

FACSIMILE APPARATUS RESPONSIVE TO VARIOUS INPUTS

BACKGROUND OF THE INVENTION

The facsimile apparatus has made rapid progress recently in the U.S. market. In a conventional facsimile apparatus, there is developed a machine which combines with an automatic telephone answering device or uses one telephone line by shifting between the facsimile apparatus and a telephone set. However, each of the apparatus has its merits and demerits for practical use, so that a user has been confused which one to choose.

SUMMARY OF THE INVENTION

The present invention relates to a facsimile apparatus incorporating a telephone answering machine.

It is an object of the present invention to provide a facsimile apparatus (FAX) incorporating a telephone answering machine (TAM) wherein an incoming telephone call is received and answered first by the TAM and thereafter the FAX is energized.

It is another object of the present invention to provide a facsimile apparatus (FAX) incorporating a telephone answering machine (TAM), wherein the engaging circuit is formed by the TAM in response to an incoming telephone call and thereafter means for shortening the access time for the FAX is provided.

It is a further object of the present invention to provide a facsimile apparatus (FAX) incorporating a telephone answering machine (TAM) wherein, during the operation of the TAM, off-hook operation by a called party enables both the called and calling parties to talk to each other without energizing the FAX.

It is a further object of the present invention to provide a facsimile apparatus (FAX) incorporating a telephone answering machine (TAM), wherein during a telephone conversation between both called and calling parties described in the above object, the called party's FAX can be energized in response to the depression of a manual operation button of a push-button telephone by either of the two parties, without disengaging a telephone line.

It is a further object of the present invention to provide a facsimile apparatus (FAX) which is responsive to a calling tone (CNG) signal using a CNG signal section, which is employed in almost all FAX apparatus, and to other circumstances determined by a

CPU (microprocessor), the outputs of the CNG signal section and a port of the CPU being combined using an OR logic circuit.

5 According to the present invention a communication apparatus for use; with a telephone line, comprising:
a microprocessor; a facsimile apparatus; means for
enabling the starting of operation of said facsimile
10 apparatus in response to any of a plurality of input
signals including a start signal generated by the
microprocessor and a calling tone signal (CNG) sent
from a calling party's apparatus; ringing circuit
means operative in response to an incoming telephone
call to provide a control input signal to said
15 microprocessor; relay means for telephone line
engaging, energized by an output from said
microprocessor when said control signal is inputted,
to engage a main loop; and telephone answering and
recording means for automatically generating an
20 outgoing message and recording an incoming message in
response to the engagement of said loop; said
microprocessor including (a) means for detecting an
occurrence of a predetermined condition; and (b) means
for generating said start signal in response to said
25 predetermined condition; whereby operation of said

facsimile apparatus is started in response to said predetermined condition.

5 How the invention may be carried out will now be described by way of example only and with reference to the accompanying drawing in which a preferred embodiment of the present invention is shown by way of illustrative example.

BRIEF DESCRIPTION OF THE DRAWING

10 The figure is a circuit diagram explaining the principle of this invention.

BEST MODE FOR PRACTICING THE INVENTION

The arrangement and operation in the preferred embodiment of the invention will now be described. The

drawing describes a construction of a facsimile apparatus as an example of this invention. In the drawing, reference symbols L1 and L2 denote terminals of a telephone line. Reference symbols TEL denote a telephone set. Reference numeral 1 denotes a ringing circuit for detecting a calling signal, the circuit having a means for detecting an on-hook condition by the calling party and a means for detecting an on-hook condition of the telephone set TEL, which uses a common part of the ringing circuit 1. When a facsimile processing section which will be described later is operated (which means is in a busy condition), the above means for detecting the on-hook is not operated.

Reference numeral 2 denotes a micro computer of one chip (herein after it is called a CPU) which sets the ROM (read-only memory). In the CPU 2, reference symbols I-1 - I-4 denote input ports. Reference symbol O-1 - O-5 denote output ports. The keyboard for operating, which is not shown in the drawing, is connected to the CPU 2. Reference numeral 3 denotes a solid state memory which can record and playback the outgoing message (OGM) and four messages (ICM-1 - ICM-4). Reference numerals 4 and 5 denote analog switches. Reference numerals 6, 7, 8, and 14 denote amplifiers. Reference numeral 9 denotes a tone decoder for decoding a PB tone (DTMF) sent for starting the facsimile device by the calling party, as will be described later. Reference numeral 10 denotes a facsimile processing section.

When the facsimile processing section 10 is set to the receipt mode by the keyboard (not shown in the drawing), a video signal which is input after a signal of an H level (start signal) is input to the START terminal, is recorded on paper (not shown in the

drawing). In this recording operation, the BUSY terminal is set to the H level, and this output is input to the ringing circuit (this operation will be described later).

Reference numeral 11 denotes a CNG signal receipt section. Reference numeral 12 denotes a bidirectional amplifier. Reference numeral 13 denotes a hybrid circuit which prevents input of the outgoing message which is input to the input terminal, to the output terminal OUT. The voice from the calling party input through the line transformer LT is output. Reference numeral 15 denotes a speaker.

Operation of the invention will now be described as follows. The solid state memory 3 is divided to five areas as shown in the drawing, and the outgoing message OGM is recorded previously in part of the solid state memory 3. The device set to the receipt mode by the keyboard (not shown in the drawing). In the above waiting condition, when the calling signal is input to the telephone line L1, L2, the calling signal is detected by the ringing circuit 1, and keeps the relay Y-1 in an ON condition through the input port I-1 of the CPU 2. As a result, the telephone lines L1, L2 are set to the closed condition through the contacts y1-1 and the line transformer LT, and the calling signal stops, the condition of talking over the telephone is set. The output port O-3 of the CPU 2 is set to the H level by the program, and the analog switch 4 is set to ON. Thereafter, playback of the outgoing message OGM starts in accordance with the code sent through the output port O-2. The outgoing message is output through the amplifier 6, the hybrid circuit 13, and the line transformer LT. When the calling party does not need to use the facsimile apparatus, and it is possible

to record the incoming message (ICM) in the solid state memory 3, and when the end of the outgoing message OGM is detected through the input port I-3 of the CPU 2, the analog switch 4 is set to OFF and the analog switch 5 is set to ON through the output port O-4 of the CPU 2. The range of the memory for the first incoming message ICM-1, for example, is designated through the output port O-2. Accordingly, the incoming message from the calling party is recorded in the position of ICM-1 in the solid state memory through the line transformer LT, the hybrid circuit 13, the amplifier 7, and the analog switch 5.

As above, when the calling party does not need to use the facsimile apparatus, and the end of recording the incoming message is detected through the input port I-2 of the CPU, the signal of H level is output from the output port O-5, and this signal is input to the START terminal of the facsimile processing section, and the facsimile processing section is operated. A discrimination signal by operating the facsimile processing device 10, which is well known (CED signal for example), is sent to the calling party through the SIGNAL terminal and the amplifier 12.

However, the caller does not need to use the facsimile apparatus as above; accordingly, when the calling party hears the signal, the calling party sets the telephone set to the on-hook condition. The on-hook condition is detected through the ringing circuit 1 and the input port I-1 of the CPU 2. As a result, the relay Y-1, which was set to ON is set to OFF, and the device is placed in the waiting condition.

When the solid state memory 3 is filled with the incoming message by repeating the above operation, the apparatus carries out only answering to the received

signal, because the solid state memory can not record any more the incoming messages. At this time, it is possible to switch the outgoing message to an exclusive outgoing message.

Anyway, when the signal is received and the output of the outgoing message OGM is finished, the finishing is detected through the input port I-3, the facsimile processing section 10 is operated through the output port O-5 as above, and the discrimination signal of the facsimile device is output to the calling party. When the calling party does not need to use the facsimile apparatus, the calling party can understand by listening to the discrimination signal that the incoming message can not be recorded, and the calling party sets the telephone set to the on-hook condition. The device is placed in the waiting condition by being on-hook as above.

Each mode when the calling party needs to use the facsimile apparatus will be now described, in order.

(1) When the facsimile device of the calling party is standard.

In this case, the calling party calls this device as above. After the calling party listens to the outgoing message and records the incoming message, and after the calling party listens to the discrimination signal, the calling party pushes the button of the facsimile apparatus (not shown in the drawing) of the calling party side, and as a result, the specific tone is output from the facsimile apparatus of the calling party side. Following some "handshaking", the facsimile apparatus between each side are set to the condition of communication, and it is possible to send a letter. This operation is omitted, because it is

known well.

(ii) When the facsimile apparatus of the calling party side has a means for sending the CNG signal;

In this case, after this device is called by the facsimile apparatus of the calling party side, and the condition of talking over the telephone is set, the CNG signal (1100 Hz) is input during sending the outgoing message. The CNG signal is detected by the CNG signal receipt section 11 through the line transformer LT and the amplifier 12, and as a result, the facsimile processing section 10 is operated such as by the start signal, the discrimination signal is output from the facsimile processing section 10 as in the above explanation, and the facsimile apparatus between each side are set to the condition of communication.

(iii) When the facsimile apparatus between each side are set to the condition of communication by the specific signal sent from the calling party side.

In this case, the specific signal means a signal whereby it is possible for the user of the facsimile to change the code. During sending the outgoing message after recording the incoming message, the button # on the telephone set (PB tone type) is pushed, the # tone is generated at this time, and the # tone is decoded by the tone decoder 9 through the line trans LT and the amplifier 8. When the # tone decoded coincides with the tone which is programmed previously, the facsimile processing section 10 is operated through the output port O-5, as in the above explanation, and the facsimile apparatus at each side is set to the condition of communication.

(iv) When the facsimile apparatus at each side is set.

to the condition of communication after the calling party side talks to the called party side.

As in the above explanation, when the signal from the calling party is received, the device records the message from the calling party after the outgoing message is output. The voice from the calling party can be monitored through the line transformer LT, the hybrid circuit 13, the amplifier 7, the amplifier 14, and the speaker 15 in outputting the outgoing message or recording the message from the calling party. Accordingly, when the calling party hopes to talk with the called party, the calling party sets the telephone set TEL to the off-hook condition. This off-hook condition is detected by the ringing circuit 1. As a result, the relay Y-1 is set to OFF through the input port I-1. Accordingly, the contact y1-1 opens, and the operation as the telephone answering device is released.

At the same time, the output detected by the on-hook of the telephone set TEL sets the relay Y-2 to On through the input port I-5 of the CPU 2. The resistance R1 is connected with the condenser C1 through the point of contact y2-1, as shown in the drawing.

After talking over the telephone, when the calling party hopes to communicate by the facsimile apparatus, the # tone is sent from the calling party as above. This signal is detected through the resistance R1, the condenser C1, and the line transformer LT as above. As a result, the facsimile apparatus between the calling party and called party are operated. The relay Y-1 is set to ON at the same time when the facsimile apparatus are operated. The telephone line is set to the closed condition by the point of contact y1-1, and the closed

condition of the telephone line by the telephone set is released by the signal from the BUSY terminal of the facsimile processing section 10.

Thus, the foregoing description of the preferred embodiment of the invention has been presented for purposes of illustration and description and is not intended to be exhaustive to limit the invention to the precise forms disclosed, since many modifications and variations are possible in light of the above teaching. The embodiment was chosen and described in order best to explain the principles of the invention and its practical application, thereby to enable others skilled in the art best to utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated thereof. It is intended that the scope of the invention be defined by the claims appended hereto, when interpreted in accordance with full breadth to which they are legally and equitable entitled.



Claims

1. A communication apparatus for use; with a telephone line, comprising:

5 a microprocessor;

 a facsimile apparatus;

 means for enabling the starting of operation of said facsimile apparatus in response to any of a plurality of input signals including a start signal generated by
10 the microprocessor and a calling tone signal (CNG) sent from a calling party's apparatus;

 ringing circuit means operative in response to an incoming telephone call to provide a control input signal to said microprocessor;

15 relay means for telephone line engaging, energized by an output from said microprocessor when said control signal is inputted, to engage a main loop; and

 telephone answering and recording means for automatically generating an outgoing message and
20 recording an incoming message in response to the engagement of said loop;

 said microprocessor including

 (a) means for detecting an occurrence of a predetermined condition; and

25 (b) means for generating said start signal in response



to said predetermined condition;
whereby operation of said facsimile apparatus is
started in response to said predetermined condition.

5 2. The apparatus of Claim 1, wherein said facsimile
apparatus comprises means for generating a busy signal
when said facsimile apparatus is in an operating
condition and wherein said ringing circuit comprises
means responsive to said busy signal to disable
10 detection of a telephone off-hook condition.

3. The apparatus of Claim 1, wherein said
predetermined condition comprises completion of said
incoming message.

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4. The apparatus of Claim 1, wherein said
predetermined condition determines receipt of a coded
signal on the telephone line.

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5. The apparatus of Claim 1, including circuit means
for releasing said relay means in response to
detection of an off-hook operation of a telephone set
connected to the telephone line to return said
facsimile apparatus, having been enabled in response



to the incoming call, to a standby mode without being operated.

5 6. The apparatus of Claim 5, further including second relay means for engaging a sub loop for DTMF tone reception in response to the off-hook operation, wherein said facsimile appartus is operated in response to sending of a DTMF tone by either a calling party or a called party after a direct conervation
10 between them, and for thereafter releasing said sub loop.

7. An apparatus substantially as described with reference to the drawing.
