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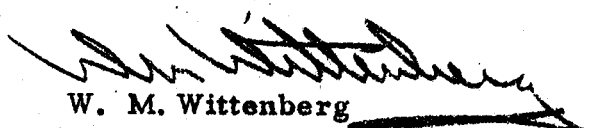
TO: W. Buchholz

February 21, 1957

SUBJECT: Proposal #2 - Phone Line  
Operation of a Remote Inquiry  
Station with line/message  
Storage Facilities

The main purpose of the accompanying proposal is to detail the advantages of a message storage type of remote Inquiry Station. The proposed storage device and very rough logic included as part of the proposal merely represent one possible technique for accomplishing cheap message storage.

The author is indebted to Mr. D. Sweeney for introducing the germ of message storage and to Mr. J. Gibson for his many fine suggestions which are included as a part of this proposal.

  
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COMPANY CONFIDENTIAL

Phone Line Operation of Remote Inquiry Station with line/message  
Storage Facilities.

By

W. M. Wittenberg - February 21, 1957

PROPOSAL #2

ABSTRACT:

The remote, line/message storage, Inquiry Station provides for direct access to the Stretch system from remote locations through the medium of telephone lines. The message storage feature enhances the utilization of the Inquiry Station from both operational and technical viewpoints.

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Advantages of Message Storage

1. Efficient and therefore cheaper utilization of phone line with multiplexing possibilities at remote end of line.
2. Burden of retransmittal of incorrectly received messages is placed upon the machine.
3. Keying errors can be randomly corrected at the operator's convenience.
4. Common inquiry information is permanently stored allowing simple message preparation.
5. The storage medium can be used in conjunction with the typewriter for multiple typed messages.
6. Complete messages can be visually compared before the computer inquiry is established.

Physical Description

The input portion of the Station consists of a typewriter keyboard with key contacts establishing a machine code. A paper endless tape is provided to control message format in high volume, single type inquiry stations. A small disc memory stores an entire line/message. The R/W mechanism of this memory is mechanically coupled to the typewriter carriage to provide for erasure of any character under operator control.

The output portion of the Station consists of a typewriter printing mechanism which is under computer control.

The Inquiry Buffer contains the necessary registers and controls to insure compatibility with the EXCHANGE. It is almost identical with the Buffer described <sup>1</sup>.

1. See Proposal #1 "Phone Line Operation of a Single Inquiry Station" dated February 14, 1957.

## TYPEWRITER STORAGE DEVICE

The concept of remote (telephone line connected) Inquiry Stations or Interrogation devices which communicate directly with a computer can be enhanced if a cheap, efficient method of line and/or message storage can be devised.

Figure one shows a novel technique for providing such a storage medium. The Typewriter carriage is mechanically coupled to a R/W Head mechanism or activating assembly and the position of the Head is determined by the position of the typewriter carriage.

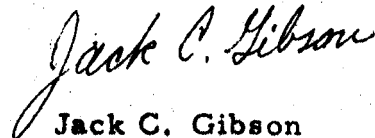
When typing occurs, the coded character is written on the revolving disc or drum, one character per track. The typist can, by repositioning the carriage and depressing an erase key, correctly assemble an entire message line.

Depressing the carriage return key would cause the entire message line to be transferred character by character, to a single character buffer register for telephone line transmission. With this scheme the message would arrive at the computer inverted. This may not be unattractive since computer translation of the transmission 4 of 8 code is assumed.

An alternate scheme, shown in Figure 2, could be utilized to cause correct sequence of transmission when the carriage returns, if required, but then the assembly would be more expensive since precision placement of two heads is required.

A third scheme, providing an independent activating mechanism, perhaps coupled to the same arm mechanism could be utilized to insure a stationary typewriter carriage during successive attempts to transmit a correct message line when a transmission error occurs. This is, once again, more expensive than the first scheme proposed.

JCG:WMW/jv

  
Jack C. Gibson

  
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Operator Activated Controls and Features

1. COMPUTER ENTRY switch - when ON, the inquiry station is utilized as a computer entry device. When OFF, the inquiry station may be used as a typewriter with or without the storage features.
2. TEL\* button and light - when depressed, will signal that aural telephone communication is desired.
3. DISC ENTRY key - when depressed, typed information is also entered into the disc buffer. When released, the typewriter is used as a standard device.
4. DISC READ button - when depressed, information on the disc is printed. This feature is useful primarily for automatic duplication of parts of lines and secondarily as a check on what information exists on the disc.
5. DISC ERASE button - depressing this button will erase the entire disc.
6. SPACE ERASE bar - The space bar is divided into two sections with SPACE ERASE utilized when composing a message or deleting a portion of a line. The regular SPACE portion of the space bar will not erase the disc information.
7. REPEAT switch - utilized when operator desires to transmit several lines in which a large portion of the information is duplicated from line to line. When off, the disc is erased upon successful transmission of a line of information.
8. END of MESSAGE\* button - This button will cause the message to be transmitted to the computer and upon successful transmission will cause erasure of the disc.
9. CARRIAGE RETURN key - This key, besides its normal function of returning the carriage, will cause the line of information to be transmitted to the computer. Erasure of the disc remains under the control of the REPEAT switch.

\* Indicates telephone transmission.

10. CANCEL\* button -

The operator can cancel any partial message that has been sent to the computer.

11. ALARM RESET button -

resets alarms that have called the operator's attention to error conditions.

12. INPUT light -

signals operator that message format tape in correct place for inquiry.

13. OUTPUT light -

signals operator that correct number of characters have been entered and END of MESSAGE button should be depressed.



Machine Activated Controls and Features

1. TYPE\* - O - this command activates a TYPE light and unlocks the keyboard when under computer control. Its purpose is to inform the operator that the computer is ready and able to receive inquiries.
2. END TYPE\* - O - this command negates the TYPE command.
3. CARRIAGE RETURN\* - O - printer control.
4. END of OUTPUT\* - O - utilized to start the disc reading into the printer and to reset PRINTER SELECT.
5. MESSAGE/LINE N. G. \* - O - signals computer to retransmit message/line.
6. LINE/MESSAGE O. K. \* - I - signals operator to proceed with next line/message.
7. CHECK ALARM - Transmission to Computer - I - indicates that retransmission of message/line has failed after a predetermined number of tries.
8. RE-READ\* - I - tells inquiry station that incorrect message/line received at computer. The above CHECK ALARM is turned on after failure. to correctly retransmit.
9. CONTINUE TO READ\* - I - utilized after SELECT REQUEST is honored to cause entry of message/line.
10. DISC WRITE ALARM - a comparison of the written bit on the disc with the desired bit is made on every bit of information placed on the disc.
11. OUTPUT BYTE SHIFT REG ALARM - indicates proper 4 of 8 character has not been correctly received and/or transmitted by the Output Byte shift register.
12. SELECT REQUEST\* - I - automatically made when END of MESSAGE or CARRIAGE RETURN keys depressed

\* Indicates telephone line transmission. O or I indicates input or output device.

and COMPUTER ENTRY switch ON.

13. PRINTER READY \* - O -

indicates status of printer to the computer.

14. PRINTER SELECT\* - O -

causes selection of the printer as an output device and interrupts utilization of the typewriter as an input device.

## Operation - Normal Modes

### 1. Computer Entry

The operator would normally look to see if the TYPE light is glowing. If it is, she composes her message depressing either the END of MESSAGE or CARRIAGE RETURN keys whenever a line/message is complete. Automatic Computer entry,utilizing the computer break-in system of first,a SELECT REQUEST, then the actual address of the station,and then the line/message occurs. The read operation is controllable by the REPEAT switch. If the REPEAT switch is ON, the line is not erased and the operator can selectively alter a portion of the line, again depress the CARRIAGE RETURN key and have the new line read into the computer automatically. If the REPEAT switch is OFF, the entire line is erased after successful computer entry. It is necessary to erase the entire disc when a message or line is completely and successfully read into the computer since the succeeding line may be shorter in duration. The read operation proceeds at a 93 character per second rate, the speed of a telephone line,which matches the 100 character per second rate the Exchange allows for a single low speed input unit. Since an automatic select request is made, it is possible that the operator may have to wait until the request is honored before she can begin typing her next line, and the keyboard must be interlocked to assure that she does wait. When the last line is completed or on short-less than one line-messages, the END of MESSAGE button is depressed, causing normal Select and Service request action between the Input unit and the Exchange - Computer complex.

The Inquiry is processed normally by the computer and the printer is selected as a normal output unit. Computer selection of the typewriter will cause the keyboard to lock up. The computer message is sent into the disc at telephone line speeds and is then printed from the disc at typewriter speeds.

### 2. Storage Typewriter

With the COMPUTER ENTRY switch off, the typewriter-disc combination can be used to supply common information to typed letters and forms. The information pattern is written into the disc with the DISC ENTRY switch ON, the switch is then turned OFF. DISC READ will print the information pattern in the disc everytime it is depressed. DISC ERASE will cause the pattern stored on the disc to be erased in preparation for a new pattern.

3. Tel Mode

Telephone service is provided as a feature of the Remote Inquiry Station to allow vocal communication between the computer location and the Remote Station.

## Operation - Error Modes

### 1. CANCEL MODE

A CANCEL button is provided to allow the operator to disconnect from the Exchange whenever she desires. The Exchange will send the CANCEL information to the computer.

### 2. TYPING ERROR

The disc is automatically erased before writing each character. Roughly speaking, the operator's speed is about 10 characters per second or 100 milliseconds per character. With the disc revolving at 10-20 milliseconds per revolution, ample time is available for incorporating this feature. This allows the operator some discretion as to the neatness of her typed report, but would insure accurate computer entry since the last character typed at any setting of the carriage would be the character entered to the computer. Since the discs write heads position is determined by the position of the typewriter carriage, disc erasure can be accomplished by simple strikeover. A split space bar is provided with the SPACE section allowing for spacing back to the proper point, after correcting an error, without erasing intermediate characters.

### 3. ALARM RESET

Three types of alarms are recognized as concerning the remote inquiry station.

#### a) Incorrect transmission to the computer

Re-transmission of incorrectly received messages is automatically accomplished. However, in case of complete mal-function, a count of the number of tries is made and an alarm set after this count is exceeded.

#### b) Disc write

By utilizing a two-gap W/R head, a comparison is made to insure correct disc entry.

#### c) Output Byte Shift Register

This register performs a variety of functions, since all keyboard, disc and computer originated information passes through it and its output is checked to insure validity of all information.

In addition, when a computer originated message is incorrectly received, the computer is so told and the message is retransmitted by the computer.

# TYPEWRITER STORAGE DEVICE

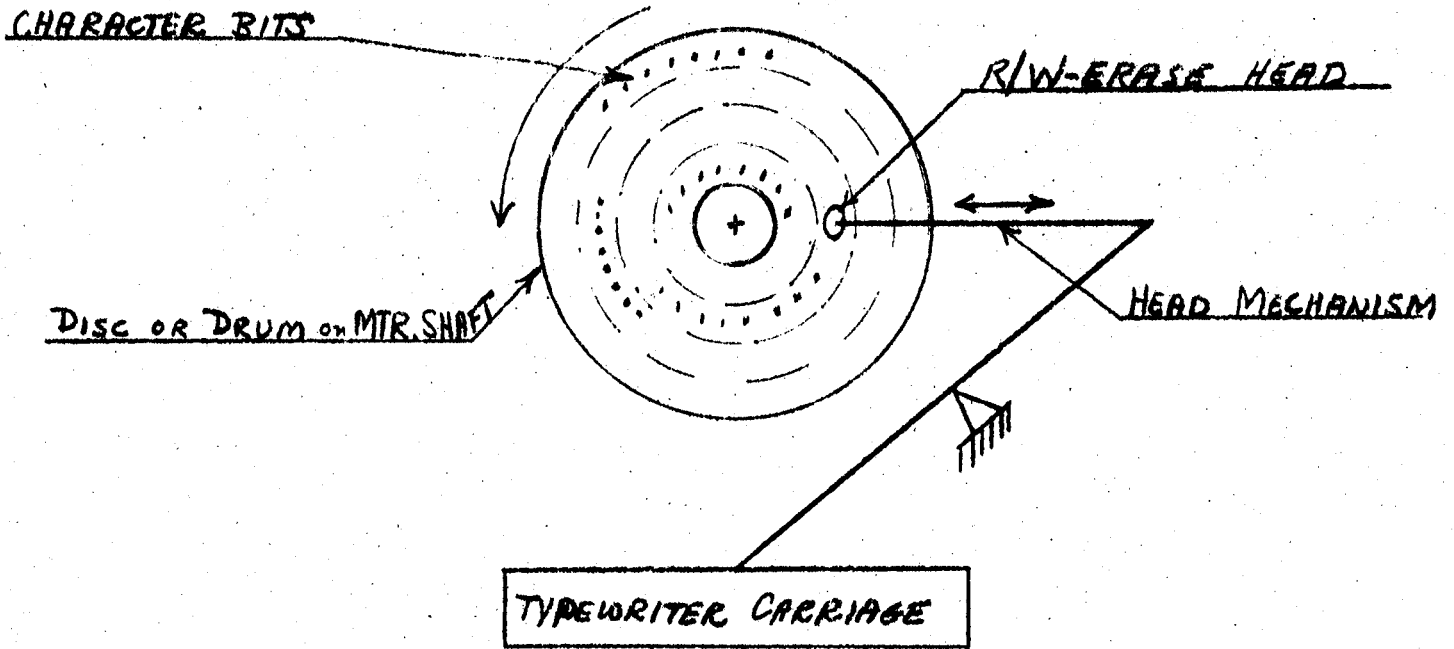


FIGURE ONE

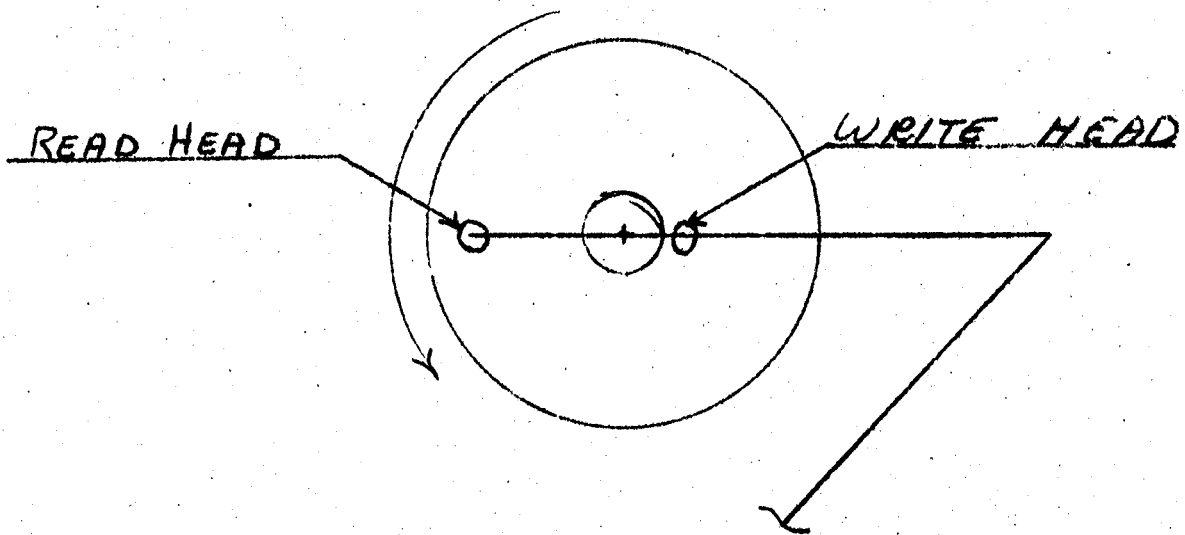
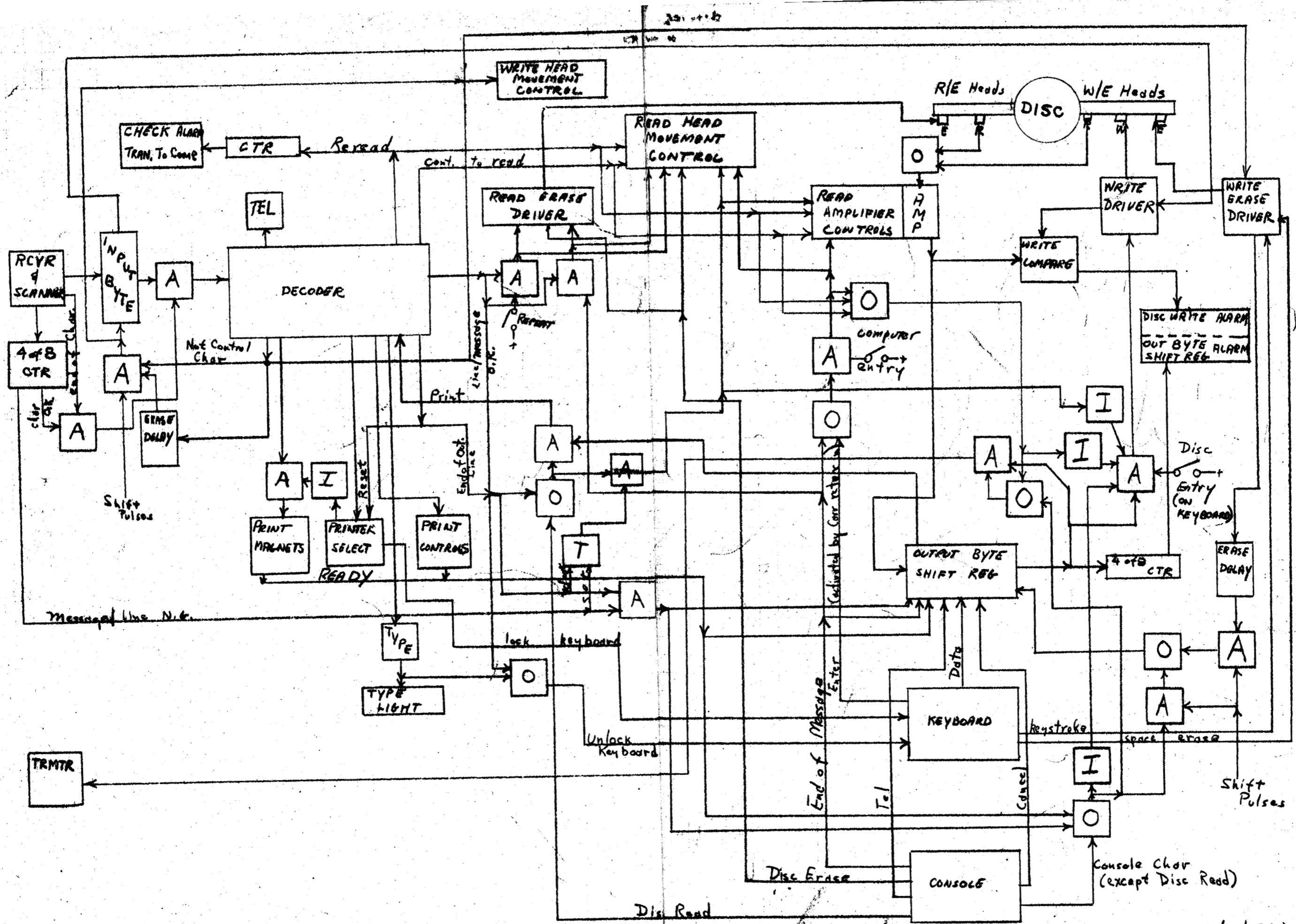


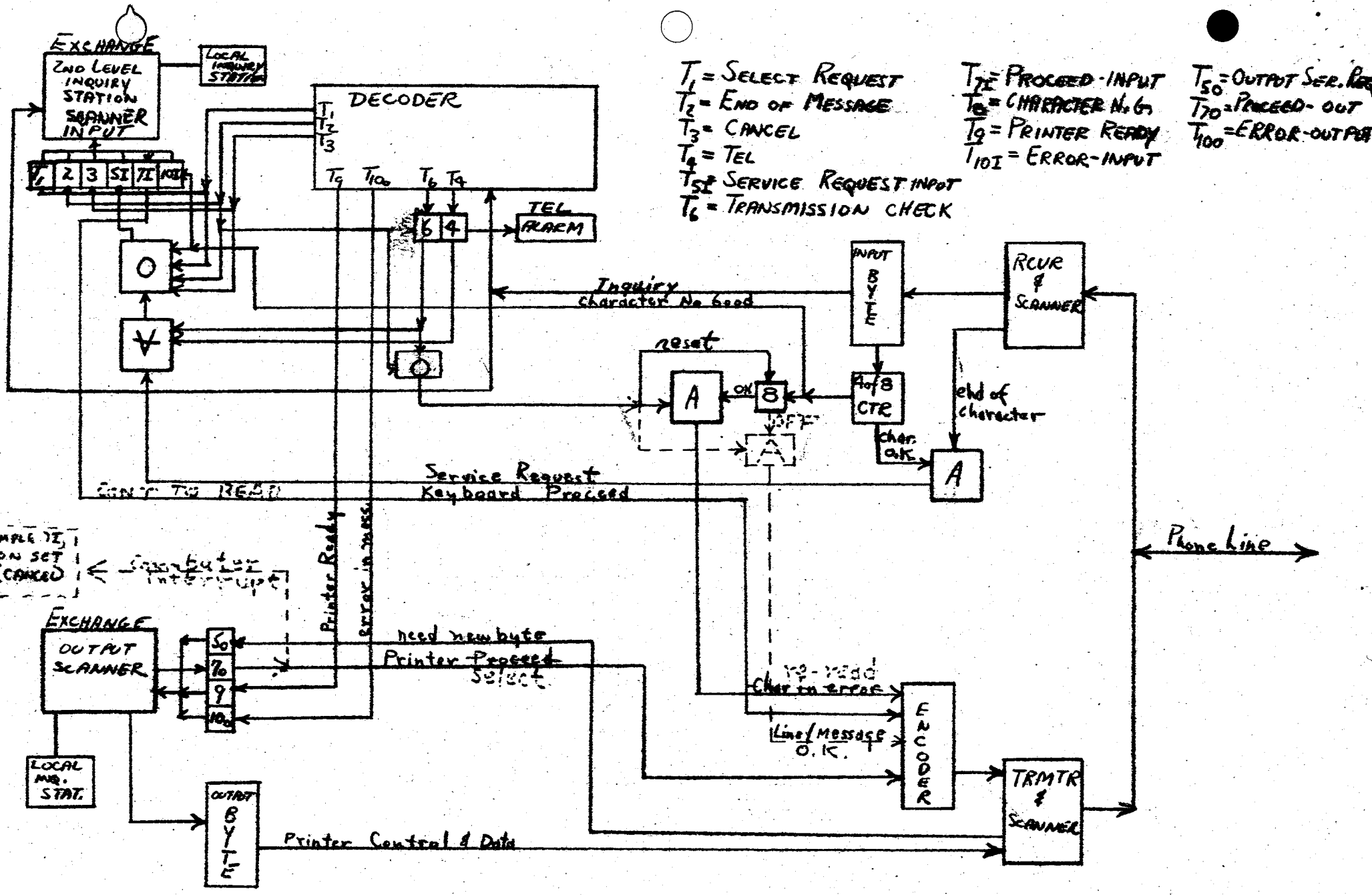
FIGURE TWO

2/14/57

*[Handwritten signature]*



2/19/57 *Ward*  
 REMOTE INQUIRY STATION  
 WITH LINE/MESSAGE STORAGE



- $T_1$  = SELECT REQUEST
- $T_2$  = END OF MESSAGE
- $T_3$  = CANCEL
- $T_4$  = TEL
- $T_5$  = SERVICE REQUEST INPUT
- $T_6$  = TRANSMISSION CHECK
- $T_7$  = PROCEED-INPUT
- $T_8$  = CHARACTER No. 6
- $T_9$  = PRINTER READY
- $T_{10}$  = ERROR-OUTPUT
- $T_{10I}$  = ERROR-INPUT
- $T_{50}$  = OUTPUT SER. REQ
- $T_{70}$  = PROCEED-OUT

SAMPLE T<sub>5</sub> IF ON SET 3 (CANCEL) ← *Interrupt*

--- INDICATES MODIFICATION TO USE WITH MESSAGE STORAGE REMOTE INQUIRY STATION 2/20/57

INQUIRY BUFFER - COMPUTER END OF LINE

2/12/57  
*[Signature]*