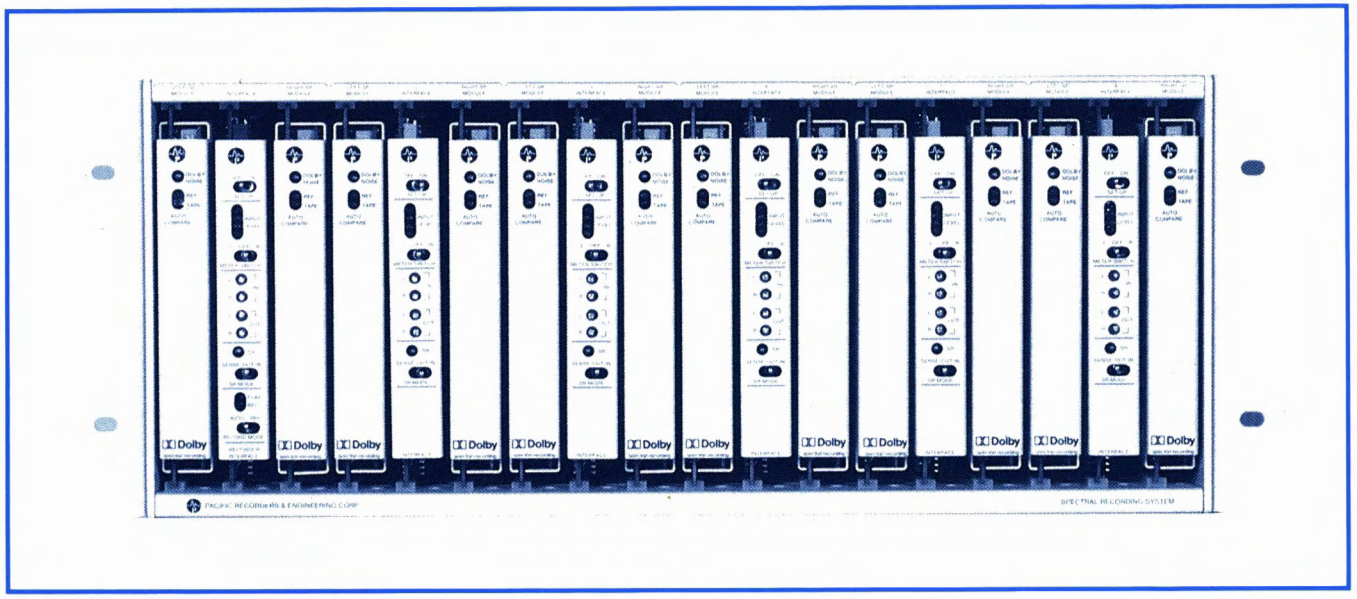
Dolby® Spectral Recording
for
Broadcast Cartridge Machines



- Audio quality combining the best performance features of digital and analog recording
- No dither noise or quantization distortion
- Compatibility with existing cartridge recorders and reproducers
- Use with existing recording medium, NAB cartridges
- Space and cost savings compared to multitrack recording studio Spectral Recording systems

PACIFIC RECORDERS & ENGINEERING CORPORATION

Spectral Recording, or SR, is a new professional audio mastering system which yields recordings with exceptional purity of sound. Spectral Recording provides two key advances in analog tape recording: a substantial extension of available headroom, and the practical elimination of the influence of noise and non-linearity on the reproduced sound. The SR system delivers this performance through being adaptive to the signal spectrum and by the consistent application of minimum processing to the signal. When combined with a professional half-track reel to reel or Maxtrax* format cartridge tape machine, SR provides performance equal to or better than 16-bit linear PCM digital audio recording. The performance with NAB format cartridge equipment is also outstanding.

Simply said, the Dolby Spectral Recording process addresses many of the classical limitations of analog magnetic recording and provides audio performance which competes favorably with the dynamic range and distortion of digital recording, while retaining the sonic advantages of analog recording such as linear phase response and wider bandwidth. Spectral Recording consists of encoding of the analog signal prior to recording and decoding it upon playback. (For that matter, so does digital audio recording!) The SR process works both by optimizing the modulation capabilities of the magnetic recording medium and by applying corrective characteristics to eliminate or minimize tape saturation at the extreme ends of the audio spectrum.

The process is best described by the following exerpt from Dr. Dolby's paper, presented at the November 1986 AES Convention in Los Angeles:

"The goal of the spectral recording process is to modify the various components of the incoming signal in such a way as to load an imperfect recording or transmission medium in the most rational way. Generally, high level signals at both ends of the spectrum are attenuated, whereby a better match with the overload characteristics of the medium is provided. At the same time, low level components are amplified substantially, in a highly frequency selective way. These effects are reversed in reproduction, restoring the original signal. The result is a significant reduction of distortion and noise, both in the absence and presence of signals."

"A design philosophy used in the development of the new system is that the best treatment of the signal is the least treatment. The operating goal of the encoder is to provide fixed, predetermined gains for all frequency components of the signal, with corresponding attenuations in the decoder. If a large signal component appears at a particular frequency or frequencies, then the gains should be reduced at those frequencies only, in accordance with predetermined compression laws for restoration of the signal during decoding. In other words, the compressor (encoding) should try to keep all signal components fully boosted at all times; when boosting must be cut back at a particular frequency, the effect should not be extended to low level signal components at other frequencies."

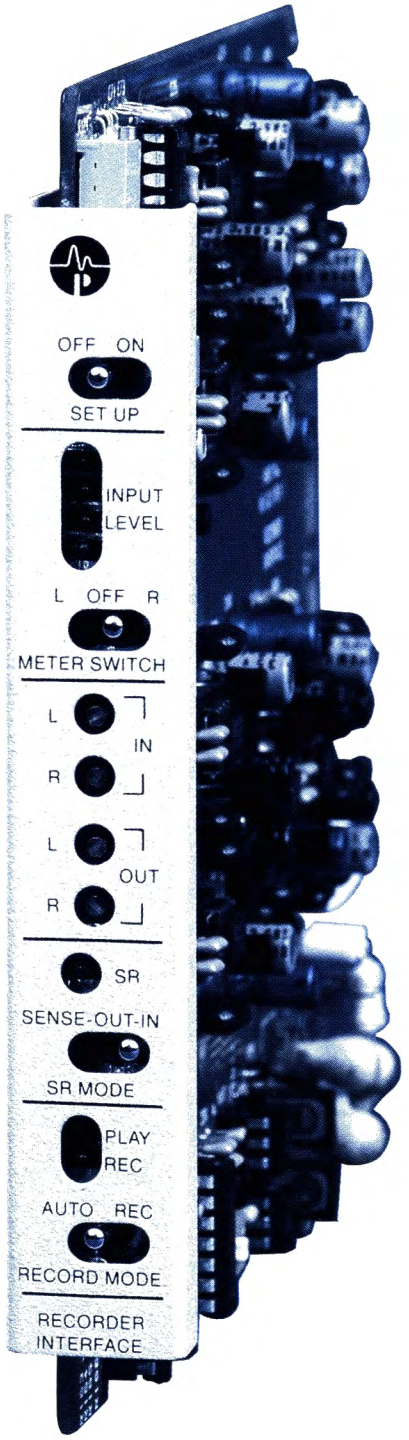
BROADCAST CARTRIDGE APPLICATION

Dolby currently manufactures several models of SR systems which address the recording studio, video and motion picture industries. By mutual agreement, it was decided that Pacific Recorders & Engineering Corporation would design and develop an interface system which addressed the particular application of broadcast cartridge machines. The goal of the design effort was to develop a more compact and affordable professional system than could be assembled using hardware, frames and cards designed for multitrack recording studios. For example, the vertical rack space required to accommodate six stereo record and/or reproduce channels with standard Dolby 365 or 361 frames is 21-inches, while our design occupies only 7-inches. In addition, we designed the system to offer features which are important to broadcast cartridge applications:

- Nominal operating levels of 0 dBu to +8 dBu, adjustable
- Automatic logic switching of stereo encode/decode modes for recording applications
- Automatic input/output monitor switching when interfaced with a recorder
- Extensive RFI protection for input, output, logic and power supply circuitry
- Redundant power supply option
- Cartridge recognition option

RACK MOUNT FRAME

The Cartridge Spectral Recording System is housed in a 7-inch rack mount frame which contains the system power supply and the input, output and logic control connectors. The regulated supply uses a toroidal power transformer equipped with an electrostatic shield to prevent the coupling of common-mode line noise and RFI. The input, output and logic connectors are the same Molex series as used in our consoles; the audio wiring sequence follows the normal console conventions. The frame will accommodate up to six sets of modules, each set representing a recorder or reproducer. Each set is comprised of an Interface Module and a stereo pair of SR Processing Modules.



INTERFACE MODULES

There are two types of interface modules, one for use with a cartridge reproducer and the other for a recorder/reproducer. The reproduce interface module is equipped with stereo balanced inputs to receive the output of the cartridge machine, stereo input and output level calibration controls, remote SR sense logic, reproduce level LED meter with meter switch, and a set-up switch. The recorder/reproducer interface module has the same facilities listed for the reproducer interface plus record mode and record/play selector switches. Each type of interface module controls its set of SR processing modules as a stereo pair.

SET UP Two position switch (Off-On) which engages the Dolby Noise logic of the SR processing modules. (Refer to the SR module description for details on Dolby Noise)

INPUT LEVEL Four LED reproduce level indicator.

METER SWITCH Three position switch, L-OFF-R, which selects the meter source from the left and right channel SR processing modules.

Trimpots Stereo pair of input and output level controls for aligning the system to the console and cartridge machine.

SR (LED) Illuminates to indicate when the SR encode or decode circuitry is engaged.

SR MODE Three position switch, SENSE-OUT-IN, which selects the SR operating mode of the associated SR processing modules. The IN and OUT positions manually engage and disengage the SR circuitry. The SENSE position allows the SR engagement to be remote-controlled by a photo sensor installed in the cartridge deck. The logic for the remote sense mode may be internally set for default modes of "SR" or "no SR". The interface module includes an LED current source and input buffer circuitry for a remote photo detector.

The following controls/indicators are included on the record/reproduce version of the interface module:

PLAY/REC Two color LED (play=green, record=red) to indicate the signal routing status and SR mode, if engaged, of the associated SR processing modules.

RECORD MODE Two position switch, AUTO-REC, which sets the operating mode of the interface and its associated SR modules. The AUTO position is used to automatically switch the SR system between the record encode and playback decode operating modes. The automatic switching is remote-controlled by the cartridge recorder and has opto-isolated logic inputs for the machine's RECORD SET and PLAY tally light voltages; the logic accommodates input tally voltages in the range of +5 to +36 Volts DC. The REC position is selected when separate sets of SR systems are used to provide simultaneous record encoding and playback decoding.

SR PROCESSING MODULE

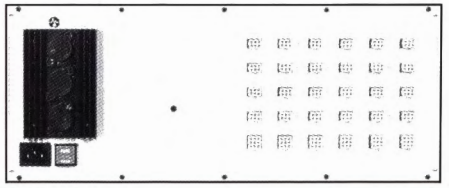
The SR Processing Module is manufactured by Dolby Laboratories and is a specialized version of the Cat. 280 module. The Cat. 280 is a retrofit for the Cat. 22 Type-A noise reduction module and is equipped with circuitry and a programming switch to accommodate a variety of existing Dolby chassis. The SR Module used in the broadcast cartridge frame does not need the programming switch and uses the input and output amplifier circuitry contained in the Interface Module.

The module is equipped with a unique set-up signal and auto-compare system for the rapid confirmation of level and frequency response in the tape equipment. Dolby Noise is pink noise interrupted with 20 millisecond nicks every two seconds for identification. Engaging the SET UP switch on the recorder interface module will cause Dolby Noise to be fed to the cartridge recorder at -15 dB below the standard reference level. Upon playback, the Dolby Noise tape signal is automatically alternated with the reference pink noise signal (without nicks) every 4 seconds and fed to the system output. The reference and tape signals may be recognized by the presence of nicks in the tape signal or by observing the REF and TAPE indicators on the SR modules. The use of Dolby Noise and the auto-compare system gives maintenance personnel a quick check method of checking the recording and playback machines. Any significant frequency response error in recorded pink noise can be heard immediately and a decision made about whether adjustments are necessary. The gain of the LED level meter is also increased in the SET UP mode to facilitate observing Dolby Noise levels.

TECHNICAL DATA:

Note: The Spectral Recording System is a unity gain device; all inputs and outputs are at the same reference level.

INPUTS			
From Console:		From Tape Deck:	
Source Impedance	600 ohms or less	Source Impedance	600 ohms or less
Input Impedance	40KΩ, balanced	Input Impedance	40KΩ, balanced
Input Level Range	0 dBu to +8 dBu	Input Level Range	0 dBu to +8 dBu
OUTPUTS			
To Tape Deck:		To Console:	
Source Impedance	80 ohms, differential	Source Impedance	80 ohms, differential
Load Impedance	600 ohms or greater, balanced	Load Impedance	600 ohms or greater, balanced
Output Level Range	0 dBu to +8 dBu	Output Level Range	0 dBu to +8 dBu
LOGIC			
Record sense	+5 to +24 Volts		
Play sense	+5 to +24 Volts		
LED current source	+12 Volts with 560Ω series resistor		
Photo sensor input	CMOS input, 100KΩ pull-up to +15 Volts		
CONNECTORS (mating connectors and pins supplied)			
Audio Inputs and Outputs	6-pin female Molex, standard wiring convention		
Logic	9-pin female Molex		
DIMENSIONS			
7 inches high, EIA rack mount chassis			
15¾ inches deep overall, not including mating connectors			
POWER REQUIREMENTS (fully configured)			
120 VAC, 50-60 Hz, 60 Watts			



Back panel

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