

Coachsound

TourMaster

Installation Guide

Multichannel Audio Server

Model: MLA2504



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1.0 TOURMASTER SYSTEM OVERVIEW

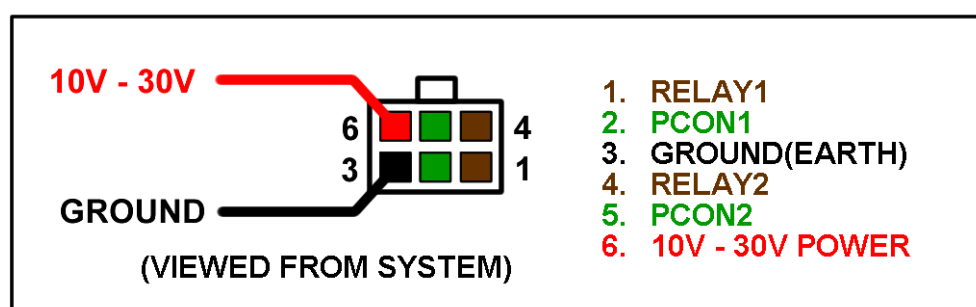
The Coachsound TourMaster is a multichannel tour commentary system that distributes audio to individual seats providing your passengers choice and control of volume and channels. The Coachsound TourMaster system consists of a central head-unit to which the GPS antennae, drivers control panel, microphones and other external audio sources such as DVD players are connected. These connected audio sources, along with the multi-lingual tour commentary and music storage integrated within the TourMaster, is converted to a high quality digital audio signal. This digital signal is then transmitted to each seat-based passenger controller.

This enables you to cater to different foreign speaking tourists on the same tour. The pre-recorded commentary can be manually triggered or set to trigger by GPS.

2.0 ELECTRICAL CONNECTIONS AND PORTS

The purpose of the TourMaster System Head Unit is to store pre-recorded commentary and audio that can be triggered via GPS and distributes the audio to individual seat controllers. Audio from additional external devices can also be distributed to individual seat controllers via the head unit.

2.1 POWER CONNECTION



- **10V-30V, GROUND - POWER SUPPLY:**

System power supply input.

- 12VDC to 24VDC nominal voltage;
- Connect to ignition side of key (constant power during cranking) and after isolating switches;
- Recommended external fuse protection: 10 Amp;
- Maximum current (operational – ON via control panel): 5 Amps;
- Maximum current (shutdown – OFF via control panel): 100mA

- **PCON1, PCON2 - REMOTE POWER CONTROL:**

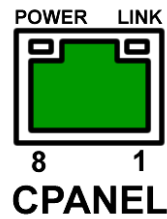
Connect to a toggle switch to remotely power up the system if a driver/guide control panel is not provided.

- **RELAY1, RELAY2 - SWITCHED OUTPUT:**

These are contacts of an internal normally-open (N/O) relay.

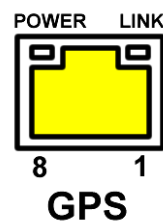
- Used for activation of a chime or connection to backlit signs;
- Maximum relay contact rating: 1 Amp.
- Do not exceed the current rating of the relay connections

2.2 CONTROL PANEL PORT



Connect the driver/guide control panel to the system via this port using the supplied green CAT-5 cable.

2.3 GPS AERIAL PORT



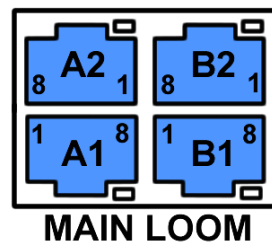
Connect the GPS aerial to this port. The aerial must have a yellow boot on the cable to be compatible with this system.

2.4 USB PORT



Connect the system to a PC/laptop via USB cable to perform updates to the system.

2.5 MAIN LOOM PORTS



The “MAIN LOOM” ports provide power and digital audio to all hubs and audio controllers in an installation. “POWER” indicators will light when power is present at each loom port. An indicator that goes out when a cable is connected indicates that the over-current protection has activated and therefore is a fault on that loom. Disconnect the loom immediately and test for faults (See document: “*Coachsound Audio Systems: Main loom testing and fault finding*”)

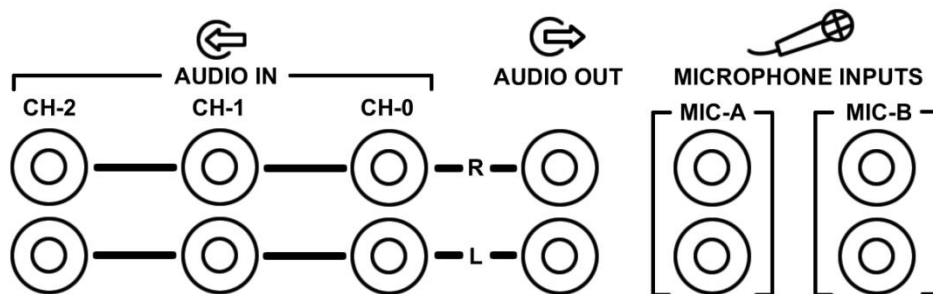
Four ports are provided to allow easy installation into both single-deck and double-deck vehicles, as well as for situations when there are more hubs (audio controllers) that can be run from a single port.

Maximum number of hubs and total accumulated length of all connected blue cables (per port):

- 12V nominal voltage:
 - 15 hubs per loom maximum (30 x audio controllers per loom)
 - 40m accumulated cable length max
- 24V nominal voltage:
 - 20 hubs per loom maximum (40 x audio controllers per loom)
 - 50m accumulated cable length max

NOTE: Exceeding the maximum number of hubs and/or the total accumulated cable length may cause the system to not operate as expected or to malfunction.

2.6 AUDIO I/O PORTS



2.6.1 AUDIO IN

The system can accept audio from up to 3 external stereo systems such as DVD players (audio), CD players, radios etc. Do not connect speaker lines directly to these inputs. Some audio systems provide up to 10V line level output - you must pad these high-level audio sources down to 1V RMS maximum for use with these inputs.

SPECIFICATIONS (AUDIO IN):

- Connectors: RCA (Stereo)
- Audio Level: 0-1V RMS maximum.
- Input impedance: 10k Ohms

2.6.2 AUDIO OUT

The system can output audio on this connector. Connect this to an external audio system such as a PA if required.

SPECIFICATIONS (AUDIO OUT):

- Connectors: RCA (Stereo)
- Audio Level: 0-1V RMS (Line level)
- Output impedance: 100 Ohms

2.6.3 MICROPHONES IN

Connect up to two separate microphones to the system. Two connectors per microphone are supplied for pass-thru or connection of multiple microphones.

NOTE: If microphones are connected in parallel to multiple audio systems (eg. to the Coachsound and a PA), then electrical noise will probably result on the microphone channel on both the Coachsound and PA. This is not a fault of the Coachsound system. It is the result of incorrect grounding between multiple audio systems.

To reduce alternator noise/ground loop hum:

- Use star-grounding topology for all audio systems;
- Physically locate all audio systems as close to each other as possible;
- Use dedicated power and ground wiring for all audio systems (Do not steal power from other vehicle systems);
- Keep microphone cables away from other high current (eg. air-con) cabling;
- Use audio isolators in series with the microphone leads at each audio system.

SPECIFICATIONS (MICROPHONES):

- Connectors: 2 x RCA per microphone input (enables pass-thru or stacking)
- Microphone type: Dynamic (Electret types are not compatible)
- Audio Level: 0-100mV RMS
- Input impedance: 6k Ohms
- Gain control per microphone? YES via control panel.

3.0 INSTALLATION

3.1 HEAD UNIT



The head unit should be located:

- In a dry and dust free environment;
- Where the BLUE main looms are not excessive in length before reaching each first hub;
- Near to the user control panel and GPS aerial location;
- With easy access to the USB port for updates via laptop.
- With at least 75mm clearance on both sides to allow for wiring and connectors

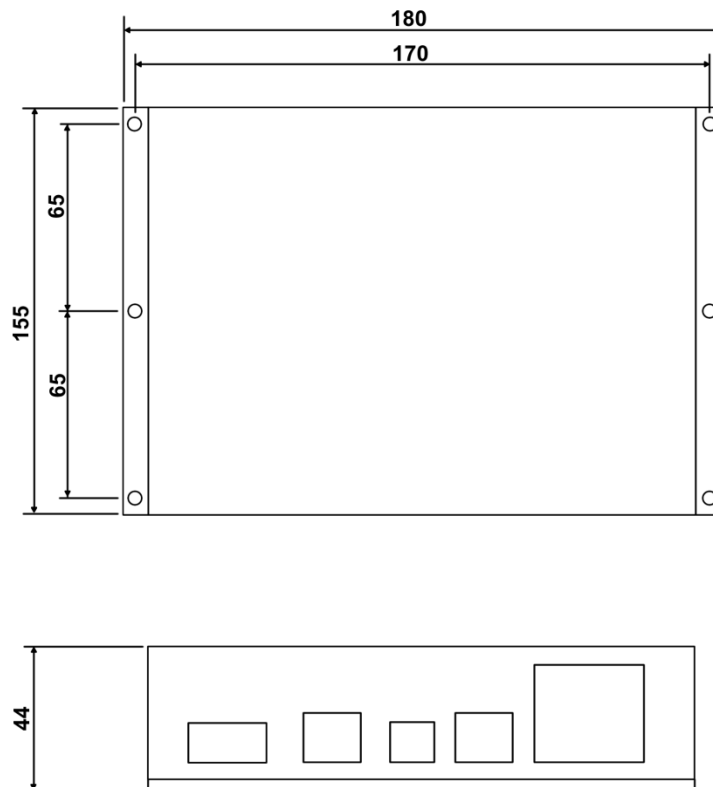


Figure 1 - MLA2504 Head Unit Dimensions

3.2 CONTROL PANEL



The User Control Panel should be located:

- In a dry and dust free environment;
- In easy view of the driver/operator and with easy access to its functions;
- Out of direct sunlight and weather (Do not mount next to windows that can be left open);
- Within the supplied cable length from the head unit (Green cable)

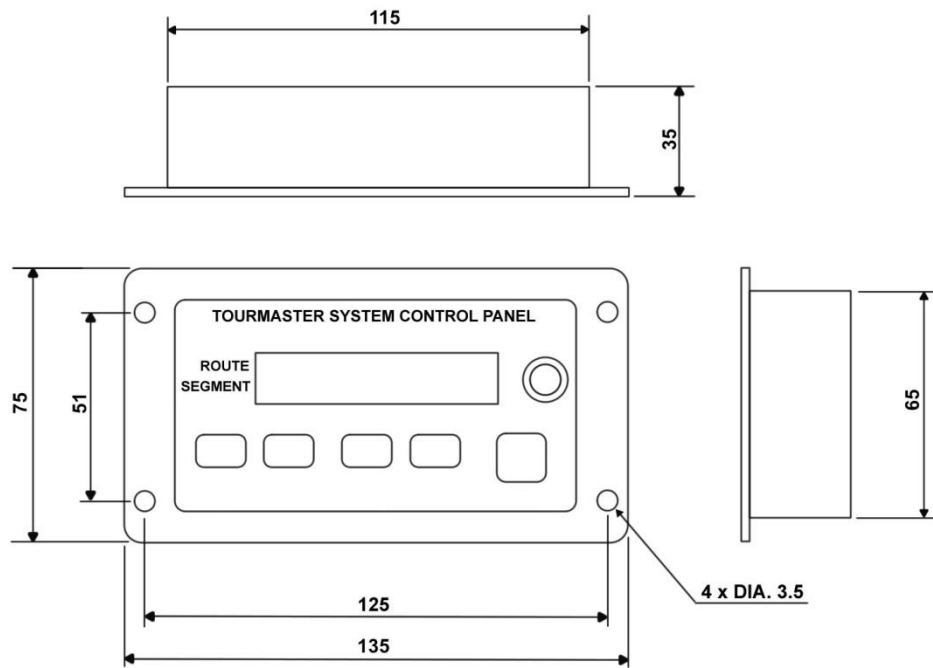


Figure 2 In-Dash Mount Driver Control Panel

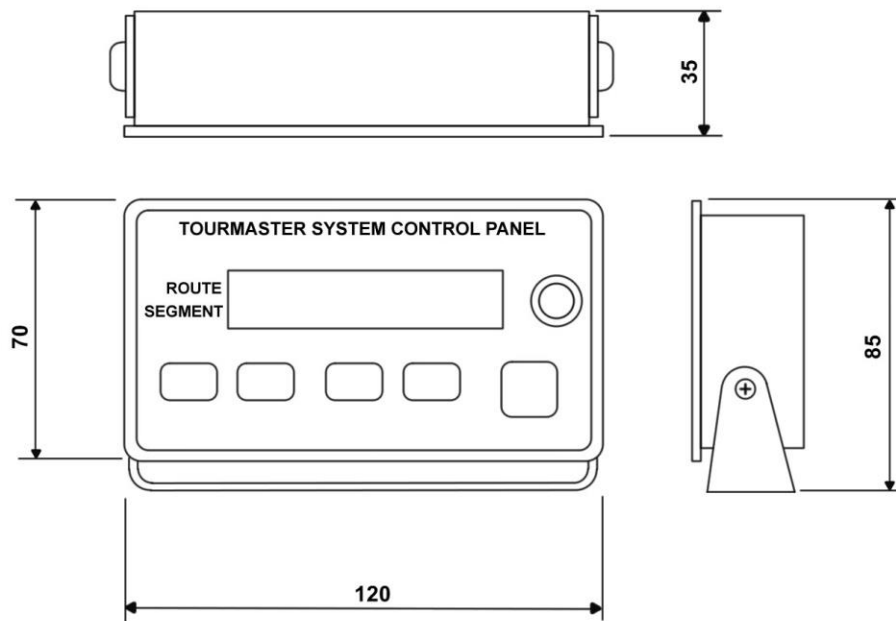


Figure 3 On-Dash Mount Driver Control Panel

3.3 GPS AERIAL



* Supplied cable length is 5m (15 ft)

The GPS aerial should be located:

- On top of vehicle roof with an unobstructed view of the sky;
- Away from other aerials such as RT and radio;
- In a location where it will not be damaged by low hanging tree branches etc.
- Within 5m (15ft) installed cable length from the location of the head unit

Method to secure aerial to the roof:

- With sealant/adhesive such as “Sikaflex 227” or similar (preferred and easiest method);
- 3 x M4 screws as per drill pattern shown in diagram below.

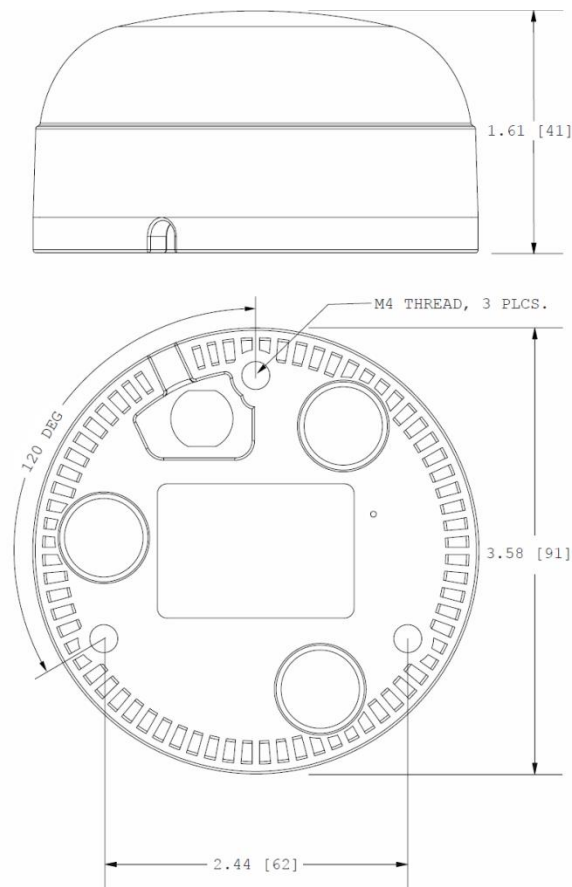


Figure 4 - GPS Aerial Dimensions

3.4 AUDIO CONTROLLERS



Audio Controllers should be mounted:

- Within easy access and easily viewable to the passenger/user;
- Within the cable length (red cable) of the connecting hub (3m maximum);
- On a flat surface or recess to prevent the controller distorting shape when mounted.

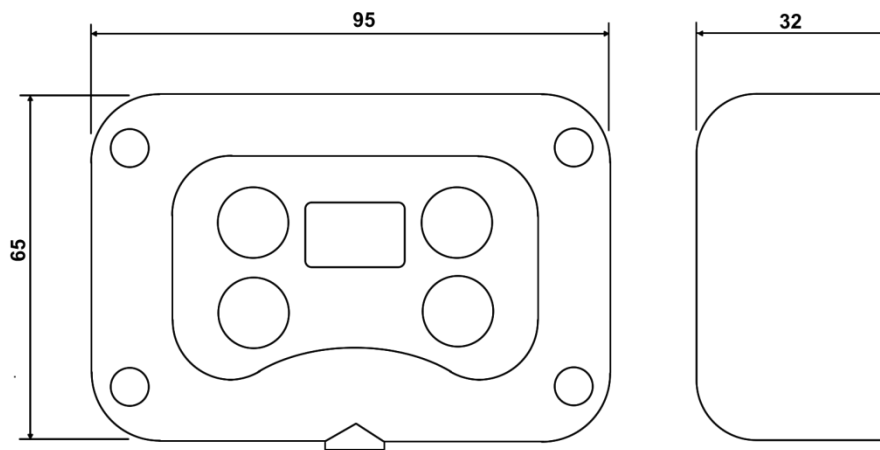


Figure 5 PCU430W (Flush/surface mount, waterproof) overall dimensions

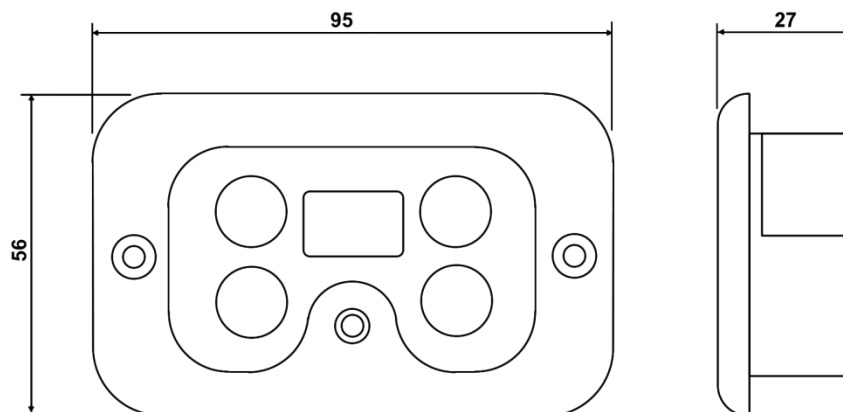
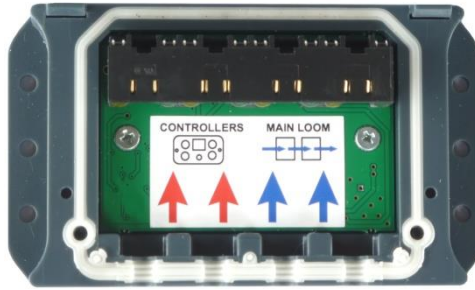


Figure 6 PCU430 (Recessed mount) overall dimensions

3.5 AUDIO HUBS



Hubs should be mounted:

- Under seat frame or on/behind walls away from passenger view and access;
- Away from areas that cables can be snagged by bags or feet, pulled at, or crimped via seat recliners;
- With cables exiting the hub underneath if mounted vertically and used in outdoor environments;

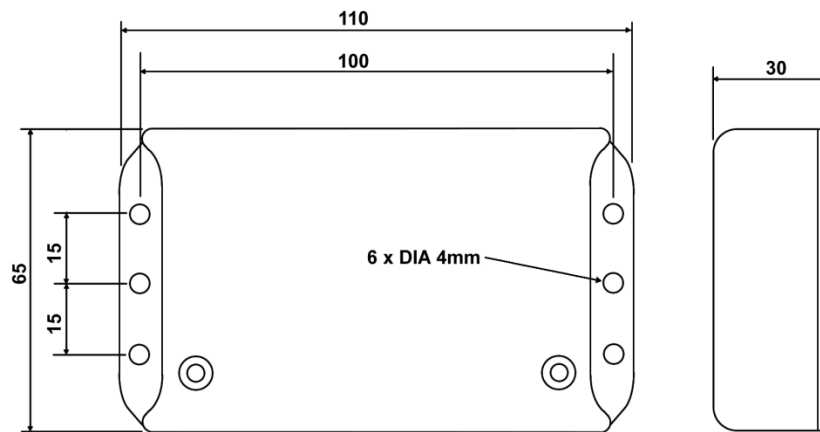
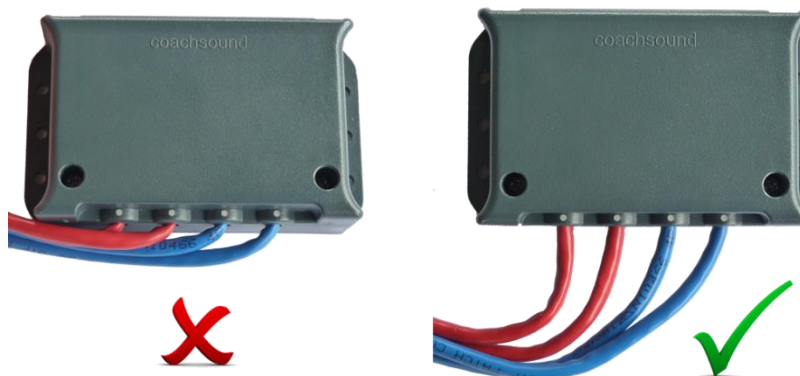


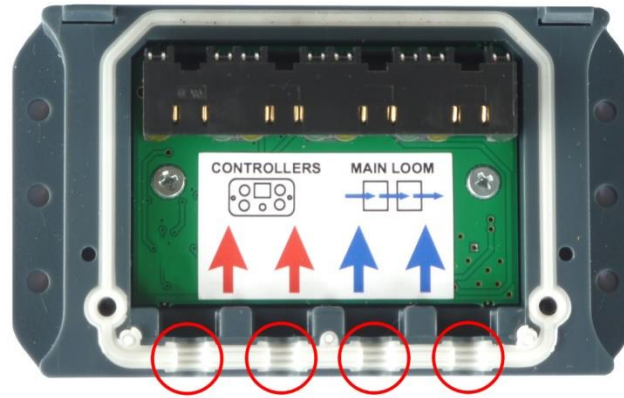
Figure 7 Hub overall dimensions

Notes for proper sealing of hubs for use in outdoor environments:

- If the hub is to be mounted vertically, ensure that the cables exit the hub from underneath;
- When tying up cables that exit the hub, do not tension/pull the cables sideways as shown in the diagram below. Doing this may compromise the hub cable seal and lead to eventual hub failure.

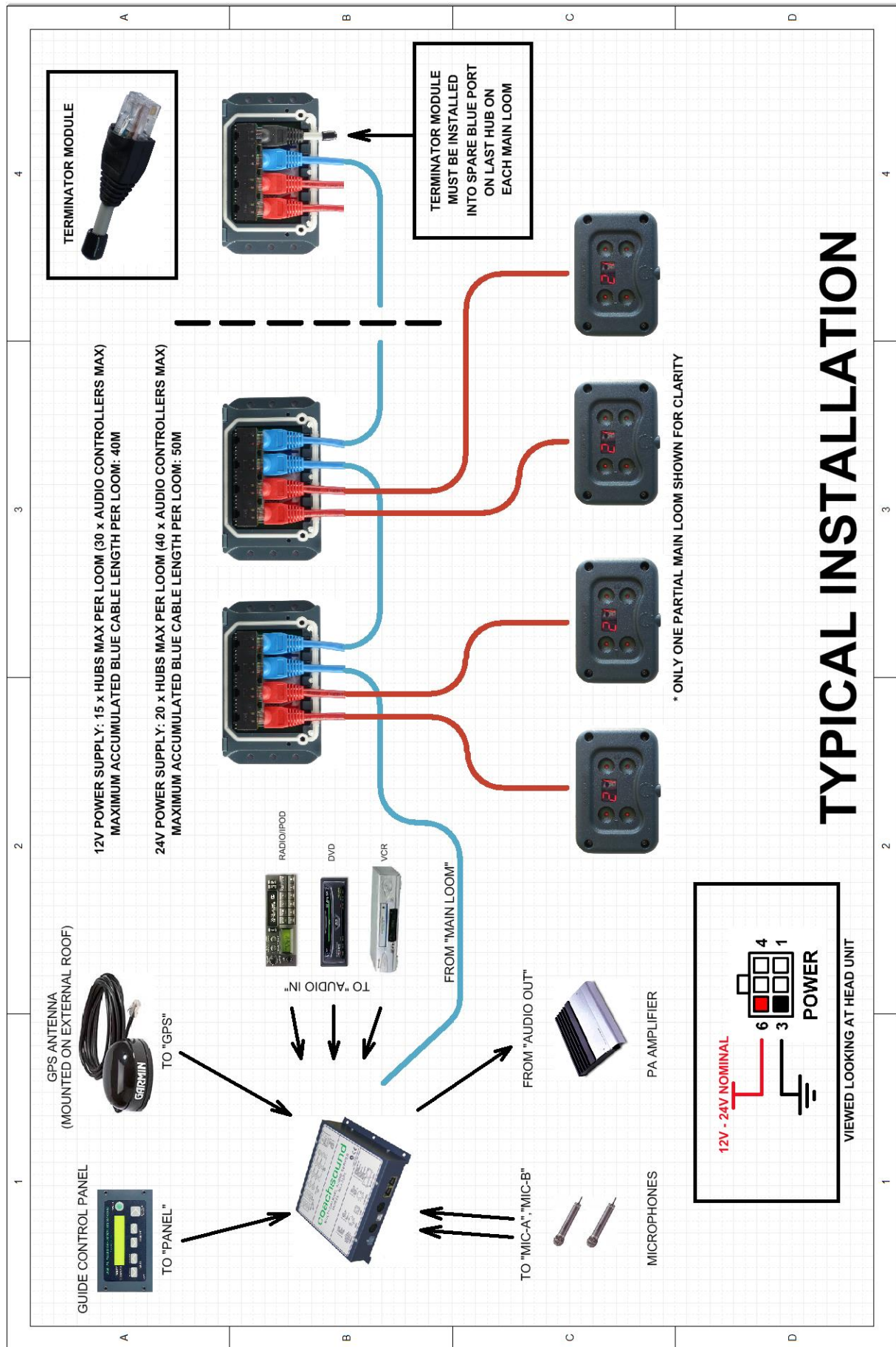


- When sealing the hub, Vaseline (or similar water insoluble grease) should be applied to the 4 cable exit points (a match head's worth per cable is more than enough) on both the lid and base. This aids the hub cable seals preventing water ingress into the hub due to the variety of cross-sectional shapes of CAT-5 cables.
- Do not use silicone sealant as this will glue the hub together making it impossible to disassemble.



APPLY VASELINE TO CABLE EXIT POINTS ON BOTH BASE AND LID

3.6 TYPICAL WIRING LAYOUT



3.7 INSTALLATION OF HUBS AND AUDIO CONTROLLERS

- Install and connect all components (hubs, audio controllers and cables) but leave the main loom cables disconnected from the head unit;
- Leave the lids off the hubs, for now;
- Install terminator modules into the spare blue port on the hub furthest from the head unit on each main loom;
- For each main loom cable that connects to the head unit, it is **IMPERATIVE** to test the head unit end of each loom cable for faults (See below: “3.8 Loom Testing Procedure”);
- Once each loom has passed the testing procedure, connect to the head unit and power up the system;
- Check that all audio controllers display a “0”;
- Play an audio file from the control panel;
- Test each audio controller for correct audio over the headphones and correct volume & channel function;
 - ➔ If there are audio controllers that do not operate as expected, see below: “3.9 Fault Finding”.
- If all audio controllers pass the testing procedure, power down the system;
- Screw lids onto the hubs (remembering to add Vaseline if the system is required to be water-proof) and tie up all loose cabling to prevent future cable damage;
- Power up system and retest for final quality assurance.

3.8 LOOM TESTING PROCEDURE

Loom testing is performed at the end of the loom that connects to the head unit. All loom cables must be tested before connecting to and powering the head unit. Using a multi-meter, check for the following resistance readings at the RJ45 plug:

From	To	Resistance	Example graphics
Orange (pin 2 or 6)*	Orange/White (pin 1 or 3)*	110Ω to 120Ω (Presence of Terminator)	
Green (pin 2 or 6)*	Green/White (pin 1 or 3)*	110Ω to 120Ω (Presence of Terminator)	
Orange pair (pins 1 & 2)*	Blue pair (pins 4 & 5)	>5kΩ	
Green pair (pins 3 & 6)*	Blue pair (pins 4 & 5)	>5kΩ	
Orange pair (pins 1 & 2)*	Brown pair (pins 7 & 8)	>5kΩ	
Green pair (pins 3 & 6)*	Brown pair (pins 7 & 8)	>5kΩ	
Blue pair (pins 4 & 5)	Brown pair (pins 7 & 8)	>5kΩ	

* There are two industry cable standards for CAT-5 cables. The difference is that the Orange and Green pairs are transposed. Both types of cables are compatible with Coachsound systems and are interchangeable with each other.

If any of the resistance readings are outside the listed range, DO NOT connect the loom to a powered head unit until the fault has been found and eliminated.

3.9 FAULT FINDING

Common faults:

- Terminator modules not installed (Symptom is erratic controller operation and static audio noise);
- Cables not fully plugged into their sockets;
- Blue and Red cables swapped at the hub;
- Damaged cable(s);

3.9.1 MAIN LOOM FAULTS

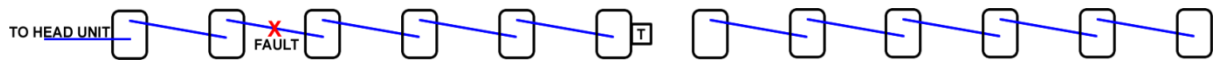
The easiest and fastest way to determine the location of a main loom fault is to keep splitting the length of the loom and retesting ("half-splitting algorithm")

Example 1:

In this example the fault is towards the head unit (but as yet is unknown):



1. Divide the loom into approx half its original length by moving the terminator module to hub #6 and retesting. Retesting shows that the fault remains, therefore the fault is in the front ½ of the loom:



2. Divide the loom again by approx half by moving the terminator module to hub #3. Retesting shows that the fault remains, therefore the fault lies in the front ¼ of the loom:



3. "Halving" again moves the terminator module to hub #2. Testing shows that the fault has been removed. The fault must therefore be between hubs #2 and #3. Replace this inter-hub cable, connect all cables, replace the terminator module to hub #12 and retest:

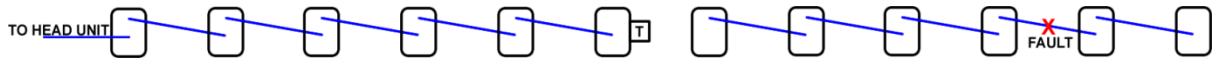


Example 2:

In this example the fault is towards the end of the loom (but as yet is unknown):



1. As per the previous example, move the terminator module to the “half” way position and retest. This will show that the fault has been removed. Therefore the fault must be in the rear ½ of the loom:



2. Divide the loom again in half by moving the terminator module ¾ of the way down the loom. Retesting will still show no fault, therefore the fault must be in the rear ¼ of the loom:



3. Divide the loom again by “half” by moving the terminator back. Retesting will show that the fault is still not showing.



4. Move the terminator module back again. Retesting reveals the fault, therefore the fault must lie between hub #10 and #11. Replace this inter-hub cable, connect all cables, replace the terminator module to hub #12 and retest:



3.9.2 AUDIO CONTROLLER FAULTS

NOTE: Not having terminator modules properly installed may result in symptoms that appear to be faulty hubs and audio controllers instead. Therefore it is important to test the main looms before assuming any faulty hubs and/or controllers.

- Single controller faulty?
 1. Cable inserted properly into audio controller and hub?
 2. Swap controller for known good controller:
 - Fixed? Test for faulty controller;
 3. Swap RED cables at hub.
 - If other audio controller is now faulty, test and replace faulty hub;
 - If same audio controller faulty, test and replace faulty RED cable
- Both audio controllers on same hub faulty?
 1. Cables inserted properly into the hub?
 2. Swap audio controllers for known good controllers:
 - Fixed? Test for faulty audio controllers;
 3. Swap hub for known good hub
 - Fixed? Test for faulty hub
 4. Test main loom again.

- All audio controllers on one side faulty?
 1. Is the loom cable properly connected to the head unit?
 2. Test the main loom
 3. Swap the main loom at the head unit
 - Fixed? Test for faulty head unit port

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