Grace

for DSX & C-Reality

Cintel

User Handbook

Issue 1
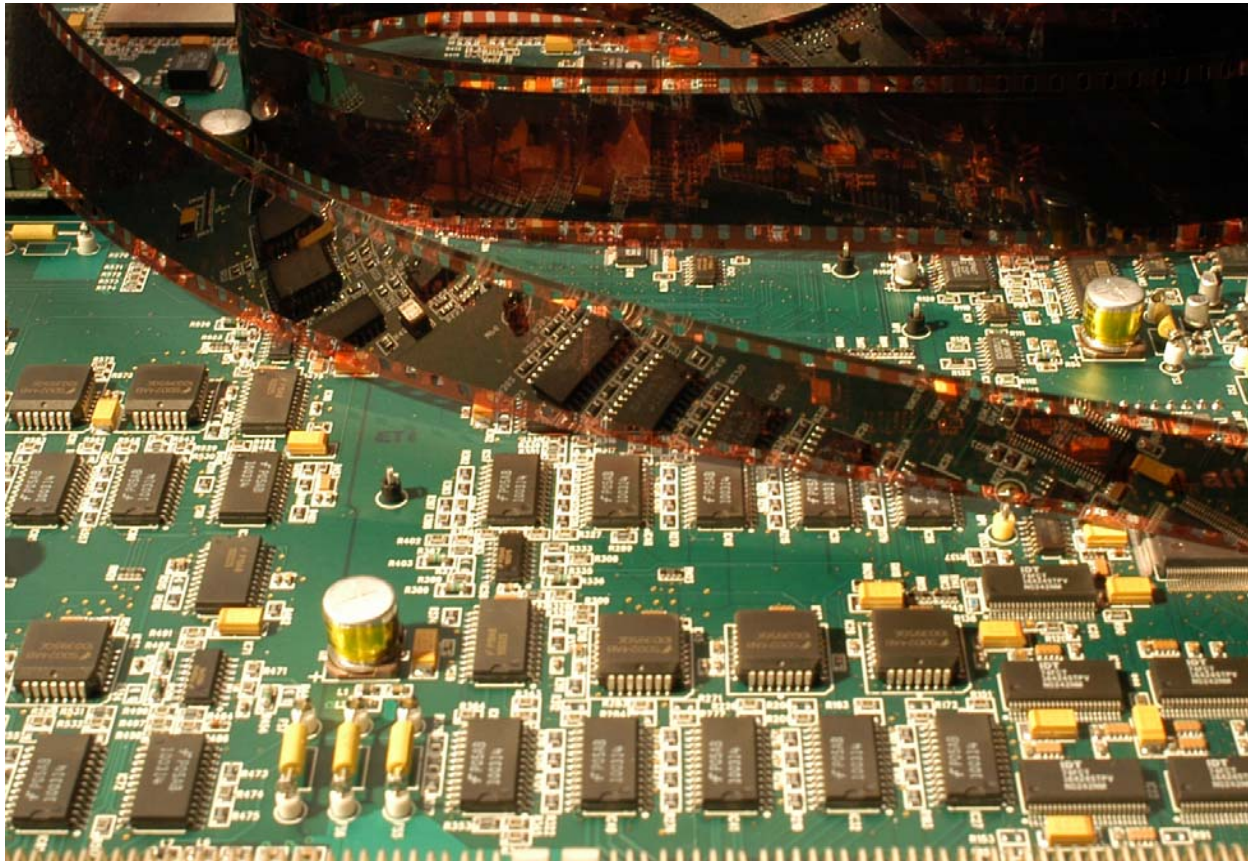
While every effort has been made to ensure that the contents of this document are accurate Cintel International equipment is under constant review to bring about improvements in design, and a unit may differ in detail from that described.

Introduction

Introduction
Grace is a high quality film oriented Grain reducer. Grace is available as an option for Cintel DSX and C-Reality Film Scanners.

Control
Although designed to be operated from a remote control desk Grace can also be controlled from the Local Control Panel where Grace's desk's functionality is replicated. Grace desk controls are supported by the following manufacturers:

- Da Vinci
- Pandora.

- Tangent

Please contact manufacturers for specific details.

General Description

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Introduction
Grace provides a high degree of grain reduction with no significant loss of image quality. To accomplish this grain reduction the whole design is based around the film image, the scanner's ability to present grain to Grace at high resolution and the progressive nature of film scanning offers a system that has no compromises for parameters such as interlace or frame to frame comparisons. This avoids recursive computations which could lead to image smear or degradation.

Grace is resolution independent and will operate equally well with Standard Definition, High Definition and 2K and 4K Data scans. Grace is a real time grain reducer and introduces no delays into the scanner. Likewise the film transfer speed is not compromised by Grace.

When correctly adjusted Grace gives a substantial reduction in film grain visibility without affecting the image. For film with very heavy grain or where a very "flat" image is desired the effect of Grace may be increased although some loss of image sharpness may be observed. Grace is tuned to be particularly effective in flat areas of the image where grain is most visible. Whilst optimised for film grain Grace will also provide useful noise reduction. Since Grace does not use any recursive filtering it does not introduce smearing or lag on moving images, nor does the correction need to "turn off" on scene changes or moving images. Additionally the correction can be viewed on a stationary frame of image making adjustment simpler.
The additional temporal filtering on Grace provides a fixed amount of extra grain reduction when the film is running, but the unique design does not cause the usual smearing or lag and there is no requirement for motion detector to switch the correction on / off.
Grace will provide a slight softening of some dust and scratches, and Oliver will assist in removing certain film grain and fine dust that appears similar to grain clumps. The combination thus becomes an even more valuable tool.

Grace Electronics

Grace utilises the high speed image processing at the front end of Cintel's scanners. This provides for real time frame by frame 14 bit Red, Green and Blue manipulation. (See Figure 2)

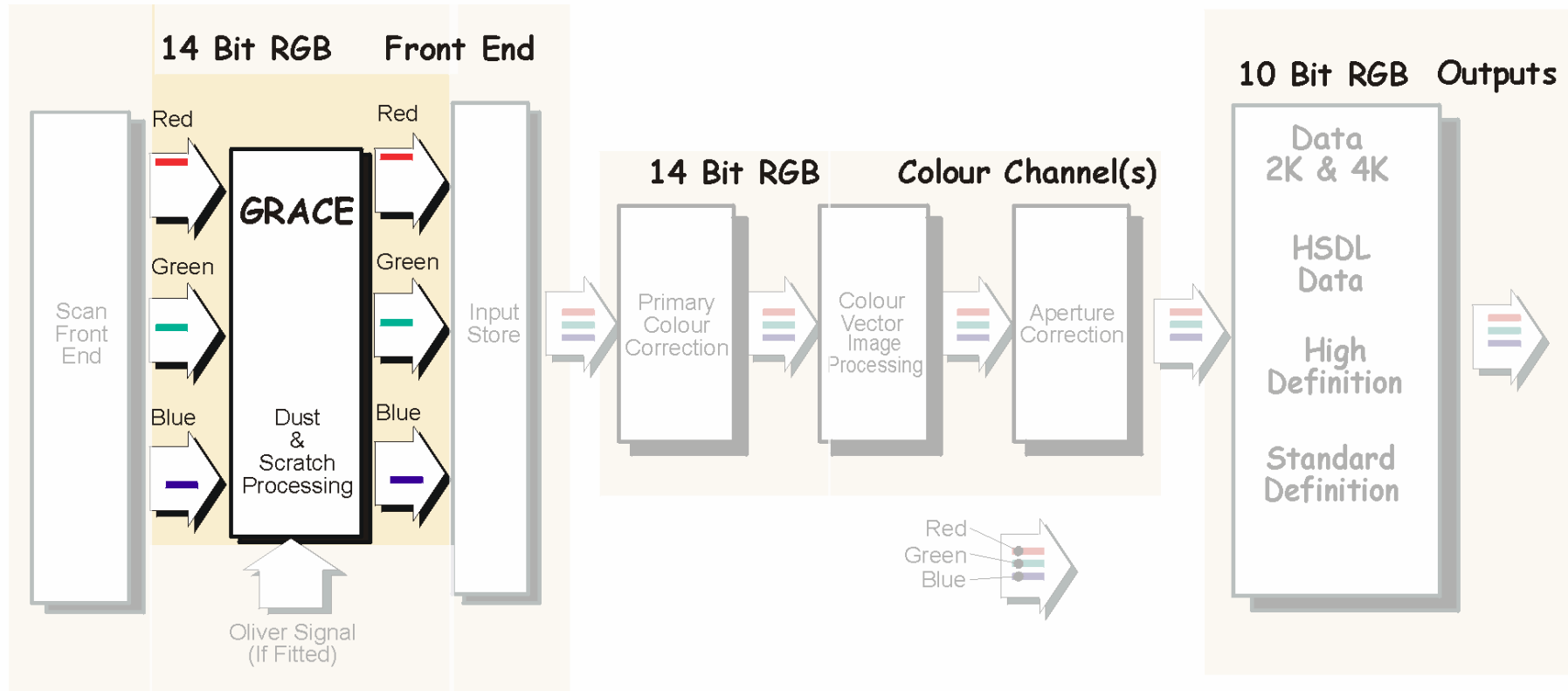Figure 1 – Grace Signal Path

Control
Grace is designed to be operated remotely from a remote control desk that provides full control over all facilities. The desk, essential for full telecine operation, communicates with the telecine through an Ethernet connection. A limited amount of control is however provided at the telecine. Refer to manufacturer's literature for separate control desk operation.

<u>Local Controls</u>
Local controls are located on the upper right control panels on the front of the machine.
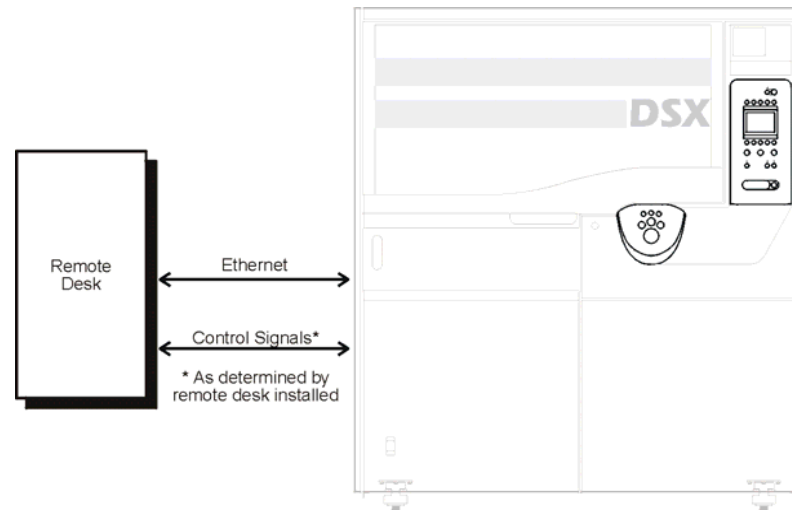

Figure 2 Control System Block Diagram

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IN-TEXT ILLUSTRATIONS

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GENERAL
Although designed to be operated from a remote control desk Grace can also be controlled and configured from the Local Control Panel.

Control Reference

     This supplement makes reference to local controls. The function of these controls will be similar to those available from a remote desk.

Grace Controls

     There are two sets of controls associated with Grace:-

               Gains
               Detail & Wipe

Gains
There are three gain controls; each reduces the grain within the image as the "Gain" is increased. The main Gain control affects the majority of grain equally in all colours. The HF Gain control has an effect on the finer high resolution grain in SD; its effect in HD and High Resolution data images is less significant. The "Blue Gain" control provides a means to reduce Blue Grain without having any effect on other colours; this is very useful in fast film stocks where it is known that Blue Grain is significant.

Detail and Wipe
While Grace has little effect on image resolution it can cause a slight "Roll Off" in very fine detail. The "Detail" control is effectively a subtle front end 14bit RGB aperture corrector. The main control provides for re-introduction of fine detail while the coring control prevents the "Grace'd" low level grain from being enhanced by the Detail control.
The Grace Wipe always operates to split the image between the left and the right of the image. This compliments the vertical upper and lower split of Oliver. Therefore in four quadrants the effect of both Oliver & Grace, or each individually can be assessed. With reference to Grace the wipe allows assessment of the degree of grain reduction compared to the original image and whether the degree of grain reduction is affecting other image attributes.

On/Off

    While locally there is no actual On/Off switch the Off condition can be achieved either by turning "Gains" and "Detail" to zero, or by placing the "Wipe" fully over to the non Grace mode. (Remote Controller manufacturers may provide a dedicated On/Off function, refer to their instructions for use.)

Control Access

    Grace can be controlled by using the menus on the upper right side control panel. For more details of these menus refer to the telecine manual.

    To access Grace controls from the Top Level menu, press "ENG" then "ENG" then "MATRIX", then select either "GRACE GAINS" menu or "GRACE DETAIL" menu.
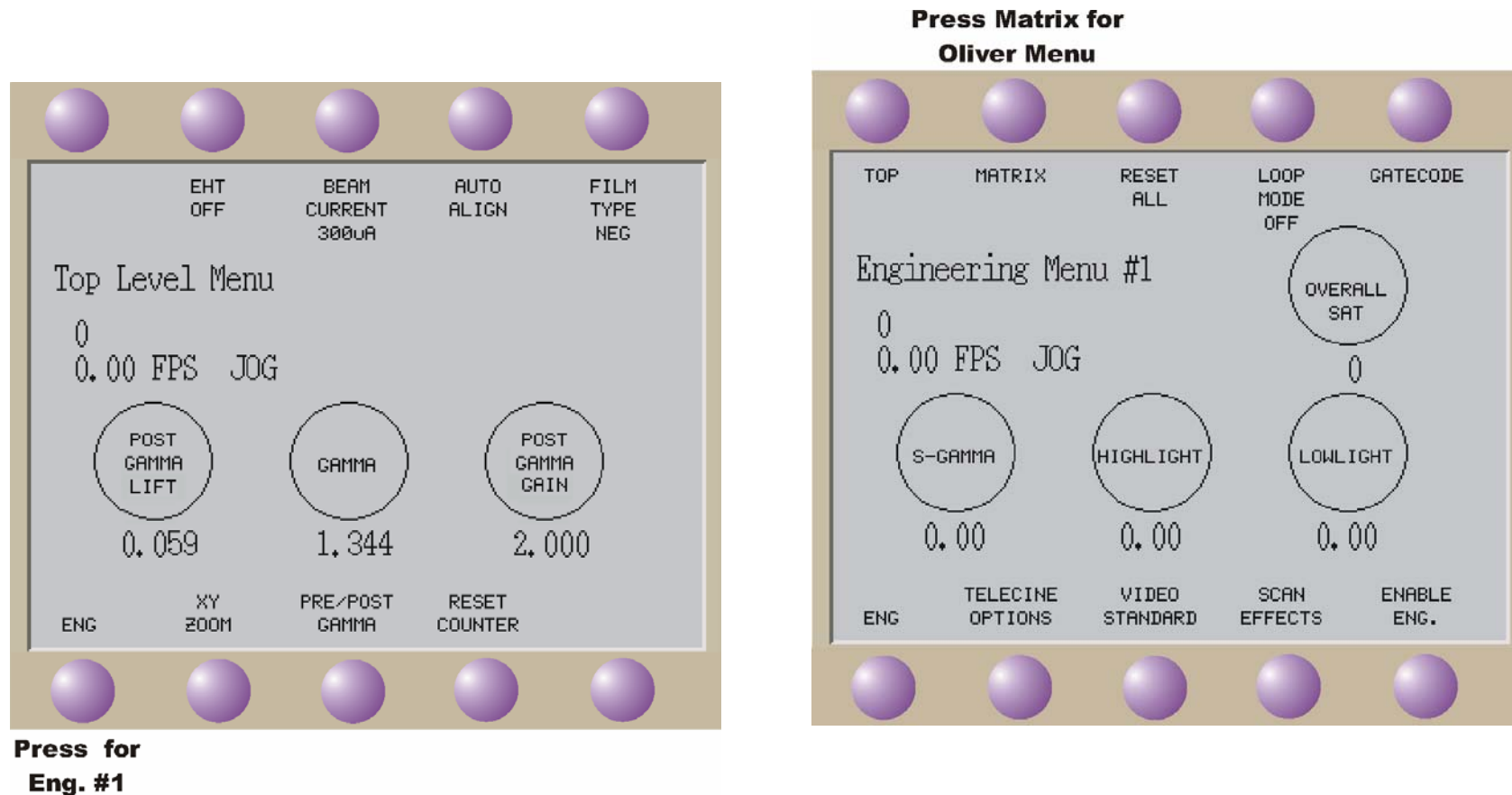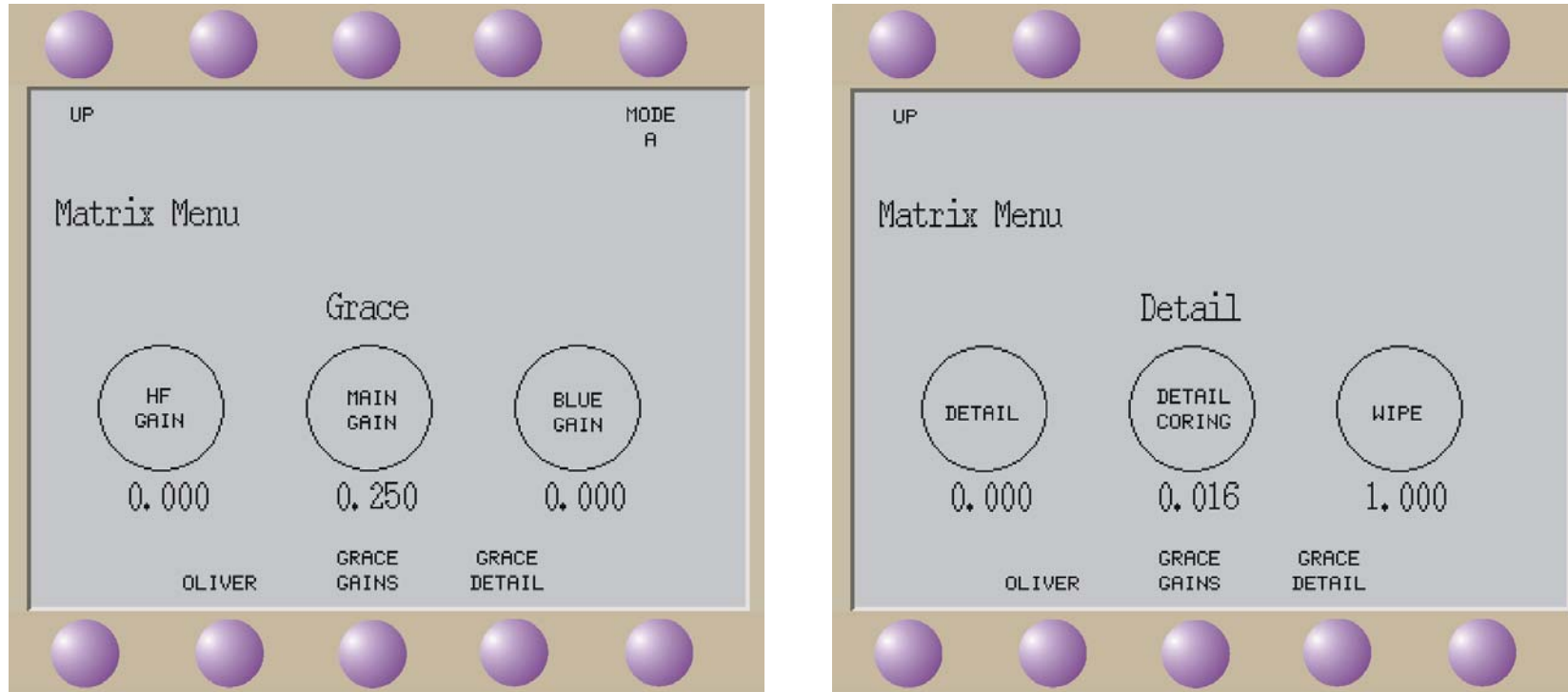

Figure 3   Menu Access

Figure 4 Grace Menus

The two Grace menus will be displayed as in Figure 4. Adjustment can be performed by means of the associated Digpots, refer to the telecine operational manual for more details.

Operating Procedure

There are 6 user controls available for Grace, all other necessary adjustments are made automatically when, for example, the film type is changed.
From the local control panel engineering menu select MATRIX menu then GRACE GAINS sub-menu, or select the GRACE controls on the remote panel.

The **HFGAIN, MAIN GAIN, and BLUE GAIN** controls should initially be set to their default values (0, 0.25, 0) which will give substantial grain correction with practically no effect on the image.
The **MAIN GAIN** control should be the first level of adjustment if it is desired to change the amount of grain reduction. Increasing the level will further reduce the grain visibility but will begin to reduce the sharpness of some images. This control may be used to change the look of the picture over a range between a grainy "film look" to a flat "video look", however take care not to overdo the correction.
The **HF GAIN** control operates similarly to the MAIN GAIN but works on finer grain. This control in combination with the MAIN GAIN may give a better result for SDTV, or for noise reduction.
If in doubt select zero for the HF GAIN, as excessive use may soften the image.

The **BLUE GAIN** control is intended to give extra correction in the blue channel for films showing excessive blue grain. **Select zero if not needed** since over-correction may result in yellow edges on some images.

From the local control panel engineering menu select GRACE DETAIL sub-menu.

The **GRACE WIPE** control is used to show the before / after effect of Grace, and is only intended as a demonstration aid, for normal operation this control may be left in the ON or zero position with Grace active over the whole picture. Ensure this control is fully on or off

The **DETAIL** control is an additional feature provided with Grace, it operates in a similar fashion to the aperture corrector to make the images sharper. Generally leave this control at its default zero setting. If it is required to make the picture a little sharper then this control may be used instead of or together with the aperture correction. In some circumstances the Grace Detail feature can be used simply as the film scanner front end 14 Bit RGB aperture corrector, rather than the scanners downstream 10 bit RGB aperture corrector.

The **CORING** control is used in conjunction with the detail control. The detail control will cause the film grain and noise to become more visible, and the coring control may be adjusted to minimise this effect. Generally keep the coring set to as low a value as possible to avoid coring artefacts on the image.

Note that the extra (temporal) grain reduction is at present activated by a switch on the Local Panel Matrix / Grace Controls menu.
TEMP A at top right corner of the local panel screen indicates temporal off, **TEMP B** indicates temporal on and is the recommended setting. **Temp B** is the only switch that introduces a temporal mode to Grace. The effect helps further minimise grain without introducing any significant interframe artefacts. In most instances Temp can remain switch on in mode B.

When using Grace keep in mind that as each film type grain structure is different and dependent upon exposure, the adjustments are unique to each image. However it will often be found that a certain set of values are suitable in general for a wide range of film transfers.

Additional notes about setting up Grace.
The Grace Detail aperture correction of GRACE is really just like any other APC system but perhaps simpler, it has just 2 controls. To set the coring drive the aperture level pretty high. Coring is introduced very slowly, just until the high frequency (Grain) is no longer enhanced. Care should be taken not to introduce too much coring or the pictures will end up looking very peculiar. On a scale of 1 - 100 a figure between 2 and 10 is probably sufficient for 16mm. 35mm will possibly require slightly different settings but much of the 'readjustment' is handled by the DSX or C-Reality firmware. With the coring level set, the aperture can now be backed off to the desired level. With the sharpness of today's scanners it is recommended not to use any aperture, even in HD, unless the amount of grain reduction warrants adding back some sharpness. Note that the removal of grain from an image can be perceived as making the image soft.

MAIN GRAIN reduction should be the first adjustment 'experimented' with. Typical levels cannot be generalized as they depend on the film stocks and grain levels. A good starting point is around 25 on a scale of 1-100, this gives a fair amount of reduction in most cases and is not high enough to degrade the image sharpness. If very grainy material is being scanned then an additional range of 25-100 exists at such levels some Detail may need to be turned in

HF CONTROL – It is difficult to describe what this control achieves visually it can best be described as 'rounds the grain off quite nicely'. It also helps with noise in the image. The levels of the MAIN and HF controls give good results when they are about equally driven - say about 20 each on a scale of 0 to 100.

The BLUE grain control should only be used with caution, in some instances it can result in a slight yellowing around edges. Typical usage would be a badly exposed, dark scene where the individual BLUE grain punctuates an otherwise dark background or perhaps a sky shot with excessive granularity. Often when this control is required it will need to be driven fairly hard - around 60 to 100 on our scale of 1 to 100.

There is one more control on DSX or C-Reality's Local Control Panel. It is labeled TEMP A or TEMP B - ensure this is in the TEMP B position as this will reduce residual "Low frequency rumble" which can appear has low level but large area non uniform brightness in the image frame to frame after Grace has removed the real grain. TEMP B should be avoided on software earlier than 2.03.

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