

1 TITLE OF THE INVENTION

Information Transmission System With Record/
Reproducing Device

5 BACKGROUND OF THE INVENTIONField of the Invention

The present invention relates to an information transmission system and more particularly to an information transmission system with record/reproducing device.

10 Related Background Art

There are already known a digital video tape recorder for recording and reproducing digital video signals, and a system for transmitting and receiving digital video signals.

15 Consequently a system for recording video signal in a digital video tape recorder and transmitting the reproduced video signal after encoding can be realized by the combination of known technologies, as shown in Fig. 1. Analog video signal supplied to an input
20 terminal 1 is entered into a video tape recorder 2. Analog video signal released therefrom is supplied to an encoder (transmitter) 3 for encoding and band compression. The output of the encoder 3 is supplied through a transmission channel 30 to a decoder 4 constituting a
25 receiver, for signal expansion and D/A conversion. Thus the original analog video signal is obtained at an output terminal 5.

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1 In the video tape recorder 2, there are provided
an A/D converter 12, a band compression circuit 14, an
electromagnetic converting unit 16, an expansion circuit
22 for effecting an expansion inverse to the process of
5 the band compression circuit 22, and a D/A converter 24.
In the encoder 3 there are provided an A/D converter 32,
and a band compression circuit 34 for transmission. In
the decoder 4 there are provided an expansion circuit
42 for effecting an expansion inverse to the process
10 conducted in the band compression circuit 34, and a D/A
converter 44.

 As an application of the above-mentioned signal
transmission system, there can be conceived a system
in which plural receivers with decoders can receive
15 desired programs from plural transmitting video tape
recorders (image sources) through an exchange. In such
system, the transmitting side has conventionally been
composed of plural transmitters, each composed of the
video tape recorder 2 and the encoder 3, and the outputs
20 of said transmitters have been connected to said
exchange.

 However, in the above-explained system, an A/D
conversion, and signal compression and expansion are
conducted in the video tape recorder, and also in front
25 of and behind the transmission channel 30. Such repeated
processes head to a complication in the structure, thus
resulting in a longer time in assembly, a lowered



1 reliability, an elevated cost, a larger weight and a
difficulty in compactization. These drawbacks become
more marked when plural transmitters and plural receivers
are connected through the exchange, as there is required
5 a group of many equipment.

Fig. 2 shows a similar system, in which the input
and output of the video tape recorder, the input of the
encoder and the output of the decoder are digital video
signals, and in which a function of error correction in
10 the codes is further added.

In Fig. 2, digital video signal is subjected to
a band compression in a band compression circuit 14, and
is supplied to an error correction code (ECC) adding
circuit 16, which adds an error correction code for
15 detecting and correcting errors resulting in the record-
ing and reproduction. The output of the ECC adding
circuit 16 is supplied to an error correction circuit
26 through an electromagnetic conversion unit 10 consist-
ing of magnetic heads and a magnetic recording medium.
20 Said error correction circuit 26 corrects the errors
caused in the recording and reproduction in the electro-
magnetic conversion unit, utilizing the error correction
code added in the ECC adding circuit 16. If correction
is not possible, the error correction circuit 26 releases
25 an interpolation flag signal 27. An expansion circuit
22 applies, to the output of the error correction
circuit 26, an expansion inverse to the band compression



1 in the band compression circuit 14, and an interpolation
circuit 28 effects interpolation on the data for which
correction is not possible, according to the interpola-
tion flag 27 set by the error correction circuit 26.

5 The circuits 14 to 28 correspond to a digital video tape
recorder 2, and the output of the interpolation circuit
28 is digital video signal.

The output of the interpolation circuit 28 is
supplied to a band compression circuit 34 for transmission
10 and band compressed therein. Then the error correction
code for transmission is added in an ECC adding circuit
36. The band compression circuit 34 and the ECC adding
circuit 36 correspond to the encoder 3.

The output data of the ECC adding circuit 36
15 are supplied, through a transmission channel 30, to an
error correction circuit 46 of the receiving side, which
corrects the error in the transmission according to the
error correction code added by the ECC adding circuit 36.
If the error is uncorrectable, the error correction

20 circuit 46 releases an interpolation flag signal 47.
An expansion circuit 42 applies, to the output of the
error correction circuit 46, an expansion corresponding
to the band compression in the band compression circuit
34, and an interpolation circuit 48 effects an interpola-
25 tion on the uncorrectable data, according to the
interpolation flag signal 47 from the error correction
circuit 46. The circuits 46 to 48 correspond to the



1 decoder 4, and the output of the interpolation circuit
48 is digital video signal.

In addition to the drawbacks associated with the
system shown in Fig. 1, the system shown in Fig. 2 has a
5 drawbacks of requiring two interpolation circuits 28,
48, as the interpolations for the errors in the electro-
magnetic conversion unit 10 and in the transmission
channel 30 are conducted separately. Also, for interpola-
tion in the interpolation circuit 28, the compressed
10 data are expanded in the expansion circuit 22, and are
again compressed in the band compression circuit 34 for
data transmission.

Therefore the system of Fig. 2 is difficult to
compactize as efficient utilization of circuits is not
15 at all intended. Also the repeated compressions and
expansions of the video signal may result in deteriora-
tion of image quality. Possibility of such deterioration
in image quality is high if the band compression method
for recording is different from that for transmission,
20 for example if a sub-sampling is conducted by field
offset method while the other is conducted by line
offset method, or if the quantizers for differential
quantization have different set values.

Fig. 3 shows a similar system in which band
25 compression associated with high-efficiency encoding is
not conducted. Such system is adapted for use as an
audio processing circuit in a system provided with a



1 video processing circuit and an audio processing circuit.
In the system shown in Fig. 3, analog audio signal
supplied to a terminal 1 is digitized in an A/D converter
12, and an error correction signal for correcting the
5 error in the recording and reproduction is added by an
error correction code adding circuit 16. Then said
signal is modulated in a modulating circuit 18 and is
recorded on a recording medium T such as a video tape,
by means of a magnetic head H_R (a rotary magnetic head
10 in case of video tape recorder. Another magnetic head
 H_P (magnetic head H_R may also be used for this purpose)
reproduces the magnetic signal on the recording medium
T, and said signal is demodulated by a demodulating
circuit 29. An error correction circuit 26 corrects the
15 error in the recording and reproduction, by the error
correction code added by the error correction code adding
circuit 16.

In the transmission of thus reproduced signal,
an error correction code adding circuit 36 adds, to the
20 output of the error correction circuit 26, an error
correction code for correction the error in the transmis-
sion, and a modulating circuit 38 effects modulation for
transmission, for supply to the transmission channel 30.
A demodulating circuit 49 receives and demodulates the
25 data transmitted through the channel 30, and an error
correction circuit 48 corrects the error in transmission,
by the error correction code added by the error correction



1 code adding circuit 36. A D/A converter 44 converts
the output digital signal of the error correction circuit
46 into analog signal.

Also in such system, the error corrections
5 conducted in two stages increase the magnitude of
circuitry and the cost of the system.

SUMMARY OF THE INVENTION

An object of the present invention is to solve
10 drawbacks mentioned above.

Another object of the present invention is, in
a system for transmitting the output of a record/
reproducing apparatus, to compactize the magnitude of
circuitry and to reduce the cost.

15 Still another object of the present invention is,
in a system for transmitting the output of an apparatus
for recording and reproducing compressed information,
to prevent deterioration of said information and to
reduce the magnitude of the circuits.

20 For attaining the above-mentioned objects, there
is proposed, as an embodiment of the present invention,
a system described in claim 1.

Still another object of the present invention
is, in a system for transmitting the output of an
25 apparatus for recording and reproducing information with
added error correction code, to reduce the magnitude of
the circuits.



1 For attaining the above-mentioned object, there
is proposed a system described in the claim as another
embodiment of the present invention. Also proposed are
systems described in the claims as other embodiments.

5 Still other objects of the present invention,
and the advantages thereof, will become fully apparent
from the following detailed description of the embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

10 Fig. 1 is a block diagram of an example of a
system for transmitting the output of a record/reproducing
apparatus to a transmission channel;

Fig. 2 is a block diagram of another system
similar to that shown in Fig. 1;

15 Fig. 3 is a block diagram of still another system
similar to that shown in Fig. 1;

Fig. 4 is a block diagram of a system embodying
the present invention;

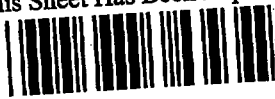
20 Fig. 5 is a block diagram of an application of
the system shown in Fig. 4;

Fig. 6 is a block diagram of another embodiment
of the system of the present invention;

Fig. 7 is a block diagram of still another
embodiment of the system of the present invention;

25 Fig. 8 is a block diagram of still another
embodiment of the system of the present invention;

Fig. 9 is a block diagram of still another



1 embodiment of the system of the present invention; and

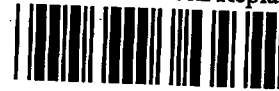
Fig. 10 is a block diagram of an application of the system shown in Fig. 9.

5 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now the present invention will be clarified in detail by embodiments thereof shown in the attached drawings.

Fig. 4 is a block diagram of an embodiment of
10 the present invention. Analog video signal entered from an input terminal 1 is supplied to an encoder 103 for A/D conversion and band compression. The compressed output data of the encoder 103 are supplied to a digital data recorder (DDR) 10 having an electromagnetic conver-
15 sion unit and are recorded on a recording medium such as a magnetic tape. Data reproduced in the DDR 10 are transmitted, through a switch 56, to a transmission channel 30. The output of the encoder 103 can be transmitted in real time to the transmission channel 30
20 by placing the switch 56 at a contact b. The data transmitted through the transmission channel 30 are entered into a decoder 104 for effecting a process inverse to that of the encoder 103 to obtain the original band width. Thus analog video signal is obtained at an
25 output terminal 5.

In the encoder 103 there are provided an A/D converter 12 and a band compression circuit 52. In the



1 decoder 104 there are provided an expansion circuit 54
for effecting an expansion process inverse to the
process of the band compression circuit 52, and a D/A
converter 44.

5 Fig. 5 is a block diagram of an application,
based on the system shown in Fig. 4, in which plural
receivers can make access to plural image sources through
an exchange. There are shown an input terminal 1 for
analog signal; an encoder 103 composed of an A/D converter
10 12 and a band compression circuit 52; digital data
recorders 10-1 - 10-i; a signal line 60 bypassing the
digital data recorders; switches 58-1 - 58-(i+1) for
supplying the output of the encoder 103 to the digital
data recorders 10-1 - 10-i and the signal line 60; an
15 exchange switch 61 having an exchange function; transmis-
sion channels 30-1 - 30-j; and decoders 104-1 - 104-j
each having an expansion circuit 54 and a D/A converter
44.

In the structure shown in Fig. 5, the compressed
20 data obtained by A/D conversion and data compression in
the encoder 103 are recorded in desired one of the
digital data recorders 10-1 - 10-i or directly supplied
to the exchange switch 61 through the signal line 60 by
means of the switches 58-1 - 58-(i+1). The receivers
25 having the decoders 104-1 - 104-j make access to digital
data recorders 10-1 - 10-i having desired program or
data through the transmission channels 30-1 - 30-j and

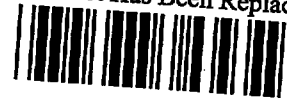


1 the exchange switch 61 to receive said data. Said data
are expanded by the expansion circuit 54 and converted
into analog signal by the D/A converter 44 to provide
analog video signal.

5 The recording medium of the digital data
recorders can be composed of magnetic tape, magnetic
disk, optical disk, magnetooptical disk etc.

As will be easily understood from the foregoing,
the systems shown in Figs. 4 and 5 avoid repetition of
10 band compression and expansion in the signal transmission
and simplify the structure, thereby facilitating the
assembly of circuit, and improving the reliability. Also
there can be realized cost reduction, weight reduction
and compactization.

15 Fig. 6 is a block diagram of another embodiment
of the present invention, wherein same components as
those in Figs. 2 and 4 are represented by same numbers.
The band compression circuit 52 is same as that shown
in Fig. 4, and the ECC adding circuit 16 and the electro-
20 magnetic conversion unit 10 are same those shown in
Fig. 2. The output of the electromagnetic conversion
unit 10 is supplied to an error correction circuit 64,
which corrects the error in the recording and reproduction
in the electromagnetic conversion unit according to the
25 error correction code added in the ECC adding circuit 16,
or releases an interpolation flag signal 65 for uncor-
rectable data. An addition circuit 66 adds an



1 interpolation flag signal 65 for example behind every
data of a predetermined amount released from the error
correction circuit 64. The ECC adding circuit 36 adds
an error correction code to the data from the addition
5 circuit 66 and sends said data to the transmission
channel 30.

In the receiving side, the data transmitted
through the transmission channel is supplied to an error
correction circuit 70, which corrects the error in
10 transmission utilizing the error correction code added
in the ECC adding circuit 36. The error correction
circuit 70 generates an interpolation signal 71 cor-
responding to the interpolation flag signal 65, and
another interpolation flag signal for uncorrectable data.
15 Said interpolation flag signals 71, 72 are supplied to
an addition circuit 73, which functions logically as an
OR circuit, and, if either of said interpolation flag
signals 71, 72 indicates the necessity of interpolation,
sends said flag signal to an interpolation circuit 74.

20 The expansion circuit 54 applies, to the output
data of the error correction circuit 70, an expansion
process corresponding to the band compression in the band
compression circuit 52. The interpolation circuit 74
effects an interpolation on the output of the expansion
25 circuit 54, according to the output of the addition
circuit 73.

Since the error rate in the transmission change



1 30 is usually very small, the interpolation flag signal
from the error correction circuit 64 scarcely generates
an error in the transmission through the channel 30, so
that the deterioration of image quality resulting from
5 such error is negligible.

As will be apparent from the foregoing descrip-
tion, the system shown in Fig. 6 requires only one inter-
polation, band compression and expansion. It is
consequently possible to compactize the entire system
10 and to reduce the weight thereof.

Fig. 7 is a block diagram of still another
embodiment of the present invention, wherein analog
video signal is supplied to an input terminal 1 and is
digitized in an A/D converter 12. A band compression
15 circuit 52 compresses the output data (digital video
signal) of the A/D converter 12 by sub-sampling,
differential encoding etc. to reduce the quantity of
data. An error correction code adding circuit 16 adds
an error correction code to the output data of the band
20 compression circuit 52. Then a modulating circuit 18
effects digital modulation for example by scramble NRZ
method, and the output thereof is recorded by a magnetic
head H_R on a magnetic tape T.

The signal recorded on the magnetic tape T is
25 reproduced by a magnetic head H_p , and is demodulated by
a demodulating circuit 29. An error correction circuit
26 effects error correction according to the error



1 correction code added in the error correction code
adding circuit 16 to provide compressed video signal.
In a simple combined system, the output of the error
correction circuit 26 is expanded by an expansion circuit,
5 but, in the present embodiment, the output of the error
correction circuit 26 is directly supplied to an
interpolation circuit 80 for effecting interpolation
on the data that have not been corrected in said error
correction circuit 26. The interpolation circuit 80
10 provides necessary data by intra- or interframe inter-
polation. The interpolation to compressed signal is not
necessarily easy for certain compression methods, but
some interpolations are quite easy such as line inter-
polation for differential digitized signal, and there
15 can be selected suitable combination of a compression
and an interpolation.

The output of the interpolation circuit 80 is
supplied then to a processing system for transmission.
Thus an error correction code adding circuit 36 adds an
error correction code for transmission, and a modulating
20 circuit 38 executes modulation for transmission. Thus
the output of the modulating circuit 38 is transmitted
to the transmission channel 30, composed for example of
an optical fiber or a communication satellite. The
signal transmitted by the transmission channel 30 is
25 demodulated by a demodulating circuit 49 of the receiving
side, and an error correction circuit 46 effects error



1 correction utilizing the error correction code added
by the error correction code adding circuit 36. Then
an expansion circuit 54 effects an expansion process
corresponding to the process of the band compression
5 circuit 52, thereby obtaining digital video signal.
An interpolation circuit 80 executes interpolation on a
part not corrected by the error correction code from
the error correction code adding circuit 36. A D/A
converter 44 converts the output data of the interpola-
10 tion circuit 82 to analog signal, which is released
from an output terminal 5.

In the embodiment shown in Fig. 7, the signal
reproduced from a magnetic tape T constituting the
recording medium is subjected, without expansion, to
15 interpolation in the interpolation circuit 80, then
added with the error correction code for transmission
and is sent to the transmission channel 30. Thus the
signal is transferred in the compressed state from the
record/reproducing system to the transmission channel,
20 so that the image quality deterioration resulting from
repeated compressions and expansions can be prevented.

Fig. 8 is a block diagram of still another
embodiment of the present invention, wherein same
components as those in Fig. 7 are represented by same
25 numbers. In the present embodiment, in the transmitting
side, the record/reproducing system of the magnetic tape
T can be bypassed by a bypass 84 and a selector switch 86.

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1 In the receiving side, the output of the error correction
circuit 46 is supplied to an interpolation circuit 88
for effecting at first the interpolation of the uncor-
rectable data, and the output thereof is supplied either
5 to a record/reproducing system 100 or a bypass 101,
selected by a switch 95. The output thereof is supplied
to the expansion circuit 54 for effecting expansion
corresponding to the band compression in the band
compression circuit 52. The record/reproducing system
10 100 is composed of an error correction code adding
circuit 90; a modulating circuit 91; a recording head
 H_R' ; a magnetic tape T' ; a reproducing head H_P' ; a
demodulating circuit 92; an error correction circuit 93;
and an interpolation circuit 94, and functions in the
15 same manner as the record/reproducing system of the
transmitting side. That is, in case that a transceiver
circuit which has both function of the transmitting and
receiving sides shown in the figures is employed, one
record/reproducing system can be used for such systems
20 of transmitting and receiving sides. If the switch 86
is positioned at the contact a in the embodiment shown
in Fig. 8, the function is same as that of the transmit-
ting side of the embodiment shown in Fig. 7. If said
switch 86 is positioned at the contact b, the signal
25 from the input terminal 1 is transmitted, on real-time
basis, to the transmission channel 30.

On the other hand, in the receiving side, at



1 first the interpolation circuit 88 effects interpolation
on the data that have been uncorrectable in the error
correction circuit 46. If the switch 95 is positioned
at the contact b, the output of the interpolation circuit
5 88 is expanded in the expansion circuit 54 and is
converted into analog signal by the D/A converter 44.
If the switch 95 is positioned at the contact a, the
output of the interpolation circuit 88 is once recorded
on the magnetic tape T'. Such interpolation on the
10 compressed video signal avoids the repetition of the
compression and expansion even when the received signal
is once recorded on the recording medium.

The embodiment shown in Fig. 8 allows four modes
of use by the combinations of the switches 86 and 95.

15 In Figs. 7 and 8 there is employed each one unit
of the magnetic heads H_R , H_P , H_R' and H_P' , but there
may be employed plural units for each, or the recording
head and the reproducing head may be combined. Also
there may be employed rotary heads as in the video tape
20 recorder. Furthermore, the magnetic tape may be replaced
by a magnetic disk or an optical disk.

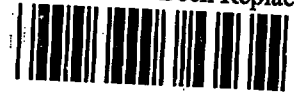
As will be easily understandable from the
foregoing explanation, the systems shown in Figs. 7 and
8, being free from repetition of signal compression and
25 expansion at the record/reproducing and transmission of
the data, enables simplification of the system structure,
cost reduction, simplification and lower power



1 consumption, and prevents unnecessary deterioration in
the signal quality.

Fig. 9 is a block diagram of still another
embodiment of the system of the present invention for
5 record/reproduction and transmission of information
signal, wherein shown are an A/D converter 12; an error
correction code adding circuit 108 for adding code of a
higher correcting ability than that of the error correc-
tion code used for correcting transmission error, such
10 as a DEC code for correcting two vertical directions
and SEC/DED code for correcting one horizontal direction
(one correction/two detections); a modulating circuit 18
for recording on a recording medium; a recording magnetic
head H_p ; a recording medium T such as a video tape or a
15 magnetic disk; a reproducing magnetic head H_p ; a
demodulating circuit 29 corresponding to the modulating
circuit 18; a modulating circuit 38 for transmission; a
transmission channel 30; a demodulating circuit 49
corresponding to the modulating circuit 38; an error
20 correction circuit 109 for effecting error correction
according to the error correction code added by an error
correction code adding circuit 108; and a D/A converter
44.

The embodiment shown in Fig. 9 functions in the
25 following manner. The A/D converter 12 digitizes analog
audio signal, and the error correction code adding
circuit 108 adds an error correction code capable of



1 correcting the error in the transmission in the transmis-
sion channel 30. The data with thus added error
correction code are recorded on the recording medium T
through the modulating circuit 18 and the magnetic head
5 H_R , and the reproduced output of the magnetic head H_P
is demodulated in the demodulating circuit 29, of which
output corresponds to the output of the error correction
code adding circuit 108 unless there is an error in the
recording and reproduction.

10 The modulating circuit 38 modulates the output
of the demodulating circuit 29, and sends the obtained
output to the transmission channel 30. The transmitted
data are demodulated by the demodulating circuit 49.
The data are then corrected in the error correction
15 circuit 109, based on the error correction code added
by the error correction code adding circuit 108, and
are converted into analog signal by the D/A converter 44.

The error rate at the stage of input to the
error correction circuit 109 is estimated to be higher
20 than that in the simple combined system, but the errors
can be sufficiently corrected by the use of an error
correction code of a high redundancy and a high error
correcting ability in the error correction code adding
circuit 108.

25 Fig. 10 shows an embodiment in which the system
shown in Fig. 9 is applied to a system for simultaneously
transmitting audio and video signals, wherein same



1 components as those in Figs. 3 and 9 are represented by
same numbers, and will not be explained in detail.

Input video signal V_{in} and input audio signal
 A_{in} are respectively supplied to input terminals 1-V,
5 1-A. The video signal is digitized in an A/D converter
12-V, then subjected to band compression, such as sub-
sampling for reducing the number of pixels or encoding
for reducing the number of bits for each pixel, in a
band compression circuit 52-V, and supplied to an error
10 correction code adding circuit 16-V.

The video signal is given an error correction
code for record/reproduction by an error correction code
adding circuit 16-V, and the audio signal is given an
error correction code for record/reproduction and
15 transmission by an error correction code adding circuit
108-A. A time-divided multiplex circuit 110 effects
time-divided multiplexing of the video and audio signal
obtained from said adding circuits 16-V, 108-A, and the
obtained multiplex signal is recorded on a recording
20 medium T through a succeeding modulating circuit 18.

Signal reproduced from the recording medium T
is demodulated in a demodulating circuit 49, then
separated into the video signal and the audio signal in
a data separation circuit 112, and the video signal lone
25 is subjected to the addition of error correction codes
for the error in the record/reproduction and that in the
transmission, in circuits 26-V, 36-V. Said signals are



1 then again subjected to time-divided multiplexing in a
time-divided multiplex circuit 114, and are sent to the
transmission channel 30 through a modulating circuit 38.

5 The signal transmitted through the transmission
channel 30 is demodulated in a demodulating circuit 49,
then separated again into the video signal and the audio
signal in a data separation circuit 116, and the video
signal is subjected to the correction of error in the
transmission by an error correction circuit 46-V while
10 the audio signal is subjected to the correction of
error in the record/reproduction and in the transmission
in an error correction circuit 109-A.

The video signal, after the error correction in
the error correction circuit 46-V, is subjected to the
15 expansion of the number of bits to the original state
and the interpolation of the pixels skipped in the sub-
sampling or lost by dropouts, in an expansion circuit 54.
Thus there are obtained output image signal V_{out} and
output audio signal A_{out} .

20 The above-explained system allows to significantly
simplify the circuit structure for the audio signal.
The amount of data of the audio signal increased due to
the elevated redundancy, but such increase is not a
problem because the band for the audio signal is suf-
ficiently narrower than that of the video signal.
25 Consequently the circuit structure can be simplified
without deterioration of the quality of the image and

1 sound.

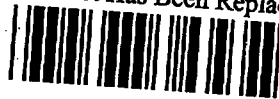
The error correction circuit and the error correction code adding circuit for the video signal may be dispensed as in the case of audio signal, but this
5 will result in a considerable increase in the amount of redundant data to be transmitted. Therefore, if the simplification of the circuit structure for the video signal is desirable, there may be employed an increased band compression in the band compression circuit 52-V.

10 In the foregoing embodiment, the record/reproducing system is provided in the transmitting side, but it may naturally be provided in the receiving side or in both the transmitting side and the receiving side.

As will be apparent from the foregoing description,
15 tion, the systems shown in Figs. 9 and 10 employ only one error correction and can therefore achieve circuit simplification and cost reduction.

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There is disclosed an information transmission system provided with:

a record/reproducing unit for recording compressed information obtained by compressing digital information with highly efficient encoding, on a recording medium, and reproducing the information from the recording medium;

a transmitting unit for transmitting the compressed information, reproduced by the record/reproducing unit, to a transmission channel; and

a receiving unit for receiving the compressed information from the transmission channel and expanding the amount of the received compressed information to reproduce the original digital information.

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1 CLAIMS:

1. An information transmitting system, comprising:
- a) information compression means for compressing digital information to generate compressed
5 information;
 - b) record/reproducing means for recording said compressed information on a recording medium, and reproducing therefrom said compressed information;
 - c) transmission means for transmitting said
10 compressed information reproduced by said record/reproducing means to a transmission channel; and
 - d) information expansion means for expanding said compressed information transmitted through said
transmission channel, thereby reproducing said digital
15 information.

2. A system according to claim 1, wherein said information compression means comprises a high efficiency encoding circuit for encoding said digital information
20 utilizing the correlation thereof, and said information expansion means comprises a decoding circuit for executing a process corresponding to that of said high efficiency encoding circuit.

- 25 3. A system according to claim 1, wherein said digital information comprises video signal.

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1 4. A system according to claim 1, wherein said
transmission means comprises switch means for selectively
sending said compressed information reproduced by said
record/reproducing means or said compressed information
5 released from said information compression means.

 5. A system according to claim 1, wherein said
record/reproducing means comprises plural record/reproduc-
ing apparatus each for recording said compressed
10 information on the recording medium and reproducing
said compressed information from said recording medium,
and said system comprises switch means for selectively
supplying said plural record/reproducing apparatus with
said compressed information.

15 6. A system according to claim 5, wherein said
transmission means comprises switch means for selectively
supplying said transmission channel with said compressed
information reproduced from said plural record/reproducing
20 apparatus.

 7. A system according to claim 1, wherein said
transmission means is adapted to transmit said compressed
information selectively to plural transmission channels.

25 8. A system according to claim 1, wherein said
record/reproducing means comprises a first error



1 correction code adding circuit for adding an error
correction code to the compressed information to be
recorded, and a first error correction circuit for
correcting the error in codes in the reproduced compres-
5 sed information utilizing the error correction code
added in said first error correction code adding circuit.

9. A system according to claim 8, wherein said
transmitting means comprises a second error correction
10 code adding circuit for adding an error correction code
to the compressed information to be transmitted, and
said information expansion means comprises a second
error correction circuit for correcting error in the
codes of the compressed information transmitted by said
15 transmission channel, utilizing the error correction
code added by said second error correction code adding
circuit.

10. A system according to claim 9, wherein said
20 first error correction circuit is adapted to generate a
first flag information in response to the generation of
an uncorrectable code, and said transmitting means is
adapted to transmit said first flag information together
with said compressed information to said transmission
25 channel.

11. A system according to claim 10, wherein said



1 second error correction circuit is adapted to generate
a second flag information in response to the generation
of an uncorrectable code, and said information expansion
means further comprises an interpolation circuit for
5 effecting interpolation of said digital information in
response to said first flag information and said second
flag information.

12. A system according to claim 9, wherein said
10 record/reproducing means comprises a first interpolation
circuit for effecting interpolation of said reproduced
compressed information, according to whether the
correction by said first error correction circuit is
possible or not.

15
13. A system according to claim 12, wherein said
information expansion means comprises a second inter-
polation circuit for effecting interpolation of said
reproduced digital information, according to whether
20 the correction by said second error correction circuit
is possible or not.

14. A system according to claim 12, wherein said
information expansion means comprises a second inter-
25 polation circuit for effecting interpolation of the
compressed information transmitted through said
transmission channel, according to whether the correction



1 by said second error correction circuit is possible or
not.

15. An information transmitting system, comprising:
- 5 (A) a record/reproducing apparatus comprising:
- a) information compression means for compressing digital information to generate compressed information;
- b) recording means for recording said
- 10 compressed information on a recording medium; and
- c) reproducing means for reproducing said compressed information from said recording medium; and
- (B) a transmitting apparatus comprising:
- transmission means for transmitting said
- 15 compressed information, reproduced by said reproducing means, to said transmission channel without restoring said digital information.

16. A system according to claim 15, further

20 comprising:

a receiving apparatus comprising information expansion means for expanding said compressed information transmitted through said transmission channel thereby restoring said digital information.

25

17. An information transmitting system, comprising:

(A) a transmit/receiving apparatus comprising:

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1 a) information compression means for compress-
sing digital information to generate compressed
information;

 b) transmission means for transmitting said
5 compressed information to a transmission channel; and

 c) reception means for receiving said
compressed information transmitted through said transmis-
sion channel; and

 (B) a recording apparatus comprising:
10 recording means for recording said compressed
information, received by said reception means, on a
recording medium with restoring said digital information.

18. A system according to claim 17, further
15 comprising:

 a reproducing comprising reproduction means
for reproducing said compressed information from said
recording medium; and information expansion means for
expanding said compressed information, reproduced by
20 said reproduction means, to restore said digital
information.

19. An information transmitting system, comprising:

 a) information compression means for compress-
25 sing digital information to generate compressed
information;

 b) first error correction code adding means

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1 for adding a first error correction code to said
compressed information;

c) record/reproducing means for recording
the compressed information with added first error
5 correction code on a recording medium, and reproducing
said compressed information from said recording medium;

d) first error correction means for correcting
error in the code of the compressed information,
reproduced by said record/reproducing means, utilizing
10 said first error correction code;

e) first interpolation means for effecting
interpolation of said reproduced compressed information,
according to whether the correction by said first error
correction circuit is possible or not;

15 f) second error correction code adding means
for adding a second error correction code to the
compressed information transmitted through said first
interpolation means; and

g) transmission means for transmitting the
20 compressed information with added second error correction
code, to a transmission channel.

20. A system according to claim 19, further
comprising:

25 second error correction means for correcting
error in the code of said compressed information
transmitted through said transmission channel, utilizing

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1 said second error correction code.

21. A system according to claim 20, further comprising:

5 information expansion means for expanding said compressed information transmitted through said transmission channel thereby restoring said digital information; and

second interpolation means for effecting
10 interpolation of said digital information restored by said information expansion means, according to whether the correction by said second error correction circuit is possible or not.

15 22. A system according to claim 20, further comprising:

second interpolation means for effecting
interpolation of said compressed information transmitted
through said transmission channel, according to whether
20 the correction by said second error correction means is possible or not; and

information expansion means for expanding said
compressed information transmitted through said second
interpolation means thereby restoring said digital
25 information.

23. An information transmitting system, comprising:





- 1 a) first error correction code adding means
for adding a first error correction code to digital
information;
- b) record/reproducing means for recording
5 digital information with said added first error correc-
tion code on a recording medium, and reproducing said
digital information from said recording medium;
- c) first error correction means for correcting
error in the code of the digital information reproduced
10 by said record/reproducing means utilizing said first
error correction code, and adapted for generating first
flag information in response to the generation of an
uncorrectable code;
- d) second error correction code adding means
15 for adding a second error correction code to the digital
information subjected to the correction of code error
in said first error correction means; and
- e) transmission means for transmitting the
digital information with said added second error correc-
20 tion code, and said first flag information to a
transmission channel.

24. A system according to claim 23, further
comprising:

- 25 second error correction means for correcting
error in the code of the digital information transmitted
through said transmission channel, utilizing said second





1 error correction code, and adapted for generating second
flag information in response to the generation of an
uncorrectable code; and

interpolation means for effecting interpolation
5 of the digital information subjected to the correction
of code error in said first error correction means,
according to said second flag information and also
according to the first flag information transmitted
through said transmission channel.

10

25. An information transmitting system, comprising:

- a) error correction code adding means for
adding an error correction code to digital information;
- b) record/reproducing means for recording
15 said digital information with said added first error
correction code on a recording medium and reproducing
said digital information from said recording medium;
- c) transmission means for transmitting the
digital information reproduced by said record/reproducing
20 means to a transmission channel; and
- d) error correction means for correcting
error in the code of the digital information transmitted
through said transmission channel, utilizing the error
correction code added by said error correction code
25 adding means.

26. An information transmitting system, comprising:





- 1 a) first error correction code adding means
for adding a first error correction code to video
information;
- b) second error correction code adding means
5 for adding a second error correction code to audio
information;
- c) record/reproducing means for recording,
on a recording medium, the video information with said
added first error correction code and the audio informa-
10 tion with said added second error correction code, and
reproducing said video information and said audio
information from said recording medium;
- d) first error correction means for correcting
error in the code of the video information reproduced
15 by said record/reproducing means, utilizing said first
error correction code;
- e) third error correction code adding means
for adding a third error correction code to the video
information transmitted through said first error cor-
20 rection means; and
- f) transmission means for transmitting, to a
transmission channel, the audio information with said
added second error correction code and the video informa-
tion with said added third error correction code.

25

27. A system according to claim 26, further
comprising:

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1 second error correction means for correcting
error in the code of the audio information transmitted
through said transmission channel, utilizing said second
error correction code; and

5 third error correction means for correcting
error in the code of the video information transmitted
through said transmission channel, utilizing said third
error correction code.

10 28. A system according to claim 26, further
comprising:

 compression means for compressing video
information to be supplied to said first error correction
code adding means; and

15 expansion means for expanding the video
information transmitted by said third error correcting
means, by a process corresponding to that of said
compression means.

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