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None

(58) Field of search

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INT CL⁴ G06F, G09G, H04N

(54) **Teletext data encoding/decoding method**

(57) A TELETEXT clock signal in simple frequency relation with the color subcarrier f_{sc} of the PAL color television system is generated from the subcarrier, and the block length of a signal section of each packet is set to 272 bits, thereby making applicable the (272, 190) code which is the same error-correcting code as in the Japanese system (Fig 1). At receiving apparatus (Fig 7), a color subcarrier signal is extracted from the PAL color television signal, and is used to generate a signal of the same frequency and the same phase as the clock run-in signal such as for TELETEXT broadcasting by an APC circuit or the like. With this signal as a clock signal, the scanning line number is counted from the first field of the television signal and at the same time, if TELETEXT signals or the like are multiplexed, the framing code is detected thereby to reproduce the framing code timing by front and back protection.

FIG. 1

BLOCK DIAGRAM SHOWING CONFIGURATION OF SIGNAL GENERATOR

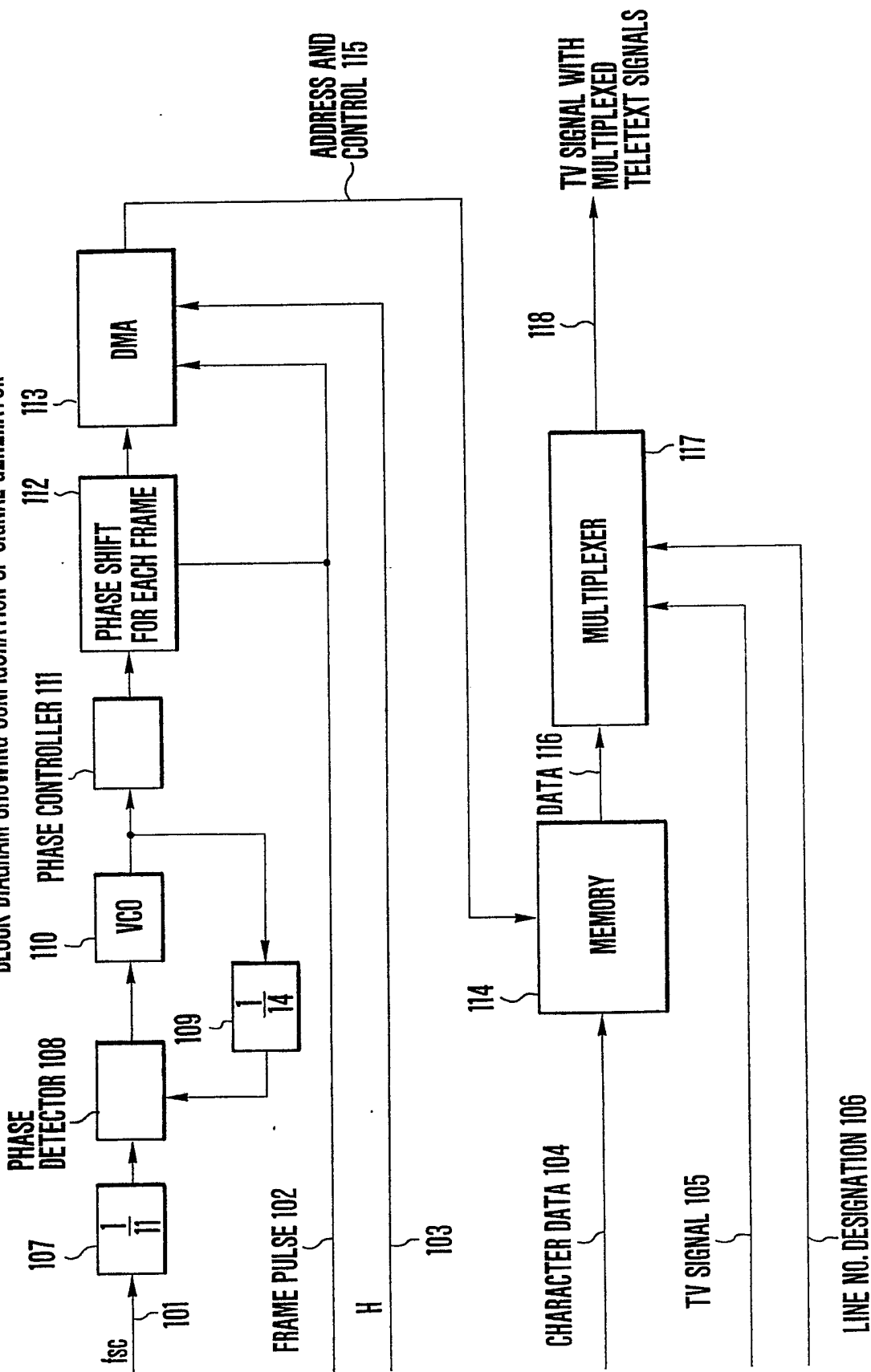


FIG.2

DIAGRAM SHOWING EXAMPLE OF MULTIPLEXING WITH 362-BIT INTERVALS

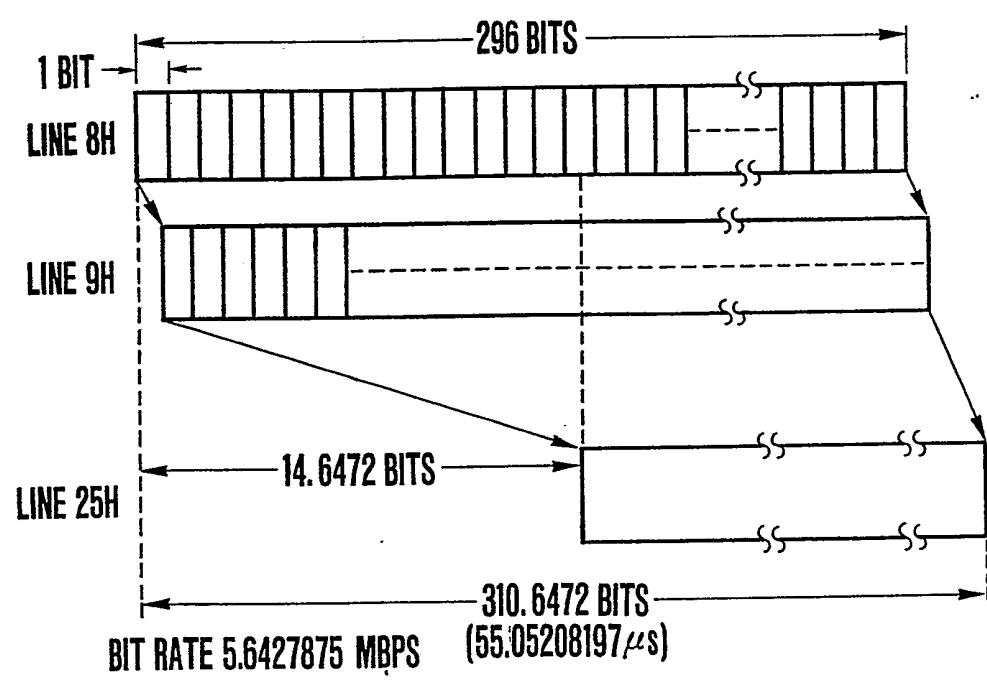


FIG.3

DIAGRAM SHOWING EXAMPLE OF MULTIPLEXING WITH 361-BITS INTERVALS

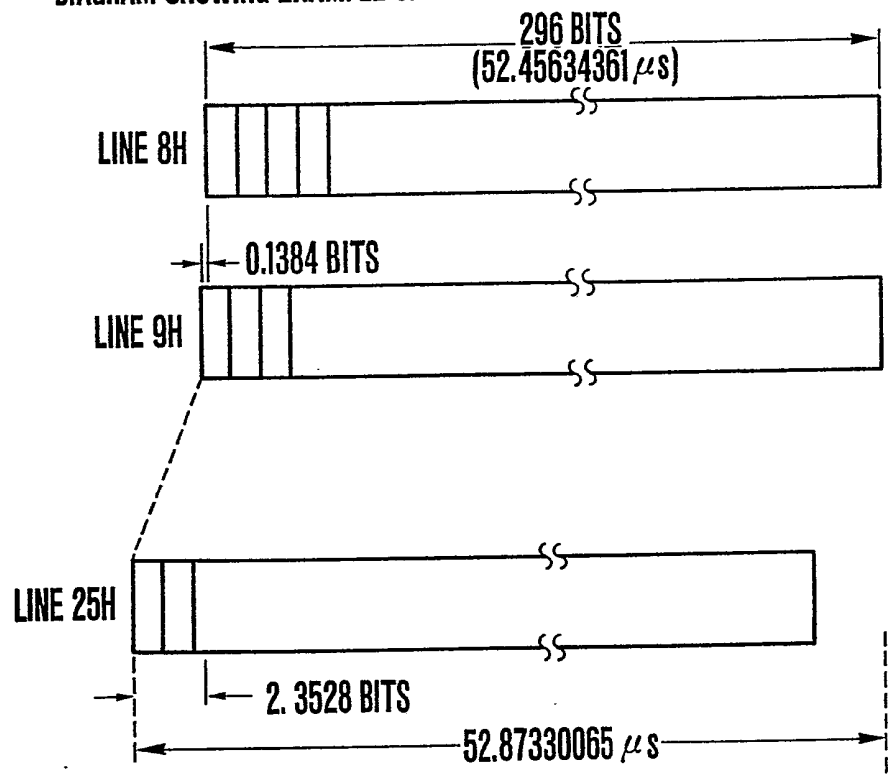
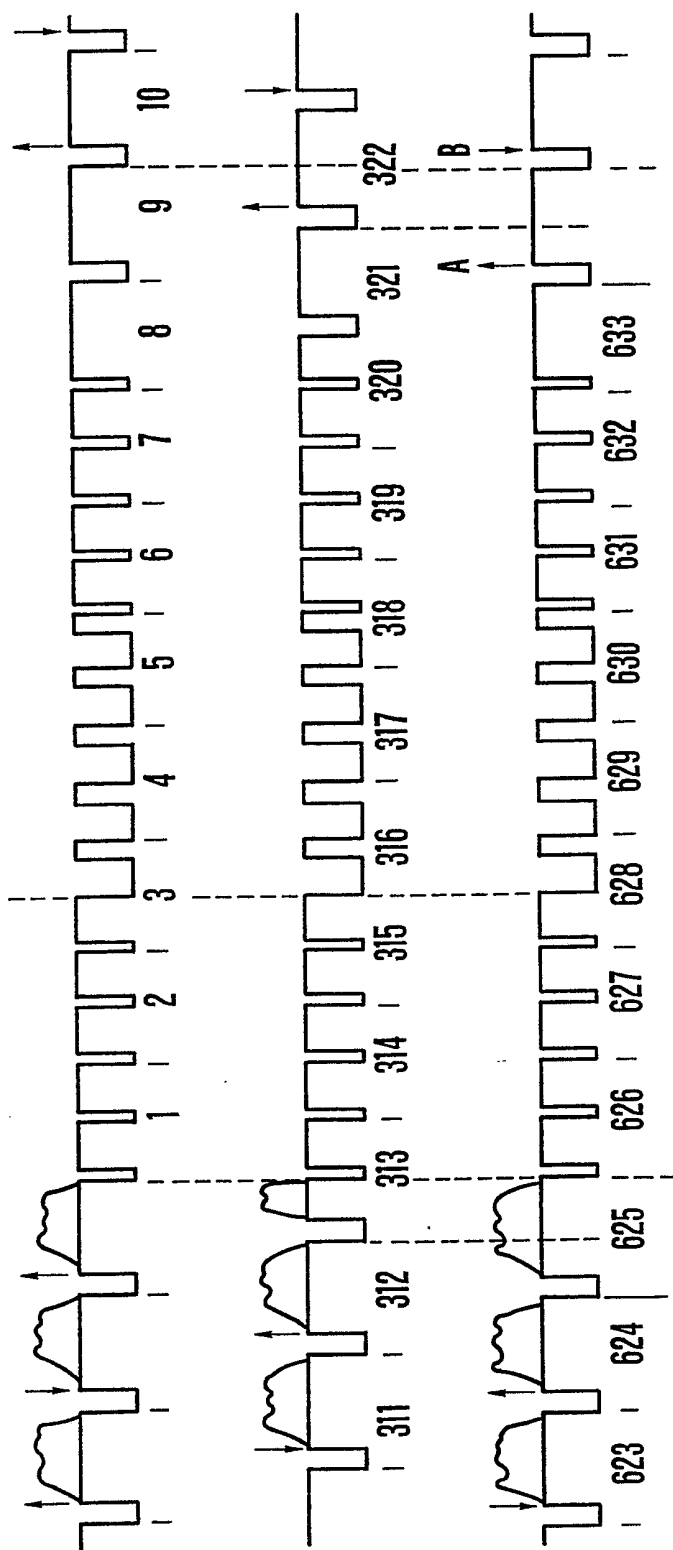


FIG. 4

DIAGRAM SHOWING VERTICAL BLANKING SIGNAL OF PAL COLOR TV SIGNAL



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FIG.5

DIAGRAM SHOWING RELATIVE POSITIONS OF PACKET SIGNALS

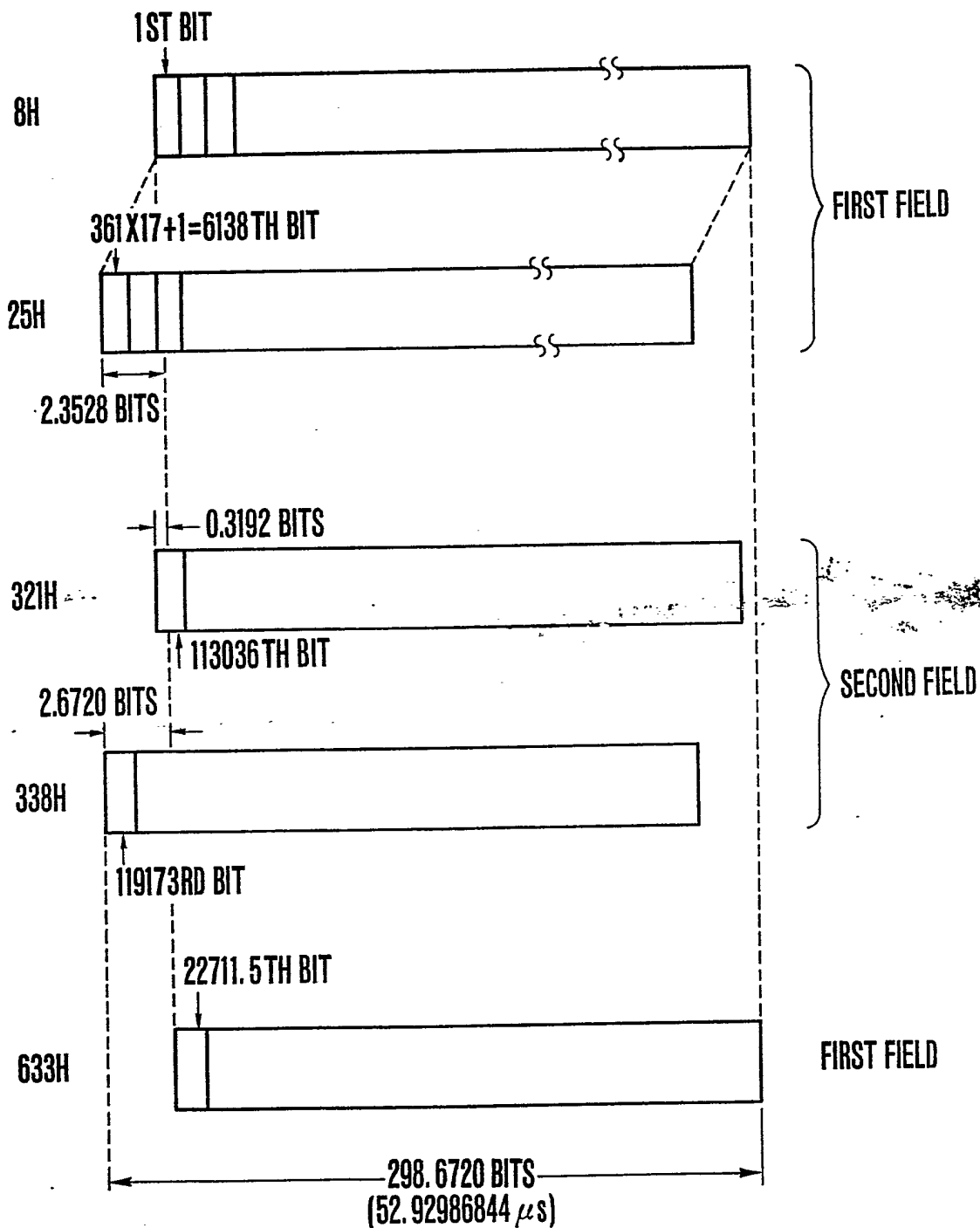


FIG.6
PRIOR ART
DIAGRAM SHOWING "CEEFAFAX" CHARACTER SIGNAL

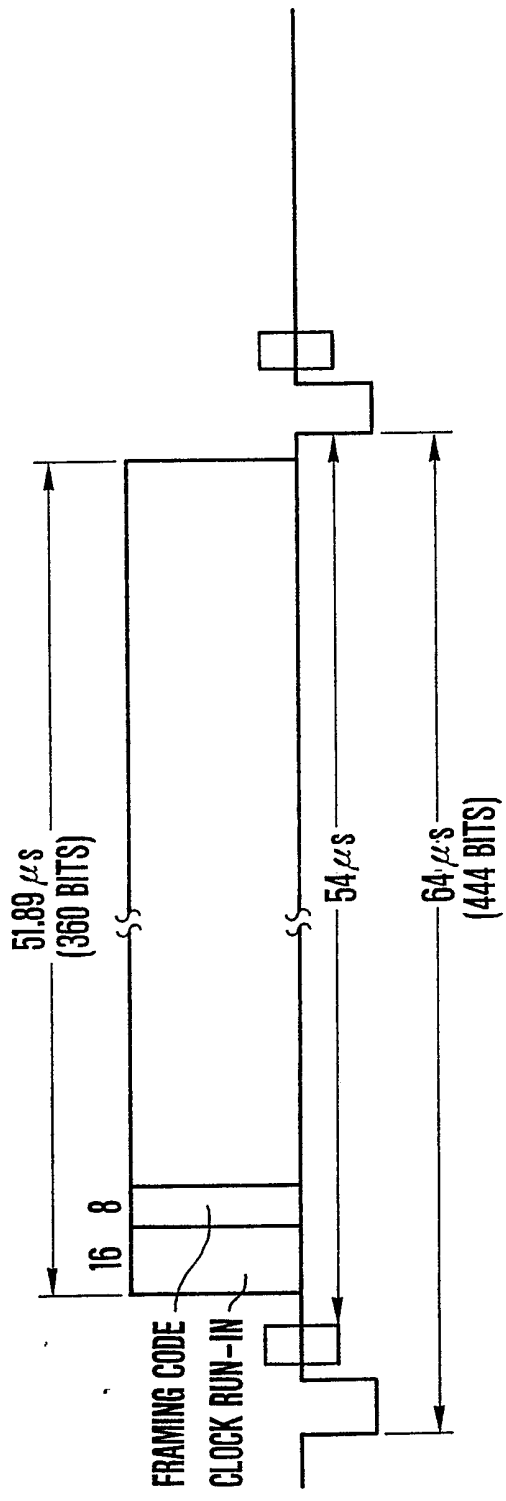


FIG. 7

BLOCK DIAGRAM SHOWING TELETEXT SIGNAL - RECEIVING APPARATUS ACCORDING TO AN EMBODIMENT OF THE INVENTION

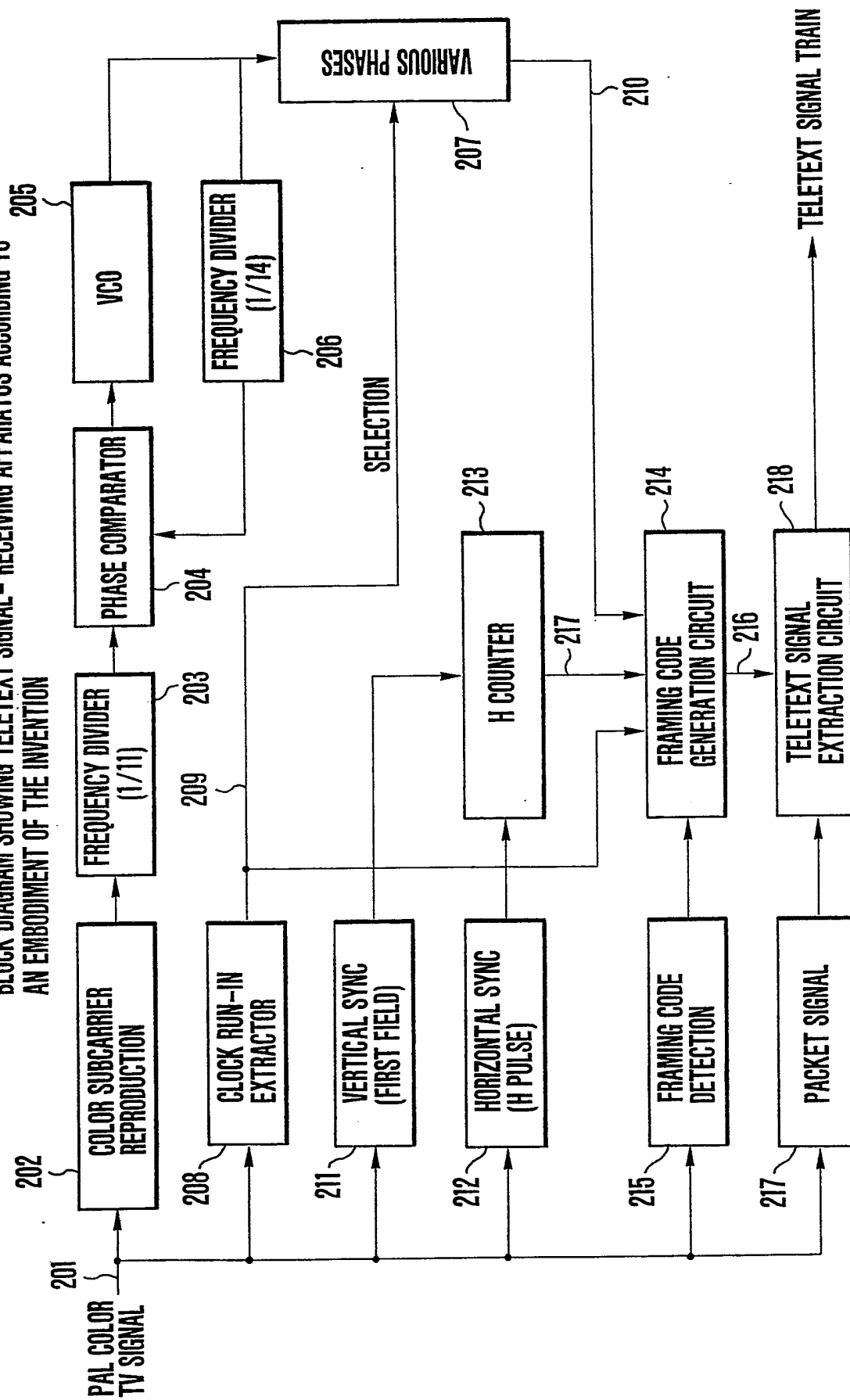
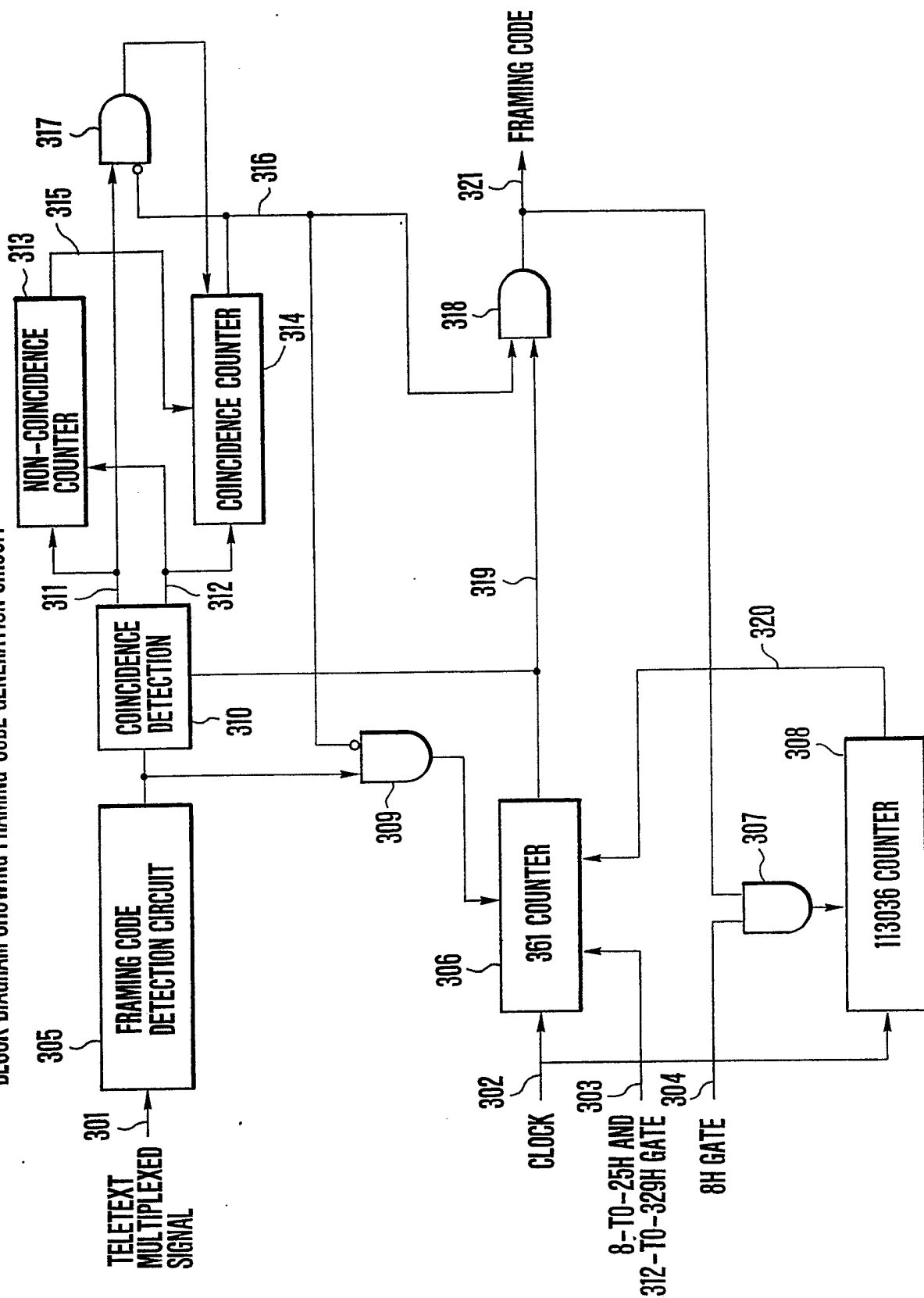


FIG. 8

BLOCK DIAGRAM SHOWING FRAMING CODE GENERATION CIRCUIT



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METHOD OF TRANSMITTING TELETEXT SIGNALS AND APPARATUS
FOR RECEIVING THE SAME

1 The present invention relates to a method of
transmitting TELETEXT signals and an apparatus for
receiving such signals, or more in particular to a method
of transmission and an apparatus for reception in which
5 the ability of correcting an error in a TELETEXT borad-
casting of the PAL color television system is strengthened.
The TELETEXT broadcasting means a broadcasting in which
signals are sent superimposed or multiplexed on the
television wave and information including characters,
10 simple patterns, etc. are displayed on the cathode ray
tube separately from a television program.

 The conventional TELETEXT broadcasting of the
PAL color television system employs a British method
called System B as determined by CCIR (Comitè Consultatif
15 International des Radiocommunication). This method
placing no great emphasis on the error correstion is
not suitable for a receiving apparatus in an area severe
in receiving conditions or for a system using the ideogram
like the one in China.

20 The Japanese system, on the other hand, which
has been under development with primary emphasis placed
on the error correction from the very beginning, has been
completed as a very strong system against an error by
employing a (272, 190) code.

25 In the Japanese system, the continuity of clock

1 signal and the phase of a framing code are held between
packets, and therefore the framing code is received
so weakly under normal receiving conditions that full
ability of correction of subsequent (272, 190) code could
5 not be achieved. The ability to correct the (272, 190)
code, however, has since been improved by means of
detecting a framing code timing through front and back
protection.

It is therefore possible to secure a framing
10 code timing as long as there occurs no continuous
detection errors even if a detection error is caused
in the framing code by an impulse or random noise.

In contrast, British or other foreign systems
process signals only within a single packet, and therefore
15 the clock frequency has not even a simple relationship
with the color subcarrier frequency. In the event that
a framing timing cannot be taken by an error caused
in the framing code, therefore, all the signal in the
particular packet would be lost. As to the error correc-
20 tion code, on the other hand, only the (8, 4) enlarged
code is employed with the ability to correct an error
of one out of eight bits, while only an error detection
code for detecting an error of one out of eight bits
is used for other code portions.

25 As a result, the problem has been posed that
an erroneous character is reproduced or important
information cannot be transmitted in an area severe
in receiving conditions.

1 The disadvantages of the above-mentioned method
of TELETEXT broadcasting of the PAL color television
system will be described in detail below.

 The characters broadcasting multiplexed on the
5 television signal of the PAL color television system
conventionally known includes a character braodcasting
developed in England and called "Ceefax". In this
system as shown in Fig. 6, TELETEXT signals are multi-
plexed as 360 bits for each packet with the bit rate of
10 6.9375 Mbps, including the leading 16 bits as a clock
run-in signal for securing bit synchronism, followed
by eight bits of a framing code signal made up of a
predetermined pattern for discriminating a signal
boundary, further followed by information section
15 of 336 bits providing the substance of the signal.
Exactly 444 bits are represented by a 1H period.

 As a result, according to the Brithish system,
there is no direct frequency relationship designated
between the clock rate and the color subcarrier.
20 Also, in spite of a predetermined frequency relationship
held between the clock rate and the horizontal sync
signal frequency, it is difficult to reproduce the clock
signal from the horizontal sync signal due to the
facts (1) that the gain cannot be secured from an APC
25 circuit and (2) that a phase jitter is liable to be
caused by the horizontal sync timing imemediately after
vertical synchronization.

 For these reasons, the Ceefax does not take

1 the frequency relations with the television signal into
consideration, but employs a receiving apparatus for
processing signals for each packet. This eliminates the
need of phase coincidence of the leading bit of the packet
5 signal for each scanning line (H) as a transmission
signal, and there is posed no problem at all by multi-
plexing in different phases.

Specifically, at the receiving end, clock
synchronization is assured by the leading 16 bits of a
10 packet singla to extract a framing pattern. If the
framing pattern has an error of a bit, it is possible
to extract the timing thereof. If there is an error
of two or more bits, however, the extraction of timing
is impossible, and the particular packet signal becomes
15 unusable.

The Ceefax system thus has a serious
disadvantage in that the framing code is received only
weakly as compared with the Japanese system in which
the framing code is received with front and back
20 protection. In the case where the ability of receiving
the framing code is low, the system is useless no matter
how strong is the subsequent ability of correcting signal
errors.

As mentioned above, the Ceefax system fails
25 to take the error correction into full consideration,
and the character code subsequent to the framing code
has only a 7-bit code with a 1-bit parity added thereto.
The function is thus limited to the error detection.

1 As will be seen from the foregoing description,
the method of the television multiplex TELETEXT braod-
casting (Ceefax) of the PAL color television system
easily succumbs to a bit error, and is not suited to a
5 system for sending an ideogram such as Japanese or
Chinese having a great amount of information for each
character or a system for transmitting a great amount
of information (such as a tele-software for sending
a computer program).

10 The object of the present invention is to
provide a method of transmitting TELETEXT signals of the
PAL color television system and an apparatus for receiving
the same with an improved error correction ability.

 In order to achieve this object, there is
15 provided a transmission system according to the present
invention, comprising means for extracting a color
subcarrier signal from a television signal of the PAL
color television system, means for generating a clock
signal for TELETEXT signals in a simple integral ratio
20 with the color subcarrier signal, and means for sequential-
ly transmitting signals of a total of 296 bits including
a 16-bit clock run-in for clock synchronization, an
8-bit framing code for framing timing, a 190-bit infor-
mation and an 82-bit parity signal computed from the
25 190-bit information, from a specific vertical blanking
period.

 According to another aspect of the present
invention, there is provided a receiving apparatus

1 comprising reproduction means for reproducing a signal
of the same frequency as TELETEXT signals from a color
burst signal thereby to reproduce a signal of the same
phase as the multiplexed clock run-in and protective
5 means for detecting a framing code and providing front
and back protection utilizing the fact that the framing
code is multiplexed at each predetermined timing, thereby
receiving a framing code securely against a receiving
error.

10 As seen from above, according to the present
invention, a clock signal having a predetermined fre-
quency relationship with the color subcarrier of the
television signal of the PAL color television system
is used, and while maintaining the continuity of the
15 clock signal, the clock frequency is determined in such
a manner that the same (272, 190) code as employed in the
Japanese TELETEXT broadcasting is superposed on line
1H of the PAL signal, thereby providing the same
powerful error-correcting ability as in the Japanese
20 TELETEXT broadcasting.

The above and other objects, features and
advantages will be made apparent by the detailed descrip-
tion taken in conjunction with the accompanying drawings,
in which:

25 Fig. 1 is a block diagram showing an example
of a circuit for generating a television signal according
to the present invention;

Fig. 2 is a diagram showing an example of

1 packets multiplexed at intervals of 362 bits;

Fig. 3 is a diagram showing an example of
packets multiplexed at intervals of 361 bits;

Fig. 4 is a diagram showing a vertical
5 blanking period of a PAL color television signal;

Fig. 5 shows relative positions of packet
signals;

Fig. 6 is a diagram showing TELETEXT signals
called "Ceefax";

10 Fig. 7 is a block diagram showing an embodiment
of a TELETEXT signal-receiving apparatus according to
the present invention; and

Fig. 8 is a block diagram showing a framing
code generation circuit.

15 Now, the present invention will be described
in detail with reference to an embodiment.

First, reference is had to the basic principle
of a transmission system.

The frequency f_{SC} of the color subcarrier of
20 the PAL color television system is defined as

$$f_{SC} = 4433618.75 \text{ Hz}$$

On the other hand, the clock frequency f_{CL} of the TELETEXT
signals is given preferably in the form of

$$f_{CL} = \frac{m}{n} f_{SC}$$

1 where m and n are simple integral numbers. In the PAL color television system, the period T of a frame is expressed as

$$T = \frac{1}{25} = 40 \times 10^{-3} \text{ (secs)}$$

The condition required for maintaining the
5 continuity of the clock signal is

$$T_{CL} \times N = M \times 40 \times 10^{-3}$$

where N is the number of clock pulses in the period involved and M the number of frames considered in terms of full frames. Thus

$$\begin{aligned} N &= \frac{M}{T_{CL}} \times 40 \times 10^{-3} \\ &= \frac{n \cdot f_{SC} \times M \times 40 \times 10^{-3}}{m} \\ &= \frac{n}{m} \times M \times 177344.75 \end{aligned}$$

The number N is required to be an integral number
10 satisfying this equation.

If the clock signal is to maintain continuity when M is unity, that is, when the number of frame is one, m/n takes the value of 12/11, 16/11, 20/11 or the like. Under this condition, the bit rate is 4.836675 MHz,

1 6.44890 MHz, 8.061125 MHz or the like respectively. It is
thus impossible to multiplex 296 (= 272 + 8 + 16) bits
in a period of about 54 microseconds where the PAL color
television signal may be multiplexed.

5 In the case where M is two, on the other hand,
the number of rames is two, and the relationship $m/n =$
12/11, 14/11, 16/11 or the like must be held for
securing the continuity of the clock signal. Except
for $m/n = 14/11$, the condition is the same as when
10 continuity is maintained for a single frame mentioned
above. The bit rate for $m/n = 14/11$ is 5.6427875 MHz,
which is substantially equal to the bit rate of 5.727
MHz for the Japanese TELETEXT braodcasting system.
Also, the number of bits that may be multiplexed during
15 the period of about 54 microseconds is 304.7 bits, which
is sufficient for multiplexing 296 bits as required.

The length 1H of the PAL color television
signal represents exactly 64 microseconds. Therefore,
the number of bits that can be multiplexed in 1H is
20 361.1384 (= 64 x 5.6427875), which is substantially equal
to the number 364 for the Japanese version. If the
clock of continuous phases is multiplexed by 296 bits for
each 1H at this bit rate, the phase of the leading bit
is displaced by about a bit slightly after 8H. The
25 number of bits one frame later is 225711.5, so that the
phase in the second and subsequent frames is displaced
by 0.5 bits as compared with the first frame, while
phase is matched in the third and subsequent frames.

1 As mentioned above, if an error-correcting
ability as strong as that of Japan is to be secured in
a system for multiplexing TELETEXT signals on the PAL
color television signal, a method is recommended
5 in which the frequency 14/11 of the color subcarrier
is used as a bit rate.

 In the PAL color television system, TELETEXT
signals may be multiplexed during the vertical blanking
period of 8H to 25H and mating fields thereof. There-
10 fore, if packet signals of 272 bits are multiplexed
sequentially from 8H, the multiplexing position is
displaced for each H by setting the packet period to
362 bits (See Fig. 2). The amount of this displacement
is equivalent to 0.8616 bits. The amount of displacement
15 up to 25H, therefore, is given as 14.6472 (= 0.8616 x 17)
bits. The length of time corresponding to this amount
is 2.595738365 (μsec) (= 14.6472 x 1/5.6427875).
Handling at the receiving end will be facilitated,
therefore, if a time margin as much as this is given at
20 the last portion of the packet signal multiplexed in
the first line 8H and a packet signal associated with
each H is multiplexed every 362 bits.

 In this case, however, as viewed on the same
H from the leading bit multiplexed in line 8H to the last
25 bit multiplexed in line 25H, the total length is given
as

$$(296 + 14.6472)/5.6427875 = 55.05208197 \text{ (}\mu\text{sec)}$$

1 since each packet signal multiplexed in each line H
has a multiplexed position displaced each other little
by little.

On the other hand, there is ten microseconds
5 available till the end of the color burst of the PAL
color television signal, and 64 microseconds is repre-
sented by 1H. Therefore, a multiplexable period
available is at most 54 microseconds. Since the amount
of displacement is more than 54 microseconds, multi-
10 plexing is impossible under this condition.

Now, if a packet signal is multiplexed in
cycles of 361 bits (Fig. 3), the phase is advanced by
0.1384 bits for each H. In this case, the length of
18H from lines 8H to 25H is given as

$$(296 + 17 \times 0.1384) / 5.6427875 = 52.87330065 \text{ (}\mu\text{sec)}$$

15 which is covered by the time length 54 μ s. Since there
is available 10 microseconds till the last portion of
the color burst, however, the time margin available
for multiplexing is

$$54 - 52.8978275 = 1.1021725 \text{ (}\mu\text{sec)}$$

This time margin is very limited although multiplexing
20 is not impossible.

The original length 296 bits of one packet
covers

$$296 \times 1/5.6427875 = 52.45634361 \text{ (}\mu\text{sec)}$$

1 In the case shown in Fig. 3, on the other hand,
difference is

$$52.87330065 - 52.45634361 = 0.41695704 \text{ (}\mu\text{sec)}$$

As seen from this, the time becomes only slightly longer
in this case.

5 As compared with "Ceefax" shown in Fig. 6.

$$52.87330065 - 51.89189189 = 0.98140876 \text{ (}\mu\text{sec)}$$

The extension of data length is less than one micro-
second, thereby leading to substantially the same packet
length as Ceefax.

10 Further, the packet head may be changed from
one packet to another. Assuming that the clock run-in
begins from the 361st bit in line 9H following 8H,
for example, 10H may start with the 362nd bit.

As compared with when the clock run-in is
assumed to start every 361 bits, the phase displacement
15 from the clock run-in first multiplexed is six or seven
times large when the clock run-in is assumed to begin
every 362 bits. Therefore, a packet with the clock
run-in having 362-bit cycles may be inserted 362 bits
after every 6 or 7H where the clock run-in starts every
20 361 bits.

The foregoing explanation involves all multi-
plexable lines during the vertical blanking period,
and therefore the multiplexing for every 361 or 362 bits
may of course be effected if multiplexable lines H are

1 limited.

Even in the method mentioned above, the information block of 272 bits may be shortened in the absence of a margin with the color subcarrier. For example, the
5 block length of 264 ($= 272 - 8$) or 256 ($= 272 - 16$) bits may be considered. Also, the information bits of the (272, 190) code is 190, which is not given in bytes, and therefore, if the number 266 ($= 272 - 6$) or 258 ($= 272 - 14$) is used as bits, the information bits involved
10 may be expressed as 184 bits = 23 bytes and 176 bits = 22 bytes respectively, thus facilitating the handling of data. Even in this case, the signal starting from the clock run-in may be arranged for each H at the intervals of 361 or 362 bits.

15 A method of multiplexing in the vertical blanking period at the starting point of a frame is mentioned above. Apart from this, consideration must also be given to the vertical blanking period of the next field. Assuming that the first line number of the
20 next field is 313H, the multiplexable lines are 17H from the 321st line. This relationship is shown in Fig. 4.

If a packet arrives for each 361 or 362 bits, however, a considerable displacement would occur
25 inconveniently at the line 321H. Arrangement is made, therefore, to multiplex after every predetermined clock length from line 8H. Further, in the next field, multiplexing is made from line 633H, after another

1 predetermined clock length. In this case, however,
the phase of the clock signal is displaced from the
first field by 0.5 bits. This is because two frames
of $14/11 \times f_{SC}$ defined herein provides one period.

5 In Fig. 4, consider on the basis of 8H. The
displacement in bit clock at line 321H of the next
field is given as

$$313 \times 64 \times 5.6427875 = 113036.3192 \text{ bits}$$

Further, after 312H in the next field, the figure is

$$312 \times 64/5.6427875 = 112675.1808 \text{ bits}$$

At the point of the same timing after one
10 frame, the displacement is

$$113036.3192 + 112675.1808 = 225711.5 \text{ bits}$$

The displacements in a fraction of a bit at these
timings are 0.05656778675 microseconds, 0.03204090177
microseconds and 0.08860868852 microseconds respectively.

As a result, if the phase of clock run-in
15 of the packet signal multiplexed on line 313H is the
113036th clock, and the corresponding phase on the line
which is 312 after (which is equivalent to one frame
after) is the 112674.5 bit, (which means that the
phase is displaced by half of a bit after one frame),
20 then the phase becomes continuous in cycles of one
frame.

Fig. 5 is a diagram showing relative positions

1 of packet signals.

A circuit for generating a television signal according to the present invention is shown in Fig. 1. In Fig. 1, reference numeral 101 designates a color
5 subcarrier signal (4.43361875 MHz), numeral 102 a frame pulse for shifting the clock phase by half bit for each frame, numeral 103 a horizontal sync signal for counting the number of lines H, numeral 104 a character data sent from the computer, numeral 105 a normal PAL
10 color television signal, numeral 106 a line number designation signal for designating the multiplexing lines H, numeral 107 a frequency divider circuit, numeral 110 a voltage controlled oscillator (VCO), numeral 111 a phase control circuit for controlling the clock phase,
15 numeral 112 a phase shifting circuit for shifting the clock phase by half bit for each frame, numeral 113 a DMA controller for reading data out of a memory 114 at a timing explained above, numeral 114 a memory for storing the sent data temporarily, numeral 115 and address and
20 a control signal for controlling the memory 114, numeral 116 a multiplexing packet data, and numeral 117 a multiplexer for multiplexing the television signal on a designated line.

Now, the operation of this signal generator
25 will be explained.

A PAL circuit made up of a color subcarrier frequency divider 107 and the VCO 110 for the PAL color television signal provides a signal of 5.6427875 MHz

1 as intended. This signal is regulated by the phase
controller 111 to produce a data output signal in right
phase. This signal is also displaced by half bit for
each frame by a frame pulse, so that a packet signal
5 for each frame is produced at the same timing as the
horizontal sync signal.

With this output as a clock signal, the DMA
controller 113 is controlled by frame timing and H sync
signal, and an address signal and a control signal are
10 produced from the DMA controller 113 in such a manner
as to produce the data at the timing described above.

The signal from the DMA controller 113 causes
the data already stored in the memory 114 to be produced
and multiplexed on a designated line of the television
15 signal by the multiplexer 117. The clock run-in and
the framing code are of course predetermined signals,
and therefore they may be produced from a fixed memory
region such as ROM instead of from the memory 114.

A basic configuration is shown in Fig. 1,
20 and the memory output data 116 is naturally subjected
to band limitation due to a cosign roll-off filter
or the like (not shown) at the input of the multiplexer
117.

Now, a receiving apparatus will be explained.

25 An embodiment of the TELETEXT signal-receiving
apparatus according to the present invention is shown
in Fig. 7. In Fig. 7, numeral 201 designates a PAL
color television signal on which TELETEXT signals are

1 multiplexed by the aforementioned method according to
the present invention. Specifically, the bit rate is
(14/11) x f_{SC} , where f_{SC} is the color subcarrier fre-
quency of the PAL color television signal and is given
5 as

$$f_{SC} = 4.43361875 \text{ MHz}$$

The bit rate of the TELETEXT signals is 5.6427875 Mbps.

Numerals 202 designates a color subcarrier
reproduction circuit for producing a color subcarrier
signal of 4.43361875 MHz reproduced as a continuous
10 signal by an APC circuit from the color burst signal
multiplexed on each line H.

Numerals 203 designates a frequency divider
circuit for dividing the color subcarrier frequency
into components of one eleventh. The output signal of
15 the frequency divider circuit 203 thus has a frequency
of 0.40305625 MHz.

Numerals 204 designates a phase comparator
circuit for generating an input signal to the VCO 205.
The output frequency of the VCO 205 is 5.6427875 MHz,
20 which is divided into components of one fourteenth (1/14)
by the frequency divider circuit 206. The frequency
of the output signal of the frequency divider circuit
206 is the same 0.40305625 MHz as the output signal
frequency of the frequency divider circuit 203.

25 The output signal of the VCO 205 is applied
to a phase selection circuit 207 to prepare signals of

1 various phases. The phase may be displaced, for example,
by 10 ns for each signal.

Numeral 208 designates a clock run-in extrac-
tion circuit. The frequency of the clock run-in signal
5 209 is the same as the output signal frequency of the
VCO 205, and a signal nearest to the phase of the clock
run-in signal 209 is selected out of the signals of
various phases prepared at the phase selection circuit
207 and is produced as a signal 210. More specifically,
10 the signal 210 and the clock run-in signal 209 are
substantially phase-locked with each other.

Numeral 211 designates a vertical sync signal
detection circuit, which detects only the first field
in particular. A multiplexing timing signal for the
15 second field is produced from the framing code generation
circuit 214 through an H counter 213.

Numeral 212 designates a horizontal sync timing
signal generation circuit for generating a signal for
counting H pulses.

20 Numeral 215 designates a circuit for detecting
the framing code of an input signal as an input signal to
the framing code generation circuit 214. This framing
code generation circuit 214 is for providing front and
back protection of the framing code by a signal for
25 designating the line H of the output signal 217 of the
H counter 213, a clock signal 210, an identification
signal 209 for deciding whether a multiplexing H exists
or not, a framing code detection signal 215 and the like.

1 On the basis of the timing of the output 216 of the
framing code generation circuit 216, only the data
section (data train subsequent to the framing code)
of the packet signal (output of the packet signal detec-
5 tion circuit 217) is extracted accurately through a data
extraction circuit 218.

The phase selection circuit 207 should be
reversed in phase by 180° automatically in the first
field by the configuration shown in Fig. 7. The output
10 of the vertical sync signal detection circuit 211 may
be used, however, to shift forcibly to a signal
 180° different in phase.

A detailed circuit configuration of the framing
code generation circuit 214 in Fig. 7 is illustrated
15 in Fig. 8. Numeral 301 designates a PAL color tele-
vision signal, numeral 302 a signal 210 generated in
Fig. 1 (clock signal reversed in phase by 180° for each
first field), numeral 303 a gate signal indicating the
periods of 8 to 25H and 312 to 329H where TELETEXT
20 signals may be multiplexed, numeral 304 a gate signal
for only 8H, numeral 305 a framing code detection
signal, numeral 306 a 361-bit counter, numeral 307 an
AND circuit, numeral 308 a 113036-bit counter, numeral
309 an AND circuit, numeral 310 a coincidence detection
25 circuit, numeral 311 a non-coincidence detection circuit,
numeral 312 a coincidence pulse, numeral 313 a non-
coincidence counter, numeral 314 a coincidence counter,
numeral 315 a non-coincidence counter output signal,

1 numeral 316 a coincidence counter output signal, numeral
317 an AND circuit, numeral 318 an AND circuit, numeral
319 a framing timing signal from the internal counter,
numeral 320 a 113036-bit counter output signal, and
5 numeral 321 a framing timing output signal.

The operation of the circuit shown in Fig. 8
will be described below from one part to another.

In initial stages, the timing signal
detected by the framing code detection circuit 305 is
10 passed through the gate 309 to reset the 361-bit counter
306. After that, the clock signal 302 is counted by
the 361-bit counter 306 thereby to generate an internal
framing code signal 319. This counter 306 is adapted to
be operated only during the period from 8 to 25H or
15 from 312 to 329H where signals are multiplexed.

The output signal 319 of the internal counter
is always compared with the output of the framing code
detection circuit 305. A signal indicating whether the
TELETEXT signal 303 is multiplexed or not is produced
20 by detecting a clock run-in or the like.

An output signal compared at the coincidence
detection circuit 310 makes up a non-coincidence signal
311 and a coincidence signal 312. Until the coincidence
counter 314 counts up, the coincidence counter 314 is
25 reset by the signal 317 always with the arrival of
the non-coincidence signal 311. Specifically, the
coincidence counter 314 is for counting the number of
continuous coincidences and normally produces a count-up

1 signal 316 when three framing code signals 316 are
received in a row in the same phase. The other non-
coincidence counter 313 is for counting the number of
continuous non-coincidences and clears the coincidence
5 counter 314 when the signal 315 is produced.

The head of the second field is reset by
the timing of the framing code of the leading multiplex-
ing line H of the first field of the gate signal 304 to
count 113036 bits, the output of which resets the 361-
10 bit counter 306 again, thus generating an internal
framing code.

The line 8H or 312H of the gate signals 303,
304 shown in Fig. 8 may be interpreted as the leading
H in a field having a multiplexed signal.

15 The configuration of Fig. 8 permits accurate
reception of the framing code of 296-bit TELETEXT
signals multiplexed on the PAL color television signal.

It is assumed, however, that the line number
such as 8H in the foregoing description is counted by
20 the method shown in Fig. 4.

The TELETEXT signal train shown in Fig. 7
is decoded by the (272, 190) code and retrieved as a
190-bit data free of error. The CPU displays characters
and patterns on the CRT by interpreting the 190-bit
25 data.

As will be understood from the foregoing
description, according to the present invention, the
clock frequency of the TELETEXT signals multiplexed on

(1 the PAL color television signal is related to the color subcarrier frequency, thereby assuring the reproduction of the clock signal and the framing timing signal in the receiving apparatus.

5 If the clock signal frequency is set to $(14/11)f_{SC}$ and the clock phase is reversed for each framing timing (40 msec) of the television signal, for example, the timing of the head of the packet signal may be rendered coincident sequentially for each time length of 40 msec
10 displaced by half bit, thus facilitating the signal handling at the receiver.

 In this way, 296 bits can be multiplexed for each packet in the same manner as the Japanese TELETEXT signals, thereby making applicable the (272,
15 190) code in a strong error-correction system. Also, the receiver, the only difference of which lies in the method of signal retrieval, is usable with the IC developed for the Japanese TELETEXT signal broadcasting. Further, the coding system may be used directly.

CLAIMS:

1. A method of transmitting TELETEXT signals comprising the steps of extracting a color subcarrier signal from the PAL color television signal, generating a clock signal for the TELETEXT signals in a simple integral ratio with the color subcarrier signal, and sequentially transmitting a 16-bit clock run-in for assuring clock synchronization, an 8-bit framing code for taking framing timing, a 190-bit information and an 82-bit parity signal computed from the 190-bit information for a total of 296 bits.
2. A method according to Claim 1, wherein the integral ratio is 14/11.
3. An apparatus for receiving the TELETEXT signals transmitted according to Claim 1, comprising means for reproducing a signal of the same frequency and the same phase with the clock run-in for TELETEXT broadcasting from a color subcarrier signal.
4. An apparatus for receiving the TELETEXT signals according to Claim 3, further comprising means for detecting a framing code by using the fact that the framing code is multiplexed at each predetermined timing, providing thereby a reliable reception of the framing code.

5. A method of transmitting teletext signals substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

6. An apparatus for receiving teletext signals constructed and arranged to operate substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.