Preliminary Edition

DATATRON
ELECTRONIC DATA PROCESSING SYSTEMS

HANDBOOK

CARD CONVERTER
Model 500
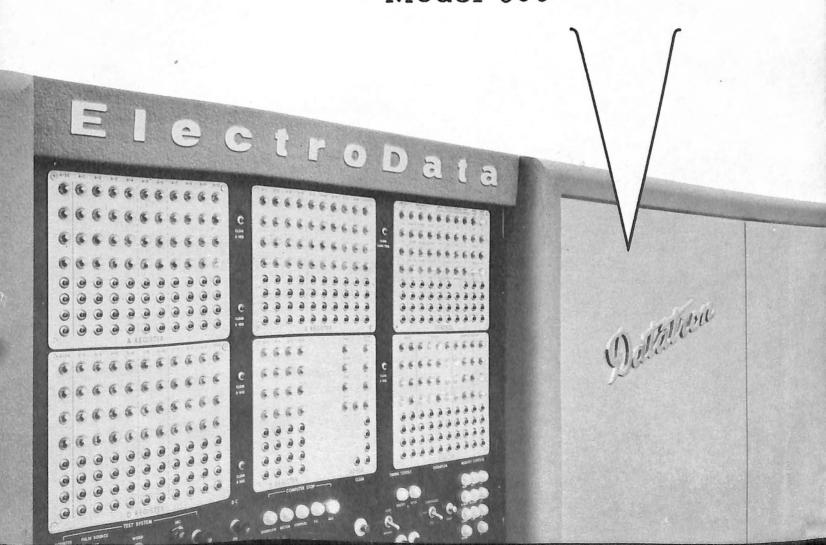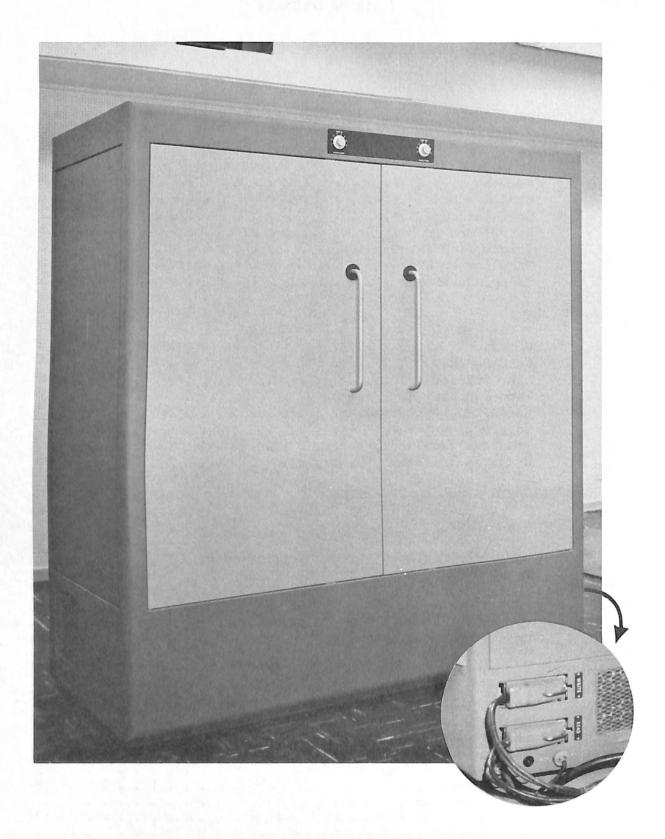
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Card Converter Model 500.

MODEL 500 CARD CONVERTER

GENERAL

Model 500 Card Converter is an economical connecting link between standard punched card machines and the DATATRON.

Model 500 Card Converter was designed primarily for scientific computer input-output use, allowing the input of information contained in up to 1000 punched cards in obedience to a single command -- or the output of information of up to 1000 cards or lines. The information processed is primarily numeric, but in certain applications of the DATATRON to commercial data processing Model 500 Card Converter has been used to connect the DATATRON to a line printer producing alphanumeric information.

Any of a variety of card readers, card punches, or line printers may be attached to Model 500 Card Converter, providing flexibility in input-output facility.

PHYSICAL CHARACTERISTICS

The unit is 64" in width, 28" in depth, and 69" in height, weighing 1,044 pounds. Heat dissipation is 14,000 BTU/hr.

INPUT

COMMAND

CDR   Card Read   nnnp 44 xxxx

Read ccc cards continuously, transferring words to consecutive storage cells on the DATATRON drum starting with cell xxxx. 1000-ccc is nnn. From 1 to 1000 cards may be read using one Card Read command.

CARD READERS*

Type 528 Accumulating Reproducer	200 CPM
Type 523 Summary Punch	100 CPM
Type 519 Document Originating Machine	100 CPM
Type 514 Document Originating Machine	100 CPM

* Manufactured by International Business Machines Corporation, New York City
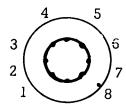
CARD READING

Any of the four mentioned card readers may be used to enter punched card information into the DATATRON. The cards, in all instances, must be read 12 edge first. Only one reader may be associated with the Card Converter at any instant. However, different card readers may be interchanged in order to take full advantage of special features of any particular card reader.

Through plugboard wiring, the "Reading Brushes" are connected by cable to the Card Converter. The 80 column card field is divided into 8 words of 10 columns, each with an associated sign. Normally, these 8 card fields are arranged sequentially across the card.

WORDS/CARD IN SWITCH

The manual switch, Words/Card In, located on the front of the Model 500, controls the number of fields which will be read from a card. The setting is usually 8. If set to any number less than 8, the rightmost fields will not be read. For example, if set to 3, only the first 3 fields would be read, assuming direct one to one wiring.
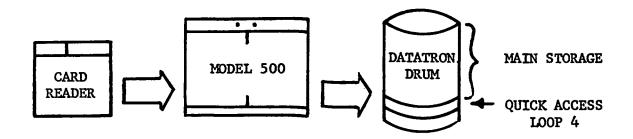
CARDS IN

WORDS/CARD

Words/Card In Switch. Figure 1

INFORMATION PATHWAY

During the reading of the card, the information is directed through the Card Converter to quick access loop 4.

Input Path Schematic. Figure 2
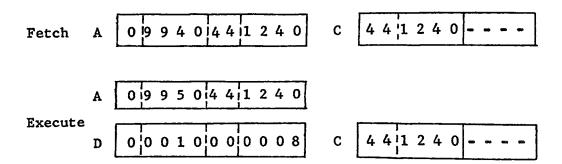
TRANSFER TO STORAGE

After each card is read into quick access loop 4, an automatic block transfer to main storage is usually executed.

The following sequence will occur during the execution of the Card Read command:

Fetch Cycle: The Card Read command is inserted into the Order and Address Registers. The 10 digit Card Read command is inserted into the A Register.

Execute Cycle: The D Register is set to a constant, designated by the setting of the Words/Card In switch. The 1000-ccc in the A Register is tallied 1 before the reading actually starts. Cards are fed through the Card Reader and the information is stored on the DATATRON drum.
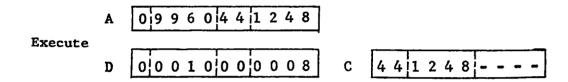
Example: Read 6 cards at 8 words/card starting at main storage cell 1240.

Fetch   A | 0 9 9 4 0 4 4 1 2 4 0 | C | 4 4 1 2 4 0 - - - - |

         A | 0 9 9 5 0 4 4 1 2 4 0 |

Execute

         D | 0 0 0 1 0 0 0 0 0 0 8 | C | 4 4 1 2 4 0 - - - - |
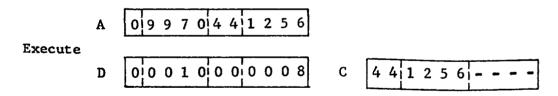
Register Schematic During Input. Figure 3

(3)

After the first card is read, cells 4000 - 4007 (loop 4) will contain the information punched on the first card. Two actions take place:

1. Loop 4 is block transferred, starting from cell 4000, to cells 1240 - 1259. Cells 1240 - 1247 contain the information from the first card. Cells 1248 - 1259 contain the previous contents of 4008 - 4019.

2. The constant in the D Register is then added to the A Register providing card tallying and address modifying totals.

3. The control counter is not affected by the Card Read command.

```
      A  | 0 9 9 6 0 4 4 1 2 4 8 |
Execute
      D  | 0 0 0 1 0 0 0 0 0 0 8 |   C  | 4 4 1 2 4 8 - - - - |
```

Register Schematic During Input. Figure 4

After the second card is read, cells 4008 - 4015 will contain the information punched on the second card. Cells 4000 - 4007 still contain the information punched on the first card. Loop 4 is block transferred, starting from cell 4008, to cells 1248 - 1267. Cells 1248 - 1255 contain the contents punched on the second card. Cells 1256 - 1267 contain the previous contents of cells 4016 - 4007.

```
      A  | 0 9 9 7 0 4 4 1 2 5 6 |
Execute
      D  | 0 0 0 1 0 0 0 0 0 0 8 |   C  | 4 4 1 2 5 6 - - - - |
```

Register Schematic During Input. Figure 5

Before the sixth card is read, the A Register will temporarily overflow. This signal causes the card reader to stop feeding after the next card is read. The next instruction is fetched and computation is resumed. No calculation can occur during the reading of cards.

The contents of the six cards are now stored consecutively in cells 1240 - 1287. Loop 4 will contain the information from the fifth and sixth cards and the latter half of the

fourth card. Cells 1288 - 1299 will contain also the fifth, and latter half of the fourth cards. Following the completion of the Card Read command, the A and C Registers will appear as follows:

Execute

A | 0 0 0 0 0 4 4 1 2 8 0 |

D | 0 0 0 1 0 0 0 0 0 0 8 | C | 4 4 1 2 8 0 - - - - |

Register Schematic After Input.   Figure 6

INPUT ADDRESSING

The Card Read command instruction address may designate any main storage address (0000 - 3999). It is possible, however, to inhibit the transfer of information to main storage from loop 4. This is accomplished by inserting 8 - - - as the instruction address of the Card Read command. Usually single or double Card Read commands are used with the inhibiting of main storage transfer, with the program using the information directly from loop 4. The information, of course, is not stored in main storage. Card information cannot be directly entered to loops 5, 6, or 7.

OUTPUT

COMMAND

CDW   Card Write   nnnp 54 xxxx

Punch or print ccc cards continuously, transferring words from consecutive storage cells on the DATATRON drum starting with xxxx. 1000-ccc is nnn. 1 to 1000 cards may be punched (or lines printed) using a single Card Write command.

CARD PUNCHES

Type 528 Accumulating Reproducer	100 CPM	
Type 523 Gang Summary Punch	100 CPM	
Type 519 Document Originating Machine	100 CPM	
Type 514 Reproducing Punch	100 CPM	

(5)

LINE PRINTERS

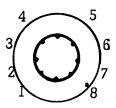|	
Type 407 Accounting Machine	150 LPM
Type 402 Accounting Machine	100 LPM
Type 419 Numerical Accounting Machine	150 LPM
Type 416 Numerical Accounting Machine	150 LPM

CARD PUNCHING OR PRINTING

Any of the above mentioned card punches or printers may be employed to record information from the DATATRON. For card punching operations, the cards must be fed 12 edge first. For printing purposes, the Card Converter will simulate the printing of a card, a 9 edge first procedure. Only one output machine may be used for a given output cycle.

Through plugboard wiring, the "Punch Magnets" or "Print" are connected by cable to the Card Converter. The information from the DATATRON is divided into 8 words of 10 positions, each with an associated sign. Normally, these 8 words are arranged sequentially across the card or tabulation.

WORDS/CARD OUT SWITCH

The manual switch, Words/Card Out, located on the front of the Card Converter, controls the number of words read from the DATATRON to the card punch or printer. The setting is usually 8. If set to any number less than 8, the rightmost fields will not be punched or printed. For example, if set to 5, only five consecutive words starting with cell xxxx will be punched or printed on a given output cycle.
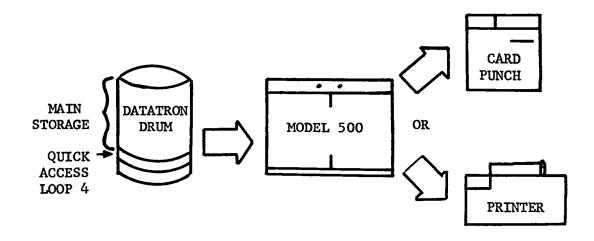
CARDS OUT

WORDS/CARD

Words/Card Out Switch. Figure 7

INFORMATION PATHWAY

The desired information stored on the DATATRON drum is
automatically block transferred to loop 4, then through
the Punch Card Converter, and on to the punch or printer.

Output Path Schematic. Figure 8

TRANSFER FROM STORAGE

An automatic transfer from xxxx to loop 4, followed by
transfer to the Card Converter, is effected with the Card
Write command.

The following sequence will occur during the execution of
the Card Write command:

Fetch Cycle: The Card Write command is inserted into the
Order and Address Registers. The 10 digit Card Write com-
mand is inserted into the A Register.

Execute Cycle: The D Register is set to a constant de-
signated by the setting of the Words/Card Output switch.
The control counter is not affected by the Card Write
command. The 1000-ccc in the A Register is tallied 1
before the reading actually starts. Cards are punched
or lines printed with information from the DATATRON drum.

(7)

Example: Punch 18 cards at 5 words/card starting
with main storage cell 3780.

Fetch   A | 0 9 8 2 0 5 4 3 7 8 0 | C | 5 4 3 7 8 0 - - - - |

Execute
         A | 0 9 8 3 0 5 4 3 7 8 0 |

         D | 0 0 0 1 0 0 0 0 0 0 5 | C | 5 4 3 7 8 0 - - - - |

Register Schematic During Output. Figure 9

Cells 3780 - 3799 are automatically block transferred to
loop 4. The previous information in loop 4 is lost. Cells
4000 - 4004 are transferred to the Card Converter and on to
the card punch.

After the first card has been punched (information in cells
3780 - 3784), the A and C Registers are automatically
tallied and modified by the constant in the D Register.

         A | 0 9 8 4 0 5 4 3 7 8 5 |

Execute
         D | 0 0 0 1 0 0 0 0 0 0 5 | C | 5 4 3 7 8 5 - - - - |

Register Schematic During Output. Figure 10

Cells 3785 - 3804 are automatically block transferred to
loop 4. The previous information in loop 4 (cells 3780 -
3799) is lost. Information in cells 4005 - 4009 is punched.
The information in main storage is not disturbed. Loop 4
is completely altered after each card is punched.

         A | 0 9 8 5 0 5 4 3 7 9 0 |

Execute
         D | 0 0 0 1 0 0 0 0 0 0 5 | C | 5 4 3 7 9 0 - - - - |

Register Schematic During Output. Figure 11

This same process will continue until the 17th card has
been punched. When the A and C Registers are again modi-
fied by the constant in the D Register, a temporary over-
flow will occur in the A Register. This signal causes the
card punch to stop operation after the 18th card is punched.
An extra tally occurs after the 18th card is punched. The
next instruction is fetched and computation is resumed.
When punching output, no buffering is possible. However,
when printing on the Type 407, approximately 1/3 of the
printing cycle is available for calculation. Following
the completion of the Card Write command, the A and C Re-
gisters will appear as follows:

A | 0 0 0 1 0 5 4 3 8 7 0 |

Execute

D | 0 0 0 0 0 0 0 0 0 0 0 | C | 5 4 3 8 7 0 - - - - |

Register Schematic After Output.   Figure 12

OUTPUT ADDRESSING

The Card Write command instruction address may be any main
storage address (0000 - 3999). It is possible, however,
to inhibit the transfer of information from loop 4 so that
output information will, in this case, be obtained from
loop 4 only. This is accomplished by inserting 8 - - - as
the instruction address of the Card Write command.

Single or double Card Write commands are often employed
using 8 - - - as the instruction address. The results to
be punched or printed more often are formed and stored in
loop 4. Information cannot be punched or printed directly
from loops 5, 6, or 7.

For applications where line by line operations are required,
a sequence using the quick access loops is suggested. Con-
sider the computation of interest where a card with princi-
pal is read directly to loop 4. The interest and new prin-
cipal are calculated and printed directly from loop 4.

Location	Instruction	Remarks
7000	9990 CDR 8001	Read next card.
7001	CAD 4006	
7002	MRO 4007	Compute new principal.
7003	AD 4006	
7004	STC 4008	Store new principal.
7005	9990 CDW 8001	Print input and results.
7006	CU 7000	Repeat process.

Program using loop 4 for input, output, and computation.

Figure 13

N	A M E		A D D R E S S		PRIN-CIPAL	RATE	-
1	2	3	4	5	6	7	8

Card Layout. Figure 14

APPLICATIONS AND BOARD WIRING

TYPE 528 WIRING

BASIC CONNECTION WITH THE CARD CONVERTER

The Summary Punch Cable is used to convey all necessary
information between the Type 528 and the Card Converter
when the Type 528 is used for card output. The Type 528,
however, is not operated on a Summary Punch Cycle, but
under control of the Feed Control hubs available at the
plugboard. All the normal interlocks (card levers, Stac-
ker Stop Switch, etc.) are effective on Card Write commands
in the same way as on any normal Type 528 card cycle.

PUNCH CYCLE CONTROL

Feed Control is jack-plugged so that control of card
feeding can be accomplished at the plugboard. The left
hub of Accumulate from Second Reading is wired to the left
Accounting Machine Start hub. The right Accounting Machine
Start hub is wired to the Digit Pick-Up of Pilot Selector 1.
The Accounting Machine Start hubs are connected internally
in the Summary Punch Cable.

When the DATATRON initiates a Card Write command, the Card
Converter connects the Accounting Machine Start hubs. Pilot
Selector 1 will be transferred at the next 6-digit time.

When Pilot Selector 1 transfers, a punch feed is initiated
on the following machine cycle. (The Type 528 is taking
idle cycles when neither feed is operating.) Pilot Selec-
tor 1 will drop out on Punch Cycle operation. The DATATRON
is tallying the number of cards punched and will not pick
Pilot Selector 1 on the last punch cycle. Punching will
stop at the end of this cycle. For a single Card Write
command, only one 6-digit can pick Pilot Selector 1 and only
one punching cycle will occur.

During the punching cycle, the Summary Punch Emitter sends
digit pulses to the Card Converter.

Since it is necessary for the Card Converter to be regula-
ted by the digit pulses from the Type 528, the operation of
the DATATRON is controlled by the Type 528 during Card Read
and Card Write commands. If the Type 528 fails to operate
becuase it has not been started, the stop button has been
depressed, or the cards have run out, no information is lost.

(11)

When the Type 528 is to be used for both reading and punching, a bracket is supplied. This bracket contains two push button switches. These switches are connected to control the Punch Feed and the Read Feed. These switches are provided as a convenience to facilitate the running of cards in or out of either feed independently.

PUNCH INFORMATION

The 80 positions in the Card Converter are connected internally via the Summary Punch Cable to hubs on the plugboard. The digits are available at the Accounting Machine Counter Exits. The left hub exit from counter group 2A is the most significant digit of the first word, the right hub exit in 8D is the least significant digit of the eighth word. The signs of the eight words are connected internally to the 11-12 hubs of Column Splits 1 through 8, respectively. The connections mentioned above are inflexible. However, the wiring from these exits to the punch entries or to other entry hubs may be done in any format desired using Co-selectors, Pilot Selectors, Digit Selectors, etc.

Information wiring illustrated is for a typical 80-80 punch plugboard. The signs in this case are punched over the most significant digit of each word. Note that the Punch Transfer entries are used in the example. Punch Transfer is impulsed by a Feed Control signal on each punching cycle. The choice is arbitrary, as information may be entered into any of the three punch entries - that is, Punch Direct, Punch Normal, and Punch Transfer.

READ CONTROL

Feed Control is jack-plugged so that control of card feeding can be accomplished at the plugboard.

The Emitter pulses 0 through 9 are jack-plugged and wired to EDC 5. EDC 6 is wired to the Digit Pick-Up of Pilot Selector 2. When the DATATRON initiates a Card Read command, EDC 5 and EDC 6 in the Card Converter are connected and Pilot Selector 2 is picked.
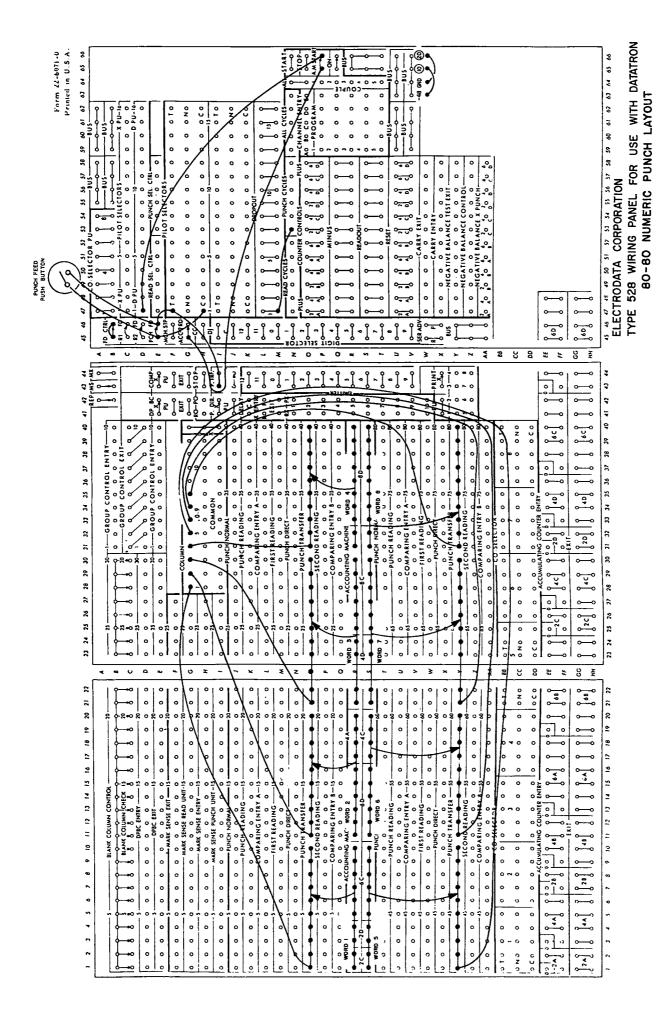
When Pilot Selector 2 is picked, the Read Feed is activated on the following cycle. Co-Selector 2 will be picked on all read cycles through the transferred point of Pilot Selector 2. The control of Pilot Selector 2 on Card Read commands is completely analogous to the control of Pilot Selector 1 as previously outlined.

The timing pulses are furnished to the Card Converter
through Co-Selector 2. On all Card Read commands, EDC
lines 51 and 52 will be coupled to Emitter digits 0 through
9 and EDC 31 and 32 to Emitter pulses 12 and 11, respec-
tively. The negative voltage reference and machine ground
reference of the Card Converter and Type 528 are connected
through EDC 10 and 20.

There are only twelve column splits standard on a Type 528.
Co-Selector 1 is normally modified internally to act as
five additional column splits, allowing 16 positions; eight
words input and eight words output. Referring to the dia-
gram, it will be observed that Column splits 9 through 12
and four positions of Co-Selector 1 are used to column split
the input sign information.

INTERNATIONAL BUSINESS MACHINES CORPORATION
ACCUMULATING REPRODUCER, TYPE 528   CONTROL PANEL

Form ZZ-6071-0
Printed in U.S.A.

ELECTRODATA CORPORATION
TYPE 528 WIRING PANEL FOR USE WITH DATATRON
80-80 NUMERIC READ LAYOUT

IBM

(14)

ELECTRODATA CORPORATION
TYPE 528 WIRING PANEL FOR USE WITH DATATRON
80-80 NUMERIC PUNCH LAYOUT

(15)

WIRING RECOMMENDATIONS TO THE TYPE 528

Sub-panel wiring is recommended such that the informa-
tion and control cables may be brought directly to the
sub-panel providing for plugboard wiring as normally per-
formed. This can be accomplished by following the recom-
mended wiring.

INFORMATION WIRING

EDC Wire	Sub-panel Location on the Type 528
62-70	EE 49-57
72-80	EE 58-66
82-90	FF 49-57
92-100	FF 58-66
102-110	GG 49-57
112-120	GG 58-66
122-130	HH 49-57
132-140	HH 58-66
61	Y 59
71	Y 60
81	Y 61
91	Y 62
101	Y 63
111	Y 64
121	Y 65
131	Y 66

CONTROL

51-52	BB 6-7
32-31	BB 8-9

EDC Wire	Sub-panel Location on the Type 528
5-6	AA 41-42
10, 20	W 65-66

SIGNS

21-28	X 59-66

TYPE 407 WIRING

BASIC CONNECTION WITH THE MODEL 500 CARD CONVERTER

When the Card Write command is fetched, a selector (K_2) is transferred in the Card Converter. The common of this selector is Cycle Count from the Type 407 (EDC 1) and is available on every Type 407 cycle whether printing or not. When K_2 is transferred, the Cycle Count pulse is directed back to the Type 407 plugboard on EDC 7. Through a Digit Pick-Up, this pulse then picks a Pilot Selector. The upper common point of this Pilot Selector is a Carry Impulse which is taken directly from CR 76 from within the Type 407. (This pulse is not available from the plugboard.) EDC 31 is then connected to the transfer of this CI pulse. The CI acts as a starting pulse so that the Card Converter can start its internal cycle of interpreting the information as it is directed from loop 4 to the Card Converter. The cycle for the Type 407 and the Card Converter then is from CI time to 0 time.

For single Card Write commands, this then permits 130 milliseconds of calculation between each print cycle; operation at 150 lines/minute.

The Coupling Exit of this Pilot Selector is used to pick Co-Selector 1. Therefore, the Pilot Selector and the Co-Selector are transferred in unison. Through the transferred points of the Co-Selector are passed the digits 0 - 9 and Comma and back to the Card Converter on EDC 51 - 60. The Comma is passed through the lower point of the Pilot Selector before being bussed with the digits from the Character Emitter.

COMPLETION OF THE OUTPUT CYCLE

When the output cycle is complete, the overflow toggle is temporarily set as the A Register counts past 999. K_2 in the Card Converter returns to normal. The Cycle Count pulse is no longer available on EDC 7. The Pilot Selector and the Co-Selector are no longer picked, breaking the link to the Card Converter.

STARTING THE TYPE 407 CYCLE

It is necessary to keep the Type 407 in a constant state of readiness so that all necessary Type 407 control pulses are available immediately. This is accomplished by operating the Type 407 in MLR at all times. A 12 pulse from the Character Emitter (Column Split A) keeps the Type 407 in MLR constantly. Actually, the Type 407 could be kept in a

List state by constantly feeding cards, but this would be
an operating inconvenience. Two cards are fed into the
hopper, and once MLR has begun, these two cards will not
be advanced in the feeding mechanism.

CARRIAGE CONTROL

During cycles on which printing does not occur, spacing
is suppressed through the normal of Co-Selector 1, other-
wise, when actually printing, spacing is not suppressed.
Overflow from the bottom of one sheet to the top of the
next or a longer carriage skip presents a problem. It
will be necessary to prevent the Card Converter from pre-
senting a line of information to the Type 407 while the
skipping is in progress. This is accomplished by select-
ing the Cycle Count pulse (EDC 1), using Skip Control as
a selector. The Cycle Count pulse is directed to Imme-
diate Exit. Skip Control is picked on every cycle on which
there is no overflow or carriage skip. Cycle Count is then
available from DD to EDC 1 (the common of K_2). When an
overflow or carriage skip is necessary, Skip Control is not
picked and the Cycle Count pulse is not available on EDC 1.
The Card Converter is temporarily disconnected from the
Type 407 permitting the overflow or skip to be completed
without the loss of an output line of information.

Co-Selector 2 is used in conjunction with this circuit and
is picked whenever overflow or carriage skip is required.
When picked, Skip Control is not pulsed and the Cycle Count
is not available. The common of the Co-Selector for over-
flow and Carriage Skip is from CR 5 (not available on the
plugboard): CR 5 is chosen to prevent burning of the points
of Co-Selector 2, since the selector is always picked during
Immediate Exit or digit time. CR 5 is active $245^{\circ} - 255^{\circ}$.

INFORMATION PATHWAY AND FORMAT CONTROL

The information from the Card Converter is available to the
plugboard a row at a time (simulating the feeding of a card)
on EDC 61-140. Each word is then wired to either Print
Normal or Print Transfer. Usually the information is di-
rected through Co-Selectors to allow for a variety of print
formats. These Co-Selectors may be picked using a control
digit of an output word.

SIGN CONTROL

The minus sign pulses are transferred from the Card Converter at 10 time (for compatibility with the Type 402) and must be delayed (for the Type 407) until 11 time. This delay is accomplished by impulsing eight counters minus and obtaining a minus sign for printing from Symbol Exit R. Minus signs are always printed to the right of the respective word. It would also be possible to use 8 Pilot Selectors if the counters were required for another purpose. The minus sign signals from the Card Converter are available on EDC 21-28.

OTHER CONTROLS

The Type 407 has voltage and current requirements which are necessary for proper operation. The Card Converter, in simulating the feeding of a card, must present its information and control pulses in a manner that is compatible with the Type 407. A ground level and a -48 volt level must be presented to the Card Converter over EDC 10 and 20.

ALPHABETIC AND ALPHANUMERIC OUTPUT

Up to 40 alphanumeric characters may be printed per line at a printing rate of 150 lines/minute. 130 milliseconds are available for computation between print cycles when using single Card Write commands.

Alphabetic characters are represented within the DATATRON by two digits; the most significant is coded to represent the overpunch on an 80 column card and the least significant being the underpunch with its correct value.

80 COLUMN CARD CODE   DATATRON CODE

A	12 - 1	A	8 - 1
B	12 - 2	B	8 - 2
C	12 - 3	C	8 - 3
D	12 - 4	D	8 - 4
E	12 - 5	E	8 - 5
F	12 - 6	F	8 - 6
G	12 - 7	G	8 - 7
H	12 - 8	H	8 - 8
I	12 - 9	I	8 - 9
J	11 - 1	J	9 - 1
K	11 - 2	K	9 - 2
L	11 - 3	L	9 - 3
M	11 - 4	M	9 - 4
N	11 - 5	N	9 - 5
O	11 - 6	O	9 - 6
P	11 - 7	P	9 - 7
Q	11 - 8	Q	9 - 8
R	11 - 9	R	9 - 9
S	0 - 2	S	0 - 2
T	0 - 3	T	0 - 3
U	0 - 4	U	0 - 4
V	0 - 5	V	0 - 5
W	0 - 6	W	0 - 6
X	0 - 7	X	0 - 7
Y	0 - 8	Y	0 - 8
Z	0 - 9	Z	0 - 9
0	0	0	0 - 0
1	N - 1	1	7 - 1
2	N - 2	2	7 - 2
3	N - 3	3	7 - 3
4	N - 4	4	7 - 4
5	N - 5	5	7 - 5
6	N - 6	6	7 - 6
7	N - 7	7	7 - 7
8	N - 8	8	7 - 8
9	N - 9	9	7 - 9
/	0 - 1	/	0 - 1
&	12 - Blank	&	8 - 0
-	11 - Blank	-	9 - 0
Blank	N - Blank	Blank	7 - 0

Alphanumeric Code Charts. Figure 15

By representing the 80 column code (left) as shown by the DATATRON code (right), the Type 407 can decode and print the proper letters, numbers, and the four special characters &, -, /, and blank. Numbers and letters may be mixed, but all must be stored within the DATATRON as two digit characters. The remaining special characters can be obtained by extending the above two charts to a three digit code. If certain fields or columns are known to be numeric, a single digit DATATRON code may be used instead of 7-.

ALPHANUMERIC PLUGBOARD METHODS

It is necessary to produce a zone and a numeric pulse to enable the Type 407 to print a letter or special character. The Type 407 must then decode each of the most significant digits to produce a zone pulse and then combine this pulse with the least significant digit.

The decoding of the most significant digit is performed by making use of the fact that echo pulses occur 150° after a print wheel has been impulsed. Reference to the Type 407 Timing Chart (exits) indicates that 9 echo time is the same as 11 digit time, 8 echo time is the same as 12 digit time, and 7 echo time is the same as N time. The DATATRON code shown on the right of Figure 15 states, for instance, that 81 is A, 91 is J, 02 is S, and 75 is 5. By wiring the most significant digit to a type wheel and from the Counter Controlled Print hub for that same type wheel, a 9 is decoded to 11, 8 to 12, and 7 to N. Zero overpunch is not decoded and is used directly. These echo pulses are then combined with the least significant digit to produce two pulses to form a letter, number, or special character.

The print wheels used to perform this decoding will print the most significant digit unless they can be signaled to suppress printing. This suppression is accomplished by effecting a modification within the Type 407 and is made available to the plugboard for control under the heading "Type Wheel Group Control". The Type 407 print wheels operate in groups of 12. Disabling must be done in groups of 12. If 10 alphanumeric characters are to be printed, 12 print wheels must be disabled temporarily; if 20 alphanumeric characters are to be printed, 24 print wheels must be disabled, etc. Of course, the maximum number of alphanumeric characters printed per line is 40, since the DATATRON can output only 80 digits per line.
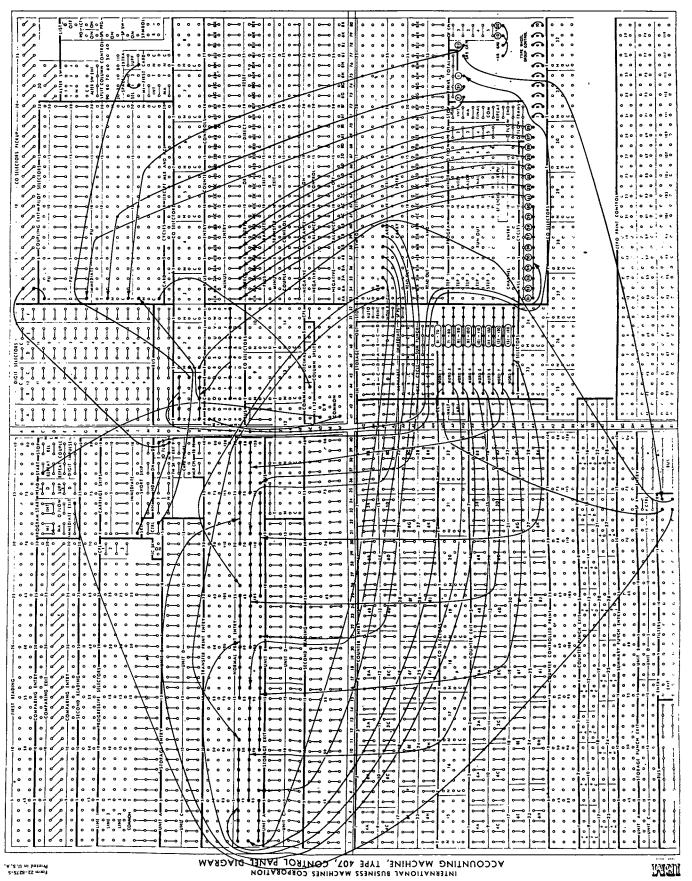
Under the heading "Type Wheel Group Control", jack-plugging type wheel groups 1, 2, 3, 4, 5, and 6, and leaving open groups 7, 8, 9, and 10 will allow alphanumeric printing from wheels 1 - 71. 72 - 120 wheels will not print. This operation is similar to hammerlocking on the Type 402. Any group of wheels may be selected to print or suppress printing with the use of digits of a control word.

MODIFICATIONS TO THE TYPE 407

Sub-panel wiring is recommended such that the information and control cables may be brought directly to the sub-panel providing for plugboard wiring as normally performed. This can be accomplished by following the recommended wiring charts.
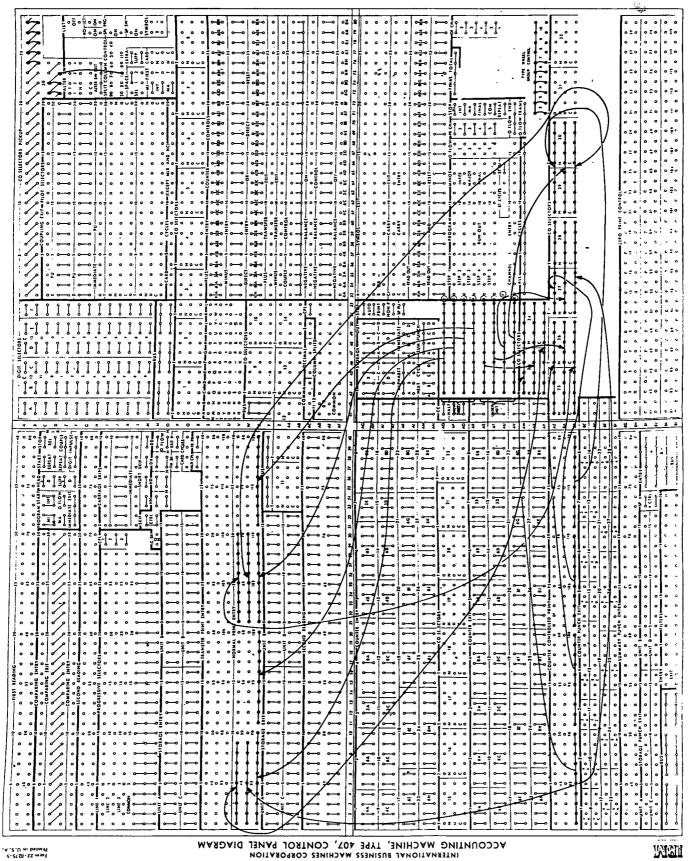
INFORMATION WIRING

EDC Wire		Sub-panel Location on Type 407
61-70	Word 1	AO 43-52
71-80	Word 2	AP 43-52
81-90	Word 3	AQ 43-52
91-100	Word 4	AR 43-52
101-110	Word 5	AS 43-52
111-120	Word 6	AT 43-52
121-130	Word 7	AU 43-52
131-140	Word 8	AV 43-52

MINUS SIGNS

21-28		AX 63-70

CONTROL

51-60	Digit Line	AX 53-62
1 K_2	Common	AQ 75
7 K_2	Return	AQ 73
31	Output Initiator	AQ 74
10		AU 79
20		AU 80

Type 407 Wiring Chart for use with DATATRON 80-80 Numeric Print Layout

(23)
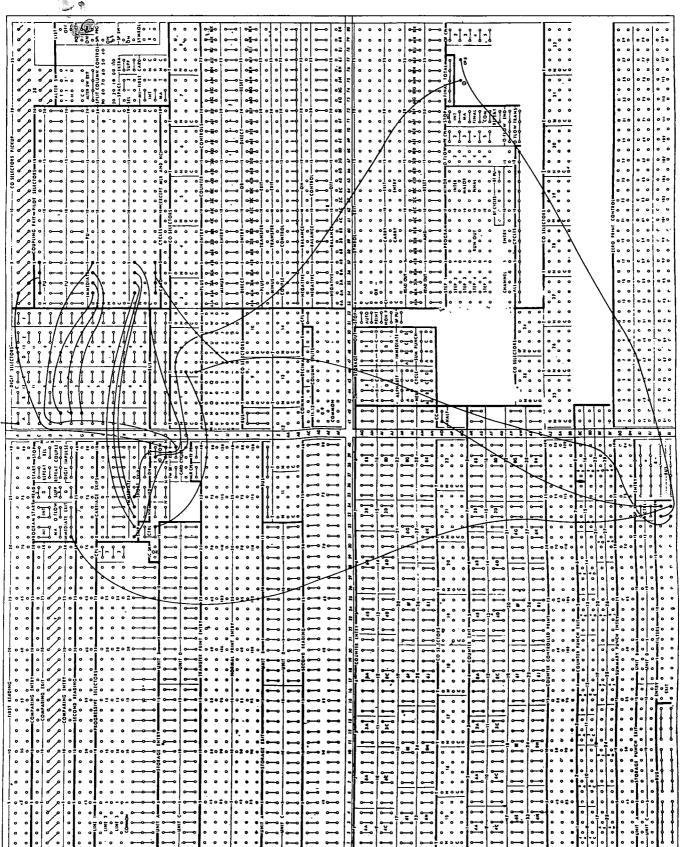
Type 407 Wiring Chart for use with DATATRON 40 Alphanumeric Characters Print Layout

Type 407 Wiring Chart for use with DATATRON – Carriage Control

ORDERING SPECIFICATIONS FOR EQUIPMENT USED WITH MODEL 500 CARD CONVERTER

MACHINE TYPE	514	517	519	523	**528
Name	Reproducing Punch	Gang Summary Punch	Document Originating Machine	Gang Summary Punch	Accumulating Reproducer
Model Number - Minimum Machine	*2	*1	*2	*1	*10B
Digit Emitter and Summary Punch Facility Standard with this Model	Yes	Yes	Yes	Yes	Yes
Digit Emitter Required by EDC	No	No	No	No	Yes
Summary Punch Facility Required by EDC	Yes	Yes	Yes	Yes	Yes
Pilot Selectors Required by EDC	None	None	None	None	2
Co-Selectors Required by EDC	None	None	None	None	2
Column Splits Required by EDC	8	8	8	8	12
Cost	$85 /Mo.	$65 /Mo.	$100 /Mo.	$65 /Mo.	$185 /Mo.

* Minimum Requirements (See Page 27 for Note.)
** Card Readers and Card Punches (See Page 27 for Note.)

ORDERING SPECIFICATIONS FOR EQUIPMENT USED WITH MODEL 500 CARD CONVERTER

MACHINE TYPE	*402	*407	*416	
Name	Alphabetical Accounting Machine	Accounting Machine	Numerical Accounting Machine	* These models contain the minimum features required for Electro-Data use. Additional features may be specified as desired.
Model Number - Minimum Machine	12A @100 LPM 12C @ 80 LPM	A1	12A	
Pilot Selectors Standard with this Model	6	15	5	** Only in the case of the Type 528 may the same unit be used as a Reader and Punch. Individual units of all other types must be used as a Reader or a Punch.
Co-Selectors Standard with this Model	4	16	None	
Emitter or Digit Selectors Standard with this Model	None	1 Character Emitter 2 Digit Selectors	None	Note: 220 Volt, single phase receptacles are available on the Card Converter
Emitters or Digit Selector Required by EDC	None	1 Character Emitter	1 Digit Emitter 2 Digit Selectors	
Pilot Selectors Required by EDC	3	1	3	
Co-Selectors Required by EDC	1	2	None	
Counters Required by EDC	None	8	None	
Cost	$265/Mo.	$800/Mo.	$235/Mo.	

DATATRON

ELECTRONIC
DATA
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ElectroData

DIVISION OF BURROUGHS CORPORATION

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