INGRAM ENGINEERING

MPA685

Dual Channel Microphone Preamplifier

Owner's Manual

Option 201

CONTENTS

INTRODUCTION

The Ingram Engineering MPA685 is a dual channel audio preamplifier designed for recording amplified or instrument level signals with the highest quality and flexibility.

Microphones of any type and with any output impedance may be used. The preamplifier has variable input impedance that can be presented to microphones for maximum flexibility in capturing the audio accurately or in shaping the tones to taste. Two ranges of impedances are possible, and the range is installed at the factory. Your pre-amplifier has been configured at the factory for the high impedance range, and its model number is 110685-20, referred to as "Option 2" in this Owner's Manual. This range consists of 600, 1.5k and 2.5k Ohm impedances that may be presented to microphones. This impedance range is particularly well suited to ribbon microphones, as they typically require higher impedance load for optimum performance. However, the extremely accurate handling of transient signals, low noise, extended low and high frequency response and other features enable this preamplifier to be used with any microphone type and any audio signal with outstanding results.

DESCRIPTION

The MPA685 provides two channels of 100% discrete semiconductor-based amplification of microphone and instrument signals.

Audio content can be input to the MPA685 via the balanced XLR input, pin 2 Hot, on the rear panel, or to the ¼" jack on the rear panel, labeled "Opt", on your unit. The 1/4" jack is fully balanced.

The balanced microphone input uses an input transformer for high CMRR, optimum noise and impedance matching and smooth tonal character over a wide range of microphone types. Your pre-amplifier is configured with a custom Sowter transformer, designed for and exclusive to Ingram Engineering, The pre-amp is designed to provide the input transformer with constant impedance load, independent of pre-amp settings, therefore guaranteeing consistently excellent transformer transient, frequency and phase response, as well as impedance and noise matching.

The impedance load presented to the microphone can be varied so that tonal and dynamic characteristics of the audio can be adjusted to taste. Different impedances are selected using a front panel switch. The impedance seen looking into the balanced microphone input is switched between 600, 1.5k and 2.5k Ohms.

Amplification is provided by a two-stage all-discrete JFET input / Class-A Output circuit. Rather than use a 20dB input pad, a combined variable-attenuator / gain stepped switch control by Goldpoint provides the ability, unique among most pre-amp designs, of optimizing signal to noise, dynamic range and transient response for any audio signal level and any pre-amp setting.

A high impedance JFET buffered instrument input provides full Direct Box capability. Maximum flexibility is realized for working with DI signals, as the pre-amplifier has a DI loop-through so that the signal may be routed to amplifier/speaker cabinets or processing equipment while simultaneously tracking or monitoring the DI signal.

An electrically balanced, buffered output stage provides isolation of the amplifier stage from output cable effects. The pre-amp is configured with a Jensen output transformer. A fully floating, ¼" output is provided for routing unbalanced signals from the output. This output provides an ideal tool for re-amplifying previously recorded tracks. For additional information, refer to Application Note "App Note AN6851_A Re-Amping". This Application Note provides detailed information about how to re-amplify a recorded track for additional recording options.

Extremely tight gain matching between channels, along with the transformer usage and discrete circuit design, also makes the MPA685 an excellent choice for stereo make-up gain applications.

High voltage rails enable excellent headroom and provide high output level. A regulated +48V power supply provides reliable power for phantom power mics. Overload indicator LED accurately detects distortion to ultrasonic frequencies.

Top quality electronic components include long life Panasonic HE Series and Nichicon Fine Gold Electrolytic Capacitors, polypropylene and metalized polyester non-electrolytic capacitors, low noise 1% Vishay/Dale RN55/RN60 Resistors, gold-plated stepped switch by Goldpoint for recalling exact pre-amp settings, and continuously variable output level control using long life State Electronics noiseless level control pots with high rotational life expectancy.

MPA685 part number is defined by the options installed, as described below:

Part number 110685-ABCD

"A" refers to the input impedance range option
- A = 1 is used for 60, 200, 600 Ohms
- A = 2 is used for 600, 1.5k and 2.5k Ohms

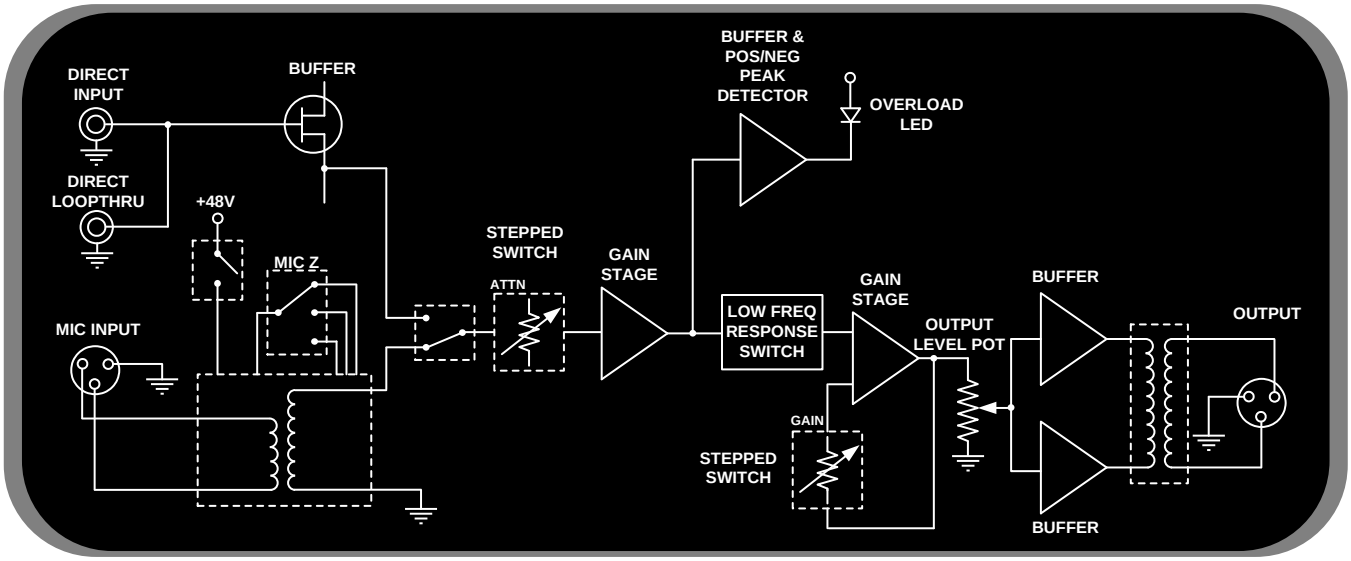
"B" refers to the output transformer option
- B = 0 is used for the standard transformer
- B = 1 is used for customer transformer 1
- B = 2 is used for customer transformer 2

"C" refers to the power supply installed
- C = 0 or no character is used for fixed 115V
- C = 1 is used for 115V/230V selectable power supply

"D" refers to special options
- D = E is used for any special options as defined in this manual

BLOCK DIAGRAM

A block diagram of the MPA685 is shown below.



Some units are also equipped with ¼" balanced phone jacks connected to the input XLR connector.

SAFETY INSTRUCTIONS

1. **Read Instructions**
   All the safety and operation instructions should be read before this product is operated.

2. **Retain Instructions**
   The safety and operating instructions should be kept for future reference.

3. **Heed Warnings**
   All warnings on the product and in these operating instructions should be followed.

4. **Follow Instructions**
   All operating and other instructions should be followed.

5. **Water and Moisture**
   This product should not be used near water or in environments with very high humidity or with condensation.

6. **Heat**
   This product should be situated away from heat sources such as radiators or other devices that product heat.

7. **Power Sources**
   This product should be connected to a power supply only of the type described in these operation instructions or as marked on this product.

8. **Power Cord Protection**
   Power supply cords should be routed so that they are not likely to be walked upon or pinched by items laced upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit this product.

9. **Object and Liquid Entry**
   Care should be taken so that objects do not fall into and liquids are not spilled into the inside of this product.

10. **Damage Requiring Service**
    This product should be serviced only by qualified service personnel when:
    a. The power supply cord or the plug has been damaged; or
    b. Objects have fallen, or liquid has spilled into the product; or
    c. The product has been exposed to rain; or
    d. The product does not appear to operate normally or exhibits a marked change in performance; or
    e. The product has been dropped, or its chassis damaged.

11. **Servicing**
    The user should not attempt to service this product beyond those means described in this operating manual. All other servicing should be referred to the Ingram Engineering Service Department.

12. **Electric Shock**
    To prevent electric shock, do not use this polarized plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.

13. **Grounding or Polarization**
    Precautions should be taken so that the grounding or polarization means of this product is not defeated.

14. **Compatible Microphone Cables**
    To prevent hazard or damage, ensure that only microphone cables and microphones designed to IEC 268-15A are connected.

    Warning – To reduce the risk of fire or electric shock, do not expose this appliance to rain or moisture.

INSTRUCTIONS FOR USE

1. AC Power

AC power is applied through an IEC 320-C16 (Male Pins) connector with earth ground. An AC fuse is contained in the connector. The fuse holder can be removed when AC power is unplugged from the unit. Use a flat blade screwdriver to remove the fuse holder from the unit. **Use only a 500mA slow blow fuse.**

2. Turning Power On and Off

The power supply is designed to ramp the DC voltage slowly when the power switch is turned on and off, and power-on/off transients are minimal. However, for good practice, reduce the studio volume before turning power on or off.

After power up, please allow approximately 5 minutes time for component warm up and stabilization time for the electronics before beginning critical listening or recording.

3. Audio Connections

Audio microphone input and output connections are made with standard ITT Cannon XLR 3-31 and 3-32 types. XLR audio input and output connections are balanced, with pin 2 positive, Pin 3 negative and Pin 1 ground. A ground lift toggle switch is included on the back panel to isolate XLR connector Pin 1 from chassis ground should hum be encountered. Note that both input and output Pin 1 is permanently connected to audio ground for maximum stability with highest gain settings. Should output connector Pin 1 need to be fully disconnected from the pre-amplifier, this is best accomplished by disconnecting Pin 1 in the XLR cable connected to the pre-amplifier output.

Your unit is configured with an extra ¼" phone jack on the back panel, labeled "Opt". It is hardwired to the XLR input connector. The ¼" jack is wired for Tip = Hot, Ring = Cold and Sleeve = Ground.

This extra input can be used as a microphone signal loop-through for mic splitting applications. Simply use a TRS ¼" balanced cable to connect Channel 1 "Opt" jack to Channel 2 "Opt" jack, and the mic signal is effectively split to Channels 1 & 2 simultaneously.

A ¼" phone jack for each pre-amplifier audio channel output is also provided on the rear panel. The ¼" jack is wired for Tip = Hot, Ring = Cold and Sleeve = Ground.

Direct Inject (DI) instrument input is made with a standard ¼" phone jack on the front panel. The ¼" jack is wired for Tip = Hot, Ring = Cold and Sleeve = Ground.

A second ¼" TRS phone jack is provided on the front panel. This second jack can be used as a DI loop-through. This allows the instrument signal to be simultaneously tracked through the DI and also amplified. The two jacks are hardwired together, so either jack may be used as the input or loop-through.

The DI inputs are loaded with a FET buffer that has an input impedance of 1 MegΩ.

Note: the impedance of a circuit connected to the direct instrument loop-through will be in parallel with the FET buffer 1 MegΩ impedance. The load impedance of the device connected to the loop-through may therefore dominate the instrument load if the loop-through load is less than 1 MegΩ. If excessive signal loading is experienced when using the loop-through connection, remove the loop-through connection and check the specifications of the device that was connected to the loop-through.

4. Using the Audio Input / Microphone Impedance Selector

Use the leftmost knob on the selected channel to choose either front panel Direct Input (DI) or rear panel microphone input.

Impedance presented at the rear panel microphone connection can be chosen as "Low", "Medium" or "High". Audio tones are affected by the load presented to the microphone, so the microphone impedance selector may be used as a tool to tweak the audio quality so that it matches the recording situation. Some microphone manufacturers have explicit requirements for the load presented to the microphone, so the MPA685 impedance selector can also be used to guarantee that the microphone manufacturer's requirements are met.

The specific impedances installed are described in the Specifications section and at the beginning of this manual.

5. Adjusting the Audio Input Level Settings

After audio connections are made and the audio source is supplying signal, adjust the "Input" knob until the Overload LED lights infrequently, then, decrease the Input knob by one step. This maximizes the dynamic range of the audio. For maximum linearity, the Overload LED should never light. However, because the pre-amp distortion curve versus input level increases gradually, infrequently lighting the Overload LED with audio peaks still realizes good quality. As always, your ears are the best guide for how high the input signal can be set.

The Input section stepped switch functions as a combined attenuator / gain control. When the switch is adjusted between "-11" and "-1" on the front panel, the switch is attenuator mode, and the pre-amp gain stage operates with fixed gain. When the switch is adjusted between "0" and "12" on the front panel, the switch is in gain mode, the attenuator is removed from the circuit and the pre-amp gain is varied. The following graph shows the relative changes in total pre-amp gain versus each stepped switch setting. Relative gain is shown, rather than absolute gain since absolute gain depends on whether the pre-amp is operated in DI mode or in microphone mode, and which microphone impedance load is selected.

Sixty five dB adjustment range is provided, while allowing dynamic range to be maximized with one simple procedure for any signal level.

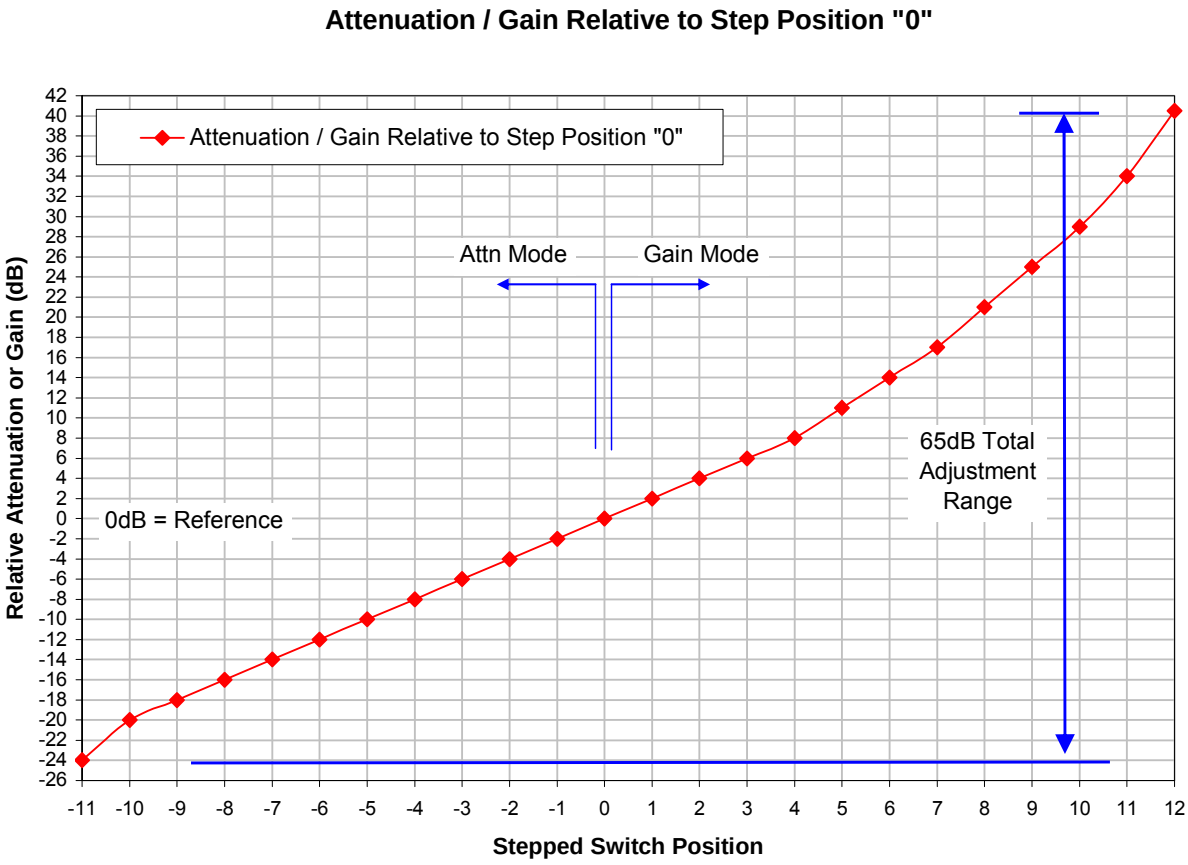


Figure 1: Attenuation or Gain vs. Stepped Switch Position

6. Overload LED

The Overload LED is designed to illuminate at ~1% THD. The Overload detection circuitry accurately tracks the 1% THD threshold to frequencies higher than 30kHz.

If the input stepped switch is adjusted one step below the setting that occasionally lights the Overload LED, minimum 2dB of headroom before ~1% distortion occurs, and dynamic range is maximized. If higher headroom is desired, the input stepped switch may be adjusted lower.

The Overload circuit senses the audio before the High Pass Filter, so the High Pass Filter setting has no effect on the distortion indication.

7. +48V Switch

+48V phantom power can be applied to microphones requiring it by turning the +48V switch to the up position. The +48V LED will light when the phantom power is On. When on, +48V regulated voltage is applied to both positive and negative balanced microphone input connections.

When turned on, +48V phantom power is supplied to the XLR as well as the ¼" audio input jacks.

8. Phase Invert

With the Phase Invert switch in the down position, the audio signal is non-inverted at the pre-amplifier output. With the Phase Invert switch in the up position, phase of the audio at the pre-amplifier output is 180° relative to the input.

9. Low Frequency Response Switch

The Low Frequency Response filter applies a 6dB / octave cut to low frequencies when activated. To activate the filter, rotate the Low Frequency Response knob clockwise to the center or right most position.

10. Adjusting the Output Level

Use the "Output" knob to adjust the audio level so that it is compatible with the level specifications of the tape machine, processing gear or A/D connected to the pre-amp output.

The output buffer of the pre-amp can handle any signal level the input sections can produce, so the increasing the Output knob to its maximum level will not degrade the audio quality. This is true for any Input section settings, and is true for the DI or microphone inputs.

AUDIO SPECIFICATIONS

(T_A=+25°C unless otherwise noted)

Parameter	Min	Typ	Max	Unit	Comments
Microphone Input Impedance, Option 2					
Low Setting		600		Ω	
Medium Setting		1.5k		Ω	
High Setting		2.5k		Ω	
Instrument DI Input Impedance		1		MΩ	Direct input and loopthrough
Nominal Gain, Input Impedance Option 2		29		dB	Mic Input, Low Setting
Input Switch Set to Position 0		34		dB	Mic Input, Medium Setting
		35		dB	Mic Input, High Setting
		28		dB	Direct Input
Max Gain, Input Impedance Option 2		70		dB	Mic Input, Low Setting
Input Switch Set to Position +12		75		dB	Mic Input, Medium Setting
		76		dB	Mic Input, High Setting
		69		dB	Direct Input
Stepped Switch Gain Change vs. Switch Position		4		dB / Step	Switch Positions –11 to -10
		2		dB / Step	Switch Positions -10 to +4
		3		dB / Step	Switch Positions +4 to +7
		4		dB / Step	Switch Positions +7 to +10
		5		dB / Step	Switch Positions +10 to +11
		6.5		dB / Step	Switch Positions +11 to +12
Stepped Switch Amplitude Error Between Steps		0.2		dB	Switch Positions –11 to +12
Gain Matching Between Left and Right Channels		0.3		dB	
Frequency Response	<10		>90k	Hz	Mic Input, Low Setting
±3.0 dB, Gain Setting = 0	<10		>50k	Hz	Mic Input, Med Setting
Option 2	<10		>50k	Hz	Mic Input, High Setting
150 Ω Mic Source Impedance	<10		>500k	Hz	Direct Input
High Pass Filter		70		Hz	
-3.0 dB High Pass Frequency		140		Hz	
Total Harmonic Distortion + Noise		0.005		%	+4 dBu
<10 Hz to 22 kHz BW, No Weighting			0.1	%	+29 dBu
100 kΩ Load			1.0	%	>+30 dBu

Noise, <10 to 22 kHz BW, No Weighting Option 2		-123		dBu	Input Referred
Overload Circuit LED Threshold		1.0		%	LED illuminates at 1.0% THD
Overload Circuit Bandwidth	30k			Hz	

AC SPECIFICATIONS

(T_A=+25°C unless otherwise noted)

Parameter	Min	Typ	Max	Unit	Comments
AC Voltage		115 / 230		V	Selectable on rear panel
AC Frequency		50 / 60		Hz	
Fuse	500 mA / 250 V				Slow Blow, Size 0.25" x 1.25" 3AG or 5x20mm GDC/213, depends on AC inlet installed
Power "On" Bulb	Type 756, 14 Volt 0.08 Amp T3-1/4, Miniature Bayonet (BA9S)				15000 Hour Life

ENVIRONMENTAL SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Comments
Operating Temperature	0		85	°C	
Humidity	40		80	%	Non-condensing

CARE AND MAINTENANCE

1. AC Fuse

Use only a **500mA, Slow Blow** fuse for replacement. The fuse is located in the AC inlet housing. A small flat blade screwdriver may be used to eject the fuse holder from the housing. The fuse type is specified in the Specifications section.

2. Power "On" Bulb

Use only Chicago Miniature Type 756 bulb. Other bulbs have the correct voltage rating, but this bulb has a long 15000-hour life span.

3. Cleaning

Avoid solvents or chemicals that may dissolve the silkscreen text on the front and back panels.

TROUBLESHOOTING

1. Power does not turn on

Verify that the rear panel master AC switch, if present on your option, is turned on. Check the AC fuse. The fuse holder can be removed when AC power is unplugged from the unit. Use a flat blade screwdriver to remove the fuse holder from the unit. Use only a 500mA slow blow fuse.

It is possible that the power is still on but the Power-on bulb is burned out. See the next section on replacing the Power-on bulb.

2. Power-on Bulb Does Not Light

Verify that the pre-amp power is actually on and audio is being amplified and applied to the output. If this is the case, the bulb may be burned out. Unscrew the lens cap from the light assembly and remove the bulb by pushing the bulb in and turning to the left. Replace the bulb with the type listed in the Specifications section.

3. Microphone Input Audio Sounds Distorted

Decrease the step switch position by one increment. If the audio is still distorted, decrease the step position one more increment. If the audio is still distorted, change the input impedance (if using the balanced microphone input).

4. Direct Instrument Input Audio is Distorted

Remove the loop-through connection, if a loop-through is connected. Retest the audio quality with only the instrument connected to the pre-amp and the DI loop-through left open circuit.

Decrease the step switch position by one increment. If the audio is still distorted, decrease the step position one more increment.

If the audio quality is still degraded, check the integrity of the audio cable connecting the instrument to the pre-amp.

If a multimeter is accessible, it can be used to check for AC or DC voltage on the DI cable shield coming from the instrument.

Note that the impedance of a circuit connected to the direct instrument loop-through will be in parallel with the pre-amplifier Direct input 1 MegΩ impedance. The load impedance of the device connected to the loop-through may therefore dominate the instrument load if the loop-through load is less than 1 MegΩ. This is why the suggestion is made to remove the loop-through connection and check the specifications of the device that was connected to the loop-through if signal degradation is experienced when using the loop-through connection.

5. Hum or Buzz is Audible

A ground lift toggle switch is included on the rear panel to isolate input and/or output XLR Pin 1 from chassis. If hum or buzz is audible, try changing the switch position. Note that Pin 1 is permanently connected to audio ground for maximum stability with highest gain settings, so the toggle switch only floats audio ground from chassis ground. In the event that the ground lift toggle switch does not eliminate hum, Pin 1 of the cable connected to the pre-amplifier **output** may be disconnected at the connection to the pre-amplifier.

If hum or buzz encountered when using the DI and/or loop-through is not solved by toggling rear panel ground lift switches, ground system currents may be flowing through the instrument to pre-amplifier chassis or instrument power amplifier, if used. If possible, pre-amplifier, instrument and power amplifier AC power should be provided from the same electrical service. In the cases where a power amplifier is used, this can be done by placing the power amplifier head in the vicinity of the pre-amplifier and then running the amplified speaker signal to the speaker cabinet in an isolation booth. If the power amplifier must be placed a distance from the control room and pre-amplifier, an alternative is to use an external isolation transformer on the DI signal, installed between the interface of the pre-amplifier to the cable that connects the pre-amplifier to the power amplifier.

CONTACT INFORMATION

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WARRANTY INFORMATION

Ingram Engineering warrants all materials, workmanship and proper operation of this product for a period of three years from the original date of purchase. If any defects are found in the materials or workmanship or if the product fails to function properly during the applicable warranty period, Ingram Engineering, at its option, will repair or replace the product. This warranty applies only to equipment sold and delivered by Ingram Engineering or its authorized dealers. Original purchase receipts showing date and location of purchase must be presented at the time of submission for warranty work.

Failure to register the product will not void the three year warranty.

Service and repairs of Ingram Engineering products are to be performed only at the factory OR at an authorized Ingram Engineering Service Center. Unauthorized service, repairs, or modification will void this warranty. To obtain repairs under warranty, you must have a copy of your sales receipt from the store where you bought the product. It is necessary to establish purchase date and thus determine whether or not your Ingram Engineering product is still under warranty.

To obtain factory service:

1. Call Ingram Engineering at 678-685-9838 9 AM to 5 PM Monday through Friday (East Coast Time) to get a Return Authorization (RA). Products returned without an RA number will be refused.
2. Pack the product in its original shipping carton. If you do not have the carton, just ask for one when you get your RA number, and we'll send a shipping carton to you. Please seal the product in a plastic bag.
3. Also include a note explaining exactly how to duplicate the problem, a copy of the sales receipt showing price and date, and your return street address (no P.O. boxes or route numbers, please). If we cannot duplicate the problem or establish the starting date of your Limited Warranty, we may, at our option, charge for service time.
4. Ship the product in its original shipping carton, **freight prepaid** to:

   Ingram Engineering Service Department
   926 Bruce Circle
   Atlanta, Ga. 30316 USA

IMPORTANT: Make sure that the RA number is plainly written on the shipping carton.

To obtain service from an Authorized Ingram Engineering Service Center:

1. Call Ingram Engineering at 678-685-9838, 9 AM to 5 PM Monday through Friday (East Coast Time) to receive: 1) The name and address of your nearest Authorized Ingram

Engineering Service Center and 2) A return authorization (RA). You must have an RA number before taking your unit to a service center.

2. Make sure that you have a copy of your sales receipt from the store where you bought the product. If you can't find it, the Authorized Service Center may charge you for repairs even if your Ingram Engineering product is still covered by the Three Year Limited Warranty.
3. Make sure the problem can be duplicated. If you bring your Ingram Engineering product to an Authorized Service Center and they can't find anything wrong with it, you may be charged a service fee.
4. If the Authorized Ingram Engineering Service Center is located in another city, pack the product in its original shipping carton.
5. Contact the Authorized Ingram Engineering Service Center to arrange service or bring the Ingram Engineering product to them.

Ingram Engineering and Authorized Ingram Engineering Service Centers reserve the right to inspect any products that may be the subject of any warranty claims before repair or replacement is carried out. Ingram Engineering and Authorized Ingram Engineering Service Centers may, at their option, require proof of the original date of purchase in the form of a dated copy of the original dealer's invoice or sales receipt. Final determination of warranty coverage lies solely with Ingram Engineering or its Authorized Service Centers.

Ingram Engineering products returned to Ingram Engineering and deemed eligible for repair or replacement under the terms of this warranty will be repaired or replaced within sixty days of receipt by Ingram Engineering. Ingram Engineering may use refurbished parts for repair or replacement of any product. Products returned to Ingram Engineering that do not meet the terms of this Warranty will be repaired and returned C.O. D. with billing for labor, materials, return freight, and insurance. Products repaired under warranty at the factory will be returned freight prepaid by Ingram Engineering to any location within the boundaries of the USA.

Ingram Engineering warrants all repairs performed for 90 days or for the remainder of the warranty period. This warranty does not extend to damage resulting from improper installation, misuse, neglect or abuse, or to exterior appearance. This warranty is recognized only if the inspection seals and serial number on the unit have not been defaced or removed.

Ingram Engineering assumes no responsibility for the quality or timeliness of repairs performed by Authorized Ingram Engineering Service Centers.

This warranty is extended to the original purchaser and to anyone who may subsequently purchase this product within the applicable warranty period. A copy of the original sales receipt is required to obtain warranty repairs.

This is your sole warranty. Ingram Engineering does not authorize any third party including any dealer or sales representative, to assume any liability on behalf of Ingram Engineering or to make any warranty for Ingram Engineering.

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NOTES:

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