

PRECAUTIONS !



WARNING - THIS APPARATUS MUST BE EARTHED.

Use only a three wire grounding type line cord, like the one supplied with the TC1128.



Be advised that different operating voltages requires different voltage selection at the mains voltage selector, and the use of a different type line cord and attachment plug. In doubt contact your TC distributor.

Check the voltage in your area and use the correct type. See table below:

Voltage	Line plug according to standard
110-125V	UL817 and CSA C 22.2 no. 42.
220-230V	CEE 7 page VII, SR section 107-2-D1/IEC 83 page C4.
240V	BS 1363 of 1984. Specification for 13A. fused plugs and switched and un-switched socket outlets.



CAUTION - Do not open the TC1128. Risk of electric shock inside.

There are no user-serviceable parts inside.

Refer servicing to qualified service personnel only.



The TC1128 should only be located so that its location or position does not interfere with its proper ventilation.



To prevent electrical shock or fire hazard, do not expose the TC1128 to rain or moisture.



Do not rely solely on the front screws when mounted in touring rack. Support the back of the TC1128 as well.

Please report any shipment damage or equipment malfunctions to your dealer, TC distributor or the TC head office in Denmark.

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 installations. 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.*

The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to identify and Resolve Radio/TV interference Problems."

This booklet is available from the US. Government Printing Office, Washington, DC 20402, Stock No. 004-000-0034-4.

Caution:

You are cautioned that any change or modifications not expressly approved in this manual could void your authority to operate this equipment.

For the customers in Canada:

*This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.*

Certificate Of Conformity

TC Electronic A/S, Grimhøjvej 3, 8220 Brabrand, Denmark, hereby declares on own responsibility that following product:

TC 1128 Programmable 28 Band Graphic Equalizer / Spectrum Analyser

That is covered by this certificate and marked with CE-label conforms with following standards:

EN 60065 (IEC 65) Safety requirements for mains operated electronic and related apparatus for household and similar general use.

EN 50081-1 Electromagnetic compatibility - Generic emission standard - Part 1: Residential, commercial and light industry.

EN 50082-1 Electromagnetic compatibility - Generic immunity standard - Part 1: Residential, commercial and light industry.

With reference to regulations in following directives:

73/23/EEC, 89/336/EEC

Issued in Brabrand, February 8. 1996

*Anders Fauerskov
Chief Executive Officer*

USER GUIDE

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INTRODUCTION

Congratulations on your purchase of the **worlds most versatile equalizer!** The **TC1128/TC1128X** offers features and applications that have never been available before... this means that some of the concepts explained in this manual will be new to you. We can only ask you to set some time aside for experimenting with the **TC1128/TC1128X** in your system. The absolute top sound engineers in the world have taken the time to understand the power of the **TC1128/TC1128X** and they have applied this technology in new and unique ways! The option selection and complimentary products for this equalizer gives you a multitude of variations to match just your application and we hope that you can learn the world of computer controlled audio and can apply this powerful work tool to solve your audio challenges!

GETTING STARTED

BASIC EQ ADJUSTMENT

1. Make sure **SWEEP** and **TRACK** LED indicators are off.
2. Press **DISPLAY** if the display is not currently showing the EQ settings.
3. Press **FILTER**, and then **SINGLE**.
4. Use the dial **PUSH ENTER** knob to make eq settings by turning the knob to select an eq band. Notice that the frequency is shown at the bottom of the display. When you push and turn the knob at the same time, you adjust boost/cut and a fader appears visualizing the position. The exact dB value is shown on the bottom line.
5. As you are turning this knob the frequency content of the audio signal is being changed. Repeat the selection process to adjust other frequency bands.

MORE ADVANCED ADJUSTMENT

1. Press the **FLAT** key to start a new EQ curve.
2. This time, press the **BROAD** key instead of the **SINGLE** key. Turn to a frequency band near the center of the display and turn the **PUSH ENTER** knob clockwise while holding it pushed in... a "wave" of frequencies will be boosted.
3. Try also the **LOW** and **HIGH** shelving keys
4. Notice as long as you are at the same frequency, you can switch between the different contours.

Now let's try doing a **parametric** approach:

1. Press the **SWEEP** key.
2. To make an eq setting of +8dB at 1kHz : press **FLAT**, turn the **PUSH ENTER** knob to 1kHz. Push in and hold in while turning up to +8dB
3. Notice now as you release the **PUSH ENTER** knob you are able to sweep up and down the frequency spectrum by turning the knob left or right.
4. To store the current setting, press the **PUSH ENTER** knob twice or press **FILTER**.

Setting the **LEVEL**:

The **LEVEL** appears as the 29th.(wider) band on the far right hand side of the display. In **FILTER** mode, simply turn the cursor to this band and change as any other band. **LEVEL** is used for matching the volume of the preset with the volume of by-pass ("eq off").

PINK NOISE OPTION

AUTOMATIC ROOM ANALYSIS

To perform an **1 position room analysis**, you can follow the procedure below. A more detailed description of the parameters is found in the PINK NOISE menu description.

1. Turn power off and then on again. This makes sure that "old" measurements are erased from the memory and MEASUREMENT NO: is reset.
2. Connect a microphone with a relatively flat frequency response to the INPUT JACK using a stereo 1/4" jack. For connection details refer to the REAR PANEL description. The pink noise will be output via the jack- and XLR-output. This should and normally will be connected to your power amplifier and speaker system.
3. Enter the UTILITY menu and select the PINK NOISE OPTION menu.
4. If needed, scroll down and turn on PHANTOM POWER for the microphone you are using.
5. Set the PINK NOISE menu settings as follows (factory default settings):

		comments
MEASUREMENT NO.	: 00	first measurement
RESULT 1 WEIGHT	: 00	(= off)
RESULT 2 WEIGHT	: 00	(= off)
RESULT 3 WEIGHT	: 00	(= off)
RESULT 4 WEIGHT	: 00	(= off)
AUTOLIN METHOD	: SWEEP/PARAL	(experiment !)
TARGET RESPONSE	: 00	(= off)
MIC AUTOSET	: ON	auto level adjustment of micamp.
MIC RESPONSE PRE	: 00	(= off)

6. Physically locate the test microphone where you want to measure. One suggestion is to place it in a good listening position.
7. Select START AUTOLIN 1 on top of the PINK NOISE menu and press PUSH ENTER.
8. If you find the pink noise level insufficient (LEVEL TOO LOW); enter the PINK NOISE menu again and adjust NOISE LEVEL briefly. You might use PINK NOISE ONLY = ON to adjust NOISE LEVEL.

9. When the measurement is finished, press the STORE button and turn the PUSH ENTER knob to a preset number you can overwrite. Press the PUSH ENTER knob in and the measurement is now stored into this preset number location. Exit STORE mode by pressing the FILTER key.

Now you can compare the result before and after the measurement. Simply play some music through the equalizer and toggle the EQ ON button. If you're not satisfied you can do this procedure over and over again moving the test microphone to different locations. In the beginning don't hesitate to experiment with SWEEP or PARALLEL methods. You will find a noticeable difference between the 2 methods. **IN THE END - TRUST YOUR EARS !**

AN ACCURATE ACOUSTIC RESPONSE HAS NEVER BEEN EASIER !

Everytime you start a new measurement just use START AUTOLIN 1 and store the measurements in different presets. You can then afterwards always recall the different measurements while listening to the music through the equalizer.

REMEMBER: The physical location of the microphone is the only variable with this method and essential for the result of the measurement. Don't be afraid of experimenting in order for you to find the best and easiest procedure.

"MORE ADVANCED ROOM ANALYSIS "

To perform an **4 position room analysis**, you need to:

1. Turn power off and then start again. This makes sure that "old" measurements are erased from the memory and MEASUREMENT NO: is reset.
2. Connect a microphone with a relatively flat frequency response to the INPUT JACK using a stereo 1/4" jack. For connection detail refer to the REAR PANEL description. The pink noise will be output through the OUTPUT JACK and XLR.
3. Enter the UTILITY menu and select the PINK NOISE OPTION menu.
4. Turn on PHANTOM POWER if needed for the microphone in use.

5. As an example set the PINK NOISE menu settings as follows:

		comments
MEASUREMENT NO.	: 00	first measurement
RESULT 1 WEIGHT	: 10	40% of RESULT
RESULT 2 WEIGHT	: 05	20% of RESULT
RESULT 3 WEIGHT	: 05	20% of RESULT
RESULT 4 WEIGHT	: 05	20% of RESULT
AUTOLIN METHOD	: SWEEP/PARAL	(experiment !)
TARGET RESPONSE	: 00	(= off)
MIC AUTOSET	: ON	
MIC RESPONSE PRE	: 00	(= off)

6. Physically locate the test microphone at the "center" of the listening area. This location has been weighted to be the most important analysis point.
7. Go to START AUTOLIN 1 and press PUSH ENTER and 1st measurement is active. The LCD display will show "WORKING". If the "LEVEL TOO LOW..." message appears please adjust the NOISE LEVEL and START AUTOLIN 1 again.
8. When the measurement is finished, move the microphone to a position half way between the 1st measurement position and the wall off to the stage left side. Then select START AUTOLIN 2 and press PUSH ENTER and 2nd measurement will start.
9. After this measurement is finished, move the microphone to a position half way between the 1st measurement position and the back wall. Return to the **TC 1128** and select START AUTOLIN 3 and press PUSH ENTER. 3rd measurement will start.
10. After the pink noise analysis stops, move the microphone to a position half way between the 1st measurement position and the wall off to the stage right. Then select START AUTOLIN 4 and press PUSH ENTER. The 4th and last measurement will start.
11. When this measurement is finished, in order to have the calculated response curve - select FINAL RESPONSE. This is a read-only parameter which shows the result of your weightings.
12. Press the STORE button and turn the PUSH ENTER knob to a preset number that you can overwrite. Press the PUSH ENTER knob in and the FINAL RESPONSE curve is now stored into this preset number location for safety backup and later recall

You now have an example of a reference curve for this acoustic space that is more accurate than any analysis you could have done with many pieces of equipment and many hours of setup !! Notice that the time taken to do this complete analysis is approximately 10-20 minutes depending on measurements methods!

13. A tip for permanent installations: Copy and STORE your reference curve into the display and then pressing STORE. Turn the PUSH ENTER knob to another preset number that you can overwrite and then press the PUSH ENTER knob in. The original EQ curve is now copied to the new preset number. Repeat this many times so you have many presets that can be modified and compared quickly. Experiment with modifications to these EQ settings with different program material. You will soon have preferred curves for different types of music, different sizes of crowds, different temperatures, different sound engineers, etc.

DESCRIPTION OF TC 1128 FRONT PANEL

1. POWER

A few seconds after you turn on the POWER, the display will show the startup screen with the software version number. After a short delay, you will hear the by-pass relays activate which sends the audio signal through the device. Should power be lost during a performance, the XLR inputs are connected to the XLR outputs automatically by these relays.

2. INPUT GAIN

Press this button to select the input gain. Adjust it by using the PUSH ENTER knob. You can see the gain of the input signal as you turn the knob. Clipping of the input is indicated on the spectrum analyzer bar graphs by segments "disappearing" at the bottom of a fully illuminated bar graph. Adjust the gain for maximum signal without clipping indication.

3. EQ ON

This is a software controlled by-pass function which electrically by-passes the equalizer circuitry.

4. FREEZE

Press FREEZE to stop the analyzer display so that you can see the frequency content of the signal. Pressing FREEZE once again will return the spectrum display to real time viewing. In the UTILITY menu - ANALYZER SETUP you can program the analyzer to show the input (pre EQ) or the output (post EQ). The TRACK FUNCTIONS menu allows you to program the TRACK button so that an inverse EQ setting is automatically generated based on a pre-EQ FREEZE spectrum response so that a post-EQ flat frequency response is obtained. This function is called ALIGN SA RESP. Refer to the TRACK FUNCTION DISPLAY for explanation.

5. 1 - 99 (preset number)

The 99 presets store the EQ boost/cut settings for the 28 frequency bands and the input and output gain settings. The input gain settings can be set so that they are not activated upon recall (see the PRESET HANDLING DISPLAY section for more information). When previewing presets, the **1-99** number will blink meaning that this preset is being displayed but is **not** being applied to the audio signal. When the display is not blinking, this preset is applied to the audio path. **NOTE:** The UTILITY menu - PRESET HANDLING allows presets to be labeled, protected against overwrite, and downloaded to other devices or for permanent storage.

6. GRAPHICS LCD DISPLAY

The LCD (liquid crystal display) is a critical part of the TC 1128 user interface. The ability to show real time spectrum response, draw frequency curves and write large amounts of text information is what makes this equalizer so powerful and easy to understand !

7. OVERLOAD LED INDICATOR

Overload indication shows if any of the internal circuits are being over driven. Input gain should be set for occasional indication.

8. TRACK LED INDICATOR

The TRACK LED is able to show MIDI input data or valid timecode indication. The setup for this indicator is in the UTILITY MENU - TRACK FUNCTIONS display.

9. DISPLAY

The DISPLAY key cycles between three types of display on the LCD:

1. EQ & ANALYZER simultaneously
2. EQ ONLY (full screen)
3. ANALYZER ONLY (full screen)

10. FLAT

Sets all frequency bands flat (no boost or cut). Audio still passes through the gain and equalizer circuitry. This key can be disabled (locked) against accidental usage under the UTILITY menu - SYS PARAMETERS.

11. TRACK

The TRACK button is a programmable function key. The functions to be controlled by this button are set in the UTILITY menu - TRACK FUNCTIONS DISPLAY section.

12. SWEEP

Make a parametric setting. Whatever curve contour you have chosen you will be able to sweep the curve through the 28 bands. To keep the current eq setting turn off SWEEP or PUSH ENTER twice quickly (referred to as **doubleclick** in the following).

CURVE EDIT CONTOUR KEYS

Four keys allowing you to adjust one or several faders at a time. With several faders, the faders follow a predefined contour:

13. SINGLE BAND

Single fader adjustment similar to the adjustment of a single fader on a standard 1/3 octave graphic equalizer.

14. BROAD BAND

Adjust more than a single band. This functions similar to a parametric equalizer so that adjustments are done in "waves" of frequency changes. To see how this works, press the FLAT key once so you have no EQ setting, then press the BROAD key. Press and turn the PUSH ENTER knob (while holding in) and you will see a curve of filters. The response of this curve can be selected as either 3dB, 6dB, 9dB, 12dB per octave preselected in the UTILITY menu - EQUALIZER SET-UP, or press and hold the BROAD key while dialing the PUSH ENTER.

15. LOW SHELVING

Boost or cut of all frequencies lower than the selected band.

16. HIGH SHELVING

Boost or cut of all frequencies higher than the selected band.

PRESET HANDLING KEYS

There are 3 selection buttons which are used for activating EQ settings, placing them into the TC1128's memory or combining EQ curve settings. Refer to the UTILITY menu - PRESET HANDLING to see even more features:

17. RECALL

The first press on the RECALL button enables the PUSH ENTER knob to control the viewing of the EQ settings that are in the 01-99 memories. There is no change to the audio signal while scrolling thru the memories until you press the PUSH ENTER knob in to select the displayed EQ memory. If you hold the PUSH ENTER knob in while turning, the EQ memories will be activated (change audio response) immediately as you scroll.

Exit RECALL mode by pressing the FILTER button.

18. ADD

If you want to combine the current EQ settings with EQ settings from one of the 01-99 memories, press ADD and select the 01-99 memory and then press the PUSH ENTER knob in. This combining of settings is useful if you want to compensate for room acoustics or microphone characteristics... just add the measurement curve to the modification that you feel sounds best.

If two curves added together are greater than the maximum dB range, the setting will be limited to the maximum dB.

Exit the ADD mode by pressing the FILTER button.

19. STORE

By pressing the STORE button you can turn the PUSH ENTER knob to the 01-99 memory number that you want an EQ setting to be stored in. When you press the PUSH ENTER knob in, the setting is then stored in memory. Preset labeling, inclusion of input gain, memory protect, and dumping of memories via MIDI are available in the UTILITY menu PRESET HANDLING.

20. UTIL

Press the UTIL (Utility) button to enter the menu system on the front panel LCD (or monitor option). Setup parameters are as follows (the parameters are explained in the UTILITY MENU section:

SYSTEM PARAMETERS

PINK NOISE OPTION

TRACK FUNCTIONS

PRESET HANDLING

ANALYZER SETUP

EQUALIZER SETUP

Return to the UTILITY main menu by pressing the UTILITY button again or exit the UTILITY menu by pressing the FILTER button.

21. FILTER

This button is used to put the unit back into the normal "edit ready" mode. For example, if you are in the utilities menu and want to get back to adjusting the EQ, then press FILTER the unit will return to the last display mode.

22. PUSH ENTER

The PUSH ENTER button is used to make adjustments. Push and turn it clockwise to increase values and counter clockwise to decrease values.

MINOR RESET

COMMAND = hold PUSH ENTER 10 sec's or until you hear the bypass relays activate at power on, and press the DISPLAY button. **It's very important that you remember to press DISPLAY** as it then initializes the parameters and confirms the reset.

This reset will zero some common parameters but will not effect the EQ presets in memory. This reset is used if for any reason there is a partial microprocessor failure, for example from power line spikes, etc. This will also allow you to "open" a security locked unit if you have forgotten the programmed lock combination (see the SYSTEM PARAMETERS DISPLAY explanation).

WARNING: THE MEMORY PROTECT SETTING IS SET OFF SO TURN IT ON AGAIN IF NEEDED !

MAJOR RESET

COMMAND = press FLAT and STORE 5 sec's or until you hear the bypass relays activate at power on, and press the DISPLAY button.

After you have turned the power on, the display will show "PRESET STORE ". If you don't press the DISPLAY button the LCD will show "ALL PARAMETERS INITIALIZED". Then press DISPLAY. Your TC1128 is now in its standard factory setup. This reset is used if you want to erase all previously set parameters, for example if you are using the TC1128 in a rental situation.

ALL PRESETS ARE LOST !

DESCRIPTION OF TC1128X FRONT PANEL

1. POWER ON / OFF

When power is first applied, the 7-segment display will briefly show the MIDI device number that has been assigned to the unit. This is useful if you have multiple units so you can see that all devices are set to function together.

2. PRESET

The first time you press PRESET, the 01-99 display will show the eq preset that is now active and the UP and DOWN keys can cycle through the preset numbers. The second time you press PRESET, the EQ ON and ON LINE keys will function. The 01-99 display will show "- -" which shows that the PRESET mode is not active right now.

3. EQ ON

This is a bypass function which removes the audio signal from the equalizer circuit. The 01-99 display must be showing "- -" for this function to be accessed. Toggle the PRESET key to get out of PRESET display mode if necessary.

4. ON LINE

This key determines if the **TC1128X** should listen to the MIDI communications port or not. For example, when connected together with another **TC1128** as a stereo pair, you can adjust them together, then take the SLAVE unit OFF LINE and make final adjustments to the MASTER unit without effecting the SLAVE. The LED indicator MUST show ON LINE for external communications with other **TC1128's** or computer control (EQTALK program).

5. 01 - 99 (PRESETS)

There can be 99 eq memories stored in the **TC1128X**. After programming the frequency response using another **TC1128** or an external device, a user only needs control over the PRESET number to activate the memory. For example, a curve can be stored for "theater" acoustics, and another curve can be stored for "pop music" acoustics. A non-technical user needs just to remember to select preset 1 or preset 2

6. OVERLOAD LED INDICATOR

Overload indication shows if any of the internal circuits are being over driven. The gain adjustment must be made by a master **TC1128**, an external computer (EQTALK), or the **TC6032** motor fader REMOTE.

7. TRACK LED INDICATOR

This flashes when MIDI communication is taking place. For example, in a stereo setup the MIDI communication takes place roughly once every 2 seconds, and immediately when changes are made.

NEW DEVICE NUMBER:

Turn the power on while holding the PRESET button depressed. The numbers on the 01-99 display will begin to flash the default MIDI device number. You can now use the UP/DOWN buttons to select the desired number. Press the PRESET button again, and the number will be stored and the display will return to normal.

MINOR RESET

Hold the PRESET key depressed for 5 seconds when powering up. Turn power off again and back on and all parameters are now set to their default value. This will not erase the presets stored in memory.

MAJOR RESET

A major reset is not possible, however all presets can be overwritten by performing a MIDI EXCLUSIVE DUMP of data from an "empty" **TC1128** to the **TC1128X**. Connect the **TC1128** MIDI OUT to the **TC1128X** MIDI IN and activate the MIDI EXCL. DUMP selection under the UTILITY menu - PRESET HANDLING.

REAR PANEL CONNECTORS

INPUT JACKunbalanced 1/4 " jack socket

- when PINK NOISE OPTION is installed, this is a balanced microphone input (stereo connection with phantom power = + 48v DC).

OUTPUT JACKunbalanced 1/4 " jack socket

INPUT XLR Pin 1 = ground

Pin 2 = hot

Pin 3 = cold

OUTPUT XLRPin 1 = ground

Pin 2 = hot

Pin 3 = cold

- **NOTE:** connection from XLR input to output is made automatically upon power loss.

MIDI OUTPUT 5 pin DIN connector

MIDI INPUT5 pin DIN connector

MIDI THRU5 pin DIN connector

ASSIGN SWITCH1/4 " jack socket for TC 0050 (5 switches + 4 resistors)

- when SMPTE/MTC option is installed, a stereo jack is connected here for SMPTE input/output, TIP = IN, RING = OUT.

TC LINK 1/4 " jack socket for connection to TC 0144 foot controller.

MONITOR OPTION RGB OUTPUT.....9 pin D connector

pin 1: ground

pin 6: intensity

pin 2: not connected

pin 7: not connected

pin 3: blue (**B**)

pin 8: horiz. sync

pin 4: red (**R**)

pin 9: vert. sync

pin 5: green (**G**)

MONITOR OPTION VIDEO OUTPUTRCA jack socket
(internal jumper for PAL or NTSC)

MONITOR OPTION RS 232 MOUSEnot implemented

TC1128 OPTIONS

Here is a list of the options for the TC1128:

1. **PINK NOISE** - generator + microphone input + analysis software for automatic acoustic equalization
2. **RGB MONITOR OUTPUT** - RGB and video output for displaying the front panel LCD on a large screen.
3. **SMPTE/MIDI TIME CODE** - software addition for synchronizing preset changes to timecode.
4. **+/- 16 dB BOOST/CUT RANGE** - additional upgrade circuitry for larger EQ range. This requires **PC99** or **Mac99** or **TC6032** for proper viewing.
5. **REMPAL** - required in order to communicate with **TC6032**.

NOTE: PINK NOISE and SMPTE options can not be mounted in the same unit at the same time.

NOTE: PINK NOISE option can not be installed in +/- 16 dB versions.'

TC1128X OPTIONS

The X version is primarily used as a slave device for a **TC1128** when used for live acoustic analysis or stereo operation, so the PINK NOISE, SMPTE, and MONITOR options must be mounted in the standard TC1128 and not in the X version.

1. **REMPAL** - required in order to communicate with **TC6032**.
2. **+/- 16 dB BOOST/CUT RANGE** upgrade.

REMOTE CONTROL OPTIONS:

1. **EQTALK**; PC (PC99) or MacIntosh (MAC99) dedicated control software
2. **PCMIDI** - MIDI card for PC computers
3. **PCM99** - an external MIDI interface for serial computer ports
4. **TC6032** motor fader remote controller + **MM24** MIDI Matrix, which allows the **TC6032** to control up to 32 **TC1128/TC1128Xs**
5. **MIDI** "fader screen" control by existing sequencer products (not supplied by t.c. electronic)
6. **TC0050** programmable remote switches (ASSIGN jack socket)
7. **TC0144** TCLINK foot controller
8. **CrownIQ** and **RS-485** option card for 1128.

UTILITY MENU

SYSTEM PARAMETERS DISPLAY:

SYSTEM PARAMETERS	POSSIBLE VALUES	DETAIL
VIEWING ANGLE : 02	from 01 to 7	A
BACKLIGHT LEVEL : 03	from 00 to 3	B

STEREO MASTER : NO	NO/YES	C

DISABLE FLATKEY : NO	NO/YES	D

MIDI IN ENABLE : YES	NO/YES	E
MIDI CHANNEL : 01	01-16	F
MIDI OMNI MODE : OFF	OFF/ON	G
MIDI DEVICE NO. : 01	01-99	H
MIDI DEV. OMNI : OFF	OFF/ON	I
MIDI EXCL. THRU : ON	OFF/ON	J

KEYCODES RECV. : ON	OFF/ON	K
KEYCODES SEND : ON	OFF/ON	L

TCLINK ENABLE : NO	NO/YES	M

REMOTE KEY 1 : OFKEY	(almost anything)	N
REMOTE KEY 2 : OFKEY	(almost anything)	O
REMOTE KEY 3 : OFKEY	(almost anything)	P
REMOTE KEY 4 : OFKEY	(almost anything)	Q
LEARN/TRIG KEY : OFKEY	(almost anything)	R

SECURITY LOCK	Press PUSH ENTER	S
CODE DIAL LEFT : 00	01-99	T
CODE DIAL RIGHT : 00	01-99	U

-
1. Turn the PUSH ENTER to highlight the menu choice you want.
 2. Adjust the choice by pressing and turning the PUSH ENTER knob at the same time.
-

- A** **VIEWING ANGLE** - Adjust for best LCD display contrast on your working angle.
- B** **BACKLIGHT LEVEL** - Setting for the backlight level of the LCD display.

SYSTEM PARAMETERS DISPLAY:

continued...

- C** **STEREO MASTER** - When setting up two **TC1128** units to work in stereo, set the unit that you will adjust to be the "master", and the other unit (a slave **TC1128/TC1128X**) will follow all adjustments made by the master as a complete clone/copy. Refer to the short stereo explanation in this manual.

- D** **DISABLE FLATKEY** - Disable the FLAT key so that no one can change an EQ setting to flat accidentally during a performance.

- E** **MIDI IN ENABLE** - MIDI enable tells the **TC1128** to listen to the MIDI input for remote commands coming in at the MIDI INPUT port. This must be set to YES when working as a slave unit.

- F** **MIDI CHANNEL** - Select one of the 16 MIDI channels for sending and receiving data. (Read the omni definition...)

- G** **MIDI OMNI MODE** - Select omni mode if you want the unit to send data on the MIDI CH set in **F** and receive data from any MIDI channel.

- H** **MIDI DEVICE NO.** - MIDI device number is the same as an address. In stereo mode, units need to be set to the same device number (1). Another example is a **TC6032** or the **EQTALK** computer program system where each unit must have a unique device number (1 to 32).

- I** **MIDI DEV. OMNI** - Select device omni mode if you want the **TC1128** to listen to all MIDI device numbers (Quad applications ?). This is also VERY helpful if you need to download a MIDI SYS EXCL. DUMP but don't know the device number of the **TC1128** that is sending (for example, previously recorded preset data).

- J** **MIDI EXCEL. THRU** - This should normally be set to ON. When a command is sent from a MIDI command device such as **EQTALK** to a particular device number, the command is sent through all units in a daisy chained system. However the command is only accepted in the unit with that exact device number. If the selection is set to OFF the command will stop in this unit and therefore never reach the intended unit.

- K** **KEYCODES RECV** - Keycodes are the numbers that are sent out over the MIDI connection every time a key on the front panel is pressed. If you have sent these to a MIDI recorder, activate this to "listen" to them.

- L** **KEYCODES SEND** - Transmit keycodes if you want to record front panel control commands into a MIDI recorder (sequencer) or other **TC1128/TC1128Xs**.

- M** **TCLINK ENABLE** - Select TCLINK enable if you want to use the **TC0144 SERIAL REMOTE CONTROLLER**. This a remote control designed specially for live use for direct access to any preset number.

SYSTEM PARAMETERS DISPLAY:
continued...

N-R REMOTE KEYS 1-5 - The ASSIGN SWITCH connector on the back panel is a simple two wire connection that can activate 5 functions. All 5 are fully programmable and can be set here. The REMOTE function can be performed by the **TC0050** remote controller, or you can make your own box with 5 momentary switches (plus a few resistors) to press following button or do one of the following functions:

GAIN	EQ ON	FREEZE
DISPLAY	FLAT	TRACK
SWEEP	SINGLE BAND	BROAD BAND
LOW SHELIVING	HIGH SHELIVING	RECALL
ADD	STORE	UTILITY
FILTER	ENTER	EQ (always) on
EQ (always) off	FREEZE (always) on	FREEZE (always) off
DISPLAY 1	DISP. 2 EQ/SA	DISP. 3 (EQ)
DISPLAY 4 (SA)	TRACK (always) on	TRACK (always) off
SWEEP (always) on	SWEEP (always) off	PRESET DOWN
PRESET UP	OFF KEY (default)	PRESET 1
PRESET 2	PRESET 3	PRESET 4

S-U SECURITY LOCK - First select your security lock code number for dialing left with **T**. Then select your security lock code number for dialing right with **U**. To activate the SECURITY LOCK select **S** and press PUSH ENTER. To open the security lock you have to dial the numbers you have set in **T** and **U**. It is like a safe box. Feel the clicks on the PUSH ENTER knob, and first dial the chosen number to the left, and then the chosen number to the right.

WARNING: IF YOU FORGET YOUR COMBINATION, YOU MUST PERFORM A MINOR RESET. (Hold the PUSH ENTER knob pushed in for 10 seconds at startup.)
Remember that security lock values and memory protect is reset/canceled !

TRACK PROGRAM DISPLAY:

TRACK FUNCTIONS	POSSIBLE VALUES	DETAIL
SEARCH & DESTROY: ON	--/ON	A
SEARCH MAX BAND: --	--/ON	B
MAKE ACTUAL RESP: --	--/ON	C
SHOW ACTUAL RESP: --	--/ON	D
ALIGN SA RESP : --	--/ON	E
AUTOLIN APPEND : --	--/ON	F
SINGLE RUN AUTOL: --	--/ON	G
REC/PLAY CUELIST: --	--/ON	H
MIDI ENABLE : --	--/ON	I
POST EDIT : --	--/ON	J

LED = MIDI IN : ON	--/ON	K
LED = TIME LOCK : ON	--/ON	L

- A** **SEARCH & DESTROY** - Select ON if you want to make an automatic search and destroy of feedback. In the ON position the function will be activated by pressing the TRACK key on the frontpanel. The analyzer will now find out where the feedback is, and the eq will take down the feedback band by a predefined number of dB's (destroy ratio). Set the destroy ratio in the EQUALIZER menu. **An example:** set the destroy ratio at -3dB. Press TRACK. The eq will now cut the band where the feedback is by 3 dB from where it was set. If you still have feedback, either in the same band or in another band then press TRACK once - again the current highest energy band is cut by 3 dB.
- B** **SEARCH MAX BAND** - Select ON if you only want to find the feedback without suppressing it. When pressing the TRACK key, the cursor on the eq will move to the current feedback band. You can then decide if you want to suppress it. To take away the feedback in this mode you press PUSH ENTER and turn up/down the band as you normally do when in FILTER mode.
- C** **MAKE ACTUAL RESPONSE** - If this is ON, the **TC1128** will automatically compensate for inter-band reaction and make the audio response equal the fader curve. Draw on the display your desired curve. Press TRACK button and the TC1128 will set the filters to obtain your desired curve. The display will at the same time show this eq setting as well.
- D** **SHOW ACTUAL RESPONSE** - The automatic frequency band compensation will be shown on the display momentarily while pressing TRACK. This will reveal the boost and cut settings required to get the expected frequency response. What you see is the curve needed to obtain the audio response setting done by the normal fader method.

- E** **ALIGN SA RESP** - Activating this will create an EQ boost/cut setting that compensates for the frequency response spectrum stored in the FREEZE buffer memory. For correct compensation remember to set the spectrum analyzer to read the **input signal**. This is done in the UTILITY menu - ANALYZER SETUP.
- F** **AUTOLIN APPEND** - This is used with the PINK NOISE OPTION so that you can press the TRACK key and start the first measurement. Press this again to get the second measurement. This can be done for all 4 measurements. It's simply an easy way to START AUTOLIN 1-4 in the PINK NOISE menu. This way you can quickly do your 4 measurements placing the test microphone on different locations and afterwards set the weighting factors and FINAL RESPONSE. **NOTE:** This function **does not** use TARGET RESPONSE or FINAL RESPONSE. You can always set these parameters after the 4 measurements in order to calculate a FINAL RESPONSE. It will not affect the actual 4 measurements.
- G** **SINGLE RUN AUTOL** - If you often use the pink noise option in the same environment or under the same terms you might want a quick way to make 1 measurement with an automatic FINAL RESPONSE - without setting all the various parameters in the PINK NOISE menu again and again. Set these parameters - if needed - once and for all in the PINK NOISE MENU: SWEEP/PARAL, TARGET RESP PRE, MICAMP LEVEL or MIC AUTOSET ON (recommended), MIC RESP PRESET and NOISE LEVEL. Now simply press TRACK - programmed to SINGLE RUN AUTOL and 1 measurement with automatic FINAL RESPONSE will take place. All the above parameters will have influence on the result. The **TC1128** will - when the TRACK button is pressed force the EQ ON and the RESULT 1 WEIGHT to **10**.

Refer to the PINK NOISE OPTION DISPLAY and the PINK NOISE measurement examples for more information.

- H** **REC/PLAY CUELIST** - When ON, this programs the TRACK key to toggle the record/playback on/off of the cue list so you can do this quickly from the front panel instead of entering the SMPTE option LCD menu every time.
- I** **MIDI ENABLE** - Select ON to assign the TRACK key to be MIDI input enable on/off.
- J** **POST EDIT** - Select ON to assign the TRACK key to be POST EDIT mode on/off. Post edit allows you to retain the curve that you have made but you can offset it up/down or left/right. This makes moving a good frequency response "just a little louder" very easy to do... the frequency bands will adjust together ! Example: Select POST EDIT mode on this TRACK menu. Recall a preset. Press the TRACK key. Turn the PUSH ENTER wheel. Press and turn the PUSH ENTER wheel. Your changes are audible.
- K** **LED = MIDI IN** - In ON position the small TRACK LED will light when midi signal is received on midi input.

L **LED = TIME LOCK** - In ON position the small TRACK LED will light when SMPTE or MTC signal is received and understood by the computer inside the TC 1128.

NOTE: The **TRACK** button can not activate the settings of **K** and **L**.

PRESET HANDLING DISPLAY:

PRESET HANDLING	POSSIBLE VALUES	DETAIL
MAKE LEGEND ---	ALPHABET / NUMBERS	A
INCLUDE IN-GAIN : NO ---	NO/YES	B
MEMORY PROTECT : NO	NO/YES	C
MEM PROTECT LO : 01	01-99	D
MEM PROTECT HI : 99	01-99	E

MIDI EXCL DUMP		F
DUMP SLOW DOWN : 04	04-99	G

Turn the **PUSH ENTER** key to the number you want. Adjust by pressing and turning the **PUSH ENTER** key at the same time.

- A MAKE LEGEND** - This screen appears enabling you to edit any preset name. Move the cursor to any letter by turning the **PUSH ENTER** . Press the **PUSH ENTER** to choose the correct letter or number. Name other presets while you're in this menu by moving the cursor to the "P" in the end. Press and turn **PUSH ENTER** to select the preset number on top of the display.
- B INCLUDE IN-GAIN** - This selects whether the setting of the input gain should be stored and recalled as a part of a preset. Sometimes you may want to turn this off so that "live" input gain volumes are not overwritten upon recall.
- C MEMORY PROTECT** - Select ON if you want memory protection on your presets. In **D** and **E** you adjust two numbers. All presets between and including these numbers will be protected from storing new eq settings. **WARNING: A MINOR RESET WILL RETURN THIS TO THE DEFAULT OF NO PROTECTION !**
- D MEM PROTECT LO** - Select the number where the memory protection starts.
- E MEM PROTECT HI** -
Select the number where the memory protection stops.

- F MIDI EXCL DUMP** - Press PUSH ENTER . The unit will then ask for a device number. This is adjusted by turning the PUSH ENTER wheel. Press PUSH ENTER to start sending the MIDI exclusive protocol out via the MIDI output port. All presets can be dumped to another **TC1128/TC1128X**. The receiving **TC1128/TC1128X** only has to be set with the proper device number for the dump to be recieved properly. **Remember to set the device number equal to the receiving unit or set the recieving unit to MIDI DEV. OMNI ON.** The preset data that is sent is: Eq band settings, input/output gain settings, legend, and 6/12 dB range setting.
- G DUMP SLOW DOWN** - Press PUSH ENTER .The transmission of MIDI data can sometimes cause problems with the receiving device, so a simple method of slowing this transmission rate has been included. Adjust this if you are experiencing download problems and suspect speed problems.

ANALYZER SET-UP DISPLAY:

SPECTRUM ANALYZER	POSSIBLE VALUES	DETAIL
SA SOURCE : OUT	IN/OUT	A
SA LEVEL : 0 dB	-12dB to +6dB	B
SA AUTO LEVEL: OFF	OFF/ON	C
SA READ MODE: PEAK	AVG./PEAK	D
SA RESP.TIME: MED	SLOW/MED./FAST	E

- A SA SOURCE** - The spectrum analyzer can be set to indicate the frequency content of the signal either before or after the EQ circuit. IN = pre-EQ and OUT = post-EQ. When indicating the input signal, you can FREEZE the response curve and automatically generate an inverse EQ curve to create a flat response. Read the description of the ALIGN SA RESP selection on the TRACK DISPLAY.
- B SA LEVEL** - Changes the sensitivity (input gain) of the spectrum analyzer. Under manual control you should desire an absolute indication of volumes in the frequency bands.
- C SA AUTO LEVEL** - Automatic adjustment of spectrum analyzer input gain so that the spectrum is always visible but volumes are relative not absolute.
- D SA READ MODE** - Spectrum analyzer audio averaging. Average gives an overall view of the signals frequency content and Peak is for viewing transients. For most applications we recommend average analysis.
- E SA RESP. TIME** - Spectrum analyzer display speed. If you are only interested in a rough idea of the frequency spectrum choose a slow response. If you are watching for the frequency spectrum of transients (drums) set this to FAST.

EQUALIZER SET-UP DISPLAY:

EQUALIZER	POSSIBLE VALUES	DETAIL
EQ RANGE : 12dB	12dB/6dB	A
SOFT CROSSFADE: NO	NO/YES	B
SILENT UPDATE	: NO	NO/YES C
LOWCUT FILTER: OFF	OFF/15Hz/30Hz/45Hz	D
HIGHCUT FILTER: OFF	OFF/15KHz	E
BR-BAND SLOPE: 9 dB	12/9/6/3 dB	F
DESTROY RATIO: -6 dB	-12dB to +12dB	G

- A EQ RANGE** - To set 6 or 12 dB eq boost/cut range. In the 6dB range the resolution increases to 1/2 dB steps. The range setting is stored in presets.
- B SOFT CROSSFADE** - The boost/cut values on all frequency bands are incremented from the current preset settings to the next preset settings. The further these values are from each other, the longer the crossfade will take. Average cross-fades are 3 to 4 seconds.
- C SILENT UPDATE** - If this feature is ON, the **TC1128** will automatically turn the SOFT CROSSFADE function ON or OFF depending on the low frequency content at the time a preset is recalled. If there is high input on frequencies lower than 400 Hz, SOFT CROSSFADE will be OFF.
- D LOWCUT FILTER** - This is a completely independent computer controlled analog filter that can get rid of rumble or other low frequency noise without having to use your low graphic filter bands. These are 12dB/oct. Butterworth type lowcut filters with -3 dB points of 15 Hz or 30 Hz or 45 Hz.
- E HIGHCUT FILTER** - This is also a separate computer controlled analog filter for eliminating high frequency content. This is a 6dB/oct. filter with a - 3dB point of 15 KHz.
- F BR-BAND SLOPE** - This allows different "Q" factors when adjusting the equalizer in BROAD mode. The different settings define how the adjacent bands will be effected when boosting or cutting frequencies. This can be accessed easily when in the normal editing mode (FILTER) by just holding down the BROAD button while turning the PUSH ENTER knob.
- G DESTROY RATIO** - The destroy ratio is the number of dB the highest energy band is to be reduced when the SEARCH & DESTROY function is activated. The TRACK button can be programmed to activate the SEARCH & DESTROY function. Notice that the DESTROY RATIO can also be a positive number, actually boosting a frequency band. This can be used by a guitar player to emphasize a specific frequency while playing (induced feedback ?) or for calibrating a desired frequency response curve by playing a harmonic and hitting track. Some musicians have reported "developing" their desired EQ curve by activating SEARCH AND DESTROY multiple times (on their foot switch) in response to them playing certain notes or harmonics on their instrument !

PINK NOISE OPTION DISPLAY:

PINK NOISE MENU	POSSIBLE VALUES	DETAIL
START AUTOLIN 1	PUSH ENTER	A
START AUTOLIN 2	PUSH ENTER	B
START AUTOLIN 3	PUSH ENTER	C
START AUTOLIN 4	PUSH ENTER	D
FINAL RESPONSE	PUSH ENTER	E

VIEW RESPONSE	PUSH ENTER + TURN = MORE	F

MEASUREMENT NO : 00	OFF(00) or 01- 04	G
RESULT 1 WEIGHT : 00	00-10	H
RESULT 2 WEIGHT : 00	00-10	I
RESULT 3 WEIGHT : 00	00-10	J
RESULT 4 WEIGHT : 00	00-10	K

AUTOLIN METHOD : SWEEP	SWEEP/PARAL	L

TARGET RESP PRE : 00	OFF(00) or 01-99	M

MICAMP LEVEL : 16	00(invalid) or 01-32	N
MICAMP AUTOSET : ON	OFF/ON	O
PHANTOM POWER : OFF	OFF/ON	P
MIC RESP PRESET : 00	OFF(00) or 01-99	Q
NOISE LEVEL : 16	01-99	R
PINK NOISE ONLY : OFF	OFF/ON	S

-
1. Turn the PUSH ENTER to the menu choice you want.
 2. Adjust the choice by pressing and turning the PUSH ENTER knob at the same time.
-

- A** **START AUTOLIN 1** - locate the "cursor" over this and press the PUSH ENTER knob to start the first measurement. A basic measurement can be done with just this ONE MEASUREMENT... the 2,3,4 autolin is used for more "involved" acoustic analysis.
- B** **START AUTOLIN 2** - second measurement
- C** **START AUTOLIN 3** - third measurement
- D** **START AUTOLIN 4** - fourth measurement
- E** **FINAL RESPONSE** - result of multiple measurements including weighting factors. If less than 4 measurements are taken, the weighting factors for the ones not used **MUST BE SET TO 00 !**

F VIEW RESPONSE - this is selected to show the contents of the 4 AUTOLIN memories. When selected, you can turn the PUSH ENTER knob and scroll view the response curves in the 4 memories. NOTE: the first few seconds of viewing shows the actual resultant frequency response, and then the view changes to the boost/cut settings required to obtain the resultant frequency response.

G MEASUREMENT NO. - A counter that shows how many AUTOLIN measurement buffers contain measurement data. This helps remind you how far you are with (for example) a 4 measurement FINAL RESULT analysis.

H RESULT 1 WEIGHT - Weighting factors are used to tell the FINAL RESPONSE calculation exactly where the test microphone is located in an acoustic space. To create a proper FINAL RESPONSE one normally sets a microphone in the middle of the seating area and set the RESULT 1 WEIGHT to a fairly high number (7 to 10). A second measurement would be done by placing the same microphone off to the one side of the seating area and perform a second measurement (START AUTOLIN 2) and set the RESULT 2 WEIGHT to a relatively low number because the OFF-AXIS response should be less important to the final result.

YOUR TALENT AND EXPERIENCE DETERMINES THE MICROPHONE POSITION AND IMPORTANCE (WEIGHTING) IN THE FINAL RESULT MEASUREMENT !!

I RESULT 2 WEIGHT - This tells the importance of this particular measurement relative to the FINAL RESPONSE curve.

J RESULT 3 WEIGHT - How important is this microphone location to the FINAL RESPONSE ?

K RESULT 4 WEIGHT - How important is this microphone location ?

WEIGHTING EXAMPLE: The 00-10 range for each weighting factor allows fine control of percentages of importance to the FINAL RESPONSE. You can arrive at a percentage figure by taking the weight number and dividing it by the total of all weight numbers. Here are some examples:

weighting set 1	weighting set 2	weighting set 3
-----	-----	-----
1 = 06 = 60 %	1 = 10 = 33.3 %	1 = 08 = 72.7 %
2 = 02 = 20 %	2 = 10 = 33.3 %	2 = 02 = 18.1 %
3 = 01 = 10 %	3 = 05 = 16.6 %	3 = 01 = 9 %
4 = 01 = 10 %	4 = 05 = 16.6 %	4 = 00 = 0 %

- L** **AUTOLIN METHOD** - This can be set to SWEEP or PARALLEL. PARALLEL means that the pink noise generator outputs noise containing "all" frequencies at the same time. After 15-30 seconds, the analysis program within the **TC1128** can determine the best EQ response curve. The SWEEP method is more accurate, but it takes roughly 3-3,5 minutes to determine the best EQ setting. The pink noise generator outputs noise a 1/3rd of an octave at a time and corrects for each band of frequencies one by one.
- M** **TARGET RESPONSE PRESET** - If you were to desire a curve that was NOT a flat frequency response, you would set this selection to a preset number that contains the response curve desired. For example, if you knew that this type of music should contain high bass content, then make a curve with boosted low frequencies and store it. Set this selection to that preset number, and the FINAL RESPONSE analysis will automatically include your desired curve in calculating the best possible EQ setting. **NOTE:** 00 = NO MODIFICATION
- N** **MICAMP LEVEL** - This is a relative input gain setting from 01 to 32 which should be adjusted like any other input gain control (as high as possible before clipping). The microphone preamp is located ONLY on the jack connector of the pink noise option card. Manual adjustment is not normally used unless you MUST set a specific gain for comparison reasons. Input clipping is shown in the spectrum analyzer by the bottom of the bargraphs disappearing. If MICAMP AUTOSET is set to ON this selection is set automatically. The value can then be displayed by entering this menu again. **NOTE:** If you see the value "00" the measurement is invalid as the MIC input level has been too high. Lowest valid value is "01"!
- O** **MICAMP AUTOSET** - If this is turned on, the **TC 1128** will adjust the mic. preamp automatically. This should be used in normal operation, and the gain number used for best response will be shown under MICAMP LEVEL.
- P** **PHANTOM POWER** - This will turn the phantom power (48V DC) supply on or off for condenser microphones and is applied to the stereo jack socket on the pink noise option card. **NOTE:** Phantom power is only on when a measurement starts. If your microphone requires a "warm up" period (older types) then turn on the PINK NOISE ONLY selection for a moment to warm it up immediately after you turn that of you go quickly over to START AUTOLIN.
- Q** **MIC. RESPONSE PRESET** - This allows you to include one of the preset numbers as a compensation for the frequency response of the testing microphone. For example, you usually receive a test curve for a quality microphone when purchased. Input this curve into one of the presets and set that preset number into this selection. The non-linearities of the microphone will then be "subtracted" from the EQ response measurements.

- R** **NOISE LEVEL** - This is a relative adjustment for outputting a proper pink noise level to a power amplifier. Standard system noise will interfere with measuring so treat the pink noise source like any other "clean" signal. Adjust for maximum signal without clipping in the next device in the system.
- S** **PINK NOISE ONLY** - This will turn the pink noise generator on or off without taking a measurement. Use this manual control for setting the **NOISE LEVEL**, adjusting the **MICAMP LEVEL** for maximum input before clipping (see **N** above) or verifying your system cabling. It is also used for warming older microphones up before measurement.

SMPTE / MTC OPTION DISPLAY:

SMPTE/MTC	POSSIBLE VALUES	DETAIL
PLAY CUE LIST: OFF	OFF/ON	A
RECORD CUE LIST: OFF	OFF/ON	B
EDIT CUE LIST	Press PUSH ENTER	C
DUMP CUE LIST	Press PUSH ENTER	D
CLEAR CUE LIST	Press PUSH ENTER	E

GENERATE SMPTE	Press PUSH ENTER	F
SMPTE GEN HOURS: 00	00-23	G
SMPTE GEN MIN: 00	00-59	H
SMPTE GEN SEC	: 00	00-59 I
SMPTE GEN FRAM: 00	00-frame-rate	J

TIMECODE SOURC: SMPTE	SMPTE/MTC	K
TIMECODE OFFSET: 00	00-24	L
SMPTE RATE : 24	24/25/30/30DF	M

- A** **PLAY CUE LIST** - Select ON to enable the unit to read SMPTE code. This is the Play mode, just play the SMPTE code into the unit and it will automatically switch programs as they were recorded. This function can also be programmed to be turned on/off by the TRACK key on the front panel if you need to do this often. The cue list can be played and recorded at the same time for easy insertion of cue additions.
- B** **RECORD CUE LIST** - Select on to enable the unit to record the SMPTE time where a preset recall should take place. Normally you would connect an external source (tape or a SMPTE generator) so that the **TC1128** will change according to a prerecorded video or multitrack music recording. You can record according to the internal SMPTE generator signal by just starting the GENERATE SMPTE command (see below) and just changing presets. They will be recorded automatically. The record function can also be programmed to be turned on/off by the TRACK button on the front panel if desired. The cue list can be played and recorded at the same time for easy insertion of cue additions.
- C** **EDIT CUE LIST** - The following line is shown at the bottom of the display when in Cue List edit mode and you press the PUSH ENTER knob again...

X I D 00:00:00:00 P00

This is used for editing the cue list and is accessed by positioning the cursor over a letter or number by turning the PUSH ENTER knob. Press the PUSH ENTER knob in and turn to make a selection.

X = **exit** to previous menu

I = **insert** the SMPTE time shown into the cue list

D = **delete** the SMPTE time shown

00:00:00:00 = SMPTE time in hrs: min: secs: frames

P00 = TC 1128 **preset** number to be recalled (01-99)

- D** **DUMP CUE LIST** - Press the PUSH ENTER knob to dump the cuelist to a cue list manager. This is done using System Exclusive codes according to the MIDI preset dump protocol. The receiving device should be ready when you activate this as communications will start immediately.
- E** **CLEAR CUE LIST** - Press to reset the cue list. **WARNING: all entries will be erased !**
- F** **GENERATE SMPTE** - Press PUSH ENTER to generate SMPTE. **G** to **J** define the starting time generated.
- G** **SMPTE GEN HOURS** - Select start time hours
- H** **SMPTE GEN MIN** - Select start time minutes
- I** **SMPTE GEN SEC** - Select start time seconds
- J** **SMPTE GEN FRAM** - Select start time frames
- K** **TIMECODE SOURCE** - Select SMPTE or MTC (MIDI time code). SMPTE can be both written and read, but MIDI TIME CODE is a read-only function. (the **TC1128** acts as a slave in an MTC setup).
- L** **TIMECODE OFFSET** - This is used to compensate for the internal processing time when a preset is recalled by the TIME CODE. This will make a general shift of the internal triggering clock of all cues so that presets can be recalled from 0 to 24 frames ahead of the actual time that is recorded for that cue.
- M** **SMPTE RATE** - select SMPTE frame rate from 24 frames per second or 25 fps or 30 fps or 30 drop frame standards.

BASIC PRINCIPLES: COMPUTER CONTROLLED EQ

Equalizers (graphic or parametric) have been one of the sound industry's main tools for many years. Because equalization by nature is very much an analog process it is not surprising that it is only through the last few years that we have seen digital technology in equalizers. There simply hasn't been technology around to do the job until now.

The focus on graphics probably originates from the fact that they are easy to use and understand but - as most of us are aware of - can be a bit misleading: the response formed by the faders can often be far from the true response. **Frequency band interaction** is a natural phenomena in a standard analog equalizer that can be compensated for in a digital implementation. Another characteristic of the analog eq is the inability to **change settings quickly** or to **remember settings** for use later. These speed and reset-ability problems have become more of a problem within the past 5 years as the number of sound inputs approaches an AVERAGE of 40 channels ! Computer controlled EQ's solve these problems, as well as offering signal analysis and user interface improvements.

The **TC1128** is a computer controlled analog EQ which offers the best of the analog advantages together with the best of the digital control advantages. Like other computer controlled audio devices, the **TC1128** has a computer display (LCD graphic) for viewing and editing settings, and the ability to record and recall eq "snapshots". But there are some functions contained in the **TC1128** that take advantage of computer control in a way that improves on the "state of the art" in user friendliness and flexibility.

You are able to control the frequency response as a graphic equalizer (one freq. band at a time) or as a parametric eq (by setting the Q factor and SWEEPING the center frequency). A spectrum analyzer is contained inside to show the response of the incoming signal or the response of the equalized signal so that the user has the ability to see exactly what he is compensating for. Refer to "THE ADVANTAGE OF EQ AND SPECTRUM ANALYSIS" for more information.

Computer compensation for boost/cut of frequencies outside of the desired adjustment band allows precise control of just the frequency range desired. The **TC1128** does this automatically and displays the eq settings as either the traditional "fader" display or the "compensated" display. For example, by increasing the display "faders" 800 Hz, 1000 Hz and 1250 Hz to +6dB thus creating an octave filter centered around 1000 Hz (at least that is what we think we are doing), pressing the "**TRACK**" button now reveals the actual response of the filter: a broad bell shape peaking +9 dB at the indicated 1000 Hz setting. This is the deception of analog graphic EQ's: the settings of the faders are NOT equal to the actual response, especially not with an extreme setting like this one.

BASIC PRINCIPLES: COMPUTER CONTROLLED EQ

continued...

By pressing the selection "MAKE ACTUAL RESPONSE", the control computer will change the response to a close approximation of an octave filter. The display now shows a strange fader setting as a result of the changed response whose audio result matches the expected boost and cut settings. Or more importantly, you can see the actual audio response curve that results from the combination of filter interaction.

Another exciting application of computer controlled eq's is their **ability to be controlled externally**. The entire audio industry is headed towards central control of all functions. While the inclusion of MIDI control is pretty much required on such a product, the **TC1128** has some features that really take advantage of the flexibility that remote control offers. A SMPTE code option allows eq programs to be recorded and recalled locked to time code for use in film or video post production. The resultant cue list has all of the features one would expect with settings of code types (24, 25, 30, 30DF), editing of times, offsetting, dumping, etc. TC has software programs for the IBM PC (PC99) or the Apple Macintosh (MAC99) which offer all features in an easy to view and modify version when a customer has many eq's that need to be controlled. These programs allow full file handling so settings can be stored to disk for later reference in studio, post production or theater applications.

The successful application of computer technology in the audio industry is highly dependent on the user interface. Since the advantages of computer equalization has caught the eye (ear?) of the professional PA companies, the desire to implement these has been growing the past couple of years. A cooperation between TC electronics and Clair Bros. (USA) resulted in 1990 the **TC6032 REMOTE CONTROL**. This unit uses motor faders to represent the frequency band settings in the **TC1128**. By using a computer controlled fader, the technology has made the perfect combination of the traditional analog method and the computer advantages. Up to 32 audio channels can be controlled in a central location; simply select the eq channel number, and the faders will move to the correct setting! Touch sensors are in the fader knobs so the motor torque is released when you make an adjustment. Powerful "PILE" and "ALL" modes allow multiple channels of eq to be changed at one time for situations where stage left or right should be adjusted together. A frequency curve can be input and the remote will place the faders to make the eq filters match this curve. In other words, this remote eq controller allows the advantages of the computer with the great advantage of being a normal "understandable" user interface.

BASIC PRINCIPLES: EQ + SPECTRUM ANALYSIS

By including spectrum analysis within the **TC1128**, there are several powerful features that are able to be offered:

- viewing of the input signal's frequency spectrum
- viewing the result of the EQ changes (audio output)
- frequency dependant preset crossfade smoothing
- offering "automatic" feedback suppression
- optional automatic room acoustics compensation with maximum matching of analysis and correction

The viewing of the input and the output frequency response is a feature that almost all musicians desire but few products provide. The audio response can be seen on the LCD display (or optional monitor) together with the boost/cut faders so you can see the results of your adjustments at all times !

The "**SILENT UPDATE**" feature found in the EQUALIZER SETUP menu uses the spectrum analyzer to decide if a preset change can be done by incremental steps or must be changed directly to the target value. This minimizes the stepping action being heard if there is a lot of bass energy below 400 Hz.

The "automatic" feedback suppression feature is called "**SEARCH & DESTROY**". When this feature is activated, the **TC1128** is able to find the frequency band where the audio volume is maximum (characteristic of a feedback tone) and reduce the volume according to a predetermined amount. This function is activated by pressing the **TRACK** button on the front panel or activating one of the remote keys set to "TRACK". This function can be a life saver for non-technical people in permanent installations where you can mount a "PANIC" button and tell the user to hit the button if he hears a feedback tone !

Spectrum analysis together with a pink noise source and a microphone input allow interactive adjustment of the EQ response curves. The PINK NOISE OPTION offers all of the hardware and software to perform complex room analysis. By adding a small circuit board, you can start an automatic analysis of the room response and the eq will adjust its settings for a linear response curve. You may also put in a preferred curve and have this included in up to 4 different "room samples" that are used to calculate the required inverse EQ settings. All of the professional requirements such as phantom power, mic. gain, mic. calibration, pink noise volume and weighting of samples are included.

By having the analyzer section use the exact same 2nd order filters as the equalizer, they are **perfectly matched**. As a practical work tool, the combination of EQ and analyzer in the same piece of equipment is equivalent to much more expensive test equipment because you have no use for better than 1/3rd octave analysis when using a 1/3rd octave equalizer for correction.

Refer to the "UTILITY MENU: PINK NOISE OPTION DISPLAY" and the "AUTOMATIC ROOM ANALYSIS" for more information.

BASIC PRINCIPLES: EQ SYNCHRONIZED TO SMPTE/MTC

All SMPTE time code standards (24, 25, 30 and 30 drop frame) are able to be written or read by the **TC1128** when equipped with the SMPTE OPTION. By just connecting a cable with the synchronizing signal from your multitrack tape machine (or other SMPTE master), you can "record" and "play-back" equalizer program changes and these will be perfectly matched to your audio (or visual) cues.

The graphic LCD display or optional monitor display allow full cue list features such as preset labeling, manual editing, real time entry, time offsets, and down-loading of data to other cue list managers.

MIDI TIME CODE (MTC) can also be used as a synchronizing signal. This MIDI standard offers the same function as SMPTE for MIDI devices (with lower timing accuracy specs) and is supported by the **TC1128** for integration into sequencer based studio systems. A master timing source is connected to the MIDI input connector on the **TC1128** and the MTC protocol will be read and used for recording and playing back preset EQ changes (**RECALL**).

NOTE: The **TC1128** does not write MTC, this is a read-only function.

Refer to the "UTILITY MENU: SMPTE/MTC OPTION DISPLAY" for more information.

BASIC PRINCIPLES: REAL TIME MIDI CONTROL

One of the REAL exciting possibilities with the **TC1128** is the ability to perform **dynamic equalization changes** synchronized to time code ! The **TC1128** is used as a slave device for a MIDI sequencer program and is controlled by a common feature of modern sequencers called a "MIDI MANAGER" page. Several major sequencer products contain a function which allows the user the ability to "draw" volume faders on the screen and define the MIDI data that they transmit when moved. A very simple MIDI protocol definition is used so a set of 30 faders can be drawn (28 bands + output gain + output volume) giving a normal graphic equalizer "look" to this control page. All normal sequencer functions such as recording, play-back and synchronizing will now apply to the settings of the TC1128 EQ !

The ability to record and play-back dynamic EQ movements into a mix offers creative options that have never been available before ! The frequency response of an actor's voice can be fluidly changing depending on his position to the camera ! A particular instrument can be "lifted" in the mix at just the right point, or a 2 second guitar lick given just the right emphasis !

There are several MIDI assignable fader devices which can offer a form of control for remote EQ adjustment - should a limited number of boost/cut bands be of interest e.g. for cleaning up a film sound-track.

Another interesting feature with the MIDI protocol implementation is the inclusion of an output gain AND "output volume". The output volume command allows a volume adjust in series with the output gain so an attenuation range from + 12 dB to - 40 dB can be obtained. While the lower range is not acceptable for muting, this range will satisfy MANY standard mix adjustment needs ! An automated EQ + volume on your effects send/return has never been easier !

BASIC PRINCIPLES: STEREO LINKING OF 1128'S

Two **TC1128's** can be easily connected together to exactly match the EQ adjustments while using only one front panel. One of the units is set as **MASTER** and the other is set as **SLAVE**, and their **MIDI in/out** connections are connected together. This setup allows any parameter changed on the **MASTER** to be transmitted to the **SLAVE**.

The flexibility of this configuration is especially interesting for situations where you use a stereo configuration sometime, and mono or multiple EQ configurations other times (PA rental ?). Permanent installations will be interested in the **MONITOR OPTION** for large screen viewing or using the less expensive **TC1128X** version as the **SLAVE** equalizer.

Easy menu selections allow down-loading all preset memories from the master to the slave **OR** the **MASTER** and **SLAVE** can retain their own battery backed up preset information while still functioning in a stereo set-up.

To show how easy the stereo setup is, here is a full description of the procedure for connecting two **TC1128's**:

- 1.** Connect the **MIDI IN** unit 1 to **MIDI OUT** unit 2, and **MIDI OUT** unit 1 to **MIDI IN** unit 2.
- 2.** On the master unit, enter the **UTILITY** menu - **SYSTEM PARAMETERS** and set **STEREO MASTER = YES**, **MIDI device no. = 1**, and **keycodes send = off**.
- 3.** On the slave, enter the **UTILITY** menu - **SYSTEM PARAMETERS** and set **STEREO MASTER = NO**, **MIDI device no. = 1**, and **keycodes send = off**.

The slave unit will now in sync follow all adjustments made to the master !

Refer to the "**SYSTEM PARAMETERS DISPLAY**" detail in this manual.

TECHNICAL DATA

MONITOR OPTION:

The monitor option is a PC board which can be installed in the **TC1128** allowing the data from the front panel LCD display to be viewed on an RGB or video monitor. A wide variety of monitors can be used and the card offers a choice of background colors to allow you to match your studios colors!

PAL / NTSC

There is a DIP switch on the PCB called SW1 which can set the video standard needed. Set to OFF = PAL version (50 Hz sync), and ON = NTSC version (60 Hz sync).

COLOR

13 different colors are available for the background. This selection is made by the black jumpers located just behind the sub-D connector.

TP 2 + 6	=	light yellow
TP 3 + 7	=	light purple
TP 4 + 8	=	light blue
TP 1 + 5 and TP 2 + 6	=	light brown
TP 1 + 5 and TP 3 + 7	=	purple
TP 1 + 5 and TP 4 + 8	=	blue green
TP 2 + 6 and TP 3 + 7	=	light red
TP 2 + 6 and TP 4 + 8	=	light green
TP 3 + 7 and TP 4 + 8	=	blue
TP 1 + 5 and TP 2 + 6 and TP 3 + 7	=	dark red
TP 1 + 5 and TP 2 + 6 and TP 4 + 8	=	green
TP 1 + 5 and TP 2 + 6 and TP 4 + 8	=	dark blue
TP 2 + 6 and TP 3 + 7 and TP 4 + 8	=	black

Dark blue is standard from the factory.

CONNECTIONS

RGB connection is made via a 9 pin sub D connector mounted on the option circuit board. The pin layout is as follows:

pin 1: ground	pin 6: intensity
pin 2: not connected	pin 7: not connected
pin 3: blue (B)	pin 8: horiz. sync
pin 4: red (R)	pin 9: vert. sync
pin 5: green (G)	

VIDEO OUTPUT is via an RCA jack socket, and there is an RS 232 MOUSE connection, but this has not been implemented.