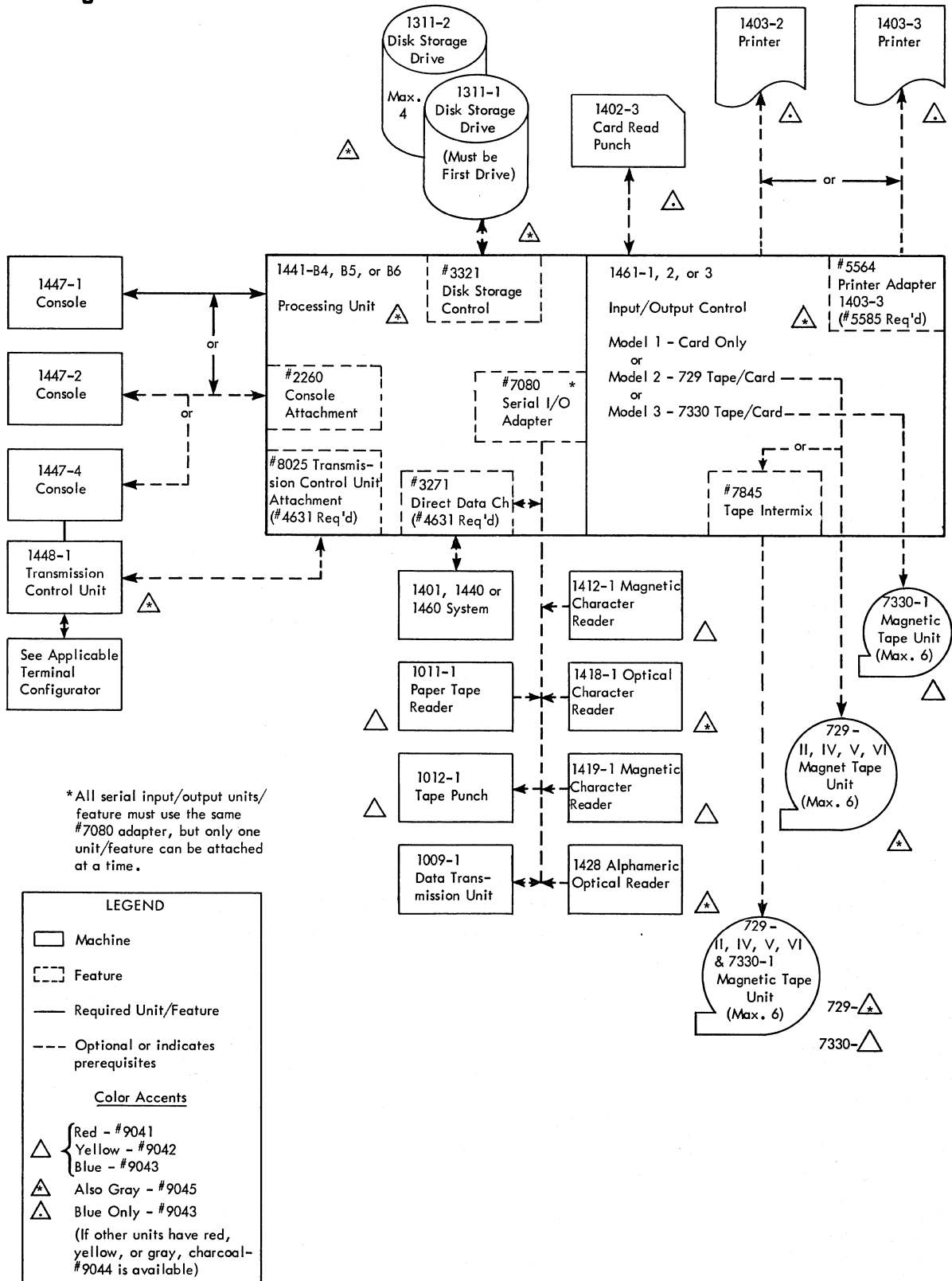


IBM 1460
Configurator

File Number 1460-00
Form A24-1497-4



IBM 1441 PROCESSING UNIT

<u>All Systems</u>	<u>Model</u>
8,000 Storage Positions	B4
12,000 Storage Positions	B5
16,000 Storage Positions	B6
<u>Special Features</u>	<u>SF No</u>
Bit Test	#1470
Console Attachment	#2260
Direct Data Chan (#4031 & #7080 req'd)	#3271
Direct Seek	#3281
Disk Storage Control	#3321
Expanded Print Edit	#3835
Indexing and Store Address Register	#4631
Multiply/Divide	#5275
Scan Disk	#6396
Seek Ovlp Adapter (#6400 req'd on all attached 1311's)	#6399
Serial I/O Adapter	#7080
Track Record	#8011
Transmission Control Unit Attachment (#4631 req'd)	#8025

IBM 1461 INPUT/OUTPUT CONTROL

<u>All Systems</u>	<u>Model</u>
Card System	1
729 Tape/Card System	2
7330 Tape/Card System	3
<u>Special Features</u>	<u>SF No</u>
Adapter, 51-Column Read Feed	#1013
Binary Transfer	#1468
Compressed Tape (Models 2 & 3)	#2210
Numerical Print Control	#5380
Print Storage (req'd on 1403 Model 3)	#5585
Printer Adapter-1403, Mod 3 (req'd)	#5564
Processing Overlap	#5730
Punch-Feed Read Control	#5895
Read-Punch Release	#6040
Selective Tape Listing Control	#6412
Tape Intermix (Mod 2 only)	
Attach 7330 (to 1461, Model 2)	#7845

IBM 1447 CONSOLE

<u>All Systems</u>	<u>Model</u>
Console Only	1
Console with I/O Printer	2
Console with I/O Printer & 1448 Ctrl.	4
<u>Special Features</u>	<u>SF No</u>
Sense Switches	#7600

IBM 1402 CARD READ-PUNCH, MODEL 3

<u>Special Features</u>	<u>SF No</u>
Feed, 51-Col Interchangeable Read (#1013 req'd)	#4150*
Punch-Feed Read (#5895 req'd)	#5890

IBM 1403 PRINTER

<u>All Systems</u>	<u>Model</u>
600 Lines per Min. (max.)	2
1100 Lines per Min. (max.)	3
<u>Special Features (Model 2 only)</u>	<u>SF No</u>
Auxiliary Ribbon Feeding	#1376
Interchangeable Chain Cartridge Adapter	#4740
Numerical Print (#4740 and #5380 req'd)	#5381*
Models 2 and 3	
Selective Tape Listing (#6412 req'd)	#6411
Change Print Arrangement/Type Size	} See Type Catalog
Non-Standard Print Arrangements	
Special Character Arrangements	

IBM 1311 DISK STORAGE DRIVE

<u>All Systems</u>	<u>Model</u>
First Drive	1
Additional Drive(s)	2
<u>Special Feature</u>	<u>SF No</u>
Seek Overlap (#6399 req'd)	#6400

IBM 1412 MAGNETIC CHARACTER READER

IBM 1419 MAGNETIC CHARACTER READER

<u>Special Features</u>	<u>SF No</u>
Document Counter (1412 only)	#2385
Electronic Accum and Seq Checking (Req #5215 on 1412; #5201 on 1419)	#3610*
Multiple-Column Control (1419 only)	#5201
Mult Col Sel-Sort Sup (1412 only)	#5215
Self-Checking Number	
Modulus 10 Technique	#7061
Modulus 11 Technique	#7062
Split Field (1419 only)	#7440
Endorser - 1412/1419	#3791*
Endorser Plate	#3792
51-Column Card Sorting (1419 only)	#4380

IBM 1418 OPTICAL CHARACTER READER

<u>All Systems</u>	<u>Model</u>
Three Pockets	1
Thirteen Pockets	2
Three Pockets	3
<u>Special Features</u>	<u>SF No</u>
Mark Rdnng Strn (not with #6045, #6046)	#4950
Read Station Add'l (not with #4950)	
For Characters .093" High	#6045
For Characters .114" High	#6046

IBM 1428 ALPHAMERIC OPTICAL READER

<u>All Systems</u>	<u>Model</u>
Three Pockets	1
Thirteen Pockets	2
Three Pockets	3
<u>Special Features</u>	<u>SF No</u>
Mark Rdnng Strn (not with #6044)	#4950
Read Station, Add'l (not with #4950)	#6044

IBM 729 MAGNETIC TAPE UNIT

Model II
Model IV
Model V
Model VI

IBM 7330 MAGNETIC TAPE UNIT

IBM 1009 DATA TRANSMISSION UNIT

IBM 1011 PAPER TAPE READER

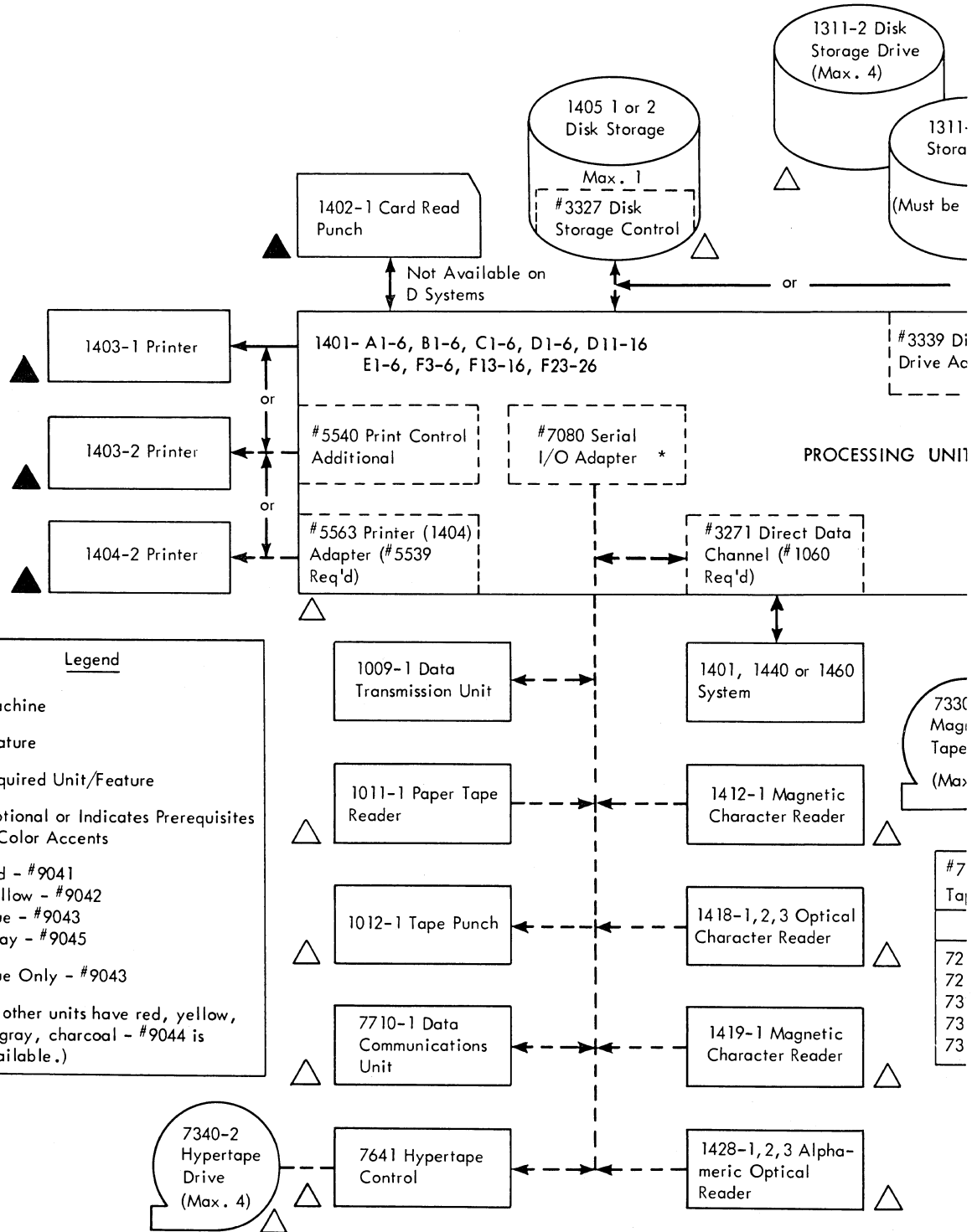
IBM 1012 TAPE PUNCH

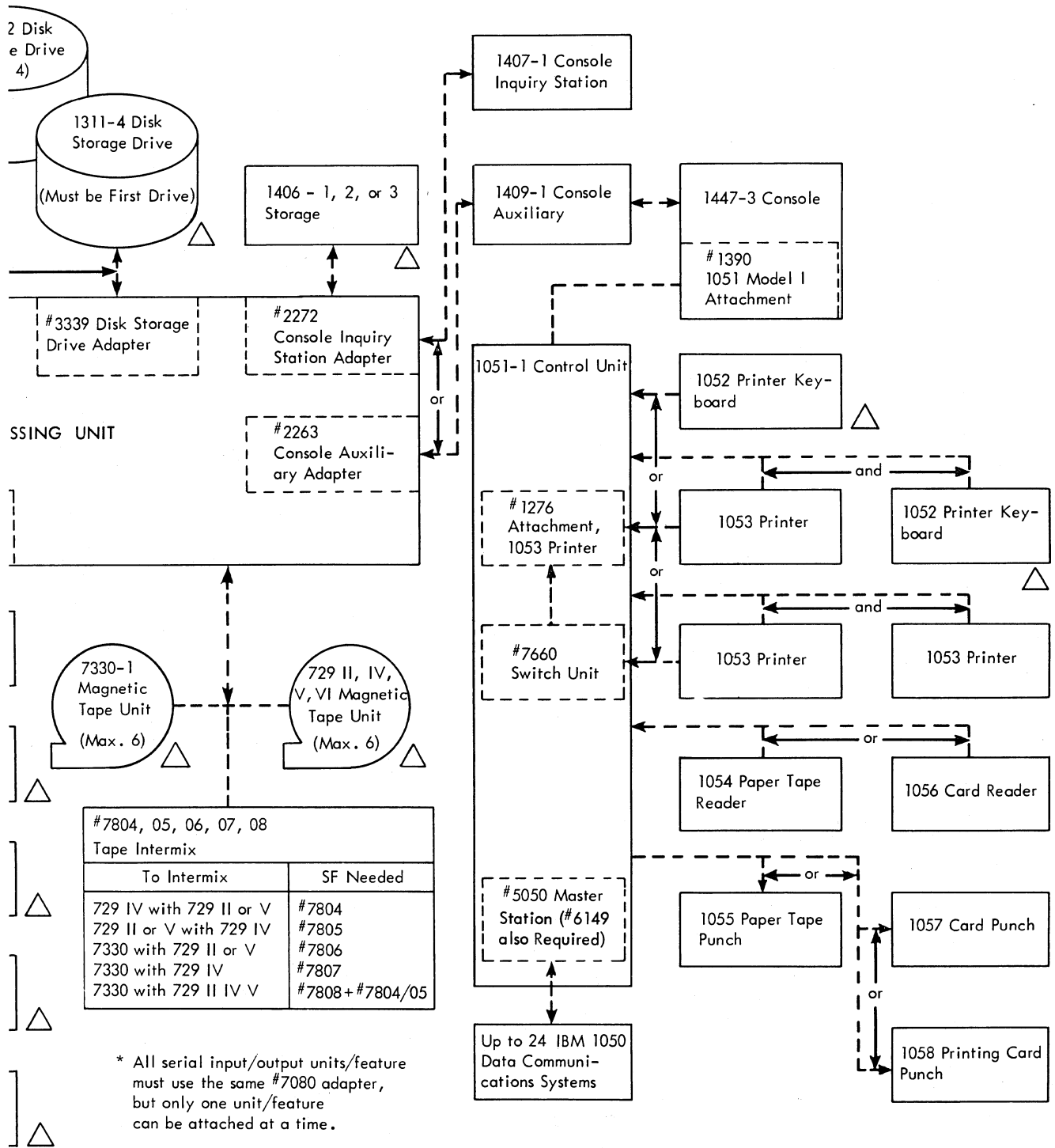
IBM 1448 TRANSMISSION CONTROL UNIT

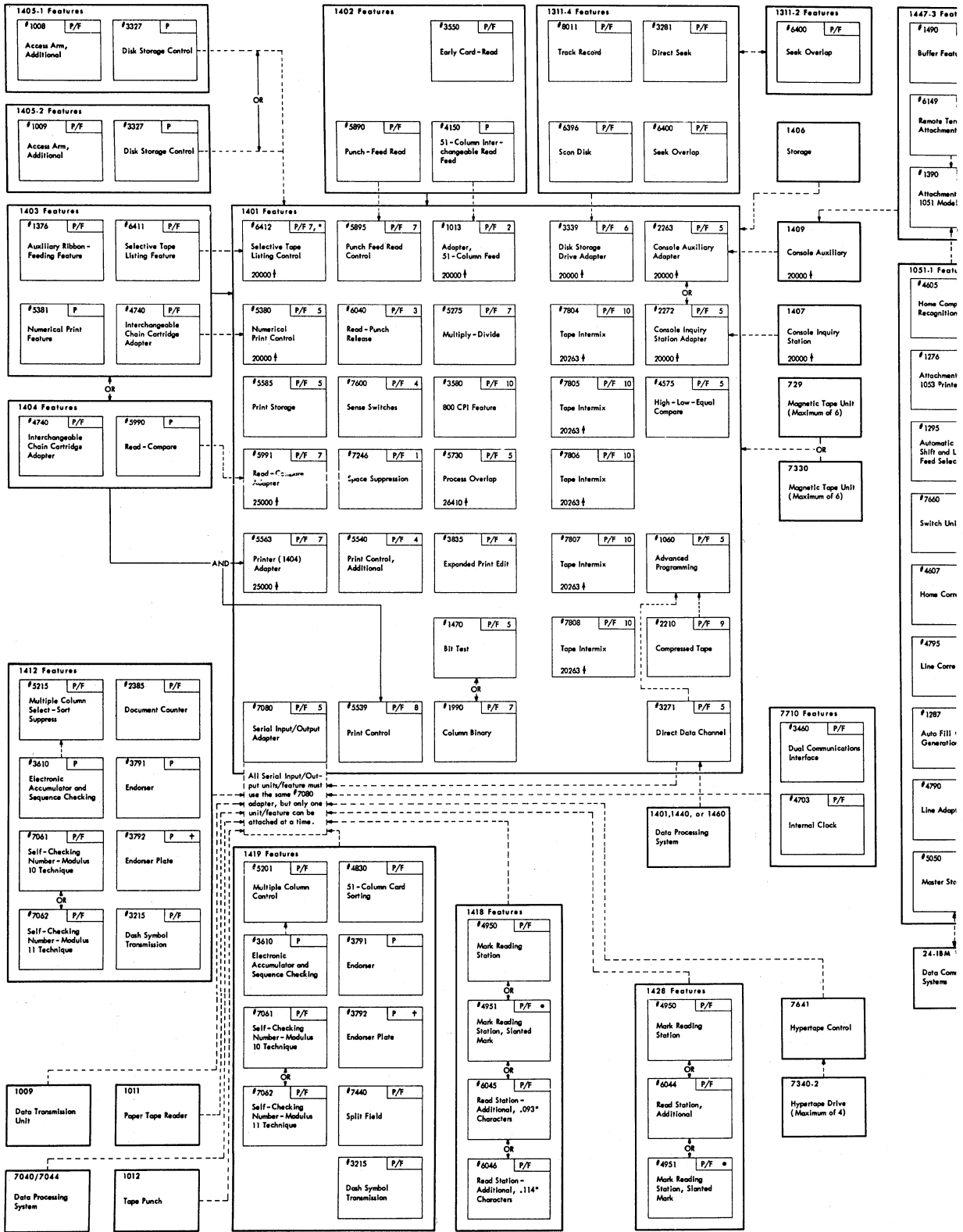
Special Features
See Applicable Terminal Configurator

* Factory Installation Only

IBM 1401
Configurator



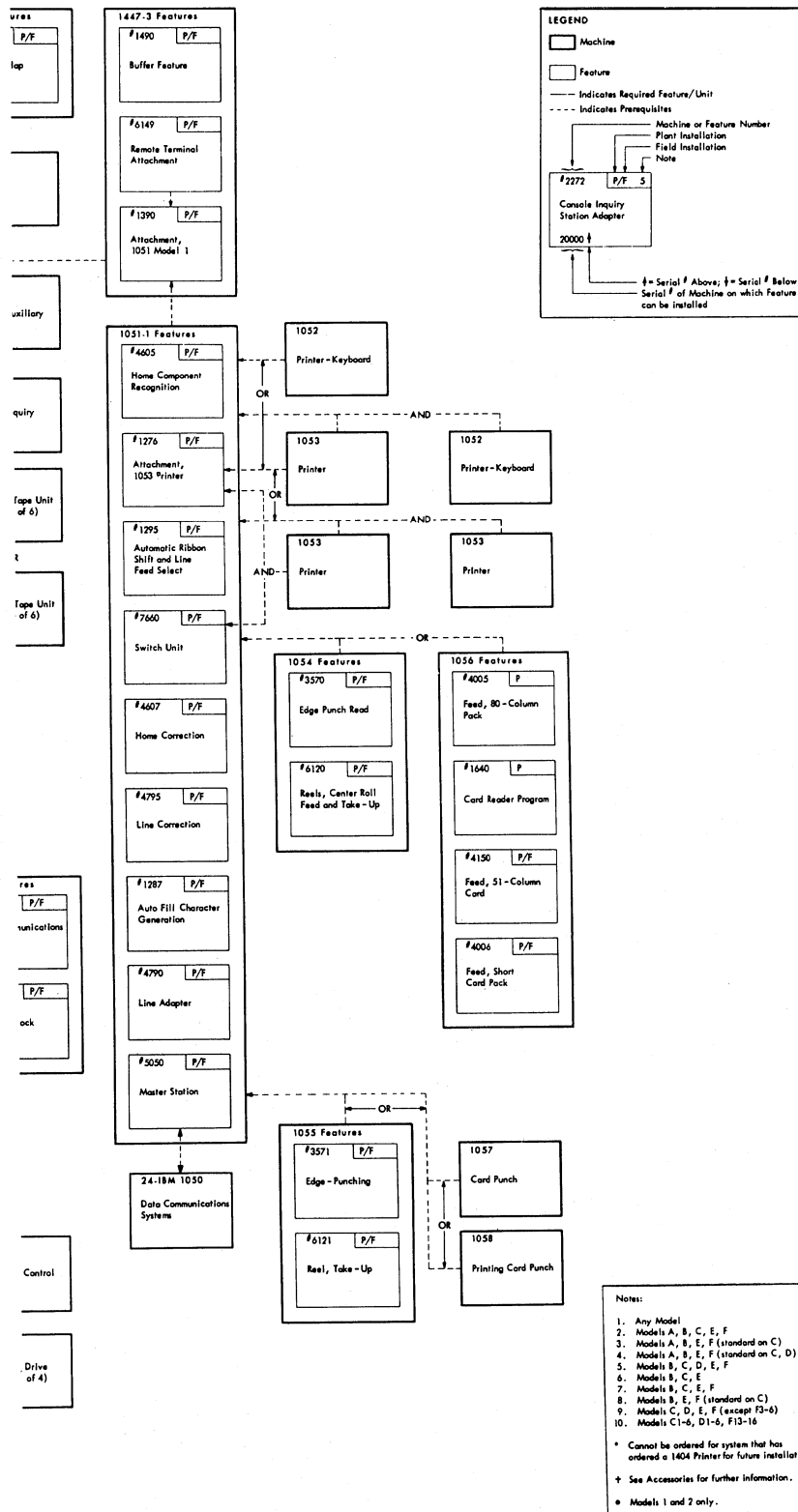




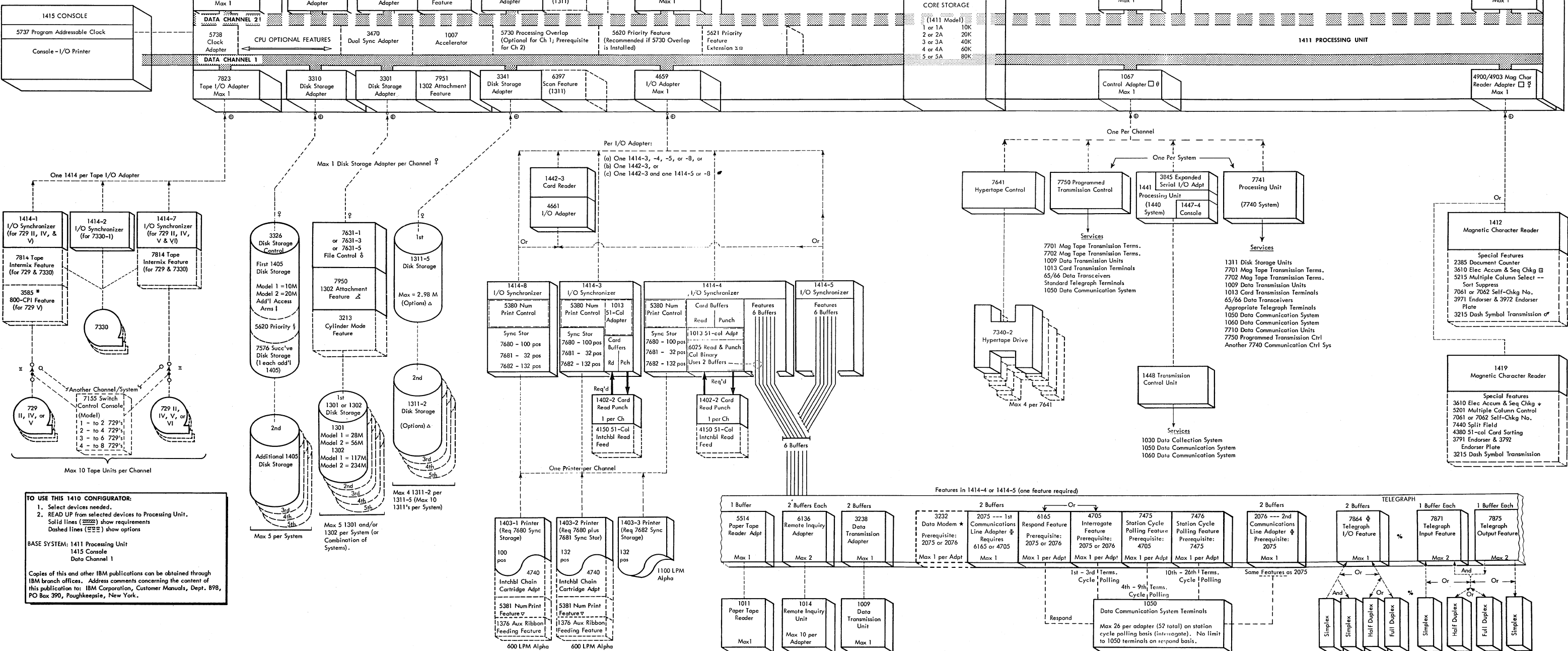
International Business Machines Corporation

Data Processing Division

112 East Post Road, White Plains, New York



IBM 1410 Configurator



TO USE THIS 1410 CONFIGURATOR:

- Select devices needed.
- READ UP from selected devices to Processing Unit.

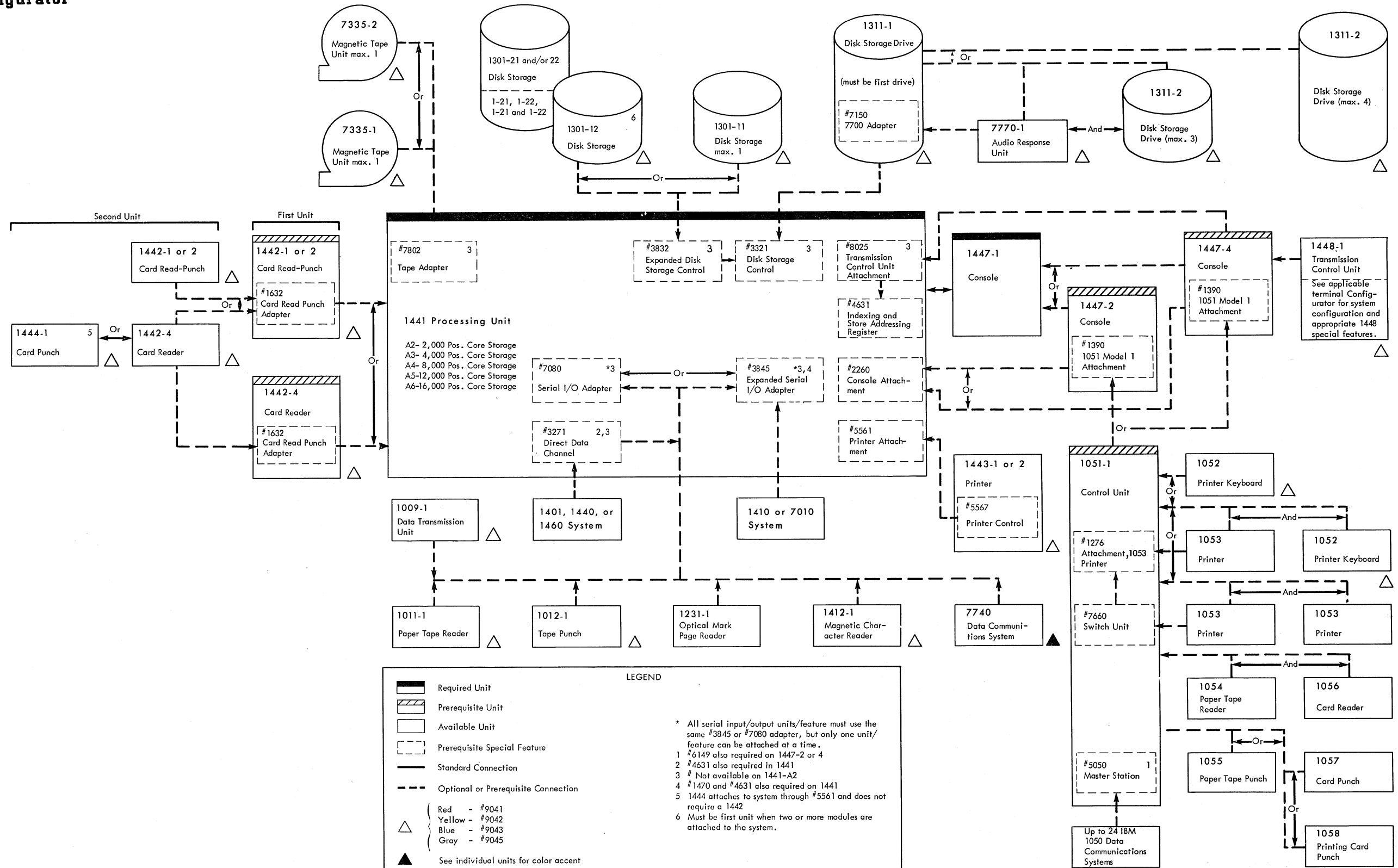
Solid lines (—) show requirements
Dashed lines (---) show options

BASE SYSTEM: 1411 Processing Unit
1415 Console
Data Channel 1

Copies of this and other IBM publications can be obtained through IBM branch offices. Address comments concerning the content of this publication to: IBM Corporation, Customer Manuals, Dept. 898, PO Box 390, Poughkeepsie, New York.

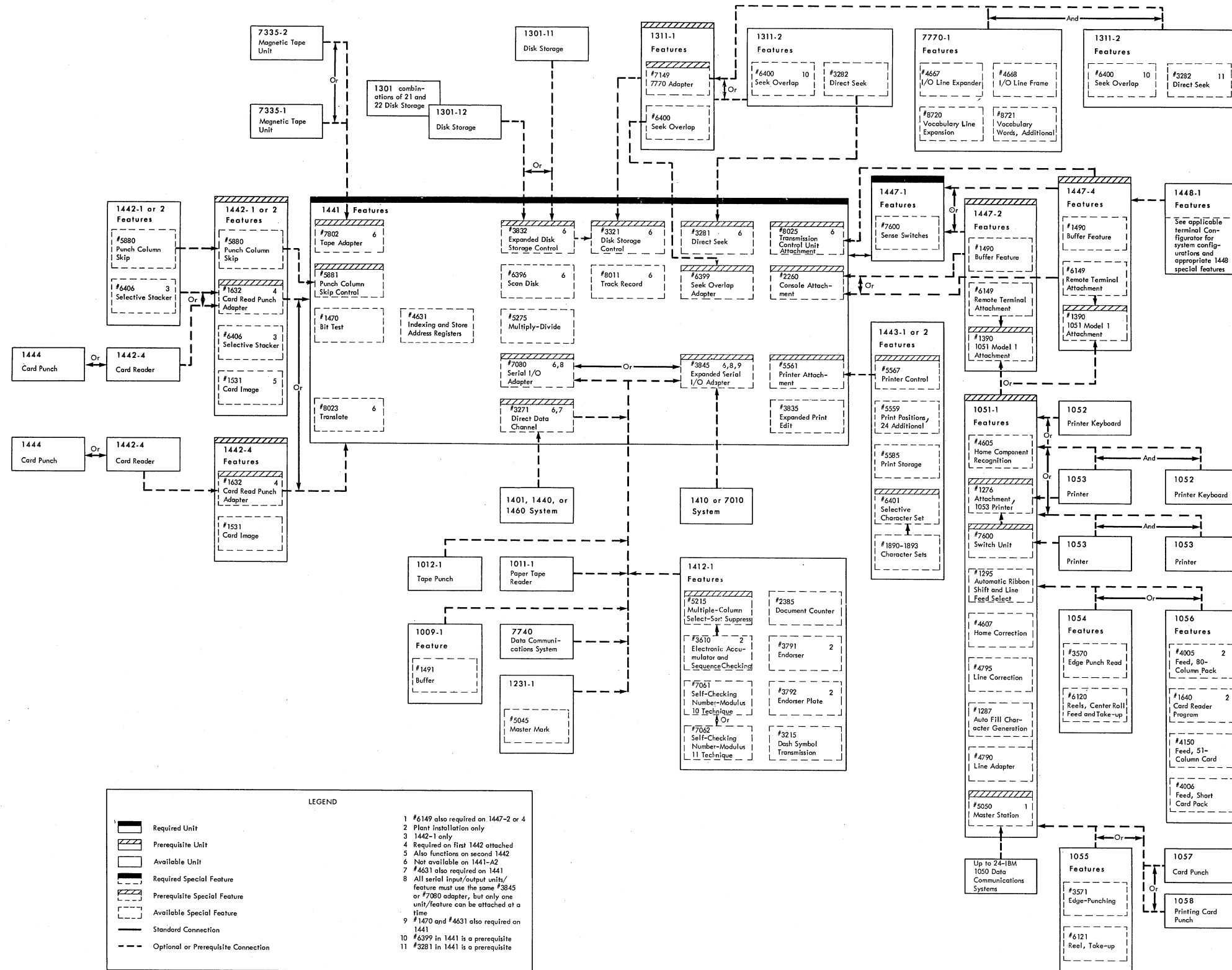
- NOTES**
- * 3585 if on Data Channel 2
 - † 7830 Tape Switching Feature read on any 729 to be switched by 7155.
 - ‡ 1008 for Model 1, 1009 for Model 2. Max of 2 additional access arms per 1405 and 12 access arms per system.
 - § Can mix 1301 and 1302 on same channel. Can mix 1301 and 1302 with 1311 if 1311 on different channel. Cannot mix 1405 with 1301, 1302, or 1311 on system.
 - ¶ Prerequisite: 3470 Dual Sync Adapter.
 - ⊕ Optional and recommended. Prerequisite: 5620 Priority on 1411.
 - ⊖ Optional features on 1311-5: 6400 Seek Overlap, 6396 Scan Disk, and 8011 Track Record; on 1311-2: 6400 Seek Overlap only. Seek Overlap on 1311-5 necessitates Seek Overlap on all companion 1311-2's. 6396 Scan Disk on 1311 necessitates 6397 or 6398 Scan Feature on CPU.
 - ⊗ Prerequisites: 4740 on printer and 5380 on 1414.
 - ⊙ I/O devices and features shown attached to Channel 1 adapters can also be attached to Channel 2 adapters, with same restrictions.
 - ⊛ 7631-3 permits sharing (a) 1301's with 7000 series systems except 7010 or 7072 (b) 1302's with 7000 series systems except 7010, 7070, or 7072. 7631-5 permits shared use by a 7010 or another 1410.
 - ⊜ Not available on 7631's with serial number lower than 12000.
 - ⊝ Prerequisites: 4660 I/O adapter and 5620 Priority.
 - ⊞ Prerequisites: 5620 Priority and 5730 Overlap.
 - ⊟ Prerequisite: 1411 Model A1 through A5.
 - ⊠ 5621 Priority Feature Extension required to extend system priority-interrupt capabilities to I/O operations transmitted through 4660 I/O adapter (Channel 2).
 - ⊡ 4902 used if Ch 1 has no 4900; 4903 used if Ch 1 already has a 4900.
 - ⊢ 4900 used if Ch 2 has no 4902; 4903 used if Ch 2 already has a 4902.
 - ⊣ Prerequisite: 5215 Multiple Column Select -- Sort Suppress feature.
 - ⊤ Prerequisite: 5201 Multiple Column Control feature.
 - ⊥ Not available on 1412's with serial number lower than 10058.
 - ⊦ Required for 2075, 2076 if 1050 terminals use customer-provided wires of 50 ft - 8 miles. (Under 50 ft permits direct interface; over 8 miles requires common carrier.)
 - ⊧ Communications line adapters and telegraph features cannot be installed on same 1414 (use the same space).
 - ⊨ Total buffers for telegraph are: minimum of 2, maximum of 4. The minimum 2 must be 1 in and 1 out (feature 7864). The additional 1 or 2 features can be one or two 7871 in, one or two 7875 out, or one 7871 in and one 7875 out. Simplex = one way only. Half Duplex = two ways, one at a time. Full Duplex = two ways simultaneously.

IBM 1440 Configurator



Copies of this and other IBM publications can be obtained through IBM Branch Offices.
Address comments concerning the content of this publication to IBM Product Publications, Endicott, New York 13764.

March 1964



IBM
 International Business Machines Corporation
 Data Processing Division
 112 East Post Road, White Plains, N. Y. 10601

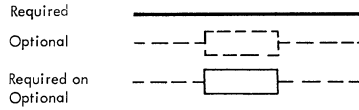
Restricted For IBM Use Only

Printed in U. S. A. A24-3017-5

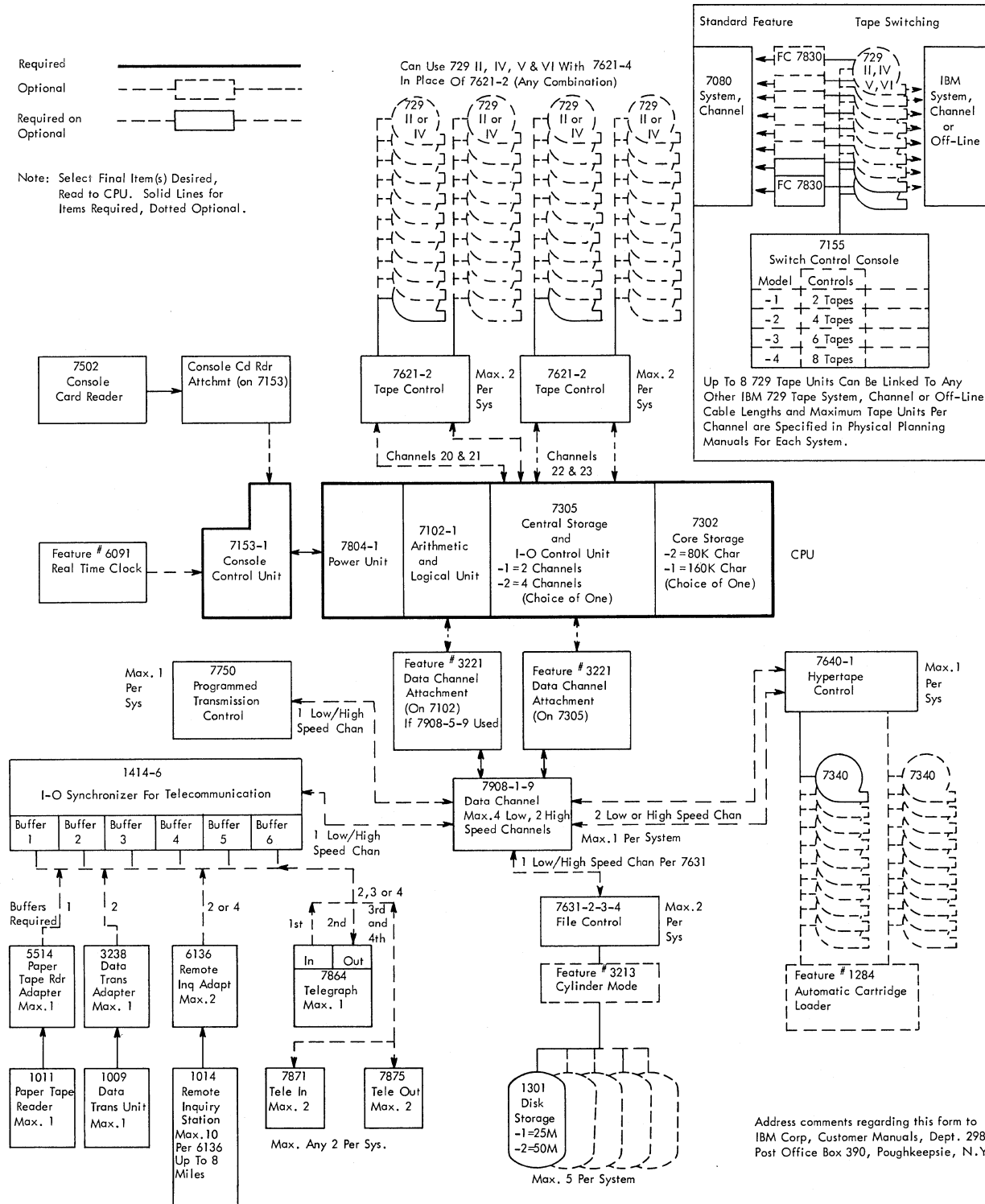


7080 Data Processing System Configuration

A22-6687
PRINTED IN U. S. A.



Note: Select Final Item(s) Desired, Read to CPU. Solid Lines for Items Required, Dotted Optional.

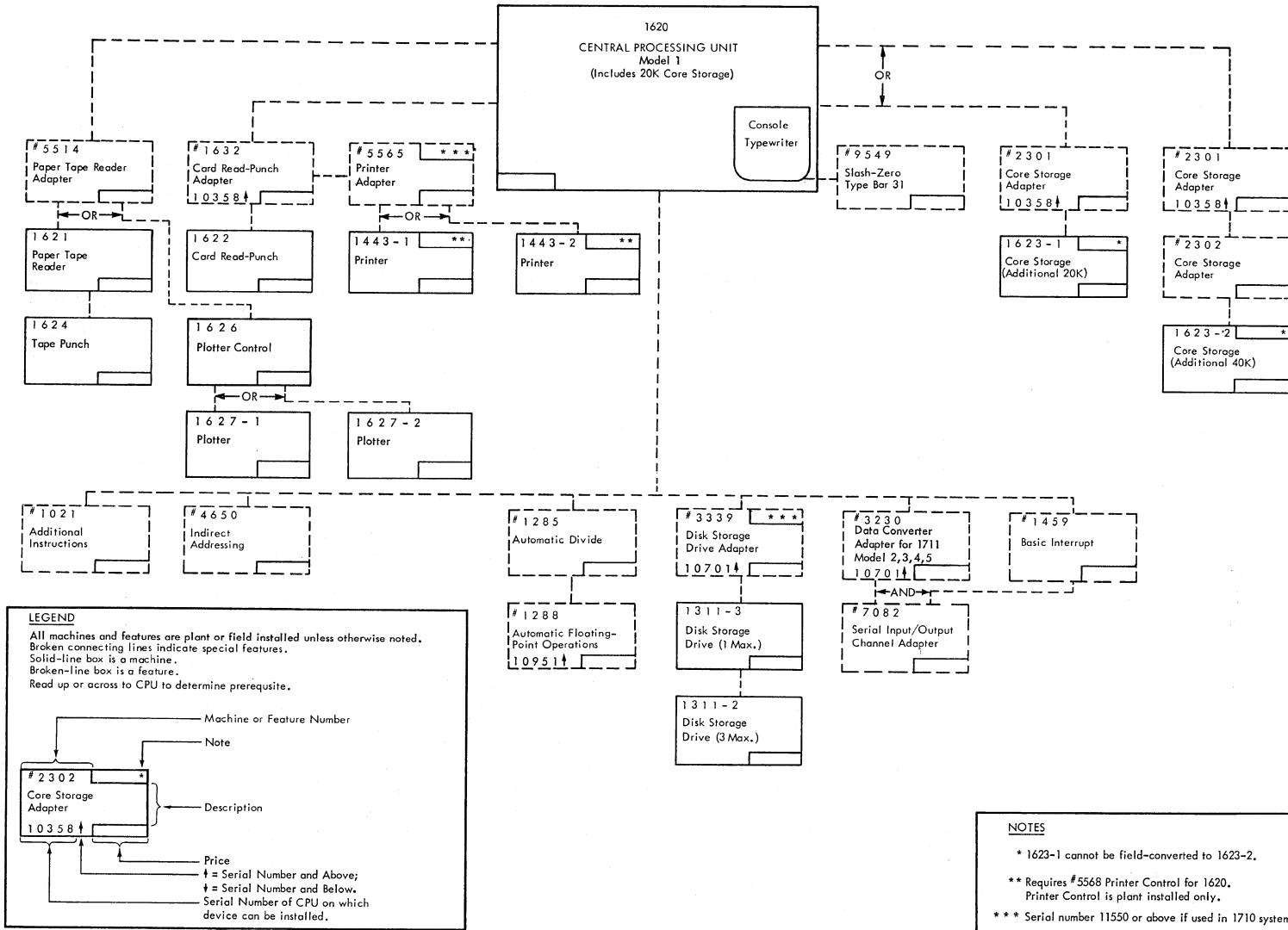


Address comments regarding this form to IBM Corp, Customer Manuals, Dept. 298, Post Office Box 390, Poughkeepsie, N.Y.



1620 Model 1 Configurator

Form A26-5691-3 August 1963



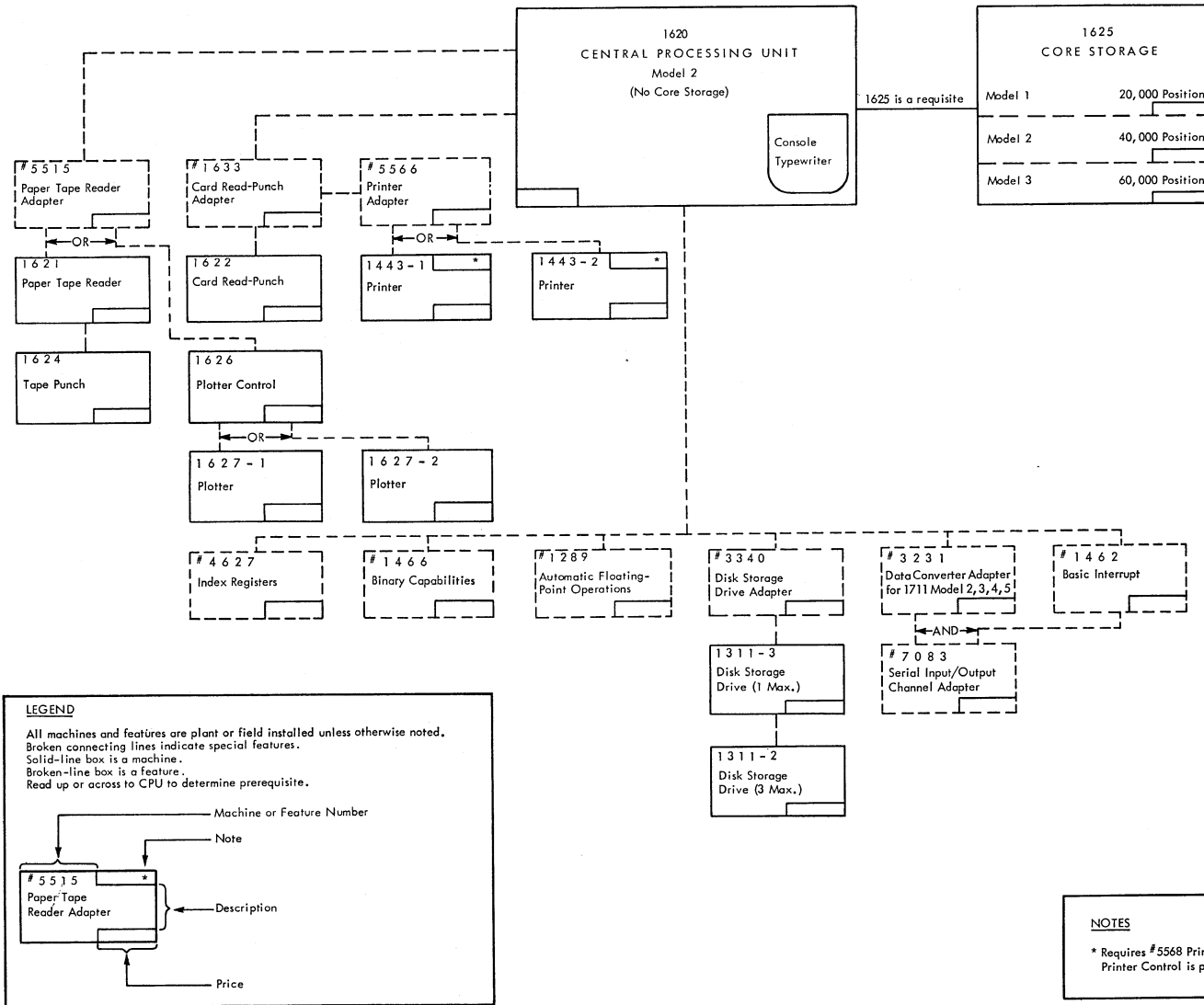
Printed in U.S.A.








1620 Model 2 Configurator

August 1963



IBM 7094 Configurator

A22-6689-2
PRINTED IN U.S.A.

Required 
 Optional 
 Required On Optional 

Note 1: Select final item(s) desired. Read up to CPU. Solid lines are required; dotted, optional.

Note 2: Each system requires one 7607 Data Channel, Models 1, 3, or 5, with a 711 and a 716. The number of channels that can operate simultaneously in a system depends on the data rates of the I/O units in use.

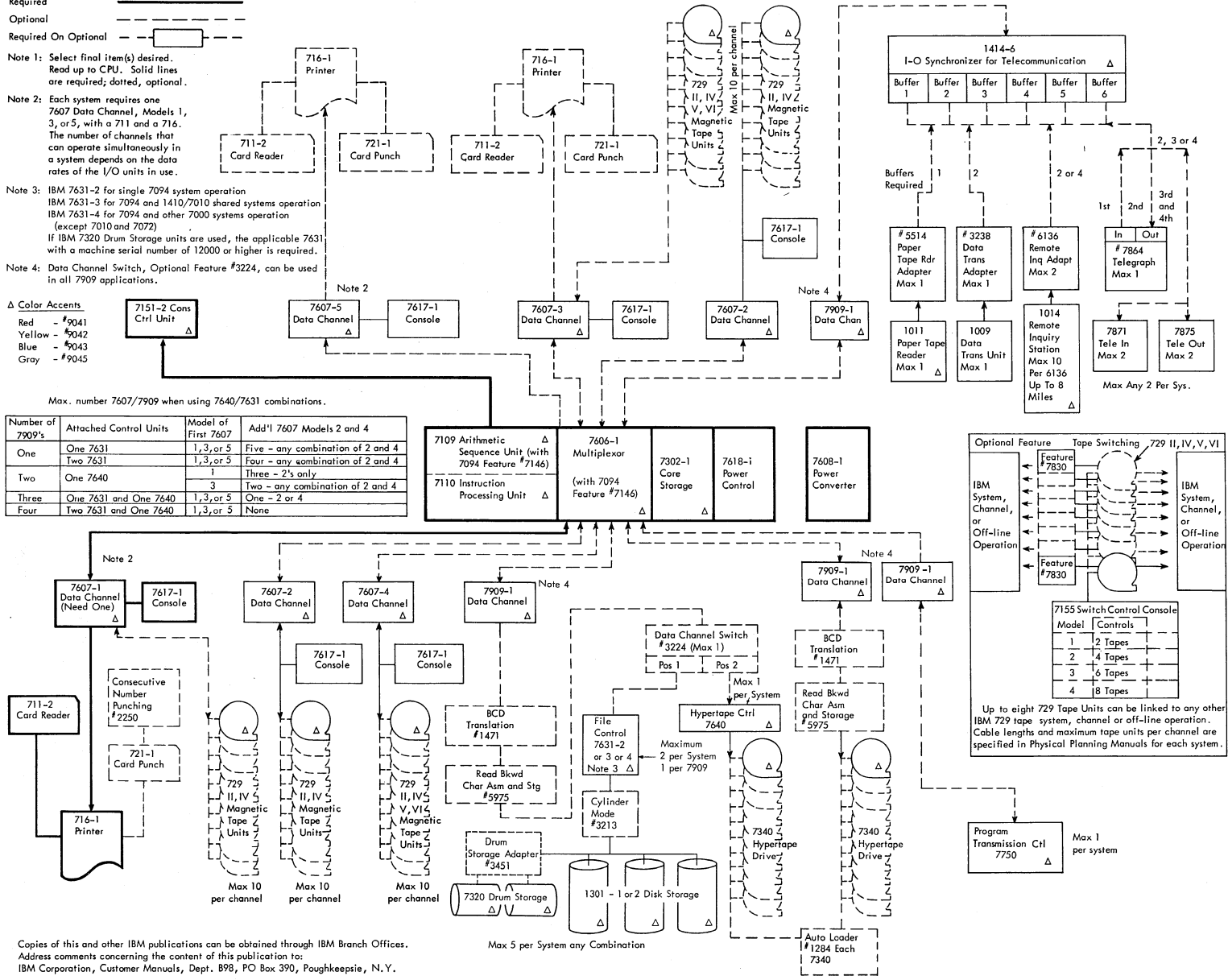
Note 3: IBM 7631-2 for single 7094 system operation
 IBM 7631-3 for 7094 and 1410/7010 shared systems operation
 IBM 7631-4 for 7094 and other 7000 systems operation (except 7010 and 7072)
 If IBM 7320 Drum Storage units are used, the applicable 7631 with a machine serial number of 12000 or higher is required.

Note 4: Data Channel Switch, Optional Feature #3224, can be used in all 7909 applications.

Δ Color Accents
 Red - #9041
 Yellow - #9042
 Blue - #9043
 Gray - #9045

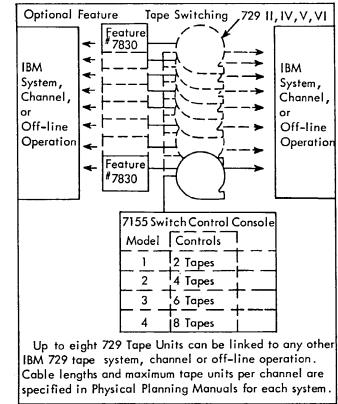
Max. number 7607/7909 when using 7640/7631 combinations.

Number of 7909's	Attached Control Units	Model of First 7607	Add'l 7607 Models 2 and 4
One	One 7631	1, 3, or 5	Five - any combination of 2 and 4
	Two 7631	1, 3, or 5	Four - any combination of 2 and 4
Two	One 7640	1	Three - 2's only
		3	Two - any combination of 2 and 4
Three	One 7631 and One 7640	1, 3, or 5	One - 2 or 4
	Two 7631 and One 7640	1, 3, or 5	None



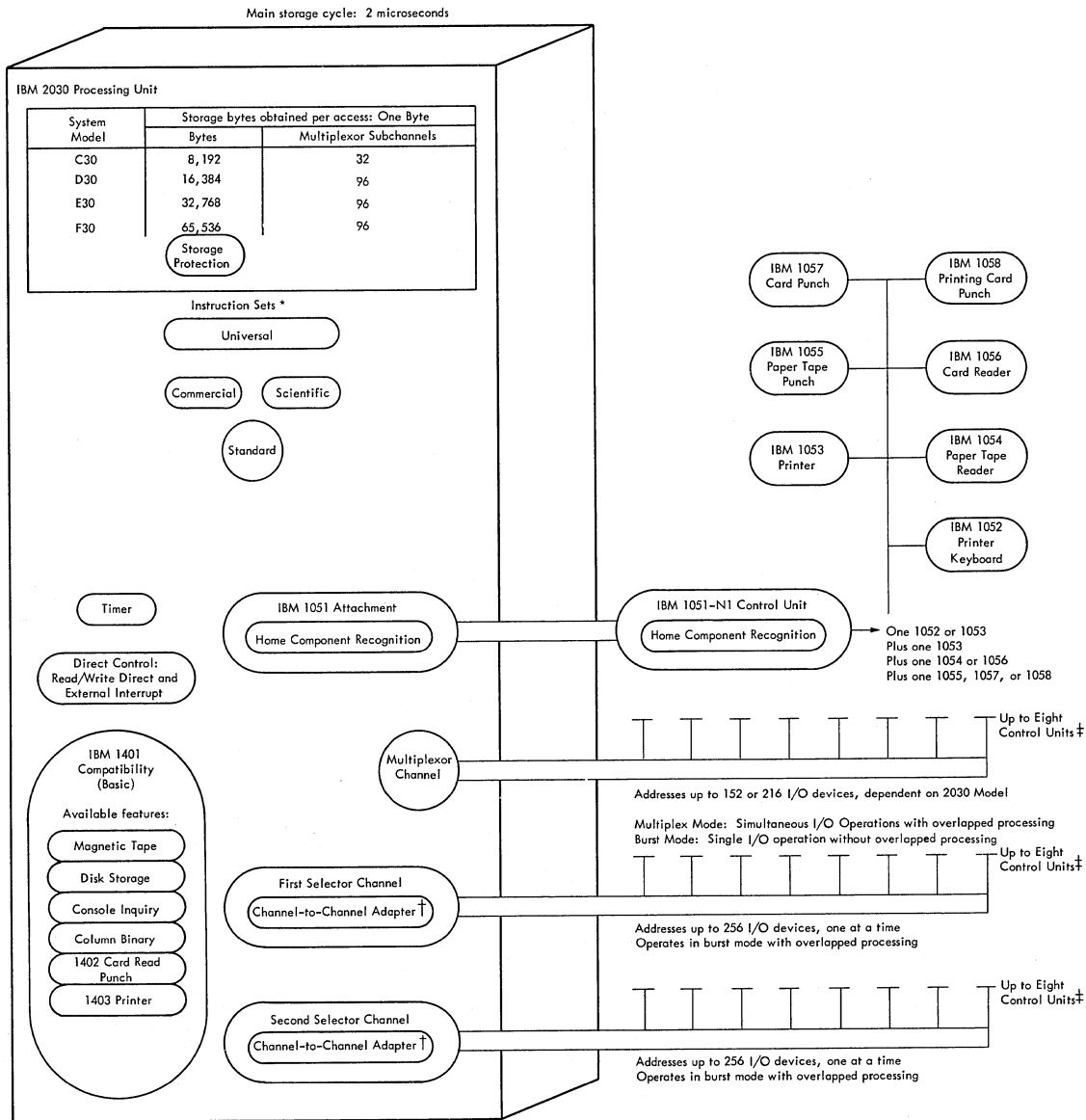
Copies of this and other IBM publications can be obtained through IBM Branch Offices. Address comments concerning the content of this publication to: IBM Corporation, Customer Manuals, Dept. 898, PO Box 390, Poughkeepsie, N.Y.

Max 5 per System any Combination



IBM System/360 Model 30 Configurator

File No 5360-30-00
Form A24-3232



NOTES:

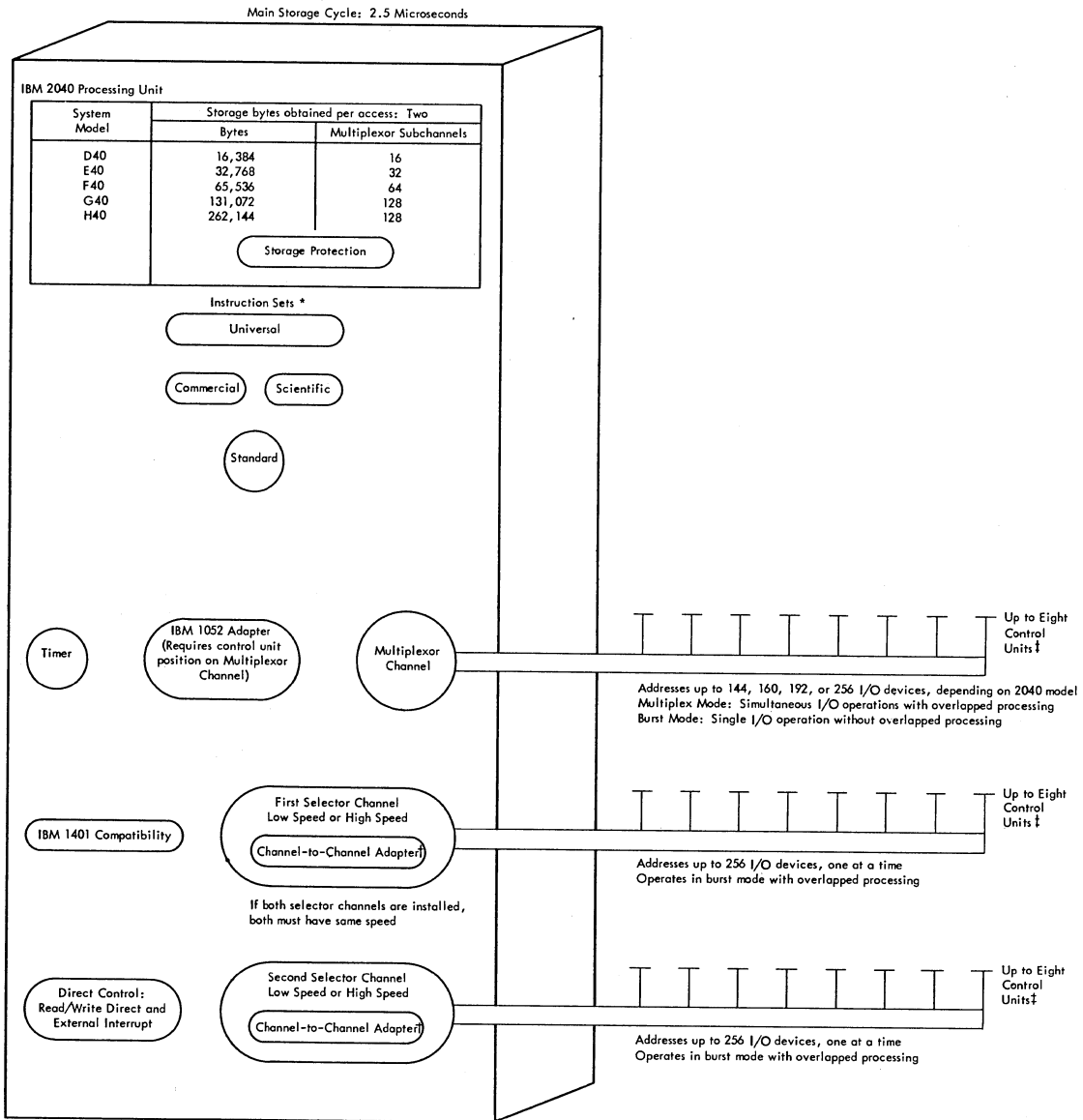


- * The Universal Instruction set includes the two storage protection instructions, plus the following subsets: Standard, Commercial and Scientific
- † A Channel-to-Channel Adapter Option (one per 2030) permits interconnection of two channels on same or different systems. Only one Channel-to-Channel Adapter needed per connection; it counts as a control unit
- ‡ Input/Output Control Units and devices are shown on the IBM System/360 Input/Output Configurator, Form A22-6823

Copies of this and other IBM publications can be obtained through IBM branch offices
Address comments concerning the content of this publication to:
IBM Product Publications, Endicott, N.Y. 13764

IBM System/360 Model 40 Configurator

File No S360-40-00
Form A22-6813



NOTES:

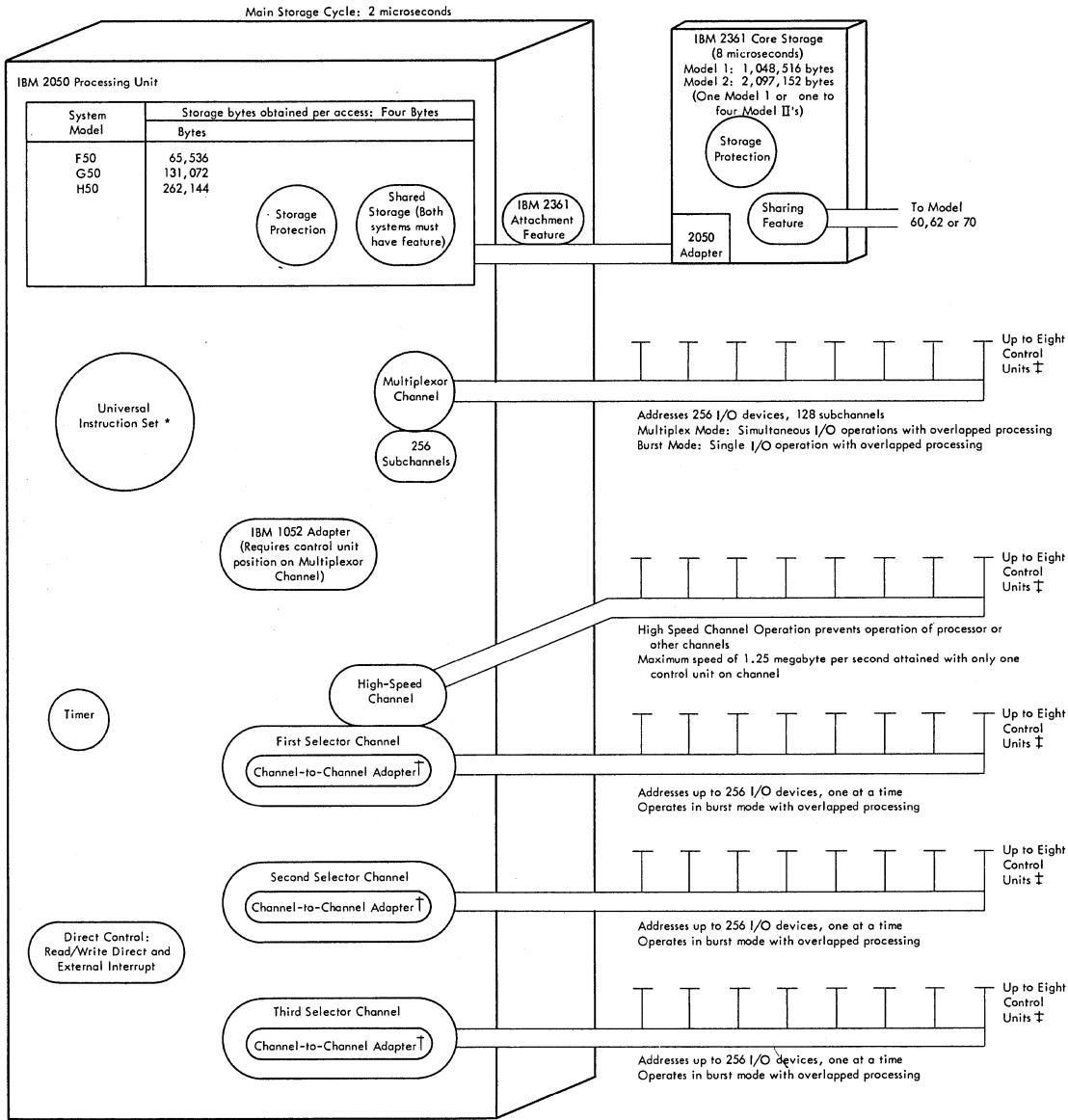


- * The Universal Instruction Set includes the two storage protection instructions, plus the following subsets: Standard, Commercial, and Scientific
- † A Channel-to-Channel Adapter option (one per 2040) permits interconnection of two channels. One channel position can connect to one channel position on any other IBM System/360 channel. Only one Channel-to-Channel Adapter needed per connection; it counts as a control unit
- ‡ Input/Output Control Units and devices are shown on the IBM System/360 Input/Output Configurator, Form A22-6823

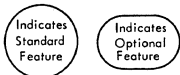
Copies of this and other IBM publications can be obtained through IBM branch offices
Address comments concerning the content of this publication to:
IBM Corporation, Customer Manuals, Dept. B98, PO Box 390, Poughkeepsie, N.Y. 12602

IBM System/360 Model 50 Configurator

File No S360-50-00
Form A22-6814



NOTES:



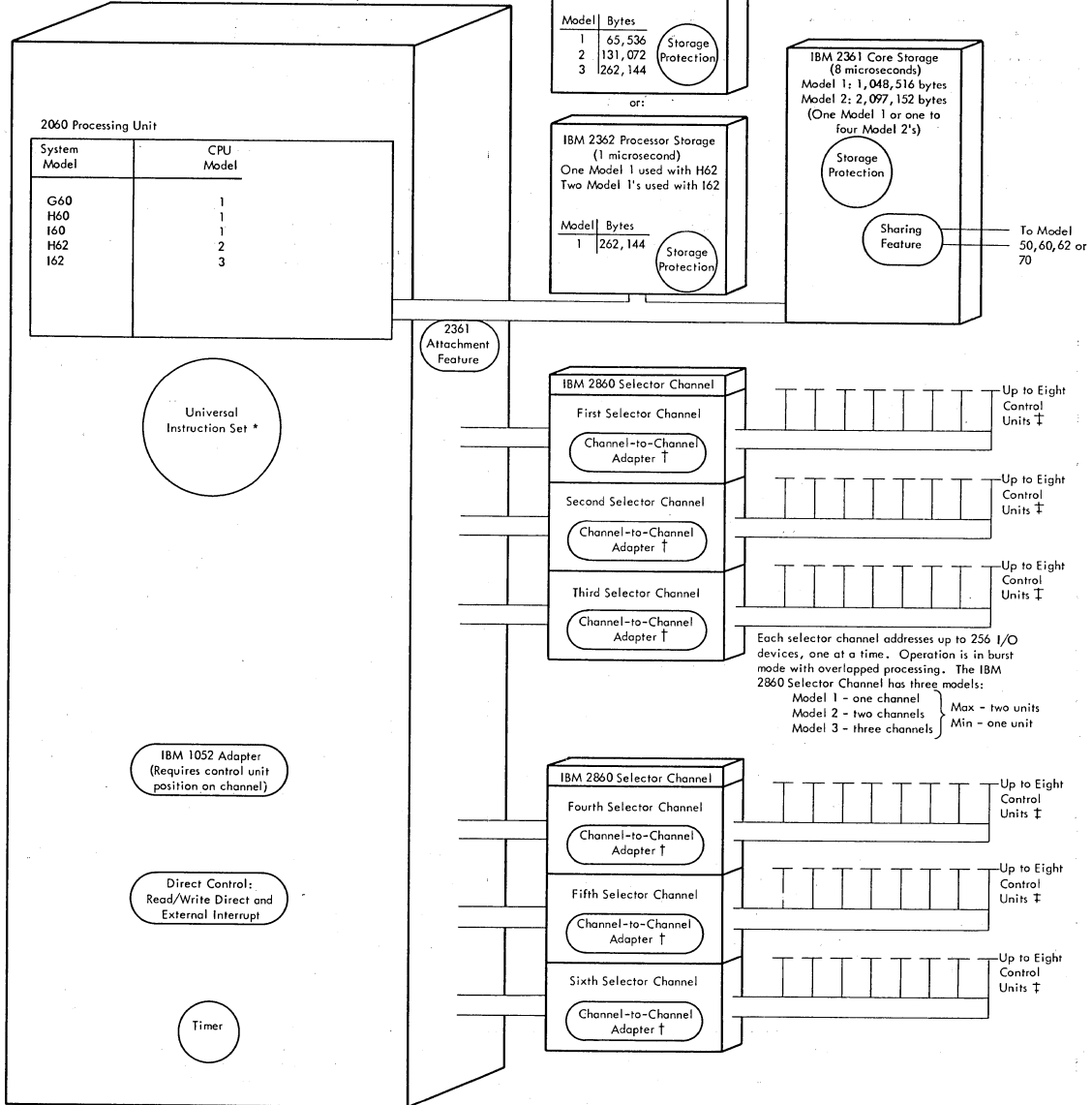
*The Universal Instruction set includes the two storage protection instructions, plus the following subsets: Standard, Commercial, and Scientific
 †A Channel-to-Channel Adapter Option (one per 2050) permits interconnection of two channels. One channel position can connect to one channel position on any other IBM System/360 channel. Only one Channel-to-Channel Adapter needed per connection; it counts as a control unit
 ‡Input/Output Control Units and devices are shown on the IBM System/360 Input/Output Configurator, Form A22-6823

Copies of this and other IBM publications can be obtained through IBM branch offices
 Address comments concerning the content of this publication to:
 IBM Corporation, Customer Manuals, Dept 898, PO Box 390, Poughkeepsie, N.Y. 12602

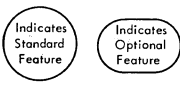
IBM System/360 Model 60, 62 Configurator

File No S360-60/62-00
Form A22-6815

Main Storage Cycle: Model 60-2 microseconds Storage bytes obtained per access:
Model 62-1 microsecond Eight Bytes



NOTES:

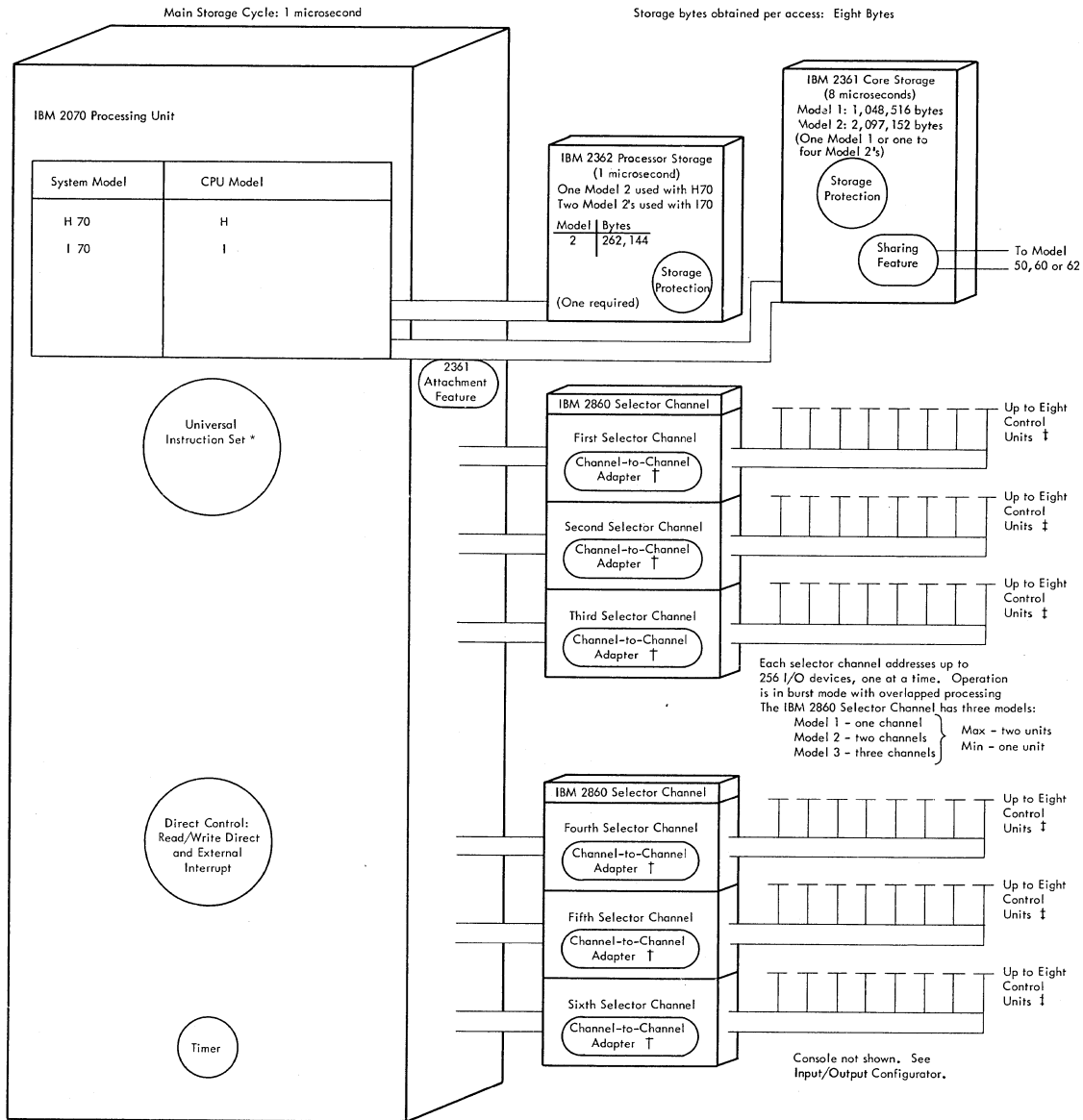


*The Universal Instruction Set includes the two storage protection instructions, plus the following subsets: Standard, Commercial, and Scientific
 †A Channel-to-Channel Adapter option (one per chan) permits interconnection of two channels. One channel position can connect to one channel position on any other IBM System/360 channel. Only one Channel-to-Channel Adapter needed per connection; it counts as one control unit
 ‡ Input/Output Control Units and devices are shown on the IBM System/360 Input/Output Configurator, Form A22-6823

Copies of this and other IBM publications can be obtained through IBM branch offices
 Address comments concerning the content of this publication to:
 IBM Corporation, Customer Manuals, Dept 898, PO Box 390, Poughkeepsie, N.Y. 12602

IBM System/360 Model 70 Configurator

File No. S360-70-00
Form A22-6816



NOTES:

Indicates Standard Feature

Indicates Optional Feature

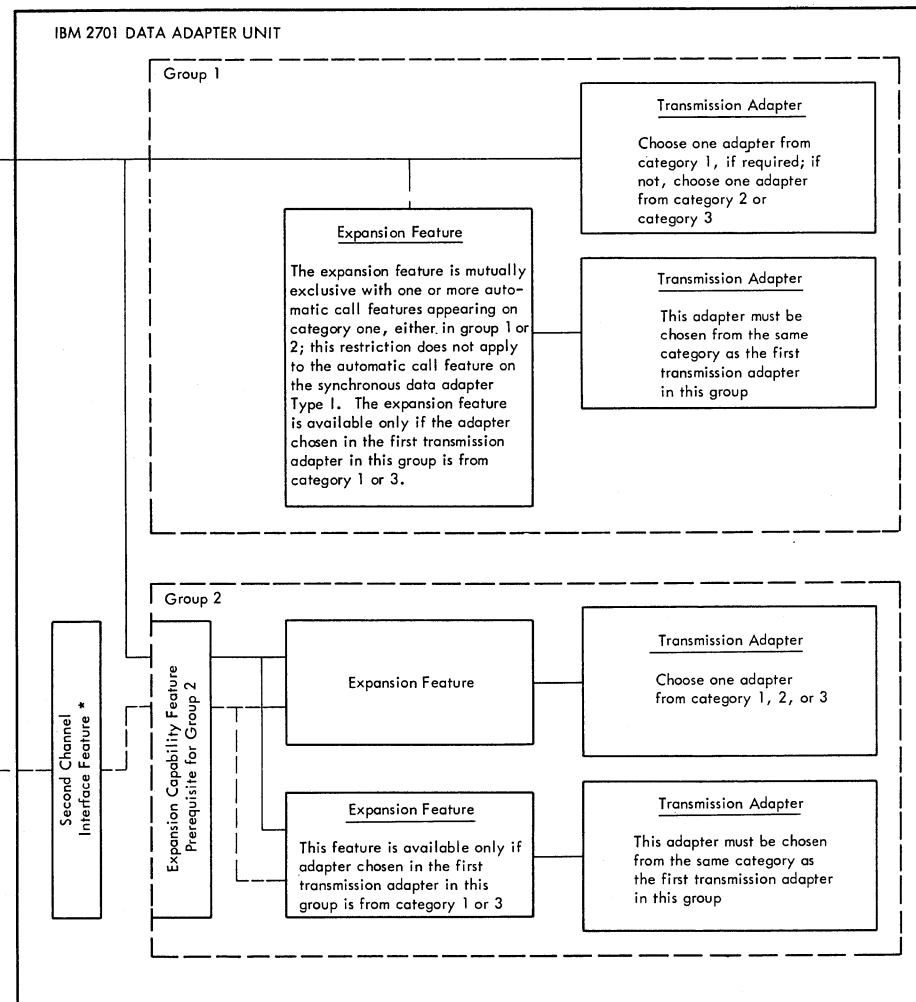
X

† The Universal Instruction Set includes the two storage protection instructions, plus the following subsets: Standard, Commercial and Scientific
‡ A Channel-to-Channel Adapter Option (one per chan) permits interconnection of two channels. One channel position can connect to one channel position on any other IBM System/360 channel. Only one Channel-to-Channel Adapter needed per connection; it counts as a control unit
‡ Input/Output control units and devices are shown on the IBM System/360 Input/Output Configurator, Form A22-6823

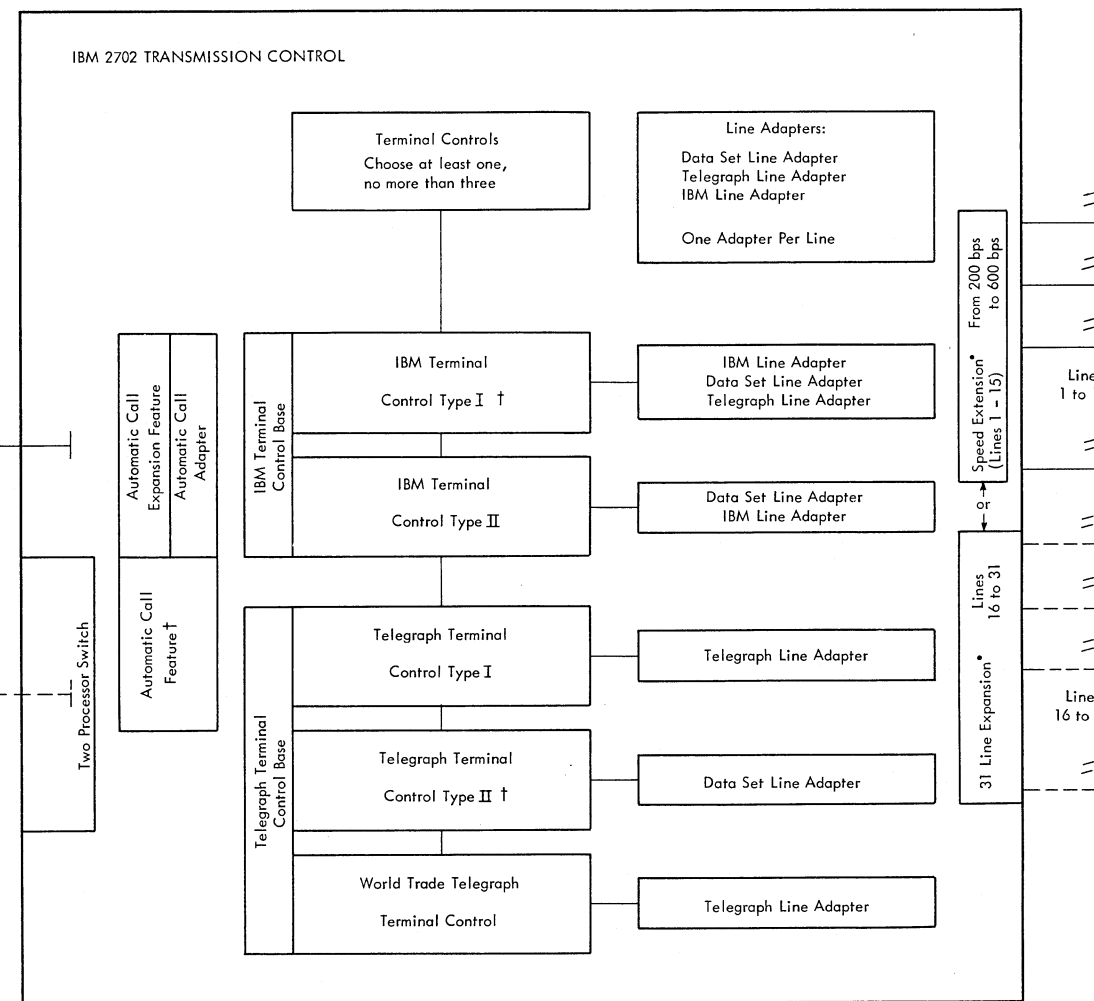
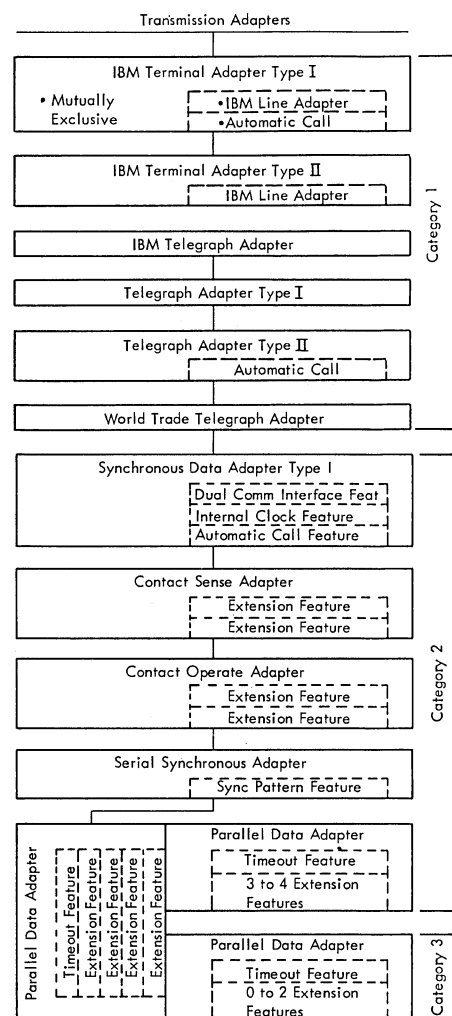
Copies of this and other IBM publications can be obtained through IBM branch offices
Address comments concerning the content of this publication to:
IBM Corporation, Customer Manuals, Dept. B98, PO Box 390, Poughkeepsie, N.Y. 12602

IBM System/360 Data Communications Configurator

File S360-00
Form A22-6824



* This feature is available only with certain combinations of adapters (consult sales representative for further details)



* These features are mutually exclusive
† The automatic call feature can only be attached to these Terminal Controls
Note: The 2702 can be attached to IBM System/360, Models 30, 40, or 50

IBM 7770 AUDIO RESPONSE UNIT Model 3

Number of I/O Lines	4	8	12	16	20	24	28	32	36	40	44	48
I/O Line Expander *		1	2	3	4	5	6	7	8	9	10	11
I/O Line Panel **			1	1	2	2	3	3	4	4	5	5
I/O Line Frame ▽					1	1	1	1	1	1	1	1

* One I/O line expander is required for each increment of 4 I/O lines in excess of the first 4
** One I/O line panel is required for each increment of 8, or portion thereof, I/O lines in excess of 8
▽ Increasing the number of I/O lines beyond a total of 16 lines requires one I/O line frame

Vocabulary -- Number of Words						
32	48	64	80	96	112	128

Note: The 7770 and the 7772 can be attached to IBM System/360, Models 30, 40, or 50

— Connection to 360 channel position

IBM 7772 AUDIO RESPONSE UNIT Model 3

Number of I/O Lines	2	4	6	8
I/O Line Expander *		1	2	3
I/O Line Frame **			1	1

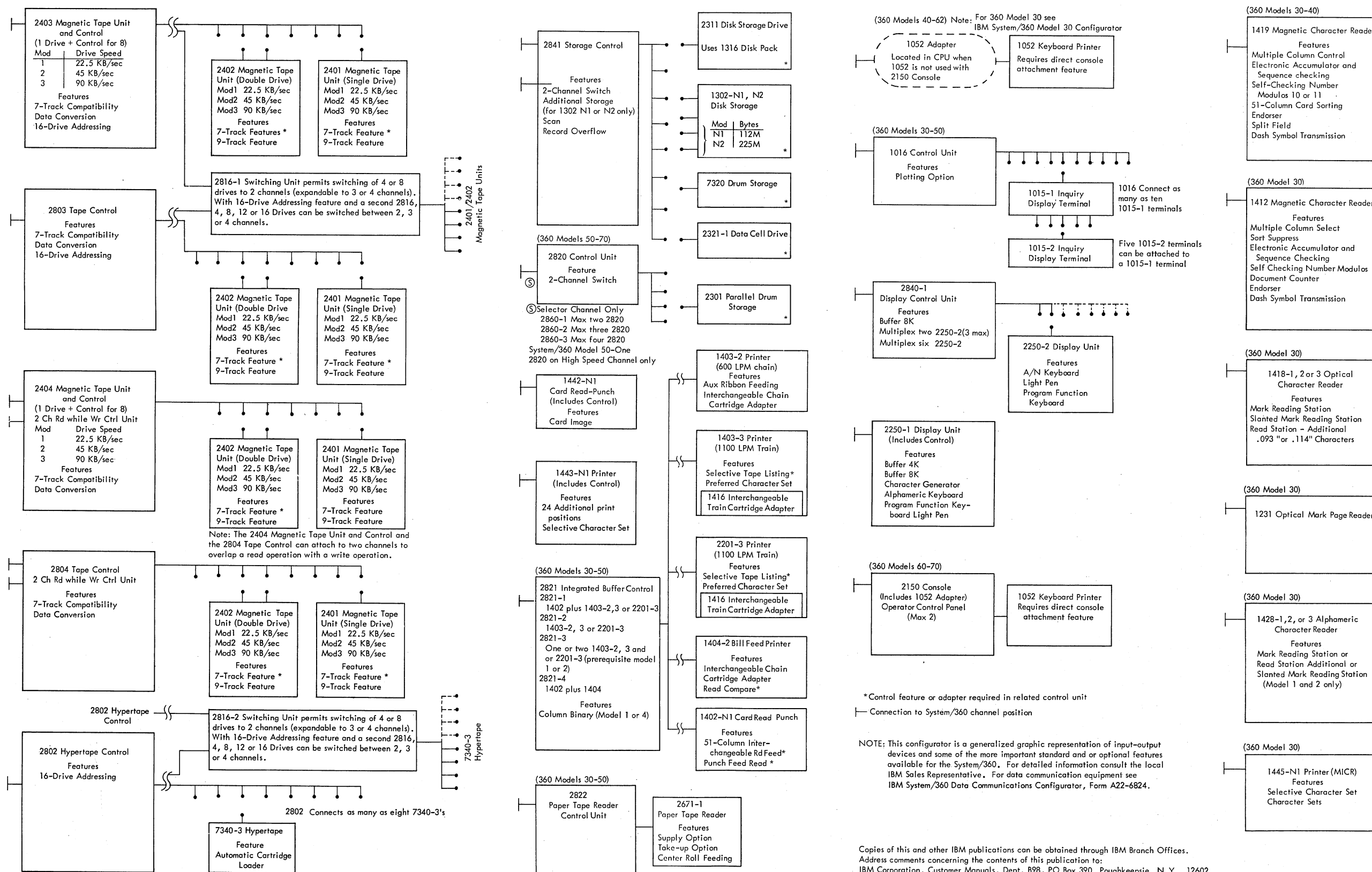
* One I/O Line Expander is required for each increment of 2 I/O lines in excess of the first 2
** An I/O Line Frame is required with more than one I/O Line Expander

Vocabulary: Response composed from vocabulary stored in random access storage devices as a digitally-coded voice

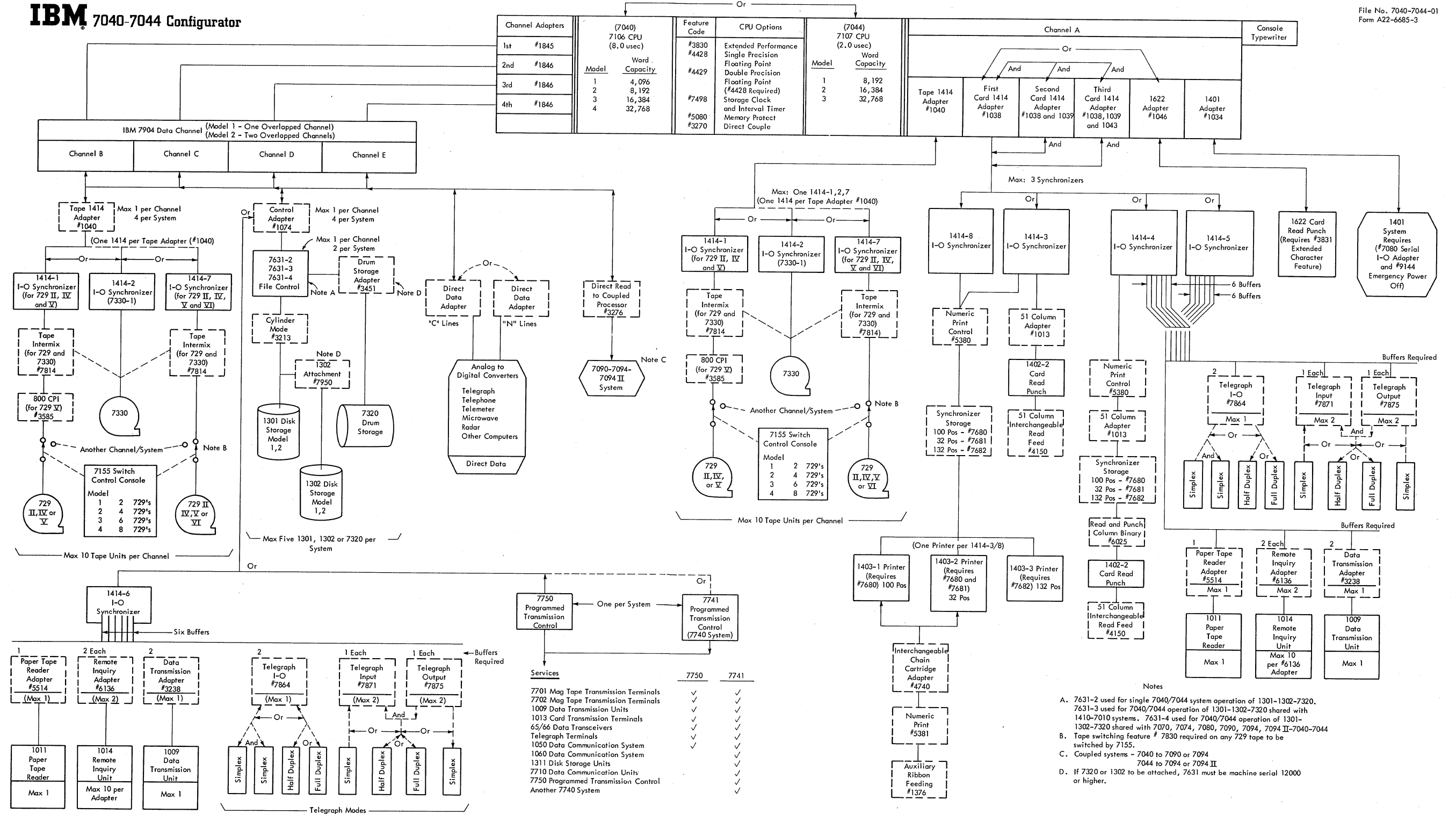
Copies of this and other IBM publications can be obtained through IBM Branch Offices.
Address comments concerning the contents of this publication to: IBM Corporation, Customer Manuals, Dept. B9B, PO Box 390, Poughkeepsie, N.Y., 12602

IBM System/360 Input/Output Configurator

File S360-00
Form A22-6823



IBM 7040-7044 Configurator



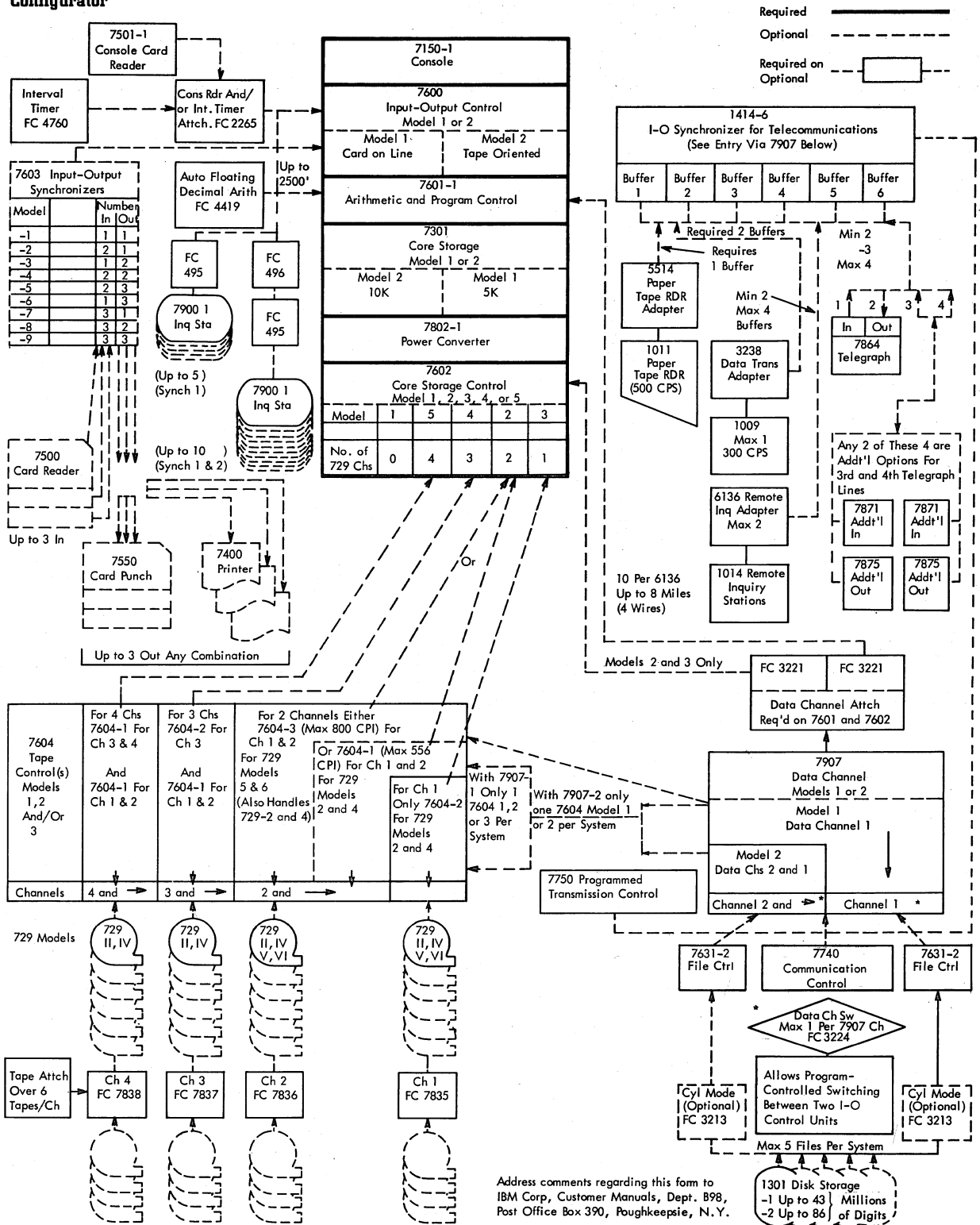
- Notes
- A. 7631-2 used for single 7040/7044 system operation of 1301-1302-7320. 7631-3 used for 7040/7044 operation of 1301-1302-7320 shared with 1410-7010 systems. 7631-4 used for 7040/7044 operation of 1301-1302-7320 shared with 7070, 7074, 7080, 7090, 7094, 7094 II-7040-7044
 - B. Tape switching feature # 7830 required on any 729 tape to be switched by 7155.
 - C. Coupled systems - 7040 to 7090 or 7094
7044 to 7094 or 7094 II
 - D. If 7320 or 1302 to be attached, 7631 must be machine serial 12000 or higher.

Printed in U.S.A.

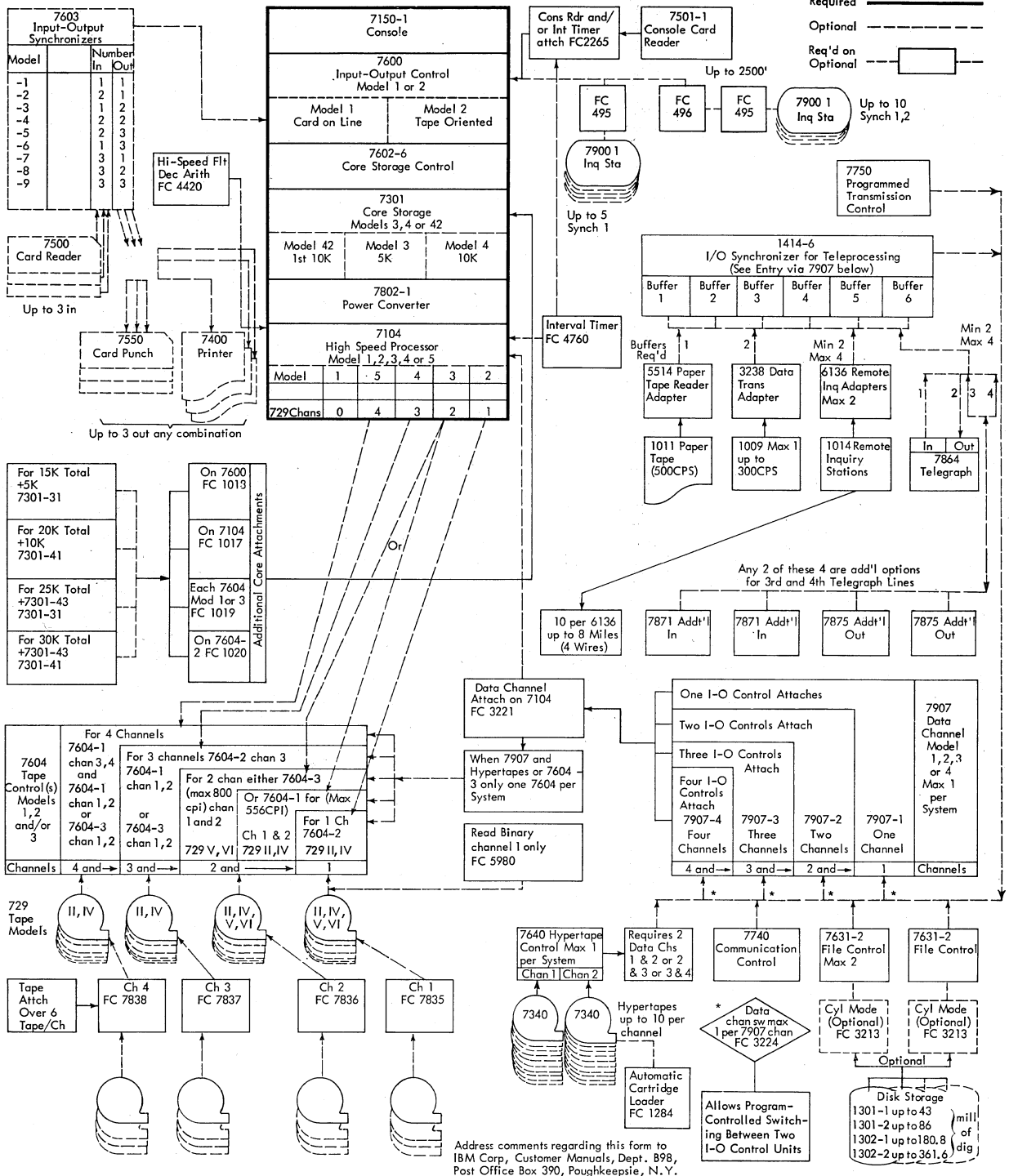
Copies of this and other IBM publications can be obtained through IBM Branch Offices. Address comments concerning the contents of this publication to: IBM Corporation, Customer Manuals, Dept. B98, PO Box 390, Poughkeepsie, N.Y. 12602

IBM 7070 Configurator

File Number 7070/7074-00
Form A22-6683-2



IBM 7074 Configurator

File Number 7070/7074-00
Form A22-6684-2

IBM SYSTEMS REFERENCE CARDS

One aspect of system installation is the conversion of the designed operating procedure into the programmed language of the system. The programmer who accomplishes this must have a great amount of information at his fingertips. Not only must he have a thorough understanding of what the procedure is to perform, but he must also be aware of the system configuration, have an intimate knowledge of the operations of the system components, and be able to accurately prepare estimates of the time required to operate the programmed procedure.

To aid the programmer in keeping straight the many detailed system operating facts, a printed reference card is available from Stationery Stores for major IBM systems. Reference cards are published and kept up to date by the respective manufacturing divisions and are designed to provide a ready summary of each system's prominent programming and timing characteristics. While these

characteristics may vary for different types of machines (internal binary versus binary coded decimal, for example), the basic contents of the reference cards are similar for all systems. They usually contain instruction format, instruction set mnemonics with corresponding binary or BCD code and card code, timing formulas, and internal binary or BCD-to-card-code conversion chart.

Reference cards are primarily for use by customer and IBM personnel who are actively engaged in the detailed programming of a specific computer system. They also serve as a reference chart for individuals with a previous thorough knowledge of the specific system programming features.

Note that the reference cards included in the handbook are, unlike other handbook material, arranged according to system number rather than assigned page number.

IBM 1401 Data Processing System Reference Card

SYSTEM TIMINGS

Key to abbreviations used in formulas

- L_A = Length of the A-field
- L_B = Length of the B-field
- L_C = Length of Multiplicand field
- L_I = Length of Instruction
- L_M = Length of Multiplier field
- L_Q = Length of Quotient field
- L_R = Length of Divisor field
- L_S = Number of significant digits in Divisor (Excludes high-order 0's and blanks)
- L_W = Length of A- or B-field, whichever is shorter
- L_X = Number of characters to be cleared
- L_Y = Number of characters back to right-most "0" in control field
- L_Z = Number of 0's inserted in a field
- I/O = Timing for Input or Output cycle
- F_m = Forms movement times. Allow 20 ms for first space, plus 5 ms for each additional space
- T_m = Tape movement times
- Σ = Number of fields included in an operation

SYSTEM TIMINGS

OPERATION	OP CODE	FORMULA
Punch a Card	4	.0115 (L _I + 1) + I/O
Read a Card	1	.0115 (L _I + 1) + I/O
Read and Punch	5	.0115 (L _I + 1) + I/O
Select Stacker	K	.0115 (L _I + 1)
Set Word Mark	9	.0115 (L _I + 3)
Start Punch Feed*	9	.0115 (L _I + 1)
Start Read Feed*	8	.0115 (L _I + 1)
Store A-address Register*	Q	.0115 (L _I + 5)
Store B-address Register*	H	.0115 (L _I + 4)
Subtract (no complement)	5	.0115 (L _I + 3 + L _A + L _B)
Subtract (complement)	5	.0115 (L _I + 3 + L _A + 4 L _B)
Write a Line	2	.0115 (L _I + 1) + I/O
Write and Punch	6	.0115 (L _I + 1) + I/O
Write and Read	3	.0115 (L _I + 1) + I/O
Write, Read and Punch	7	.0115 (L _I + 1) + I/O
Zero and Add	?	.0115 (L _I + 1 + L _A + L _B)
Zero and Subtract	1	.0115 (L _I + 1 + L _A + L _B)

INSTRUCTION FORMAT

The IBM 1401 Data Processing System uses a variable word-length concept; the length of an instruction can vary from one to eight characters.

OP CODE	A- or I-ADDRESS	B-ADDRESS	d-CHARACTER
X	XXX	XXX	X

Op Code: This is always a single character which defines the basic operation being performed. A word mark is always associated with the operation code position of an instruction.

A-Address: This always consists of three characters. It can identify the units position of the A-field, or it can be used to select a special unit or feature (tape unit, column binary feature, disk storage, inquiry, etc.).

I-Address: Instructions that can cause program branches use the I-address to specify the location of the next instruction to be executed if a branch occurs.

B-Address: This is a three-character storage address associated with the B-field. It usually addresses the units position of the B-field, but in some operations, such as tape or disk record read and write, it specifies the high-order position of a record storage area.

d-Character: The d-character is used to modify an operation code. It is a single alphabetic, numerical, or special character, positioned as the last character of an instruction. It can be used with instructions of any length.

PROCESSING OVERLAP

A-Address

The hundreds position of the A-address of a tape or input-output unit (not 1405 or 1407) instruction is changed from % to @. The symbol is used to signal an overlap operation with character reader, magnetic tape, paper tape, and data transmission units.

Overlap Mode

The following instructions are used when the system is in the overlap mode and card, printer or serial I/O operations are to be performed.

INSTRUCTION	FUNCTION
K\$	Overlap On
K(I)\$	Overlap On And Branch
K*	Overlap Off
K(I)*	Overlap Off And Branch
K□	Reset Overlap
K(I)□	Reset Overlap and Branch

1405 TIMING

TIMINGS (Model 2)	MAX.	AVG.	MIN.
Disk to Disk	800 ms	600 ms	450 ms
Track to Track	250 ms	175 ms	100 ms
Record to Record, same Track	50 ms	25 ms	

International Business Machines Corporation
Data Processing Division
112 East Post Road White Plains, N. Y.

© 1959, 1960, 1961 by International Business Machines Corporation

TAPE OPERATIONS

T_m — Tape movement can be determined from the following:

- I = Number of Characters
- C = Character Rate

729 II at 200 cpi = .067 ms	729 V at 200 cpi = .067 ms
at 556 cpi = .024 ms	at 556 cpi = .024 ms
at 800 cpi = .017 ms	
729 IV at 200 cpi = .044 ms	7330 at 200 cpi = .139 ms
at 556 cpi = .016 ms	at 556 cpi = .050 ms

729 Model II and V Read	10.7 + CN ms = TAU interlocked
	10.5 + CN ms = Processing interlocked
Write	11.7 + CN ms = TAU interlocked
	7.5 + CN ms = Processing interlocked

729 Model IV, Read	6.8 + CN ms = TAU interlocked
	6.7 + CN ms = Processing interlocked
Write	7.8 + CN ms = TAU interlocked
	5 + CN ms = Processing interlocked

7330 Read	20.5 + CN ms = TAU interlocked
	7.7 + CN ms = Processing interlocked
Write	20.3 + CN ms = TAU interlocked
	5 + CN ms = Processing interlocked

Rewind
729 Models II and V = 1.2 minutes/reel
729 Model IV = .9 minutes/reel
7330 (High Speed) = 2.2 minutes/reel

Skip and Blank Tape
(add to subsequent write time)
729 Models II and V = 40.5 ms
729 Model IV = 27 ms
7330 = 103 ms

Backspace (after Read)
729 Models II and V = 46 + CN ms
729 Model IV = 33 + CN ms
7330 = 428 + CN ms

Backspace (after Write)
729 Models II and V = 52 + CN ms
729 Model IV = 37 + CN ms
7330 = 435 + CN ms

* Special Feature

Form X24-6447-6

Printed in U. S. A.

OPERATION CODE	FUNCTION	MNEMONIC	BCD CODE	CARD CODE	OPERATION CODE	FUNCTION	MNEMONIC	BCD CODE	CARD CODE	INSTRUCTION	FUNCTION	MNEMONIC	BCD CODE	CARD CODE
INPUT-OUTPUT CODES					MISCELLANEOUS OPERATION CODES					MAGNETIC TAPE %UX TAPE UNIT ADDRESS				
1	Read a Card	R	1	1	C	Compare	C	CBA21	12-3	L(%UX)(B)d	Read/Write Tape with Word Marks	LCA		d-modifier, R-Read Tape
2	Write a Line	W	2	2	E	Move Characters and Edit	MCE	CBA41	12-5	M(%UX)(B)d	Read/Write Tape	MCW		W-Write Tape
2 □	Write Word Marks		□ is modifier		F	Control Carriage	CC	CBA42	12-6	M(%CX)(B)R	Read Compressed Tape*			(%CX) is address of tape unit
3	Write-Read	WR	C21	3	H	Store B-Address Register*	SBR	BA8	12-8	P(A)(B)	Move Characters to Record or Group Mark*	MCM	CB421	11-7
4	Punch a Card	P	4	4	K	Select Stacker	SS	CB2	11-2	U(%UX)d	Control Unit	CU	CA4	0-4
4R	Read-Punch Feed*		R is modifier		N	No Operation	NOP	B41	11-5	X(A)(B)	Move and Insert Zeros*	MIZ	CA421	0-7
4(I)R	Read-Punch Feed and Branch*		R is modifier		Q	Store A-Address Register*	SAR	CB8	11-8	INSTRUCTION FUNCTION REMARKS				
5	Read-Punch	RP	C41	5	/	Clear Storage	CS	CA1	0-1	COLUMN BINARY				
6	Write-Punch	WP	C42	6	.	Halt	H	BA821	12-3-8	1C	Read Column Binary			C is Modifier
6R	Write-Read Punch Feed*		R is modifier		#	Modify Address*	MA	821	3-8	4C	Punch Column Binary			C is Modifier
6(I)R	Write-Read Punch Feed and Branch*		R is modifier		CHARACTER AT d FOR B(I)d BRANCH					M(A)(B)A	Move and Binary Decode			A is Modifier
7	Write-Read-Punch	WRP	421	7	d	BRANCH ON	d	BRANCH ON		M(A)(B)B	Move Binary Code			B is Modifier
8	Start Read Feed*	SRF	8	8	b1	Unconditional	R	Carriage Busy*		M(%BX)(A)R	Read Binary Tape			%BX is Address of tape unit
9	Start Punch Feed*	SPF	C81	9	9	Carr. Chan. #9	T	Low Compare B < A*		M(%BX)(A)W	Write Binary Tape			
ARITHMETIC CODES					A	"Last Card" Switch	U	High Compare B > A*		W(I)(B)d	Branch if Bit Equal			BBE is mnemonic
A	Add	A	BA1	12-1	B	Sense Switch B*	Z	Overflow		DISK STORAGE %FX DISK OPERATION				
S	Subtract	S	CA2	0-2	C	Sense Switch C*	?	Reader Error if I/O Check Stop Switch OFF		M(%FO)(B)R	Seek Disk			B is Disk Address
?	Zero and Add	ZA	CB42	12-0	D	Sense Switch D*	!	Punch Error if I/O Check Stop Switch OFF		M(%FX)(B)R	Read Disk			X can be 1, 2, or 3
!	Zero and Subtract	ZS	BB2	11-0	E	Sense Switch E*	!	Punch Error if I/O Check Stop Switch OFF		M(%FX)(B)W	Write Disk			1 Specifies Single Record
@	Multiply*	M	C84	4-8	F	Sense Switch F*	!+	Printer Error if I/O Check Stop Switch OFF		L(%FX)(B)R	Read Disk with Word Marks			2 Specifies Full Track
%	Divide*	D	A84	0-4-8	G	Sense Switch G*	@	Carr. Chan. #12		L(%FX)(B)W	Write Disk with Word Marks			3 Specifies a Write Disk Check operation M(%F3)(B)W
LOGIC OPERATION CODES					K	End of Reel*	%	Processing Check with Process Check Switch OFF		1407 INQUIRY %TO ADDRESS				
B(I)	Branch	B	BA2	12-2	L	Tape Error*	/	Unequal Compare B ≠ A		M(%TO)(B)R	Read Console Printer			Data from 1407 transferred to B-address
B(I)d	Branch if Indicator ON		d is modifier		S	Equal Compare B = A*				M(%TO)(B)W	Write Console Printer			Data at B-address transferred to 1407
B(I)(B)d	Branch if Character is Equal		Contents of B compared to d		CHARACTER AT d FOR MAGNETIC TAPE DISK STORAGE					L(%TO)(B)R	Read Console Printer with Word Marks			Data from 1407 transferred to B-address with Word Marks
V(I)(B)d	Branch if WM and/or Zone	BWZ	A41	0-5	d	OPERATION	d	BRANCH ON		L(%TO)(B)W	Write Console Printer with Word Marks			Data at B-address transferred to 1407 with Word Marks
MOVE AND LOAD CODES					B	Backspace Tape Record	N	Access Inoperable		M(%TO)(B)W	Line Space			B is address of a Group Mark with a Word Mark
D	Move Numerical	MN	BA4	12-4	E	Skip and Blank Tape	V	Read/Write Parity Check or Read Back Check Error						
L	Load Character to A Word Mark	LCA	B21	11-3	M	Write Tape Mark	W	Wrong-Length Record						
M	Move Characters to A or B Word Mark	MCW	CB4	11-4	R	Rewind Tape	X	Unequal Address Compare						
Y	Move Zone	MZ	CA8	0-8	U	Rewind Tape and Unload	Y	Any Disk Storage Error Condition						
Z	Move Characters and Suppress Zeros	MCS	A81	0-9	CHARACTER AT d FOR 1407 CONSOLE INQUIRY STATION									
?	Set Word Mark	SW	CA821	0-3-8	Q	Inquiry Request	*	Inquiry Clear						
□	Clear Word Mark	CW	CBA84	12-4-8										
* Special Feature														

Mnemonic Op Code	Description	Op Code	A/I-Address	B-Address	d-character	WM's Req.	Registers		Remarks
							A	B	
BIN	Branch if Access Inoperable	B	XXX		N†		BI	dbb, Blank or (NSI**)	Disk in Not Ready Status
BIN	Branch if Disk Error	B	XXX		V†				Read/Write Parity or, WDC Error
BIN	Branch if Wrong-Length Record (Disk)	B	XXX		W†				000 Sector Count and \pm Do Not Correspond
BIN	Branch if Access Busy	B	XXX		\ †				Disk Drive in Busy Status
BIN	Branch if Unequal Address Compare (Disk)	B	XXX		X†				Sector Address on Disk \neq Sector Address in Core
BIN	Branch if Reader Error	B	XXX		?†				I/O Check Stop Switch Must Be Off
BIN	Branch if Punch Error	B	XXX		††				I/O Check Stop Switch Must Be Off
BIN	Branch if Printer Error	B	XXX		††				I/O Check Stop Switch Must Be Off
BIN	Branch if Processing Check	B	XXX		%†		Process Check Stop Switch Must Be Off		
C	Compare	C	XXX	XXX		B - L _B + 1	A - L _w	B - L _w	B-Field Word Mark Determines Length of Compare
MISCELLANEOUS OPERATIONS									
CC	Control Carriage	F			d†		dbb	dbb	If Carriage Already in Motion, Program Stops
CS	Clear Storage (and Branch)	/	XXX	(XXX)			A or (BI)	X00-1or (Blank or NSI**)	Clears Left from A- or B-Address to Nearest Hundreds Position
CW	Clear Word Mark	□	XXX	(XXX)			A - 1	A - 1 (B - 1)	WM's Cleared at A- and B-Addresses
H	Halt (and Branch)	.	(XXX)				A _p or (BI)	B _p or (Blank or NSI**)	Press Start Key to Resume. I-Address Gives Auto Branch
MA	Modify Address*	#	XXX	(XXX)			A - 3	B - 1 or B - 3	Three Character Field on Systems > Than 4K
NOP	No Operation	N	(XXX)	(XXX)			A _p	B _p	Program Operation Resumes at Next Op Code
SAR	Store A-Address* Register	Q	XXX				A - 3	A _p	Stores Contents of A-AR in A-Field
SBR	Store B-Address* Register	H	XXX	(XXX)			A - 3	B _p (B)	Store Contents of B-AR in A-Field
SS	Select Stacker*	K			‡		dbb	dbb	Give before Inst. that Ejects Card. Standard on Model 2 1442
SW	Set Word Mark	,	XXX	(XXX)			A - 1	A - 1 (B - 1)	WM's Set at A- and B-Addresses
DISK OPERATIONS									
SDE	Scan Disk Equal*	M	%F8	XXX	W		B + 6	B + 11 + L _p	Records Must Be in Sector Format. Test Result with BE, BH, BL, Instruction. \pm Must Be Set at Right of Search Argument.
SDEW	Scan Disk Equal With Word Marks*	L	%F8	XXX	W		B + 6	B + 11 + L _p	
SDH	Scan Disk High,* Equal	M	%F9	XXX	W		B + 6	B + 11 + L _p	
SDHW	Scan Disk High,* Equal with Word Marks	L	%F9	XXX	W		B + 6	B + 11 + L _p	
SDL	Scan Disk Low, Equal*	M	%F7	XXX	W		B + 6	B + 11 + L _p	
SDLW	Scan Disk Low, Equal* with Word Marks	L	%F7	XXX	W		B + 6	B + 11 + L _p	
RD	Read Disk Sector(s)	M	%F1	XXX	R		B + 6	B + 11 + N _s L _s	Complete When SC = 000
RDCO	Read Disk with Sector Count Overlay	M	%F5	XXX	R		B + 6	B + 8 + N _s L _s	Mult. Sect. Count Field in First Record Read Determines # Sectors Read
RDCOW	Read Disk with Sector Count Overlay with Word Marks	L	%F5	XXX	R		B + 6	B + 8 + N _s L _s	See RDCO
RDT	Read Disk Track Sectors with Addresses	M	%F6	XXX	R		B + 9	B + 11 + 2120	Reads 2120 chars. and Sector Addresses
RDTA	Read Disk Track Record with Address*	M	%F@	XXX	R		B + 9	B + 11 + 2986	Reads 2986 Chars.
RDTAW	Read Disk Track Record with Address and Word Marks*	L	%F@	XXX	R		B + 9	B + 11 + 2688	Reads 2688 Chars.
RDTR	Read Disk Track Record*	M	%F2	XXX	R		B + 6	B + 11 + 2980	Reads 2980 Chars.
RDRW	Read Disk Track Record with Word Marks*	L	%F2	XXX	R		B + 6	B + 11 + 2682	Reads 2682 Chars.
RDTW	Read Disk Track Sectors with Addresses and Word Marks	L	%F6	XXX	R		B + 9	B + 11 + 1920	Reads 1920 Chars. and Sect. Addresses
RDW	Read Disk Sector(s) with Word Marks	L	%F1	XXX	R		B + 6	B + 11 + N _s L _s	See RD
SD	Seek Disk	M	%F0	XXX	R		B + 6	B + 7	Seeks Specified Cylinder
WD	Write Disk Sector(s)	M	%F1	XXX	W		B + 6	B + 11 + N _s L _s	Complete when SC = 000
WDC	Write Disk Check	M	%F3	XXX	W		Depends on Previous Opn.		Data in Core Comp. with Data Written on Disk
WDCO	Write Disk with Sector Count Overlay	M	%F5	XXX	W		B + 6	B + 8 + N _s L _s	Mult. Sect. Count Field in First Record Determines # Sectors Written
WDCOW	Write Disk with Sector Count Overlay with Word Marks	L	%F5	XXX	W		B + 6	B + 8 + N _s L _s	See WDCO
WDCW	Write Disk Check with Word Marks	L	%F3	XXX	W		Depends on Previous Opn		See WDC
WDT	Write Disk Track Sectors with Addresses	M	%F6	XXX	W		B + 9	B + 11 + 2120	Writes 2120 Chars. and Sect. Addresses
WDTA	Write Disk Track Record with Address*	M	%F@	XXX	W		B + 9	B + 11 + 2986	Writes 2986 Chars.
WDTAW	Write Disk Track Record with Address and Word Marks*	L	%F@	XXX	W		B + 9	B + 11 + 2688	Writes 2688 Chars.
WDTR	Write Disk Track Record*	M	%F2	XXX	W		B + 6	B + 11 + 2980	Writes 2980 Chars.
WDRW	Write Disk Track Record with Word Marks*	L	%F2	XXX	W		B + 6	B + 11 + 2682	Writes 2682 Chars.
WDTW	Write Disk Track Sectors with Address and Word Marks	L	%F6	XXX	W		B + 9	B + 11 + 1920	Writes 1920 Chars. and Sect. Addresses
WDW	Write Disk Sector(s) with Word Marks	L	%F1	XXX	W		B + 6	B + 11 + N _s L _s	See WD

* Special feature
 ** If store-address-register function is installed
 † d-character must be coded in operand portion of instruction
 (XXX) Address not required for some formats of instruction

SWITCH AND INDICATOR CODES

Q	Q ₁	Code
0	1	Program Switch 1
0	2	Program Switch 2
0	3	Program Switch 3
0	4	Program Switch 4
0	5	Read Check Indicator*
0	6	Write Check Indicator*
0	7	Last Card Indicator
1	1	High-Positive Indicator
1	2	Equal-Zero Indicator
1	3	High-Positive or Equal-Zero Indicator
1	4	Overflow Check Indicator
1	5	Even-Even Check Indicator*
1	6	Odd-Even Check Indicator*
1	7	Any Data Check
1	9	Any Data Check

* Will Cause 19 to be on.

COMPARE RESULTS

Condition (Algebraic)	High/Positive	Indicator
P Greater Than Q	ON	OFF
P Less Than Q	OFF	OFF
P Equal to Q	OFF	ON

P = Data in Field at P Address
Q = Data in Field at Q Address

INPUT/OUTPUT DEVICE CODES

Q	Q ₁	Device
0	1	Typewriter — 10 char./sec
0	2	Tape Punch — 15 char./sec
0	3	Paper Tape Reader — 150 char./sec
0	4	Card Punch — 125 cpm
0	5	Card Reader — 250 cpm

CORE STORAGE TABLE AREAS

Address	Area
00000-00099	Console Area
00090-00099	Product Area
00100-00299	Multiply Table
00300-00399	Add Table

TYPEWRITER CONTROL CODES

Q ₁	Code
1	Space
2	Return Carriage
8	Tabulate

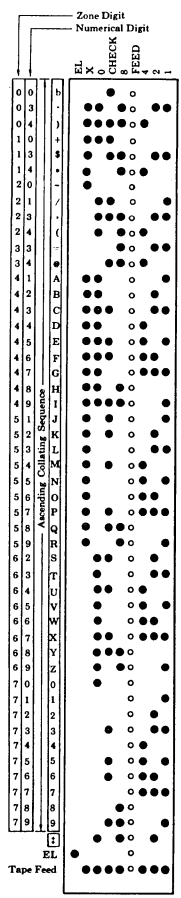
BIT CODE

DECIMAL DIGITS 0-9

C	F	8	4	2	1
0	1	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	1	0	0	0	1
4	0	0	1	0	0
5	1	0	0	1	0
6	1	0	0	1	1
7	0	0	1	1	1
8	0	1	0	0	0
9	1	0	1	0	1

SIGN CONTROL CHART

	ADD		SUBTRACT	
Sign of P Field	+	+	-	-
Sign of Q Field	+	-	-	-
Stored P Field Sign	-	-	-	-
True or Complement Add Q Field	True	Comp	Comp	True
Recomplement Answer if Q Field Value is Greater Than P Field Value (Change on Recomplement)	X	X	X	X
Resulting Sign of P Field	+	+	-	-



IBM Reference Card | 1620 Data Processing System

Mnemonic	Code	Instruction	Operation	Time
A	21	Add	$F_p + F_q$ replaces F_p	$160 + 80D_p$, basic time $80D_p$, recomp. time†
AM	11	Add (I)	$F_p + Q$ replaces F_p	$160 + 80D_p$, basic time $80D_p$, recomp. time†
B	49	Branch	Do I_p	200
BB	42	Branch Back	Do I_p	200
BD	43	Branch on Digit	If d_q not zero, do I_p	200 No Branch 240 Branch
BI	46	Branch Indicator	If i_q on, do I_p	160 No Branch 200 Branch
BNF	44	Branch No Flag	If no i_q , do I_p	200 No Branch 240 Branch
BNI	47	Branch No Indicator	If i_q off, do I_p	160 No Branch 200 Branch
BNR	45	Branch No Record Mark	If no r_q , do I_p	200 No Branch 240 Branch
BF	27	Branch & Transmit	Save A_p, F_q to $L_p - 1$, do I_p	$200 + 40D_p$
BTM	17	Branch & Transmit (I)	Save A_p, Q to $L_p - 1$, do I_p	$200 + 40D_p$
C	24	Compare	F_p compared with F_q	$200 + 80D_p$, Unlike signs $160 + 80D_p$, Like signs
CF	33	Clear Flag	Remove f from L_p	200
CM	14	Compare (I)	F_p compared with Q	$200 + 80D_p$, Unlike signs $160 + 80D_p$, Like signs
D	29	Divide	Product Area (00080-00099) $\div F_q$	$160 + 520D_p, Q_p + 740Q_p$ Average quotient digit 4.5
DM	19	Divide (I)	Product Area (00080-00099) $\div Q$	$160 + 520D_p, Q_p + 740Q_p$ Average quotient digit 4.5
DN	35	Dump Numerically	$1/0_q$ writes from L_p to 19, 999, 39, 999 or 59, 999	§
H	48	Halt	Stop	160
K	34	Control	Do Q_1 on $1/0_q$	§
LD	28	Load Dividend	F_q to L_p	$400 + 40D_p$
LDM	18	Load Dividend (I)	Q to L_p	$400 + 40D_p$
M	23	Multiply	$F_q \times F_p$ (result at 00099)	$560 + 40D_p + 168D_p, D_p$
MF	71	Move Flag	i_q to L_p	240
MM	13	Multiply (I)	$Q \times F_p$ (result at 00099)	$560 + 40D_p + 168D_p, D_p$
NOP	41	No Operation	Go to A_p	160
RA	37	Read Alphanumerically	$1/0_q$ reads at $L_p - 1$	§ Except Card $1/0$ (3.4 ms)
RN	36	Read Numerically	$1/0_q$ reads at L_p	§ Except Card $1/0$ (3.4 ms)
S	22	Subtract	$F_p - F_q$ replaces F_p	$160 + 80D_p$, basic time $80D_p$, recomp. time†
SF	32	Set Flag	Place f at L_p	200
SM	12	Subtract (I)	$F_p - Q$ replaces F_p	$160 + 80D_p$, basic time $80D_p$, recomp. time†
TD	25	Transmit Digit	d_q to L_p	200
TDM	15	Transmit Digit (I)	Q_1 to L_p	200
TF	26	Transmit Field	F_q to L_p	$160 + 40D_p$
TFM	16	Transmit Field (I)	Q to L_p	$160 + 40D_p$
TNF	73	Transfer Numerical Fill	F_q to F_p	$160 + 40D_p$
TNS	72	Transfer Numerical Strip	F_p to F_q	$160 + 40D_p$
TR	31	Transmit Record	R_q to L_p	$160 + 40D_p$
WA	39	Write Alphanumerically	$1/0_q$ writes from $L_p - 1$	§ Except Card $1/0$ (3.4 ms)
WN	38	Write Numerically	$1/0_q$ writes from L_p	§ Except Card $1/0$ (3.4 ms)

Symbols and Definitions for "Operation" Column

P	P part of instruction	R_q	Record defined by Q
Q	Q part of instruction	$1/0_q$	$1/0$ defined by Q_1, Q_2
F_p	Field defined by P	d_q	Digit at L_q
F_q	Field defined by Q	i_q	Flag bit at L_q
I_p	Instruction defined by P	f	Flag bit
I_q	Saved instruction	r_q	Record mark at L_q
L_p	Location defined by P	i_q	Indicator defined by Q, Q_1
L_q	Location defined by Q	A_q	Address of next seq. instr.

Symbols and Definitions for "Time" Column

D_p	Number of digits, including high-order zeros, in the field at P.
D_q	Number of digits, including high-order zeros, in the field at Q.
D_{pq}	Number of digits, including high-order zeros, in the Q part of the instruction.
D_{pq}	Number of digits, including high-order zeros, in the dividend.
Q_p	Number of digits, including high-order zeros, in the quotient.
D_v	Number of digits, including high-order zeros, in the divisor.
D_p	Number of positions compared until a digit other than zero is detected in either field.

All times are in microseconds (1 microsecond = 1/1,000,000 second).

† Immediate.
‡ If signs initially unlike and numerical value of Q data greater than P data.
§ Depends on speed of $1/0$ device and number of characters involved.
¶ Depends on control function and speed of $1/0$ device.

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

Form 226-6872-3
Printed in U.S.A.

1620 CHARACTER CODING

Alphanumeric Character	Input			Core Storage			Output		
	Typewriter (Space)	Type C	Card	Alpha C	Num C	(Space) C	Typewriter (Blank)	Type C	Card
(Blank)	(Space)	C	(Blank)	C	C	(Space)	C	(Blank)	
(Period)	.	X0821	12, 3, 8	C 3			X0821	12, 3, 8	
1	1	X0C84	12, 4, 8	C 4			X0C84	12, 4, 8	
+	+	X0C	12	1 C			X0C	12	
\$	\$	X0C821	11, 3, 8	1 3			X0C821	11, 3, 8	
*	*	X84	11, 8, 4	1 4			X84	11, 4, 8	
- (Hyphen)	-	X	11	2 C			X	11	
/	/	0C1	0, 1	2 1			0C1	0, 1	
(Comma)	,	0C821	0, 3, 8	2 3			0C821	0, 3, 8	
()	()	084	0, 4, 8	2 4			084	0, 4, 8	
=	=	821	3, 8	3 3			821	3, 8	
•	•	C84	4, 8	3 4			C84	4, 8	
A-1	A-1	X0, 1-9	12, 1-9	4 1-9			X0, 1-9	12, 1-9	
0 (-)	(None)	(None)	11, 0	5 C			- (Hyphen) X	11, 0	
J-R	J-R	X, 1-9	11, 1-9	5 1-9			J-R X, 1-9	11, 1-9	
1-9 (-)	J-R	X, 1-9	11, 1-9	5 1-9			J-R X, 1-9	11, 1-9	
S-Z	S-Z	0, 2-9	0, 2-9	6 2-9			S-Z 0, 2-9	0, 2-9	
0 (+)	0	0	0 or 12, 0	7 C			0	0	
1-9 (+)	1-9	1-9	1-9	7 1-9			1-9	1-9	
†	†	082	0, 2, 8	C 28			† (Stop) EOL	0, 2, 8	
Numerical Character									
(Blank)	(Space)	C	(Blank)	C	0		0	0	
0 (+)	0	0	0	0			0	0	
0 (-)	0	X, X0C	11, 0	F 0			X	11, 0	
1-9 (+)	1-9	1-9	1-9	1-9			1-9	1-9	
1-9 (-)	1-9	X, 1-9	11, 1-9	1-9			X, 1-9	11, 1-9	
†	†	082	0, 2, 8	C82			† (Stop) EOL	0, 2, 8	
Num Blank †	•	C84	4, 8	C84			• (Blank)		

† For Card Format Use Only

ALLOWABLE INDIRECT ADDRESSING

Arithmetic Instructions:	MNEMONIC	CODE	P & Q	P
Add	A	21	X	X
Add Immediate	AM	11	X	X
Subtract	S	22	X	X
Subtract Immediate	SM	12	X	X
Multiply	M	23	X	X
Multiply Immediate	MM	13	X	X
Load Dividend	LD	28	X	X
Load Dividend Immediate	LDM	18	X	X
Divide	D	29	X	X
Divide Immediate	DM	19	X	X
Internal Data Transmission Instructions:				
Transmit Digit	TD	25	X	
Transmit Digit Immediate	TDM	15	X	X
Transmit Field	TF	26	X	
Transmit Field Immediate	TFM	16	X	X
Transfer Numerical Strip	TNS	27	X	X
Transfer Numerical Fill	TNF	23	X	X
Logic (Compare and Branch) Instructions:				
Compare	C	24	X	X
Compare Immediate	CM	14	X	X
Branch	B	40	X	X
Branch No Flag	BNF	44	X	X
Branch No Record Mark	BNR	45	X	X
Branch On Digit	BD	43	X	X
Branch Indicator	BI	46	X	X
Branch No Indicator	BNI	47	X	X
Branch and Transmit	BT	47	X	X
Branch and Transmit Immediate	BTM	17	X	X
Branch Back	BB	37	X	X
Input-Output Instructions:				
Read Numerically	RN	36	X	X
Write Numerically	WN	35	X	X
Dump Numerically	DN	35	X	X
Read Alphanumerically	RA	37	X	X
Write Alphanumerically	WA	34	X	X
Control	K	39	X	X
Program Control Instructions:				
Set Flag	SF	32	X	X
Clear Flag	CF	33	X	X
Move Flag	MF	71	X	X
Halt	H	48	X	X
No Operation	NOP	41		

1620 STORAGE REGISTERS

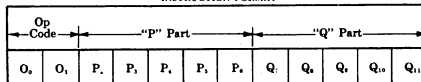
Register	Function
DR-1	Contains address of next instruction if machine is stopped with stop key or halt instruction.
DR-2	Saves return address when BT and BTM instructions are executed.
OR-1	Contains Q address after 1 cycle of an instruction.
OR-2	Contains P address after 1 cycle of an instruction.
OR-3	Retains address of low-order multiplier digit during multiplication.
PR-1	Saves return address when a save key operation occurs.
PR-2	Decrementer for each new multiply digit during multiply.
PR-3	Decrementer for each new multiplicand digit during multiply.
PR-4	Used to add partial product to each multiply cycle result.
MAR	Addresses core storage.
MER	Receives digits entering or leaving core storage.
MDR	Receives addressed digit entering or leaving core storage.
Digit	Stores partial product during multiplication.
or	Contains or code of instruction just executed if machine is stopped with stop key or halt instruction.
Multiplier	Contains multiplier digits during multiply operation.
Sense & Branch	Contains i/o device code during input-output operations. Units positions used to develop each quotient digit during divide operation.
Digit & Branch	On some machines, combines functions of Digit, Sense & Branch Registers.

SIGNIFICANCE OF P & Q ADDRESS

Operation Code	P Address	Q Address
11—Add (1)*	Memory address of units position of Augend.	Q ₁ of instruction is units position of Addend.
21—Add	Same as Code 11.	Memory address of units position of Addend.
12—Subtract (1)*	Memory address of units position of Minuend.	Q ₁ of instruction is units position of Subtrahend.
22—Subtract	Same as Code 12.	Memory address of units position of Subtrahend.
13—Multiply (1)*	Memory address of units position of Multiplicand.	Q ₁ of instruction is units position of Multiplier.
23—Multiply	Same as Code 13.	Memory address of units position of Multiplier.
14—Compare (1)*	Memory address of units position of the field to which another field is to be compared.	Q ₁ of instruction is units position of the field to be compared with the field at the P address.
24—Compare	Same as Code 14.	Memory address of units position of the field to be compared with the field at the P address.
15—Transmit Digit (1)*	Memory address to which single digit is to be transmitted.	Q ₁ of instruction is the single digit to be transmitted.
25—Transmit Digit	Same as Code 15.	Memory address of single digit to be transmitted.
16—Transmit Field (1)*	Memory address to which units position of field is to be transmitted.	Q ₁ of instruction is the units position of the field to be transmitted.
26—Transmit Field	Same as Code 16.	Memory address of units position of the field to be transmitted.
17—Branch and Transmit (1)*	"P minus one" is the memory address to which the units position of the Q field is to be transmitted. "P" is the memory address of the high-order digit of the next instruction to be interpreted and executed.	Q ₁ of instruction is the units position of the field to be transmitted.
27—Branch and Transmit	Same as Code 17.	Memory address of units position of the field to be transmitted.
18—Load Dividend (1)*	Memory address in Product Area to which units position of field (Dividend) is to be transmitted.	Q ₁ of instruction is the units position of the field (Dividend) to be transmitted.
28—Load Dividend	Same as Code 18.	Memory address of the units position of the field (Dividend) to be transmitted.
19—Divide (1)*	Memory address at which first subtraction of the Divisor is to occur.	Q ₁ of instruction is the units position of the Divisor.
29—Divide	Same as Code 19.	Memory address of units position of Divisor.
31—Transmit Record	Memory address to which high-order position of record is to be transmitted.	Q ₁ of instruction is high order position of the record to be transmitted.
32—Set Flag	Memory address at which flag bit is to be placed.	Not used.
33—Clear Flag	Memory address from which flag bit is to be cleared.	Not used.
34—Control	Not used.	Q ₁ and Q ₂ specify input-output device. Q ₃ specifies control function to be performed.
35—Dump Numerically	Memory address from which first numerical character is to be written.	Q ₁ and Q ₂ specify output device.
36—Read Numerically	Memory address at which first numerical character is to be stored.	Q ₁ and Q ₂ specify input device.
37—Read Alphanumerically	Memory address at which numerical digit of first character is to be stored. (Zone digit of first character will be stored at "P minus one.")	Same as Code 36.
38—Write Numerically	Memory address from which first numerical character is to be written.	Same as Code 35.
39—Write Alphanumerically	Memory address for numerical digit of first character to be written. (Zone digit of first character is at "P minus one.")	Same as Code 35.
41—No Op	Not used.	Not used.
42—Branch Back	Not used.	Not used.
43—Branch On Digit	Memory address of the high-order digit of the next instruction to be interpreted and executed, if Branch occurs. (Not used if Branch does not occur.)	Memory address to be interrogated for the presence of a significant digit (not a zero).
44—Branch No Flag	Same as Code 43.	Memory address to be interrogated for the presence of a flag bit.
45—Branch No Record Mark	Same as Code 43.	Memory address to be interrogated for the presence of a Record Mark character.
46—Branch Indicator	Same as Code 43.	Q ₁ and Q ₂ digits specify program switch or indicator to be interrogated for status.
47—Branch No Indicator	Same as Code 43.	Same as Code 46.
48—Halt	Not used.	Not used.
49—Branch	Memory address of the high-order digit of the next instruction to be interpreted and executed.	Not used.
71—Move Flag	Memory address of flag to be moved.	Memory address to which flag is to be moved.
72—Transfer Numerical Strip	Memory address of the units position of the alphanumeric field.	Memory address of the units position of the numerical field.
73—Transfer Numerical Fill	Same as Code 72.	Same as Code 72.

* Immediate.

INSTRUCTION FORMAT



IBM Reference Card 7040-7044 Codes

Form X22-6696-1
Printed in U. S. A.

CHARACTER CODING AND TRANSLATION

CORE STORAGE BYTE	TAPE		OTHER		TYPEWRITER REPORT WRITING GRAPHICS		TYPEWRITER PROGRAMMING LANGUAGES GRAPHICS	
	BCD		BCD		BCD	BINARY	BCD	BINARY
	C BAB 421	C BAB 421						
000 000	0 001 010	1 001 010	Ø	Blank	Ø	Blank	Ø	Blank
000 001	1 000 001	0 000 001	1	1	1	1	1	
000 010	1 000 010	0 000 010	2	2	2	2	2	
000 011	0 000 011	1 000 011	3	3	3	3	3	
000 100	1 000 100	0 000 100	4	4	4	4	4	
000 101	0 000 101	1 000 101	5	5	5	5	5	
000 110	0 000 110	1 000 110	6	6	6	6	6	
000 111	1 000 111	0 000 111	7	7	7	7	7	
001 000	1 001 000	0 001 000	8	8	8	8	8	
001 001	0 001 001	1 001 001	9	9	9	9	9	
001 010	0 001 010*	0 010 000	Ø	Ø	Ø	Ø	Ø	
001 011	1 001 011	0 001 011	#	#	#	#	#	
001 100	0 001 100	1 001 100	@	@	@	@	@	
001 101	1 001 101	0 001 101	:	:	:	:	:	
001 110	1 001 110	0 001 110	>	>	>	>	>	
001 111	0 001 111	1 001 111	✓ TM	✓	✓	✓	✓	
010 000	0 110 000	1 110 000	C	D	+	+		
010 001	1 110 001	0 110 001	A	/	/	/		
010 010	1 110 010	0 110 010	B	S	B	S		
010 011	0 110 011	1 110 011	C	T	C	T		
010 100	1 110 100	0 110 100	D	U	D	U		
010 101	0 110 101	1 110 101	E	V	E	V		
010 110	0 110 110	1 110 110	F	W	F	W		
010 111	1 110 111	0 110 111	G	X	G	X		
011 000	1 111 000	0 111 000	H	Y	H	Y		
011 001	0 111 001	1 111 001	I	Z	I	Z		
011 010	0 111 010	1 111 010	?	‡	?	‡		
011 011	1 111 011	0 111 011	,	,	,	,		
011 100	0 111 100	1 111 100	□	%)	(
011 101	1 111 101	0 111 101	<	~	[]		
011 110	1 111 110	0 111 110	<	~	[]		
011 111	0 111 111	1 111 111	‡ GM	‡	‡	‡		
100 000	1 100 000	0 100 000	-	-	-	-		
100 001	0 100 001	1 100 001	J	J	J	J		
100 010	0 100 010	1 100 010	K	K	K	K		
100 011	1 100 011	0 100 011	L	L	L	L		
100 100	0 100 100	1 100 100	M	M	M	M		
100 101	1 100 101	0 100 101	N	N	N	N		
100 110	1 100 110	0 100 110	O	O	O	O		
100 111	0 100 111	1 100 111	P	P	P	P		
101 000	0 101 000	1 101 000	Q	Q	Q	Q		
101 001	1 101 001	0 101 001	R	R	R	R		
101 010	1 101 010	0 101 010	I	I	I	I		
101 011	0 101 011	1 101 011	•	•	•	•		
101 100	1 101 100	0 101 100	•	•	•	•		
101 101	0 101 101	1 101 101	□	□	□	□		
101 110	0 101 110	1 101 110	:	:	:	:		
101 111	1 101 111	0 101 111	Δ	Δ	Δ	Δ		
110 000	1 010 000	0 000 000	Δ	Blank	Δ	+		
110 001	0 010 001	1 010 001	/	A	/	A		
110 010	0 010 010	1 010 010	S	B	S	B		
110 011	1 010 011	0 010 011	T	C	T	C		
110 100	0 010 100	1 010 100	U	D	U	D		
110 101	1 010 101	0 010 101	V	E	V	E		
110 110	1 010 110	0 010 110	W	F	W	F		
110 111	0 010 111	1 010 111	X	G	X	G		
111 000	0 011 000	1 011 000	Y	H	Y	H		
111 001	1 011 001	0 011 001	Z	I	Z	I		
111 010	1 011 010	0 011 010	‡ RM	‡	‡	‡		
111 011	0 011 011	1 011 011	.	.	.	.
111 100	1 011 100	0 011 100	%	¶	()		
111 101	0 011 101	1 011 101	~	[[]		
111 110	0 011 110	1 011 110	<	<	<	<		
111 111	1 011 111	0 011 111	‡	‡	‡	‡		

* CORE STORAGE = 000 000 on READ

PRINTER "A" CHAIN		PRINTER "H" CHAIN		READ - PUNCH IBM CARD CODE	
BCD	BINARY	BCD	BINARY	BCD	BINARY
Ø	Blank	Ø	Blank	Ø	Blank
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
‡	‡	‡	‡	8-2	0
#	#	#	#	8-3	8-3
@	@	-	-	8-4	8-4
Blank	Blank	Blank	Blank	8-5	8-5
Blank	Blank	Blank	Blank	8-6	8-6
Blank	Blank	Blank	Blank	8-7	8-7
&	≠	+	≠	12	8-2
A	/	A	/	12-1	0-1
B	S	B	S	12-2	0-2
C	T	C	T	12-3	0-3
D	U	D	U	12-4	0-4
E	V	E	V	12-5	0-5
F	W	F	W	12-6	0-6
G	X	G	X	12-7	0-7
H	Y	H	Y	12-8	0-8
I	Z	I	Z	12-9	0-9
&	‡	+	‡	12-0	0-8-2
.	.	.	.	12-8-3	0-8-6
□	%	)	(	12-8-4	0-8-4
Blank	Blank	Blank	Blank	12-8-5	0-8-5
Blank	Blank	Blank	Blank	12-8-6	0-8-3
Blank	Blank	Blank	Blank	12-8-7	0-8-7
-	-	-	-	11	11
J	J	J	J	11-1	11-1
K	K	K	K	11-2	11-2
L	L	L	L	11-3	11-3
M	M	M	M	11-4	11-4
N	N	N	N	11-5	11-5
O	O	O	O	11-6	11-6
P	P	P	P	11-7	11-7
Q	Q	Q	Q	11-8	11-8
R	R	R	R	11-9	11-9
-	-	-	-	11-0	11-0
•	•	•	•	11-8-3	11-8-3
•	•	•	•	11-8-4	11-8-4
Blank	Blank	Blank	Blank	11-8-5	11-8-5
Blank	Blank	Blank	Blank	11-8-6	11-8-6
Blank	Blank	Blank	Blank	11-8-7	11-8-7
Blank	&	Blank	+	Blank	12
/	A	/	A	0-1	12-1
S	B	S	B	0-2	12-2
T	C	T	C	0-3	12-3
U	D	U	D	0-4	12-4
V	E	V	E	0-5	12-5
W	F	W	F	0-6	12-6
X	G	X	G	0-7	12-7
Y	H	Y	H	0-8	12-8
Z	I	Z	I	0-9	12-9
‡	&	‡	+	0-8-2	12-0
%	¶	(	)	0-8-3	12-8-3
Blank	Blank	Blank	Blank	0-8-4	12-8-4
Blank	Blank	Blank	Blank	0-8-5	12-8-5
Blank	Blank	Blank	Blank	0-8-6	12-8-6
Blank	Blank	Blank	Blank	0-8-7	12-8-7

"9"=709, 7090, 7094
Storage Code
"5"=705, 7080 and
BCD Magnetic
Tape Code
"14"=1401, 1410, 1414
Storage and
Buffer Code
"H"=Standard 64
Character IBM
Card Code

INSTRUCTION LISTING-NUMERIC
(All Options)

SYM	NUMERIC	NAME	F	T
TRA	0020	TRANSFER		X X
TRCA	0022	TRANSFER ON REDUNDANCY CHECK, CHANNEL A	X	X X
TRCB	0022	TRANSFER ON REDUNDANCY CHECK, CHANNEL B	X	X X
TRCC	0024	TRANSFER ON REDUNDANCY CHECK, CHANNEL C	X	X X
TRCD	0024	TRANSFER ON REDUNDANCY CHECK, CHANNEL D	X	X X
TRCE	0026	TRANSFER ON REDUNDANCY CHECK, CHANNEL E	X	X X
TEFA	0030	TRANSFER ON END OF FILE, CHANNEL A	X	X X
TEFB	0030	TRANSFER ON END OF FILE, CHANNEL B	X	X X
TEFC	0031	TRANSFER ON END OF FILE, CHANNEL C	X	X X
TEFD	0031	TRANSFER ON END OF FILE, CHANNEL D	X	X X
TEFE	0032	TRANSFER ON END OF FILE, CHANNEL E	X	X X
TCOA	0060	TRANSFER ON CHANNEL A IN OPERATION	X	X X
TCOB	0061	TRANSFER ON CHANNEL B IN OPERATION	X	X X
TCOC	0062	TRANSFER ON CHANNEL C IN OPERATION	X	X X
TCOD	0063	TRANSFER ON CHANNEL D IN OPERATION	X	X X
TCOE	0064	TRANSFER ON CHANNEL E IN OPERATION	X	X X
TSX	0074	TRANSFER AND SET INDEX	X	X X
TZE	0100	TRANSFER ON ZERO	X	X X
TNZ	0100	TRANSFER ON NO ZERO	X	X X
TPI	0120	TRANSFER ON PLUS	X	X X
TMI	0120	TRANSFER ON MINUS	X	X X
TOV	0140	TRANSFER ON OVERFLOW	X	X X
MPY	0200	MULTIPLY	X	X X
VLM	0204	VARIABLE LENGTH MULTIPLY	X	X X
DVP	0221	DIVIDE OR PROCEED	X	X X
VDV	0226	VARIABLE LENGTH DIVIDE OR PROCEED	X	X X
FDP	0241	FLOATING DIVIDE OR PROCEED	X	X X
DFDP	0241	DOUBLE PREC FLO DIVIDE OR PROCEED	X	X X
FMP	0260	FLOATING MULTIPLY	X	X X
UFM	0260	UNNORMALIZED FLOATING MULTIPLY	X	X X
DFMP	0261	DOUBLE PRECISION FLOATING MULTIPLY	X	X X
FAD	0300	FLOATING ADD	X	X X
UFA	0300	UNNORMALIZED FLOATING ADD	X	X X
DFAD	0301	DOUBLE PRECISION FLOATING ADD	X	X X
FSS	0302	FLOATING SUBTRACT	X	X X
UFS	0302	UNNORMALIZED FLOATING SUBTRACT	X	X X
DFSD	0303	DOUBLE PRECISION FLOATING SUBTRACT	X	X X
ANA	0320	AND TO ACCUMULATOR	X	X X
CAS	0340	COMPARE ACCUMULATOR WITH STORAGE	X	X X
LAS	0340	LOGICAL COMPARE ACCUM WITH STORAGE	X	X X
ACL	0361	ADD AND CARRY LOGICAL WORD	X	X X
ADD	0400	ADD	X	X X
SUB	0402	SUBTRACT	X	X X
HPR	0420	HALT AND PROCEED	X	X X
CLA	0500	CLEAR AND ADD	X	X X
CAL	0500	CLEAR AND ADD LOGICAL WORD	X	X X
ORA	0501	OR TO ACCUMULATOR	X	X X
CLS	0502	CLEAR AND SUBTRACT	X	X X
EXC	0522	EXECUTE	X	X X
LXA	0534	LOAD INDEX FROM ADDRESS	X	X X
LXD	0534	LOAD INDEX FROM DECREMENT	X	X X
LAC	0535	LOAD COMPLEMENT OF ADDRESS IN INDEX	X	X X
LDC	0535	LOAD COMPLEMENT OF DECREMENT IN INDEX	X	X X
RCHA	0540	RESET AND LOAD CHANNEL A	X	X X
RCHB	0540	RESET AND LOAD CHANNEL B	X	X X
LDLB	0540.1	LOAD DATA REGISTER AND LOOP, CHANNEL B	X	X X
RCHC	0541	RESET AND LOAD CHANNEL C	X	X X
LDLC	0541.1	LOAD DATA REGISTER AND LOOP, CHANNEL C	X	X X
RCHD	0541	RESET AND LOAD CHANNEL D	X	X X
LDLD	0541.1	LOAD DATA REGISTER AND LOOP, CHANNEL D	X	X X
RCHE	0542	RESET AND LOAD CHANNEL E	X	X X
LDLE	0542.1	LOAD DATA REGISTER AND LOOP, CHANNEL E	X	X X
LDO	0560	LOAD MQ	X	X X
ENB	0564	ENABLE FROM Y	X	X X
STZ	0600	STORE ZERO	X	X X
STO	0600	STORE MQ	X	X X
STO	0601	STORE LOGICAL WORD	X	X X
SLW	0602	STORE ADDRESS	X	X X
STA	0621	STORE ADDRESS	X	X X
STD	0622	STORE DECREMENT	X	X X
STL	0625	STORE INSTRUCTION LOCATION COUNTER	X	X X
SXA	0634	STORE INDEX IN ADDRESS	X	X X
SXD	0634	STORE INDEX IN DECREMENT	X	X X
SCHA	0640	STORE CHANNEL A	X	X X
SCHB	0640	STORE CHANNEL B	X	X X
SORB	0640.1	STORE DATA REGISTER, CHANNEL B	X	X X
SCHC	0641	STORE CHANNEL C	X	X X
SORC	0641.1	STORE DATA REGISTER, CHANNEL C	X	X X
SCHD	0641	STORE CHANNEL D	X	X X
SORD	0641.1	STORE DATA REGISTER, CHANNEL D	X	X X
SCH E	0642	STORE CHANNEL E	X	X X

INSTRUCTION LISTING-NUMERIC
(All Options)

SYM	NUMERIC	NAME	F	T
SDRE	0642.1	STORE DATA REGISTER, CHANNEL E	X	X X
SSLB	0660	STORE SENSE LINES, CHANNEL B	X	X X
SSLC	0661	STORE SENSE LINES, CHANNEL C	X	X X
SSLD	0661	STORE SENSE LINES, CHANNEL D	X	X X
SSLE	0662	STORE SENSE LINES, CHANNEL E	X	X X
PSLB	0664	PRESENT SENSE LINE, CHANNEL B	X	X X
PSLC	0665	PRESENT SENSE LINES, CHANNEL C	X	X X
PSLD	0665	PRESENT SENSE LINES, CHANNEL D	X	X X
PSLE	0666	PRESENT SENSE LINES, CHANNEL E	X	X X
PAX	0734	PLACE ADDRESS IN INDEX	X	X X
PDX	0734	PLACE DECREMENT IN INDEX	X	X X
PAC	0737	PLACE COMPLEMENT OF ADDRESS IN INDEX	X	X X
PDC	0737	PLACE COMPLEMENT OF DECREMENT IN INDEX	X	X X
PXA	0754	PLACE INDEX IN ADDRESS	X	X X
PXD	0754	PLACE INDEX IN DECREMENT	X	X X
PBT	0760.0001	LOW ORDER BIT TEST	X	X X
PBT	0760.0001	P BIT TEST	X	X X
CHS	0760.0002	CHANGE SIGN	X	X X
ESP	0760.0003	SET SIGN PLUS	X	X X
ENK	0760.0004	ENTER KEYS	X	X X
IOI	0760.0005	INPUT/OUTPUT CHECK TEST	X	X X
COM	0760.0006	COMPLEMENT MAGNITUDE	X	X X
DCT	0760.0012	DIVIDE CHECK TEST	X	X X
RCT	0760.0014	RESTORE CHANNEL TRAPS	X	X X
SWT	0760.0016N	SENSE SWITCH TEST	X	X X
ETTA	0760.01000	END OF TAPE TEST, CHANNEL A	X	X X
RDCA	0760.01352	RESET DATA CHANNEL A	X	X X
ETTB	0760.02000	END OF TAPE TEST, CHANNEL B	X	X X
RDCB	0760.02352	RESET DATA CHANNEL B	X	X X
RDCD	0760.03000	RESET DATA CHANNEL C	X	X X
RDCD	0760.03352	RESET DATA CHANNEL D	X	X X
ETTD	0760.04000	END OF TAPE TEST, CHANNEL D	X	X X
ETTE	0760.05000	END OF TAPE TEST, CHANNEL E	X	X X
RDC E	0760.05352	RESET DATA CHANNEL E	X	X X
RDS	0762	READ SELECT	X	X X
LLS	0763	LONG LEFT SHIFT	X	X X
LGL	0763	LOGICAL LEFT SHIFT	X	X X
BSR	0764	BACKSPACE RECORD	X	X X
LRS	0765	LONG RIGHT SHIFT	X	X X
LOR	0765	LOGICAL RIGHT SHIFT	X	X X
WBT	0766	WRITE BLANK TAPE	X	X X
WRS	0766	WRITE SELECT	X	X X
ALS	0767	ACCUMULATOR LEFT SHIFT	X	X X
WEP	0770	WRITE END OF FILE	X	X X
ARS	0771	ACCUMULATOR RIGHT SHIFT	X	X X
REW	0772	REWIND	X	X X
RUN	0772	REWIND AND UNLOAD	X	X X
ROL	0773	ROTATE MQ LEFT	X	X X
AXT	0774	ADDRESS TO INDEX TRUE	X	X X
STR	1000	STORE LOCATION AND TRAP	X	X X
TXI	1000	TRANSFER WITH INDEX INCREMENTED	X	X X
RPM	1004	RELEASE PROTECT MODE	X	X X
TDOA	1060	TRANSFER ON CHANNEL A DEVICE IN OP	X	X X
SPM	1160	SET PROTECT MODE	X	X X
TRT	1164	TRANSFER AND RESTORE TRAPS	X	X X
TRP	1165	TRANSFER AND RESTORE PARITY AND TRAPS	X	X X
VMA	1204	VARIABLE LENGTH MULTIPLY AND ACCUM	X	X X
CCS	1341	COMPARE CHARACTER WITH STORAGE	X	X X
CMT	1341.6	STORAGE MINUS TEST	X	X X
PLT	1341.7	STORAGE PLUS TEST	X	X X
PCS	1505	PLACE CHARACTER FROM STORAGE	X	X X
CAP	1510	CLEAR AND ADD LOGICAL WORD WITH PARITY	X	X X
SLP	1612	STORE LOGICAL WORD WITH PARITY	X	X X
SAC	1623	STORE ACCUMULATOR CHARACTER	X	X X
MSM	1623.6	MAKE STORAGE SIGN MINUS	X	X X
MSP	1623.7	MAKE STORAGE SIGN PLUS	X	X X
TSL	1627	TRANSFER AND STORE INSTR LOCATION COUNTER	X	X X
TMT	1704	TRANSFER	X	X X
ICT	1760.00014	INHIBIT CHANNEL TRAPS	X	X X
SLFA	1760.01501	STATUS LINE OFF, CHANNEL A	X	X X
SLNA	1760.01541	STATUS LINE ON, CHANNEL A	X	X X
PRD	1762	PREPARE TO READ	X	X X
SEN	1762	SENSE SELECT RREADY	X	X X
CTR	1766	CONTROL SELECT XWRITED	X	X X
PWR	1766	PREPARE TO WRITE	X	X X
TIX	2000	TRANSFER ON INDEX	X	X X
TNX	2000	TRANSFER ON NO INDEX	X	X X
TIH	3000	TRANSFER ON INDEX HIGH	X	X X
TXL	3000	TRANSFER ON INDEX LOW OR EQUAL	X	X X

NOTES

- F - Represents an indirectly addressable instruction
- T - Represents an indexable instruction
- N - Represents a number 1 to 6



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

IBM 1410 Instruction Card

INDEX REGISTER	STORAGE LOCATIONS
1	00025 through 00029
2	00030 through 00034
3	00035 through 00039
4	00040 through 00044
5	00045 through 00049
6	00050 through 00054
7	00055 through 00059
8	00060 through 00064
9	00065 through 00069
10	00070 through 00074
11	00075 through 00079
12	00080 through 00084
13	00085 through 00089
14	00090 through 00094
15	00095 through 00099

INDEX TAGS				
A, B, OR I ADDRESS				TAG INDEX REGISTER
B-BIT OVER HUNDREDS POSITION	A-BIT OVER HUNDREDS POSITION	B-BIT OVER TENS POSITION	A-BIT OVER TENS POSITION	
				NONE
			A	1
		B		2
		B	A	3
	A			4
	A		A	5
	A	B		6
B				8
B			A	9
B		B		10
B		B	A	11
B	A			12
B	A		A	13
B	A	B		14
B	A	B	A	15

INDEXING EXAMPLE

Modify the A- and B-addresses of this instruction, by tags selecting the same index register:

Op Code A-address B-address
 A 066F6 077G7

Both the A- and B-addresses are tagged by B and A bits over the tens position (F = BA42 and G = BA421). Index register 3 is selected. Because the index factor in IX3 is unsigned, it is added to both addresses.

A-address066F6..... 06666
 I X 3, factor 00081
 Effective A-address 06747

B-address077G7..... 07777
 I X 3, factor 00081
 Effective B-address 07858

Effective Instruction: A 06747 07858

VALID ADDRESSES ON 10K OR LARGER SYSTEMS

STANDARD BCD INTERCHANGE CODE						
CHARACTER Report Program	CARD CODE	BCD CODE (Core Storage)				
b	No PUNCHES	C				
.	12-3-8	C	B	A	8	2 1
□	12-4-8	C	B	A	8	4
|	12-5-8	C	B	A	8	4 2 1
<	12-6-8	C	B	A	8	4 2 1
#	12-7-8	C	B	A	8	4 2 1
& +	12	C	B	A		
\$	11-3-8	C	B		8	2 1
*	11-4-8	C	B		8	4
]	11-5-8	C	B		8	4 2 1
;	11-6-8	C	B		8	4 2 1
△	11-7-8	C	B		8	4 2 1
-	11	C	B			
/	0-1	C	A			1
,	0-3-8	C	A	8		2 1
%	0-4-8	C	A	8	4	
∩	0-5-8	C	A	8	4	1
\	0-6-8	C	A	8	4	2 1
#	0-7-8	C	A	8	4	2 1
6	2-8	C	A			
#	3-8	C				2 1
@	4-8	C				8 4
:	5-8	C				8 4 2 1
>	6-8	C				8 4 2 1
∨	7-8	C				8 4 2 1
?	12-0	C	B	A	8	2 1
A	12-1	C	B	A		
B	12-2	C	B	A		2 1
C	12-3	C	B	A		2 1
D	12-4	C	B	A		4
E	12-5	C	B	A		4 2 1
F	12-6	C	B	A		4 2 1
G	12-7	C	B	A		4 2 1
H	12-8	C	B	A		8
I	12-9	C	B	A		8 2 1
J	11-0	C	B			8 2 1
K	11-1	C	B			2 1
L	11-2	C	B			2 1
M	11-3	C	B			2 1
N	11-4	C	B			4
O	11-5	C	B			4 2 1
P	11-6	C	B			4 2 1
Q	11-7	C	B			4 2 1
R	11-8	C	B			8
S	11-9	C	B			8 2 1
T	0-2-8	C	A			8 2
U	0-2	C	A			2
V	0-3	C	A			2 1
W	0-4	C	A			4
X	0-5	C	A			4 2 1
Y	0-6	C	A			4 2 1
Z	0-7	C	A			4 2 1
0	0-8	C	A			8
1	0-9	C	A			8 2 1
2	0	C				2
3	1	C				2 1
4	2	C				4
5	3	C				4 2 1
6	4	C				4 2 1
7	5	C				4 2 1
8	6	C				8
9	7	C				8 2 1

NOTE: Tape may use even parity.

ACTUAL LANGUAGE FOOTNOTES

Mode M (move) or L (load)

Ch 1 Only	Non-Overlap Only	Code Alternate
x*	x*	% — Ch 1 Non-Overlap = (
x*	x*	@ — Ch 1 Overlap =)
x*	x*	□ — Ch 2 Non-Overlap = '
x*	x*	* — Ch 2 Overlap = *

NOTE: x* or x*, when present, occupies x' position.

Type of I/O Unit

- 1 = Card Reader (1402 or 1442-3)
- 2 = Printer (1403)
- 4 = Card Punch (1402) normal
- 8 = Card Punch (1402) column binary
- B = Magnetic Tape Unit odd parity
- D = Data Transmission Unit (1009)
- F = Disk Storage (1405, 1301, 1311)
- K = 7750 Programmed Transmission Control
- 1440 System with 1448 Transmission Control
- 7340-2 Hypertape
- L = Telegraph
- P = Paper Tape Reader (1011)
- Q = Remote Inquiry Unit (1014)
- S = Magnetic Character Reader (1412, 1419)
- T = Console-I/O Printer
- U = Magnetic Tape Unit even parity

I/O Unit No. or Specific Operation

- 0-9 = Magnetic Tape Unit (unit No.)
- 0, 1, 2 = 1402 Pocket (read)
- 0, 4, 8 = 1402 Pocket (punch)
- 9 = 1402 No Stack or Feed Operation (read)
- 0, 1 = Specific Printer Operation
- 0-9 or @ = Specific Disk Storage Operation
- 0 = 1440 Move Operation
- 1 = 1440 Load Operation
- 1 = 7750 or Hypertape Move Operation
- 0, 1 = Specific 7750 or Hypertape Load Operation
- 0 = Data Transmission Unit
- 1 = Paper Tape Reader
- 0, 1 = Remote Inquiry Unit — specifies group
- 0, 1, 2 = Telegraph — specifies buffers
- 0, 1 = No meaning, but completes instruction length, for Console-I/O Printer, 1442-3, 1412, 1419.

Five-position B-address identifying the high-order (leftmost) position of data field

d-character (definer) — operation modifier

M or L x' x' x' x' (B) x

AUTOCODER FOOTNOTES

Mnemonic Op-Code Suffixes

- # 1 or 2 for Ch
- (#) 1 (or 2) for Ch, but the 1 may be omitted
- w W if WM (load mode)
- o O if overlap
- (+I/O) Any I/O statement (prerequisite: priority feature)
- x Undefined and referenced

Operands

- a A-address
- a' A-address (AAR does not step)
- b B-address
- i I-address
- d d-character
- c 1 or 2 for Ch
- u I/O unit No.
- cu Ch and unit No.
- 0/bl Either 0 or blank
- x X-control field

(All other characters actual)

Examples:
 P(#)w* 0,b is written as P2W0 0,b to punch a card in the channel 2 1402, using the load and overlap modes, and stack in pocket 0. Equivalent actual-language instruction is L %40 (B) W.
 P(#)w* 0,b is written simply as P 0,b or P1 0,b to punch a card in the channel 1 1402, using the move and non-overlap modes, and stack in pocket 0. Equivalent actual-language instruction is M %40 (B) W.

IBM 1410 Instruction Card

For use with 1410 Processor Operating Systems 1410-PR-108 and -134

Copies of this and other IBM publications can be obtained through IBM branch offices. Address comments concerning the content of this publication to IBM Corporation, Customer Manuals, Department B98, PO Box 390, Koushkegale, New York 12002.

This card, Form X22-6740-1, obsoletes IBM 1410 Instruction Card, Form X22-6740 and IBM 1410 Data Processing System Reference Card, Forms X24-6502-1, -2, and -3.

System/File No. 1410-80
 Form X22-6740-1
 Printed in U.S.A.

NOTE: Listing is Basically Alphabetic By Instruction Name

Table with columns: INSTRUCTION, AUTOCODER, ACTUAL, INSTRUCTION, AUTOCODER, ACTUAL, INSTRUCTION, AUTOCODER, ACTUAL. It lists various instructions like ADD, BRANCH, MOVE DATA, and their corresponding codes and actions.

Section Area Page 09 21 1410

Restricted For IBM Use Only

July 1964

IBM 7070-7074 Data Processing System Reference Card

CORE STORAGE LOCATIONS WITH SPECIAL FUNCTIONS

0001-0099	Indexing words 01-99
0097	Priority address word
0098	Table lookup indexing value and found address
0099	Address of 729 tape priority final-status word
0100	Priority indicator storage word
0101-0103	Electronic switches
0104	Unit-record priority A branch address
0105	Unit-record priority B branch address
0106	Inquiry-control 1 priority branch address
0107	Inquiry-control 2 priority branch address
01CU	0110-0149; 729 tape final status words: C=7604 channel (1-4); U=729 tape unit (0-9)
0150-0159	729 tape priority branch addresses
01CU+50	0160-0199; 729 tape initial status words
0301-0304	7907 data channel final status words
0351-0354	7907 data channel initial status words
0311-0314	7907 normal stacking latch branch addresses
0321-0324	7907 attention stacking latch branch addresses

INITIAL STATUS WORD

S	Sign of 729 tape instruction
0	Always 0
1	Operation—from pos. 5 of instruction
2345	Location + 1 of instruction
6789	Address in instruction

FINAL STATUS WORD

S	Always +
0	Units digit of priority branch address
1	Condition Code:
	729 Tape
	0. TWE
	1. ERR
	2. CLR
	3. SLR
	4. LLR
	5. EOF
	6. EOS
	7. SCLR
2345	Last core storage location used by RDW
6789	Location + 1 of last RDW



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

Printed in U.S.A. Form X22-6467-3

PRIORITY INDICATOR STORAGE WORD, 0100

0	Sign Change:
	0. Off, sense/stop switch at stop
	5. Off, sense/stop switch at sense
	9. On, sense/stop switch at sense
1	Field Overflow:
	0. Off, sense/stop switch at stop
	5. Off, sense/stop switch at sense
	9. On, sense/stop switch at sense
2	Floating Point Underflow: 0-Off; 1-On
3	Floating Point Overflow: 0-Off; 1-On
4	High (compare): 0-Off; 1-On
5	Equal (compare): 0-Off; 1-On
6	Low (compare): 0-Off; 1-On
7	Accumulator 1 Overflow: 0-Off; 1-On
8	Accumulator 2 Overflow: 0-Off; 1-On
9	Accumulator 3 Overflow: 0-Off; 1-On

PRIORITY MASK WORD

0	(0—allow priority; 1—mask priority)
1	729 tape channel 4, units 0-9
2	729 tape channel 3, units 0-9
3	Inquiry control group 2, stations 1-5
4	Inquiry control group 1, stations 1-5
5	729 tape channel 2, units 0-9
6	729 tape channel 1, units 0-9
7	Unit record B
8	Unit record A
9	Unit record A

STORE AND ADD-TO-STORAGE CODES

All store and add-to-storage codes can turn on the field-overflow indicator:
 -11, -21, -31 Zero Storage and Store Accumulator # ZST1, ZST2, ZST3
 +12, +22, +32 Store Accumulator # ST1, ST2, ST3
 -12, -22, -32 Store Digits from Accumulator # and Ignore Sign STD1, STD2, STD3
 +18, +28, +38 Add to Storage from Accumulator # ASI, AS2, AS3
 -18, -28, -38 Subtract Accumulator # from Storage SSI, SS2, SS3
 +19, +29, +39 Add to Absolute Storage from Accumulator # AAS1, AAS2, AAS3

These codes can turn on the sign-change indicator:
 +12, +22, +32 Store Accumulator # ST1, ST2, ST3
 +18, +28, +38* Add to Storage from Accumulator # ASI, AS2, AS3
 -18, -28, -38* Subtract Accumulator # from Storage SSI, SS2, SS23

*Only if less than a full word is field-defined.
 These codes cannot turn on the sign-change indicator:
 -11, -21, -31 Zero Storage and Store Accumulator # ZST1, ZST2, ZST3
 -12, -22, -32 Store Digits from Accumulator # and Ignore Sign STD1, STD2, STD3
 +19, +29, +39 Add to Absolute Storage from Accumulator # AAS1, AAS2, AAS3

DIGIT AND SIGN CODING

Digit Value										Sign Value			
	0	1	2	3	4	5	6	7	8	9	A	-	+
0	X	X	X	X							X	X	X
1	X	X			X						X	X	X
2	X		X			X					X	X	X
3				X	X	X					X	X	X
6							X	X	X	X	X	X	X

7070-7074 CODING SYSTEMS

Character	Core Storage 2-Digit Alphanumerical Code	Core Storage 1-Digit Numerical Code	Card Code	Magnetic Tape BCD Code	Notes
Blank	00			CA	8
	15		12-3-8	CB821	
□ or)	16		12-4-8	BA84	
	17		12-5-8	CB841	1
	18		12-6-8	CB842	1
GM ±	19		12-7-8	BA8421	1
& or +	20		12	BA	
\$	25		11-3-8	B821	
*	26		11-4-8	CB84	
	27		11-5-8	B841	1
-	28		11-6-8	B842	1
/	30		0-1	CB	7
% or (	31		0-3-8	A821	
	36		0-4-8	CA84	
	37		0-5-8	A841	1
	38		0-6-8	A842	1
SM	39		0-7-8	CA8421	1, 5
# or =	45		3-8	CB21	
@ or !	46		4-8	B4	
	47		5-8	CB41	1
	48		6-8	CB42	1
TM	49		7-8	8421	1, 6
+0	60		12-0	BA82	2
A	61		12-1	CB81	
B	62		12-2	CB82	
C	63		12-3	BA21	
D	64		12-4	CB84	
E	65		12-5	BA41	
F	66		12-6	BA42	
G	67		12-7	CB8421	
H	68		12-8	CB8	
I	69		12-9	BA81	
-0	70		11-0	CB82	2
J	71		11-1	B1	
K	72		11-2	B2	
L	73		11-3	CB21	
M	74		11-4	B4	
N	75		11-5	CB41	
O	76		11-6	CB42	
P	77		11-7	B421	
Q	78		11-8	B8	
R	79		11-9	CB81	
RM ±	80		0-2-8	CA82	3
S	82		0-2	A2	
T	83		0-3	CA21	
U	84		0-4	A4	
V	85		0-5	CA41	
X	86		0-6	CA42	
Y	88		0-7	A421	
Z	89		0-8	CA81	
0	90	0	0	B2	7
1	91	1	1	C1	7
2	92	2	2	C2	7
3	93	3	3	21	7
4	94	4	4	C4	7
5	95	5	5	41	7
6	96	6	6	42	7
7	97	7	7	C421	7
8	98	8	8	CB	7
9	99	9	9	B1	7
Delta Δ			11-7-8	CB8421	4
Alpha α			12-11		7

- NOTES:
- Cannot be read into the IBM 7500 Card Reader, nor are they translated on output to the 7500 Card Punch, 7400 Printer, 7900 Inquiry Station, or the Console type-writer.
 - Cannot be read by the 7500 Card Reader unless they are wired as the units position of numeric words. Similarly, on punching or printing operations, these codes (60, 70) require special wiring.
 - This code cannot be wired to read or punch on the unit record equipment.
 - Generated by the system controls on write operations, and not translated on read operations. This card code (11-7-8) cannot be entered through the 7500 Card Reader.
 - The tape segment mark Write instruction (TSM) writes a single-character tape record that causes a condition six tape final status word (end of segment—EOS) when it is read; it is not placed in core storage. However, the tape segment mark can be read into core storage as a character within a tape record having a length of five or more characters. Also, the tape segment mark can be written from core storage as part of a tape record.
 - The tape mark is handled the same as the tape segment mark.
 - Only the numerals 0 through 9 and special characters +, -, and alpha can be read in the 7501 Console Card Reader. The 7500 Card Reader does not read the 12-11 alpha punch.
 - Note that no invalid (nontranslatable) 2-digit combinations are included. Any invalid 2-digit combination in core storage would be written on tape as a check (C) bit.

IBM 7080 Data Processing System Reference Card

Printed in U.S.A. X22-6561-1

INSTRUCTION	MNEMONIC	CODE		
		OP	BIT	CARD
Add	ADD	G	111 0111	12-7
Add Addr to Mem	AAM		000 1100	4-8
Add to Mem	ADM	6	000 0110	6
Blank Memory BLM 00	BLM	\$	010 1011	11-3-8
Blank Memory Serial BLM 01	BLMS	\$	010 1011	11-3-8
Comma 00 Set Start Point Count	SPC	.	001 1011	0-3-8
Comma 02 Load Four Char	LFC	.	001 1011	0-3-8
Comma 03 Unload Four Char	UFC	.	001 1011	0-3-8
Comma 04 Load Stor Bank	LSB	.	001 1011	0-3-8
Comma 05 Unload Stor Bank	USB	.	001 1011	0-3-8
Comma 06 Enter Interrupt Mode	EIM	.	001 1011	0-3-8
Comma 07 Leave Interrupt Mode	LIM	.	001 1011	0-3-8
Comma 08 Ten Character Transmit	TCT	.	001 1011	0-3-8
Comma 10 Enable Indirect Address	EIA	.	001 1011	0-3-8
Comma 14 Transfer to Interrupt Prog.	TIP	.	001 1011	0-3-8
Comma 15 Leave Interrupt Prog.	LIP	.	001 1011	0-3-8
Compare	CMP	4	100 0100	4
Control 0000 Turn off I-O Ind.	IOF	3	000 0011	3
Control 0001 Write Tape Mark	WTM	3	000 0011	3
Control 0002 Rewind	RWD	3	000 0011	3
Control 0002 (01) Rewind and Unload	RUN	3	000 0011	3
Control 0003 Turn on I-O Ind.	ION	3	000 0011	3
Control 0004 Backspace	BSP	3	000 0011	3
Control 0004 (01) Backspace File	BSF	3	000 0011	3
Control 0005 Supp print or punch	SUP	3	000 0011	3
Control 0009 Skip Tape	SKP	3	000 0011	3
Control xxxx (12) Enable Compare Backward	ECB	3	000 0011	3
Control xxxx (13) Channel Reset	CHR	3	000 0011	3
Control xxxx (14) Enter 7080 Mode	EEM	3	000 0011	3
Control xxxx (15) Leave 7080 Mode	LEM	3	000 0011	3
Control 0037 Set Density Low	SDL	3	000 0011	3
Control 0038 Set Density High	SDH	3	000 0011	3
Divide	DIV	W	101 0110	0-6
Lengthen	LNG	D	111 0100	12-4
Load	LOD	8	100 1000	8
Load Address	LDA	#	100 1011	3-8
Multiply	MPY	V	101 0101	0-5
No Operation	NOP	A	111 0001	12-1
No Operation, Comma (11)	CNO	.	001 1011	0-3-8
Norm and Tr	NTR	X	001 0111	0-7
Read 00	RD	Y	001 1000	0-8
Read 01 Forward Space	FSP	Y	001 1000	0-8
Read 02 Read Memory Address	RMA	Y	001 1000	0-8
Read 03 Sense Status Trigger	SST	Y	001 1000	0-8
Read 04 Control Read	CRD	Y	001 1000	0-8
Read 05 Read Memory Block	RMB	Y	001 1000	0-8
Read while Writing	RWW	S	001 0010	0-2
Receive	RCV	U	001 0100	0-4
Reset Add	RAD	H	111 1000	12-8
Reset Subtract	RSU	Q	010 1000	11-8
Round	RND	E	011 0101	12-5

SPECIAL CHARACTERS	CODE	
	BIT	CARD
&	0 11 0000	12
,	0 01 1011	0-3-8
□	0 11 1100	12-4-8
0	0 00 1010	0
△	1 11 1110	None
Blank	1 01 0000	None
Drum Mark or Storage Mark (in storage)	0 00 0000	None
Card Reader Storage Mark	None	12-1-4-7
Group Mark	0 11 1111	12-5-8; 12-7-8
Record Mark	1 01 1010	0-2-8
+	0 11 1010	12-0
-	1 10 1010	11-0

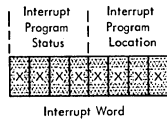
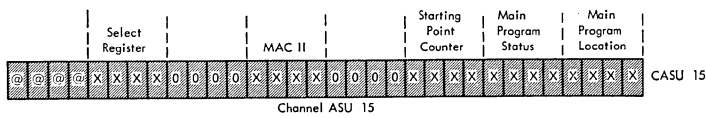
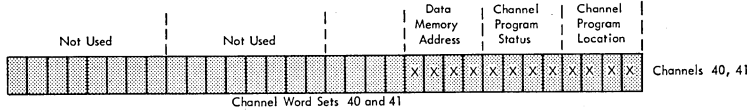
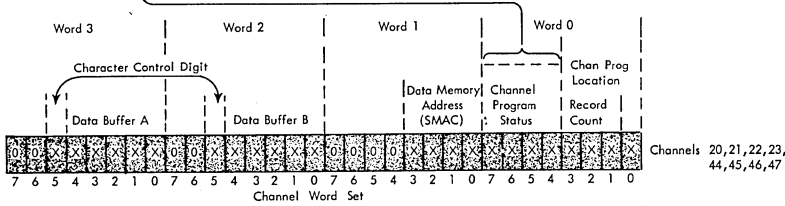
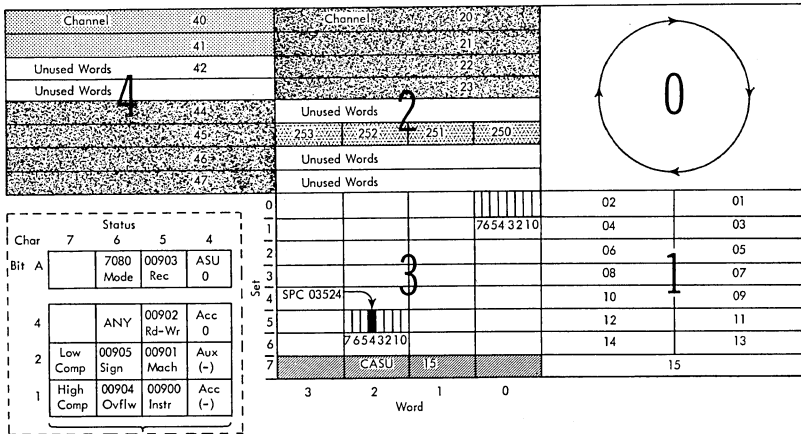
Mode	705 I-II Switch	40 K Switch	Program Wrap Around
705 I	ON	OFF	20 K
705 II	ON	ON	40 K
705 III	OFF	ON	40 K
705 III	OFF	OFF	80 K

INSTRUCTION	MNEMONIC	CODE		
		OP	BIT	CARD
Select	SEL	2	100 0010	2
Select (Sel 6001 Reset WTC Trigger)		2	100 0010	2
Select (Sel 6002 Reset SAR 8 Trigger)		2	100 0010	2
Send	SND	/	001 0001	0-1
Set Bit Alternate SB 07	SBA	%	101 1100	0-4-3
Set Bit 1 SB09-14	SBN	%	101 1100	0-4-8
Set Bit Redundant SB08	SBR	%	101 1100	0-4-8
Set Bit 0 SB 01-06	SBZ	%	101 1100	0-4-8
Set Left	SET	B	111 0010	12-2
Shorten	SHR	C	011 0011	12-3
Sign	SGN	T	101 0011	0-3
Stop	HLT	J	010 0001	11-1
Store	ST	F	011 0110	12-6
Store for Print	SPR	5	000 0101	5
Subtract	SUB	P	010 0111	11-7
Transfer	TR	1	100 0001	1
Transfer Auto Restart (TRS 09)	TAR	0	110 0110	11-6
Tr Sw A On 0911 (TRA 01)	TAA	I	011 1001	12-9
Tr Sw B On 0912 (TRA 02)	TAB	I	011 1001	12-9
Tr Sw C On 0913 (TRA 03)	TAC	I	011 1001	12-9
Tr Sw D On 0914 (TRA 04)	TAD	I	011 1001	12-9
Tr Sw E On 0915 (TRA 05)	TAE	I	011 1001	12-9
Tr Sw F On 0916 (TRA 06)	TAF	I	011 1001	12-9
Tr Non-stop Sw (TRA 07)	TNS	I	011 1001	12-9
Tr and Store Location Ctr (Tr 01)	TSL	I	100 0001	1
Tr Any	TRA	I	011 1001	12-9
Tr Read-Write Check (TR 12)	TRC	0	110 0110	11-6
Tr Equal	TRE	L	110 0011	11-3
Tr High	TRH	K	010 0010	11-2
Tr Instr Check (TRS 10)	TIC	0	110 0110	11-6
Tr Machine Check (TRS 11)	TMC	0	110 0110	11-6
Tr O'flow Check (TRS 14)	TOC	0	110 0110	11-6
Tr Plus	TRP	M	010 0100	11-4
Tr Ready (TRS 01)	TRR	0	110 0110	11-6
Tr Echo Check (TRS 13)	TEC	0	110 0110	11-6
Tr Sign Check (TRS 15)	TRS	0	110 0110	11-6
Tr Signal	TRS	0	110 0110	11-6
Tr Sync Any (TRS 03)	TSA	0	110 0110	11-6
Tr Transmission Check (TRS 02)	TTC	0	110 0110	11-6
Tr Zero	TRZ	N	110 0101	11-5
Tr Zero Bit	TZB	.	111 1011	12-3-8
Transmit	TMT	9	000 1001	9
Transmit Serial (TMT 01-15)	TMTS	9	000 1001	9
Unload	UNL	7	100 0111	7
Unload Address	ULA	*	110 1100	11-4-8
Write 00	WR	R	110 1001	11-9
Write 01 (Dump Memory)	DMP	R	110 1001	11-9
Write 02 (Set Record Counter)	SRC	R	110 1001	11-9
Write 03 (Set Control Condition)	SCC	R	110 1001	11-9
Write 04 (Control Write)	CWR	R	110 1001	11-9
Write 05 (Write Multiple Control)	WMC	R	110 1001	11-9
Write Erase 00	WRE	Z	101 1001	0-9
Write Erase 01	WRE	Z	101 1001	0-9

Card Readers	0100-0199
Console Card	
Reader	0100-0109
754, 760, and Tape Units	0200-0299
Card Punches	0300-0399
Printers 717	0400-0499
720-730	02x4
Typewriter	0500
Real Time Clock	0501
TRC Tape Units	0600-0699
Alteration Switches	0911-0916
Channel Tape Units	2000-2999 or 0200-0299

Instruction	0900
Machine	0901
Read/Write	0902
Record Check	0903
Overflow	0904
Sign	0905

7080 CENTRAL STORAGE



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

Disk Storage Orders		
Orders	Mnemonic Code	Numeric Code
No Operation	DNOP	00
Release	DREL	04
Eight-Bit Mode	DEBM	08
Six-Bit Mode	DSBM	09
Seek	DSEK	80
Prepare to Verify—Single Record	DVSR	82
Prepare to Write Format	DWRF	83
Prepare to Verify—Track with No Addresses	DVTN	84
Prepare to Verify—Cylinder Operation (Optional Feature)	DVCY	85
Prepare to Write Check	DWRC	86
Set Access Inoperative	DSAI	87
Prepare to Verify—Track Operation	DVTA	88
Prepare to Verify—Home Address Operation	DVHA	89

Hypertape Orders		
Orders	Mnemonic Code	Numeric Code
No Operation	HNOP	00
End of Sequence	HEOS	01
Reserved Light Off	HLRF	02
Reserved Light On	HLRN	03
Check Light On	HCLN	05
Select	HSEL	06
Select for Backward Reading	HSBR	07
Change Cartridge and Rewind	HCCR	28
Rewind	HRWD	30
Rewind and Unload Cartridge	HRUN	31
Erase Long Gap	HERG	32
Write Tape Mark	HWTM	33
Backspace	HBSR	34
Backspace File	HBSF	35
Space	HSKR	36
Space File	HSKF	37
Change Cartridge	HCHC	38
Unload Cartridge	HUNL	39
File Protect On	HFPN	42

Notes:
 1. F = Indirectly Addressable Instruction
 2. T = Indexable Instruction
 3. c = 01 to 10 or A to H
 4. u = Unit Address
 5. V = Variable
 6. n = A Number from 1 to 6

INSTRUCTION LISTING - ALPHABETIC

Alpha Codes	Octal Codes	F	T	CPU Cycles	Alpha Codes	Octal Codes	F	T	CPU Cycles
ACL	0361	x	x	2	LLS	0763			
ADD	0400	x	x	2	LNT	-0056		x	v
ADM	0401	x	x	2	LRS	0765		x	v
ALS	0767		x	v	LSNM	-076000010		x	2
ANA	-0320	x	x	3	LTM	-076000007		x	2
ANS	0320	x	x	4	LXA	0534			2
ARS	0771		x	v	LXD	-0534			2
AXC	-0774			1	MPR	-0200		x	x 2+14
AXT	0774			1	MPY	0200		x	x 2+14
BSFC	-0764bcc2uu		x	2	MSE	-0760b			2
BSRC	0764bcc2uu		x	2	NOP	0761			2
BTTc	0760bcc000		x	2	NZT	-0520		x	x 2
CAL	-0500		x	2	OAI	0043			1
CAQ	-0114			2+8	OFT	0444		x	4
CAS	0340	x	x	3	ONT	0446		x	4
CHS	0760000002		x	2	ORA	-0501		x	x 2
CLA	0500		x	2	ORS	-0602		x	x 2
CLM	0760000000		x	2	OSI	0442		x	x 2
CLS	0502		x	2	PAC	0737			2
COM	0760000006		x	2	PAI	0044			1
CRD	-0154			2+8	PAK	0734			1
CVR	0114			2+8	PBT	-076000001		x	2
DCT	0760000012		x	2	PDC	-0737			1
DVH	0220		x	3+14	PDX	-0734			1
DVP	0221		x	3+14	PIA	-0046			1
ECTM	-0760000006		x	2	PSE	0760b		x	2
EFTM	-0760000002		x	2	PXA	0754			1
ENB	0564		x	2	PXD	-0754			1
ENK	0760000004		x	2	RCDC	0762bcc321		x	2
ERA	0322		x	3	RCHA	0540		x	3
ESNT	-0021		x	1	RCHB	-0540		x	3
ESTM	-0760000005		x	2	RCHC	0541		x	3
ETM	0760000007		x	2	RCHD	-0541		x	3
ETTc	-0760bcc000		x	2	RCHE	0542		x	3
FAD	0300		x	6+15	RCHF	-0542		x	3
FAM	0304		x	x	RCHG	0543		x	3
FDH	0240		x	3+14	RCHH	-0543		x	3
FDP	0241		x	3+14	RCT	0760000014		x	2
FMP	0260		x	2+13	RDCc	0760bcc352		x	2
FRN	0760000011		x	2	RDS	0762b		x	2
FSB	0302		x	6+15	REWc	0772bccuuu		x	2
FSM	0306		x	6+15	RFT	0054			3
HPR	0420		x	2	RIA	-0042			1
HTR	0000		x	2	RICc	0760bcc350		x	2
I1A	0041			1	RIL	-0057			1
I1L	-0051			1	RIR	0057			1
I1S	0051			1	RIS	0445		x	2
I1R	0440		x	2	RND	0760000010		x	2
I0T	0760000005		x	2	RNT	0056			3
LAC	0535		x	3	RPRc	0762bcc361		x	2
LAS	-0340		x	2	RQL	-0773		x	v
LBT	0760000001		x	2	RSCA	0540		x	3
LCHA	0544		x	x	RSCB	-0540		x	3
LCHB	-0544		x	x	RSCC	0541		x	3
LCHC	0545		x	x	RSCD	-0541		x	3
LCHD	-0545		x	x	RSCe	0542		x	3
LCHe	0546		x	x	RSCF	-0542		x	3
LCHF	-0546		x	x	RSCG	0543		x	3
LCHG	0547		x	x	RSCH	-0543		x	3
LCHH	-0547		x	x	RTBc	0762bcc2uu		x	2
LDC	-0535		x	2	RTDc	0762bcc2uu		x	2
LDI	0441		x	x	RUnc	-0772bccuuu		x	2
LDO	0560		x	2	SBM	-0400		x	2
LFT	-0054			3	SCHA	0640		x	2
LFTM	-0760000004		x	2	SCHB	-0640		x	2
LGL	-0763		x	v	SCHC	0641		x	2
LGR	-0765		x	v	SCHD	-0641		x	2

INSTRUCTION LISTING - ALPHABETIC

Alpha Codes	Octal Codes	F	T	CPU Cycles	Alpha Codes	Octal Codes	F	T	CPU Cycles
SCHE	0642		x	x 2	TCOH	0067		x	x 2
SCHF	-0642		x	x 2	TEFA	0030		x	x 2
SCHG	0643		x	x 2	TEFB	-0030		x	x 2
SCHH	-0643		x	x 2	TEFC	0031		x	x 2
SDHC	0776bcc2uu			2	TEFD	-0031		x	x 2
SDLC	0776bcc2uu			2	TEFE	0032		x	x 2
SIL	-0055			1	TEFF	-0032		x	x 2
SIR	0055			1	TEFG	0033		x	x 2
SLF	076000140		x	2	TEFH	-0033		x	x 2
SLNn	07600014n		x	2	TIF	0046		x	x 2
SLQ	-0620		x	2	TIO	0042		x	x 2
SLTc	-07600014n		x	2	TIx	0000			2
SLW	0602		x	x 2	TLQ	0040		x	x 2
SPRN	0760bcc3nn		x	2	TMI	-0120		x	x 1
SPTC	0760bcc360		x	2	TMO	-0140		x	x 1
SPUR	0760bcc34n		x	2	TNK	-2000			2
SSM	-076000003		x	2	TNZ	-0100		x	x 2
SSP	0760000003		x	2	TOV	0140		x	x 1
STA	0621		x	x 2	TPL	0120		x	x 1
STCA	0544			2	TRC	0161		x	x 1
STCB	-0544			2	TGP	0162		x	x 1
STCC	0545			2	TQA	0020		x	x 1
STCD	-0545			2	TRC	0022		x	x 2
STCE	0546			2	TRCB	-0022		x	x 2
STCF	-0546			2	TRCC	0024		x	x 2
STCG	0547			2	TRCD	-0024		x	x 2
STCH	-0547			2	TRCE	0026		x	x 2
STD	0622		x	2	TRCF	-0026		x	x 2
STI	0604		x	x 2	TRCG	0027		x	x 2
STL	-0625		x	x 2	TRCH	-0027		x	x 2
STO	0601		x	x 2	TSX	0074		x	x 2
STP	0630		x	2	TYR	0021		x	x 1
STQ	-0600		x	2	TXH	3000			2
STR	-1000			2	TXI	1000			2
STT	0625		x	x 2	TXL	-3000			2
STZ	0600			2	TZE	0100		x	x 2
SUB	0402		x	x 2	UAM	-0304		x	x 5+10
SWTn	076000016n		x	2	UFA	-0300		x	x 5+10
SXA	0634			2	UFM	-0260		x	x 2+13
SXD	-0634			2	UFS	-0302		x	x 5+9
TCNA	-0060		x	2	USM	-0306		x	x 5+11
TCNB	-0061		x	2	VDH	C224		x	2+14
TCNC	-0062		x	2	VDP	0225		x	2+14
TCND	-0063		x	2	VLM	0204		x	2+14
TCNE	-0064		x	2	WFC	0770bcc22u		x	2
TCNF	-0065		x	2	WPBC	0766bcc362		x	2
TCNG	-0066		x	2	WPDC	0766bcc361		x	2
TCNH	-0067		x	2	WPUC	0766bcc341		x	2
TCOA	0060		x	2	WRS	0766 b		x	2
TCOB	0061		x	2	WTBc	0766bcc2uu		x	2
TCOC	0062		x	2	WTDc	0766bcc2uu		x	2
TCOD	0063		x	2	XCA	0131			1
TCOE	0064		x	2	XGL	-0130			1
TCOF	0065		x	2	XEC	0522		x	x 1
TCOG	0066		x	2	ZET	0520		x	x 2

INPUT-OUTPUT DEVICE ADDRESSES

Magnetic Tape Units				Card Readers	
Channel	BCD	Binary	Channel	Octal	
A	01201 TO 01212	01221 TO 01232	A	01321	
B	02201 TO 02212	02221 TO 02232	B	02321	
C	03201 TO 03212	03221 TO 03232	C	03321	
D	04201 TO 04212	04221 TO 04232	D	04321	
E	05201 TO 05212	05221 TO 05232	E	05321	
F	06201 TO 06212	06221 TO 06232	F	06321	
G	07201 TO 07212	07221 TO 07232	G	07321	
H	10201 TO 10212	10221 TO 10232	H	10321	

Printers		Card Punches	
Channel	Address	Channel	Address
A	01361	A	01341
B	02361	B	02341
C	03361	C	03341
D	04361	D	04341
E	05361	E	05341
F	06361	F	06341
G	07361	G	07341
H	10361	H	10341

INSTRUCTION LISTING - NUMERIC

Octal Codes	Alpha Codes	F	T	CPU Cycles	Octal Codes	Alpha Codes	F	T	CPU Cycles
0000	HTR	x	x	2	-0130	XCL			1
0020	TRA	x	x	1	0131	XCA			1
0021	TRR	x	x	1	0140	TOV	x	x	1
-0021	ESNT	x	x	1	-0140	TND	x	x	1
0022	TRCA	x	x	2	-0154	CRO			2,8
-0022	TRCB	x	x	2	0161	TGO	x	x	1
0024	TRCC	x	x	2	0162	TPP	x	x	1
-0024	TRCD	x	x	2	0200	MPY	x	x	2,14
0026	TRCE	x	x	2	-0200	MPR	x	x	2,14
-0026	TRCF	x	x	2	0204	VLM	x	x	2,14
0027	TRCG	x	x	2	0220	DVH	x	x	3,14
-0027	TRCH	x	x	2	0221	DVP	x	x	3,14
0030	TEFA	x	x	2	0224	VDH	x	x	2,14
-0030	TEFB	x	x	2	0225	VDP	x	x	2,14
0031	TEFC	x	x	2	0240	FDH	x	x	3,14
-0031	TEFD	x	x	2	0241	FDP	x	x	3,14
0032	TEFE	x	x	2	0260	FMP	x	x	2,13
-0032	TEFF	x	x	2	-0260	UFM	x	x	2,13
0033	TEFG	x	x	2	0300	FAD	x	x	6,15
-0033	TEFH	x	x	2	-0300	UFA	x	x	5,10
0040	TLQ	x	x	2	0302	FSB	x	x	6,15
0041	IIA			1	-0302	UFS	x	x	5,9
0042	TIO	x	x	2	0304	FAM	x	x	6,15
-0042	RIA			1	-0304	UAM	x	x	6,15
0043	OAI			1	0306	FSM	x	x	6,15
0044	PAI			1	-0306	USM	x	x	5,11
0046	TIF	x	x	2	0320	ANS	x	x	4
-0046	PIA			1	-0320	ANA	x	x	3
0051	IIR			1	0322	ERA	x	x	3
-0051	IIL			1	0340	CAS	x	x	3
0054	RFT			3	-0340	LAS	x	x	3
-0054	SRT			3	0361	ACL	x	x	2
0055	SIR			1	0400	ADD	x	x	2
-0055	SIL			1	-0400	SBM	x	x	2
0056	RNT			3	0401	ADM	x	x	2
-0056	LNT			3	0402	SUB	x	x	2
0057	RIR			1	0420	HPR	x	x	2
-0057	RIL			1	0440	IIS	x	x	2
0060	TCOA	x	x	2	0441	LDI	x	x	2
-0060	TCNA	x	x	2	0442	OSI	x	x	2
0061	TCOB	x	x	2	0444	WTF	x	x	4
-0061	TCNB	x	x	2	0445	RIS	x	x	2
0062	TCOC	x	x	2	0446	ONT	x	x	4
-0062	TCNC	x	x	2	0500	CLA	x	x	2
0063	TCOD	x	x	2	-0500	CAL	x	x	2
-0063	TCND	x	x	2	-0501	ORA	x	x	2
0064	TCOE	x	x	2	0502	CLS	x	x	2
-0064	TCNE	x	x	2	0520	ZET	x	x	2
0065	TCOF	x	x	2	-0520	NET	x	x	2
-0065	TCNF	x	x	2	0522	NEC	x	x	11
0066	TCOG	x	x	2	0534	LXA			2
-0066	TCNG	x	x	2	-0534	LXD			2
0067	TCOH	x	x	2	0535	LAC			2
-0067	TCNH	x	x	2	-0535	LDC			2
0074	TSX			2	0540	RCHA	x	x	3
0100	TZE	x	x	2	0540	RSCA	x	x	3
-0100	TNZ	x	x	2	-0540	RCHB	x	x	3
0114	CVR			2,8	-0540	RSCB	x	x	3
-0114	CAQ			2,8	0541	RCHC	x	x	3
0120	TPL	x	x	1	0541	RSCC	x	x	3
-0120	TMI	x	x	1	-0541	RCHD	x	x	3

INSTRUCTION LISTING - NUMERIC

Octal Codes	Alpha Codes	F	T	CPU Cycles	Octal Codes	Alpha Codes	F	T	CPU Cycles
-0541	R5CD	x	x	3	076000006	COM			x 2
0542	R5CE	x	x	3	076000007	ETM			x 2
0542	R5CE	x	x	3	076000010	RND			x 2
-0542	R5CF	x	x	3	076000011	FRN			x 2
-0542	R5CF	x	x	3	076000012	DCT			x 2
0543	R5CG	x	x	3	076000014	RCT			x 2
0543	R5CG	x	x	3	076000014	SLF			x 2
-0543	R5CH	x	x	3	07600	PSE			x 2
-0543	R5CH	x	x	3	076000000	BTTC			x 2
0544	LCHA	x	x	v	076000014n	SLNN			x 2
0544	STCA			v	076000016n	SMN			x 2
-0544	LCHB	x	x	v	076000034n	SPUN			x 2
-0544	STCB			v	0760000350	R1CC			x 2
0545	LCHC	x	x	v	0760000352	RDCC			x 2
0545	STCC			v	0760000360	SPTC			x 2
-0545	LCHD	x	x	v	07600003nn	SPRN			x 2
-0545	STCD			v	-0760000001	PBT			x 2
0546	LCHE	x	x	v	-0760000002	EFTM			x 2
0546	STCE			v	-0760000003	SM			x 2
-0546	LCHF	x	x	v	-0760000004	LFTM			x 2
-0546	STCF			v	-0760000005	ESTM			x 2
0547	LCHG	x	x	v	-0760000006	ECTM			x 2
0547	STCG			v	-0760000007	LTM			x 2
-0547	LCHH	x	x	v	-0760000010	LSNM			x 2
-0547	STCH			v	-07600	MSE			x 2
0560	LDQ	x	x	2	-0760000000	ETTC			x 2
0564	END	x	x	2	-0760000016n	SLTE			x 2
0600	STZ	x	x	2	0761	NOP			x 2
-0600	STQ	x	x	2	0762n	RDS			x 2
0601	STO	x	x	2	0762000200	RTDC			x 2
0602	SLW	x	x	2	0762000200	RTBC			x 2
0604	STI	x	x	2	0762000321	RCDC			x 2
-0620	SLQ	x	x	2	0762000361	RPRC			x 2
0621	STA	x	x	2	0763	LLS			x v
0622	STD	x	x	2	-0763	LGL			x v
0625	STT	x	x	2	0764000200	BSRC			x 2
-0625	STL	x	x	2	-0764000200	BSFC			x 2
0630	STP	x	x	2	0765	LRS			x v
0634	SKA			2	-0765	LGR			x v
-0634	SKD			2	0766 n	WRS			x v
0640	SCHA	x	x	2	0766000200	WTDc			x 2
-0640	SCHB	x	x	2	0766000200	WTBc			x 2
0641	SCHC	x	x	2	0766000341	WPJC			x 2
-0641	SCHD	x	x	2	0766000361	WPDC			x 2
0642	SCHE	x	x	2	0766000362	WPBC			x 2
-0642	SCHF	x	x	2	0767	ALS			x v
0643	SCHG	x	x	2	0767000220	WEFC			x 2
-0643	SCHH	x	x	2	0771	ARS			x v
0734	PAX			1	-0772000000	RUNC			x 2
-0734	PDX			1	-0773	ROL			x v
0737	PAC			1	0774	AKT			1
-0737	PDC			1	-0774	AXC			1
0754	PXA			1	0776000200	SDHC			2
-0754	PXD			1	0776000200	SDLc			2
0760000000	CLM			x 2	1000	TKI			2
0760000001	LBT			x 2	-1000	STR			2
0760000002	CHS			x 2	2000	TIX			2
0760000003	SSP			x 2	-2000	TNX			2
0760000004	ENK			x 2	3000	TKH			2
0760000005	IOT			x 2	-3000	TKL			2

IBM 7607/7909 DATA CHANNEL COMMANDS IBM 7909 DATA CHANNEL COMMANDS

Binary Codes Positions	Alpha Codes	F	T	Binary Codes Positions	Alpha Codes	F	T
0 0 0 0	10CD	x		0 0 0 0	WTR	x	
0 0 0 1	10CDn	x		0 0 0 1	XMT	x	
0 0 1 0	10TCH	x		0 0 1 0	TCH	x	
0 1 0 0	10RPh	x		0 0 1 1	LIPT	x	
0 1 0 1	10RPh	x		1 0 0 0	CPYP	x	
0 1 1 0	10RT	x		1 0 0 1	CPVD	x	
0 1 1 1	10RTn	x		1 0 1 0	1 TCM	x	
1 0 0 0	10RPh	x		1 1 1 0	1 ICC	x	
1 0 0 1	10CPn	x		0 1 0 0	CTL	x	
1 0 1 0	10TCT	x		0 1 0 1	CTLR	x	
1 0 1 1	10TCTn	x		0 1 0 1	CTLW	x	
1 1 0 0	10SP	x		0 1 1 0	1 SMS	x	
1 1 0 1	10SPn	x		0 1 1 0	LAR	x	
1 1 1 0	10ST	x		0 1 1 1	SAR	x	
1 1 1 1	10STn	x		0 1 1 1	TWT	x	
				1 1 0 0	1 LIP	x	
				1 1 0 1	1 TDC	x	
				1 1 0 1	1 LCC	x	
				1 1 1 0	0 SMS	x	

IBM 7631 FILE CONTROL ORDERS IBM 7640 HYPERTAPE CONTROL ORDERS

Binary Positions	Alpha Code	Num Code	Binary Positions	Alpha Code	Num Code
2 3 4 5 8 9 10 11	DNOP	00	2 3 4 5 8 9 10 11	HNOP	00
1 0 1 0 1 0 1 0	DREL	04	1 0 1 0 1 0 1 0	HEDS	01
1 0 1 0 1 0 1 0	DSBM	08	1 0 1 0 1 0 1 0	HRLF	02
1 0 1 0 1 0 1 0	DSBM	09	1 0 1 0 1 0 1 0	HRLN	03
1 0 0 0 1 0 1 0	DSEK	80	1 0 1 0 1 0 1 0	HCLN	05
1 0 0 0 0 0 1 0	DVSR	82	1 0 1 0 1 0 1 0	HSEL	06
1 0 0 0 0 0 1 0	DWRP	83	1 0 1 0 1 0 1 0	HBSR	07
1 0 0 0 0 1 0 0	DVTN	84	0 0 1 0 1 0 0 1	HCCR	28
1 0 0 0 0 1 0 1	DVCY	85	0 0 1 1 1 0 1 0	HWRD	30
1 0 0 0 0 1 1 0	DWRC	86	0 0 1 1 0 0 0 1	HRUN	31
1 0 0 0 0 1 1 1	DSAI	87	0 0 1 1 0 0 1 0	HERG	32
1 0 0 0 1 0 0 0	DVTA	88	0 0 1 1 0 0 1 1	HWTM	33
1 0 0 0 1 0 0 1	DVHA	89	0 0 1 1 0 1 0 0	HBSR	34
			0 0 1 1 0 1 0 1	HBSF	35
			0 0 1 1 0 1 1 0	HBSR	36
			0 0 1 1 0 1 1 1	HSKF	37
			0 0 1 1 1 0 0 0	HCHC	38
			0 0 1 1 1 0 0 1	HUNL	39
			0 1 0 0 0 0 1 0	HFPN	42

7904 DATA CHANNEL DIAGNOSTIC INSTRUCTIONS

SYM	NUMERIC	NAME	F	T
LDLB	-0540,1	LOAD DATA REGISTER AND LOOP+CHANNEL B	x	x
LDLC	0541,1	LOAD DATA REGISTER AND LOOP+CHANNEL C	x	x
LDLD	-0541,1	LOAD DATA REGISTER AND LOOP+CHANNEL D	x	x
LDLE	0542,1	LOAD DATA REGISTER AND LOOP+CHANNEL E	x	x
SDRB	-0640,1	STORE DATA REGISTER+CHANNEL B	x	x
SDRC	0641,1	STORE DATA REGISTER+CHANNEL C	x	x
SDRD	-0641,1	STORE DATA REGISTER+CHANNEL D	x	x
SDRE	0642,1	STORE DATA REGISTER+CHANNEL E	x	x

SINGLE PRECISION FLOATING POINT INSTRUCTIONS

SYM	NUMERIC	NAME	F	T
FAD	0300	FLOATING ADD	x	x
FDP	0241	FLOATING DIVIDE OR PROCEED	x	x
FMP	0260	FLOATING MULTIPLY	x	x
FSS	0302			

BASIC INSTRUCTION SET - ALPHABETIC

INPUT-OUTPUT DEVICE ADDRESS

SYM	NUMERIC	NAME	F	T
ACL	0361	ADD AND CARRY LOGICAL WORD	X	X
ADD	0400	ADD	X	X
ALS	0767	ACCUMULATOR LEFT SHIFT	X	X
ANA	-0320	AND TO ACCUMULATOR	X	X
ARS	0771	ACCUMULATOR RIGHT SHIFT	X	X
BSR	0764	BACKSPACE RECORD	X	X
CAL	-0500	CLEAR AND ADD LOGICAL WORD	X	X
CAP	-1510	CLEAR AND ADD LOGICAL WORD WITH PARITY	X	X
CAS	0340	COMPARE ACCUMULATOR WITH STORAGE	X	X
CHS	0760,00002	CHANGE SIGN	X	X
CLA	0500	CLEAR AND ADD	X	X
CLS	0502	CLEAR AND SUBTRACT	X	X
COM	0760,00006	COMPLEMENT MAGNITUDE	X	X
CTR	-1766	CONTROL SELECT (WRITE)	X	X
DCT	0760,00012	DIVIDE CHECK TEST	X	X
DVP	0221	DIVIDE OR PROCEED	X	X
ENB	0564	ENABLE FROM Y	X	X
ENK	-0760,00004	ENTER KEYS	X	X
ETTA	-0760,01000	END OF TAPE TEST, CHANNEL A	X	X
ETTB	-0760,02000	END OF TAPE TEST, CHANNEL B	X	X
ETTC	-0760,03000	END OF TAPE TEST, CHANNEL C	X	X
ETTD	-0760,04000	END OF TAPE TEST, CHANNEL D	X	X
ETTE	-0760,05000	END OF TAPE TEST, CHANNEL E	X	X
HPR	0420	HALT AND PROCEED	X	X
ICT	-1760,00014	INHIBIT CHANNEL TRAPS	X	X
IOT	0760,00005	INPUT/OUTPUT CHECK TEST	X	X
LAS	-0340	LOGICAL COMPARE ACCUMULATOR WITH STOR	X	X
LBT	0760,00001	LOW ORDER BIT TEST	X	X
LDO	0560	LOAD MQ	X	X
LGL	-0763	LOGICAL LEFT SHIFT	X	X
LGR	-0765	LOGICAL RIGHT SHIFT	X	X
LIS	0763	LONG LEFT SHIFT	X	X
LRS	0765	LONG RIGHT SHIFT	X	X
MPY	0200	MULTIPLY	X	X
ORA	-0501	OR TO ACCUMULATOR	X	X
PBT	-0760,00001	P BIT TEST	X	X
PRD	-1762	PREPARE TO READ	X	X
PWR	-1766	PREPARE TO WRITE	X	X
RCMA	0540	RESET AND LOAD CHANNEL A	X	X
RCMB	-0540	RESET AND LOAD CHANNEL B	X	X
RCMC	0541	RESET AND LOAD CHANNEL C	X	X
RCMD	-0541	RESET AND LOAD CHANNEL D	X	X
RCME	0542	RESET AND LOAD CHANNEL E	X	X
RCT	0760,00014	RESTORE CHANNEL TRAPS	X	X
RDCA	0760,01352	RESET DATA CHANNEL A	X	X
RDCB	0760,02352	RESET DATA CHANNEL B	X	X
RDCD	0760,03352	RESET DATA CHANNEL C	X	X
RDCD	0760,04352	RESET DATA CHANNEL D	X	X
RDCD	0760,05352	RESET DATA CHANNEL E	X	X
RDS	0762	READ SELECT	X	X
REW	0772	REWIND	X	X
RQL	-0773	ROTATE MQ LEFT	X	X
RUN	-0772	ROTATE MQ RIGHT	X	X
SCMA	0640	STORE CHANNEL A	X	X
SCMB	-0640	STORE CHANNEL B	X	X
SCMC	0641	STORE CHANNEL C	X	X
SCMD	-0641	STORE CHANNEL D	X	X
SCME	0642	STORE CHANNEL E	X	X
SEN	-1762	SENSE SELECT (READ)	X	X
SLP	-1612	STORE LOGICAL WORD WITH PARITY	X	X
SLW	0602	STORE LOGICAL WORD	X	X
SSP	0760,00003	STORE IN PL	X	X
STA	0621	STORE ADDRESS	X	X
STD	0622	STORE DECREMENT	X	X
STL	-0625	STORE INSTRUCTION LOCATION COUNTER	X	X
STO	0601	STORE	X	X
STZ	-0600	STORE ZERO	X	X
STR	-1000	STORE LOCATION AND TRAP	X	X
STZ	0600	STORE ZERO	X	X
SUB	0402	SUBTRACT	X	X
SWT	0760,0016N	SENSE SWITCH TEST	X	X
TCA	0061	TRANSFER ON CHANNEL A IN OPERATION	X	X
TCCB	0061	TRANSFER ON CHANNEL B IN OPERATION	X	X
TCCD	0062	TRANSFER ON CHANNEL C IN OPERATION	X	X
TCCD	0063	TRANSFER ON CHANNEL D IN OPERATION	X	X
TCCD	0064	TRANSFER ON CHANNEL E IN OPERATION	X	X
TDA	-1060	TRANSFER ON CHANNEL A DEVICE IN OP	X	X
TEFA	0030	TRANSFER ON END OF FILE, CHANNEL A	X	X
TEFB	-0030	TRANSFER ON END OF FILE, CHANNEL B	X	X
TEFD	0031	TRANSFER ON END OF FILE, CHANNEL C	X	X
TEFD	-0031	TRANSFER ON END OF FILE, CHANNEL D	X	X
TEFE	0032	TRANSFER ON END OF FILE, CHANNEL E	X	X
TMI	-0120	TRANSFER ON MINUS	X	X
TNZ	-0100	TRANSFER ON NOT ZERO	X	X
TOV	0140	TRANSFER ON OVERFLOW	X	X
TRL	0120	TRANSFER ON PLUS	X	X
TRA	0020	TRANSFER ON ZERO	X	X
TRCA	0022	TRANSFER ON REDUNDANCY CHECK, CHANNEL A	X	X
TRCB	-0022	TRANSFER ON REDUNDANCY CHECK, CHANNEL B	X	X
TRCC	0024	TRANSFER ON REDUNDANCY CHECK, CHANNEL C	X	X
TRCD	-0024	TRANSFER ON REDUNDANCY CHECK, CHANNEL D	X	X
TRCE	0026	TRANSFER ON REDUNDANCY CHECK, CHANNEL E	X	X
TRP	-1165	TRANSFER AND RESTORE PARITY AND TRAPS	X	X
TRT	-1164	TRANSFER AND RESTORE TRAPS	X	X
TSL	-1627	TRANSFER AND STORE INSTR LOCATION CTR	X	X
TZE	0100	TRANSFER ON ZERO	X	X
VOP	0225	VARIABLE LENGTH MULTIPLY	X	X
VLM	0204	VARIABLE LENGTH DIVIDE OR PROCEED	X	X
VMA	-1204	VARIABLE LENGTH MULTIPLY AND ACCUM	X	X
WBT	0766	WRITE BLANK TAPE	X	X
WEP	0770	WRITE END OF FILE	X	X
WRS	0766	WRITE SELECT	X	X
XEC	0522	EXECUTE	X	X

DEVICE	CHAN	ADAPT	BCD ADDRESSES	BINARY ADDRESSES
MAGNETIC TAPE	A	0	01202/01212	01221/01232
	B		02201/02212	02221/02232
	C		03201/03212	03221/03232
	D		04201/04212	04221/04232
	E		05201/05212	05221/05232
DIRECT DATA CONNECTION	B		02240	02260
	C		03240	03260
	D		04240	04260
	E		05240	05260
1622 CARD READER	A	3	01210	01230
1622 CARD PUNCH	A		01211	01231
1402 CARD READER	A		01210	01230
1402 CARD PUNCH	A	3	01211	01231
1403 PRINTER	A	3	01212	01232
TYPEWRITER	A		01000	01020
1401 DATA PROC SYSTEM	A		01201/01212	01221/01232
1011 PAPER TAPE READER	A		01601	01621
1009 DATA TRANSFER UNIT	A	3	01301	01321
1014 REMOTE INQUIRY UNIT	A	3	01701/01702	01721/01722
TELEGRAPH TYPE UNITS	A	3	01401/01404	01421/01424

NOTES

F - Represents an indirectly addressable instruction
 N - Represents a number from 1 to 6

EXTENDED PERFORMANCE INSTRUCTIONS

SYM	NUMERIC	NAME	F	T
AKT	0774	ADDRESS TO INDEX TRUE		
CCS	-1341	COMPARE CHARACTER WITH STORAGE	X	X
LAC	0535	LOAD COMPLEMENT OF ADDRESS IN INDEX		
LDC	-0535	LOAD COMPLEMENT OF DECREMENT IN INDEX		
LXA	0534	LOAD INDEX FROM ADDRESS		
LXD	-0534	LOAD INDEX FROM DECREMENT		
MIT	-1341,6	MAKE STORAGE MINUS TEST	X	X
MSM	-1623,6	MAKE STORAGE SIGN MINUS	X	X
MSP	-1623,7	MAKE STORAGE SIGN PLUS	X	X
PAC	0737	PLACE COMPLEMENT OF ADDRESS IN INDEX		
PAX	0734	PLACE ADDRESS IN INDEX		
PCS	-1505	PLACE CHARACTER FROM STORAGE	X	X
PDC	-0737	PLACE COMPLEMENT OF DECREMENT IN INDEX	X	X
PDX	-0734	PLACE DECREMENT IN INDEX		
PLT	-1341,7	STORE PLUS TEST	X	X
PXA	0754	PLACE INDEX IN ADDRESS		
PXD	-0754	PLACE INDEX IN DECREMENT		
SAC	-1623	STORE ACCUMULATOR CHARACTER	X	X
SXA	0634	STORE INDEX IN ADDRESS		
SKD	-0634	STORE INDEX IN DECREMENT		
TIX	2000	TRANSFER ON INDEX		
TMT	-1704	TRANSFER ON NO INDEX		
TNK	-2000	TRANSFER ON NO INDEX		
TSX	0074	TRANSFER AND SET INDEX		
TXH	3000	TRANSFER ON INDEX HIGH		
TXI	1000	TRANSFER WITH INDEX INCREMENTED		
TXL	-3000	TRANSFER ON INDEX LOW OR EQUAL		

DIRECT DATA CONNECTION INSTRUCTIONS

SYM	NUMERIC	NAME	F	T
PSLB	-0664	PRESENT SENSE LINE, CHANNEL B	X	X
PSLC	0665	PRESENT SENSE LINE, CHANNEL C	X	X
PSLD	-0665	PRESENT SENSE LINE, CHANNEL D	X	X
PSLE	0666	PRESENT SENSE LINE, CHANNEL E	X	X
SSLB	-0660	STORE SENSE LINE, CHANNEL B	X	X
SSLC	0661	STORE SENSE LINE, CHANNEL C	X	X
SSLD	-0661	STORE SENSE LINE, CHANNEL D	X	X
SSLE	0662	STORE SENSE LINE, CHANNEL E	X	X

1401 OPTION INSTRUCTIONS

SYM	NUMERIC	NAME	F	T
SLFA	-1760,01501	STATUS LINE OFF, CHANNEL A	X	
SLNA	-1760,01541	STATUS LINE ON, CHANNEL A	X	