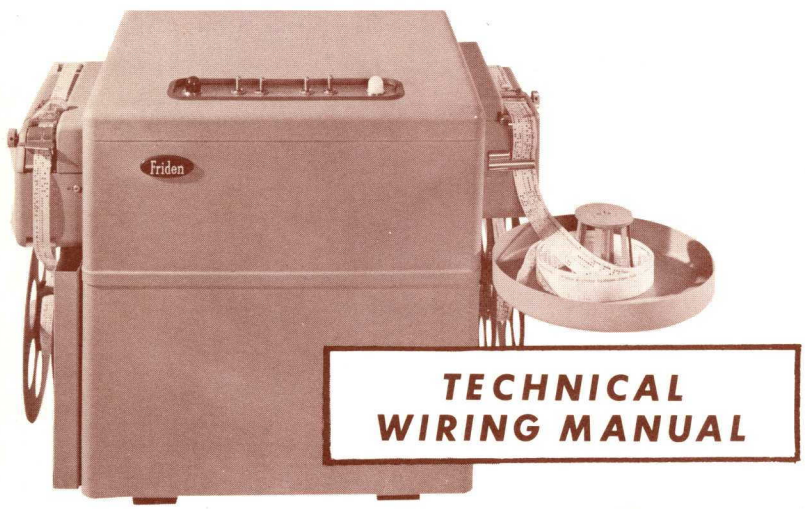
Friden

punched tape

CODE CONVERTER



TECHNICAL WIRING MANUAL

Composition for this manual was set on the Friden Justowriter® automatic tape-operated copy setting machine, a product of FRIDEN, INC.

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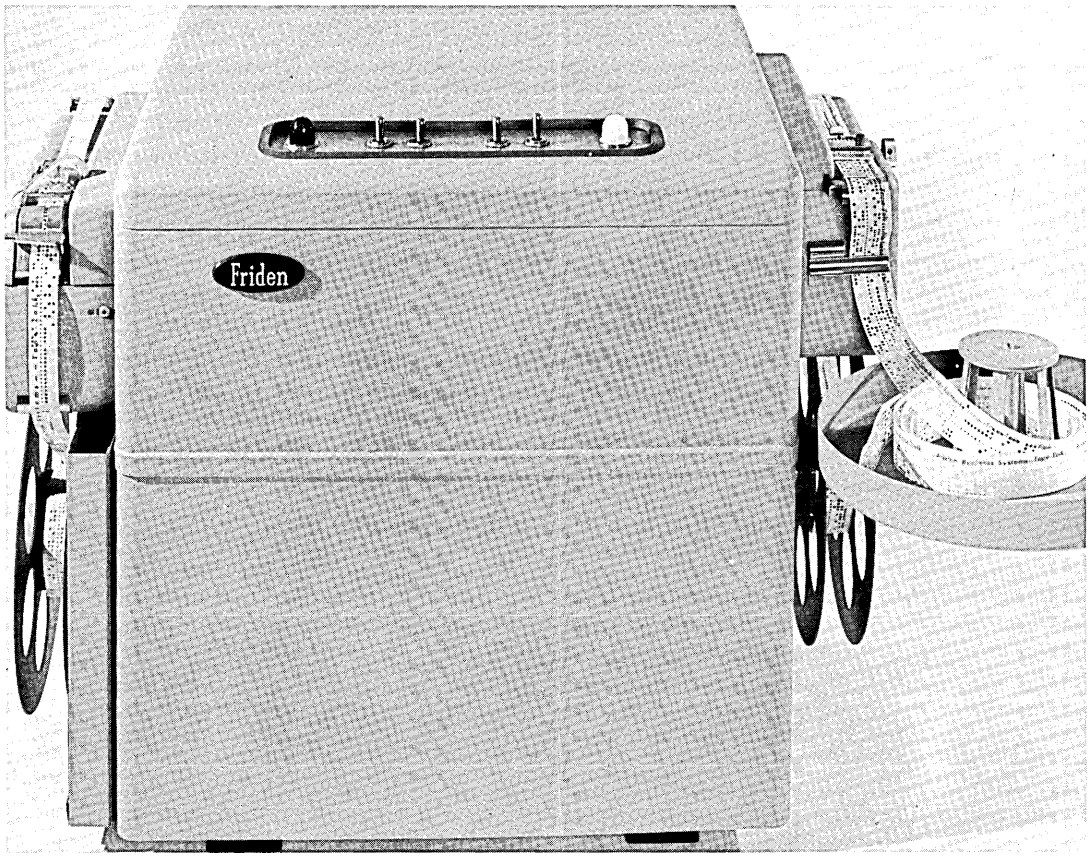
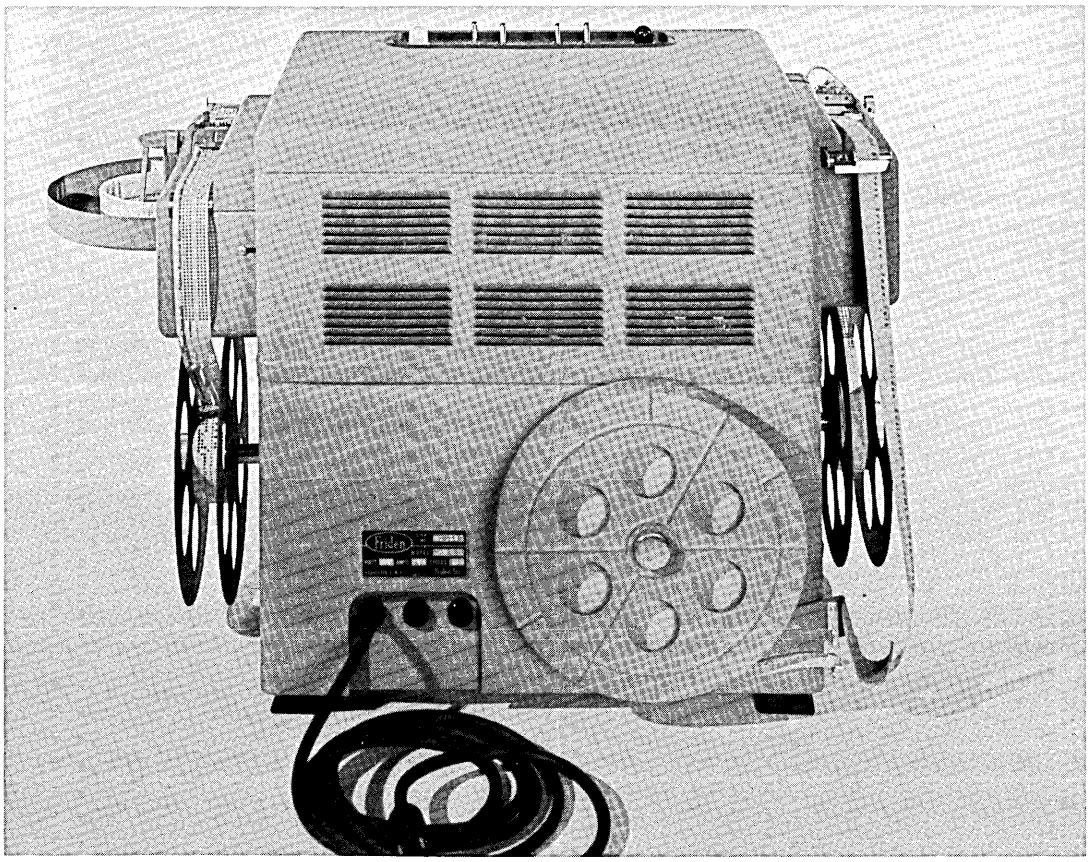

Friden



PUNCHED TAPE CODE CONVERTER

I. GENERAL DESCRIPTION The Punched Tape Code Converter is a unit designed to read information encoded in punched tape according to a given code system (e.g., the Friden Systems Code) and to produce as an output a punched tape containing the same information encoded according to a different code system.

The following codes may be employed as inputs or outputs:

1. Any five channel code (e.g. Communications)
2. Any six channel code (e.g. Graphotype - LGP Computer)
3. Any seven channel code containing one redundant (parity) channel.
4. An eight channel code, containing one redundant channel, and which uses channel eight to represent limited control functions, in a fashion similar to the Friden Systems Code.

II. GENERAL SPECIFICATIONS

1. Reader Speed: 1180 codes per minute
2. Tape used:

   (a) The punch and reader will accept tape 11/16", 7/8", or 1" wide. Adjustments are provided on the reader and punch to allow modifications for these various widths.

   (b) The standard unit punches and reads tape with feed holes in line with the code holes and positioned .394" from the guiding edge of the tape. As an option for Teletypesetter applications, the unit may be equipped with a special punch or reader with advanced feed holes positioned .4375" from the guiding edge.

3. Control Switches

   (a) Power Switch: Turns on the motor and puts the converter in a ready condition.

   (b) Tape Feed: When operated, causes continuous feeding of tape from the punch as long as the switch is held operated. Through plugging of the control panel, any code combination, or blank codes, may be punched during this tape feed operation.

   (c) Start Read: When operated and restored to normal, causes tape reading to start.

(d) Stop Read: When operated causes tape reading to stop.

4. Indicating Lights

(a) Power: This white light will glow whenever the power is turned on.

(b) Error: This red light will glow whenever a parity check error occurs.

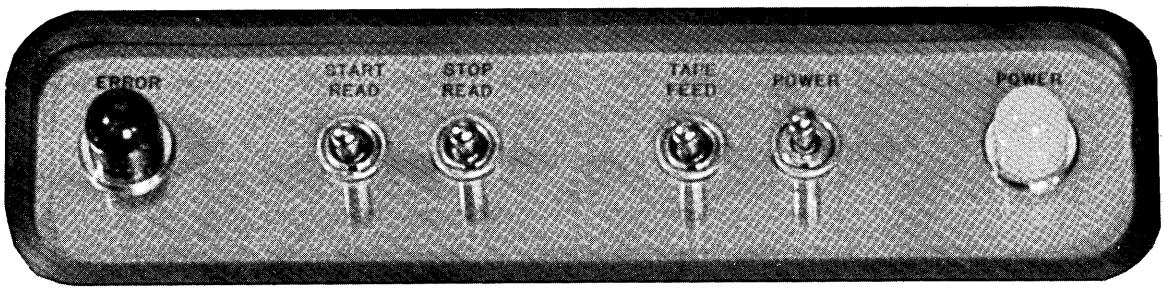
5. Tape unwind and rewind units are provided as standard equipment on the Punched Tape Code Converter.

6. Checking Facilities

(a) Parity check of tape punching is a standard feature. Through patching of a terminal block either odd or even count parity check may be selected. Parity check may also be disabled through patching of the terminal block.

If through a mechanical failure an invalid code is punched, the Code Converter will stop and the error light will glow. Operation of the Tape Feed switch will restore the machine to an operating condition.

(b) The machine is also designed to check that an output code is punched for every input code that is read, unless the input code is one that has been specified as unassigned by control panel wiring. The power must be turned off to reset this error condition.

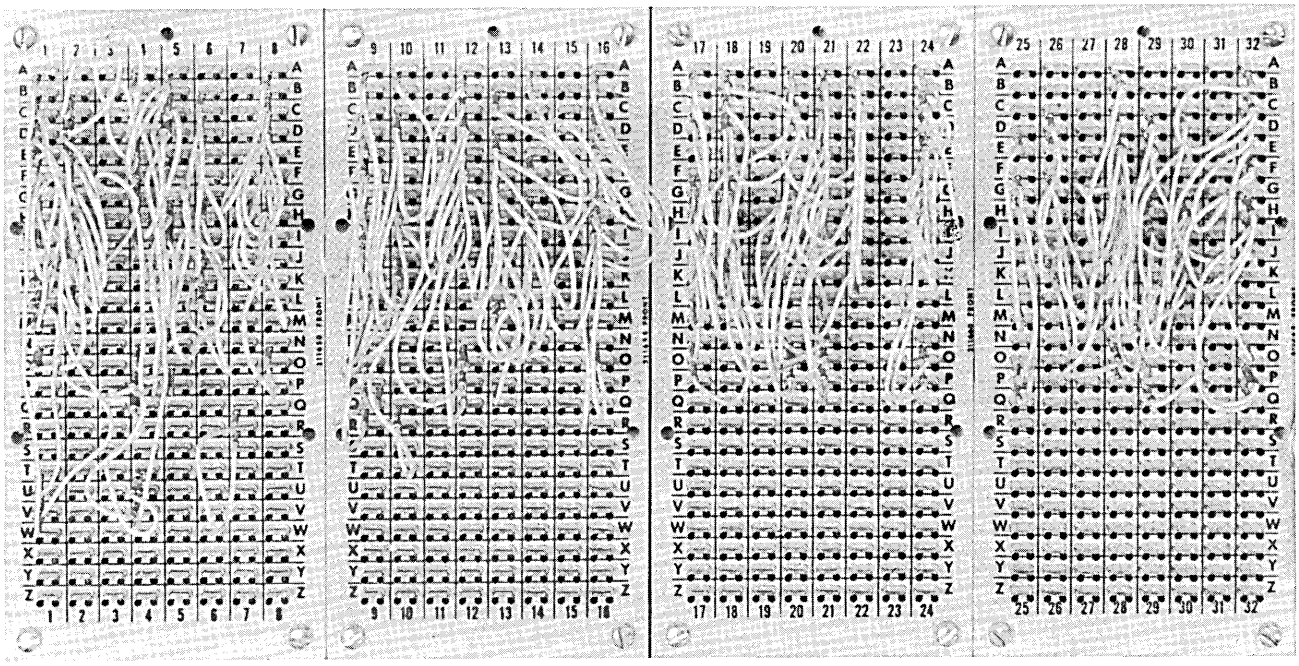


GENERAL DESCRIPTION OF PROGRAM PANEL

A fixed type control panel is provided in the Code Converter to allow programming of the unit for various input and output requirements. This panel cannot be removed from the machine for re-programming.

The control panel is divided into four sections, each having 208 patch points or hubs, making a total of 832 hubs on the complete panel. Each of these hubs has a double outlet.

The co-ordinates A-Z (vertical) and 1-32 (horizontal) are used for reference purposes in explaining the details of programming.



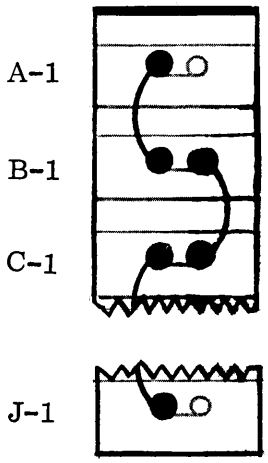
EXIT HUBS AND ENTRY HUBS

There are two types of hubs on the control panel, exits and entries. Exit hubs emit impulses as codes are read in the tape reader. Entry hubs accept these impulses and cause the punching of output codes. The theory behind control panel wiring is to connect the proper exit hubs to the proper entry hubs so that a given input code system will produce specific output coding.

"LEAPFROG PLUGGING"

It will often be necessary to connect several exit hubs to a single entry hub. This will be necessary whenever several input combinations are to cause the same output result. Since each hub has a double outlet, "LEAPFROG" wiring may be used to accomplish the result.

Example: If it is necessary to connect EXIT hubs A-1, B-1, and C-1 each to ENTRY hub J-1, the following procedure would be followed.



A connection is made from an outlet of A-1 to an outlet of B-1. The other outlet of B-1 is connected to an outlet of C-1. This plugging, in effect, connects A-1, B-1, and C-1 together. The remaining outlet of C-1 is then connected to an outlet of J-1.

CONTROL PANEL HUBS

I. CODE EXITS A1-H32

The CODE EXITS emit impulses as input codes are read. There are 64 sets of CODE EXITS representing the 64 code combinations which the converter will recognize. (Note: The converter will recognize only channels 1-6 in the input tape. Channel 7 is not sampled and if present in the input tape is considered redundant. The 8th channel may be employed in the input tape on a limited basis only. The 8th channel is not recognized in the CODE EXITS section of the control panel, but will be treated separately.)

For each of the 64 code combinations in the CODE EXITS section, there are 4 sets of hubs labeled EXIT 1, EXIT 2, EXIT 3 and CONTROL EXIT. Whenever a given input code is read, a separate and isolated impulse will be emitted from each of these four exits. EXITS 1, 2, and 3 will be used to cause punching of an output code The CONTROL EXIT will be used to cause various control functions to occur, such as shift to letters or figures in a five channel system.

II. CODE ENTRIES

In general, the CODE ENTRY hubs are impulsed from exit hubs to cause the punching of output code combinations. There are 8 identical sets of CODE ENTRY hubs on the control panel wiring and eliminate the need for long wires extending across the panel board.

The first of these 8 sets of CODE ENTRIES can be found in that section which includes vertical columns 1, 2, 3, and 4 and horizontal columns I - P. This first set should be used in conjunction with the 8 CODE EXITS directly above it (Blank, 1, 2, 3, 4, 5, 6, and 12).

In the same manner, the second set of CODE ENTRIES (vertical columns 5, 6, 7, and 8; horizontal columns I - P) should be used in conjunction with the 8 CODE EXITS directly above (13, 14, 15, 16, 23, 24, 25, and 26).

In light of the above, our discussion can be limited to one set of CODE ENTRIES - - - Illustration I, (1-4; I-P).

Assume that whenever a 12 combination is read in the input tape, we desire to punch a 13457 combination in the output tape. The following wiring would be used.

A. EXIT 1 of the 12 code combination (H-1) would be connected to the entry hub labeled 13 (N-1).
B. EXIT 2 (H-2) would be connected to the entry hub below it labeled 45 (K-2).
C. EXIT 3 (H-3) would be connected to the entry hub below it labeled 7 (J-3).

These three connections will cause the punching of 13457 combination in the output tape.

EXIT 1

Note that in the same vertical column with CODE EXIT 1, there are eight CODE ENTRY combinations (Blank, 1, 2, 3, 12, 13, 23, and 123).

Blank (I-1) should only be impulsed if the output code is to be a blank code (feed hole only). If neither a 1, 2, or 3 bit is to be present in the output code desired in a given case, there should be no connection from EXIT 1 of the input code in question. For any combination of bits 1, 2, or 3 in the output tape, CODE EXIT 1 should be wired directly to the exact combination desired in vertical column 1 of the CODE ENTRY section.

EXIT 2

EXIT 2 is used to cause punching of bits 4 and 5. If neither a 4 or 5 bit is desired in the output code, there should be no wiring from EXIT 2 of the code in question. If, however, the 4 and/or the 5 bit is to be present, EXIT 2 of the input code should be connected to the proper CODE ENTRY labeled 4, 5, or 45 (I-2, J-2, K-2).

EXIT 3

EXIT 3 is used to cause punching of bits 6 and 7 of the output code. The ENTRY hubs 6, 7, and 67 will be used for the punching of these bits (I-3, J-3, K- 3).

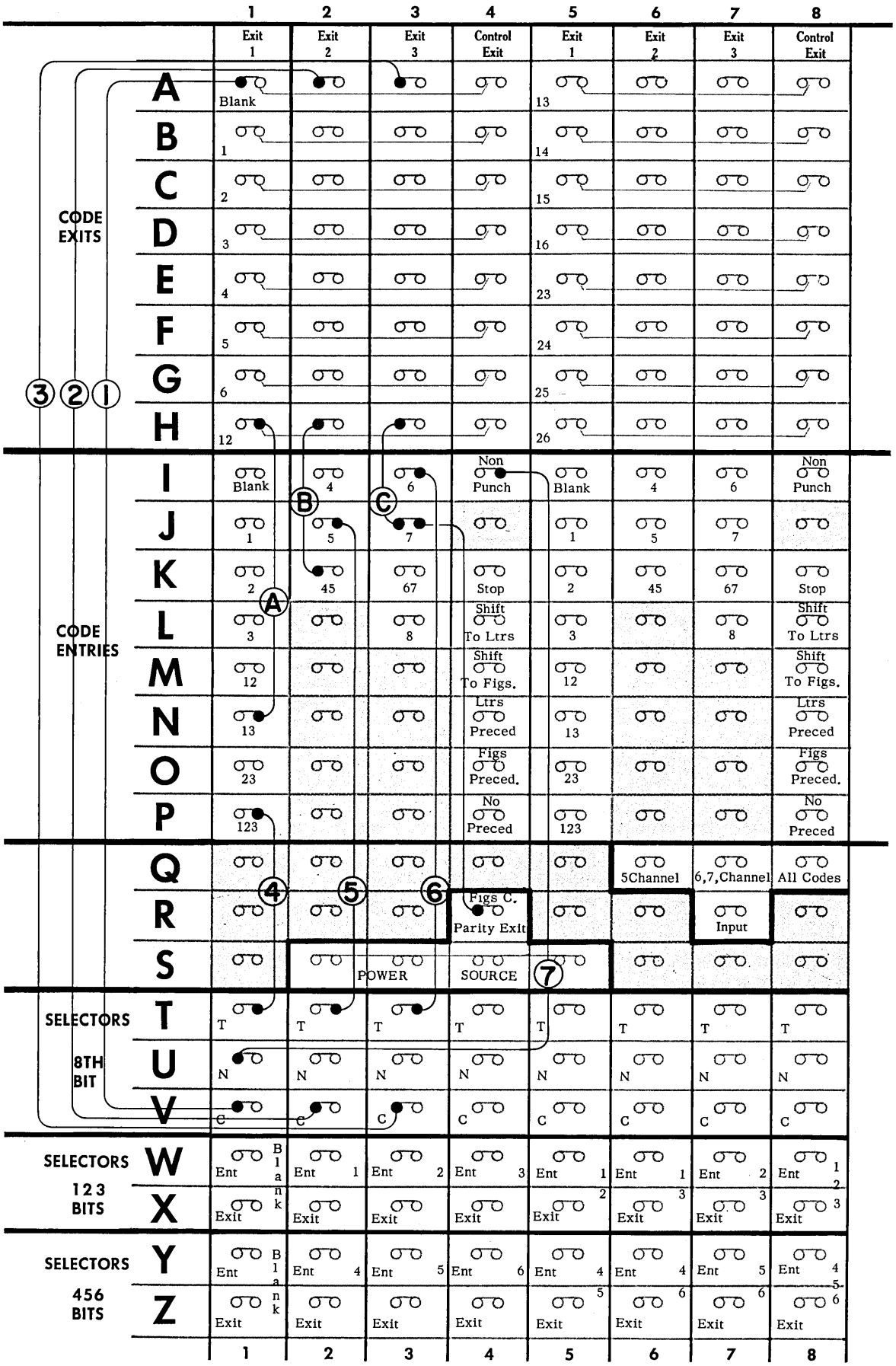


ILLUSTRATION I

If the 8th bit is desired in the output code, the entry hub labeled 8 (L-3) should be impulsed from a CODE EXIT hub. Normally the 8th bit will be punched as a single code and will not be punched in conjunction with the other bits. It is possible, however, to impulse the 8th bit in conjunction with other code bits. In this case, any one of the available CODE EXITS may be used to impulse the 8th bit entry.

If several CODE EXITS in the same vertical column are to impulse the same CODE ENTRY hub, they should all be connected to this entry hub through the "LEAPFROG" method previously described.

CONTROL EXIT

The impulses from the CONTROL EXIT are for the functional entry hubs (I-4 thru P-4, etc.) located directly below them.

A. NON-PUNCH (I-4)

Note that this hub also appears in I-8, I-12, I-16, I-20, I-24, I-28 and I-32. Keep in mind that while we are concerned with only column 4, these hubs are duplicated in columns 8, 12, 16, 20, 24, 28 and 32.

The NON-PUNCH hub should be used whenever a given input code is not to cause punching of an output code. Each one of the 64 codes that the Code Converter recognizes should be wired to punch an output code or to the NON-PUNCH hub. If a given input code is wired to the NON-PUNCH hub, it will be ignored in the conversion process. However, if a given code combination is sensed which has neither been wired to punch an output code nor to NON-PUNCH, the Code Converter will stop. If through a machine malfunction, the Code Converter fails to punch an output code when an assigned input code is read, the Converter will also stop. Because of this, the NON-PUNCH hub can serve as a check against non-valid code combinations and also facilitates a valuable check against certain malfunctions.

B. STOP (K-4, K-8, K-12, K-16, K-20, K-24, K-28 and K-32)

Whenever the STOP entry is impulsed from a CODE EXIT, the Converter will stop. The input code selected as the stop code may also be wired to punch an output code if desired. However, a stop code is not required at the end of a tape to be read. The reading will stop automatically when the end of the input tape is reached.

C. SHIFT TO LTRS (L-4, L-8, L-12, L-16, L-20, L-24, L-28 and L-32)

The SHIFT TO LTRS function will only be employed in an application involving five channel tape for input or output.

There is a pair of relays within the Code Converter designated as the LETTERS MEMORY relay and the FIGURES MEMORY relay. These relays control the punching of letters and figures codes in a system involving five channel output. They also control the distinction between a letters code and a figures code in a system using five channel tape for input. The exact use of these principles will be discussed later.

When the SHIFT TO LTRS hub is impulsed from a CONTROL EXIT, the letters memory relay will be energized, unless it has been previously energized, and the figures memory relay will be shut off.

D. SHIFT TO FIGS (M-4, M-8, M-12, M-16, M-20, M-24, M-28 and M-32)

Whenever the SHIFT TO FIGS hub is impulsed from a CONTROL EXIT, the figures memory relay will be energized unless it has been previously energized, and the letters memory will be shut off.

E. LETTERS PRECEDENCE (N-4, N-8, N-12, N-16, N-20, N-24, N-28 and N-32)

The LTRS PRECED hub when impulsed will:

(1) Punch a 12345 code into the output tape if the letters memory relay is not already energized.

(2) Energize the letters memory relay and shut off the figures memory relay.

The above functions will occur prior to the punching of the output code that has been wired to punch from the input code in question.

F. FIGURES PRECEDENCE (0-4, 0-8, 0-12, 0-16, 0-20, 0-24, 0-28 and 0-32)

The FIGS PRECED hub when impulsed will:

(1) Punch a 1245 code into the output tape if the figures memory relay is not already energized.

(2) Energize the figures memory relay and shut off the letters memory relay.

The above functions will occur prior to the punching of the output code that has been wired to punch from the input code in question.

G. NO PRECEDENCE (P-4, P-8, P-12, P-16, P-20, P-24, P-28, and P-32)

If the application at hand does not involve the punching of five channel tape, a jumper connection should be made between the NO PRECED (P-8) hub and the hub labeled ALL CODES (Q-8). This jumpering will indicate to the machine that no precedence codes whatsoever will be punched into the output tape. If this is the case, neither the LTRS PRECED hub or the FIGS PRECED hub will ever be plugged in the application in question.

However, for five channel output tape, the following procedure should be used.

(1) If a given input code, when read, is to punch an output code which is to be preceeded by a letters shift code, the CONTROL EXIT for that input code must be wired to a LTRS PRECED hub.

(2) If a given input code, when read, is to punch an output code which is to be preceeded by a figures shift code, the CONTROL EXIT for that input code must be wired to a FIGS PRECED hub.

(3) Certain input codes, when read, should punch output codes which are common to both figures and letters shift. (Example: Five channel carriage return, line feed, space). The input codes which are to cause punching of these NO PRECEDENCE codes should have their CONTROL EXITS wired to NO PRECED hubs.

When several input codes are assigned to one precedence function, "LEAPFROG" wiring must be used.

The CONTROL EXITS of the Converter panel board must be employed to impulse the following entry hubs: SHIFT TO LTRS, SHIFT TO FIGS, FIGS PRECEDENCE, LTRS PRECEDENCE and NO PRECEDENCE. EXITS 1, 2, and 3 should never be employed to impulse these entries.
The NON-PUNCH and STOP entries may be impulsed from any CODE EXIT.

III. INPUT (R-7), 5-CHANNEL (Q-6), 6-7 CHANNEL (Q-7) These three hubs regulate the type of input that the Code Converter will accept.

If the INPUT (R-7) hub is jumpered to the 6-7 CHANNEL (Q-7) hub, the Code Converter will be conditioned to handle 6, 7, or 8 channel input tape. If the INPUT (R-7) is jumpered to the 5-CHANNEL (Q-6) hub, the Converter is conditioned to accept 5 channel input tape.

In a five channel system there are only 32 distinct code combinations possible rather than 64 as in the six and seven channel systems. Through the use of figures and letters shift codes, however, the 32 possible combinations can have 2 meanings each; thus giving the theoretical equivelant of 64 combinations. In practice, however, only 58 possibilities are acknowledged since several codes are common to both shifts (carriage return, space, etc.).

In the Code Converter the problem exists of obtaining two sets of CODE EXITS for each of the 32 code combinations that can be read. One of these sets of hubs should emit pulses whenever the letters memory relay is energized and the other should emit impulses whenever the figures memory relay is energized. In effect, then, we need 8 hubs for each of the 32 codes that can be read. Four of these (EXIT 1, 2, 3, and CONTROL EXIT) are to emit during a letters condition and the other four (EXIT 1, 2, 3 and CONTROL EXIT) to emit during a figures condition.

Since the 6th bit is never present in a five channel tape, this bit may be used to accomplish the desired effect. The 6th bit is used to differentiate between a given code read in a figures memory condition and the same code read in a letters memory condition.

Example: If the 1 code is read in the tape with the letters memory relay energized a set of four separate impulses will be emitted from the CODE EXITS labeled "1" (B-1, B-2, B-3 and B-4). If, on the other hand, the 1 code is read in the tape with the figures memory relay energized, impulses will be emitted from the hubs labeled "16" (D-5, D-6, D-7, and D-8).

IV. SELECTORS: 8TH BIT (T-V, 1-8) There are 8 sets of three hubs each. The individual hubs in each set are labeled "C" (common), and "N" (normal) and "T" (transferred).

There is normally an internal connection between the common and the normal hubs of each set. When the 8th bit is sensed in the reader, this connection is broken and a new connection is made between the common and transferred hubs. This transferred connection will be held only during the reader cycle in which the 8th bit is sensed. The purpose of these 8TH BIT SELECTORS is to allow the recognition of punching in channel 8 as codes are sensed in the reader.

Assume, for example, that we desire to read a tape encoded according to the Friden Systems Code and produce a 6 channel output tape. Assume, also, that when the systems code for carriage return (8th bit alone) is sensed, we wish to punch a 12356 code.

Whenever the systems carriage return code is read, the CODE EXITS labeled "BLANK" will emit impulses. It must be remembered that the CODE EXITS section of the control panel is concerned only with bits 1-6. Thus, if either a blank code, carriage return code (8 alone) or the hyphen code (7 alone) is sensed, hubs A-1, A-2, A-3, and A-4 will emit.

We need not be concerned with the BLANK code itself, since this is an invalid code in the Friden Systems Code, which only includes odd parity codes. The only problem is to differentiate between the code for hyphen and the code for carriage return.

Illustration 1 shows how this is accomplished: EXITS 1, 2, and 3 for the blank code (A-1, A-2, and A-3) are connected (1, 2, and 3) to the common hubs of three of the 8TH BIT SELECTORS (V-1, V-2, and V-3). The CONTROL EXIT for the blank code (A-4) need not be wired to a common hub, since no functions other than punching are desired.
Once the above connections (1, 2, and 3) are made, the following conditions will exist: Whenever the code for hyphen (7 alone) is read the normal hubs of the three 8TH BIT SELECTORS used will emit (U-1, U-2, and U-3). This is because there is normally an internal connection between the common and normal hubs.

Whenever the code for carriage return (8 alone) is read, the transferred hubs (T-1, T-2, and T-3) will emit. Reading the 8th bit will break the connection between the common and normal hubs and make a connection instead between the common and transferred hubs.

The three transferred hubs are, therefore, wired (4, 5, and 6) to the proper CODE ENTRY hubs to cause a 12356 code to be punched. Whenever the carriage return code is read, these entry hubs will be impulsed and the 12356 code will be punched

In this example, the code for hyphen (7 alone) is to be ignored. It is necessary, therefore, to impulse the NON-PUNCH entry hub whenever the hyphen is read. We have, therefore, connected (7) one of the normal hubs (U-1) to the NON-PUNCH hub (I-4). If an output code was desired from reading the hyphen, the three normal hubs involved (U-1, U-2 and U-3) could be wired to CODE ENTRY hubs.

This example utilized three of the eight 8TH BIT SELECTORS. This leaves five remaining for similar conversions. For this reason, we have previously stated that only a limited number of codes containing punching in channel 8 will be recognized by the Code 4 Converter.

V. TAPE FEED EXITS (Q-9, Q-10, Q-11, Q-12) The four TAPE FEED EXIT hubs will emit separate and isolated impulses whenever the tape feed switch is operated. These exits should be wired to CODE ENTRY hubs in order to create the TAPE FEED code desired in a given application.

Example: If the TAPE FEED code is to be a 1234567 code, the following connections are made:

Q-9	to	P-9	to punch 123
Q-10	to	K-10	to punch 45
Q-11	to	K-11	to punch 67

VI. FIGS CODE PARITY EXIT (R-4) In a conversion application involving five channel output, it is possible to create an artificial parity check to check the accuracy of the Code Converters punching circuits and mechanisms.

This is accomplished by plugging the CODE ENTRIES on the control panel in such a fashion that any five channel code that has an even number of bits, has the seventh bit added to it to make the number of bits come out odd. Thus:

12	becomes	127
Blank	becomes	7

But:

123	remains	123
1	remains	1

If 11/16" width tape is used in the punch, the seventh hole will not be punched in the tape and a standard five channel tape will be punched. Nevertheless, if through malfunction a code bit is dropped or added, the machine will detect the error and stop. This procedure is highly recommended.

The only problem caused by this procedure concerns the figures code. The figures code is a 1245 code and therefore has an even number of bits. The seventh bit must be added to it if the check system outlined above is to be used. Since the figures code is automatically emitted from impulsing the FIGS PRECEDENCE hub, a special method must be employed to add the 7th bit to the figures code. The FIGS CODE PARITY EXIT hub (R-4) provides for this method. If this hub is connected to a code entry hub for the 7th bit alone (J-3), the figs code will become 12457 instead of 1245.

VII. SELECTORS: Bits 123 W-X, 1-8

SELECTORS: Bits 456 Y-X, 1-8

The SELECTORS for Bits 1, 2, 3 and 4, 5, 6 are 16 sets of exit hubs and entry hubs. Normally these hubs are not internally connected. Whenever a code is sensed in the Reader, two of the sixteen entry and exit combinations will be internally connected. One of the two that will be connected in this fashion will be from the SELECTORS: Bits 1, 2, 3, and the other will be from the SELECTORS: Bits 456.

For example, when the 156 code is read the entry and exit hubs labeled "1" W2, X2 will be connected. In like fashion, the entry and exit hubs labeled "56" Y7, Z7 will also be connected.

Notice that hubs W1 and X1 are labeled "blank" as are hubs Y1 and Z1. Whenever neither Bit 1, 2 or 3 is present in a code "blank" hubs W1 and X1 will be connected. By the same token when neither Bits 4, 5, or 6 are present in a code being sensed, blank hubs Y1 and Z1 will be internally joined.

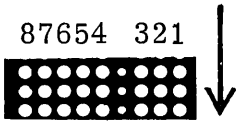
VIII. POWER SOURCE (S2, S3, S4, S5)

This set of hubs emits a signal whenever any code is read. Its purpose is to enable the programmer to run power through the 1, 2, 3 and 4, 5, 6 SELECTORS to cause certain output functions to occur when given code combinations are read.

ALTERING THE CHANNEL NUMBERING SYSTEM

Instructions for altering the channel numbering system in the Tape Reader:

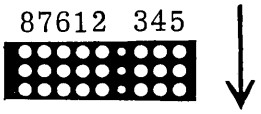
I. The Reader normally is plugged with channel numbering as follows:



to obtain this sequence, points on terminal block "B" should be patched as follows:

From	To	From	To	From	To
B1	B11	B8	B18	B27	B37
B2	B12	B21	B31	B28	B38
B3	B13	B22	B32	B41	B51
B4	B14	B23	B33	B61	B71
B5	B15	B24	B34	B44	B54
B6	B16	B25	B35	B64	B74
B7	B17	B26	B36		

II. For certain input applications (5 channel, 6 channel Teletypesetter, etc.) the following sequence is needed:



To achieve this numbering, remove all standard straps listed above and wire block B as follows:

From	To	From	To	From	To
B1	B31	B8	B38	B17	B27
B2	B32	B11	B21	B18	B28
B3	B33	B12	B22	B41	B71
B4	B34	B13	B23	B51	B61
B5	B35	B14	B24	B44	B74
B6	B36	B15	B25	B54	B64
B7	B37	B16	B26		

Instructions for altering the channel numbering system in the Tape Punch:

I. To achieve standard systems channel sequence, terminal block "D" should be wired as follows:

From	To	From	To
D1	D11	D5	D15
D2	D12	D6	D16
D3	D13	D7	D17
D4	D14	D8	D18

II. To achieve the alternate sequence characteristic of the 5 channel or Teletypesetter code, wire terminal block D as follows:

From	To	From	To
D1	D15	D5	D11
D2	D14	D6	D16
D3	D13	D7	D17
D4	D12	D8	D18

Parity Check Options:

The Code Converter may be modified through patching terminal block D for various parity check options:

1) Odd Count Parity Check:
   jumper D9 to D19

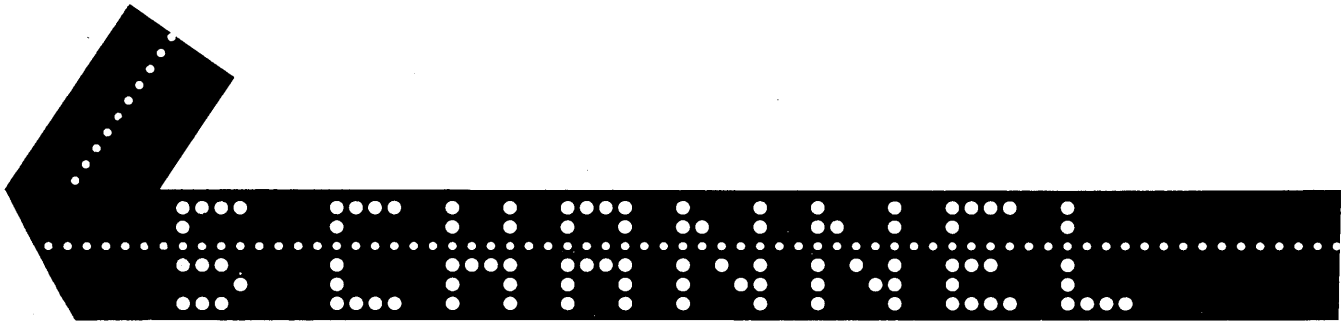
2) Even Count Parity Check:
   jumper D10 to D19

3) To Disable Parity Check:
   remove straps from D9, D10, D19

It should be pointed out that parity check will only detect malfunctions of the Code Converter's punching mechanisms and circuits. If an invalid code, which violates parity check, is present in the input tape, the parity check will not detect the fact, and the code will probably be mistranslated.

Operation of the Tape Feed switch will restore the Code Converter to a normal operating condition upon detection of a parity error.

TO



ILLUSTRATED WIRING

EIGHT CHANNEL CODE CONVERTED TO FIVE CHANNEL CODE

In this sample program, an 8 channel code produced on a standard FRIDEN SPS FLEXOWRITER will be converted to a 5 channel code for use in Teletype equipment. The specification sheets on page 17 outlines the conversion requirements.

A. Note that in the column labeled "OUTPUT TAPE", both the Upper Case (figs) and the Lower Case (ltrs) columns are used. When a symbol or function appears in the Upper Case (figs) column, it signifies that this code, when punched, should be preceeded by a figures code (1245), unless the last precedence code punched into the tape was a figures code.

In like manner, when a symbol or function appears in the Lower Case (ltrs) column, it signifies that this code, when punched, should be preceeded by a letters code (12345), unless the last precedence code punched into the tape was a letters code.

A few of the codes (Example: Space Code) appear in both columns. These codes are common to both shifts and never will require precedence codes.

B. The punching of figures and letters codes in the output tape is normally an automatic function of the Code Converter. Codes are not normally required in the 8 channel input tape to trigger the punching of these shift codes. The only exception to this would be instances where it is desirous to punch shift codes in a place where they are not required by the logic of the coding itself.

For Example: Assume the output tape is to read in a given place:

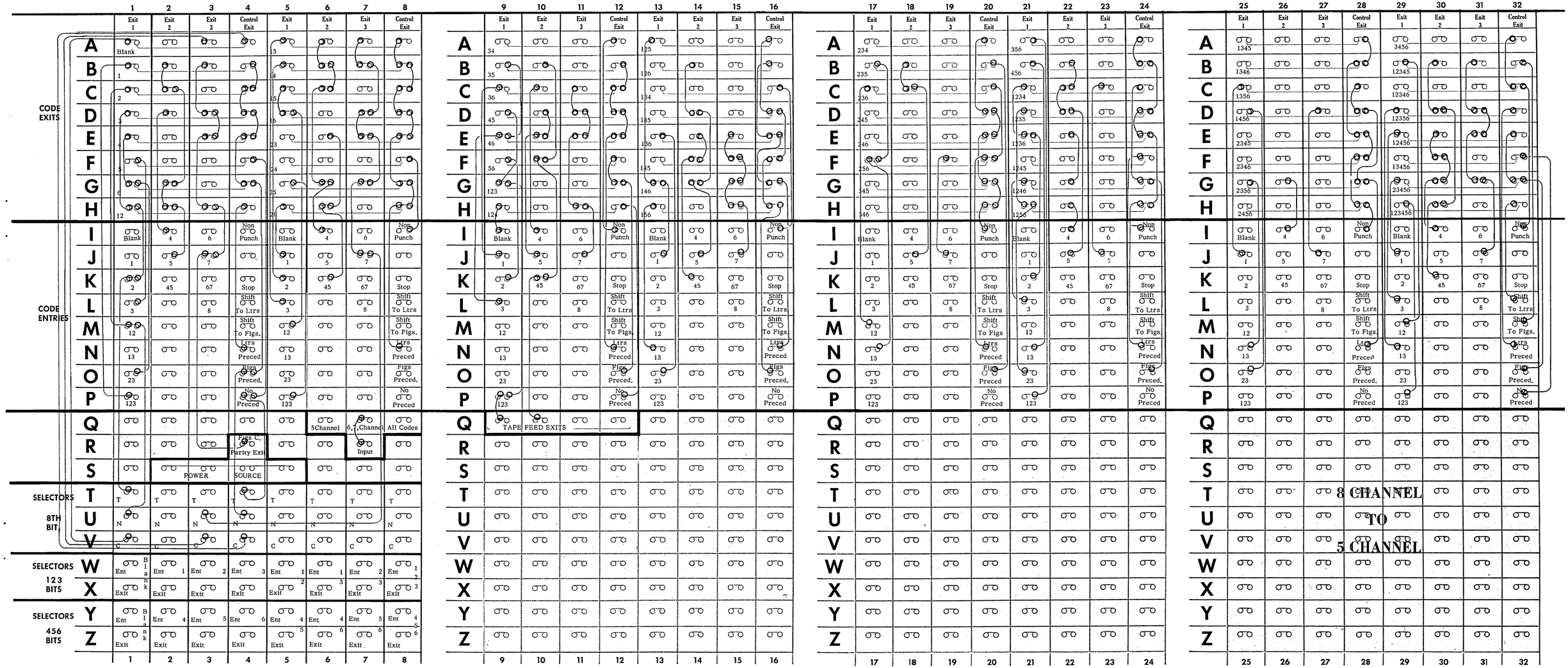
Ltrs, B, figs, tab, figs, figs

The first figs code would be automatically punched by the Code Converter. The second and third figs codes would not be automatically punched, however, since this tape has already been put in a figs condition by the first figs code. In this case, then, it would be necessary to put two codes in the 8 channel tape to trigger the punching of these extra figures codes. The code chart (illustration II) shows that the 8 channel Data Select code has been selected to cause punching of such artificial figs codes. (To avoid confusion, we will term the shift codes which must be triggered by codes in the input tape as artificial shift codes, to distinguish them from natural shift codes automatically punched by the Code Converter.) Note also that the 8 channel tape feed code (1234567) has been selected to cause punching of artificial ltrs codes. Such artificial shift codes are often required in a five channel tape for buffering purposes.

8 TO 5

CHANNEL

Chart-4


1 Exit 1
2 Exit 2
3 Exit 3
4 Control Exit
5 Exit 1
6 Exit 2
7 Exit 3
8 Control Exit
9 Exit 1
10 Exit 2
11 Exit 3
12 Control Exit
13 Exit 1
14 Exit 2
15 Exit 3
16 Control Exit
17 Exit 1
18 Exit 2
19 Exit 3
20 Control Exit
21 Exit 1
22 Exit 2
23 Exit 3
24 Control Exit
25 Exit 1
26 Exit 2
27 Exit 3
28 Control Exit
29 Exit 1
30 Exit 2
31 Exit 3
32 Control Exit
CODE EXITS
CODE ENTRIES
SELECTORS 8TH BIT
SELECTORS 123 BITS
SELECTORS 456 BITS
Blank
Non Punch
Shift To Ltrs
Shift To Figs.
Ltrs
Figs Preced.
No Preced
Stop
5Channel
6, 7, Channel
All Codes
Figs C. Parity Exit
Input
POWER SOURCE
TAPE FEED EXITS
Ent
Exit
8 CHANNEL TO 5 CHANNEL

CODE CONVERTER SPECIFICATIONS

Chart-1

Friden

COMMERCIAL CONTROLS CORPORATION

SUBSIDIARY

ONE LEIGHTON AVENUE ROCHESTER 2, N. Y.

HOME OFFICE USE ONLY	BUILD SCHEDULED	MACHINE SERIAL NO.	RELEASED BY	DATE

CUSTOMER	ADDRESS	CUSTOMER APPROVAL	DATE	PURCHASE ORDER NO.	
BRANCH OFFICE	INSTALLATION OFFICE	BRANCH APPROVAL	DATE	PREPARED BY	DATE

SPECIFICATIONS for PUNCHED TAPE CODE CONVERTER

QUANT.	MODEL	COLOR							
			READER	TAPE WIDTH	11/16" ☐	7/8" ☐	1" ☐	SPECIAL ☐	.4375 ADVANCE ☐
			PUNCH	TAPE WIDTH	11/16" ☐	7/8" ☐	1" ☐	FEED HOLE ☐	.4375 ADVANCE ☐

INPUT TAPE WILL BE FROM THE FOLLOWING EQUIPMENT (Manufacturer and Model No.)

OUTPUT TAPE WILL BE USED WITH THE FOLLOWING EQUIPMENT (Manufacturer and Model No.)

ADDITIONAL COMMENTS:

CONTROL BOARD WIRING: THE FOLLOWING CONVERSION TABLE MUST INCLUDE EVERY CODE WHICH WILL BE READ, WITH AN ASSIGNED CONVERSION CODE OR DESIGNATE THE INPUT CODE AS A "NON PUNCH" OR CONVERTER "STOP" CODE.

PARITY: ODD [X] EVEN [ ] NONE [ ] TAPE FEED CODE: FEED HOLE ONLY [ ] OTHER [ ] [ ] [ ] 1 2 · 3 4 5

CODE CONVERSION TABLE:

CODE NO.	INPUT TAPE: SYMBOL OR FUNCTION UPPER CASE (FIGS.)	INPUT TAPE: SYMBOL OR FUNCTION LOWER CASE (LTRS.)	INPUT TAPE: INDICATE CODE SEQUENCE 8 7 6 5 4 · 3 2 1	OUTPUT TAPE: INDICATE CODE SEQUENCE 1 2 · 3 4 5	OUTPUT TAPE: SYMBOL OR FUNCTION UPPER CASE (FIGS.)	OUTPUT TAPE: SYMBOL OR FUNCTION LOWER CASE (LTRS.)
1		1	· 1	1 2 · 3 5	1	
2		2	· 2	1 2 · 5	2	
3		4	· 3	2 · 4	4	
4		8	4 ·	2 · 3	8	
5		SPACE	5 ·	· 3	SPACE	SPACE
6		ZERO O	6 ·	2 · 3 5	ZERO O	
7		-	7 ·	1 2 ·	-	
8		L	7 · 2 1	2 · 5		L
9		N	7 · 3 1	· 3 4		N
10		R	7 4 · 1	2 · 4		R

DIRECTION OF TAPE

FORM NO. 1260

SPECIFICATIONS for PUNCHED TAPE CODE CONVERTER SERIAL NO.....

CODE NO.	INPUT TAPE: SYMBOL OR FUNCTION UPPER CASE (FIGS.)	INPUT TAPE: SYMBOL OR FUNCTION LOWER CASE (LTRS.)	INPUT TAPE: INDICATE CODE SEQUENCE 8 7 6 5 4 · 3 2 1	OUTPUT TAPE: INDICATE CODE SEQUENCE 1 2 · 3 4 5	OUTPUT TAPE: SYMBOL OR FUNCTION UPPER CASE (FIGS.)	OUTPUT TAPE: SYMBOL OR FUNCTION LOWER CASE (LTRS.)
11		J	7 5 · 1	1 2 · 4		J
12		A	7 6 · 1	1 2 ·		A
13		O	7 · 3 2	· 4 5		O
14		PI 2	7 4 · 2	·	UNASSIGNED	
15		K	7 5 · 2	1 2 · 3 4		K
16		B	7 6 · 2	1 · 4 5		B
17		ON 1	7 4 · 3	·	UNASSIGNED	
18		M	7 5 · 3	· 3 4 5		M
19		D	7 6 · 3	1 · 4		D
20		Q	7 5 4 ·	1 2 · 3 5		Q
21		H	7 6 4 ·	· 3 5		H
22		&	7 6 5 ·	2 · 4 5	&	
23		7	· 3 2 1	1 2 · 3	7	
24		STOP	4 · 2 1	·	STOP	STOP
25		3	5 · 2 1	1 ·	3	
26		T	6 · 2 1	· 5		T
27		SK.RS.	4 · 3 1	·	UNASSIGNED	
28		5	5 · 3 1	· 5	5	
29		V	6 · 3 1	2 · 3 4 5		V
30		9	5 4 · 1	· 4 5	9	
31		Z	6 4 · 1	1 · 5		Z
32		/	6 5 · 1	1 · 3	/	
33		CNT	4 · 3 2	·	UNASSIGNED	
34		6	5 · 3 2	1 · 3 5	6	
35		W	6 · 3 2	1 2 · 5		W
36		PI 1	5 4 · 2	·	UNASSIGNED	
37		PI 3	6 4 · 2	·	UNASSIGNED	

DIRECTION OF TAPE

SPECIFICATIONS for PUNCHED TAPE CODE CONVERTER SERIAL NO.....

CODE NO.	INPUT TAPE: SYMBOL OR FUNCTION UPPER CASE (FIGS.)	INPUT TAPE: SYMBOL OR FUNCTION LOWER CASE (LTRS.)	INPUT TAPE: INDICATE CODE SEQUENCE 8 7 6 5 4 · 3 2 1	OUTPUT TAPE: INDICATE CODE SEQUENCE 1 2 · 3 4 5	OUTPUT TAPE: SYMBOL OR FUNCTION UPPER CASE (FIGS.)	OUTPUT TAPE: SYMBOL OR FUNCTION LOWER CASE (LTRS.)
38		S	6 5 · 2	1 · 3		S
39		NON PRINT	5 4 · 3	·		UNASSIGNED
40		PRINT RES.	6 4 · 3	·		UNASSIGNED
41		U	6 5 · 3	1 2 · 3		U
42		Y	6 5 4 ·	1 · 3 5		Y
43		FORM FEED	7 4 · 3 2 1	2 · 5	FORM FEED	
44		P	7 5 · 3 2 1	2 · 3 5		P
45		G	7 6 · 3 2 1	2 · 4 5		G
46		UNASSIGNED	7 5 4 · 2 1	·		UNASSIGNED
47		.	7 6 4 · 2 1	· 3 4 5	.	
48		C	7 6 5 · 2 1	2 · 3 4		C
49		AID	7 5 4 · 3 1	·		UNASSIGNED
50		PI 5	7 6 4 · 3 1	·		UNASSIGNED
51		E	7 6 5 · 3 1	1 ·		E
52		I	7 6 5 4 · 1	2 · 3		I
53		FC ON	7 5 4 · 3 2	·		UNASSIGNED
54		ON 2	7 6 4 · 3 2	·		UNASSIGNED
55		F	7 6 5 · 3 2	1 · 3 4		F
56		UNASSIGNED	7 6 5 4 · 2	·		UNASSIGNED
57		UNASSIGNED	7 6 5 4 · 3	·		UNASSIGNED
58		DATA SELECT PUNCH OFF	5 4 · 3 2 1	1 2 · 4 5		FIGURES CODE
59			6 4 · 3 2 1	·		UNASSIGNED
60		X	6 5 · 3 2 1	1 · 3 4 5		X
61		,	6 5 4 · 2 1	· 3 4	,	
62		PI 4	6 5 4 · 3 1	· 4		CARRIAGE RETURN
63		TAB	6 5 4 · 3 2	1 · 4		TAB
64		TAPE FEED	7 6 5 4 · 3 2 1	1 2 · 3 4 5		LETTERS CODE
	CAR. RET.		8	2		LINE FEED

C. The code chart (ill. II) also shows that the 8 channel carriage return code is to cause punching of the five channel line feed code (2) and that the 8 channel PI 4 code (13456) is to cause punching of the five channel carriage return code (4). By using this system of code assignments, the 8 channel sequence: "P14, CR, CR, CR" will cause punching of the five channel sequence: "CR, LF, LF, LF." This will give compatability with Teletype standard coding practice.

D. Five channel communications code uses a different system for channel numbering than the 8 channel code. The five channel tape is numbered starting from the guide edge of the tape, "54321", whereas the 8 channel tape channels are numbered "12345678". It will be necessary to alter circuits within the converter so that the channel numbering in the punch corresponds to five channel practice.

E. The machine is modified, by patching a terminal block, for odd count parity check. It will be recalled that in the case of five channel output the parity check will be an artificial check. Channel seven is selected as the redundant channel and the seventh bit is added to all output codes which otherwise have an even number of bits. Since the tape in the punch is only 11/16" wide, the seventh punch pin will never perforate the tape.

F. For the control panel wiring of this application, refer to the first gate fold page in the rear of this manual.

G. R-7 (INPUT hub) is jumpered to Q-7 (6, 7 CHANNEL). This conditions the Code Converter to accept the Friden Systems Code as input.

H. R-4 (FIGS CODE PARITY EXIT) is jumpered to J3 (CODE ENTRY 7). This will alter the automatic figs code punching from 1245 to 12457. This is necessary to achieve compatability with the odd count parity system.

I. Those 8 channel codes which have no five channel assignment have their control exits wired to the NON PUNCH hubs. Example: the 8 channel PI 2 code (247) is wired as unassigned by connecting the CONTROL EXIT of the 24 code (F8) to the NON PUNCH hub below it I-8. Again, it must be remembered that Channel 7 is not recognized in the CODE EXITS section of the panel board. Thus the exits for the 24 code (F-5, F-6, F-7, F-8) are used for the 247 code. The 24 code, itself, will not be encountered in the input tape, as it is an invalid code.

J. Those 8 channel codes which are to punch a five channel output code are handled in the following fashion:

(1) CODE EXITS 1 and 2 are wired to the proper code entries to cause punching of the desired output code bits. Where several code exits are to impulse the same code entry hub, "LEAPFROG" wiring is employed.

Example: The 8 channel code for the numeral 1 (1) is to punch a 1235 code. CODE EXIT 1 for this code (B1) is, therefore, wired to the "123" code entry (P1). CODE EXIT 2 for this code (B2) is wired to the code entry for "5" (J2). In this case, however, a "LEAPFROG" circuit (B2 to C2 to G2 to H2 to J2) must be employed, since several CODE EXITS are to impulse the CODE ENTRY (J2).

(2) CODE EXIT 3 is only employed for adding the 7th bit to those five channel codes which otherwise would have an even number of bits. Therefore, CODE EXIT 3 for all codes with an even number of bits is wired through a "LEAPFROG" circuit to CODE ENTRY 7" below it (B3 to D3 to E3 to H3 to J3). Therefore, the assignment for the 1235 code really becomes 12357.

(3) The CONTROL EXIT of each input code must be wired to one of the following hubs: SHIFT to LTRS, SHIFT to FIGS, LTRS PRECEDENCE, FIGS PRECEDENCE, or NO PRECEDENCE.

K. Only the code that has been assigned to cause punching of artificial letters codes should be wired to SHIFT to LTRS. Since the tape feed code in the 8 channel tape (1234567) has been assigned to this function, the CONTROL EXIT for the 123456 code, (H32), is wired to SHIFT to LETTERS. Notice that exits 1 and 2 of this code are wired to punch a 12345 code.

Whenever the tape feed code is sensed in the input tape, therefore, the letters memory relay will be energized (if it is not already energized) and a 12345 code will be punched into the output tape. With this method it will be possible to interject artificial letters shift codes into the output tape as often as desired.

L. By the same token, the 8 channel code that has been selected to cause punching of artificial figs codes has its CONTROL EXIT wired to the SHIFT to FIGS hub. In this case, the Data Select Code (12345) was selected. For this reason the CONTROL EXIT of the 12345 code (B32) is wired to the SHIFT to FIGS hub below it (M32). Notice also that code exits 1, 2 and 3 are wired to cause punching of a 12457 code whenever the data select code is read. The 7 is added to the normal figs code (1245) for parity check purposes.

In a Code Converter application involving five channel output the SHIFT to LTRS and SHIFT to FIGS hubs will never be impulsed except in the case of the two codes mentioned above that are to cause punching of artificial figs and ltrs codes in the output tape.

M. The FIGS PRECEDENCE hubs will be impulsed by the CONTROL EXIT of all codes in the input tape which are to punch codes in the output tape assigned to figures shift. Example:

The 1" code in the input tape is assigned to punch figs 1235 into the output tape. As a result, the CONTROL EXIT for the 1" code (B4) is wired through a "LEAPFROG" circuit to the FIGS PRECEDENCE hub. (B4 to C4 to D4 to E4 to G4 to M4).

The result of impulsing the FIGS PRECEDENCE hub will be recalled. Whenever the 1 code is read in the tape the figs memory relay will be energized if it has not been already energized and the letters memory relay will be shut off. Furthermore, if the figs memory relay was not previously energized a figs code (12457) will be punched into the output tape. Finally, the 1235 code to which the 1 code is to be converted, will punch.

N. The LTRS PRECEDENCE hubs will be impulsed by the CONTROL EXITS of all codes in the input tape assigned to punch codes in the letters shift.

Example:

The 137 code in the input tape is assigned to punch a ltrs 34 code into the output tape. As a result, the CONTROL EXIT for the 13 code is wired through a "LEAPFROG" circuit to the LTRS PRECEDENCE hub (A8 to B8 to C8 to D8 to E8 to G8 to H8 to N8.)

The result of impulsing the LTRS PRECEDENCE hub will be recalled. Whenever the code 137 is read in the tape, the letters memory relay will be energized if it had not been already energized and the figures memory relay will be shut off. Furthermore, if the letters memory relay was not previously energized, a letters code (12345) will be punched into the output tape. Finally, the 34 code, to which the 137 code is to be converted, will punch.

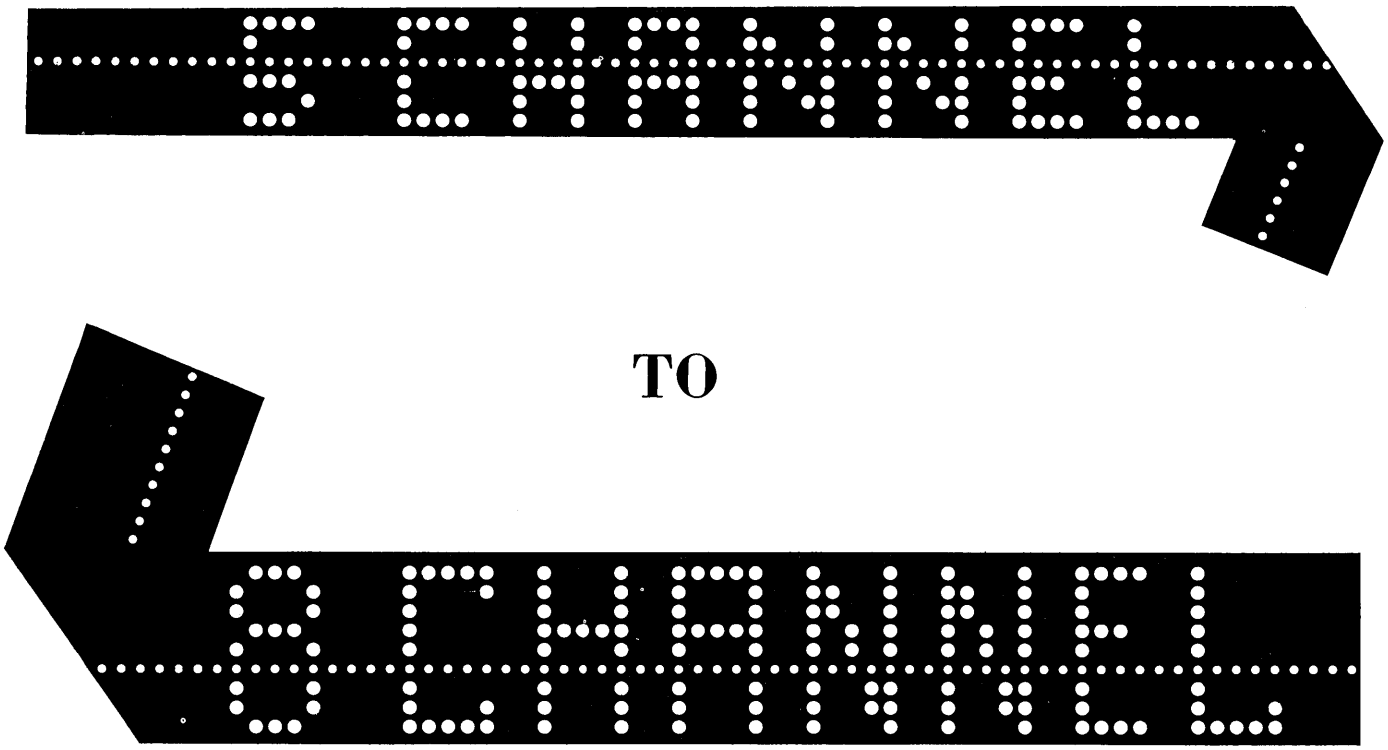
O. The NO PRECEDENCE hubs will be impulsed by the CONTROL EXIT of all codes in the input tape assigned to punch codes common to both the letters and figures shift. (The five channel space code, carriage return, line feed and stop code are such codes.) Example:

The 8 channel space code is a "5" code. It is to be converted to the five channel "3" code. CONTROL EXIT F4 for the "5" code is wired, therefore to the NO PRECEDENCE hub below it (P4) Whenever the space code is read, therefore, the memory relays will not be effected and NO PRECEDENCE code will punch.

P. Once again the code exits for the blank code are wired to the common hubs of 8TH BIT SELECTORS in order to differentiate between a hyphen and a carriage return in the input tape. (A1 to V1, A3 to V3, A4 to V4.)

The normal hubs of the 8th bit contacts are wired to the necessary code entries to cause punching of the hyphen code, Figs 12 and the transferred hubs are wired to the necessary code entries to cause punching of the five channel line feed code (2). Observe that the hyphen code is wired to FIGS PRECEDENCE (U4 to O4) and that the line feed code is wired to NO PRECEDENCE (T4 to P4).

Q. The Tape feed operation on the Code Converter should punch a 12345 code in the output tape. The TAPE FEED EXITS are wired to the correct code entries: Q1 to P1 and Q2 to K2.



ILLUSTRATED WIRING

Five Channel Code Converted to 8 Channel Systems Code

This application sample illustrates a case where a five channel tape prepared on a Teletype is converted to an 8 channel tape for use in a systems Flexowriter.

(A) The specification sheets on page 25 outlines the conversion requirements for this application.

(B) Note that in the column labeled "INPUT TAPE", both the Upper Case (figs) and the Lower Case (ltrs) columns are used. Figs indicates the figures shift assignment of a particular code and Ltrs indicates the letters shift assignment. Notice, furthermore, that those codes which are shown as being assigned to figures shift all have the 6th bit included and enclosed in parenthesis. It will be recalled that the Code Converter, when reading five channel tape, will emit impulses from a different set of code exits when a specific code combination is read in the figures shift than when that code combination is read in the letters shift. Example:

> When the 12 code combination is sensed in the letters shift, CODE EXITS H1, H2, H3 and H4 (labeled 12) will emit impulses On the other hand, when the same code combination is sensed in the figures shift, the exit hubs labeled 126 (B13, B14, B15 and B16) will emit.
>
> For this reason, the 6th bit on the code chart and on the code exits section of the control panel charts can be looked upon as meaning figures shift; whereas the absence of the 6th bit can be looked upon as meaning letters shift.

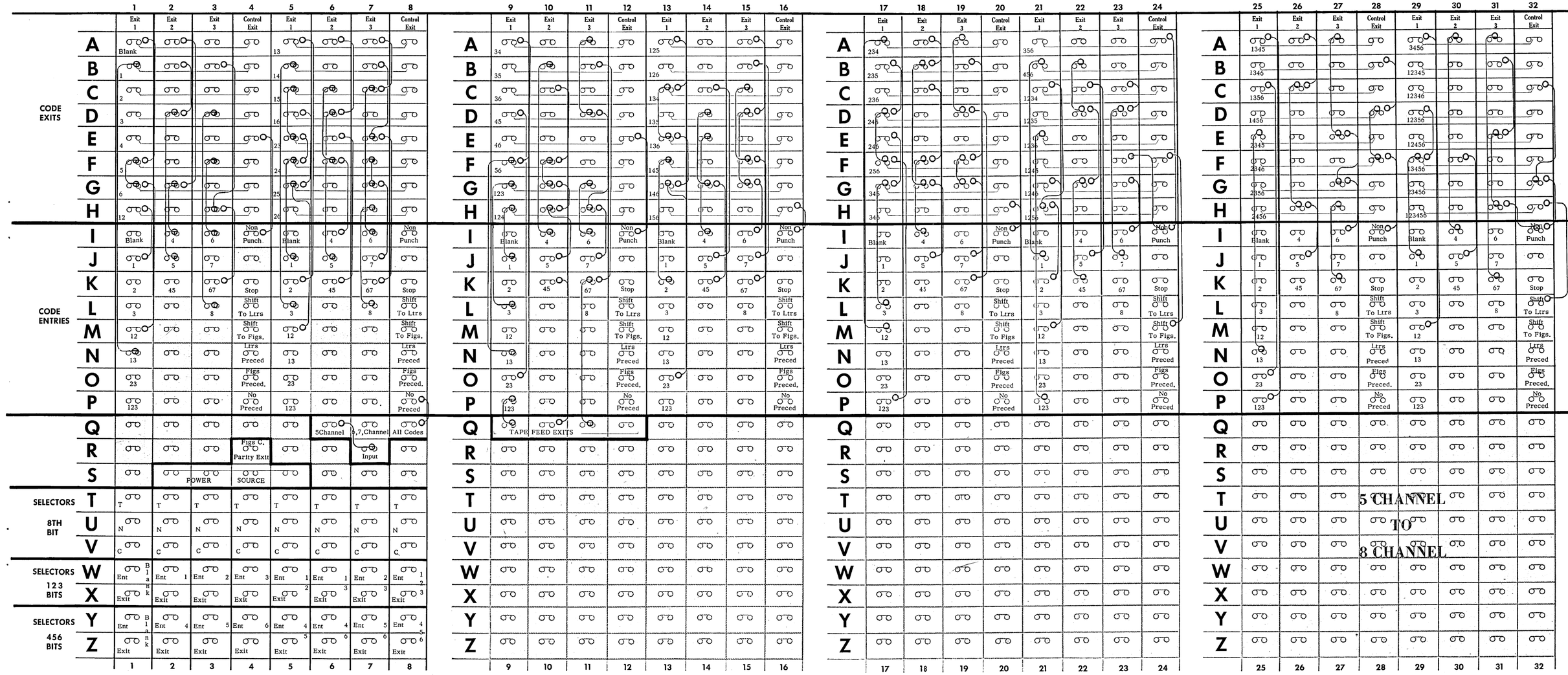
The above means that each of the 32 combinations possible in the five channel code will have two sets of code exits on the panel board, one to emit during a letters shift condition (no 6th bit), the other to emit during a figures shift condition(6th bit). This creates a small problem concerning those few five channel codes which are common to both shifts: carriage return (4), line feed (2), space (3), stop (blank), letters code (12345) and figures code (1245). These 6 code combinations have the same meaning in a five channel system whether they are read in the figures or letters shift. Thus, a letters code (12345) when read in the figures shift means "shift to letters" and when read in the letters shift means "remain in letters".

The logic of the Code Converter is such, however, that even these 6 codes which are common to both shifts, will have two sets of codes exits, one of which will emit when the Converter is in letters shift and the other to emit when the unit is in figures shift.

5 TO 8

CHANNEL

Chart-3


1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32
Exit 1
Exit 2
Exit 3
Control Exit
CODE EXITS
CODE ENTRIES
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
Blank
Non Punch
Stop
Shift To Ltrs
Shift To Figs.
Ltrs Preced
Figs Preced.
No Preced
5Channel
7,7Channel
All Codes
TAPE FEED EXITS
Figs C. Parity Exit
Input
POWER SOURCE
SELECTORS 8TH BIT
SELECTORS 123 BITS
SELECTORS 456 BITS
Ent
Exit
Blank
5 CHANNEL TO 8 CHANNEL

CODE CONVERTER SPECIFICATIONS

Chart-2

Friden

COMMERCIAL CONTROLS CORPORATION

SUBSIDIARY

ONE LEIGHTON AVENUE ROCHESTER 2, N. Y.

HOME OFFICE USE ONLY	BUILD SCHEDULED	MACHINE SERIAL NO.	RELEASED BY	DATE

CUSTOMER	ADDRESS	CUSTOMER APPROVAL	DATE	PURCHASE ORDER NO.
BRANCH OFFICE	INSTALLATION OFFICE	BRANCH APPROVAL	DATE	PREPARED BY / DATE

SPECIFICATIONS for PUNCHED TAPE CODE CONVERTER

QUANT.	MODEL	COLOR							
			READER	TAPE WIDTH	11/16" ☐	7/8" ☐	1" ☐	SPECIAL ☐	.4375 ☐ ADVANCE ☐
			PUNCH	TAPE WIDTH	11/16" ☐	7/8" ☐	1" ☐	FEED HOLE ☐	.4375 ☐ ADVANCE ☐

INPUT TAPE WILL BE FROM THE FOLLOWING EQUIPMENT (Manufacturer and Model No.)

OUTPUT TAPE WILL BE USED WITH THE FOLLOWING EQUIPMENT (Manufacturer and Model No.)

ADDITIONAL COMMENTS:

CONTROL BOARD WIRING: THE FOLLOWING CONVERSION TABLE MUST INCLUDE EVERY CODE WHICH WILL BE READ, WITH AN ASSIGNED CONVERSION CODE OR DESIGNATE THE INPUT CODE AS A "NON PUNCH" OR CONVERTER "STOP" CODE.

PARITY: ODD [X] EVEN [ ] NONE [ ] TAPE FEED CODE: FEED HOLE ONLY [ ] OTHER [7 6 5 4 • 3 2 1]

CODE CONVERSION TABLE:

CODE NO.	INPUT TAPE: SYMBOL OR FUNCTION — UPPER CASE (FIGS.)	INPUT TAPE: SYMBOL OR FUNCTION — LOWER CASE (LTRS.)	INPUT TAPE: INDICATE CODE SEQUENCE (6) 1 2 • 3 4 5	OUTPUT TAPE: INDICATE CODE SEQUENCE 8 7 6 5 4 • 3 2 1	OUTPUT TAPE: SYMBOL OR FUNCTION — UPPER CASE (FIGS.)	OUTPUT TAPE: SYMBOL OR FUNCTION — LOWER CASE (LTRS.)
1		STOP	•	4 • 2 1		STOP
2		E	1 •	7 6 5 • 3 1		E
3		LINE FEED	2 •	8 •		CAR. RET.
4		SPACE	• 3	5 •		SPACE
5		CAR. RET.	• 4	•	UNASSIGNED	
6		T	• 5	6 • 2 1		T
7	STOP		(6) •	4 • 2 1		STOP
8		A	1 2 •	7 6 • 1		A
9		S	1 • 3	6 5 • 2		S
10		D	1 • 4	7 6 • 3		D

DIRECTION OF TAPE

FORM NO. 1260

SPECIFICATIONS for PUNCHED TAPE CODE CONVERTER SERIAL NO.....

CODE NO.	INPUT TAPE: SYMBOL OR FUNCTION — UPPER CASE (FIGS.)	INPUT TAPE: SYMBOL OR FUNCTION — LOWER CASE (LTRS.)	INPUT TAPE: INDICATE CODE SEQUENCE (6) 1 2 • 3 4 5	OUTPUT TAPE: INDICATE CODE SEQUENCE 8 7 6 5 4 • 3 2 1	OUTPUT TAPE: SYMBOL OR FUNCTION — UPPER CASE (FIGS.)	OUTPUT TAPE: SYMBOL OR FUNCTION — LOWER CASE (LTRS.)
11		Z	1 • 5	6 4 • 1		Z
12	3		(6) 1 •	5 • 2 1		3
13		I	2 • 3	7 6 5 4 • 1		I
14		R	2 • 4	7 4 • 1		R
15		L	2 • 5	7 • 2 1		L
16	LINE FEED		(6) 2 •	8 •		CAR. RET.
17		N	• 3 4	7 • 3 1		N
18		H	• 3 5	7 6 4 •		H
19	SPACE		(6) • 3	5 •		SPACE
20		O	• 4 5	7 • 3 2		O
21	CAR. RET.		(6) • 4	•	UNASSIGNED	
22	5		(6) • 5	5 • 3 1		5
23		U	1 2 • 3	6 5 • 3		U
24		J	1 2 • 4	7 5 • 1		J
25		W	1 2 • 5	6 • 3 2		W
26	-		(6) 1 2 •	7 •		-
27		F	1 • 3 4	7 6 5 • 3 2		F
28		Y	1 • 3 5	6 5 4 •		Y
29	BELL		(6) 1 • 3	4 • 3 2		CNT.
30		B	1 • 4 5	7 6 • 2		B
31	TAB		(6) 1 • 4	6 5 4 • 3 2		TAB
32			1 • 5	•	UNASSIGNED	
33		C	2 • 3 4	7 6 5 • 2 1		C
34		P	2 • 3 5	7 5 • 3 2 1		P
35	8		(6) 2 • 3	4 •		8
36		G	2 • 4 5	7 6 • 3 2 1		G
37	4		(6) 2 • 4	• 3		4

DIRECTION OF TAPE

SPECIFICATIONS for PUNCHED TAPE CODE CONVERTER SERIAL NO.....

CODE NO.	INPUT TAPE: SYMBOL OR FUNCTION — UPPER CASE (FIGS.)	INPUT TAPE: SYMBOL OR FUNCTION — LOWER CASE (LTRS.)	INPUT TAPE: INDICATE CODE SEQUENCE (6) 1 2 • 3 4 5	OUTPUT TAPE: INDICATE CODE SEQUENCE 8 7 6 5 4 • 3 2 1	OUTPUT TAPE: SYMBOL OR FUNCTION — UPPER CASE (FIGS.)	OUTPUT TAPE: SYMBOL OR FUNCTION — LOWER CASE (LTRS.)
38	FORM FEED		(6) 2 • 5	7 4 • 3 2 1		FORM FEED
39		M	• 3 4 5	7 5 • 3		M
40	,		(6) • 3 4	6 5 4 • 2 1		,
41	#		(6) • 3 5	•		UNASSIGNED
42	9		(6) • 4 5	5 4 • 1		9
43		K	1 2 • 3 4	7 5 • 2		K
44		Q	1 2 • 3 5	7 5 4 •		Q
45	7		(6) 1 2 • 3	• 3 2 1		7
46	FIGS CODE	FIGS CODE	1 2 • 4 5	•		UNASSIGNED
47	,		(6) 1 2 • 4	6 5 4 • 2 1		,
48	2		(6) 1 2 • 5	• 2		2
49		X	1 • 3 4 5	6 5 • 3 2 1		X
50	1/4		(6) 1 • 3 4	•		UNASSIGNED
51	6		(6) 1 • 3 5	5 • 3 2		6
52	5/8		(6) 1 • 4 5	•		UNASSIGNED
53		V	2 • 3 4 5	6 • 3 1		V
54	1/8		(6) 2 • 3 4	•		UNASSIGNED
55	ZERO 0		(6) 2 • 3 5	6 •		ZERO 0
56	&		(6) 2 • 4 5	7 6 5 •		&
57			(6) • 3 4 5	7 6 4 • 2 1		.
58		LTRS CODE	1 2 • 3 4 5	•		UNASSIGNED
59	1/2		(6) 1 2 • 3 4	•		UNASSIGNED
60	1		(6) 1 2 • 3 5	• 1		1
61	FIGS CODE		(6) 1 2 • 4 5	•		UNASSIGNED
62	/		(6) 1 • 3 4 5	6 5 • 1		/
63	3/8		(6) 2 • 3 4 5	•		UNASSIGNED
64	LTRS CODE		(6) 1 2 • 3 4 5	•		UNASSIGNED

Example: The letters code (12345) will cause the CODE EXIT hubs labeled 12345, (B29, B30, B31, B32), to emit impulses if it is sensed when the Converter is already in the letters condition. If the letters code is sensed with the Converter in the figures condition, the code exits labeled 123456, (H29, H30, H31, H32), will emit impulses.

In the case of these codes, which are common to both shifts, it will be necessary to wire both the hubs which emit during letters shift and the hubs which emit during figures shift to identical code entry hubs, so that the same output result will occur in both instances.

(C) Observe that the five channel carriage return code is unassigned in the 8 channel output tape and that the five channel line feed code is assigned to punch a carriage return code into the output tape. Thus the five channel combination "CAR RET, LF, LF, LF", will give the combination CAR-RET, CAR RET, CAR RET in the output tape.

(D) Since the channel numbering system for the five channel code differs from the channel numbering system for 8 channel tape, it will be necessary to alter circuits within the Code Converter so that the numbering system in the reader complies with 5 channel practice. This rewiring is accomplished in a terminal block within the machine. Page 13 gives the wiring instructions.

(E) The second gate fold page in the rear of this manual shows the control panel wiring for this application. The following show be noted:

(F) The INPUT hub (R7) is wired to the "5 CHANNEL" (Q6). This will condition the Code Converter to read five channel tape. The basic result of this connection is that the 6th bit in the CODE EXITS section of the panel board no longer indicates a punch in channel six, but rather indicates "figs shift".

(G) Once more, the machine is patched, through a terminal block to check odd parity, characteristic of the 8 channel systems code.

(H) ALL CODES (Q8) is wired to NO PRECEDENCE (P8). This indicates to the Code Converter that there are to be no precedence codes punched into the output tape. It should be remembered that the PRECEDENCE hubs refer to the punching of precedence codes and have no effect on the reading of precedence codes.

(I) The wiring of the exits for the letters shift code and the figures shift code should be noted:

The letters shift code (12345) has two sets of code exits. One set labeled "12345" will emit whenever the letters shift code is sensed with the Converter already in letters shift (B29, B30, B31, B32). The other set, labeled "123456" will emit impulses whenever the Converter reads the letters code while in figs shift (H29, H 30, H31, H32). In like fashion, there are two sets of exits for the Figures Shift code, one labeled "1245" (F21, F22, F23, F24) the other is labeled "12456", (E29, E30, E31, E32).

Neither of the shift codes is to cause punching when read. It is necessary to wire all four sets of exits, therefore, to the NON PUNCH hubs. It must be remembered that any code which is not to punch an output code must be wired to NON PUNCH. If it is not, the Code Converter will stop when the code is read. In the case of the shift code combinations CODE EXIT 3 has been wired in each case to the NON PUNCH hub (B31, E31, H31, and F23). EXIT 3 is used because EXIT 4, CONTROL EXIT, will be used for another purpose.

Although the shift codes are not to punch output codes, they will be used in the input tape to energize and shut off the figs and letters memory relays. For this reason the CONTROL EXIT of the 123456 exit set is wired to the SHIFT to LTRS hub (H32 to L32). The CONTROL EXIT of the 1245 combination is wired to SHIFT to FIGS (F24 to M24). Notice that it is necessary to wire only two of the four sets of CODE EXITS for the shift codes to the SHIFT entries. The exits labeled "12345" and "12456" are not so wired. The reason is that these are the exits for the letters code sensed with the Code Converter already in a letters condition and for the figures code sensed with the Converter already in a figures condition. Under these conditions there is no reason to impulse SHIFT entries, since the Converter is already in the proper shift.

In short, the shift codes when read act in the following manner:

(1) They punch no output code.

(2) When the letters code is sensed, with the Code Converter in the figures shift, it will cause the letters memory relay to be energized and the figures memory relay to be shut off.

(3) When the figures code is sensed with the Converter in the letters shift, the figures memory relay will be energized and the letters memory relay will be shut off.

It must be remembered that the condition of these shift memory relays will determine whether a code read emits from its normal exit hubs (absence of the 6th bit) or from the figures exit hubs (presence of 6th bit).

(J) The actual wiring of the conversion is quite straightforward. Those CODE EXITS which are not to punch output codes are wired to the NON PUNCH hubs. Those CODE EXITS which are to punch output codes are wired to the proper code entries in the conventional manner.

(K) The wiring of the five channel line feed code (2) should be noted. Like all codes, this has two sets of exits, a letters exit, labeled "2" (C1, C2, C3, C4) and a figures exit labeled "26" (H5, H6, H7, H8). Since the line feed code is common to both shifts, both sets of exits are wired identically. Since the line feed code is to cause punching of the 8 channel carriage return code (8), exit hub 3 in both cases is wired to the code entry hub labeled 8 (C3 to L3 and H7 to L7). Thus, whenever the line feed (2) code is sensed, a carriage reutrn (8) will be punched.

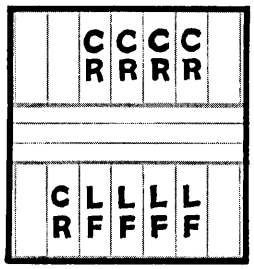
OPTIONAL FEATURES

AUTOMATIC LINE FEED

The automatic line feed feature is intended for applications of the Code Converter which involve a conversion to 5-channel Teletype coding. Through the use of this feature it is possible to generate a Teletype carriage return code (4) followed by a line feed code (2) whenever a carraige return code is sensed in the input tape. Furthermore, in the event that several consecutive carriage return codes are sensed in the input tape, only the first of the series will cause this carriage return line-feed combination to be generated in the output tape. Succeeding carriage return codes in the input tape will cause single line feed codes to be punched into the output tape, thus conforming to standard Teletype practice.

e.g.: Input Tape

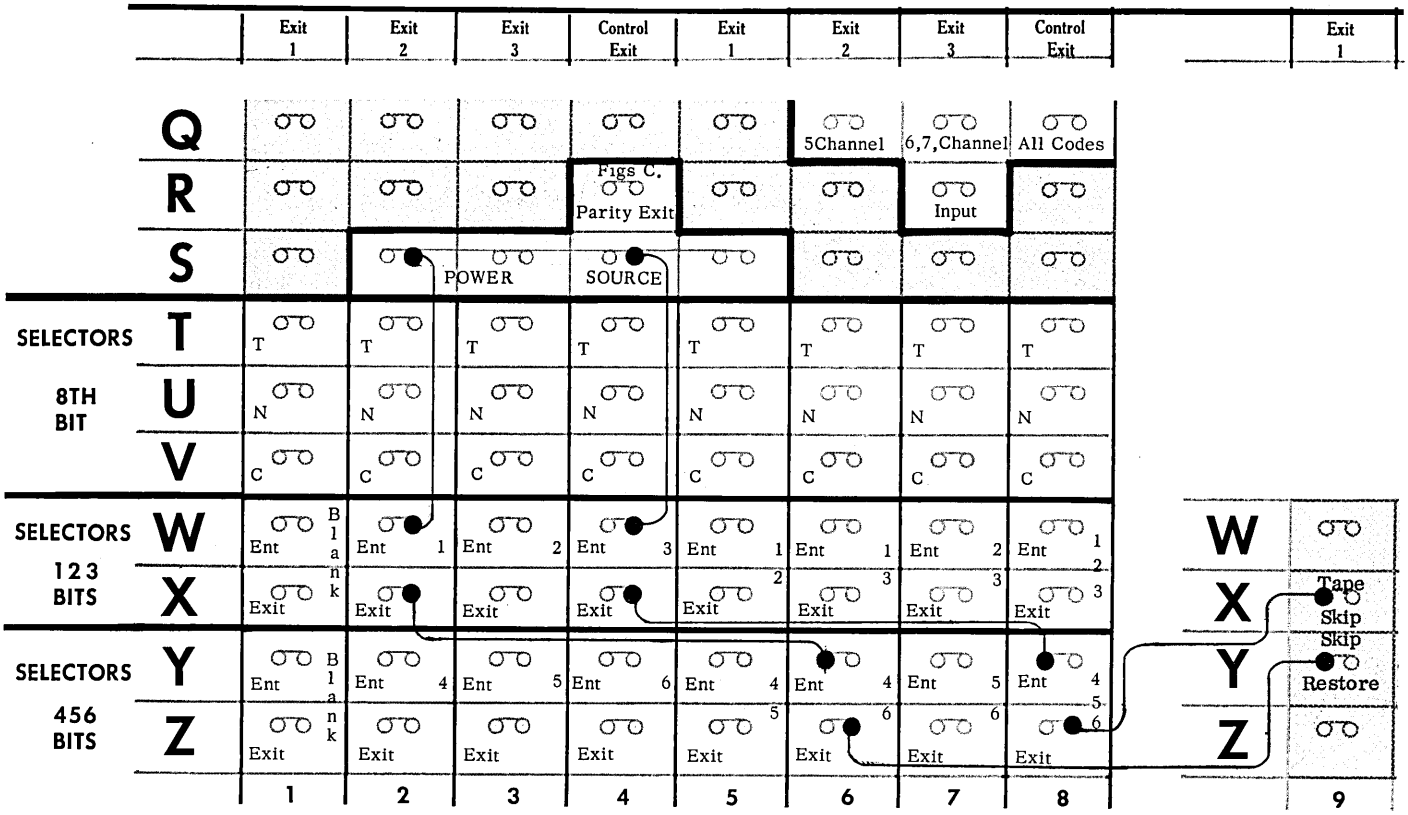
Output Tape



The attached control panel chart illustrates the wiring for this feature. In the illustration the 12 code combination in the input tape is to be considered the carriage return code. Note that Code Exit 1 for the 12 combination (H1) is wired to the Code Entry labeled "2" (K1). Thus, whenever a 12 code is sensed in the input tape, a 2 code (line-feed) will be punched into the output tape. Notice, furthermore, that the CONTROL EXIT hub for the 12 combination (H4) is wired to the entry hub labeled "AUTO L.F." (J-4) . The impulsing of this AUTO LINE FEED hub will cause a 4 code (carriage-return) to be punched into the output tape prior to the punching of the 2 code (line-feed). If, however, there are several combinations in a series in the input tape, the 4 code will be automatically generated before the first one only.

The AUTO LINE FEED hub appears not only at J4 but also at J8, J12, J16, J20, J-24, J-28 and J32. This is done merely for convenience as it eliminates the need for lengthy wires stretching across the control panel.

It should be noted, furthermore, that although the application involves the punching of 5-channel tape, it is necessary not to impulse the NO PRECEDENCE hub when punching the carriage return, line feed combination, as might be expected.



an output code. If it were required that the Skip Restore code punch an output code the CODE EXITS (G13, 14, 15) would be wired to the proper CODE ENTRIES in the standard fashion and the CONTROL EXIT (G16) would be wired to the proper functional entry (FIGS PRECEDENCE, LTRS PRECEDENCE, or NO-PRECEDENCE). Of course, if jumper connection P8-Q8 were made (ALL CODES - NO PRECEDENCE), it would not be necessary to wire the control exit to a functional entry hub.

In the case of the Tape Skip code (3456), it was not necessary to wire the CONTROL EXIT (A32) to a NON-PUNCH hub. Since the Tape Skip code can never cause punching of an output code this is accomplished by internal wiring.

INTERMESSAGE GAP GENERATOR

This feature is intended for applications of the Code Converter which involve a conversion to the RCA 501 code. The required format for tapes that are to be input to the 501 Computer is such that there must be gaps of from 7 to 10 blank codes (feed hole only) at specific locations in the tape.

The Intermessage Gap Generator allows individual codes in the input tape to trigger the punching of from 7 to 10 blank codes. The input code that causes the gap to be generated may or may not itself be converted to an output code prior to the punching of the gap, depending on the requirements of the application. In order for the gap to be generated, an entry hub labeled "GAP ENT." must be impulsed from the CONTROL EXIT of the input code combination selected. The GAP ENTRY hub is found at O 3, O 7, O 11, O 15, O 19, O 23, O 27, and O 31. The following example illustrates the control panel wiring:

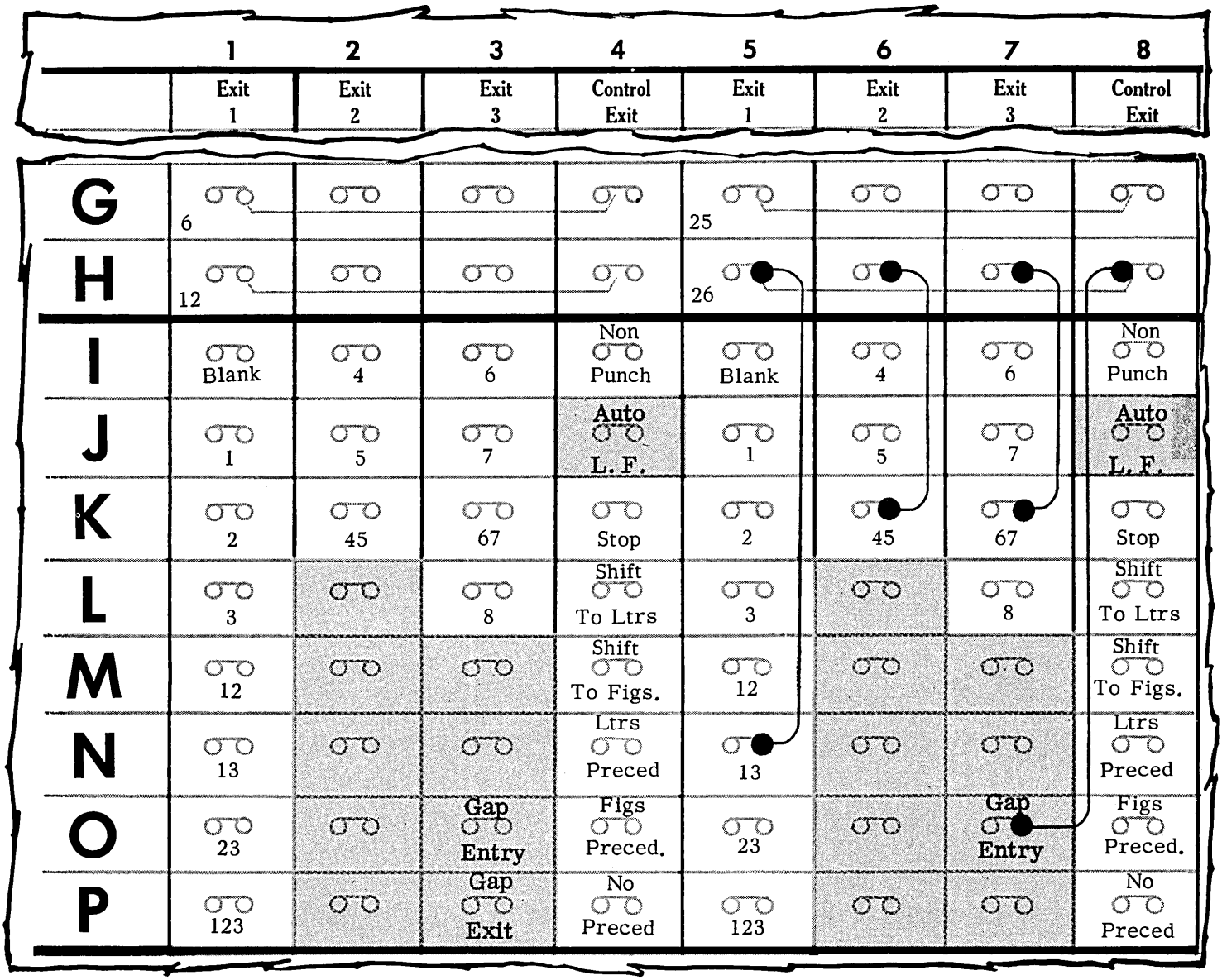
In this example a 26 code in the input tape is to be converted to a 134567 code followed by the Intermessage Gap. The CODE EXITS for the 26 code (H5, H6, H7,) are wired to the proper code entries to cause punching of the 134567 code in the standard fashion. The CONTROL EXIT for the 26 code (H8) is wired to the GAP ENTRY hub below it (07). This is all that is required for the desired effect to occur.

There is an additional hub in position P3 labeled "GAP EXIT". The purpose of this hub is to make it possible to impulse the NON-PUNCH hub if the code in the input tape that triggers the gap generation is not to cause punching of an output code.

If such is to be the case the normal CODE EXITS for this input code would be left unwired, and the GAP EXIT hub (P-3) would be wired to NON-PUNCH (I4). Of course, the CONTROL EXIT for the input code would still be wired to a GAP ENTRY hub.

It is assumed that whenever the Intermessage Gap feature is employed, since the output code will be the seven channel RCA code, the jumper P8-Q8 (ALL CODES-NO PRECEDENCE) will have been made. As a result there will be no need to impulse the NO PRECEDENCE hub if the input code that triggers gap generation is to punch an output code. In theory, if the P8-Q8 jumper were not made, it would then be necessary to impulse the NO-PRECEDENCE hub. In this theoretical instance, the GAP EXIT hub (P-3) could be wired to the NO PRECEDENCE hub (P4). (See Operating Specifications, pages 8-9).

It is possible to have several different input codes trigger gap generation provided the following limitation is observed. The codes that trigger gap generation must either all punch output codes or not punch output codes. It is not possible to have



some cause punching of output codes and others not. For this reason, there is only one GAP EXIT hub on the control panel, whereas there are eight GAP ENTRY hubs. This one GAP EXIT hub serves all codes that trigger gap generation.

SPECIAL SELECTORS

It is possible to equip the Code Converter with from one to three Special Selectors. These are designated as Special Selector 1, 2, and 3. Their purpose is to make it possible for specific codes in an input tape to selectively cause one of two alternate output results depending on their location in the tape. Inasmuch as Special Selector 1 functions somewhat differently from Selectors 2 and 3, we will discuss Selector 1 separately from the others.

Special Selector 1 can be found on the control panel in the section defined by vertical columns 13-16 and horizontal columns Q-T. The following control hubs are utilized.

(1) PICK ENTRY (Q13)

This hub is impulsed from one of the 64 CONTROL EXITS in the CODE EXITS section of the Control Panel. Once the PICK ENTRY hub has been impulsed, the selector is said to be in an energized condition. The input code that is used to pick, or energize, the selector may also be wired to punch an output code. This is accomplished by wiring CODE EXITS 1, 2, and 3 of the code selected to the proper CODE ENTRIES.

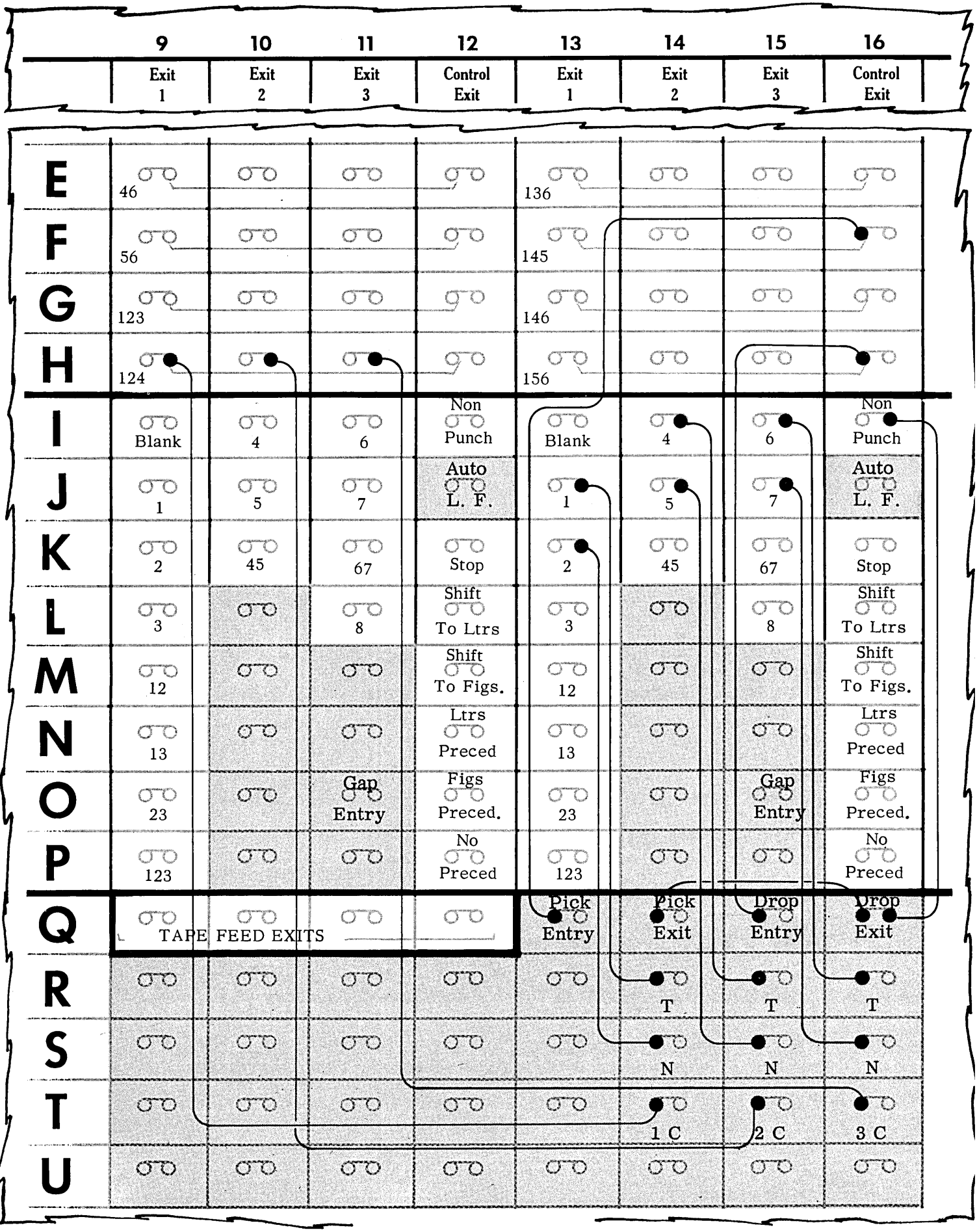
(2) PICK EXIT (Q14)

The PICK EXIT hub makes it possible to impulse one of the functional entry hubs when the input code that picks the selector is sensed. Normally these functional entries would be impulsed from the CONTROL EXIT for that input code. Since the CONTROL EXIT, in this case, has been used to impulse the PICK ENTRY hub, an alternate hub, PICK EXIT, has been provided for this purpose.

The PICK EXIT hub could be wired to the NON-PUNCH, FIGS PRECEDENCE, LTRS-PRECEDENCE, SHIFT-TO-LTRS, or SHIFT-TO-FIGS, depending on the nature of the input code. If the input code that picks the selector is not to cause punching of an output code, the PICK EXIT hub must be wired to the NON-PUNCH hub. If, on the other hand, the code that picks the selector is to punch an output code and the jumper connection P8-Q8 (ALL CODES-NO-PRECEDENCE) has been made, PICK EXIT may be left unwired.

(3) DROP ENTRY (Q15)

This hub is impulsed from one of the 64 Control Exits in the Code Exits section of the Control Panel in exactly the same way that the PICK ENTRY



SPECIAL SELECTOR 1

hub is impulsed. When the DROP ENTRY hub is impulsed, the selector will become de-energized if it had previously been energized. Thus, it can be concluded that Special Selector 1 has two possible states, an energized and a de-energized state. If the PICK ENTRY hub is impulsed, the selector will be energized, and it will remain energized until the DROP ENTRY hub is impulsed.

(4) DROP EXIT (Q16)

The DROP EXIT hub serves the same purpose in relation to the DROP ENTRY hub that the PICK EXIT hub serves in relation to the PICK ENTRY hub. It is used to impulse one of the functional entry hubs when the code that "drops" the selector is read. If this code is not to punch an output code, DROP EXIT must be wired to NON-PUNCH.

If the code is to punch an output code and jumper connection P8-Q8 (ALL CODES-NO-PRECEDENCE) has been made, DROP EXIT should be left unwired. If jumper connection P8-Q8 has not been made, the DROP EXIT must then be wired to either FIGS-PRECEDENCE, LTRS-PRECEDENCE NO PRECEDENCE, SHIFT-TO-FIGS, or SHIFT-TO-LTRS.

(5) SWITCHING HUBS

In the section of the control panel defined by vertical columns 14-16 and horizontal columns R-T, there are three sets of hubs called switching hubs. Each set has three hubs labeled "C" (common), "N" (normal) and "T" (transferred). When the selector is de-energized, there is an internal connection between each COMMON hub and the NORMAL hub immediately above it. When the selector becomes energized, these connections are broken, and a new connection is established between the COMMON hubs and their associated TRANSFERRED hubs.

The COMMON hubs should be considered entry hubs and are to be connected through control panel wires to exit hubs in the CODE EXITS section of the control panel.

The NORMAL and TRANSFERRED hubs should be considered exit hubs and are to be connected to entry hubs in the CODE ENTRIES section of the control panel. The wiring shown on the attached control panel diagram illustrates how the above principles might be applied.

Notice that the CONTROL EXIT for the 145 code (F16) is wired to the PICK ENTRY hub (Q13). Thus, whenever a 145 code is sensed in the input tape, Special Selector 1 will be energized. Notice also that the CONTROL EXIT for the 156 code (H16) is wired to the DROP ENTRY hub (Q15). Thus, a 156 code will de-energize the selector. Notice, furthermore, that the PICK EXIT and DROP EXIT hub is also connected to a NON-PUNCH hub (Q16-I16). Thus, neither the code that "picks" the selector nor the code that "drops" the selector is to punch output codes.

You will observe that the three CODE EXITS for the 124 code are wired to the three COMMON hubs of Special Selector (H9-T16 H10-T15, H11-T16). The NORMAL hubs of Special Selector 1 are connected to the proper CODE ENTRIES to cause punching of a 257 code (S14-K13, S15-J14, S16-J15). The TRANSFERRED hubs of Special Selector 1 are connected to the proper CODE ENTRIES to cause punching of a 146 code (R14-J13, R15-I14, R16-I15). Thus, a 124 code in the input tape will punch either a 257 code or a 146 code in the output tape depending on whether or not Special Selector 1 is energized at the time the code is read.

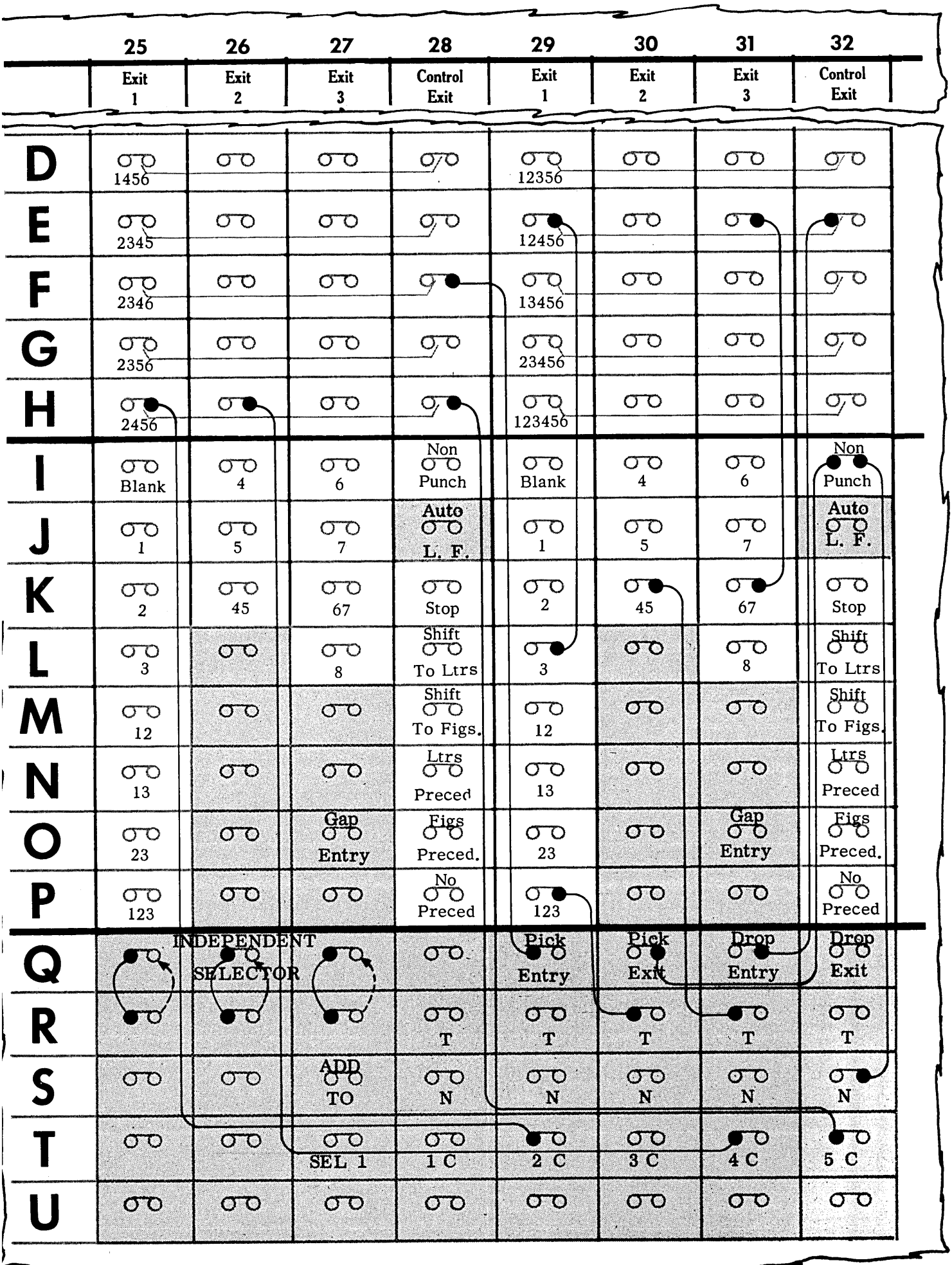
Special Selectors 2 and 3 can be found in that section of the control panel defined by horizontal columns Q-T and vertical columns 17-32.

Notice that each has PICK ENTRY, PICK EXIT, DROP ENTRY, and DROP EXIT hubs. These function in exactly the same manner as the corresponding hubs on Special Selector 1. Notice, however, that Special Selector 2 and 3 each have five sets of switching hubs rather than three as was true of Special Selector 1.

Special Selectors 2 and 3 can be used in two different manners. They can be used as independent selectors with their own "pick" and "drop" codes or they can be used as extentions of Special Selector 1.

In the case of Special Selector 2, for example, there is a set of three jumper connections labeled "INDEPENDENT SELECTOR" (Q17-R17, Q18-R18, Q19-R19). If these connections are made as indicated, Special Selector 2 becomes an independent selector and is to be energized and de-energized from its own "pick" and "drop" codes or they can be used as extentions of Special Selector 1.

In the case of Special Selector 2, for example, there is a set of three jumper connections labeled "INDEPENDENT SELECTOR" (Q17-R17, Q18-R-18, Q19-R19). If these connections are made as indicated, Special Selector 2 becomes an independent selector and is to be energized and de-energized from its own "pick" and "drop" codes. If such be the case, only switching hubs 3, 4, and 5 may ever be used for code switching. Switching hubs 1 and 2 are marked with diagonal lines on the control panel layout chart to indicate that they may not be employed if the selector is wired for independent operation.



SPECIAL SELECTOR 2

There is another jumper connection labeled "ADD TO SEL 1" associated with Special Selector 2(T19-S19). If this connection is made as indicated, the PICK and DROP hubs associated with the selector are not usable and the selector will be energized and de-energized by the same codes that "pick" and "drop" Special Selector 1. In other words, Special Selector 2 becomes an extention of Special Selector1.

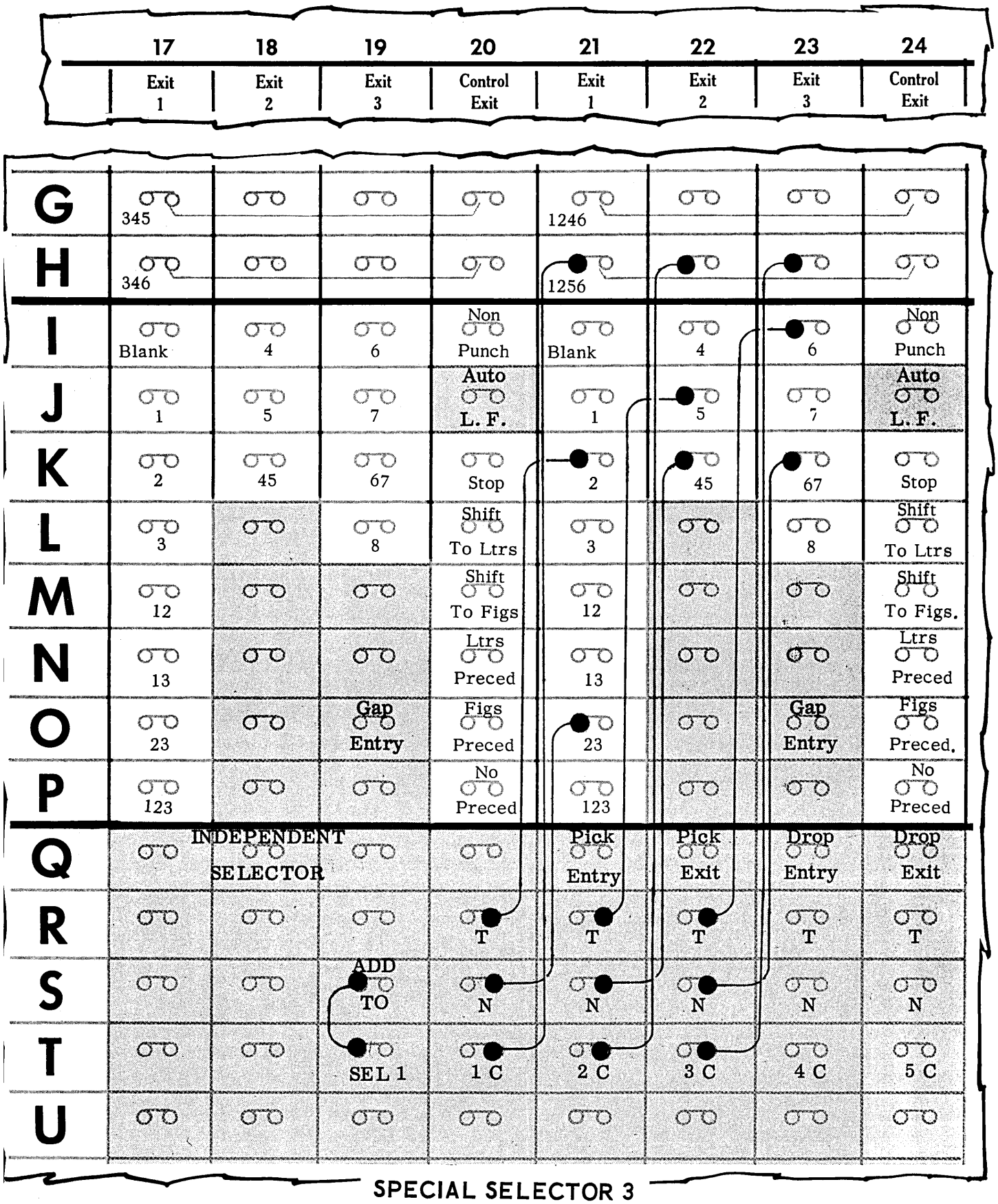
If such be the case, all five of the switching hubs associated with the selector become usable. Furthermore, if both Special Selector 2 and 3 are added to Selector 1, the selector has 13 usable switching hubs. This will allow the switching of several codes through the selector. The attached control panel diagram illustrates the use of Special Selector 2 as an addition to Selector 1 and shows the use of Special Selector 3 as an independent selector.

In the case of Special Selector 2, notice that jumper connection S19-T19 is made (ADD TO SEL 1). Thus, since Selector 1 is energized by a 16 code and de-energized by a 156 code, Special Selector 2 will be energized and de-energized in similar fashion. Notice, furthermore, that the CODE EXITS for the 1256 code (H21, 22 and 23) are connected to the COMMON hubs of Special Selector 2. The NORMAL hubs of the Selector are connected to the proper CODE ENTRIES to cause punching of a 234567 code and the TRANSFERRED hubs are connected to the CODE ENTRIES that cause punching of a 256 code. Thus, whenever a 1256 code is read in the input tape, it will cause punching of a 234567 code if Selector 1 is de-energized. If it is energized, a 256 code will be punched. Although switching hubs 4 and 5 were not employed in this illustration, they could have been if the application required.

Special Selector 3 in the attached control panel diagram is wired for independent operation. Observe that jumper connections R25-Q25, R26-Q26, R-27-Q-27 (INDEPENDENT OPERATION) have been made. Notice that the 2346 code in the input tape is to energize the selector. The CONTROL EXIT for this code (F28) is wired to the PICK ENTRY (Q29). The PICK EXIT (Q30) is wired to a NON-PUNCH hub (132). Thus, the "pick" code (2346 is not to cause punching of an output code.

The CONTROL EXIT for the 12456 code (E32) is connected to the DROP ENTRY hub of Special Selector 3 (Q31). Observe that CODE EXITS 1 and 3 of the 12456 code (E29, E31) are wired to CODE ENTRIES L29 and K31 to cause punching of a 367 code. The DROP EXIT (Q32) is left unwired since jumper connection P32-Q32 (ALL CODES-NO PRECEDENCE) has been made.

Thus, Special Selector 3 will be energized whenever a 2346 code is read. The 2346 code will not cause punching of an output code. The Selector will be de-energized by a 12456 code which will also cause punching of a 367 code.



SPECIAL SELECTOR 3

Notice that CODE EXITS 1 and 2 and the CONTROL EXIT of the 2456 code (H25, 26, 28) are connected to COMMON hubs 3, 4, 5 of Special Selector 3. Switching hubs 1 and 2 cannot be employed, since the selector is wired for independent operation. NORMAL hub 5 (S32) is wired to a NON-PUNCH hub (I-32) whereas NORMAL hubs 3 and 4 are left unwired. This indicates that the 2456 will not cause punching of an output code when it is read with the selector in a de-energized state

The TRANSFERRED hubs of Special Selector 3 are wired to CODE ENTRY hubs to cause punching of a 12345 code. Thus, if a 2456 code is read with the selector in an energized state, a 12345 code will be punched.

COMPATABILITY OF OPTIONAL FEATURES

The Punched Tape Code Converter may be equipped with a full compliment of optional features if desired. This full compliment would include Automatic Line Feed Tape Skip, Intermessage Gap Generator and Special Selectors 1, 2, and 3.

A question arises, however, as to what extent several of the above functions can be triggered from a single input code. For example, could one input code act as both a Skip Restore Code and energize a Special Selector? The following is a discussion of this problem:

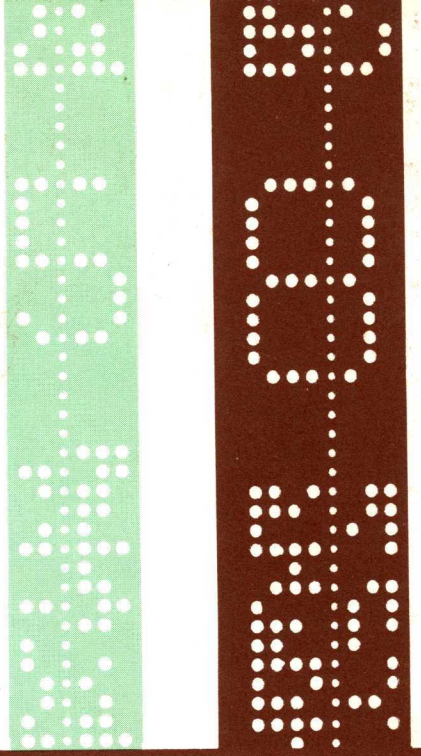
(A) Since the Automatic Line Feed feature is characteristic of the five channel Teletype code and the Intermessage Gap is characteristic of the RCA code, the design of the two features does not allow their simultaneous use.

(B) Since the code that is used as a Tape Skip code cannot also cause punching of an output code, it may not be used to generate an Intermessage Gap or to cause Automatic Line Feed.

(C) With the exception of the above, all other features are compatible. The following methods should be employed for control panel wiring when several of the optional functions are to be triggered from one input code.

(1) If the combination of features in question involves neither Tape Skip nor Skip Restore, the impulse available from the Control Exit of the input code should be routed to the various functional entry hubs (GAP ENTRY, AUTO L. F., PICK ENTRY, DROP ENTRY).

(2) If the combination of features in question does involve either Tape Skip or Skip Restore, the CONTROL EXIT of the input code cannot be used to impulse the various functional entry hubs. Rather the power available from the SELECTORS BITS 123-456 must be employed. The reason for this is that during a Tape Skip condition, no power is available from the CONTROL EXITS of the various input codes. Illustration 2 shows how a given input code (1356) will cause Skip Restore and also energize Special Selector 1. Observe that POWER SOURCE (S5) is routed through the proper SELECTORS-BITS 123-456 to create an output whenever a 1356 code is sensed. This output is wired to SKIP RESTORE (Y9) which is in turn wired to PICK ENTRY(Q13). DROP EXIT (Q14) is wired to NON-PUNCH (I12), since no output code is to be punched.



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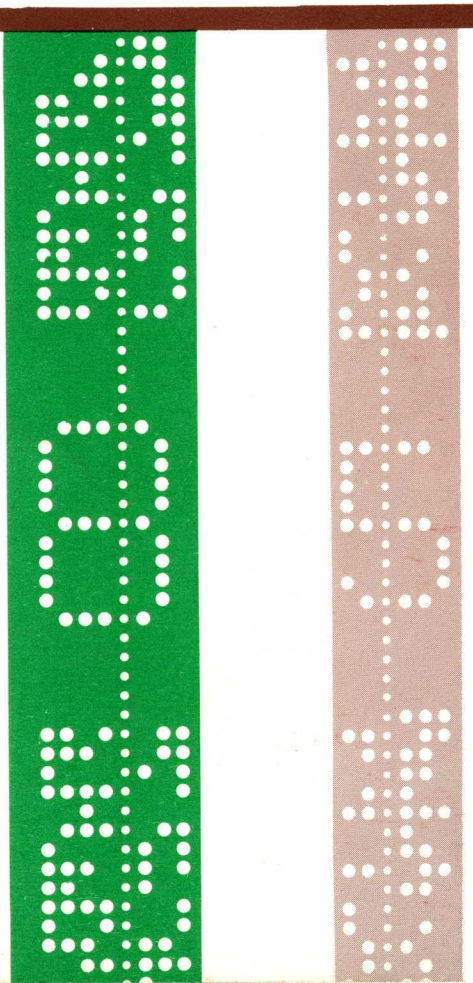

SP-8763

PRINTED IN U.S.A.