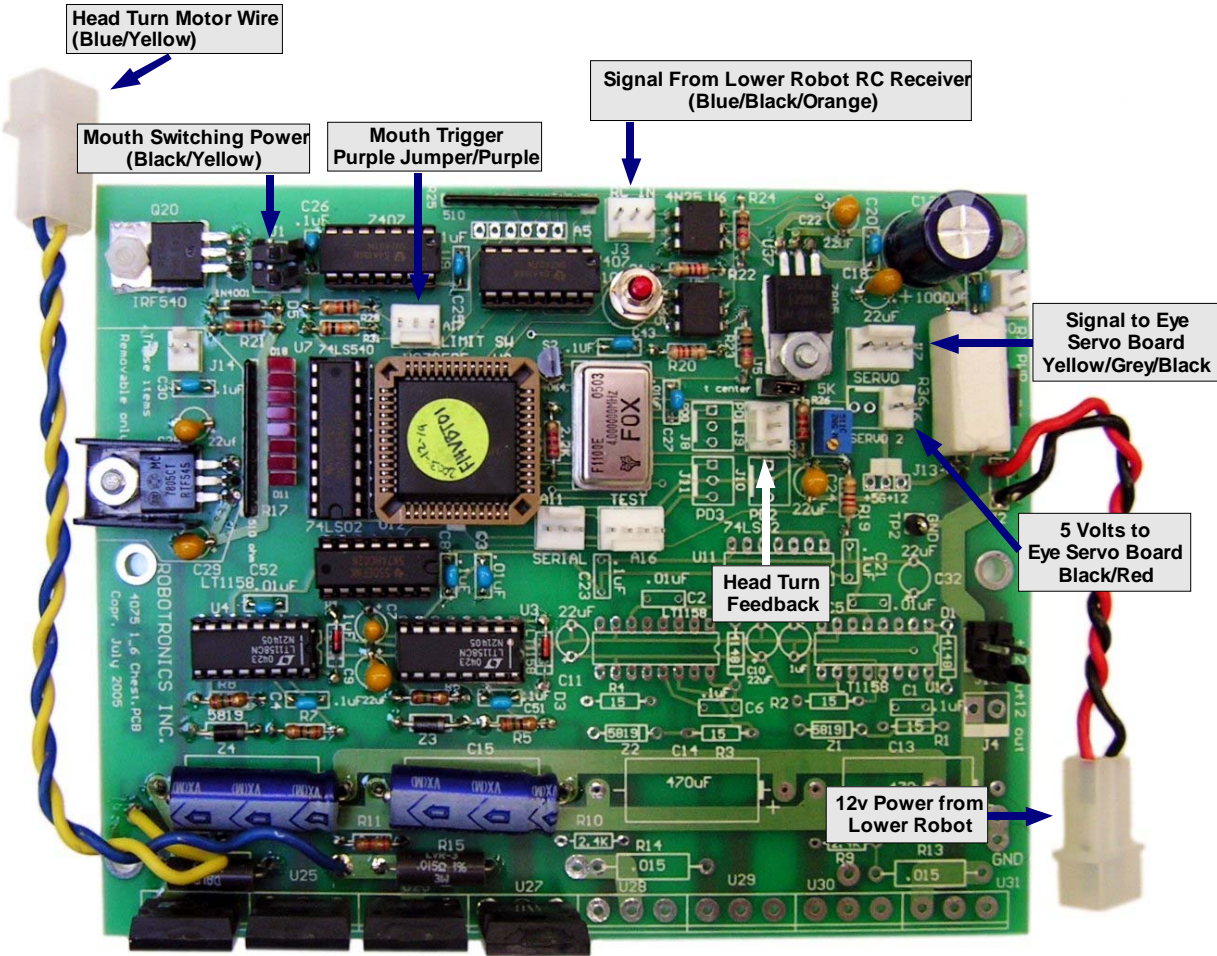
To loosen the head and reset the head position, there is an Allen set screw in the neck area. Pull down the fur below the neck and there is a hole in the plastic to access the set screw. Use a **3/16" Allen wrench** for this. The head has to be looking forward to access this.



# Character Control Board Type 1



# Character Control Board Type 2



Character Control Board

# LED Light Bar

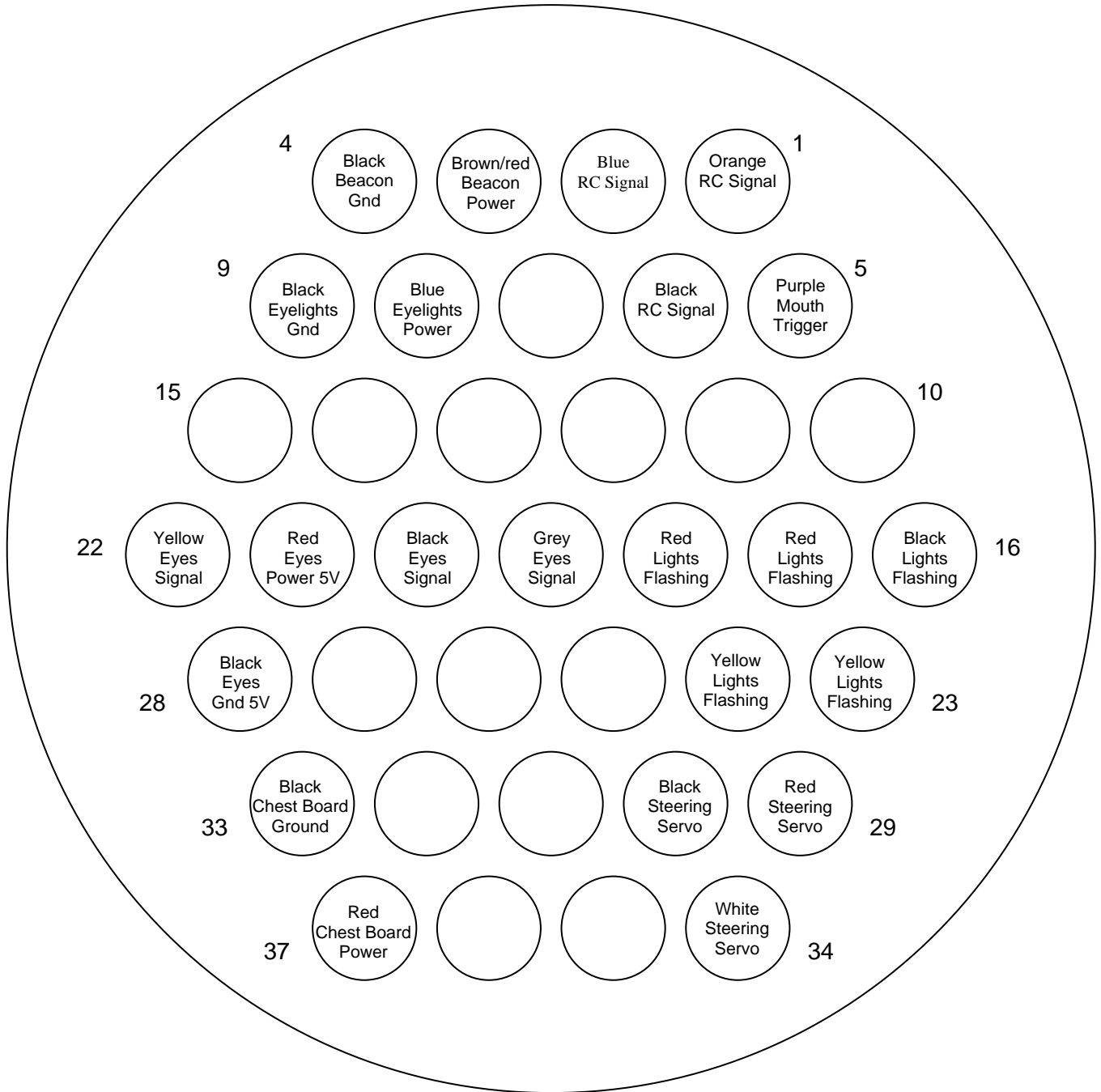
This is an optional feature available on certain robots.

The flashing pattern can be changed by pushing a **switch** that is located in the seat area of robots with a character. It is on the seat back to the right of the character driving the robot for Patches and Sparky. On K.C. Cruiser and McGruff Cruiser, it is just below the windshield on the right hand side. On other robots open the rear door and it is on the back right side of the eye plate.

**To change the pattern:** To cycle forward to the next pattern; push the button for less than 1 second and release. To cycle back to the previous pattern, push the button for more than 1 second and release. If you keep going forward you will cycle back around to the first pattern. There are about 40 patterns including a constant on.



# 37 Pin Connector Pinout



- Observe pin numbers not orientation. Can be used for the upper robot and panel side. This view is for Upper robot 37 Pin.
- Red flashing is for Andy and Cruisers. Red and Yellow flashing is for Buster and Barney.

**APPENDIX C**

**CHECKLIST AND MAINTENANCE  
FORMS**

## Pre/Post Checklist for Robot Use

Mark the appropriate one: Pre-checklist \_\_\_\_\_ Post-Checklist \_\_\_\_\_

Event: \_\_\_\_\_ Date: \_\_\_\_\_

Your Name: \_\_\_\_\_

|  |            |           |
|--|------------|-----------|
| <b>Inspect the items that are listed below</b> <ul style="list-style-type: none"> <li>Check the appropriate column. If something is not operating properly, note it in the comments section.</li> <li>If you check "No" for any of the items below, notify those needed to perform repairs or obtain needed parts to correct the problem.</li> </ul> |            |           |
| <b>Is this function working properly?</b>  | <b>Yes</b> | <b>No</b> |
| Check to make sure you have everything.  |            |           |
| Body portion of the robot is in good condition besides minor scrapes and scratches. Fur is in good condition; body is not ripped and is clean.   |            |           |
| Radio Control is in good condition. Antenna is attached to it.   |            |           |
| Headset and accessories are in good condition. Install new 9-Volt alkaline batteries in the voice receiver and voice transmitter.  |            |           |
| Battery chargers are in good condition. There should be one for the robot battery and one for the radio control.   |            |           |
| Robot moves forward-back and left-right with no problems.  |            |           |
| The head turns left and right (robots with character)  |            |           |
| The Steering handle turns left and right.  |            |           |
| The mouth moves when talking through the headset.  |            |           |
| Voice works.   |            |           |
| You can hear through the headset.  |            |           |
| Eyes both blink and move side to side.   |            |           |
| The siren works.   |            |           |
| Lights work including headlights, tail lights, light bar, and flashing lights  |            |           |
| The MP3 player or tape player works.   |            |           |

**After you turn off the robot, recharge the robot battery, store everything properly, and fill out the trip form.**

Comments:

### Trip and Maintenance Form

|        |         |          |                 |
|--------|---------|----------|-----------------|
| Robot: | Model # | Serial # | Period of time: |
|--------|---------|----------|-----------------|

| Event Information |          |                                       |                          | Maintenance                           |    |                    |                                   |     |          |    |
|-------------------|----------|---------------------------------------|--------------------------|---------------------------------------|----|--------------------|-----------------------------------|-----|----------|----|
| Date              | Operator | Location where the robot was operated | Estimated Operation Time | Record dates for the following things |    |                    | Is Everything Operating Properly? |     | Comments |    |
|                   |          |                                       |                          | Robot Battery Charged #1              | #2 | RC Battery Charged | Cass. Player Cleaned              | Yes |          | No |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |
|                   |          |                                       |                          |                                       |    |                    |                                   |     |          |    |

More information on battery charging is in the operating manual.

**Robot Battery:** Do not fully discharge this battery. This battery must be recharged after every use. It could take 10 to 14 hours to recharge.  
**Radio Control Battery:** Do not overcharge or fully discharge this battery. Typically charge this for 14 hours.

# Notes



# Technical Tips