

MS-AM402

MARINE AMPLIFIER

User/Installation Manual



FUSION[®]
FUSIONENTERTAINMENT.COM

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RECORD YOUR PRODUCT DETAILS HERE:

MODEL NUMBER _____ DATE OF PURCHASE _____ AFFIX RECEIPT HERE

Feature Overview

- 2 Ohm Stable MOSFET Amplifier Design
- Variable Bass Boost 0 - + 18dB
- Variable LP and HP Electronics X-OVER @ 18dB/octave
- 4 Gauge Power and Ground Connections
- Nickel Plated Audio Input and Output RCA Connections
- Nickel Plated RCA Output for multi-amp Installations

2-OHM STABLE STEREO

Provides the option of connecting an extra pair of speakers in parallel, 2 per channel at 2-Ohms (A total of 8 speakers).

MARINE GRADE CONNECTIONS

Nickel plated RCA connectors and stainless components improve signal flow for optimum output

CLASS-AB DESIGN

The 500 Watt 2-Ohm stable (per channel) design ensures clean and powerful amplification of the input signal, enough to rock the boat.

CONFORMAL COATED CIRCUITRY

Provides added protection from salt air and moisture to ensure maximum product life.

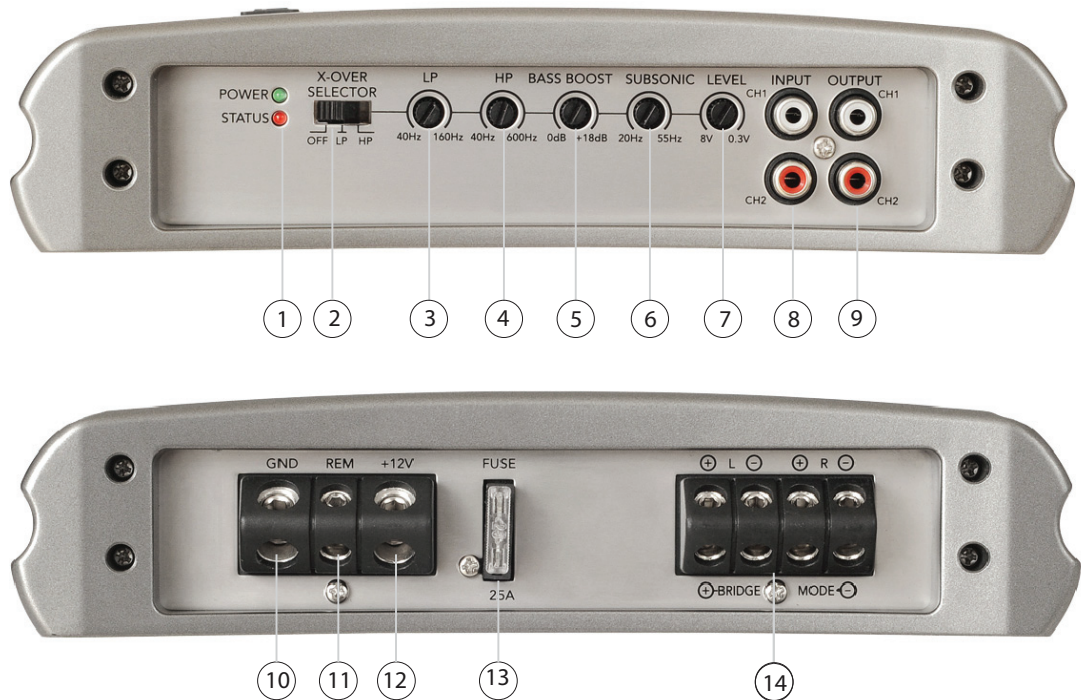
MARINE GRADE CHASSIS

Stainless steel end and bottom plates provide a stunning finish coupled with environmental protection.

RCA LINE OUT

A pass through RCA output enables linking of multiple amplifiers for enhanced system performance

Control Descriptions



1 Power And Status LEDs:

This shows if the amplifier has been correctly powered up and if any faults are present.

2 Crossover Selector:

Set the appropriate mode of operation. The 3 positions available are OFF, LP and HP.

3 Low Pass:

Set the crossover switch 2 to LP when a subwoofer is connected. Ensure the crossover frequency is set at 100Hz or below, this feature is designed to filter all mid to high frequencies that only FULL RANGE speakers should produce. NOTE: Failure to do so could result in speaker damage.

4 High Pass:

Set the crossover switch 2 to HP and turn this control to 65Hz or above when using speakers smaller than 6", this feature is designed to filter all low bass frequencies that only SUBWOOFERS should produce. NOTE: Failure to do so could result in speaker damage.

5 Bass Boost:

This is a variable control to increase the bass boost at 45Hz from 0 -+18dB of gain, adjust to suit.

6 Subsonic Filter:

This is a variable control filters out all Sub Bass Frequencies below the set point at 18dB/octave.

7 Level:

This allows level adjustment of the input signal. Use this control to correctly match the head unit to the amplifier. To set this control correctly, turn the amplifier level to MIN and the head unit to 3/4 volume, with the BASS and TREBLE on zero , then slowly turn up this amplifier level control towards the MAX end of the control.

NOTE: If the sound becomes distorted, turn this control down.

8 RCA Input:

Connect these RCA connectors to the LOW LEVEL output connection from the head unit.

9 RCA Output:

Use these RCA Output connectors to connect to a secondary amplifier. This output is a PASS-THRU connection derived from the RCA input connector so the signal level and frequency response are the same as the original input signal.

10 Ground Connection:

Connect directly to a suitable ground point via a 4 gauge power cable. NOTE: This is to be the first wire to connect. Damage could result if this is not done.

11 Remote Connection:

This input is for turning the amplifier on and off. This requires a switched positive (+12V) to power 'ON' the amplifier, this can be found on the rear of the head unit in the form of an electric antenna output, or a remote on output. If not available you can wire to a switched +12V supply.

12 Power +12V Connection:

This must be connected to the battery positive (+) terminal via a 4 gauge power cable and with an inline fuse or circuit breaker at the battery end. NOTE: This is to be the last wire to connect up during installation as damage could result.

13 Fuse:

Please ensure the correct type of fuse is fitted, as specified in this manual. PLEASE NOTE: the MS-AM402 has 1x 25A fuse.

14 Speaker Output:

See channel installation diagrams in this manual for correct speaker connection.

Installation

Mounting

Appropriate mounting is very important for the prolonged life expectancy of any amplifier. Select a location that allows enough space so sufficient airflow is maintainable and a location that provides protection from moisture. Keep in mind that an amplifier should never be mounted upside down. Upside down mounting will compromise heat dissipation through the heatsink and could engage the thermal protection circuit. Excessive heat will shorten your amplifiers life. To maximise heat dissipation, be sure to leave at least 2.5" of clearance around the amplifier. If space is of the essence and the amplifier must be mounted in an enclosed or restricted area, a small 3 inch fan should be used in correspondence with a duct so the heat can flow past the Heatsink.

To avoid scratching your new FUSION amplifier, pre-drill the mounting holes with either a 3mm or 9/64" diameter drill bit and use the screws supplied in the accessory kit. Be sure to investigate your mounting area thoroughly to avoid electrical wires, vacuum lines or fuel lines.

Installation Options

The quality of installation will affect the performance and reliability of your FUSION amplifier. For maximum performance we recommend you have your new FUSION amplifier installed by an authorised FUSION dealer. Our highly skilled dealers have vast knowledge of our products and their installation techniques are necessary to unleash the high performance capabilities of your amplifier.

If you decide to connect the amplifier yourself, it is important that you read this manual carefully and throughout before starting. Once you have finished reading and you still have questions regarding installation, we recommend your FUSION dealer.

Connection

FUSION amplifiers are designed to work within a 10 to 16 volt DC range. Before any wires are connected, the vessel's electrical system should be checked for correct voltage supply with the help of a voltmeter. First, check the voltage at the battery the voltmeter should read between 12 and 13.8 Volts. If your vessel's electrical system is not up to these specification, we recommend having it checked by an auto electrician before any further installation. Once the vessel is checked, make certain the correct cable size is used. We recommend using the following cables calculator diagram on page 9 to calculate the correct power cable for your application.

Power

FUSION amplifiers should be wired directly to the battery using the appropriate sized cable. Start at the vessels battery and run the power cable through to the amplifier. FUSION recommends the use of grommets when passing the power cable through any metal wall to avoid sharp corners or sharp body parts that may easily cut through the insulation on the cable.

Avoid running the power cable over engine components. The use of an inline fuse or circuit breaker is a must, this will prevent the risk of a potential fire caused be a short in your power cable. Connect the fuse holder or circuit breaker as close to the

battery positive terminal as possible. Use a fuse or circuit breaker of equal value as that found on the chassis of your FUSION amplifier. You may now connect the cable to the battery, but remember to leave the fuse out or circuit breaker off until all other cable connections are made.

Ground

When grounding your FUSION amplifier, use the same gauge cable for ground as you did for the power. Secure the ground cable to the appropriate ground point, now its time to connect the power and ground cables to the amplifier. Cut both cables to length. Use a hex type screwdriver to loosen the +12V and the GND connections on the amplifier. Terminate the ground first, and then the +12V and please make sure that you terminate them into the correct terminals. Then tighten the screws down securely.

Speaker Load

Keep in mind FUSION 'AM' series amplifiers are high power amplifiers and not high current amplifiers. In other words they require a minimum impedance of 2 ohms STEREO and 4 ohms bridged MONO to operate trouble free. Too low of an impedance could send your FUSION amplifier into protection mode and/or damage the amplifier.

Remote Turn-on

This terminal must be connected to a switched +12V source. Typically, remote turn-on leads are provided at the head unit which will turn on and off the amplifier. If the head unit does not have a remote turn-on lead, then a power antenna wire can be used. If neither of these leads are present on the head unit then a switched +12V supply must be used , like the ACC +12V.

Run a minimum of 18 gauge wire from the amplifier location to the source of the switched +12V lead. Connect the source remote output to the wire. Go back to the amplifier and cut the wire to length. Loosen the screw terminal marked REM on the amplifier using a hex type screwdriver. Slip the wire into the connector and tighten the screw securely.

Inputs & Gain Setup

Low Level Inputs

Be extra careful with your RCA interconnects. Hiss, engine noise, and fan noise can easily be picked up through RCA cables if run incorrectly. Avoid running your RCAs near large wire looms and electric fans if possible. Run your RCA cables on the opposite side of the power cable. Be sure to check for correct balance (Red is right and black or white is left)

Level Control

On the amplifier, is the LEVEL control, this control allows you to match the input level of the amplifier to the output level of your head unit. Matching the input can be accomplished in three simple steps:

1. Turn the LEVEL control on the amplifier to minimum.
2. Turn up the head unit and adjust to 2/3 maximum volume ensuring that the BASS and TREBLE are set to zero.
3. Adjust the LEVEL control until the desired volume is achieved without audible distortion.

Remember, the gain control is not a volume control. Ignoring the three steps above may leave you with damaged speakers and/or a damaged amplifier.

Single Channel Installation

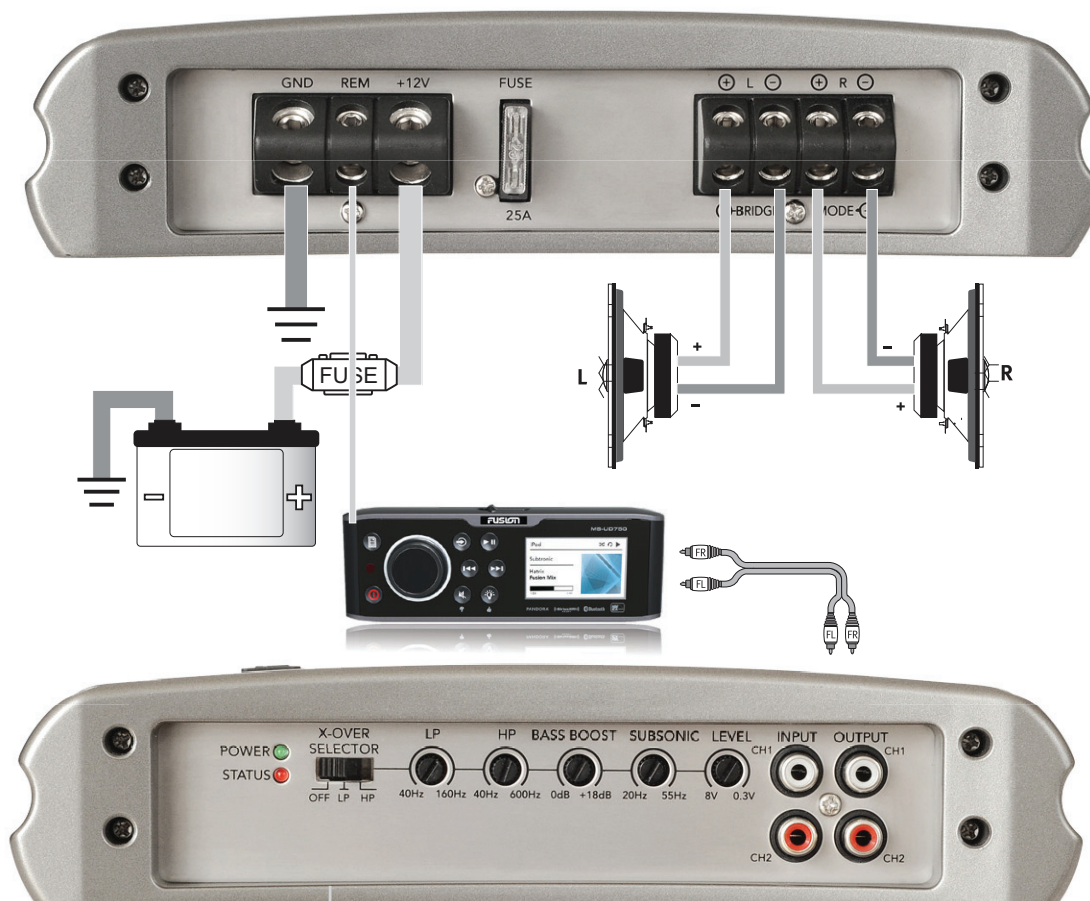


Power Cable Calculator

Total Amperage	0-4ft	4-7ft	7-10ft	10-13ft	13-16ft	16-19ft	19-22ft	22-28ft
0-20	14	12	12	10	10	8	8	8
20-35	12	10	8	8	6	6	6	4
35-50	10	8	8	6	4	4	4	4
50-65	8	8	6	4	4	4	4	2
65-85	6	6	4	4	2	2	2	0
85-105	6	6	4	2	2	2	2	0
105-125	4	4	4	2	0	0	0	0
125-150	2	2	2	0	0	0	0	0

The above chart shows cable gauges to be used, if no less than a 0.5 volt drop is acceptable. If aluminium wire or tinned wire is used, the gauges should be an even larger size to compensate. Cable gauge size calculation takes into account terminal connection resistance. 1 Metre = 3.28 Feet

Two Channel Installation



Trouble Shooting

Problem	Cause	Solution
Power LED not 'ON'	Fuse at battery blown or not installed	Replace with correct type and rated fuse.
	Improper connections	Check that the ground wire, power wire and the remote wires are connected to the correct terminal
Status LED 'ON'	Fuse blown	Replace with correct type and rated fuse.
	Amplifier too hot	Move the amplifier into a more ventilated area
	Speaker wires shorted	Check that there are no speaker wires shorted to any other wire and also check if any wire is shorted to ground
	Internal malfunction	Disconnect all wires except ground, power and remote. Then turn the amplifier 'ON', if the protection light is still 'ON' then return for service

Specifications

Signal to Noise Separation	>95dB
Input Sensitivity	>60dB
LP Variable Crossover	300mV - 8V
HP Variable Crossover	40Hz - 160Hz @ 18dB/octave
Variable Bass Boost	40Hz - 600Hz @ 12dB/octave
Variable Subsonic Filter	0 - + 18dB @ 45Hz
Input Impedance	20Hz - 55Hz @ 18dB/octave
Damping factor	20k Ω
T.H.D	>200
Fuse Ratings	0.05%
Dimensions(mm)	1 x 25A
	229 (W) x 296(L) x 53vz(H)

12.6 Volt power output specification

50 Watts RMS x 2 @ 4 Ω 1% THD+N

96 Watts RMS x 2 @ 2 Ω 1% THD+N

160 Watts RMS x 1 @ 4 Ω Bridged 1% THD+N

14.4 Volt power output specification

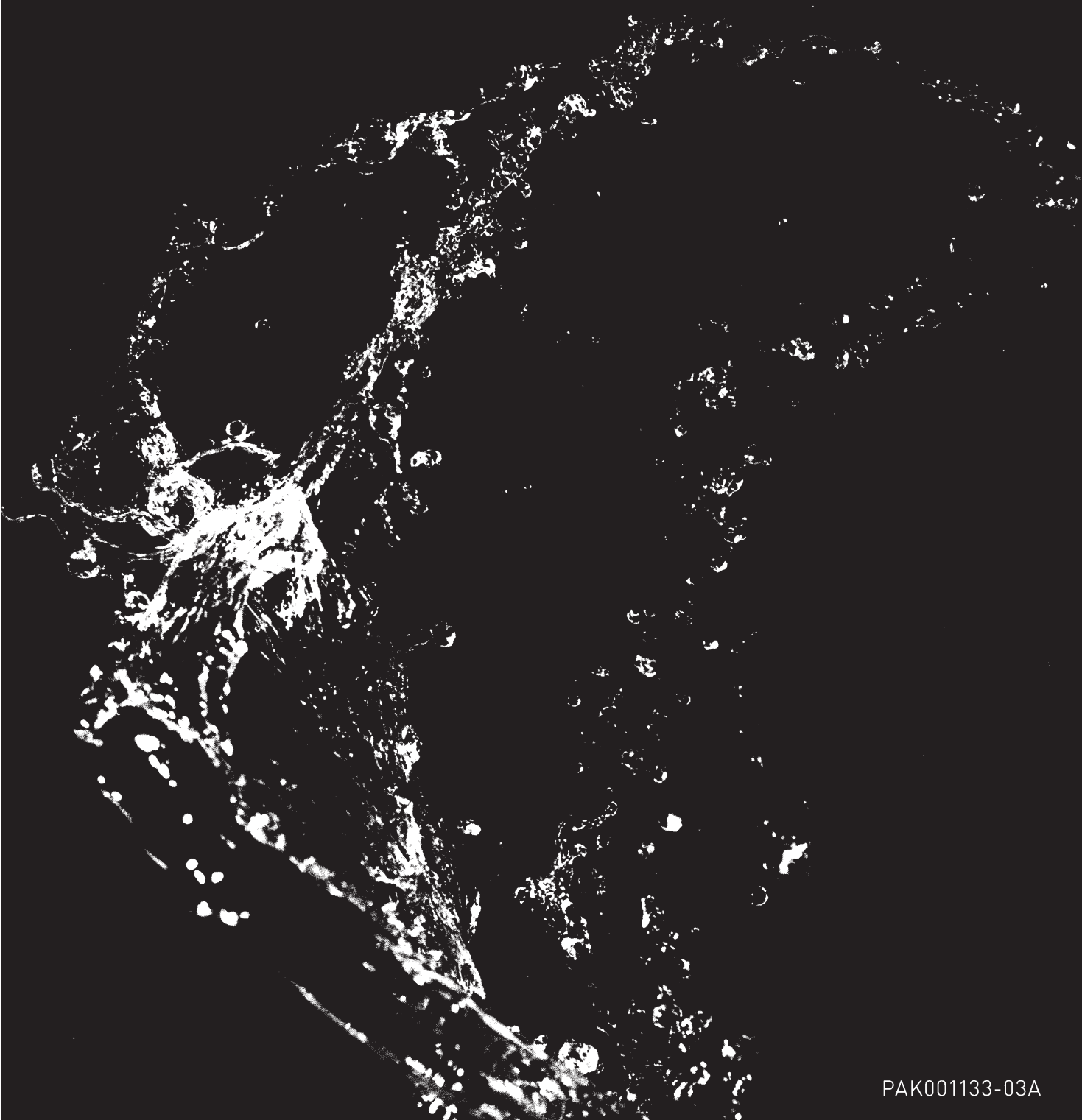
65 Watts RMS x 2 @ 4 Ω 1% THD+N

100 Watts RMS x 2 @ 2 Ω 1% THD+N

200 Watts RMS x 1 @ 4 Ω Bridged 1% THD+N

FUSION

LIMITED 1 YEAR MARINE CONSUMER WARRANTY



PAK001133-03A

LIMITED 1 YEAR MARINE CONSUMER WARRANTY

Garmin New Zealand Ltd., trading as FUSION Entertainment ('FUSION') warrants that this FUSION Marine product is free from defects in material and workmanship, according to the following terms and conditions:

- The initial limited warranty for the FUSION product purchased extends to the first 12 months beginning on the date of purchase of the product
- The limited warranty extends only to the original consumer purchaser (consumer) of the product and is not assignable or transferable to any subsequent purchaser/end user.
- The limited warranty extends only to consumers who purchase the product in one of the countries (or areas) set forth on www.fusionentertainment.com. The limited warranty is only valid in FUSION's intended country (or area) of sale of the product.
- During the limited warranty period, FUSION or its authorised service network will repair or replace (at FUSION's discretion), any defective product or parts thereof with new and return the product to the consumer in working condition. No charge will be made to the consumer for either parts or labour in repairing or replacing the product. All replaced parts and cosmetic parts should be free of defects at the time of shipment and, therefore shall not be covered under these limited warranty terms.
- Repaired product will be warranted for the balance of the original warranty period or for ninety (90) days from the date of repair, whichever is longer.
- All warranty claims must be accompanied with a copy of this warranty card, and a copy of proof of purchase.

The consumer shall have no coverage or benefits under this limited warranty if any of the following conditions are applicable:

- The product has been subject to: abnormal use, abnormal conditions, improper storage, unauthorised modifications, unauthorised connections, unauthorised repair including but not limited to use of unauthorised spare parts in repairs, misuse, neglect, abuse, accident, alteration, improper installation, acts of God, spill of foods or liquids, maladjustment of customer controls or other acts which are beyond the reasonable control of FUSION, including deficiencies in consumable parts such as fuses, and breakage or damage to antennae unless caused directly by defects in materials or workmanship, and normal wear and tear of the product.
- FUSION was not notified by the consumer of the alleged defect or malfunction of the product during the applicable limited warranty period.
- The product serial number or the accessory date code has been removed, defaced or altered.
- The product was used with or connected to an accessory not supplied by FUSION or fit for use with FUSION product, or used in a manner other than its intended use.

If a problem develops during the limited warranty period, the consumer should take the following step-by-step procedure:

1. The consumer shall return the product to any authorised FUSION dealer in authorised sales countries for repair or replacement processing. FUSION assumes no freight or shipping responsibility for returning goods to an authorised FUSION dealer, or return freight from an authorised dealer to the consumer submitting the warranty claim.
2. The consumer shall be charged for any parts or labour charges not covered by this limited warranty. The consumer shall be responsible for expenses related to removal and reinstallation of the product.
3. If the product is returned to FUSION after the expiration of the warranty period, FUSION'S normal service policies shall apply and the consumer will be charged accordingly.

THE BENEFITS CONFERRED BY THIS LIMITED WARRANTY APPLY TO THE EXTENT THAT THEY ARE NOT SUPERCEDED BY ANY OTHER RIGHTS AND REMEDIES UNDER ANY APPLICABLE LEGISLATION THAT CANNOT BE EXCLUDED. OTHERWISE, TO THE EXTENT PERMITTED BY LAW, ANY IMPLIED WARRANTY IS EXCLUDED AND THE FOREGOING WARRANTY IS THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. TO THE EXTENT PERMITTED BY LAW, FUSION SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OR A LOSS OF ANTICIPATED BENEFITS OR PROFITS, OUT OF USE OR INABILITY TO USE THE PRODUCT.

- Some states in America do not allow the exclusion or limitation of consequential damages, so the above limitation and exclusion may not apply to you. This warranty gives you specific legal rights which may vary from state to state.
- FUSION neither assumes nor authorises any authorised service centre or any person or entity to assume for it any other obligation or liability beyond that which is expressly provided for in this warranty.
- All warranty information, product features and specifications are subject to change without notice.

AUSTRALIAN CONSUMERS

LIMITED 1 YEAR MARINE CONSUMER WARRANTY

Garmin Australia Limited, Unit 21/130 Kingston Road, Underwood, Queensland, 4119, Australia.

EMAIL: australia@fusionentertainment.com **PHONE:** 1300 736 012

THE FUSION PROMISE OF QUALITY LIMITED 1 YEAR CONSUMER WARRANTY

This warrant is given in addition to other rights and remedies available to the consumer under Australian Consumer Law. In addition to the Fusion Warranty our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any others reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Garmin New Zealand Ltd., trading as FUSION Entertainment ('FUSION') warrants this FUSION Product including Speaker, Subwoofer, Amplifier Head Unit or genuine FUSION Accessory 'product' is free from defects in materials and workmanship, in accordance with the following terms and conditions:

- The limited warranty for the FUSION product purchased is only available for (12) months after the date of purchase.
- The limited warranty extends only to the original consumer of the product and may not be assigned or transferred to any other person or consumer without Fusion's prior written consent being provided.
- During the limited warranty period, FUSION or its authorised service network will repair or replace any defective or faulty product or parts at its own cost.
- Repaired or replaced product will be warranted for the balance of the original warranty period or for ninety (90) days after the date of repair, whichever is longer.
- All warranty claims must be notified to Fusion or its authorised Dealer in writing during the warranty period accompanied with a copy of this warranty card, proof of purchase date and the product with an intact and unaltered serial number or accessory date code.

This Warranty will not apply if:

The consumer causes the Product to be of unacceptable quality or fails to take steps to prevent the Product from becoming of unacceptable quality and/or it is damaged by abnormal use. Examples of goods becoming of unacceptable quality or of abnormal use by the consumer include;

- Storage of product under improper conditions.
- Exposure to excessive moisture or dampness.
- Exposure to excessive temperature extremes or other adverse environmental conditions.
- Unauthorised modifications of product, connections or otherwise unauthorised repairs including, but not limited, to the use of unauthorised parts in the repair of products
- Improper use of or installation of, or interference with, product adjustments or controls and or including antenna breakage or damage due to misuse
- Damage caused by consumables or by electricity supply.
- Acts of god (force majeure), exposure of product to food spills, or any other type of fluid ingress
- Using the product in a way for which was not intended to be used or connecting it to an accessory not supplied by, specified by, or authorised by Fusion
- Any other abnormal use of or conduct causing product to become of unacceptable quality

Other exclusions;

- This warranty extends to the repair or replacement of Fusion product only and the consumer is responsible for any expenses relating to the removal or installation of the product or related services including the cost of delivering the product to Fusion or its authorised dealer.
- Repair work conducted by Fusion after this warranty has expired or if this warranty for any other reason this Fusion warranty does not apply is subject to Fusion's normal service policies and Fusion charges for labour and material may apply.
- This is a manufacturers warranty provided to consumers of Fusion products. Variations to this warranty may only be made by Fusion and will be notified to the customer in writing or issued on the Fusion website. Fusion Dealers, agents and authorised dealers are not authorised to make changes or vary this Fusion warranty.
- All warranty information, product features and specifications are subject to change without notice.
- Fusion is not responsible for replacing or the cost of replacing any consumer data lost occurring either due to equipment failure, or during the repair and replacement process.

GARANTÍA LIMITADA DE UN AÑO PARA EL CONSUMIDOR

Garmin New Zealand Limited, comercialmente FUSION Entertainment ("FUSION") garantiza que este producto marino FUSION no presenta defectos materiales ni de fabricación, según los siguientes términos y condiciones:

- La garantía limitada para los productos FUSION adquiridos se extiende durante los primeros doce (12) meses a partir de la fecha de compra del producto.
- La garantía limitada se aplica solo al comprador consumidor original (consumidor) del producto y no es endosable ni transferible a ningún comprador/usuario final posterior.
- La garantía limitada se aplica únicamente a los consumidores que adquieran el producto en uno de los países (o regiones) expuestos en www.fusionentertainment.com. La garantía limitada solo es válida en los países (o regiones) en los que FUSION tenga intención de vender el producto.
- Durante el periodo de garantía limitada, FUSION o su red de reparación autorizada, reparará o sustituirá (según FUSION considere oportuno) los productos o piezas defectuosos por otros nuevos, y devolverá el producto al consumidor en condiciones de utilizarlo. No se le cobrarán al consumidor las piezas ni la mano de obra necesarias para reparar o sustituir el producto. Ninguna pieza sustituida ni pieza embellecedora debería presentar defectos en el momento de su envío y, por lo tanto, no estará cubierta en los presentes términos de garantía limitada.
- La garantía del producto reparado se extenderá durante el tiempo restante del periodo original de garantía o durante noventa (90) días a partir de la fecha de reparación, escogiéndose la opción de mayor duración.
- Todas las reclamaciones sobre la garantía han de ir acompañadas de una copia de la presente tarjeta de garantía y una copia justificante de la fecha de compra.

El consumidor no tendrá la cobertura ni beneficios expuestos en la presente garantía limitada si se da cualquiera de las siguientes condiciones:

- El producto ha sido objeto de: uso anormal, condiciones anormales, almacenamiento inadecuado, modificaciones no autorizadas, conexiones no autorizadas, reparaciones no autorizadas, incluyendo pero sin limitarse al, uso de piezas no autorizadas en reparaciones, uso indebido, abandono, abuso, accidente, alteración, instalación incorrecta, causa de fuerza mayor, derrame de alimentos o líquidos, ajuste incorrecto de los controles del cliente u otros actos que estén más allá del control de FUSION, incluida la falta de piezas consumibles tales como fusibles, y la rotura o daños ocasionados a las antenas, salvo que hayan sido causados directamente por materiales o fabricación defectuosos, y el desgaste natural por el uso.
- El consumidor no le notificó a FUSION el supuesto defecto o disfunción del producto durante el periodo de aplicación de la garantía limitada.
- Se ha eliminado, borrado o modificado el número de serie del producto o el código de fecha del accesorio.
- El producto se conectó o se utilizó con un accesorio no suministrado por FUSION o no adecuado para utilizar con productos FUSION, o se utilizó de una forma diferente a su uso indicado.

Si surge un problema durante el periodo de validez de la garantía limitada, el consumidor debe seguir paso a paso el siguiente procedimiento:

1. El consumidor devolverá el producto a un distribuidor autorizado de FUSION, en los países donde su venta esté autorizada, para proceder a su reparación o sustitución. FUSION no asume ninguna responsabilidad sobre el transporte o envío de los artículos devueltos al distribuidor autorizado de FUSION, ni sobre el reenvío desde el distribuidor autorizado al consumidor que haga la reclamación de la garantía.
2. El consumidor será responsable de los gastos por las piezas o mano de obra no cubiertos por esta garantía limitada. El consumidor será responsable de los gastos relacionados con la retirada y reinstalación del producto.
3. Si se devuelve el producto a FUSION después del vencimiento del periodo de garantía, se aplicará la política normal de reparación de FUSION y se le cobrará al consumidor de acuerdo con esta.

LOS BENEFICIOS CONFERIDOS POR LA PRESENTE GARANTÍA LIMITADA SON DE APLICACIÓN SIEMPRE Y CUANDO NO SEAN SUSTITUIDOS POR OTROS DERECHOS Y RECURSOS BAJO OTRA LEGISLACIÓN QUE NO SE PUEDA EXCLUIR. DE LO CONTRARIO, Y HASTA EL LÍMITE PERMITIDO POR LA LEY, SE EXCLUYE TODA GARANTÍA IMPLÍCITA, Y LA GARANTÍA ANTERIORMENTE EXPUESTA ES EL RECURSO ÚNICO Y EXCLUSIVO DEL COMPRADOR, Y REVOCA CUALQUIER OTRA GARANTÍA, YA SEA EXPLÍCITA O IMPLÍCITA. HASTA EL LÍMITE PERMITIDO POR LA LEY, FUSION NO SE RESPONSABILIZA DE DAÑOS INCIDENTALES NI EMERGENTES NI DE PÉRDIDAS DE BENEFICIOS O GANANCIAS ANTICIPADAS RESULTANTES DEL USO O DE LA IMPOSIBILIDAD DE UTILIZAR EL PRODUCTO.

- Algunos estados en EE.UU. no permiten la exclusión o limitación de los daños emergentes, por lo que puede que la limitación y exclusión anteriores no sean de aplicación para usted. Esta garantía le otorga derechos específicos que pueden variar de un estado a otro.
- FUSION no asume ni autoriza a ningún centro autorizado ni persona ni entidad a aceptar ninguna otra obligación o responsabilidad más allá de lo expuesto expresamente en esta garantía.
- Toda la información de garantía, características y especificaciones del producto están sujetas a cambios sin previo aviso.