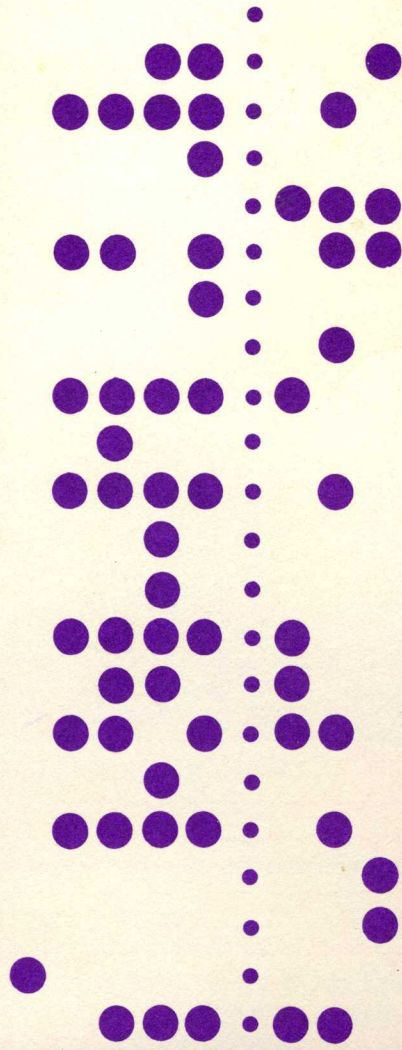
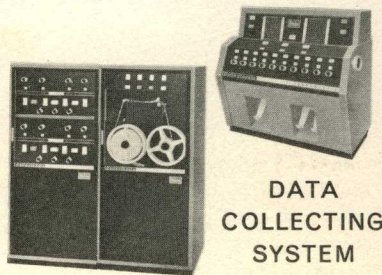


Friden

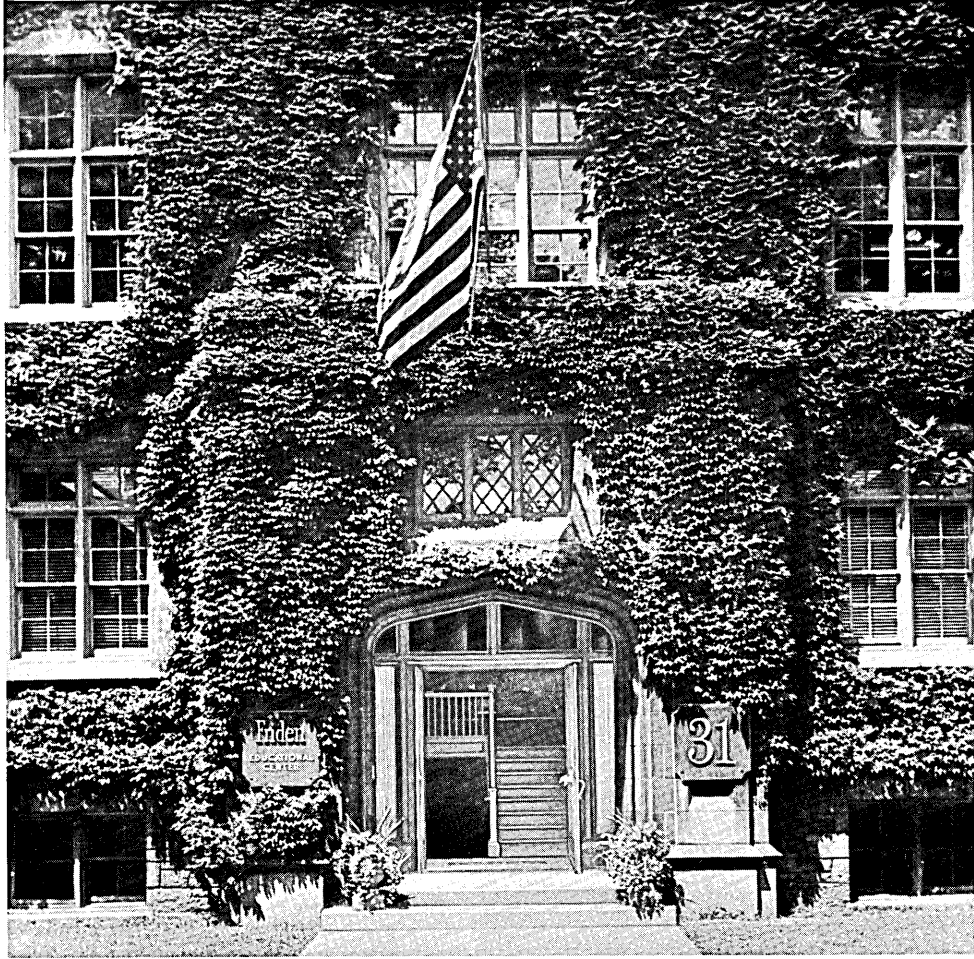


Technical Manual for

Friden Collectadata[®] 30 System



DATA
COLLECTING
SYSTEM



Friden Educational Center

Published by

PRODUCT APPLICATIONS DEPARTMENT
FRIDEN EDUCATIONAL CENTER - 31 PRINCE STREET
ROCHESTER, NEW YORK

H. J. LINDSAY - TRAINING DIRECTOR

Composition for this manual was set on the Justewriter® automatic tape-operated, copysetting machine. Headings were composed on the Typro®, cold type photo-composing machine. Justewriter and Typro are products of

FRIDEN, INC.

© COLLECTADATA - JUSTOWRITER - TYPRO
Registered Trademarks of Friden, Inc.

Technical Manual for

Collectadata[®] 30 System

FOREWORD

Data collection and communications are two principle management tools essential to the profitable control of any business. And it is through the intelligent use of these tools that management problems become simplified and more effectively solved.

Obviously, there is no standard communications program that will fit all business needs . . . requirements and conditions of each company differ widely. Therefore, each business must establish its own Data Collection System: One that is capable of giving them the maximum benefits to be derived. To do this, each firm must fit the system to its own needs by proper planning.

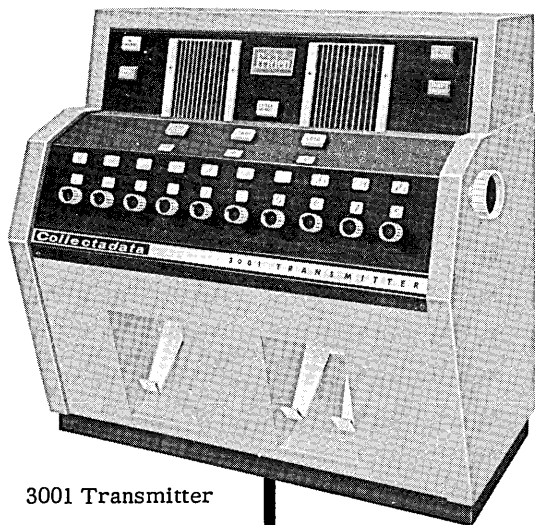
To assist all companies in this search (for the particular combination of data collection and data processing tools best suited to their own needs, and to combine these into a single, coordinated system), Friden, Inc., has engineered the Collectadata 30 System . . . the equipment and techniques found most successful to do the job.

These techniques and equipment are described in this manual. They are already proving successful for all businesses . . . both large and small. Furthermore, this manual is essential to those people in industry who are responsible for an effective and successful Data Collection System.

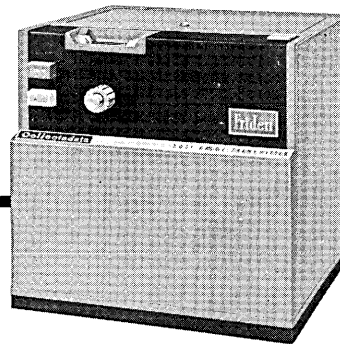
Additional assistance along these lines can be obtained, at any time, at Friden Branch offices, located in all major cities, or by contacting Friden, Inc., Rochester, New York.

TABLE OF CONTENTS

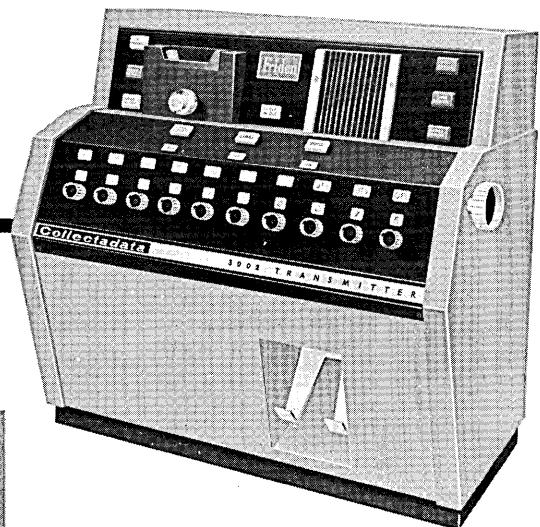
	Page
SECTION I	
Introduction	1
SECTION II	
Transmitters	3
SECTION III	
Receiver Console.	11
SECTION IV	
Badge Reader	15
SECTION V	
Control Console.	21
SECTION VI	
Attendance Recording	25
SECTION VII	
Cable Sharing System	27
SECTION VIII	
Cabling System	29
SECTION IX	
Identification Badge	33
APPENDIX	
Publications and Education	35



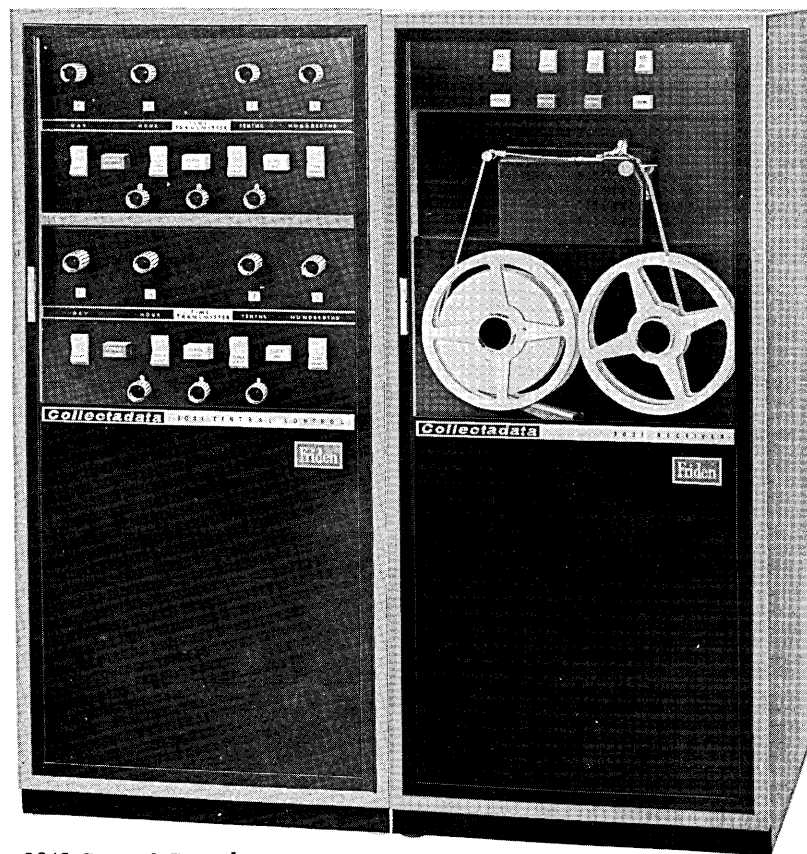
3001 Transmitter



3021 Badge Reader



3002 Transmitter



3031 Receiver Console

3042 Control Console

DATA
COLLECTION
CENTER

Friden Collectadata 30 System (typical components).

SECTION I

INTRODUCTION

SCOPE

In today's dynamic business world, management must make decisions based on facts as they happen, not a week after the event. To do this, management must process and quickly act upon vital data each day.

Manual methods of collecting data have proven too slow and inaccurate to provide the reports required of business proceedings as they occur. Thus, the role of automatic "Data Collection," as a management tool, is essential to the needs of all successful businesses.

Automatic data collection is a scientific approach to the solution of many management problems. And it has changed the whole concept of management decision making. In the past, production management decisions were based on trial-and-error methods. Today, management can be more analytical and accept the techniques of this new management tool and put it to good use.

Data collection is the key to successful data processing and the achievement of accurate results from electronic computers. Computers are merely information-processing devices. They cannot initiate any new information not contained in the original source, even though they can transform random-original data into usable information. Computers can process thousands of facts at phenomenal speeds, but the data to be processed must reach the computer in machine sensible form . . . quickly, accurately, and complete.

Automatic data collection provides an efficient method of recording the many kinds of business transactions that occur daily within a plant. These transactions are mechanically registered at the point of origin by shop personnel; transmitted to a central collection

point; recorded in machine-sensible form; and then processed into useful reports.

During the span of a very few years, application requirements in this area have grown from the rather elementary needs of simple job status reporting. They now cover the complex demands of payroll, accounting, labor distribution, time and attendance recording, plant scheduling, shop loading, and numerous other activities which relate to an integrated manufacturing control system.

The concept of data collection first evolved in the area of manufacturing operations, where transactions of diverse types occur with great frequency throughout a large plant area. Now its application extends to numerous other fields . . . anywhere a need to gather data originated at diverse points exists. Furthermore, a data collection system, when properly planned, can be self-sufficient and profitable, with or without a computer.

To satisfy industry's present-day data collection demands, Friden, Inc., engineered the "Collectadata 30 System." This second generation data collecting system not only has been designed for use today, but also for the expanding business application requirements of the future.

SYSTEMS CONCEPT

Within one system, Friden's new Collectadata 30 involves a number of transmitters distributed throughout a plant area. These are linked through transmission cables, to a centrally located control console and tape-punch receivers. This system, with its data collection center concept, can supply management with up-to-date information on plant operations at all times.

In order to do this, the Friden Collectadata 30 System has been engineered to achieve the following objectives:

Simplicity of Operation. Human engineering of the system permits anyone, with no particular aptitude for clerical functions, to record rapidly and with extreme accuracy various kinds of transactions.

Built-in Checks and Controls. Safety checks and controls reduce human error to an absolute minimum.

Speed of Operation. Operating speeds easily handle traffic demands of peak periods.

Flexibility. Modularity and flexibility are built into the system to allow a user to adapt his own specific requirements with relative ease.

Rapid Change of Programs. To transmit a completely different type of message, the operator simply turns a transaction selector.

Reliability. Design limits are well beyond the capacities required for the normal industrial application.

Time and Attendance Recording. The system is capable of efficiently handling the necessary requirements of daily attendance recording.

Economy. These goals have been met within the confines of a price structure that guarantees economy of operation in the small, as well as in the large installation.

BASIC COMPONENTS

The Collectadata 30 System consists of three basic components: Transmitters, Receivers, and a Control Console. Identification Badge Readers and Badge Transmitters are offered as optional components.

Transmitters. The basic input unit in the system is the transmitter. With this unit, shop personnel can quickly and easily record the many kinds of transactions that occur in the plant area. This is done by simply inserting tab cards which describe transactions into the

transmitter, and by entering any variable information required into dials on the transmitter's front panel.

Receiver. The Collectadata 30 System, 3031 Receiver Console is the output terminal of the system. This unit records transmissions in the Friden Systems code with an 8-channel tape punch. In addition, this console contains tape handling mechanisms, control logic, and a regulated power supply.

A number of transmitters will be served by a single receiver console.

Control Console. In the Collectadata 30 System, the central control unit is a control console which is physically located adjacent to the receiver consoles at the data collection center. It houses the following components: Central Switch Panel, Central Time Transmitter, and Standby Central Time Transmitter.

Badge Reader. 3021 Badge Readers and 3022 Badge Transmitters are offered as optional components in the Collectadata 30 System. A laminated plastic identification badge is used as input to these readers. This badge may be coded with a maximum of 10 digits of numeric information punched in the Hollerith code.

DAILY ATTENDANCE RECORDING

Efficient daily attendance recording is the primary function of the Badge Reader Station.

Automatic Program Control. To facilitate daily attendance recording, the central time transmitter may be equipped with the optional automatic program control feature.

When this feature is employed, a central time transmitter may be programmed to automatically switch a complete Collectadata system into an attendance recording mode of operation at specified time intervals during the day.

SECTION II

TRANSMITTERS

GENERAL

Transmitters are the basic input devices for the Collectadata 30 System. They are classified in two model designations:

<u>Name</u>	<u>Description</u>
3001 Transmitter	2 Tab Card Readers
3002 Transmitter	1 Tab Card Reader, 1 Badge Reader

Because the 3001 Transmitter is the basic unit for a Collectadata 30 System, it will be discussed in detail in this section. The other model merely has features added to or subtracted from the base unit to provide flexibility for any given situation.

One basic transmission requirement influenced Collectadata 30 System transmitter design . . . conservation of transmission time. The transmitter has access to the transmis-

sion line only for the period of time actually needed to transmit the required data. All operator functions, such as card insertion and the entry of variable data, occur prior to the time that access to the transmission line has been obtained.

MANUAL CONTROLS

There are three sets of manual controls provided on all Collectadata 30 System Transmitters: variable entry dials, semi-variable entry dials, and a transaction selector. In addition, there is a CARD EJECT, a VOID, and a START switch.

Variable Entry Dials. These 10 dials enable an operator to enter a maximum of 10-digits of variable information. Each dial has 12 positions, representing 10 numerals, a symbol, and a blank. The symbol position can be altered to transmit a space code (5) or a dash code (7).

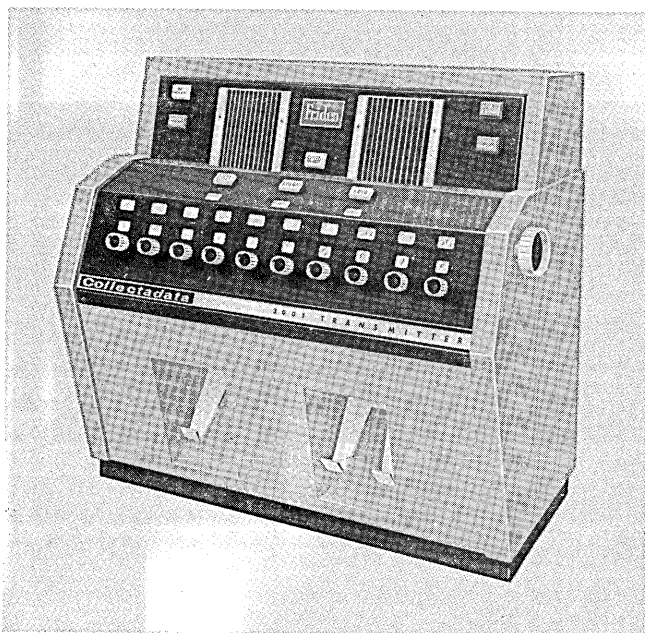


Figure 1. 3001 Transmitter.

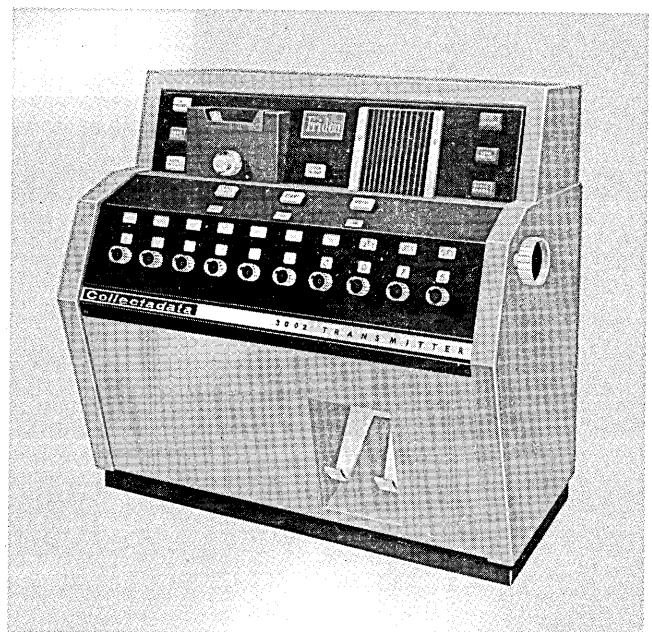


Figure 2. 3002 Transmitter.

Normally there is no readout or transmission from a dial set to the blank position. However, the system may be altered through terminal board wiring to cause transmission of a space code (5) from a dial set to the blank position.

Upon completion of a transmission, the 10 dials will automatically reset to the blank position. This eliminates the possibility of inheriting information from a previous transmission. If desired, individual dials may be modified not to reset.

Variable entry dials may be divided into fields and labeled on the transaction selector bar. (See Figure 4.)

Semi-Variable Entry Dials. For constant information and station identification, there are eight additional dials mounted inside the transmitter. Access to these dials is obtained by lifting a hinged cover plate. The same 12 positions are provided on these dials as on the variable dials. The semi-variable entry dials DO NOT reset at the completion of a transmission.

Transaction Selector. The transaction selector enables an operator to manually select one of seven transaction programs. It includes a series of 13 display windows and a selector knob. Ten display windows are located above the variable entry dial windows, one beneath each of the two card readers, and one below the START switch.

These windows provide operating instructions for each transaction simply by rotating the selector knob, forward or reverse, until the desired transaction is pictured in the window, directly beneath the START switch. When the desired transaction is selected, the windows above each of the variable entry dials will indicate the information that is to be entered into the dials for the particular transaction selected. The windows below each of the card readers will indicate the type of card that should be inserted into the reader for the transaction. Access to the transaction selector bar is achieved by removing a metal cover plate. Once the plate is removed, pressure sensitive paper tabs may be placed on the flat surfaces of the seven-sided bar. (See figure 4.)

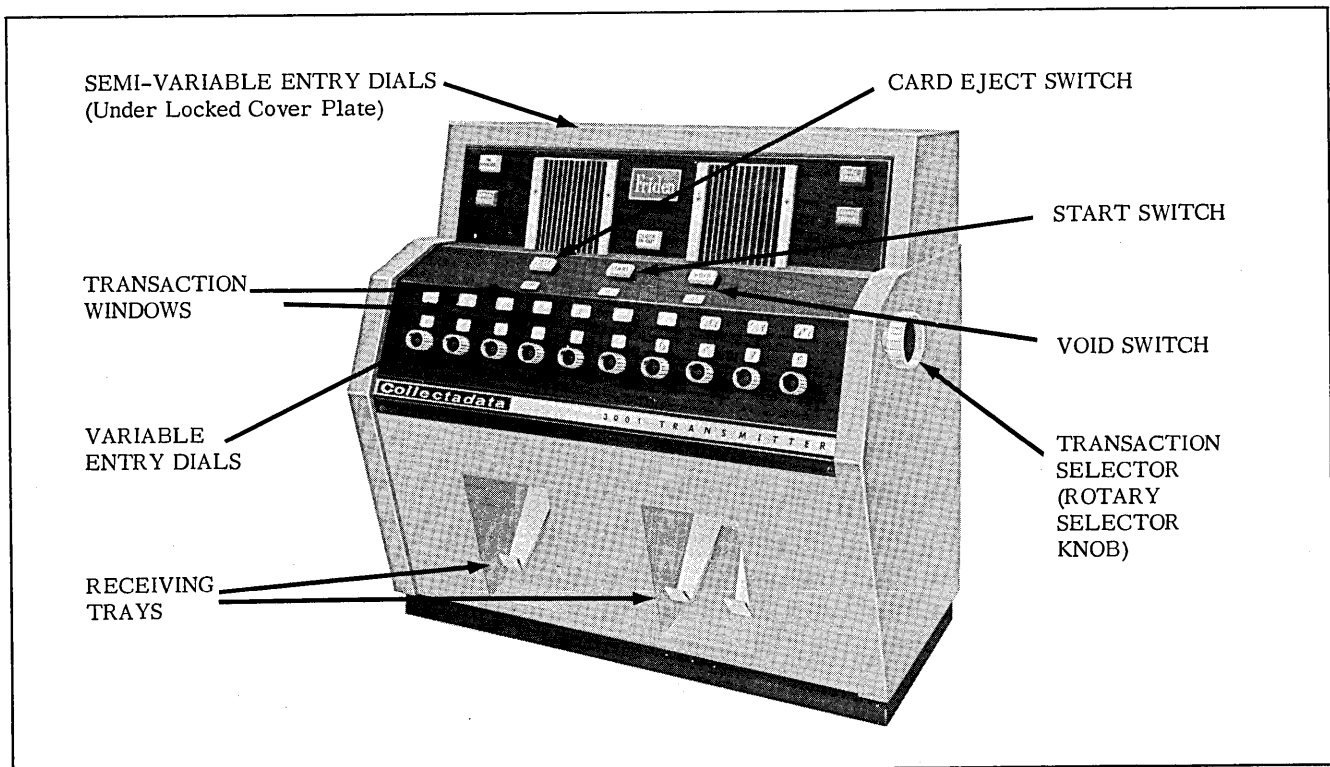


Figure 3. Collectadata 30 System Transmitter, Basic Features.

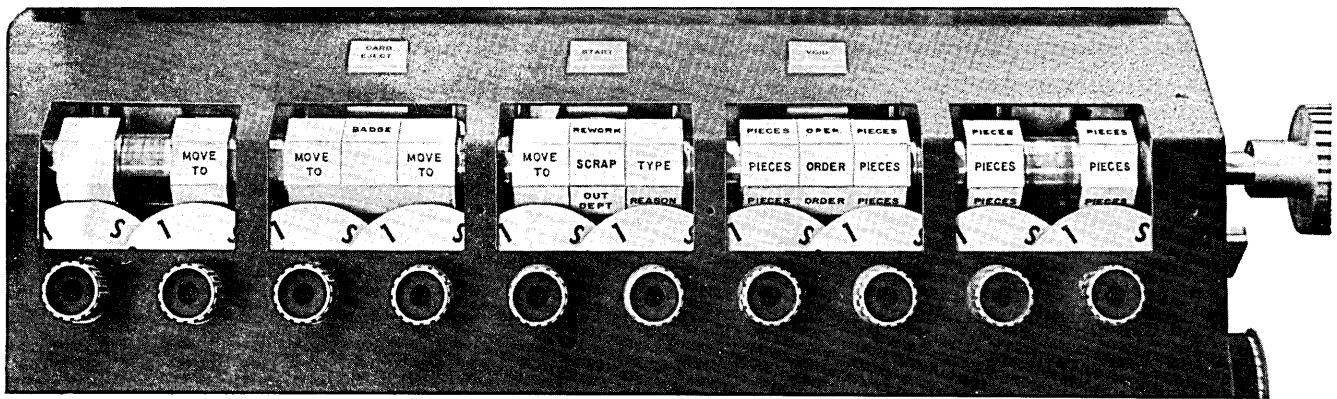


Figure 4. Transaction Selector Bar, Cover Plate Removed.

START Switch. This is a self-restoring switch which, when operated, causes the transmission procedure to start. The position of the transaction selector described above will determine which transaction program will begin when the START switch is operated.

CARD EJECT Switch. When operated, this self-restoring switch causes any cards that are in the dual readers to be ejected into the receiving tray below. And the variable entry dials are reset to the blank position.

The switch is used when certain error conditions occur, or when, for some reason, the operator wants to clear the transmitter.

VOID Switch. The VOID switch is a self-restoring panel switch. Its purpose is to enable an operator to correct an erroneous transmission by voiding the message. There is a direct relationship between the VOID switch and its functions, and the transaction codes as follows:

The first code transmitted in every Collectadata transmission is a transaction code. Its function is to identify the type of transaction. The transmission of this code is fully described under Machine Functions, step 5, page 8.

Following the transaction code, a 5 (space) code is normally transmitted. This space code identifies the transaction as a normal one.

If the VOID switch is operated during a transmission, a 7 (dash) code will be transmitted instead of the space code. This 7 code serves to indicate that the transaction is to void a previous message.

If an operator realizes that a transaction was made in error (example, wrong quantity set in variable entry dials), the following corrective routine can be followed:

1. The previous transmission should be repeated, including the error. However, during the repeat transmission, the VOID switch should be activated. As a result, the output tape punched at the 3031 Receiver Console will contain two records which are identical, except that the first contains a 5 code. During subsequent processing, the second record can be made to cancel the first.
2. The operator should then make a third transmission containing correct information. This record will be processed in the normal fashion.

Power Switch. The power switch is located beneath the hinged cover plate along with the semi-variable entry dials. Its function is to turn the power on or off in the transmitter.

INPUT MEDIA

Standard tab cards, coded with the Hollerith code, serve as input to all Collectadata 30

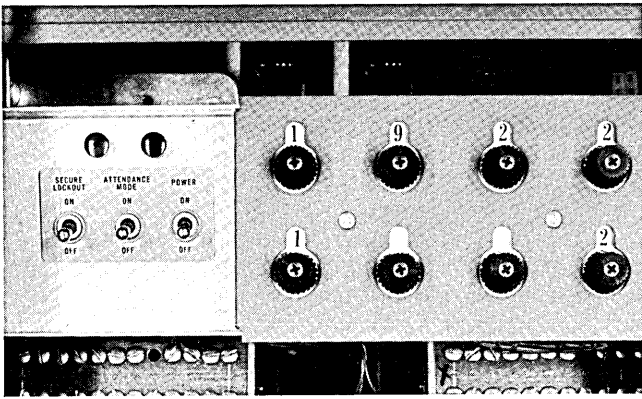


Figure 5. Semi-Variable Entry Dials - Supervisory Controls.

System transmitters. The system will accept the conventional 80-column card, as well as intermediate stub card sizes.

Depending on the model desired, the input can be combinations of: One or two tab cards and one laminated plastic badge read simultaneously.

Input Format. The following control punches are required in the input cards:

1. Card Code - Column one of each input card must be punched with either a 12,

0, 1, or 2 punch. This punch serves as a card code to identify the types of cards.

2. End Data Code - A 3, 8 code (end data) must be the last code punched in every input card. It should be punched in the column immediately following the last column assigned to data punching.
3. Transfer Code - A 5, 8 code is the transfer code. It should be punched into an input card at the exact point, in the transmission, where it is required that the information stored in the variable entry dials be read out and transmitted.

Code Language. With the exception of the end data code (3, 8); transfer code (5, 8); an 11, 3, 8 code (which is reserved for readout of the 3021 Badge Reader Station); and the 2, 8 code (that is reserved for any extra function), the Hollerith equivalent of all 65 codes in the Friden Systems code may be freely used in the input cards. They all will be transmitted to the 3031 Receiver Console where they will punch their Friden Systems code equivalents into the output tape.

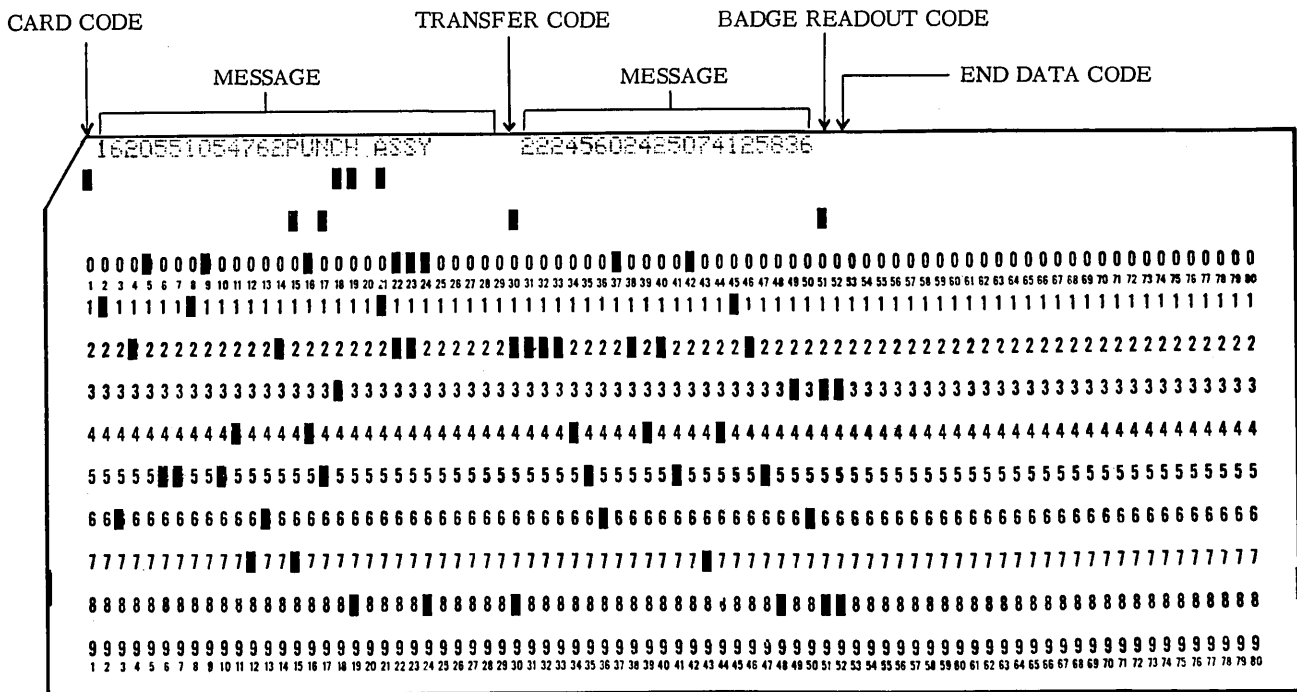


Figure 6. Typical Punched Card Illustrating Input Format.

OPERATOR FUNCTIONS

In order to transmit a transaction on the 3001 Transmitter, an operator must perform the following steps in sequence:

1. Rotate the transaction selector to select the desired transaction.
2. Select the input card or cards required for the transaction and insert them into the proper readers.
3. Enter into the variable entry dials the information required for the transaction.
4. Operate the START switch.

When the START switch is activated, the system will begin the transmission program for the transaction selected providing all the requirements have been met.

MACHINE FUNCTIONS

The sequence of machine functions that occur at the transmitter after the START switch has been operated, are as follows:

1. The first transmitter function checks the variable entry dials to determine if the proper dials have been loaded with data, and to see if the dials not being used for the selected transaction are blank. This check is based on the following logic:

The 10 variable entry dials are looked upon as being divided into several fields (five maximum). A typical field configuration might be:

Dial 1-5 Quantity (field 1)

Dial 6-8 Machine Code (field 2)

Dial 9 Shortage Code (field 3)

Dial 10 Scrap Code (field 4)

These fields may be of any length as long as they do not overlap one another.

Any combination of fields may be used for a given transaction.

Field assignment for a particular transmitter, and determination of field set-ups for each transaction will be determined by terminal block wiring.

If a transaction is selected which calls for fields 1, 3, and 5 to be used, two systems checks will be made. The system will check to determine that the dials which make up fields 1, 3, and 5 are not set at the blank position, and that all other dials are set at blank.

The program will stop if a dial error has been detected. An alarm buzzer will sound and a red light, labeled DIAL ERROR, will glow.

To correct the error, the proper dials must be adjusted and the START switch must be operated again. Upon operation of this switch, the program will proceed once more, provided the check is now satisfied.

2. At this point, the system will examine the punching in card column 1 of the input cards. This is done to determine if the proper card or cards have been employed for the transaction selected. It further will check the cards for proper registration in the readers.

Since column 1 of each input card must contain either a 12, 0, 1, or 2 code (card code), each transaction program is assigned a particular card code set-up, through terminal block wiring. A given transaction might call for a 12 punch in reader one and no card in reader two; another might call for a 0 punch in reader one and a 2 punch in reader two.

Note: If a single card transmission is called for, the card must be in reader one.

The card check will detect several types of errors: It will detect the fact that a card has been improperly inserted (upside-down or backwards). It will detect the fact that the wrong type card has been inserted in a given reader. It also will detect the fact that the operator failed to insert a card in a given reader, or that he inserted a card in reader two when the transaction called for a single card transmission.

If any of the above errors are detected, the program will stop. The alarm buzzer will sound and a red light, labeled CARD ERROR, will glow. To correct the error, the operator must depress the CARD EJECT switch on the transmitter, thereby, causing the input cards to be ejected and the variable entry dials to reset to the blank position. The operator must then repeat the complete set-up and transmission procedure, using the correct input card set-up.

3. When the dial and card checks have been satisfied, the system will request access to the transmission line. A white light labeled IN PROCESS will glow as the request is made.
4. Once the request has been made, the system will remain idle until the Collectadata cable sharing system grants the transmitter access to the line. If the line happens to be free at the time the request is made, access to the line will be granted immediately.
5. At this time the transmitter will then begin the transmission of the complete transaction, according to the following sequence:

The first code transmitted will be a transaction code and the following transaction codes will be employed:

Transaction 1	2,4,5
Transaction 2	2,4,7

Transaction 3	2,4,6
Transaction 4	1,3,4,5,6
Transaction 5	1,3,4,6,7
Transaction 6	1,3,4,5,7
Transaction 7	2,4,5,6,7

Following the transaction code, a space code (5) is transmitted to identify the transaction as a normal one. In the event that the VOID switch is operated during the transmission, a dash code (7) will replace the space code to identify the fact that the transaction voids the previous one. (See VOID Switch, page 5.)

The data stored in the semi-variable entry dials will be read out and transmitted to the receiver.

Note: It is possible to regulate the length of readout of the semi-variable entry dials to less than eight digits. This is accomplished by setting that dial, at which the readout is to terminate, to the blank position. When this dial (set at the blank position) is sensed, the dial readout will terminate and the next step in the program will start.

The card in reader one will be read and the data transmitted. However, when the end data code is sensed, it will NOT be transmitted if the transaction calls for a two-card transmission. But reading will switch to the second card.

The second card will be read next and transmitted. This time upon sensing the end-data code, reading will stop.

The input cards will not be immediately ejected upon reading the end data codes. Rather, the cards will be held in the readers until a signal has been received from the receiver console. This will indicate that the transaction has been recorded correctly, and that

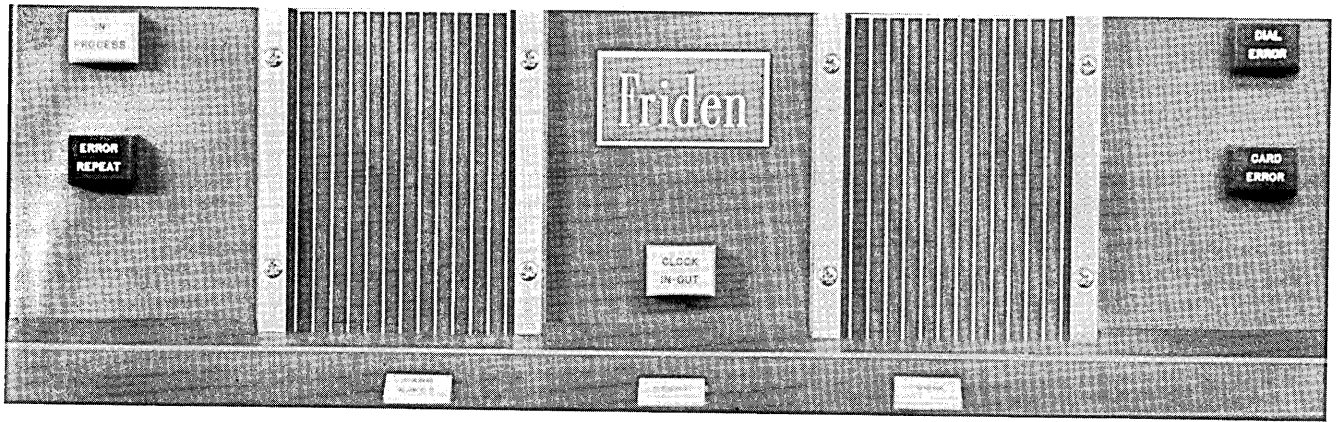


Figure 7. Dual Readers and Panel Lights 3001 Transmitter.

the time transmitter, if one is employed, has completed its readout. When this signal is received, both cards will be ejected and the IN PROCESS light will go out. The variable entry dials will then reset to the blank position. This completes the transmission program.

If during card reading, a transfer code is read in either reader, reading will stop. At this point data stored in the variable entry dials will be read out and transmitted. Upon completion of the dial read out, card reading will resume.

Note: The transmitter may be modified through terminal block wiring, to suppress the transfer code when read in a given reader.

At any time during transmission an error signal may be received from the receiver console. The error may be a parity violation, a length-of-message error, a tape safety check, or a power failure. When this signal is received, the transmitter will immediately lose access to the transmission line. The alarm buzzer will sound, and a red light, labeled ERROR REPEAT, will glow. Under this condition the operator must depress the CARD EJECT switch. The alarm will then stop, the error light will go out, variable dials will reset, and any cards in the reader will be ejected.

ADDITIONAL CONTROL FEATURE

A secure lockout feature makes it possible to restrict the use of specific transactions on Collectadata 30 System transmitters to authorized personnel only.

Secure Lockout. When this feature is employed, a toggle switch (labeled SECURE LOCKOUT ON/OFF) is mounted beneath the locked hinged cover plate, along with the semi-variable entry dials, power switch, and other supervisory controls.

If the secure lockout switch is in the OFF position, any of the seven transactions on the transmitter may be freely used.

When the switch is in the ON position, certain transactions (designated by terminal block wiring) will be disabled. If the operator selects a disabled transaction with the transaction selector, operation of the START switch will cause no action.

Any number of the seven transactions may be put under secure lockout. However, the groups which are put under secure lockout must include transaction 7 and those immediately adjacent to it. An example of those groupings that can be put under secure lockout are: 7, 67, 567 and 4567. The following groupings, on the other hand, cannot: 12, 17, 124, and 467.

COLLECTADATA 30 INPUT CODING	INPUT STANDARD TABULATING CARD PUNCHING POSITIONS										FRIDEN SYSTEMS CODE							COLLECTADATA 30 OUTPUT CODING						
	12	11	0	1	2	3	4	5	6	7	8	9	8	7	6	5	4		FEED	3	2	1		
0																								
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
A																								
B																								
C																								
D																								
E																								
F																								
G																								
H																								
I																								
J																								
K																								
L																								
M																								
N																								
O																								
P																								
Q																								
R																								
S																								
T																								
U																								
V																								
W																								
X																								
Y																								
Z																								
SPACE																								
-																								
/																								
END DATA CODE																								
BADGE R/O CODE																								
'																								
.																								
&																								
AUX. FUNCTION																								
TRANSFER CODE																								
*CARD CODES																								

NOTE: Blank positions not normally used in data collection transmissions, but may be employed if Flexwriter function codes are required.

Figure 8. Collectadata 30 System Coding Format.

SECTION III

RECEIVER CONSOLE

GENERAL

The receiver console is the output terminal of a Collectadata 30 System. Each transmission line passes through a central control and terminates at a 3031 Receiver Console. This console contains a tape punch which records transmissions in the 8-channel Friden Systems code. In addition, it houses tape handling mechanisms, control logic, and a regulated power supply. The regulated power supply furnishes power to the receiver and to all the transmitters which share its transmission cable.

Under normal conditions, a number of transmitters will be served by a single 3031 Receiver Console. These transmitters will share a transmission cable which terminates at the receiver console. The number of transmitters that can share a transmission cable is 20.

MANUAL CONTROLS

The Collectadata 30 System receiver console has a control panel displaying four manually operated switches and their four associated display lights.

Power Switch. This latching type panel switch is used to turn on or off the power supply and motor of the 3031 Receiver Console.

Receive Switch. The receive switch also is a latching type panel switch used to put the console in a condition to receive transmissions. When the switch is in the OFF position, NO transmissions can occur. When it is operated, the console is in "receive mode" and transmissions can commence.

Note: If an operator should restore the receive switch while a message is being received, the 3031 Receiver Console will remain in the receive mode until the message is complete.

TAPE FEED Switch. This switch is a self-restoring panel switch. Upon operation, it will cause a cancel code (1, 2, 3, 4, 7) to punch into the output tape. Following the cancel code, continuous delete codes (1, 2, 3, 4, 5, 6, 7) will punch into the tape as long as the switch is held operated.

If the TAPE FEED switch is operated when the receiver is in a receiving mode, the tape-feed operation will not function.

RESET Switch. This self-restoring switch is operated to clear certain error conditions. (See Checking System, page 13.)

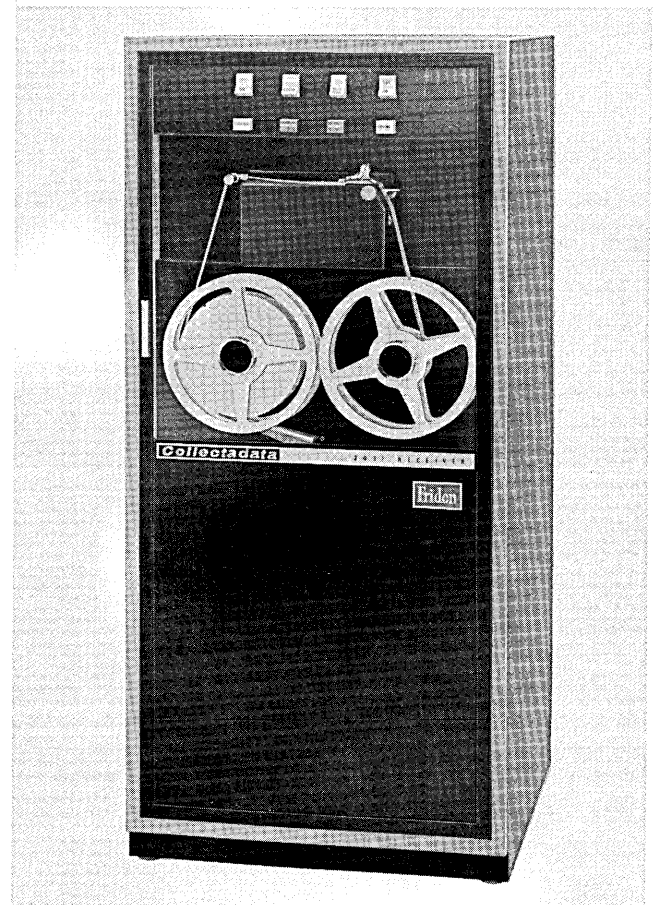


Figure 9. 3031 Receiver Console.

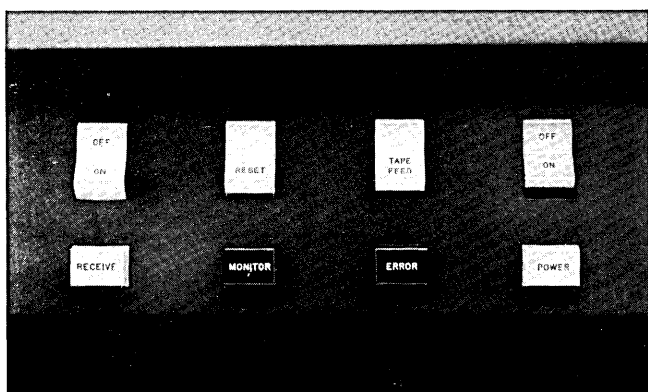


Figure 10. Receiver Console Controls.

DISPLAY LIGHTS

A series of four (4) display lights that have specific functions aid in the correct operation of the 3031 Receiver Console. These lights, which are located adjacent to each of the control switches described above, are as follows:

Power. A white light, adjacent to the power switch, will glow when the power is ON.

Receive. A white light, adjacent to the receive switch, will glow whenever the 3031 Receiver Console is in the receive mode.

Error. A red light, adjacent to the TAPE FEED switch, will glow when certain error conditions occur which require operation of the TAPE FEED switch. An alarm buzzer will sound when this light is on. These error conditions are described in subsequent sections of this manual.

Monitor. A red light, adjacent to the RESET switch, will glow whenever a transmission error has occurred.

CONTROL COMPONENTS

The 3031 Receiver Console has four major control components. These are:

Tape Punch. The tape punch, employed in the 3031 Receiver Console, is an 8-channel punch. It has a punching speed of 30 codes per second.

Code Language. Output tape produced at the receiver is coded according to the Friden Systems code. The 65 basic combinations of this code can be punched into the tape. Of these, the following have functional assignments:

2,4,5	Transaction Code 1
2,4,7	Transaction Code 2
2,4,6	Transaction Code 3
1,3,4,5,6	Transaction Code 4
1,3,4,6,7	Transaction Code 5
1,3,4,5,7	Transaction Code 6
2,4,5,6,7	Transaction Code 7
1,3,4	Transaction Code, Badge Reader
1,2,3,4,5	Change of Time
1,2,3,4,7	Cancel Code
8	End of Message

Tape Handling Mechanisms. A tape supply and tape rewind magazine are incorporated in the receiver. Both are designed to hold a standard 8-inch roll of tape.

Cable Connector. The receiver console contains a cable connector that is used to connect it to the central control unit.

SEQUENCE OF OPERATIONS

Set-up Procedure. A specific sequence of operator functions is required to put a 3031 Receiver Console into the receive mode. They are as follows:

1. Turn on power switch. This will cause the white light adjacent to the power switch to glow. At the same time, the red light, adjacent to the TAPE FEED switch, will glow and the alarm buzzer will sound.
2. Operate the TAPE FEED switch. The red light will go out and the alarm will stop. The first code punched when the TAPE FEED switch is operated will be a cancel code. Following it, normal delete codes will punch.
3. Place the receive switch in its operated position. The white light associated with the receive switch will glow and transmissions can begin immediately.

Message Reception. The sequence of system functions that occur during the reception of a normal message are:

1. The first code transmitted to the 3031 Receiver Console will always be a transaction code. This code may be one of the seven normal transaction codes or a badge reader transaction code. When the transaction code is received, it not only is punched into the output tape, but also is used to set up a length-of-message check. This length-of-message check operates in the following manner:

The length of message is determined on a "modulus-four" basis. The total number of digits in a message (including the transaction code, space code, semi-variable entry dials, body, variable entry dials, badge and time), is divided by four. After dividing, the remainder is termed the "check digit." For example, the check digit in a 37-digit message is 1. Thus there are four possible check digit values: 0, 1, 2, and 3.

Through terminal block wiring, each of the eight valid transaction codes is assigned to one of the four check digit values, depending on the length of its associated message. As the message is punched, the system will count each punch cycle in such a fashion that the count proceeds: 1, 2, 3, 0, 1, 2, 3, 0, 1, 2, 3, 0 etc. At the end of the message, the count should be at the same value as the assigned check digit.

2. Following the transaction code, the body of the message will be received and punched into the output tape.
3. At the conclusion of the message, a signal will be received from the transmitter indicating end of message.
4. If a central time transmitter is employed at this time, the receiver will request a time readout indicating end of message.
5. The time readout will consist of five digits: day (1), hours (2), tenths (1),

hundredths (1). The operation of the central time transmitter will be fully described in Section V, Control Console, page 22.

6. Immediately upon reception of the end-of-message signal from the transmitter, the system will check to determine that the message length is correct. This is done after punching the time, or in cases where no central time transmitter is employed. This check follows the logic outlined above in step 1.

If the length of message is correct, an end-of-message code (8) will be punched in the tape. And a signal will be sent to the transmitter indicating that the message has been recorded correctly. At this point, the punch can immediately start receiving the next message.

CHECKING SYSTEM

The 3031 Receiver Console incorporates an extensive checking system to insure that the output tape is complete and accurate.

Transmission Errors. The 3031 Receiver Console monitors transmissions to detect several types of errors. If a transmission error is detected, the red MONITOR light will immediately glow. At the same time, a cancel code will be punched into the output tape. Error detection also will cause the transmitter involved to immediately lose access to the transmission line. An error repeat signal will be displayed at the transmitter indicating that a re-transmission must be made.

Once the cancel code has been punched, the receiver will be free to receive a new message from any of the transmitters which share its cable. The MONITOR light, however, will continue to glow. This light is merely an indication to the operator that a transmission error has occurred. The operator can shut the light off by depressing the RESET switch adjacent to it. By occasionally monitoring the light, the operator will be able to detect repetitive or frequent errors which may necessitate servicing a component in the Collectadata system.

The various kinds of transmission errors which can be detected are:

Parity Errors - Receiver consoles monitor each code punched in output tape to assure that they do not violate the odd-count parity requirements of the Friden Systems code. If a code is punched with an even number of holes, a transmission error will occur and events described in Transmission Errors, page 13 will take place.

Length-of-Message Error - The receiver console checks the length of punched messages as described in Message Reception, step 6, page 13. If this check indicates that the length of the punched message is incorrect, a transmission error will occur. The sequence of events described in Transmission Errors will take place.

Incomplete Transmission - Once a transmission has started, the receiver console will require that it be completed within 10 seconds. If through a mechanical failure a transmitter should stop before completing its transmission, the receiver will (after 10 seconds has elapsed since the start of the transmission), register a transmission error. The events described in Transmission Errors will occur.

Interruption of Transmission. If during a transmission, the operator of the transmitter should for any reason operate the CARD EJECT switch, or if there should be an interruption of power at the transmitter, the situation will be detected at the receiver and a cancel code will be punched. However, this is not regarded by the receiver as a transmission error.

Low Tape Supply. When the tape supply at the receiver console reaches a critical level, the ERROR light, adjacent to the TAPE FEED switch, will glow and the alarm buzzer will sound. This will not interrupt operation of the system, and the RECEIVE light will still glow. When this occurs, the following steps should be taken:

Restore the receive switch to its normal position, taking it out of the receive mode. If a message is in progress at this time, the unit will remain in the receive mode until

the message is complete. The white light, adjacent to the receive switch, will then go out.

Operate the TAPE FEED switch and tear off the tape for removal.

Load the new tape supply in the prescribed fashion. Operate the receive switch to put the unit back into the receive mode.

Safety Checks. If the punch should fail to operate because of undue tape tension, tape runout, or an open hold-down arm, the red light, associated with the TAPE FEED switch, will glow and the alarm buzzer will sound. The white RECEIVE light also will go out. If a transmission is in progress when the above occurs, the transmitter will lose access to the transmission line. And a ERROR REPEAT signal will be displayed at the transmitter indicating that a re-transmission must be made. Furthermore, the system will prevent any further transmissions from occurring until the following corrective steps are taken:

Restore the receive switch to its normal position, and remedy the problem which has caused the error condition.

Operate the TAPE FEED switch. This will cause the ERROR light to go out and the alarm to stop. Since the first code of a tape series is a cancel code, any message that was in progress at the time will be cancelled in the output tape.

Power Failure. If a power failure should occur at the receiver console, the white POWER light will go out and any transmission that is in progress will stop. An ERROR REPEAT light will go on at the transmitter involved.

When power is resumed (whether or not a transmission was in progress at the time of failure), the ERROR light will glow and the alarm will sound. The following corrective steps should then be taken:

Restore the receive switch to normal.

Operate the TAPE FEED switch. The cancel code punched prior to the delete codes will cancel any message in the output tape that was interrupted by the power failure. The alarm will stop, the light will go out.

Depress the receive switch to put the system back into the receive mode.

SECTION IV

BADGE READER

GENERAL

Three badge reader versions are offered as optional components in the Collectadata 30 System. The model designations for badge readers are as follows:

<u>Model</u>	<u>Description</u>
3021 Badge Reader	Badge Reader, Auxiliary Unit
3022 Badge Transmitter	Badge Transmitter, Independent Unit
3002 Transmitter	1 Tab Card Reader, 1 Badge Reader

The 3021 Badge Reader unit is cable-connected to the 3001 Transmitter. It may be employed for data collection transmissions in conjunction with the card readers, or as an independent attendance transmitter.

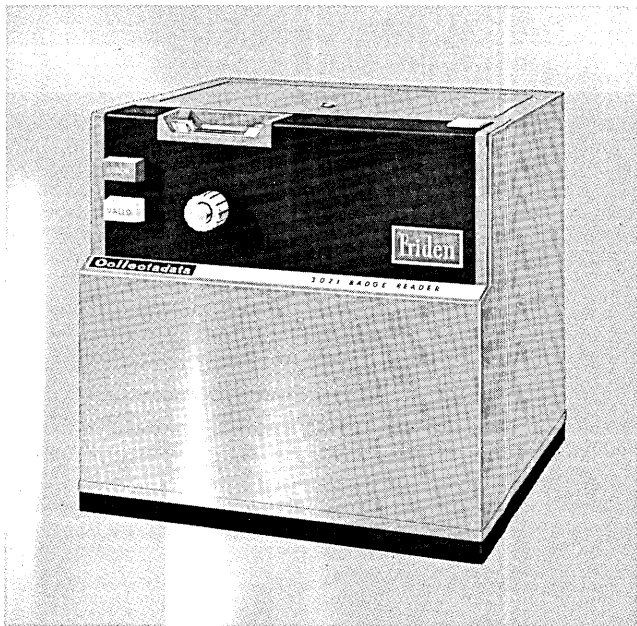


Figure 11. 3021 Badge Reader.

The 3022 Badge Transmitter is a completely independent attendance transmitter used for daily attendance recording.

The 3002 Transmitter contains a badge and card reader, rather than dual card readers, as provided on the 3001 Transmitter. The badge reader may be used as an attendance transmitter or for data collection transmissions in conjunction with the card reader.

All units operate on a code storage principle. When the badge reader is used for attendance recording, the employee momentarily inserts his identification badge into a slot provided for the purpose and then removes it. The punched information in the badge will be stored in the reader and will be released at the time the system calls for it.

Input. A laminated plastic identification badge is used as input to all badge readers. This badge may be coded with a maximum of 10-digits of numeric information punched in the Hollerith code. (See Section IX, Identification Badge.)

Indicating Lights. Two indicating lights are associated with the badge reader. They are a red light labeled ERROR and a white light labeled VALID.

Badge Release Button. A badge release button is provided on the reader. Its function is to clear error conditions described in Normal Data Collection, steps 4 and 9, page 16.

Time Display. A clock is provided as optional equipment on the 3021 Badge Reader or the 3022 Badge Transmitter. This clock will display time in hours and minutes.

3021 BADGE READER

Operating Modes. When cable-connected to the 3001 Transmitter, the 3021 Badge Reader may be used in two operating modes: for nor-

mal data collection transmissions, or for attendance recording.

To facilitate this, a switch labeled ATTENDANCE MODE ON/OFF is provided on the 3001 Transmitter for use with the cable-connected 3021 Badge Reader. When this switch is in the ON position, the badge reader will be used for attendance recording. When it is in the OFF position, the unit is used in conjunction with the transmitter for normal data collection. The switch is located beneath the hinged cover plate on the transmitter, along with other supervisory controls.

An indicating light also is provided. This light labeled CLOCK IN-OUT will glow whenever the system is in the attendance recording mode.

Normal Data Collection. When the 3021 Badge Reader is in the normal data collection mode, cable-connected to the 3001 Transmitter, the following steps are to be adhered to for its operation.

Note: In describing the operation of the 3021 Badge Reader, reference will be made to a "read-in" and "readout" cycle. The read-in cycle refers to the operation where data is read from the badge into storage elements of the reader. Whereas, the readout is the operation where the data in the storage element is actually transmitted.

1. Terminal block wiring will specify which of the seven transaction programs for a given transmitter will require the use of the 3021 Badge Reader.
2. If a given transaction program does require its use, the 3021 Badge Reader is loaded as part of the normal setup procedure, along with dial setting and card insertion.
3. The badge will be inserted in the prescribed manner. When the badge is seated in the reader, the locating pin will be unlatched and will pass through the guide hole in the badge. A read-in cycle will not immediately occur; rather, the badge will be held in place by

the locating pin until a read-in cycle occurs during the program. Therefore, the operator is prevented from removing the badge before starting the transaction program.

The white light, labeled VALID, will NOT glow immediately upon proper badge insertion, but will glow upon completion of the read-in cycle. It will remain on until the transmission is completed.

4. Should the badge be improperly inserted, it can be removed since the locating pin will not have passed through the guide hole in the badge. However, upon removal of the badge, the alarm buzzer will sound and the red light labeled ERROR will glow. The operator should then operate the release button to restore the locating pin to its normal position. This will cause the light to go out and the alarm to stop.
5. The transmission program will start in the normal fashion by operating the START switch on the 3001 Transmitter.
6. Upon operation of the START switch, the system will check to determine: that the reader is loaded (in cases where it should be), or that it is not loaded (in cases where it should not be).
7. If an error is detected when the check is made, the red light on the 3021 Badge Reader will glow and the alarm will sound.
8. If the error is caused by the fact that the reader has not been loaded, the operator can correct the problem by loading the badge and re-operating the START switch.
9. If the error is due to the fact that the badge reader has been loaded and it should not be, the operator can correct the error by removing the badge and re-operating the START switch. It will be necessary to operate the release button to restore the locating pin before the badge can be removed.

10. Once all checks are satisfied, the transmission program will proceed in the normal fashion. A read-in cycle of the 3021 Badge Reader, will occur after the badge check is satisfied. At this time, the VALID light will glow. When a badge readout code (11, 3, 8) is read in either input card, during the transmission, card reading will stop and information stored in the reader will be read out and transmitted. Upon completion of the badge readout, card reading will resume at the 3001 Transmitter.

Note: The transmitter may be modified through terminal block wiring to suppress the badge readout code when read in a given reader.

Should the readout be limited (through terminal block wiring) to less than the maximum 10 digits, card reading will resume upon transmission of the last digit.

Note: If the badge readout code is sensed in an input card during a transmission that does not require badge readout, the badge reader will not be loaded with a badge. Therefore, the badge readout code will be ignored.

11. Upon completion of the transmission program, the badge will be removed from the reader.
12. If at any time during the transmission an error repeat should occur (necessitating operation of the CARD EJECT switch on the transmitter), any storage setup in the 3021 Badge Reader will be erased, along with input card ejection and dial reset. Thus, the operator must re-load the badge before making the re-transmission. Since the badge will not have been removed from the reader at this time, it is necessary to depress the badge a fraction of an inch to re-load the reader.

Attendance Recording. The 3021 Badge Reader may be used for attendance recordings.

When the reader is in the attendance recording mode, the START switch on the 3001 Transmitter will be incapable of starting a normal transmission, and the light labeled CLOCK IN-OUT will glow.

If station identification is required as part of an attendance transmission, two semi-variable entry dials on the 3001 Transmitter may be employed for this purpose. Terminal block wiring will determine which two of the eight dials will be used. The two dials selected may also be read out, along with the remaining semi-variable entry dials, during a normal data collection transmission.

The 3021 Badge Reader can be put into the attendance recording mode in three ways:

1. The automatic program control feature described in Section VI can put the unit into an attendance recording mode automatically, at pre-determined time periods during the day.
2. A toggle switch is provided on the 3001 Transmitter. This switch (located under a locked cover plate), along with other supervisory controls, is labeled ATTENDANCE MODE ON/OFF. Supervisory personnel can operate this switch in order to manually put the badge reader into the attendance recording mode.
3. A manual switch, labeled CLOCK IN-OUT, is also provided on the 3021 Badge Reader. If an employee desires to transmit attendance when the badge reader has not been put into the attendance mode by either of the methods described above, this switch may be employed.

If the employee inserts his badge into the reader when the system is not in an attendance mode, a badge transmission will not immediately occur.

Rather, the badge will be locked in place in the reader. If the CLOCK IN-OUT switch is then operated, an attendance transmission will occur.

Operation of the 3021 Badge Reader, when in the attendance recording mode, is identical to the procedure described under General Operations, page 18.

3022 BADGE TRANSMITTER

The 3022 Badge Transmitter operates as an independent transmitter for daily attendance recording. Input for this unit is the same laminated plastic badge previously described for the 3021 Badge Reader.

Operating controls and indicating lights are basically the same as those on the 3021 Badge Reader. It does, however, employ station identification dials within the unit.

Station Identification Dials. The 3022 Badge Transmitter is equipped with two station identification dials. They are of identical design to the semi-variable entry dials on the 3001 Transmitter. Access to the dials is obtained by raising a locked cover plate located on the top of the unit.

The purpose of the dials is to allow a pre-set station identification to be read out as part of a 3022 Badge Transmitter transmission.

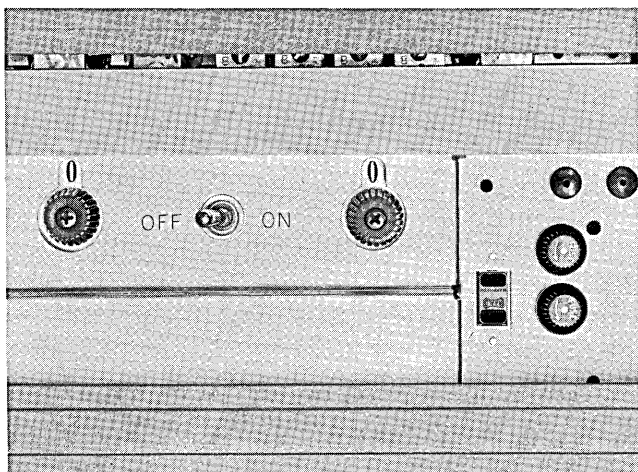


Figure 12. Station Identification Dials.

General Operations. The 3022 Badge Transmitter operates according to these prescribed steps:

1. Insert the laminated plastic badge into the prescribed slot.
2. When the badge is seated in the reader, it will cause a locating pin to unlatch.
3. If the badge has been properly inserted, the locating pin will pass through a guide hole provided in the badge. This will cause the white light, labeled VALID, to glow immediately.
4. If there is no information in the reader still awaiting readout, a read-in cycle will immediately occur. During this momentary read-in time, the badge will be held in place by the locating pin.
5. When the read-in cycle is complete, the locating pin will return to its normal position, allowing the removal of the badge. On completion of read-in, the white light will go out.
6. If the badge should be improperly inserted (upside-down or backwards), the locating pin, when unlatched, will not pass through the guide hole. As a result the white light will not glow and no read-in cycle will occur. When the badge is removed, the locating pin will remain in the unlatched position, preventing re-insertion of the badge. The ERROR light will glow and an alarm buzzer will sound.
7. To clear this error condition, operate the release button. This will restore the locating pin to its normal position, cause the alarm to stop, and the red light to go out.
8. If a badge is inserted into the reader while there is data stored in the reader still awaiting readout, the locating pin will hold the badge in the reader until the previous readout has occurred.

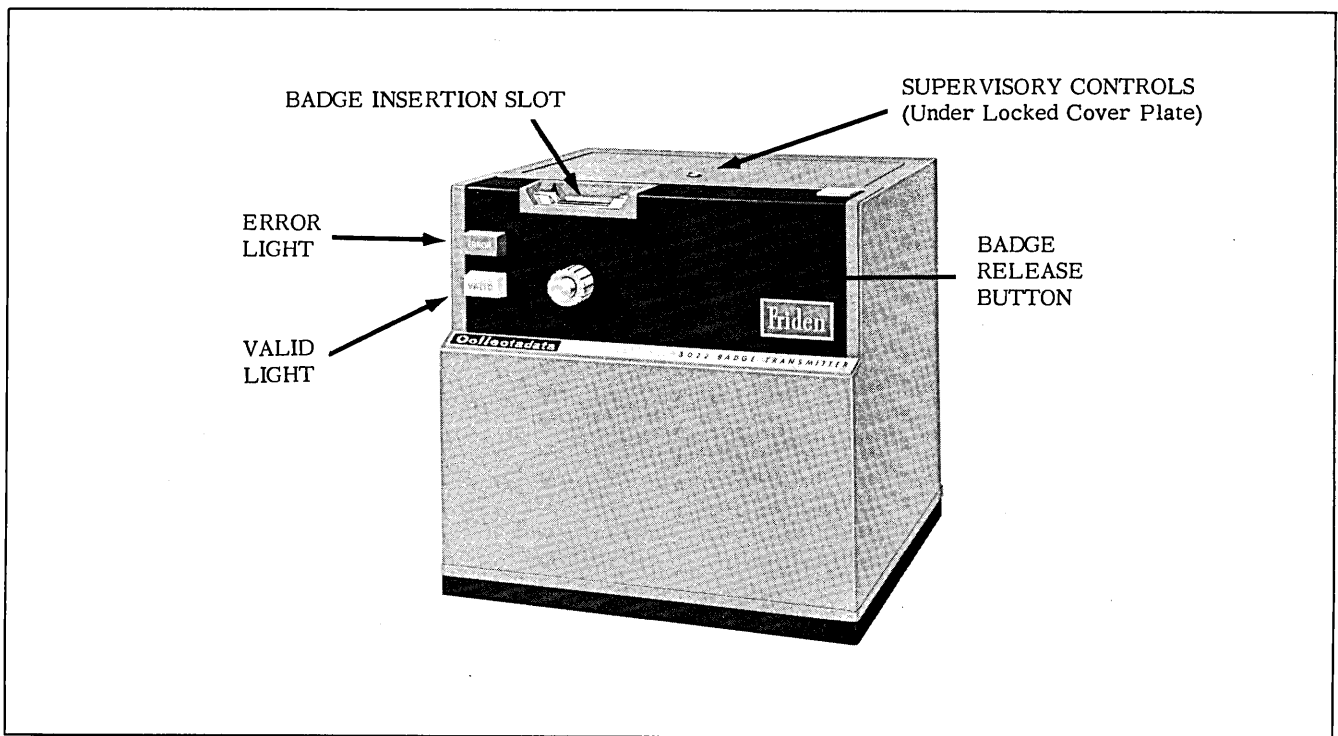


Figure 13. 3022 Badge Transmitter, Basic Features.

- During this time, the white light will be on. Once the readout has occurred, a normal read-in cycle will take place. The complete read-in cycle only takes about 1/10 of a second.
9. Upon completion of the read-in cycle, the 3022 Badge Transmitter will request access to the transmission line.
 10. 3022 Badge Transmitters will be granted access to the transmission line according to normal Collectadata priority system logic. (See Section VII, Cable Sharing System.)
 11. The first code transmitted will be a transaction code. The 3022 Badge Transmitter transaction code is a 1, 3, 4, code.
 12. Following this, the data stored in the reader will be read out and transmitted. If the badge employed in the system contains less than the maximum 10-digits of punching, it is possible, through terminal block wiring, to adjust the readout to the proper length.
 13. If badge transmitter identification is to be included as part of the attendance message, the information entered in the station identification dials may be read out at any time during the message. This will be determined by terminal block wiring.
 14. When the last digit has been transmitted, an end-of-message signal is sent to the receiver. The 3022 Badge Transmitter then immediately loses access to the transmission line. There is no wait for a signal from the receiver that the message has been properly recorded. Time and the end-of-message code will be punched into the output tape in the normal fashion.
 15. In event an error is detected at the receiver (parity violation, length of message, etc.), a cancel code will punch in normal fashion and the badge transmitter will lose access to the transmission line. The error signal will not, however, be displayed at the badge transmitter.

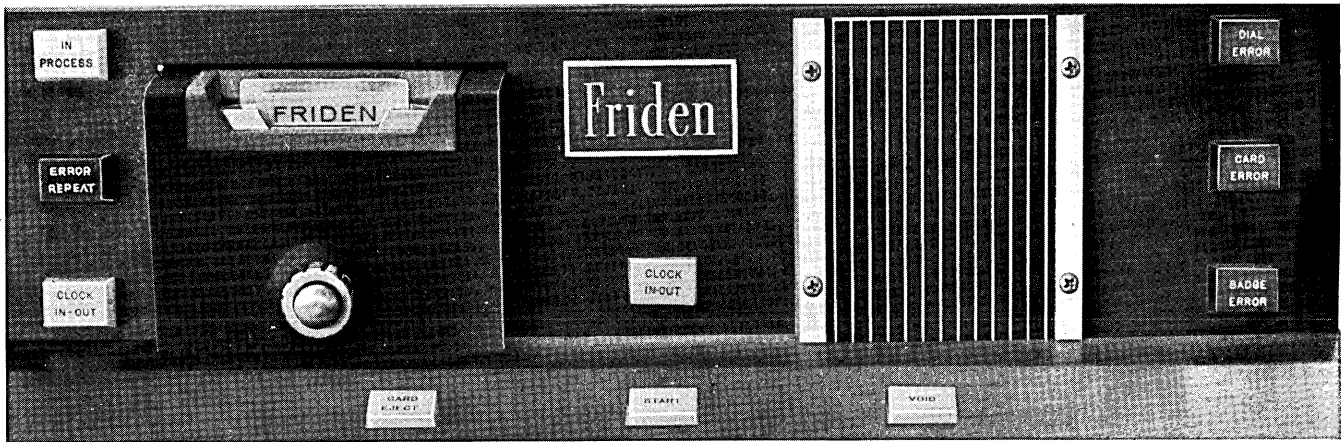


Figure 14. 3002 Transmitter Illustrating Badge Reader.

3002 TRANSMITTER

A badge reader and one tabcard reader make up the 3002 Transmitter. With the exception of a valid light the same indicating lights and controls are provided for badge reading as when it is a separate component. Two operating modes, normal data collection and attendance recording are possible. The switch described under Operating Modes may be employed to switch the system from one mode to the other.

Normal Data Collection. The use of the integrated badge reader, along with the other elements of the 3002 Transmitter, for normal data collection is the same as the method described for the cable-connected unit in normal data collection, page 16, with the following exception:

A badge readout code is not required to cause read out of the badge reader although one

may be used. Rather, the data stored in the badge reader will be read out and transmitted, either following the readout of the semi-variable entry dials or following the reading out of the input card, depending on the user's option. In other words, the transmitter may be modified through terminal block wiring so that the badge reader data can be transmitted immediately before or after the reading of the input card.

It should be noted, however, that the latter is preferable. Should the badge readout occur immediately following the readout of the semi-variable entry dials, a slight delay will occur while the serializing mechanism completes its cycle.

Attendance Recording. The use of the integrated badge reader for attendance recordings is identical to the method described for the cable-connected unit in Attendance Recording, page 17.

SECTION V

CONTROL CONSOLE

GENERAL

All transmission cables terminate at a control console. The basic model available is the 3042 Central Control. One of these units is located adjacent to the receiver consoles at the data collection center.

3042 Central Control. This unit contains a central switch panel and two central time transmitters.

Basically, the central switch panel is an arrangement of connector plugs which allows an operator to quickly connect or disconnect any of the receiver consoles in a system to any of

the transmission cables, as the need arises. This facility offers an efficient method for bringing a standby receiver into the Collectadata 30 System to replace a disabled unit with a minimum of down-time.

The primary function of the central time transmitter is to register the time of day in digital form. It transmits this registered time, upon request, to the receiver consoles in the system for punching into the output tapes.

The second or standby central time transmitter is housed in the 3042 Central Control. This secondary unit may be switched into the system immediately in the event of down-time on the primary unit.

CENTRAL SWITCH PANEL

All transmission cables employed in a Collectadata 30 System, and all receiver console cables at the data collection center, are routed to a control console. Transmission cables terminate in male connector plugs, extending from the central switch panel. Cables from each of the receiver consoles in the system terminate at the central-switch panel, in panel-mounted female connector plugs. The central switch panel has the capability to accommodate a maximum of 20-transmission lines and 22-receiver consoles.

The design of the connector plugs allows ease and speed of connection and disconnection. A sufficient amount of slack cable extends from the switch panel to allow any male plug to be connected to any panel-mounted female plug. Male connector plugs are labeled with letters of the alphabet (maximum A-T) to identify their respective transmission cables. Female connector plugs are labeled with numerals (maximum 1-22) to identify their respective receiver consoles.

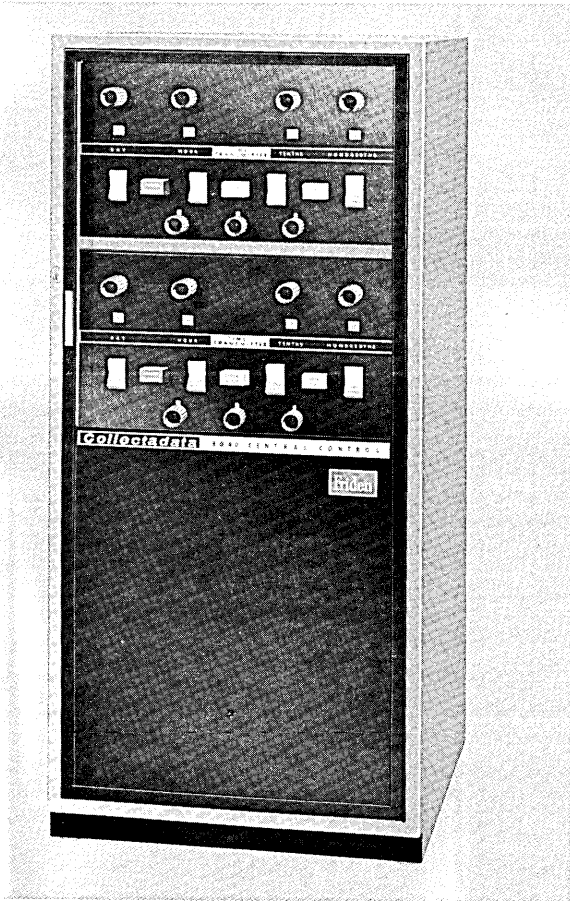


Figure 15. 3042 Central Control.

To connect a given transmission line to a receiver console involves connecting the proper male and female plugs together. Such connections can be identified by a letter-number designation such as A-1, B-19, D-12.

Operation. The following is a description of the operator steps required to switch a transmission line from one receiver console to another:

1. Shut off the receive switch on the receiver console that is to be disconnected. The white RECEIVE light will go out when the receiver console is taken out of the receive mode.
2. When the white light goes out, disconnect the male transmission line plug from the female panel-mounted plug associated with the receiver console.
3. Make sure that both power and receive switches are shut off on the replacement receiver console.
4. Connect the male transmission line plug to the panel-mounted female plug associated with the replacement receiver console.
5. Turn the power switch on the replacement receiver console to ON. The red ERROR light will glow and the buzzer will sound on the new unit. Operation of the TAPE FEED switch will clear this condition.
6. Turn on the receive switch on the replacement receiver console. The white RECEIVE light will glow and transmission can begin.

CENTRAL TIME TRANSMITTER

The chief function of the central time transmitter is to register the time of day in digital form. And to transmit the registered time, upon request, to the receiver consoles in the system for punching into the output tapes.

When this feature is employed, the cables which extend from the central control to each receiver console contain conductors from the central time transmitter, as well as transmission line conductors. Thus, there is only

one cable extending from the central control to each receiver. In those instances where two central time transmitters are housed in the 3042 Central Control, a manual two position latching switch labeled CTT1 and CTT2 is provided to determine which will be employed as a standby. The standby is synchronized with the unit in use and may be switched over at any time. All receiver consoles should be taken out of the receive mode while the switch over is made.

Functional Components. A time register, clock, and serial readout are the three functional components of the central time transmitter.

A time register is a storage device which registers the time of day in digital form. Time is stored in the form of a 5-digit number as follows:

1. The first, or high-order digit of the registered time denotes the day of the week. The numbers 1-7 are used for this purpose.
2. The second and third digits of the registered time denotes the hour of the day in continental form. The numbers 00-23 are used.
3. The fourth digit of the registered time denotes tenths of hours. Numbers 0-9 are used for this purpose.
4. The fifth digit of registered time denotes hundreds of hours. Numbers 0-9 are used for this purpose.
5. Example: The number 31820 would indicate third day, eighteenth hour, 2 tenths and no hundreds of an hour, or Tuesday 6:12 P.M.

A clock provided within the central time transmitter supplies a control signal to the time register every hundredth of an hour (36 seconds). Upon receipt of this clock signal, the value of the fifth digit of the registered time (hundredths) will be increased by one. Accordingly, the values of the tenths, hours, and days digits will advance at the proper time.

The serial readout is a device which, upon command, scans the information stored in the time register and transmits it, one digit at a

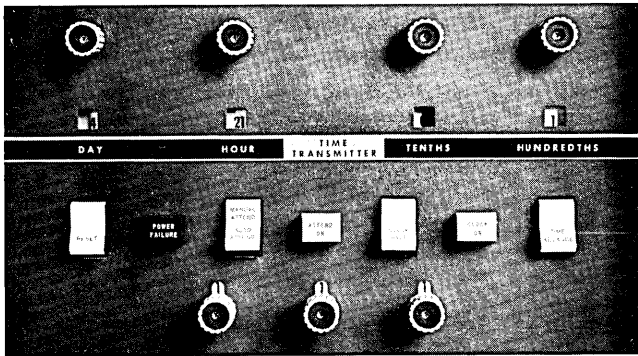


Figure 16. Central Time Transmitter.

time, to the receiver consoles. The transmission is made in the Friden Systems code at a rate of 30 codes per second.

Operator Controls and Visual Displays. Operator controls and visual displays provided on the central time transmitter are: time-display dials, dial-set knobs, TIME ADVANCE switch, CLOCK HALT switch, RESET switch, CLOCK-ON light, POWER-FAILURE light and M-day dials. A locked door on the 3042 Control Console prevents unauthorized persons from obtaining access to these controls. The following is a detailed description of their functions:

Time-Display Dials - Four display dials are provided on the central time transmitter to give a visual indication of the time stored in the time register. The four dials indicate the following:

- Dial 1 Days (7 positions)
- Dial 2 Hours (24 positions)
- Dial 3 Tenths of Hours (10 positions)
- Dial 4 Hundredths of Hours (10 positions)

Dial-set Knobs - A knob is provided with display dials 1, 2, and 3 (day, hour, and tenths). The knobs allow an operator to manually set these display dials, and consequently the registered time to any desired value.

Note: Operators should not operate the knobs unless the clock on the central time transmitter has first been halted.

TIME ADVANCE Switch - A self-restoring panel switch, labeled TIME ADVANCE is provided to manually change the value of the hundredths of hours digit. When this switch is operated, the hundredths of hours digit of

the registered time, and its associated display dial will be advanced one increment.

Halt Switch - A latching type panel switch, labeled CLOCK HALT, is provided on the central time transmitter. It enables an operator to stop the operation of the central time transmitter temporarily, while he synchronizes it with a master clock. This synchronizing operation is described under Synchronizing to a Master Clock, page 24. No power switch is provided on the central time transmitter. The unit will operate as long as the power cord is plugged into a power outlet. Should the CLOCK HALT switch be operated, the central time transmitter will not immediately stop operating. Rather, it will continue to operate until immediately before the clock is about to advance the registered time to the next hundredth of an hour. At this point, the clock mechanism will stop and all time transmission will be suspended.

When the CLOCK HALT switch is restored, the clock will immediately start operating again. It will start exactly at the beginning of its 36-second cycle. This approach facilitates synchronizing the central time transmitter with a master clock, since it gives positive assurance that the unit will start precisely on a hundredth-of-an-hour increment.

RESET Switch - A red light will glow upon resumption of power in the central time transmitter, after it has been interrupted. Operation of the self-restoring panel switch, labeled RESET, will shut off this light.

CLOCK ON - A white light provided on the central time transmitter, labeled CLOCK ON, will glow when the clock within the transmitter is running.

POWER-FAILURE Light - A red POWER-FAILURE light is provided on the central time transmitter. This light will glow whenever power within the central time transmitter is resumed after interruption. Operation of the RESET switch shuts off the light.

M-Day Dials - The central time transmitter is equipped with 3 rotary switches which will enable an operator to enter 3 digits of numeric information. These switches are similar to the semi-variable entry dials on the Collectadata 30 Transmitter. They will be employed if it is necessary to include a 3-

digit M-day (manufacturing day) as part of the time transmission.

If this option is adopted, the time transmission will consist of 7-digits of information. Three digits M-day, 2-digits hours, 1-digit tenths of hours, and 1-digit hundredths of hours.

Note: If this option is employed, the 1-digit day, which is normally stored in the time register, is available as a pluggable option. To employ this M-day feature, it is only necessary to set the three M-day dials off their blank positions to numeric positions.

Time Transmission - Sequence of Operations.

The following describes the sequence of operations that occur at the central time transmitter when time is transmitted to the receiver consoles.

1. The receiver will request a time transmission at the conclusion of each message that is received from one of its associated transmitters.
2. Upon receipt of this request, the central time transmitter will, if free to do so, immediately transmit the 5 digits of registered time to the receiver console.

If, at the time the request is made, the time stored in the time register is in the process of changing, the transmission will be delayed until the register has completed its advance to a new time.

3. If one or more receiver consoles should make a request while the central time transmitter is transmitting to a given receiver, the time will be simultaneously transmitted to all making such a request, immediately upon completion of the transmission in progress.

Power Interruption. If power in the central time transmitter should be interrupted or shut off, the fact will be detected by all of the receiver consoles associated with the unit, provided the power failure has not also affected the receiver consoles. Receiver con-

soles will react to this condition in exactly the same manner, as if a tape error had occurred.

When power is resumed in the central time transmitter, the red light will glow. This light can be shut off by operating the RESET switch.

Synchronizing to a Master Clock. It is assumed that the time stored in the central time transmitter will be initially set in synchronism with a master clock which is in view of the operator of the central control.

To accomplish this, the operator should operate the CLOCK HALT switch on the central time transmitter. The clock in the transmitter will not immediately stop, but will continue to run until immediately prior to the time that it is to send the next control signal to advance the time register. At this point, it will stop and the white light will go out. The operator should set the dials on the central time transmitter to a time somewhat in advance of the exact time, as indicated by the master clock.

Note: The dial set knobs should not be operated until the CLOCK HALT switch has been operated.

The operator must watch the master clock, and release the CLOCK HALT switch when the second hand on the master clock is exactly at the time manually set into the central time transmitter.

Immediately upon release of the CLOCK HALT switch, the clock in the central time transmitter will start. This will put the transmitter in synchronism with the master clock. Once synchronized, the central time transmitter should, barring power failure, remain synchronized. The synchronism can be periodically checked by visually comparing the point-of-time change on the display dials with the time, as shown on the master clock.

Should it be necessary to re-synchronize the system, the receive switches on all receiver consoles should be shut off to prevent transmissions from occurring while the synchronizing operation takes place. The operator should then synchronize the system in the manner described above.

SECTION VI

ATTENDANCE RECORDING

GENERAL

Daily attendance recording is extremely difficult to attain, because many people must be processed from scattered areas, in a short time. The Collectadata 30 System can provide a fast and efficient method of attendance recording.

Upon entering or leaving a plant, the employee inserts his identification badge into a badge reader with an action similar to that employed at a conventional time clock. This laminated plastic badge is not held in the reader to await transmission. It can be removed immediately, since the information punched in the badge is stored within the reader. By the time the next employee in line has inserted his badge, the information will have been transmitted and the unit will be free to receive the new badge. The speed of the system is such that several badge readers may share a transmission line with similar results.

AUTOMATIC PROGRAM CONTROL

To facilitate daily attendance recording, the Collectadata 30 System may be equipped with the Automatic Program Control feature. When this feature is employed, the central-time transmitter in a 3042 Central Control may be programmed to automatically switch a complete Collectadata 30 System into an attendance recording mode of operation, at specified time intervals. In order to equip a Collectadata 30 System with this provision, certain modifications must be made on receiver consoles, and transmitters in the system, as well as in the central control.

A maximum of four-time intervals in a (24-hour) day may be specified for attendance recording. Each interval must be at least six minutes in duration, and may not exceed 54 minutes in duration. The start and stop time for each of the attendance recording intervals must occur exactly on the tenth-

of-an-hour (0, 6, 12, 18, 24, 30, 36, 42, 48, 54 minutes).

The start and stop time for each interval is determined by adjustable cam settings in the central time transmitter of the central control unit.

MANUAL ATTEND/AUTO ATTEND Switch. This double-throw, center-off switch, is provided on the central time transmitter that is equipped with the automatic program control feature.

When the switch is in the AUTO ATTEND position, automatic program control will occur, according to the programmed time intervals.

If the switch is put in the MANUAL ATTEND position, the Collectadata 30 System will go into an attendance recording mode of operation at the beginning of the next hundredth-of-an-hour increment. The system will remain in the attendance recording mode as long as the switch remains in this position.

If the switch is put in the center-OFF position, while the system is in the attendance mode, the system will go out of the attendance mode at the next hundredth-of-an-hour increment. While the switch is in this position, the automatic program control feature will be disabled.

ATTEND ON Light. A white indicating light is provided on a central time transmitter, equipped with the automatic program control features. This light will glow whenever the system is in the attendance recording mode of operation.

Sequence of Operations. When a Collectadata 30 System is put into an attendance recording mode of operation, the following sequences of events occur:

1. At the pre-determined time when the Collectadata 30 System is to be switched

into an attendance recording mode of operation, a signal will be sent from the central time transmitter (in the central control) to all its associated receiver consoles.

2. The receiver consoles will acknowledge this signal immediately if no transmission is in progress. However, if a transmission is in progress, it will acknowledge the signal immediately upon its completion. At this time, the receiver consoles also will send a signal to their associated transmitters, indicating that the attendance recording mode is to begin. This signal will be sent at a time when no transmitters have access to the transmission line. Upon receipt of it, a white light, labeled CLOCK IN-OUT, will glow on all Collectadata 30 System Transmitters, whether associated with a badge reader or not. From this point on, the transmitter will be incapable of starting a data collection transmission.

Should a transmitter already have started a transmission program when the switch over to attendance recording occurred, the ERROR REPEAT light will glow and the alarm buzzer will sound. Operation of the transmitter CARD EJECT switch will clear this error condition.

Upon switch-over to the attendance recording mode, any badge reader which is associated with Collectadata 30 System Transmitters (3021 Badge Reader or 3002 Transmitter) will operate in an attendance recording mode, rather than in data collection mode. In other words, attendance transmissions will occur immediately upon badge insertion. (Refer to Badge Reader Section, page 18.)

Because 3022 Badge Transmitters perpetually operate in an attendance recording mode, they are not affected.

3. When the Collectadata 30 System has been completely switched into the attendance recording mode, the central

time transmitter will transmit the time to the receivers. The time will be punched into the output tapes according to the following format:

Change-of-Time Code	(1, 2, 3, 4, 5)
Time	(5 digits)
End-of-Message	(8)

4. Once the time has been punched, attendance transmissions will begin.
5. During the attendance recording mode, time is not punched at the end of each message. Instead, the time will be punched as a separate message whenever a change of time occurs. Depending on the user's option, this can be whenever a change of hundredths of hours occurs (36 sec.) or at a change of tenths of hours (6 min.).

Speed of attendance transmission is significantly increased, by not punching time at the end of each message, but rather only punching changes of time as separate messages.

6. At a pre-determined time, the central time transmitter will signal all its associated receiver consoles that the system is to be switched back to the normal data collection mode of operation. This signal will occur immediately after a change of time has been punched . . . at a time when no transmissions are in progress.
7. Receiver consoles will relay this signal to their associated transmitters, thus returning them to the data collection mode of operation.
8. If any badge readers have not completed an attendance transmission when the switch back to data collection occurs, they will be allowed to complete the transmission.

Note: Once switch back has occurred, any transmitter associated with a badge reader may be manually put into the attendance recording mode by operating the ON/OFF switch provided for that purpose.

SECTION VII

CABLE SHARING SYSTEM

GENERAL

The Collectadata 30 System has a balanced cable sharing system which justly distributes line time among transmitters in proportion to their individual traffic loads. No transmitter or group of transmitters can "lock out" any others. It is not a scanning system; therefore, no scanning wait time. A smooth flow of data is assured at all times for optimum efficiency with no extraneous equipment.

METHOD OF OPERATION

If a Collectadata 30 System transmitter is using the transmission line, no other transmitter can obtain that line until it has been relinquished by the first transmitter. A transmitter relinquishes the line after an end-of-message code is sensed and all the message checks have been completed.

While one transmitter is transmitting, a second unit may request the line. However, before the request is recognized, the proper card or cards must be inserted, the required dials must be set, and the START switch must be operated. When these steps have been properly taken, the second transmitter will automatically begin to transmit, after the first one relinquishes the line.

Note: The only time a transmitter is "on line" is when it is actually transmitting a message.

If, however, while one transmitter is on line, several other transmitters request the line, it becomes necessary to establish a logical cable sharing system to determine which will get the line next, and in what sequence the other transmitters will obtain the line. Such a logical system is inherent in the design of the Friden Collectadata 30 System as follows:

1. As soon as a given transmitter (T1) relinquishes the line, those transmitters that are closer to the data collection center, and the respective receiver, than T1, are sampled to determine if any have requested the line. If any have, the one that put in the earliest request will get the line.

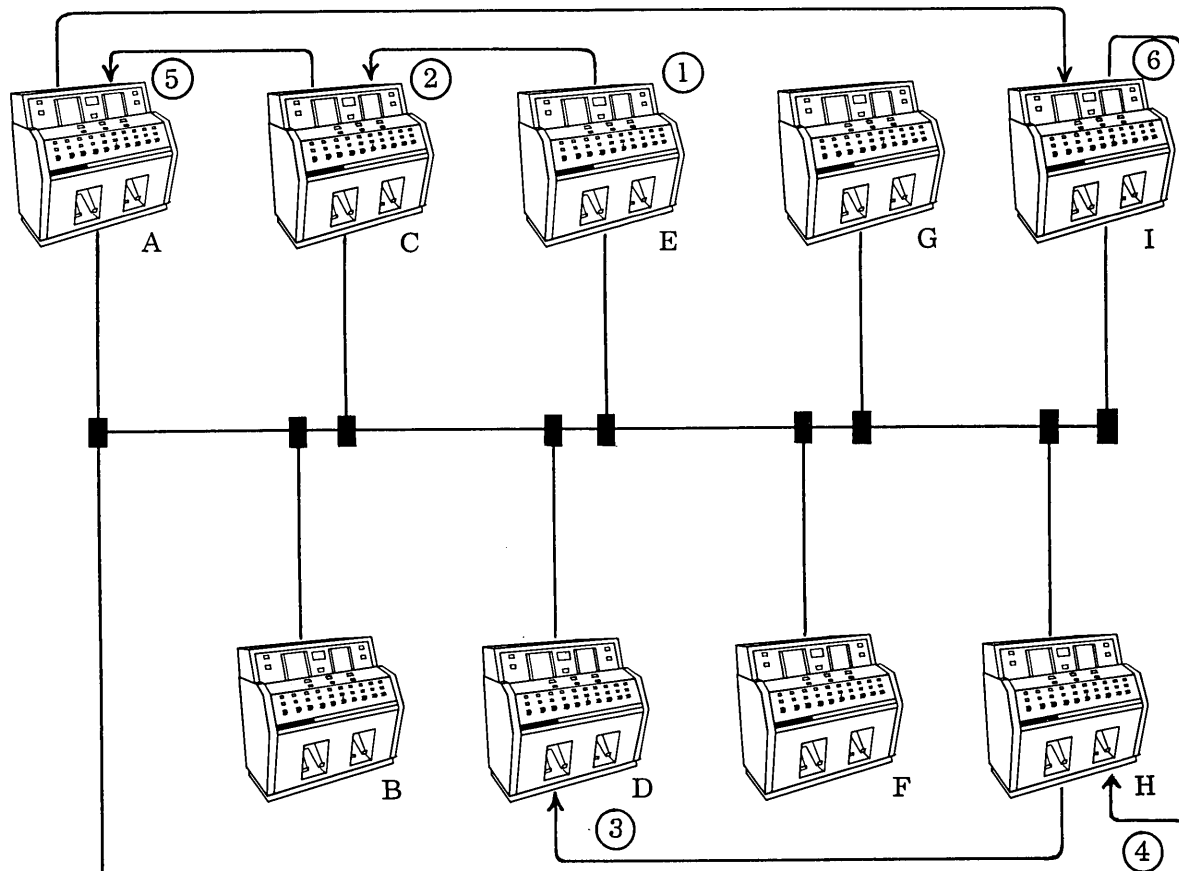
Once this transmitter (T2) relinquishes the line, priority will pass to the next closest requesting transmitter to T2, in the direction of the receiver.

2. Priority will continue to advance toward the receiver console in the above fashion. When the transmitter closest to the receiver that has made a request has been serviced, priority will then pass to the transmitter farthest away from the receiver that has made the request (T3).
3. Once T3 has been serviced, priority will pass from T3 to the transmitter closest to it in the direction of the receiver console. The progression will once more continue in this fashion toward the receiver until all requests have been serviced.

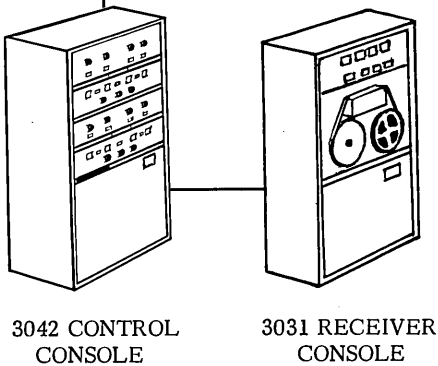
The maximum wait time that can be experienced by a specific transmitter can be computed by multiplying the number of transmitters to a receiver, times the length of the message, and dividing it by the punching speed (30 codes per second). This result is highly improbable, however, for the maximum number of transmitters would all have to request the line at exactly the same time.

The above procedure, showing the physical sequence of priority among transmitters, is illustrated in figure 17.

3001 TRANSMITTERS



DATA COLLECTION CENTER



Assume that while Transmitter E is transmitting, Transmitters C, D, H, A, and I make requests in that order. Progression will be E.C.A.I.H. and D.

Note: Numbers ① indicate sequence in which requests were made.

Figure 17. Typical Collectadata 30 System Priority Sequence.

SECTION VIII

CABLING SYSTEM

GENERAL

Detailed cabling specifications may vary between installations because of electrical codes, varying locations in which cables will be installed, and other local considerations. However, the following specifications can be adapted to most applications because they deal primarily with the actual cable requirements of Collectadata 30 Systems equipment.

Figure 18 shows a typical Collectadata system cable layout. Although there are two different terms used to identify cabling, Main Cable and Drop Cable, they both are of the same construction.

Main Cable. This single cable runs directly from the Receiver Termination Box through each area where there is a Collectadata 30 transmitter. The receiver termination box is the connecting box between the central control unit and the main cable.

The main cable requires a minimum of 13 conductors plus one twisted pair. These conductors are used as follows:

- 2 Series Lockout
- 9 Control
- 2 D.C. Power
- 1 Twisted pair for Sound Powered Telephones

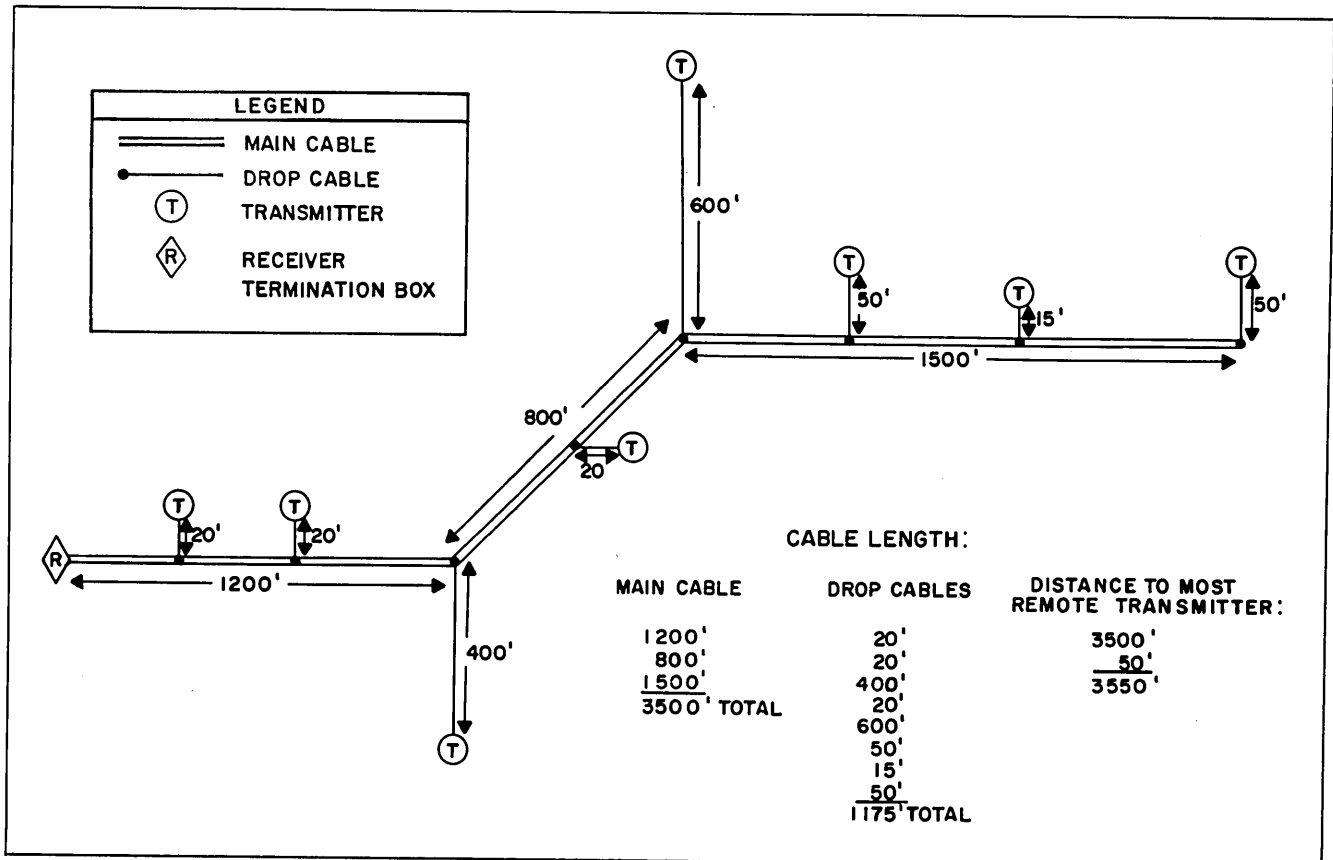


Figure 18. Typical Cable Layout.

Drop Cables. These cables connect to the main cable at various points by means of main cable junction boxes, and run directly to a transmitter termination box or individual transmitter.

Transmitter termination boxes simply provide a convenient means of connecting the drop cable to the transmitter.

The drop cable requires 15 conductors plus one twisted pair as follows:

- 4 Series Lockout
- 9 Control
- 2 D.C. Power
- 1 Twisted pair for Sound Powered Telephones

Note: The minimum number of conductors for a main cable is 13, and for a drop cable 15. However, Friden, Inc., recommends that both cables have 15 working conductors (because of the economy of standardization), one twisted pair for sound powered telephones, and one spare, for a total of 18 conductors.

CABLE REQUIREMENTS

Cable Length. The total length of cable in any system cannot exceed two miles. Cable distance is determined by the length of cable from the receiver terminal junction box to the farthest transmitter connector, plus twice the length of all drop cables added together as follows: (See figure 18 for reference.)

Main Cable	3500'
Twice the total drop cable length (1175' x 2)	2350'
TOTAL	5850'

Wire Size. The size of wire within the main and drop cables will be dictated by the transmission distance involved.

The wire size of the P (power line) conductor in the main cable should, for all practical purposes, be the same size as the other conductors. The maximum resistance for a single power line is 110 ohms. All other single lines must not exceed 280 ohms. (See figure 20.)

To make it possible for all conductors to be the same size power lines can be run in

parallel. Therefore the number of power lines to be used is determined by cable length, plus the maximum resistance and wire gauge used for the other conductors. No more than four power lines can be run in parallel.

Figure 19 shows American Wire Gauge (A.W.G.) wire sizes and resistance per 1,000 feet of wire. If the wire gauge is the same for all lines and the total length of the line is known, the maximum line resistance can be computed from this chart.

WIRE GAUGE	OHMS PER 1,000 FEET
18	6.385
19	8.051
22	16.14
24	25.67
26	40.82

Figure 19. Wire Gauge.

The maximum line (conductor) resistance for the power line and all other lines must not exceed the values shown in figure 20. The maximum power line resistance is 110 ohms, however, it may be run with up to four lines in parallel.

If the maximum Resistance of the P (Power) Line is:	The maximum Resistance of Any other line can be:
70 Ohms	280 Ohms
78 Ohms	235 Ohms
92 Ohms	185 Ohms
110 Ohms	110 Ohms

Figure 20. Resistance Chart.

Illustrated in figure 21 is the procedure for connecting up junction and termination boxes, cable, and Collectadata 30 Systems equipment. Nomenclature references refer to parts and cable that may be purchased from Friden, Inc. More detailed Engineering Specifications on Collectadata 30 Systems cabling may be obtained from: Friden, Inc., Service Department, Rochester, New York.

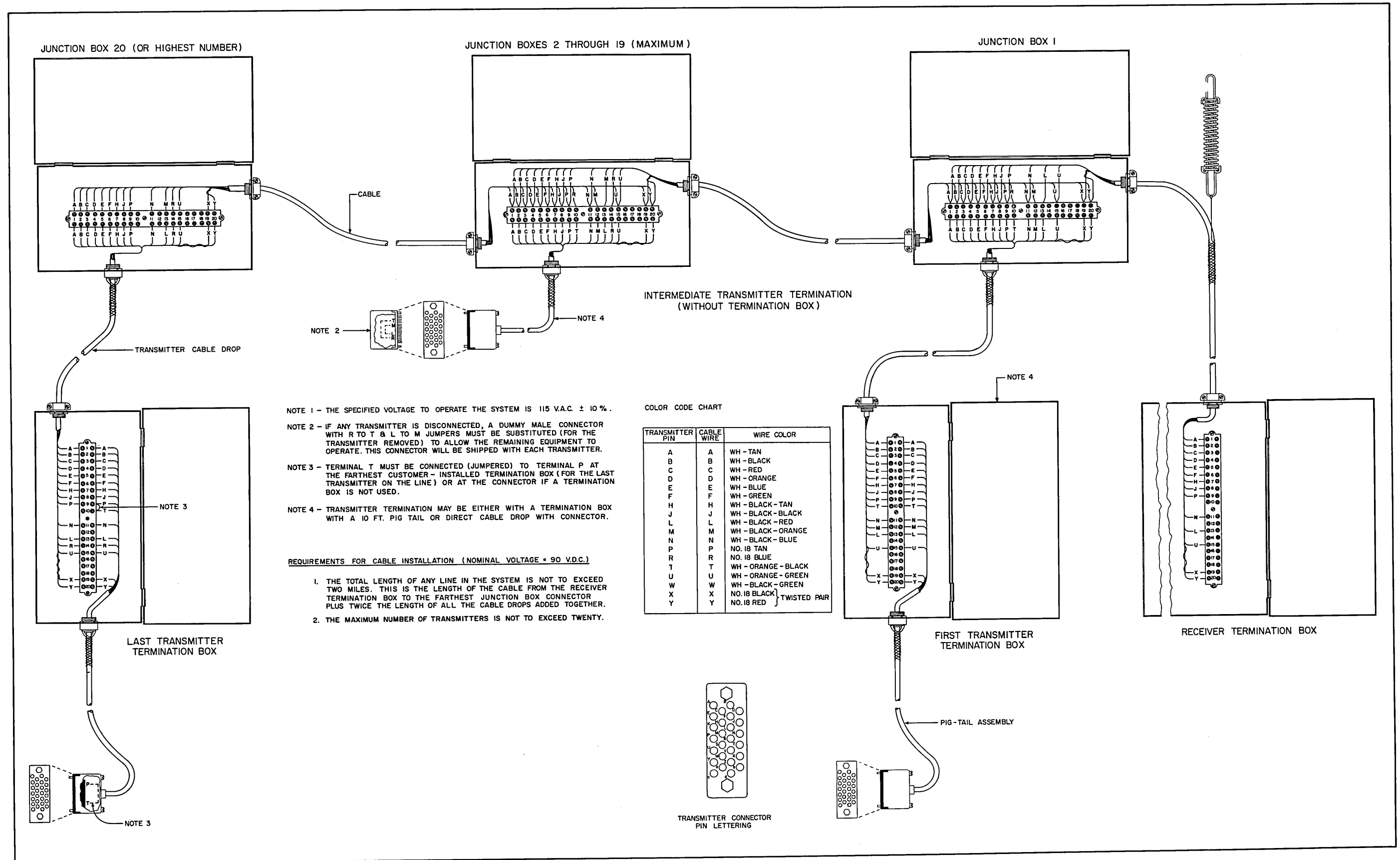


Figure 21. Cable Installation Diagram.

SECTION IX

IDENTIFICATION BADGE

GENERAL

A laminated plastic identification badge is used as input to all badge readers in the Collectadata 30 System. It generally contains a paper insert plus a photograph (if required), laminated between two pieces of mylar-polyethylene plastic film.

Badges and their paper inserts can be constructed to meet military specifications, for security purposes, by using water marked safety paper and other protective materials. The insert may be designed to visually show any information desired. However, most badges usually include: the company name, employee's badge number and photograph on the front; and the employee's name, department number, start date, and signature on the back.

The identification badge may be coded with a maximum of 10 digits of numeric information punched in the Hollerith code.



Figure 22. Identification Badge.

LAMINATION

There are several plastic or specialty companies that will make up laminated badges. To facilitate this, they usually require that inserts and photographs be supplied to them from the customer.

Many companies also will sell or lease a wide variety of laminating equipment and supplies to customers who want to laminate their own badges.

PUNCHING

The punching of the Hollerith code into the badge is accomplished with a portable-electric badge punch. With this unit, badge punching starts in column one of the badge and proceeds to column 10.

All badges must be free of any attachments, burrs, nicks and protrusions which could affect the punching accuracy or the badge movement in the badge punch. A column indicator makes it possible to punch the information in the proper columns when the badge is positioned in the unit.

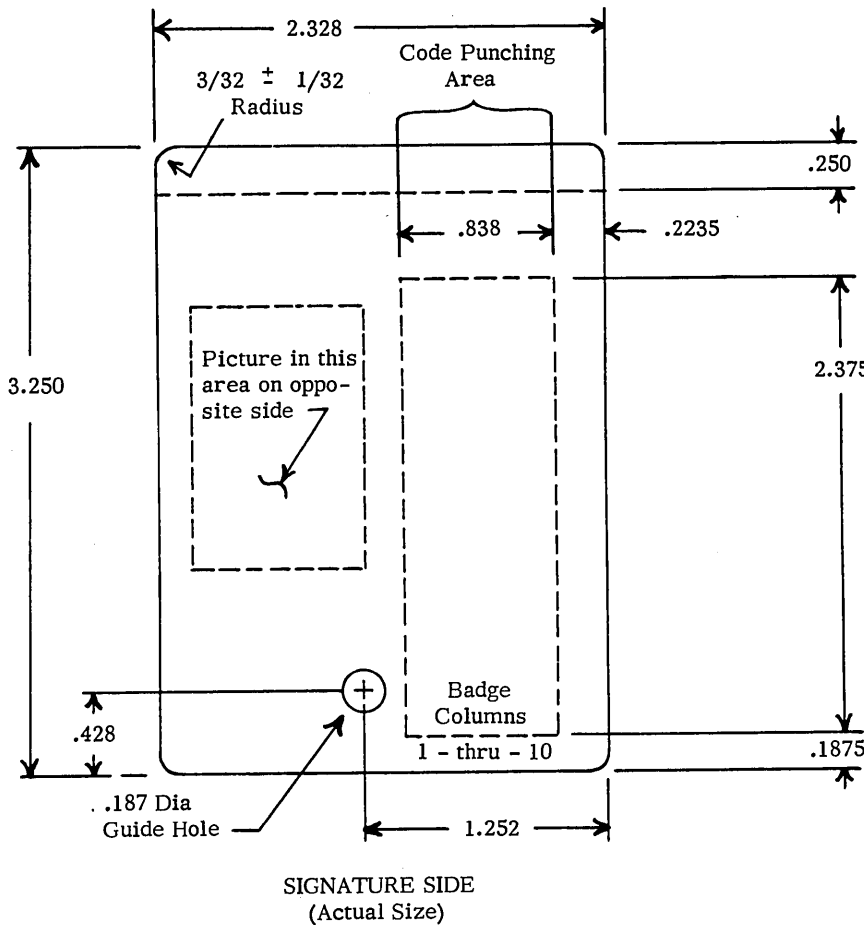
CLIPS

A clip may be attached on the badge after it has been punched. It is centered at the top of the badge: it may not extend lower than 1/4" from top edge of finished badge. Tools may be purchased to mount these clips.

SPECIFICATIONS

Collectadata 30 System laminated identification badge specifications are shown in figure 23, page 34.

Note: More detailed badge specifications on the types of plastics, clips, inserts, and other features that are recommended may be obtained from: Friden, Inc., Service Department, Rochester, New York.



● NOTE
All decimals have a tolerance of $\pm .005$ ".

All dimensions in inches.

● BADGE FRONT
Must face Badge Reader when inserted in badge slot (Signature side facing operator).

● FINISHED BADGE
Over-all thickness of finished laminated badge $.035 \pm .005$.

The following specifications are designed to cover all requirements for standard identification badges for use with Friden Collectadata 30 Badge Readers and Badge Transmitters. They conform to the standards set forth for Physical Security of Industrial Facilities, Office of Defense Mobilization, U.S. Government.

Each finished badge shall be a three ply lamination which shall consist of a paper insert laminated on both sides with a mylar-polyethylene film. The mylar-polyethylene film shall consist of no less than .001" mylar and .009" polyethylene and no more than .005" mylar with .010" polyethylene.

The mylar-polyethylene film must not exceed .015" on either side of the badge. The over-all laminated badge must not exceed .040".

The mylar-polyethylene film shall provide a permanent bond to the paper insert, photograph, and to the material itself when laminated at the temperature and pressure ranges specified. The laminating pressure shall not be greater than 200 to 250 p.s.i. with a temperature range of 270° to 350°.

● PLASTIC

● CLIP
Centered at top of badge; may not extend lower than 1/4" from top edge.

● GUIDE HOLE
Slightly offset to the left of center when looking at Signature side of the badge.

● PAPER INSERT

Figure 23. Specifications For Laminated Badge.

APPENDIX

PUBLICATIONS AND EDUCATION

SPECIFIC PUBLICATIONS

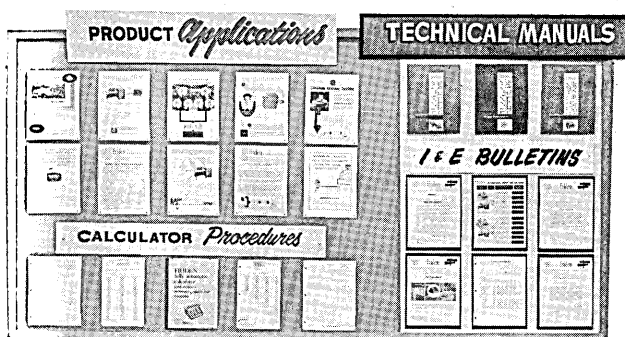
Product publications editorializing actual customer installations of Friden products, commonly called "Case Histories", are available depicting before and after methods, flow chart procedures, and benefits derived from these installations.

These product publications and all other Friden literature may be obtained from Friden Branch offices, located in all major cities, or by writing Rochester, New York.

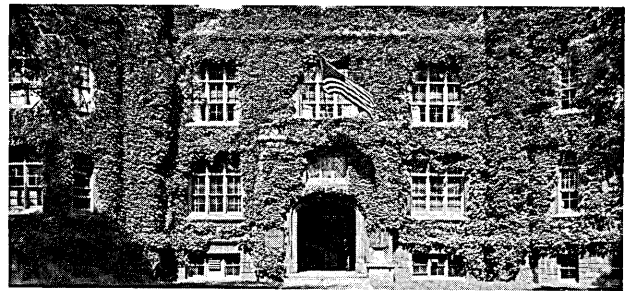
Customer Case Histories cover a wide scope of industries and businesses. Each write-up portrays the methods and equipment that benefited a specific customer in a given area. Many of these well thought-out customer applications may be duplicated or applied to a business operating under similar circumstances.

Technical Manuals, Information and Education Releases (I & E Bulletins) also are available. Friden Technical Manuals provide a sound knowledge of the principles that form the basis and background for Friden equipment. The entire machine or system is taken in a logical sequence and clearly described to aid anyone in achieving a complete understanding of Friden products.

Information and Education Bulletins cover a vast range of information on such subjects as data processing, graphic arts, mailroom methods, data collection and other topics.



Examples of Friden Literature



Friden Educational Center

FREE COURSES AND SEMINARS

Friden, Inc., maintains an Educational Center located in Rochester, New York. This Center, equipped with over a million dollars worth of Friden and allied equipment, directs its activities toward fulfilling the guidance needs of Friden's current and potential customers.

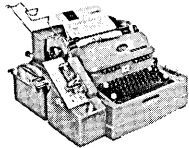
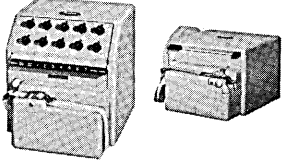
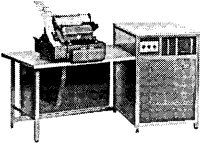
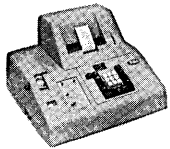
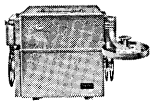
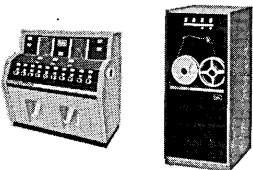
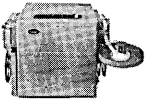
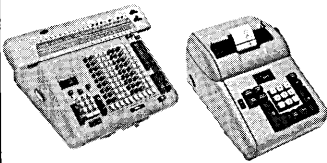
Thousands of systems - procedures - graphic arts and management level personnel have completed one or more courses of study conducted at this Center. The curriculums, which range over the full spectrum of integrated data processing, communications, data collection, graphic arts, and allied areas are scheduled the year-round.

Courses are taught by instructors of the Friden Customer Educational staff, each an expert in his particular field.

To augment regularly scheduled courses special seminars are initiated for organizations whose requirements are restricted to specific equipment or applications.

Enrollment and registration for ALL customer programs will be arranged by the Friden representative or office nearest you. They will gladly make arrangements for you and for any member of your organization who wishes to attend any of the many courses offered. Ask them for the brochure describing and listing the dates of all courses. All courses are conducted FREE of charge.

Friden Products Designed for Practical . . .

	<p>FLEXOWRITER</p>
<p>AUXILIARY EQUIPMENT</p>	
	<p>COMPUTYPER</p>
<p>ADD-PUNCH</p>	
	<p>TELEDATA</p>
<p>COLLECTADATA</p>	
	<p>CODE CONVERTER</p>
<p>CALCULATOR ADDING MACHINE</p>	

DATA PROCESSING EQUIPMENT

The FLEXOWRITER® . . . automatic writing machine, is a tape-operated data processing unit. It automatically produces documents at 100 words per minute, and simultaneously perforates punched paper tapes for further data processing. Many models are available for specific data processing applications.

A wide variety of AUXILIARY, input/output units may be cable-connected to the Flexowriter, Computyper and other Friden equipment. These units facilitate greater application and programming flexibility.

The COMPUTYPER®, automatic writing-computing machine, is a complete billing department at a single desk. It contains all the versatility of the Friden Flexowriter, plus the ability to compute automatically.

The Friden ADD-PUNCH®, 10-key "Natural Way" adding machine with automatic tape punch, captures numeric data for automatic preparation of reports. This unit creates a printed tape as well as a punched paper tape for many data processing applications.

TELEDATA®, data transmission and receiving system, speeds communications to and from remote points over existing wire services. These units have the ability to simultaneously transmit, receive, and check tapes of 5 through 8-channels for a wide range of applications involving communications.

COLLECTADATA®, data collecting system, facilitates fast and accurate reporting from diverse points directly to a data collection center. This transmission and receiving system provides management with up-to-date information on plant operations at all times, thus allowing executive decisions to be based on events as they occur.

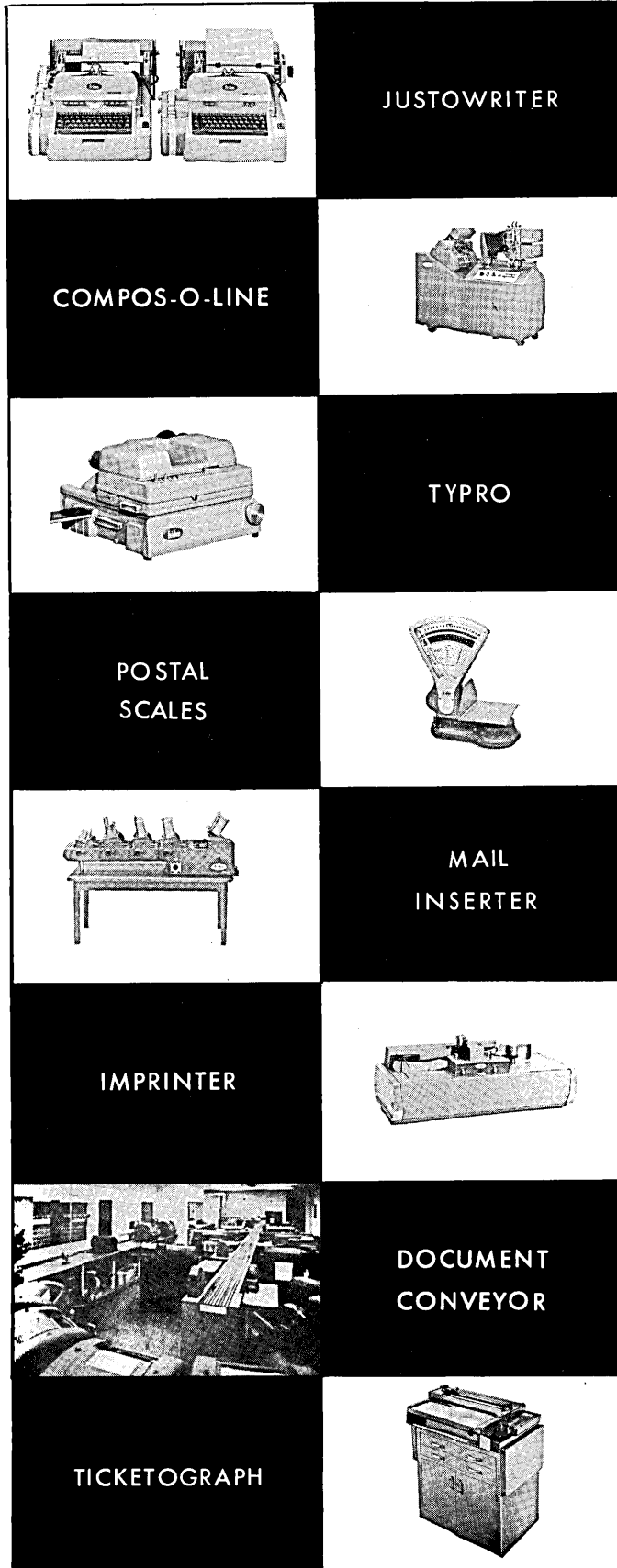
The Friden CODE CONVERTER has the ability to convert one punched paper tape coding system to another. This unit reads a tape and automatically produces a similar tape containing identical information in a different coding system. This facilitates compatibility between machines using different coding methods. It processes 5-6-7-8-channel tapes.

CALCULATORS AND ADDING MACHINES

Friden CALCULATORS and "Natural Way" 10-key ADDING MACHINES are leaders in their field. These easy to operate units come in a wide variety of models, thus providing a versatile machine for all businesses, large or small.

® Registered Trademark of Friden, Inc.

Application in Business and Industry



GRAPHIC ARTS EQUIPMENT

The JUSTOWRITER, automatic tape operated copy-setting machine, produces justified (even margin) copy for duplicating or printing. This easy-to-operate machine is available in a variety of models that will provide an economical source of high-quality composition.

COMPOS-O-LINE, Sequential Card Camera, converts original source data from file cards into film negatives ready for the printing of price lists, directories, catalogs, labels, and other similar applications.

Friden TYPRO is a cold type photo-composing machine used to produce flawless, micro-sharp display type and lettering. This easy-to-operate precision machine holds up to 15 type fonts on one reel. Type sizes range from 6 to 144 points and over 1800 selections are available.

MAILROOM EQUIPMENT

Friden provides a complete line of mailroom equipment to speed mail handling and distribution. This includes a complete line of POSTAL SCALES, sorting racks, mail bags, openers, sealers, and endorsing machines.

The Friden - Ertma MAIL INSERTER automatically gathers and stuffs into envelopes as many as eight different inserts, then seals, stacks, and counts the envelopes ready for mailing.

The IMPRINTER, automatic check endorsing and signing machine, signs, endorses, cancels, counts numbers, dates and imprints checks or other documents at high speed. These operations are performed economically; and safety is insured by the use of locked steel signature plates.

Friden DOCUMENT CONVEYOR eliminates the hand carrying of mail, papers, reports, and other documents. This system moves paperwork economically, smoothly, silently and swiftly to any specific area. The Document Conveyor is tailored to any customer requirements.

TICKETOGRAPH

Mather Division of Friden, Inc. designs and prints coupons or work tickets of all widths, lengths, colors of ink, stock and types of perforations, for all kinds of machines, automatic or manual. TICKETOGRAPH, gang numbering and pricing machine, imprints piecework rates and production data utilizing these tickets.

Friden, Inc.

HOME OFFICE AND MAIN PLANT
SAN LEANDRO, CALIFORNIA
SALES AND SERVICE THROUGHOUT THE WORLD