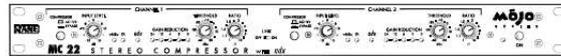




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You can read the recommendations in the user guide, the technical guide or the installation guide for RANE MC 22. You'll find the answers to all your questions on the RANE MC 22 in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

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QUICK START

Shredded, this document makes excellent packing material. In its present form, it makes interesting and useful reading. If you run out of patience quickly, at least read this part to make sure you don't exterminate everything within a two mile radius by doing something wrong.

Attach one or two channels of inputs and outputs to the respective connectors on the rear. *This device uses low impedance balanced line drivers. Do not connect the XLR "+" or "-" output pins to ground, as this may cause the power supply to shut down. For unbalanced use, leave the unused output pin ("+" or "-") unterminated.*

With the **RATIO** turned all the way down at 1:1, **THRESHOLD** turned all the way up to 20 dBu, and the **LEVEL** controls in their *center* at 0 dB, you have an expensive patch cord.

While sending a signal to the MC 22, adjust the **INPUT LEVEL** so the +4 dBu LED lights occasionally, but the 0L LED does not light. Now increase the **RATIO** to something useful, like 2:1 (with the control set at 2, the Ratio is 2:1; at 5, it is 5:1.) Adjust the **THRESHOLD** to the point you want the Compressor to kick in. The **GAIN REDUCTION** meter reads the amount of signal compression.

Both Compressors will activate by the source material applied to either Channel if the **LINK** switch is **ON**. This is the preferred setting for stereo program material.

WEAR PARTS: This product contains no wear parts.

Manual-1



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Manual abstract:

@@@This device uses low impedance balanced line drivers. @@For unbalanced use, leave the unused output pin ("+" or "-") unterminated. With the RATIO turned all the way down at 1:1, THRESHOLD turned all the way up to 20 dBu, and the LEVEL controls in their center at 0 dB, you have an expensive patch cord. While sending a signal to the MC 22, adjust the INPUT LEVEL so the +4 dBu LED lights occasionally, but the OL LED does not light. Now increase the RATIO to something useful, like 2:1 (with the control set at 2, the Ratio is 2:1; at 5, it is 5:1.) Adjust the THRESHOLD to the point you want the Compressor to kick in. The GAIN REDUCTION meter reads the amount of signal compression. Both Compressors will activate by the source material applied to either Channel if the LINK switch is ON. This is the preferred setting for stereo program material. WEAR PARTS: This product contains no wear parts. Manual-1 COMPRESSOR ACTIVE/BYPASS switch This switch compares compressed and noncompressed signal. There is one for each Channel. The INPUT LEVEL remains active regardless of switch position. GAIN REDUCTION LEDs These LEDs show the amount of average signal reduction in dB. This aids in setting the THRESHOLD and RATIO controls by showing how much compression is occurring.

THRESHOLD control This control sets the point at which the Input signal level causes the Compressor to become active. See Figure 1 on page Manual-4.

INPUT LEVEL control This controls the overall level. Unity gain is reached at "0". With signal applied, set this control so the +4 dBu LED lights occasionally.

If the OL (overload) LED flashes, turn the INPUT LEVEL control down. adx LED This illuminates whenever noise reduction is active. This automatic downward expander circuit acts like a gate to keep the system quiet when no signal is present. When the input level drops below -55 dBu, downward expansion occurs at a ratio of 2:1. See Figure 3 on page Manual-5. RATIO control Once the threshold is exceeded, the ratio of input change to output change is determined by this control. The compressor has no effect when set at 1:1. But at 10:1, it takes a 10 dB input signal increase above the Threshold to produce a 1 dB increase in Output Gain. See Figure 2 on page Manual-4. CHANNEL 2 OUTPUT Same as Channel 1 Output.

CHANNEL 2 INPUT Same as Channel 1 Input. Manual-2 LINK switch Switch this to ON when using stereo material. This activates both Compressors when either Channel's signal exceeds the set Threshold, preserving stereo imaging. CHANNEL 2 controls These duplicate the controls in Channel 1. Power ON switch and LED Your basic, straightforward power switch. When the switch is depressed and the yellow LED is lit, the MC 22 is ready to go. CHANNEL 1 OUTPUT Use either the balanced XLR or the unbalanced 1/4" TS jack. Using both types of Outputs are permissible to drive two devices, such as an amplifier and a recorder. This device uses low impedance balanced line drivers. Do not connect the XLR "+" or "-" CHANNEL 1 INPUT Choose between the balanced XLR or the balanced/unbalanced 1/4" TRS jacks, but only use one.

Inserting a 1/4" TS jack will work--however--use balanced lines, especially when connecting cables over 10 feet in length. Consult SOUND SYSTEM INTERCONNECTION on page Manual-10. Cable Wiring In agreement with IEC and AES/ANSI standards, XLR wiring convention is pin 2 Positive (hot), pin 3 Negative (cold), and pin 1 chassis grounded and signal grounded (to allow unbalanced operation). The XLR case is chassis grounded. output pins to ground, as this may cause the power supply to shut down.

For unbalanced use, leave the unused output pin ("+" or "-") unterminated. Manual-3 OPERATING INSTRUCTIONS A PRIMER Let's start with what a compressor actually does. No matter how you cut it, this is an automatic volume control. It is a hand on a knob, turning the volume down and turning it up again. The hand is really quick and really accurate, but it's just turning a volume control.

When the input signal reaches a level set by the THRESHOLD control, the compressor begins turning down the signal by an amount determined by the RATIO control. The MC 22, like most compressors, operates by making the loud signals quieter, but does not make the quiet parts louder. However, by keeping the loud signals under control, the entire system may be turned up when necessary to make the quiet parts louder. PRE-FLIGHT CHECKLIST Before proceeding, it's a good idea to turn the control knobs to the following positions: 1. LEVEL control

.....
.....
.. 0 dB 2. THRESHOLD control ..
..... fully clockwise 3. RATIO control .

.....
.....
.....
.. fully counterclockwise 4. COMPRESSOR switches .. ACTIVE (out) This renders the MC 22 with no compression, but allows signal through at unity gain. No change occurs either in the ACTIVE or BYPASS position of the COMPRESSOR switch. LEVEL Before making any Threshold adjustments, set the LEVEL control so the +4 dBu LED lights occasionally, and the OL LED does not light. Be aware that changes to the Input Level will affect the Threshold level. THRESHOLD The threshold is the point at which gain adjustment begins.

When the input signal is below the threshold, the MC 22 acts like a straight wire. When the signal is loud enough to cross the Threshold, the compressor is active and turns the volume down. Various Threshold points are illustrated in Figure 1 below. How much it gets turned down is determined by the RATIO control (shown at 2:1). RATIO Once the threshold is exceeded, the increase in output compared to the input signal increase depends on the RATIO setting. An ordinary preamp set for unity gain or a straight wire has a ratio of 1:1, that is, the output level tracks the input level perfectly. A 2 dB change at the input produces a 2 dB change at the output. For a 10:1 ratio, a 10 dB blast at the input would rise only 1 dB at the output heavy compression. Kinder, gentler ratios are in the 2:1 to 3:1 range. Figure 2 illustrates various Ratios.

1:1 2:1 4:1 10:1 Figure 2. Threshold at -20 dBu. Ratios of 1:1, 2:1, 4:1, and 10:1. Vertical axis = output level, horizontal axis = input level. Referring to Figure 2, note that the Ratio indicated is the average over 40 dB of compression.

The ratio is initially lower. This action provides a "soft" response which is less audible than hard limiting. For example, the 10:1 ratio response shows an initial ratio of about 6:1 and ends with a ratio of :1. ATTACK TIME Attack is the time which passes between the moment the input signal exceeds the threshold, and the moment that the gain is actually reduced. This can be a difficult control to set, so Rane made it easier by pre-setting an attack time of 30 ms/ 10 dB step, an optimal setting for a wide variety of material.

RELEASE TIME Release time is the time which passes between the moment the input signal drops below the threshold and the moment that the gain is restored.

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Another difficult control for the average user to adjust, Rane presets the release rate at 0.3 dB/ms. **LIMITING** A limiter is a special form of compressor set up especially to reduce peaks for overload protection. In other words, it is a compressor with a maximum ratio. A compressor is usually set up to change the dynamics for purposes of aesthetics, intelligibility, or recording or broadcast limitations. Once the threshold of a limiter is reached, no more signal increase is allowed. The MC 22 acts as a limiter when set at a very high ratio of 10:1. 0 dBu -20 dBu -40 dBu Figure 1. Set to 2:1 Ratio.

Thresholds at -40 dBu, -20 dBu, and 0 dBu. Vertical axis = output level, horizontal axis = input level. **Manual-4 adx NOISE REDUCTION** The adx circuit is an automatic downward expander, acting like a compressor running in reverse, making the quiet parts quieter. This is valuable in reducing system background noise. The MC 22 has an automatic expander set at a Ratio of 2:1 that is only active when the input level drops below -55 dBu. The adx LED illuminates when the downward expander is active. See Figure 3 to the right. **LINKING IN STEREO** When using the MC 22 as a true stereo processor, with left signal in Channel 1 and right signal in Channel 2, it is recommended to turn the LINK switch ON to prevent large balance and image shifts. While LINKed, both channels attenuate by exactly the same amount when either Compressor works, maintaining correct stereo imaging. For both Channel detectors to contribute, set the controls to similar positions in both Channels when LINKed.

The adx circuits are not linked. **MC 22 APPLICATIONS TWO CHANNEL COMPRESSOR/LIMITER** In this case, the audio path on channel 1 is completely separate from channel 2, allowing you to use it as a stereo unit or for doing two completely different processes to two completely different signals. For stereo use, the front panel LINK switch allows you to link Channels. When either Channel's Threshold is reached, both channels compress equally, preserving the stereo image. The higher of the two Ratio settings will affect both Channels when the first Threshold is reached, and the lesser Ratio setting affects both Channels when the second Threshold is reached.

GUITAR & BASS Where does the unit go in the signal chain? Well, that depends on how you want it to function. If it's a comp/limiter for the input signal, it would go after the guitar (if the guitar has a line-level output) and before the preamp. If it's to function as a limiter to protect the speakers in the rig, it would go after the preamp and before the power amp. Another method is to insert the unit in the effect loop of the preamp. This allows the bass signal to be affected by the pre-amp first, then the comp/limiter, and then sent to the power amp.

This can be desirable with tube pre-amps. @@@@severe clipping. @@@@Another good application would be a drum mix or vocal submix. @@@@This provides a very low distortion, low noise line driver. @@@@adx preset to 2:1 Ratio, Threshold at -55 dBu. @@@@Set the equalizer and crossover Inputs to unity gain. Set t risk of unwanted hum and noise. Another way to create the necessary isolation is to use a direct box. @@@@This is a dangerous and illegal practice. 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 can create 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 a matter of personal preference and should be religiously obeyed; choose inputs or outputs and always lift the side you choose (our drawings happen to disconnect the outputs). 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 one-end-only shield connection increases the possibility of high frequency (radio) interference since the shield may act as an antenna. Many reduce this potential RF interference by providing an RF path through a small capacitor (0.1 or 0.01 microfarad ceramic disc) connected from the lifted end of the shield to the chassis. 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. See the following page for suggested cable assemblies for your particular interconnection needs.

Find the appropriate output configuration from either your mixer output or the MX 22 output (down the left side), and then match this with the correct balanced or unbalanced input to the MX 22 or the amplifier (down the right side.) An "off-the-shelf" cable may be available or modifiable. Soldering should only be attempted by those trained in the art. **SUMMARY** If you are unable to do things correctly (i.e.

use fully balanced wiring with shields tied to the chassis at the point of entry, 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.

WINNING THE WIRING WARS · Use balanced connections whenever possible. · 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 ten feet (three meters) in length.

Lengths longer than this will amplify the nasty side effects of unbalanced circuitry's ground loops. This information was condensed from Rane Note 110, "Sound System Interconnection". If you would like the complete note, call or email the factory, download it from Rane's web site (addresses on page Manual-12), or ask your dealer for a copy. **Manual-8 VARIOUS XLR & 1/4" CABLE ASSEMBLIES Manual-9 MOJO GLOSSARY** balanced line The recommended method of interconnecting audio equipment. A balanced line requires three conductors: a twisted-pair for the signal (positive and negative) and an overall shield. The shield must be tied to the chassis at both ends for hum-free interconnect. **bandwidth** Abbr. BW The numerical difference between the upper and lower -3 dB points of an audio band. **clipping** What occurs when a unit tries to produce a signal larger than its power supply. The signal takes on a flat-topped, or clipped shape.

When an amplifier tries to go above its max power, it clips. **compressor** A signal processing device used to reduce the dynamic range of the signal passing through it.



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For instance, an input dynamic range of 110 dB might pass through a compressor and exit with a new dynamic range of 70 dB. The modern usage for compressors is to turn down (or reduce the dynamic range of) just the loudest signals. Other applications use compressors to control the creation of sound. When used in conjunction with microphones and musical instrument pick-ups, compressors help determine the final timbre by selectively compressing specific frequencies and waveforms. connectors Audio equipment uses different styles: RCA An unbalanced pin connector commonly used on consumer and some pro equipment; aka phono plug XLR A 3-pin connector common on pro audio equipment. Preferred for balanced line interconnect; aka Cannon plug 1/4" TRS 1.

Stereo 1/4" connector consisting of tip (T), ring (R), and sleeve (S) sections, with T = left, R = right, and S = ground/shield. 2.

Balanced interconnect with the pos & neg signal lines tied to T and R respectively and S acting only as an overall shield. 3. Insert loop interconnect with T = send, R = return, and S = ground/shield. [Think: ring, right, return] 1/4" TS Mono 1/4" connector consisting of tip (T) [signal] and sleeve (S) [ground & shield] for unbalanced wiring. constant-Q equalizer (also constant-bandwidth) The bandwidth remains constant for all boost/cut levels.

Since Q and bandwidth are interrelated, the terms are fully interchangeable. decibel Abbr. dB (named after Alexander Graham Bell). The preferred method and term for representing the ratio of different audio levels. Being a ratio, decibels have no units.

Everything is relative. So it must be relative to some 0 dB reference point. A suffix letter is added to distinguish between reference points: 0 dBu A reference point equal to 0.775 V +4 dBu Standard pro reference level equal to 1.23 V 0 dBV A reference point equal to 1.0 V -10 dBV Standard reference level for consumer and some pro audio use, equal to 0.316 V. RCA (phono) connectors are a good indicator of units operating at -10 dBV dynamic range The ratio of the loudest signal to the quietest signal in a unit or system as expressed in decibels (dB). expander A signal processing device used to increase the dynamic range of the signal passing through it. Expanders complement compressors.

For example, a compressed input dynamic range of 70 dB might pass through an expander and exit with a new expanded dynamic range of 110 dB. Modern expanders usually operate only below a set threshold point, i.e., they operate only on low-level audio. The term downward expander describes this application type. ground Any electrical reference point for measuring voltage levels. Usually a large conducting body, such as the earth or an electric circuit connected to the earth. Chassis should always be at earth potential. WARNING: SHOCK HAZARD Never use an AC headroom The level in dB between the typical operating level and clipping. @@@@ interpolating Term meaning to insert between two points.

@@levels Terms used to describe relative audio signal levels: mic-level Nominal signal coming directly from a microphone. Very low, in the microvolts, and requires a preamp with at least 60 dB gain before using with any line-level equipment. line-level Standard +4 dBu or -10 dBV audio levels. instrument-level Nominal signal from musical instruments using electrical pick-ups. Varies widely, from very low mic-levels to quite large line-levels.

limiter A compressor with a fixed ratio of 10:1 or greater. The dynamic action prevents the audio signal from becoming larger than the threshold setting.

Linkwitz-Riley crossover The most preferred active crossover design. It features steep 24 dB/octave slopes, in-phase outputs, and flat amplitude response. Due to the in-phase outputs the acoustic lobe resulting when both loudspeakers reproduce the crossover frequency is always on-axis (not tilted up or down) and has no peaking.

noise 1. Interconnect. Unwanted sounds contaminating audio paths. RFI (radio frequency interference) caused by broadcast signals leaking into unbalanced, poorly shielded, or improperly grounded connecting cables. Also by light dimmers, motor controls and computers. 2. Music. A random mix of audio frequencies not harmonically related, sounding like radio static. polarity A signal's electromechanical potential with respect to a reference. For example, a microphone has positive polarity if a positive pressure on its diaphragm results in a positive output voltage.

polarity vs. phase shift: polarity refers to a signal's reference NOT to its phase shift. Being 180 degrees out-of-phase and having inverse polarity are DIFFERENT things. We wrongly say something is out-of-phase when we mean it is inverted. One occurs over a period of time; the other occurs instantaneously. Q (upper-case) Quality factor. Defined to be the ratio of the center frequency f divided by the bandwidth BW for a bandpass filter. signal-to-noise ratio The ratio in dB between a reference level and the noise floor. For example, a signal-to-noise ratio of 90 dB re +4 dBu, means the noise floor is 90 dB below a +4 dBu ref. unbalanced line An audio interconnect scheme using one wire with an overall shield.

The shield must perform two functions: act as the return signal path (ground) and to protect the conductor from noise (shield). Consequently this method is vulnerable to hum & noise problems. unity gain A gain setting of one. The level out equals the level in. line cord ground-lift adapter or cut off the 3rd pin.

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