

IMPORTANT SAFETY INSTRUCTION – READ FIRST



This symbol, whenever it appears, alerts you to the presence of uninsulated dangerous voltage inside the enclosure-voltage that may be sufficient to constitute a risk of shock.



This symbol, wherever it appears, alerts you to important operating and maintenance instructions in the accompanying literature. Read manual.

Read instructions:

Retain these safety and operating instructions for future reference. Heed all warnings printed here and on the equipment. Follow the operating instructions printed in this user guide.

Do not open:

There are no user serviceable parts inside. Refer any service work to qualified technical personnel only.

Power sources:

Connect the unit to mains power only of the type described in this user guide or marked on the rear panel. The power source must provide a good ground connection.

Power cord:

Use the power cord with sealed mains plug appropriate for your local main supply as provided with the equipment. If the provided plug does not fit into your outlet consult your service agent. Route the power cord so that it is not likely to be walked on, stretched or pinched by items placed upon or against.

Grounding:

Do not defeat the grounding and polarization means of the power cord plug. Do not remove or tamper with the ground connection on the power cord.

Ventilation:

Do not obstruct the ventilation slots or position the unit where the air required for ventilation is impeded. If the unit is to be operated in a rack, case or other furniture ensure that it is constructed to allow adequate ventilation.

Moisture:

To reduce the risk of fire or electrical shock do not expose the unit to rain, moisture or use in damp or wet conditions. Do not place container of liquid on it, which may spill into any openings.

Heat:

Do not locate the unit in a place close to excessive heat or direct sunlight, as this could be a fire hazard. Locate the unit away from any equipment, which produces heat such as: power supplies, power amplifiers and heaters.

Environment:

Protect from excessive dirt, dust, heat, and vibration when operating and storing. Avoid tobacco ash, drink spillage and smoke, especially that associated with smoke machines.

Handling:

To prevent damage to the controls and cosmetics avoid rough handling and excessive vibration. Protect the controls from damage during transit. Use adequate padding if you need to ship the unit. To avoid injury to yourself or damage to the equipment take care when lifting, moving or carrying the unit.

Servicing:

Switch off the equipment and unplug the power cord immediately if it is exposed to moisture, spilled liquid, objects fallen into opening, the power cord or plug becomes damaged during a lightening storm or if smoke odor or noise is noted. Refer servicing to qualified technical personnel only.

Installation:

Install the unit in accordance with the instruction printed in the user guide.

The ART TCS™ Twin Compressor System

Table of Contents

Introduction	4
TCS Features	5
Installation	6
AC Power Hookup	6
Analog Audio Connections	6
Safety Precautions	6
Controls and Indicators	7
Rear Connections	9
Operation	10
Compression Basics	10
Expansion Basics	10
Opto Basics	10
VCA Basics	10
Understanding V3	11
V3 Quick Reference Chart	13
Common Applications	14
Additional Applications	16
Warranty Information	18
Service	19
TCS™ Specifications	20
Contact Information	21

INTRODUCTION

Thank you and congratulations on your purchase of an ART TCS (Twin Compressor System). You now own a unique compression system with features unlike any other. Offering a superb level of sound quality, the TCS' dual compression topology allows you to quickly and easily choose from a multitude of compression settings tailored to your needs.

With the ART TCS you now have one of the most versatile compression systems on the market. With both VCA and Optical compression underneath the hood of this compressor, and ART's V3 presets you can easily tune in the compression you need fast. We've carefully chosen 16 presets that cover all of your compression needs. The right setting is just a knob twist away. Need more control? Each setting also allows for tweaking to get it just right.

Compression metering has never been easier than with the TCS. The two VU meters clearly display the gain reduction for each channel, making it visually simple to figure out just how much you're compressing the signal. The ultra-precise LED meters show the average level with a peak hold function to monitor your signal. The TCS is excellent for digital recording since you can see exactly how loud your signal is to avoid digital clipping.

The TCS includes detector loop inserts so you can change the character of the detection path with an inserted EQ, or insert over the detection path with a different signal to duck or create a talk-over effect.

TCS FEATURES

- Optical Compression
- VCA Compression
- 4 Compression Modes /16 Different V3 settings
- Controls Per Channel
 - Attack and Release Transient Controls
 - Ratio Control
 - Threshold Control
 - Noise Reduction (Expander/Gate) with Threshold Control,
 - Noise Reduction Tuning Control and Activity light.
 - Bypass Control
 - Tube Insertion
 - Detector Loop
 - V3 settings
- Front Mounted Instrument Input and Level control on Channel 1
- Switchable Dual Output Controls or Stereo Level + Pan Control
- Stereo Linking capabilities
- Twin VU compression meters
- LED Input / Output level metering with Peak Hold
- 12AX7 Tube Dual Pentode, hand selected.
- ¼ Inch and Balanced XLR I/O
- Torodial Power Transformer for lower noise.

INSTALLATION

The TCS may be used in a wide variety of applications and environments. In a rack-mountable, all-steel enclosure, the unit is designed for continuous professional use. Mounting location is not critical. However, for greater reliability we recommend that you not place the units on top of power amps or other sources of heat. The tube circuitry needs about a minute to “warm up” from a cold power up.

AC Power Hookup

The TCS has an internal power supply designed to operate at 115 VAC @ 50 to 60 Hz. Units manufactured for use outside the United States of America have been modified to comply with the required electrical specifications.

Analog Audio Connections

Audio connections to and from the TCS are balanced XLR (Pin 2 = Hot (+), Pin 3 = Cold (-), Pin 1 = Ground), balanced 1/4" (Tip = Hot (+), Ring = Cold (-), Sleeve = Ground) and unbalanced 1/4" (Tip = Hot (+), Sleeve = Ground).

Safety Precautions

WARNING: To avoid the risk of shock or fire, do not expose this unit to moisture. Refer all servicing to qualified personnel. Do not remove the metal cover; there are no user-serviceable parts inside.

CONTROLS & INDICATORS



① **Power** – Switches the unit’s power on and off.

② **Instrument Input and Level** – The front ¼” jack is intended for instrument level signals and the level control applies from 0 to 30db of gain to the signal.

When using the front instrument jack, the rear inputs on Channel 1 are disconnected.

③ **Compression Controls (Attack, Release, Threshold, Ratio)** – These four controls control the amount of compression and its’ transient settings. These are continuously active throughout all V3 settings (V3 optimizes ranges for selected application).

④ **Noise Reduction Controls (NR Thresh, Shelf, NR Active LED)** – These two controls set the noise reduction characteristics. They are continuously active throughout all V3 settings. Users can look at the LED to determine if the current NR is an expander or a gate by viewing it’s dimming characteristics. When the LED simply turns on and off the NR is a gate, when it slowly fades in and out it is an expander.

As the NR Thresh is increased, the noise reduction will become more sensitive to the signals. Thus, more of the signal will be affected by the NR.

The Shelf control tunes the Noise Reduction detection circuitry such that it is less sensitive to certain frequencies. When fully counter-clockwise the noise reduction is most sensitive to lower frequencies, and when fully clockwise the noise reduction is most sensitive to higher frequencies.

⑤ **Bypass, Tube, Det. Loop Switches** – These 3 switches control the channel settings.

When depressed, the **BYPASS** switch completely bypasses the compressor controls, including output level (It should be noted that this is an active bypass, so if the unit is unpowered no signal shall pass through).

The **TUBE** switch places a 12AX7 tube in the signal path adding tube warmth and gain.

The **DETECTOR LOOP** switch selects the rear inserts for the detection path. This routing is useful for ducking and voiceover techniques.

⑥ **V3 Compression Selector** – This selects the V3 setting for the given channel. To learn more about V3 see pg. 11.

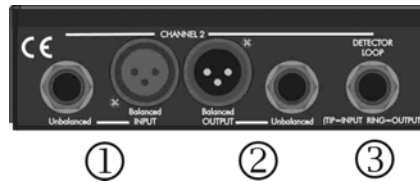
⑦ **LED Meter and Source Selection** – This **LED METER** bar graph shows either the input or the output average level (with a peak hold). The source for the meter is determined via the **LED METER SWITCH**.

⑧ **Output Level** – These knobs function as either dual output level controls or stereo output and pan controls.

⑨ **Stereo Link** – When engaged the unit functions in Stereo Mode. While in this mode the **LEFT CHANNEL CONTROLS** act as the global controls for the unit with the exception of the detector loop controls.

⑩ **Gain Reduction Meters** – These VU meters show how much gain reduction is taking place. When set at 0 there is no compression, and as compression increases, the VU meters move “down” displaying the gain reduction in dB.

REAR CONNECTIONS



① **Rear Input Jacks** – The TCS features both ¼ inch and XLR connectors on the back as inputs wired in parallel. The rear input jacks accept line level signals up to +20dBu.

The rear inputs of Channel 1 are disconnected whenever the front panel ¼” jack is used. This allows you to keep the rear inputs connected in a rack installation and override Channel 1 when you plug into the front panel ¼” jack.

② **Rear Output Jacks** - The TCS features both ¼ inch and XLR connectors on the back as outputs wired in parallel.

③ ¼” **Detector Loop Inputs (Rear)** – The TCS features 2 detector loop inputs on the rear that accept line level signals. These are useful for ducking and voice over applications (the voice signal coming in must be line level, TS jack for override, TRS jack for loop insertion)

OPERATION

Compression Basics – Compression is an effective way to gently control the dynamics of a signal. The most important setting in your compressor is the **threshold**. The **threshold** sets the average signal level, above which the TCS acts on. From there the **ratio** control sets how aggressively the compressor holds signals above the **threshold** to the operating level. Typically a good starting ratio of 2:1 is suggested for vocal settings, 4:1 for instruments, and ∞ :1 for limiting or sustain. Settings with extremely high ratios are called **limiters** because they limit the signal to the operating level. The **attack** and **release** controls are intended for controlling how quickly the compressor begins (**attack**) and ends (**release**) its amplitude reduction. If your sound seems to lack punch try increasing the attack, and if too much of the peaks are coming through, decrease it. With release you want to increase the release time if you hear the compressor pumping, and you want to decrease it if it seems to lack sustain or dynamics.

Expansion Basics – Expanders are basically the opposite of compressors such that they increase the dynamic range of a signal. Typically these are used to remove unwanted portions of a signal that are quieter than the working material. When there are gaps in the working material, the expander quiets signals **beneath** the **noise reduction threshold** to remove any unwanted sound and to increase lower level dynamics. An extreme variant of an expander is a gate, which mutes signals **beneath** the **noise reduction threshold**.

Opto Basics – Optical compression is based on an optical – electric package made up of (in it's simplest definition) a light bulb and a photocell. Many classical compressors employed the use of opto-isolators, and it was a key element to their “sound”. A properly designed opto based compressor is more musical than most VCA based designs. The opto-isolator acts on signal changes much like the eye reacts to light changes – smooth. Based on these characteristics it is felt optical compression works quite well in tracking situations.

VCA Basics – Solid-state compressors make use of what is called a VCA (Voltage Controlled Amplifier). Sometimes in critical situations an opto compressor isn't enough for compression needs, and a VCA based one

might be necessary. If a VCA compressor has one advantage over opto-based compression, it's speed. VCAs have very quick response time when peaks need to be compressed very rapidly. For these reasons VCAs are especially good in situations that require amplitude protection.

Stereo Operation

When placed into stereo mode the TCS uses the left channel controls for all of its compression controls (with exception given to the detection loop). When in "linked" mode, simply use the left channel controls to set your attack, release, threshold, ratio, noise reduction, V3 settings, and the right channel will have the same exact settings. In this mode the output controls function differently. The **Channel 1** output control now controls the master volume, and the **Channel 2** output control now controls the balance of the stereo image.

Understanding V3 – The TCS features the ability to select 4 different compression modes each with presets that tailor the compressor to your needs.

▪ **Compression Modes**

- **Opto** – In this mode the TCS uses only the opto-isolator for it's compression and the VCA is deactivated.
 - Bass – useful for smooth bass compression, this setting uses an expander for the noise reduction.
 - Mix – intended for mix-based material, this setting uses an expander for the noise reduction.
 - Manual – this is a general all-purpose setting, which gives you maximum flexibility; it uses a gate for noise reduction.
 - Vocal – this setting is intended for lead vocals, includes de-essing and a gate for noise reduction.
 - Choral – this setting is intended for group vocals, includes de-essing and a gate for noise reduction.
- **VCA** – In this setting the TCS uses only the VCA component for compression.
 - Vocal – this setting is intended for lead vocal compression, includes de-essing and an expander for the noise reduction.
 - Mix – this setting is intended for mix-based material, includes an expander for noise reduction.

- Manual – this is a general all-purpose setting, which gives you maximum flexibility; it uses a gate for noise reduction.
- Percussion – this setting is intended for percussion compression on single instruments such as snare, kick, etc, and includes a gate for noise reduction.
- Bass – this setting is intended for more aggressive bass sounds and includes a gate for noise reduction.
- **Stack** – Sometimes it just sounds better to have two compressors doing less work, then one doing all the of work. In this setting both the VCA and the opto-isolator perform compression in series giving it a distinct character. Please note in this setting the ratio setting is effectively doubled.
 - Sustain – this setting is intended to squeeze out sustain and includes a gate for noise reduction.
 - Nice – this setting is for when you want extreme compression, it includes a gate for noise reduction.
 - Guitar – this setting is intended for instrument compression includes an expander for noise reduction to maintain the natural decay of the source.
- **OPL** – In this setting the TCS uses the opto-isolator for compression and the VCA acts as a limiter on high signal levels.
 - Leveling – this is intended for smooth optical compression with a VCA limiter, and includes a gate for noise reduction.
 - Mix – this is for mixed based material and uses an optical compression with a VCA limiter and an expander. Ideal for mixing to digital media to prevent digital clipping.
 - Vocal – this is intended for vocals primarily in the live capacity with a limiter on top of the compression. Also, has a de-esser and an expander for NR.

Getting the most out of V3

The best way to become familiar with the V3 settings is to experiment. The presets are intended as a starting place, and are not necessarily set in stone. One hint is to run your program material into the TCS, set the attack, release settings to about mid-point, set the ratio to about 2:1, and gradually increase the threshold until you can see the VU meters reducing gain by about 6 dB. From there, step through the compression settings until you find one that works best for you. After that, tweak away on the controls to customize the sound to your taste.

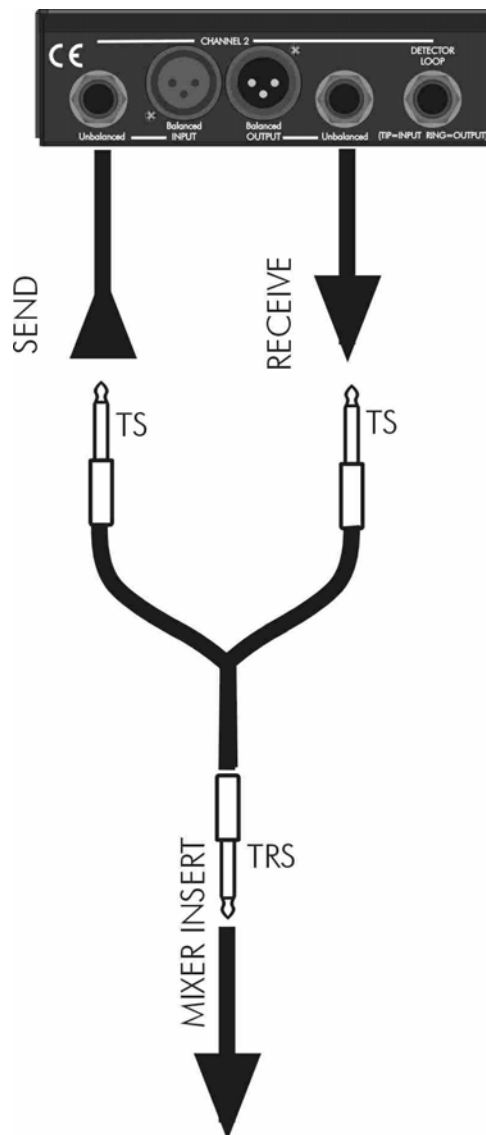
V3 Quick Reference Chart

NAME	MODE	NOISE REDUCTION	SPEED RANGE	NOTES
NICE	STACK	GATE	Normal	
GUITAR	STACK	EXPANDER	Fast	
BASS	OPTO	EXPANDER	Normal	
MIX	OPTO	EXPANDER	Normal	
MANUAL	OPTO	GATE	Fast	
VOCAL	OPTO	GATE	Fast	DE-ESSING
CHORAL	OPTO	GATE	Normal	DE-ESSING
LEVEL	OPL	GATE	Normal	
MIX	OPL	EXPANDER	Fast	
VOCAL	OPL	EXPANDER	Fast	DE-ESSING
VOCAL	VCA	EXPANDER	Fast	DE-ESSING
MIX	VCA	EXPANDER	Normal	
MANUAL	VCA	GATE	Fast	
PERC	VCA	GATE	Normal	
BASS	VCA	GATE	Fast	
SUSTAIN	STACK	GATE	Fast	

COMMON APPLICATIONS

Setting up the TCS with a mixing console

For most compression situations we want to set the TCS in series with the channels it will be processing. Start by first placing an insert cable (¼ inch TRS to 2 ¼ inch TS) into the channel(s) insert point on your console. Next route the “Send” into the Input of your TCS, and route the “Receive” into the Output of the TCS. Now the TCS is serially placed in the signal path of your mixer.

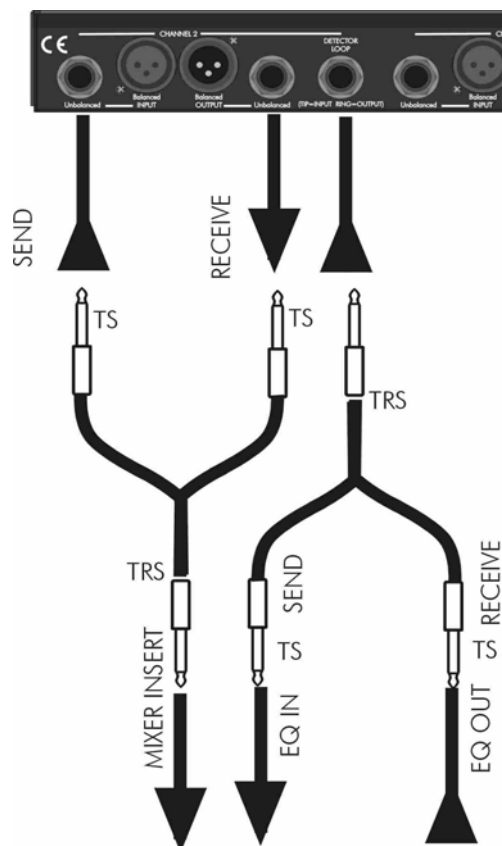


Ducking

One example of utilizing the detector loop inserts on your TCS is ducking. With the TCS connected to the source material to be compressed place a line level signal, such as a vocal mic run through a pre amplifier, into the side chain jack on the TCS. Now the TCS will compress the source material based on the vocal channels dynamics. Increase the threshold control to set the vocal sensitivity, and set the ratio to 4:1. Make sure you use one of the “VCA” settings when using the detector loop input for ducking.

Advanced De-essing

Although the TCS features de-essing on it’s vocal settings, some may wish to use de-essing on a non-vocal setting, or externally adjust the detectors frequency response. Thus another example of using both the send and receive of the detector loop is advanced de-essing with a graphic equalizer. Take an Insert (1/4 inch TRS to 2 1/4 inch TRS) cable and route the “Send” of the TCS into the EQ, then route the output of the EQ into the “Receive” of the TCS. Next boost the frequency bands on the EQ that you wish the TCS to be more sensitive to. The more you change on the EQ the more the TCS will compress that material. Typically the frequency range for sibilance is between 2kHz and 10kHz.



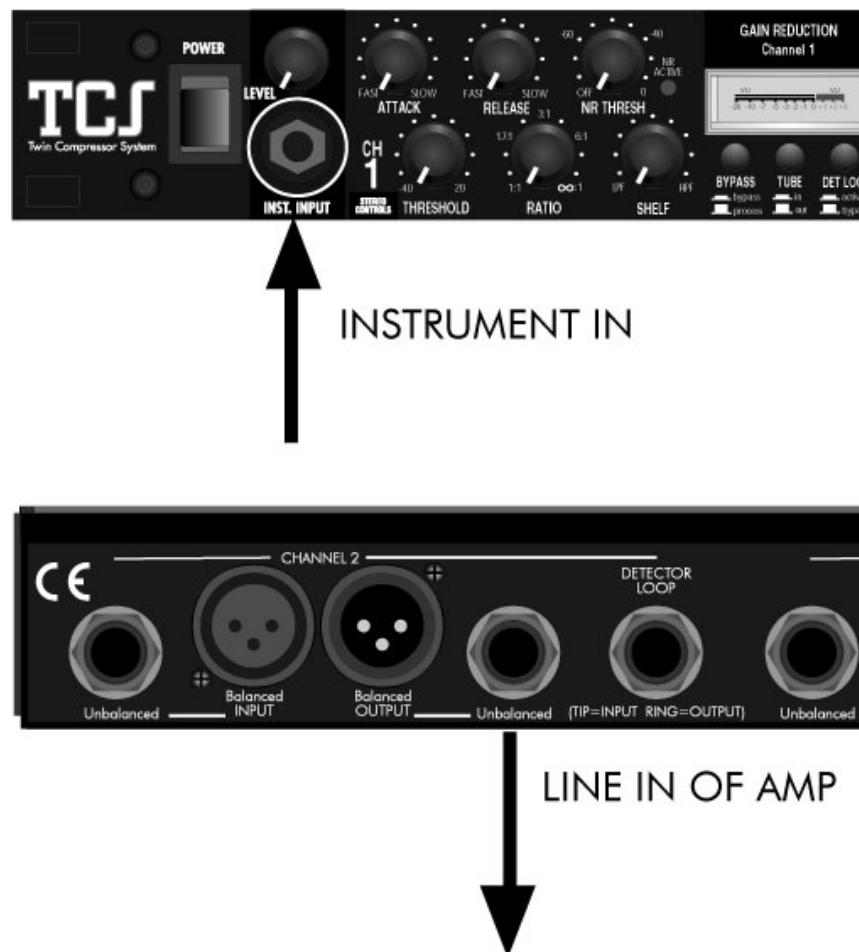
ADDITIONAL APPLICATIONS

Setting up the TCS for sustain with a guitar amplifier

If your guitar amp has a pre-EQ effects loop you can patch the TCS into it. Otherwise plug your guitar into the instrument input on Channel 1 of the TCS, and increase the instrument level until you're working with a decent signal level. Adjust the ratio to about 4:1 and increase the threshold to a comfortable level. Using high amounts of compression clamps down on the incoming note, but if you hold the note for a long time, instead of gradually decaying, the note will get a bit louder.

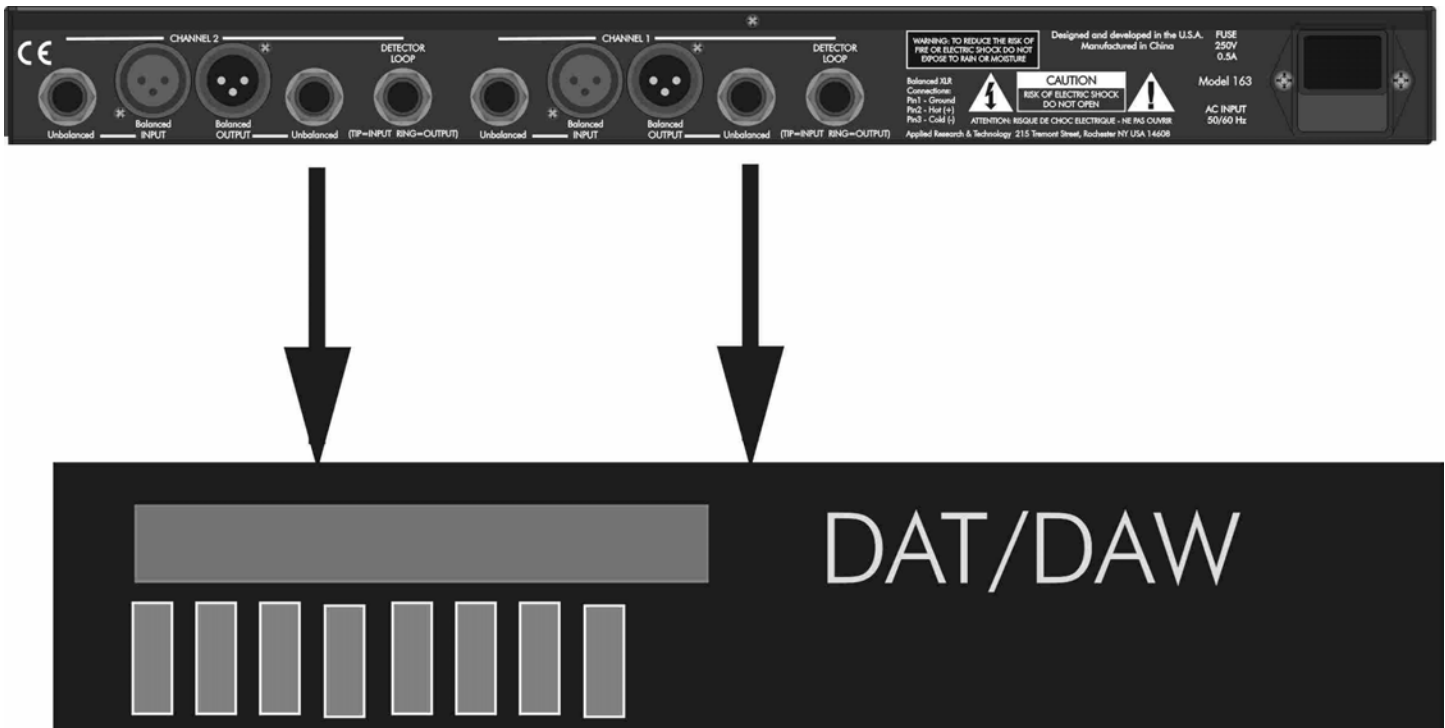
Setting up the TCS as an instrument limiter

Some instruments, particularly slap bass, can damage speakers or overload a mixer if recorded directly. Try running the bass into the instrument input, and select the VCA bass setting. This will clamp down on the spike and allow more overall gain without worrying about distortion or speaker damage.



Setting up the TCS for stereo mastering

For bus mastering or stereo mix mastering try placing the TCS in the signal chain after the mixer, or on a subgroup bus. From there try the OPL settings labeled **MIX** and **VOCAL**. The OPL settings will allow the VCA to limit any peaks, and have the opto-isolator carry out the leveling compression.



WARRANTY INFORMATION

Limited Warranty

Applied Research and Technology will provide warranty and service for this unit in accordance with the following warrants:

Applied Research and Technology, (A R T) warrants to the original purchaser that this product and the components thereof will be free from defects in workmanship and materials for a period of three years from the date of purchase. Applied Research and Technology will, without charge, repair or replace, at its option, defective product or component parts upon prepaid delivery to the factory service department or authorized service center, accompanied by proof of purchase date in the form of a valid sales receipt.

Exclusions:

This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. This warranty is void if the serial number is altered, defaced, or removed.

A R T reserves the right to make changes in design or make additions to or improvements upon this product without any obligation to install the same on products previously manufactured.

A R T shall not be liable for any consequential damages, including without limitation damages resulting from loss of use. Some states do not allow limitations of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific rights and you may have other rights, which vary, from state to state.

For units purchased outside the United States, an authorized distributor of Applied Research and Technology will provide service.

SERVICE

The following information is provided in the unlikely event that your unit requires service.

1) Be sure that the unit is the cause of the problem. Check to make sure the unit has the proper power supplied, all cables are connected correctly, and the cables themselves are in working condition.

2) If you find the unit to be at fault, write down a complete description of the problem, including how and when the problem occurs.

3) Contact our Customer Service Department at (585) 436-2720 for your Return Authorization number or questions regarding technical assistance or repairs. Customer Service hours are 9:00 AM to 5:00 PM Eastern Time, Monday through Friday.

4) Pack the unit in its original carton or a reasonable substitute. The packing box is not recommended as a shipping carton. Put the packaged unit in another box for shipping. Print the RA number clearly on the outside of the shipping box. Print your return shipping address on the outside of the box.

5) Include with your unit: a return shipping address (we cannot ship to a P.O. Box), a copy of your purchase receipt, a daytime phone number, and a description of the problem.

6) Ship your unit (keep your manual!) to:

APPLIED RESEARCH AND TECHNOLOGY

215 TREMONT STREET
ROCHESTER, NEW YORK 14608

RA# _____

Fill in the following information for your reference:

Date of purchase _____

Purchased from _____

Serial number _____

TCS™ SPECIFICATIONS

Dimensions		1.75"H x 19"W x 7.5"D
Weight		7.0 lbs.
Analog Input Connections		Front: ¼ inch instrument (unbal) Rear: XLR, ¼ inch TRS (balanced)
Analog Output Connections		XLR, ¼ inch TRS (balanced),
Detector Loop Connections		¼ inch TRS (Tip = Receive, Ring = Send)
Analog Input Impedance		
XLR, ¼ inch line		10k Ohm
Instrument Input		1M Ohm
Analog Output Impedance		XLR-300 ohms, ¼" -150ohms
Maximum Input Level		+20dBu (Rear), +14dBu (Front ¼" instrument)
Maximum Output Level		+20dBu
Frequency Response		10Hz to 150KHz, ±1dB
Dynamic Range		>120dB
Total Harmonic Distortion		<0.01% typical @ 1kHz (tube out)
Equivalent Input Noise (EIN)		
Rear XLR, ¼" line		-97 dBu typical
Front Instrument ¼"		-106 dBu typical
Attack Time		
Opto		1ms to 100ms (normal), .1ms to 10ms (fast)
VCA		1ms to 100ms (normal), .15ms to 15ms (fast)
Release Time		
Opto		.4sec to 15sec (normal), .1sec to 4sec (fast)
VCA		.16sec to 8sec (normal), 50ms to 2sec (fast)
Slope		Variable from 1:1 to > 10:1
Maximum Attenuation		25dB (Opto), 35dB (VCA), 60dB (Gate)
Threshold Range		-40db to +20db
NR Threshold Range		Off to 0dB
Shelf Frequency Cutoffs		10Hz to 700Hz (Low), 1kHz to 20kHz (High)
Tube Type		12AX7A, Dual Triode, Hand Selected
Transformer Type		Torodial
Power Requirements		USA – 110-125V AC / 50-60hz/ 16W export units configured for country of destination.

ART maintains a policy of constant product improvement. ART reserves the right to make changes in design or make additions to or improvements upon this product without any obligation to install same on products previously manufactured. Therefore, specifications are subject to change without notice.



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