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(56) Documents Cited

GB 2271239 A GB 2249904 A GB 2246925 A
GB 2231228 A US 5812202 A

(58) Field of Search

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INT CL⁷ H04N 5/44 7/01
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(54) Abstract Title

Video standards conversion

(57) In standards conversion, a 60 Hz interlaced video signal is de-interlaced, producing a 60 Hz progressive signal, which is then synchronised with a 24 Hz frame rate, producing a 24 Hz progressive signal, with the unwanted frames being discarded.

A method of standards conversion is also described wherein a motion compensated field doubling process is employed on an input signal, and a linear conversion process is employed on the output of the field doubling process, producing an output video signal.

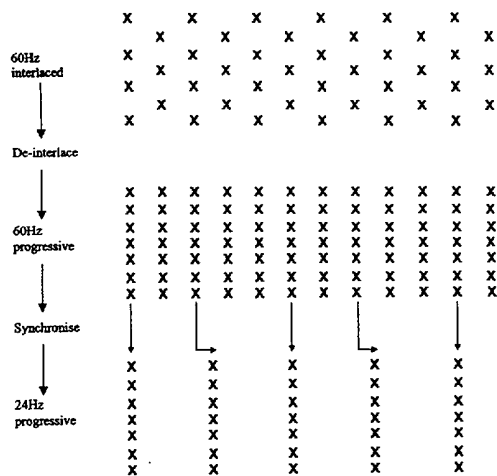


Fig 1

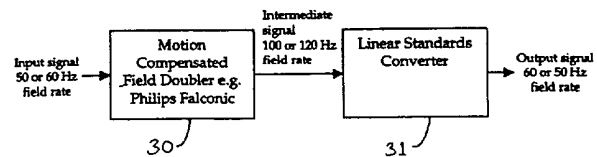


Fig 3

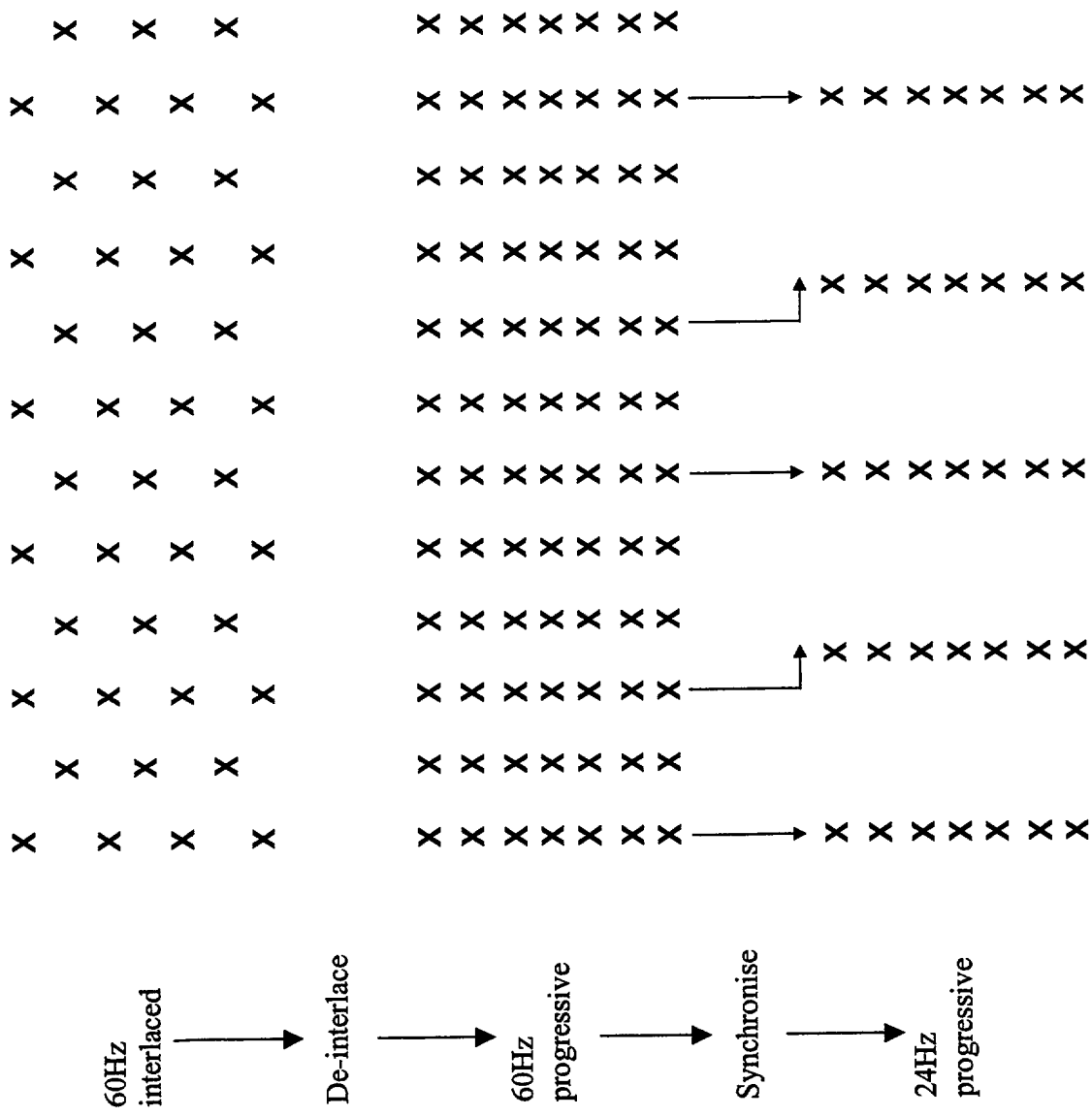


Fig 1

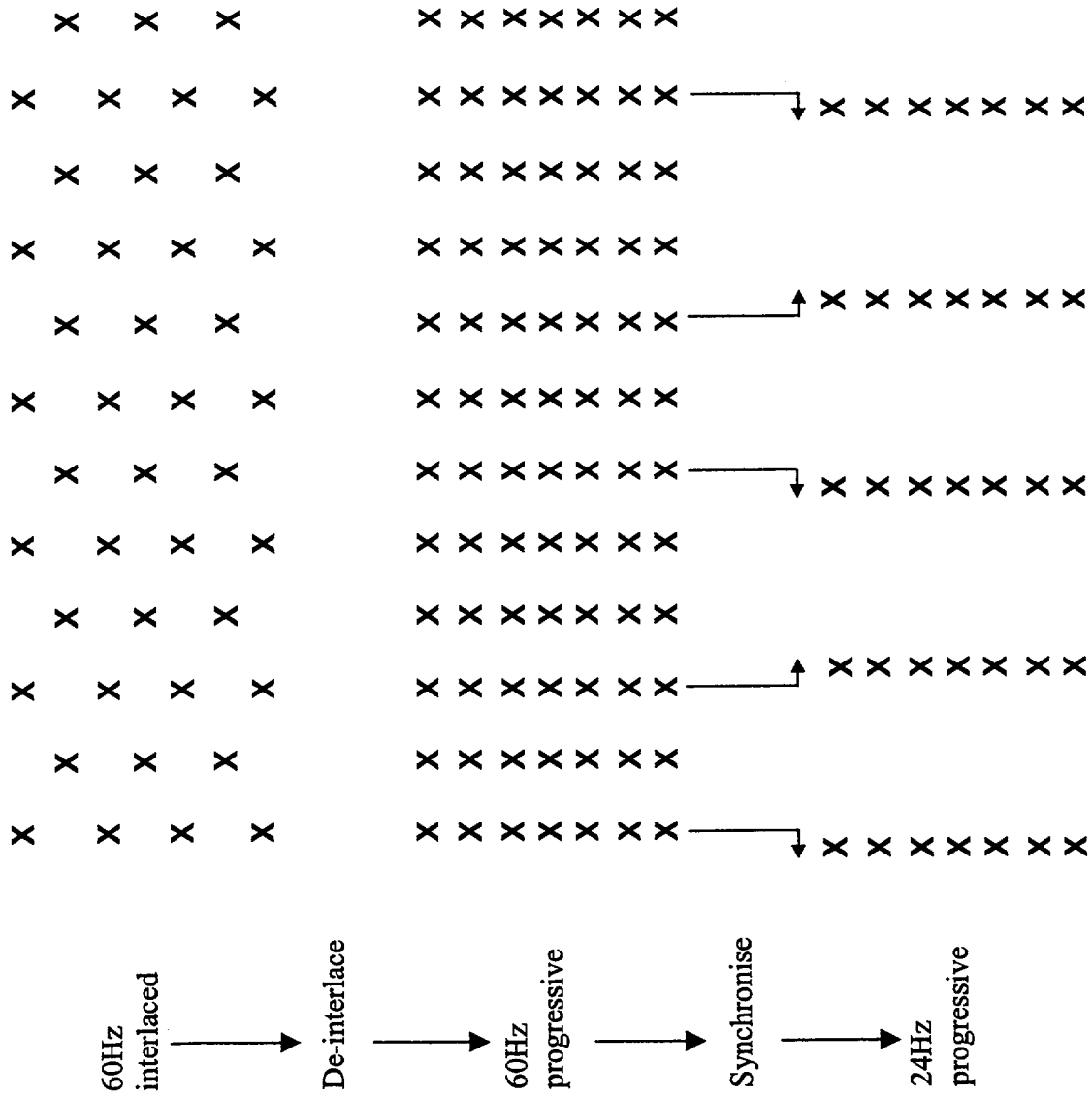


Fig 2

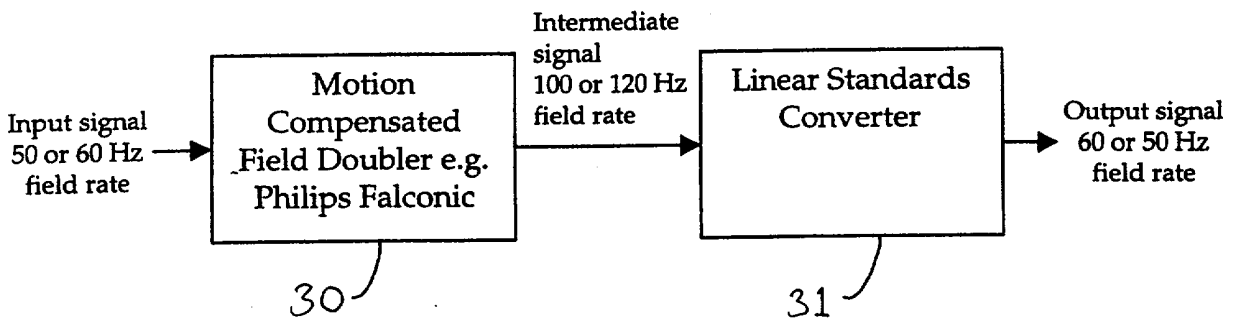


Fig 3

VIDEO SIGNAL PROCESSING

This invention relates to video signal processing, and particularly to standards conversion. A particular aspect is directed to the conversion of higher frame rate video material to lower frame rate material.

There are a wide variety of known methods of standards conversion are known. These methods are employed for a variety of different conversions, from a variety of different signal sources.

However, known methods of standards conversions can have certain disadvantages in that they are often complex, leading to the need for extra processing power and expense. It is therefore an object of this invention to address these problems, and to provide simpler and more efficient conversion methods.

Accordingly, the present invention consists in one aspect in a method of converting 60Hz interlaced video signals to 24Hz progressive video signals comprising the steps of: de-interlacing the 60Hz interlaced video signal to produce a 60Hz progressive signal; synchronising the 60Hz progressive signal with a 24Hz frame rate; and discarding the unwanted frames.

It is an advantage of this embodiment of the invention that no interpolation is used. Multiple image artefacts which can be produced in the output material are thus removed. Though some temporal distortion is inevitable with the off-setting of the output frames, this is negligible in comparison to the usual artefacts, such as judder, associated with film and other low sampling rate signals, and can therefore be tolerated.

It is a further advantage that the steps involved are more simple than those used in conventional standards converters, thus saving processing power and expense.

In another aspect, the invention consists in a method of standards conversion, comprising the steps of: employing a motion compensated field doubling process on an input video signal; and employing a linear standards conversion process on the output of the field doubling process to produce an output video signal.

It is an advantage of this aspect of the invention that artefacts such as judder and blurring can be removed, or at least reduced in comparison with

known converters. It is a further advantage that the architecture is again, less complex than conventional methods.

The invention will now be described by way of example, with reference to the accompanying drawings, in which:

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Figure 1 is a diagram showing a method of conversion of a video signal according to an embodiment of the invention;

Figure 2 is a diagram showing a method of conversion of a video signal according to another embodiment of the invention; and

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Figure 3 is a block diagram showing a method of standards conversion according to another embodiment of the invention.

Figure 1 illustrates a method of conversion according an embodiment. The 60Hz interlaced video input is first converted to progressive video by the de-interlacer. The 60Hz progressive signal is then synchronised with the 24Hz frame rate. In this case, the first of each pair of output frames is in the same temporal location as the input frame, and the second is the result of a temporal shift during synchronisation, equivalent to half the time between input samples. The result is a progressive 24Hz signal.

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Figure 2 illustrates a conversion method according to another embodiment. As before, the interlaced input is de-interlaced, and the progressive signal is synchronised with the 24Hz rate. Here, however, every (rather than every other) output frame is temporally shifted with respect to its associated input frame. This means that the maximum temporal shift involved in the synchronisation is equivalent to a quarter of the time between input samples. The result, again, is a progressive 24Hz signal, though here there may be less temporal distortion, as the maximum temporal shift is smaller than for the previous method.

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Figure 3 illustrates a method of standards conversion according to another embodiment. The input signal, for example, 60Hz video, is first passed to the motion compensated field doubler (30). This produces the intermediate signal, with twice the sampling rate. This signal is then passed to the linear standards converter (31), which produces the required output.

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The field doubler is only required to produce new intermediate fields at a single position, relatively, between input fields. Compared with the fully flexible field rate converters required by known standards converters, the processing complexity is therefore greatly reduced.

5 The second step of standards conversion is linear, rather than involving motion compensation, and therefore also represents a considerable saving in complexity.

10 The combination of these two simpler steps also helps to reduce the severity of certain artefacts. The motion compensated field doubler provides twice as many samples as the input to the linear standards converter. This allows the converter to make more accurate estimates of required output fields, and this greater accuracy results in reduction of judder and blurring.

15 It will be appreciated by those skilled in the art that the specific arrangements have been described by way of example only and a wide variety of alternative approaches can be adopted.

CLAIMS

1. A method of converting 60Hz interlaced video signals to 24Hz progressive video signals comprising the steps of: de-interlacing the 60Hz interlaced video signal to produce a 60Hz progressive signal; synchronising the 60Hz progressive signal with a 24Hz frame rate; and discarding the unwanted frames.

2. A method according to Claim 1, wherein the phase of the 24Hz signal produced is offset with the 60Hz progressive signal so as to minimise the maximum time shift performed in the synchronisation step.

3. A method of standards conversion, comprising the steps of: employing a motion compensated field doubling process on an input video signal; and employing a linear standards conversion process on the output of the field doubling process to produce an output video signal.



INVESTOR IN PEOPLE

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Claims searched: 1-2

Examiner: Frank D. Moeschler
Date of search: 8 November 2000

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.R): H4F (FEP, FKE)
Int CI (Ed.7): H04N-5/44, 7/01
Other: Online: WPI; JAPIO; EPODOC; TXTE

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X,Y	GB 2271239 A (SONY) See Page 1 especially	X:1 Y:2
X,Y	GB 2249904 A (SONY) See Page 10 especially	X:1 Y:2
X,Y	GB 2246925 A (SONY) See Page 5 especially	X:1 Y:2
X,Y	GB 2231228 A (SONY) See Page 5 especially	X:1 Y:2
Y	US 5812202 (NG et al) See Abstract	2

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.