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SR-1
UNIVERSAL
TIME CODE REFRESHER

The SR-1 Time Code Refresher is a high quality reshaper that re-conditions very low level or amplitude distorted time code into a properly shaped SMPTE/EBU specified waveform.

Although the SR-1 is a very simple device to use, it has many different applications. It can be used to reshape time code to SMPTE or EBU specifications, to give it a fast rise time or simply to adjust and stabilize its level. It can even be used to help correctly align the time code track.

1. GENERAL APPLICATIONS

RESHAPING DISTORTED TIME CODE:

When time code comes off a tape machine (especially a VCR), it usually has improper rise/fall times, leading edge peaking and different amplitude levels on "one's" and "zero's" (figures 1). This is due to the fact that analog tape machines were not designed to record a basically digital signal. Long cables can also induce ringing or rounding off of the signal. All this makes the time code difficult or sometimes impossible to read. The SR-1 re-shapes and re-adjusts the code level to its original SMPTE or EBU specifications.
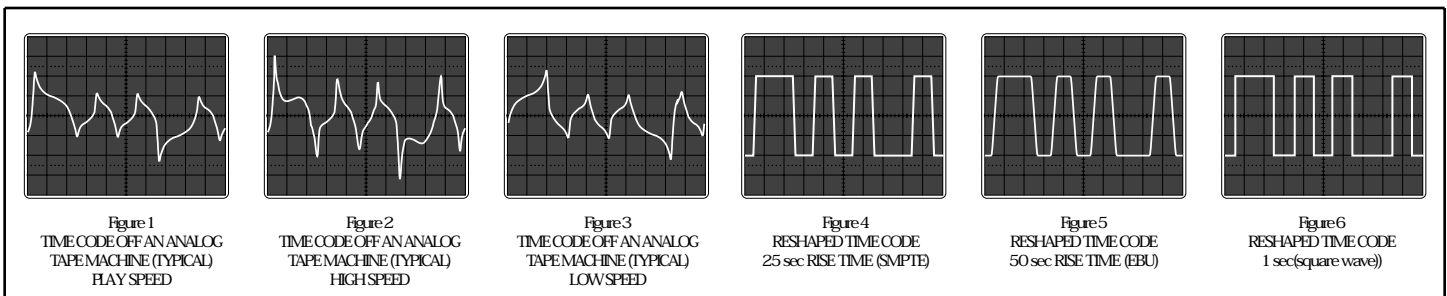
DUBBING TIME CODE:

Re-recording time code by direct dubbing is not recommended since the accumulated distortions make it very unreliable. Instead, patch your time code into the SR-1 and record the reshaped output. This eliminates the signal degradations that would result from a direct transfer.

Note: To minimize cross-talk, it helps to not record time code and audio simultaneously on adjacent tracks. Stripe time code first, then record the audio. When recording the audio, you will erase any time code spillage to adjacent tracks.

ADJUSTING THE TIME CODE LEVEL:

The SR-1 has a very wide input dynamic range: it will accept input levels from below −30dbU to above + 20dbU. Independent of the input level, the SR-1's output can be adjusted with the front panel pot from full off to +8dbu, with less than 2% amplitude distortion. This allows you to use the SR-1 to simply change and/or stabilize your time code level.

Figure 1	Figure 2	Figure 3	Figure 4	Figure 5	Figure 6
TIME CODE OFF AN ANALOG TAPE MACHINE (TYPICAL) PLAY SPEED	TIME CODE OFF AN ANALOG TAPE MACHINE (TYPICAL) HIGH SPEED	TIME CODE OFF AN ANALOG TAPE MACHINE (TYPICAL) LOW SPEED	RESHAPED TIME CODE 25 sec RISE TIME (SMPTE)	RESHAPED TIME CODE 50 sec RISE TIME (EBU)	RESHAPED TIME CODE 1 sec (square wave)

2. SPECIAL APPLICATIONS

SQUARE WAVE VS. SMPTE/EBU:

Per SMPTE and EBU specifications, the rise time limiting is used to minimize crosstalk from time code into audio. A longer rise time removes more high frequency components from its waveform. However some equipment may not be able to read time code if its rise time is too long.

The SR-1 has three preset rise times for its output waveform (figures 4-6): 25 μsec (SMPTE), 50μsec (EBU) and 1μsec (square wave). As a general rule, if time code is patched directly into the reader you should use the square wave position; but, whenever possible cross-talk problems exist (i.e. in an audio patchbay...), you should use the SMPTE or EBU setting (as needed).

VARIABLE SPEED RESHAPING:

Some variable speed readers are designed to read time code at speeds ranging from 1/50th to 100x playspeed.

However, when not in playspeed, many tape machines distort time code so badly that it becomes unreadable.

The SR–1 can reshape time code over an even wider range of speeds in forward and reverse. The tape must obviously be in contact with the playback head and the recorder's playback electronics must be capable of reproducing higher/lower frequencies: SMPTE at 20x playspeed = 48Khz; at 1/100x playspeed= 24Hz. For high speed reshaping, you must set the SR-1's output rise time to 1μsec so high frequencies won't be filtered out.

CODE TRACK ALIGNMENT:

For best results, the time code track should be aligned to reproduce a square wave as well as possible. Patch a 2400Hz sine wave into the SR1 and record the reshaped output. This will simulate time code and will be stable when viewed on the oscilloscope. Adjust the bias level for the least amount of output distortions.

3. OPERATING INSTRUCTIONS

1. Plug in the AC adapter supplied with the SR-1. The red LED indicates that the power is on.

2. Patch the time code in and out of the SR-1. The green LED lights up when time code is present at the input.

3. Set the slider switch to the proper rise time (see other side: square wave vs. SMPTE/EBU). Remember that for high speed reshaping, you must set the rise time to 1μs (square wave).

4. Adjust the front panel pot for the desired output level.
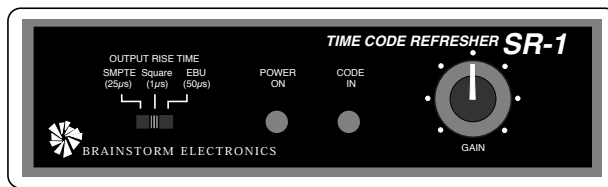
Suggested output level settings for striping code: –5 to –7dBU to analog tape recorders, 0VU to video recorders.

The SR-1 reshapes all time code formats (24, 25, 29.97 & 30 fr/s, drop or non drop) without having to change any of the settings (see input specs below).

4. INSTALLATION

The Time Code Refresher is available with 1/4" jacks (SR-1) or with XLR connectors (SR-1X). Pins are as follows:

    SR-1:   high = tip   low = ring   ground = sleeve
    SR-1X: high = pin 3   low = pin 2   ground = pin 1

Both units can work with balanced or unbalanced signals. They can also balance an unbalanced signal if needed (the output should then be wired for balanced equipment of course).

SR-1 Input   SR-1 Output

Proper wiring for unbalanced equipment
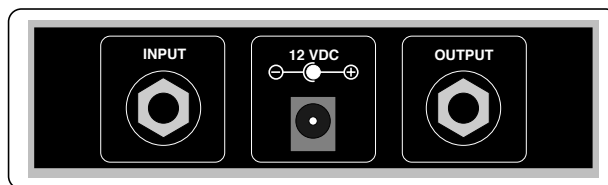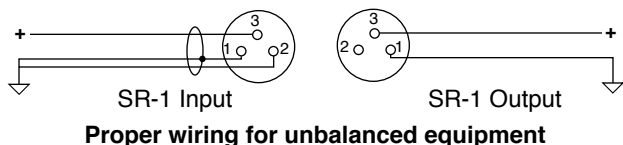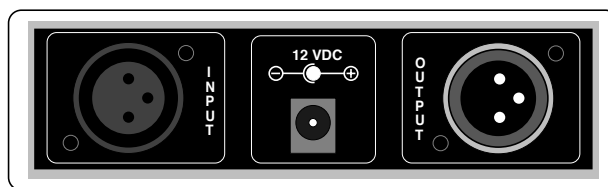
TYPICAL PROBLEMS SOLVED BY THE SR-1:

• Reader equipment is sensitive to improper waveform due to:
 - Cable induced distortions (either rounding off or ringing),
 - Poor reproduction of the recorded time code (especially with VCR's),
 - Elongated rise time at low shuttle speeds,
 - Accentuated peaks at high shuttle speeds;

• Time code recorded too low or the reader threshold is too high;
• Time code reading is intermittent due to level fluctuations;
• The output of some old generators is distorted and needs reshaping;
• Reader equipment requires a fast rise time to properly read the time code.

NOTE: MANY PROBLEMS ARE CAUSED BY DISTORTED TIME CODE AND MOST OF THEM CAN BE SOLVED BY RESHAPING THE TIME CODE. HOWEVER THE SR-1 WILL NOT CORRECT FOR BIT OR TIMING ERRORS NOR WILL IT REGENERATE NEW TIME CODE IF THE INCOMING SIGNAL DROPS MOMENTARILY BELOW THE SR-1'S THRESHOLD (-30DB).

SPECIFICATIONS

Input Signal: SMPTE/EBU Longitudinal Time Code (all time code formats in forward or reverse; play, jog, shuttle and wind: The SR1 will reshape a sine, triangular or square wave from 1Hz to 1Mhz)
Impedance: 20KΩ balanced; 10KΩ unbalanced
Level: -30dbU min; +20dbU Max

Output Signal: Rise time: switchable (rear panel): 25μs (SMPTE), 50μs (EBU), or 1μs (square wave)
Impedance: 600Ω balanced; 300Ω unbalanced
Level: adjustable (front panel pot): full off to +8dbU balanced; to + 2dbU unbalanced
Amplitude distortion: less than 2%

Power: 9 to 16VDC @.3 watt max (12VDC wall adaptor supplied w/ center pin hot)

Indicators: Red LED: power on
Green LED: signal in.

Connectors: SR-1: 1/4" jacks - RTS
SR-1X: XLR Female (input); Male (output) - Pin 1=shield; 2=low; 3=high

Dimensions: 5" x 1 1/2" x 5 1/4"