Automated Logic Diagrams (ALD)

Automation of design was initiated because of the large volume of paper work required in the design and manufacturing of new data processing equipment. This program uses an IBM 704 or 705 to provide a fast and accurate method of preparing and up-dating the information necessary for customer engineering, manufacturing, and engineering. Automation of design eliminates the slow and costly manual drafting procedures previously used.

Figure 9 traces the flow of information from the logic designer to the 704 or 705. The logic designer follows definite rules and procedures in laying out the raw logic on special sketch sheets. From these forms, information is coded and punched into IBM cards and then fed into the computer. Design aids, manufacturing data, reference material, and the printed logic pages are the most important outputs of the computer.

ALD Diagram Format

The automated logic diagrams printed out by the 704 or 705 aid in the understanding of the various logic operations, simplify logic tracing and locate the circuit components. Standard blocks and symbols are used to represent specific circuit configurations. Use of the automated logic diagrams allows for standardized logic diagrams between all personnel and all plant locations.

Page Layout

An automated logic diagram consists of page identification, edge information, logic blocks, their connecting lines, and an area for comments at the bottom of the page. Figure 10 shows a typical logic page from the 7070 system.

The original logic page from the computer is 17 inches wide and 22 inches long, having a possible logic block format of five blocks wide and nine blocks long. Logic blocks may occupy any of the 45 possible positions. The actual machine systems diagrams are reduced to a more convenient size, 11 by 17 inches.

Page Identification

As shown in Figure 10, the following information is found at the top of the systems page:

1. *Page Part Number.* Used for ordering a specific page.
2. *Title.* A description of the logic contained on the systems page.
3. *Machine Number.* The number assigned a given frame or machine (e.g., 7601).
4. *Logic Page Number.* A seven-digit number (xx. xx. xx. x) assigned the logic page. For explanation purposes, letters are used to designate each position in the number: AB. CD. EF. G.

Position A: Primary breakdown according to the machine number (e.g., input-output 7603).

Position B: Secondary breakdown according to a feature group such as the arithmetic circuits.

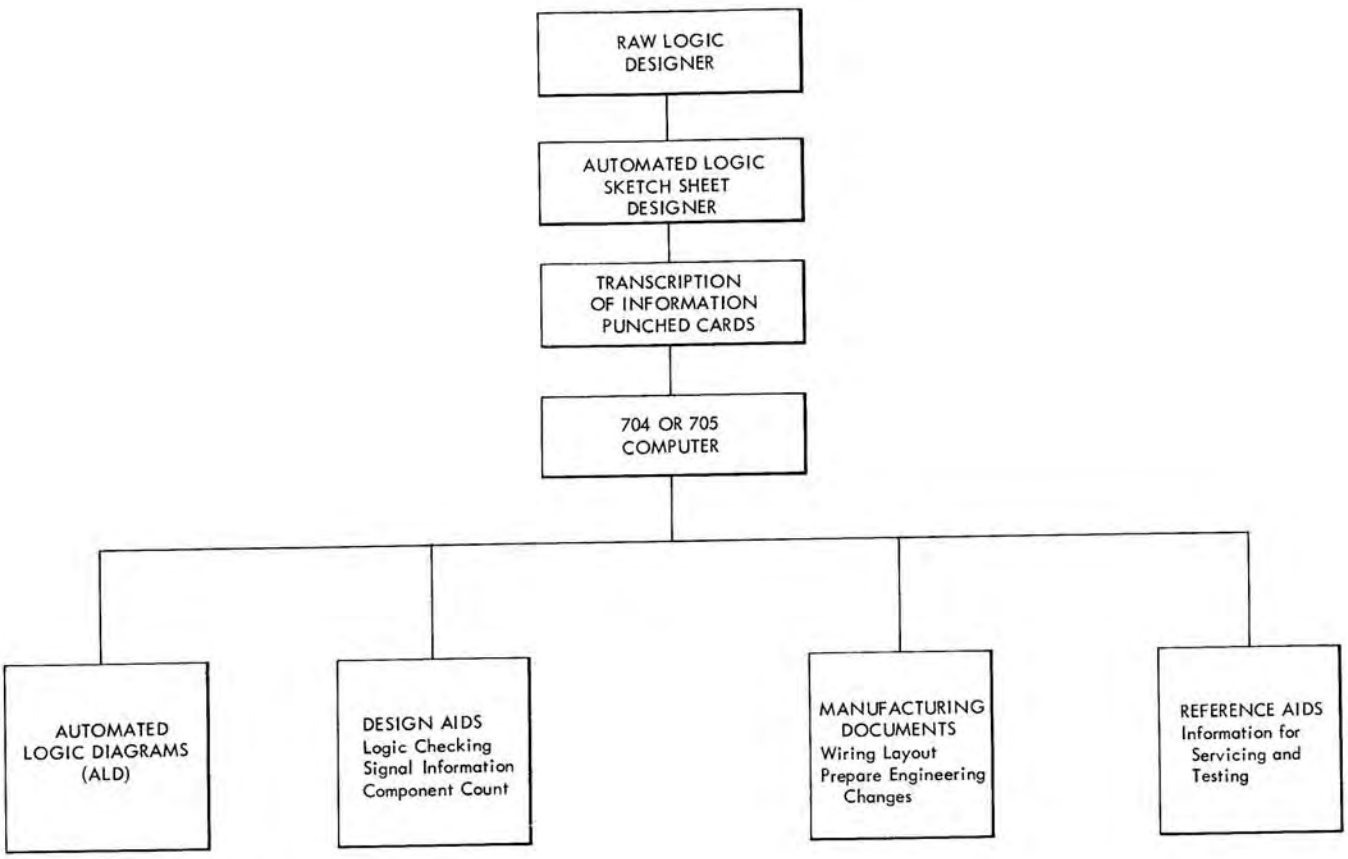

Figure 9. Automation of Design

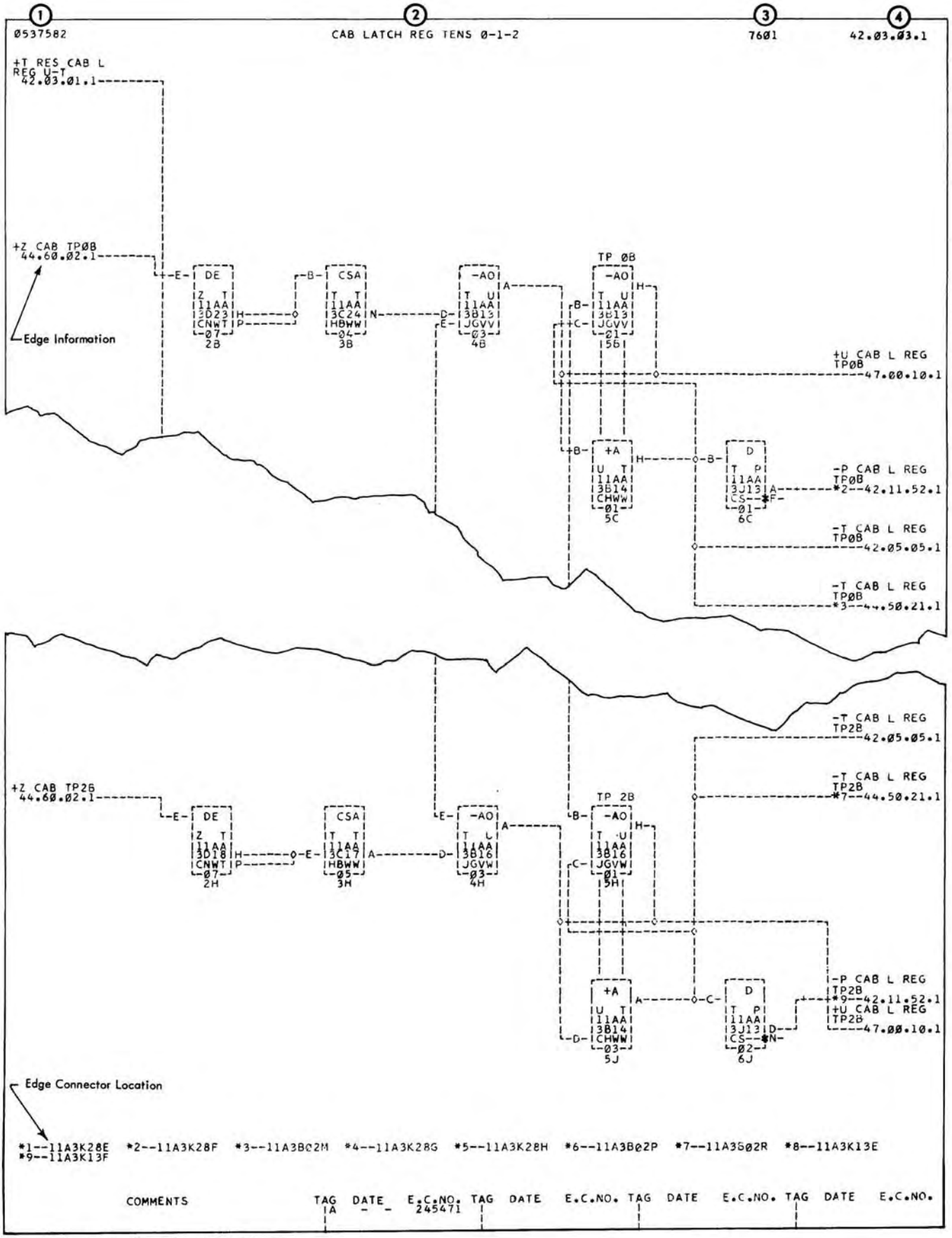

Figure 10. Logic Page for 7070 System

Positions C and D: Major logical group within the feature group, such as the adder drivers or the drum read circuits.

Positions E and F: Page number within the major logical group.

Position G: An insert page number, or reference page notation.

5. *Comments.* At the bottom of the page are listed the edge-connector locations used for the entry and exit lines on the logic page, and an area reserved for comments. Any pertinent information concerning the logic on the systems page is noted here, along with additional data about the various engineering changes affecting the logic page.

Signal Lines, General

1. All lines entering or leaving a systems page are labeled and correspond to the symbol and sign of the logic block they connect.
2. Lines enter on the left side of the systems page and leave on the right side of the page.
3. If a line leaves a systems page and goes to several locations on another page, the line is usually distributed on the TO page and not the FROM page.
4. If a line leaves a page and goes to several pages, but carries the same line name, it can be shown as in Figure 11.
5. When a line performs a function with the UP status as well as the DOWN status the two functions are described in the line name on the FROM page.

Edge Information (Figure 10)

Data shown in the vertical page coordinates 1 and 7 are called edge information. Edge information can consist of three lines of information, each line 15 characters in length. Edge information names input and output lines, and names the logic page the line appears on again.

The first line contains the coding and sign of the line type, followed by the signal name. (On some earlier ALD's the coaxial shield or twisted-pair reference wire of the signal line was also shown entering or leaving a page. Then the letters "cs" for coaxial shield and "tw" for a twisted-pair reference were used to indicate the coaxial shield or twisted-pair line.) The second line is reserved for continuation of the signal name, if required, and the third line lists the logic page number on which the signal appears again. The logic page number is directly opposite the signal line.

Edge Connectors

When a signal or service wire enters or leaves a panel, it may be routed through an edge connector. Signal lines connected to edge connectors are indicated by a symbol and a number or letter located on an entry line or exit line (Figure 10). These notations refer the reader to the bottom of the ALD page for the actual edge-connector location and pin number.

Reference Drawing

All locations that identify core arrays, resistors, and other components mounted on a gate, are given on a reference drawing. Signal lines on the systems pages refer to these drawings for locations. Reference drawings are easily identified by noting the logic page number. The seven-digit number always ends in zero for these drawings (xx. xx. xx. 0).

The Logic Block

To simplify the systems pages, logic blocks are used to represent the basic electronic circuits of the machine. A basic electronic function is usually represented by a single block but some functions (e.g., triggers) may require more than one block. In the case of multiple circuits on one SMS card, each circuit is represented by a separate logic block. The size of the block allows for the printing of four characters across the box and for six vertical lines of printing. The standard format of the logic block is shown in Figure 12, and is explained below.

Title

Over each logical block a ten-character name can be printed. However, only special circuits such as triggers, latches, single shots, and their associated timings, are named. The units of time used in the title are abbreviated as follows:

S Seconds
M Milliseconds
U Microseconds
° Milli-microseconds

Functional Symbol

The symbol that appears on line 1 of the block consists of a sign (where used) and the standard letter(s) that represent the circuit. The Appendix contains a listing of the symbols used.

Machine Feature Index

The machine feature index (MFI) code is shown on line 2 and indicates a circuit not normally used in the standard equipment (e.g., TD=tape drive). Two dots indicate a block used in the basic circuit.

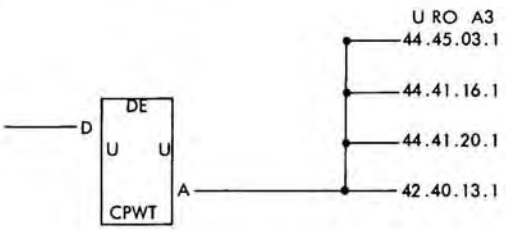

Figure 11. Multiple Outputs—Same Line Name

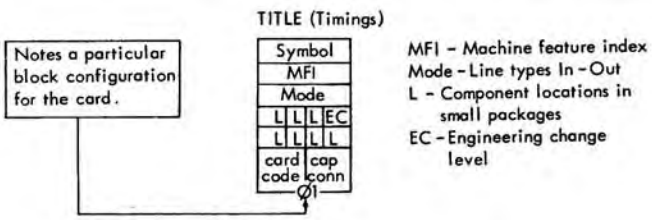

Figure 12. Logic Block Format

Circuit Type	Line Symbol	Voltage Ref.	Voltage Levels (Nom) Positive	Negative
Current Switching (N)	± N	0	+ 0.8	- 0.8
Current Switching (P)	± P	-6	- 5.2	- 6.8
CTRL (N)	± R	+6	12.0	0.0
CTRL (P)	± S	-6	0.0	-12.0
CTDL (N)	± T	0	+ 6.0	- 6.0
CTDL (P)	± U	-6	0.0	-12.0
Indicators	M	-	0.0	-36.0
Relay	± W	-	0.0	±48.0
Tube	± X	-	+10.0	-40.0
Voltage Mode	± Y	-	0.0	- 6.0
Core	± Z	-6	+ 6.0	- 6.0
Special	± V	-		

Figure 13. ALD Line Type Symbols

Mode

The third line contains symbols indicating the mode or type of input and output lines that connect the logic block. Figure 13 is a table listing the alphabetic letters used for the various line types. Each symbol represents a reference voltage with approximate swings for plus and minus line types. In most logic block configurations, the circuit type, voltage reference and swings, and translations are noted in the third printing line.

Input lines (Figure 14). A maximum of eight input lines can be shown entering the left side of the logic block. If the inputs are of the same line type, the appropriate symbol for the line type is indicated in the first printing position of line 3. To indicate multiple inputs of different line types, the input lines are grouped such that the first symbol on line 3 indicates the line type of the upper input(s) and the second symbol on line 3 indicates the lower input(s).

Output lines (Figure 14). A maximum of eight output lines can be shown leaving the right side of the logic block. Outputs from the upper half of the block indicate an out-of-phase signal, while outputs from the lower half of the block indicate an in-phase signal. In many blocks the in-phase and out-of-phase outputs are of the same line type and are indicated by the appropriate symbol in printing position 4. In blocks having multiple outputs of different line types, the symbol in printing position 3 indicates the line type of the upper output and the symbol in printing position 4 indicates the line type of the lower output.

The number, phase, and line types of the outputs are dependent upon the block representation.

Card Location and Engineering Change Level

Positions 1, 2, and 3 on line 4 and positions 1, 2, 3 and 4 on line 5 note the location of the component card in the system (Figure 12). Figure 15 relates the location information found in the logic blocks to the two types of SMS packaging used in a system. To locate the various components in the SMS packages, the numbering system follows two rules: (1) All the numbering starts at the hinge and progresses out. (2) The numbering is from the top to the bottom of the machine. Therefore, a given location can be identified by the same method from either side of a gate.

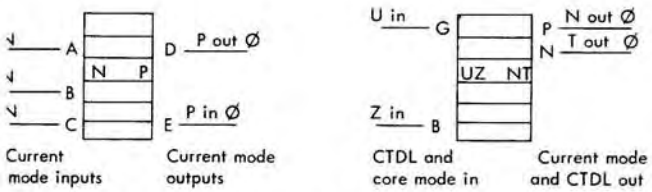

Figure 14. Examples of Line Coding

ALD Block	Line Position	4 1-2	4 3	5 1	5 2	5 3-4
Modular I		Frame	Module	Gate	Column	Row
		01-99	A, B	1-8	A-F	01-26
Modular II		Frame	Gate	Chassis	Row	Column
		01-99	A, B, C, D	1-4	A-K	01-28

Figure 15

The fourth printing position of line four indicates the engineering change level (EC) of the logic block. A "tag" letter (A, B, C) is assigned to indicate the changes in EC level. This 'tag' letter indicates that the block was affected by an engineering change made to that logic page.

Card Code and Cap Connection

The first two letters of line 6 indicate a card code that is assigned to a particular SMS card. The card codes are assigned from AA to ZZ, in that order (omitting the I and O groups). Positions 3 and 4 of line 6 indicate the cap connections used and are assigned from ZZ to AA in that order (again omitting the I and O groups). If cap connections are not used, dashes (- -) are shown in positions 3 and 4. A card code and cap connection designation is required to identify each circuit configuration on that particular card.

Logic Block Terminal Pins

Input, output, and tie-down terminal pins are indicated alphabetically, in the two character spaces between the logic block and the input or output line, as shown in Figure 16. The input and output pins are the terminals that are wired to the signal lines. Tie-down pins are terminals that are jumpered by back panel wiring to the input or the output pins. Coaxial shields or twisted-pair reference wires tied to a terminal pin are also indicated in Figure 16.

Examples of ALD Block Configurations

Basic Blocks

A large variety of logic blocks are used to perform the functions in the systems pages. Some of the most common block configurations used are illustrated in Figure 17.

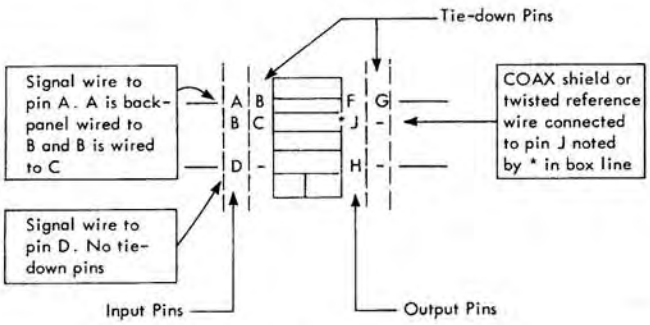

Figure 16. Logic Block Pin Connections

Two-Card Triggers

Trigger circuits are represented by a variety of block configurations and usually consist of two or more cards. The configuration used is dependent on the line type and the number of set and reset lines required. Logic blocks used in a trigger circuit are stacked vertically and are connected by dashed lines. A few typical trigger configurations are illustrated in Figure 18.

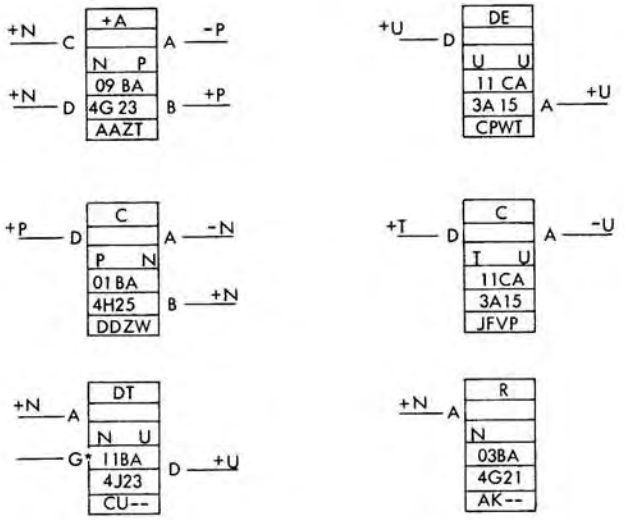

Figure 17. Basic Logic Blocks

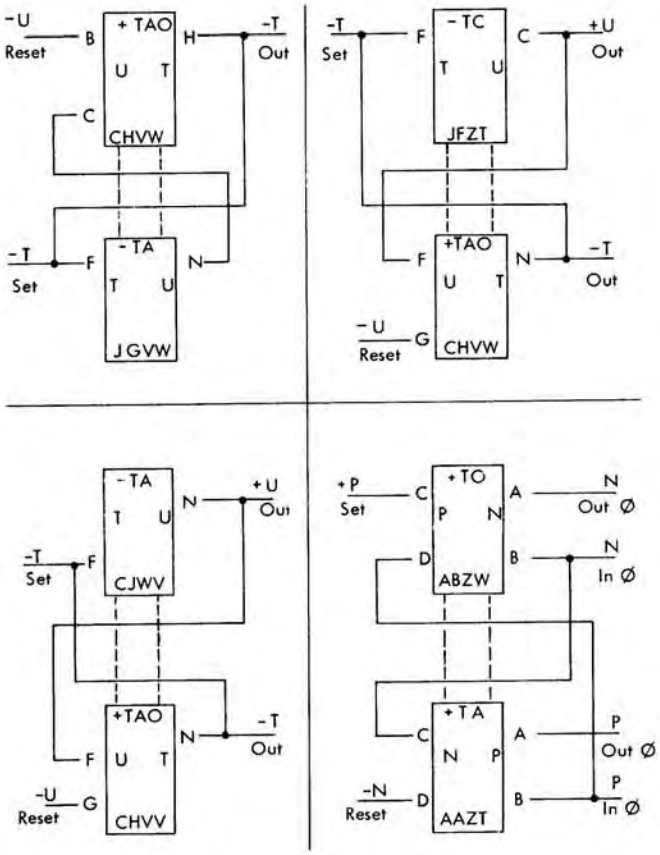

Figure 18. Two-Card Trigger Configurations

Extenders

To provide additional inputs to a logic block, extender cards are used (Figure 19). The symbol "E" is used in the extender block and dashed lines are used to show the connection to the extending block. The extender block is always placed below the extended card.

Limiters and Coupling Networks

The blocks representing coupling networks or clamp diodes that limit or terminate the outputs of a circuit are connected to the driver output as shown in Figure 20. These blocks do *not* have output lines.

DOT Functions

Under certain conditions, outputs of similar levels can be tied together, to share a common load. This connection provides a second level of logic in the output circuits, and is referred to as a DOT function. When the DOT function is performed, an additional letter is shown with the standard functional symbol (line 1) to indicate the logic performed by the output circuit (e.g., +AO, −DEA, −OA). Figure 21 illustrates the block representation of the +AO DOT function.

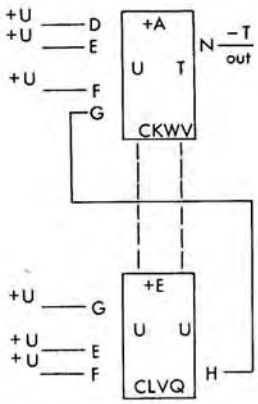

Figure 19. Extender Application

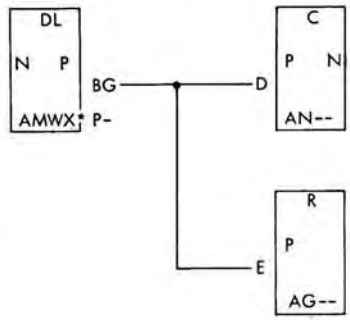

Figure 20. Coupling Network

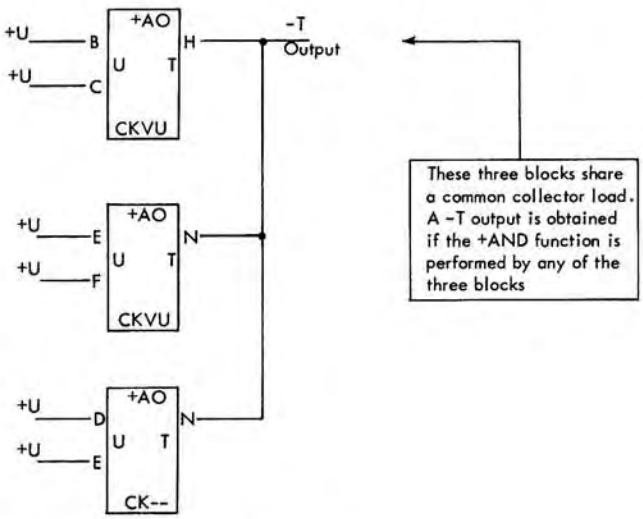

Figure 21. Example of DOT Function

Appendix B. Alphabetical Index of Card Codes

Card Code	Description	Part No.	Symbol
	CURRENT MODE		
AA--	Two-Way AND (no loads)	371207	+A
AAZU	Two-Way AND (out-of-phase load)	371206	+A
AAZV	Two-Way AND (in-phase load)	371205	+A
AAZW	Two-Way AND (both loads)	371204	+A
AB--	Two-Way OR (no loads)	371216	+O
ABZU	Two-Way OR (out-of-phase load)	371215	+O
ABZV	Two-Way OR (in-phase load)	371214	+O
ABZW	Two-Way OR (both loads)	371213	+O
ACYV	Four-Way AND-Block Extender	371227	E
ACYW	Two-Way AND-Block Extender	371226	E
ACYX	Three-Way AND (no loads)	371221	+A
ACYY	Three-Way AND (out-of-phase load)	371220	+A
ACYZ	Three-Way AND (in-phase load)	371219	+A
ACZA	Three-Way AND (both loads)	371218	+A
ACZF	Four-Way AND (no loads)	371225	+A
ACZG	Four-Way AND (out-of-phase load)	371224	+A
ACZH	Four-Way AND (in-phase load)	371223	+A
ACZJ	Four-Way AND (both loads)	371222	+A
ADYV	Four-Way OR-Block Extender	371237	E
ADYW	Two-Way AND-Block Extender	371236	E
ADYX	Three-Way OR (no loads)	371231	+O
ADYY	Three-Way OR (out-of-phase load)	371230	+O
ADYZ	Three-Way OR (in-phase load)	371229	+O
ADZA	Three-Way OR (both loads)	371228	+O
ADZF	Four-Way OR (no loads)	371235	+O
ADZG	Four-Way OR (out-of-ohase load)	371234	+O
ADZH	Four-Way OR (in-phase load)	371233	+O
ADZJ	Four-Way OR (both loads)	371232	+O
AEWY	N Line Complemented Emitter Follower	371238	DE
AEWZ	P Line Complemented Emitter Follower	371239	DE
AF--	N Line Terminator	371242	DT
AG--	Line Driver Coupling Network	371240	R
AK--	N and P Block Coupling Networks	371241	R
AL--	P Line Line Terminator	371243	DT
AM--	N to P Converter (no loads)	371203	C
AMWX	N Line Driver	371208	DL
AMZX	N to P Converter (out-of-phase load)	371202	C
AMZY	N toP Converter (in-phase load)	371201	C
AMZZ	N to P Converter (both loads)	371200	C
AN--	P to N Converter (no loads)	371212	C
ANWX	P Line Driver	371217	DL
ANZX	P to N Converter (out-of-phase load)	371211	C
ANZY	P to N Converter (in-phase load)	371210	C
ANZZ	P to N Converter (both loads)	371209	C
AQ--	P to S Current Mode to Voltage Mode Converter	371031	C
	CURRENT MODE		
AW--	3.2-215 Microsecond Universal Single Shot	371039	SS
BGWA	W to N and W to P Integrators	371430	C
BGWB	W to N and W to P Integrators	371429	C
BGWC	W to N Integrators	371428	C
BGWD	W to P Integrators	371427	C
	CTDL		
CG--	Two-Way-AND (no loads)	371263	-A
CGVV	Two-Way-AND (1 load)	371262	-A
CGVW	Two-Way-AND (2 loads)	371261	-A
CGWW	Two-Way-AND (all loads)	371251	-A
CH--	Two-Way+AND (no loads)	371266	+A
CHVV	Two-Way+AND (1 load)	371265	+A
CHVW	Two-Way+AND (2 loads)	371264	+A
CHWW	Two-Way+AND (all loads)	371252	+A
CJ--	Three-Way-AND (no loads)	371268	-A
CJVU	Three-Way-AND (1 load)	371267	-A
CJWV	Three-Way-AND (2 loads)	371253	-A
CJYC	Three-Way-AND (2 loads) (Ext. In)	371071	-A
CK--	Three-Way+AND (no loads)	371270	+A
CKVU	Three-Way+AND (1 load)	371269	+A
CKWV	Three-Way+AND (2 loads)	371254	+A
CKYC	Three-Way+AND (2 loads) (Ext. In)	371072	+A
CLVQ	Extender and Limiter Card	371255	E
CLVR	Extender and Limiter Card	371075	E

Card Code	Description	Part No.	Symbol
	CTDL		
CLVS	Extender and Limiter Card	371074	E
CLVT	Extender and Limiter Card	371073	E
CM--	CM to CTDL Coupling Network	371256	R
CNWT	Emitter Follower NPN	371260	DE
CNWU	U to T Converter	371258	C
CPWT	Emitter Follower PNP	371259	DE
CPWU	T to U Converter	371257	C
CQ--	T to U Converter (no loads)	371273	C
CQYG	T to U Converter (1 load)	371278	C
CQZT	T to U Converter (2 loads)	371272	C
CQZV	T to U Converter (4 loads)	371271	C
CR--	U to T Converter (no loads)	371276	C
CRYG	U to T Converter (1 load)	371277	C
CRZT	U to T Converter (2 loads)	371275	C
CRZV	U to T Converter (4 loads)	371274	C
CS--	N Type Line Driver	371520	DL
CT--	P Type Line Driver	371521	DL
CU--	N Type Line Terminator	371518	DT
CV--	P Type Line Terminator	371519	DT
CW--	Trigger	371534	T
CY--	Power Inverter	371542	IP
	DIFFUSED JUNCTION		
DAZU	Two-Way AND, Type A (out-of-phase load)	371281	+A
DAZW	Two-Way AND, Type A (both loads)	371280	+A
DAZX	N to P Converter, Type A (out-of-phase load)	371283	C
DAZZ	N to P Converter, Type A (both loads)	371282	C
DB--	N to P Converter, Type B (no loads)	371295	C
DBYD	Two-Way AND, Type B (Ckt 1, both loads) (Ckt 2, in-phase load)	371359	+A
DBZP	Plus Exclusive OR (no loads)	371291	+OE
DBZQ	Plus Exclusive OR (out-of-phase load)	371290	+OE
DBZR	Plus Exclusive OR (in-phase load)	371289	+OE
DBZS	Plus Exclusive OR (both loads)	371288	+OE
DBZT	Two-Way AND, Type B (no loads)	371287	+A
DBZU	Two-Way AND, Type B (out-of phase load)	371286	+A
DBZV	Two-Way AND, Type B (in-phase load)	371285	+A
DBZW	Two-Way AND, Type B (both loads)	371284	+A
DBZX	N to P Converter, Type B (out-of-phase load)	371294	C
DBZY	N to P Converter, Type B (in-phase load)	371293	C
DBZZ	N to P Converter, Type B (both loads)	371292	C
DCZU	Two-Way OR, Type A (out-of-phase load)	371297	+O
DCZW	Two-Way OR, Type A (both loads)	371296	+O
DCZX	P to N Converter, Type A (out-of-phase load)	371299	C
DCZZ	P to N Converter, Type A (both loads)	371298	C
DD--	P to N Converter, Type B (no loads)	371311	C
DDZP	Minus Exclusive OR (no loads)	371307	-OE
DDZQ	Minus Exclusive OR (out-of-phase load)	371306	-OE
DDZR	Minus Exclusive OR (in-phase load)	371305	-OE
DDZS	Minus Exclusive OR (both loads)	371304	-OE
DDZT	Two-Way OR, Type B (no loads)	371303	+O
DDZU	Two-Way OR, Type B (out-of-phase load)	371302	+O
DDZV	Two-Way OR, Type B (in-phase load)	371301	+O
DDZW	Two-Way OR, Type B (both loads)	371300	+O
DDZX	P to N Converter, Type B (out-of-phase load)	371310	C
DDZY	P to N Converter, Type B (in-phase load)	371309	C
DDZZ	P to N Converter, Type B (both loads)	371308	C
DEYR	N to P Terminator-Buffer-Converter (out-of-phase load)	371329	CBT
DEYS	N to P Terminator-Buffer-Converter (both loads)	371328	CBT
DEYT	N to P Buffer Converter (out-of-phase load)	371327	CB

Card Code	Description	Part No	Symbol
	DIFFUSED JUNCTION		
DEYU	N to P Buffer Converter (both loads)	371326	CB
DEYV	Four-Way AND-Block Extender	371318	E
DEYW	Two-Way AND-Block Extender	371325	E
DEYX	Three-Way AND, Type B (no loads)	371324	+A
DEYY	Three-Way AND, Type B (out-of phase load)	371323	+A
DEYZ	Three-Way AND, Type B (in-phase load	371322	+A
DEZA	Three-Way AND, Type B (both loads)	371321	+A
DEZC	Three-Way AND, Type A (out-of-phase load)	371320	+A
DEZE	Three-Way AND, Type A (both loads)	371319	+A
DEZF	Four-Way AND, Type B (no loads)	371317	+A
DEZG	Four-Way AND, Type B (out-of-phase load)	371316	+A
DEZH	Four-Way AND, Type B (in-phase load)	371315	+A
DEZJ	Four-Way AND, Type B (both loads)	371314	+A
DEZL	Four-Way AND, Type A (out-of-phase load)	371313	+A
DEZN	Four-Way AND, Type A (both loads)	371312	+A
DFYR	P to N Terminator-Buffer-Converter (out-of-phase load)	371348	CBT
DFYS	P to N Terminator-Buffer-Converter (both loads)	371347	CBT
DFYT	P to N Buffer Converter (out-of-phase load)	371346	CB
DFYU	P to N Buffer Converter (both loads)	371345	CB
DFYV	Four-Way OR-Block Extender	371336	E
DFYW	Two-Way OR-Block Extender	371344	E
DFYX	Three-Way OR, Type B (no loads)	371343	+O
DFYY	Three-Way OR, Type B (out-of-phase load)	371342	+O
DFYZ	Three-Way OR, Type B (in-phase load)	371341	+O
DFZA	Three-Way OR, Type B (both loads)	371340	+O
DFZC	Three-Way OR, Type A (out-of-phase load)	371338	+O
DFZE	Three-Way OR, Type A (both loads)	371337	+O
DFZF	Four-Way OR, Type B (no loads)	371335	+O
DFZG	Four-Way OR, Type B (out-of-phase load)	371334	+O
DFZH	Four-Way OR, Type B (in-phase load)	371333	+O
DFZJ	Four-Way OR, Type B (both loads)	371332	+O
DFZL	Four-Way OR, Type A (out-of-phase load)	371331	+O
DFZN	Four-Way OR, Type A (both loads)	371330	+O
DH--	N to P Line Terminator	371138	DT
DJ--	P to N Line Terminator	371139	DT
DK--	P to P Line Terminator	371140	DT
DL--	N to N Line Terminator	371141	DT
DMYP	P to P Power Driver (4-10 Bases)	371350	DP
DMYQ	N to N Power Driver (4-10 Bases)	371349	DP
DNYJ	P to P Power Driver (11-40 Bases)	371354	DP
DNYL	N to N Power Driver (11-40 Bases)	371351	DP
EA--	Minus N Line Indicator	371363	DI
EB--	Plus P Line Indicator	371364	DI
EF--	N to N Line Driver	371171	DL
EG--	P to P Line Driver	371375	DL
EH--	N Line Single Shot (no loads)	371369	SS
EHVK	N Line Single Shot (both loads)	371368	SS
EHVL	N Line Single Shot (in-phase load)	371367	SS
EHVM	N Line Single Shot (out-of-phase load)	371366	SS
EJ--	P Line Single Shot (no loads)	371374	SS
EJVK	P Line Single Shot (both loads)	371373	SS
EJVL	P Line Single Shot (in-phase load)	371372	SS
EJVM	P Line Single Shot (out-of-phase load)	371371	SS
	CURRENT MODE		
FF--	Negative Binary Trigger Card 1	371411	-TB
FG--	Positive Binary Trigger Card 2	371414	+TB
FH--	Positive Binary Trigger Card 1	371413	+TB

Card Code	Description	Part No.	Symbol
	CURRENT MODE		
FJ--	Negative Binary Trigger Card 2	371412	-TB
FU--	Coil Driver Gate and Reset Driver	371616	D
FX--	Magnetic Core Shift Register	371506	SR 1
FY--	Magnetic Core Shift Register Extender	371507	SR 2
FZ--	Magnetic Core Shift Register	371508	SR 3
GA--	Magnetic Core Shift Register Extender	371509	SR 4
GB--	Capacitor Storage	371505	CS
GF--	Bias Load and Coupling Networks	371538	R
GG--	Capacitor Sense Amplifier and Driver	371503	CSAD
GH--	Two of Five Validity Check Circuit	371504	VCK
GJ--	General Purpose Filter Card	371501	FILT
GK--	Cable Decouple Card	371533	CAP
GLVG	Inverter Core Driver	371536	DC
GLVH	Emitter Follower Core Driver	371537	DC
GLVJ	Relay Driver	371535	DR
GM--	Input Output Core Card No. 1	371532	RDB
GN--	Word Size Buffer Core	371523	WSB
GP--	W to U Line Converter	371502	C
GQ--	Core Buffer Integrator	371515	C
GR--	CTDL Low Current Indicator Driver	371528	DI
GS--	Drum Write Driver	371524	D
GT--	Drum Sense Shaper	371525	DS
GU--	Drum Sense Amplifier	371526	AM
GV--	Variable Gated Oscillator	371531	OSC
GW--	Converter (1) U to X Level (2) X to U Level	371522	C
GX--	Magnetic Core Bit Insert Driver	371514	DC
GY--	Magnetic Core Read-Out Driver	371511	D
GZ--	Magnetic Core Read-In Driver	371510	D
HAVE	Core Mode Z to N Converter	371516	C
HAVF	Core Mode to CTDL Converter	371513	C
HB--	Capacitor Sense Amplifier (no loads)	371561	AM
HBVV	Capacitor Sense Amplifier (1 load)	371560	AM
HBVW	Capacitor Sense Amplifier (2 loads)	371559	AM
HBWW	Capacitor Sense Amplifier (3 loads)	371500	AM
HC--	Sync Line Driver	371527	DL
HD--	Sync Line Terminator	371540	DT
HE--	Current Mode to CTDL Power Inverter	371541	IP
HF--	Magnetic Core Read-Out Control Driver	371512	D
HG--	Digit Read-In Driver	371517	D
HH--	Tape Core Sense Amplifier	371529	AM
HJ--	Core Adder Driver	371530	D
HK--	Integrator Load Card	371543	R
HQ--	Ring Delay Network	371544	DLY
HR--	Current Mode, Coil Driver Latch	371620	D
HS--	Current Mode, Coil Driver Power Inverter	371498	IP
HX--	Current Mode, Minus N Line Indicator	371049	DI
HY--	Capacitor Storage	371548	CS
HZ--	Capacitor Storage	371549	CS
	CTDL HIGH SPEED		
JF--	T to U Converter (no loads)	371579	C
JFVA	T to U Converter (1 load)	371578	C
JFVV	T to U Converter (2 loads)	371577	C
JFVP	T to U Converter (4 loads)	371576	C
JG--	Two-Way -AND (no loads)	371583	-A
JGVV	Two-Way -AND (1 load)	371582	-A
JGVW	Two-Way -AND (2 loads)	371581	-A
JGWW	Two-Way -AND (3 loads)	371580	-A
JH--	Three-Way -AND (no loads)	371586	-A
JHVU	Three-Way -AND (1 load)	371585	-A
JHWV	Three-Way -AND (2 loads)	371584	-A
JJ--	U to T Converter (no loads)	371590	C
JJVA	U to T Converter (1 load)	371589	C
JJVN	U to T Converter (2 loads)	371588	C
JJVP	U to T Converter (4 loads)	371587	C
JLVB	CTDL Logic Inverter (PNP)	371077	I
JMVB	CTDL Logic Inverter (NPN)	371079	I
JN--	CTDL Trigger Extender Card	371081	E
JZ--	CTDL Trigger 2	371082	T
KA--	High Current Indicator Driver	371546	DI
KB--	Current Mode to CTDL Power Inverter	371558	IP
KD--	Core Shift Register (Significant Digit Detection	371563	SR5

APPENDIX B (cont'd)

Card Code	Description	Part No.	Symbol
KE--	Current Mode P and N Driver	371547	D
KH--	CTDL Delay Circuit	371564	DLY
KJ--	CTDL Delay Circuit	371565	DLY
KK--	CTDL Delay Circuit	371566	DLY
KL--	CTDL Delay Circuit	371567	DLY
KM--	CTDL Delay Circuit	371568	DLY
KN--	CTDL Delay Circuit	371569	DLY
KP--	CTDL Delay Circuit	371570	DLY

Card Code	Description	Part No.	Symbol
KQ--	Converter W to T Line	371545	C
KS--	Current Mode, P to P Line Driver	371476	DL
KT--	Current Mode, N to N Line Driver	371480	DL
LE--	Sync Power Driver	371572	DP
LU--	Bus Discharge Card	371575	BD
NB--	CTDL Single Shot Trigger (T Input)	371591	SS
NC--	CTDL Single Shot Trigger (U Input)	371592	SS
QS--	Drum Load Card	371574	R