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# Important Safety Instructions



1. Read these instructions.
  2. Keep these instructions.
  3. Heed all warnings.
  4. Follow all instructions.
  5. Do not use this apparatus near water.
  6. Clean only with a dry cloth.
  7. Do not block any ventilation openings. Install in accordance with manufacturer's instructions.
  8. Do not install near any heat sources such as radiators, registers, stoves, or other apparatus (including amplifiers) that produce heat.
  9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
  10. Protect the power cord and plug from being walked on or pinched particularly at plugs, convenience receptacles, and the point where it exits from the apparatus.
  11. Only use attachments and accessories specified by Rane.
  12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
  13. Unplug this apparatus during lightning storms or when unused for long periods of time.
  14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
  15. The plug on the power cord is the AC mains disconnect device and must remain readily operable. To completely disconnect this apparatus from the AC mains, disconnect the power supply cord plug from the AC receptacle.
  16. This apparatus shall be connected to a mains socket outlet with a protective earthing connection.
  17. When permanently connected, an all-pole mains switch with a contact separation of at least 3 mm in each pole shall be incorporated in the electrical installation of the building.
  18. If rackmounting, provide adequate ventilation. Equipment may be located above or below this apparatus, but some equipment (like large power amplifiers) may cause an unacceptable amount of hum or may generate too much heat and degrade the performance of this apparatus.
  19. This apparatus may be installed in an industry standard equipment rack. Use screws through all mounting holes to provide the best support.
- WARNING:** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture. Apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus.

<p><b>WARNING</b></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><b>ATTENTION: RISQUE DE CHOCS ELECTRIQUE - NE PAS OUVRIR</b></p> </div> <div style="text-align: center;"> <p><b>CAUTION</b></p> <p><b>RISK OF ELECTRIC SHOCK</b></p> <p><b>DO NOT OPEN</b></p> </div> <div style="text-align: center;">  </div> </div> <p>To reduce the risk of electrical shock, do not open the unit. No user serviceable parts inside. Refer servicing to qualified service personnel.</p>	<p>The symbols shown below are internationally accepted symbols that warn of potential hazards with electrical products.</p> <div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div style="text-align: center;">  </div> <div> <p>This symbol indicates that a dangerous voltage constituting a risk of electric shock is present within this unit.</p> </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div style="text-align: center;">  </div> <div> <p>This symbol indicates that there are important operating and maintenance instructions in the literature accompanying this unit.</p> </div> </div>
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**WARNING:** This product may contain chemicals known to the State of California to cause cancer, or birth defects or other reproductive harm.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

**CAUTION:** Changes or modifications not expressly approved by Rane Corporation could void the user's authority to operate the equipment.

CAN ICES-3 (B)/NMB-3(B)

# Instructions de Sécurité



1. Lisez ces instructions.
2. Gardez précieusement ces instructions.
3. Respectez les avertissements.
4. Suivez toutes les instructions.
5. Ne pas utiliser près d'une source d'eau.
6. Ne nettoyer qu'avec un chiffon doux.
7. N'obstruer aucune évacuation d'air. Effectuez l'installation en suivant les instructions du fabricant.
8. Ne pas disposer près d'une source de chaleur, c-à-d tout appareil produisant de la chaleur sans exception.
9. Ne pas modifier le cordon d'alimentation. Un cordon polarisé possède 2 lames, l'une plus large que l'autre. Un cordon avec tresse de masse possède 2 lames plus une 3<sup>e</sup> pour la terre. La lame large ou la tresse de masse assurent votre sécurité. Si le cordon fourni ne correspond pas à votre prise, contactez votre électricien.
10. Faites en sorte que le cordon ne soit pas piétiné, ni au niveau du fil, ni au niveau de ses broches, ni au niveau des connecteurs de vos appareils.
11. N'utilisez que des accessoires recommandés par Rane.
12. N'utilisez que les éléments de transport, stands, pieds ou tables spécifiés par le fabricant ou vendu avec l'appareil. Quand vous utilisez une valise de transport, prenez soin de vous déplacer avec cet équipement avec prudence afin d'éviter tout risque de blessure.
13. Débranchez cet appareil pendant un orage ou si vous ne l'utilisez pas pendant un certain temps.
14. Adressez-vous à du personnel qualifié pour tout service après vente. Celui-ci est nécessaire dans n'importe quel cas où l'appareil est abîmé : si le cordon ou les fiches sont endommagés, si du liquide a été renversé ou si des objets sont tombés sur l'appareil, si celui-ci a été exposé à la pluie ou l'humidité, s'il ne fonctionne pas correctement ou est tombé.
15. La fiche du cordon d'alimentation sert à brancher le courant alternatif AC et doit absolument rester accessible. Pour déconnecter totalement l'appareil du secteur, débranchez le câble d'alimentation de la prise secteur.
16. Cet appareil doit être branché à une prise terre avec protection.
17. Quand il est branché de manière permanente, un disjoncteur tripolaire normalisé doit être incorporé dans l'installation électrique de l'immeuble.
18. En cas de montage en rack, laissez un espace suffisant pour la ventilation. Vous pouvez disposer d'autres appareils au-dessus ou en-dessous de celui-ci, mais certains (tels que de gros amplificateurs) peuvent provoquer un buzz ou générer trop de chaleur au risque d'endommager votre appareil et dégrader ses performances.
19. Cet appareil peut-être installé dans une baie standard ou un châssis normalisé pour un montage en rack. Visser chaque trou de chaque oreille de rack pour une meilleure fixation et sécurité.

**ATTENTION:** afin d'éviter tout risque de feu ou de choc électrique, gardez cet appareil éloigné de toute source d'humidité et d'éclaboussures quelles qu'elles soient. L'appareil doit également être éloigné de tout objet possédant du liquide (boisson en bouteilles, vases,...).

## ATTENTION



Afin d'éviter tout risque de choc électrique, ne pas ouvrir l'appareil. Aucune pièce ne peut être changée par l'utilisateur. Contactez un SAV qualifié pour toute intervention.

Les symboles ci-dessous sont reconnus internationalement comme prévenant tout risque électrique.



Ce symbole indique que cette unité utilise un voltage élevé constituant un risque de choc électrique.



Ce symbole indique la présence d'instructions d'utilisation et de maintenance importantes dans le document fourni.

**REMARQUE:** Cet équipement a été testé et approuvé conforme aux limites pour un appareil numérique de classe B, conformément au chapitre 15 des règles de la FCC. Ces limites sont établis pour fournir une protection raisonnable contre tout risque d'interférences et peuvent provoquer une énergie de radiofréquence s'il n'est pas installé et utilisé conformément aux instructions, peut également provoquer des interférences aux niveaux des équipements de communication. Cependant, il n'existe aucune garantie que de telles interférences ne se produiront pas dans une installation particulière. Si cet équipement provoque des interférences en réception radio ou télévision, ceci peut être détecté en mettant l'équipement sous/hors tension, l'utilisateur est encouragé à essayer de corriger cette interférence par une ou plusieurs des mesures suivantes:

- Réorienter ou déplacer l'antenne de réception.
- Augmenter la distance entre l'équipement et le récepteur.
- Connecter l'équipement à une sortie sur un circuit différent de celui sur lequel le récepteur est branché.
- Consulter un revendeur ou un technicien radio / TV expérimenté.

**ATTENTION:** Les changements ou modifications non expressément approuvés par Rane Corporation peuvent annuler l'autorité de l'utilisateur à manipuler cet équipement et rendre ainsi nulles toutes les conditions de garantie.

CAN ICES-3 (B)/NMB-3(B)



Cartons et papier à recycler.

**Quick Start**

Congratulations! You are the proud owner of an exceptional performance instrument. Experienced turntablists will find the TTM 56S comfortable and familiar. The TTM 56S has many unique features which are mastered quicker if you read the manual. Right! We know you can't resist jumping right in, but please *read at least this portion of the manual*. It will help you get a good start.

About the faders: *The program faders and crossfader are magnetic, non-contact faders.* This means **No travel noise – No bleed – Ever!** The electrical performance of the faders is unaffected by use. Old habits are hard to break, but you really don't have to mess with these faders. The magnetic faders in this mixer are very different from what you are used to. Be sure and read the *Q* and *A* section on page Manual-6.

**Special Features:**

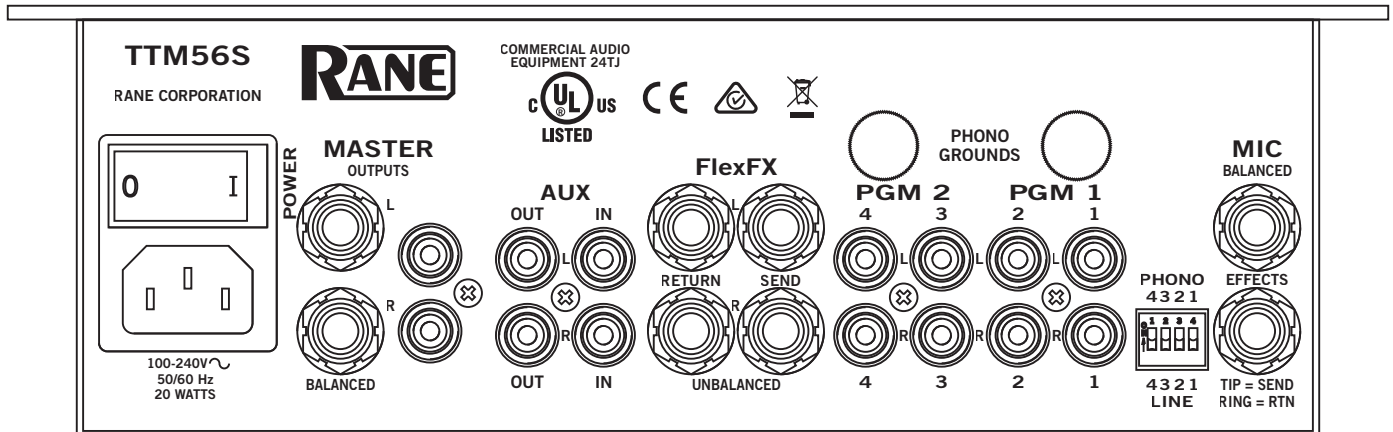
- **KILL** switches behave like transform controls, to quickly cut a signal in or out. Be sure these switches are *up* to get sound!
- Separate **CONTOUR** controls for each fader and the cross-fader allow continuous adjustment from smooth blend to fast cut.
- The **CHANNEL SWAP** switch allows the left-hand or right-hand fader to control PGM 1 or PGM 2.
- Auxiliary Inputs and Outputs, with independent level controls, give session mixing ability. **AUX** Inputs may be used for a drum machine, keyboard, etc. **AUX** Input comes in after the Crossfader and after the FlexFX loop. **AUX** Outputs may be used for recording, booth monitoring, or a second zone. **AUX** Output is the same mix as the Master.
- **FlexFX™** allow individual assignment of PGM 1, PGM 2 or both to the effects loop. The effects loop is *post-fader*. You get great results when using the program faders or crossfader with reverb or other delay effects. For instance, reverb and echo tails are still heard after the fader is off. The **WET/DRY** pan lets you control how much of the effect is in the mix.
- Three-band **Accelerated-Slope™** EQ allows full cut of each band. The **EQ** engage switches lets you A/B compare or quickly transform the EQ effect.
- Two 10-segment meters provide Dual-Mono-Cue *or* Stereo-Master operation.
- Yes, we included a power switch on the rear.



The flexibility of the TTM 56S can result in some initial confusion. The CHANNEL SWAP switch, KILL switches, REVERSE switches, Faders and Crossfader are all different ways to cut the signal. We recommend trying one thing at a time. Check that the KILL switches are ON (*up* position). Make sure the CHANNEL SWAP switch (and its yellow LED) is *off*. Start by changing the Contour of each fader, one at a time. See the diagrams on page Manual-5 to understand the fader responses under different settings, with REVERSE on and off. Once you understand the controls, start creating!

**WEAR PARTS:** This product contains no wear parts.

## Rear Panel Hook-up



### Power

The TTM 56S features an internal universal switching power supply that operates on any AC mains 100 to 240 VAC, 50 or 60 Hz (most places in the world). All that is required when traveling is the appropriate IEC line cord available in each country. The universal supply is a major plus for the traveling DJ. The **POWER** switch is just above the power connector. You know what to do with this, but leave it off until everything is connected.

### Inputs

**PGM 1** and **PGM 2** each have two inputs, each assignable PHONO or LINE. For a turntable input with RIAA compensation, push the corresponding switch up to **PHONO**. For all other sources such as CD or MP3 players, push the corresponding switch down to **LINE**.

**PHONO GROUNDS** provide independent ground connect points for turntables. It is very important that each turntable have a very good ground connection to one of these terminals. The thumbscrews will come off if they are over-rotated, so be careful not to spin them off and lose them.

**AUX IN** may be used with a drum machine, groovebox, sampler, or another mixer's output for session mix. This Input is mixed *after* the Crossfader and FlexFX loop.

**MIC INPUT** is a balanced input specifically designed for a dynamic mic (a condenser mic will not work).

### Effects Loops

**MIC EFFECTS** insert jack is unbalanced. It is wired for ¼" TRS, meaning Tip=Send, Ring=Return and the Shield or Sleeve. This is an independent Effects Loop for the Mic. There is no engage switch, so the Mic signal is always processed when you have a plug inserted and an effects box connected. If you are connecting to an effects processor with a Send/Return (sometimes called Insert) jack, a single TRS cable will work. If your effects processor has separate Send and Receive jacks, you need a "Y" cable. You can buy a Send/Return cable from your local music store, or you can make one of your own as shown below.

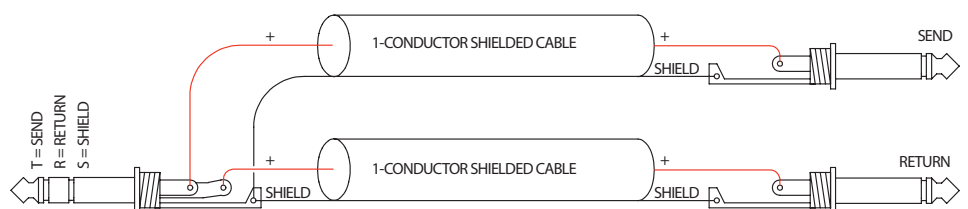
**FlexFX EFFECTS** jacks are unbalanced mono ¼" TS (Tip and Sleeve). This stereo loop is used for output to (send) and input from (return) an effects processor. The SEND jacks provide the output *to* your effects processor. The RETURN jacks provide input for the signal returning *from* your effects processor. If you have an effects device with a single ¼" TRS, tip=send, ring=return jack, you need a "Y" cable, as shown below.

### Outputs

**AUX OUT** may be used for recording, booth monitoring, a second playback zone, or connecting another mixer for session mix. **AUX OUT** is the same signal as the Master Mix with its own Level control.

**MASTER OUT** includes two sets of stereo outputs: The ¼" TRS jacks provide balanced (Tip-Ring-Sleeve) output. Use this balanced output whenever driving equipment with a balanced input, or when running distances greater than 10 feet (3 meters). *Never* use a mono ¼" Tip/Sleeve (no ring) plug in this jack. Use the RCA unbalanced outputs for shorter runs connecting to unbalanced devices. See the RaneNote "Sound System Interconnection" if you need to convert between balanced and unbalanced or run long distances.

Send/Return Cable Wiring (Insert Cable)



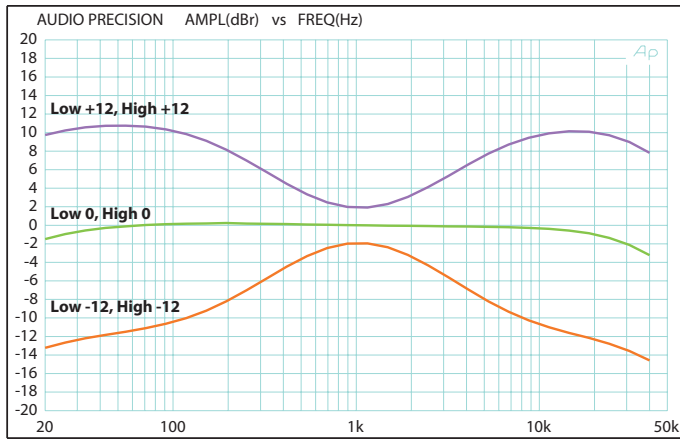
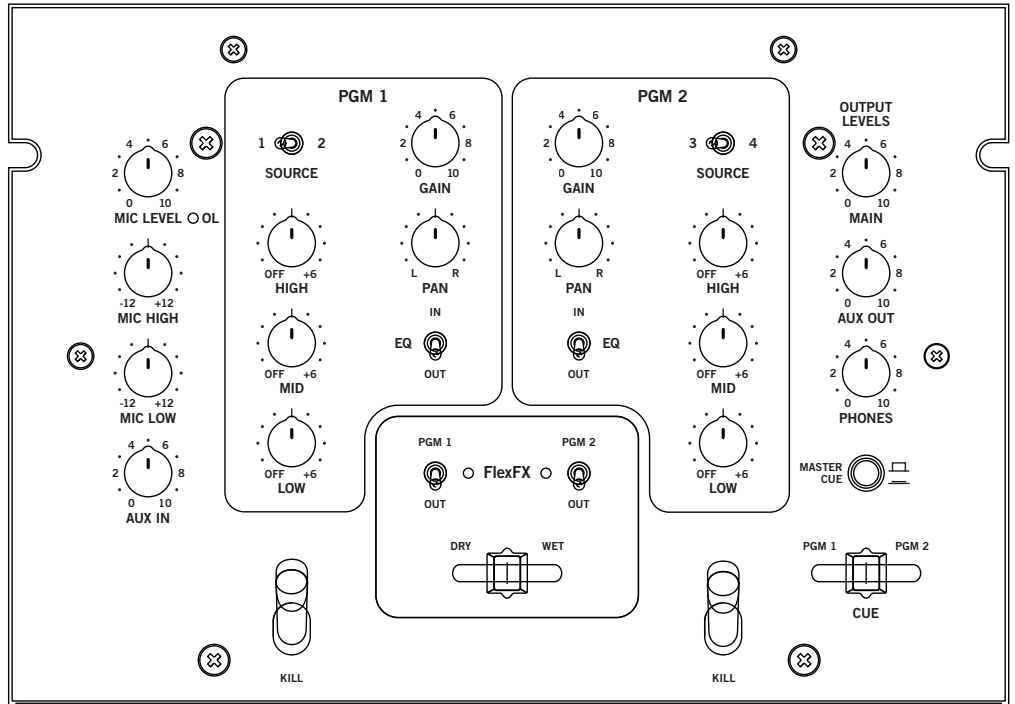
# Mixer Controls

## Mic Section

**MIC LEVEL** sets the gain of the Mic Input. The range is off to +44 dB. There is no engage switch, so set the Mic Level to zero (0) when you aren't using it. The Mic Input minimum gain is 26 dB, so a line-level mic source (such as a wireless receiver) must be padded.

The **OL** indicator lights 6 dB before clipping. Adjust the Mic Level so the OL indicator flashes only when you really shout into the mic.

**MIC HIGH** and **LOW** tone controls provide as much as 12 dB of boost or 12 dB of cut. These controls have no effect when the controls are set to their center detent (12 o'clock).



Combined response of the Mic tone controls

## Program Sections

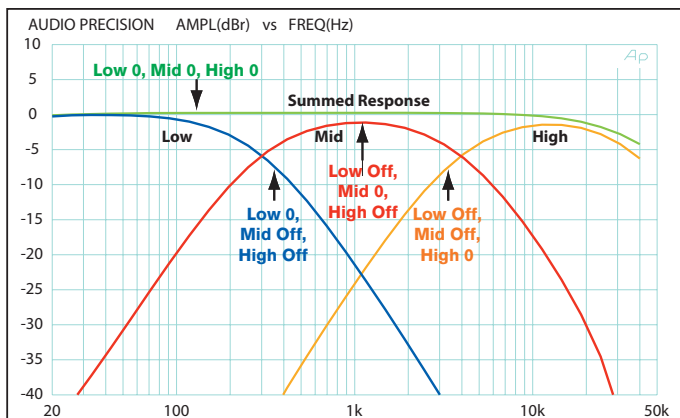
**PGM 1** inputs are sent to the left side of the crossfader. (with the Fader 1 Reverse switch *out* and LED *off*)

**PGM 2** inputs are sent to the right side of the crossfader. (with the Fader 2 Reverse switch *out* and LED *off*)

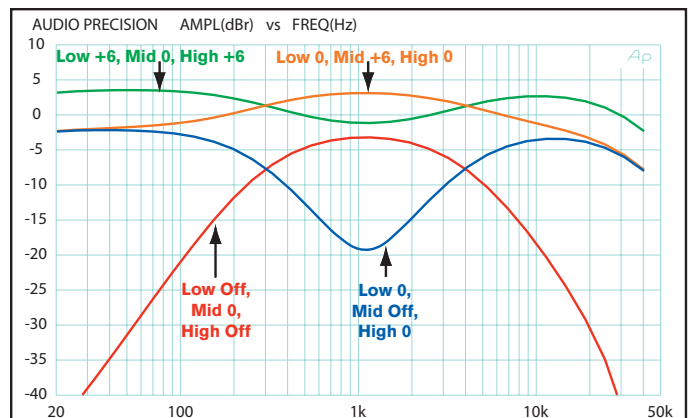
**SOURCE** switches select which inputs are assigned to each of the Programs. PGM 1 can switch between inputs 1 and 2. PGM 2 can switch between inputs 3 and 4.

**GAIN** controls adjust the signal level before it gets to the Faders. Set the Gain controls to indicate an average signal level of +4 on the meter with the program faders set to maximum. Don't use the Gain controls to set the output level...use the Main Level control to set the output level. This is a very simple thing, yet makes a huge difference in mixer performance.

**EQ** switches engage the 3-band tone controls. EQ switches may be used in conjunction with the High, Mid and Low controls as "kill" switches by turning any or all of them Off. Set the rotary controls and flip the switch.



The three tone controls and the flat summed response



The interactive operation of the three tone controls

**HIGH** tone controls affect frequencies above 4 kHz. The range of control is +6 dB to Off (full kill). The center detent position leaves this filter inactive. This filter is just above the vocal range, and can make small tonal changes, or eliminate high frequency signals.

**MID** tone controls affect frequencies from 300 Hz to 4 kHz (vocal midrange). The range of control is +6 dB to Off (full kill). The center detent position leaves this filter inactive. Use for small tonal changes or to cut midrange signals.

**LOW** tone controls affect frequencies below 300 Hz. The range is +6 dB to Off (full kill). The center detent position leaves the filter inactive. These filters influence signals below the vocal range. Use to adjust or eliminate bass beats.

**PAN** controls adjust the Left and Right balance of PGM 1 and PGM 2.

**KILL** switches provide quick program mute, much like the Transform switches on the previous TTM 56. The signal is **ON** in the *up* position, the straight out position Kills the signal.

### Aux Input

**AUX IN** adds another line-level input to the mix. This input comes in *after* the Crossfader and FlexFX Loop.

### FlexFX Loop

**FlexFX** switches send PGM 1, PGM 2 or both to the stereo effects loop. The effects loop is post-fader and post-crossfader. You get great results when using the program faders or crossfader with reverb or other delay effects. The effects loop provides separate stereo send and return jacks. The green indicator lights when FlexFX is engaged for either Program.

**WET/DRY** pan control lets you set the amount of effect in the mix. DRY equals no effect, WET gives maximum effect.

### Output Levels

**MASTER** control sets the level for both the unbalanced and balanced Master Outputs.

**AUX OUTPUT** control sets the level going to the Auxiliary Outputs.

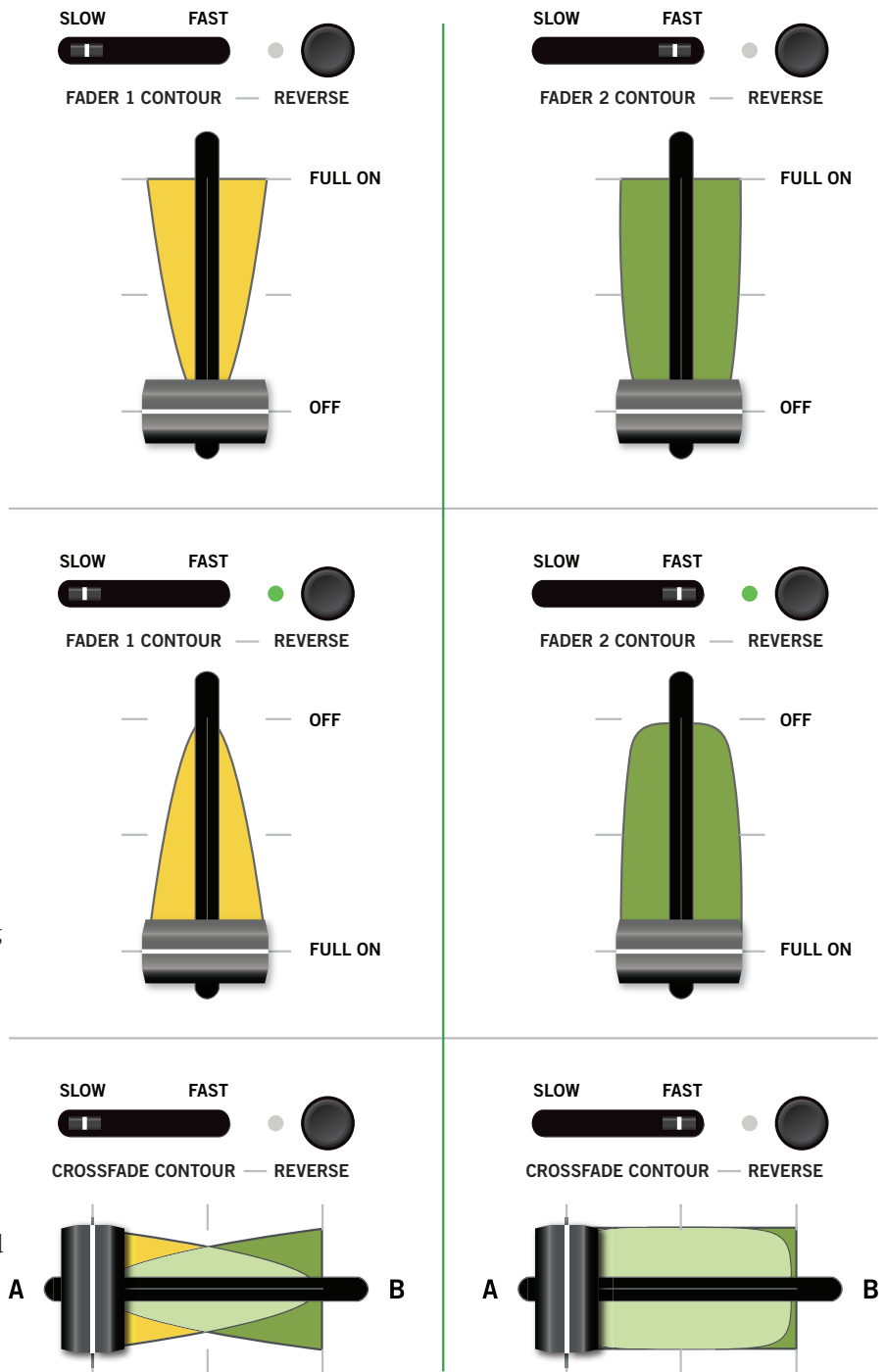
### Faders

The **program faders and crossfader** are *magnetic, non-contact* faders. This means **No travel noise or bleed!** The electrical performance of the faders is unaffected by use. The program faders and crossfader each have their own Contour and Reverse (hamster) controls. Magnetic faders are very different from what you are used to. Read "Maintaining Magnetic Faders" on page 9.

**CHANNEL SWAP** switch allows the left-hand or right-hand Fader to alternately control PGM 1 or PGM 2. (Don't confuse with the REVERSE switches, see below.)

**CONTOUR** controls allow smooth, continuous adjustment of contour. The range of control is from SLOW blend to FAST cut, adjustable independently for each fader and the crossfader. See the illustrations on the next page.

**REVERSE** switches change the direction of the faders. When a Reverse switch is engaged on a PGM fader, up is down and down is up (hamster). When the Reverse switch is engaged on the Crossfader, PGM 1 goes to the B side and PGM 2 goes to the A side.



Channel faders and Crossfader illustrating the effects of the Reverse and Contour controls.

## Meters

**Meters** provide switchable true stereo Master Mix or dual-mono PGM1 / PGM2 indication of Pre-Program fader signal levels. Ten-segment resolution is provided with a one second, peak hold. Use the meter to set the GAIN controls. With the program fader set to maximum, the input GAIN should be set to indicate an average level of about +4 dB.

## Headphone Cueing

**PHONES** Level control sets the output level of the headphone amplifier.

**MASTER / CUE** switch is used to select the headphone monitor source:

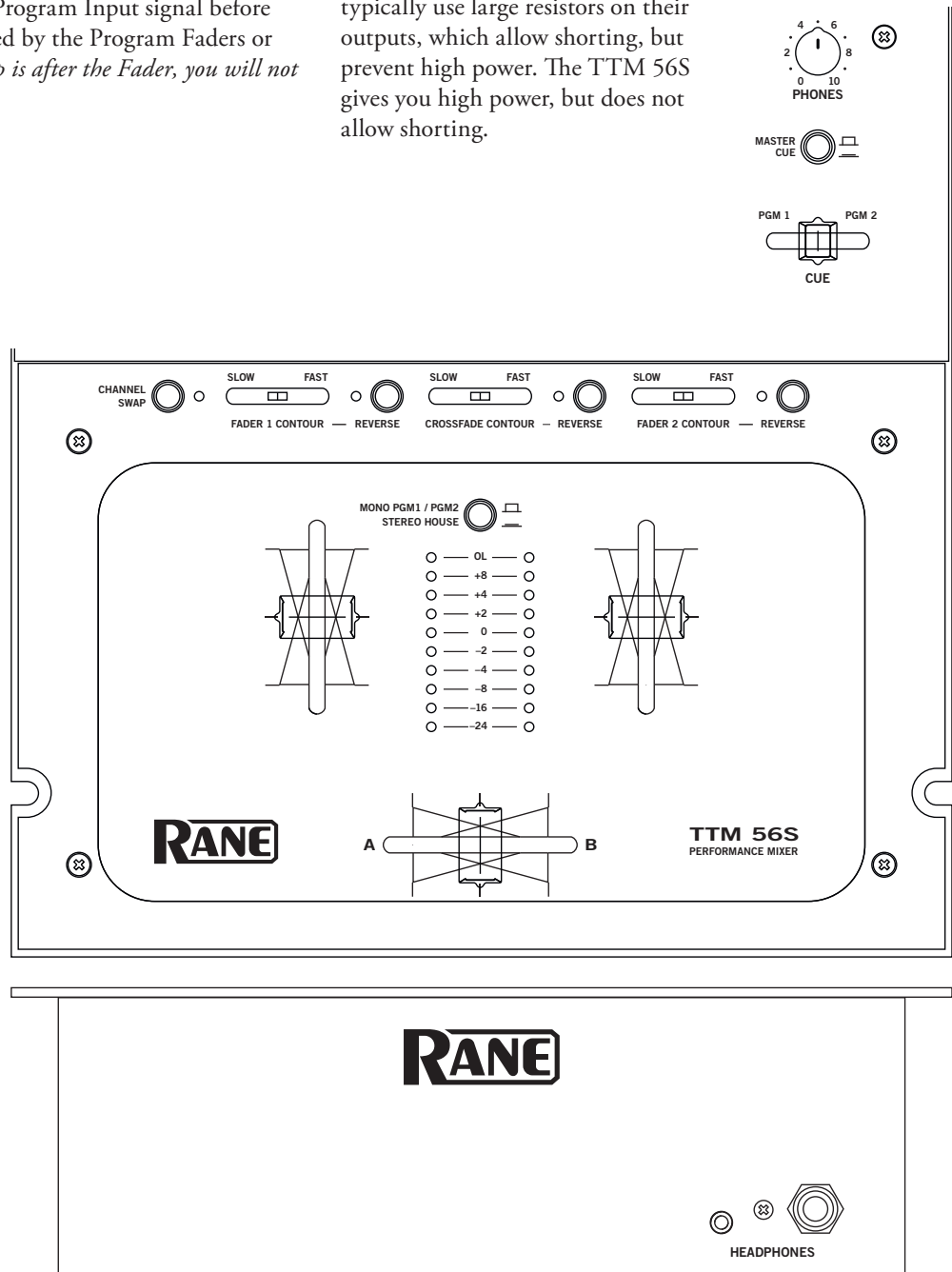
Use **MASTER** (*out*) to rehearse your performance. This signal is the same as the Master Out, but is not affected by the Master Level control.

Use **CUE** (*in*) to monitor the Program Input signal before fading in. This signal is not affected by the Program Faders or Crossfader. *Because the Effects Loop is after the Fader, you will not hear effects in the Cue.*

**CUE** slider Pans between PGM 1 and PGM 2 in the headphones when the **CUE** switch is depressed. When the switch is released, this control has no effect.

The headphone amp in the TTM 56S has a high power output (unlike most you have used before). There are notable differences...

- The headphone output of the TTM 56S delivers very high volume.
- To avoid pain, never put headphones on your head before plugging them in.
- Always start with the **PHONES Level** turned down, and then turn it up.
- Because of the high current and low output impedance, never short one side to ground, or short left and right together as is possible with mono cup headphones.
- Low power headphone stages typically use large resistors on their outputs, which allow shorting, but prevent high power. The TTM 56S gives you high power, but does not allow shorting.





## Maintaining Magnetic Faders

*There are no electrical contacts to clean!*

The faders in the TTM 56S are designed with materials highly resistant to corrosion and most chemicals. While the faders will handle millions of operations, they may become dirty over time. Bad things may be spilled or sprayed into the faders. In either case, the faders are not damaged and the sound quality is unaffected. *Cleaning is only required to maintain the feel of the faders.*

The faders are self-lubricating and with normal use, should not require additional lubrication. If you wish, you can use a light silicone lubricant rated for use with electrical parts. This will help maintain the feel. We recommend DuPont™ Teflon® Multi-Use Lubricant.

See the Teflon® Multi-Use Lubricant page at the Dupont website for a list of retailers. For online orders, we recommend [www.midwayautosupply.com](http://www.midwayautosupply.com). Make sure and follow all directions and warnings on the bottle.

**Never use a heavy lubricant or grease.** Doing so will not damage the faders, but can undo the feel. If grease was used, it may be removed by following the cleaning instructions. Light lubrication is possible with the Lexan plate on. A couple of drops or a short spray are all that is required. Make sure the products you use are suitable for use with electrical parts that contain plastic.

## Magnetic Fader Q and A

**Q: Will I damage the faders if I spray them with bad stuff or spill bad things in them?**

**A: No.** The faders in the TTM 56S are designed with materials highly resistant to corrosion and most chemicals. *There are no electrical contacts to clean or damage.* While bad things may change the feel of the faders, bad things will not affect the sound. To clean faders that have had a bad thing put in them, follow the simple instructions on page Manual-8.

**Q: Can I install magnetic faders in any other mixer?**

**A: Sorry.** The connectors may be similar, but the circuits are very different. Connecting the faders to anything other than the intended cable in the TTM 56S could permanently damage them.

**Q: Can I install other faders in my TTM 56S?**

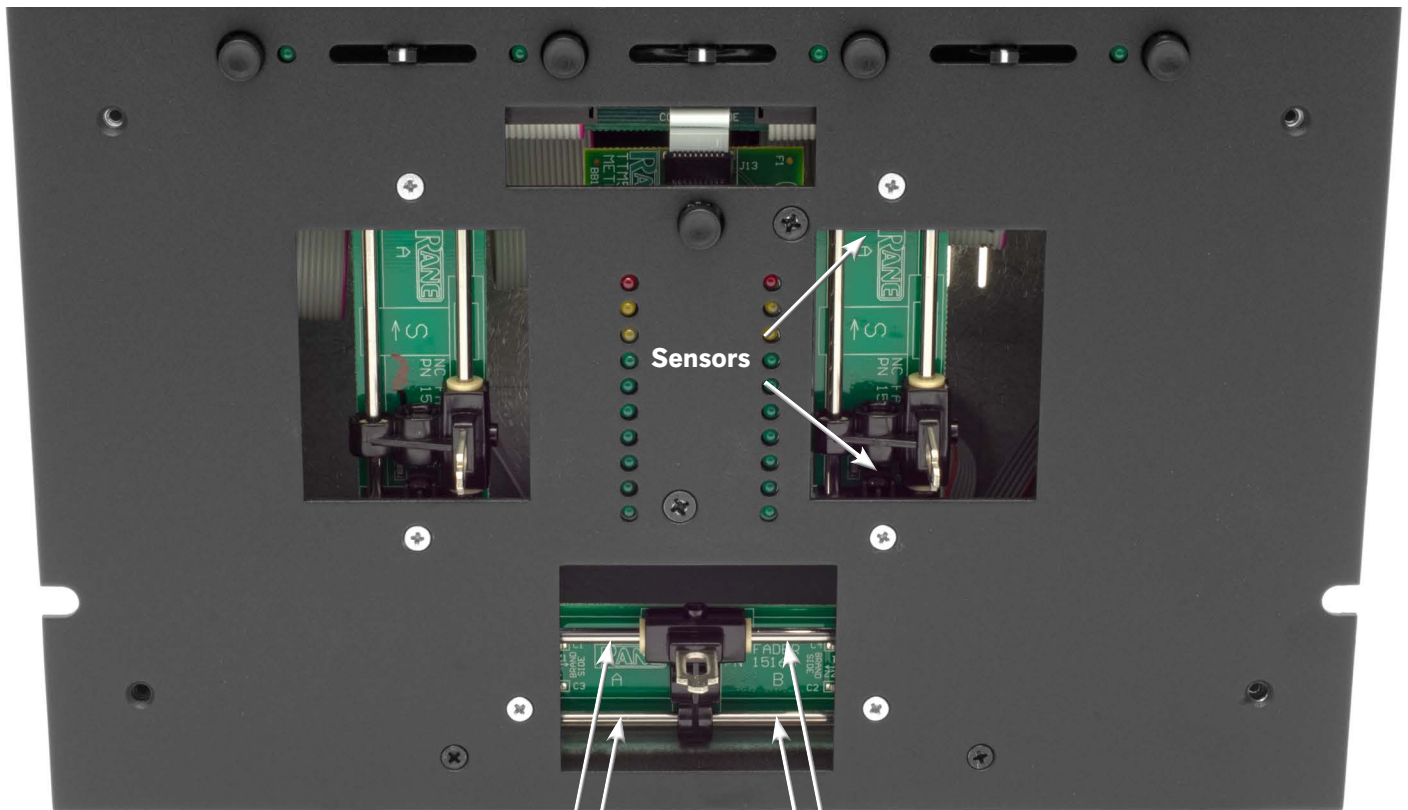
**A: No.** The cable connections are specially designed for Rane magnetic faders.

**Q: Can I install a different magnetic fader in my mixer or swap the position of my faders?**

**A: No.** In order to achieve the highest possible accuracy, each magnetic fader is factory calibrated for the location in which it was shipped. For information about replacement or calibration, contact Rane Customer Service. If you remove the faders for cleaning, make sure you mark them. This helps you to put them back in the same location.

**Q: Is the same fader used in the TTM 56 as the TTM 56S?**

**A: Yes.** We finally get to say yes.



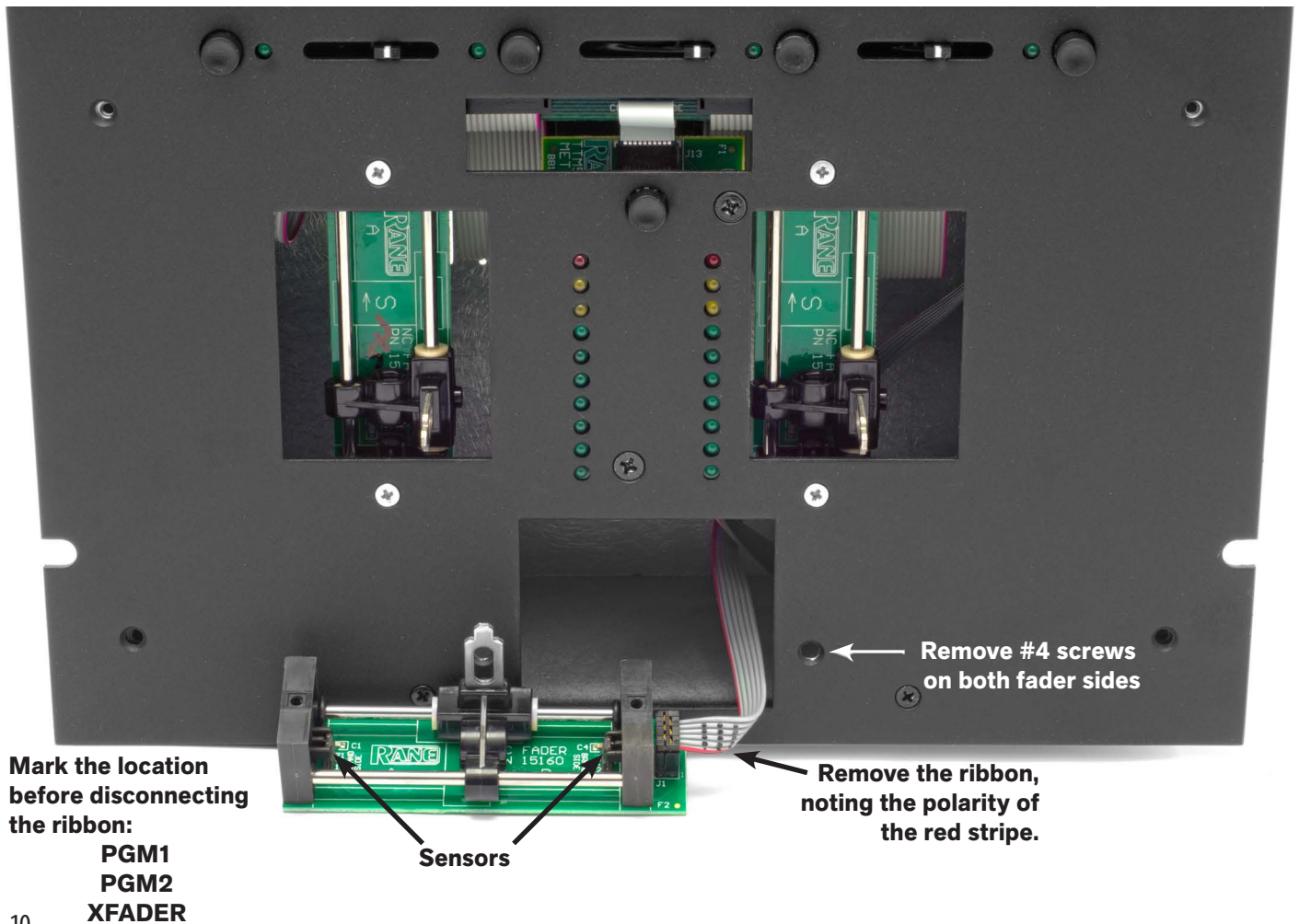
### Magnetic Slider Rail Cleaning

- Move the carrier all the way to one side.
- Use a soft lint-free cloth to wipe off rails.
- Add a drop of silicone lubricant (or quick spray from aerosol) to the center of each rail.
- Move the carrier back and forth to distribute lubricant.
- Do not bend torsion spring or touch sensors.

## Fader Removal

For more effective cleaning and lubrication, follow the directions outlined below:

1. Required tools: #1 Philips screwdriver and a pair of clean hands.
2. Disconnect the power.
3. Remove the fader caps by pulling them away from the Lexan faceplate.
4. Remove the four 4-40 screws attaching the Lexan faceplate.
5. Remove the Lexan faceplate. The fader rails are now accessible for normal cleaning and lubrication.
6. If more thorough cleaning is required, or the fader needs replacing, remove the fader by removing the two #4 screws securing it.
7. **NOTE:** Do not disturb the position of the small sensors at each end of the Fader. If you do, make sure the parts are standing straight before reinstalling.
8. **NOTE:** To achieve the highest possible accuracy, *each magnetic fader is factory calibrated* for the location in which it was shipped. If you remove all the faders for cleaning, *make sure you mark them*. This helps you to put them back in the correct location.
9. Disconnect the ribbon cable, noting the orientation of the red stripe.
10. Sugary liquids spilled into a fader may be removed by thoroughly rinsing the part in hot water. Removal of grease or other stubborn debris may require alcohol or contact cleaner.
11. Make sure the part is clean and dry before lubricating or reinstalling.
12. To reassemble, reverse the disassembly procedure.
13. Problems? Contact Rane Corporation customer service at 425-355-6000.

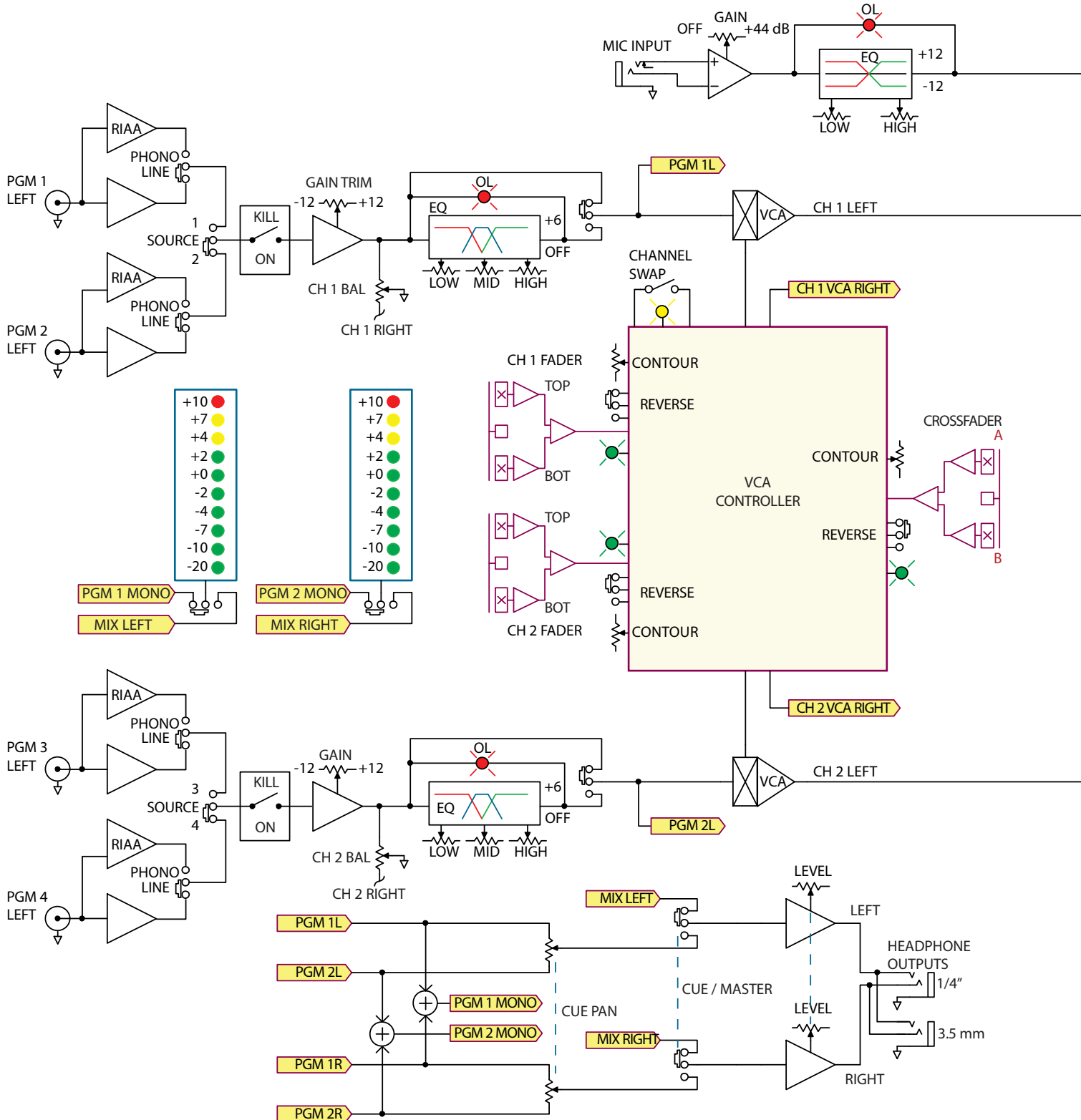


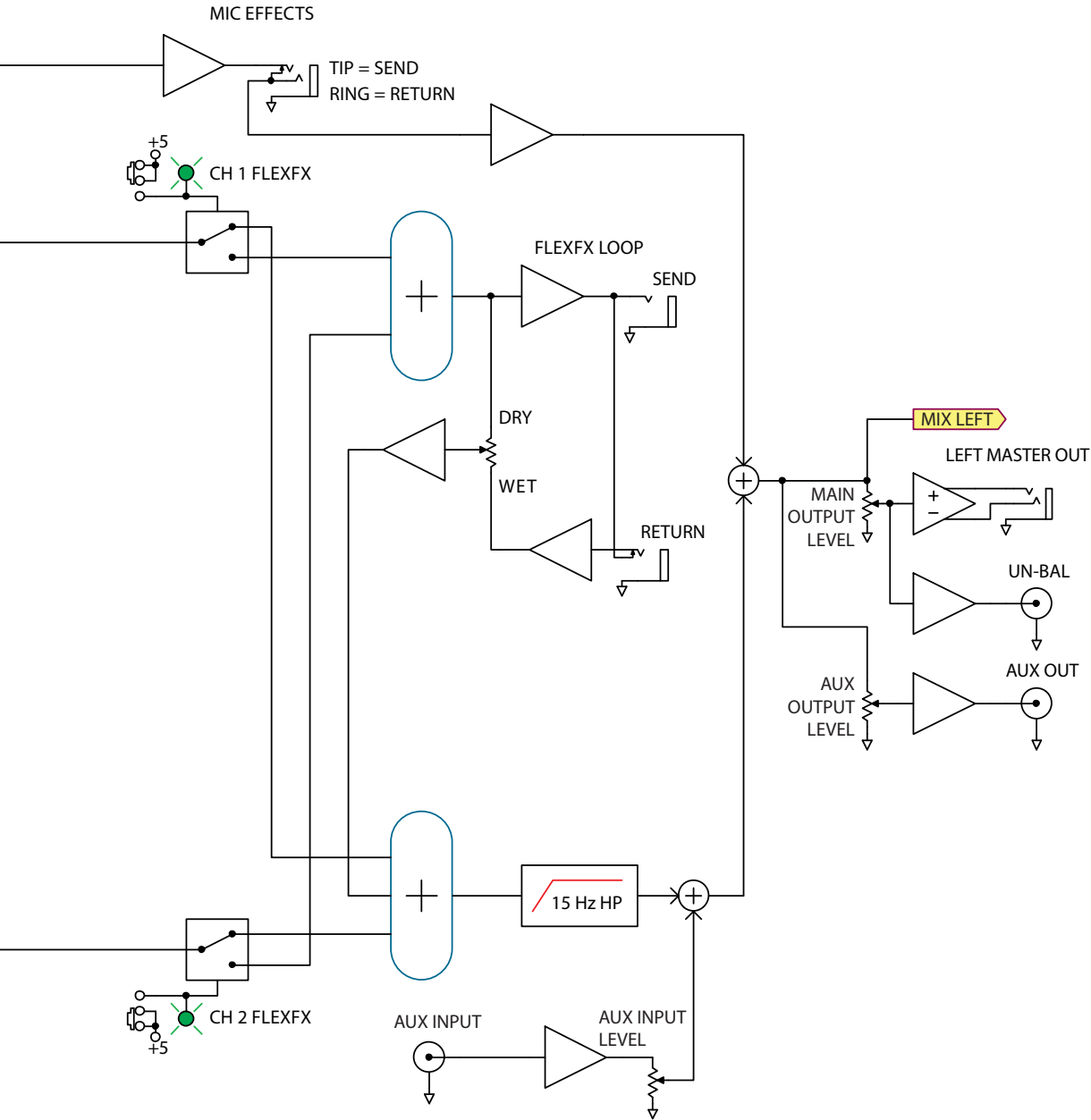
# Specifications

Parameter	Specification	Conditions & Comments
Program Inputs: Phono:	Switchable Line / Phono	Unbalanced RCA jacks
.....Response	RIAA	±1 dB
.....Gain	40 dB	1 kHz
.....Input Impedance	47.5 kΩ, 200 pF	
.....Line:	Switchable Line / Phono	Unbalanced RCA jacks
.....Gain	Off to +12 dB	1 kHz
.....Input Impedance	20 kΩ	1 kHz
.....Tone Control (EQ)	3-Band, Accelerated-Slope™	Full Cut, see figures on next page
Auxiliary Input:	1 stereo	Unbalanced RCA jacks
.....Input Impedance	20 kΩ	1 kHz
.....Gain	Off to +10 dB	1 kHz
FlexFX Return:	Stereo	Unbalanced ¼" TS (tip-sleeve) phone jack
.....Input Impedance	12 kΩ	Minimum
.....Gain	Unity	1 kHz
Mic Input:	Active Balanced	Balanced ¼" TRS (tip-ring-sleeve) phone jack
.....Input Impedance	20 kΩ	10 kΩ, each leg to ground
.....Gain	44 dB	1 kHz, Master Out, max gain
.....Frequency Response	30 to 20 kHz	+0, -3 dB, max gain
.....CMMR	>40 dB	1 kHz, max gain
.....S/N	76 dB	Re +4 dBu, max gain, @ insert, 20 kHz BW
.....Tone Control	2-Band	See Figure in Manual
.....Effects Insert Loop	¼" TRS, Tip=Send, Ring=Return	Unbalanced mono
Master Output:	Stereo balanced / unbalanced	¼" TRS phone / RCA jacks
.....Output Impedance	300 Ω balanced each leg	301Ω unbalanced
.....Gain	6 dB balanced	0 dB unbalanced
.....Frequency Response	10 Hz to 30 kHz	+0, -3 dB
.....THD+N	<0.05%	re +4 dBu, 20 to 20 kHz, 20 kHz BW
.....S/N (balanced output)	101 dB	re +4 dBu, 20 kHz BW, unity gain
	94 dB	re +4 dBu, 20 kHz BW, 12 dB gain
Auxiliary Output:	Stereo	Unbalanced RCA jacks
.....Output Impedance	301 Ω	
.....Gain	Off to +6 dB	
FlexFX Send:	Stereo	Unbalanced ¼" TS phone jack
.....Output Impedance	301 Ω	Unity Gain
General Specifications:		
.....Control Feed-through	-80 dB	re +4 dBu, all controls
.....Crosstalk	-70 dB	re +4 dBu, 1 kHz
Unit: Conformity	CE, FCC, cULus	
.....Universal Line Voltage	100-240 VAC	50-60 Hz
.....Maximum Power	20 W	
.....Front Panel Size	13.3"H x 10"W	(33.8 cm x 25.4 cm)
.....Coffin Depth	3" (see detail)	(7.7 cm)
.....Weight	9 lb	(3.7 kg)
Shipping: Size	7.75"H x 12.75"W x 19.25"D	(19.7 x 32.5 x 49 cm)
.....Weight	12 lb	(5.5 kg)

*Note: All specifications are typical unless otherwise stated.*

Block Diagram





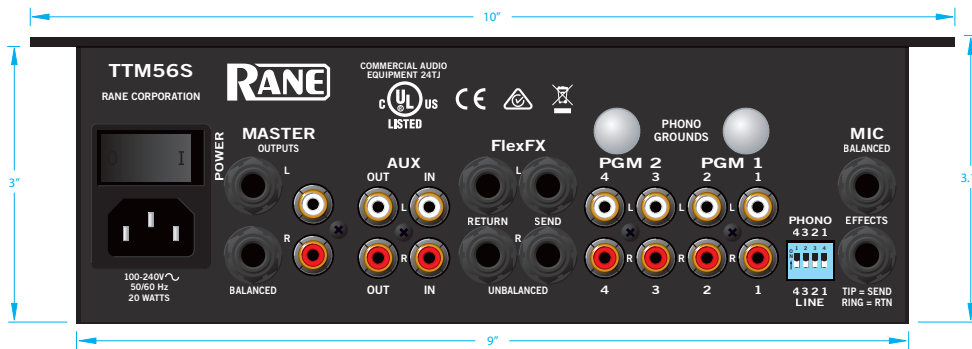
# TTM 56S

PERFORMANCE MIXER

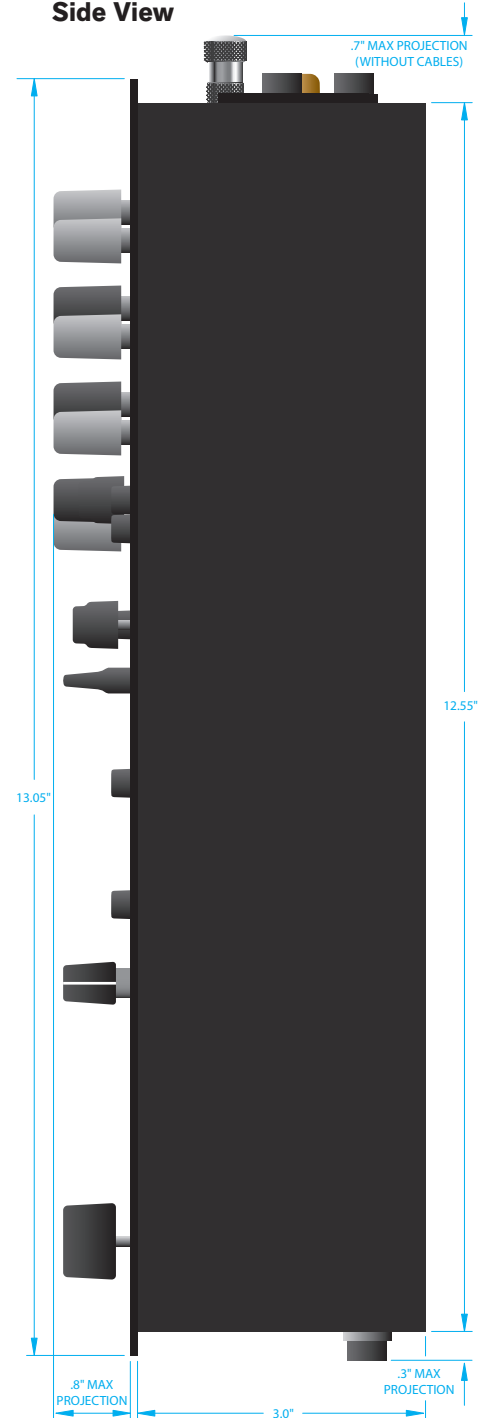


## Dimensions

Rear View



Side View



Front View



Views are 50% actual size

# RANE SL2



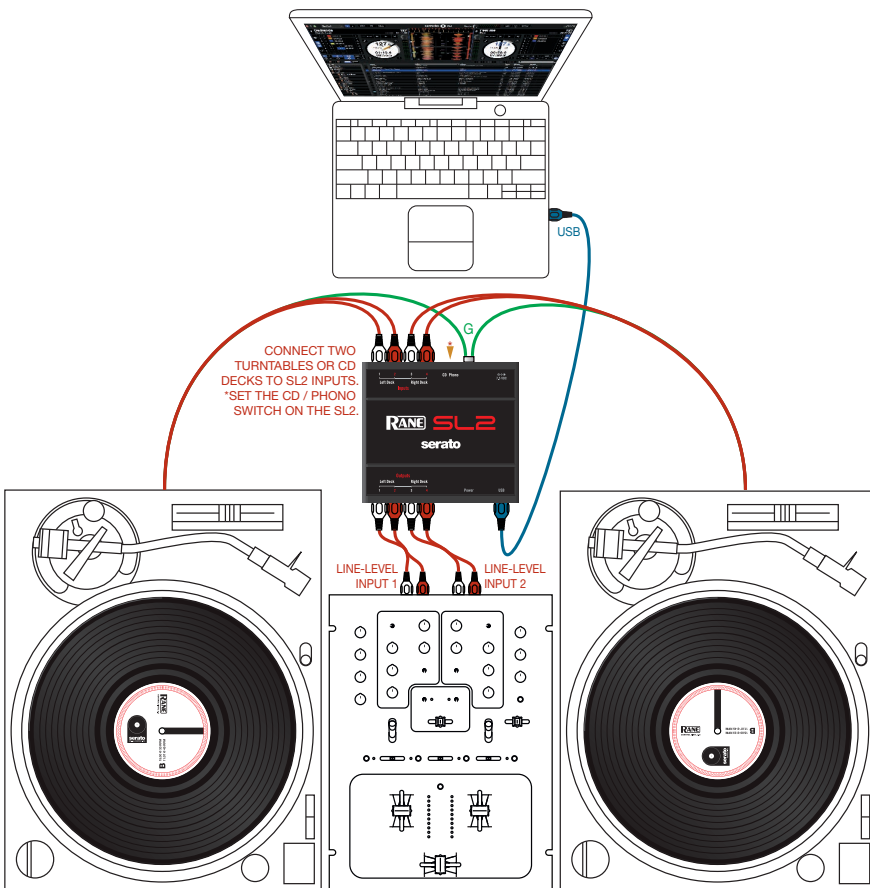
## The standard for professional DJs

The Rane SL series of interfaces set the standard for vinyl emulation. Rane and Serato give you advanced features that add extra creativity to your DJing. This intuitive system replicates the traditional DJing experience for “real feel” usability. Low latency means the response time from touching the decks to hearing an audio signal is extremely fast. The SL series of interfaces work with computers running Serato DJ (included), Scratch Live, and all DJ and audio workstation software thanks to ASIO (PC) and Core Audio (Mac) support.

The Rane SL2 interface connects one or two standard vinyl turntables or CD decks to your computer using a single USB cable and audio connections to line inputs on any DJ mixer of your choice. This system includes Serato DJ software with two 12” Serato Control Vinyl records, two Serato Control CDs, USB cable, and RCA audio cables to your mixer. Galvanic isolation guarantees audio is actively isolated from USB and power. Several MIDI controllers are supported, and a current list is at [serato.com](http://serato.com).

The SL2 advances the technology from the original SL1 with these improvements:

- CD / Phono input switch on the box.
- Superior sounding 24-bit converters.
- Hotter 3 Vrms input and output.
- 44.1 or 48 kHz selectable sample rate.
- Smaller and more compact cast design.
- ASIO / Core Audio drivers for most software.



serato  DJ

RANE

The SL2 includes Serato DJ with 2 Serato Control Vinyl and 2 Serato Control CDs.

# SL2 Specifications

All specifications typical unless otherwise stated	
CODEC	24-bit PCM
44.1 kHz Sample Rate Frequency Response	-0.5 dB @ 20 Hz, -1.22 dB @ 20 kHz
48 kHz Sample Rate Frequency Response	-0.5 dB @ 20 Hz, -0.40 dB @ 20 kHz
Sample Rate Selection	44.1 / 48 kHz selected in software control panel
Deck Inputs	Unbalanced RCA with CD / Phono switch
.....Phono Maximum Input	70 mV rms @ 1 kHz
.....Phono Gain	33 dB at 1.0 kHz
.....Line Level (CD) Maximum Input	3 Vrms
Line Outputs:	Unbalanced RCA
.....THD+N	0.007% @ 1 kHz
.....Maximum Output	3 Vrms
.....Dynamic Range	101 dB A-weighted analog in to analog out
Dynamic Range DAC	104.5 dB A-weighted
Device Latency	1.4 ms @ 44.1 kHz and 1.3 ms @ 48 kHz
USB 2.0 High Speed Port Required	3-unit load (300 mA max)
Blue Indicator	Flashing while device is booting Lit when USB 2.0 connection is detected
Yellow Indicator	Lit when the analog section is powered on
Optional RS5 External Universal Power Pack	7.5 Volts DC, P6 barrel plug
Power: Turn On/Off Muting	Yes
.....Galvanic Isolation: Audio I/O is actively isolated from USB port and external power	
.....Auto-selects USB or external power without interruption	
Kensington Security Slot	Both sides of unit
Unit: Conformity	CE, FCC
.....Size	5.5" x 5" x 1.3" (14.1 x 12.5 x 3.3 cm)
Shipping: Size	14" x 14" x 4" (36 x 36 x 10 cm)
.....Weight	5 pounds (2 kg)

## ASIO & Core Audio Drivers

These included drivers allow the SL2 to act as a 4-in 4-out USB external sound card for use with multiple third-party software clients supporting Core Audio (Mac) or ASIO (Windows).

## Serato DJ

Rane is pleased to announce that the SL2 which previously included Serato Scratch Live software is now fully supported by Serato DJ software. DJs using Serato Scratch Live are migrating to the new and improved Serato DJ. If you're familiar with Scratch Live, the transition to Serato DJ is easy and intuitive.

## Computer Requirements

Serato DJ is supported by Mac OSX and Windows 7 or 8. Before purchasing a Mac or PC, please check [serato.com](http://serato.com) for best results with the latest version of Serato DJ.

## Serato Control

Mix files from your computer hard drive using Serato Control Vinyl, Serato Control CD or approved USB Controllers. The Serato Control Vinyl and Control CDs each contain the Serato NoiseMap™ Control Tone, a unique control signal which allows Serato DJ or Scratch Live to track the motion of the record, simulating the same movement with digital audio.

## Included in the Box

The Rane SL2 is only sold as part of a complete package. This box includes:

- SL2 hardware interface
- USB cable
- 4 stereo RCA cables
- Printed color manuals
- 2 Control Vinyl Records
- 2 Control CDs
- Serato DJ software install disc



## [serato.com](http://serato.com)

Features are being added and improved, and the latest version of Serato DJ or Scratch Live is a free download. The Forum at [serato.com](http://serato.com) is the best place for technical support and performance tips from thousands of other DJs.

## [whitelabel.net](http://whitelabel.net)

The Serato Whitelabel Delivery Network is a unique system that allows record labels to digitally deliver promotional releases directly to Serato DJs. To download Whitelabel audio files and sign up for updates on the latest promotional releases, visit [whitelabel.net](http://whitelabel.net).

## [dj.rane.com](http://dj.rane.com)

Visit the Rane DJ website for the most up-to-date information on all Rane hardware, manuals, accessories, support, community, newsletter and the blog.

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2-2015



## Sound System Interconnection

- Cause & prevention of ground loops
- Interfacing balanced & unbalanced
- Proper pin connections and wiring
- Chassis ground vs. signal ground
- Ground lift switches

Rane Technical Staff

**RaneNote 110**

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## Introduction

This note, originally written in 1985, continues to be one of our most useful references. It's popularity stems from the continual and perpetual difficulty of hooking up audio equipment without suffering through all sorts of bizarre noises, hums, buzzes, whistles, etc.— not to mention the extreme financial, physical and psychological price. As technology progresses it is inevitable that electronic equipment and its wiring should be subject to constant improvement. Many things *have* improved in the audio industry since 1985, but unfortunately wiring isn't one of them. However, finally the Audio Engineering Society (AES) has issued a standards document for interconnection of pro audio equipment. It is AES48, titled "AES48-2005: AES standard on interconnections —Grounding and EMC practices — Shields of connectors in audio equipment containing active circuitry."

Rane's policy is to accommodate rather than dictate. However, this document contains suggestions for external wiring changes that should ideally only be implemented by trained technical personnel. Safety regulations require that all original grounding means provided from the factory be left intact for safe operation. No guarantee of responsibility for incidental or consequential damages can be provided. *(In other words, don't modify cables, or try your own version of grounding unless you really understand exactly what type of output and input you have to connect.)*

## Ground Loops

Almost all cases of noise can be traced directly to ground loops, grounding or lack thereof. It is important to understand the mechanism that causes grounding noise in order to effectively eliminate it. Each component of a sound system produces its own ground internally. This ground is usually called the audio *signal* ground. Connecting devices together with the interconnecting cables can tie the signal grounds of the two units together in one place through the conductors in the cable. Ground loops occur when the grounds of the two units are also tied together in another place: via the third wire in the line cord, by tying the metal chassis together through the rack rails, etc. These situations create a circuit through which current may flow in a closed “loop” from one unit’s ground out to a second unit and back to the first. It is not simply the presence of this current that creates the hum—it is when this current flows through a unit’s audio signal ground that creates the hum. In fact, even without a ground loop, a little noise current always flows through every interconnecting cable (i.e., it is impossible to eliminate these currents entirely). The mere presence of this ground loop current is no cause for alarm if your system uses properly implemented and *completely* balanced interconnects, which are excellent at rejecting ground loop and other noise currents. Balanced interconnect was developed to be immune to these noise currents, which can never be entirely eliminated. What makes a ground loop current annoying is when the audio signal is affected. Unfortunately, many manufacturers of balanced audio equipment design the internal grounding system improperly, thus creating balanced equipment that is not immune to the cabling’s noise currents. This is one reason for the bad reputation sometimes given to balanced interconnect.

A second reason for balanced interconnect’s bad reputation comes from those who think connecting unbalanced equipment into “superior” balanced equipment should improve things. Sorry. Balanced interconnect is not compat-

ible with unbalanced. The small physical nature and short cable runs of completely unbalanced systems (home audio) also contain these ground loop noise currents. However, the currents in unbalanced systems never get large enough to affect the audio to the point where it is a nuisance. Mixing balanced and unbalanced equipment, however, is an entirely different story, since balanced and unbalanced interconnect are truly *not compatible*. The rest of this note shows several recommended implementations for all of these interconnection schemes.

The potential or voltage which pushes these noise currents through the circuit is developed between the independent grounds of the two or more units in the system. The impedance of this circuit is low, and even though the voltage is low, the current is high, thanks to Mr. Ohm, without whose help we wouldn’t have these problems. It would take a very high resolution ohm meter to measure the impedance of the steel chassis or the rack rails. We’re talking thousandths of an ohm. So trying to measure this stuff won’t necessarily help you. We just thought we’d warn you.

## The Absolute Best Right Way To Do It

The method specified by AES48 is to use balanced lines and *tie the cable shield to the metal chassis (right where it enters the chassis) at both ends of the cable*.

A balanced line requires three separate conductors, two of which are signal (+ and –) and one shield (see Figure 1a). The shield serves to guard the sensitive audio lines from interference. Only by using balanced line interconnects can you *guarantee* (yes, *guarantee*) hum-free results. Always use twisted pair cable. Chassis tying the shield at each end also *guarantees* the best possible protection from RFI [radio frequency interference] and other noises [neon signs, lighting dimmers].

Neil Muncy<sup>1</sup>, an electroacoustic consultant and seasoned veteran of years of successful system design, chairs the AES

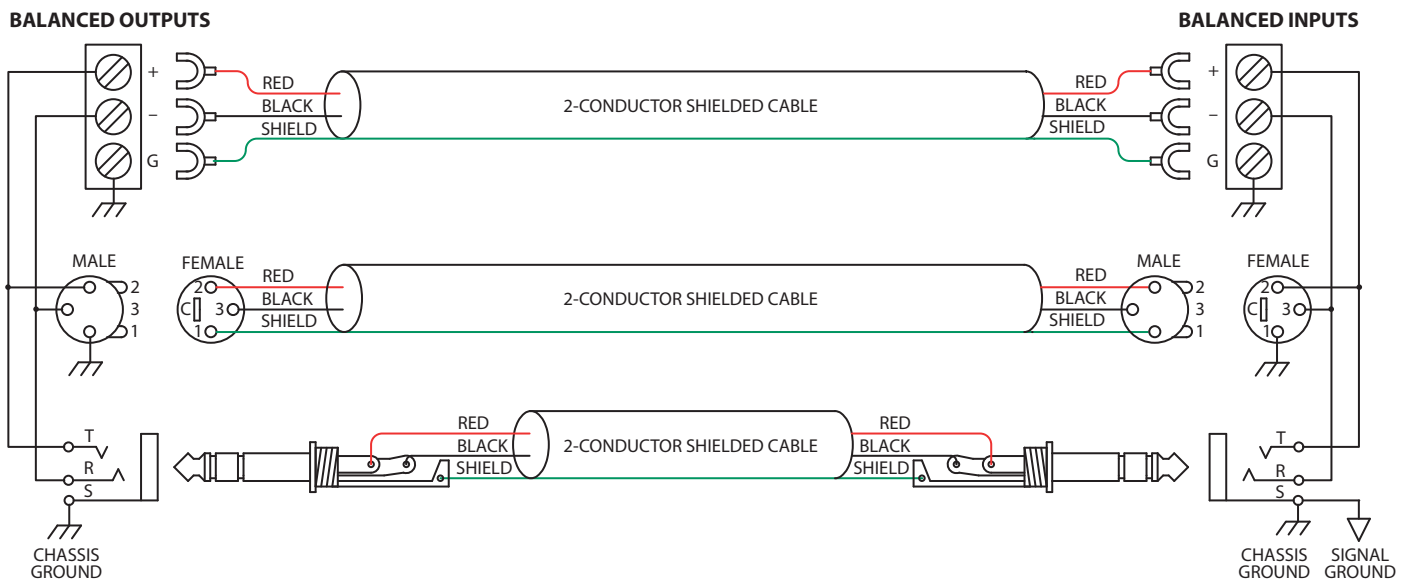


Figure 1a. The right way to do it.

Standards Committee (SC-05-05) working on this subject. He tirelessly tours the world giving seminars and dispensing information on how to successfully hook-up pro audio equipment<sup>2</sup>. He makes the simple point that it is absurd that you cannot go out and buy pro audio equipment from several different manufacturers, buy standard off-the-shelf cable assemblies, come home, hook it all up and have it work hum and noise free. *Plug and play*. Sadly, almost never is this the case, despite the science and rules of noise-free interconnect known and documented for over 60 years (see References for complete information).

It all boils down to using balanced lines, only balanced lines, and nothing but balanced lines. This is why they were developed. Further, that you *tie the shield to the chassis, at the point it enters the chassis, and at both ends of the cable* (more on 'both ends' later).

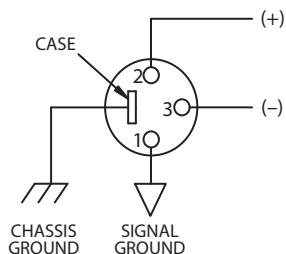
Since standard XLR cables come with their shields tied to pin 1 at each end (the shells are not tied, nor need be), this means equipment using 3-pin, XLR-type connectors *must tie pin 1 to the chassis* (usually called chassis ground) — not the audio signal ground as is most common.

Not using *signal ground* is the most radical departure from common pro-audio practice. Not that there is any argument about its validity. There isn't. **This is the right way to do it.** So why doesn't audio equipment come wired this way? Well, some does, and since 1993, more of it does. That's when Rane started manufacturing some of its products with balanced inputs and outputs tying pin 1 to chassis. So why doesn't everyone do it this way? Because life is messy, some things are hard to change, and there will always be equipment in use that was made before proper grounding practices were in effect.

Unbalanced equipment is another problem: it is everywhere, easily available and inexpensive. All those RCA and 1/4" TS connectors found on consumer equipment; effect-loops and insert-points on consoles; signal processing boxes; semi-pro digital and analog tape recorders; computer cards; mixing consoles; et cetera.

The next several pages give tips on how to successfully address hooking up unbalanced equipment. Unbalanced equipment when "blindly" connected with fully balanced units starts a pattern of hum and undesirable operation, requiring extra measures to correct the situation.

**COMMON (WRONG) PRACTICE**



**RECOMMENDED PRACTICE**

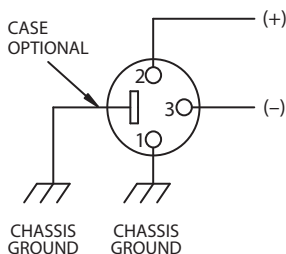


Figure 1b. Recommended practice.

**The Next Best Right Way To Do It**

The quickest, quietest and most foolproof method to connect balanced and unbalanced is to **transformer isolate all unbalanced connections**. See Figure 2.

Many manufacturers provide several tools for this task, including Rane. Consult your audio dealer to explore the options available.

The goal of these adaptors is to allow the use of *standard cables*. With these transformer isolation boxes, modification of cable assemblies is unnecessary. Virtually any two pieces of audio equipment can be successfully interfaced without risk of unwanted hum and noise.

Another way to create the necessary isolation is to use a *direct box*. Originally named for its use to convert the high impedance, high level output of an electric guitar to the low impedance, low level input of a recording console, it allowed the player to plug "directly" into the console. Now this term is commonly used to describe any box used to convert unbalanced lines to balanced lines.

**The Last Best Right Way To Do It**

*If transformer isolation is not an option, special cable assemblies are a last resort.* The key here is to prevent the shield currents from flowing into a unit whose grounding scheme creates ground loops (hum) in the audio path (i.e., most audio equipment).

It is true that connecting both ends of the shield is theoretically the best way to interconnect equipment — though this assumes the interconnected equipment is internally grounded properly. Since most equipment is *not* internally grounded properly, connecting both ends of the shield is not often practiced, since doing so usually creates noisy interconnections.

A common solution to these noisy hum and buzz problems involves disconnecting one end of the shield, even though one can not buy off-the-shelf cables with the shield disconnected at one end. The best end to disconnect is the receiving end. If one end of the shield is disconnected, the noisy hum current stops flowing and away goes the hum — but only at low frequencies. A ground-sending-end-only shield connection minimizes the possibility of high frequency (radio) interference since it prevents the shield from acting as an antenna to the next input. Many reduce this potential RF interference by providing an RF path through

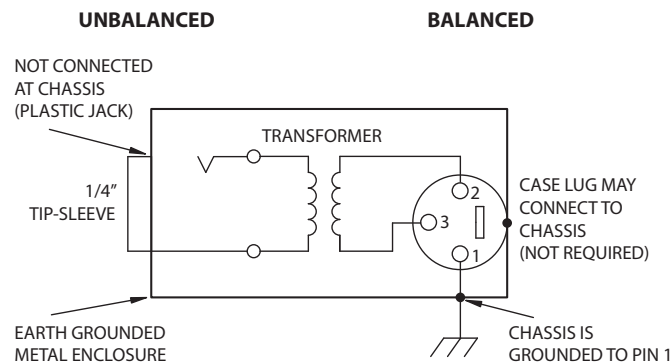


Figure 2. Transformer Isolation

a small capacitor (0.1 or 0.01 microfarad ceramic disc) connected from the lifted end of the shield to the chassis. (This is referred to as the “hybrid shield termination” where the sending end is bonded to the chassis and the receiving end is capacitively coupled. See Neutrik’s EMC-XLR for example.) The fact that many modern day installers still follow this one-end-only rule with consistent success indicates this and other acceptable solutions to RF issues exist, though the increasing use of digital and wireless technology greatly increases the possibility of future RF problems.

If you’ve truly isolated your hum problem to a specific unit, chances are, even though the documentation indicates proper chassis grounded shields, the suspect unit is not internally grounded properly. Here is where special test cable assemblies, shown in Figure 3, really come in handy. These assemblies allow you to connect the shield to chassis ground *at the point of entry*, or to pin 1, or to lift one end of the shield. The task becomes more difficult when the unit you’ve isolated has multiple inputs and outputs. On a suspect unit with multiple cables, try various configurations on each connection to find out if special cable assemblies are needed at more than one point.

See Figure 4 for suggested cable assemblies for your particular interconnection needs. Find the appropriate output configuration (down the left side) and then match this with the correct input configuration (across the top of the page.) Then refer to the following pages for a recommended wiring diagram.

## Ground Lifts

Many units come equipped with ground lift switches. In only a few cases can it be shown that a ground lift switch improves ground related noise. (Has a ground lift switch ever *really* worked for you?) In reality, the presence of a ground lift switch greatly reduces a unit’s ability to be “properly” grounded and therefore immune to ground loop hums and buzzes. Ground lifts are simply another Band-Aid to try in case of grounding problems. It is true that an entire system of properly grounded equipment, without ground lift switches, is guaranteed (yes *guaranteed*) to be hum free. The problem is most equipment is *not* (both internally and externally, AC system wise) grounded properly.

Most units with ground lifts are shipped so the unit is “grounded” — meaning the chassis is connected to audio signal ground. (This should be the best and is the “safest” position for a ground lift switch.) If after hooking up your system it exhibits excessive hum or buzzing, there is an incompatibility somewhere in the system’s grounding configuration. In addition to these special cable assemblies that may help, here are some more things to try:

1. Try combinations of lifting grounds on units supplied with lift switches (or links). It is wise to do this with the power off!
2. If you have an entirely balanced system, verify all chassis are tied to a good earth ground, for safety’s sake and hum protection. Completely unbalanced systems never earth ground anything (except cable TV, often a ground loop source). If you have a mixed balanced and unbalanced system, do yourself a favor and use isolation transformers or, if you can’t do that, try the special cable assemblies described here and expect it to take many hours to get things quiet. May the Force be with you.
3. Balanced units with outboard power supplies (wall warts or “bumps” in the line cord) do *not* ground the chassis through the line cord. Make sure such units are solidly grounded by tying the chassis to an earth ground using a star washer for a reliable contact. (Rane always provides this chassis point as an external screw with a toothed washer.) Any device with a 3-prong AC plug, such as an amplifier, may serve as an earth ground point. Rack rails may or may not serve this purpose depending on screw locations and paint jobs.

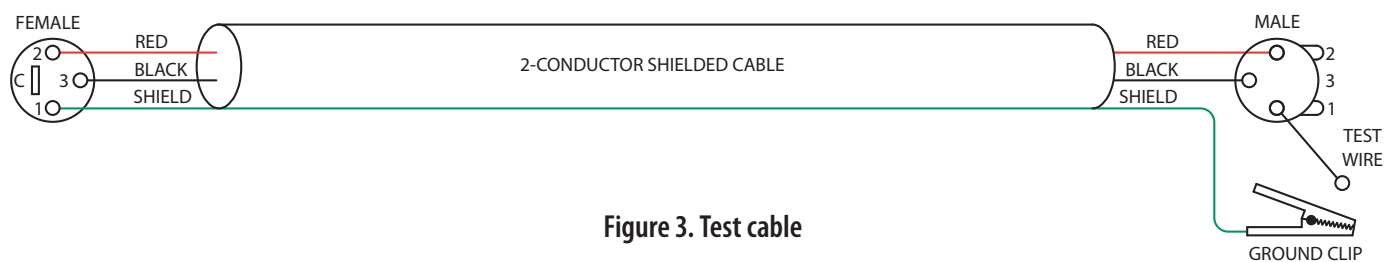


Figure 3. Test cable

## Floating, Pseudo, and Quasi-Balancing

During inspection, you may run across a ¼" output called floating unbalanced, sometimes also called pseudo-balanced or quasi-balanced. In this configuration, the sleeve of the output stage is not connected inside the unit and the ring is connected (usually through a small resistor) to the audio signal ground. This allows the tip and ring to “appear” as an equal impedance, not-quite balanced output stage, even though the output circuitry is unbalanced.

Floating unbalanced often works to drive either a balanced or unbalanced input, depending if a TS or TRS standard cable is plugged into it. When it hums, a special cable is required. See drawings #11 and #12, and do not make the cross-coupled modification of tying the ring and sleeve together.

## Winning the Wiring Wars

- Use balanced connections whenever possible, with the shield bonded to the metal chassis at both ends.
- Transformer isolate all unbalanced connections from balanced connections.
- Use special cable assemblies when unbalanced lines cannot be transformer isolated.
- Any unbalanced cable must be kept under 10 feet (3 m) in length. Lengths longer than this will amplify all the nasty side effects of unbalanced circuitry's ground loops.

## Summary

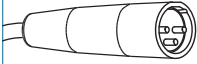

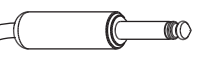


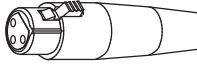
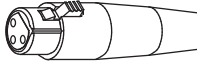
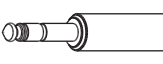
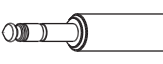
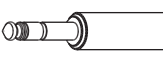
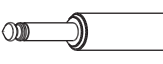


If you are unable to do things correctly (i.e. use fully balanced wiring with shields tied to the *chassis* at both ends, or transformer isolate all unbalanced signals from balanced signals) then there is no guarantee that a hum-free interconnect can be achieved, nor is there a definite scheme that will assure noise-free operation in all configurations.

## References

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2. *Grounding, Shielding, and Interconnections in Analog & Digital Signal Processing Systems: Understanding the Basics*; Workshops designed and presented by Neil Muncy and Cal Perkins, at the 97th AES Convention of Audio Engineering Society in San Francisco, CA, Nov. 1994.
3. The entire June 1995 AES Journal, Vol. 43, No. 6, available \$6 members, \$11 nonmembers from the Audio Engineering Society, 60 E. 42nd St., New York, NY, 10165-2520.
4. Phillip Giddings, *Audio System Design and Installation* (SAMS, Indiana, 1990).
5. Ralph Morrison, *Noise and Other Interfering Signals* (Wiley, New York, 1992).
6. Henry W. Ott, *Noise Reduction Techniques in Electronic Systems*, 2nd Edition (Wiley, New York, 1988).
7. Cal Perkins, “Measurement Techniques for Debugging Electronic Systems and Their Instrumentation,” *The Proceedings of the 11th International AES Conference: Audio Test & Measurement*, Portland, OR, May 1992, pp. 82-92 (Audio Engineering Society, New York, 1992).
8. Macatee, *RaneNote*: “Grounding and Shielding Audio Devices,” Rane Corporation, 1994.
9. Philip Giddings, “Grounding and Shielding for Sound and Video,” *S&VC*, Sept. 20th, 1995.
10. AES48-2005: *AES standard on interconnections — Grounding and EMC practices — Shields of connectors in audio equipment containing active circuitry* (Audio Engineering Society, New York, 2005).

*Band-Aid* is a registered trademark of Johnson & Johnson

## To Input

From Output	<b>CABLE CONNECTORS</b>					
		MALE BALANCED XLR	¼" BALANCED TRS (TIP-RING-SLEEVE)	¼" OR 3.5mm UNBALANCED TS (TIP-SLEEVE)	UNBALANCED RCA	BALANCED EUROBLOCK
	 FEMALE BALANCED XLR (NOT A TRANSFORMER, NOR A CROSS-COUPLED OUTPUT STAGE)	<b>1</b>	<b>2</b>	<b>3<sub>B</sub></b>	<b>4<sub>B</sub></b>	+ to + - to - SHIELD NC
	 FEMALE BALANCED XLR (EITHER A TRANSFORMER OR A CROSS-COUPLED OUTPUT STAGE)	<b>1</b>	<b>2</b>	<b>5</b>	<b>6</b>	+ to + - to - SHIELD NC
	 ¼" BALANCED TRS (NOT A TRANSFORMER, NOR A CROSS-COUPLED OUTPUT STAGE)	<b>7</b>	<b>8</b>	<b>9<sub>B</sub></b>	<b>10<sub>B</sub></b>	+ to + - to - SHIELD ONLY TO EUROBLOCK
	 ¼" BALANCED TRS (EITHER A TRANSFORMER OR A CROSS-COUPLED OUTPUT STAGE)	<b>7</b>	<b>8</b>	<b>11</b>	<b>12</b>	+ to + - to - SHIELD NC
	 ¼" FLOATING UNBALANCED TRS (TIP-RING-SLEEVE) (SLEEVE IN UNIT = NC)	<b>21<sub>A</sub></b>	<b>22<sub>A</sub></b>	<b>11</b>	<b>12</b>	+ to + - to - GROUND to GROUND
	 ¼" OR 3.5 mm UNBALANCED TS (TIP-SLEEVE)	<b>13</b>	<b>14</b>	<b>15<sub>A</sub></b>	<b>16<sub>A</sub></b>	<b>23</b>
	 UNBALANCED RCA (TIP-SLEEVE)	<b>17</b>	<b>18</b>	<b>19<sub>A</sub></b>	<b>20<sub>A</sub></b>	<b>23</b>
	 BALANCED EUROBLOCK	+ to + - to - SHIELD ONLY TO XLR PIN 1	+ to + - to - SHIELD ONLY TO TRS SLEEVE	<b>24</b>	<b>24</b>	+ to + - to - GROUND to GROUND

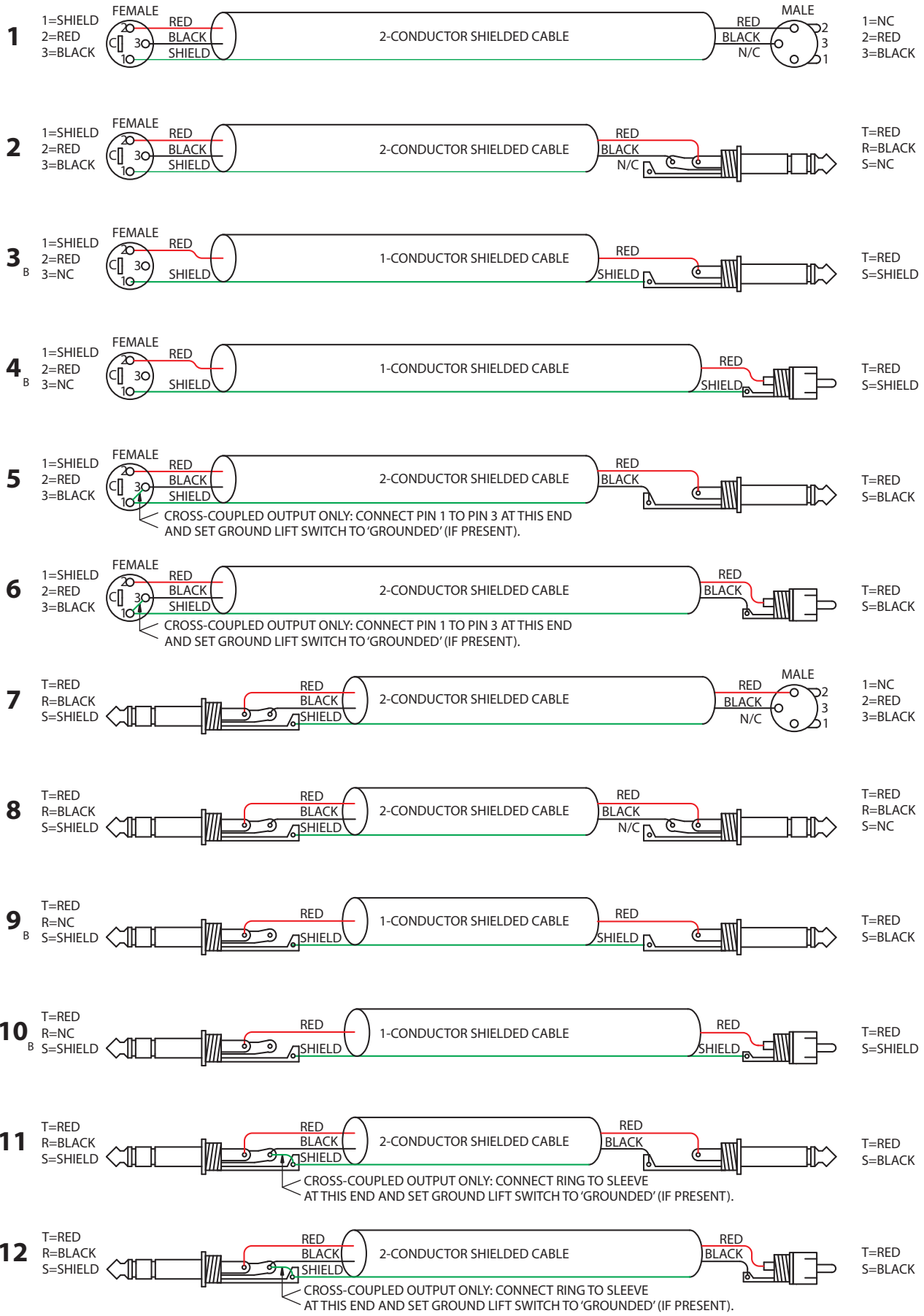
**Figure 4. Interconnect chart for locating correct cable assemblies on the following pages.**

Note: (A) This configuration uses an "off-the-shelf" cable.

Note: (B) This configuration causes a 6 dB signal loss. Compensate by "turning the system up" 6 dB.

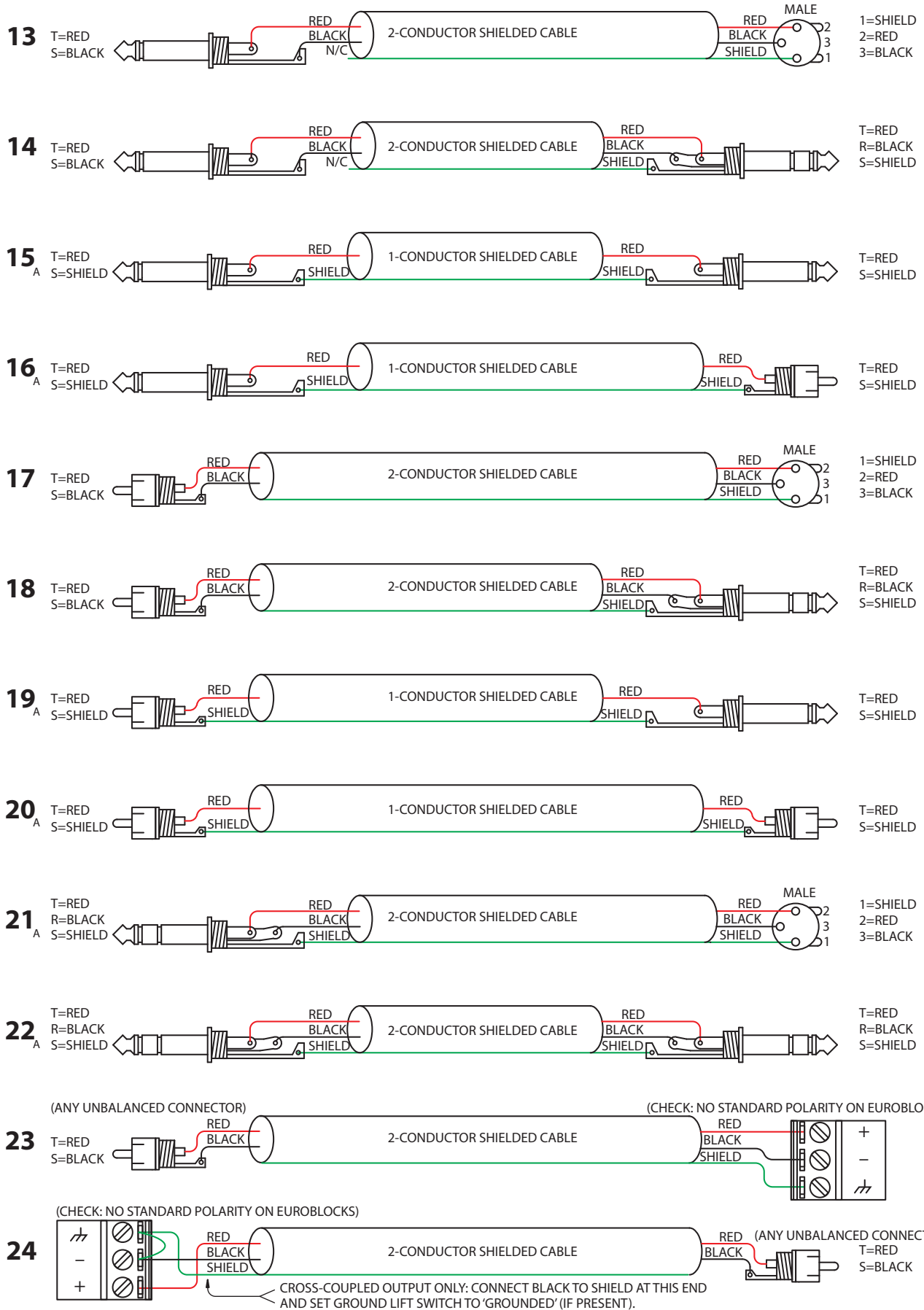
# From Output

# To Input



# From Output

# To Input







## **Factory Authorized Service**

Your unit may be serviced by the Rane Factory or any Authorized Rane Service Center. To find a Service Center near you, please call the Rane factory, or check the Rane website. Please do not return your unit to Rane without prior authorization.

Rane Corporation

To obtain service or a Return Authorization, please phone 425-355-6000

or Fax 425-347-7757

The current list of U.S. Rane Authorized Service Centers is found on our website: [www.rane.com/service.html](http://www.rane.com/service.html)

## **Limited Domestic Warranty**

RANE CORPORATION WARRANTS ALL RANE PRODUCTS (EXCEPT THOSE ITEMS CLASSIFIED AS *WEAR PARTS*, AND LISTED ON THE MANUAL-1 PAGE OF EACH OPERATORS MANUAL) PURCHASED IN THE U.S. AGAINST DEFECTS IN MATERIAL OR WORKMANSHIP FOR A PERIOD OF TWO (2) YEARS. *WEAR PARTS* ARE LIMITED TO A PERIOD OF NINETY (90) DAYS FROM THE INITIAL DATE OF RETAIL PURCHASE FROM AN AUTHORIZED RANE DEALER—*WEAR PARTS* REQUIRE PROOF OF PURCHASE DATE. This limited warranty extends to all purchasers or owners of the product during the warranty period beginning with the original retail purchase. Rane Corporation does not, however, warrant its products against any and all defects: 1) arising out of material or workmanship not provided or furnished by Rane, or 2) resulting from abnormal use of the product or use in violation of instructions, or 3) in products repaired or serviced by other than the Rane Factory, or 4) in products with removed or defaced serial numbers, or 5) in components or parts or products expressly warranted by another manufacturer. Rane agrees to supply all parts and labor to repair or replace defects covered by this limited warranty with parts or products of original or improved design, at its option in each respect, if the defective product is shipped prior to the end of the warranty period to the Rane Factory in the original packaging or a replacement supplied by Rane, with all transportation costs and full insurance paid each way by the purchaser or owner.

### **LIMITED WARRANTY OUTSIDE THE U.S.A.**

RANE PRODUCTS ARE WARRANTED ONLY IN THE COUNTRY WHERE PURCHASED, THROUGH THE AUTHORIZED RANE DISTRIBUTOR IN THAT COUNTRY, AGAINST DEFECTS IN MATERIAL OR WORKMANSHIP, THE SPECIFIC PERIOD OF THIS LIMITED WARRANTY SHALL BE THAT WHICH IS DESCRIBED TO THE ORIGINAL RETAIL PURCHASER BY THE AUTHORIZED RANE DEALER OR DISTRIBUTOR AT THE TIME OF PURCHASE. Rane Corporation does not, however, warrant its products against any and all defects: 1) arising out of materials or workmanship not provided or furnished by Rane, or 2) resulting from abnormal use of the product or use in violation of instructions, or 3) in products repaired or serviced by other than authorized Rane repair facilities, or 4) in products with removed or defaced serial numbers, or 5) in components or parts or products expressly warranted by another manufacturer. Rane agrees, through the applicable authorized distributor, to repair or replace defects covered by this limited warranty with parts or products of original or improved design, at its option in each respect, if the defective product is shipped prior to the end of the warranty period to the designated authorized Rane warranty repair facility in the country where purchased, or to the Rane factory in the U.S., in the original packaging or a replacement supplied by Rane, with all transportation costs and full insurance paid each way by the purchaser or owner.

ALL REMEDIES AND THE MEASURE OF DAMAGES ARE LIMITED TO THE ABOVE SERVICES, IT IS POSSIBLE THAT ECONOMIC LOSS OR INJURY TO PERSON OR PROPERTY MAY RESULT FROM THE FAILURE OF THE PRODUCT; HOWEVER, EVEN IF RANE HAS BEEN ADVISED OF THIS POSSIBILITY, THIS LIMITED WARRANTY DOES NOT COVER ANY SUCH CONSEQUENTIAL OR INCIDENTAL DAMAGES. SOME STATES OR COUNTRIES DO NOT ALLOW THE LIMITATIONS OR EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

ANY AND ALL WARRANTIES, EXPRESS OR IMPLIED, ARISING BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE, OR OTHERWISE, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO A PERIOD OF TWO (2) YEARS FROM EITHER THE DATE OF ORIGINAL RETAIL PURCHASE OR, IN THE EVENT NO PROOF OF PURCHASE DATE IS AVAILABLE, THE DATE OF MANUFACTURE, SOME STATES OR COUNTRIES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE, COUNTRY TO COUNTRY.



**Warranty Procedure - Valid in USA only**

**NOTICE!** You must complete and return the warranty card or register your product online to extend the Warranty from 2 years to 3 years!

TO VALIDATE YOUR EXTENDED WARRANTY: Use the postcard that came in the box with your unit, or go to *www.rane.com* and click on **New Product Registration**. Fill out the warranty completely, being sure to include the model and serial number of the unit since this is how warranties are tracked. If your Rane product was purchased in the U.S.A., mail the completed card or register online with to Rane Corporation within 10 days from the date of purchase. **If you purchased the product outside the U.S.A. you must file your warranty registration with the Rane Distributor in that country.** It is advised that you keep your bill of sale as proof of purchase, should any difficulties arise concerning the registration of the warranty card. **NOTICE: IT IS NOT NECESSARY TO REGISTER IN ORDER TO RECEIVE RANE CORPORATION'S STANDARD TWO YEAR LIMITED WARRANTY.**

WARRANTY REGISTRATION is made and tracked by MODEL AND SERIAL NUMBERS ONLY, not by the purchaser's or owner's name. Therefore any warranty correspondence or inquires **MUST** include the model and serial number of the product in question. Be sure to fill in the model and serial number in the space provided below and keep this in a safe place for future reference.

WARRANTY SERVICE MUST BE PERFORMED ONLY BY AN AUTHORIZED RANE SERVICE FACILITY LOCATED IN THE COUNTRY WHERE THE UNIT WAS PURCHASED, OR (if product was purchased in the U.S.) AT THE RANE FACTORY IN THE U.S.. If the product is being sent to Rane for repair, please call the factory for a Return Authorization number. We recommend advance notice be given to the repair facility to avoid possible needless shipment in case the problem can be solved over the phone. **UNAUTHORIZED SERVICE PERFORMED ON ANY RANE PRODUCT WILL VOID ITS EXISTING FACTORY WARRANTY.**

FACTORY SERVICE: If you wish your Rane product to be serviced at the factory, it must be shipped **FULLY INSURED, IN THE ORIGINAL PACKING OR EQUIVALENT**. This warranty will **NOT** cover repairs on products damaged through improper packaging. If possible, avoid sending products through the mail. Be sure to include in the package:

1. Complete return street shipping address (P.O. Box numbers are **NOT** acceptable).
2. A detailed description of any problems experienced, including the make and model numbers of any other system equipment.
3. Remote power supply, if applicable.

Repaired products purchased in the U.S. will be returned prepaid freight via the same method they were sent to Rane. Products purchased in the U.S., but sent to the factory from outside the U.S. **MUST** include return freight funds, and the sender is fully responsible for all customs procedures, duties, tariffs and deposits.

In order to qualify for Rane's one year extended warranty (for a total of 3 years parts and labor), the warranty must be completely filled out and sent to us immediately. Valid in USA only.

**We recommend you write your serial number here in your owners manual and on your sales receipt for your records.**

**SERIAL NUMBER:** \_\_\_\_\_ **PURCHASE DATE:** \_\_\_\_\_

# Declaration of Conformity

Application of  
Council Directive(s):

2001/95/EC  
2012/19/EU  
2004/108/EC  
2006/95/EC  
2011/65/EU

Standard(s) to which  
conformity is declared:

EN60065: 2002/A1:2006/A11:2008/A2:2010/A12:2011  
EN55103-1:2009  
EN55103-2:2009  
EN50581:2012  
ENVIRONMENT E2  
CE MARK FIRST AFFIXED IN 2008  
SERIAL NUMBERS 900000 - 999999

Manufacturer:

**Rane Corporation**  
**10802 47th Avenue West**  
**Mukilteo WA 98275-5000 USA**

This equipment has been tested and found to be in compliance with all applicable standards and regulations applying to the EU's Low Voltage (LV) directive 2006/95/EC, and Electromagnetic Compatibility (EMC) directive 2004/108/EC. In order for the customer to maintain compliance with this regulation, high quality shielded cable must be used for interconnection to other equipment. Modification of the equipment, other than that expressly outlined by the manufacturer, is not allowed under this directive. The user of this equipment shall accept full responsibility for compliance with the LV directive and EMC directive in the event that the equipment is modified without written consent of the manufacturer. This declaration of conformity is issued under the sole responsibility of Rane Corporation.

Type of Equipment: **Professional Audio Signal Processing**

Brand: **Rane**

Model: **TTM 56S**

Immunity Results:

**Test Description**

**RF Electromagnetic Fields Immunity**

80 MHz - 1000 MHz, 1 kHz AM, 80% depth, 3V/m

THD+N: 4 dBu, 400 Hz, BW = 20 Hz - 20 kHz

**Specification Conditions**

< -55 dB	80 MHz - 120 MHz
< -61 dB	120 MHz - 200 MHz
< -58 dB	200 MHz - 447 MHz
< -48 dB	447 MHz - 540 MHz
< -58 dB	540 MHz - 1000 MHz

**Conducted RF Disturbances Immunity**

150 kHz - 80 MHz, 1 kHz AM, 80% depth, 3V RMS

< -63 dB	Power Lines
< -62 dB	Signal Lines

**Magnetic Fields Immunity**

50 Hz - 10 kHz, 3.0 - 0.3 A/m

< -63 dB

*I, the undersigned, hereby declare that the equipment specified above conforms to the Directive(s) and Standard(s) shown above.*



(Signature)

**Greg Frederick**

(Full Name)

**Compliance Engineer**

(Position)

**June 30, 2010**

(Date)

**Mukilteo WA, USA**

(Place)

# TTM 56S

PERFORMANCE MIXER

