IBM

Customer Engineering Announcement

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Audio Response Unit

IBM 7770 Audio Response Unit

The IBM 7770 Audio Response Unit provides audio responses to inquiries made from telephones, IBM 1001 Data Transmission Terminals, or similar terminals. The terminals may be connected to the 7770 by means of common carrier-provided switching and send/receive equipment, private wire systems, or privately owned communication networks of voice bandwidth. The audio response is composed from a vocabulary prerecorded on a magnetic drum.

In operation, a calling party enters an inquiry, consisting of a series of digits, by means of a terminal. The 7770 buffers and assembles the inquiry, and the assembled inquiry is sent to the CPU under program control. The CPU processes the inquiry and composes a coded response message, which is sent to the 7770. The 7770 interprets the response message, selects the proper words from the vocabulary, and transmits the words as an audio response to the inquirer.

Features

Two Models

- Model 1 for use with IBM 1401, 1440, and 1460 Systems via IBM 1311 File Control Channel
- Model 2 for use with IBM 1410 and 7010 Systems via Data Channel 1 or 2

Vocabulary

- Tailored to customer requirements
- 32-word basic vocabulary, expandable to 48, 63, 79, 95, 111, or 127 words (maximum of 126 words for Model 1)
- Changed by changing drum rotor (The revised vocabulary, which is specified and ordered by the customer, is recorded on the new rotor by IBM)

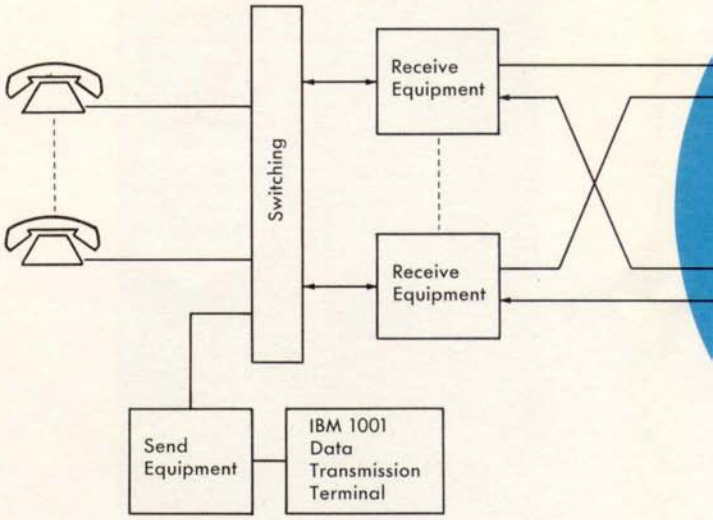
Magnetic Drum

- 126 addressable tracks for Model 1 and 127 for Model 2
- Maximum response message of 38 drum words

Input-Output (I-O) Lines: 4-line basic unit, expandable to 48 in 4-line increments

40-Digit Maximum Inquiry

Network Facilities



Functional Description

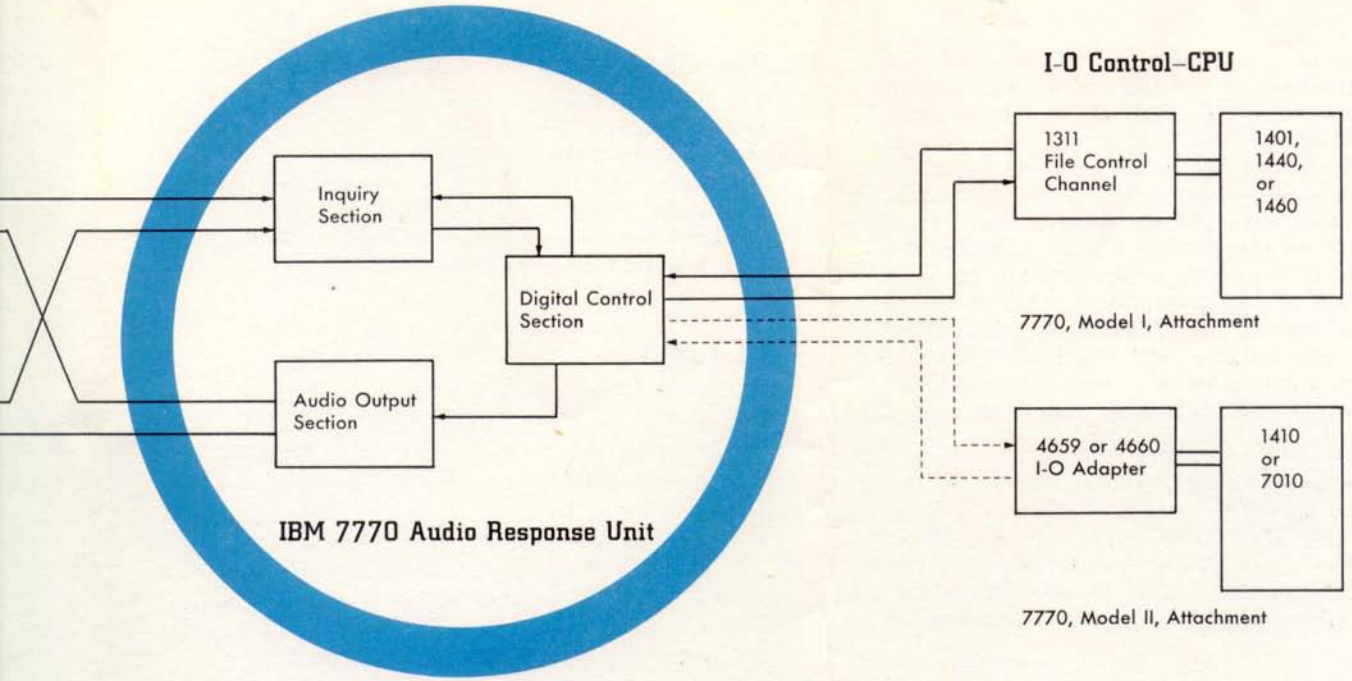
Functionally, the IBM 7770 comprises three sections: inquiry, digital control, and audio output. Each I-O line to the 7770 has an associated delay line buffer which is used by the three sections.

Inquiry Section

The inquiry section receives the digital inquiry (up to 40 digits) from the terminal via the send/receive equipment. The inquiry, which is sent in a 3-out-of-14 or 2-out-of-8 code, is received by the inquiry section parallel-by-bit and serial-by-character. The inquiry section translates the inquiry into BCD code, assembles the inquiry in the buffer associated with the inquiring line, and, under control of the digital control section, transfers the assembled inquiry to the CPU. An inquiry is said to be completed when no further data are received for five consecutive seconds. At that time, the inquiry is terminated and control is given to the digital control section.

Digital Control Section

The digital control section controls data flow between the CPU and the IBM 7770. For Model 1, data flow is via the IBM 1311 File Control Channel. To the 1311 File Control Channel, the 7770 appears as a 1311, Model 2; data flow is started when the CPU issues a *read file* or *write file* command. A *read file* command transfers the assembled inquiry from the inquiry section to the CPU. A *write file* command



sends the composed response message to the buffer in the 7770 associated with the inquiring line.

For Model 2, data flow is via CPU Data Channel 1 or 2. To the data channel, the 7770 appears as an IBM 1414 I-O Synchronizer, Model 3, 4, 5, or 8. When an inquiry is assembled, the 7770 sends the CPU an inquiry signal, which interrupts CPU operation and initiates transfer of the inquiry to core storage. After processing the inquiry, the CPU controls the transfer of the composed response message to the buffer in the 7770 associated with the inquiring line.

The response message, composed of vocabulary word location addresses, is sent to the audio output section one word at a time under control of the digital control section. The maximum length of a response message is 38 addresses; a group mark signifies the end of the message.

Audio Output Section

The audio output section generates the audio response. Under control of the digital control section, drum word addresses are obtained in sequence from the CPU via the buffer associated with the inquiring line. The words (audio response) are read from the drum, amplified, and sent to the inquiring terminal.

Magnetic Drum

The vocabulary is prerecorded in analog form on the magnetic cylinder (rotor) of a drum 4 inches in diameter and 10 inches long. The drum contains 126 addressable tracks for Model 1 and 127 for Model 2. The contents of three of the Model 1 tracks and two of the Model 2 tracks are fixed:

Model 1

1. BCD blank (check bit and no information bits)
2. BCD group mark (all bits)
3. BCD group mark word mark (all bits and word mark)

Model 2

1. BCD blank
2. BCD group mark

The BCD blank, which must be present in all vocabularies, provides 500 ms of silence for appropriate spacing. The BCD group mark and the BCD group mark word mark are used by the IBM 7770 for control purposes.

The drum rotates at 120 rpm (500 msec per revolution). The recorded signals on the tracks are sensed by associated read heads. A magnetic sensor on the drum signals the digital control section to call for the next sequential address and indicates the beginning of a drum word.

A drum word is the audio signal recorded on one track. When a particular track is addressed, the entire drum word is read; portions of the drum word cannot be accessed or read. Since one revolution of the drum takes 500 ms, a drum word may contain a part of a spoken word, a spoken word,

letter, or number, or several spoken words (a phrase), depending on the time it takes to record the spoken word(s). Several short monosyllabic words (a phrase), which can normally be said in less than 500 ms, can be recorded on one track. On the other hand, bisyllabic or polysyllabic words, which take more than 500 ms to say, must be recorded in parts on two or more tracks. Although the BCD addresses of the tracks containing the parts of the word need not be consecutive, the addresses must be presented to the 7770 in sequential order according to the parts of the word. If letters or numbers 0 to 9 are to be recorded, only one letter or number can be recorded on a single track.

Vocabulary

IBM has compiled a master vocabulary which includes words frequently used in different industries, numbers 0 through 9, and letters A through Z. From this master vocabulary, each customer can select specific entries to make up his vocabulary. The blank (silence) track is used for appropriate spacing.

Programming

Model 1

The IBM 7770, Model 1, can be operated with the IBM 1311 File Input-Output Control System (IOCS) program or with customer-written programs. If the customer uses the 1311 File IOCS program to "get" an inquiry from the 7770 and "put" the response into the 7770, he must write an operational program to interpret the inquiry and to compose the response. If the customer elects to write his own I-O program, he can use any programming technique and any instruction that apply to the 1311, Model 2.

Model 2

The operation of the IBM 7770, Model 2, is controlled by the Tele-Processing® Supervisor (TPS). When the 7770 has an inquiry for the CPU, it sends an inquiry signal to the CPU, whereupon the TPS places the inquiry in core storage. The TPS determines the status of the I-O line and sets up a control field reflecting the status. The TPS then exits to the customer-written program, which inspects the control field and indicates to the TPS the TP program required for processing. After processing, the TP program assembles a response and places it in core storage. At this point, the TPS assigns an address for the response; when that address is reached in the output message queue, the response is sent to the audio response section.

Operator's Panel

The IBM 7770 Operator's panel contains lights, keys, and switches which control and monitor the operation of the 7770. In addition, each I-O line has indicators and an output jack associated with it which allow the operator to follow the inquiry from the send/receive equipment through the 7770 to the CPU and the subsequent response.

CE Panel

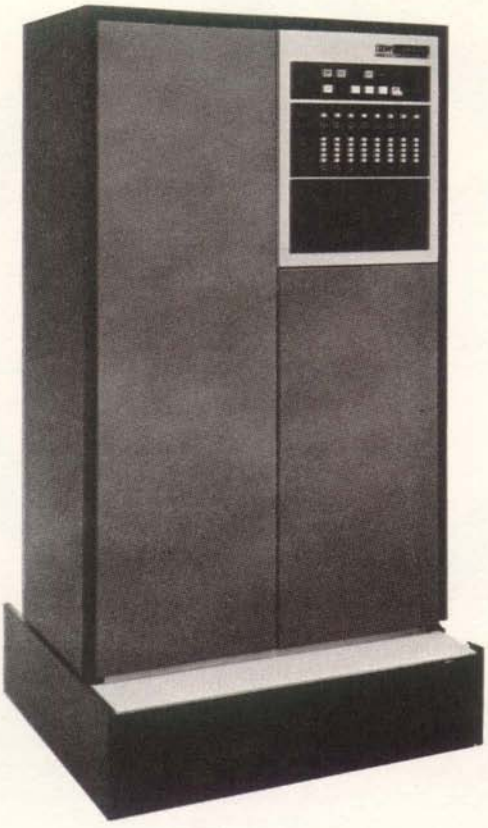
The CE panel contains switches and keys which enable:

1. Setting up a character for an inquiry.
2. Entering the character set up by the switches into the 7770.
3. Cycling the entered inquiry repeatedly through the 7770 to test the inquiry section.
4. Addressing vocabulary words by setting up addresses and listening to the response by means of earphones and an output jack.
5. Operating the I-O line scanner normally by means of the master clock or in a single-step mode.

On all data transfers between the 7770 and the CPU, parity is tested on both sides of the interface.

The CE can perform off-line tests and on-line tests. For off-line tests, all I-O lines are disabled and the operation of the 7770 is interrupted. The addresses of the selected drum words are specified by means of switches and entered in the 7770. Single-cycle operation is selected. The interface is wrapped by connecting the output to the CPU to the input from the CPU, thus bypassing the CPU. The audio response may be heard by plugging earphones into the output jack.

On-line tests may be performed on individual I-O lines. Any I-O line may be disabled, and a 1-character inquiry may be entered in the buffer associated with that line by means of switches. The CPU returns the inquiry to the 7770 as a digital response message. The audio response may be monitored using the earphones.



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IBM®

International Business Machines Corporation
Data Processing Division
112 East Post Road, White Plains, New York

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