METHOD AND APPARATUS FOR DISPLAYING AT A SELECTED STATION SPECIAL SERVICE INFORMATION DURING A SILENT INTERVAL BETWEEN RINGING

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is related to the applications of R. W. Foster et al., Ser. No. 512956, entitled "Method and Apparatus for Providing Call Tracing Service"; R. M. Lottes, Ser. No. 512079, entitled "Method and Apparatus for Providing a Plurality of Special Services"; and C. A. Doughty, Ser. No. 512955, entitled "Method and Apparatus for Sending a Data Message to a Selected Station during a Silent Interval between Ringing"; all filed concurrently on July 12, 1983, with this application.

TECHNICAL FIELD

This invention relates to telephone station sets and particularly to displaying special service information at an on-hook telephone station.

BACKGROUND OF THE INVENTION

A variety of display station sets and other means exist for displaying at a called station the directory number of a calling station after the parties establish a talking condition between the stations. In one arrangement, while a called party is talking, the telephone switching system performs calling station directory number identification upon request of the called party. There are also some subscriber-owned systems in which the directory number of the calling station is transmitted to the called station by devices positioned at both of the stations. However, these devices are only functional after the call has assumed a talking condition.

In situations where the privacy of the called party is important, a number of arrangements are available. Many require the use of an additional communications link which is an inefficient use unless justified by other needs. Another arrangement transmits the directory number of the calling station to the called station between successive ringing signals. However, this arrangement displays only dialed information such as the directory number of a calling station and is not so practical for other than use in a private branch exchange.

SUMMARY OF THE INVENTION

The foregoing problems are solved and a technical advance is achieved by method and apparatus for displaying at a selected station special service information during a silent interval between ringing signals from a telephone switching office. In addition to transmitting the ringing signals, the telephone switching office is capable of sending to the selected station an unmodulated signal and by a modulated signal during the silent interval between ringing signals. The modulated signal represents the special service information. The apparatus includes a detector which detects the unmodulated signal during the silent interval between ringing signals. After the unmodulated signal is detected, the special service information is received and stored during the silent interval. The stored special service information is then displayed at the selected station during the silent interval.

In one illustrative embodiment of the invention, the apparatus comprises a frequency shift keyed (FSK) demodulator, a universal asynchronous receiver transmitter (UART), a microprocessor with program and data memory, and a display unit which are all well-known devices. The FSK demodulator detects incoming modulated and unmodulated carrier signals which have been filtered from the ringing signals. Upon detecting an unmodulated carrier signal, the FSK demodulator signals the UART to receive special service information demodulated from the subsequently received modulated carrier signal. Each received character of the special service information is then stored in the data memory by the program-controlled microprocessor. The stored special service information is then exhibited in the display unit under the control of the microprocessor. The display is thus initiated during the silent interval and remains until cleared. This special service information not only includes the directory number of the calling station, but may comprise special service indicators, personal messages, time of day, a called station directory number, and any other desired information.

BRIEF DESCRIPTION OF THE DRAWING

The invention may be better understood from the following detailed description when read with reference to the drawing in which:

FIG. **1** shows, in block diagram form, a data receiver connectable to a telephone station set for displaying special service information during the silent interval between ringing signals from a telephone switching system;

FIG. **2** illustrates an idealized frequency shift keyed signal, which represents special service information, during the silent interval between idealized ringing signals from a telephone switching system;

FIG. **3** discloses the message character format of the special service information sent from a telephone switching system, to the data receiver;

FIG. **4** shows the memory layout of a message status block in the data memory of the data receiver;

FIGS. **5** through **10** show detailed flow diagrams of the routines and subroutines for detecting and receiving special service information at a selected station during a silent interval between ringing signals; and

FIG. **11** shows a flow diagram of the base level program for periodically updating the display unit of the data receiver with special service information.

DETAILED DESCRIPTION

The general organization of an embodiment of the invention is illustrated in the block diagram of FIG. **1** which shows on-hook data receiver **100**. Input leads **150** and **151** of the receiver are connected to the tip and ring leads of any well-known and commercially available telephone station set. The data receiver may be built into the station set or connected to the station set as a separate stand-alone unit. Data receiver **100** comprises line interface **101**, converter **102**, control circuit **103**, and alpha-numeric display unit **126** to receive frequency shift keyed signals during a silent interval between intermittent ringing signals from a telephone central office. These frequency shift keyed signals represent a data message which contains information which is displayed in providing a telephone special service. In particular, this special service information may include the directory number of the station which is making the call to this particular station. Also included in this informa-