regarding the use of plastics in a high temperature environment, the design of the cooling system for EC90 is far in excess of worst case conditions in a high temperature environment.

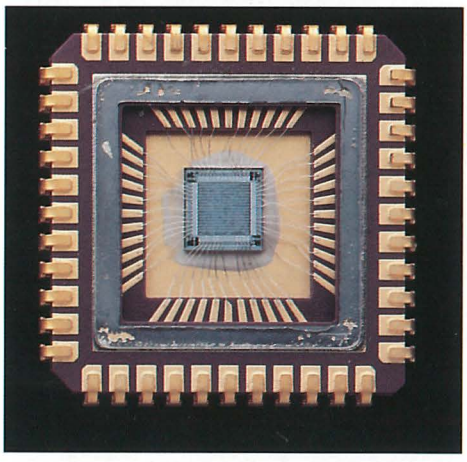
Two large tangential fans, each acting as back-up for the other, are provided in each rack. Even should both fans fail, the rack is still capable of running for a minimum of 30 minutes before entering an overheat condition. In such extreme conditions, each EC90 dimmer module contains overheat sensors which will shut down operation of the dimmer before dangerous temperatures are reached.

An additional benefit of the design and use of plastics is the absolute integrity and inherent safety of a rack even with modules removed.

The unique nature of EC90 and the new technical ground it breaks may all seem a bit imposing and perhaps a bit 'over the top'. Rest assured that no one need use *all* of the many features offered by EC90. Indeed the Strand engineer may well install the system and it will happily sit in the dark, humming to itself making the lights go up and down indefinitely without further thought. But, with today's demanding production schedules, limited manpower and efficiency requirements, not to mention the simple desire for a better dimmer, EC90 may be an answer you hadn't thought of.

LOAD CABLE COMPENSATION

Electrical consultants familiar with the problems of studio design are aware that where dimmers are situated long distances from the luminaires, voltage loss caused by resistance in the cable connecting the two can be significant. As tungsten filament lamps are sensitive to changes in voltage at or near full output, a 3% drop in voltage will cause a 10% drop in light output. This drop in output can result in a temperature shift from 3200°K to 3160°K, sufficient to be perceived by colour cameras.



To reduce cable resistance and resulting voltage drop, load cables between dimmer and luminaire are frequently over-sized. As a result, the cable itself is more expensive and installation more costly. To give an extreme example, if a 2Kw circuit was run in 1.5mm^2 cable over 100 metres, the voltage drop would be 19 volts. To reduce the drop to a more acceptable 5 volts, the cable would have to be increased to 6mm^2

Various solutions are currently implemented to reduce this problem: attempts are made to site the dimmers closer to the loads in perhaps a number of different areas, which can be both inconvenient and costly. Another common solution is to use an elevated input supply to increase the maximum output level of the dimmer. This will only be correct for a given load rating. Lower loads can be overloaded by the dimmer, thereby shortening the lamp life.

The Innovation:

The patented solution provided by EC90MD*plus* uses a unique method to compensate for the cable loss for all loads, without the danger of overvolting. The microprocessor measures current and voltage being supplied to the load, and knowing the value for cable resistance, calculates the amount by which to increase the output to counteract the voltage loss in the cable. This calculation is performed many times a second to ensure correct compensation even when a fade is running.

The real benefit is that the lamp is driven with the full supply range, with the dimmer curve scaled to fit. The measurements of current and voltage are both made in the dimmer module, with no requirement for extra sense wires to be run to the load.

Cable resistance for each load is stored in the dimmer rack. These can be entered by the user, from the known cable length and type, or measured by the fitting of a test load and instructing EC90 to perform an auto-calibration.

The benefit of the dimmer automatically compensating for known voltage drop in the cable is the ability to use smaller section cables than would be possible in a normal installation. And of particular importance to broadcast production, lamps will operate at their correct colour temperature.

Implementation:

A high speed microprocessor is used to perform all the calculations necessary to service groups of up to 12 dimmers. Since thyristor dimmers use phase control, each dimmer's compensation needs to be recalculated at least every 8.3mS. The processor is used in conjunction with an Application Specific Integrated Circuit which digitally controls the firing time required for each dimmer and receives back information on the output current and voltage. Mains voltage is measured centrally.

The function of the microprocessor is to calculate the firing time for a particular requested output voltage. This is then corrected for the measured mains input voltage and by the current and voltage data fed back from each dimmer. The output voltage measured takes into account the losses in the thyristor and filter networks. The output current is used to determine the compensating extra output voltage needed to overcome load cable voltage drop.