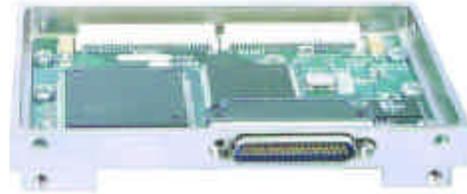


## Apogee Labs MPEG Video Encoding and Decoding System

Apogee Labs has produced a video digital encoding and decoding system that offers a great deal of flexibility, allowing adjustment to a wide range of measurement and transmission conditions. Simplicity of programming and automatic adjustments always produces the best picture, virtually guaranteeing superior results.



Simple to understand and simple to use, the video encoder and decoder offer flexibility for a wide range of applications.



**Offered as BOTH ground equipment and Airborne packages.**

The Apogee Labs Video Encoder (VEM) and Decoder (VDM) Modules utilize standard MPEG II techniques with enhanced functionality and supports:

- Both Inter AND Intra-Frame Compression
- Selectable Frame Rate
- Automatic Decoder Operation
- NTSC and PAL



Today, video surveillance is a basic security requirement in many areas. There are needs to observe empty rooms, highway traffic, street scenes, aircraft landings, views from aircraft in flight, experiments in process and many more. Often the viewing location is separated from the observer by a significant distance. Multiplexing is a requirement when multiple cameras are to be monitored simultaneously.

To maintain security, the video transmission must be encoded.

Digital video provides the solution to these issues. However, given realities, the bandwidth of the transmission is limited.

Video compression resolves a multitude of problems: whereas a typical analog video signal is passable in a 6 MHz bandwidth, the digital equivalent requires upwards of a hundred Mbps. It is obvious that such a rate must be reduced to permit the use of most data links. Furthermore, to record digitized video in its raw form requires vast storage capacities.

The VEM and VDM maintain the Apogee philosophy of providing maximum capability devices with minimum programming requirements.

- Regardless of the setup conditions, the VEM automatically compensates to provide the best possible picture quality.
- Knowledge of how the video was generated is not needed to setup the video decoder.
- The video encoder passes all required information to the decoder so that the reproduce function is completely automatic.

The Apogee Labs Video Encoder Modules (VEM) and Video Decoder Modules (VDM) incorporate and exploit the MPEG compression techniques. The VEM and complementary VDM devices permit fine-tuning to a specific application.

The method selected for compression of a video image is dependant upon the application. Two factors effecting compression relate to motion and image resolution. Four possibilities exist.

- High motion, high resolution is needed to track an aircraft or missile in flight
- High motion, low resolution may be used to observe moving objects with little need for detail
- Low motion, high resolution is required to monitor an area with the need to clearly identify an intruder
- Low motion, low resolution can be used to monitor static situations without the need for detail.



However, Apogee Labs recognizes that there is more to encoding and transmitting video than just the full data rate at full frame rate and the standard predictive encoding method. To accommodate constraining conditions two unique modes of encoding are included.

- Naturally, full frame rate fully compliant MPEG II is supported for both NTSC and PAL video formats.
- Normal mode permits inter-frame compression.
- I-Frame modes (with or without Interlace) support intra-frame compression (I-Frame modes are similar to motion JPEG.)

If data bandwidth is not a constraint but clarity and the ability to step through recorded video frame-by-frame (starting at any spot in the recording) are important, the VEM provides intra-frame compression in the I-Frame modes. These modes eliminate all predictive estimates that are normally in the MPEG compression technique. Compression is performed on each individual picture without regard to preceding or succeeding images. Digitizing video in the I-Frame modes, at the full frame rate, results in reproduced images of the highest fidelity. Recordings made of digitized I-Frame encoded video may be viewed frame by frame beginning at any position in the recorded file.



To permit I-Frame mode to function on reduced bandwidth data links, the VEM permits selecting reduced frame rates. Nineteen frame rates, from full rate (NTSC 30 and PAL 25 frames per second) to 1/4-frame per second are available to support the application. At 1/4 frames per second quality images are transmitted at data rates as low as 72 kbps.

The video frame is made up of two independent fields. Each field is a complete image in its own right. The two fields are presented on a CRT display by interlacing. In rare circumstances, two fields from a single frame can be from two different scenes. This frequently occurs in film converted-to-digital movies. At higher frame rates this is not a problem. However, at low rates this effect can be bothersome. To eliminate this condition the VEM is capable of generating its output in non-interlaced mode (I-FR-NI).

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