

Add an important new capability
to your film, video or audio editing center

The VSC® Model M8-C Pitch Corrector

AUDIO/SIGNAL
PROCESSING



This new rack-mounted module lets you SPEED LISTEN to soundtracks and understand every word. It eliminates that annoying "chipmunk" distortion. The result is improved editing efficiency. Preview faster, search faster, review faster... all with increased accuracy and less fatigue.

The M8-C is easy to use. Just connect it between the audio output of your VTR, film editing table, tape deck or other variable speed playback device and your studio monitor. It is compatible with most studio equipment, since it features balanced line input and output.

The M8-C is versatile too, with four convenient operating modes.

MANUAL

Use the large front panel RATE knob to select the amount of pitch correction appropriate to the playback speed. If your VTR or open reel tape deck offers just double speed, pre-set the M8-C to exactly 2.0X. Also, over or under correct pitch, according to user preference, for maximum intelligibility.

BYPASS

Switch to BYPASS whenever you don't need pitch correction. Manually returning large RATE knob to 1.0X has the same effect, but use of BYPASS lets you keep the rate knob in its pre-set position. In either case, pitch-correction circuitry is totally bypassed for maximum bandwidth and S/N ratio.

REMOTE

Use optional remote control box for fingertip selection of pitch correction or bypass. When you switch to higher speed, bring in the proper pitch correction. When you go back to normal speed, punch BYPASS. The M8-C, mounted in a rack, never has to be touched.

SYNC

From your variable speed playback unit take any voltage or tachometer frequency proportional to speed and feed it to a jack on rear of the M8-C. Calibrate the unit once. The M8-C will automatically pitch correct in proportion to playback speed over an extended speed range of from 0.6X to 4.0X. (Intelligibility decreases at the extremes however, and front panel warning lights alert you that you are "over" or "under" the optimum range of 1.0X to 2.5X.)

NOTE: The patented, purely analog VSC system is utilized for the pitch correction function. Zero-crossing splicing minimizes "glitches" for maximum intelligibility. Sampling rate is optimized in relation to psychoacoustic parameters of voice signals.

Bandwidth of the M8-C is limited to 5kHz for maximum intelligibility of speeded speech. However, when 1.0X rate (i.e., no pitch correction) is selected, the unit automatically switches to the BYPASS mode regardless of Mode Selection Switch setting. In BYPASS, the bandwidth is over 15kHz and there is essentially no degradation of signal.

The M8-C Pitch Corrector gives you an important increase in studio capability

Only \$68.00

PRELIMINARY SPECIFICATIONS

Front Panel Controls

Illuminated Power Switch

Mode Select Switch (with mode indicator lights)

- MANUAL: set rate with front panel adjustment
- BYPASS: bypass module circuitry; no degradation of signal
- REMOTE: set rate, or switch to BYPASS, using optional remote control box
- SYNC: take command voltage or frequency from variable speed playback device and "slave" pitch correction over extended range of 0.6X to 4.0X

Manual "Rate" Adjustment

Range: Normal Speed (1.0X) to 2.5 times normal speed

Two-digit LED Display of "Rate" Setting

with "over" and "under" warning lights showing that command voltage or frequency is out of optimum range of 1.0X to 2.5X (sync mode only).

Rear Panel Jacks, etc.

Command Voltage Input for SYNC Mode: 1/4" jack

1X rate $V_{in} = 1.1V$, 2.5X rate $V_{in} = 2.8V$

Command Frequency (Tachometer) Input for SYNC Mode: 1/4" jack

f_{in} -to-rate relationship is adjustable. Max f_{in} for 2.5X rate: 25KHz

NOTE: F_{in} may be sine or square wave; min 600mV peak-to-peak, max 50V peak-to-peak

Tach Gain Adjustments (Coarse and Fine): to calibrate f_{in} -to-rate relationship for slaving to given range of tach frequencies

Connector for Remote Control Unit: 5-pin connector for use with special Remote Control Unit.

Fuse: AGC 1/8 amp

Audio Input/Output Jacks: XLR-type, 3 pin, balanced line.

Other Features

Automatic Bypass: Around the 1.0X rate (where no pitch correction is needed), regardless of operating mode, automatic switching circuit bypasses all module circuitry for maximum fidelity. Bypass indicator light illuminates.

Electrical

Power Supply: 117V AC $\pm 10\%$

Balanced Line Input/Output

input impedance: 24k

output impedance: 1k

AGC for maximum signal-to-noise ratio.

AGC range: 35dB

Input level to activate AGC: 1.0V peak-to-peak

Output Signal Level: 1.0V at AGC input level

Bandwidth: 300 Hz to 5KHz

Signal-to-Noise Ratio: 46 dB

Mechanical

Size: 19" rack-mounted module, 3 1/2" high

NOTE: The M8-C is intended for speed listening to voice recordings, not for pitch-shifting of pure tones such as music.

Specifications are subject to change without notice.

The M8-C is protected under US Patent Number 3786195 and other US and Foreign patents. No license is granted to users by implications or otherwise under any patent or patent rights of the Variable Speech Control Co.

© Copyright Variable Speech Control Company 1979

New Low Cost Module For: Speech Compression, Pitch Correction, Frequency Shifting

George Bestie

Deanne

VSC* (Variable Speech Control) is a well known patented technology that uses Bucket Brigade Devices (BBD's) in a single-channel configuration to achieve low-cost speech compression. Multiplicative frequency transformation of audio signals is also possible. Through licensing agreements, VSC is now offered in **Sony** dictating equipment, **General Electric** cassette recorders, **La Belle Industries** variable speed audio-visual systems, and other products.

Today VSC is available as a module designed to mate conveniently with existing audio systems. This means that small manufacturers, "system houses," and others can now use VSC economically, even if the volume is small.

The VSC Module is Compact and Economical

The new module, called the M8, is priced at under \$100. It comes as a convenient printed circuit assembly measuring 3.3" by 5.0" by 0.7" utilizing a standard 18-pin edge connector. Two versions of the module are available: M8-A and M8-B.

*VSC and Variable Speech Control are Trademarks of The Variable Speech Control Company.

For Immediate Evaluation

Speech Compression, Pitch Correction, Frequency Shifting ... if you are involved in any of these areas, you owe it to yourself to evaluate VSC's new M8 module. Why not order one and an evaluation kit today? (For specifications and application details, see reverse side.)

M8-A

The M8-A is used for simple multiplicative pitch change of audio signals. It can lower the pitch of a sound source by 60%.

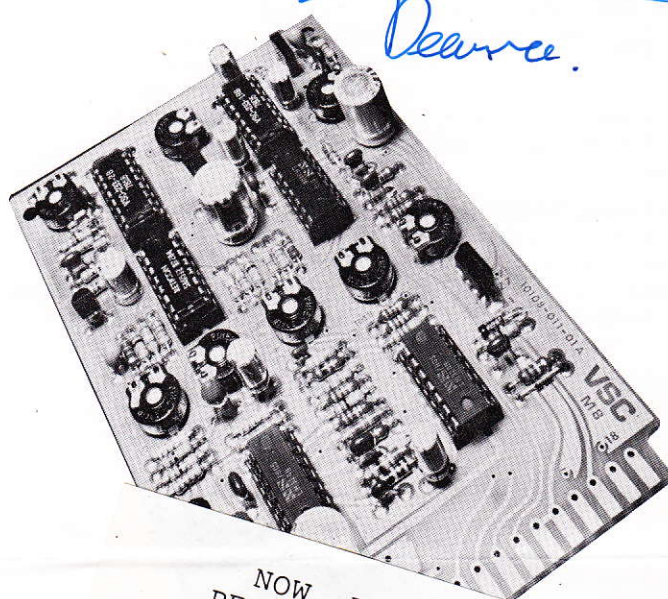
The M8-A finds applications in:

- **Telecommunications**—for high speed transmission of voice signals (via media of limited bandwidth).
- **Pitch Shifting Hearing Aids**
- **Helium Speech Unscramblers**

The term "compressed speech" refers to the playback of audio recordings—usually voice—in a fraction of the recording time, while maintaining all frequency components at their correct original values. With VSC compressed speech, intelligibility is excellent and comprehension can actually *increase*. The M8-A can be used in some speech compression applications. If a variable- or multi-speed audio playback device is available, but change to its motor speed control system is undesirable, the M8-A can be wired to process the audio output during speeded playback. "Compressed speech" is then achieved by means of separate controls: one for speed, the other for pitch correction. Also, under- or over-correction may readily be obtained.

How VSC Works

VSC operates by sampling a (speeded) audio signal at sub-audible rates and discarding every other sample. The remaining samples are then stretched out, returning them to their **original** frequencies and filling the gaps left by the discarded samples. These remaining samples are joined in a way that minimizes "splicing noise." With VSC, the actual "stretching" of the signal samples is accomplished with a **variable delay line** for which a low-noise bucket brigade device (BBD) can be used.



NOW, IN A
READY-TO-USE
BLACK BOX

*95.00
less 30%*

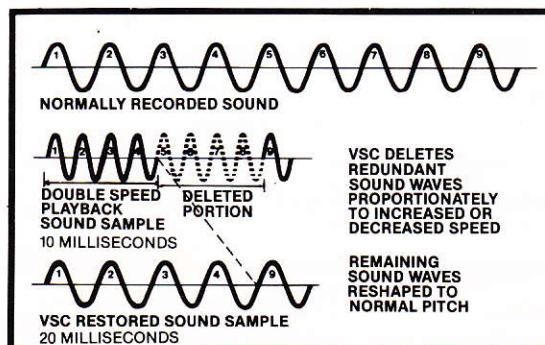
M8-B

The M8-B is designed specifically for speech compression. It has a built-in motor speed control system which can mate directly with the small tachometer-equipped DC motors typically used in high quality tape recorders. A single control potentiometer then automatically governs playback speed and pitch correction. Compressed speech with accurate pitch can be obtained over a wide range of playback speeds: from normal recording speed to as much as 3 times that speed!

A slight modification enables the M8-B to provide a reference voltage to an external motor drive circuit. This means that larger DC motors—requiring more than 1 watt of power—or AC motors can be driven with a simple interface.

The M8-B finds applications in:

- **"Compression" of Radio Commercials**—allowing more efficient use of radio time.
- **"Self-Paced Learning"**—a feature for teaching and training systems.
- **"Speed Listening"**—for cassette users in business and education; or high speed scanning of motion picture soundtracks, video tapes, studio soundtracks—all with retention of intelligible audio.



VSC: Variable Speech Control M8 Module

Applications

Speech Compression

Educational and Training Devices and Systems

In **tape recorders** and **audio visual equipment** for schools and training centers, such as sound-sync slide projectors and filmstrip viewers, VSC offers "self-paced learning" for students and trainees. Compressed speech actually increases learning efficiency while improving productivity of learning centers.

Business Products

In **dictating units** used in the office or enroute to work, the executive can review letters, memos and meetings in a fraction of the usual time. In **telephone answering machines**, speech compression permits rapid retrieval of recorded messages.

Personal Use Cassette Recorders

In tape recorders used at home or in the car, professionals such as doctors, lawyers and CPA's can listen to professional update cassettes. Students can review recorded lectures. All in half the time.

Aids for the Blind and Visually Handicapped

In tape recorders for the blind, used at home or in training centers, VSC makes possible "speed listening" to **Talking Books** and other recordings. With VSC the visually impaired can listen as fast as their sighted counterparts can read.

Radio Broadcasting

With VSC, broadcasting stations gain the ability to compress commercials by 20% to 30%, with almost no noticeable effect. It's useful in previewing program material as well.

Motion Picture and Video Editing

VSC makes it possible to understand the soundtrack while scanning "rushes" at up to 3 times normal speed.

Studio Sound Recording

VSC can be used to make **pre-compressed cassettes** for efficiency-minded clients. Savings in tape and faster communications are among the benefits.

Telecommunications

Where transmission is expensive or the medium is limited, compressed speech can cut transmission time by half or more so that message handling capacity can be increased. Real-time applications, in conjunction with a multiplexing system, may also be possible.

Hobby Projects

With the M8 Module and a motor change, hobbyists can convert their cassette recorders to VSC "speech compressors."

Pitch Correction

There are numerous applications for VSC where the object is to return an audio signal, whether from a live source or a recording, to its **proper** pitch.

Helium Speech Equipment

VSC can be used to unscramble **helium speech** in real-time. Here the objective is lowering the frequencies back to their normal level.

Frequency Transformation

Another field of applications involves the shifting of audio frequencies **away from** their original values. VSC is effective because it accomplishes **multiplicative** transformation so that harmonic relationships are preserved.

Hearing Aids

VSC, operating in real-time, could transform speech from its normal bandwidth to a lower frequency range. The result would greatly help the partially deaf who have residual hearing ability only in the low frequency range.

Sound Recording Equipment

VSC can be used for a variety of interesting **sound effects**. A VSC "harmonizing unit" could be made so that a performer could sing a duet with himself!

Pitch Shifting Toys

With a VSC "voice box" for example, a child could change his voice to sound like the notorious Darth Vader.

Electrical

| | |
|--------------------------|--|
| * Supply Voltage: | 12v. minimum to 15v. maximum (tested at 12v.) |
| Supply Current: | 50 ma. typical |
| Line Input Impedance: | 390K Ω |
| Line Input signal level: | 150 mv rms for AGC activation |
| AGC Range: | 35 dB |
| Load Impedance: | Minimum 1K Ω |
| Output signal level: | 1v rms (when in AGC) |
| * Bandwidth: | 350 Hz-5K Hz (limited for max. intelligibility) |
| Signal/Noise: | Greater than 46 dB |
| * Pitch Correction: | <i>No change to reduction to 40% of original</i> |

Mechanical

| | |
|-------------------|----------------------------------|
| PCB Dimensions: | 3.3" \times 5.0" \times 0.7" |
| Component Height: | .65" max. above board |
| Mounting Holes: | (2) .140" dia. (for 4-40 screw) |
| Edge Connector: | Standard 18 pin, .156" spacing |

Motor Speed Control (M8-B Only)

| | |
|------------------------------|--|
| * Motor Speed Control Range: | 1.0 \times to 2.5 \times times normal speed |
| External Servo Drive: | 2.0 to 5.0 v. (for 1.0 \times to 2.5 \times speed) |
| Motor Drive: | 1.2 v. to 10 v. DC, 400 ma. max, P _D = 1.0 watt max. |
| Tachometer Input: | 0-10vpp |

*These specifications are recommended by VSC Company. However, they may be altered if required, as per M8 Application Notes.

Specifications are subject to change without notice.

The M8 is protected under US Patent Number 3786195 and other US and Foreign patents. No license is granted to users by implications or otherwise under any patent or patent rights of the Variable Speech Control Co.

© Copyright Variable Speech Control Company 1978.