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(54) METHOD FOR OBTAINING VIDEO SIGNALS AND APPARATUS FOR PERFORMING THE METHOD

(71) We, KARL VOCKENHUBER, of 118 Pötzleinsdorferstrasse, Vienna 18, Austria, and RAIMUND HAUSER, of 2 Goldeggasse, Vienna 4, Austria, both Austrian Citizens, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The invention relates to a method and apparatus for obtaining video signals derived from an object image which is projected onto a pick-up screen through a colour-strip mask so that the electrical output from the screen provides a luminance signal and colour-difference signals which are then processed by dot-sequential means.

It is known that the luminance data in colour television is of much greater significance than the colour data and it is common practice that transmitters provide a much greater band width for the luminance signal than for the chrominance signal. Several embodiments of single tube and twin tube colour cameras have also been proposed in which the colour data is obtained from a pick-up tube with a colour strip mask in front thereof. Different kinds of colour strip mask have also been developed. However, the use of one or two high-frequency carriers in the video range for encoding the colour is a common feature of all these systems so that the resolution of such cameras is greatly reduced. Moreover, these methods call for great uniformity of scanning of the screen in the pick-up tube because in such methods the luminance signal is obtained from the low-frequency portions of the video signal. However, the scanning characteristic for such low-frequency portions is different from the high-frequency portions of the colour carriers and this leads to difficulties in colour forming.

A method, called the index method, has been proposed and utilizes a colour mask with black, yellow, magenta, and cyan strips. The signals are processed by dot sequential means, the black strip characterizing the beginning of this data quartet. However, since

a full brightness signal requires the assembling of three dots it follows that this method calls for a large number of dots if a luminance signal of sufficient band width is to be obtained.

According to one aspect of the present invention, there is provided a method of obtaining video output signals representative of an object image which is projected onto a pick-up screen *via* a coloured strip mask, the pick-up screen providing an electrical output which is processed by dot sequential means and which includes a luminance signal and two colour difference signals each corresponding to the luminance signal from which a different primary colour signal has been suppressed, the strips of said mask being disposed in a repeated data sequence so that sequential data dot information regarding the luminance signal and the two colour difference signals is provided by the screen output, the screen being scanned in synchronism with operation of a timing circuit and the data dot information being fed into delay means from which delayed dot information is fed together with data dot information coming from one or more adjacent data dots to processing circuitry which operates sequentially on the individual data dot information to extract the colour information and luminance information and provides the video output signals.

According to a second aspect of the present invention, there is provided a method for obtaining video signals representative of an object image which is projected onto a pick-up screen *via* a colour strip mask, the electrical signal derived from the pick-up screen being processed by dot sequential means and including luminance signals (Y) red colour difference signals (Y-R) and blue colour difference signals (Y-B), in which method the strips of said mask are disposed in a data sequence such that said luminance signals, red colour difference signals and blue colour difference signals are sequentially produced in the order

Y/Y-R/Y/Y-B

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and each luminance signal is stored at least until the next colour difference signal occurs whereupon the corresponding colour signal is obtained by the subtraction $Y-(Y-R)$ or $Y-(Y-B)$ respectively.

According to a third aspect of the present invention, there is provided colour television apparatus having a colour strip mask spanning an optical path along which an image is directed, a light sensitive pick-up screen onto which the image falls after passage through the mask, parallel light-transmitting strips on the mask recurring in sequence in each sequence of which the same three colours of strip appear, the strips being, respectively, transparent to provide a luminance signal, a first colour providing the luminance signal from which a first primary colour signal has been suppressed and a second colour providing the luminance signal from which a second primary colour signal has been suppressed, means for scanning the screen transversely of the strips to provide repeated sequences of data dot information corresponding to the mask strip sequence in an electrical output provided by the screen, a timer providing a signal synchronised with the scanning rate of successive dot sequences in the scanned lines, storage means for holding information related to a data dot in one sequence until the information related to a later data dot is obtained, a colour signal forming means operating dot sequentially on the held data information and the later data dot information and providing a signal significant of a colour whose signal is to appear in the video output of the camera apparatus, and circuitry obtaining video colour information from the output of the colour signal forming means.

According to a fourth aspect of the present invention, there is provided colour television camera apparatus having a colour strip mask spanning an optical path along which an image is directed, a light sensitive pick-up screen onto which the image falls after passage through the mask, recurring parallel yellow, cyan and transparent strips on the mask so that the electrical output from the screen contains luminance signals (Y) and colour difference signals (Y-B) and (Y-R) provided by light which has passed through the yellow and cyan strips on the mask, respectively, means for scanning the screen transversely of the strips to provide repeated dot data sequences in each line of:—

$$Y/Y-R/Y/Y-B$$

in the electrical output from the screen, a timer synchronised with the scanning rate of successive data sequences in the scanned lines, first storage means for holding a luminance signal Y until the following colour difference signal is derived, signal differences forming

means having one input connected to the output of the first storage means and the other input connectible to receive the electrical output from the screen, and a colour selector circuit connected to receive the output of the signal difference forming means.

The method provides maximum resolution by means of which a wide band luminance signal can be readily obtained. Three sets of data are required for recognising a colour, namely either the three primary colours or the luminance data and two of the primary colours. Since the luminance signal represents the sum of all colour brightness and therefore provides the largest output signal it follows that it is convenient to utilize this signal as one of the three sets of data. Proceeding from the same consideration the colour strips selected for the two difference signals suppress only the desired colour. The desired colour can then be obtained by forming the difference with the brightness signal. Complete colour data can therefore be obtained solely from the three different colour strips of the colour strip mask.

The invention will now be described in more detail, by way of examples, with reference to the accompanying schematic and block diagrammatic drawings, in which:—

In the Drawings

Figure 1 shows how an image picture is broken down by a strip mask and how an electrical video output signal can be used to indicate a colour change edge;

Figures 2A and 2B illustrate how scan synchronizing signals may be generated and used to produce a colour switching signal;

Figure 3 shows a modification of Figure 2; and

Figure 4 is a block diagram of a colour television camera apparatus which operates to provide red, green and blue video signals.

In the following descriptions only those parts of a colour television camera which are necessary for the invention are described, other parts which play no part in the invention and which are known *per se* being omitted in order to avoid burdening the description with unnecessary detail.

Principle and Preferred Embodiment

Referring to Figure 1, an image 1 with two differently coloured areas 2, 3 is to be processed into video signals by means of a colour strip mask 4 which is only partially shown and whose width scale is expanded. The size and dimensions of such colour strip masks are adequately described in the relevant literature and need not therefore be described in detail in this context.

The essential feature of the colour strip mask 4 is that it contains transparent colour strips Y, cyan coloured strips Y-R and yellow strips Y-B. The red and blue signal may be

obtained from these three sets of data by subtraction of the difference data Y-R and Y-B respectively from the luminance data Y which is defined by the transparent strip Y, and the green signal can be obtained in known manner from the luminance data and the data thus derived. The means for processing the green signal are well known to the experts and need not therefore be explained in this context.

From the description above it will therefore be evident that it is possible to operate with a colour strip mask which contains the data sequence

Y/Y-R/Y/Y-B

in which case the Y signal must be stored for the duration of the succeeding data dot so that one or the other of the two difference signals can be subtracted therefrom.

According to the embodiment illustrated in Figure 1 the data sequence comprises a data quartet which includes luminance data between the successive colour difference data. To obtain the colour data the luminance signal Y is stored during the succeeding data dot so that the next colour difference data can be subtracted in accordance with line I of Figure 1. As may be seen by reference to line II of Figure 1 this subtraction alternately provides a luminance signal and a colour signal, that is to say practically the complete luminance signal is obtained from a transparent strip of the mask 4 and the corresponding colour signal is obtained by subtraction of the signal from a strip containing the difference data. The difference signal on the other hand represents an incomplete luminance signal which, in some circumstances, may be subject to disturbances.

The complete luminance signal contained in the difference data can be obtained in a further process step if, as symbolized by the arrow 5, the colour signal is stored for the duration of an entire data sequence until the next difference signals occurs in which the corresponding colour is absent and the first mentioned colour signal is subsequently added to the aforementioned difference signal in accordance with line III. The result is a luminance signal which is also obtained from each difference data in accordance with line IV. This is however conditional on the colour data in the two data sequences, i.e. in the strip 6 as well as in the strip 7 of the illustrated embodiment, being of equal magnitude. If this condition is not satisfied there is the risk of interference. This interference is only insignificant in the Y signal, appearing as a slightly irregular edge. In the colour signal however it may result in wrong colour formation which must be avoided.

The risk of such wrong colour formation occurs whenever a colour edge 8 appears

between the two colour areas 2 and 3 in the image 1. In the electrical output signal of the pick-up screen this is reflected by a step response 9 as shown in the graphical lower half of the Figure. Disturbance must therefore be expected whenever such a step response occurs. In the illustrated embodiment the edge 8 coincides with a transparent strip Y of the colour mask 4 so that even subtraction according to line I would result in an error because the Y data of the strip 10 is not equal to that of the strip 11. An incorrect result for the colour signal would therefore be obtained by subtracting the colour difference data Y-B of the strip 11 from luminance data Y of the strip 10.

The appearance of a step response 9 in the output signal of the pick-up screen, detected most readily by its first derivative 12 is used to trigger a change-over pulse 13 which ensures that subtraction is performed in identical manner with the signals obtained from strips 14 and 11 respectively in place of the data pair obtained from strips 10, 11. The strips 11, 14 provide the blue signal and subsequently the red signal is provided from the strips 14, 15. In order for a colour edge to be detected in good time it is convenient for the entire signal to be stored in order to obtain sufficient time for switching from the data pair 10, 11 which has interference, to the data pair 11, 14 which has no interference. The sensitivity of the circuit may then be defined by the width of the changeover switching pulse 13.

First Timer Circuit

To ensure clean processing of the signals it is necessary that the individual stores are switched on at the correct moments of time. Basically such synchronization is done by means of an oscillator whose frequency corresponds to the strip frequency and which may therefore be utilized for actuating suitable switching means. A free-running oscillator however imposes very stringent requirements on the linearity of the horizontal deflection. Instead therefore, black strips 16 are provided in the colour strip mask 4, as shown in Figure 2B, at least at the beginning of each line and where appropriate at regular distributed intervals along the line. Each of these strips, with a succeeding transparent strip 17, provides a signal characteristic 18 which facilitates synchronization. The first rise of voltage amplitude after a black strip must in all cases be the first luminance signal. The signals from the screen 19 are, as shown in Figure 2A, passed through an amplifier 20, and a limiting amplifier 21 to form a pulse sequence 22. The pulse sequence 22 is then utilized for switching a register 23 between the points A,B,C,D, which provide the synchronized switching sequence illustrated graphically in the lower part of

figure 2B. The circuit of Figure 2A therefore provides a timer.

Alternative Timer Circuit

Another timing arrangement is illustrated in Figure 3. If the total number of colour strips per line is selected so that the resultant frequency corresponds to the frequency of an auxiliary colour carrier utilized in the system, for example 4.43 MHz, it is possible to supply the output of the pick-up screen 19 via an amplifier 20 and a selective amplifier 24 to a limiting amplifier 25 the output of which is compared in a phase comparison stage 26 with the frequency of an oscillator 27 that operates at the frequency of, for example 4.43 MHz. The output signal of the phase comparison stage 26 is utilized for controlling an amplitude regulator 28 which receives a signal from a horizontal deflection circuit 29 of the electron scanning beam impinging on the screen. This provides the additional advantage of a perfect scanning linearity. This system also requires the black strips 16. Even if the image spot at the beginning of the line is itself black the stay light in the optical system will be sufficient to result in modulation of the output signal in order to ensure correct synchronization.

Some dots of the pick-up screen 19 are shown in symbolic form in Figure 4. The pick-up screen 19 will usually be the photocathode of a pick-up tube but it may also be a tubeless screen comprising a raster of diode lines. The term "scanning" as used in this specification applies not only to the electron beam scanning technique conventionally employed for cathode ray tubes but for all devices which can be utilized to the same end in conjunction with such diode screens and which scan the individual diodes of the lines to read their responses to incident light. The colour strip mask already described above is disposed in front of the pick-up screen 19 so that one set of data of the colour strip mask is coordinated to the individual dots of the pick-up screen 19. In the embodiment being described, these dots are scanned by a scanning beam 30 and the resultant video signals are obtained from a signal electrode 31.

The output signal of the signal electrode 31 is amplified in a video amplifier 32 and is delayed in a delay circuit or store 33 by a period of time which is equal to at least the scanning duration of an image dot for a purpose which is to be described below.

Reference should again be made to the description relating to Figure 1 according to which it is appropriate for step responses 9 in the signal to be detected in good time for the appropriate switching operation to be performed. From amplifier 32 there extends a conductor 34 to the input of a

differentiating circuit 35, which is adapted to detect high frequencies and to form the signal 12 (Figure 1) in order to provide the time for the switching operation to take place. The differentiation circuit 35 supplies a threshold switch 36. Two AND-networks 37, 38 are connected to the threshold switch 36, the other inputs of the networks being provided with timing pulses derived in accordance with Figure 2B from the pulse sequence 22. The AND-networks 37, 39 supply changeover pulses 13 (Figure 1) to trigger respective monostable multivibrator stages 39, 40. As may be seen, an AND-network 37 or 38 with an associated monostable multivibrator stage 39 or 40 is provided for each one of the two colour signals.

Operation

The formation of the colour signals is as follows.

The output of the store 33 is connected to electronic switching stages 41, 42, 43 and 44. These stages 41 to 44 are driven by the register 23, illustrated in Figure 2A, to supply the signal at the correct time to the correct processing stages.

If it is assumed that the signal Y_1 is initially applied to the output of the store 33 and the switching stage 41 is closed at the same moment of time t_1 it means that the signal Y_1 is delivered into a second store 45 in which it is delayed until the time t_2 is reached.

When the time t_2 is reached the switching stage 41 is opened and the switching stage 42 is closed by the register 23. At the time t_2 and simultaneously with the output signal of the store 45 the difference signal Y-R is applied to one of two inputs of a difference former 46 which receives also the Y_1 signal from the second store 45 and performs the subtraction shown in line I of Figure 1. A first red signal R1 therefore appears at the time t_2 at the output of the difference former 46.

The red signal R1 is conducted via a third store 47, in which it is delayed by an amount of time corresponding to one data dot until the time t_3 , to one input of a colour selector switch 48. The selector switch 48 is driven by the output of the monostable switching stage 39 and is thus indirectly controlled by the output of the differentiating stage 35.

The other input of the selector switch 48 comprises the output of a storage device 49. The storage device 49 may contain a red signal in any desired manner, for example the red signal from an adjacent data sequence, for example the preceding data sequence. Switching from the data pair of the strips 10, 11 which probably has interference (see Figure 1) to any adjacent pair without interference takes place if the differentiating stage 35 detects a data step response. If the data

sequence comprises only the luminance data and the two succeeding difference data it may for example be the corresponding pair of an adjacent data sequence. However, it is advantageous, as already described by reference to Figure 1 to switch to the strips 11, 14 and this is achieved by virtue of the fact that the storage device 49 comprises a system with a store 50 and a difference former 51 which is analogous to the store 45 and difference former 46.

At the time t_2 the store 50 receives the corresponding difference signal Y-R via the switching stage 42 simultaneously with the input thereof to the difference former 46. This signal will then be delayed for the duration of one scanning dot until the time t_3 at which time the next luminance signal Y_2 is obtained via the switching stage 43. It will be clear that at the time t_3 the switching stage 42 is open but the switching stage 43 will be closed. The luminance data Y_2 then passes via the switching stage 43 to the other input of the difference former 51 and at the time t_3 the resulting difference signal R_2 is applied to the changeover switch 48, this being the same time at which the red signal R_1 is applied to the other input. The red signal R_1 and the red signal R_2 may thus be used alternatively, the differentiating stage 5 determining which of the two red signals is actually conducted. A red signal R is obtained in each case at the output of the changeover switch 48.

The same procedure takes place when a blue signal is formed, the Y_2 signal passing simultaneously into a store 52 at the time t_3 via the switching stage 43, the store 52 corresponding to the store 45. With a delay equal to one scanning dot, namely at the time t_4 , the signal Y_2 is applied to the input of a difference former 53 which in turn corresponds to the difference former 46.

At the time t_4 the switching stage 43 opens and the switching stage 44 closes. Simultaneously with the arrival of the output signal of the store 52 at one input of the difference former 53, the difference signal Y-B arrives at the other input of the difference former 53 which forms the blue signal B1 and at the time t_4 conducts this signal to a store 54 which corresponds to the store 47 and therefore introduces an amount of delay equivalent to the scanning time for one data dot. Accordingly the blue signal B1 arrives at the time t_5 at a selector switch 55, which corresponds to the selector switch 48 and is driven by the monostable switching stage 40.

At the same time t_5 the output signal of a storage device 56, which corresponds to the storage device 49 and carries the blue signal B2, arrives at the other input of the selector switch 55. Conveniently the storage device 56 is constructed analogously to the storage

device 49 and therefore has a store 57 which corresponds to the stores 45, 50, 52 and which is supplied with the difference signal Y-B at the time t_4 and is adapted to deliver the difference signal at the time t_5 to a difference former 58 which in turn corresponds to the difference formers 46, 51, 53.

The switching stage 44 will have opened again at the time t_5 and the switching stage 41 will be again closed and will then be supplied with the luminance signal Y_3 which is supplied to the store 45 to form the red signal and is also supplied to the difference former 58 to form a blue signal B2.

The blue signal B appears at the time t_5 at the output of the selector switch 55. In order to obtain the green signal it is necessary for it to be processed together with the red signal R but this is already available at the output of the selector switch 48 at the time t_5 . It is therefore necessary to connect the output of the selector switch 48 to the input of a further store 59 which delays the red signal R by the scanning time of two data dots, that is to say until the time t_6 . These two colour signals are conducted through respective low pass filters 60, 61 and are subsequently processed in known manner in a matrix 62 so that the red signal R, the green signal G and the blue signal B are available at the output of the said matrix.

Line III of Figure 1 indicates the manner in which the luminance signal can also be obtained from the difference data. According to Figure 4 this is achieved by the connection of the output of the store 33 to a further store 63 parallel to the switching stages 41 to 44 which ensures that the signals that are obtained by a colour strip can be stored until the correct time to form the luminance signal with the missing colour signal R or B respectively, namely by means of a selector switch 65 with timed operation. To this end it is important that the red signal R reaches one input of the selector switch 65 at the time t_5 and the blue signal B reaches the other input of the selector switch at the time t_6 . The selector switch 65 must therefore connect the correct input to the output at the correct moment of time. The output of an adding stage 64 is also connected to a selector switch 66 which on the one hand transfers the luminance signal Y, obtained directly from the store 63, to the output and on the other hand supplies the luminance signal obtained from the output of the adding stage 64 to the first mentioned output. The fact that the pure Y signal is supplied to the adding stage 64 does not result in any interference because the selector switch 66 is not connected to the output of this adding stage but to the output of the store 63 at the same moment of time.

A further store 67 is interconnected between the output of the selector switch 66

and the input of the matrix 62 because the band width of the luminance signal Y is wider than that of the colour signals. In this case the delay may be equivalent to the time required for scanning four image dots provided the store 63 provides delay over a period during which a single data dot is scanned.

WHAT WE CLAIM IS:—

1. A method of obtaining video output signals representative of an object image which is projected onto a pick-up screen via a coloured strip mask, the pick-up screen providing an electrical output which is processed by dot sequential means and which includes a luminance signal and two colour difference signals each corresponding to the luminance signal from which a different primary colour signal has been suppressed, the strips of said mask being disposed in a repeated data sequence so that sequential data dot information regarding the luminance signal and the two colour difference signals is provided by the screen output, the screen being scanned in synchronism with operation of a timing circuit and the data dot information being fed into delay means from which delayed dot information is fed together with data dot information coming from one or more adjacent data dots to processing circuitry which operates sequentially on the individual data dot information to extract the colour information and luminance information and provides the video output signals.

2. A method as claimed in claim 1, in which said two colour difference signals correspond to the luminance signal from which red and blue colour signals, respectively, have been suppressed.

3. A method as claimed in claim 1 or claim 2, in which the screen output includes sequentially the luminance signal, the first colour difference signal, the luminance signal and the second colour difference signal.

4. A method for obtaining video signals representative of an object image which is projected onto a pick-up screen via a colour strip mask, the electrical signal derived from the pick-up screen being processed by dot sequential means and including luminance signals (Y) red colour difference signals (Y-R) and blue colour difference signals (Y-B), in which method the strips of said mask are disposed in a data sequence such that said luminance signals, red colour difference signals and blue colour difference signals are sequentially produced in the order

Y/Y-R/Y/Y-B

and each luminance signal is delayed at least until the next colour difference signal occurs whereupon the corresponding colour signal

is obtained by the subtraction $Y-(Y-R)$ or $Y-(Y-B)$ respectively.

5. A method as claimed in claim 4, in which each of the red and blue colour signals derived from the luminance signal and the respective colour difference signal is delayed until the appearance of the next colour difference signal (Y-R) or (Y-B) from which this colour signal is absent, and is then added to this colour difference signal.

6. A method as claimed in claim 4 or 5, in which the luminance signals Y are monitored and in the event of a sudden change of the luminance signal the next colour difference signal is subtracted from the following luminance signal in order to avoid signal disturbances at or behind colour edges of the image.

7. A method as claimed in any one of claims 1 to 3, in which the presence of a perturbation in the electrical output of the screen produced by a colour change edge in said object image is used to initiate a switching operation whereby the processing circuitry receives information coming from dots all lying on the same side of the colour change edge.

8. Colour television camera apparatus having a colour strip mask spanning an optical path along which an image is directed, a light sensitive pick-up screen onto which the image falls after passage through the mask, parallel light-transmitting strips on the mask recurring in sequence in each sequence of which the same three colours of strip appear, the strips being, respectively, transparent to provide a luminance signal, a first colour providing the luminance signal from which a first primary colour signal has been suppressed and a second colour providing the luminance signal from which a second primary colour signal has been suppressed, means for scanning the screen transversely of the strips to provide repeated sequences of data dot information corresponding to the mask strip sequence in an electrical output provided by the screen, a timer providing a signal synchronised with the scanning rate of successive dot sequences in the scanned lines, delay means for delaying information related to a data dot in one sequence until the information related to later data dot is obtained, a colour signal forming means operating dot sequentially on the held data information and the later data dot information and providing a signal significant of a colour whose signal is to appear in the video output of the camera apparatus, and circuitry obtaining video colour information from the output of the colour signal forming means.

9. Apparatus as claimed in claim 8, in which the mask strips recur in the sequence a transparent strip, a first colour strip, a transparent strip and a second colour strip.

10. Apparatus as claimed in claim 8 or



and the input of the matrix 62 because the band width of the luminance signal Y is wider than that of the colour signals. In this case the delay may be equivalent to the time required for scanning four image dots provided the store 63 provides delay over a period during which a single data dot is scanned.

WHAT WE CLAIM IS:—

1. A method of obtaining video output signals representative of an object image which is projected onto a pick-up screen *via* a coloured strip mask, the pick-up screen providing an electrical output which is processed by dot sequential means and which includes a luminance signal and two colour difference signals each corresponding to the luminance signal from which a different primary colour signal has been suppressed, the strips of said mask being disposed in a repeated data sequence so that sequential data dot information regarding the luminance signal and the two colour difference signals is provided by the screen output, the screen being scanned in synchronism with operation of a timing circuit and the data dot information being fed into delay means from which delayed dot information is fed together with data dot information coming from one or more adjacent data dots to processing circuitry which operates sequentially on the individual data dot information to extract the colour information and luminance information and provides the video output signals.
2. A method as claimed in claim 1, in which said two colour difference signals correspond to the luminance signal from which red and blue colour signals, respectively, have been suppressed.
3. A method as claimed in claim 1 or claim 2, in which the screen output includes sequentially the luminance signal, the first colour difference signal, the luminance signal and the second colour difference signal.
4. A method for obtaining video signals representative of an object image which is projected onto a pick-up screen *via* a colour strip mask, the electrical signal derived from the pick-up screen being processed by dot sequential means and including luminance signals (Y) red colour difference signals (Y-R) and blue colour difference signals (Y-B), in which method the strips of said mask are disposed in a data sequence such that said luminance signals, red colour difference signals and blue colour difference signals are sequentially produced in the order

Y/Y-R/Y/Y-B

- and each luminance signal is delayed at least until the next colour difference signal occurs whereupon the corresponding colour signal

is obtained by the subtraction $Y-(Y-R)$ or $Y-(Y-B)$ respectively.

5. A method as claimed in claim 4, in which each of the red and blue colour signals derived from the luminance signal and the respective colour difference signal is delayed until the appearance of the next colour difference signal (Y-R) or (Y-B) from which this colour signal is absent, and is then added to this colour difference signal.

6. A method as claimed in claim 4 or 5, in which the luminance signals Y are monitored and in the event of a sudden change of the luminance signal the next colour difference signal is subtracted from the following luminance signal in order to avoid signal disturbances at or behind colour edges of the image.

7. A method as claimed in any one of claims 1 to 3, in which the presence of a perturbation in the electrical output of the screen produced by a colour change edge in said object image is used to initiate a switching operation whereby the processing circuitry receives information coming from dots all lying on the same side of the colour change edge.

8. Colour television camera apparatus having a colour strip mask spanning an optical path along which an image is directed, a light sensitive pick-up screen onto which the image falls after passage through the mask, parallel light-transmitting strips on the mask recurring in sequence in each sequence of which the same three colours of strip appear, the strips being, respectively, transparent to provide a luminance signal, a first colour providing the luminance signal from which a first primary colour signal has been suppressed and a second colour providing the luminance signal from which a second primary colour signal has been suppressed, means for scanning the screen transversely of the strips to provide repeated sequences of data dot information corresponding to the mask strip sequence in an electrical output provided by the screen, a timer providing a signal synchronised with the scanning rate of successive dot sequences in the scanned lines, delay means for delaying information related to a data dot in one sequence until the information related to later data dot is obtained, a colour signal forming means operating dot sequentially on the held data information and the later data dot information and providing a signal significant of a colour whose signal is to appear in the video output of the camera apparatus, and circuitry obtaining video colour information from the output of the colour signal forming means.

9. Apparatus as claimed in claim 8, in which the mask strips recur in the sequence a transparent strip, a first colour strip, a transparent strip and a second colour strip.

10. Apparatus as claimed in claim 8 or

claim 9, in which the first colour is cyan and the second colour is yellow.

11. Colour television camera apparatus having a colour strip mask spanning an optical path along which an image is directed, a light sensitive pick-up screen onto which the image falls after passage through the mask, recurring parallel yellow, cyan and transparent strips on the mask so that the electrical output from the screen contains luminance signals (Y) and colour difference signals (Y-B) and (Y-R) provided by light which has passed through the yellow and cyan strips on the mask, respectively, means for scanning the screen transversely of the strips to provide repeated dot data sequences in each line of:—

Y/Y-R/Y/Y-B

in the electrical output from the screen, a timer synchronized with the scanning rate of successive data sequences in the scanned lines, first storage means for holding a luminance signal Y until the following colour difference signal is derived, signal difference forming means having one input connected to the output of the first storage means and the other input connectible to receive the electrical output from the screen, and a colour selector circuit connected to receive the output of the signal difference forming means.

12. Apparatus as claimed in claim 11, in which the light sensitive pick-up screen is formed at one end of an electron beam scanning tube having its horizontal deflection device controlled in synchronism with the timer.

13. Apparatus as claimed in claim 11 or claim 12, in which a second output of the signal difference forming means is connected to a second storage means for storing the output of the signal difference forming means during a period of time which corresponds to the scanning of one data sequence, the output of the second storage means being connected to one input of an adding stage to whose other input is applied the electrical output from the screen.

14. Apparatus as claimed in claim 11, claim 12 or claim 13, including a further storage device for storing a colour difference signal until the following luminance signal is derived, and further signal difference forming means having one input connected to the output of the further storage means and the other input connectible to receive the electrical output from the screen, the output of

the signal difference forming means and the output of the further signal difference forming means being connected to the colour selector circuit which is controlled by a stage for detecting colour change edges in said image.

15. Apparatus as claimed in any one of claims 11 to 14, in which the colour selector circuit includes a red colour signal change-over switch and a blue colour signal change-over switch being connected to receive the output of said signal difference forming means and an output from a second signal difference forming means receiving the same colour difference signal as said first signal difference forming means but a different luminance signal, the blue colour signal change-over switch being connected to receive the outputs from third and fourth signal difference forming means which receive different luminance signals but the same colour difference signal, the outputs of the change-over switches being selectively connected to their inputs under the control of a circuit which responds to a perturbation in the electrical output from the screen signifying a colour change edge in said image.

16. Apparatus as claimed in any one of claims 11 to 15, including a circuit for detecting a perturbation in the electrical output from the screen signifying a colour change edge in said image, such circuit including a differentiation stage followed by a threshold switch whose output controls the colour selector circuit.

17. Apparatus as claimed in any one of claims 11 to 16, in which circuitry responsive to the data dot reading rate controls the operation of the timer.

18. Apparatus as claimed in any of claims 11 to 16, in which the timer includes an oscillator set to a predetermined frequency, and screen scanning circuitry is controlled by the output of a comparator which receives at one input the oscillator output and at the other input a signal generated by scanning the data dots on the screen, the speed of scanning being controlled by the output of the comparator.

19. Apparatus as claimed in any one of claims 8 to 11 or any one of claims 13 to 18 when dependent on claim 11, in which the screen comprises a parallel line array of light sensitive elements and the lines of elements are scanned electrically.

20. A method as claimed in claim 1



carried out substantially as described with reference to the accompanying drawings.

21. Apparatus as claimed in claim 8,
5 arranged and adapted to operate substantially
as described with reference to the accompanying drawings.

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