

Progressive-scan in Philips OEM P-scan boards

The Quality Emotive Range

Progressive scanning (NTSC for demonstration)

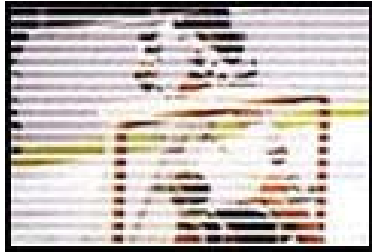
- Conventional TV and DVD can only display interlace picture
- Interlace picture only half of the maximum resolution on the screen every time the picture is refreshed (1/60sec)
- Progressive scan doubles the vertical resolution of the picture so you get 525 lines every time the picture is refreshed
- This format provides film-like, flicker free images especially noticeable on large screen TVs

8/17/2004

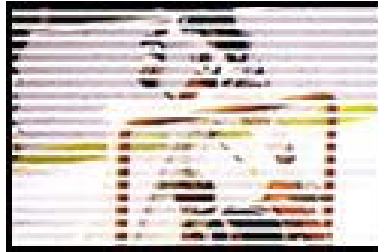


Technology

Progressive scan doubles the vertical resolution of the picture so you get 525 lines every time the picture is refreshed



Interlaced scanning first scans the odd numbered lines in 1/60th of a second...

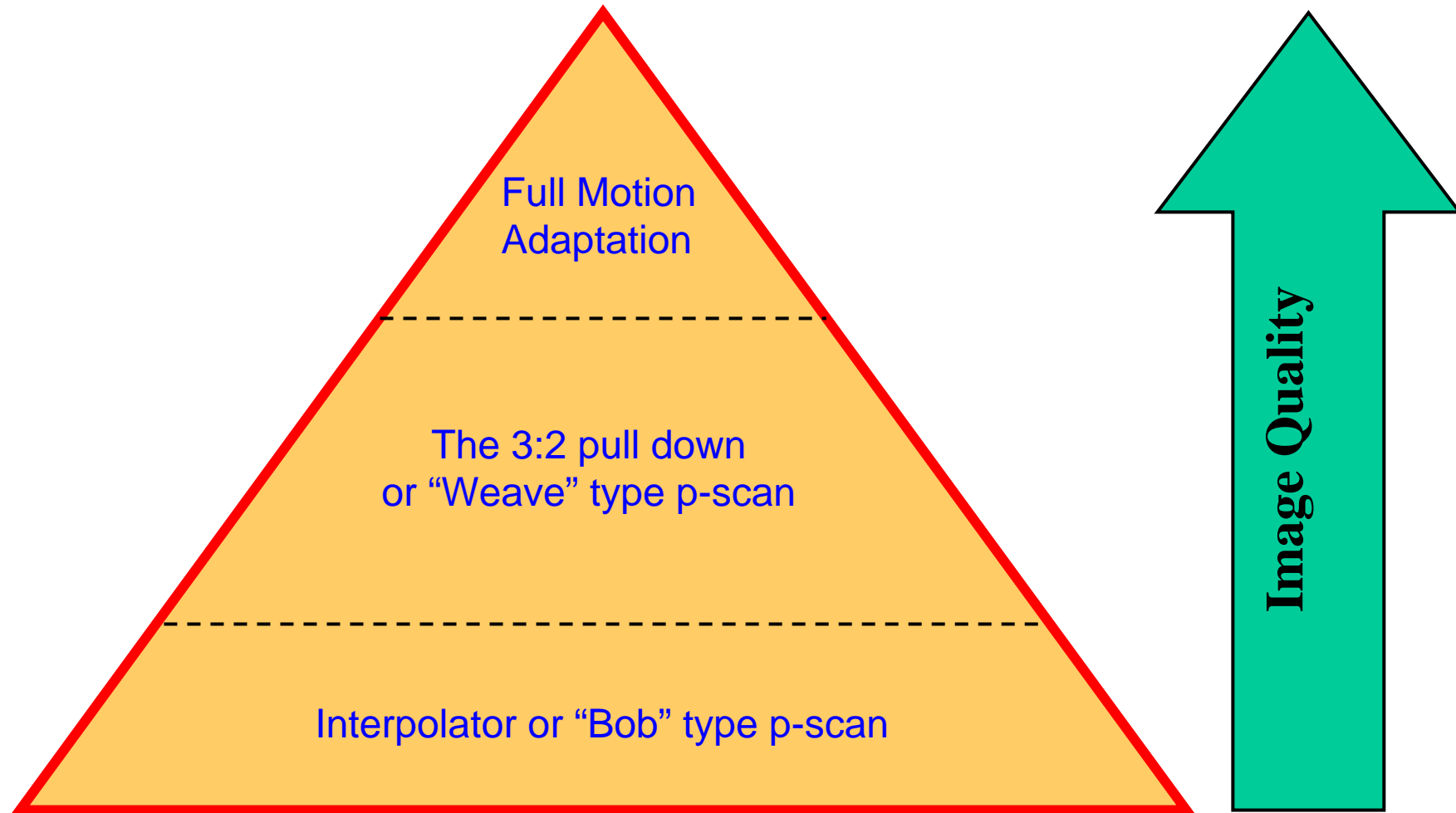


...followed by the even-numbered lines in the next 1/60th of a second.



Progressive scanning scans the entire picture in 1/60th of a second.

Levels of sophistication of progressive scan



Not all Progressive scan are created Equal....

There are basically 3 families of p-scan solution which will represents the different level of sophistication (and cost) in this technology

Interpolator or “Bob” type p-scan

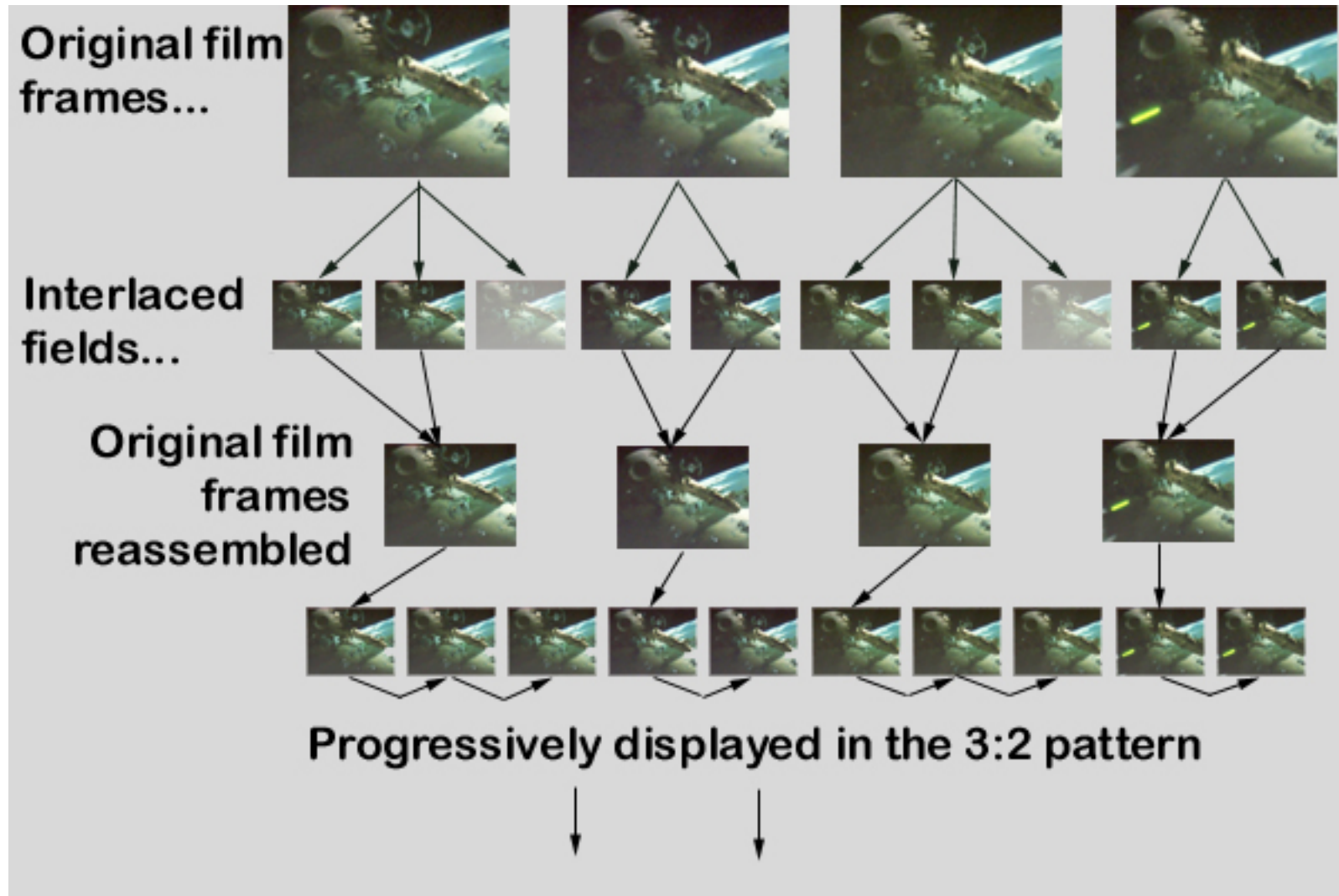
- This are the most basic of the 3 family by simply interpolating the missing lines in between the signals. This type of solution does not cause much artifact but since the information on the adjacent interlace frame are not used in recreating the p-scan frames, the picture quality is somewhat soft and hazy

- Advantage : This type of implementation is cheap as it does not need video memory to hold information on adjacent frames
- Disadvantage : Poor image quality
- Cheap p-scan solution tends to be fall into this family of solution

The 3:2 pull down or “Weave” type p-scan

- This family of solution is much better and does de-interlacing by using information on adjacent frames to “Weave” the p-scan frame. As the information on the frame is doubled, the resulting frame is much clearer and sharper than those of the “Bob” type. This type of solution performs best with film source material DVD whose 24 frames are encoded on the 60 frames DVD by using the 111, 22, 333, 44, 555, ... sequence. Hence this type of de-interlacing sequence is commonly known as the 3:2 pull down.
- Most of this type of p-scan will also do “Bob” type of processing, however, it can only operate in either one mode at any one time.
 - Advantages: Excellent quality on film base material
 - Disadvantage: More costly as it needs video memory, can be intolerant for bad edits and mix mode signal (where video base material and film base material are on the same screen) which will cause visible motional artifacts, like feathering distortion around the edges of fast moving objects

3:2 pull down illustrated



Some common artifacts that could show up with simple progressive solution

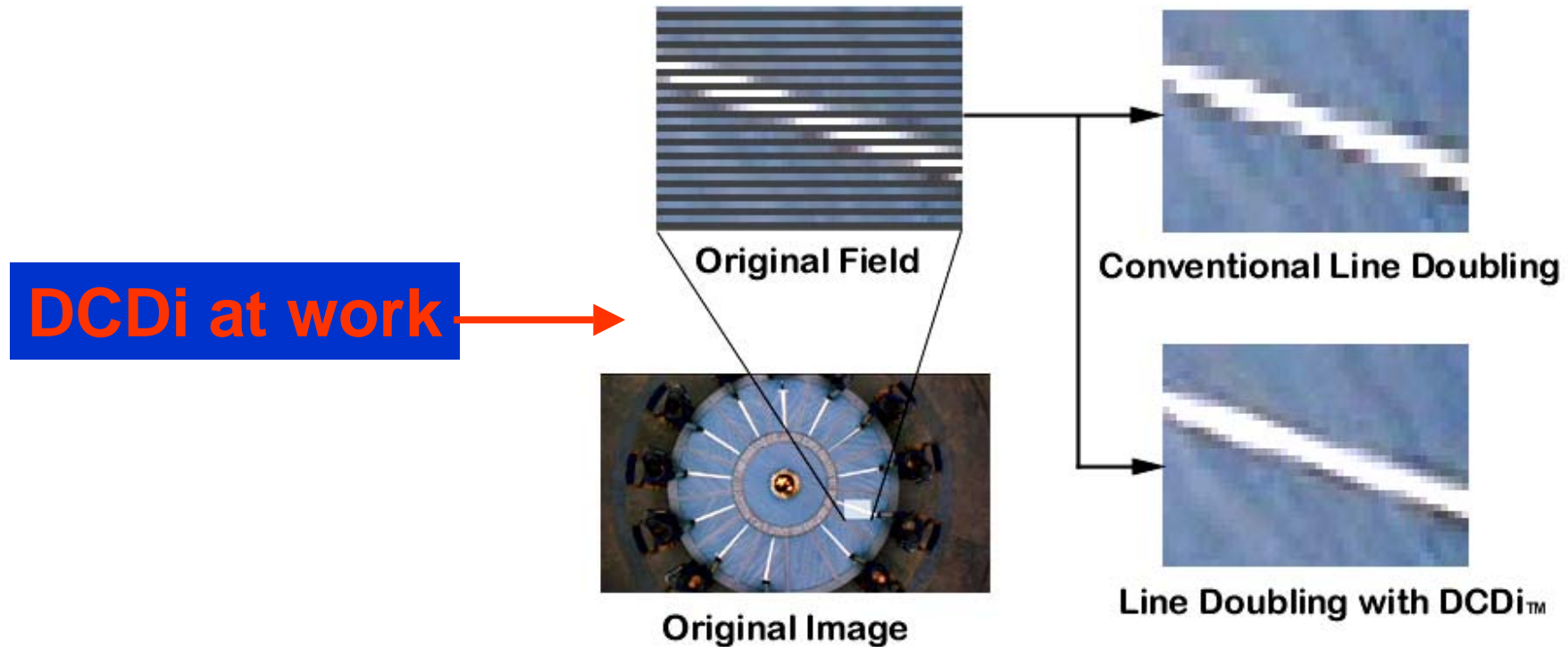


This how it could look with the wrong DVD player



The smart type with motion adaptation

- This family of solution not only the last two type of operations but are also smart enough to actually apply the above two techniques to different part at the same time to different part of the picture. This is done to optimize clarity of the picture using “Weave” on parts with little or no motion on the screen (such as the background) AND suppress motional artifact on fast moving parts (such as your action hero) using motion estimation and “Bob” technique
- This is accomplished by having a high power video computer to constantly analyze the sequence of images and identify the difference (caused by motion) between the images. It will then decide what algorithm should be applied to different part of the image to optimize quality
- The solution used in the Philips OEM p-scan boards belongs to this family of p-scan and hence can achieve optimum quality from any source. It is further enhance with a feature call DCDi™ by Faroudja. This new algorithm computes and tracks the angles of edges and uses this information to optimally fill in the missing pixels. It greatly improves the quality of moving images, particularly those in fairly slow motion, by eliminating the “jaggies” conventionally generated by interpolation.



- Some even go as far as interpolating an intermediate image to achieve a smoother motion (Falconic)
 - Advantage: Crystal clear on all material with no motion artifacts
 - Disadvantage: Much more costly than first two as it needs even more processing power to constantly monitor and process the image

Additional note

- The classification presented above are broad classification. There are some differences in refinements and further classification in each class such as:
 - “Weave” type that detects and suppress bad edits
 - “Weave” type that does very limited motion estimation
 - Motion Estimation combined with Directional Correlational Deinterlacing (DCDi™) that minimizes jaggies on angled
 - Motion Estimation that even compensate for in-between frames
- Manufacturers are often making wild claims on their p-scan solution. The best way to know the quality is to actually test it with signals and images designed to quickly identify the characteristics of the p-scan solution such as those made by “Mad Onion” or “Video Essential”

The Quality Emotive Range

54Mhz video over-sampling

The DVD is encoded in Mpeg 2 format which has a horizontal resolution of 720 pixel. With Philips OEM P-scan board, a power video processor is employed to perform a 4X oversampling on the video signal to 54Mhz.

This process up the horizontal resolution by four folds to a breathtaking 2880 pixel. Benefit would be finer pixel size, smoother transition and lack of those annoying “mosquito net” distortion found on the less players.

12bit video DAC

Normal DVD players uses a video DAC with 8 bit resolution. This translate to exactly 256 possible level of signal for the Y (luma) U and V (Chroma) signals. Philips has up the ante by introducing a 12 bit video DAC in its OEM P-scan board. With 12 bit of information reserved for color, This increases the color palatte to a whopping 4096 level of color for each of your Y,U and V signal. It means more subtle shades, smoother graduation of colors.

Combining with the 54Mhz video over sampling, It will quite simply means vibrant and natural pictures with not artifact that simply makes the picture comes to life.

The Quality Emotive Range

Digital Crystal Clear

Chroma Luma delay adjustments

The TV monitors might have some inherent delay in one or more of the input signals. This phase (timing) difference cause color bleeding or ghosting that can significantly deteriorate the image. Utilizing Y/C Timing Adjustment, the Philips module can actually compensate for this type of distortions by accurately synchronizing luminance and chrominance signals.

Gama adjustments

This feature allows the user to adjust the the Gamma of the output. This feature is especially useful for user of LCD base monitors which usually does not re-produce low level black information as accurately as CRT type monitors

It comes in handy when playing movies with lots of dull or dark scenes such as “Batman” or “The Crow”

The Quality Emotive Range

Digital Crystal Clear

DNR / Sharpness adjustments

This feature allows the user to control the apparent sharpness of the video to make your TV monitor for maximum clarity and minimum video noise

DCDi On/Off

This turn on or off the DCDi feature. This is a feature that does Per-pixel selection of edge direction produces smooth picture without staircasing/jaggies

The Quality Emotive Range

Digital Crystal Clear



Original Image



DCDi™ off



DCDi™ on