Video Processors - First Round

Bookkeeping: For the simplest system using 1 camera or 1 VTR in playback mode, the processor should accept composite video input and deliver composite video output in the same 1.4 volt format.

Module 0: DC power supply.
Module 1: sync stripper

Module 2: sync compositor

If more than one camera is to be used, then sync must be provided separately to each camera from an external source. If a VTR is involved, it will probably have to provide sync for other system parts. The specific design of Mod. 3 will require a little more research on my part into sync signals from VTR's and how to make editing possible in a 1/2 inch format.

(Cf. presume we are aiming at use by 1/2 inch amateurs)
more than 1 inch and 2 inch professionals.) In general, though, Mod. 3 should look like this:

Module 3, mode 1 (no VTR) sync generator

no input → Mod. 3 → sync out → to camera 1

Module 3, mode 2 (with sync from VTR) sync relay

sync in (from VTR) → Mod. 3 → sync out →
-sync out

I will likely delay designing Mod. 3 until I have completed the other modules for a minimal 1 camera system.

Module 4: limiter + overload indicator

video in → Mod. 4 → pattern switch

Mod. 4 is a sync compositor, like Mod. 2, but adds a feature not present in Mod. 2. First, a module that combines video (non-composite) and sync should limit
the range of the video in its outputs to the allowable limits of the device to receive that composite. Arrows in the diagram indicate where limits were exceeded on video input, and how the excess amplitude was clipped off by Mod.1, as it should be for Mod.2 as well. The user of this equipment would want to know what parts of a picture are being clipped, and an indication of limiting would appear on his monitor when he had the pattern switch on. The pattern switch would do something like this: parts of the picture off-scale beyond white would appear on the monitor to switch rapidly between saturated white and an inverted pattern returning towards black in proportion to the overload.

The same type pattern would appear for overload off the black end. Thus, the operator could discover what parts of any picture, after any process, went off-scale on either end, and by how much.

This overload indicator would be more useful than an oscilloscope for most users, as it would show overload on the monitor itself, in the frame of reference.
of the picture.

The following modules accept non-composite video input and give non-composite video output.

Mod 5: special effects - mixture of 2 effects:
A) input picture, modified in frequency response so as to either reduce bandwidth (filter out high frequencies) or increase relative amplitude of high frequencies. The effect is to either blur out detail (reduced bandwidth) or enhance fine detail. The picture, thus modified, is mixed with B), the amount entering the mix being adjustable both in amplitude and polarity (positive or negative).

B) left to right derivative of picture, available on two separately controllable output, one of positive excursions from zero, the other of negative excursions. Parameters under control are frequency response of the picture before differentiation (same kind of control as for A) in the module, but independent of the setting for A) and hysteresis of differentiation process, so that small changes in the picture can be made to have no effect, and only large features will appear. This picture is mixed, and the gain and polarity of positive going and negative going derivative variations are separately controllable.

Mod 6: comparator - maps input into two discrete levels, one level if input is below some reference level, the other output level if input is above the reference level. The input and reference
levels may both be provided by external inputs, or the reference level may be set by a potentiometer. The comparator is simple enough that two comparators should probably be combined in one module. The output of each half of the two comparator modules would be a mixture of the input to the comparator and the output of that comparator, the mixture being controlled by a balance potentiometer. An additional output would be a mixture of the outputs of the two halves, again controlled by a balance pot.

**Mod 7**: logarithmic to linear to antilogarithmic response curve. A logarithmic response to picture information will increase contrast on the dark-grey to black end of the picture scale, while decreasing relative contrast toward the white end. The antilogarithmic scale will be the opposite. The logarithmic scale will bring out detail in less well illuminated portions of a picture, while preventing brightly illuminated objects from being so prominent. Thus, the total detail observable in a picture from the viewer’s standpoint will appear to be greater on a logarithmic scale than on a linear scale. If a picture is first mapped to a logarithmic scale and then differentiated, the resultant picture will not look different in well-illuminated and poorly illuminated regions, except in places where illumination is so poor that camera response is swamped by noise in the camera.

**Mod 8**: mixer - adds its inputs with adjustable scale factors.
Note concerning frequency response controls in Mod 5: it should be fairly easy to control video frequency.
response by a control voltage as well as a hand-setting of a potentiometer. Thus, with voltage control over both frequency response and gain or blend (with a multiplier) it should be possible to control all the effects the video circuits can achieve by an electronic control source, either audio, touch sensors, analog computer, or digital computer.